RESPONSE TO TRAI'S CONSULTATION PAPER NO. 16/2004 ON GROWTH OF TELECOM SERVICES IN RURAL INDIA

Issues for Consultation

1. **This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.**

   The definition of Niche operator should be enlarged to include all districts where the rural tele-density is less than 3%. The Niche operator should be allowed to provide communications only in the villages.

2. **Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?**

   Yes. Niche operator should be able to bid for Universal Service Fund.

3. **Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?**

   Yes. Subsidy of bandwidth, spectrum charges and tower is more desirable.

4. **In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments**.

   Yes. The services to the villages are almost sustainable. Some help from USO would make it fully sustainable.

5. **For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc, be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?**

   Yes. This is a good suggestion. However, the regulation needs to be done only for districts where rural tele-density is less than 3%.

6. **Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?**

   TRAI need to ensure that 2 Mbps leased lines from the district Head Quarters to the state capital be made available to ISPs and to Niche operators at a low-cost. I would suggest a charge of Rs.2.0 lakhs for a 2 Mbps link.

7. **Do you think that we can sustain USO subsidy model in the long run?**

   USO subsidy needs to be phased out gradually.

8. **Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?**

   Government must make available all its services on Internet to whoever can deliver. Once the number of village kiosks pick up, the software will be developed.

9. **Share your experiences within and outside the country which established the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.**

   The key problem in our experience has been getting the leased lines, even when fibre is available. Much tighter regulation is required.

   The key bottleneck is no longer electronics/wireless to provide connectivity. However, a 64 Kbps Internet leased line in a district still costs Rs.2.0 lakhs per year. Spectrum charges are high (for example Rs.2.0 lakhs per year for two corDECT frequencies). The third biggest bottleneck is tower cost — about 10.0 lakhs in a district.

   Further, 64 Kbps Internet at a district Head Quarter is totally inadequate. We need 512 Kbps today, growing to 2 Mbps.

VSAT Services Association of India

103, Ashoka Estate,
24 Barakhamba Road,
New Delhi - 110001
Tel. : 91 11 2335 0633
Fax : 91 11 2372 3909
e-mail: vsai@vsatindia.org
website : www.vsatindia.org

Comments on TRAI Consultation Paper
on Growth of Telecom Services In Rural India.

Our response to "Issues for consideration" (Chapter-7 on Page 32)

Issue No.1: Our comments on the captioned consultation paper may please be read in conjunction with the comments on Niche Operators submitted to TRAI on 01 September 2004. Copy attached for ready reference.

Issue No. 2: Niche Operators must get support from USO Fund.

Issue No.3: Subsidy should be given on inputs like bandwidth and spectrum charges. As far as VSAT services are concerned bandwidth should be read as transponder space on satellites. In fact bandwidth should be provided free of cost for first 3 years or till the time tele-density (including Broadband/Internet connections) in the area of operation reaches 5%, whichever is earlier.

Issue No.4: Start-up input costs should be subsidized from USO Fund.

Issue No.5: Sharing of infrastructure, wherever required by the niche operator, should be mandated thru regulation with appropriate commercial compensation provided to the owners thru regulatory intervention.

Issue No.6: Wherever the operator chooses to deploy VSAT technology, the interconnection to the nearest SDCA may necessitate deployment of one extra VSAT at the SDCA end. This input cost can be avoided if the inter-connection is allowed to the TAX nearest to the Hub Station.

Issue No.7: The task of developing local relevant software should be entrusted to the State and/or the Central Government and supplied to the operator free of cost.

Issue No.9: The e-Choupal experience of ITC has proved that erection & maintenance of towers for wireless services is more expensive and requires much more time & effort (on account of cost of land, ownership issues, local clearances etc) as compared to servicing the intended area with VSATs. *Yet, looking at it from another angle ITC e-Choupal initiative has proven that VSAT connections, despite the higher set-up costs, help recover investment faster than non-VSAT -Choupals.* **(As quoted by Mr. V V Rajasekhar, Chief Information Officer ITC)**

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103, Ashoka Estate,
24 Barakhamba Road,
New Delhi - 110001
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Fax : 91 11 2372 3909
e-mail: vsai@vsatindia.org
website : www.vsatindia.org

Bridging the digital-divide : On ground!
Need to walk the first step!

1. **PREAMBLE**: It is obvious that a serious ***"Think Tank"*** process is underway within the Govt. circles to bridge the urban-rural digital divide ***"on-ground"*** compared to the historical efforts made ***"on-paper"*.** There is very little to show on this account for two basic reasons:-

   - ***Lack of accountability by the incumbent telco.*** Thousands of crores of tax payer money has been spent in the first 50 years after independence to create telecom-infrastructure in rural areas. The laid down criteria to declare a village connected has been to place one telephone in the Panchayat office (exactly in the manner a village is declared electrified with just one light connection given to the Panchayat). Thereafter, it is nobody's concern whether or not the reliability/availability of this service is 10% or 70%. **Reason**: No accountability and extremely poor maintenance culture.

   - ***Lack of financial viability for private telcos:*** Private telcos, otherwise capable of providing more reliable service than the incumbent (something which is proven without any iota of doubt in the urban areas.), have found it financially unviable to meet the *rural-area roll out-obligation* incorporated as a license condition. This is in spite of all efforts by the Govt., even to the extent of threatening to cancel their licenses.

2. TRAI, mandated with a clear objective to bridge the digital-divide and a task to perform, is fully seized of this ground reality. The ingenuity of TRAI in introducing an entirely new category of telecom service provider, ***a Niche Operator***, is an honest admission of the above stated facts on part of the Govt. This type of service provider has been included in TRAI draft recommendations on Unified License Regime.

3. ***This may as well prove to be the first step in fulfilling this "so-far-elusive" objective, truly & effectively on-the-ground. But then, a toddler - the Niche operator - must be encouraged to walk a few steps, before running on its own!*** More on this in the succeeding paragraphs.

4. **FOCUSED APPROACH:** Public sector telco failed us because of lack of accountability. Private operators failed us because their business focus remained in revenue earning areas.

5. *In comparison, the Niche operator will have no option but to focus in the designated SDCA.* Once an entrepreneur decides to become a Niche operator, it will have no choice but to focus on its area and will, therefore, concentrate on making the business viable and breaking-even at the earliest. This may well prove to be the trigger to bridge the digital-divide.

6. **CHOICE OF TECHNOLOGY:** In the initial stages, the traffic in the area of operation of the Niche operator will be very thin. Therefore, the initial cost of infrastructure must be minimal. Laying terrestrial infrastructure to inter-connect with the nearest existing infrastructure is, therefore, ruled out. To see what other technologies this operate may choose from, it may be necessary to refer to TRAI recommendations on Broadband wherein a reference has been made to the VSAT technology and we quote:-

   "While satellite connections are typically more expensive than other methods of delivery, they provide a viable option to rural and remote areas that have no other real broadband options. Additionally, simplicity in network design, reliability, and ***rapid deployment*** *are other examples. However, for point-to-multipoint occasional use applications where bandwidth is required on a*

part-time basis, satellite consistently proves most cost effective. It is also the only technology that boasts of 99% coverage of world landmass." Unquote

7. Rightly so, TRAI has permitted use of fixed wireless networks only. However, for the sake of clarity, we have already suggested that the following be included in the final recommendations on Unified License Regime:-

> ***"Niche Operators:*** *These operators shall however, be permitted to use fixed wireless and / or VSAT networks in combination with the cable or fixed wireline networks. In the case of VSAT networks, interconnection will be permitted through lease line or SCPC link from the Central Hub of the VSAT service provider servicing the said niche operator to any other SDCA whether operated by the Niche operator or by a Unified license operator."*

6. In essence, VSAT technology will prove to be most cost effective option from the point of view of interconnectivity with PSTN. Once connected, the Niche operator may use other viable technology/ies to service its area of operation.

7. **WHY A NICHE OPERATOR?** One may argue, why a niche operator may succeed where others have not? It is not that the existing telcos do not have the means to invest in the targeted SDCA areas. Of course, they do!

   - Incumbent has tried but failed due to lack of motivation & accountability at all levels, especially in the field.

   - Many private operators too can afford to create an infrastructure in these areas (e.g. TATA Teleservices having their own VSAT hub & network), but did not, purely on business reasons.

8. On the other hand a niche operator, having taken a business decision, will be more focused and motivated to perform.

9. **BUSINESS MODEL:** As referred above, TRAI has observed that VSATs have a prominent role to play in bridging the digital divide, provided Govt. carries out further reforms in order to reduce some of the artificial costs attached to the VSAT services at present. We have provided exhaustive inputs to TRAI on a variety of business models suggesting that such reforms can make VSAT services more affordable than at present and therefore contribute in meeting Govt.'s objectives on Broadband penetration.

10. The existing VSAT licenses are permitted to provide only data services. However, a niche operator will be allowed to carry voice traffic. The present day digital technology does not distinguish between data-only or voice traffic. Therefore, the basis of calculations and financial viability submitted to TRAI for Broadband data traffic, will essentially not vary much if a Niche operator was to deploy VSATs for voice/internet/broadband services.

11. If one was to use VSAT technology along with other technology options to provide services under a Niche Operator's Class license, then an existing VSAT operator may find it *more practical* to take such a license because initial capital investment to install a VSAT hub runs into 15 crore or more. This is a real possibility because 75% of the existing VSAT-Hub infrastructure is lying unutilized.

12. **TIME TO TAKE BOLD INITIATIVES:** Having realised that various models put to work in the last 57 years, have failed to bridge the digital divide, it is time for the Government to take some bold initiatives, lest 70% of our population is deprived of the ICT environment.

13. Towards this end, VSATs should be allowed to play their complementary role alongside other technologies in a far more liberal environment to the benefit of the end-users; more so the connectivity hungry rural folks.

14. We submit that:-

- *TRAI recommendations on Broadband, as far as they concern the VSAT industry, should be accepted by the Government.*
- *USO support be given to the Niche operators.*
- *The Niche operators be given free transponder space for the first 3 years operations.*
- *Niche operators be given tax-holiday for 3 years.*
- *Niche operators be permitted tariff forbearance for first 3 years.*

15. Needless to add that, by suggesting a Niche Service provider, TRAI is experimenting upon a novel idea of taking the connectivity from rural to urban areas rather than the other way around something which has failed to work all these years. For this to succeed and become a workable model for emulation, ***Niche Operator must be given every encouragement and incentives to walk the first step!***

COMMENTS ON THE CONSULTATION PAPER ON GROWTH OF TELECOM SERVICES IN RURAL INDIA.

Sl.No.	Issues	Comments
1.	This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.	In the consultation paper it has been indicated that there is a need to spread the coverage of wireless networks in order to have a quicker roll out in rural areas. However, from the experience of BSNL it is seen that there is huge reluctance on the part of rural customers to go in for wireless telephone connections mainly due to poor/non-availability of electricity in rural areas and this results into very poor capacity utilization. In the prevailing circumstances unless the electricity supply position is drastically improved, there is a need to re-examine the issue for utilizing the fixed wire-line network also. Our comments on the suggested possible approach to rural telecommunications in ensuring increased GDP as indicated in para 6.9 of the Consultation Paper are as below: - (i) Before revising the objective for rural connectivity, the other factors for example literacy, penetration of computers, electricity, etc. need to be analysed so that the investment by the operators is commercially viable. At this stage, it is not at all advisable to revise the objectives of rural connectivity from the existing voice and low speed data to broadband connectivity. (ii) An adoption of the approach of broadband kiosk has been suggested on the lines similar to STD/ISD kiosk for voice telephony. It may be worthwhile to note that the utility of both the services is totally different as they operate at different levels of need hierarchy. Hence the target segment population may not be the same for both the ventures. Therefore, the suggested approach has to be implemented in a reserved/limited basis after proper analysis of the available market segment. The support from USO fund may be extended to the service providers for setting up such kiosks (iii) The support from USO fund for providing connectivity from district headquarters down to multiple location in each block as suggested in the Consultation Paper will not help in proliferation of services in rural areas and USO fund will be misused by some service providers for their commercial benefit. The Authority may kindly be aware that almost all the networks

		have already reached sub-divisional headquarters. The operators may be given support from USO fund for creating telecom infrastructure below the sub-divisional headquarters which will help in proliferation of telecom services in the rural areas. The support should also be given for the works undertaken in the last few years so as to encourage the operators to continue with the work of expansion of telecom network / services in the rural areas. (iv) The approach suggested for maximizing the use of broadband kiosks facilities through locally relevant content provisioning is fine as far as the need of entertainment is concerned as it has practically no literacy requirement. However, success of other suggested applications like e-governance, e-agriculture, e-health has to be viewed in terms of prevailing literacy rate (which varies drastically from one state to another) and implementation of such approach needs to be correlated with the other educational efforts/programmes being organized by the Government. (v) There is no second opinion on this issue. There are many areas where only satellite-based solution is workable which is quite expensive. The operators should be duly compensated for the entire Capex and Opex being incurred by them for providing such solutions. (vi) Sharing of infrastructure has to be through a commercial arrangement between the parties. It may not be feasible for the Central Government to issue any guidelines to State Governments in this regard. Further, it should not mandate sharing of infrastructure already created by service operators. It will be anti-competitive and de-motivate the operators to create infrastructure and will thus choke the growth of the infrastructure in the country. Sharing of the infrastructure among operators will not increase the coverage and expansion of the network in virgin area, which is the objective of the consultation paper. (vii) The future growth in telecom service has been envisaged through wireless technologies and availability of spectrum. TRAI has finished the consultation process w.r.t spectrum charges etc. long back. However, it has not given its recommendation as yet which has delayed the policy. This has created uncertainty in the minds of investors and is delaying the rollout of

		networks. The suggested approach of offering a discount to big operators in spectrum price related to coverage in rural areas is fine. However, it may not serve the purpose. It may be noted that there is a need to address the availability of stable and reliable power supply infrastructure in rural areas, if all the problems of penetration are to be addressed through use of wireless technologies. viii) The idea of support from central/state governments to NGOs, companies, corporate individuals is a good idea but it has been seen that the support from state governments is of prime concern in such endeavours and implementation issues thereto need to be analysed for effective penetration. The state/local governments may help the operators by giving right of way and reduction in road re-instatement charges, etc. They may also support by way of providing suitable accommodation/land at concessional rates.
2.	Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?	BSNL is opposed to the concept of Niche Operators due to the following reasons: - i) The concept of 'Niche Operators' is not only beyond the scope of NTP-99 but is also not a commercially viable proposition in the telecom sector, where the competition is intense, volumes alone drive the cost down to make the services competitive and commercially viable. Without any substantial volumes in the services offered by the service provider, there is no scope for survival of the so-called "Niche Operator". Since the potential in these SDCAs is very low and the demand is scattered, it is not possible for the small Niche Operators at the SDCA level to sustain their operations in this era of open unlimited competition and further taking into account that BSNL is already present in all the SDCAs in the country. ii) There are number of services, inter-alia, fixed phones, mobile phones, broadband, internet etc., which will be of particular interest to the customers in these SDCAs. The Niche Operators will not be in a position to provide all these services on their own. The customer today prefers single window solution, as it is cost effective and convenient. In the absence of availability of required bouquet of services with the Niche Operators, the customers may not like to

			avail only fixed services from these operators thereby jeopardising the competitiveness and sustainability of such Niche Operators. The failure of PMRTS and Radio Paging Service Providers, who were providing only one type of service in a limited area, are some examples to learn our lesson from. Lesson can also be learnt from the failure of ISPs of category 'C" operating at district level. It is submitted that the Niche Operators will meet the similar fate.
		iii)	One of the major aims of NTP-99 was, to develop the telecom infrastructure ubiquitously across the country, which can then lead to the faster growth of teledensity. The introduction of the Niche Operators at SDCA level would not fulfil the said objective for the very simple reason that the cost of such development of infrastructure shall be prohibitive and no "Niche Operator" would make such an investment in low and scattered demand areas.
		iv)	Government has recently approved mergers and acquisitions to enable small stand alone operators to exit so that the merged entity can achieve economies of scale for providing cost effective state of the art services. By introducing the licenses SDCA wise and allowing Niche Operators to roll out their services in these SDCAs as per their choice, the Government will not only be adversely affecting the viability of existing operators but also create liabilities in the form of sick operators, who at a later date, may be required to be bailed out by the Government at a very high cost.
		v)	It is to mention that we have already seen the inability of stand-alone operator to compete and survive in this market of open competition with 4 to 5 big players who are having vertically and horizontally integrated operation across the country. The failure of M/s Data Access, a stand-alone ILD operator, is the latest example in this regard. M/s DATA Access has not only gone bankrupt and stopped its operations but also has a huge liability of more than Rs. 200 crores payable to other operators including BSNL. The Niche Operators will have still smaller area of operation and will not be able to generate adequate revenues to sustain their operations.
		vi)	It may not be feasible for the Government to restrict the number of Niche Operators in a SDCA. As per the earlier draft recommendations of TRAI, it seems that

			there may be more than one Niche Operator in a SDCA. As mentioned above, the resources and revenue potential of these SDCAs are limited and there is hardly any scope for more than one operator. BSNL is already providing services in these SDCAs. In case, numbers of additional small operators (Niche Operators) are permitted to provide service in the same SDCA, they will be only competing with each other for a few selected high revenue-yielding customers and will be unnecessarily wasting their energies and resources to churn them on their network. This will lead to over provisioning of the capacities and dead investments in the few selected pockets and will, therefore, increase the cost of service. ARPUs in these SDCAs are already very low and such localized competition will further decrease the earnings of not only of such Niche Operators but also of other service providers like BSNL and will adversely affect both.
		vii)	Besides, in the proposed SDCAs, BSNL is generally having a small switch which is neither capable nor have the required resources to provide interconnection to such 'Niche Operators'. BSNL's exchanges in these SDCAs are generally in the rented buildings where it will not be possible for BSNL to provide infrastructure support, interconnect links and co-location facility to the Niche Operators. This will lead to numerous disputes and litigations. As such, 'Niche Operator' policy may become a non-starter.
		viii)	**Further, for achieving penetration of services in the rural areas as is being stated and envisaged by TRAI, it will be necessary to prescribe rollout obligation for the Niche Operators in some form of minimum number of DELs, area and population coverage etc. to be provided in the specified time frame. However, going by the past experience of the private operators, the Niche Operators will not comply with any such rollout obligation and will try to concentrate only in the SDCC locations or high revenue yielding urban areas of these SDCAs and may not proliferate services outside the urban centres thereby defeating the very purpose of this concept.**
		ix)	BSNL has already allocated substantial investment to provide connectivity in the rural areas by deploying wire-line, CDMA and

		GSM networks with a view to enable Government achieving its envisaged vision for dispersed development of the telecom network and services in every nook and corner of the country. As explained above, the Niche Operator will concentrate only in high revenue yielding centres of the SDCA and will not penetrate in un-remunerative areas of that SDCA and will, thus, churn away by hook or crook the prime customers of BSNL which are, otherwise also, very few in these areas. This will adversely affect the operation and revenue model of BSNL for providing service in these SDCAs and will, thus, also jeopardise rollout plans of BSNL in these backward and less developed areas. The penetration of services and rural teledensity will, therefore, further suffer. This will increase the 'Digital Divide' instead of 'Bridging' it. Any support to the Niche Operators from the USO fund will be subject to misuse and shall not help in proliferation of the telecom services in the rural areas. In view of our submission above, it is not at all advisable to introduce the concept of Niche Operators.
3.	Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?	The subsidy on the bandwidth and spectrum charges shall not be definable properly and, therefore, it shall be subject to misuse and may not help in actual proliferation of services in rural areas. Proper arrangements will have to be put in place to ensure that the bandwidth and spectrum, on which subsidy is being claimed by the operator, are actually used only for providing services in the rural areas. This will require strict monitoring for which it seems that TRAI does not have adequate infrastructure. Further, the final product will also have to be subsidized. as the operating cost of the services is more than the revenue generated/expected from the services. The support for expansion of the network in rural areas to create telecom network has also to be introduced.
4.	In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self-sustaining model in rural areas, which can be implemented through subsidization of inputs costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.	A near self-sustaining model has to be developed on the basis of various pilot projects and then only the quantum of subsidization can be considered and properly acted upon.

5.	For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?	No, Sir. Sharing of infrastructure for mobile services should not be mandated due to the reasons explained above. Such a step will be anti-competitive, de-motivating and will lead to lot of litigations and disputes and choke the growth of infrastructure in the country. This will also adversely impact the development plan of the operator who has created such infrastructure after lot of investment. This in turn will adversely affect further proliferation of telecom services.
6.	Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?	➢ SDCA wise licensing should not be implemented. ➢ BSNL should be allowed to rollout its network in these areas and pursue other initiatives as already planned. ➢ Whatever support from the USO fund is being envisaged to be provided to the Niche Operators, the same may be given to BSNL to supplement its expansion plan for the rural areas, which will help in faster proliferation of services. ➢ ADC should continue. ➢ The Access Providers should be allowed to retain higher termination charge from long distance National and International calls which will help them in generating additional revenues which can be deployed for proliferation of services in the rural areas. ➢ BSNL is contributing 5% of its revenue amounting to about Rs. 1500 crores per annum towards USO fund. BSNL should be allowed to retain this money. BSNL undertakes the responsibility of utilising this amount for expansion of telecom services and infrastructure in rural areas, backward areas, hilly areas and other less developed areas for providing state of the art technology and services leading to increase in rural teledensity and bridging the 'Digital Divide' in much shorter period. This will in turn boost the overall economic growth in the country. ➢ If above steps are taken, the rural teledensity will certainly get the required boost and country will succeed in adequate penetration of the services in rural areas.
7.	Do you think that we can sustain USO subsidy model in the long run?	Subsidy from USO for provision, operation and maintenance of telecom services in non-remunerative areas is continuing even in most developed countries like USA, UK, Canada etc. In India, where teledensity in rural area is very poor, there is no alternative but to continue subsidy from USO for quite some time.
8.	Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?	In addition to development of locally relevant software, the prime need is availability of e-services like e-governance, etc. from the various agencies whom the customer needs to contact. Again here, the basic infrastructure of reliable power supply is a must.

9.	Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.	BSNL has set up network in large number of rural areas. It has been noticed that areas which suffer from the lack of basic amenities, infrastructure and economic activity, have gained only marginally. Their only achievement is that telecom infrastructure has reached there. In other places, on going economic activity got a boost varying with in accordance with the already existing amenities/ infrastructure. The fact remains that telecommunication alone cannot lead to the growth of economy in the rural area.

Bharat Sanchar Nigam Ltd.

(A Government of India Enterprise)
613, Statesman House, 148-B, Barakhamba Road, New Delhi-110001

No. 4-5/2004-Regln **Date : 07/12/2004.**

To

The Secretary,
Telecom Regulatory Authority of India,
A-2/14, Safdarjung Enclave,
New Delhi.

Subject : **TRAI's CONSULTATION PAPER NO. 16/2004 – "GROWTH OF TELECOM SERVICES IN RURAL INDIA".**

Sir,

Kindly refer your letter No. 101-14/2004-MN dated 30.11.2004 on the subject mentioned above. Preliminary comments of BSNL on the various issues raised in this paper are enclosed for kind perusal and further necessary action.

Thanking you,

Yours faithfully,

(MAHIPAL SINGH)

Jt. Dy. Director General (Regulation-I)
07.12.2004.

Encl. : As above.

Consultation Paper on "Growth of Telecom Services in Rural India"
(Consultation Paper No. 16/2004)

ISSUEWISE COMMENTS

1. At the outset we would like to state that our opinion provision of Gram Panchayat Phone and Village Public Telephone need to be extended to cover all villages and provide access to people living in rural areas. However, beyond that any provision of telecommunication services in rural areas should be on the basis of demand and supply or on the basis of market forces. Any attempt to achieve the targets set in the New Telecom Policy (NPT 99) without a felt need will only harm the programme. Any infrastructure investment should yield adequate returns although there can be some 'hand holding' for a limited time.
2. Niche Operators need to be given preferential treatment for the simple reason that they will be required to operate in the worst economic scenario in Short Distance Charging Area (SDCA) where the fixed tele-density is less than one percent. Further, niche operators should be allowed to provide all telecom services including fixed, mobile, wireless, wire line, Internet telephony, etc. There should be no restriction on the use of technology by niche operators and the service should be technology neutral. Niche operators are expected to operate in rural, remote and telecommunication-facilities-wise less developed areas, which are not lucrative as far as revenue generation is concerned and neither the economies of scale are available. As an incentive, no license fee should be imposed on niche operators for an initial period of say, five years, after which there can be a review. This subset of operators should be exempt from the USO contribution as well. Limited Mobility must be allowed to the niche operators by law. Niche operators should be provided support from the USF, for a limited period and this support can be re-evaluated after this period.
3. An input subsidy is generally a better solution, as it is easier to regulate and prevent misuse. Spectrum for the niche operators should be made available at low cost. Similarly bandwidth, which at present is lying unutilised, could be made available at a nominal fee. Of course it is not a good idea to make available anything free!
4. Telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self-sustaining model provided it could be implemented through input cost subsidization.
5. Infrastructure sharing should be mandated with appropriate commercial compensation being provided to owners through regulatory intervention. This should be applicable to all areas and not just rural areas. It would be a welcome step to cut duplication in creating infrastructure and would lead to better utilisation of available infrastructure.
6. State governments should be involved in this initiative. Some scheme for sharing of revenue with the State Governments, on lines similar to the Small Savings Scheme could be examined.
7. USO subsidy model should become easier to sustain with increase in tele-density.
8. No comments.

9. No comments.

Submitted by:

Consumer Unity & Trust Society (CUTS),
D-217, Bhaskar Marg, Bani Park,
Jaipur 302 016, India
Ph: 91-141-228 2821
Fx: 91-141-228 2485
Email: **c-cier@cuts-international.org**
Website: **www.cuts-international.org**
(Registration No. TRAI/CO/NGO/02/2003 – NO)

COAI'S RESPONSE TO TRAI'S CONSULTATION PAPER NO. 16/2004 ON GROWTH OF TELECOM SERVICES IN RURAL INDIA

Introduction

At the outset we would like to state that we **wholeheartedly welcome this initiative** of the Authority. We believe that the **provision of services in rural, remote and less developed areas is an important policy objective** that must be addressed to achieve the Government objective of 250 million subscribers by 2007. COAI thus fully supports the efforts of the Authority to encourage growth of telecom and increased competition in the rural areas.

The Authority has rightly noted that there is a **huge untapped potential in rural India**, which needs to be fully exploited for the growth of telecom services in the country and to bring India at par with other developed nations. As a matter of fact around 70% of the population of India (1.2 Billion) lives in the rural areas. Despite of the fact that India has achieved a tele-density of 8.5%, the rural urban divide is increasing. It is thus important for us to look at **various issues that must be addresses and incentives given so that we are able to reach out and serve the rural markets.**

As the Authority may be aware, the COAI has for many months now being representing on the need for special initiatives to tap into the huge potential demand for telecom services in rural India.

This initiative of the Authority is also extremely timely as it is in consonance with the target that has been set by the Government to reach 250 million subscribers by 2007. In fact a special Group has already been set up by the DoT in this regard under the Chairmanship of Member, Services and a meeting has already been held with all industry stakeholders for their views and submissions on the issues that need to be addressed in order to reach the 250 million target that has been set by the Government.

COAI has already made a formal submission to the Group, a copy of which is enclosed as Annexure-1, for your kind consideration.

In light of the above, our specific response to the issues posed by the Authority are as below :

Responses to Consultation Questions

Q1. This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.

1. COAI believes that the **Authority needs to take a holistic view of the situation** and **consider** / recommend **a multi-pronged approach** to achieve the subscriber objectives that have been enunciated by the Government.

2. As rightly noted by the Authority, there are a number of initiatives / tools that are presently being used by the Government to achieve universal service objectives. We believe that going forward, we will still need to rely on a combination of measures and there is no one single approach that will achieve this objective of rural tele density.

3. In our submission to DoT, we have elaborated on the various policy and regulatory issues that need to be addressed to achieve the subscriber target of 250 million by 2007. These include:

    a. **Expeditious introduction of Unified Licensing** – we believe that this will immediately facilitate the introduction of increased competition into the long distance segment and could

result in nation-wide calling at near local rates. This would immediately boost the market leading to increased subscriber growth, higher usage, revenues, etc.

b. **Review of the ADC Regime** – we believe that a higher mobile termination charge on incoming ILD calls will virtually eliminate grey market traffic solving the leakage problem of the prevalent regime. We also believe that since affordable access is one of the key telecom objectives of the Government, there should be no ADC levied on intra-circle calls.

c. **Sharing of Infrastructure** – we believe that this would be a cost effective solution to reach out to rural and remote areas by leveraging on the existing nation-wide infrastructure that has already been put in place by the incumbent as also by some private operators.

d. **Reduction in High costs of Duties and Levies** –Indian telecom is amongst the most highly taxed sectors, which translates into higher cost of service. The Authority has already mooted a lower license fee revenue share in its draft unified licensing recommendations. The Authority is also considering a lower quantum of access deficit and more affordable charges for spectrum. Positive decisions on these issues will give a tremendous fillip to affordability and improved subscriber growth.

e. **Increase in FDI / FII limit** - Increase in the FDI / FII limit from 49% to 74% has already been announced in the Union Budget for 2004-05 and this will go along way in meeting the huge funds requirements that have been estimated over the next three years. The modalities for this are being worked out and it must be ensured that the terms and conditions are not so constrictive that they actually deter the inflow of FDI / FII.

f. **Expeditious Introduction of 3G** – 3G with a 4-5 times higher voice capacity that present 2G services will be an ideal tool to deliver low cost voice telephony to rural India. 3G will also be a valuable tool for undertaking social initiatives such as e-Education, Tele medicine, e-Governance, etc.

4. In addition to the various policy & regulatory issues, there is a **need to also look at procedural issues**. There are no uniform, clear, applicable and enforceable guidelines for various procedures such as right of way, municipal & civic clearances, setting up of cell sites, etc. As a result of this different state governments adopt different rules, criteria, costs and time frames, which causes significant amount of effort and delays in operators getting the requisite clearances. This issue needs to be redressed and **uniform guidelines need to be laid down for the various clearances and other procedures** involved in setting up and maintaining a telecom network.

   A detailed note on the above issues is enclosed as Annexure-1.

5. Further, we believe that cellular mobile will continue to play a leading role in achieving India's tele density objectives. However, **for cellular mobile telephony to succeed in rural markets,** the telecom infrastructure equipment deployed in the rural areas must get **adequate power for proper working**. The Government will thus have to ensure availability of stable power supply in the rural areas.

Q2. Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?

1. We are **not too clear about the objectives of introducing Niche Operators** or about the **exact terms and conditions under which these will be allowed to operate**.

2. From the Consultation Paper we gather that Niche Operators will be allowed to operate only in rural areas with a tele density below 1% and that license / registration fee and spectrum fee for

these operators will be nil, although they will be expected to pay the annual charges of 6% (administrative charges + contribution towards USO). Further, the Authority is also considering whether these operators should be entitled to support from the USO Fund.

3. In this regard we would like to submit existing operators have already paid the entry fee for the full service area and there are already entitled to spectrum under their licenses. Further, under the prevalent USO guidelines, existing Access Providers are equally entitled to USO Funding through a multi-layered bidding process on the Least Quoted Subsidy support basis.

4. In light of the above, we are **unable to understand how giving the Niche Operators free entry, free spectrum and USO funding** will better equip them or **make their business case more viable than that of existing operators**.

5. We believe that the **existing service providers** who are already licensed to provide services throughout their respective service areas **are better equipped to undertake this responsibility**. This is because these operators have already **invested significantly in infrastructure** and have **extensively rolled out their networks**. Because of **economies of scale**, it would be **far easier and more cost-effective** for such operators to reach the rural consumers.

6. Further, we believe that it would be **undesirable to create another category of licensee** such as the Niche Operator and **then to incentivise him through various subsidies and incentives to serve the same market** for which the **existing operators have already have a license**. We thus believe that the concept of Niche Operators is not a viable business model for the growth of telecom services, as this will **only fragment the various licenses**, which have already been issued to the operators.

7. Further, the statement in the Consultation Paper that the **definition of Niche Operators could be reviewed at any time also gives rise to concerns about level playing field**.

8. For all the above reasons, it is submitted that **rather than introduce a fresh category** of service providers, it would be far **more appropriate to incentivise the existing licensees** to rollout into the rural areas.

9. Notwithstanding the above**, if the concept of Niche Operator has to be considered**, it **must be on clearly defined terms and conditions** that **ensure that the service is distinct** and **level playing field is maintained** between the existing Access Providers and the Niche Operators. Some suggestions in this regard include :

    a. **Niche Operators to be given an entirely different spectrum** than that which is assigned to the Access Providers. This could be the 450MHz spectrum, which is meant especially for addressing rural requirements.

    b. A **different numbering scheme** so that it can be ensured that all subsidies and incentives are targeted at and received by only Niche Operators.

    c. There should be a Local Exchange at each SDCA in which the Niche Operator is providing service. Further, it should be clearly specified that the **wireless system would be interfaced to the Local Exchange of the rural SDCA only through the ITU specified interface V5.2** – this will ensure that the wireless service do not become full cellular as had happened earlier in the case of WLL (M).

    d. **Once the service is clearly defined & distinct**, a number of **direct and indirect subsidies and incentives could be extended** to the Niche Operator so as to make the services affordable for the rural consumers. These could include :
        i. Waiver of Registration Charges & Entry Fee for Spectrum

ii. Exemption from Service Tax
iii. Exemption from Customs Duty
iv. Exemption from Sales Tax
v. Exemption of ADC for calls originating from the rural SDCA
vi. Lower Interconnection Charges
vii. Exemption from requirement to provide Financial Guarantees & Performance Guarantees & also deletion of the clause for liquidated damages as these add to the cost.
viii. No separate charges for Right of Way, setting up of cellsites, etc.
ix. Etc.

10. **Most importantly**, this above **Niche Operator package** that is designed by the Authority **must first be offered to the existing Access Providers**, who are already entitled to offer all types of access services under their existing licenses, and **if the existing Access Providers do not express any interest, it may then be offered to new operators**.

Q3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

1. We believe that a **subsidy may need to be given both on the inputs as well as the final product** so as to make it cost effective for operators to rollout into rural areas.

2. Our submissions in this regard for existing access providers have already been dealt with under our response to Issue 1.

3. Our suggestions and proposals regarding Niche Operators have been covered in our response to Issue 2.

4. We would once again like to **reiterate that if Niche Operators are to be considered, it must be on clearly defined terms and conditions** that ensure that the **service is distinct and level playing field is maintained** between the existing access providers and the Niche Operators. Further, the **Niche Operator package must first be offered to the existing Access Providers** and only if the existing access providers do not express any interest, it may be offered to new operators.

Q4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self-sustaining model in rural areas, which can be implemented through subsidization of input costs from Universal Obligation Fund. Do you agree with this proposition? Offer your comments.

No Comments

Q5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, towers, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

1. We believe that **sharing of infrastructure** between operators is an important and **cost-effective tool** that must be optimally utilized to **reach out services into rural areas at the most affordable prices.**

2. Infrastructure sharing is a **relevant tool for India because** :

a. The **extremely low tariffs** that are prevalent in the Indian market **leave the operators with inadequate resources to extensively rollout their networks** into rural and remote areas.

b. **India being a low-income country**, it is also **not desirable for each operator to replicate costly telecom infrastructure** to reach the rural subscribers.

3. Countries like Europe, Australia, etc are already using infrastructure-sharing model to reduce the cost of offering telecom services.

4. We believe that **given the huge disparity in the bargaining / negotiating powers of different operators,** it **may be necessary for the Authority to actually mandate infrastructure sharing**. The Authority may consider **recommending appropriate guidelines on the technical and commercial aspects for sharing infrastructure in a multi-operator scenario.**

Q6. Do you visualize any other initiative, which should be taken by TRAI as to achieve the growth of telecom services in rural India?

In addition to our above submissions, the Authority may also like to consider the following suggestions to achieve the growth of telecom services in rural India:

1. At present, provision of rural service is not a viable business for existing service providers. While incentivising operators to venture into areas, **some efforts may be made to define the extent of competition in the initial years**, so that the operators are able to develop the market and reap some benefits. In this regard it is proposed that **if the existing access providers do not express any interest in serving the rural and remote areas**, the Authority may like to consider that in addition to BSNL, **only one Niche Operator should be allowed in each rural SDCA**. The Authority may **determine the appropriate selection criteria** in this regard.

2. The lack of a POI at the SDCA level would increase the call charges to the rural consumer because of higher Interconnect Usage Charge (IUC). Hence, it is proposed that a **point of interconnection (POI) must be provided at each SDCA**. **Cost of providing the POI** may be **shared between the interconnection seeker and the interconnection provider**. We would like to also reiterate our view that separate port charges should be eliminated as it is covered under IUC charges.

3. The **cost of domestic leased circuits needs to be reduced**. The Authority has already undertaken a consultation in this regard and the decision of the Authority in this regard is awaited. While announcing the revised leased line tariffs, the Authority may kindly **keep in mind the sharp reduction in STD tariffs** from Rs. 24 / minute to Rs. 2.40 / minute by BSNL.

4. **Built up leased lines may be permitted** so that the service providers are able to negotiate the best terms and conditions for leased lines within the desired time frames.

5. There should be a **single uniform pulse rate for all types of calls**. At present there is a disparity in the pulse rate applicable to fixed to fixed calls (180 seconds), fixed to WLL (M) calls (90-seconds) and fixed to cellular calls (60-seconds). This disparity creates unfair advantage for certain types of calls, which is not desirable.

6. **Use of electricity poles in rural areas should be mandated for laying copper cables/optical fibers without payment** or any charge **to State Electricity Board**.

Q7. DO you think that we can sustain USO subsidy model in the long run?

1. The **Universal Service objectives were first enunciated in NTP-99** whereunder specific targets and time frames were laid down under the policy. The policy also laid down the broad guidelines for raising resources for USO as also the implementation of the scheme.

2. The objective of the USO subsidy model is to achieve the USO objectives laid down in NTP-99. We thus believe that the **USO subsidy model has to continue till the target tele density objectives are achieved.**

3. In this regard it may be noted that **all service providers are paying a USO levy since August 1999** and the amount of USO funds collected in the last one year alone is in excess of Rs. 3,000 crores. On the other hand it is clear that the **disbursements from the USO fund are extremely modest** amounting to only Rs. 500 crores in the last year.

4. It may be appreciated that **the USO levies add to the costs** of the service providers, which in turn **impact the tariffs for the service**.

5. It is therefore suggested that the primary effort of the Authority should be to **first utilize the huge USO corpus** that has collected over the years **before further taxing the service providers** on this account. Once this fund is used up then like the Access Deficit scheme, the Authority should **determine the quantum of USO funding that it requires on an annual basis** and **then impose a suitable levy** on the service providers **to recover the targeted quantum.**

6. **Concurrent to the operation of the USO scheme**, we believe that **all efforts must be made to reach competition into rural areas**. Once the rural markets are served by a number of service providers giving them choice and quality at the most affordable prices, the **business model will start generating revenues and become sustainable**, thus obviating the need for USO funding.

Q8. Locally relevant software will have to be developed. What steps could be taken to develop such software and database and what should be government role in this?

1. We believe that the **role of the authorities should be to incentivise the service providers to roll out their services in the rural areas** and to **leave the rest to market forces**. Development of locally relevant software and content is an objective and responsibility that will be best accomplished by the individual service providers who will develop the necessary databases and the relevant software after assessing the needs and demands of their target market..

Q9. Share your experiences within and outside the country, which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

No comments

Annexure - 1

REACHING A SUBSCRIBER BASE OF 250 MILLION BY 2007
CONTRIBUTION OF THE GSM CELLULAR MOBILE INDUSTRY
PROSPECTS & CHALLENGES

I. INTRODUCTION

a. World over, **telecom is accepted to be a critical infrastructure sector**. Growth and development of telecom services has a direct and significant impact on the efficiency, competitiveness and growth of every other sector of the economy. In fact, international studies have shown a direct relationship between growth in tele-density and its impact on economic growth. It has been established that **for every 1% increase in tele-density, there is a 3% increase in the rate of growth of GDP.**

b. It follows from the above that if we can create a **nationwide telecom infrastructure that can deliver easily available, affordable and efficient telecom services to all consumers**, this will have a **multiplier impact on the growth of the economy**. To ensure access, affordability and efficiency in the telecom sector, it is important for **policy and regulation to encourage as well as facilitate healthy and vibrant competition and a sufficiently vigorous spread of telecommunication services.**

c. Within telecom, it is the **mobile infrastructure that has demonstrated itself to be the most conducive** medium to **rapidly and economically deliver the benefits of communications and connectivity in developing economies.** Cellular mobile telephony is uniquely suited bridge the digital divide and bring modern telecommunications services to chronically underserved communities. Setting up a fixed line infrastructure is a costly and time-consuming task, cellular networks are cheaper to set up and faster to deploy and thus represent the optimal solution to expeditiously reaching the power and benefits of telecommunications to remote and rural India.

d. The importance of telecom and telecom infrastructure was first recognized in the **National Telecom Policy 1994** (NTP-94) which recorded that telecommunication services of world class quality were necessary to ensure the success of the Government's new economic policies. The Policy also recognized that development of telecom is both technology and capital intensive and that the rapid acceleration in the growth of telecom services would require huge resources, which were beyond the capacity of the Government. The Policy identified a resource gap of over Rs. 23,500 crores that would be necessary to meet the revised targets of the Eighth Five-Year Plan. Accordingly, to bridge this resource gap, telecom was opened up to private sector participation.

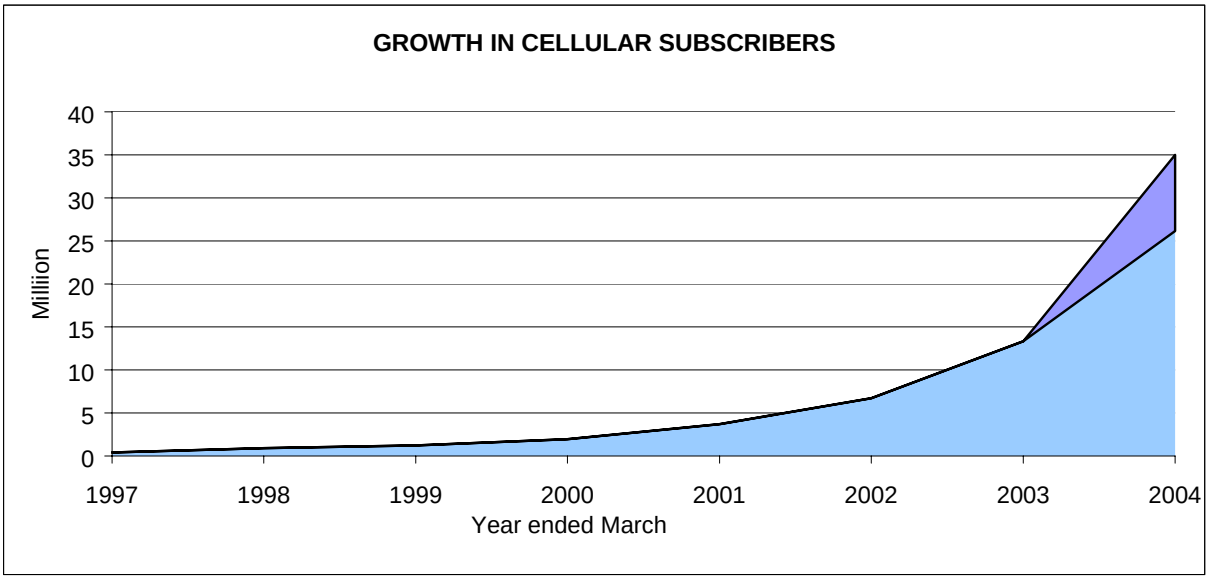
II. GROWTH OF CELLULAR MOBILE SERVICES

a. Cellular mobile was one of the first sectors to be opened up to the private sector when the Metro licenses were awarded in 1994. However, the initial growth was stifled by the high prices resulting from

very high license fees. Since then, **a series of initiatives taken by the Government** have **completely transformed the mobile landscape.** Introduction of **NTP-99**, **migration** of existing operators to the new revenue share regime, introduction of **increased competition** into cellular services and most importantly the introduction of a **Calling Party Pays (CPP) regime** have all **contributed to improved affordability, increased consumer choice and the overall growth and prosperity of the industry**.

b. **1999 marked the turning point in the fortunes of the cellular mobile industry**. The number of cellular mobile subscribers has grown from a miniscule 1.24 million in March 1999 to touch 35 million in March 2004 and cross 45 million in October 2004 growing at a compound annual growth rate (CAGR) of around 95% p.a. (See Graph-1) It can thus truly be said that India's real telecom liberalization started in 1999.

GRAPH-1



Year ended March	1997	1998	1999	2000	2001	2002	2003	2004
GSM Cellular Subscribers (in Million)	0.41	0.91	1.24	1.96	3.70	6.71	13.34	26.15
CDMA Cellular Subscribers (in Million								8.85

Source: Cellular Operators Association of India

c. Cellular mobile now forms an integral component of the Indian telecom pie. When cellular services were first introduced **in 1995, the total tele density of the country was 0.8 per hundred persons**. (All fixed lines and no mobiles). In the nine years since then, the mobile landscape in the country has undergone a dramatic transformation. **Tele-density has grown exponentially to reach 8.24 per hundred persons in October 2004**.

d. The contribution of mobile to this performance is significant. **By the end of October 2004, the total cellular mobile subscribers had overtaken the number of fixed line subscribers in the country.** The number of mobile subscribers has now crossed 45 million and continues to **grow at an average**

rate of around 1.5 million subscribers per month. **Cellular subscribers now constitute around 4.1 % of tele density** and account for over 50% of all the phones (fixed + mobile) in the country.

e. **GSM continues to be the main driver** for cellular mobile growth accounting for around **80% of all the mobile subscribers** in the country and continuing to contribute **80% of the subscriber additions.**

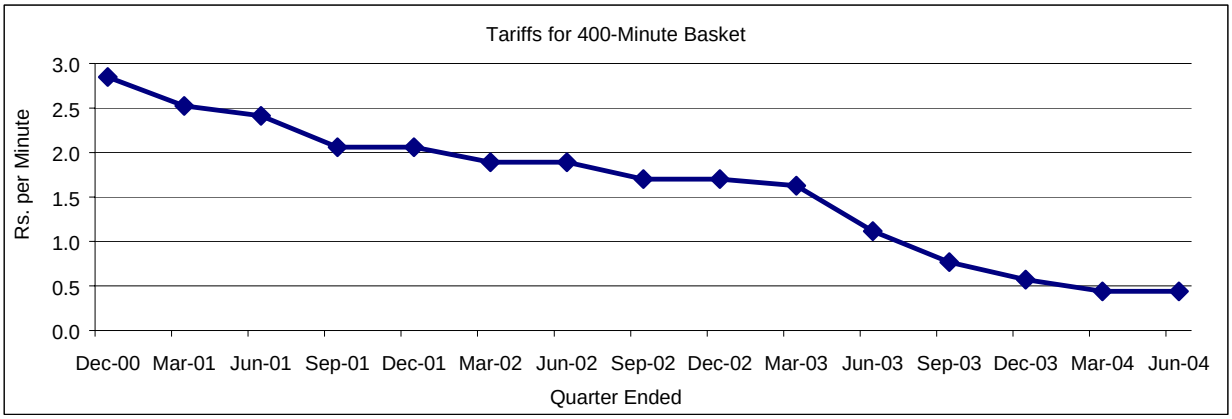
f. This **aggressive growth of cellular mobile services was the result of both improved affordability and increased coverage.**

g. **Affordability** of cellular mobile services has been progressively enhanced with the continuous introduction of increased competition into the sector. The introduction of the 3rd and 4th GSM operator in 2001-02 and the migration of fixed operators to full CDMA based cellular mobility in end 2003 has resulted in **India becoming one of the most intensively competitive cellular mobile markets in the world**.

h. Further, the introduction of CPP (Calling Party Pays) system in May 2003 removed one of the greatest barriers to take-up of cellular mobile services as it encouraged increased subscription amongst the low-end and marginal consumers. Minimum effective local call charges for cellular mobile services are have dropped from Rs. 2.85 per minute in December 2000 to around **44 paise per minute in June 2004.** (See Graph-2)

GRAPH-2

IMPROVING AFFORDABILITY OF MOBILE SERVICES



Rs. per Minute

Quarter ended	Dec-00	Mar-01	Jun-01	Sep-01	Dec-01	Mar-02	Jun-02	Sep-02	Dec-02	Mar-03	Jun-03	Sep-03	Dec-03	Mar-04	Jun-04
Tariff	2.85	2.52	2.41	2.06	2.06	1.89	1.89	1.70	1.70	1.63	1.12	0.77	0.57	0.44	0.44

Source: TRAI Quarterly Performance Indicators Report

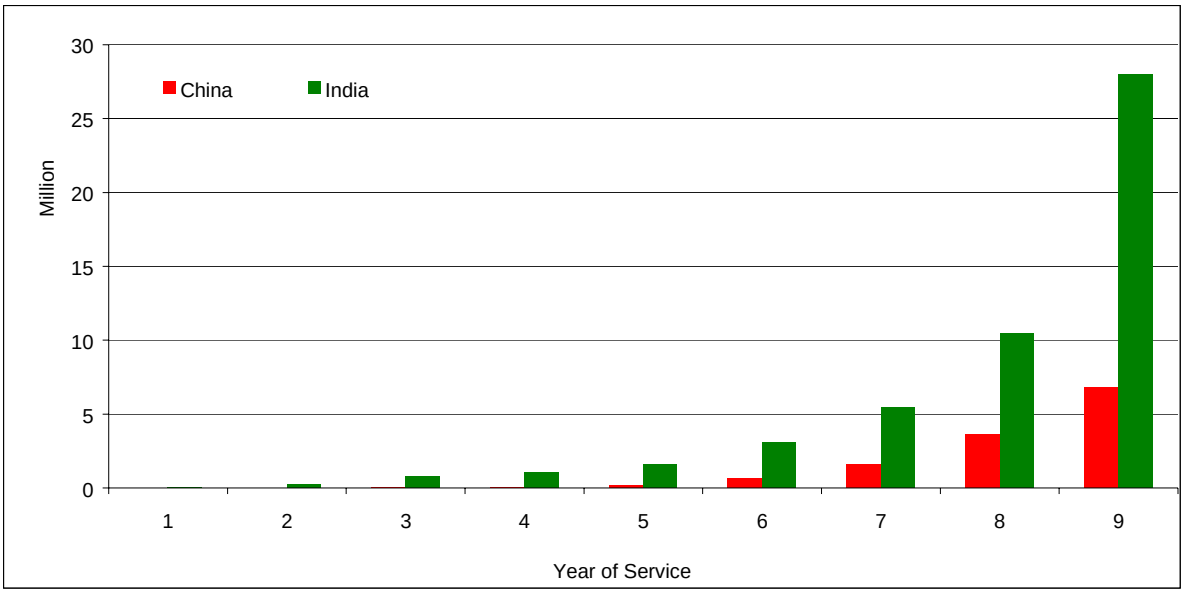
i. As a result of NTP-99, cellular mobile operators were able to break out of the vicious circle in which they had been trapped under the high fixed license fee regime and use the resources that had been freed up to invest in their networks and rollout their services in more and more cities and towns. India comprises of around 5000 cities and towns. Cellular mobile services / **coverage** was available only in around 421 cities and towns in June 1999, it is now **available in over 2500 cities and towns all across the country**. **Due credit in this regard must also be given to BSNL which has spearheaded the initiative to rollout in smaller cities and towns** by leveraging its nationwide fixed line infrastructure. In fact BSNL, in a very short period of time has been able to notch up an impressive performance and has raced to second position in the market accounting for 8 million mobile subscribers all India by end October 2004. The **private operators too have undertaken to extensively rollout their networks in the smaller cities and to**wns. It is expected that **by June 2005, the private operators will be present in at least around 4000 towns** and in the process **also provide air cover to several thousands of villages.**

j. As of date, Indian cellular service providers (both GSM and CDMA) have set up 109 mobile networks and are offering services to over 45 million subscribers in around 2500 cities and towns all across the country at tariffs which are amongst the lowest in the world. Of this, GSM alone has 78 networks, serves around 36 million subscribers and covers around 2500 cities & towns

k. The **success of India's reform policies** can be clearly seen when the mobile growth is **benchmarked against that of China**. China because of its similar geographic and demographic profile has often been looked up to as a role model for India's reform initiatives. China represents one of the greatest success stories of mobile communications. At the end of 1990 there were just 18,319 cellular subscribers in China i.e. one out of 65 million people in that country owned a mobile phone. However, by the end of the decade, numbers were practically doubling year-on-year. China is now the largest mobile phone market (by subscribers) in the world with around 320 million subscribers and currently accounts for the greatest absolute number of new subscriber additions of any market. However, if we look at a **year-on-year comparison from start of service between India and China, we can see that India is in fact far ahead of China at its current stage of mobile development.** At the end of Year 9 (1996), China had only reached 6.8 million mobile subscribers, while India by the end of Year 9 (2003) had already crossed 28 million mobile subscribers. (See Graph-3)

GRAPH-3

CELLULAR GROWTH – INDIA VERSUS CHINA



Year of Service	1	2	3	4	5	6	7	8	9
China									
Year ended December	1988	1989	1990	1991	1992	1993	1994	1995	1996
Mobile Subscribers (in Million)	0.003	0.01	0.02	0.05	0.18	0.64	1.6	3.6	6.8
India									
Year ended December	1995	1996	1997	1998	1999	2000	2001	2002	2003
Mobile Subscribers (in Million)	0.03	0.22	0.79	1.07	1.6	3.1	5.48	10.48	28.0

l. Thus it would be fair to say that **if India can maintain its present aggressive growth rate, it will not just emulate but it will surpass the growth of China.**

III. FUTURE PROSPECTS

a. Going forward, the future looks bright for India, as there are a number of demographic and socio-economic factors in India's favour that would continue to fuel the aggressive growth rate of the cellular mobile industry. These include factors like a **rising income levels, a booming knowledge sector, a burgeoning middle class and growing urbanization of population.**

b. **Cellular mobile telephony** is **uniquely suited bridge the digital divide** and reach the power and benefits of telecommunications to remote and rural India. Mobile telephony will thus have an **increasingly important role to play in India's future economic growth**. The last few years have already demonstrated what can be achieved by mobile telephony, as the cellular mobile industry, in virtually the last 5 years, has equaled the number of fixed connections set up the fixed line incumbent in the past 50 years. **Going forward, the growth can be expected to be equally explosive, if certain key policy and regulatory issues are expeditiously addressed**.

IV. SUBSISTING CHALLENGES

a. It has been estimated by some experts that the addressable mobile population in the country will be around 300 million by 2007. In fact even now, the **addressable mobile population in the country is in excess of 200 million**. But India has a **mobile subscriber base of only around 45 million**. The **disconnect** between addressable population and actual subscriber base arises primarily **because about 70% of India's billion plus population lives in the rural areas where the cellular coverage is not extensive**. Going forward too, it is expected that the increased potential will come from rural and un-served areas. Thus, the **most important challenge before the industry now is to reach out and address the potential users in the rural and remote areas.**

b. Secondly, we have to **ensure that services remain affordable**. The success of mobile telephony in India has amply demonstrated that the **key success factor in driving tele density and mobile growth has be the increased affordability of services.**

c. Achieving these twin objectives of availability and affordability will not be an easy task. Network deployment is a capital-intensive proposition. Further, in India, the **addressable population is dispersed throughout the country**. Consequently the operators will have to rollout extensively to be able to reach the addressable population. This is in stark contrast to our role model China, where the population and mobile users are concentrated over a far smaller geographic area. The eastern region of China covers 48% of the total population and contributes 70% of total mobile users. Further, the per capita GDP in this region is about 67% higher than national average of USD 887, thus giving the Chinese service providers the advantage of availability of high income concentrated population in geographically contiguous areas. In **India however the geographic and economic dispersal of the addressable population will constitute a formidable challenge in meeting the Government's subscriber objectives**. As a result of this disparity, an India operator will have to rollout in around double the number of cities than his Chinese counterpart, to be able to access the same addressable population, thus involving a significantly higher amount of capital and operational expenditure.

d. However, as mentioned earlier, the **hyper competition in the market has led to extremely low mobile tariffs**, which are currently prevailing at around 44 paise per minute. Whilst the low tariffs have resulted in an aggressive expansion in the subscriber base, it has considerably **reduced the margins of the operators, leaving them with inadequate resources to invest in expansion of networks to rollout into the rural areas**.

e. India will have to look for **cost-effective and efficient solutions to ensure that the mobile infrastructure pervades across the length and breadth of the country.** Options to do this in the most optimal manner could include :

1. Optimal utilization of existing infrastructure through introduction of unified licensing
2. Putting in place a suitable ADC regime that yield requisite funds for achieving social objectives
3. Reduction of costs through infrastructure sharing

4. Reduction in High Costs of Duties & Levies
5. Facilitation of increased funding through increased Foreign Direct Investment / Foreign Institutional Investment (FDI/FII) limits.
6. Expeditious introduction of broadband and 3rd Generation mobile services (3G).
7. Laying down uniform Nation wide guidelines for various Procedures & clearances

1. Expeditious Introduction of Unified Licensing

a. When **Unified Licensing** was first mooted in 2003, it was as a measure that would do away with the artificial segregation of service specific licenses and enable operators to optimally utilize their existing infrastructure to offer a gamut of services at the most affordable tariffs.

b. In India, the introduction of a holistic licensing regime has been envisaged as a two-step process. Step 1 which was taken in October 2003 unified fixed and mobile services under a single unified access license. Step 2 which will essentially include the long distance services under the ambit of a unified license is still awaiting the recommendations of the Regulator.

c. The delay in the introduction of full unified licensing is hurting the industry as it is not only stalling the introduction of additional competition, but is also preventing operators from optimally using their existing infrastructure to offer the most affordable services to their consumers.

d. At present players **who are** interested in acquiring long distance rights are awaiting the introduction of a full-unified license **before acquiring the said rights.** Unified Licensing **will result in a** proliferation of long distance players **and the increased competition in this segment will automatically** translate into more affordable services, increased customer choice, quality of services, etc.

e. At present a mobile call from end-to-end in any service area, whether it is 50 kms or 500 kms, is available at local call rates. However, the moment the call transcends the border, the charges increases significantly, because the mobile operator has to go through an NLD operator. Under a unified license, operators would be able to interconnect across borders thus be able to optimally using their infrastructure to offer the most affordable services to his consumers.

f. Introduction of full unified licensing is expected to dramatically transform the competitive landscape especially in the long distance segment and in the process also give a significant boost the growth and rollout of mobile services. Further, it would facilitate nation wide calls at near local call rates **which would give as** tremendous boost to both subscriber growth as well as usage and revenues.

g. **Expeditious introduction of full unified licensing is** also important for investor confidence and to attract more foreign investment into this sector.

h. **It is important to note that the** commitment to introduce full unified licensing within 6-months **was one of the** prime motivators **to the** amicable settlement of the limited mobility dispute **& the** withdrawal of the challenge to unified access licensing.

2. Ensuring Affordable Access through a suitable ADC regime

a. Access Deficit Charges are paid by all operators and the ADC funds are used to meet the national objectives of providing **affordable access to consumers especially in the rural and remote areas. However for the ADC regime to be successful it is important that it is enforceable and self-regulating.**

b. The recent **instance of illegal routing of ILD calls** has exposed the flaws in the present regime and has resulted in a **loss of several hundreds of crores for the PSUs. This in turn has hampered** the ability of BSNL **to rollout its services** especially in the rural areas and consequently **the telecom growth objectives set by the Government.**

c. The **30-40% reduction in the ADC charge on ILD calls that is being considered to address the above concern, will not discourage grey market activities, rather** it will **only slightly reduce the size of the incentive** for operators indulging in grey market activities. For example, for an operation of **100 million incoming ILD minutes per month,** reducing the ADC from the present Rs. 4.25 per minute to say Rs. 2.5 per minute will merely **reduce the incentive or arbitrage opportunity from Rs. 42.5 crores to Rs. 25 crores per month**, which is still a huge incentive for illegal routing grey market traffic.

d. Further, **a lower ADC on ILD calls will only advantage the international operators** who do not need this benefit. It may be pointed out most countries are increasing their termination charges, which not only adversely impacts the Indian operators and their consumers, but also results in increased outflow of foreign exchange from the country. It would thus be undesirable for India to reduce its termination charges (by reducing ADC) to benefit the foreign ILD operators.

e. The above **concern can be addressed by permitting a higher Mobile Termination Charge (MTC) for incoming ILD ca**lls. This will **incentivise the mobile operators to put in place the necessary checks & balances to distinguish between various types of c**alls and check grey market traffic. At present the mobile operator has no incentive to invest any resources to check grey market traffic as he is paid the same termination charge of 30 paise / minute for local, STD and ISD calls.

f. This would also be **in line with international practices** as **globally, charges for termination on mobiles are invariably higher.**

g. **The ITU Recommendations** (D-140 on Accounting Rate Principles of International Telephone Service)also provide that, for calls terminating in India, we can negotiate for accounting rates of about 34 cents. When the international operators are demanding high termination charges for calls terminating in their countries and these rates, we believe, have further gone up recently, we fail to see why should Indian cellular operators should be deprived a benefit permitted by ITU and international practice.

h. It is understood that **BSNL too, would be comfortable with this higher MTC regime.**

i. The **exact level of MTC may be left to forbearance** and should be determined through mutual negotiation between the service providers.

j. However, it is suggested that **a floor MTC of Rs. 1.75 per minute may be prescribed for incoming ILD calls**. This would be **well within the extent of ADC reduction that is presently under consideration**. (that ADC on incoming ILD calls be reduced from Rs. 4.25 to Rs. 2/ minute.) All that is being suggested is that instead of passing on the reduction in ADC to the foreign operators, an equivalent be provided to the access providers in the form of higher MTC.

k. The introduction of an **higher MTC on incoming ILD calls will result in a win-win situation for all concerned** as it will ensure the full recovery of targeted ADC amounts, check grey market traffic is checked and ensure that BSNL gets the full resources as ADC to achieve its social objectives, the mobile operators get an improved termination charge in line with global practice and the Government is able to realize its objectives of reaching the targeted subscriber base within the defined time frames.

l. It may be appreciated that for mobile services the entire circle is a local area and operators are proving end-to-end services within their services area at local call rates. However, at present intra-circle calls are also being loaded with ADC thus making these calls more expensive. It is submitted that **since affordable access is vital** for achieving the 250 million target, all possible efforts should be made by the Authority to ensure that **no ADC is loaded on intra-circle calls**.

m. Further, **the ADC funds should as far as possible be recovered from international calls,** with a higher MTC on incoming calls to check grey market traffic. If necessary, a modest ADC may be loaded on NLD calls.

n. **Under the prevalent ADC regime**, **private fixed operators**, who are now in fact all unified access licensees, **are entitled to retain ADC on calls that originate as well as terminate on their network.**

o. **This provision competitively disadvantages the cellular operators**. This is on account of the fact that the **fixed wireless services** being provided by the FSPs / UASLs are **classified as fixed services and thus entitled to ADC.** However, these services are **for all intents and purposes**

tantamount to full cellular services and can be **offered seamlessly throughout the service area**. This **creates a non-level playing field and competitively disadvantages the cellular operator** vis-à-vis the fixed wireless service provider. In fact it may be noted that a large UAS operator is prominently advertising its fixed wireless as a mobile service (WALKY).

p. **This anomaly needs to be addressed.** With the **introduction of unified access licensing** and the **complete waiver of all rural rollout** obligations for the fixed operators, **there is absolutely no justification in continuing to provide them with ADC funding.**

3. Sharing of Infrastructure between Public & Private Operators

a. In a capital starved country like India, it would indeed be wasteful for every operator to duplicate costly infrastructure. **Infrastructure sharing** o**n fair, transparent and commercial terms** will ensure that **consumers in rural areas get choice of service, quality as well as affordability;** the **nation achieves aggressive rollout and improved tele density** whilst the **operators get an attractive commercial proposition and an opportunity to expand coverage and reach of their services**. BSNL, the incumbent fixed line operator has created an extensive nationwide fixed line infrastructure, which can be leveraged, at small incremental costs to also reach the cellular mobile services to all corners of the country. BSNL is already building upon its fixed line infrastructure to provide its mobile services. This opportunity needs to be extended to private operators as well as this will not only proved **increased choice to the consumer, but also bring in revenues for BSNL**. All operators have accepted the principles of infrastructure sharing and the modalities are being worked out.

4. Reduction in High Costs of Duties & Levies

a. The Indian mobile sector is one of the most highly taxed sectors in the country with annual recurring regulatory costs still accounting for as much as one-third of its operating costs. (See Table-1)

TABLE-1

BURDEN OF ANNUAL DIRECT REGULATORY COSTS IN INDIA

Elements of Cost	**Annual Levy**	**Payments by Private GSM operators (in 2003-04)**
1. **License Fee Revenue Share**	6-10% of Revenues	Rs. 954 Crores
2. USO Levy	Part of License Fee above	
3. Spectrum Usage Charges	2-6% of Revenues	Rs. 290 Crores
4. Service Tax	8%	Rs. 600 Crores
5. Access Deficit Charges	10-12% of Telecom Sector Revenues,	Rs. 800 Crores*

	imposed as levy on NLD & ILD calls, including cell-to-cell calls	
6. Import Duties	- On Mobile Handsets -5% - On Mobile Infrastructure -16%	

b. This high duty and levies structure is also significantly out of line with international norms as can be seen from the following Tables 2 & 3.

TABLE-2

BURDEN OF ANNUAL DIRECT REGULATORY COSTS – INTERNATIONAL COMPARISON

In %

Regulatory Cost Country	License Fees	Spectrum Charges	USO Levy	Total
India	8[1]	3[2]	-[3]	11+
China	0	Neg.[4]	0	Neg.
Pakistan	2.5	0.5	1.5	4.5
Sri Lanka	0.3	Neg[5].	Nil	0.3+
Malaysia	0.5	Nil	6	6.5
South Africa	5	Nominal [6]	No. of Comm.Phones[7]	5+
Singapore	n.a.	Neg[8]	-	Neg.
Hong Kong	-[9]	5	-[10]	5+
South Africa	5	-[11]	0	5+

Source: Country Regulators / Ministries, ITU Regional Working Group Forum, April 26-27, 2004, New Delhi

Notes:

1. Varies from 6-10%
2. Varies from 2-6%
3. Included in License Fee, is 5% of Revenues1 Million Rmb/MHz, less than 0.05% of RevenuesSri Lankan Rs 60,000 per KHz
6. 1800 MHz and 2.4 GHz spectrums at Rand 100,000 a year for each frequency pair used, plus Rand 5 million annual radio frequency spectrum licenseUniversal Service Commitment – 52,000 community telephone service phones over a period of six years for Cell C
8. Approx. Rs 3.7 lakhs for 6.2 MHz - as a % revenue share, insignificant value
9. 2G: 20 HK$ per subscriber per year (effective from 1st May'04)0.6HK$ per ISD call to heavy traffic. 0.23 HK$ per ISD call to other countries
11. 1800 MHz and 2,4 GHz spectrums at Rand 100,000 a year for each frequency pair used, plus a R5m annual radio frequency spectrum license.

TABLE-3

BURDEN OF IMPORT DUTIES – INTERNATIONAL COMPARISON

In %

Import Duties Country	Handsets	Infrastructure
India	5	16
China	0	0

Pakistan	Nil	10
Sri Lanka	Nil	Nil
Malaysia	Nil	Nil
Singapore	0	0
Hong Kong	0	0

Source: Country Regulators / Ministries, ITU Regional Working Group Forum, April 26-27, 2004, New Delhi

c. The industry has been representing before the Government on the need to **rationalize the cost structure** of the sector to bring it in line with international best practices. The 2nd Meeting of the ITU Regional Working Group on Private Sector Issues, which met in Delhi on April 26-27, 2004, also discussed the issue of the high incidence of duties & levies on the telecom sector. The Forum was attended by around 140 delegates from over 15 Asia-Pac countries. The Group was of the view that a common yardstick could not be applied for countries at different stages of economic growth and the levies on the sector would be to some extent dictated by the level of economic development in respective countries.

d. For **developing countries, within which India would be covered, the Group made the following recommendations with respect to the different cost elements:**

Issue	**Recommendation for Developing Economies**
1. Entry Cost	Nominal to cover Administration charges / Eliminate Non serious players by Eligibility criteria
2. Annual Fees on Operator	To cover the administrative and regulation cost around 1% of Gross Operating Revenue. Excludes Revenue from non-operating sources e.g. Sale of Handsets, etc.
3. USO	It is a necessary levy and should be properly utilized exclusively for Rural Telecommunication Levy to be determined by Government from time to time to be capped at 5%.
4. Spectrum Charges	The spectrum pricing should be such that objectives of affordability, growth and accessibility are achieved while ensuring efficient use of spectrum and quality of service.
5. Indirect Taxes on Capital	Telecommunication being an important Infrastructure sector preferential treatment to be given. All Indirect Taxes cumulative should not exceed 12%.
6. Handsets, spares, components and accessories	All applicable duties and levies put together should not exceed 10%
7. Usage Fees to Subscribers (VAT /Service Tax / GST)	Between 5% to 8% depending on the state of economic development of the country

e. **Recent developments** in India do appear to indicate that **some elements of high cost may be reviewed downwards** inasmuch as :

i. The TRAI has suggested in its draft unified licensing recommendations that the **annual license fee should be pegged at 1% + contribution to USO**. This would be in line with international best practices.

ii. The **ADC regime is being reviewed** and there are indications that the quantum of access deficit **will be lowered**. As suggested by us, this **regime should be made self-regulating** by permitting a higher MTC on incoming ILD calls, intra-circle calls should be exempted from ADC to make local access most affordable and that there should be some eligibility norms to be complied with to receive the ADC Funding.

iii. **Spectrum pricing is also being looked at** by the TRAI. Since spectrum is a vital raw material for mobile services, the price of spectrum would have a considerable bearing on the prices of mobile services. As mobile services are expected to contribute significantly to future growth objectives, it is desirable that spectrum be priced in a manner that is in consonance with the overall telecom policy of the country. Further, as spectrum, being an input / raw material, it may be more appropriate to tax the final product i.e. the revenues of the service providers.

f. **Positive decisions on the above cost elements will give a further fillip** to the growth of the sector.

g. In addition to the above, an element of cost, which needs to be considered, is the **definition of Adjusted Gross Revenues** (AGR), which is the basis on which all operators are paying their annual license fees. At present the definition of AGR, which has been adopted, includes several elements of revenues that are not related to telecom activities. One key element in this regard is the revenues from the sale of handsets. It must be appreciated that with the usage tariffs for mobile telephony touching a low of 44 paise per minute (tariffs for a 400 minute basket, as estimated by TRAI), the **biggest hurdle for the low end and marginal consumers is the price of the mobile handsets.** As mobile telephony grows it will continue to reach out to the marginal subscribers, for whom the price of the handset could be the only reason for not taking up the service. The **inclusion of handset sales revenues in the AGR definition hinders/ discourages service providers from offering bundled (handset + airtime) services** to new consumers, which going forward**, could have an inhibiting effect on the aggressive subscriber growth targets** being set for the industry. It is therefore **important for the Government to review the definition of AGR and most urgently, exclude revenues from handset sales from the purview of AGR / payment of license fees.**

5. Increased Flow of Investment through FDI/FII

a. Another aspect to facilitating aggressive rollout is to actually enhance the prospects for inflow of increased funds. It has been estimated that a sum of close to **Rs. 125,000 crores will be required over the next 3 years to meet the aggressive targets that have been set by the industry**. It is unlikely that this funds requirement can be met from domestic sources alone. **Foreign investment through FDI or FII will thus play an important role** in providing the resources for growth and expansion of networks. The Government too, has recognized the need for increased FDI/FII and in the

Union Budget for 2004-05, the **Finance Minister announced an increase in the FDI/FII limit from 49% to 74%.** The terms and conditions for this are presently being worked out by the Government, however it must be kept in mind that whilst it is important to address the legitimate management and security concerns of the Government, it is equally important to ensure that the **terms and conditions are not so constrictive as to actually discourage the inflow of FDI/FII.**

6. Expeditious Introduction of Mobile Broadband / 3G

a. **Broadband** could play a key role in achieving India's infrastructure objectives and delivering world-class telecom services across the length and breadth of the country. Broadband has been identified as the next priority area for India. The cellular mobile services sector can play a key role in contributing to the country's broadband objectives through 3G services. Introduction of 3G services holds significant advantages and a strategic relevance for a developing country inasmuch as :

i. **3G has a 4-5 times higher voice capacity than present 2G services. In a market that is driven by affordability, 3G** can serve as an **ideal platform to deliver low cost voice telephony to Indian consumers**. As a result, 3G can be an extremely effective tool in **driving penetration of the huge addressable market in the rural areas** where price of service will be the key factor for encouraging increased subscriber take-up is and voice telephony will continue to be for quite some time at least, the primary requirement for the masses.

ii. 3G can also prove to be a **crucial tool in undertaking social initiatives such as delivering E-Education, Tele medicine,** etc.

iii. 3G will also be very **relevant for enhancing India's competitiveness in the ITES / BPO segment** where India is already a significant force to reckon with in the global market. In fact in a meeting early this year, with the industry, Commissioner Liikanen of the European Commission opined that 3G will be essential for sustaining India's competitiveness the global ITES market.

iv. **The** Government's vision of leapfrogging to services beyond 3G level can also be greatly facilitated by the introduction of 3GSM (WCDMA), **as this will** allow for the almost concurrent introduction of 3.5G services. **This is because HSDPA (hi-speed downlink packet access), which offers peak bit rates of 10.7 mbps, uses the same spectrum the same infrastructure as 3GSM (WCDMA).**

v. The **hi-speed data capabilities** of 3G will fulfill the content rich mobility experience that will increasingly be demanded **in the urban and metropolitan markets**.

b. 3G services would not only be an **ideal media to achieve India's primary objective of low cost voice telephony services across the length & breadth of the country**, but also provide an **opportunity for operators to increase their revenues** through increased volumes / usage of voice

telephony as well as the premium data services. Data from countries that have introduced 3G has demonstrated that introduction of 3G leads to increased ARPUs, not only through increased use of data services, but also increased use of voice telephony services.

c. It may be noted that as it will **take at least 12-18 months for the 3G networks to be up and running and stable**, **for 3G services to be able to contribute to the 250 million target, the 3G decision must be taken almost immediately.**

7. Uniform Nation wide guidelines for Various Procedures

a. Lastly, we would like to state that while there are a number of policy and regulatory issues that need to be addressed to clear the way for the aggressive growth of mobile telephony in the country, we **must not ignore the micro aspects of processes and procedures**. The cellular operators need to approach their respective state governments and authorities for various clearances that are involved in the establishment and maintenance of a world-class cellular mobile network

b. **Lack of clear applicable and enforceable guidelines & rules means that d**ifferent rules, regulations, procedures, timelines, costs, etc are adopted by various state governments which **cause significant amount of effort and delay** in the operators getting the requisite clearances to set up their networks thus resulting in delay in setting up services, higher costs, etc.

c. It must be appreciated that as networks grow and rollout increases, these problems will multiply manifold. Telecom is an essential utility & must be recognized as such. It is thus **opportune for the Government and industry to collaborate and exhaustively detail out the various procedural aspects** for which guidelines need to be framed as also **consensually develop the actual guidelines and rules that would then be applicable nation-wide.**

d. **As a first step it is suggested that uniform rules and guidelines be developed for the following :**
   i. Right of Way
   ii. Municipal & Civic Clearances,
   iii. Guidelines regarding setting up of Cell sites to provide seamless coverage & service

e. It is also imperative that the various clearances are given in a timely manner so that undue delay does not hold up provision of service, lead to increased costs, etc.

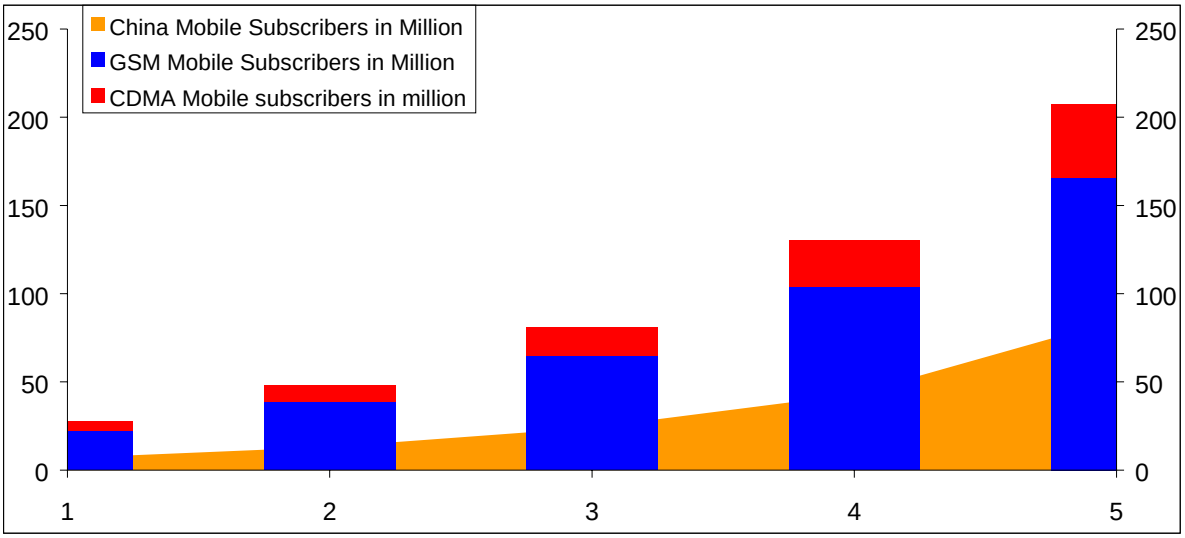
f. In this regard, the delays in receiving SACFA clearances and requisite TEC Certification need to be addressed. It is therefore suggested that service providers should be allowed as far as feasible to do self-certification with random checks by the authorities to ensure compliance.

V. CONCLUSION

a. If the above measures are implemented in a timely manner through suitable policy and regulatory initiatives, then **the Indian cellular wireless industry has the potential reach a subscriber base of nearly 207 million subscribers by the end of 2007** and thus contribute in a significant and substantial manner to the overall target of 250 million fixed + mobile subscribers that is being set by the Government. Of this total mobile subscriber base of 207 million, we believe that in line with international trends, **80% of the mobile subscriber will be on GSM standard**. India thus has the potential to surpass the mobile success of China (See Graph-5) and to become the next Asian Tiger.

GRAPH-5

CELLULAR GROWTH – INDIA VERSUS CHINA



Year of Service	9	10	11	12	13
China					
Year Ended December	1996	1997	1998	1999	2000
Mobile Subscribers in Million	6.8	13.2	24	43	85
India					
Year ended December	2003	2004	2005	2006	2007
GSM Mobile Subscribers in Million	22.4	38.4	64.8	104	165.6
CDMA Mobile subscribers in Million	5.6	9.6	16.2	26	41.4

*******ENDS*******

C O N S U M E R C A R E S O C I E T Y
1 / A , 2 N D M A I N , 3 6 T H C R O S S , 8 T H B L O C K ,
J A Y A N A G A R B A N G A L O R E 5 6 0 0 8 2 .

T E L E P H O N E : 0 8 0 - 2 6 3 4 1 5 1 5 D A T E : N O V E M B E R 2 5 , 2 0 0 4

T H E S E C R E T A R Y
T E L E C O M R E G U L A T O R Y A U T H O R I T Y O F I N D I A
N E W D E L H I E M A I L :
T R A I 0 7 @ B O L . N E T . I N

Dear Sir,

Reference: Your Letter No.15-9/2004-A&P of 03 November 2004
Subject: COMMENTS ON CONSULTATION PAPER OF TRAI DATED 27.10.2004 PERTAINING
TO GROWTH OF TELECOM SERVICES IN RURAL INDIA

We have perused the above Consultation Paper. Following are our observations.

The Preface to the CP rightly recognizes " Despite several attempts over the last more than ten years, telecom infrastructure in rural areas is lagging behind the expected levels…….. but the gap between the urban and the rural teledensity has been rising. It is pertinent to re-look at the entire issue of rural communications to make a speedy headway". We are happy that this recognition has come about now at least. Hence it is time to take a totally unbiased approach without being tied down to any previous mindset and make a fresh study of options available, evaluate them and decide on the path to take hence forward. Our approach to this aspect is detailed in the attached “A Fresh Approach to Improving the India's Rural Telecommunication Infrastructure".

1. The thinking at all levels, including Government, has undergone a drastic change in the past few years. It is now recognized that it would not be possible for Government to subsidize the service sector on a long-term basis. Subsidy rarely reaches the segment for which it was meant and a large portion of the subsidy is frittered away on administration costs.
2. Experience has shown that service can always be tailor made to suit rural areas and could be provided on a commercial basis. For example, in the field of rural finance there has been a very positive development. An entity in the corporate sector has entered the rural finance field by affording rural credit at reasonable rates of interest to small farmers. Each loan normally does not exceed Rs.50,000/-. The experience in collection has been very positive at 98% and NPAs are

practically nil. The entity has been profitable from day one. At the same time the farmers are benefited. In other words, the service sector in rural areas can be self-sustaining if individual effort is taken to cater to the specific needs of farmers. This also shows that people at every level are prepared to pay for services provided they get benefit out of it.

3. In like manner, it may be possible to the supply telecom services to meet the specific needs of the rural customer. It would be desirable to render service to the more affluent strata initially i.e. the segment where the value addition is immediately visible and significant such as: rural banks, medical, marketing access etc These would be willing to pay a reasonable amount provided the services are meaningful and efficient. The same infrastructure could then be used to extend the services to the lower strata. The telecom companies serving the rural areas could compute the chargeable amounts based on the marginal costing principle and thus reduce the rates to be charged at the secondary level. We are of the view that in the long run only commercial operations with profit motive could succeed in penetrating the rural market in an efficient way.

4. We, therefore, submit that ultimately any subsidy whether from the universal service fund or in any other manner should be stopped and efforts made to provide telecom services in rural areas as a commercial venture. The example of introduction of the indigenous C-Dot 128 Line exchange is a success story in providing telephone connectivity at affordable cost

Following are our specific comments on points in Para7 of the CP

7.1) please see the attachment.

7. 2) Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?
Support from USF should not become a permanent feature; all operations must become self sustaining after some predetermined time.

7.3) Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

YES. Also it is important to keep the tariffs affordable and attractive both as a marketing strategy and as an aperitif for additional services to come, by subsidizing tariff as required. This may take several forms, zero or lower revenue share, revenue share after revenue accrues beyond a certain level etc

7.4) In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

Present telecom status as described in last portion of Paragraph 2.2, 6.6 and 6.7 are promising. It appears that it is indeed the last mile connectivity between the OFC Cable point and the rural Exchanges and the Exchanges and the subscribers by radio connectivity are the missing links, and these can be fairly easily overcome.

7.5) For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

NO. Regulating and intervention should be kept to the minimum**.** Let the owners decide what is good for them.

7.6) Do you visualize any other initiative, which should be taken by TRAI as to achieve the growth of Telecom services in rural India?

TRAI could help by preparing project reports for developing telecom services for various standard configurations suitable for rural India. For example, some of the initiatives like Bhoomi in Karnataka and E-CHAUPAL have been great successes. The services need not be limited to these areas only. Various project reports that TRAI may prepare could be publicised to enable the service providers to utilize the expertise of TRAI in this regard.

It will be valuable if after a survey TRAI can choose a few typical rural locations and takes up implementation of Pilot or Field Exercises to test the hypothesis of tariff Vs traffic growth, rural telecom booths, marketing/maintenance efforts required, impact on rural life style etc. to get a first hand experience.

In fact, NGOs engaged in empowerment of rural population can also be involved in planning. Implementation, and performance monitoring with immense advantage.

7.7) Do you think that we can sustain USO subsidy model in the long run?

NO.

7.8) Locally relevant software will have to be developed. What steps could be taken to develop such Software and database and what should be government role in this?

Locally relevant software would have to be developed by each service provider. The Government Role would be limited to being a facilitator.

7.9) Share your experiences within and outside the country that establishes the linkage between growth of Telecom services and economic growth of an area with particular reference to rural area economy.

Rural telecoms in developing countries all over is a challenge and there are a number of publications in different countries. These need to be studied carefully and evaluated for our scenario.

For **CONSUMER CARE SOCIETY,**

N.SHASHIREKHA
SECRETARY

Enclosure: A New Approach for Improving India's Rural Telecommunication Infrastructure

A New Approach for Improving India's Rural Telecommunication Infrastructure

The suo moto initiative being taken by TRAI to take a re-look at the entire issue of rural telecommunications for reducing the gap between the urban and the rural segments of India with regard to the tele-density is very appropriate and timely. Reference: TRAI's Consultation Paper No.16/2004 dated October 27, 2004

The emphasis so far has been on collecting a certain levy from the telecom service providers as USO funding and disbursing same among entities which have come forward to meet the stated telecom facilities in the rural area via an elaborate tendering procedure. The earlier specified obligation for providing certain rural telecom facility has been a non starter.

As efforts so far have not yielded the expected results we have to explore possible alternatives to hasten the pace of provision of telecom services to the rural segment.

So far, such rural projects have been handled by the existing service producers, mostly BSNL and some private service providers. They are all urban centric and there is no incentive on their part to make these a success. It might not be far from truth to say that even their staff is urbanite; ready to migrate to urban areas at the first opportunity. Hence where is the interest? The human resource being the most important element that seems to be weakest. We see on the other hand there are several rural initiatives which have benefited rural areas and running well. Milk cooperatives, agriculture based units, schools or self- help groups with specific goals are some of them. Could it be that the vital difference for anything of this nature to succeed is the human capital, which can come only when the entire project implementation and maintenance and benefits are shifted to the rural community? Are we not having successful rural electrical installations, cable distributors or other industries? We have to replicate these successes in telecom. Imparting telecom training will open further employment potential to the rural educated people and reduce migration to cities apart from enhancing their capabilities. Therefore a methodology has to be found to transfer such rural telecom projects to the rural communities themselves.

For testing this new methodology of handling rural telecom projects and for acquiring the required expertise it is essential to undertake a few such pilot projects. There is an advantage for TRAI to handle them directly as it gives them the necessary knowledge first hand, neutrality is assured, and most importantly it is a significant step towards fulfilling their mandate. A broad outline could be:

1. A preliminary and final project location survey to identify possible location of such rural telecom pilot projects is necessary from the angle of: local resource, training necessary, closeness to contiguous telecom infrastructure from connectivity/cost angle, identifying agency for take over later and business potential etc.
2. Preparation of Project Report with all the available or best guess information including cost, implementation method/time, interconnectivity, consumer education, training, traffic and revenue projection. Capital and running and maintenance expenses for over say a five-year time frame.
3. Implement the project as planned.
4. Financing the pilot project, cash flow analysis and pay back period, organizational ownership/management structure. It is best to finance the pilot project from USO funds to avoid delays and execute the same in a time bound manner by TRAI directly or through an Agency under its supervision.
5. After the results of the Pilot Project are evaluated, the TRAI/USO/GOI will be in a much stronger position to launch massive rural telecom projects.

What the Prime Minister's Golden Quadrilateral Road Project, and National and States' highways are doing to open up the rural India to massive economic activity can be multifold enhanced by creating similar nation wide telecom grid by implementing rural telecom projects. Creation of massive employment opportunities in agriculture, education, transportation and industries and BPOs will make our rural regions powerhouses. And there will be slowing down of rural population migration to cities, simply because all the factors attractive in cities will become available and affordable right where they live. It is clear that in such a scenario the cost of getting telecom services becomes a negligible fraction of income levels as in the case of urban areas now.

It also does not make any economic sense to keep the huge investments already made in telecom infrastructure vastly under utilised by not making optimum use of the readily available 6.7 RKM of Optical Fibre Network and 27000 OFC connectivity capable Exchanges- Para 2.1 of TRAI CP.

Consumer Care Society, Bangalore.
Bangalore,
25 November 2004

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Telecom Regulatory Authority of India

Consultation Paper

On

GROWTH OF TELECOM SERVICES IN RURAL INDIA

The Way Forward

October 27, 2004

Content

Preface

Despite several attempts over the last more than ten years, telecom infrastructure in rural areas is lagging behind the expected levels. There has been a phenomenal spurt in the growth of tele-density in the country, with the evolution of new wireless technologies, but the gap between the urban and the rural tele-density has been increasing. It is pertinent to re-look at the entire issue of rural communications to make a speedy headway.

2. As per the TRAI ACT, TRAI shall make recommendations, either suo motu or on a request from the licensor, on

- measures to facilitate competition and promote efficiency in the operation of telecommunication services so as to facilitate growth in such services.
- measures for the development of telecommunication technology and any other matter relatable to telecommunication industry in general

Additionally, as per the Act, TRAI has to ensure effective compliance of Universal Service Obligation.

3. This consultation paper is an invitation to all stakeholders to participate in a collective thinking process so as to achieve higher and higher quantitative and qualitative growth in telecom services in the country, particularly in rural areas. The Authority recognises that without focus on rural areas, sizeable growth in telecom sector would not be possible and it has discussed various issues related to growth of telecom services in rural areas and seeks the comments of various stakeholders on them. The paper has already been placed on TRAI's website (www.trai.gov.in).

4. Written comments on this Paper may be furnished to Secretary, TRAI by November 30, 2004. For any further clarification on the matter, Secretary TRAI or Adviser (MN), respectively, may be contacted at trai07@bol.net.in (Ph No. 26167448) and jsengg@bol.net.in (Ph No. 26106118).

(Pradip Baijal)
Chairman, TRAI

Chapter 1

Present status

1.0 Background

1.1 National Telecom Policy 1994 (NTP '94) was announced to provide impetus to the liberalization process. In Cellular Mobile Services duopoly was introduced in 1994-95 with both the operators from the private sector. The third cellular mobile license was granted to the incumbents MTNL & BSNL in 1997 and 2000 respectively. In 2001, the Government introduced 4th Cellular Mobile operator. In the case of Basic Services competition was introduced in 1997-98. Here also duopoly was permitted with a difference that one of the operator was incumbent (BSNL/MTNL). With the announcement of the New Telecom Policy 1999 (NTP'99), the migration to revenue share was permitted and four cellular operators were allowed to operate in the market. This policy also led to open competition in Basic Services segment and these licenses, which included spectrum were awarded on first-come-first serve basis. Basic Services operators were permitted to offer limited mobility services in 2001. In 2003, TRAI recommended a migration from service specific licensing regime to Unified Licensing Regime in two-stage process with the Unified Access Regime for Basic and Cellular Services in the first phase, to be followed up with a process to define the guidelines and rules for fully Unified License/Authorisation Regime. The Government accepted these recommendations and Unified Access licensing regime was implemented. In the Unified Access Licensing Regime, both Basic as well as Cellular Mobile Service Providers are free to offer basic and/or cellular mobile service using any technology. In the case of long distance services open competition has been the policy of the Government since 2001 (NLD licenses were awarded in 2001/2002 and ILD licenses were awarded in 2002/2003) As of now there are four National Long Distance (NLD) and five International Long Distance (ILD) operators.

1.2 Though India started late in liberalizing its telecom network and introducing mobile services vis-a-vis other countries, particularly China. We have done extremely well as the following figure 1.1 would show:

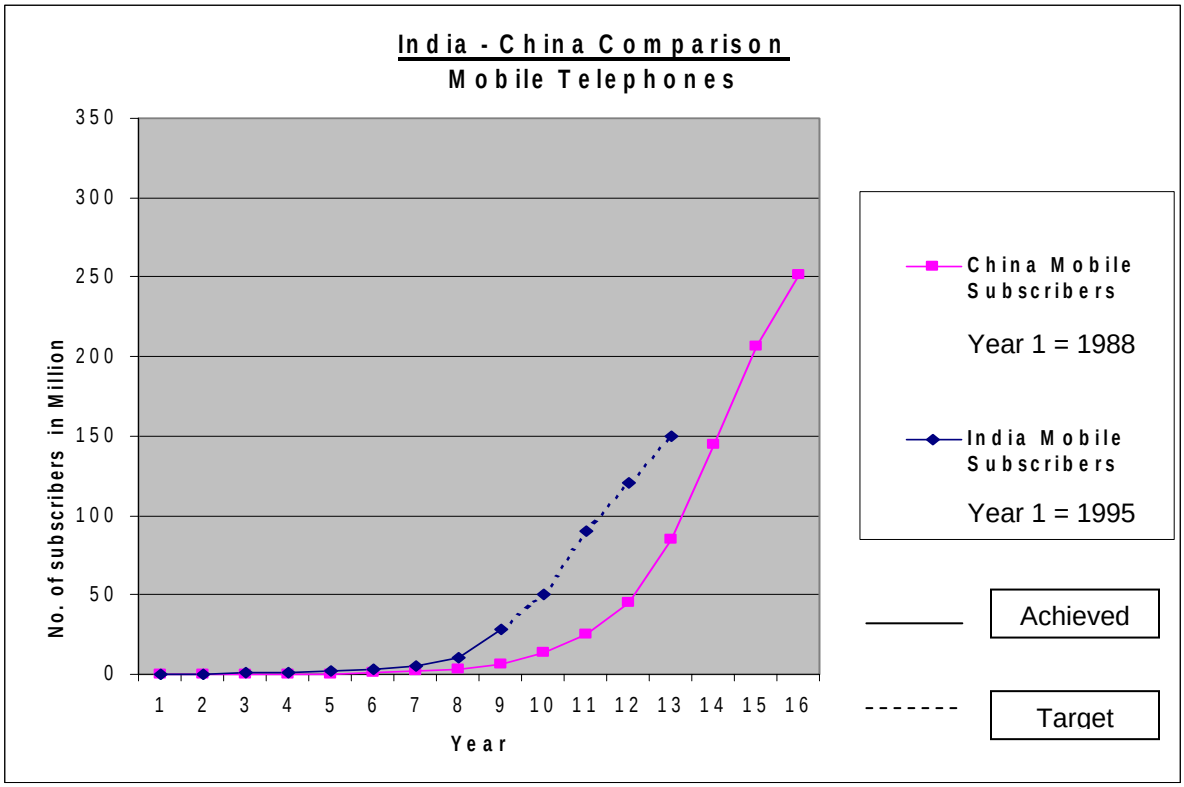


Fig 1.1: India-China Comparison.

1.3 Several steps were taken by the Government & TRAI and aided by aggressive investors the mobile sector growth was accelerated even further as the figure 1.2 would show.

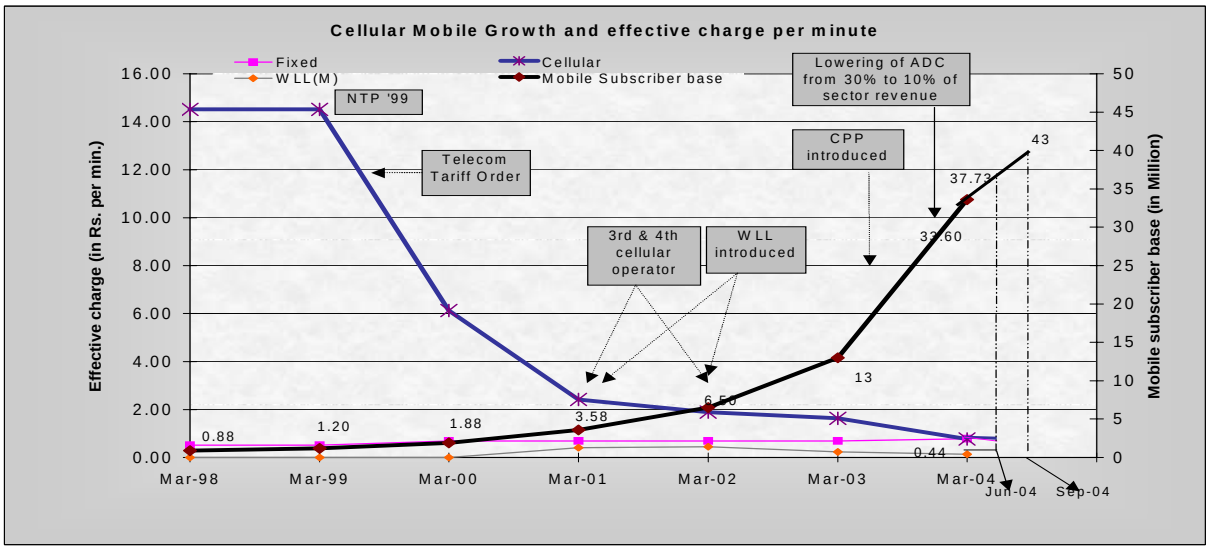


Fig 1.2 Cellular Mobile growth and effective charge per minute

The current mobile numbers are around 43 million (September 2004) and we hope to reach 200 million (including fixed around 50 million) by 2007, announced by Hon'ble Minister, Communications and IT as target, recently.

1.4 We expect to achieve this growth rate since the current mobile network coverage in India is only 20 per cent of the population but this coverage is likely to increase to 75 per cent, as shown below, in next two years. Table 1.1 shows the present and proposed coverage of mobile networks.

Table 1.1 - Present and proposed coverage of mobile networks

Present Coverage of Mobile Networks (Population Coverage 20%)		
	By area	*Population Coverage*
Towns	~1700 out of 5200	~200 Million
Rural areas	Negligible	Negligible
Proposed Network Coverage by 2006 : operators plan (Population Coverage 75%)		
	By area	*Population Coverage*
Towns	~4900 out of 5200	~300 Million
Rural areas	~350,000 out of 607,000 villages	~450 Million

<u>We have to facilitate/encourage implementation of operator's plan</u>

At present the cellular coverage is confined mostly to urban areas. Estimates suggest the total coverage to be about 200 million urban population covering 1700 towns. The coverage in rural areas is very small and mostly incidental. The expanded network would mean that mobile coverage would be available to about 87% of urban population, and 55 ~ 60% of village coverage by 2006 accounting for over 70% of rural population.

1.5 Once the mobile network cover more than half the villages as shown in Table 1.1, rural teledensity will increase multifold vis-à-vis the present teledensity of 1.7. The NTP'99 had envisaged making telecom services of international standards, an aid to the enhance

growth of the national economy. Therefore, we will have to plan for improved telecom facilities, in urban and rural areas besides covering the remainder 2.57 lakh villages which are not included in the present plans of the operators for cellular mobile coverage. It is important to ponder on the means to facilitate such coverage. These are discussed in the subsequent chapters.

1.6 The position of internet, broadband, fixed and mobile telephones services in India as compared to other countries is shown in Table 1.2 below:

Table 1.2 - Status of internet, broadband, fixed and mobile telephones services

				End of year 2003
Parameters	Korea	Malaysia	China	India
No. of fixed telephone lines per 100 persons	51	18.5	18.0	3.9
No. of mobile phones per 100 persons	75	43.9	18.3	2.6
No. of internet connections per 100 persons	26	12	2.5	0.4
No. of broadband connections per 100 persons	25	0.4	1.4	0.019
Charges per 100 kbps per month (US$)	0.25	7.61	3.07	15.63

Even with tremendous growth in the information technology sector, overall ICT usage and penetration in the country has still lagged behind international averages. At today's levels, though, Indians are expected to pay 60 times more than subscribers in Korea for the same throughput, which translates to 1,200 times more when considering affordability measures based on GDP per capita comparison. As recently as 1996, Korea had Internet subscriber penetration under 2%, and broadband reached close to 1% penetration only in 1999. In the five years since, however, broadband has become a way of life for Koreans, and it

permeates in everything they do. Today, almost 80% of households have broadband connections, and in 2002, US$148 billion, nearly 30% of their GDP, was transacted on the Internet. China has also launched a major broadband expansion programme.

The success in other countries in making telecom services as the basic platform, on which economic and commercial growth is achieved, can also be replicated in India, particularly for rural areas. For this development to occur, appropriate regulatory environment and policies need to be established so that the discrepancy in pricing, penetration and type and quality of telecom services between India and other countries can be eliminated. Once this happens, only then will there be successful growth and business models in video, broadband, Internet and telephony services.

1.7 This consultation paper is an invitation to all stakeholders to participate in a collective thinking process so as to achieve higher and higher quantitative and qualitative growth in telecom services in the country. In a higher growth model and when there are multiple service providers, ARPU is likely to fall. The service providers have to focus on offering new innovative value-added services and applications which are useful to local population and are also affordable since further growth cannot be achieved unless telecom services penetrate deeper into rural areas. In fact this could no more be treated as an obligation but this is a business opportunity for a growth based business model. Further details are discussed in the following chapters.

Chapter 2

Rural Telecommunications

2.0 Background

2.1 Before liberalization, universal service objectives have been met by the DOT through a series of programs like Long Distance Public Telephone Program (progressively increasing the scope to the provision of a public telephone within 5 kms of any habitation one telephone in a hexagon of size 5 Square Kilometers), Gram Panchayat Phone (one phone in each Gram Panchayat), and Village Public Telephone Program (one phone in each revenue village) to provide access to voice services. While liberalizing the access segment, post NTP 1994, specific VPT roll out obligations were specified in the licenses. However, these commitments remained largely unmet. Most of the VPTs till date have been provided by BSNL. As on 31.3.2004, 522263 villages out of a total of 607491 villages have telephone access and out of them 509491 have been provided by BSNL. In 2002, USO Fund was established to fund specific USO targets set by NTP 99. In addition, open competition was introduced to create competitive pressure on service providers to expand coverage and reduce tariffs. The results of opening of competition have been fruitful, as it has resulted in steep reduction in mobile and long distance tariffs and increased availability of choice. However, concerns on slow down of VPT / Rural Direct Exchange Lines (DELs) roll out have arisen.

The yearly additions in VPTs / Rural DELs indicated below in figure 2.1 confirms the slow down.

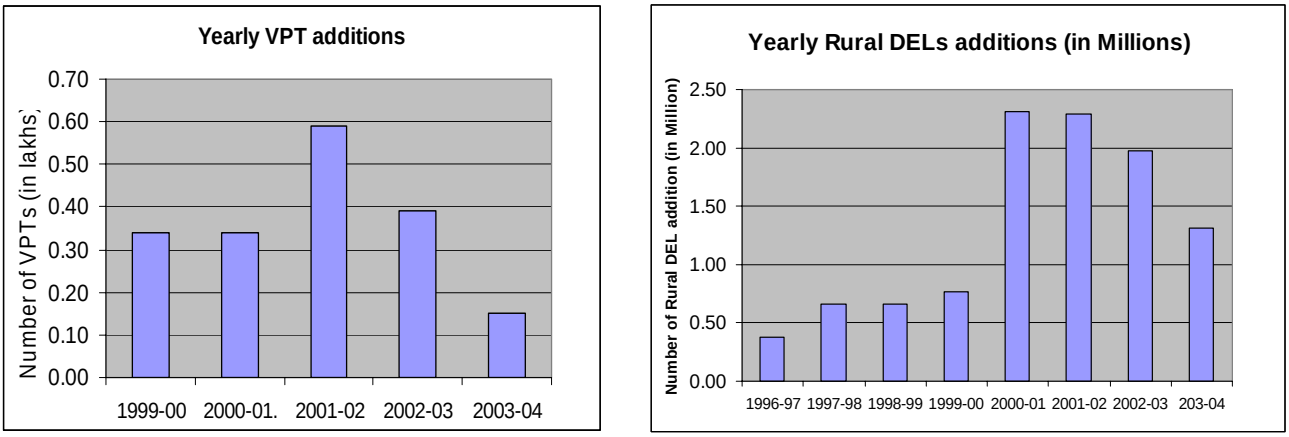


Fig 2.1: VPT/Rural DELs additions

The prime reason for slow-down is apparently the increased focus on cellular mobile infrastructure deployment after 2001-02 and reduction in fixed line and rural investments. Also, most of the rural DELs installed by BSNL have been funded by the government through license fees reliefs. While the direction of investment moved towards cellular, very little of cellular mobile investment went during the period to serve rural areas. However, what is positive about rural network infrastructure is the deployment of huge Optical Fibre network (close to about 6.70 lakh route kilometer), presence of 35000 exchanges in the country and among these 30000 exchanges with OFC connectivity (these include OFC connectivity of about 27000 out of 35000 exchanges in rural areas). It is important to generate synergy from the existing infrastructure which is mostly underutilized in terms of capacity of OFC, to reduce the cost of rural connectivity. This chapter discusses the status of Universal Service in the country vis-à-vis the targets set by NTP'99 .

2.2 Universal Access and Universal Service: concept

Universal Access and Universal Service are internationally defined as

"Universal Access means that every one in a community can gain access to a publicly available telephone, although not necessarily in their homes. Universal access can be available through pay phones, shop – like tele centers, multi purpose centers or even single entrepreneurs who market mobile phone service on a per call basis."

"Universal service means that every household in the country has telephone service - traditionally, a fixed - line phone for every house hold."

- Source: Trends in Telecommunication Reform 2003 ITU

2.3 Universal Service Objectives and NTP'99

In 1999, the Government announced the New Telecom Policy i.e. NTP'99. Universal Service was one of the main objectives of NTP'99. Section 6.0 of the policy has laid down the following specific Universal Service targets:

- Provide voice and low speed data service to the balance 2.9 lakh uncovered villages in the country by the year 2002
- Achieve Internet access to all district head quarters by the year 2000
- Achieve telephone on demand in urban and rural areas by 2002

In addition NTP'99 has also set the following targets:

- Make available telephone on demand by the year 2002 and sustain it thereafter so as to achieve a teledensity of 7 by the year 2005 and 15 by the year 2010
- Encourage development of telecom in rural areas making it more affordable by suitable tariff structure and making rural communication mandatory for all fixed service providers.
- Increase rural teledensity from the current level of 0.4 to 4 by the year 2010 and provide reliable transmission media in all rural areas.
- Achieve telecom coverage of all villages in the country and provide reliable media to all exchanges by the year 2002.
- Provide high speed data and multimedia capability using technologies including ISDN to all towns with a population greater than 2 lakh by the year 2002.

2.4 USO Fund and amendment in the Indian Telegraph Act 1885

The government had finalized the guidelines[1] on USO (Annexure -I), which seek to meet the targets provided in the USO Recommendations. The USO levy is presently 5% of AGR and comes out of the license fees paid to the government. However, the implementation of Universal Service Obligation is through a multi-layered bidding process. The Fund is being administered by the Department of Telecom through Universal Service Fund Administrator.

On 9th January 2004, the Indian Telegraph Act 1885 was amended to provide the USO Fund a statutory non-lapsable status. The Act states

[1] www.dotindia.com

""Universal Service Obligation" means the obligation to provide access to basic telegraph services to people in rural and remote areas at affordable and reasonable prices"

2.5 Present Status of USO Fund receipts and disbursements

Around Rs. 500 crores have been disbursed to telecom service providers during last two financial years to provide telecom services in rural/remote areas. These services mainly include maintenance of existing VPTs, Replacement of VPTs working earlier with MARR technology and subsidy to existing rural DELs. It can be noted that disbursement is much smaller than the amount received on account of contribution to Universal Service Fund (USF) by telecom operators @ 5% of their Adjusted Gross Revenue (AGR).

2.6 NTP'99 targets; achievements and shortfalls

Table 2.1 mentions the targets set by NTP'99 and the achievements till March 2004.

Table 2.1: NTP'99 targets & achievements

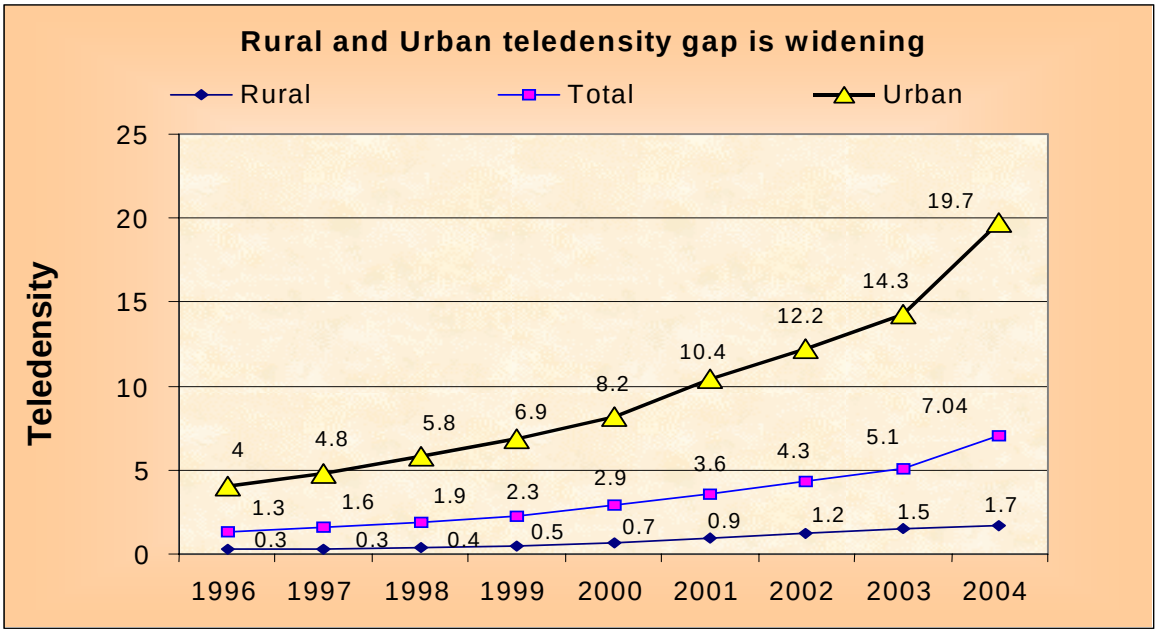
Sr	NTP'99 targets	Whether eligible for USO Funding as per NTP'99	Achievement (March '04)
1	Provide voice and low speed data service to the balance 2.9 lakh uncovered villages in the country by the year 2002	Yes	5.22 out of 6.07 lakh villages have voice capability
2	Achieve Internet access to all district head quarters by the year 2000	Yes	Achieved
3	Achieve telephone on demand in urban and rural areas by 2002	Yes	Urban demand largely met, Rural unmet
4	Tele-density of 7 by the year 2005 and 15 by the year 2010	No	Tele-density 7 achieved in March 2004, 15 likely by 2006
5	Rural Tele-density from the current level of 0.4 to 4 by the year 2010	Partly	Rural Tele-density 1.7 in March'04
6	Reliable media to all exchanges by the year 2002	No	30000 out of 35000 exchanges on fibre and several on microwave and satellite

7	High-speed data and multimedia capability using technologies including ISDN to all towns with a population greater than 2 lakh by the year 2002.	No

While overall tele-density have far exceeded NTP'99 targets there are clear shortfalls in achieving rural telecom growth. The number of rural DEL additions has slowed down in recent years while the mobile services where tremendous growth has been experienced has not ventured into rural markets. This has created a paradoxical situation that needs to be addressed.

2.7 Teledensity increase and growth of rural DELs

The increase in rural and urban teledensity is shown in figure 2.2. The figure clearly demonstrates that the gap between rural and urban tele-densities have been widening.



Source: Indian Telecommunication Statistics 2004, DOT & TRAI Telecom Service Performance Indicators June 2004

Fig 2.2: Rural and Urban teledensity

This gap has arisen as there have been 20.7 Million mobile phone additions in the last year itself and almost the entire additions have been in urban areas and unless the mobile and wireless services penetrate in rural areas, this gap will widen. We have to adopt policies that make business case for rural connectivity. This is now possible due to reducing costs of wireless connectivity both for telephony and broadband.

2.8 The objectives of Universal Service is met through a combination of initiatives shown in figure 2.3 below:

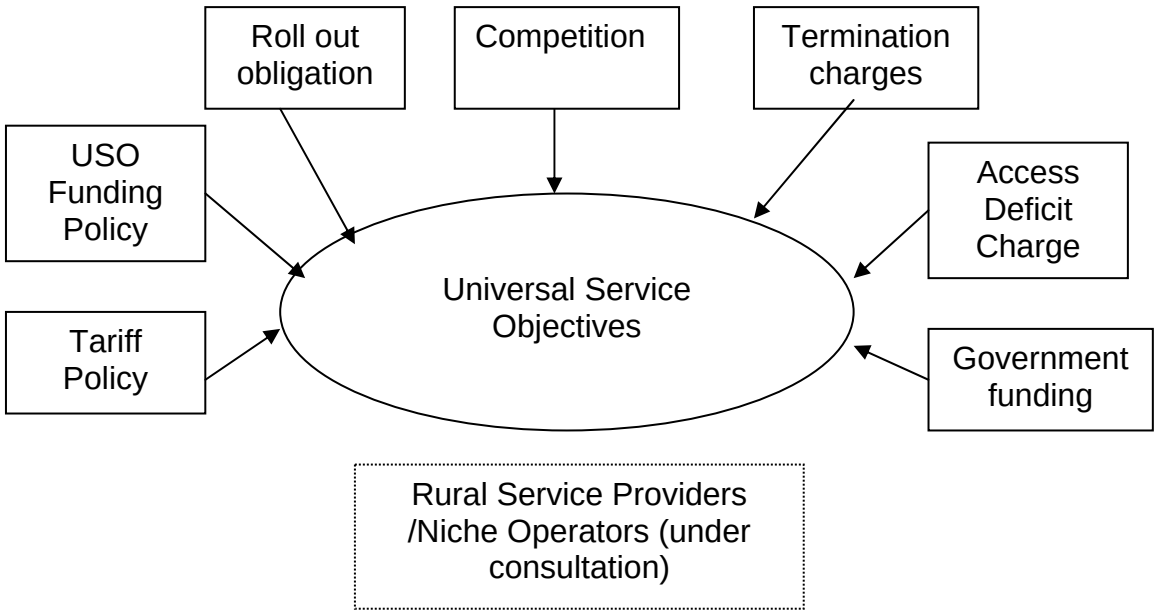


Fig. 2.3: Universal service objectives

It would be seen from above that while the present initiatives have been successful in achieving growth beyond anticipated overall targets, we have failed in achieving rural targets.

The brief status of each of these initiatives is illustrated in Table 2.2.

Table 2.2: Various Policy Initiatives for Universal Service Objectives

Policy initiatives	Contribution towards USO

Tariff Policy	Rural & Urban fixed rentals were traditionally below cost. Mobile tariffs, when specified earlier, were cost based. In 2003, urban fixed tariffs were forborne. However, rural fixed rentals are still regulated and range from Rs. 70 - 280 depending on the exchange capacity. The service provider is allowed to give lower tariffs under alternative tariff package.
USO Fund Policy	To fund voice access in villages, low speed data in 35000 villages, high speed data access in about 5400 villages, subsidy for DELs in rural and/or remote SDCAs (486 out of 2648) . At present about 5% of adjusted gross revenue is collected, estimated at about Rs 3000 Crores for 2004-05
Competition	Intense competition in mobile services is forcing operators to bring down tariffs and expand coverage.
Termination charge	Rural termination charge same as urban termination charge.
Access Deficit Charge	A charge imposed to cover the deficits in provision of fixed lines in rural and urban areas. Funding to the extent of Rs 5340 Crore per annum. Reduced from 30% of the sectoral revenue to 10% to make services more competitive.
Government funding	License fees reimbursement to BSNL (Rs 2300 Crore) in lieu of commitment to provide 10 lakh rural DELs.
Roll out obligation	Access Providers to cover 50% of DHQs, NLDOs to set-up POPs in every LDCA. The revised roll out obligation for NLD services are under consideration in Unified licensing recommendations.
Rural Service Provider	Presently non-existent. Under discussion in Unified license in form of 'niche players'

USO Fund covers a certain portion of USO initiative in India. As discussed earlier, these are

Universal Access related

- Providing voice access to rural areas
- Low speed data access
- High speed Internet access

Universal Service related

Providing subsidy to individual DELs in 486 (out of 2648) rural /remote SDCA

2.9 Subsequent chapter discusses the various on-going initiatives and existing opportunities to facilitate growth in the telecom sector.

Chapter 3

On going initiatives and Opportunities

3.1 Increased competition and dramatic decline in tariffs led to explosive growth in the mobile sector. The various policy initiatives that facilitated this include introduction of calling party pays regime and aggressive competition, lowering of Access Deficit Charge from 30% of sectoral revenue to below 10%, finalisation of IUC regime tailored to facilitate ongoing convergence, handset price reduction, general tariff forbearance, Unified Access licensing regime, etc.

3.2 Key ongoing initiatives for improving growth of telecom services include

- Unified Licensing
- ADC Review
- Spectrum related issues
- Internet and Broadband growth
- Tariff for domestic and international lease line

3.2.1 Unified Licensing Regime:

TRAI had issued its draft recommendations on Unified Licensing for the comments of stakeholders. Based on the comments received and its own analysis TRAI will shortly finalise its recommendations on Unified Licensing Regime and submit them to the Government for its consideration.

In its draft recommendations on Unified Licensing Regime TRAI has proposed reduction in regulatory costs such as license fee and simplifying the licensing procedure. Unified Licensees shall optimise their resources by offering all kinds of services using any technology as per the prescribed terms and conditions. This will help in reduction of input

costs. The concept of Niche Operators has also been introduced in the Unified Licensing draft recommendations of TRAI. This enables such operators to provide services at lower prices and costs in backwards areas from telecom perspective. It may be recalled that mobile networks will only cover about half the villages. Internet/Broadband connectivity in these villages can be given by ISPs. Several other villages could be covered through the 'Niche operator' concept. These villages will be those that have less than 1% teledensity, as defined for the 'Niche operator' concept in the Unified Licensing draft recommendations. TRAI's recommendations on ULR envisages that the SDCAs having rural teledensity less than 1% will be considered telecom-wise-backward areas and niche operators would be entitled to offer telecom services in these areas only. At this point of time, niche operators are defined to offer telecom services in these areas only but this definition of niche operators could be reviewed depending upon market conditions and development of various technologies and various applications. Niche Operators will be subjected to nil registration (entry) charges. These Niche Operators will pay annually 6% (contribution to USF + administrative cost) of their AGR as license fee. Niche operator may be given support from USO.

One could argue that since Niche operators shall be mandated to operate in only those SDCAs where rural teledensity is less than 1% and are being levied a license fee of 6% which includes contribution of 5% towards USO there is a case that they should get support from USF. Comments received from the various stakeholders are being examined. Some of the stakeholders have opined that Niche operators should be permitted to offer both fixed and mobile services/any telecom service. License fee and spectrum fee for the Niche operator should be nil. Only Administrative cost should be charged as license fee and Niche operator should get support from USF. Few other stakeholders have opined that Niche

operators should not be allowed. Instead give incentives to existing operators to roll out in telecom facility wise less developed areas. If niche operators are introduced then roll-out obligations to cover all villages of SDCA may be imposed on such operators

As far as "niche operators" are concerned there are arguments for and against providing them support from USO Fund.

	Arguments in favour of providing support to niche operators from USO	**Arguments against providing support to niche operators from USO**
1	Niche operators are access providers and the present USO policy envisages provision of support / participation in USO provisioning by access providers	The concept of 'Niche operators' did not exist when USO guidelines was framed. Licensees with nil or zero entry fee were not permitted to participate in USO Bidding in the first phase.
2	Niche operators have been granted free entry as there area of operation is confined to telecom service wise backward and is not a mix of very lucrative / less lucrative area as is the case of Unified licensees. Therefore, grant of free entry is not an argument to debar them from USO Fund reimbursements / support.	Niche operators have already been granted free license and, therefore, should not be considered for support from USO.

One option could be to consider niche operators for USO support in the second round of bidding i.e., if the Unified licensees fail to meet the benchmarked price.

The entry of 'niche players' would also provide the stimulus to the other service providers to improve coverage in such areas in order to retain markets with them.

The issue for consideration here is should such an operator be licensed under the Unified Licensing regime, whether he should also be eligible for USO support in case he pays the same annual license fees? If yes, how should these operators get support from USF.

Issues pertaining to ADC and spectrum are being dealt with separately through a consultation process.

3.2.2 **ADC Review:-**

As mentioned in the preceding paragraphs ADC was reduced from around 30% of sector revenue to 10%. Due to unprecedented high growth specially in wireless subscribers and changing traffic pattern due to reduction in long distance tariff, Authority felt it necessary to further review ADC regime. Authority had floated a Consultation Paper and Consultation Process has been completed with various stakeholders. Authority had asked various telecom operator to submit the data regarding traffic and ADC. There has been a delay in submission of the data and Authority is taking necessary steps to ensure the availability of the data. It is expected that at least some of this data would be made available soon and Authority would shortly finalise the revised ADC regime.

3.2.3 **Spectrum Related Issues:-**

Considering the growth of wireless services, Authority is of the view that it is necessary that spectrum availability at reasonable price or at lowest possible price is one of the key objectives. Authority is aware of the fact that if a scarce commodity like Spectrum is available at a very low price, then operators may have a tendency not to use it efficiently. All these issues including availability of spectrum, spectrum trading, etc have been dealt in a Consultation Paper on Spectrum related issues. Authority has received comments from various stakeholders and spectrum recommendations are under finalisation. Most of future growth in telecom services has to be achieved in rural areas. Authority is exploring the possibility of either drastically reducing the spectrum charges in rural area or make it 'Nil'. Delicensing of spectrum for introduction of **wi fi** and **wi max** technologies is of utmost concern to the Authority. Authority considers that with 1 billion population and only 8%

teledensity, there is a big opportunity to leapfrog for introduction of all new technologies so as to make the telecom services available to rural areas at affordable price.

3.2.4 Broadband Internet Growth :- Government has recently come out with Broadband Internet Policy. Authority expects that we will surpass the targets set therein for Broadband Internet Services. In other countries, for example South Korea and Malaysia, their Governments had to spend lots of money through infrastructure projects and subsidy to achieve widespread networks and broadband connections. Only after these funds were invested and projects completed did those countries start seeing any benefits of having these networks and extensive e-governance. On the other hand, in India, we are lucky to have a strong and rapidly growing telecom industry. Both public and private players have already covered the country extensively with their networks. By the end of next year we will have international bandwidth connectivity of 16Tbps. We have only lit 0.34 Tbps so far. BSNL already has 30,000 exchanges which are connected by fibre. This implies an average of 4-5 exchanges per block are connected by fibre. In addition, private operators like Tata, Reliance and Bharti have laid their own new networks. Leased line providers like Railways, Power-Grid and GAIL have also laid large optic fibre networks. Most of this capacity has not been lit. It is evident that by using the existing infrastructure, it would be possible to connect the entire country without sizeable incremental investment. Lighting up fibre optical network is only 20 per cent of the costs of laying down the network. For extending the fibre connectivity up to each village, wireless connectivity including WiFi/Wi-Max or in some cases just tapping existing fibre could be considered. Thus there are enough existing resources in the country to launch major internet, broadband, telephone connectivity and e-Governance projects. However, this has to be done in the most economically viable, efficient and beneficial manner.

3.2.4 Reduction in domestic and International Lease Line Tariffs.

Authority has already floated a Consultation Paper for review of domestic and International lease line tariffs. Various stakeholders have already submitted their comments which are being analyzed and Authority will shortly finalize the tariffs for domestic and International lease lines. While finalizing these tariffs Authority will keep in mind the available optical fibre infrastructure both in domestic and international sector and continued investment in infrastructure growth. Authority is also aware of the fact that availability of lease line and its tariffs plays a very vital role in growth of telecom services in the country.

3.3 Existing Projects to increase telecom penetration in rural areas

There are many broadband/internet projects primarily for rural areas, which have been implemented by various State Governments/NGOs or Corporate Houses. Some of these projects are:-

- ITC e-Chaupal
- N-Logue
- MS Swaminathan centre in Pondicherry
- Akshaya in Kerala
- Gyaandoot in MP with focus on e-Governance.
- Bhoomi in Karnataka
- E-seva in Godavari District of AP
- Warana in Maharashtra by NIC
- Aksh Broadband
- Jagriti in Punjab

In these projects the connectivity to rural areas is through satellite, microwave link, copper, fibre, etc. as shown in figure 3.1, depending on what is available already or has been specially installed for this purpose.

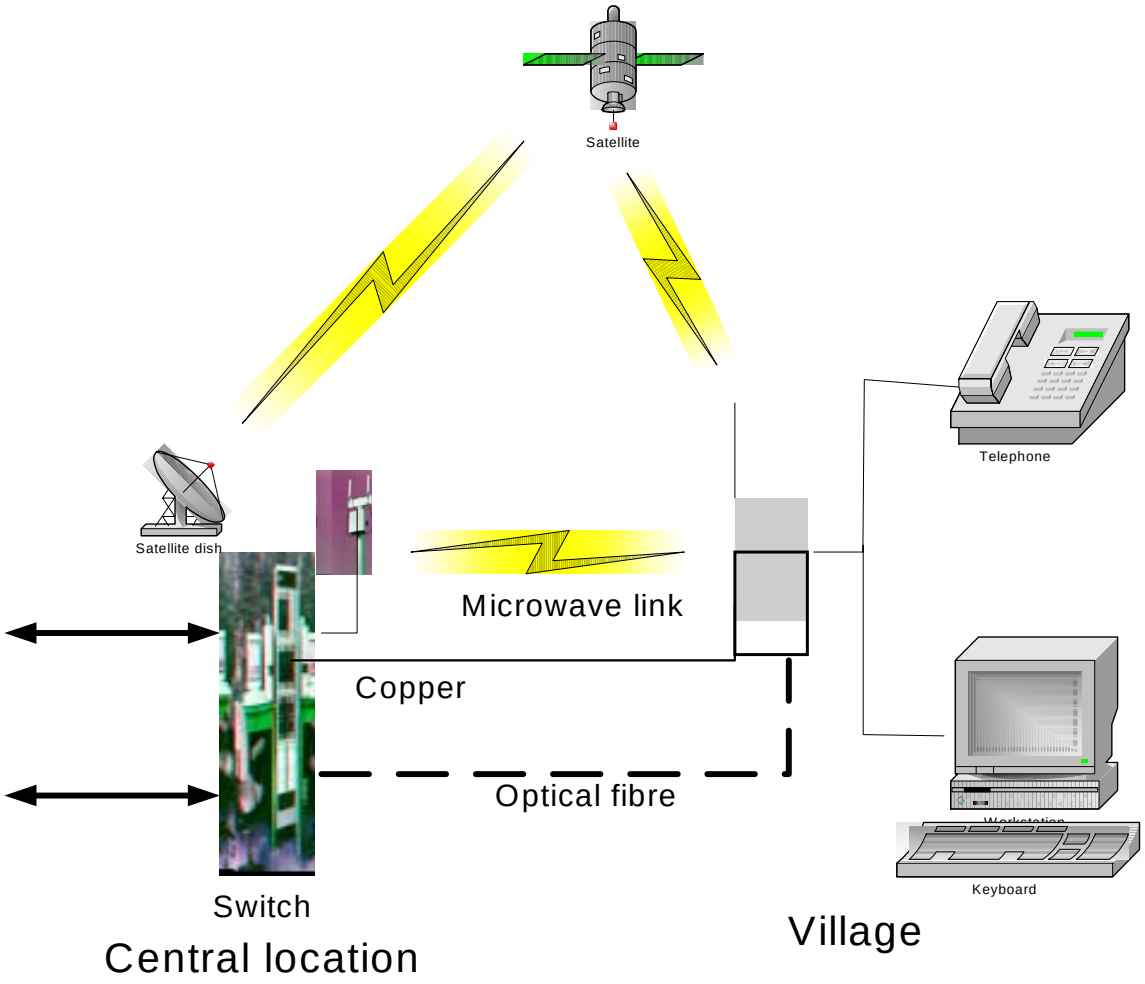


Figure 3.1 - Village connected either through satellite, fibre, microwave, etc.

Some of these ongoing projects were analysed to examine their self-sustainability aspects. Salient features of four of these projects, especially highlighting the financial viability aspects are discussed in Annexure II. Analysis of these four projects indicates that these business models may not be sustainable on their own if implemented on countrywide basis specially in the initial years of their operations. At the same time, giving away direct subsidy may also not be a desirable solution. Under these circumstances, to facilitate the growth of these projects, Government may support them by ensuring that necessary inputs are made available to them at reasonable and lowest possible costs. For example, spectrum for such projects, especially in rural / remote areas should be made available at low cost or free of cost. The pricing in such areas should also logically be very low. With low prices relatively large demand can be generated, making these projects more attractive and sustainable. The bandwidth for connectivity should also be given to such projects at a low cost or free for an initial period of 5 years or until such time that bandwidth prices fall low

enough to be affordable for widespread use, approximately more than a 75% decrease. The bandwidth providers giving this free bandwidth or at low cost should be subsidised from Universal Service Fund. The price of this bandwidth could be determined by the Regulator particularly since all this bandwidth, at present, is lying unutilized.

Recently, Chairman, WIPRO and Chairman MICROSOFT, India have indicated their plans to bring down hardware and software costs very substantially for rural broadband and connectivity projects. The project costs also have to be reduced by substantially reducing spectrum and bandwidth costs.

At present these projects are scattered attempts in different areas by different organizations. One should analyse these projects in detail and work out a suitable model for self-sustainability of these projects. Efforts are required to be made to make such projects self-sustainable and multiply such projects. A significant Government initiative involving corporates/NGOs/State Governments in implementing these types of projects would be effective in launching a major broadband/internet/rural connectivity/ e-governance projects as visualized by the Hon'ble Prime Minister. The Government can involve such bodies also for undertaking projects in different geographical areas in the country.

3.4 Sharing of Infrastructure

Another initiative to reduce the cost of providing telecom services is sharing of infrastructure. Several countries in Europe, Australia are using infrastructure sharing model to reduce the cost of offering of telecom services. Some of the examples are white zone concept in France, sharing of infrastructure between two mobile operators in Australia to offer 3G services, sharing of infrastructure among various mobile operators in Europe for 3G services. The question comes whether it should be left to market forces to decide the mode of sharing the infrastructure, the commercial terms and conditions or Regulator should mandate it. In India also, Authority has noted that operators are sharing infrastructure but it is to be considered that pace has to increase specially to improve the mobile coverage in rural areas. In fact, like in France operators could even divide the areas and have roaming arrangement to each other's subscribers when they roam in these areas. One may argue that it may lessen the competition but considering large number of operators

in all service areas, still competition will be available. This could be just an initial impetus to increase penetration of mobile services in rural areas.

Chapter 4

Telecom Technologies

India is very fortunate that the telecom growth is taking place at a time when various technological developments are taking place in a direction that low cost telecom technologies in access devices, access network, switching network and transmission technologies are emerging. The regulatory challenge today is that the regulatory system should be such that the growth and deployment of all these technologies should receive a fillip. With around 700 million population living in rural areas having only 1.7% teledensity there is a big market for introduction of latest technologies. Some of these technologies are briefly discussed below:-

i) Wi fi/ Wi max:

The growth of wi fi /wi max technologies in different countries provides a very good opportunity especially for growth of telecom services in rural India. As already mentioned in the previous Chapter, Government has already taken initiatives for de-licensing of spectrum for introduction of ***wi fi*** technologies. Some further steps in co-ordination with Department of Space and other users of spectrum in 5.1 GHz band will be taken very shortly. Similar steps for promoting the deployment of wi max technology will have to be taken urgently. Authority considers that this will provide an affective alternative for growth of telecom services in rural areas.

ii) Power Line Communication :

Recently on October 14, 2004 FCC (US Telecom Regulator) has adopted rules for broadband over power line to increase competition and promote broadband services to all American citizens. Access broadband over power line (Access BPL) is a new technology that provides Access to high speed broadband services using the untapped communications capabilities of the nations' power grid. This technology will also facilitate the ability of electric utility to dynamically manage the power grid itself,

increasing network reliability by remote diagnosis of electrical system failures. While allowing Access BPL care has to be taken that existing Licensed Services are not interfered with. Power line technology is already being used in Hong Kong and Brazil. In Brazil Access BPL is being used to provide broadband services in schools and public libraries. Authority is getting more details about this technology and would come out with a consultation note separately on this issue after getting more details from the countries which are using this technology and will share their experiences with various stakeholders.

iii) Cable based broadband:-

Penetration of cable for entertainment has reached a level of 55 million, considerably higher than fixed line penetration. This growth has been achieved by the industry in an unregulated environment resulting in poor quality. Two way type network capable of broadband services including telephony, requires some additional investment. This opportunity has been seized by only a few large cable operators and has to be encouraged through training and information dissemination brining out the new business case. Such a business case for cable operators has become imperative due to the evolving and upcoming competition from fixed line based broadband and DTH technologies.

iv) Satellite technology:-

Satellite technology is another attractive option for the growth of telecom services which has been clearly brought out by the Government's new broadband policy. This policy encourages the deployment of DTH and VSATs for triple play services.

v) VOIP & Internet Telephony :-

Various stakeholders are aware of the services offered by Skype. This service allows a user to download free software and make free voice calls to another subscriber who also is a Skype Subscriber. Recently by charging nominal charges

Skype has offered the facility even of calling PSTN and mobile subscribers. In one of the interviews, CEO of M/s. Skype said that if an e-mail can be sent without charging extra then why not a voice call specially when both are using the same resource. In competition to that another Israel based Company called M/s. Popular Telephony has come out with another software called Peerio. This software is a *marked shift* from the phone network-- new and old—work today. Typical networks require special switches to make connections between phones. The more recent Internet based networks like VONAGE use cheaper software switches and gateways compared to the old phone systems for interconnecting phones. This technology has eliminated the need for any switches and one can make phone calls from one Peerio user to other Peerio user on the Internet via high speed Internet links. The software also allows one to make phone calls to plain old telephone systems. In pure IP network the concept of current telecom business order of buying monthly service may not be applicable and instead of that telecom services will be like buying a PC and keeping it i.e. commoditisation. The basic difference between SKYPE software and Peerio software is that SKYPE software connects call through a server with a directory of all users while Peerio users connect directly as a P2P network and do not need a directory server. It is expected that this software will be available in the handsets also. (Source : Telecom and Wireless Report of Business 2.0 dated October 20, 2004). The introduction of such disruptive technologies would open up new frontiers of applications and make the telecom services more and more user friendly in such a way that various applications suitable for local population could run on this telecom infrastructure.

vi) The other existing wireless technologies like CorDECT etc. have not been discussed here because it is expected that stakeholders are already aware of most of such technologies.

CHAPTER 5

Why Rural Telecommunications?

5.1 This Consultation paper has discussed various issues related to growth of telecom services in rural areas. The fundamental question comes why it is necessary to have this growth. This chapter briefly analyse the reasons for having higher and higher penetration of telecom services in rural areas which are enumerated below:-

i) There is no doubt about the linkage of economic prosperity (in terms of GDP per capita and teledensity of a country) and to achieve a higher teledensity in a country like India where around 70% population lives in rural areas, it is necessary for telecom services to penetrate into rural areas if we have to increase the teledensity in the country and we as a nation also join the club of developed countries where very high level of telecom penetration has already been achieved.

ii) Based on international experience in various countries it has been estimated that the penetration of telecom services enhances the productivity and wealth generating capabilities of the local population which in turn increases the GDP of the country.

iii) This is not a new hypothesis and it has already been demonstrated at thousands of locations within and outside the country that a largely self-sustainable business model can be created for these telecom services even in most backward areas.

iv) It is to be kept in mind that connectivity is not an end in itself. We have to see that what do the rural people do with the computers and connectivity.

v) Various applications useful to the local population are to be developed and we have to go beyond tele-education and tele-health and revitalize the rural economy by creating rural micro enterprises.

vi) These micro enterprises could be in the areas of agriculture, food processing industry, animal husbandry, fisheries, sericulture, handicrafts, etc.

vii) Urban India can outsource their IT based services to rural India. Government would outsource works like digitization of land records, birth – death certificates and variety of data entry works to the agencies or small entrepreneurs in rural areas. This would enable these enterprises to create wealth in rural areas.

5.2 Recently Government of Thailand has taken an initiative to promote local Thai products in the global market. This is called ONE TAMBON ONE PRODUCT (OTOP). These products are very carefully chosen from each locality (Tambon) in a rigorous selection process and a range from food, textiles, accessories, handicrafts, decoration items, furniture and herbal products. This type of projects can be initiated in our country also where a broadband telecom connectivity at village level would give an opportunity to our rural population to publicize their products in world market. (Source: Time Magazine issue September 20, 2004)

5.3 World Meteorological Organization, Geneva, Switzerland is taking an initiative for communication of weather information to farmers through Field Servers. Information can be identified as the cornerstone for successful farming in the 21st Century. Timely availability and appropriate use of agro meteorological information is critical for many field operations and has shown significant economic benefits.

Information and communication technologies (ICTs), and especially computer-based and Internet communication tools, can be effectively used to provide farming communities with agro meteorological information for appropriate decision-making. Recent developments in the design of Field Servers, which can be easily deployed in the fields, enable real-time monitoring of rainfall, temperature, solar radiation, soil temperature, etc. Field Servers have a very flexible interface and can optionally have several other types of sensors such as a web camera, an infra-red sensor, wind speed, wind direction and leaf wetness. In addition to its sensing functions, Field Server can serve a wireless LAN access point so that each field Server can establish a wireless network with other Field Servers. Thus a whole region can be covered by the Internet accessible wireless hot spots with the

deployment of several Field Servers. (Source : Dr. M.V.K. Sivakumar, Chief, Agricultural Meteorology Division, World Meteorological Organization, Geneva, Switzerland). Further details on this project could be obtained from World Meteorological Organization, Geneva, Switzerland.

5.4 These two applications have been mentioned which could open up the new opportunities to the rural and farming population of the country. But there could be many applications which may be added to this list. In fact as mentioned earlier in this paper, at thousands of locations many applications are already running in the country and the question is to learn from these efforts and experiences and develop a national approach for growth of economy of the country through increased penetration of telecom services in rural India.

AN APPROACH TO MAKING TELECOM FACILITIES AVAILABLE IN RURAL AREAS

6.1 Discussions in the previous chapters have brought out the following:

i. There has been a phenomenal spurt in the growth of tele-density in the country, with the evolution of new wireless technologies. Despite several attempts over the last more than ten years, the gap between the urban and the rural tele-density has been increasing (see figures 2.2 Chapter 2).

ii. Roll out obligations as part of licence conditions also did not manage to get telecom infrastructure in rural areas.

iii. The evolution of GSM and CDMA technologies besides the indigenously developed corDECT technology gave tremendous scope for the spread of telecommunication facilities in the rural areas. While there has been a definite improvement over the last two to four years in terms of coverage of villages, the coverage and its reliability are far from satisfactory.

iv. There is a clear indication available that potential exists for 200 million telephones in the country for which the Government have announced a target date of 2007, largely based on achievement of about 150 million wireless based telephones. This requires a growth by 120 million in the next 30 months, i.e. an average of four million connections per month. Currently, we are able to achieve on an average 1.6 million connections per month.

v. There has been a slight slow down in the rate of provisioning of cellular mobile telephones in the last six months despite the prices being very attractive. The reason for this has been traced to the exposure of a merely 20 percent of the population to mobile coverage.

vi. The Universal Service Obligation Fund (USO Fund) currently has emphasized mostly on telephone connections and to a limited extent on high speed telecom information centres. Even this effort has had limited results so far as is evident from the amount of money disbursed.

6.2 From the above summary it is evident that a relook at the entire issue of rural communications is needed to make a speedy headway. A few pilot projects and schemes tried out in rural areas albeit not in extremely backward rural areas, and discussed in the previous chapters have demonstrated that there is a different market available in the rural areas which goes beyond the current approach of essentially voice communication to these areas. It has also been shown that this model requires help in inputs for reducing the time periods (for at least some of them) to become economically viable.

6.3 An alternative approach has to be based on an improved business case associated with Rural Telecommunications to attract more entrepreneurs to set up their networks. Even if subsidy is needed to improve the business case, this should be attempted in the form of a transparent direct subsidy at input level only for a limited period of time.

6.4 Such a model relies on the concept that telecommunication facilities will enhance the efficiency and efficacy of the existing commercial and agricultural activities taking place in rural areas thereby contributing towards enhancing GDP in rural areas. The current contribution of rural segment to the national GDP is about 25 percent and requires an approach in which this 70 percent rural population of the country makes a much better contribution towards national GDP compared to the present status. That telecommunications provides such efficiency and efficacy and enhancing effect leading to higher GDP has been established in several well-developed countries where up to two percent GDP growth increase has been attributed to broadband connectivity. This has been followed most effectively in South Korea where the State took upon itself to spend substantially on the telecom backbone infrastructure and achieve 80 percent household penetration with broadband and a two percent increase year to year in GDP.

6.5 Technologies are available which are reducing the cost of provisioning telecommunication facilities – in particular, broadband facilities – in rural areas at an ever

increasing pace. These have been briefly discussed in Chapter 4. Providing direct subsidy through USO Fund at input stage for a few years where needed, would result in new entrepreneurs coming in and expanding the network quickly. With this rural connectivity in mind, the concept of niche operators has been proposed in the draft recommendations for Unified Licensing.

6.6 We are in a fortunate situation where the optic fibre structure has already been extended to the extent that on an average optic fibre termination is available in 4-5 locations in each block. This implies that we can reach within 15 to 20 kms. of most villages with large bandwidth through lighting up of dark fibres which would, in turn, imply that the total investment needed for achieving this objective could be one-fourth to one-fifth of that needed in case we had to lay the entire optic fibre backhaul infrastructure. And in this regard, India is in a far more advanced and fortunate situation than most of the similarly placed countries. One approach could be that capital funding required and the maintenance effort needed for creating this bandwidth from district headquarters down to all such locations in a block could be provided from the USO Fund.

6.7 As already discussed, technologies are available to extend these bandwidth access locations right to the villages based on wireless connectivity. The choice of the technology must lie with the entrepreneur. But, an incentive could be provided to him which would make the spectrum between bandwidth access points to the villages and rural areas, available free of cost or at a mere administrative cost only. This could be justified on the basis of the argument that in such areas where spectrum is not a scarce commodity and therefore, need not command any price.

6.8 The key to making such an approach viable is to ensure that the telecom infrastructure is used to the maximum extent thereby maximising the output on the capital investments on the infrastructure. It may be recalled that the ISD/STD booths initiative of Government of India was highly successful as the implementation of this scheme was left to the entrepreneurs and the operators ran the Government scheme. A similar strategy is possible for a viable rural telecommunication connectivity project.

6.9 Based on the above considerations a possible approach to rural telecommunications in ensuring increased rural GDP could be outlined as follows:

i. Revise the objective of rural connectivity from the existing voice and low speed data to broadband connectivity.

ii. Adopt the approach of broadband kiosks on the same lines as STD/ISD kiosks for voice telephony used so successfully for spreading public access to telephone. These kiosks may be in the domain of entrepreneurs whose input costs could be subsidized in a transparent manner from USO Fund for a period of two to three years.

iii. For providing connectivity from District headquarters down to the multiple locations in each block, based on utilization of existing mostly optic fibre infrastructure, USO Fund support may be made available for lighting up spare fibres in the network of various operators and in particular, that of BSNL. USO Fund could also be used to pay for the maintenance expenditure of this bandwidth.

iv. The key to self-sustainability of these kiosks would lie in maximizing the use of kiosks facilities and the network connecting these kiosks to the national networks. For ensuring this, locally relevant content would have to be developed which will follow the setting up of large number of kiosks to make it attractive for entrepreneurs to develop such content. This content will vary substantially from location to location within the country. However, to provide the initial impetus for the setting up of such kiosks and making them attractive for the entrepreneurs, major contribution would come from the Government's e-Governance programme which will ensure citizen to Government and Government to citizen interaction through these kiosks on a paid basis. The Government could run e-education, e-health, e-agricultural, etc. extension programmes on these kiosks and pay for the utilisation of these networks. It is anticipated that growth of other content starting with entertainment would follow rapidly.

v. There could be large number of areas where optic fibre-wireless communication combination may not be able to reach and the only effective solution would be satellite based.

Suitable measures are required to be taken to reduce input costs including connectivity costs, to the service providers

vi. Sharing of Central/State Government Infrastructure at zero or minimal cost. Central Government may issue necessary guidelines to State Governments for sharing of buildings, masts, etc. available with them, particularly in areas which are backward from telecom point of view.

vii. Since the future growth in telecom services will be through wireless technologies, the availability of Spectrum at a reasonable price is a must for the growth. TRAI has already finished the consultation process and will submit its recommendations to the Government for consideration. Spectrum is a key input and, therefore, its availability at a reasonable price is a must for the growth of services. In fact, for the operators operating in rural areas only, Spectrum should be made available free of charge or at the maximum, the administrative cost. For the big operators a discount in spectrum price related to coverage in rural areas could be worked out. TRAI recommendations shall cover all these aspects.

viii. Central/State Government should support NGOs, companies, corporate, individuals for different areas in the country, who wish to undertake these projects.

ISSUES FOR CONSIDERATION

1. This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.
2. Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?
3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?
4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.
5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?
6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?
7. Do you think that we can sustain USO subsidy model in the long run?
8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?
9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

Annexure-I

GUIDELINES FOR IMPLEMENTATION OF UNIVERSAL SERVICE SUPPORT

The New Telecom Policy'99 envisaged provision of access to basic telecom services to all at affordable and reasonable prices. The resources for meeting the Universal Service Obligation (USO) shall be generated through a Universal Service Levy (USL), at a prescribed percentage of the revenue earned by the operators holding different type of licenses. Further, NTP'99 envisaged implementation of Universal Service Obligation for rural and remote areas through all Basic service providers who will be reimbursed from the funds collected by way of USL. Other service providers shall also be allowed to participate in USO provisioning subject to technical feasibility and shall be similarly reimbursed out of the funds of USL.

2. It has been decided to extend support to the Universal Service from the Financial Year 2002-03 and the following are broad guidelines for implementation of Universal Service Support Policy:

i) The funds created by the Universal Service Levy shall be spent in rural and remote areas on both the public access telephones or Community telephones meant for public use and individual household telephones in net high-cost rural/ remote areas.

ii) The support from Universal Service Fund will be provided to meet Net Cost (i.e. Cost minus Revenue) of providing the universal service.

iii) In the event of an increase in the requirement of Universal service Obligation (USO), the percentage of contribution towards USL can be raised to meet such additional

requirement but the added levy will be drawn out of the prevalent percentage of license fee keeping the ceiling intact and as such, will not cause any additional burden either on the service providers or the consumers.

iv) The implementation of USO will be divided into two clearly identifiable streams:

A) Stream-I:

Provision of Public Telecom and Information services:

a) **Installation of VPTs in the remaining villages**. For installation of VPTs in the 6,07,491 villages, identified as per 1991 census which were required to be covered by 31.3.2002, no reimbursement towards Capital recovery shall be admissible and given. However, the Net Cost towards operating expenses of these VPTs will be reimbursed. For the remaining villages, i.e. additional revenue villages identified as per 2001 Census, the Net cost towards both, the annual capital recovery as well as annual operating expenses will be allowed as a support from the USF.

b) **Provision of additional rural community phones in areas after achieving the target of one VPT in every village.** The second public phone will also be installed in villages where population exceeds 2000. These may be provided in public places such as schools, primary health centers etc and for the purpose of support from the USF, the Net cost towards both annual capital recovery as well as annual operating expenses will be allowed.

c) **Replacement of VPTs installed before 1.4.2002**. A large number of VPTs working on MARR Systems will in the first instance be required to be replaced to ensure their reliable operation. The BSOs will be required to draw up a yearly plan for replacement of such

VPTs and support from USF will be allowed towards both the annual capital recovery as well as annual operating expenses.

d) **Up gradation of VPTs to Public Telecom and Info Centers (PTICs)**. It shall be endeavoured to provide, by the year 2004, for data transmission facilities within 5 Kms of every village and at least in all those villages where regular post offices are located. The reimbursement from the USF will be towards Net Cost that may arise if the PTICs are engineered by upgrading an existing VPT, with the minimum configuration of i) a PC, ii) a Modem and iii) an UPS. Both capital and operational cost will be taken into account to determine the quantum of support from USF. A phased programme will be drawn and implemented to upgrade about 35,000 VPTs to function as PTICs by end of year 2004.

e) **Installation of High Speed PTICs** (HPTICs) by upgrading the existing VPTs to provide wide band applications like tele-education and tele-medicine based on two basic channels i.e. 128 Kbps. In the first phase by 2004, about 2 HPTICs shall be set up in each SDCA, Both capital and operational costs will be taken into account to determine the quantum of support from USF.

B) Stream-II:

Provision of household telephones in Net High cost areas (rural/remote). For Stream II, the cost of service in the SDCAs will comprise the capital recovery and operating expenses in respect of the access network, developed for DELs installed after the specified date. Per Line net cost will be worked out on the basis of SDCA average. At the beginning of each Financial Year, the service providers would indicate their SDCA-wise roll out plan including projected cost and revenue. The rural SDCA as per list issued by Department of Telecommunication shall be treated as rural SDCA for this purpose. The subsidy will be

automatically withdrawn as soon as any SDCA's net cost becomes zero i.e; it becomes a revenue surplus area.

v) Stream-I will be given priority in respect of disbursement of funds over Stream II and top priority will be accorded, in their order of sequence, to (a), (b) and (c) of Stream-I as described in para iv) A above.

vi) The details as required and decided by DOT shall be furnished by the BSOs in regard to installation of Rural Community Phones and Replacement of VPTs by such dates as may be determined from time to time by DOT. These shall amongst others include number of VPTs to be replaced/installed with details of their locations, technology employed, distance from exchange and Average Revenue per VPT etc.

vii) The implementation of Universal Service Obligation shall be through a multi-layered bidding process on the Least Quoted Subsidy support basis. For this purpose, the first round of bidding will be amongst the existing Access providers (BSOs and CMSPs) of the concerned Service area. Where no bids are received from any of the BSOs/ CMSPs in the concerned service area, or the lowest bid is higher than the benchmark, then a fresh round of bidding shall be called from where all the BSOs and CMSPs in the country including the ones in the concerned service area as well as their franchisees. However, the award of contract as a result of bidding process will not be treated and taken as grant of fresh license under Indian Telegraph Act 1885.

viii) The existing Service Areas as defined in the Basic Services Licenses shall be the unit of bidding for US support. The bids shall be called for separately, for each Service Area or part thereof.

ix) The lowest bid, offering the least subsidy shall be accepted subject to a ceiling of the benchmark cost as determined by DOT. A subsidy higher than the benchmark shall not be accepted, and may either call for negotiations or further round of bidding.

(x) For calculation and estimating benchmark cost, fully allocated current costs method shall be adopted, considering the most effective solution for a particular location/ area. For operating expenses, the costs will be calculated on the basis of operations run most efficiently.

(xi) A separate fund for crediting the receipts towards USO is being set up and will be presently administered by the DoT.

xii) The Universal Service Support shall be reimbursed on the basis of the actual physical performance. Such reimbursements shall be made on completion of the targets & after necessary verification of the same. Liquidated Damages shall be imposed in accordance with devised scheme for any shortfall in the achievement of targets.

xiii) The DoT or its authorized representative shall have the right to inspect the sites used for extending the service.

xiv) The DoT will ordinarily carry out all inspections after reasonable notice except in circumstances where giving of notice is not feasible or will defeat the very purpose of inspection. In such event, an inspection will be undertaken without prior notice. .

xv) The DoT reserves the right to modify these guidelines or incorporate new guidelines considered necessary in public interest, security, and for proper conduct of telegraphs.

xvi) The detailed terms and conditions applicable to the bidding process shall be given separately.

Annexure II

Project profiles

I[st] Project

- The centre is located in a village of 3500 with a catchment area of 2000, which brings the served area to 5500 people. This centre was opened 4 years ago.
- It is owned by a franchisee, but HQ donates computers, printers, scanners, generator and webcam etc worth Rs. 85,000, which are being amortised over five years, and has connectivity through a satellite connection (because of lack of dial-up option) paid for by HQ. The Cash income is retained by the franchisee who pays a modest Franchisee fee.
  - CAPEX/centre
    - Rs. 85,000 appox., which are being amortised over five years - Borne by HQ
    - Depreciation = Rs. 17,000 per year appox.
  - OPEX/Centre
    - Approx Rs. 16,500, including Electricity, Stationery, Generator operation, Advertising cost etc. - Borne by franchisee
    - **Connectivity via satellite = Rs. 72,000/year - Borne by HQ**

- *Revenue: Rs. 3200 per month i.e. Rs. 38,400 per year*
- Revenues are limited by the services that can be offered with this type of connectivity.

- *EBITDA retained by Franchisee = 21,900 per year.*

- *Cash income is retained by the franchisee who pays a modest Franchisee fee of Rs. 1800/year appox.*
- **HQ does not recover its cost of supervision, capacity building and mobilization, and especially its cost due to connectivity (Rs. 89,000 per year)**
- Accordingly, this model is not sustainable and replicable over large areas.

2[nd] Project

- The centre is located in a village of 15,000 with a catchment area which brings the served population to 25,000 people. This centre was opened 6 months ago.
- It is owned by a franchisee, who installs equipment, fixings and furniture totalling Rs 200,000 - 250,000, which is being amortized over five years.
- Centre has connectivity through dial-up paid for by the Franchisee.
- Franchisee pays a modest Franchisee fee and share of revenues (Rs.2000 per month i.e. Rs. 25,000 per year).
- CAPEX/centre: Rs. 2 – 2.5 lacs appox. which is being amortized over five years – Borne by franchisee.
- **OPEX/ centre: Rs. 2.2 lacs appox - borne by franchisee which includes electricity, training, salaries, telephone, stationary, Generator operation, Advertising cost etc.**
- Revenue: Rs. 2.75 lacs per year.
- EBITDA retained by Franchisee = Rs. 57,000 per year.
- Depreciation = 40,000 per year-borne by franchisee.

- EBIT of franchisee = 17,000
- HQ does recover its cost of supervision, capacity building and mobilization. Accordingly this model is sustainable.
- However, the results are marginal for both the HQ and franchisee, not allowing significant growth and reach to occur. Not replicable in areas having lesser density.

3rd Project:

- Presently running 4300 rural projects covering 25,000 villages
- Latent value extracted from main economic activity in the village.
- Entire Capital and operating expenses borne by HQ.
    - Franchises and other agents in the chain do not bear any capital or operating expenditures
- Total number of franchise presently - 3200
- Other agents presently - 200
- Capital expenses: Rs.1.2 lacs per project.
- Operating expenses: Rs. 0.53 lacs per year per project.
- Total CAPEX: Rs. 52 crores approx.
- Total OPEX: Rs. 23 crores per year approx.
- Breakeven happens after 4^{th} – 5^{th} year of operations

- Revenue HQ: 14.1 Crores approx.
    - With 30% Projects in their 1^{st} year of operation and rest in their 2^{nd} year of operation
- Revenue Franchisee
    - Total revenue = 1% of total transactions
    - Approximately 4.5 crores, assuming 450 crores transactions made in one year.
    - Approximately Rs.14063 per year per Franchisee
    - Revenue Agent
    - Approx. 1.25 crores, assuming 450 cores transactions made in one year
    - Approx. Rs.62500 per year per agent

- Project involves massive upfront costs. Breakeven happens after 4-5 years of operation. Therefore, during first few years at least, favorable policy initiatives required to hasten recovery and attract investments in such projects.

4th Project:

- Presently implementing 40 rural projects. 1 project designed to connect 300 villages. As on date there are 30 functional projects - each presently connecting 70 villages. These 40 projects can connect 300 villages each within one/two years. Total 12,000 Villages can be connected. Project runs 300 Kiosks in villages.
- Each district has 1000 villages. Each district needs 3 projects to cover accessible villages – about 900 villages.
- CAPEX and OPEX

- 1 project can be completed in two years. **Two years capitalized cost = Rs. 50 lacs which includes bandwidth cost, spectrum cost, leased line cost, tower's cost, equipment cost, training cost, staff cost etc. Thereafter, recurring cost for each project = Rs. 15 lacs per year which includes spectrum, leased line, bandwidth cost plus staff and recurring costs**
- Each Kiosk's
  - Capital cost = Rs. 50,000.
  - Recurring cost = **Rs. 25,000/year including connectivity charges and bank repayment of loans.**
- Total capital cost of 1 project + 300 Kiosks, including capitalized cost of project HQ for two years = Rs. 200 lacs (appox).

- Kiosks
  - Income/year from year II = Rs. 20,000 to Rs. 1 lacs/year.

- Expenditure: 32,000/year (payment to bank against loan, connectivity charges, recurring charges)
  - Profitability Project Head quarter: Income 10,000 X 300 = Rs. 30 lacs/year (To be shared by project HQ/company).
  - Projects start breaking even after 3-4 years but not replicable in large areas due to negative/unattractive returns..

MULTI SERVICES THROUGH VSATS

S. BARATHY
HCL COMNET LTD.
November 2004

MULTI SERVICES THROUGH VSATS

1.0 INTRODUCTION :

Satellite Communication is in existence in the country for the last 35 years. However, with the privatization of Very Small Aperture Terminal (VSAT) networks in 1993, this medium is widely in use by various segments. National Stock Exchange (NSE) became operational in 1994 with on-line trading using Extended C-band VSATs at broker premises. Though Extended C-band was exclusive to India, with transponder capacity available only in INSAT satellites and VSATs operating at Extended C-band was created for India, the high reliability, quick deployability and access to remote locations gave enough reasons for enterprise networks to make use of VSATs for business applications.

VSAT networks are in use by Corporate, Public Sector units, Banks, Stock Exchanges, Lottery Systems, utility Companies, Government for Defence and Security, Educational Institutions etc. These networks support data, voice, multimedia internet services. They are flexible to support very low bandwidth applications like, Stock trading, ATM, SCADA (Supervisory Control and Data Acquisition) to wide band applications like video conferencing, Internet download, video broadcast etc. Wideband capability and on-demand use of bandwidth are becoming attractive features of VSATs for back up networks.

2.0 Growth Factors:

Regulatory changes in 2000, like revenue share arrangement with government instead of license based VSAT use, encouraged the use of VSATs. Use of Ku-band for VSATs was also allowed in 2000 leading to availability of cheaper VSATs, higher capacity to support broad band applications. This also accelerated the growth of VSAT industry. More than 30,000 VSATs are operational in the country. High power C-band and Extended C-band transponders in INSAT has helped in further liberalizing the VSAT antenna sizes. The government has recently notified use of 1.2 m for Time Division Multiple Access (TDMA) VSAT and 2.4m for Demand assigned Multiple access (DAMA) VSAT in Extended C-band. Also the information rate can be upto 2 Mbps for mesh VSATs. These changes will give further fillip to widespread use of VSATs.

VSAT service providers also extend internet services to their customers. Leading VSAT service providers like, HCL COMNET can give TDMA, DAMA and Hybrid VSAT services in Extended C-band and Ku-band. Distance Education, Telemedicine, Video broadcast reception can also be integrated to enhance the utility of VSATs in remote locations.

The reason for evolving multi services through VSATs stems from the following factors:

- Shifting demand for different types of digital services.
- Greater emphasis on taking information and services to rural locations.
- Opportunities from Synergy between broadcasting and broadband IP delivery from satellites.

- ❖ Improved satellite and VSAT technology
- ❖ Regulatory shift towards unified services license to support digital convergence.
- ❖ Infrastructure capabilities of VSAT service providers to offer multiple services.

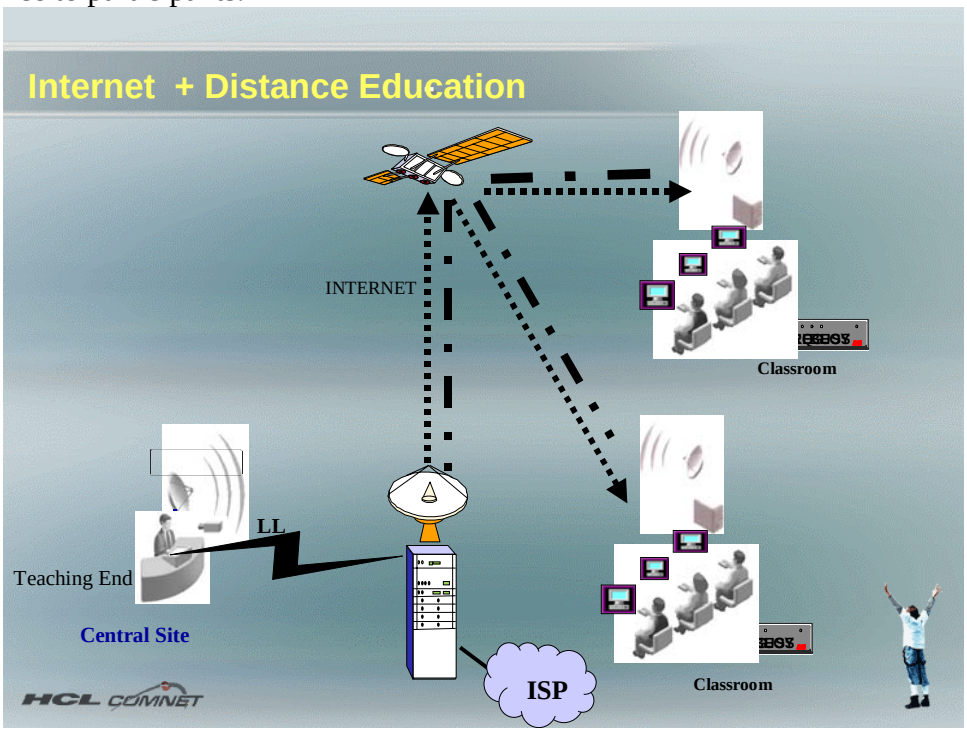
Major VSAT service providers are also Internet Service providers. They are examining ways to combine DVB (Digital Video Broadcast) multicasting services to offer traditional VSAT services, Internet services and emerging applications relevant for remote / rural locations. DVB-RCS (Return Channel through Satellite) is emerging as a open standard to support all these services and will make many manufacturers to adhere to this standard so that large number of users can afford to use this technology.

3.0 Internet Services :

VSATs are widely used in remote locations where terrestrial systems are either inadequate or non existent to provide multimedia internet. Asymmetrical nature of VSAT systems based on DVB-IP delivery is very suitable for this service. Bandwidth requirement can be supported for SOHO, SME and cyber café environment to serve multi user environment. More over , Government has now allowed use of VSATs to further distribute Internet to users through other media. VSATs in remote and rural locations can be integrated with cable TV system to take internet to homes.

4.0 Distance Education Service :

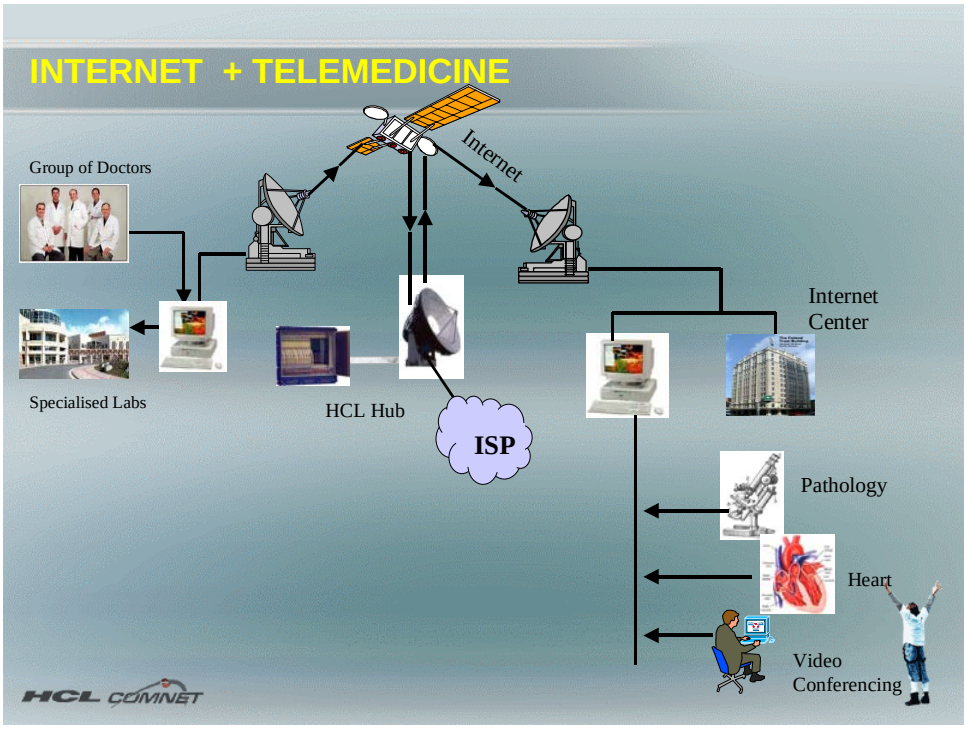
Teaching end studios, either co-located or connected with VSAT service providers' HUB can offer live interactive distance education to a large number of remote class rooms equipped with VSAT. While it can extend availability of quality teachers / trainers to a large population of students / trainees, multimedia rich content would give new learning experience to participants.



Quality education can be made available to primary, secondary schools in rural area utilizing VSATs. It is expected that a dedicated satellite like 'Edusat' along with interactive VSATs deployed in different states will provide multilingual multimedia content in multichannels.

5.0 Tele-Medicine Service :

Multimedia and interactive capability of VSATs are used to link remote patients with Doctors in specialty Hospitals. Local doctors / para medical staff in a village health care center can send patient's medical data and have on-line medical consultancy from doctors in city hospitals.

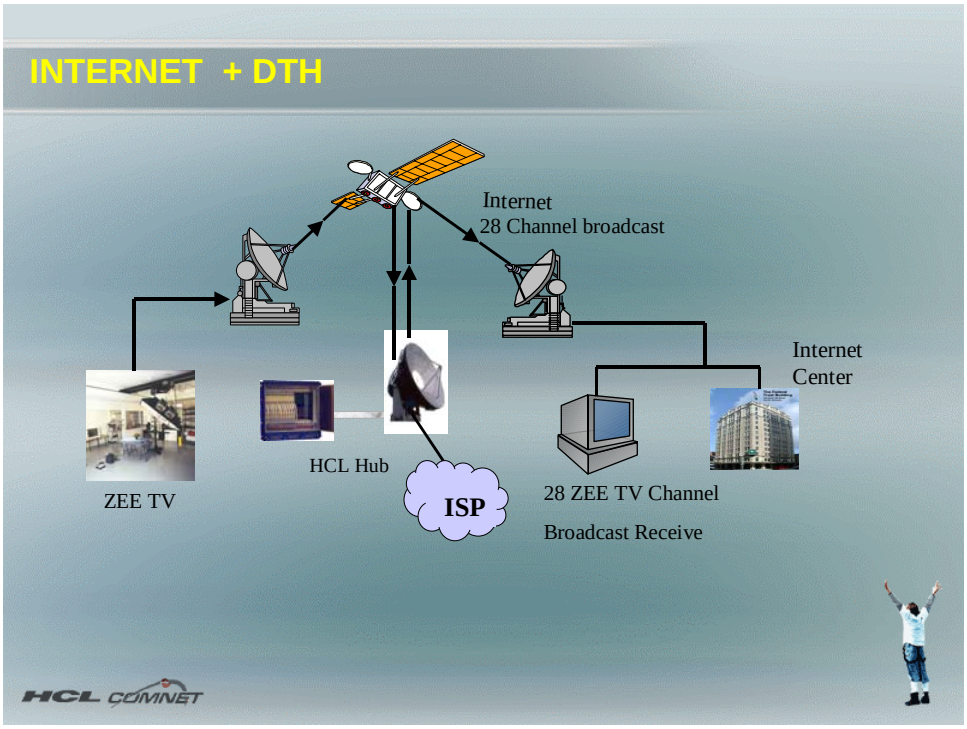


6.0 Entertainment Service :

Wideband capability of satellites and high power availabilities in Ku-band have led to introduction of Direct to Home (DTH) digital TV services. This service is already introduced in the country by Zee TV under the brand name 'Dish TV'. DoorDarshan has also introduced multiple channels in DTH. VSATs operating with this satellite can also receive multiple TV channels in remote locations with augmentation of DTH receivers.

VSAT service providers can carry them through DVB-IP delivery streams. This will mean better utilization of existing uplinking infrastructure of VSAT service providers

and immediate development of DTH services. Regional and media companies can get benefited.



7.0 Data Broadcast Service :

VSAT service providers serve on-line stock trading applications. Recently established commodity exchanges also make use of VSATs for on-line trading. Price information of stocks, commodities in various exchanges are broadcast and would be of interest to investors / Traders / Common man across the country. Display of this information in public gathering places, commodity centers, Mandis etc are possible with VSAT.

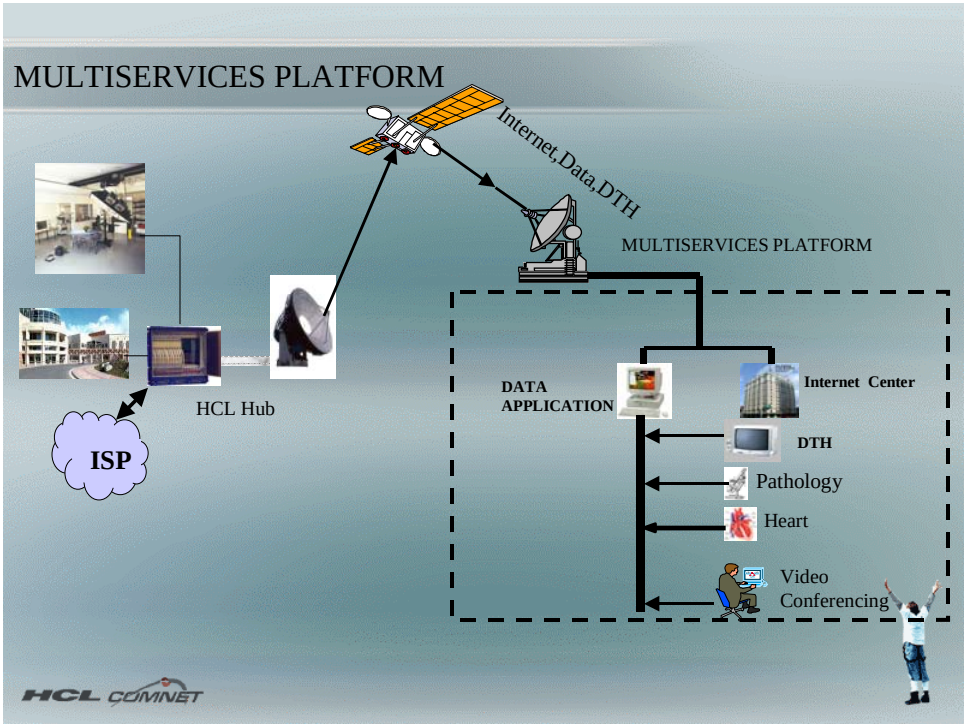
8.0 Multi Services :

While VSAT networks are set up and in use for one of the above services, the present capabilities of VSAT service providers infrastructure, different services from the same INSAT satellite and broad band capabilities of VSATs make possible two or more of services to be available with single VSAT. Particularly in remote rural locations this possibility brings new dimension to the viability of VSATs.

A VSAT installed in a community center or the one being used in E-Choupal network of ITC in rural area can support stock trading, commodity trading, internet access. By

locally extending this connectivity through cable or radio to primary schools and primary health centers will provide interactive distance education and Telemedicine services.

Multi service feasibility is illustrated in the figure.



9.0 Conclusion :

VSAT networks continue to grow in the country despite the expansion of landline and mobile services. The broadcast feature of satellite, multimedia support of VSATs, infrastructure of VSAT service providers will make multi service delivery through VSATs feasible. The need for taking internet, e-governance, entertainment and developmental services to rural areas coupled with regulatory shifts to enable this possibility will make multi services through VSATs affordable.

Sparse Area Communication System (SACS)

S. BARATHY
HCL COMNET LTD.
November 2004

29.11.04

Sparse Area Communication System (SACS)

1.0 Introduction: Rural connectivity is becoming a reality with more and more technology solutions available. A homogenous medium connecting rural area to be part of national communication network is neither feasible nor viable. A mix of media to suit the terrain, capacity, flexibility to enhance, feasibility of implementation, multiplicity of services has to be considered. One such to combine the use of satellite based VSAT system with indigenously developed CorDECT is proposed for rural connectivity under Sparse Area Communication System (SACS) Project.

SACS Project envisages integration of wireless CorDECT system with Very Small Aperture Terminal (VSAT) network to make the system more flexible and cost effective to provide Voice and data communication to far flung rural area with in the country. The complete system is being developed by IIT, Madras.

2.0 SACS Network Configuration: Sparse Area Communication System (SACS) is aimed at providing Internet and Telephony in village clusters in areas where fibre connectivity is not available in the vicinity. It uses a satellite backhaul connection to connect the remote areas to a city (typically a state capital) in the region. At each remote area, corDECT WiLL or other local wireless technology is used to provide telephone and Internet connection to about 100 villages in 10/20 kms radius of the remote. Fig 1 shows the conceptual network.

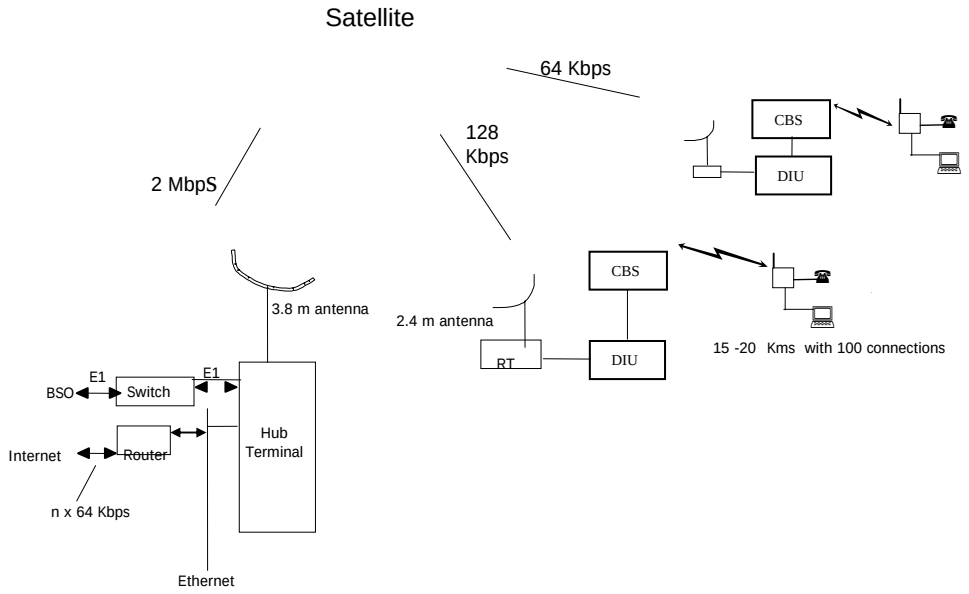


Fig 1: Sparse Area Communication System (SACS)

The VSAT network connectivity will be in star configuration with a set of remote VSATs connected to a Hub terminal The satellite hub is located in a regional city/state capital where fibre connectivity is available. The hub is connected to a circuit switched telephone network of a Basic Services Operator, thus connecting every subscriber on this network to all telephones in the world. The satellite hub is also connected a Router (using Ethernet) which routes all the internet traffic between subscribers in the network. The Router is connected to the Internet, thus connecting all subscribers on network to the Internet. The satellite backhaul connects the hub to remote terminals (RT) in areas where very little connectivity is available.

The Hub size antenna is selected as 3.8m and the remote VSAT size as 2.4m. This network is designed to use INSAT satellite. The Remote area size can be reduced depending on traffic and regulatory condition. Presently the 2.4m antenna is a minimum size needed in mesh network. The modems are being developed to provide 70 MHz interface to RF system. As this system can be used in any frequency band (C band, Extended C band or Ku band) and also to have flexibility to operate in any transponder within the satellite band, the RF system is selected to have a L-band converter and a Block Up converter (BUC). L- band converter will become part of In Door unit (IDU) . Since Oven Controlled Crystal oscillator (OCXO) operates in indoor environment it provides better frequency stability and change of parameters like frequency, power,etc becomes easy with the in built display in L-band converter. As part of the RF system becomes in door, the power requirement for BUC becomes less and dc supply can be easily sent through the L band cable . This arrangement is particularly advantageous for low power remote VSAT system where mains power availability on roof top is not advisable.

3.0 Hub configuration: The Hub configuration is shown in figure 2. In order to have high reliability the central Hub station is configured to have redundant chains of equipment. The switching from live chain to redundant chain will be automatic and will happen at output of transmit chain and at the input of receive chain. The switches in the transmit path and receive paths are ganged to operate simultaneously so that either the complete chain 1 or chain 2 from Modem to antenna feed will be used**.** When a problem is detected in any of the equipment in a chain, the switch will operate. BUC will have the capability to deliver 20 w of power and will have a fixed LO. The frequency selection to operate with a particular transponder in the satellite will be done in L- band converter and it will have at least 1 MHz synthesizer step size . This will enable selection of any frequency within the operating band of the network. The selection of channel frequency with in the transponder (with in 36 MHz) will ,however, be done by modem.

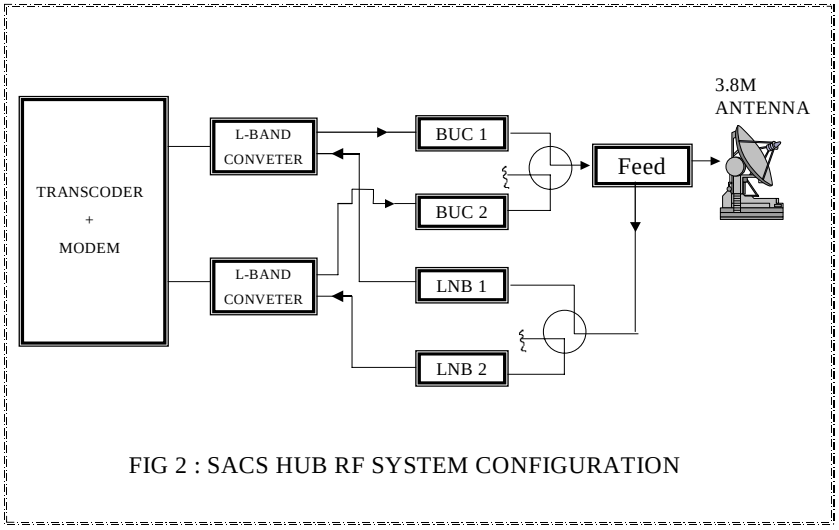


FIG 2 : SACS HUB RF SYSTEM CONFIGURATION

4.0 VSAT Configuration: The VSAT configuration is shown in Figure 2. It is configured to have a single chain to keep the cost of VSAT low. This will also have the similar equipment as in Hub. L- band cable connecting In Door Unit (IDU) and Out Door Unit (ODU) will also carry power supply for ODU and M&C signals in addition to RF signals. With the proliferation of FM transmission across the country (in the 90 MHz range) the 70 MHz interface cable is not preferred and L-band will provide better immunity to these high power interfering signal.

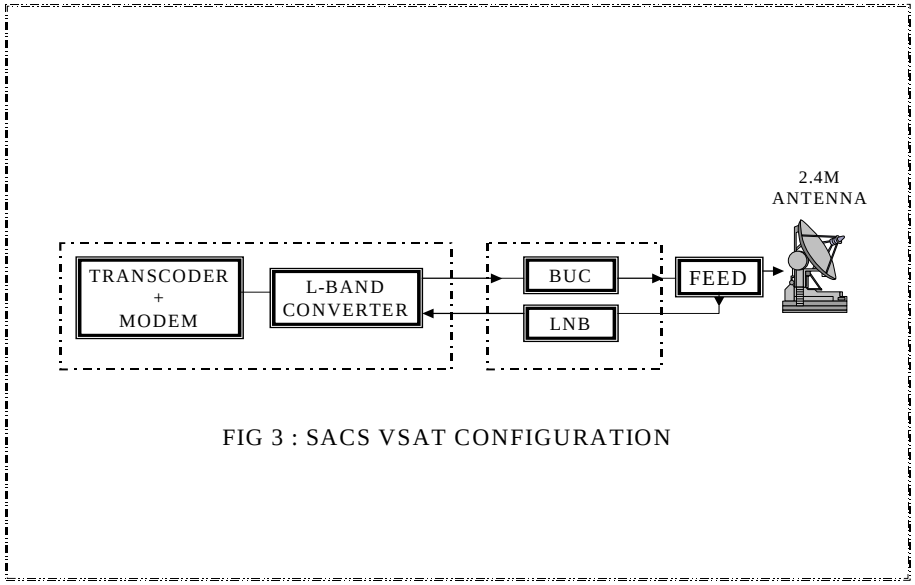


FIG 3 : SACS VSAT CONFIGURATION

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The hub transmits 2 Mbps stream to upto 16 remote stations using a satellite transponder. The 2 Mbps stream consist of both telephony as well as Internet data for all the remotes. Each remote receives the full 2 Mbps stream and picks up the data meant for itself. As bandwidth to each remote is not fixed but is dynamically shared amongst all remotes, different remotes can get different amount of Internet download at different times. The remotes however transmit to the satellite at a pre-configured bit-rate of 64 kbps or 128 kbps or 256 kbps. The choice is made depending on the number of subscribers supported by the remote and the amount of traffic expected from the subscribers. It is possible to reconfigure the bit rate at remote from one bit-rate to another, when need arises. This *SCPC (Single Channel Per Carrier)* system is used with hub using one carrier and each remote using one carrier to transmit. The modems employ QPSK modulation and a combination of convolutional coding and Reed-Solomon coding.

At each remote site, the satellite remote station is connected to a corDECT system, which provides voice and data connectivity to kiosks in villages in 10/20 km radius of the hubs. Typically 100 villages will be connected providing telephone as well as 35 kbps Internet (or 70 kbps premium service) to each of the kiosk. The 16 remote stations served by a hub would therefore connect typically 1600 villages.

As mentioned earlier, 64/128/256 kbps upstream from remote would carry both voice and data. Voice coding, (G.723 with voice activity detection) and packetisation is done at a typical rate of 5 kbps per channel. Thus, 10 channels would have a bit rate of 50 kbps. If the 128 kbps upstream link is used, besides catering to 10 voice channels and signaling (which would also be carried as data packets) and multiplexing overhead, 64 kbps Internet upstream traffic can be supported. Table 1 provides typical values for number of subscribers and bandwidth used. The actual numbers of voice connections and the data rate at any time depends on the traffic demands.

Table – 1

Upstream bit rate	**Typical nos. of kiosks supported**	**Voice BW**	**Internet upstream BW**
64 kbps	50	5x5 kbps	30 kbps
128 kbps	100	10x5 kbps	64 kbps
256 kbps	200	20x5 kbps	128 kbps

5.0 Baseband and NMS: The unique feature of the project is to have indigenous baseband equipment with the associated Network Management system (NMS). NMS is designed to monitor and control all satellite equipment at Hub including the RF system and Remotes.

The remote terminals can be powered from solar panels in remote locations and equipment will have DC voltage interface. Since most of the capabilities are available through software the hardware standardisation is done. This will reduce the production cost. Standard RF systems which are widely in use in VSAT industry are adopted to have easy sourcing and supply competitive.

6.0 Conclusion: SACS Project which is being developed combining the technologies of VSAT and CorDECT will make the Rural Telecommunication viable and broadband internet reach in these regions. Since it uses indigenous technologies the long term availability, flexibility to modify/enhance , control on production ,etc would be possible. Easy deployment and reach to difficult terrain are ensured through

VSATs. Enough capacity in extended C band is available in INSAT and can be used even in rain prone zones.

HITL-Reg./2004-05/182 December 7, 2004

Mr. Pradip Baijal
Chairman
Telecom Regulatory Authority of India
A-2/14, Safdarjung Enclave
New Delhi

Dear Sir,

Sub: Consultation Paper on Growth of Telecom Services in Rural India

We are pleased to enclose our thoughts and suggestions on the captioned Consultation Paper.

We hope that our views would be useful in arriving at meaningful conclusions.

Yours sincerely

Kapil Dev Kumar
Associate Vice President

HFCL Infotel's Views on Consultation Paper on Growth of Telecom Services in Rural India

ITEMWISE RESPONSE TO "QUESTIONS"

Q1: This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India ?

It is an commendable effort from TRAI to spearhead a debate on the ways and means for enhancing the teledensity in rural India.

Just like a small kid would jump to grab the low hanging fruit before climbing up the tree to pluck the other, it is natural for service operators to first tap the potential in the more lucrative areas before getting into the marginal areas. Recent trends, as alluded to in the Consultation Paper (esp. paras 1.4 & 1.7), do indicate that the operators are moving into the rural areas.

Nonetheless, there is a need to accelerate the penetration into the rural areas. On one hand, the operators need to explore & develop applications beyond plain-vanilla voice communication to drive usage & revenue, policy makers need to consider all possible direct and indirect support mechanisms.

BSNL deserves the credit for the rural penetration achieved so far. However, it should not be forgotton that this has been possible through the cross-subsidy available from very steep long distance tariffs, and that cost & availability of capital has perhaps not been a limiting consideration until recently. Further, the incremental penetration is directly linked to the support available in the form of refund of licence fee, spectrum fee, etc. In addition, the cross subsidy available from long distance calls (the ADC) is loaded in favour of BSNL (ADC on mobile to mobile calls goes entirely to BSNL).

If fair and equitable support is extended to other operators as well, there is no doubt that private sector would be a significant contributor to the incremental growth in telecom facilities in rural areas.

This brings us to two significant points:

- **One, continued support – fiscal measures and cheaper inputs – is required to accelerate the growth into rural areas**
- **Second, support for extending telecom services should be available to all operators in an objective manner, i.e level playing field principles should be followed**
  - **private operators should get an equitable share of the fiscal incentives & cross-subsidy**
  - **large operators should get the same level of opportunity & support as may be contemplated for niche operators.**

The Consultation paper has quite appropriately recognized that wireless technologies are the means to connect the rural areas. In this context, TRAI should make suitable recommendations to ensure that spectrum for wireless technologies operating on shared basis – especially CorDECT, Wi-Fi & Wi-Max – is effectively delicenced quickly.

It has been observed that some of the larger operators have refrained from deploying CorDECT as the current licencing conditions limit the maximum spectrum allocable for macro-cellular technologies (GSM, CDMA) in case CorDECT is also deployed by the operator. This linkage needs to be done away with.

Q2: Should 'Niche Operators' as discussed in this consultation paper get support from Universal Service Fund ?

In the matter USF support, Niche Operators should be considered at par with other operators.

Q3: Instead of subsidizing final product, should the subsidy be given on inputs like bandwidth and spectrum charges ?

All support measures – direct subsidy from Universal Service Fund, concessions in inputs (spectrum, bandwidth), fiscal benefits (lower licence fee), concessions in infrastructure sharing – should be considered.

All operators – niche, regional, national – should be treated equitably while extending the benefits. Ceteris paribus, a large operator has better access to cheaper capital and is in a better position to make investments.

Q4: In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation Fund. Do you agree with this proposition ? Offer your comments.

We believe that multiple services – voice, access to information, broadcast video, multi-media applications – are required to improve realizations from the rural areas.

Development of locally relevant content and applications is an arduous task and may not be scalable. It requires understanding of the local requirements and customization.

Hence, we believe it is not easy to attain a self-sustaining model.

Q5: For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention ?

We agree with this suggestion.

Q6: Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India ?

While we conceptually support the idea of niche operators, we foresee several operational difficulties in the niche operators operating as independent licencees. And consequently, we believe an option of "mandated franchising arrangement" needs to be developed to enable niche operators to function as franchisees of licenced access service providers. Our concern and suggestion is explained hereunder.

We foresee the following two key areas of operational difficulties for niche operators functioning as independent licencees:

- **Service Area & Focus**: With SDCA as the proposed service area boundary, there is perhaps the need for checks & balances to prevent a clever niche operator from enjoying the concessional benefits offered to niche operators, while focusing only on the urban areas in the SDCA and ignoring the rural area. Forced roll-out in rural areas is difficult to monitor.
- **Inter-connection**: Under the current practice, each operator inter-connects with every other operator within the circle. Also, substantially the POI for non-local calls is at TAX level. Following these norms can potentially mean a lot of drain on capital and operating resources for a niche operator. Connecting at TAX level (which is outside the service area) for STD calls would add significantly to a niche operator's cost. Forcing some or all circle wide operators as well as NLD operators to go down to the SDCA level would be some combination of additional costs and restricted connectivity options.

We believe that if niche operators function as franchisees (akin to Group EPABX operators) of circle-wide licenced access service providers, they can avoid the above operational difficulties and other administrative expenses.

TRAI could consider developing a "mandated franchising arrangement", wherein a niche operator could easily become a franchisee of an access licence on the terms and conditions prescribed by TRAI/ Government.

Q7: Do you think that we can sustain USO subsidy model in the long run ?

USO subsidy model has to continue till the time teledensity reaches the expected level.

Q8: Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?

Governments have the biggest role to play in development of locally relevant content. e-governance content & applications are the most relevant of the local community's requirement. Governments need to rapidly develop these drivers of communication infrastructure need. For this, governments need to digitize a lot of their information bases/ databases. Governments need to also ensure that the content is available in local language. Private sector can support the development of middleware applications & processes.

221URJIT R. PATEL Chief Policy Officer
urjitpatel@idfc.com

November 29, 2004

Mr. Pradeep Baijal
Chairperson, Telecom Regulatory Authority of India
A-2/14 Safdarjung Enclave, New Delhi 110 029

Dear Mr. Baijal,

This is in reference to TRAI's consultation paper No. 16/2004 on *"Growth of Telecom Services in Rural India: The Way Forward."*

As we see it, expansion of telecom services to rural areas deserves special attention because such services are usually found to be commercially unviable. Accordingly, this objective is best pursued as part of a comprehensive Universal Service Obligation (USO) strategy and the onus of achieving the same should primarily rest with the government. In this regard, the government needs to decide *inter alia* three key aspects, viz., universal coverage targets, resources for meeting them and deployment of support. Viewed from this perspective, we felt that the issues identified in the Consultation Paper are relevant but far from exhaustive to provide a clear set of actionable points for the government. Hence, instead of attempting an item-wise response, we have delineated below how the government could expand rural telephony by making appropriate policy choices with regard to each of the aforementioned key aspects.

Universal Coverage Targets: To begin with, the government should clearly spell out the universal coverage targets that it seeks to achieve in terms of Access (community/village level) as well as Service (individual households). As regards Access, a decision regarding the optimal level of connectivity to be targeted for each village should be based on a realistic assessment of the cost-benefit implications of providing various levels of connectivity and, of course, the quantum of resources available to pursue this objective; the Consultation Paper could have attempted to throw more light on these parameters. Nevertheless, the proposal to revise the objective of rural connectivity to broadband connectivity may be interpreted as ambitious considering that the extant target of voice and low speed data services itself has proven to be a rather challenging one. Support for individual consumers (Service), on the other hand, may be limited to those who are willing to pay a portion of the cost of service. This support, however, should be gradually withdrawn and the consumers should be required to pay full cost of service over a defined time frame, say, five years. Otherwise, subsidy support is likely to be perceived as an entitlement and government will have that much less resources to expand telecom services to other consumers deserving support.

Resources: After delineating the Universal Access and Service objectives, government should identify the quantum of resources that it can muster for meeting them. At present, the objective of universal coverage is being met through a variety of means, viz., tariff policy, USO funding policy, termination charges, access deficit charge and reimbursement of license fees to Bharat Sanchar Nigam Limited. The government should consider pooling all these resources into the non-lapsable Universal Service Fund (USF). In case of shortfall, either the Fund should be given supplementary support from the exchequer or the coverage targets should be pruned/prioritised to match with available resources. Also, allocation of funds for areas that hitherto do not have access to any telecom services and those that already have telecom connectivity should be clearly specified ex-ante, in order to avoid overzealous pursuit of growth in either of these areas at the expense of the other.

Deployment of Resources: Support from the Fund should be provided in a manner that ensures transparency and harnesses benefits of competition. In case of areas without telecom connectivity, the concessions to meet the specified level of Access/Service obligations should be awarded through minimum subsidy bidding. Preferably, USF should announce the geographic

Cont'd...2

coverage schedules over the next few years in advance so as to enable potential service providers to plan their business strategies, including resources and network configurations. As for the areas that already have telecom connectivity, the regulator and the USF should jointly arrive at an optimal combination of reasonable tariff and, consequently, a benchmark subsidy support per consumer. The subsidy support should be thrown open to all the operators (fixed as well as wireless), based on the number of rural DELs actually being serviced by them. In other words, the subsidy support should be made portable so as to provide an equal opportunity to the existing as well as potential service providers and to encourage them to compete for the custom of the users. Also, operators should be given complete freedom to deploy technologies of their choice and to offer other complementary services to defray a part of their expenses. Such flexibility is imperative to induce operators to choose appropriate cost-effective technologies and to aggressively pursue innovative ways of exploiting the network facilities, i.e., augment revenues by offering additional services.

In order to provide fillip to rural telephony, “niche operators” proposed by TRAI as part of its draft recommendations on *Unified Licensing Regime (ULR)* should be allowed in all rural areas (regardless of teledensity levels in those areas). Niche operators should also be permitted to (a) compete for subsidy support from the USF; and (b) offer both fixed and mobile services. Equally importantly, the Authority should ensure that existing players provide interconnection to niche operators, at fair terms.

As regards spectrum, we concur with the Paper’s observation that *spectrum is a key input and, therefore, its availability at a reasonable price is a must for the growth of services* (in rural areas). Considering that the supply of spectrum is likely to far exceed demand for operators providing services in rural areas, spectrum should be made available free of charge or at the cost of its administration.

We trust you will find our suggestions to be useful and acceptable.

With best regards,

Sincerely,

Urjit R. Patel

TVA Rural Studies

Improving Rural Telecommunications Infrastructure

Bruce L. Egan
Columbia University

1. Introduction

Advanced (digital) telecommunications technology has the potential to dramatically improve the quality of life and the rate of economic development in rural America[1]. Public access to advanced telecommunications technology needn't imply that one has to be physically located in proximity to urban areas where most information and production is generated. But while technology adoption in communication networks continues at a very rapid pace, increased market competition among telephone network operators forces them to invest where the money is, in dense urban and suburban areas. Thus, while a modern and effective telecommunications infrastructure is crucial for rural economic development, its financing raises a multitude of difficult public policy issues.

The analysis herein examines the rural telecommunications infrastructure focusing on technological developments and the costs and financing of network modernization. While there has been considerable hype in the industry and trade press about digital information "superhighways" (as if we all can just sit back and wait for "it" to happen), a look at the facts would lead to a more pessimistic view, especially for rural areas of the country[2].

There are some recent technological developments which provide exciting prospects for new digital wireless technologies to come to the rescue for some rural services, however, the government needs to pay more attention to spectrum allocations for rural radio services in order for these to fulfill their promise[3]. Because the cost characteristics of such technologies are not nearly as sensitive to the physical distances involved, these technologies hold special promise for rural applications, but will likely not be deployed in rural areas until well after they appear in dense urban and suburban markets.

Much of rural America is served by small independent telephone companies. There are over 1300 local telephone companies in the US, the top 10 of which serve over 90% of all subscribers. The rest serve mostly rural areas with a relative handful of subscribers. Historically, financing for the modernization of rural company network facilities has come from a combination of the local tariff rates charged by the rural telco and cross subsidies derived from: 1) rural company charges to interconnecting toll carriers and, 2) other revenue sharing arrangements with larger local telephone carriers which serve relatively dense areas with lower cost (higher profit) subscribers. Increased competition has added considerable uncertainty to the traditional revenue flows derived from these sources.

Market competition is the natural enemy of cross subsidies. While direct competition for telephone subscribers may be long in coming to many rural

areas, the competitive erosion of cross subsidies currently provided by toll calling, business and high profit residential market segments is surely going to proceed rapidly. Naturally, the political lobbies for competitive network operators do not want to provide any subsidies for rural development. At the same time however, small telephone companies want the government to assure that the rural network infrastructures and individual subscriber service in rural areas is affordable and equivalent to that available in urban and suburban areas[4]. The reality, of course, is that the outcome for the future will be similar to that of the past, namely, that rural network infrastructures will lag behind urban areas in terms of advanced service capability. In the new competitive environment, the risk (assuming the status quo of competitive entry with no proportional subsidy funding requirement from entrants) is that the disparity will become much worse.

In order to prevent the erosion of rural subsidies from newly competitive services, a number of federal and state initiatives are under way with the goal of preserving subsidy flows, usually under the rubric of so-called Universal Service Objectives. At the federal level, the FCC is investigating ways to better target subsidies to rural areas in need, and pending legislation in both houses of Congress contain provisions for maintaining subsidies for high cost areas[5].

Rural Network Technology

The following analysis indicates that now and in the future, fiber optics will continue to be the technology of choice for all shared network facilities where terrain permits. At times, local conditions may call for microwave radio trunk transmission lines instead of fiber. In the future, however, digital fiber optics will dominate local network trunking. For the dedicated subscriber loop plant, there are several alternatives depending on local terrain and the spatial distribution of individual subscribers, including coaxial cable, copper wire and digital radio. Due to significant variations in local demographics and topography, some of the overall analysis and conclusions may not apply in many specific rural areas although they are relevant for broad public policy considerations. For example, new digital satellite systems may be the only realistic way to get relatively low cost and high quality digital service to certain remote locations.

The most important conclusion of all is that technological solutions must be tailored to specific circumstances regarding topology, terrain, subscriber demand and spatial distribution. A "cookie cutter" approach to technology deployment, while easier from a network standards perspective, is usually not the least cost method to optimize the network for local supply and demand conditions or for planning future network upgrades[6]. Indeed, flexibility in network deployment strategies is the key to successful low cost investment. This means that flexible standards must be developed by both wireline and wireless network equipment manufacturers to allow efficient interconnection between networks and a high degree of connectivity between end users[7].

The cost of advanced rural communication network infrastructures is substantial. In a future competitive market environment, it may not be possible to finance its construction without significant increases in subscriber rates unless a new stable source of subsidy funding is adopted by regulators[8]. Assuming a construction

interval of 10-20 years—a normal time span for turning over telephone plants—one estimate of the cost of digital service is about $1,000 per subscriber[9]. This would endow rural subscribers with digital communication capability comparable to narrowband ISDN service. While this may suffice for residential subscribers using home computers or other devices, such narrowband service capability may not meet the communication requirements of business customers. As subscriber needs develop, broadband services using fiber-optic technology or other suitable media may be necessary.

Achieving broadband communication capability in rural areas is a very costly proposition at about $4,000-$5,000 per rural subscriber[10]. Broadband communication facilities would allow consumers to enjoy high quality service, including entertainment video and multimedia applications where more than one communication activity may occur simultaneously. For example, with broadband telephony one may access an on-line database while viewing a movie, reading, or listening to the news. The cost of such capability is high because it requires new alternatives for the subscriber loop plant to replace traditional twisted-pair copper phone lines.

Where possible, existing coaxial cable television loops could be interconnected to a fiber backbone of shared network facilities to provide broadband capability. Elsewhere, fiber-to-the-home (or "near"-the-home) is required. Current satellite and microwave radio will not be the best option for most service applications because bandwidth limitations and delay times make these technologies unsuitable for a multimedia real-time environment. However, both radio and satellite are useful for infrastructure development in some applications. Satellites, for example, are preferred for delivery of distant video programming and may be interconnected to the wireline network infrastructure. But the use of satellites for voice service or other real-time two-way communications will likely be minimal[11]. This could change, however, with the future deployment of new Low and Medium Earth Orbit (LEO/MEO) digital satellite systems[12].

Microwave radio is useful and cost effective in many situations where fiber is not practical, such as over rough terrain or water. Much of the existing microwave facilities are useful for providing advanced telecommunications because they are already digital and may feature high bandwidth and capacity for new service applications. However, for distribution of basic local service, both satellite and microwave will generally be limited to relatively high cost applications. The FCC-approved Basic Exchange Telecommunications Radio Service (BETRS) is the primary application of microwave radio technology for local service. It is expected to be the preferred alternative when wireline service is not feasible, but as such cases are rare, rural radio service, as currently defined by the FCC, is not being widely deployed as an alternative to traditional wireline service in rural areas[13]. The FCC could change this if new spectrum assignments for high powered rural radio systems were made. High powered digital radio systems for fixed telephone service are cost effective in rural applications compared to wireline systems, but only if there is enough spectrum and only if system power restrictions allow for large “macrocell” radio coverage areas (e.g., 15-30 mile radius) featuring maximum sharing of available spectrum within single base station area. Foreign countries, especially those with nascent network infrastructures are deploying new digital wireless systems as an alternative to traditional wireline connections[14]. The US government’s recent focus for radio

spectrum policy has been on new convenient low power cellular and advanced paging and cordless telephone services which, while ideal for pedestrian and mobile applications in congested urban environments, is not cost effective or feasible in rural settings.

The best way to establish rural objectives for a network infrastructure is to begin at the state level. The reason: telecommunications depreciation policy, basic rates and economic development planning are set at the state level; each state determines its objectives, timetables and financing requirements. There is an important gap in telecommunications infrastructure planning in most states, especially regarding coordination with the important transportation and energy sectors. We find the synergies of telecommunication network providers and public power grid operators to be underutilized for fiber optic transmission and recommend more cooperation in this area. The same is true, but to a lesser degree, in the case of the transportation sector. The early beneficiaries of more cooperation between these sectors is rural education, health care and income growth.

What is Rural?

There is no standard definition of rural telecommunication subscribers; however, some general observations should be made. Government data indicates that about a third of all residence subscribers (some 30 million households) are in non urban areas of the U.S. (called Metropolitan Statistical Areas or MSAs). Non-metropolitan counties are those with no urban areas greater than 50,000 population, but there are many possibilities for classification errors. For example, there could be metropolitan areas close to the border of adjacent non-MSA counties, or there could be many towns of less than 50,000 people each. It is potentially misleading for policy makers to use such data for policy purposes without adjusting it for classification problems[15].

It is very important to distinguish "rural" from "remote" subscribers; The latter refers to those whose access to the telephone network is difficult due to physical "remoteness" caused by either extreme distance or terrain. While remote subscribers with no telephone service might represent a socially deserving segment of the general population, for public policy purposes they should be separated from the general body of rural subscribers. Public policy must be able to focus on upgrading communication infrastructures for those customers already hooked up to the network regardless of policies for reaching customers who are not only rural, but physically remote. Otherwise, policy debates over the subsidies required to provide service to remote non-subscribers can derail progress in technology adoption for the vast majority of rural subscribers. Furthermore, the available evidence is that remoteness is neither a particularly common problem nor one which requires much total subsidy to solve. Pockets of truly remote subscribers will be most economically served by new digital satellite communication networks.

There are few truly "remote" subscribers relative to the base of all rural subscribers. One estimate puts the number of remote customers at 183,000, or only about 1% of all rural subscribers[16]. Fortunately, a wealth of information exists for small independent telephone companies from industry trade groups such as United States Telephone Association (USTA), the National Telephone Cooperative Association (NTCA), and an agency of the United States Department of Agriculture which for many years was called the Rural Electrification Administration (REA). The REA’s areas of responsibilities were recently

combined with other areas and the new agency is called the Rural Utilities Service (RUS). RUS provides investment and financial data for almost 900 small telephone companies serving about 6M subscribers in very thin markets. Thus, for purposes herein, the RUS data will be representative of "rural" subscribers. While many other data sources will be used in this analysis, the basis for most statistics will be the RUS data[17]. Depending upon one's view as to the absolute number of rural telephone subscribers in the US, for broad policy analysis the per subscriber results based on RUS data may be increased by an appropriate factor to arrive at universal results.

Beyond the distinction of rural vs. remote, there is also an important distinction between existing and new customers. Costs of technology adoption may be very sensitive to the fact that the necessity of starting from scratch in some areas renders moot the issue of whether or not to use some of the existing facilities in a network upgrade. For most subscribers, a network upgrade must consider the embedded base of technology to ensure a cost effective construction decision. Keeping in mind the distinctions between rural vs. remote and existing vs. new subscribers, this analysis concentrates on the cost of network upgrades for existing subscribers—the vast majority. Remote and new subscribers will be considered separately.

Financial Profile for Rural Telephone Companies

There are over 1300 telephone companies in the US, about 900 of which are borrowers in the federal government RUS financial assistance program. The top 53 Local Exchange Carriers (LECs) which report annually to the FCC, account for about 90% of the approximately 150M access lines in the US[18]. The seven Regional Bell Operating Companies (RBOCs) alone account for about 70% of all telephone lines; adding GTE and Sprint accounts for nearly 85%. However, despite the huge differences in the scale and scope of the operations among US LECs, when comparing statistics for average per line financial results between large and small companies, the data are surprisingly similar. One reason for this is that, while the larger LECs may enjoy the low average per line costs of serving large metropolitan areas and spreading fixed network costs over a large subscriber base, they also serve a considerable number of rural service areas. Similarly, while small rural LECs may serve much less dense areas overall, they too serve relatively dense towns within those rural areas. Furthermore, larger LECs tend to have a scope of operations which is very different from that of smaller LECs including investments in regional toll service network facilities and specialized and business services.

Tables 1 and 2 provide financial benchmark data for key operating ratios, costs and revenues for large and small LECs.

3.1 Operations, Investment and Expenses

A comparison of the FCC and RUS data for large and small LECs indicates that large LECs enjoy substantial capital and labor productivity advantages due to their large scale of operations and dense subscriber base. For example, large LECs support on average about 30% more telephone lines per employee than small LECs.

Average annual expenses per line are $607 for small LECs and $446 for large LECs. However this includes annual depreciation charges per line which, due to the small LECs larger investment in physical plant per line, would be expected to cause annual capital related expenses to be higher. Since depreciation expense requires no cash outlay, operations expense net of depreciation provides a better measure of relative expense

performance. Net of depreciation expense, small LECs annual expense per line is $450 and the large LEC is $330.

Even though small LECs have 40% more investment per subscriber line, the annual network related expense ($128) is almost the same as for large LECs ($120). Annual customer operations expense is $70 per line for small LECs and $84 for large LECs. Corporate operations expense (i.e., overhead) per line for small LECs is $120 and for large LECs is $70. This cursory analysis of average expense data reveals that small LECs are quite efficient relative to their larger LEC counterparts when considering the on-going network and business office operations. This is especially significant considering that conventional wisdom is that there are important production cost economies associated with larger scale and scope of network operations. Overhead expense performance for smaller LECs relative to larger LECs is not good. But, per line corporate overhead involves expenses which are more easily reduced by "spreading" them over more access lines.

3.2 Revenue and Operating Margins

Chart 1 portrays major sources of revenue and expense for small LECs in average percentage terms and Table 3 provides some indication of the variability of per subscriber revenue and expense among individual firms. The data presented earlier in Table 1 showed that annual revenue per line for small LECs is $799 per year or $66 per month and corresponding amounts for large LEC revenue is $605 per year or $50 per month. Basic local monthly service charges per line are similar for both large and small LECs at about $16 per month. Regulation continues to achieve the social objective of rate parity between rural and non-rural areas for Plain Old Telephone Service (POTS). The quality of POTS service is similar with RUS companies reporting that 98.5% of residential subscribers have single party service (the remainder have shared party line service).

These average revenue numbers reflect both business and residence lines. The FCC reports that 64% of access lines for large LECs are residential, while the RUS reports that small LECs have 82% residential lines. Throughout the US, business basic local service rates are higher than residential and therefore, the basic rates for residential service for rural subscribers is somewhat higher than that for large LECs once the higher ratio of business to residential lines is accounted for.

Table 1 shows operating margins per line for small LECs of 24% of revenue ($191.37 per year), for large LECs the corresponding margin is similar at 26%. So, for now, the cash flow performance is similar for both large and small LECs.

The most important difference in the revenue streams of small and large LECs is that a whopping 67% of small LEC revenue is derived from toll and toll carrier access services, while for large LECs the number is 45%. Per dollar of household income, rural telephone subscribers spend almost twice as much on toll service than urban customers. Relative to large LECs, small LECs provide very little toll service directly, but instead share in the use of the toll network facilities of interconnected large LECs and interexchange carriers (IXCs). This is a harbinger of future problems for small LECs who have little hope of increasing their toll operations. Large LECs on the other hand, especially the RBOCs, have much to gain when the government removes restrictions into the huge interLATA toll market. Carrier access charges and toll settlements paid from larger telephone companies to smaller ones increase the ratio of toll and carrier access revenues. As competition in the industry for toll and carrier access services escalates, this very important revenue support for small telephone companies is increasingly at risk. The fact

that some very high cost rural telephone companies depend on toll subsidies for their very existence represents a special problem for the future. For such companies, average loop costs can easily run two to ten times the overall rural average.

3.3 Financial Trends

Whatever the prospects for the financial future of rural LECs, the trend for the last five years is certainly a healthy one. For the time period 1989 to 1993 RUS LECs achieved an 8% increase in per line revenue and operating margins. Basic service revenue for RUS LECs increased over the period by 8% and toll and network access revenue increased by 11%. This is impressive considering that the corresponding FCC data for large LECs indicates percentage reductions in revenue per line (-10%) and operating margins per line (-18%)[19].

Furthermore, investment in rural networks is proceeding apace. From 1989 to 1993 the per line investment for RUS LECs increased by 9%. The depreciation reserve ratio (an indicator of the rate of capital replacement) has steadily increased (albeit slowly 9%) from 38.1% to 41.6%. Large LECs have done somewhat better on average as depreciation reserve ratios rose considerably from about 34% to about 40% (an 18% increase). Thus, the rural LECs rate of capital recovery increased only one-half that of the large LECs over the last five years. However, the large LECs had started back in 1989 with a depreciation reserve percentage far below that of the rural LECs and are only now catching up.

That having been said, rural LECs are now at risk of stagnating and falling behind. Large LEC depreciation rates for 1993 were 7.1% compared to only 6.2% for the small LECs (about the same as it was for 1989). In 1993 the large LECs invested in capital additions at a rate of +7.5% of the total plant in service, indicating that almost all of the financing was generated internally from depreciation charges. No comparable estimate of total capital additions over time is available for RUS companies because the exact number of companies which borrow (and report) this data to RUS varies from year to year.

Rural Telephone Plant Characteristics and Costs

Based on RUS company cost characteristics, one broad gauge estimate of the total cost of providing rural telephone service in the US is $19B per year[20]. This total assumes that all 22M non-MSA subscriber lines are classified as rural and an average annual cost of $871.08 or $72.59 per month.

There are significant differences in the physical characteristics of rural vs. urban telephone plants. RUS companies' markets are very thin, averaging only 4 subscriber lines per square mile of area served and only 6 lines per route mile of telephone transmission plants. For large telephone companies the average density of subscriber lines is greater by an order of magnitude[21]. Large LECs have five times more lines per switching office and almost five times less transmission facilities per line than small LECs (measured by sheath meters of copper cable - Table 2). The average length of subscriber connections to the LEC exchange switch for large LECs is about 10,000 feet vs. double that for small LECs. However, the net result is that the average investment and expense per subscriber line is only about 40% higher for the small LECs (Table 2).

Chart 2 shows a breakdown of small LEC total capital expenditures by major category of plant. Eighty-five percent of small LEC capital investment is represented by switching plant (31%) and cable and wire facilities (54%). Large LECs have 82% of total

investment in switching plant(38%) and cable and wire facilities (44%). For both large and small LECs the remainder of the investment is primarily in land, building and support assets.

The average loop length for RUS companies is 20,330 feet, which is significant considering that access lines longer than 18,000 feet usually require special treatment to insure high quality basic service. The main problem is the attenuation of the analog signal, which may require boosting, using repeaters and amplifiers, or passive reduction of attenuation losses by loading coils, or both. Such loops pose a problem for the narrowband digital and new broadband services that require relatively high quality circuits for error free digital transmission. However, the mode loop length is less than the average for RUS companies. Consequently, 55% of the loops are less than 18,000 feet. The majority of RUS company loops are actually non-loaded, but many still receive treatment of some kind to improve transmission and signal quality. In contrast, about 90% of RBOC loops are less than 18,000 feet, and a large majority of those are non-loaded with an average length of only 7,500 feet.

On average, there are about 7,400 access lines per telephone company exchange in the US. Bell companies (BOCs) have about 12,000 lines per exchange[22]. Non-Bell Independent Companies (ICOs) have only about 3,000 lines per exchange. For 1993, the RUS reports an average of only 1,223 lines per exchange.

Average statistics regarding costs and network operations can be very misleading when considering any individual LEC or specific geographic region and caution must be used before ascribing average statistics to any company or group of companies. An examination of the RUS data for individual companies indicates some highly skewed distributions. Charts 3-5 illustrate the high variability in small company network characteristics including the number of exchanges, the number of subscribers and the average exchange size. For example, Chart 3 shows that the average number of exchanges per small LEC is 6 while the standard deviation is 8.5 and by far, most companies have only 1. Chart 4 shows that the average number of subscribers per company is 6,341 with a standard deviation of 14,000 with most companies having under 1000. Chart 5 shows that most RUS companies have between 200–400 subscribers per exchange, while the average is 1,223 and the standard deviation is 1,499. There are a considerable number of companies with over 2,800 subscribers per exchange.

Indeed, even within a single rural exchange area there are substantial differences in the physical characteristics of subscriber connections. This means that it is not only misleading to ascribe average company or exchange statistics to individual companies or exchanges, but that it is also problematic to apply average loop characteristics of a single exchange to individual subscribers. This has enormous implications for public policies that are trying to accurately target funding assistance to those subscribers who are truly in need.

Figure 1 is a stylized example of a representative local exchange area for a rural telephone company. The average exchange is comprised of about 1,200 households with a relatively dense downtown area containing 65% of total lines in the exchange area and 35% considered to be in the rural surrounding area of the exchange. The “typical” rural exchange as shown in Figure 1 has 768 households in the downtown area at a density of 256 subscribers per square mile, and 440 rural households with an average density of 6 per square mile. This example of a “typical” exchange shows that it is the rule rather than the exception to expect very different costs for individual subscriber connections within the same exchange area.

To illustrate the impact of subscriber density on the average cost per subscriber for rural LECs, Chart 6 provides cost estimates for the average urban and rural subscriber in the stylized exchange presented in Figure 1. The overall average per subscriber cost is $2,200. For the urban zone of the exchange the average cost is $800 and for the rural zone it is $6,000. As expected, the difference in cost is due primarily to the placement of longer loops for the rural subscriber.

A further examination of the variability of rural loop costs among small LECs can be found in Table 4 which provides a breakdown of total investment per subscriber for three density bands 1–10 lines per kilometer (km), 10–100 lines, and 100–500 lines. The per subscriber cost in the lowest density band (0-10/km) is about one third higher than for the second (10-100/km) and three times higher than the highest density band 100-500/km, with the average investment being $2,055 per line. Even within each density band, however, it would be misleading to ascribe the average cost result to any one company. For example, there could be drastic differences in topology and terrain which would dramatically affect costs but which do not appear in this data. One company may serve a relatively flat area with sandy soil, while another might be hilly or mountainous featuring solid rock. The spatial distribution of subscribers in a single exchange area could be exactly the same for both companies and yet the per subscriber costs for each could vary by an order of magnitude or more. The bottom line is that local conditions matter a lot.

Table 5 provides further support for the need to consider local conditions when assessing average cost characteristics. This Table displays statistical correlations between key publicly available measures of subscriber distance and density and investment and expense costs per line actually observed for 886 RUS companies. The subscriber density measures which were correlated with average cost per line were subscribers per route mile of cable, subscribers per square mile of serving area, and subscriber lines per switch. The very low values of the standard correlation coefficients demonstrate that there is no significant relationship between density measures and costs. Yet, it is well known that local factors like terrain notwithstanding, the primary engineering cost driver in local telephone networks is the distance of subscribers from the exchange. The second set of correlation coefficients is based on positioning all of the observed values for each variable in rank order from highest to lowest and correlating the rank ordered vectors. The very high rank correlation coefficients do indicate significant relationships, but now they have no meaning for any given company since the ranking of variable values were made without regard to which company the values belonged.

Kentucky is considered one of the most rural states in the US and Table 6 shows how small LECs average costs and revenues may vary within any given state. There are 16 rural Kentucky LECs that borrowed from the RUS in 1993. Table 6 (2 pages) provides operating and financial statistics for each of them. The weighted average revenue and cost per line and network density for the combined Kentucky rural LECs (second last row of Table 6) are fairly close to those for the national averages which appear in the last row of Table 6.

Conventional wisdom (at least to the layperson) is that rural telephone companies serve sparsely populated regions with little or no urban areas. This is not true. The available data makes it clear that inferences for any given company based on the average statistics for the group could be grossly misleading. Similar data is available for small LEC revenues and expenses. This data provides an important message for policy makers and regulators which may be tempted to develop competition policies and rural subsidy requirements based upon average cost and revenue statistics. There is no such thing as an

"average" rural company, and no such thing as a "meaningful" average measure of the subsidy requirement.

Network Modernization

Notwithstanding the differences in individual company costs, at a broad policy level, the average statistics for loop length, transmission electronics and investment are useful for evaluating the average and total cost of rural subscriber loop upgrades. There is a great disparity between the tasks confronting large and small LECs to upgrade their loop plant to ISDN compatibility. Although bridged taps limit the ability of loop plant to support new digital service, this is no longer a serious problem for RUS companies.

In terms of digital network switching and intelligent network (i.e., switches equipped for Signaling System 7 (SS7) facilities, small LECs compare favorably to large LECs. Table 6 provides recent data on digital network facilities for Bell, other large LECs and smaller independent companies.

As the economies of scale derived from digital and fiber optic technology continue to lower the incremental per subscriber costs for advanced telephone services, the total costs associated with converting subscriber lines to narrowband and broadband digital service remains high or even prohibitive. Digital subscriber lines will allow rural subscribers to take advantage of new information age services including on-line computing, database, information and transaction services, remote monitoring, advanced facsimile and data services. These are the primary near-term applications for advanced rural telecommunications that will enable subscribers to "telecommute" or improve their productivity in the office or the home. Eventually, broadband digital service will become possible, ultimately providing for bandwidth on demand for anything from still pictures and high speed graphics to video telephony and full motion entertainment video.

Basic narrowband digital service begins with upgrading rural network functionality. Initial upgrades will support only low speed data and voice service. Expanded network capability will support higher data rates from 56Kbs service up to 144Kbs full ISDN service. This is the same modernization scenario scheduled for urban and suburban network upgrades, except that rural areas face some special challenges due to longer loop lengths. In both urban and rural areas, business customers may require broadband services, while most residential customers will probably be satisfied with narrowband capability for advanced voice and data telephone services. If residential demand for integrated broadband services takes off, narrowband network upgrades could be "leapfrogged" by the provisioning of broadband network connections capable of simultaneously supporting traditional telephone and broadband services. This scenario is very expensive and particularly risky in light of the cost effective alternatives including terrestrial wireless and satellite networks. It is especially risky for rural LECs to deploy broadband subscriber connections due to the very high sunk costs involved in the face of uncertain demand and certain competition from technological alternatives.

Not only is the broadband network infrastructure expensive, but the additional subscriber premises equipment cost must be factored in. New terminal equipment is currently very expensive. Even the basic digital set top converter box which is used to manipulate and control telephone and digital television signals coming into the house is very expensive. Early production units will retail at around $500-$700 apiece.

A second major problem with narrowband digital service network upgrades (as with next generation broadband services) is that there are no significant demand drivers, primarily

because network services, almost by definition, require two-way end-to-end connectivity. Yet, physical network upgrades are gradual processes where more and more customers obtain access to the new technology over a period of many years. It takes a long time to implement widely available interconnectivity—the factor that will provide the demand-pull for further technology adoption. What good is it to be able to have advanced telecommunications equipment in your home if the people you want to communicate with do not have similar capability.

Thus, developing and deploying advanced digital telecommunication networks is a difficult and costly proposition, even in dense urban and suburban areas. Narrowband digital service, in the form of ISDN, has been in the implementation stage for almost a decade now; and there is still no residential service and only very limited access to business service. With widely available residential ISDN service not expected until late this decade, it is clear that even more advanced network upgrades will be delayed for both physical and financial reasons.

5.1 Business Subscribers

The rapid development of an advanced communication infrastructure for rural America will depend on how easy it is for businesses to access the technology. Businesses consider telecommunications capability an important factor in their location decisions. To the extent that businesses will have advanced services available to them, rural areas may become more attractive locations. Furthermore, as telecommunications capability improves in rural areas, "demand-pull" will begin to stimulate further technology adoption as businesses and their various suppliers and customers make use of more efficient network facilities. However, exactly what constitutes advanced telecommunication for businesses is an unsettled issue.

Relatively large businesses in rural areas, whether in the service or manufacturing sector, often require broadband communications capability to maximize operating efficiency and compete with their urban and suburban counterparts. Broadband in this case refers to digital transmission speeds of 45 Mb/s and higher. At such speeds, high quality data services and video telephony are possible. These speeds are much greater than the narrowband ISDN service which is gradually being deployed. Broadband service generally requires coaxial or fiber optic cable for subscriber connections, while narrowband service may be provided over more traditional copper facilities. Microwave and fiber optic transmission technologies are nominally capable of supporting both narrowband and broadband services but, as already explained, fiber is expected to be the dominant medium for shared network facilities in the future—even in rural areas.

Since fiber optic and coaxial cable subscriber connections not only allow for future broadband telecommunications but also for simultaneously providing for high quality narrowband services, there is some question as to whether incurring the costs of narrowband ISDN on copper facilities is a good long term prospect. Some anaIysts believe early deployment of broadband facilities is the way to go, bypassing the deployment of narrowband digital service on copper. Rural economic development depends partially on attracting businesses that require efficient telecommunications. Therefore, the focus should be on getting fiber optics deployed in the public network as far downstream as possible, so that business customers have the option of accessing the network for high speed service applications, should the need arise. It will not be necessary to subsidize business access to the fiber optic public network but it is important that they have a cost effective option to build or lease their own access lines to a high speed digital public network, since this option usually exists in urban and suburban settings. The way

to accomplish this is through an aggressive statewide plan for a fiber optic network infrastructure.

5.2 Residence Subscribers

The deployment of advanced rural telecommunication facilities for residence subscribers should be addressed/viewed in several stages. Dedicated coaxial and fiber optic access lines are generally not required to support the demands of residential customers for known services. Indeed, most of the copper loops in the “downtown” portion of rural exchanges, like that in the “typical” rural exchange described earlier, are short enough to cost effectively upgrade to narrowband digital service. The larger problem is that subscribers in the rural portion of the same "typical" exchange require that expensive loop rearrangements and improvements occur to reduce or eliminate loop electronics on longer loops.

Furthermore, since the late 1970s many rural LECs pursued a plan to upgrade rural loop transmission quality and achieve economies in loop provisioning by deploying remote terminals which were placed between the central exchange and the subscriber. This upgrade strategy was endorsed and encouraged by the REA's guidelines for borrowing companies. In effect, by investing in the deployment of remote terminals (RTs) at specified locations called serving area interfaces (SAI), the placement of subscriber loop carrier (SLC) systems allowed rural LECs to save on investment in loop transmission facilities dedicated to individual subscribers while improving loop transmission quality by making the subscriber connection shorter. But, as can often happen, saving in one generation of network upgrades may be costly in transitioning to the next generation.

It turns out that the deployment of new ISDN and broadband digital network capability is somewhat easier in an environment of dedicated subscriber connections. The placement of remote electronics makes it difficult to upgrade, on demand, any given subscriber's line to provide ISDN or broadband service. No smooth and cost effective migration from POTS to ISDN is possible in these situations, and ultimately this may result in the early retirement of remote terminals if future subscriber loop upgrades are to occur in a timely fashion. This situation is typical not just in rural areas of small LECs, but for many service areas of large LECs as well (which also deployed a number of remote terminals).

This discussion provides some measure of insight as to how to conduct sound fundamental network planning. Most experts agree that the future of telecommunications demand is that households will no longer be satisfied with POTS, desiring instead their own choices of service and their own choices of service suppliers. This means that networks must be designed flexibly enough to accommodate the mix of demand which will (or might) occur. In other words, not all households will want (or be able) to pay for ISDN or broadband service. At a minimum, not all households will want it all at the same time. Thus, a cash flow oriented fundamental network plan would try to accommodate the structure of future demand, meaning LECs must invest in network facilities which allow for differentiation of service capability to match the differentiation in consumer demand.

Network Upgrade Costs

Figure 2 provides an illustration of an advanced digital rural subscriber connection. The basic loop architecture is similar to today's average rural POTS loop except for a few features. Assuming that the basic POTS loop meets the maximum length for high quality digital service e.g. 12-l8 kft.) and that the serving C0 already houses a modern digital

switch, the placement of sophisticated electronic equipment located in the three shaded boxes between the subscriber premises and the C0 enables the subscriber to use a range of new digital services.

Upgrading the loop plant of rural telephone subscribers for digital service presents a financial dilemma. A high percentage of existing subscriber loops cannot support an acceptable level of digital transmission, even for existing services. Regular voice telephone service requires much more bandwidth in digital form than in analog form. Most rural loops are engineered to support analog voice at 3–4 kHz, and very low speed data service up to 9.6 kb/s. To attempt more than this risks intolerable errors in transmission. Thus, the motivation to upgrade the rural loop plant is that current bandwidths will not support the use of many new service applications.

It would be misleading to conclude from the data on rural company loop investment that the upgrade problem is simply solved over time by replacing investment through rapid depreciation. Increased cash flow from depreciation, an important source of funds for new loop plant, also implies rate increases for current subscribers, increased subsidies from others, or both. In addition, the new loop plant is nominally more expensive than the old, even with technological advances, because of inflation in prices.

Generally, the main problem with upgrading rural subscriber loops to digital service is the presence of loading coils. These must be removed by cutting out the coils and replacing the cable at the load coil point. Alternatively, loop carrier or remote switching terminal equipment may be installed. Normally, this is all that is required in the physical loop digital upgrade. However, some rural telephone companies still have old "non-filled" cable in their loop plant. This may not support high-quality digital service even at low speeds if moisture has penetrated the cable. Nevertheless, analog voice is generally acceptable on non-filled cable. The financial requirements for upgrading "gel-filled" cable rural loops for digital service are not too much of a burden for current telephone company construction budgets over a reasonable period of time. However, for "non-filled" cable loops, a costly and aggressive rehabilitation program may require external financing. The process of replacement will speed up since the remaining non-depreciated useful life of non-filled cable is relatively short (it was last installed in the early 1970s).

6.1 Narrowband Digital Service

Chart 6 presents the base case costs for current narrowband rural LEC loops. The estimated cost of upgrading existing rural loops to provide for ISDN service is only about $100 to $200 per subscriber (again assuming that the loop is qualified in terms of length and electronics) For non qualified loops (featuring load coils, non-filled cable, etc.), the average cost can be anywhere from $50–$2,000 per subscriber[23]. This only represents the average; some customer loops will be even more expensive to upgrade, such as where spatial distribution of subscribers was not conducive to sharing facilities. One goal of the upgrade, de-loading rural loops, could be very expensive when there is no cost justified possibility for shortening the dedicated portion of the subscriber loop through the use of a ISDN compatible remote subscriber terminal (RST) or digital loop carrier (DLC) system. The state-of-the-art loop architecture assumes that a fiber trunk connects an RST to a digital host CO (see Figure 2).

6.2 Broadband Digital Service

Based on a broad based analysis of existing (1992) RUS company cost structures, the monthly cost of deploying a rural broadband network is estimated to be between $92–$132 a month per line depending upon the period for deployment (10-20 years)[24].

Whereas rural network upgrades for narrowband digital service are based on maximum loop lengths of 18 kft. from the switching node, higher bandwidth and power requirements of switched broadband networks will require a smaller serving area featuring loops of only 6–12 kft. depending on the services contemplated and the specific network design. This raises costs considerably. For example, reducing a maximum serving area distance from 18 kft. to 6 kft. means that 9 network nodes are required vs. only one.

The digital loop diagram in Figure 2 indicates where electronics may be installed to allow subscribers to upgrade service for broadband capability like entertainment video service. Recalling that the downtown area of the rural exchange might well be within the 6 kft. limit, this situation certainly favors that area over the outlying rural area in any upgrade decision. Chart 7 provides an estimate of a rural LEC's broadband loop upgrade using Hybrid Fiber Coax (HFC). Assuming that the maximum number of households served per HFC network node is 480, Chart 7 shows how per subscriber costs might be expected to vary as subscriber density varies (i.e., as one moves out from the downtown area toward the rural areas of the exchange). Subscriber access connections within the dense downtown area may be upgraded to broadband service for $1,000, while serving subscribers in the outlying rural areas of the exchange can cost up to $10,000. The illustrative costs in Chart 7 are for subscriber connections, and do not include the costs of upgrading other network and non-network functions including sophisticated broadband network system hardware and software and programming service. One estimate is that this could add another $400–$1,500 per subscriber.

Another possibility for providing broadband telecommunications to rural areas is through upgrading the existing rural coaxial cable systems with fiber optic trunk lines and interconnecting to the public switched telephone network. For a truly integrated broadband system, this usually generates per subscriber costs similar to those already discussed for telco network upgrades. There are other (even more sophisticated) methods of providing broadband services to the home, but the costs of these alternatives are generally equal to or higher than the HFC network upgrade.[25] Fiber to the Home systems are touted as being the ultimate in broadband telephony featuring high quality bandwidth on demand with capacity for any conceivable service. The costs of such systems for rural applications are currently so high as to not even be seriously considered by rural LECs, however, this conclusion in no way detracts from the great potential of fiber optic trunk network systems in rural settings. [26]

6.3 Wireless Alternatives

For situations where it is simply too expensive to use the recommended loop architecture, there are several alternative choices including satellite, point or multipoint radio, and cellular radio. These alternatives must be evaluated on a case-by-case basis, including an estimation of the cost of an efficient connection to the public wireline network.[27]

Digital wireless technology could potentially become a cost effective replacement for fixed wired telephone service for everything from POTS to broadband service. In particular, new digital wireless cable networks are already competing with traditional wired cable in urban areas and it is widely believed that the new digital cellular Personal Communication Networks (PCNs) will provide a cost effective alternative to both the

fixed and mobile cellular telephone systems in service today, all at competitive prices.[28] However, rural areas pose a special problem for successful deployment of cellular systems for fixed telephone service. Furthermore, while PCN systems using small cells (microcells) are optimal for low power operation in urban settings (i.e., dense market areas), they are not cost effective in rural areas because of the sparse number of subscribers who can share a single base station in a small coverage area.

Due to the distances involved in a rural setting, the power levels for transceiver base stations needs to be much higher than in urban cellular markets or it is not possible to reach enough subscribers to make the investment worthwhile. Too many low power antennae sites would be required to cover rural areas in a cost effective manner. Current microwave radio systems for rural telecommunications (dubbed BETRS by the FCC) are very expensive to deploy and operate and tend to be cost effective only in the thinnest rural markets, or where terrain will not permit wired subscriber connections.[29]

Many recent articles have touted the virtues of using wireless access at a cost effective substitute for wired access in rural areas.[30] Hatfield, Paulraj and others show that in the thinnest markets (0–100 subscribers per square km), fixed microwave radio (i.e., BETRS) systems may be cost effective to deploy. Other authors show that cellular systems using large cells (macrocells) are also cost effective in many rural markets including downtown areas. Figure 3 provides a broad gauge look at the relative cost effectiveness of macrocell and microcell wireless access systems vs. wired access.

Raw cost efficiencies aside, much of the problem with deploying wireless networks in rural areas lies more with the long head start and continuing inertia of wired service and the ingrained preferences of telephone company managers and engineers for the old (well understood) way of doing things.[31] A second important problem to overcome is the current federal rules governing the provision of digital cellular service in rural areas and the limited radio spectrum frequency which has been licensed for use by rural radio systems.[32] Currently, rural cellular service must be provided under restrictive conditions imposed by the government on radio frequency use. Rural cellular providers must share radio frequencies with existing high power paging services, causing interference problems. Channelization schemes used by current urban area cellular radio licensees are not optimal for use in rural areas. Power restrictions are too low and the radio carrier channels are too narrow to allow for a single channel to be shared cost effectively in a rural setting.

If the government would allocate sufficient dedicated radio frequency spectrum (e.g., 20 MHz) and increase permitted power levels, then cellular equipment manufacturers and network operators could use state of the art digital access techniques such as TDMA and CDMA and wide carrier channels (e.g., spread spectrum). This would allow rural cellular service to become a cost effective replacement for expensive wired POTS access arrangements and could reduce the costs of broadband network upgrades.

For subscribers in rural areas which are truly remote (perhaps even unserved), new digital satellite systems offer the best hope of obtaining high quality digital telephone service. Beginning in l996, many new systems will be launched, providing coverage over the entire continental US. Initially prices for these systems will be very high and some subsidies may be required to make it available. One of the main reasons why satellite service has not been viewed as potentially competitive with wired service is the annoying (and heretofore unavoidable) delay time associated with voice transmission on the system uplink and downlink segments (250 milliseconds). Many new digital satellite systems

have overcome this quality differential by using Low Earth Orbit (LEO) satellites which feature only a fraction of the delay time.[33]

The recent (and rapid) introduction of digital satellite television using Direct Broadcast Satellite (DBS) service demonstrates that rural areas will be able to benefit substantially. The cost of this technology is not distance sensitive and therefore rural subscribers can finally obtain equivalent service at equal prices in a market setting.[34]

Infrastructure Development

Now and in the foreseeable future, federal state and local governments play a key role in developing the rural telecommunications infrastructure. Indeed, regulators are largely responsible (along with the industry) for creating the current complex web of industry cross subsidies which are the very lifeblood of many rural systems and which allow rural POTS subscribers to enjoy a level of service and prices that are at par with urban and suburban subscribers.

As the industry transitions from a monopoly structure to a competitive one, rural subsidies are clearly at risk. The federal government remains concerned about rural issues and both major pieces of federal legislation aimed at furthering competition in the industry contain provisions to protect subsidies for universal service including both low income subscribers and rural high cost areas.[35]

7.1 RUS Guidelines for Borrower Companies

The RUS provides low interest loans for network upgrades to the majority of small rural LECs. As the primary source of public funding for rural telephone network upgrades, the RUS's published guidelines for network upgrades has important national standing for infrastructure policy. The most recent guidelines were adopted on March 15, l995. Its major provisions are:[36]

- every State must have a modernization plan to improve the rural telecommunications network and must submit it for RUS approval (may be drafted by the State regulatory agency or the borrower companies themselves);
- the plan must provide for the elimination of party line service;
- the plan must provide for availability of services for improved business, educational, and medical services;
- the plan must encourage and improve computer and information highways for subscribers in rural areas;
- the plan must provide for rural subscribers to receive
    - conference calling
    - video
    - data rates of at least 1 Mb/s;
- uniform deployment schedules in rural and nonrural areas;
- expeditious deployment and integration of emerging technologies;
- affordable tariff rates for medical and educational services;
- reliable powering for POTS service including alternative power sources during electric utility power outages;
- in the "short term" all new telecom network facilities shall be constructed so that all single party service subscribers have access to
    - lines capable of speed of at least 1 Mb/s
    - switching equipment that supports custom calling features

    - E9ll;
- in the *medium term* (6 years after plan approval) all new facilities must be capable of
    - transmitting (motion) video signals
    - E911;
- in the *long term* all plans should accomplish
    - an elimination of party line service
    - universal availability of digital voice and data service (56-164 kb/s)
    - service at transmission speeds of no less than 1 Mb/s
    - video service

Needless to say, the new RUS guidelines and the considerable network capabilities which are required have sparked equally considerable controversy.[37] Suffice it to say that while the RUS has laid out the rules for approving loan applications for network upgrades, it is far from clear that there is enough money available to pay for such substantial upgrades and it equally unclear whether or not non-borrower companies would otherwise plan to make such upgrades. A consistent state infrastructure upgrade policy would ideally be based on an industry consensus, but with the RUS setting the least common denominator at such a high level it may not be possible to reach an industry consensus. Keeping in mind that many large LECs serve rural areas too (in fact most rural areas of the US are served by large LECs), until the large LECs (which cannot borrow from the RUS) concur in the RUS proposals (not a likely proposition) it will not be possible for States to implement consistent network infrastructure upgrades plans.

It appears that the RUS rules were written for an era of continued monopoly provisioning of telephone service. This model is outdated in light of other federal and state initiatives promoting market entry. Large and small LECs, whether or not they are RUS borrowers, recognize that the future competitive environment means that local network upgrades involve considerable market risk, and there is no longer any good prospect of recovering all of the investment from tariff rates on captive customers. One obvious provision is lacking in the RUS's rules - that infrastructure investment plans meet the fundamental test of market viability (i.e., there is no business case called for).

This having been said, the RUS should be applauded for its vision, which, rather than a mandate, is a reasonable goal to strive for. The problem is that without large LEC concurrence it will never be implemented on a large scale. The RUS probably sensed this when they called for state PUCs, which regulate all LECs both large and small, to coordinate and submit their own infrastructure upgrade plans in accordance with RUS minimum requirements.

It will be up to the state and federal governments to try to coordinate their respective roles regarding telecommunications infrastructure policy. This is not an easy task and it has barely begun.[38]

7.2 Public Power Grid

The use of a dielectric transmission medium, such as fiber optics, provides an unprecedented opportunity for inexpensive infrastructure development by taking advantage of the new-found synergies of combining existing electric utility distribution infrastructures with those of telecommunications. Construction costs of fiber optic facilities may be substantially reduced by utilizing public power grid rights of way and pole or conduit facilities. Since optical transmission is not susceptible to the electromagnetic interference caused by power lines, fiber cables could use the distribution

plant offered by the statewide power grid by purchasing or leasing facilities from rural electric utilities. Such inexpensive fiber deployment may even include lashing the fiber cable to the electric utility ground and phase wires, which often run along the tops of towers and poles. There are many possibilities. One new product on the market is a fiber cable which utilizes the metallic ground wire for strength. The ground wire in the cable supports the requirements of electric utilities, and the fiber communications capacity may be resold.

Power companies are heavy users of communication services, and many large utilities already operate major private communication networks. Smaller rural electric companies also require communications for load management, monitoring, internal communication and the like. Rural Electric Cooperatives serve geographically large and thin rural markets which often span many independent telephone company exchanges. Because they cannot justify "stand alone" internal communication networks, small electric utilities must rely on many rural telephone companies, and pay relatively high tariff rates. The sharing of power company facilities with local telephone companies can provide economies for both, providing a "win-win" situation. In addition, some large businesses who choose to locate in rural areas are often able to get sufficient power, while advanced communications capability is lacking. If the shared infrastructure were available, businesses might be more likely to locate and expand in rural areas. Safety communications for fire and alarms are other new service applications which place only nominal bandwidth requirements on the communications infrastructure. There seems to be a natural synergy here for rural communication infrastructure development, but one that is under-exploited. The electric power industry tends to be very conservative, but many firms are now examining novel arrangements with communication service providers.

7.3 Toll Service

Rural telephone companies, long desiring direct entry into the lucrative toll market, could begin taking advantage of the revenue opportunities that a fiber optic infrastructure could provide, including the possibility of providing new data and video services. This is very important if the traditional large telephone company toll subsidies enjoyed by small rural telephone companies truly disappear due to increasing competition. Small rural telephone utilities may pool traffic and interconnect with the fiber optic backbone trunk network to efficiently, and profitably, provide high quality toll voice and data services. Fiber optic backbone networks may also allow rural subscribers to purchase digital services and access remote databases of enhanced service vendors.

7.4 State Planning

The process of rural telecommunication infrastructure development is an evolutionary one that will occur only gradually as advanced facilities become available. For this reason it is important that the process begin as soon as possible. State telecommunication planners must take on the role of coordinating network interconnection and development activities, exploiting potential synergies for the benefit of all subscribers In the early stages, such coordination will concentrate on surveying all of the communication facilities, public and private, and evaluating short and long term interconnection and compatibility potential. At first, microwave and satellite network facilities will be evaluated, along with existing coaxial cable network facilities, to determine interim infrastructure possibilities. The long term focus will be on migrating to a more efficient infrastructure based on digital fiber optics and radio technology; the goal will be to share network facilities whenever it is cost

effective to do so, and guide the replacement of older network facilities with advanced facilities, stressing network compatibility along the way. Without compatibility, interconnection of communication networks will be inefficient or even impossible, and potential synergies are lost.

The rate of development for rural telecommunication infrastructures may depend largely on demand drivers. There are some logical ways to pursue network technology adoption, paying close attention to demand patterns in the current infrastructure. For example, secondary and tertiary schools, libraries, hospitals, and regional airports tend to be among the heaviest consumers of information and telecommunication services in rural areas. Public power utilities and other rural infrastructure firms, including occasional large manufacturing or service companies, also represent logical node points for rural networks. Existing telephone company switching offices, combined with the aforementioned, represent demand drivers and potential network hub sites, providing for efficient communication infrastructures. This set of candidates for network node (hub) points should generate a number of alternative deployment scenarios for state telecommunication planners to consider. Hubbing allows the economies of satellite, microwave, and fiber transmission to be used cost effectively in relatively thin markets, thereby maximizing the net present value of the rural construction program.

7.5 Regulatory Issues

Planning for an advanced rural telecommunication infrastructure raises many regulatory and public policy issues. Prominent among them is: Who should own and control the infrastructure and how should it be financed? There are obviously no "right" answers to such questions, but some general economic principles may guide the thinking on these issues First, private ownership and control is generally preferred to public ownership and control, for reasons of operating efficiency incentives that competition provides.[39] Second, government must have a pro-active role as an overseer, enabler, and planner. As discussed previously, private network development may help support infrastructure development in a "win-win" situation where net revenue opportunities accrue to both private and public network participants through efficient interconnection and compatibility. The role of state government may be most helpful in identifying where public and private communications network activities may complement one another and strengthen the overall infrastructure.

As a rule, an infrastructure approach does not imply centralized ownership or control. It does imply cooperation among the various players, however, and this is the enabling role of government bringing together the players and encouraging infrastructure development. Much more can be done than we observe today. Most states have not yet placed sufficient emphasis on telecommunication infrastructure and its role in economic development, even in rural areas. New technologies just beginning to be deployed have very low unit costs once demand thresholds are met, but have very high up front capital costs. For this reason, an infrastructure approach to planning, which maximizes capacity sharing through a "hubbing" network architecture, holds great promise for dealing with the problem of thin rural markets. For example, even in Kentucky, which is considered a rural state, there are many locations which could generate enough traffic demand to justify a fiber, radio or satellite hub, depending upon the specific demand application(s) required.[40] Eventually fiber hubbing would dominate as the technology of choice for most new shared network applications, while microwave radio, coaxial and copper cable will be used for dedicated short haul subscriber plant; with satellite and microwave radio utilized whenever wireline facilities cannot be deployed cost effectively, especially in physically remote applications.

Finally, there are a host of important pricing issues associated with recovering the costs of advanced telecommunications infrastructure development. Two primary issues, are broad toll rate averaging across the nation and toll-to-local service subsidies. Trends in both of these areas are troubling for rural telephone companies, and will no doubt become the subject of extensive public policy debates. A full discussion of these issues is beyond the scope of this paper but a few observations deserve brief discussion.

Increasing competition in toll services, and the absence of regulatory rules for retail tariffs of competitive toll carriers is slowly eroding the broad rate averaging rules which have been in effect for many years. The effect of rate averaging is to subsidize subscribers in thin rural markets relative to those in dense markets. New volume discounts for heavy toll users, especially business customers, have already been undermining traditional rate averaging. Regional rate de-averaging is likely to occur eventually. The toll subsidy which generally flows from larger telephone companies to smaller ones is also going to decrease as competition continues to drive prices down. The best solution here is probably to target subsidies more carefully toward only those companies who are most in need rather than toward entire classes of small companies as is currently the case.

7.6 Rural Telephone Service Subsidies

Using REA data as a representative proxy for high cost rural areas of the US, the total rural subsidy is estimated to be $5B per year based on revenues of $14B and costs of $19B.[41] This means that rural rates on average would have to rise about 35% in order to pat the full costs of providing rural POTS service. This means an increase in average monthly tariff rates of about $19.

But this is a broad average figure is substantially understated if open competition were allowed. Competitive entrants will tend to pursue only the profitable rural LEC subscribers, like those which reside in relatively dense downtown areas of the rural exchange, larger business subscribers, and those subscribers who purchase a lot of non-basic services. These subscribers also provide substantial contributions toward funding the high costs, and supporting the low average tariff rates for the high cost, low (or no) profit subscribers. Without individual subscriber data on costs and corresponding revenues it is not possible to estimate what the cross subsidy flows within the rural LEC exchanges would be, but it is well known that the most profitable subscribers who are responsible for generating the most revenue, provide an inordinate amount of funds to support the costs of the remaining majority. Thus it is easy to see that the rural subsidy to truly high cost unprofitable subscribers who need to be much more heavily subsidized, is at least two times or more than the $19 per month quoted earlier.

If competition and subsidies for small LECs are to coexist, then there are some general economic principles which should underlie the subsidy funding mechanism. The mechanism should be:

- fundamentally fair for consumers;
- competitively neutral for competitors; and,
- long term sustainable.

Furthermore, pursuant to a host of recent federal and state investigations of Universal Service it appears that almost all parties to the debate have agreed on certain aspects of various plans and proposals:

- All charges for telephone service should be cost compensatory except for a narrowly defined and highly targeted set of basic service subscribers (e.g., low income, high cost).
- Subsidy funding requirements should be shared by a broad base of market players and the funding mechanism should be administered by an independent third party.

Beyond the need to define exactly what constitutes the *benefited* service and subscriber group deserving of subsidies, there are some primary unresolved issues:

1. What is the cost of the current and future public service obligations (e.g., Universal Service Obligation (USO) and Carrier of Last Resort (COLR)) and how should the cost be determined?
2. Exactly how should the subsidy funding mechanism work? (e. g., How to administer the subsidy fund? Who should administer the fund? How to collect and distribute funds within any given geographic area—local, regional or statewide.)

Assuming, for purposes of discussion, that subsidies should only apply to covering a portion of the costs of providing Plain Old Telephone Service (POTS) for certain residential PSTN subscribers (e.g., high cost/low income), and assuming also that all other subscribers should directly pay the cost of their POTS service, then it becomes clear that the proper cost "object" for quantifying a subsidy requirement for USO and COLR is the total PSTN investment and expense cost of the LEC minus the cost of the (hypothetical) PSTN if there were no such obligation to serve or be ready to serve. (Put it another way, had the LEC not had the social compact with the certification authority that it would be the only service provider and that it would be allowed to recover its total costs from tariff rates charged to its subscribers what would its investment and expense cost be.)

A cost study method must be developed which establishes both the historical and going forward costs of the USO. In particular, the total (or average per line) cost of the USO is simply the cost of providing POTS service to residential subscribers. When this cost is compared to POTS revenues, the difference is the net cost (subsidy requirement) of the obligation to serve.

In the current local monopoly environment, the funding of this subsidy amount comes from numerous sources, namely, mark ups of prices over costs (i. e., cross subsidies) for LEC business services and residential non-POTS services. In the new competitive environment, all carriers must be required, in a competitively neutral way, to share in the funding of the costs of public service obligations.

Historical Perspective

The reason that the historical cost of the LEC's public service obligations must be considered is that the monthly subscriber bills now and in the future simply represent the time payment plan that regulators (on behalf of PSTN subscribers) and the LECs agreed to under the pre-competitive regulatory regime. Thus, in the post-competitive regulatory environment, the LEC must still be enabled to reimburse its historical investors. Had the LEC and its investors known that the regulatory regime would change such that it would not have the future opportunity to compete at the margin and still recover the cost of its regulatorily imposed historical public service obligations, then the LEC would not have kept investing in network infrastructure to certain customers and locations which it viewed as too risky without good prospects for cost recovery.

Incremental Perspective

The definition of the going forward cost of a LEC's public service obligations is the same as the historical one except that the costs would be based on the total incremental cost of the obligation instead of the total historical cost. Thus, the cost calculations would reflect incremental instead of embedded technology and business practices.

LRSIC vs. Total (Average) Cost

Some parties to the subsidy debate have asserted that the cost and funding of LEC public service obligations should be based on the incremental cost of POTS, not the total or average cost. Unless the Long Run Service Incremental Cost (LRSIC) study methodology they espouse is carefully constructed to approximate the total cost of the obligation; then it is flawed. This is unjustifiable from an economic perspective. This theoretical and practical distinction is important since it is the total (average) cost of a business enterprise which must be covered by total (average) revenues for the firm to be sustainable. Open market entry and competition will, over time, force rates for all services to be driven toward their costs (unless subsidies are provided).

Thus, a subsidy system which relies on continued price cost margins on competitive services to fund a portion of the costs for residential POTS service is an inherently unsustainable system. Competition is the natural enemy of cross subsidies. Indeed, a LEC, and, in turn, the LECs customers, which must incur the costs of regulatorily imposed public service obligations which are not similarly borne by market entrants (and their subscribers) will be disadvantaged in the market place The end result is a shift in consumer welfare from the LEC’s customer base toward the entrant's subscribers.

To avoid such discrimination and inadvertent shifts of wealth between subscriber groups, regulators should adopt a consumer friendly and competitively neutral subsidy funding mechanism before competitive entry forces a de facto rate deaveraging where one group of subscribers must pay for regulatorily imposed obligations and one does not. Fundamentally, there are only two types of POTS subscribers: those low cost subscribers in relatively dense areas served by relatively short loops who have relatively low local calling rates (subsidizers); and those relatively high cost subscribers served by relatively long loops which have relatively high local calling rates (subsidizees). Of course, even in high cost (long loop) geographic locations there will almost always be highly profitable subscribers who purchase a lot of non-POTS services. For this reason, a proper cost analysis must be conducted at the individual customer level. In other words, classifying a particular subscriber as a net subsidizer or a net subsidizee requires monitoring individual subscriber characteristics. Obviously, this is not practical even though it is the only way to guarantee that subsidies flow to subscribers who would otherwise not be able to obtain POTS service (or at least that quality of POTS which "profitable" PSTN subscribers receive).

Because LECs were historically monopoly providers of residential POTS, it is straightforward to calculate the total cost of any given LEC’s public service obligation by examining the embedded accounting cost data for PSTN investment and expense and converting it to an annual or monthly per subscriber amount.

In a historical context, LECs, as regulated common carrier monopoly providers of POTS, were obligated to serve (or be ready to serve) all subscribers on demand in a given service area at broadly averaged affordable POTS prices. Thus, the historical cost of the

obligation to serve would be the cost a LEC would have incurred. The average subsidy requirement for rural telephone subscribers in the US was previously provided. Even this broad gauge level of analysis provides the regulators with a "ballpark" estimate of the total and average per subscriber subsidy. It is important to keep in mind, however, that this broad gauge estimate cannot be used to evaluate the cost (subsidy requirement) for any given subscriber or location because the available information is not sufficiently granular to make that determination. The average is the net total subsidy requirement from all POTS subscribers; the sum of those subscribers which are subsidizers and subsidizees. Nevertheless, the estimate does establish the total (average) amount of the subsidy funding requirement for the (as yet to be determined) subsidy recovery mechanism.

The total and average subsidy amounts determined in stage one of the costing process may begin to be deaveraged into density cells by examining the available data for a LEC's POTS subscriber density characteristics. This Phase is made somewhat easier because it is also possible to examine the PSTN investment and expense costs of smaller rural (less dense) LECs and comparing that to the same embedded accounting data for larger (more dense) LECs (see Table 4). The results from density cell analysis may be further disaggregated down to customer specific analysis via a computerized cost "proxy" model which calculates the costs for each subscriber location.[42]

7.7 Funding Mechanism

The mechanism for collecting funds to pay the cost (subsidy requirement) of LEC public service obligations must be competitively neutral with respect to incumbent LECs, which have the obligations, and competitive entrants, which do not. In other words the contributions toward covering the subsidy costs should be shared equitably by all telecommunication service providers. In order to be sustainable, no service providers should be able to avoid payments via bypass of the LECs PSTN. Many such funding mechanisms have been proposed by industry groups and most involve a revenue surcharge mechanism.[43]

7.8 Financing Alternatives

The costs of the deployment of efficient communication infrastructures are high compared to any historical measure of the costs of technology adoption. The reason is that the technological trends are toward lower on-going usage costs, and higher up front capital costs. Digital network equipment has few moving parts and features very large scale capacity relative to older generation network equipment. As such, the new equipment is more cost efficient from a maintenance and repair expense perspective, but is more capital intensive and is typically purchased in greater "lumps", because it is well suited for large scale operations. The same tends to be true of fiber optic transmission equipment, although for many network applications fiber will soon be cost effective even relative to the older generation copper and coaxial cable costs. The bonus with fiber optics is not only its very high capacity, but also its high quality and reliable service as compared to metallic and radio technologies. Nevertheless, up front deployment costs for fiber optics are substantial, and every effort to cost it effectively is important.

Telephone rates are the obvious first choice for financing advanced rural network infrastructures. Indeed, most of the financing must come from this source. Fortunately, it appears likely that the internal capital flows of telephone utilities will fund much of infrastructure deployment costs. But as was pointed out previously, these traditional

internal cash flows are at risk due to increasing competition and the advance of technological alternatives.

Borrowing is the next alternative to consider. The U.S. Department of Agriculture's Rural Utilities Service and others provide subsidized loans to rural telephone companies. Without government assistance these telephone companies would have to go to other capital markets that offer less attractive terms.

Unlike large telephone utilities, many rural companies are already highly leveraged. This is not bad in and of itself, but it does impact the propensity of lenders to approve more funds on favorable terms. Regulators may also become concerned about the level of business risk which leverage implies, even though ratepayers may benefit from the lower average cost of debt capital relative to equity finance.

The RUS and some other lender's practices are basically sound for financing advanced rural telecommunication infrastructures because they operate within an incentive structure which tends to signal borrowers to make good investments (not to mention the new aggressive network upgrade guidelines). The RUS uses "equity based" financing and loans that are usually “self liquidating”. The proposed investments of borrowers must meet general technical guidelines for acceptable and approved equipment purchases. This system prevents speculation and abuse of government loan funds. Even though the RUS program is a loan subsidy program, only the interest rate discount is truly "subsidized”, and this is a relatively small portion of the entire loan and repayment sum. The loans are self liquidating from revenue and cash flow from telephone rates. Overall this approach seems socially efficient since it allows the private sector to determine the market requirements and opportunities for sound investment decisions, and requires the borrower to have a substantial equity stake. The only government role is to provide an inexpensive source of funds, technical support, and monitoring.

Direct subsidies, especially of the current untargeted variety, are much worse and are often not socially efficient. The current flow of toll-to-local subsidies from many large telephone companies to many smaller ones is generally inefficient because it is not based on need; instead, it is based simply on a grand formula for broad rate averaging and revenue sharing. In fact, some of the vast sums of money in the toll revenue pool now divided among telephone companies through the use of a broad formula could be used to increase the RUS’s loan authority or could be distributed based on bonafide financial need Whenever subsidies are not targeted there are potentially wasted resources. The introduction of basic telephone “lifeline" service based on a "need" (income) test is a good example; this has proven to be much more socially efficient than a blanket subsidy for all local service subscribers, many of whom can afford it. As the financial data provided earlier indicate, many small rural telephone companies have very healthy cash flow situations and do not really need subsidies.

Direct government subsidies for rural telecommunications should be discouraged since the investments funded will presumably generate some level of on going subscriber revenue and should therefore always be included in any loan repayment formula, even if the repayment is only a partial one.

Conclusions

Perhaps one of the most important policy conclusions from the analysis herein is a firm recognition that there is a notable difference between the costs of local network upgrades for the base of existing rural telephone subscribers, and the costs of serving brand new

and physically remote subscribers. From a public policy perspective the latter group must be treated as special cases requiring significant cost subsidies, otherwise policy for the masses could fall victim to debates of subsidies for the few. Overall, the existing body of rural subscribers is currently being served cost effectively and profitably, and a timely digital network upgrade is a reasonable proposition without necessitating large rate increases.

The second important message is that small rural LECs cannot be classified according to average costs and subsidy requirements. There is just too much variability based on the local market conditions and geography, which presents a major problem for policy makers desiring to better target subsidies to those companies and subscribers who really need it. Average statistics just will not do. There is no such thing as an average rural LEC. This revelation has tremendous implications for state and federal government competition policy. If open market entry is allowed, existing subsidies will dry up—period. Therefore if the government is serious about having both competition and subsidies, the current system is in bad need of reform. The alternative is the natural market solution which is to drive out cross subsidies. This may not be bad since the subsidies may not all have been justified in the first place. Nevertheless, if it remains a public policy objective that rural areas of the US should be able to continue to obtain a comparable level of basic service (e.g., POTS however defined) at prices comparable to those in urban areas of the US, then the subsidy system must be reformed as soon as possible.

Third, the key to rapid adoption of advanced technology for rural subscribers is to take an infrastructure approach to the problem. This implies significant coordination and monitoring of public and private network investment and business activity, preferably at the state level. Specifically, in the current environment, there appear to be significant lost opportunities for the realization of public benefits and potential synergies from cooperation of the energy, transportation and telecommunication sectors.

The infrastructure approach could go a long way toward solving this problem and actually follows from the technology itself. First and foremost, new telecommunications technologies can be very efficient, but that efficiency depends on two critical factors which are often non-existent in rural areas of the country, economies of scale and end-to-end service capability. The first factor operates on the supply side of the equation and simply says that technologies such as digital fiber optics require relatively large scale operations to achieve the low unit costs which are ultimately available. End-to-end service operates on the demand side of the equation and simply says that unless advanced network functionality is adopted on a very wide scale, demand drivers will be unable to speed up the technology adoption process. It is no good to have ISDN service capability unless the other party to the call also has it. Thus, the critical issue for efficient technology adoption in rural telecommunications is sharing of network facilities, both to achieve scale economies and to stimulate demand drivers.

Fiber optics is generally the most cost effective technology for shared network service applications, and new digital wireless technology has tremendous potential for reducing the cost of dedicated subscriber connections. (Fiber is not cost effective for dedicated (non-shared) customer connections). Most businesses, especially large ones, share network facilities among a number of telephones and therefore may cost effectively adopt fiber technology before residential customers. However, both businesses and residences must share facilities as much as possible to take advantage of the superior economies of scale which fiber exhibits relative to competing technologies.

Another important advantage with fiber optics is that it can support new broadband services like video telephony, multimedia services, and very high speed data service. It is not necessary that demand for broadband services precede fiber optic technology adoption because fiber is also very cost efficient for simultaneously transmitting narrowband services. Sharing and multiplexing allow fiber to become cost effective even when only narrowband service applications are used.

An infrastructure approach to rural telecommunications technology adoption should maximize the possibilities for sharing, thereby stimulating investment in those technologies offering the greatest cost efficiencies. The bonus with adopting digital fiber optic technology early on is that the network will be robust with respect to almost any conceivable demand scenario that ultimately develops.

13/12/2004

To
Mr. Rajendra Singh
Advisor
Telecom Regulatory Authority of India
New Delhi

Sub: Response to TRAI's Consultation paper on Growth of Telecom Services in Rural India - The Way Forward.

Dear Mr.Singh,

Thank you for the visionary approach and the thought provoking industry opportunity in terms of creating new business models for rural India. In our opinion this is probably the only way to accelerate growth of rural internet & telephony, create and scale sustainable business models and attract more and more non-conventional players to this opportunity, who are nimble and can operate with lesser overheads. It was very timely to see in the consultation paper that all of these have been given appropriate priority by the Telecom Regulatory Authority of India (TRAI) and I thank you for the strategic thought leadership.

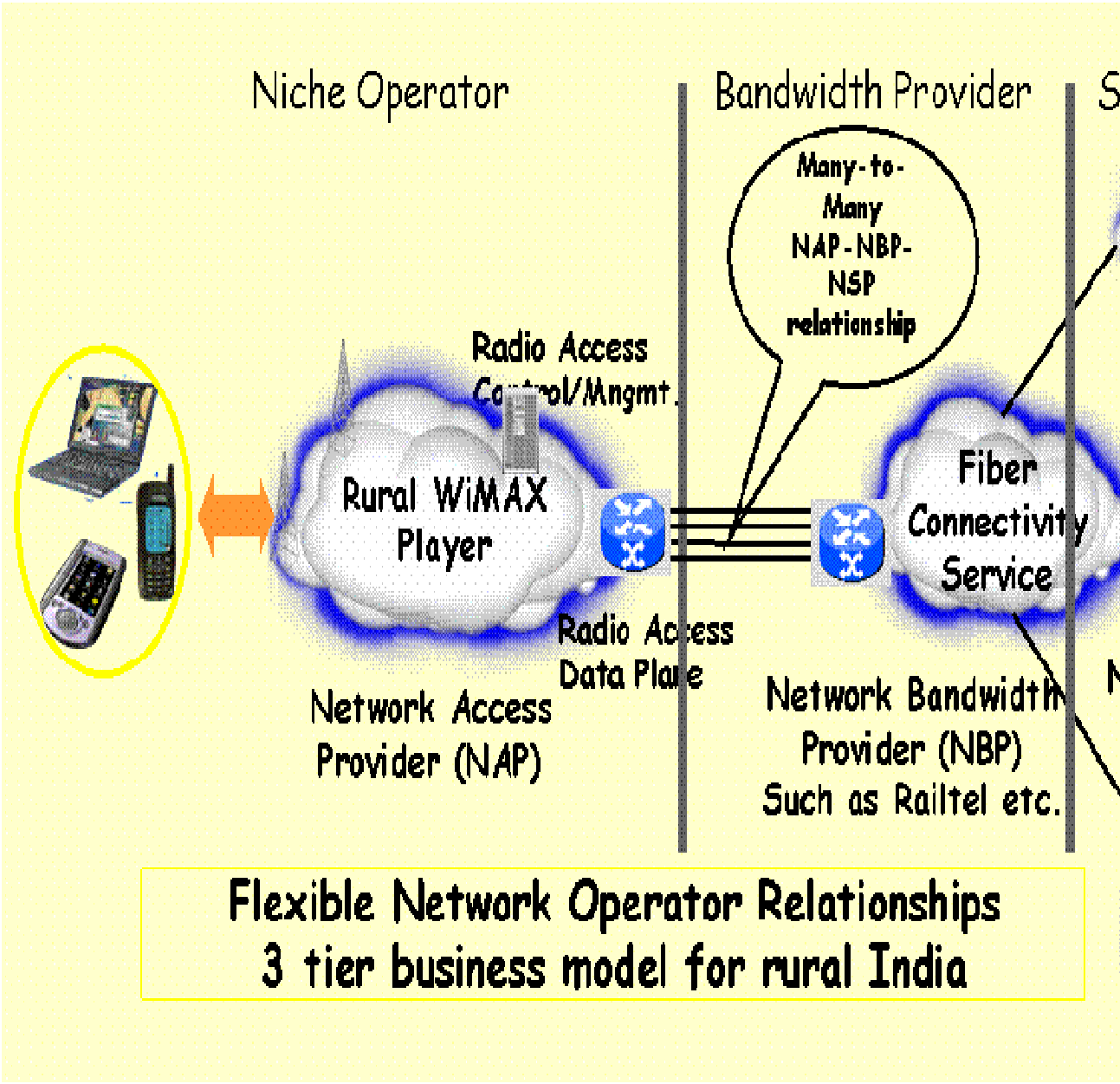
As a formal response to the TRAIs' consultation paper titled "Growth of Telecom Services in Rural India" – The Way Forward dated October 27, 2004, we want to record our observation and opinion as follows:-

1. **Niche Operators:** The rural service provider model is in our opinion the only way services could scale in rural India and would require carefully crafted policy framework, technology and subsidy models by the regulator. In our humble opinion Government of India (GOI) is in a best position to spearhead in galvanizing the eco-system to kick start rural deployments as opposed to leaving this to the market forces at this initial formative stage.

2. **End to End Services model detrimental to growth:** We should however acknowledge that some of the existing rural projects have not demonstrated scalable business models as they ran the risk of being too vertically focused (a approach to do 'end to end' by a single company) which could be

detrimental for large scale coverage in rural India. The economy of scale and time to profit for these operators would also depend very heavily on their ability to minimize capital expenditure on network build out and should have the ability to lease bandwidth on demand from what could be a shared infrastructure provider. There is therefore a strong need to create a horizontal model that involves a cafeteria style approach where the local Community Service Centre owner can get connectivity from a network orchestrator and thereon connect on demand to several value added service providers such as video conferencing, e-healthcare , E-Government , tele-education rural BPO etc.

3. **The Horizontal Model:** We like to introduce this horizontal concept as one that exist as a relationship between Network Access provider (NAP) , Network Bandwidth Provider (NBP) and Network Service Provider (NSP) as shown in this picture. The synergistic nature of this business model is win-win for all operators in the value chain, niche players, bandwidth providers and service providers, yet provides flexibility for larger players to be an end to end operator. This however requires strong policy guideline and interconnect regime that could be monitored for universal access obligations.


Niche Operator
Bandwidth Provider
Many-to-Many NAP-NBP-NSP relationship
Radio Access Control/Mngmt.
Rural WiMAX Player
Fiber Connectivity Service
Radio Access Data Plane
Network Access Provider (NAP)
Network Bandwidth Provider (NBP) Such as Railtel etc.
Flexible Network Operator Relationships
3 tier business model for rural India

4. **Shared Infrastructure:** A major component of the horizontal model is the shared infrastructure similar to the one articulated in the TRAI paper, would be the backbone connectivity that could be leased from operators such as RailTEL, Power-Grid, GAIL etc. that already have an extensive fiber network reaching out eventually to most railway stations or power sub-stations in the country for example. These bandwidth providers should be motivated to provide bandwidth to the rural last mile operators. Provide roof rights to share towers and/or mount base stations at their POPs and potentially provide co-location rights to the niche players/ CSCs. This probably can be achieved by creating incentives for such organizations through tax breaks on revenues generated by rural BB services.

5. **WiMAX and Spectrum as key enabler for niche operators:**

a. It is strongly felt that the TRAI and other bodies such as WPC get together and release broadband wireless licenses (preferably 2.3 GHZ-2.5 GHZ and 3.3-3.4 GHz) at significantly lower or subsidized rates or free for rural-use-only type licenses. Only licenses for larger urban areas should be sold at auction to prevent rural entrepreneurs from being priced out of the market. It is assumed that the primary goal of this program is to increase Internet access into rural India and there should be ease of use and lower entry barriers which shall provide rural entrepreneurs access to capital from banks, FIs and venture capitalists. To support the new spectrum, there is a need to create a permit process that is easy to apply, streamlined and efficient, and capable of quick response. It should also be ensured that approved licenses can be quickly and easily acquired. It is imperative that the WiMAX equipment used in rural areas **operates in the same frequencies** as in the cities to ensure economies of scale that will drive down equipment costs in the long run.

b. No unlicensed use of WiMAX in 5.8 GHZ should be permitted. WiMAX is operable in several bands including 2.3 GHZ, 2.5 GHZ, the 3.3-3.4GHz and the 5.8 GHz bands. Operating in the 5.8 GHz range is attractive because the 5.8 GHz frequency is unlicensed and therefore free to use. However, 5.8 GHz WiMAX has some disadvantages:

- 5.8 GHz WiMAX has a reduced range compared to 3.3-3.4 GHz WiMAX. Reduced range requires additional base stations and thus higher capital expense costs. The higher capital expense may offset any savings from free bandwidth access and time to acquire permits/licenses.
- Because 5.8 GHz WiMAX has an unlicensed environment, there may be more interference, which can adversely impact quality of service (QoS).
- 3.3GHZ and in future 2.3 GHZ , 2.5 GHZ WiMAX equipment may become cheaper because of economies of scale when used in both rural and urban settings.

6. **Universal Service Obligation Fund & Rural Internet:**

a. The TRAI paper states that Niche operators should contribute 5% of their AGR to the USO fund. Although this seems fair from an operator perspective TRAI should consider waiving the USO contribution for a RSPs for the first 3yrs or until they are profitable whichever is earlier. This will further motivate RSPs to enter the market and take on the risks associated with running this business. This is proposed keeping in mind that rural ICT is both a business and social opportunity for India.

b. USOF subsidy is currently voice focused. Voice centric approach is short sighted. The USOF should also be used in proportion for technologies that are future safe and has the elasticity to scale up services that are packet based and therefore internet compatible. VoIP is an important component to today's internet as this provides significant flexibility in service multiplexing, bandwidth management and overall economy of operation. The requirement of rural voice and internet should be upgraded to include such more sophisticated forward looking service requirements and supporting technologies.

We hope you find these remarks in order and find them useful as you propose your recommendation to Government of India.

We are also attaching a rural connectivity techno commercial approach note that we submitted to MoCIT in October 2004 for your kind perusal. This should also provide details on our understanding of rural ICT business, technology and telecom models.

Warm regards
Joydeep Bose
Director Corporate Technology Group
Intel India Technology Private Ltd

Consultation Paper 16/2004: Growth of Telecom Services in Rural India: The Way Forward
Comments by LIRNE*asia*

I. Responses to questions in Chapter 7

Q1. This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.

A1. Please see following commentary on the Consultation Paper.

Q2. Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?

A2. Yes. Please see para ~~7~~6 of the commentary on the Paper.

Q3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

A3. No. It is best that a uniform system be enforced, with transparent, output-based subsidies implemented independently.

Q4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

A4. I agree generally. In some circumstances, the subsidy will be unnecessary, simply the reform of regulatory provisions will be enough;. in others, the regulatory reforms will have to be supplemented by one-off smart subsidies that address the capital-cost problem; in a smaller number of cases, it maybe necessary to further supplement the above two actions with demand-side and continuing (for a defined period) smart subsidies such as vouchers. The ITU Asia Telecom paper referenced below develops the argument in greater detail.

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Q5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

A5. No, in the first instance. It is recommended that the pros and cons of this particular market intervention be studied while the more fundamental problem of giving all operators, including the cellular mobile operators, non-discriminatory and cost-based access to the backbone is solved.

Q6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

A6. The key issues that require TRAI's attention--market entry, scarce resources, access and interconnection, and effective enforcement of regulatory and competition rules--have been covered in this paper, though there are certain areas that could be improved such as asymmetrical termination rates. The real solution lies in an integrated set of actions that include smart subsidies on the supply and demand sides where needed, as well as actions to create the conditions for and stimulate the development of Internet content and transaction opportunities of relevance to rural citizens. There is a role for ~~What about~~ stimulating demand through non-financial means such as~~incentives –~~ awareness raising, etc. ~~?~~ This is

not TRAI's task, though TRAI can play an important ~~critical~~ role. TRAI can also perform a role similar to that of the Rakesh Mohan Committee on infrastructure back in the 1990s, by identifying the investment requirements for extending telecom infrastructure into the rural areas and raising awareness of the need to attract private and public investment. The LIRNE*asia* case studies from 2003-04, especially the one on India authored by Payal Malik, may be of relevance n this regard.

Q7. Do you think that we can sustain USO subsidy model in the long run?
A7. No. All subsidies should be thought of as time limited and subject to sunset.

Q8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?
A8. Government should go about the task of making government services available to citizens virtually as well as in person, starting with shifting some of the expenditures currently spent on the latter form of service delivery to the former, gradually changing the balance to more in the former.~~-~~ Reengineering government can also contribute to this process. The software development and other actions should take place under this rubric and need not involve TRAI.

Q9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.
A9. Correlation is well established, though causality is ~~still open~~more difficult to ~~debate.~~establish in a watertight way. The key studies are Cronin, F. J., Colleran, E. K., Parker, E. B. and Gold, M. A. (1991)
'Telecommunications Infrastructure and Economic Growth: An Analysis of Causality', *Telecommunications Policy*, 15(6): 529-535.

Cronin, F. J., Gold, M. A. and Lewitzky, S. (1992) 'Telecommunications Technology, Sectoral Prices and International Competitiveness', *Telecommunications Policy*, 16(7): 553-564.

Cronin, F. J., Colleran, E. K., Herbert, P. L. and Lewitzky, S. (1993a) 'Telecommunications and Growth: the Contribution of Telecommunications Infrastructure Investment to Aggregate and Sectoral Productivity', *Telecommunications Policy*, 17(9): 677-690.

Cronin, F. J., Colleran, E. K., Parker, E. B. and Gold, M. A. (1993b) 'Telecommunications Infrastructure Investment and Economic Development', *Telecommunications Policy*, 17(6): 415-430.
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Hardy, A. P. (1980) 'The Role of the Telephone in Economic Development', *Telecommunications Policy*, 4(4): 278-286.

~~Parker, E. B, Hudson, H. E. et al. (1995) Electronic Byways: State Policies for Rural Development through Telecommunications, revised Second Edition, Washington DC: Aspen Institute. Colerain etc. [Ayesha to insert]~~

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II. Commentary on the Text of the Consultation Paper

1. LIRNE*asia* commends TRAI for calling for comments on what is perhaps the most important issue in ICT policy today in developing Asia and for the quality and comprehensiveness of the paper. In particular the basic approach set out in **para 6.3** (which is unfortunately not given enough prominence) is ~~commendable.~~sound. In general, the important recommendations in **Chapter 6** can do with a little more integration with the main preceding chapters; it is customary in these kinds of documents to have a strong introduction, development of the main arguments for the recommendations in the body of the text, and then the tight summary of recommendations. The following brief comments are intended to improve the quality of the final product.

2. **Para 2.1** (among others) refers to the existence of a massive fiber optic network within the country, amounting to 6.7 lakh of route km. This is a good thing. However, the critical questions are whether the geographical coverage is adequate, whether all this fiber is lit and in use, and whether there is an effective, non-discriminatory and cost-based access regime for the use of this capacity by all operators, especially the new entrants. Unless such a regime exists and in enforced, it is extremely difficult for operators without ~~a~~ large subscriber bases in the rural areas to enter those markets in a cost-effective way. Indeed, if such an access regime does not exist, it may even be possible to conclude that it constitutes an anti-competitive barrier in the rural markets. Unless the fiber is actually used, we are talking about vanity investments by State Owned Enterprises.

3. It is understood that biases and imperfections cannot be avoided with regard to any indicator; what can be done is to use indicators in a way that recognizes the biases and imperfections. ~~T~~In **Chapter 2** and throughout, he Paper has adopted the practice of directly adding fixed (household and office) teledensity and mobile (personal) teledensity numbers. It is important that one be aware that fixed phones are shared-use phones and mobile phones are sole-use phones, for the most part. It is also important to recognize their different potentials with regard to Internet connectivity.

4. The schematic in **para 2.8** is helpful. However, its utility may be enhanced if it were possible to incorporate the possibility of interaction among the different policy instruments. For example, a tariff policy that allows one operator to cross-subsidize its prices in rural areas may constitute a conflict with the overall competition policy in that the new entrants who ~~may~~do not have a captive market to use as a source of cross-subsidy will be unable to compete with the cross-subsidizing operator.

5. Indeed the text of **Table 2.2** suggests that the example above may actually be highly relevant. If the incumbent is free to drop his prices in rural markets even below the admittedly below-cost regulated tariff levels (i.e., tariff is a ceiling not a floor), a new entrant entering that market would have to have some spectacular cost advantages or be exceptionally courageous (which is another way of saying foolhardy).

6. **Para 3.2.1**. The proposal re niche operators is commendable and is worthy of greater investigation and elaboration. LIRNE.NET and its African affiliate, the LINK Centre of the University of the Witwatersrand, made substantive proposals on the requirements for the success of niche operators of this type when the idea was first introduced by South African legislation in 2001. The issues to be considered include a realistic analysis of the causes of under-supply in rural areas (hinted at in **para 6.3** of the TRAI consultation paper but not fully fleshed out); a solution to the capital-cost problem in the form of least-cost subsidy auctions; asymmetrical termination charges and numbering changes to make the operation of

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the charging scheme possible; an appropriate access regime to the backbone; frequency assignments and facilitation of access to rights of way, towers and tower sites (referred to only in relation to Central Government sites, rather than all locations, in **para 6.9, vi**). The LINK submission may be found at http://link.wits.ac.za/research/usal.htm. Another summary of issues on these topics is ~~at~~ contained in Rohan Samarajiva, "Extending access to ICTs: Regulatory reforms and smart subsidies," plenary presentation at ITU Telecom Asia, Busan, Korea, September 9, 2004. http://www.itu.int/cgi-bin/htsh/TELECOM/scripts/forum/speaker.details?event=ast2004&_addressid=108997&_participantid=7684

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7. **Para 3.2.2**. It is extremely important that access deficit charges (ADCs), universal service fund contributions and other extra-market transfers be carefully assessed to ensure that they do not contribute to the diminution of competitive forces in the rural market and are not in contravention of the Regulatory Reference Paper of the Fourth Protocol to the General Agreement on Trade in Services that India is now signatory to. I understand that the data and models for some of the ADC calculations are not in the public domain so it is difficult to make this assessment. It may also be advisable to consider an independent and/or outsourced mechanism for the disbursement of all universal service and related extra-market transfers to remove the perception that the disbursements so far have been somewhat biased in favor of the incumbent. Participation of non-government representatives on the governing bodies of the fund may be worth consideration. In addition to improving perceptions of fairness, this is likely to act as a break against the tendency to perpetuate subsidies.

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8. **Para 3.2.3**. The discussion on spectrum here and elsewhere in the paper suffers from the unfortunate and unjustified assumption that the efficiencies of use that can be promoted by the use of market mechanisms such as auctions ~~low cost frequencies~~ have to be sacrificed in the name of reducing the input costs of the supply of rural telecom services. It is possible, through the use of innovative design of auctions and property rights, to achieve both objectives and also ensure that transparency is enhanced. One can also combine licenses and spectrum assignments in one auction, in a way that would result in efficient assignment of frequencies without having to charge for them. This would be most appropriate for niche operators, particularly if least-cost subsidies are being used. Indeed the new technologies such as WiFi and WiMax that do not work on the basis of exclusive use or highly constrained sharing of specific frequencies, but on common use of a range of frequencies may require greater reliance on new property-rights regimes.

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9. **Para 3.3** and throughout. The identified problems of scalability of small-scale ICT access projects are real. It may be useful to think through the problem in an integrated manner that looks at the causes for undersupply of ICT access is rural areas (regulatory shortcomings, capital-cost problems, operational-revenue shortfall problems, and problems of lack of perceived demand for ICT content and transactions). The above cited ITU Telecom Asia 2004 paper provides a model of this approach, drawing from the design of the e Sri Lanka Initiative. The Consultation Paper contains the elements, but there may value in highlighting the integration. The closest it comes in the present draft is **para 6.9(iv)**.

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10. **Para 3.4**. The issues covered here include non-discriminatory access regimes (see para ~~3~~2 above) and the assignment of infrastructure responsibilities in demarcated areas to specific operators along with an internal roaming regime. While the roaming proposals are not without merit, it is recommended that priority be given to the access regime in the first instance.

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11. **Chapter 4** and throughout. There is a choice between continuing to build narrow-band networks and hoping that market and other incentives will accelerate their ~~upgrading~~incremental conversion to broadband, ~~or~~and of creating the conditions for the building of broadband networks. In other words, should we wait for the adaptation to broadband of networks designed for narrowband voice, or should we clearly indicate the preference for broadband networks that will also carry narrowband voice. It may be useful to tackle ~~head-on~~ this fundamental design element of ~~the~~ rural telecom policy~~.~~ head-on. Sri Lanka's proposed design of a mechanism for building Regional Telecom Networks under the e Sri Lanka Initiative (niche networks in TRAI parlance) clearly took the position that new networks must be designed for broadband, on which narrowband applications are possible. The recommendation in **para 6.9(i)** is in line with this, but the preceding text contains little support for this highly significant shift (with a few exceptions such as paras 1.2, 6.2).

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Midas Communication Technologies (P) Ltd.

Response of Midas to the Draft Recommendations Growth of Telecom Services in Rural India released by TRAI

MIDAS is a technology company built on a partnership of the top minds in wireless technology and business leaders. Over the years, it has successfully developed and implemented viable technologies for the last mile in the access network.

Midas' vision is to become a best in class communication Technology Company delivering technologically advanced and economically compelling telecom solutions to underserved telecom markets. The company is headquartered at Chennai (Madras), India with national sales office in Delhi, Brazil and Singapore.

With solutions ranging from toll-quality voice and dedicated Internet access to meet the needs of far-flung communities to the typical broadband needs of densely populated urban communities. MIDAS is fast becoming the preferred access solution provider in emerging markets.

Today, Midas offers corDECT as a complete end-to-end access network solution – network elements, PSTN interfaces, Internet connectivity, network management software & various Broadband solutions. Midas' ability to work with various collaborative developments has contributed significantly to its growth. Partnerships include those with,

- TeNeT Group of IIT Madras for the R&D of new access technology concepts
- Analog Devices Inc. for the manufacture of special semiconductors for corDECT equipment
- Adventnet Inc. for telecom signaling protocol software to interface the corDECT switch with the PSTN
- NMS Works for Network Management Software for corDECT systems
- n-Logue Communication for special applications and deployment in rural areas

ISSUES FOR CONSIDERATION

1. This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India?

Niche operators should be allowed to operate at the SDCA's where Rural Teledensity is at least 1%.

Midas View: Contrary to a rosy picture of an accelerated growth in overall teledensity over the last few years, rural India still remains neglected and starved for telephone connections. According to an annual report of Department of Telecommunication (DoT), rural teledensity has grown only by 4 per cent in the last financial year from 1.49 (number of phones per 100 people) to 1.55. This is compared to a 27 per cent growth in overall teledensity that has gone up from 5.11 to 7.02 during the last fiscal. **Moreover, the gap between rural teledensity and urban teledensity remains much wider.** Urban teledensity has jumped by 45 per cent from 14.32 to 20.79 in last fiscal (2003-04).

If the country needs to have rural Teledensity at a point of say 25% that of Urban Teledensity, then we should look at 25% of 20.79, hence Niche operators should be allowed to operate at the SDCA's where rural Teledensity is at least 2.5%.

Midas strongly feels that SDCA's where rural teledensity is below 2.5% should be the area of operation for Niche operators.

To ensure that the widening gap between urban and rural teledenstiy we have to address the basic issue of low disposable income of rural households.
Thus the government has to ensure that the communication service should reach villages at a more affordable price. Therefore Niche operators shall be exempted the USF fee instead they should be given some financial assistance in doing so. This will attract participation from small private players to provide services in rural areas.

Midas welcomes the view of the Authority to open a route for entry of small operators to provide Telecom services in rural India. The necessity of such Niche operators has become more after the removal of the roll out obligations in the Unified Access Service License.

The **Rural Community Phone** tender invited by the USO on 7th June 2004 from existing Basic Service Operators (BSO's), Cellular Mobile Telephone Service (CMTS) Providers and Unified Access Services Licensees (UASL) licensed for

respective Service Areas had no takers**. In such situation it becomes essential to have Niche operators who can bridge the digital divide.**

2. Should 'Niche Operators' as discussed in this consultation paper get support from Universal Service Fund?

The niche operators are being formed to take care of the low tele-density rural areas which aren't considered profitable by BSO, CMTS and UASL because of the low volume and difficult reach of the place. Under such circumstances "Niche operators" shall be given some assistance from the USO fund rather then being asked to pay 5% as fee for the USF. The government shall not levy 5% fee for USF fund on Niche Operators

3. Instead of subsidizing final product, should the subsidy be given on inputs like bandwidth and spectrum charges?

Since the effort here is to encourage small operators barge into rural SDCA's, which are not a lucrative option for BSO, CMTS, and UASL. Government should make special efforts to help Niche operators to roll out services as easily and cheaply as possible. This will encourage participation from local players to take up the cause and thus lead us to achieve the broader aim of higher rural tele-density

The spectrum requirements for the Fixed Wireless systems should be completely de-linked from Wireless systems. Splitting of this spectrum between different service providers will not make use of the available spectrum optimally, and we suggest that this entire 20 MHz spectrum should be allowed to be `shared' by all the Fixed Wireless users. The charges could be nominal for the Niche operators.

IND 50 footnote, 1900-1910 MHz could be used in addition to IND 49, 1880-1880MHz to give sufficient carriers to the Niche operators. These footnotes have already been allotted to the indigenous developed technologies based on TDD access techniques.

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self-sustaining model in rural areas, which can be implemented through subsidization of input costs from Universal Obligation Fund. Do you agree with this proposition? Offer your comments.

We think that instead of offering plain vanilla voice services to the people there're is a better chance to succeed with options where we can offer them other

services like data and other VAS etc. which can help the operators increase the ARPU thus making it an attractive proposition for the Niche Operators. For e.g. CorDECT can offer simultaneous voice and data without any extra investment in the infrastructure thus giving end user more choices and increasing the ARPU for the operator at the same time.

5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

The sharing of the infrastructure shall not only be restricted for the Cellular Mobile Service but also for other services like Fixed Wireless System where they shall be allowed to use towers and other infrastructure of the existing operator there and thus offer cheaper services (both the operators can save a lot of cost as they can share the cost which otherwise had to be borne by one operator) which can be the key to provide affordable services in rural India thus can help in increasing tele-density in a price sensitive market like India.

TRAI will have to take a strong initiative to make sure that the agreements are done between various service providers UASL, CMSP etc. to share physical infrastructure such as buildings, towers etc. on mutually agreed commercial terms. In the event of discord, TRAI may intervene to meditate.

To make the Niche operator business model viable, all calls for and originating at the SDCA or even neighboring SDCA should be handed over at some fiber point, and would be carried by the operator who owns fiber. The appropriate sharing of call charges should be worked out by the authority.

6. Do you visualize any other initiative, which should be taken by TRAI as to achieve the growth of telecom services in rural India?

The major barrier to growth of telecom services in rural areas is affordability. Though, there is some reduction in tariffs viz, rental and free calls etc. but in rural areas, this is not sufficient to make the tariff affordable to rural masses. To make the tariff affordable, further reduction of rental and increase of free calls would unduly increase the Access Deficit Charge. It is, therefore, suggested that access deficit charge should not be imposed on calls originating in rural areas.

The niche operators can play a big role in achieving that required growth in rural areas but government must facilitate Niche operators by clearly defining their scope of work and the actions expected from them. Government should provide information regarding the number and details of SDCA's with fixed rural teledensity of less than 1%, proposed to be service areas of Niche Operators in order to remove the ambiguity.

There is no mention of frequency bands to be allotted to Niche Operators proposed to be permitted use of fixed wireless networks. Types of services to be allowed to Niche Operators are also not detailed.

Spectrum needs to be allotted outside the bands reserved for mobile services (GSM and CDMA).

In addition, there should be no service tax for telecom services in rural areas and telecom infrastructure equipment for rural areas should attract no custom duty, sales tax etc. Financial concession/ support to all service providers on inputs like bandwidth, point of interconnection and spectrum charges for rural areas irrespective of teledensity as proposed in the consultation paper for Niche operators.

Government can use systems like corDECT, which offers so may advantages like

- Provides toll quality voice and supports simultaneous voice and data at 70 Kbps
- Has low per-line cost
- Quick deployment and leverages existing infrastructure and optimizes its use
- Low start-up cost of setting up the new infrastructure
- Scalable system: 300 lines and above viable
- High Reliability

7. Do you think that we can sustain USO subsidy model in the long run?

The basic purpose of setting up the USO fund was to make sure that the non lucrative areas are being taken care of by that fund thus making sure that even the remotest area are connected and teledensity improves to at least the minimum expected level. Therefore USO subsidy model must continue till we achieve that minimum expected level of teledensity within the entire country

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and database and what should be government role in this?

Content and language are the two key factors that will decide the reach of Internet in the remotest of the villages. The use of familiar language will make villagers comfortable while using data devices. Similarly to sustain the interest developed it has to be made sure that the content useful to them is made available on the net. Thus locally relevant software has to be developed and government clearly has a major role to play in it. Government should promote

regional players like Chennai Kavigal, which develops software in local languages.

n-Logue Communications Pvt. Ltd
Response to Consultation paper on Growth of Telecom Services in Rural India

Introduction:

n-Logue Communications is Category A ISP, that has been incubated by the TeNet group of IIT Madras to offer internet services in villages of India.
With over 1900 villages on the internet, this is already one of the world's largest rural tele-centre projects and has received national and international acclaim in being able to demonstrate that sustainable internet and telecom services can reach villages.

Background:
In many ways the STD/PCO revolution has significantly contributed to the quality of life of many villagers. The opportunity that lies in front of us today is that **can we do the same with Internet,** and the key challenge is how fast can this be done.

There have been many operations in the space of rural internet and n-Logue is one of the larger players currently. What is amply clear is that a village internet kiosk can make substantial money for it to be the first step in a sustainable business model. There are however many policy related issues that had been created without envisaging rural specific issues and therein lies the merit of speedy correction. This consultation paper is a much appreciated step in the right direction.

There also is merit in helping the growth of rural telecom in a way that the acceleration that is needed to take this thrust into the next level can be done.
There are significant benefits for the rural areas in terms of saving costs (in time and travel), better access to information and hence higher incomes and an entire range of benefits contributing to increased jobs, better health and education and finally incomes.

Issues for Consultation

1. **This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.**

In all the plans that are discussed by TRAI, the focus is on BSOs or Niche Operators. This focus and eligibility should also include ISPs – who are allowed to offer Internet Services in these rural areas. If we are offering Internet to rural India, it must also allow Internet Service providers to enable the benefits of any changes in policy as they are invariably more focused on data services than a BSO.

The other dimension to consider is the focus on scope of operation of the Niche Operators. The Niche Operators should be allowed to operate at all telecom districts with current penetration of less than 2.5%. This kind of benchmark would help the Niche Operator to successfully and profitably roll out in these penetration deficient areas.

2. **Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?**

Yes, Niche operators by definition would be small with lower financial muscle and hence they should get support from the Universal Service Fund.

The Universal Service Fund is by design directed to assist the less remunerative rural segment by diverting a small fraction of the revenues from the operators successfully present in more urban and better serviced areas.

3. **Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?**

This is a good suggestion. However the modalities should ensure that the proposal does not seriously affect the cash flows of small operators.

4. **In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments**.

It has been found that for rural telecom, a bouquet of services is the model that makes it self sustainable. There is enough empirical data that this is workable. Hence it does make sense to support this from the Universal Obligation Fund.

5. **For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc, be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?**

This is an excellent suggestion. The concern would be that the rates commercially available for such tower hire are sometimes unaffordable on an operating expense basis for rural operators. In such a case a suitable rate can be worked out, with the difference coming from the USO fund, if so need be.

6. **Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?**

The suggestion that of revising the objective of rural connectivity , from existing voice and low speed data to broad band connectivity is a step in the right direction. However offering 256 kbps to villages is not necessarily the best step in the short run. What is needed is at least 64kbps, dedicated (not shared) always on connection. This offers good quality video conferencing and can offer great value for the villagers. This can be upgraded over the next 3-4 years.

7. **Do you think that we can sustain USO subsidy model in the long run?**

No specific Comment

8. **Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?**

The key role that the government needs to do in this case is computerize its data and enable digital services in the form of land records, birth and death certificates and other needed services. The government can also work on some content in the education space which can be offered to all such operators to disseminate to villagers. Key areas would be tutorials, both in the direct school curriculum as well as in the vocational space.

9. **Share your experiences within and outside the country which established the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.**

With over 30 Districts in operation and 1900 villages connected on the internet , n-Logue is a visible participant in this space. Though quantitative research is being currently done , the take out from all stake holders are that these will set the foundation of a digital road into the village. This can be the backbone for higher order applications in the form of financial services, medical services, a buying and selling rural market place and an overall increase in rural prosperity.

jmukhija@yahoo.com
Subject: Fw: comments on consultation paper , surendran pa,palakkad,kerala
From: ssharma@trai.gov.in Add to Address Book
Date: Tue, 30 Nov 2004 10:23:34 +0530

----- Forwarded by sapna sharma/traicert on 30/11/04 10:23 AM -----

Rajendra Singh <jsengg@bol.net.in>

30/11/04 09:58 AM

To ssharma@trai.gov.in
cc
Subject FW: comments on consultation paper , surendran pa,palakkad,kerala

---

From: surendran p a [mailto:surendranpdca@rediffmail.com]
Sent: Monday, November 29, 2004 8:14 PM
To: jsengg@bol.net.in
Cc: trai07@bol.net.in; trai@del2.vsnl.net.in
Subject: comments on consultation paper , surendran pa,palakkad,kerala

Dated at Palakkad, Kerala State , the 29 th day of November March 2004..

Memorandum submitted BEFORE THE HONBLE CHAIRMAN,

Telecom Regulatory Authority of India New Delhi

by PA. Surendran (CAG Member , No. TRAI/CO/NGO/O1/2003)

General Secretary , Palakkad District Consumers' Association ,

Kits College Court Road Palakkad - 678001 , Kerala State .

Respected Sir ,

To: jsengg@bol.net.in

Copy to: trai07@bol.net.in ,
Shri Mathew Palamattom
Senior Research Officer, (A&P) &
Nodal Officer(Consumer Affairs)

Thank you for the important consultation paper :

Before I discuss with the Issues for consideration outlined in Chapter 7 of the Paper, lease permit me to highlight some incongruities in the data provided.

Firstly, as per the graph in Fig 1-1, the projection for mobile connections is 50 million, that is just 5% of population, in 2005. It increases to less than 100 million by 2006, 125 million by 2007 and 150 million by 2008. Whereas in para 1.4 the current mobile network is mentioned as 20% of the population, that is a whopping 200 million! Also by 2006 it is expected to increase to 75%, that is more than 750 million! This is the data mentioned in Table 1-1 too! In Table 2-1 it is mentioned that a tele density of 7 has already been achieved in Mar 2004 and this tallies with the data in Table 1.2.

In this context, even the graphical representation is misleading at first look because of the convergence of the date of introduction of mobile services. It would have been more realistic if the graph for India commenced from the seventh year of introduction in China.

As per data that appeared in a daily the other day, the mobile penetration is of the order of about just 20 million, that is 2% of the population as of now, with Reliance heading the list with just about 9 million!

Next, some presumptions are irrelevant in the Indian context. For example, on page 7 it is mentioned that 'at today's levels, though, Indians are expected to pay 60 times more than the subscribers in Korea for the same throughput, which translates to 1200 times more when considering affordability measures based on GDP per capita comparison'. I doubt if the disparities as exist in India exist in Korea.

If statistics are to be believed only less than 5% of the population pays income tax in our country. Almost 40% are illiterate and 30% do not even have the means for one square meal a day. So if the statistics mentioned by you are to be relevant it should be related to the class of users currently availing the facilities in India and Korea. I think if you take out the Ambanis, Tatas, Birlas, Narayanamurthys, Premjis, Bachans and Thendulkars alone, our GDP per capita is likely to plummet further! That means if desired penetration levels are to be achieved there has to be different costs for different levels of use, necessitating higher cost for higher use rather than the present telescopic rates which hurts the nominal user more than the extravagant user.

Third, it is mentioned in para 1.7 that 'this could no more be treated as an obligation but this is a business opportunity for growth'. I am afraid that while telecom services can contribute a lot to growth, the more demanding growths are in physical connectivity through better roads/rail and uninterrupted power, both of which require considerable capital investment and political will to improve. Without these one cannot even think of even back office work moving out to the rural areas as suggested elsewhere in the Paper.

Fourthly, it needs to be explained why specific VPT roll out obligations specified in the licenses have remained largely unmet.

Fifthly, In Table 2-2, Access deficit Charges have been explained as due to deficit in provision of fixed lines in rural and urban areas. In a Consultation Paper on Access Deficit Charges itself, the deficit has been indicated as due to provision of value added /broad band services also. In fact it was mentioned therein that 25% of the access deficit charges is made up from profit from local calls!

Sixthly, the whole of Chapter 5 is a lot of unsubstantiated premises. For example, it would be foolhardy to believe that applications useful to the local population will be developed in micro enterprises in the areas of agriculture, food processing, animal husbandry etc just by increasing the rural penetration of telecom facilities.

CHAPTER 7: ISSUES FOR CONSIDERATION.

1. E-governance when introduced substantially will give a thrust to the growth of rural telecom services with telecom kiosks providing necessary interface with the government including judiciary

2. Niche operators may be supported from USF but before that it has to be established why

rural roll out provisions of current licensees have not been enforced and how they same story will not repeat in the case of niche operators.

3. Subsidies have to be handled with care. There are any number of cases where people set up industries taking benefit of tax-holidays and then vanishing only to reappear with another identity and the story is repeated. Subsidy could be on input operational costs subject to meeting targets (something akin to what is mentioned in para xii on page 41).

4. Answer same as in para 3 above.

5. Sharing of infrastructure should be permitted without affecting cost to user adversely.

6. Unless infrastructure in terms of roads/rail connectivity and power are not adequate, mere telecom services will not make any impact on rural growth. It is true that telecom services are the ones that can be provided fast and cheap. Hence there is NO NEED to be too enthusiastic about it till other material infrastructure is in place.

7. There is no way any subsidy model can be sustained in the long run. Even the US of A is facing problems with their social security schemes!

8. In the global village scenario 'locally relevant software' is a misnomer. Food habits, dressing, culture etc may have local flavours but software? If only some examples had been given one could have understood the question in context.

9. The only experiences one can share are the growth of the consultation process (though even this has a long way to go to be considered befitting a democratic society) that proceeds law-making at least in some areas and the market research that establishes consumer needs before a product is introduced. Yes, these are the areas that links growth of telecom services and economic growth of an area. This link could be the same even in rural areas but not appreciable today.

ADDITIONAL COMMENTS.

On page 39, in para (a), it would have been pertinent to give the data pertaining to the actual number of villages covered by VPTs till 31.3.2002.

Also, in the same para, it would have been pertinent to give the number of additional revenue villages identified by the 2001 census.

The provisions of para (b) and (c) should be cancelled and merged with that of para (d). Like the uni-rail project, it would also be in keeping with the e-governance initiative being taken up by various governments these days.

On the same page, in para xiii, it is mentioned that DoT should be authorized to inspect the sites. But considering the fact that it is the DoT that is administering the Fund, it would be rational for the TRAI to inspect the sites.

On the same page, in para xiv, the ambiguity due to the provision 'after reasonable notice except..' may be removed. Since it is accepted that there could be occasions when giving notice will defeat the very purpose of inspection, it is better that the provision to give notice be done away with in to.

Kindly consider my comments to protect the interest of the consumer before finalizing consultation paper.

Thanking you,

Sincerely yours,

-Sd-

P A Surendran

(Consumer Advisory Group Member , TRAI)
General Secretary,
Palakkad District Consumer Association

Kits College , Court Road , Palakkad 678001, Kerala

Thu, 02 Dec 2004 10:53:50 +0530

From: "Rajendra Singh" <jsengg@bol.net.in> Add to Address Book

Subject: FW: Response to trai consultation paper on rural telecom

To: jmukhija@yahoo.com

-----Original Message-----

From: Partha Mukhopadhyay [mailto:pmukhopadhyay@gmail.com]

Sent: Tuesday, November 30, 2004 5:33 PM

To: jsengg@bol.net.in

Subject: Response to trai consultation paper on rural telecom

November 30, 2004

Mr. Rajendra Singh

Adviser (MN)

Telecom Regulatory Authority of India

A-2/14 Safdarjung Enclave

New Delhi 110 029

Dear Mr. Singh,

Please find attached an individual response to TRAI's Consultation Paper No. 16/2004 on "Growth of Telecom Services in Rural India: The Way Forward".

It builds on TRAI's move to emphasise universal access as compared to universal service, which is particularly appropriate at this stage of development.

The response is from the perspective of fostering an organic self-sustaining model of growth of telecom services in rural areas, much in same manner as the explosive growth of cellular telephony that has occurred in urban areas. It builds on TRAI's move to emphasise

universal access as compared to universal service, which is particularly appropriate at this stage of development. In particular, it emphasises the following:

(a) Niche Operators should be allowed in all areas except towns above a certain size.

(b) It is important to implement accounting separation in order to calculate the effect of incoming (long-distance) call revenue sharing on the viability of rural telephony.

(c) Subsidy should be on universal access and not universal service.

As individual connections in rural areas are likely to be availed of by the upper-income fractions of the population, any subsidy for individual connections is likely to be regressive. However, there may be a case to provide connections at the same tariff as the urban areas, thus entailing some subsidy, since the cost of service is likely to be higher in rural areas.

(d) The subsidies from the Universal Service Fund need to be based on performance parameters with respect to outcomes and not an across the board subsidy on input cost. However, it is important to recognise that inputs such as spectrum and bandwidth are likely to be relatively inexpensive in rural areas.

(e) A critical additional need in the regulatory framework is a Standard Interconnect Offer for rural areas, which should be mandatory for all operators to offer. This will complement the Niche Operator license by ensuring that entrepreneurs can develop their business plans keeping in view a predictable regime for interconnecting to the most convenient major network operator.

The underlying rationale for these suggestions is detailed in the item-wise response to the consultation paper, which is attached for your consideration. I trust you will find the suggestions to be useful.

With regards,

Yours sincerely,

Partha Mukhopadhyay

Encl. as above

Attachment

Response_to_trai_consultation_paper_rural_partha.rtf
.rtf file

June 10, 2015

Mr. Rajendra Singh
Adviser (MN)
Telecom Regulatory Authority of India
A-2/14 Safdarjung Enclave
New Delhi 110 029

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(c) Subsidy should be on universal access and not universal service. As individual connections in rural areas are likely to be availed of by the upper-income fractions of the population, any subsidy for individual connections is likely to be regressive. However, there may be a case to provide connections at the same tariff as the urban areas, thus entailing some subsidy, since the cost of service is likely to be higher in rural areas.

(d) The subsidies from the Universal Service Fund need to be based on performance parameters with respect to outcomes and not an across the board subsidy on input cost. However, it is important to recognise that inputs such as spectrum and bandwidth are likely to be relatively inexpensive in rural areas.

(e) A critical additional need in the regulatory framework is a *Standard Interconnect Offer* for rural areas, which should be mandatory for all operators to offer. This will complement the Niche Operator license by ensuring that entrepreneurs can develop their business plans keeping in view a predictable regime for interconnecting to the most convenient major network operator.

The underlying rationale for these suggestions is detailed in the item-wise response to the consultation paper, which is attached for your consideration. I trust you will find the suggestions to be useful.

With regards,

Yours sincerely,

Partha Mukhopadhyay

Encl. as above

Comments on TRAI Consultation Paper No. 16/2004

Growth of Telecom Services in Rural India: The Way Forward

This note is in response to the above consultation paper, and seeks to offer comments from the perspective of fostering an organic self-sustaining model of growth of telecom services in rural areas much in the same manner as the explosive growth of cellular telephony that has occurred in urban areas.

At the outset it is important to emphasise that the benefit from rural telecommunication services and the linkage to rural growth is obtained by increasing access to the telecom service, not by ownership of a telephone. The initial growth in the use of telephone services generally is widely credited to the 'PCO (public call office) revolution'. It addressed the critical issue of lack of maintenance of public telephone booths (prevalent in developed countries) and generated employment for the booth operator. *Since the operator received a share of total revenues from the use of the telephone, it was in his interest to ensure that the line was in working condition – an example of incentives that were well aligned to those of consumers.*

However, the nature of universal access in telecom has undergone significant change since the days of the PCO. In particular, there is now need for spreading high speed data access in these days of low computer prices and internet bandwidth, especially given the impact such access can have for delivery of e-governance.

In this context, the current consultation paper is substantially different from the position in earlier paper issued by the TRAI[1] which implicitly aimed at achieving a wireline teledensity target, since it used the cost of wireline exchanges as the basis of calculating the cost of universal service, at a time when it is evident from TRAI's own telecommunication tariff order that wireless service was more cost-effective, at least in urban settings[2]. This change is welcome. However, given the number of references to teledensity in the current consultation paper, especially in determining areas where "Niche Operators" would be allowed to operate, it is important to reiterate and retain the distinction between universal access and universal service and focus on provision of access rather than service.

This is also reinforced by the definition of USO quoted in the consultation paper that states that "*Universal Service Obligation" means the obligation to provide **access** to basic telegraph services to people in rural and remote areas at affordable and reasonable prices*" (emphasis added).

[1] Consultation Paper on IUC issues Consultation Paper No. 2003/1 dated 15th May 2003

[2] The Telecommunication Tariff (Twenty Second Amendment) Order, 2002 (6 of 2002) 4th July 2002, which stated "*cost based rentals for the two service providers with the largest planned WLL (M) coverage in the country are below the two highest rental slabs for fixed line*"

Furthermore, compared to an earlier era, when emphasis on wireline connectivity was justified keeping in view the need to provide data access, current developments in wireless technology, even for systems already operational in India, e.g., corDECT as also CDMA and GSM-EDGE, make it possible to provide sufficient high-speed (128kbps as mentioned in the consultation paper) bandwidth for both voice and data especially at a High Speed Public Tele-Info Centre (HPTIC)[3]. Furthermore, it is important to recognise that the commercial viability of such PTICs is enhanced by the growing demand for various off-line services that they can offer such as entertainment and computer education.

A network of wireless PTICs that route data to the nearest fibre-optic node is therefore a feasible solution to meeting universal access obligations with high-speed data. The use of wireless technology also provides significant value-addition for voice access by making it possible to use a wireless phone as a mobile PCO, e.g., Gramin Sanchar Sevaks of BSNL and *Grameenphone* in Bangladesh. The instrument's mobility adds to the PCO's ability to increase universal access.

Item-wise response to issues for consultation

1. This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.

The broader shifts from teledensity to teleaccess and the growing feasibility of wireless solutions to meeting universal teleaccess targets are discussed briefly above. An organic self-sustaining model of growth of telecom services in rural areas is now even more possible under the new interconnection regime that provides for revenue sharing for incoming traffic. This could make VPTs viable in localities with substantial numbers of 'relatively richer' migrants who call in from the city. Since these are typically long distance calls, there may be substantial incomes from revenue sharing. Such revenue is also likely to be disproportionately higher in poorer rural areas since migration is also higher from such areas. *However, in order for the USF (Universal Service Fund) Administrator and TRAI to fully appreciate the extent of this phenomenon, it is important for accounting separation to occur especially in BSNL, which is a long-pending issue*. A few other issues are summarised in the response to question no. 6 below.

2. Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?

Yes. The fact that there is no license fee proposed for Niche Operators is no argument for not providing support since, if bidding were to occur for these areas, the license fee would be zero.

[3] There is a marginal disadvantage with wireless networks and individual data connections, since all the individual connections share the same cloud or wireless capacity (unlike a wireline connection which can dedicate capacity to an individual user) but this is of little consequence for PTICs.

Furthermore, Niche Operators will be paying into the USF. Not providing them support is likely to increase the cost of providing universal access since the channel most likely to be cost-effective would be excluded from USO support.

In the context of the distinction between teledensity and teleaccess, it is important to remove the proposed ceiling of 1% teledensity for allowing Niche Operators. What would happen if 1% teledensity were achieved? Would their license be revoked because they were successful in meeting the objectives of the government? *Instead, it is better to identify areas where Niche Operators will not be allowed, e.g., towns above a certain population. All other areas should be open for Niche Operators.* This will help to maximise tele-access in India. There will be no adverse impact on existing license holders since their marginal license fee to serve areas that are already included in their license is zero. Indeed, taking advantage of their existing network, in most commercially viable areas, they should be able to out-price the Niche Operator. However, it is likely that Niche Operators will operate in a manner similar to distributors in FMCG industry.

3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

The issue is not that of tariff but that of access. There is no need to subsidise call tariffs or individual phone rentals. As individual connections in rural areas are likely to be availed of by the upper-income fractions of the rural population, any subsidy for individual connections is likely to be regressive. However, in some circumstances, there may be a case to provide connections at the same tariff as urban areas, thus entailing some subsidy, since the cost of service is likely to be higher in rural areas. Thus the issue of subsidising the final product does not arise. As for spectrum, it should be almost free in the areas of interest since the demand for spectrum is far less than the supply in these areas. Even bandwidth may be inexpensive given the widespread laying of fibre-optic cables. In many areas, the usage of fibre-optic is far below capacity and therefore marginal pricing will attract additional traffic and increase revenues for the bandwidth provider. A simple and fair interconnect regime (see response to question no. 6 below) will help in achieving this outcome.

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

To follow on from the response to the previous question, the degrees of viability and self-sustainability will vary across locations and over time in a given location, as demand for services increase. This is the case because the marginal cost of telecom service provision is close

to zero and additional usage leads to direct improvement in viability. The issue of input costs needs more definition. As pointed out in the previous response, spectrum and bandwidth should be expensive in the areas of interest.

The relevant costs are the marginal costs of extending the network (whether wireline or wireless, whichever is more cost-effective) to cover the identified area and customer premises equipment, i.e., a telephone instrument or computer terminals (for PTICs). The examples provided in the consultation paper indicate that non-viability is often due to the need to invest in additional power back-up equipment or the usage of high cost access devices like VSATs. In a situation where access is largely through wireless telephony that interconnect to a portion of the PSTN operated by a major network operator, much of this cost will not be incurred.

Taking the off-line and incoming call revenues into account, it is possible to evolve near self-sustaining models for the spread of rural telephony. In the event of significant growth in the use of e-governance, the revenues (both from service fees paid by the government and user fees from citizens) the viability of PTICs should be considerably enhanced.

However, even taking all this into account, it is possible that some locations may not be viable. In such cases, it is important to ensure that the subsidy from the USF is outcome based, and the payment of subsidy is deferred and dependent on meeting performance obligations.

5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

It may be premature to mandate it at this point in time. This may evolve organically. However, in the event it does not, this issue can be revisited later. Making operators aware that the TRAI is seized of this issue and retains the right to mandate sharing of infrastructure should make operators more inclined to evolve mutually acceptable arrangements.

6. Do you visualize any other initiative, which should be taken by TRAI as to achieve the growth of telecom services in rural India?

There are three other initiatives that could be taken by TRAI as to achieve the growth of telecom services in rural India. The need to **(a)** implement accounting separation and **(b)** modify the proposed license area where Niche Operators will be allowed to operate have been already mentioned.

A third additional need in the regulatory framework is **(c)** a ***Standard Interconnect Offer*** for rural areas, which should be mandatory for all operators to offer, similar to standard tariff in the early days of tariff regulation. This will complement the Niche Operator license by ensuring that entrepreneurs can develop their business plans keeping in view a predictable regime for

interconnecting to their most convenient major network operator. This offer should specify tariffs, PoIs and other operational details necessary to achieve such predictability. Such a *Standard Interconnect Offer* is likely to result in rapid growth of franchising agreements between Niche Operators and major network operators resulting in substantial growth in tele-access.

7. Do you think that we can sustain USO subsidy model in the long run?

Yes, especially in the long run, as the need for subsidy declines with the growing commercial viability of rural telephony and the ability of a growing telecom market to bear the burden increases. In addition, there will be reduction in cost due to technological advances.

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and database and what should be government role in this?

There are a number of fledgling software programmes that are currently available in the market. The growth of PTICs driven by a supportive rural telecom policy will create a level of demand that will enable the better among these to scale up to a cost-efficient level. Additionally, a broad push by the government for e-governance would also help to boost demand.

9. Share your experiences within and outside the country, which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

No comment.

Delhi Science Forum's Submission on TRAI's Consultation Paper on Growth of Telecom Services in Rural India

Date of Release: November 30, 2004

Delhi Science Forum
D 158, Saket
New Delhi – 110 017
INDIA

Contents

1 Introduction

1.1 Purpose

This submission addresses the concerns of Delhi Science Forum on TRAI's Consultation Paper on Growth of Telecom Services in Rural India, dated October 27, 2004.

1.2 Scope

This note is only comments on the TRAI's Consultation Paper and is not meant as the framework of an alternate policy. Delhi Science Forum will be happy to present an Alternate Framework based on its submission here if such is desired by TRAI.

1.3 References

The table given below list all the reference sources, on which this document is based, or which have been consulted while preparing this document.

Name	**Reference Number**
TRAI's Consultation Paper on Growth of Telecom Services in Rural India	Consultation Paper No 16/2004

1.4 Abbreviations and Acronyms

The table given below lists all the abbreviations and acronyms used in this document.

TRAI	Telecom Regulatory Authority of India
DSF	Delhi Science Forum
USO	Universal Service Obligation
VPT	Village Public Telephone
ADC	Access Deficit Charge

2. Broad Observations on TRAI's Consultation Paper

DSF is constrained to note that this consultation paper of TRAI lacks the rigour and quality we have been used to from TRAI. The obvious lacunae in the paper are as follows:

2.1 Non-Fulfilment of License Conditions for Rural Telephony

The Consultation paper notes that the Private service providers have not fulfilled the terms and conditions of their licenses regarding rural telecom. The number of VPTs provided by all the private service providers are only 12, 772. Rural DELs are also well below the mandated figure of 10% of all DELs to be provided being rural. Even this figure of 10% was a very low figure, as it meant a rural: total ratio of 1:10, which was well below that of the rural: total ratio of 1:4 (1996 figures) prevailing then. It is not surprising therefore that the gap has widened today to alarming proportions.

Status of Rural Telephony as on 31.03.04 (Consultation Paper)

Total Villages	Village Public Telephones (VPTs)	Villages with No Telephone Connection	Villages Connected by BSNL	Villages Connected by Private Service Providers
607,491	522,263	85,228	509,491	12,772

While we do see that there is a need to address the widening rural urban divide in telecom even if the private providers meet their license obligations, the TRAI has not addressed the issue of what steps need to be taken make the service providers meet their license terms and conditions. We have on good authority that these service providers have taken legal opinion that if they pay the penalty, then it is legally permissible for them not to meet the service terms and conditions. Of course, they also believe that the DoT and TRAI will not move to cancel their licenses for this violation. Given that the country needs rural telephony urgently to narrow the increasingly dangerous rural urban divide, it is surprising that the TRAI's Consultation paper makes no effort to address this obvious problem. DSF suggests that given the nature of the offence, punitive damages for a wilful violation of the license terms and conditions should be levied on these service providers. The current penalty was a good faith penalty and was considered if the service provider was slow to fulfil its obligations. The same penalty cannot be considered when there is an obvious and mala fide intention not to fulfil the terms and conditions of the license.

2.2 Definition of USO: Fixed, Mobile and Internet

The Consultation Paper does not spell out clearly the scope of USO: whether USO is based only on fixed lines (using wireless or copper cable based landlines) or now includes mobile as well. Secondly, if USO is also to include Internet, it should define the limits of USO for Internet, including if necessary broadband for district/ village Internet centres. Thus, it is possible to consider that an emerging definition of USO can include mobile and Internet also.

Unfortunately, no international status of USO in these terms has been given in the discussion in the Consultation Paper. For the purpose of USO, we believe that the definition should be still based on fixed lines as the basis. This is also because such a definition can be extended later to Internet. Though mobile Internet services are also available, it does appear that the transition in Internet in terms of throughput is more likely to be dial-up to DSL rather than mobile to Wi Fi. Here again, a clearer regulatory picture of the international scenario would have been preferable to the partial discussion on available technologies. If we look at the network growth, it is clear that mobile growth is much faster than growth of fixed telephony. If our contention of Internet and high throughput Internet based on DSL in the future is right, then it is the fixed network that needs to be supported. The market will take care of the mobile network, but the fixed network needs regulatory support. At best, we can include broadband/Internet kiosks on the lines of the STD/ISD kiosks with the proviso that this should only be for a limited portion of the USO Fund (Maximum of 10%).

The discussion on Broadband and telephone calls using various peer to peer or Internet based telephony seems quite inappropriate for rural areas. When rural connectivity is so low, electricity is there only 6-8 hours a day, to talk of PC based telephone calling is completely out of place. At present, our focus should be plain old telephony with a trajectory that can naturally grow towards Internet in the future.

2.3 Niche Operators or Franchisees

While the concept of niche operators is well meaning, the Consultation Paper does not clarify whether the niche operators are expected to interface with every other network and every long distance operator. If this is also in the scope of the niche operator, then the interfacing costs and the Interconnect charges will have to be considered for the niche operators. This would mean a very heavy overhead, which would limit the size below which the niche operator is not viable. While it is possible to go into the details of these calculations and below which a niche operator is not viable, the simple fact is that it does not allow small operators to come into rural telephony (also semi *mofussil* towns that have a waiting list still of 4 million).

Instead of niche operators, TRAI may consider the concept of franchises, in which the fixed operator would have to provide mandatory access to their network from their side for anybody who is willing to provide either a local or a rural exchange. This means only one interface, an identical regulatory regime, no requirement of interfacing with other operators, and no interconnect charges. The USO fund can be split between the franchisee and the fixed line operator. The concept of franchise is not new in telecom. DoT franchisees had done a commendable job in extending telephony. Regulating the relationship between the franchisee and service provider would be considerably simpler than regulating the interfacing between a new class of operators and the existing ones. Again, DSF can furnish a more detailed scheme if TRAI so desires.

2.4 Contract Between Operators and Franchisees

TRAI needs to define a model contract between the franchisees and the fixed service operator (or the unified service operator). This should prescribe the interface, the scope of work, the numbering plan, the kind of revenue share, tenure, etc., between the operator and the franchisee. The problem has been

that currently, the franchisee is at the mercy of the operator and can be used to develop telecom services in an area and then the operator can enter and compete with the franchisee to their detriment. Therefore, clear obligations and scope of services on both sides needs to be created for the franchisees to succeed. The key issue of what technology to use can also be decided by the operator as a set of options. Obviously, the rural areas provide more scope of wireless technologies of various kinds coupled to the operator's physical network. The network can be then be based on either mobile, WiLL, copper cable or a mixture of the above depending on the density, terrain and size of the area to be covered. The argument of providing franchisees of only the fixed or unified service operator is to ensure that no license is required by the franchisee restricting his technological options. As the fixed or unified license combines both land and wireless spectrum, therefore we have considered the franchising of only the fixed or unified license operator.

2.5 USO Fund: Support for Fixed or Also Operating Costs

While we are not submitting a detailed position with regards to how the USO levy should be spent, we believe that the USO Fund should be used to extend the network physically and not for a long term subsidy of the access deficit. The Universal Service Obligation is to provide connectivity and access to the telecom network. The access deficit is to compensate those service providers who have to provide the local network, which has both rural/remote areas as well as low-end consumers. Therefore, there are two different kinds of issues here and the question of extending the network for coverage should not be combined with the access deficit.

TRAI has been talking about combining the two for some time, and at present, given that the existing telecom network coverage is only 20%, our focus should be to keep the USO Fund for this purpose only. To meet the access deficit, we have argued that apart from long distance revenue, we should also use peak and off-peak differential costs to balance the local network costs. This is easy to implement as it means changing the pulse rate of the exchanges based on time, a very simple step. In such a scenario, the access costs to the network (rentals and installation costs) should remain low, night charges would remain low and peak hour charges can be hiked up. As the commercial establishments, who would peak time calling more, are already being befitted from long distance calling rates coming down, emails replacing fax and so on, the higher peak charges would impact them only marginally.

The danger of combining the two arises from the fact that as telecom network expands, this would lead to an increasingly large part of the USO Fund going towards maintaining the network and its continued extension would be threatened.

3 Replies to TRAI's "ISSUES FOR CONSIDERATION"

1. Question: This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.

   Comment: We have given our comments in section 2 above. Aaprt from providing incentives, TRAI should also consider penal provisions for operators who are not fulfilling the terms and conditions of the license for rural telephony.

2. Question: Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?

   Comment: We have indicated that we do not agree with the concept of niche operators but think TRAI should consider franchisees. Maintaining the quality of service, transactions with the franchisee and operator would fall within the purview of the operator and only the degree of support or the kind of contract between the two needs to be defined by the regulator. There would be a need to force the operators to accept franchisees if Teledensity is below a certain number and provide access to their network on a mandatory basis. It is possible to consider that this obligation should be imposed only on the incumbent operator.

3. Question: Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

   Comment: Capital costs need to be subsidised. If franchise concept is accepted, there are no spectrum or bandwidth charges.

4. Question: In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self-sustaining model in rural areas, which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

   Comment: We see a real problem with the Consultation Paper on this issue. We do not see a clear technical framework for rural telephony, nor how it can be made self-sustaining. The Annexure II does not provide either a clear picture of the delivery model of the services nor does it provide a clear business model. Putting one specific technical solution with a business model would substantiate the argument about self-sustaining model. But nowhere has such an attempt been made. At the end of the discussion, we are still not clear how TRAI is considering the delivery of rural telephony.

5. Question: For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

   Comment: In the countries where such a sharing was allowed, this was when 3G licensees got into major financial problems and wanted a waiver of the stipulation in the license that no sharing of infrastructure should take place. This is quite different from our case, where we believe that no such restriction exists. Mandating forcible sharing would get TRAI into myriad disputes, which should be settled commercially between the operators.

6. Question: Do you visualize any other initiative, which should be taken by TRAI as to achieve the growth of telecom services in rural India?

   Comment: The only other interesting alternative that can also be considered is the use of party lines: sharing of lines in the rural areas. While it is already legal, perhaps we can build some more advantages in the USO scheme that allows for party lines to be used to speed up rural telephony.

   The other part of the promotion of rural telephony is through rural termination charges being higher than urban termination charges. This also means a clear definition of what constitutes a rural exchange. Otherwise, all Reliance Infocom's exchanges will be found to be only rural exchanges!

7. Question: Do you think that we can sustain USO subsidy model in the long run?

Comment: Yes. Provided it is used for extension of the network and not for covering the local network costs. We believe that ADC is meant to recover the operating costs of the network while the USO levy is meant for expanding connectivity. We are not in agreement with ADC being merged with the USO levy. We are aware that there is a possibility of arbitrage in the system due to ADC rates being different for different kind of calls. However, tariff balancing such that rural telephony operating costs are recovered from differential termination charges, ADC as a revenue share and other forms of compensating the local network can be used to cover the operating costs. Once we have covered the voice end of the network completely, we can then decide whether to i) end USO, ii) extend USO to cover Internet or iii) merge it with ADC.

Consultation Paper

Growth of Telecom Services in Rural India

Submission by

QUALCOMM Incorporated

Mr. Kanwalinder Singh
President, QUALCOMM India
ksingh@qualcomm.com
Direct: +91.22.5504.1401
Fax: +91.22.5504.1500

QUALCOMM appreciates the opportunity to submit these comments to the "Consultation on the Growth of Telecom Services in Rural India" as the Telecommunication Regulatory Authority of India (TRAI) analyzes the broad range of issues involved in addressing how to increase teledensity in the country, particularly in rural areas. QUALCOMM commends the Government of India for its telecommunication policies, most notably the unified licensing regime which further liberalized the mobile sector and has played a pivotal role in achieving the targeted teledensity of seven percent ahead of schedule. In order to achieve the goal of 100 million mobile subscribers by 2005 and implement additional policies which spur the provision of universal high-speed Internet access to the public, the Government's effort in improving telecommunications services in rural areas is a critical element in achieving these objectives and contributing to overall economic growth.

QUALCOMM agrees with TRAI that it is important to review the development and deployment of telecommunications services in rural areas and to explore ways in which TRAI's policies might be improved to facilitate access to such services in rural areas of India. India has greatly benefited from the competition brought about by wireless local loop and mobile services. However much of the benefits from this competition have not yet reached rural areas where the teledensity is only about 1.67 percent versus 24 percent in urban areas.[1] TRAI is correct to acknowledge that this gap must be minimized and a primary focus should be on providing improved access to rural areas. A periodic review of the unique characteristics of rural areas, their needs, and the services being provided to these areas should help TRAI meet its goal of facilitating telecommunication access to rural regions in a more effective and efficient manner.

QUALCOMM is the primary developer of CDMA2000 (1X and 1x EV-DO) and WCDMA (UMTS), the two widely accepted International Telecommunication Union approved IMT-2000 standards, and the world's fastest growing wireless communications technologies. These 3G technologies are being used by more than 140 million reported subscribers worldwide,[2] and have been licensed to over 120 leading communications manufacturers worldwide.[3] CDMA-based solutions are available for a number of communications applications, including mobile cellular, fixed wireless and satellite communications and have been utilized to provide telecommunications access to rural communities throughout the world.

The deployment of advanced wireless technologies, such as CDMA2000, can provide a wide range of benefits to consumers residing in rural areas. In addition to providing high-quality voice services, CDMA technology provides users with access to information at speeds comparable to or better than existing wireline Internet access. CDMA2000 1xEV-DO has been optimized for the delivery of high-speed broadband packet data at speeds of up to 3.1 Mbps, and provides cost-effective alternatives to DSL and cable systems. Commercial mobile cellular-based technologies have many advantages over

[1] TRAI Rural Consultation and Minister Maran's speech to the Economic Editor's Conference, November 2004.
[2] www.3gtoday.com
[3] http://www.qualcomm.com/technology/licensing.html

both traditional wireline access technologies in addition to emerging and unproven wireless broadband access technologies. As described further in our comments, CDMA-based technologies have been utilized to provide pay phone service, fixed and vehicular telecenter access and high speed Internet to rural schools and hospitals. Furthermore, the deployment of CDMA systems is spurring the development of new applications, which promise to bring substantial benefits to both rural and urban populations. Examples of these applications include telemedicine, e-agriculture, e-commerce, e-government, position location and emergency assistance.

QUALCOMM's contribution will focus on the benefits that CDMA based technologies can bring to rural areas by providing robust telecommunications access in rural areas. QUALCOMM appreciates the opportunity to provide comments and recommendations in this consultation. We provide responses to several of the questions raised in this consultative process and we will be pleased to provide clarifications and further comments as TRAI addresses this important matter of improving telecommunications services to rural areas.

CONSULTATION QUESTIONS

1. This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.

In response to discussion of various telecom technologies on page 26 of the consultation paper, QUALCOMM recommends existing commercial cellular-based wireless standards such as CDMA2000 be strongly considered given the existing economies of scales and the benefits such technologies offer for rural areas. Indeed, the subscriber growth rate of commercial mobile services in India has been higher than 100 percent from the second quarter of 2003 onwards. This was the highest among 50 countries covered in an international survey of all major countries released by an international research group, the findings of which were released by the TRAI on November 8, 2004. Such growth and continued opportunities for growth in rural areas should be further encouraged by government policies.

Some Benefits of Cellular-based Wireless Systems over Wireline Systems

- Commercial mobile technologies provide an attractive alternative for rural areas where the installment of traditional wireline systems is less desirable due to higher deployment costs, geographical constraints, and/or infrastructure limitations.
- A wireless cellular-based system is likely to be less expensive and faster to deploy than a wireline network, particularly in rural and/or underserved areas.
- Mobile cellular systems can be configured to handle both *fixed and mobile* traffic, which provides flexibility for operators to meet the demands of both types of services.
- Most wireless systems can be easily configured and upgraded to meet the changing traffic demands - which can vary significantly and are often unanticipated by the operator. The ease of evolving a wireless network is attractive to operators in rural areas that face higher start-up and operating costs as compared to operators serving densely populated areas.
- Wireline technologies require firm business planning, before the actual deployment of access network can take place. Thus, the risk of investment for the service provider is higher than for a wireless network particularly as wireless systems can be planned at a much more incremental level (e.g., cell site planning).

Because of the advantages mentioned above and the commercial deployment of internationally standardized broadband wireless systems such as CDMA2000 1xEV-DO and WCDMA, wireless access technologies have emerged as a true competitor to wireline access systems, offering voice and data access to rural areas more rapidly and more affordably. Many areas of India lack the wireline infrastructure required to develop

a traditional broadband network. Therefore, wireless solutions will have a competitive edge, serving as the primary, if not the only means for providing the last mile Internet access. QUALCOMM recognizes the progress in deploying fiber optic infrastructure in India and believes that the fiber optic nodes throughout the country should be used as bandwidth aggregation points for traffic coming from wireless access subscribers in rural areas.

To meet demand in a timely and cost effective manner, we encourage the Government of India to examine cellular-based wireless technologies that provide high speed data transmission without the expense of installing and maintaining traditional wireline broadband networks, such as DSL. Today, most high-speed/broadband Internet access is being provided via DSL and cable modem technologies. Where access is currently available over the wireline network in underserved areas, the networks use low grade copper wiring that is insufficient for providing the type of access necessary for broadband applications. The average cost per subscriber for upgrading the older wireline network is still relatively expensive, running up to the thousands of dollars per user in urban areas to cover network equipment, installation and end-user equipment. Wireless access continues to experience much stronger growth than wireline access and the flexibility provided to operators in deployment of wireless systems and the overall cost advantages of wireless networks are significant reasons for wireless access taking over wireline access.

Benefits of 3G CDMA

It is important to recognize the inherent benefits that third generation technologies provide to consumers and communities around the globe. While some standards have been deployed more widely than others, the standardization efforts have evolved to a point where the international standards of IMT-2000 are mature and the performance and business proposition is proven. Today, there are over 140 million reported 3G CDMA subscribers in 50 countries.[4] The spectrum identified by the ITU for IMT-2000 is below 3 GHz where propagation characteristics are more suitable for terrestrial systems. Furthermore, operators can deploy 3G networks in greenfield spectrum or migrate their 2G cellular systems to 3G in order to provide wireless broadband data.

As much attention has been given to WLANs and other wireless broadband technologies in the media and in TRAI's paper, QUALCOMM would like to highlight some important distinctions between WLANs and other broadband wireless networks with respect to the capabilities of unlicensed networks to provide telecommunications services in rural areas. First, QUALCOMM recognizes that unlicensed systems, such as WiFi, can be an effective extension of or complement to other broadband networks. However, there are significant limitations inherent in WLAN systems that are important to consider in the context of promoting access in rural areas to advanced wireless services. For example, WLAN systems are dependent upon the backhaul used to support each node or access point. With a range of only a few hundred feet, WLAN systems are an attractive option for delivering high-speed data services within an office building or home. However,

[4] www.3gtoday.com. More than 40 operators have not reported subscriber numbers.

WLAN access points must still be connected to the PSTN and Internet via another broadband platform, such as DSL, T1, cable, or wide-area wireless networks, including IMT-2000. Given these limitations, WLAN technology is a useful complement, but not a replacement for other broadband solutions for rural areas.

Recognizing that other wireless broadband technologies under development, such as WiMax, may be of interest to the Government as licensed systems, the TRAI should carefully consider these technologies that are currently under discussion in various technical forums and standards bodies as there are many different flavors. The TRAI should carefully distinguish between the different types of systems, their capacity requirements, performance criteria, spectrum requirements, maturity of standard and equipment availablility in order to facilitate an objective comparison of these planned systems to existing commercial wireless broadband systems such as CDMA2000. The following points should further be considered by the TRAI:

- Many of these technologies are in their infancy and have yet to be proven commercially, whereas 3G systems are being deployed globally.
- Such systems are typically planned for backhaul and for data only, whereas CDMA technologies support both data and voice seamlessly to the last mile, which is of paramount importance for rural context.

As such broadband wireless technologies are widely discussed in the media but are not yet proven commercial solutions or even fully standardized, their reported acceptability and performance conclusions are often based upon the upon the WiFi experience when in fact there are limited similarities. Issues such roaming between access points, cell handoff, contiguous RF planning, power control etc, have not been experienced in WiFi deployment. Thus no conclusions can be drawn about such new technologies until they are fully tested and compared with existing proven technologies like CDMA2000.

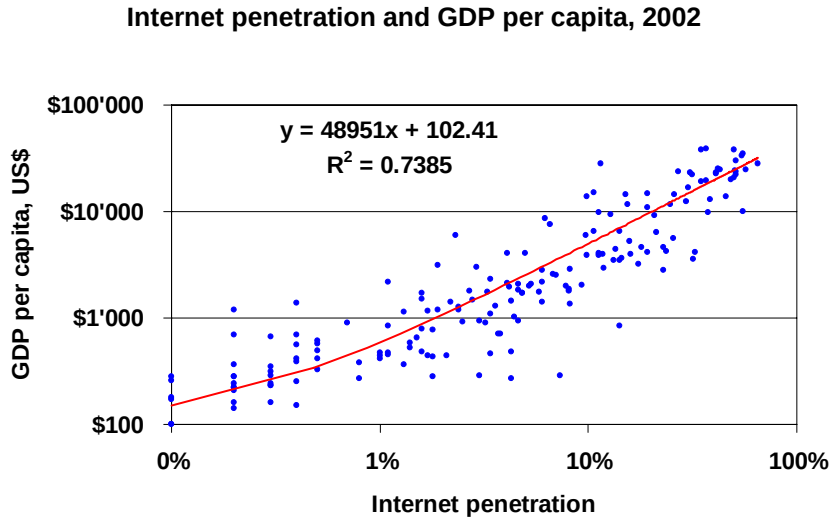
Contribution of CDMA Technology to Telecom Growth in India

Although the Indian Government has taken steps such as the Unified Licensing Regime in order to foster subscriber growth, broadband teledensity remains very low (about .02 percent), presenting ideal opportunities for the introduction of CDMA2000 1xEV-DO (the deployment of which is dependent upon CDMA operators getting more spectrum). Currently in India, mobile users have overtaken fixed users, a trend that is becoming increasingly common all over the world. As of October 2004, there were a total of 44.5 million mobile subscribers as opposed to 43.96 million land line subscribers.[5] Such a statistic demonstrates the importance of Internet enabled mobile data devices, which have become widely available in India and around the world. Most certainly, accessing the Internet over mobile cellular technologies such as CDMA2000, will become more commonplace as mobile access continues to outpace fixed access. This will have important ramifications for the economy as well. The chart below demonstrates the importance of information access as a contributor to GDP by plotting the correlation of

[5] TRAI Press Release: http://www.trai.gov.in/pr8nov.htm

GDP and internet access in more than 175 countries. The data indicates that for each 1% increase in Internet penetration, GDP per capita goes up by US $593.

Graph 1



Source: Adapted from ITU World Telecommunications Indicators, 2003

CDMA technology has been a steady contributor to increased teledensity in India. CDMA was introduced in India as a limited mobility solution and had 135,000 users in January 2002. By the end of 2002 there were nearly 1.1 million CDMA subscribers. With the deployment of CDMA2000 and the introduction of the Unified License regime, CDMA's adoption rate surged and the subscriber base grew to over 13 million as of October 2004. The overall teledensity in India has increased from 3.5 percent at the end of 2001 to 4.28 percent at the end of 2002 to 8.03 percent as of October 2004. Furthermore, the introduction of CDMA services has created competition, lowered tariffs and allowed many citizens access to communications services for the first time. Deployment of CDMA systems in rural and underserved areas will certainly strengthen these communities and provide an important catalyst for new economic development.

Universal Service Obligations[6]

In addition to improving access to basic voice services, developing countries have expanded the definition of universal service/access to include data services, such as Internet access. Wireless systems, such as CDMA2000 have been designed to handle both voice as well as low-to-high speed data services. CDMA2000 1xEV-DO, the technology optimized for high speed data, in Rev.0 of the technology currently offers

[6] Adapted from QUALCOMM Inc. ITU-D Submission to Q 18/2, "IMT-2000 Technology Migration and Special Needs of Developing Countries"

peak download rates of up to 2.4 Mbps and Rev. A of the technology offers up to 3.1 Mbps, and can bring advanced services to a wider range of users, including meeting important social needs such as providing high speed Internet connectivity to clinics, schools, libraries, governments, telecenters and other priority users. In addition to accessing the Internet directly with wireless handsets or personal digital assistants, CDMA2000 handsets can be used as a modem connected to a laptop or desktop computer via Bluetooth or cables. Also available are CDMA2000 1xEV-DO-capable PCMCIA cards, which are wireless modem cards that plug into laptop or traditional desktop computers. Fixed modems are another method to access the Internet via CDMA2000 networks. QUALCOMM suggests the government consider programs to support the deployment of infrastructure and terminals to spur connectivity in rural areas. QUALCOMM would be interested in working cooperatively with operators, institutions, the TRAI and other government officials to consider various approaches to spurring connectivity to rural areas.

In addition to Internet access, many other applications essential for developing countries, such as e-health/telemedicine, can be provided over CDMA2000. For example, hospitals are beginning to use hand-held computers connected to a commercial wireless network to order and track supplies, which is expected to save millions of dollars. Other applications include using CDMA2000 networks to monitor remotely outpatients with specific health conditions. Applications designed to improve farmers' access to market data for their crops and government services can also be provided over such wireless Internet networks.

3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

Given that spectrum is a limited resource, the regulator can provide guidelines and set qualifying criteria prior to issuing spectrum in order to ensure its efficient use. Qualifying criteria can include net worth of the operator, technical capabilities, and demonstrated telecommunications operational experience, among other factors. However, in order to foster economic growth opportunities and social and technological benefits that stem from telecom services in India, *low cost* spectrum is essential. Specifically, QUALCOMM emphasizes the importance of low cost spectrum for existing operators in the lower frequency bands. The 450 and 800 MHz bands have proven to be an excellent option for rural coverage. Because of the well established advantages of radio frequency propagation at lower bands of spectrum, these bands provide an opportunity to offer basic telephony and advanced wireless services at an affordable cost. For example, a CDMA450 or CDMA800 network deployed to provide universal access in rural communities could offer voice and broadband Internet services to schools, hospitals, mobile clinics (vehicular) and other public places where traditional landline solutions prove cost prohibitive. A valuable incentive to promote rural connectivity and fulfill universal service obligations would be for the Government to subsidize end-user data devices so that low cost equipment is available to consumers.

Currently due to the high initial cost of a mobile handset (which we note is still significantly less expensive than a personal computer) the service providers typically bundle the cost of the handset (often Internet-enabled) with the service received in order to increase affordability for consumers. As the license fees and contribution to USF is 5 to 6 percent of operators' annual gross revenue and service tax, the result is an increase in the cost of handsets to the end subscribers. Additionally, the service tax, which the subscriber is required to pay on handset rentals, is tantamount to a 15 percent raise in the handset price. QUALCOMM urges TRAI to make the necessary corrections to these policies in order to enable more affordable handsets for the subscriber, which in turn would be an important factor in increasing the growth of rural telephony.

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

QUALCOMM agrees that such telecommunications facilities would be helpful in increasing rural connectivity. As mentioned above, CDMA2000 can bring advanced services to a wider range of users, including meeting significant social needs such as providing high speed Internet connectivity to clinics, schools, libraries, governments, telecenters and other priority users. A typical CDMA2000-based telecenter in rural areas could include voice, data, fax and video services. Such telecenters are utilized already in Venezuela. Also, rural community telecenters using CDMA technology could easily evolve over a period of time beginning with offering voice and data services and later offering higher speed data access and multimedia applications. CDMA wireless systems can be configured to handle both fixed and mobile traffic, which provides flexibility for operators to meet the demand for both types of services, which may vary over time. In addition to the facility itself, the technology content and applications, as well as human resource training involved in such telecenters would play a crucial role in their success. Lastly, CDMA technology has a strong foundation with continued research and development and applications to ensure continued growth in advancements that will continue to support the growth of these communities.

QUALCOMM is in favor of providing subsidies to appropriate technologies which are effectively able to meet the end objective of the government as has been contemplated in this consultation. QUALCOMM feels that proper qualification criteria matrices must be quantified for identifying the technologies which will qualify for the subsidy. The qualification criteria must be comprehensive and should fulfill the Government's goal for coverage, capability of offering multiple services (both voice and data) and ability of offering a sustainable business growth model.

5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

QUALCOMM recommends that TRAI encourages the sharing of infrastructure rather than mandating it. The Government of India should encourage basic and cellular/USAL operators to leverage existing investments and extend their networks to rural areas. QUALCOMM recommends the collocation of equipment as a good option for India.

In addition, the Government should review potential benefits of Mobile Virtual Network Operators (MVNOs) and their possible value when utilized in conjunction with well-known business brands such as banks and NGOs. MVNOs would give operators flexibility to utilize their networks to provide both direct service to consumers and wholesale service to business brands. Also if an operator does not have the available infrastructure in a particular area, they could utilize the infrastructure of another company to become an MVNO and be able to offer a wider range of services to consumers. Telecom MVNOs are also suitable for fixed operators wanting to become fixed and mobile operators, and for mobile network operators without radio coverage or licenses in regions/countries. Further, MVNOs can be effectively operated as micro-businesses by individuals. In India, the female population consists of the most disenfranchised rural citizen group. QUALCOMM suggests supporting organizations that can train and empower women to run MVNOs.

6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

India has witnessed a phenomenal growth in cellular telephony. On average, 1.6 million cellular subscribers are being added per month. This rate of growth would not have been possible without regulatory and government support. One particularly important factor has been preferential duty treatment (i.e., 0 percent basic custom duty), an import benefit for service providers importing infrastructure under a cellular license or the current universal access license. Many of the technologies that the Government is envisaging for rural telephony growth must be imported by service providers who might not have a cellular or UASL license, and higher custom duties may become an impediment to future growth for telecommunications services in India. QUALCOMM requests TRAI to look into this aspect so as to enable healthy competition and competitive prices.

CDMA technology has proven to be effective for all types of service environments including WLL. However, if WLL is an approach that continues to serve the rural communities of India, QUALCOMM suggests that TRAI carefully examine the import duties for telecommunications equipment. Certain service providers who are consumers of the USO fund do not have UASL, and are unable to migrate to UASL in the near future due to the high cost entailed. Even if such service providers are interested in

launching CDMA services as WLL services only, and would use GSM for full mobility, as is the case with BSNL, any imported CDMA equipment for basic (WLL) services would attract higher duties on hardware by 18 percent as compared to cellular equipment. This creates an artificial price barrier for the import of CDMA equipment for WLL services, and if the service provider does not have a UASL, would be equivalent to instituting higher prices for CDMA equipment than for GSM equipment. QUALCOMM urges TRAI to correct this disparity, as it will have impact on the CDMA rural subscriber base, and place CDMA technology in an inequitable position.

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?

QUALCOMM believes that tax incentives are an effective mechanism to foster the investments of software R&D centers by various companies around the world. For example, QUALCOMM's Hyderabad R&D center and our recent acquisition of Spike Technologies, Inc. will support QUALCOMM's CDMA chipset development activities and ongoing efforts to advance CDMA wireless technology in India and across the region. Centers such as these help meet the increasing demand for third-generation (3G) wireless devices in emerging markets and are aligned with the Government's goal to increase telecommunication services in rural areas.

The Government may consider enhancing the effect of the work of software development centers with the augmentation of applications in the realms of e-agriculture and e-government, which would play a beneficial role in the development of rural areas. The vast scope of such projects to improve the quality of life in rural areas through technology include initiatives enabling clean water, energy conservation, disease prevention education, literacy programs, and programs to enable efficient business transactions of rural farmers by avoiding middlemen. There have been cases such as the Grameen bank that have been very successful in implementing such programs to enhance the quality of life in rural areas through technology.

9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

Around the world, mobile phone users are overtaking fixed-line subscribers due to the affordable high-quality voice and data services that are made possible by today's technologies. The correlation between voice and data access and economic growth is significant as shown earlier in Graph 1 and there are many countries who have realized telecommunications services in rural areas through CDMA2000. CDMA2000 1X, EV-DO and WCDMA foster various levels of global connectivity – from wireless local loop to high speed mobile voice and/or data in many different *licensed* frequency bands. Operators can choose lower frequency bands, such as 800 MHz or 450 MHz and offer

excellent coverage at affordable prices. Some examples of rural CDMA2000 networks include:

- Australia: In rural areas of Australia, Telstra's CDMA 1X network offers typical connectivity speeds of 80-100 kbps, up to 144 kbps. Coverage is available nationally on Telstra's CDMA network, covering approximately 1.5 million square Km and 98 percent of the population. Telstra has received subsidies from the government for the growth of this network to rural areas and Telstra has launched CDMA2000 1xEV-DO in several urban areas with intentions to extend the high speed Internet option to rural areas.
- Brazil: A partnership between Lucent and Anatel (Brazilian telecom regulator) enabled the demonstration of CDMA2000 1xEV-DO broadband data capabilities and coverage at lower frequencies for universal broadband access. The trial was conducted on a "telecenter" bus which visited government agencies and rural public schools to provide broadband access.[7]
- Cambodia: Cambodia Shinawatra, the largest telecom operator in the country, deployed CDMA450 to provide Internet access throughout Cambodia.
- Chile: In September 2004, BellSouth Chile implemented a pilot project providing CDMA2000 1x EV-DO broadband access to a school at Placilla (141 Km from the capital of Santiago). This project is part of a Government plan to bridge the digital divide and invest more than $ US 4 million to connect rural schools to the internet. More than 51,000 students will benefit from this project at 667 schools across the country. This is the first of 5 schools in the rural area which will be connected by BellSouth's CDMA2000 1xEV-DO network.[8]
- China: Uses CDMA2000 1X networks to provide telecommunications access in rural areas.
- Dominican Republic: Tricom, a CDMA2000 operator and telecoms infrastructure in the Dominican Republic and Bec-Telecom have entered a partnership to deploy a wireless public pay phone system for rural areas based on CDMA technology.[9] In a contract worth US$6.4million, awarded by the country's telecoms regulator, Bec-Telecom will provide and install a network of over 1,700 wireless pay phones in underserved rural areas of the Dominican Republic. According to Tricom's CEO, the project puts the company in a strong position to provide the communities with additional services in the future, including voice, high-speed internet access and other valued services. This project will bring thousands of people into the Dominican telecommunications network for the first time.
- Ecuador: Edumasters, a US-based company, has introduced students at public schools throughout Ecuador to the Internet using CDMA2000 1X wireless data. Edumasters installs a small kiosk at each school with a computer and 1X data

[7] Additional information can be found on online video in English, Spanish, and Portuguese : http://projetoscd.isat.com.br

[8] MINISTRO ETCHEBERRY INAUGURÓ PROYECTO PILOTO PARA DOTAR CON INTERNET A ESCUELAS RURALES DE LA VI REGIÓN, http://www.subtel.cl/servlet/page?_pageid=57&_dad=portal30&_schema=PORTAL30&p_language=e Sept. 3rd 2004

[9] "Bec-Tel, Tricom partner for wireless network - Dominican R.", November 17, 2004 BNamericas.com

connection. The free Internet access is paid for by advertising on the kiosk. QUALCOMM is one of the advertisers. Edumasters is looking to replicate this model elsewhere in Latin America.[10]

- India: One operator has equipped a fleet of rickshaw drivers with a mobile calling office consisting of two or three CDMA terminals with basic fax capabilities, a battery, a billing machine and a printer. Approximately 200 rickshaw drivers pedal mobile payphones throughout Jaipur, and the surrounding countryside. The self-employed drivers earn between 20 percent to 50 percent on each call, and several of them are now able to support entire families.[11] Benefits of the project include:
    - The operator increases the traffic on their network
    - The driver earns a living based on commission
    - The consumers get access to voice and fax services

  Reliance Infocomm will also roll out CDMA to several villages as part of its USO obligations.
- Pakistan: Telecard provides pay phone service via CDMA technology and PTCL has begun the deployment of CDMA450 service to provide 200,000 telephone connections to remote areas.
- United States: According to the FCC's 9th Competition Report, CDMA2000 1X and/or 1xEVDO has been launched in at least some portion of counties containing 273 million people, or roughly 96 percent of the U.S. population.[12]
- Vietnam: ETC is deploying a nationwide CDMA450 network to serve 300,000 users and plans to introduce CDMA2000 1xEV-DO services in Saigon.

[10] www.edumasters.net
[11] http://www.hellorainbow.com/aboutus.asp
[12] FCC 9th Competition Report, Released September 28, 2004, WT Docket No. 04-111

No.RCIL/2003/TRAI/172 Dated: 30.11.2004

Chairman,
Telecom Regulatory Authority of India
A-2/14, Safdarjung Enclave,
New Delhi – 110 029

FAX No. 26103294

Dear sir,

Sub: **Consultation paper on 'Growth of Telecom Services In Rural India'.**

The comments on the various issues for consideration in Chapter 7 are as under:

1. This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional points to achieve higher growth of telecom services in rural India.

We propose following additional points to achieve higher growth of telecom service in rural India:

a) *In order to have future growth of tele density in rural area, it is necessary that rural telephone and broadband is made available at much lower tariff to the population staying in rural India. The infrastructure required to provide rural connectivity will need lot of capital investment per telephone user because of very small population density in these areas and low paying capacity. As such, in addition to funding from USO fund, it is proposed that an additional grant/funding similar to ADC should be applicable to Niche Operators providing services in rural areas.*

b) *It is further proposed that any call originating from rural areas should be eligible for nil IUC charges. With this facility, it will be possible to reduce tariff by Niche Operators.*

c) *It is further proposed that IUC charges given to Niche Operators for calls coming to rural areas from urban areas should be increased. ADC charges which can further compensate higher cost of CAPEX and O&M for providing ICT in rural India by Niche Operators.*

2. Should 'Niche Operators' as discussed in this Consultation paper get a support from Universal Service Fund?

Niche Operators should get support from universal service fund. Moreover, there should not be any license fee (it can be only 1% for administrative cost) for niche operators because it will defeat the very purpose of encouraging relatively smaller operators to enter into this market.

3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

We agree with this and it is proposed that spectrum should be made available at nil charges for initial period of 3 years by which time it is expected that rural connectivity will break-even and will start giving some profit due to increase in tele density in these areas. It is further proposed that some subsidy may also be given to provide VSAT terminals in these areas where it is not possible to extend other infrastructure like optical fibre/wireless. The subsidy can be in the form of no revenue share and no service tax and may be some additional subsidy on transponder charges for use of transponder capacities from rural areas.

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

Yes, we agree with this preposition but it will be sustainable only after 2-3 years. Further, as indicated in your letter, the terminal equipment to provide VOIP and internet telephony and broadband connectivity in rural areas as proposed in Chapter 4 Para (v) should be available at reasonable price which is affordable by user in rural area. We need to see that IP based telephone with software like 'SKYPE' are available at the same price.

5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be

mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

Yes, we agree with this and such infrastructure should be shared and State Government may also be advised to provide buildings etc. at a reasonable charges.

6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

The separate operator has been included in the unified license regime. Although, the paper has been circulated long time back and discussions have been held but recommendations are not being finalised due to large number of issues involved in the consultation paper. It is suggested that the issue of Niche Operators may be separated and recommendations issued immediately to permit Niche Operators to start their service without waiting for finalisation and acceptance of recommendations on unified license regime.

7. Do you think we can sustain USO subsidy model in the long run?

It is suggested that USO subsidy can continue for a period of 5 years from now. By that time the provision of telephone service in rural areas will become self sustaining.

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?

Telecom industry should create a fund which should finance R&D in reputed institutions for developing relevant systems.

9. Share your experience within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

No comments.

Thanking you,

Yours faithfully,
For & on behalf of RailTel Corpn of India Ltd.

(Mahesh Mangal)
Director (NPM)

Response
TRAI Consultation Paper On
Growth of Telecom Services in Rural India
October 27, 2004

Sidharth Sinha[1]
Indian Institute of Management
Ahmedabad

TRAI has issued this consultation paper to express its concern at the widening of the rural-urban teledensity gap during 2003-04. While urban teledensity jumped from 14.32% to 20.74%, rural teledensity increased only marginally from 1.49% to 1.57%.

This response is organized as follows:

1) Section 1 examines the limitations of teledensity numbers.
2) Section 2 reviews findings on the relationship between teledensity and economic growth.
3) Section 3 places rural teledensity within the context of the predominantly agricultural economy of rural areas.
4) Section 4 provides correlations between rural teledensity and a set of demographic and economic variables for states of India. This provides some indication of factors explaining cross section variation in rural teledensity.
5) Section 4 concludes with recommendations for increasing rural teledensity.

1. Teledensity numbers and telecommunications coverage

The table below provides figures on growth of the telecom network in India during the last three years

Growth of telecom network[2]

		March'02	March'03	March'04
No. of Telephones (Fixed+WLL) (In millions)	Public	37.94	40.62	40.87
	Private	0.59	1.31	9.52
	Total	38.54	41.93	50.39
	Rural	9.14	11.41	12.27
	Urban	29.39	30.52	38.11
Cellular Subscribers (In millions)	Public	0.22	2.55	5.62
	Private	6.21	10.14	20.54
	Total	6.43	12.69	26.16
Total (Fixed + Cellular) in millions		44.97	54.62	76.54
Teledensity		4.29	5.11	7.02

It is important to put these figures in perspective.

- During 2003-04 BSNL added only about 0.8 million rural DELs as compared to about 2.3 million during the previous year. This may be the result of two factors. In recent years BSNL added rural DELs mainly under government directive. With the corporatization of the BSNL and the setting up of the USF, both the government and the BSNL may have refrained from undertaking an aggressive approach to addition of rural DELs.

[1] Views are personal.

[2] DOT Annual report 2003-04

- The private basic operators have always been reluctant to add rural DELs. With the setting up of the USF and the migration to the universal access regime there may have been even less incentive.

- 2003-04 was the second consecutive year of over 100% growth in cellular subscribers, all in the urban areas. Most of the increase in urban teledensity can be attributed to the growth of cellular subscription. Urban teledensity figures which include cellular subscribers are not comparable with rural teledensity figures. A larger proportion of cellular subscribers are likely to have a fixed line connection as well. Therefore, cellular connections do not represent an increase in coverage or access in the same way as addition of rural DELs.

Teledensity[3]

March 2004	Urban	Rural	Overall
Total	20.74%	1.57%	7.02%
Fixed	12.28%	1.57%	4.62%
Cellular	8.43%	0	2.40%

The Census of India 2001 provides information on telephone ownership by households.[4] This number may be more appropriate for measuring coverage and access. It excludes business and government connections; adjusts for family size; and corrects for ownership of multiple phones.

Household ownership of telephone

Households in millions	Urban	Rural	Overall
Total	54	138	192
With telephone	12	5	17
% with telephone	23.0%	3.8%	9.1%

The % of rural households with telephones is more than double the rural teledensity number. However, the % of urban households with telephones is only marginally higher than the teledensity number.

Household ownership of other assets is provided in **Appendix 1.** The 3.8% ownership of telephones compares unfavourably with 19% for televisions, 6% for LPG connections and 43% for electric lighting. The high percentage of electric lighting may reflect the heavy subsidy on rural electricity supply and may be partly nullified by poor quality and erratic supply. Overall telephone ownership appears to be low compared to other assets.

Another aspect of rural coverage is the availability of village public telephones.

		March'02	**March'03**	**March'04**
VPTs [PSUs+Private]	Public	468,016	504,945	509,682
	Private	846	9,342	12,665
	Total	468,862	514,287	522,347

[3] DOT Annual Report 2003-04

[4] Census of India 2001, Tables on Houses, Amenities and Assets.

According to official statistics, as of March 2004 there were 522,263 village public telephones for a total of 607,491 villages.[5] This represents about 85% coverage. About 45% of the VPTs are on landline, 30% are WLL, and the balance 25% is on MARR systems.[6] However, a large number of these VPTs are not in working conditions.[7] Therefore, the coverage implied by the VPT numbers is misleading.

2. Teledensity and economic growth

In chapter 5, the consultation paper raises the question, "Why rural telecommunications?" The answer in the paper is based on a simplistic interpretation of the generally observed positive correlation between teledensity and GDP per capita. According to the consultation paper, "Based on international experience in various countries it has been estimated that the penetration of telecom services enhances the productivity and the wealth generating capacity of the local population which in turn increases the GDP of the country". This represents the view of the early studies relating telecom growth and GDP. However, recent studies suggest a more complex relationship between economic growth and teledensity. While the significant positive correlation is well established, there is less unanimity on the conclusions to be drawn from this statistical observation.

As pointed out by Roller and Waverman (2001)[8] there is a problem of 'simultaneity bias' or 'reverse causality' and 'spurious correlation'. Reverse causality implies the need to distinguish two effects:

(i) the increase in economic growth attributable to increases in telecommunication infrastructure and services development and
(ii) the increase in demand for telecommunications services attributable to increases in economic growth, i.e., the income elasticity of telecommunications demand.

Both these effects can give rise to a positive correlation between economic growth and teledensity. If the first effect is significant then there is a role for government intervention on efficiency considerations. However, if the second effect is large then government intervention may be required from an equity perspective, to enable low income groups to consume telecommunication services.

Forestier et al (2002)[9], after surveying the econometric evidence arrive at the following conclusion:

> There is clearly a complex relationship between telecommunications rollout and economic growth. And econometric tools (and available data) are not able to measure the strength of the relationship. Nonetheless, the bulk of current evidence suggests that, at least under certain circumstances, and perhaps only after a certain scale of infrastructure has been achieved, there is a causal link.

Similarly, Heather Hudson (2002) [10]describes the simple causality from teledensity to economic growth as one of the myths of rural telecom.

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[5] According to the 2001 census there were 594,000 villages with 13,000 villages being added during 1991-2001. "Size, Growth, Distribution of Population", July 10, 2004, Census Division, Office of the Registrar general and Census Commissioner India,

[6] Indian Telecommunication Statistics 2004, Department of Telecommunications, Table 9A, page 16

[7] "Out of 7045 VPTs provided on landlines, a test check revealed that 446 VPTs were faulty. The percentage of fault in the different SSAs varied from 24 to 74 per cent. (Para 16 of Report No. 5 of 2003), Commercial", Audit observation of C&AG, DOT Annual report, 2003-04, page 34

[8] Roller, J., & Waverman, L. (2001). Impact of telecommunications infrastructure on economic growth and development. American Economic Review, 91(4), 909–923.

[9] Can information and communication technologies be pro-poor?, Emmanuel Forestier, Jeremy Grace, Charles Kenny, Telecommunications Policy 26 (2002) 623–646

Myth: Build It and Jobs Will Come

Justification for rural telecom policies and investments is often based on the assumption that investment in telecom alone will result in economic development. However, numerous studies have shown that telecom is necessary, but not sufficient, for development (Hudson 1997a). The reality is that many other factors contribute to rural economic development, including other infrastructure (particularly electrification and transportation), a skilled workforce and the cost of operations including facilities and labour. Rural regions with all of these advantages may well be able to attract new jobs by encouraging investment in modern and competitively priced telecom networks.

The overall picture that emerges is that telecommunication has a role to play in economic development but only as one of several complementary factors. In the absence of these complementary factors, the role of telecommunication is likely to be limited.

3. Role of telecommunication in economic growth of rural India

Rural India is dependent primarily on agriculture. Therefore, rural growth and development is likely to be driven by performance in agriculture.

The following are some of the salient features of recent agriculture performance:

- The growth rate in foodgrains production declined from 2.81% in the 1980s to 1.98% in the 1990s. [11] Agriculture growth exhibits sharp year to year fluctuations because of dependence on the monsoons.
- There has been a secular decline in public investment in agriculture. According to the 2003-04 Economic Survey the decline in agriculture sector's capital formation as a % of GDP from 1.9% in the early 1990s to 1.3% in the early 2000s is a matter of concern.[12] The decline was mainly due to the stagnation or fall in public investment in agriculture, particularly since the mid 1990s. There appears to be a reversal in the trend with the public sector investment in agriculture at a five year high in 2002-03. The effect of this decline in investment has been felt in irrigation and research and extension.

Apart from inadequate direct investment in agriculture there is also inadequate investment in rural infrastructure, especially rural roads. According to a World Bank Report, an estimated 300,000 habitations (about 40% of the 825,000 habitations in the country) are without all weather road access. While some states, such as Haryana and Punjab have high levels of connectivity, other states have poor access. [13]

Rural habitations connected with all weather roads

	Total No. of Habitations				
Habitation size	1000+	500-999	250-499	250-	Total
Total	218,307	197,577	176,227	223,036	815,152
Unconnected	43,578	70,323	73,437	100,785	288,123
% unconnected	19.96%	35.59%	41.67%	45.19%	35.35%

[10] From Arctic Village to Alice Springs: Rural Telecom Myths and Realities, *Heather E. Hudson in* Networking Knowledge for Information Societies: Institutions & Intervention, Edited by Robin Mansell, Rohan Samarajiva and Amy Mahan, © 2002 Delft University Press

[11] How to make rural India shine, S.Mahendra Dev, Economic and Political Weekly, October 2-8, 2004, page 4416

[12] Economic Survey, 2003-04, Government of India, page 166, Section 8.46

[13] Project Appraisal Document for A Rural Roads Project, Report No. 29742 – IN, World Bank, August 16 2004, page 1

Given the poor performance of agriculture and inadequate investment in both agriculture and rural infrastructure, a stagnating rural teledensity is not surprising. In the absence of these other investments, telecommunications investment is unlikely to add value and may even remain grossly underutilized.

4. Cross-sectional variation in rural teledensity

The state-wise figures for rural teledensity provide an opportunity to explore factors driving rural teledensity in India. The correlations of rural and urban teledensity with certain relevant demographic and economic indicators are given in the Table below. Rural and urban teledensity also strongly correlated with a correlation coefficient of 0.84. The correlations coefficients are based on the data in **Appendix 2.**[14]

Correlation coefficients

	Teledensity	
	Rural	Urban
Urban teledensity	0.84	
State domestic product per capita	0.67	0.74
% urbanization	0.20	0.20
Average village population	0.74	
Average town population		0.11
% rural habitations with road connectivity	0.61	
% rural households with electric lighting	0.60	

- There is a strong correlation between urban and rural teledensity. States with high urban teledensity also have high rural teledensity. Both urban and rural teledensity are strongly correlated with the state domestic product per capita.
- Information on the average village and town size can be used to explore issues related to economies of scale and network effects. There is a strong correlation between average village size and rural teledensity. However, the correlation between urban teledensity and average town size is low. In fact the correlation is only 0.06 for urban fixed teledensity and higher at 0.14 for urban cellular teledensity. These results indicate that scale and network effects are important for rural but not for urban areas. This may be because scale and network effects are unimportant above a certain population size.
- The National Rural Roads Development Agency provides data on 'connectedness' of rural habitations with all weather roads.[15] As of November 2004, out of a total of 800,000 habitations about 300,000 were unconnected. The correlation between rural teledensity and % of habitations connected is positive.
- There is a similar correlation between rural teledensity and % of households with electric lighting.

[14] Similar analysis for Rural infrastructure is available in The Nature of Rural Infrastructure: Problems and Prospects[14], Suman Bery, D B Gupta, Reeta Krishna, and Siddhartha Mitra, NCAER, Working Paper 94, 2004

[15] **A** habitation is defined under the Program as a cluster of population, living in an area, the location of which does not change over time. The population of all habitations within a radius of 500 meters (1.5 km of path distance in case of hill areas) is added together for the purpose of determining population size. The cluster approach enables provision of connectivity to a larger number of habitations, particularly in hilly or mountainous areas.

The cross-sectional variation in rural teledensity in India appears to be consistent with international evidence.

5. Way forward

There are two complementary but distinct approaches to increasing rural teledensity - the 'indirect' market based approach and the direct subsidy based approach. The first alternative is aimed at reducing costs and improving quality of telephone services. The second alternative is driven largely by equity considerations. In neither case is teledensity sought to be increased in order to promote economic growth. As discussed, while there is a positive association between teledensity and economic growth, the direction of causality is not clear. Moreover, teledensity is likely to contribute to growth only in the presence of other enabling factors.

The indirect market based approach requires the regulator and the government to adopt measures which reduce costs of entry and operation and enhance competition. They must also ensure that scarce resources, such as spectrum, are allocated efficiently, not only initially but also ever time. Cost reduction and improvement in quality of service will increase penetration, even in relatively high cost areas, and make service affordable even for relatively low income subscribers. This approach, even though 'indirect', can be quite effective and powerful.

Such policy measures could include the following:

1) Allowing inter-circle interconnection, without the need for going through a NLD operator. In return the NLD operator could be allowed to carry intra-circle long distance traffic.
2) Separating rural spectrum and making it available on a first come first served basis with some time bound roll-out obligations.
3) Allowing domestic IP telephony.
4) Mandate sharing of underutilized BSNL rural telecom infrastructure.

The 'direct' approach requires subsidy in some form for consumers with low incomes or living in high cost, remote or sparsely populated areas. With a monopolistic market structure this can be achieved through cross subsidies. In a competitive market cross subsidies are not sustainable. Operators are directly subsidized for operating in high cots areas or providing service to low-income consumers through a Universal Service Fund financed by a Universal Service Levy. This structure has been established in India.

After a slow start the fund is now functioning as per its mandate, with the following priority:

(i) Installation of VPT in the uncovered villages.
(ii) Provision of additional rural community phones in areas after achieving the target of one VPT in every village.
(iii) Replacement of VPTs installed before 1-4-2002 on MARR systems.
(iv) Upgradation of about 35,000 VPTs to function as Public Telecom and Info Centres (PTICs).
(v) Upgradation of at least two VPTs in each SDCA to High Speed PTICs.

Once this has been achieved the fund will also finance household telephones in Net High Cost rural and remote areas. The mandate of the USF is clearly based on equity concerns and not general growth consideration.

It may be tempting to increase the scope and scale of the USF by increasing the universal service levy. However, this may be self defeating if it results in higher overall prices of telecommunications services and lower or stagnant overall telecom revenues. The preferable approach would be to implement policy reforms which reduce the cost of services in urban and/or rural areas. This may result in lower tariffs, increased usage and higher revenues, and larger amounts received by the USF given the same percentage levy.

The USF could also take the following enabling or facilitating steps.

1) Collecting and disseminating information on rural traffic. This would enable operators to identify and invest in high potential rural areas.
2) Coordinating with other rural infrastructure agencies. For example, the National Rural Road Development Agency (NRRDA) is implementing the PMGSY. There may be possibilities of exploiting synergies between provision of road and telecom connectivity.

Appendix 1

Household ownership of Assets and Access to amenities

	Total	Rural	Urban
Total number of households	191,963,935	138,271,559	53,692,376
% of households			
Availing banking services	35.54%	30.11%	49.52%
Electricity as source of lighting	55.80%	43.50%	87.60%
LPG as fuel for cooking	17.50%	5.70%	48.00%
Availability of assets: % of households			
Y.1 Radio, Transistor	35.12%	31.49%	44.47%
Y.2 Television	31.59%	18.91%	64.26%
Y.3 Telephone	**9.14%**	**3.77%**	**22.97%**
Z.1 Bicycle	43.67%	42.78%	45.98%
Z.2 Scooter, Motor cycle, Moped	11.71%	6.67%	24.70%
Z.3 Car, Jeep, Van	2.50%	1.29%	5.63%
Z.4 None of the specified assets	34.48%	40.49%	19.02%

Source: Table H-9, H-11 and H-13 India: Census of India 2001

Appendix 2
Rural teledensity and economic and demographic indicators

	Reported teledensity			Adjusted **urban** teledensity						% habitations **unconnected**	% rural households with electric lighting
	Overall	Urban	Rural	total	fixed	cellular	Avg village population	% Rural population	Per capita sdp		
A & N	11.56	17.5	8.4	17.50%	12.92%	4.58%	438	67.33%	24,560		68%
A. P.	7.85	22.7	2.33	22.70%	13.81%	8.89%	1,964	72.92%	17,642	3.26%	60%
ASSAM	2.13	12.47	0.56	12.47%	10.15%	2.32%	886	87.28%	10,951	62.85%	17%
BIHAR	1.67	11.64	0.5	11.64%	7.24%	4.40%	1,645	89.53%	5,445	56.74%	5%
CHHATTISGARH	1.63	6.02	0.47	6.02%	5.32%	0.70%	818	79.92%	12,476	65.19%	46%
GUJARAT	10.14	22.46	2.52	22.46%	12.46%	10.00%	1,715	62.71%	21,276	19.25%	72%
HARYANA	8.38	22.01	2.42	22.01%	14.15%	7.86%	2,152	71.00%	24,820	0.12%	79%
H. P.	10.14	51.12	5.51	51.12%	25.05%	26.07%	273	90.21%	21,543	28.91%	94%
J & K	3.01	10.12	0.61	10.12%	8.66%	1.46%	1,137	75.12%	12,781	34.97%	75%
JHARKHAND	2	7.34	0.45	7.34%	5.76%	1.58%	642	77.75%	9,392	66.52%	10%
KARNATAKA	9.46	22.58	2.41	22.58%	13.48%	9.10%	1,181	66.02%	18,324	5.58%	72%
KERALA	14.87	32.82	8.6	32.82%	17.89%	14.93%	17,007	74.00%	21,310	12.95%	66%
M. P.	3.99	12.91	0.68	12.91%	8.47%	4.44%	799	73.33%	12,027	64.68%	62%
MAHARASHTRA	8	19.99	2.31	26.24%	14.92%	11.32%	1,280	57.50%	25,077	10.58%	66%
NORTH-EAST- I	3.35	10.89	1.08	10.89%	9.46%	1.43%	642	77.51%	16,734	42.66%	32%
NORTH-EAST- II	2.71	9.07	1.01	9.07%	8.44%	0.63%	556	79.04%	12,714	48.47%	52%
ORISSA	2.95	13.86	0.95	13.86%	9.31%	4.55%	608	85.03%	10,234	51.17%	19%
PUNJAB	17.33	38.25	4.81	38.25%	17.63%	20.62%	1,265	64.06%	26,497	3.27%	90%
RAJASTHAN	4.5	14.83	1.32	14.83%	10.57%	4.26%	1,046	76.62%	13,825	39.35%	44%
TAMIL NADU	8.54	17.21	2.35	21.91%	13.51%	8.40%	2,145	55.79%	21,478	4.36%	71%
UTTARANCHAL	5.1	15.17	1.48	15.17%	11.56%	3.61%	375	74.41%		48.68%	50%
U. P.	2.96	12.24	0.47	12.24%	7.61%	4.63%	1,224	79.22%	9,749	45.70%	20%
WEST BENGAL	2.18	9.79	0.95	15.14%	10.25%	4.89%	1,411	72.08%	17,767	64.33%	21%
ALL- INDIA	7.02	20.74	1.57	20.71%	12.28%	8.43%	1,161	72.22%		35.35%	44%

Data	Source
Teledensity and number of telephones with rural-urban break-up	Annual Report 2003-04, Department of Telecommunications, Statistical supplement, Tables 1, 2, 3 and 8
Average village and town size	eCensus India, Issue 14, 2003, Table 6, Census of India 2001
Per capita net state domestic product at current prices	Economic Survey 2003-04, Table 1.8 (2001-02 or 2000-01)

Reported Teledensity figures are for telecom circles and metros. Demographic and economic data is for States and Union territories. The two sets of data are reconciled by making the following adjustments:

1. In the case of teledensity the metro figures are combined with the respective states to arrive at adjusted teledensity figures. This changes the urban teledensity and overall teledensity figures but not the rural teledensity figures for these states.
2. The economic and demographic figures are adjusted by combining
    a. Gujarat with Dadar and Nagar Haveli and Daman and Diu
    b. Kerala with Lakshadweep
    c. Maharashtra with Goa
    d. NE 1 = Meghalaya + Mizoram + Tripura
    e. NE 2 = Arunachal + Manipur + Nagaland
    f. Tamil Nadu with Pondicherry
    g. West Bengal with Sikkim
3. Delhi and Andaman and Nicobar figures are not considered in the correlations.

ISSUES FOR CONSIDERATION

(TRAI Consultation Paper No 16/ 2004)

1. This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.

Span : We have some very pointed suggestions to make regarding fiscal and regulatory policies which can ensure growth of telecom in rural India. These are in the document attached.

2. Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?

Span: We are in full agreement with TRAI suggestion on Niche Operator and it getting support from USO Fund.

3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

Span : We are of the view that rural area are two types – extremely backward and backward – as defined by us in the attached document. Depending upon the rural area, subsidy may be required for both capex and opex.

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from universal obligation fund. Do u agree with this proposition? Offer your comments.

Span : We agree with the TRAI suggestion and have recommended review of Stream 1 and 2 as defined by USO. We are of the view that in the present technical environment, we must take broadband IP access to rural area and build all services on this.

We suggest that Stream 1 and 2 to be merged and redefined as 'provide a 512 Kbps IP burstable upto 2 Mbps. Services to be built up to depend upon specific area / market requirement'

5. For increasing the percentage population exposure to cellular mobile services, Should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

Span : We recommend that this be best left by the Regulator / Govt for the operators to decide and share infrastructure. In fact, this cooperation will come by itself due pressure to cut cost of operation. MobileFirst is an example of effort by mobile oprators in this direction.

6. Do u visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

Span : TRAI has suggested many good initiatives but these will need greater punch to make the difference.

7. Do u think that we can sustain USO subsidy model in the long run?

Span : No subsidy can be in place for long. Time for which subsidy will be provided needs to be decided a priori and rest of the plan designed accordingly.

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?

Span : We are of the view that this again be left to market dynamics.

9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

Span : Nil.

COMPILED SUGGESTIONS BY SPAN TECHNOLOGIES

(TRAI CONSULTATION PAPER NO 16/ 2004 – GROWTH OF TELECOM SERVICES IN RURAL INDIA)

TRAI has proposed a possible approach to rural communications (see Clause 6.9, Chapter 6, pp. 32 -34).

The TRAI's approach needs to eliminate regulatory and financial policies which are hurdles in improving tele density in rural areas. New regulatory and financial policies also need to be defined in such a manner that telecom business cases in these areas become financially viable which is not the case at present and it does not become so even if the Govt was to accept the recommendations in Paper 16/20024 in toto. Telecom operation in these areas should be encouraged to become self sustainable and viable business proposition in three to four years.

Policies suggested by TRAI in its Consultation Paper No 16/2004 will not be able to achieve above changes. We propose the following very pointed changes :-

- **Notification of rual areas in two categories as 'extremely backward' and 'backward' from telecom infra point of view (just as Govt declared areas as industrially backward).** This could be done as under :
  - Extremely Backward Region : Villages which are located in difficult mountainous terrain and have no road connection, no power connection and can not be connected using terrestrial means of communication. There are approx 30,000 such villages as on date(BSNL has data on this subject). In these villages tele density is ZERO.
  - Backward Region : Villages and areas which are connected by road, have power connection and can be connected by terrestrial means of communication but have tele density below 1.00 per hundred.
  - All villages declared as Extremely Backward Region will remain in this category till tele density reaches to 1.00 per hundred.
  - All villages declared as Backward Region will remain in this category till tele density reaches to 8.00 per hundred.
- **Amendment in the Guidelines for Implementation of USO Support :**
  - Merge Stream 1 and 2 and redefine it as stated here : Provision of 512 Kb connectivity burstable upto 2 Mb on as reqd basis. Services to include one telephone, one PC and one color TV. (Reason : today such IP connectivity providing converged services are commercially available. This will provide information access to rural community and also provide them the choice to exercise their options (based upon the info available), thereby enhancing their contribution to national GDP).
  - Delete Stream 1 as it does not make sense in present tech, social and economic environment and expectations.
- **Financial Support for Extremely Backward Region :**
  - Hundred percent exemption from all duties and taxes on telecom and associated power equipments reqd for these regions.
  - Capex and opex for first three years : Fully funded by the Govt.
  - Capex and opex after three years : To be reviewed in the third year of operation and decision taken.
  - Satellite Transponder BW (as reqd) to be made available by ISRO at following tariffs : First Year - free of cost. Second Year - 50 percent of cost, Third Year -No Subsidy, BW at actual cost.
  - Operational cost : First Year - full subsidy from USO Fund, Second Year - 50 percent subsidy, Third Year - No Subsidy.

- **Financial Support for Backward Region :**
  -
    - Hundred percent exemption from all duties and taxes on telecom and associated power equipments reqd for these regions.
    - BW (as reqd) to be made available by the nearest NLD or Infrastructure Provider at following tariffs : First Year - 50 percent of cost. Second Year - 75 percent of cost, Third Year - No Subsidy, BW at actual cost.
    - Operational cost : First Year - 50 percent subsidy from USO Fund, Second Year - 25 percent subsidy, Third Year - No Subsidy.
- **Service Provider for Extremely Backward Region :** These regions are in mountainous areas which are of considerable political and military importance. These areas are also close to international borders / Line of Control. No telecom operator except for BSNL has shown any interest in these regions before or after the inception of NTP -99 and this situation is unlikely to change in near future (in next 2 to 3 years). In these areas, Army is generally present and has all the competencies to provide communication and services in these areas.
  - **For first three years** : We recommend that Army be entrusted with this task through a suitable Govt Notification. In the past, Govt has made similar notification for land reclamation and created TA units to do this job, which was a national necessity and all other Govt and private agencies lacked the will to do the needful. This notification will be due for review after three years.
  - **After Three years** : BSNL. All assets and operation will be transferred to any telecom operator through a process of tender bid.
- **Service Provider for Backward Region :** These regions are connected by road and most have electric supply. Niche operators as defined by TRAI can be service providers in these regions. Niche operators shall provide connectivity and offer services as 're-defined Stream ' as mentioned above. In addition, they may offer any other service after obtaining necessary regulatory clearance but without attracting any levy or fees.

Comments on TRAI's Consultation Paper
Growth of Telecom Services in Rural India: The Way Forward

From

Sundararaman Ramesh
Bangalore, India
(Email: Sundararaman_Ramesh@yahoo.com)

1. General comments on the paper:

   TRAI's approach of formulating policies based on public opinion and feedback is commendable.

   Though this paper looks at various ways to increase the telecom density in the rural areas, it would have been of significant help if the sections are classified into the following:

   i. Backbone
      1. PSTN
      2. Optical fiber
      3. Wireless – GSM/CDMA/WLL
      4. Wireless – WiFi/WiMax
      5. Wireless – Satellite

   ii. Access
      1. PSTN
         a. Home Telephones
         b. Home PCs
         c. PCO/STD kiosks
         d. Internet kiosks
      2. Optical fiber
         a. Internet kiosks
      3. Wireless – GSM/CDMA/WLL
         a. Mobile handsets
      4. Wireless – WiFi/WiMax
         a. Access points
         b. Access devices
      5. Wireless – Satellite
         a. Reception units

   The next version of the paper could be organized this way so that specific measures would become apparent on their own at the end of the discussion of the current status of rural telecom services.

   Also, the proposal to a major part, discusses about providing subsidies to the service providers. Though there is a passing mention about facilitating development of software solutions (again through subsidies), there is no mention about offering subsidies to either handset or network equipment manufacturers.

   With the need to add 4m new subscribers every month in order to meet the 2007 targets, it is imperative that the proposal attracts all players in the mobile service supply chain. This would not only ensure that the objectives of this proposal would be met, but also would enable these objective be met within the shortest possible time frame.

2. Niche Operators and USO Fund:

a. Clearly, there is a need for Niche Operators to provide acceptable, desirable coverage to rural areas. This would not only increase the TAM (increase in demand), but also create a sense of urgency in the minds of the existing service providers (like Hutch, Idea) to increase their coverage.
b. Yes, the Niche Operators should be provided support from the USO fund. However, care should be taken while extending this offer in order to prevent Niche Operators from functioning inefficiently.

3. Subsidy to Intermediate components or to Final products:
    a. Subsidy should be provided only at the final product level
        i. This would ensure that the service providers and the equipment manufacturers, though fully aware that they are entitled for reimbursement, would function efficiently in order to maximize their profits.
        ii. Subsidizing only the final products would also ensure implementation that is uniform across players and is transparent.
    b. However, there may be certain rural pockets that would require additional support from government and these pockets need to be addressed on a case to case basis.

4. Agreement with the proposal:
    a. Yes, I agree with this proposition.

5. Sharing of infrastructure – Network, Buildings, etc.
    a. No, this is a highly complicated proposal which if implemented would not allow the market forces to function properly. The scope of the proposal should be narrowed down only to consider sharing of network backbone in the first instance, as this alone is the core issue. Sharing of buildings (central/state governments) need to be taken up at a later point in time.

6. Other Initiatives that TRAI should take up:
    a. While this proposal intends to address the supply side of the mobile services, TRAI should also find out ways of increasing the demand for these services in the rural areas. TRAI should therefore work with other support departments and organizations (IT department, NASSCOM, private software firms) in order to come up with ways to make available software solutions that are relevant to and made full use of by rural people. Without these steps, TRAI may achieve its stated objective of increasing rural coverage, but would fail in its unstated objective of achieving economic growth for the rural public.
    b. TRAI should also look at regulating the mobile service tariff and also an asymmetric termination charge based on the costs involved (typically, rural termination costs are more than the urban termination costs)

7. USO subsidy model for the long term:
    a. No, subsidies should never be perpetual. All subsidies should be subject to a sunset clause.

8. Government's role in software development:
    a. On the demand side, create ways by which rural public would be forced to make use of telecom infrastructure
        i. Make announcements relating to weather, vaccination programs, prices of farm produce, etc.
    b. On the supply side, make use of Indian software firms to come up with the necessary applications
        i. Software firms could be provided with tax exemptions on a portion of their revenues.

ii. Just like medical students are mandated to serve their final year of MBBS in rural areas, the engineering students should also be mandated to work on projects that would be of great relevance to rural public.

9. Linkage between growth of telecom services and economic growth in rural areas:
    a. While it is easy to see that there is a strong correlation between infrastructure growth and economic growth, it is difficult to prove that such economic growth was only because of growth in telecom access. As I understand, this question looks for answers that would justify the proposed subsidies. However, such justification need not be measured only in terms of economic growth.

    b. From my personal experience, access to telecom services with relevant software solutions has made me grow at a personal level – timely access to raw data, information and knowledge which increases both my understanding of the worldly happenings and my confidence.

    c. Thus access to telecom services to rural public would help them definitely at a personal level and if considered collectively at a village or society level.

TATA TELESERVICES LIMITED.

Response to TRAI paper on Growth of Telecom Services in Rural India

ISSUES FOR CONSIDERATION

1. This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest an additional point to achieve higher growth of telecom services in rural India.

Tata Teleservices congratulates TRAI on their excellent paper on the growth of Telecom Services in India , clearly bringing out the various issues affecting the rural growth. We are glad to note that in rural areas, for the first time, emphasis is being given for Universal Service where every household will have a telephone service as against the existing policy of providing Universal Access where everyone in a community will have access to a telephone. According to TRAI, rural connectivity is to be revised from existing voice and low speed data to broadband connectivity.

In this context, the following points are to be noted:

- Only BSNL has the requisite infrastructure in the rural areas in the form of telephone exchanges and optical fibre connectivity.
- Universal Access is available in 522,263 villages only.
- Universal Service is available in villages with over 2000 population.

The laudable objective of providing broadband connectivity to rural areas cannot be achieved unless BSNL shares their optical fibre infrastructure.

We agree with TRAI that Rural teledensity has to be increased from the present 1.7 to 4 as this will significantly increase economic growth leading to better living standards. It is possible to achieve this objective by launching extensively wireless services in rural areas. In our view, broadband connectivity can be given in an efficient and economical manner by CDMA EVDO services which can provide high speed data offering a variety of advanced services meeting important social needs such as such as internet connectivity to

primary health centers, schools, Government offices and other consumer related multimedia applications. .

The main barrier for the launch of wireless services in rural areas is the lack of backbone infrastructure in the private sector for connecting the BTS to the MSC which is located in a commercial city. BSNL which has the infrastructure is unwilling to share the bandwidth. We are glad to note that TRAI has recognized this problem and is suggesting that " The bandwidth for connectivity should be given at a low cost or free for an initial period of 5 years or until such time that the bandwidth prices fall low enough to be affordable for widespread use approximately more than 75% decrease. The bandwidth providers should be subsidized by Universal Service Fund and the price could be determined by the Regulator and not left to the market forces to decide the mode of sharing the infrastructure, commercial terms and conditions.. However, this requires acceptance and cooperation from BSNL.

The following suggestions are offered for achieving higher growth of telecom services in rural areas:

- Provide BTS connectivity, using excess idle capacity available in INSAT network for connecting all the SDCAs in the Rural areas as explained in Fig. 3.1 of the consutation paper.. Sufficient incentives will have to be provided to keep the input costs low.
- Abolition of SDCA numbering scheme, SDCA codes and adoption of LDCA numbering scheme to facilitate internetwork handing over calls at the LDCC. This is possible now as all service providers are adopting uniform charging based on time, irrespective of distance.
- Easy interconnect between all wireless technologies for rural applications. TRAI should intervene, if necessary, to make it mandatory.

2. Should 'Niche Operators' as discussed in this Consultation Paper get a support from Universal Service Fund?

We do not recommend the introduction of " Niche Operators" for providing rural telecommunications as this will create unnecessary complication of level playing field.

Adequate coverage of rural areas is possible only by wireless services and the present available spectrum is not sufficient to meet the needs of existing service providers. Moreover,the niche operators also will require backbone bandwidth for connectivity and if this is to be provided free or at low cost, the same facility could be extended to the existing service providers. The rural areas can be divided among the existing service providers in a circle and bandwidth can be provided under the supervision of the Regulator.

If at all TRAI is keen on introducing Niche operators, they can be permitted to deploy new technologies such as WI-FI, Access broadband over power line, Cable based broadband etc have been mentioned in Chapter 4 of the consultation paper as these do not need the spectrum allotted to the present service providers.This will also ensure level playing field.. They can get support from Universal Service Fund provided they pay 6% of their AGR as license fee.

3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges?

We fully support that the subsidy should be given on inputs like Bandwidth, spectrum charges, interconnection with incumbent, instead of the final product.

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your comments.

We totally agree with this proposition. Modern wireless technologies for access can offer not only telephony but also complete range of data and broadband services in the most economical and efficient manner. It is possible to cover the entire circle with one or two MSCs. Any number of BTSs can be commissioned provided BSNL allows sharing of their infrastructure.

5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?

We agree with this view. Rural telecommunication growth can be faster only with sharing of infrastructure such as buildings, tower etc mandated through regulation. TRAI can decide the appropriate commercial compensation.

6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

In addition to the initiatives mentioned in the consultation paper, TRAI can have discussions with the service providers on the adoption of new technologies mentioned in chapter 4 of the paper. It is suggested that some funds may be made available from USO for conducting field trials to test the efficacy of new technologies.
TRAI should also take the initiative of mandatory interconnect of all wireless technologies serving rural areas.

7. Do you think that we can sustain USO subsidy model in the long run?

The USO subsidy model can be sustained in the long run. The subsidy should be stopped as soon as a particular rural area becomes profitable. USO administration should be entrusted with this task as is the practice adopted for VPTs.

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?

Locally relevant software is available and this area is best left to market forces and private enterprise.

9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

We have seen that provision of a VPT in a village has led to increased economic activity in the village. Villagers have started using the telephone facility extensively for contacting the nearest town. It is found that telephone is cheaper than bus travel .The marginal farmers are able to get better price for their surplus produce such as vegetables, eggs etc. The surplus money has resulted in increased standard of living. This is true in most of the villages in Maharashtra and Andhra Pradesh where we have provided VPTs.

We have established a V Sat network for connecting over 1000 VPTs in Andhra Pradesh at a cost of over Rs. 20 Crores. It is possible to utilize this network to provide narrow band applications in these rural areas.

We believe strongly in economic benefits of Telecommunications for the rural community. A good network of telecommunications in rural area can contribute significantly to improved education, health and social services besides increased productivity of business activity. All this will add to the quality of life and thus their contribution to the national GDP will increase.

For the reference of the Authority, we are also enclosing three case studies on promotion of rural telephony. These three case studies explain three different methodologies adopted by South Africa, Paraguay and the neighboring country of Bangladesh for promotion of rural telephony.

Case 1

Internet Access to rural areas; South Africa.

The South African Government had launched a drive to provide internet access to remote/ rural areas by way of setting up of a Telecenter which is centrally located in a rural area. Enclosed is a case study on a Telecenter established in Manguzi a remote town in Kwazulu Natal province in South Africa. Radio links and satellite broadcast technology was used to provide the required connectivity. The aim was to enable internet connectivity

to the rural areas. The enclosed case study details the network architecture used and the methodology followed for setting up the telecenter.

Case 2

Paraguay; Rural Network Trial Using VSATs

The Republic of Paraguay's telecommunication agency, referred to as ANTELCO, introduced a trial VSAT system to improve telephone circuits linking various under populated/ rural areas with the capital city. The initial costs of establishing the VSAT network were lowered by utilizing an old Intelsat standard A earth station that had become superannuated as the network Hub. The VSAT project was carried out as part of a project to expand satellite earth station facilities in Paraguay. The enclosed case study provides a practical example of applying a VSAT system via Intelsat satellites in under populated and remote areas.

Case 3

Grameen Telecom, Bangladesh

Grameen Phone has been working towards promoting rural telephony in Bangladesh. The company scouts for a technically feasible rural location for the Village Phone Business. After selecting a candidate village, the company works with the Grameen Bank to encourage creditworthy literate villagers to become Village phone operators. These entrepreneurs are given unsecured loans to buy and operate mobile phones. The above strategy has significantly helped in improving rural telephony in Bangladesh. The enclosed case study gives details regarding the challenges faced by Grameen Phone in expanding rural coverage.

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VSAT in the Republic of Paraguay

Paraguay: Rural Network Trial Using VSATs

Submitted by KDD Engineering and Consulting Inc.

1. Introduction

kdd002_fig1.jpg (19132 bytes)

The Republic of Paraguay is a landlocked country located in the central portion of South America. The country covers an area of 400,000 square kilometers and has a population of 5 million. Outside of the main cities there are vast areas, such as Chaco in the north, where the population is thinly scattered.There are approximately 250,000 telephone subscribers in the country.

The Republic of Paraguay's telecommunication agency, henceforth referred to as ANTELCO, oversees the country's electricity, telecommunications, and broadcasting networks. ANTELCO recently introduced a trial VSAT system to improve telephone circuits linking various underpopulated areas with the capital city, Asunción. The initial costs of establishing the VSAT network were lowered by utilizing an old Intelsat standard A earth station that had become superannuated as the network Hub. The VSAT project was carried out as part of PG-P10, a project to expand satellite earth station facilities in Paraguay. PG-P10 carried out between 1995 and 1999 on the basis of a soft loan from Japan's Official Development Assistance (ODA).

This report provides a practical example of applying a VSAT system via Intelsat satellites in underpopulated areas.

2. Goals of the VSAT project

In the Republic of Paraguay, there are only a few cities other than Asunción with more than 10,000 telephone subscribers. These cities are connected with fiber optic cables and a microwave network. While these urban areas have been expanding their fixed and mobile telephone networks, upgrading to digital switching, and installing Signalling System Number 7, the smaller towns have been left behind. The telephone circuits connecting small cities like Tacuati, in the Chaco region, have used VHF wireless systems. The VHF systems can handle only a small number of low quality circuits.

The VSAT system was introduced on a trial basis as the most appropriate method of improving the quality and number of telephone circuits connecting Asunción with such rural areas.

3. Outline of the project

ANTELCO requested a plan for the improvement of the telephone network in underpopulated regions of the Republic of Paraguay, keeping in mind future expandability of the VSAT system. The specified requirements for the system focused on the following:

a. Use of existing C-band, Intelsat standard A earth station facilities.
b. Minimization of initial cost, with provisions for future upgrade to a DAMA system and expansion of the number of VSAT terminals.
c. Limited number of VSATs for test operation.
d. Possibility of providing data transmission for computer communications.

On this basis, KEC designed a solution employing C-band frequencies, an SCPC-DAMA system, six VSATs for test operation, and datacommunication circuits in addition to telephone circuits. Each of the remote VSATs was configured to for two to four telephone lines. The entire test system provided 16 telephone lines plus four data lines.

3.1 VSAT network configuration

The VSAT system will consist of a domestic switching system at the central office in Asunción (Central II), a Hub station with a 32-meter antenna at the Aregua earth station facility, Intelsat satellite 328.5° E, and remote VSAT stations with 2.4-meter antennas.

The first location chosen for a remote VSAT station in the trial was Tacuati, located 350 kilometers north of Asunción in the state of Concepción. This site was used to introduce the VSAT system and to train local staff. For the other five stations, ANTELCO will select sites from the proposed site list, and construct the stations themselves.

As of January 2000, the locations at which facility construction had been decided upon or completed were as follows:

-- Tacuati
-- Ype Jeu
-- Laureles
-- Aregua
-- Yabebyry
-- Pozo Hondo

Figure 3-1: Proposed VSAT facility sites

Par-VSAT1.jpg (72774 bytes)

The locations of these existing and proposed sites are indicated in Figure 3-1.

The initial equipment involved in the project is as follows:

1) Central exchange system :	16 channels 2w (FXO/FXS)
2) Transmission line (STM-4):	2Mbps PCM-MUX 2w (FXO/FXS) 2Mbps V35 data 64Kbps (V.35 data)
3) Hub station (retrofitted) :	ANT 32m, X1 Previous INTELSAT std.A
4) VSAT Terminal (C-band) :	ANT 2.4m, X6

Figure 3-2 shows the configuration of the equipment described above.

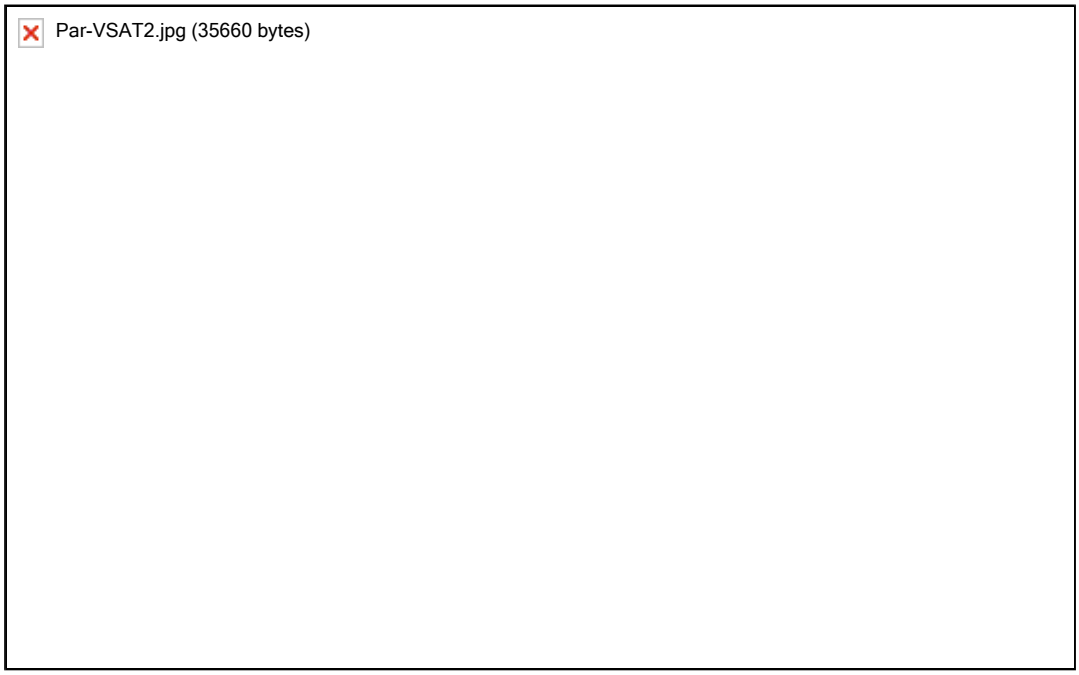

Figure 3-2: VSAT Subsystem Configuration

The network consists of one Hub station and six VSAT stations, all located within Paraguayan territory. To reduce equipment costs, the Hub station uses components of an obsolete standard A station belonging to ANTELCO. The earth station was originally directed at an Intelsat satellite over the Atlantic Ocean, but was taken out of service when the PG-P10 project constructed new earth station facilities. Reused components consist of antenna and RF equipment, as illustrated in Figure 3-3.

The system supports permanent assignment multiple access (PAMA) transmission mode for voice and data services in a star topology. The system can also be upgraded for DAMA transmission mode according to future demand.

Ordinary telephone 2-wire copper line was installed between the VSAT and subscriber's premises, over distances ranging from tens of meters to hundreds of meters.

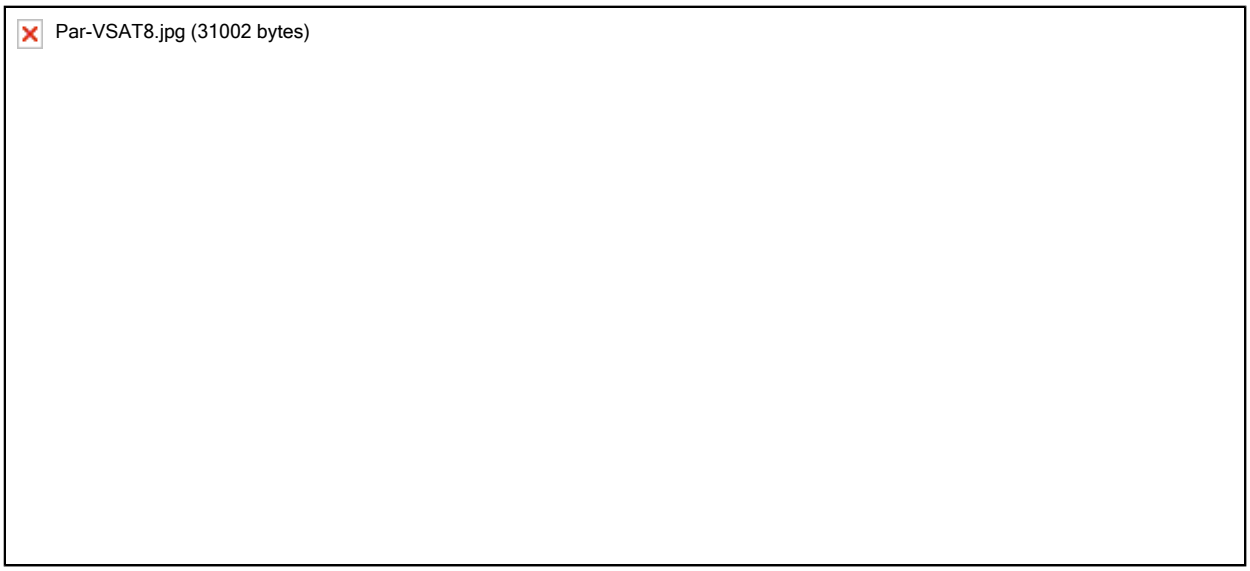

Figure 3-3: System Configuration for ANTELCO's Main VSAT Facilities

Note 1
Maximum system capacity of satellite channels is 2000 CH / 36MHz

Note 2
BOD : Bandwidth On Demand
PAMA : Permanent Assignment Multiple Access
DAMA : Demand Assignment Multiple Access
IUD : Indoor Unit
MODEM : Modulator Demodulator

U/C : Up converter
D/C : Down converter
HPA : High Power Amplifier
LNA : Low Noise Amplifier
RF COMB : RF Combiner
RF DIV : RF Divider

3.2 Images from the ANTELCO VSAT project

The Hub station, shown in Figure 3-3, employs a 32-meter diameter antenna which was originally directed at an Intelsat satellite over the Atlantic Ocean. The small antenna in Figure 3-4 was temporarily constructed for test purposes at the Aregua earth station facility.

Figure 3-3: Retrofitted hub station at Aregua

Par-VSAT3.jpg (23664 bytes)

Figure 3-4: Test VSAT at Aregua

Par-VSAT4.jpg (72027 bytes)

Figure 3-5: Hub modems (left cabinet) and frequency converters (right cabinet)

Par-VSAT5.jpg (45293 bytes)

Figure 3-6: VSAT terminal at Tacuati city

Par-VSAT6.jpg (67720 bytes)

Figure 3-7: ANTELCO office for VSAT in Tacuati

Par-VSAT7.jpg (68106 bytes)

4. Lifetime cost advantages of a rural VSAT system

1. On routes extending more than 100 km, a rural VSAT system can generally reduce the total investment cost of extending the telephone network into rural areas compared to long haul microwave links. VSAT systems tend to be deployed when telephone services are provided to villages over an extensive service area with a limited budget. In such circumstances, a VSAT network can reduce initial costs while allowing for future expansion of the network according to an area's stage of growth. A VSAT solution can be most economically attractive in cases where villages are distributed in a wide, unpopulated area such as the Chaco district in Paraguay.

   The initial cost of the VSAT system described in this report was 75 million yen (0.7 million US$), inclusive of:
   - Main VSAT facilities (1 Hub + 6 VSATs)
   - PCM-MUX (voice and V.35 data)
   - Spare parts (VSAT and PCM-MUX)
   - Document fee (6 sets)
   - Installation (1 Hub + 1 VSAT terminal)

   The Hub antenna and RF equipment consisted of existing, reused equipment, thus reducing expenditure compared to the purchase of a completely new Hub antenna system.

   If ANTELCO had not made use of the existing 32m dish, it would have been required to install a new earth station dish of 10m in diameter. This would have added US$ 1 million to the total system cost. If the same size dish (32m diameter) were installed, it would have cost an additional US$ 3 - 4 million.

2. Installation of a VSAT terminal is relatively simple.
3. The VSAT terminals can be operated by remote control from the Hub station. For example, the carrier ON/OFF functions can be executed automatically. Therefore, no operational staff is necessary at the remote VSAT station.
4. It is easy to upgrade an SCPC DAMA system and to increase the number of VSAT terminals on the network at a later date.

5. Technical System Specifications

Table 5-1 Hub and VSAT Station Technical Specifications

	VSAT Station	**HUB Station**
1. RF Frequency	C-Band	C-Band
2. ANT Diameter	2.4m	32.0m (previously Std A)
3. TX power	5W	3KW
4. LNA	60K	55K
5. IFL cable	Up to 100m	--

Table 5-2 Hub Modem and VSAT IDU Technical Specifications

	VSAT IDU	HUB MODEM
1. Information Rate (Kbps)		
Synchronous data	9.6 ~ 2048	
Asynchronous data (on the voice card)	3.0 ~ 14.4 (at 17.5 Kbps transmission rate) 0.3 ~ 14.4 (at 35.0 Kbps transmission rate)	
2. Voice	32 Kbps (ADPCM), 16 Kbps (LD-CELP)	
3. FEC Rate		
Synchronous Data	1/2, 3/4, 7/8	
Asynchronous data	1/2, 3/4	
Voice	1/2, 3/4	
4. Modulation	BPSK, QPSK	
5. User Interface		
Synchronous Data	RS-232C, RS-449/422, V.35, G703	
Asynchronous data	RS-232C	
Voice	2W FXS, 2W FXO, 4W E&M	
6. Power requirement	AC 200~240V ±10%, 50~60Hz ±5%,	
7. Power consumption	Max. 500 VA (2W ODU)	Max. 340 VA

8. Dimensions (H x W X D) (mm)	132 X 436 X 450	132 X 436 X 450
9. Environmental conditions		
Operating temperature	0 to +40ºC	
Humidity	up to 95% (non-condensing)	

6. Contact point

KDD Engineering and Consulting, Inc. (KEC) conducted this PG-P10 Project. If you have a question, please feel free to contact us.

Address :
KDD Engineering and Consulting, Inc. (KEC)
23, NAKAMEGURO 2-CHOME,MEGURO-KU, TOKYO, 153-0061 JAPAN
TEL. +81-3-3794-8232, FAX. +81-3-3794-8209
E-mail : hh-fujii@kdd-ec.or.jp

Overcoming Regulatory and Technological Challenges

Overcoming Regulatory and Technological Challenges

To Bring Internet Access To a Sparsely Populated, Remote Area

Overcoming Regulatory and Technological Challenges To Bring Internet Access To a Sparsely Populated, Remote Area: A Case Study

The South African Government has launched a drive to provide Telecentres to communities and Internet access to schools. The Telecentres are normally centrally located with respect to clusters of schools and other community services. In the context of this drive, a Telecentre was established in Manguzi, a remote town in the KwaZulu Natal province in South Africa. The surrounding schools did not benefit from this centre due to the inappropriate distance between the schools and Telecentre. In addition, the schools could not be connected to Internet directly due to the absence of telephones. In this case study we will show that existing "off-the-shelf" technologies were not applicable to the specific situation and hence there was a need for a new solution.

There are unusual challenges in providing Internet connectivity to a "sparsely" populated rural community separated by vast distances from nearest urban development. This case study details how we combined existing Internet access technologies to overcome various obstacles such as the lack of existing telecommunications infrastructure, remoteness of area, as well as political and economic issues. Furthermore the solution implemented had to be cheap, suited to the specific regulatory and geographic environment, robust and suitable for a particular application, namely Web browsing and e-mail.

We used the asymmetric nature of the data requirements of the specific applications to our advantage, using radio links and satellite broadcast technology to provide the required connectivity. We will discuss the expected merits of the new solution and its implementation. We will also present our practical findings and discuss how it compared to our expectations.

Similar needs and situations exist in other parts of the world, especially those that have a lack of telecommunications infrastructure, very remote rural areas that are very sparsely populated. We hope that the outputs of this paper can contribute to the technology decisions of people responsible for rolling out Internet infrastructure in similar environments.

Contents

Introduction

Providing a remote rural community with Internet access can be a challenge at the best of times. If the intended target audience does not have access to telephones or any of the other traditional telecommunications infrastructures,the challenge becomes even greater. The Information and Communications Unit of the CSIR (Mikomtek) did just that in a project in Manguzi, a rural community in South Africa's KwaZulu Natal province. The initial part of the project consisted of the establishment of a Telecentre in the centre of town. The community's desire was that the facilities offered at the Telecentre should be available to the largest possible audience, including the students. However, walking (cars are an extreme luxury, there is no public transport such as busses and trains, most people don't even own a bicycle) the five kilometres to the Telecentre on a regular basis was not practical. At a community workshop we were approached by one of the headmasters with a request to connect his school to the Telecentre, in order for his students to have access to the facilities from his school, eliminating the need to walk to the Telecentre. In this paper I hope to show why the "normal" solutions weren't appropriate in this situation. The challenge lay in devising a cheap, robust and legal solution.

Background

Manguzi

Manguzi is a rural community in the Maputaland region of the KwaZulu Natal province of South Africa. It is situated about 15 kilometres south of the Mozambique border en route to the Ponto Do Ouro border post.

Figure 1: Map of Manguzi and environments

The area is 60 square kilometres in size with about 100,000 inhabitants. The people are very poor, most are subsistence farmers. Maputaland offers subtropical and tropical climate zones, and embraces an ecological diversity - both terrestrial and marine - that makes it one of the most a popular ecotourism destinations in South Africa. It has a largely pristine coastline with coral reefs, estuaries, lakes systems, forests and rugged mountains. In the past it has been sheltered from major human intrusion by the tsetse fly and malaria and has therefore remained relatively sparsely populated and unknown (and underdeveloped). The biggest tourist attraction is the Kosi Bay nature reserve, which is renowned for its remoteness and unspoiled beauty. During the last couple of years, ecocultural tourism has become an important means of sustainable rural development in the area. A number of projects are underway in the area to promote ecotourism among which is the introduction of Information and Communication Technology (ICTs) in the form of a Telecentre.

Telecentre

The community runs various projects, one of which is the Telecentre. The Telecentre was established with the help of the CSIR's Information and Communications Technology Unit (Mikomtek) and has been operational since September 1998. A big problem in the area is the near

complete absence of a communications infrastructure. Most homes and businesses don't have telephones and an Internet Café is unheard of. The Telecentre is situated in the centre of town and its purpose is to address this lack of telecommunications infrastructure by providing IT and telecom services to the community. It consists of two parts:

- A phone shop with five telephone booths and a fax machine; and
- The IT component,which consists of a local area network with eight Windows 98 personal computers and a FreeBSD file server. It is connected to the Internet with a dial-up analog connection, which dials on demand, as a user on the network requests Internet access. They also provide services such as word processing, scanning, printing, photocopying, etc.

Since its establishment the community has actively used the services offered by the Telecentre.

Problems and Requirement Specifications

Recognizing the potential of the Internet as information source, Mikomtek was requested by a headmaster of one of the schools in the area to connect his school to the Telecentre to enable his students to utilize the facilities there, specifically the Internet.

In a well-developed telecommunications infrastructure the solution would have been trivial: install a modem, open an account with an Internet Service Provider and you're connected. In a remote rural area, far removed from urban development and telecommunications infrastructure, this request was not so simple, for the following reasons:

1. Underdeveloped telecommunications infrastructure:

- The vast majority of homes and businesses in the area do not have telephones. A couple of public telephones are available in the town itself, but due to the absence of transport, are not freely accessible to anybody outside the town. Imaging having to walk many hours or even days to make a telephone call!
- Although cellular coverage is available, it is very patchy and unreliable. Due to the high cost associated with ownership it is not an option for most of the local inhabitants and exists mainly to serve tourists.
- High bandwidth services such as ISDN, VSAT and leased lines are not available.

2. Of the 71 schools in the vicinity of Manguzi only three have electricity and none have telephones available to connect to either the Internet or the Telecentre.

3. The funds available for installation of the required infrastructure were extremely limited. The reasons for this were that unemployment stands at 85% and the area is predominantly agriculturally-based and under a tribal authority.

4. The solution therefore, had to be cheap and preferably not involve recurring monthly costs.

5. For a variety of reasons, which will be explained later, none of the traditional telecommunications infrastructures were suitable.

6. Telco (Telkom) monopoly.

7. In South Africa, rural tribal authority politics combined with our particular legislation and historical inequalities in access provision makes for an interesting and risky mix.

Methodology

1. Obtain community buy-in and co-operation.

Even more important than choosing the most appropriate technology is the co-operation with and buy-in from the community. Together with the community a pilot project was launched with the aim of exploring the various options available to provide Internet access to the schools.

2. Identify schools as partners for the project.
Two schools - Shayina Secondary School with 1,002 students and Maputa Senior Primary School with 450 students - were nominated to participate. They were ideal for a couple of reasons:

- Both have electricity;
- They are close enough to the Telecentre (3 - 5 km) to make for easy access to both sites during the installation and testing phases; and,
- Despite being relatively close to the Telecentre, the schools did not have line of sight to the Telecentre, enabling us to properly test the solution installed.

3. Identify possible solutions and test suitability.
In deciding how to connect the schools to the Internet, we explored the various traditional methods available (more detail later in the paper) and came to the conclusion that none of these were suitable. The first choice would have been to install access technology directly at the schools. This was not possible either because of limited financial resources or because the technology was unavailable. The Telecentre had a dial-up link to the Internet and the required infrastructure (account with an ISP, modem, file server, trained manager capable of providing the necessary support) and it was decided that the easiest option would be to utilize this link to provide Internet connectivity to the schools. We then had to find a way to connect the schools to the Telecentre network.

4. Establish relationships with relevant partners.
This was largely dictated by the technology chosen.

- Maputaland Development and Information Centre (MDIC): Community organization and owner of the Telecentre;
- WBS: Existing Mikomtek partner. Black empowerment company (necessity to conduct successful business in post apartheid South Africa) in possession of a license roll out a wireless network.
- Siyanda: Satellite Broadcasting ISP. Already involved in providing Internet to rural schools.

5. Technology options and considerations.
We investigated various options to connect the two schools to the Telecentre. These options with associated comments are given in Table 1.

Option	**Comment**
Telephone lines	Not available
Cellular telephone	Coverage not ubiquitous. Reception very unreliable.
Two-way VSAT	Installation and monthly costs too expensive.
Spread spectrum radio solutions	Requires line-of-sight but the two schools are not visible from the Telecentre. License required.
ISDN	Not available
Satellite Internet Broadcast	High-speed Internet downloads via satellite uses telephone line for the back channel to the Internet. No license required.
Low Frequency Radios	Normally used for telemetry - are limited to very low bit-rates. Attractive option because a partner company had a license and line-of-sight isn't a problem.

Table 1: Link options investigated to provide Internet connectivity

An important consideration to keep in mind in the choice of solution was that in South Africa, the Telco (Telkom) has a monopoly on fixed telephony until 2003. This results in most independent and innovative solutions (especially wireless solutions) running foul of legislation.

Implementation

As explained earlier, the Telecentre's dial-up analog connection was the only available "entry point" into the Internet. In some way the schools had to be connected to the Telecentre in such a way that they could access the Internet on demand. The solution we implemented combined a variety of "off-the-shelf" solutions, which on their own were not suitable.

Radio only solution

Mikomtek has a relationship with a black empowerment company with a South African Telecommunications Regulatory Authority (SATRA) approved license to operate a mobile data network in the 420 MHz frequency band. We decided to investigate the feasibility of using their radios to connect the schools to the Telecentre. If someone at the school is interested in browsing the Web or reading e-mail, the Unix server at the Telecentre dials on demand. We provided each school with a PC, radio and antenna (Yagi). At the Telecentre one of the Windows PCs acted as router. This PC was connected to the Telecentre Local Area Network and also to a radio. Figure 2 provides a diagrammatic representation of the network. The radios emulate a network card, enabling us to run TCP/IP over the link. We managed to connect the schools to the Telecentre and also access the Internet.

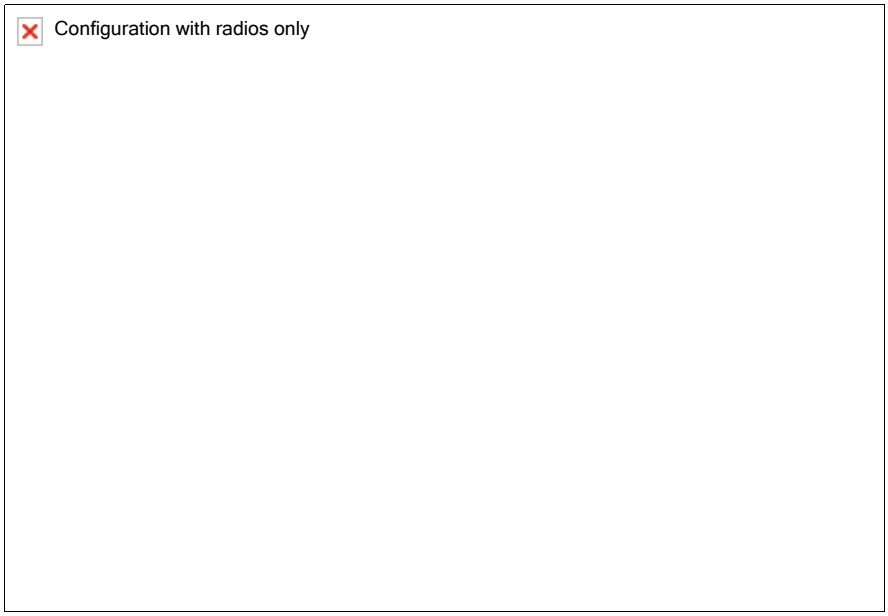

Figure 2: Configuration with radios only

We ran into a problem however. The radios used were telemetry radios, with a maximum bandwidth of 4200 baud. This configuration was suitable for e-mail but not for Web browsing. We had to find another way of downloading Web pages to the PCs at the schools.

Radio combined with satellite broadcast

The asymmetric communications requirements of Internet applications could be used to solve the problem. The eventual solution deployed combined Satellite Internet Broadcasting with the radio network. The radio link via the Telecentre is used for the uplink path (in place of a telephone line) and the satellite is used to download Web content directly to the PC at the school. Figure 3 provides a diagrammatic representation of the network combining the two technologies. Satellite receivers are usually capable of receiving data at much higher rates than what is possible via normal telephone lines. Siyanda was selected as the Satellite ISP. Siyanda makes use of the PAS-7 satellite whose Ku-band footprint covers the whole of Southern Africa. Their data receiver is compliant with MPEG-2 DVB digital TV. The ordinary 90 cm Digital Satellite Broadcasting (DSB) satellite dishes are used for reception. Requests from clients are sent to Siyanda via Virtual

Private Networks (VPNs) over MWeb's (a local ISP) terrestrial infrastructure. Distribution of data is this fashion is permitted under the Broadcasting Act of 1999.

The equipment required at each site is as follows:

1. Schools	**2. Telecentre**
Radio	Radio
Yagi antenna	Omni-directional antenna
Satellite receiver card	Connection to Telecentre LAN
DSB dish	

Figure 3 depicts the equipment used and provides a short description of each.

Figure 3: Equipment used

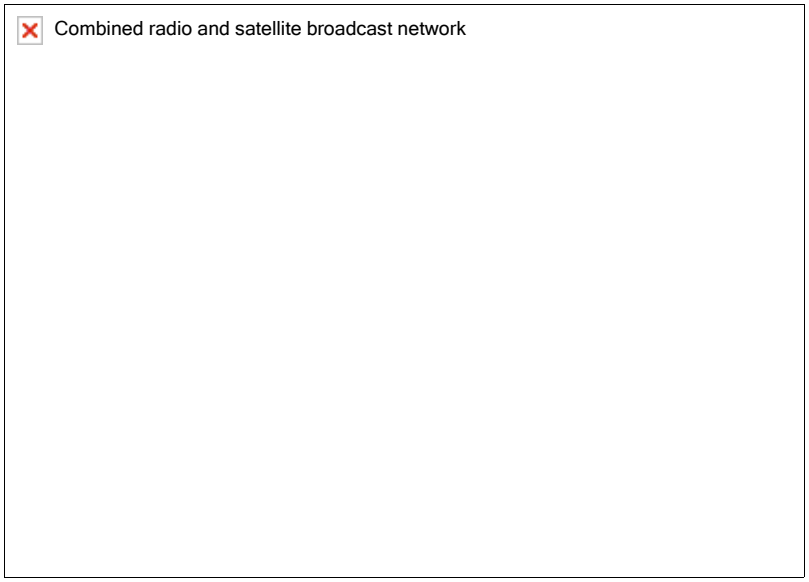

Figure 4: Combined radio and satellite broadcast network

Here is an explanation of how the system operates. Refer to figure 4 above.

1. A pupil at Shayina Secondary School wants to access a Web page.

2. The PC forwards the request to the PC acting as radio base & router at the Telecentre, using the low speed radio link.
3. The radio base & router forwards the request to the Unix file server.
4. Unix server makes a dial-up connection to the closest ISP POP: Siyanda makes use of Virtual Private Networks (VPNs) to tunnel their private network's traffic across the public network of M-Web (a local ISP).
5. The Unix file server forwards the request to a VPN server on the Siyanda network. At the same time it loads a virtual adapter that connects to the VPN server on the Siyanda network. The Unix file server needs to become part of the Siyanda network before it can forward data requests to the Siyanda network.
6. The VPN server receives the request from the Unix server and forward the request to the Siyanda proxy server.
7. The proxy server requests the Web page, somewhere in the Internet, on behalf of the PC at Shayina.
8. The Siyanda proxy server receives a response from the Web server, and forwards the response to the requesting PC at the school. The response delivered using the high-speed satellite link, directly to the PC.

The total cost including personal computers are estimated at $2,300 for the Telecentre and $3,000 per rural site. Refer to table 3 for a breakdown of costs. The advantage of this solution is the fact that the bulk of the costs are a once off. The recurring monthly cost is minimal ($40). In the case of Manguzi, an arrangement was made between the schools and the Telecentre that these costs will be funded from the profit made by the Telecentre.

Item	Unit Cost	Comment
DSB Dish	$200	At least one required per site
Usage cost (100 Mbytes download)	$40 / month	
Radio modem	$900	One required per remote site and a shared one for the Telecentre. (Adding more sites does not require additional equipment at the Telecentre)
Installation	$400 - $1200	1 - 3 man-days per site needed to determine suitable sites for antennas, positioning and fixtures, etc. Variable "rural" surprises may also feature

Table 2: Cost of installation

Findings

- The main reason for the introduction of Information and Communications Technology (ICT) to Manguzi was to facilitate access to opportunities and information. It is succeeding in this mission. The members of the community are actively using the facilities offered by the Telecentre to do word processing, desktop publishing, send and receive e-mail, surf the Web and perform numerous other activities.
- In the configuration as for the pilot project - which consisted of one PC at each school connecting to the Internet - the performance can roughly be compared to the experience of an Internet user with a 9.6 kbps dial-up connection. This is much slower than the 30Kbit/s expected and can probably be attributed to the extremely slow uplink.
- Training teachers in the utilization of ICT in education accompanied the introduction of the technology to the schools. This was done in cooperation with the KwaZulu Natal Education Department and SchoolNet SA (a NGO with a Government brief to introduce Internet into South African schools). Teachers, who had never seen a PC before, moved to basic Web literacy over a week. However, skills degenerate if there isn't regular use and therefore, professional development of teachers using the Internet has to go hand in hand with establishing professional networks and support groups between teachers in Manguzi and elsewhere.
- One of the biggest hurdles to overcome during this project was not technological in nature,

but related to community support and the politics surrounding access provision. In South Africa, rural tribal authority politics combined with our particular legislation and historical inequalities in access provision makes for an interesting and risky mix. It is important to introduce technology with the full buy-in and understanding of the community. Everybody concerned should be realistic about what can and cannot be achieved with the introduction of ICT; it is not an instant cure all ills.

- Technical support for this project was a major challenge. Because of the remoteness of Manguzi (minimum 8 hours by car, or 2 hours by airplane) it was not possible to "jump in the car" and go to the site when something went wrong. The project had to be planned in the finest detail and thoroughly tested before being rolled out at Manguzi. Furthermore it is important to have a person on site that is able to do at least first line support. The solution (hardware and software configuration) must be extremely robust and able to stand up to the rigors of rural life.

Conclusions and further work

This project proved to be a bigger challenge than initially expected. The team learnt a lot about innovative use of technology, but even more about the social and cultural aspects that accompany the introduction of ICT in rural South Africa. We also saw the difference access to information can make in peoples' lives. This project was limited to one PC at each of two schools. The schools are also quite close to the Internet access point. Developments are underway to increase the number of PCs supported at the remote site, the distances that can be covered and performance. Rollout will be in a cellular fashion with "base stations" - which will serve as the Internet access point - each with their own "outstations".

About the Author

Ronel Smith is the Manager of Connectivity Business at e-tek (Pty) Ltd, the commercialization vehicle of CSIR Information and Communication Technology. The aim of this group is to be a "vibrant hothouse for new digital start-up businesses". Ms. Smith has ten years of experience in IT and telecommunications with a specific interest in broadband communications. She has been involved in projects ranging from the design and implementation of a wireless rural network to a large ATM network at one of South Africa's largest universities.
E-mail: ronel.smith@mikom.csir.co.za

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WHAT WORKS: GRAMEEN TELECOM'S VILLAGE PHONES

KEY TOPICS: rural telephony; shared-access; franchise via local entrepreneurs; private sector-civil society partnership

THE TAKE-AWAY: The high revenues generated by Grameen Telecom's shared-access business model suggest how powerful such approaches can be. With local entrepreneurs providing one phone per village, the whole community is the customer. The phones generate revenues averaging $90 per month in rural Bangladesh, one of the world's poorest countries. Social and economic benefits to the entrepreneurs, and to the village, from phone access have proved to be high as well.

A DIGITAL DIVIDEND STUDY
BY THE WORLD RESOURCES INSTITUTE

NEVIN COHEN

JUNE 2001

MADE POSSIBLE WITH SUPPORT FROM
MICROSOFT AND THE MARKLE FOUNDATION

EXECUTIVE SUMMARY

In Bangladesh, 97% of all homes and virtually all rural villages lack a telephone, making the nation one of the least wired in the world. This lack of connectivity has contributed to underdevelopment and the impoverishment of individual Bangladeshis. To address this problem Grameen Bank, a micro-finance institution, formed two entities: 1) Grameen Telecom (GT), a wholly-owned non-profit organization to provide phone service in rural areas as an income-generating activity for members of Grameen Bank, and 2) GrameenPhone Ltd. (in partnership with U.S., Norwegian, and Japanese companies), a for-profit entity that bid on and in 1996 won a national GSM cellular license. GrameenPhone (GP) has since become the country's dominant mobile carrier,[1] providing service in urban areas and along the major railway routes via a network of cellular towers linked by fiber optic cable.

BUSINESS MODEL

Grameen Telecom's goal is to connect rural Bangladesh through the provision of mobile telephone service by creating micro-enterprises that can both generate individual income and provide whole villages with connectivity. GT uses GrameenPhone's advanced GSM technology in stationary village phones owned and operated by local entrepreneurs. These entrepreneurs purchase the phones with money borrowed from Grameen Bank,[2] and sell phone service to customers by the call. Rates are generally twice the wholesale rate charged by GP plus taxes and airtime fees. An average of 70 customers a month use each phone; this shared-access business model concentrates demand and creates relatively high cash flow, even in poor villages, enabling operators to make regular loan payments and still turn a profit. Repayment rates to Grameen Bank are 90-95%.

HUMAN CAPACITY

Key to the success of the village phone has been the development of a cadre of entrepreneurs nurtured by Grameen Bank. After the Bank approves financing of a phone, GT buys a cellular phone subscription on behalf of the entrepreneur and provides the connection, necessary hardware, and training to operate it. GT also tracks trends in phone use and identifies operators who are having difficulty marketing or collecting payments for the service.

The village phone network also yields important secondary benefits to the women who live in the villages that they serve. Because 95% of operators are female, and the phones are in their homes, women who might otherwise have had very limited access to a phone feel comfortable using one. There is also some evidence that, because the phones are so important for whole villages, having female operators has helped to enhance the status of women in the communities where they work.

INFRASTRUCTURE

Grameen Telecom's original goal was to have a phone in each of Bangladesh's 65,000 villages by 2000, but only 4,543 village phones were in service as of March, 2001. The primary constraint has been a distorted telecommunications market controlled by a monopolistic government provider, BTTB. Because BTTB has been unwilling to increase its capacity to connect mobile systems to the fixed telephone infrastructure, GP and other mobile companies have been unable to add additional phones to the national switched network and instead have had to offer primarily mobile-to-mobile phone services.[3] This infrastructure barrier has also limited expansion of the rural phone network.

A second constraint is GP's use of cellular technology for fixed phone centers, a choice that is neither efficient nor probably competitive over the long run. GSM—used throughout much of Europe and Asia—is far more

expensive than fixed wireless local loop (WLL) systems used by Grameen Telecom's competitors, Sheba and BRTA. While GSM towers can provide service within 15 to 20 kilometers, WLL towers provide coverage within 50 kilometers. Moreover, WLL provides better bandwidth for data transmission and at a lower cost.

POLICY

Bangladesh's telecom regulatory regime is both antiquated and anti-competitive. One consequence has been BTTB's ability to maintain control over the switched network without expanding its capacity, even in the face of high demand. Scarcity forces Bangladeshis to pay large sums (allegedly both legal and illegal) to BTTB officials in order to obtain phone service. BTTB's control of the network is likely to become an even more significant market disadvantage to GP and other mobile operators when BTTB launches its own GSM mobile network this year.

ENTERPRISE

Grameen Telecom's village phone venture as structured in Bangladesh would not be feasible without access to the credit and bill collection services provided by Grameen Bank and the infrastructure and urban mobile phone network provided by GrameenPhone. Village phones would be far less successful if GP were not able to discount by 50% the rate charged to GT for a phone call, an underlying subsidy made possible by a transfer of profits from the more profitable urban part of the business to the rural sector—and a significant advantage unavailable to rural-only competitors BRTA and Sheba.

CONTENT

Demand for telephone service in rural Bangladesh remains high despite relatively limited marketing and no overt content development by GT or GP. In large measure this is because the village phones offer tremendous economic value to the users who would otherwise have to spend hours or days traveling to other towns to make a phone call. According to one study, the average consumer savings for a phone call from a village to Dhaka ranges from 2.6% to 9.8% of the user's mean monthly household income.

Bangladesh is also a labor-exporting country with many rural people working overseas. As a result, one of the most important functions of the village phone is to facilitate remittances from relatives.[4] Local business people and farmers use the phone to reduce costs, get better prices for their products, and plan shipments to reduce spoilage of perishable products.

KEY LESSONS

Were it not for policy and infrastructure barriers, Grameen Telecom's village phones might already serve all of Bangladesh's 65,000 rural villages. The high revenues generated by the shared-access business model suggest how powerful market drivers for such approaches can be. And as a development-centered IT strategy, the village phone program promises broad development benefits, including enhanced productivity and social welfare and new sources of rural income.

Nonetheless, the Grameen Telecom business model relies on subsidies from urban cellular users, on financing and other support from Grameen Bank, and on GSM cellular technology that is unsuited (or at least very high cost) for sparsely-populated rural areas, for fixed phone centers, and for data transmission. The wireless local loop technologies used by GT's rural competitors or wireless multi-point distribution technologies—already being deployed by the TeNeT group and their partners in rural India—promise lower costs and higher data bandwidths. Under favorable policy environments, such rural networks combined with shared access strategies that concentrate demand and generate efficient usage may well enable profitable, market-driven approaches to providing connectivity and infrastructure in rural areas.

RURAL CONNECTIVITY: GRAMEEN TELECOM'S VILLAGE PHONES

EVOLUTION OF GRAMEEN TELECOM AND GRAMEENPHONE

Since its founding in 1976, Grameen Bank has become one of the developing world's most successful microlending institutions. Over its first twenty years, Grameen Bank made $2 billion in loans to rural entrepreneurs, helping to spur development in some of the world's poorest communities. With 1,128 branches and over 66,000 centers in more than half of the nation's 65,000 villages, Grameen Bank has an extensive presence throughout Bangladesh and is the largest rural finance institution in the country.

The Bank's primary business is to make very small loans (averaging US$160) to finance entrepreneurial ventures and cottage industries. Most loans have gone to traditional agricultural activities, such as buying and raising farm animals or marketing agricultural products. By the mid-1990s, bank officials wanted to begin financing potentially higher- yield businesses than animal husbandry or food marketing to capture some of the economic benefits of the emerging technology sector. Officials like Managing Director Mohammed Yunus were also keenly aware of the substantial development benefits of telephone access in villages.

In 1994, a US-based native Bangladeshi entrepreneur named Iqbal Quadir approached Grameen Bank with the idea of using the Bank's financing mechanism to establish a nationwide telecommunications business that would serve the country's rural villages. From Quadir's perspective, telephones were not luxuries or mere conveniences, but rather essential business tools that could dramatically improve the productivity of poor Bangladeshis. Quadir helped Grameen Bank officials to understand that rural telephones were the digital equivalent of the cows they had been financing—profitable, secure investments that offered real value to rural villagers.

Bangladesh was a particularly important test case for Quadir's concept, as its telecommunications infrastructure is one of the least-developed in the world, far behind even neighboring India or Pakistan. Some 97% of its households, and virtually all of the homes outside the largest cities, lack telephones. For rural villagers, it is not uncommon to spend two days traveling to a city to make an important phone call.

Table 1. Telephone Main Lines per 100 Inhabitants, 2000

Country	Main Lines per 100 People
Bangladesh	0.34
Pakistan	2.22
India	3.2
Sri Lanka	4.06

Source: ITU Telecommunication Indicators, 2000

In 1995, the liberalization of Bangladesh's telecommunications sector created a unique window of opportunity for Grameen Bank. The Bangladeshi government decided to auction licenses for the operation of cell phone businesses to private firms. Grameen Bank and Quadir's US company, Gonofone, formed a consortium with Norway's Telenor to bid for one of the licenses. The Bank started Grameen Telecom (GT) as a wholly-owned non-profit organization and submitted a bid for a cell phone license, with a newly-created for-profit entity called GrameenPhone Limited (GP) as the operating company.[5] GP was awarded one of four nationwide licenses for GSM 900 cellular mobile phones on November 11, 1996. On Bangladesh Independence day, March 26, 1997, less than five months after receiving its license, GP began offering mobile phone service in Dhaka.

VILLAGE TELEPHONE BUSINESS MODEL

"GrameenPhone is merely what we need to do Grameen Telecom's Village Phone."
Muhammad Yunus, Managing Director, Grameen Bank

GP is a nationwide mobile phone company that provides telephone service in both urban and rural areas of Bangladesh. For urban customers with sufficient income, GP sells individually-owned handsets and traditional mobile phone service plans. GT's primary goal, on the other hand, is to promote rural sustainable development by extending telephone connectivity to Bangladeshi villages that would otherwise have no phone service at all, ensuring at least one phone in each of Bangladesh's villages and providing everyone in the country with access to telephone services within ten minutes' walking distance. Achieving this goal from a state of nearly zero connectivity, with overwhelming technical and political obstacles, has been an enormous challenge.

For poor, rural customers in Bangladeshi villages, GT has worked with Grameen Bank to establish a unique Village Phone business model. It involves financing telephone businesses that serve entire villages.

GT scouts out technically feasible rural locations for the Village Phone business. After selecting a candidate village, GT works with local Grameen Bank branches to encourage literate, creditworthy, Grameen Bank members to apply to become Village Phone operators. Following a screening process, these entrepreneurs are given unsecured loans from Grameen Bank to finance the purchase of mobile phones to operate businesses of leasing the phones to customers by the phone call.[6] The money that Grameen Bank lends the Village Phone operator (approximately US $420) is repaid through revenues collected from users who are charged per minute for the time they make or receive calls.

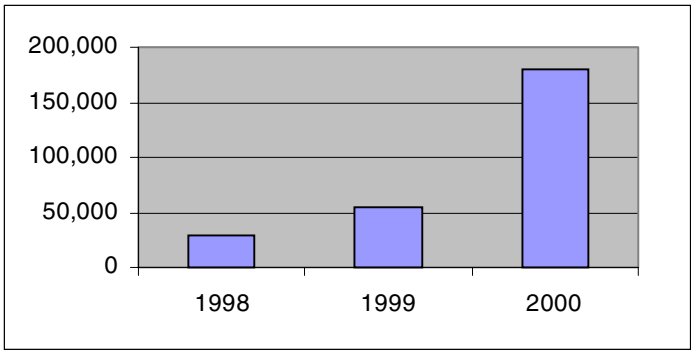
Despite extremely low per capita income in the rural villages of Bangladesh, aggregating the buying power of an entire village provides sufficient revenue to support the infrastructure and operating costs of the telephone operator, who is able to maintain a relatively high cash flow. The shared-access model, providing telephone connectivity for entire communities at an affordable cost per use,[7] is enormously profitable. An average of 70 customers per month use each phone, generating revenues of $93 a month as of March 2001. Revenues per Village Phone are twice as high as those of GP's urban mobile phones.

With low operating costs—the market "retail" rate for a phone call is generally twice the wholesale rate charged by GrameenPhone ($ 0.03) plus taxes and airtime fees—operators are able to earn a profit and repay their loans.[8] With a unique peer support system and regular meetings to collect payments, Grameen Bank has been able to maintain an average repayment rate of 90-95% on its loans, a far better track record than for most small business loans in developed countries.

Business Performance

Between 1991 and 1996, mobile telephone services in Bangladesh were provided by a single company, Pacific Bangladesh Telecom Ltd (PBTL), that targeted the country's relatively small urban elite. The market expanded significantly when new licences for GSM networks were awarded in 1996. However, GrameenPhone's competitors have not been able to expand beyond subscriber bases in the tens of thousands. GrameenPhone, meanwhile, has experienced rapid growth.

Figure 1. GrameenPhone Subscribers, 1998-2000



Source: Paul Budde Communication, 2001

By the end of 2000, GP subscribers totaled 193,588, and by March 2001, nearly reached 247,000. As the following data show, GrameenPhone has captured approximately 63% of the country's mobile phone market.

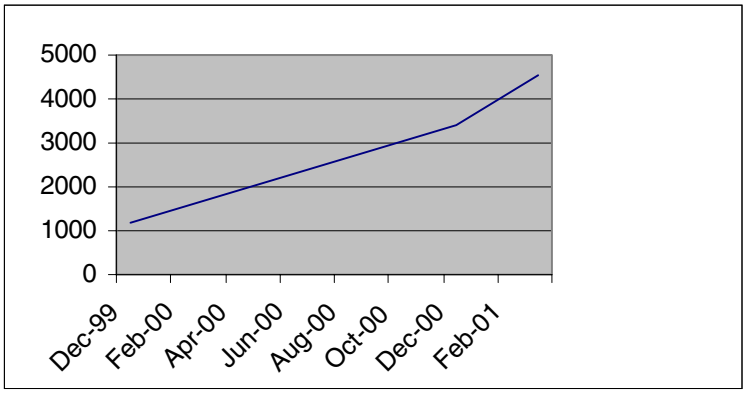
Table 2. Mobile Subscribers by Major Operator, December 2000[9]

Operator	Technology	Subscribers	Market Share
GrameenPhone	GSM-900	180,000	63%
Pacific Bangladesh Telecom LTD (PBTL)	AMPS/CDMA	20,000	7%
Sheba Telecom (Pvt.) LTD	GSM-900	34,000	12%
TM International AK TEL	GSM-900	52,000	18%
TOTAL	GSM/AMPS/CDMA	286,000	100%

Source: Global Mobile, February 2001

The Village Phone business has experienced a similar rapid rate of growth. The number of Village Phone operators has increased from just over 1,000 at the end of 1999 to 4,543 in March 2001, according to data from GT.

Figure 2. Village Phone Subscriptions, 1999 to 2001 (in numbers of subscribers)



Source: Grameen Telecom, 2001

As with subscriber growth, revenue growth has been substantial. From June 1998 through July 2000, the amount of the average monthly Village Phone bill increased by a total of 137%—from $60.75 to $144.02. The average Village Phone bill was three to seven times the size of the average urban phone bill, in part because most urban customers are restricted to making calls to other GP phones, while many rural customers use the Village Phone to call long-distance to relatives working in Dhaka or overseas. Revenues for the Village Phone vary by region, and are significantly higher than the $93/month average in communities that make an above-average number of international calls because of family members working abroad (Latif, 2000).

Table 3. Monthly Village Phone (VP) Bills (in Taka)

Month	Average Monthly Billing			Number of VPs Billed
	All	Dhaka Zone	Chittagong Zone	
Jul-99	5,295	4,356	7,443	467
Jan-00	7,559	5,487	9,542	1,067

Source: Latif, 2000.

Rural phones, which represent fewer than 2% of the phones used on GP's network, account for 8% of the company's total revenue. While Village Phones are more profitable than urban phones on a per-phone basis, the company depends primarily on its urban business for the bulk of its revenues. GP's urban phone network enables GT to expand connectivity to rural villages, by subsidizing the Village Phone System. The 50% discount on the rate the company charges Village Phone operators enables them to capture the difference between the discounted price and the retail market rate.[10] In fact, in the eyes of Grameen Bank and Grameen Telecom officials, GP exists primarily to fund the rural side of the business, even though most of its subscribers are urban.

Elements of Village Phone Success

Human Capacity

An essential element of the Village Phones' success has been the development of a cadre of phone entrepreneurs who receive funding from Grameen Bank as well as initial business support from Grameen Telecom during the startup phase of their operations. For example, after the Bank selects a Village Phone operator and approves the financing of her phone, GT buys a cellular phone subscription on her behalf and provides the connection, necessary hardware, and training to operate the phone.

More importantly, GT's support lasts long after the startup phase. For example, while telephone rates are determined by individual operators, and can be as high as the market will bear, Grameen Telecom supplies a recommended price list that helps to ensure that phone operators do not price themselves out of the market or out of business.[11] In fact, GT claims to monitor the rates charged to ensure competition. If a phone operator charges significantly more than the market rate, GT may put a competitor in that operator's service area to induce price reductions.

GT also serves as a support system for the phone operators who, though entrepreneurial, are also relatively inexperienced at running businesses. By tracking trends in phone use, the company can identify operators who are having difficulty marketing phone service or collecting payments for phone use. These operators are then provided with personal assistance to ensure that their businesses succeed.

Village Phone operators are trained in how to use their mobile phones, but GT and Grameen Bank staff are available to address problems during weekly meetings held to collect phone revenue. In addition, GP itself

provides direct customer service to anyone having trouble using a phone via a 24/7 call center for customer concerns. One sign of good customer satisfaction is GP's relatively low rate of service cancellation (or "churn rate") of 2.18% per month.

Improved Status of Women

While the direct financial benefits to phone operators are significant, the phones have also reportedly helped to elevate the status of the female phone operators within their villages.[12] Surveys have found that the Village Phone operators become socially empowered as they earn an income, gaining participation in family decisions in which, in rural Bangladeshi society, women usually have no say. Women operators also gain status because other villagers must travel to their homes to make or receive phone calls, making the operator's home an important center of activity within the village.

Some female villagers report that the Village Phones have been liberating to women besides the phone operators, too, in part by creating a public space—the Village Phone Office—where women can go unescorted by a male relative. With women as Village Phone operators, other women in this Islamic society are more likely to feel comfortable using a phone.

INFRASTRUCTURE OPPORTUNITIES AND CONSTRAINTS

Leasing Fiber Optic Network

Bangladesh's dense population and relatively compact geography make it efficient to cover with wireless infrastructure.[13] Moreover, GP made an important strategic decision to enter into a long-term agreement with the Bangladesh Railways to lease the railways' underutilized, 1,800-kilometer, high-capacity fiber optic digital transmission network to serve as the backbone of GP's telephone system.[14] This agreement gave GP instant access to a nationwide fiber optic infrastructure that essentially parallels the one operated by BTTB.[15] Thanks to this infrastructure, GP's rural telephone service stretches through much of the nation's rural countryside. Only in areas without fiber optic infrastructure, such as the southern coast, has GP built microwave links.

Interconnection Constraints

The country's incumbent telecommunications operator and carrier, the Bangladesh Telegraph and Telephone Board (BTTB), is one of the biggest obstacles to the growth of the Village Phone enterprise. BTTB held an absolute monopoly over Bangladesh's telecommunications sector until 1989, and has performed abysmally throughout its tenure. The waiting time for a fixed-line connection is more than 10 years, according to one account (Richardson, 2000). The installation charge of US $450 for a new line is one of the highest in the world, and the charge for calling the UK is six times higher than the charge for calling Bangladesh from the UK. On average, only two of 10 calls are successfully completed. The company's complaint rate—at 50 per 100 lines per year—indicates that consumers are dissatisfied (Richardson, 2000).

While BTTB's poor performance resulted in pent up demand for telephone service and provided opportunities for more efficient competitors to enter the market, the agency has strangled the mobile sector by limiting access to the national fixed network, which it alone controls. In its Fifth Five Year Plan (1997-2002), BTTB set forth goals of ensuring universal telephone service, expanding telecom infrastructure in both urban and rural areas to enable one telephone per 100 people by 2002, expanding international telecom circuits and ancillary facilities for smooth international operations in urban and rural areas, ensuring telephone connection to all industries, particularly those located in Export Promotion Zones (EPZs) and industrial estates, and improving overall quality of service. Given its past performance, however, it is unlikely to achieve these objectives.

As a consequence of BTTB's unwillingness to expand the fixed line network, GP has been forced to stop sales of

mobile phone subscriptions that connect to fixed line subscribers. Instead, GP and other mobile companies have been relegated to selling inferior mobile-to-mobile phone services. GP's most common service is "GP-GP Regular," which enables callers to connect only to other mobile phones. For less credit-worthy consumers, GP also offers a popular pre-paid service for mobile-to-mobile calls. As of March 2001, such mobile-to-mobile calling plans accounted for a large majority of the company's urban subscriptions.

Subscribers to tandem or nationwide dialing services that connect to the fixed network are also assessed a small fee per call to cover the cost of interconnection—and to limit the number of such calls. GP offers national roaming—connecting GP customers to phones on its own and competing mobile networks—to all customers. Incoming calls from mobile phones are not assessed a charge, but all incoming calls from the BTTB fixed network are assessed a small surcharge.

Mobile-to-mobile service is marketable in Bangladesh thanks to the breadth of GP's service areas, including its rural network, which enables urban customers to use their phones as they travel across the country. GP has one of the largest and most rapidly growing networks of phones in the country, with 227 base stations and 634 cells, covering nearly 30% of the population.

One side-effect of the BTTB infrastructure bottleneck has been an unusual degree of cooperation among competitive mobile providers, who have an incentive to work together to create as large a mobile-to-mobile network as possible in order to compete with fixed-line telephone service. A key question is whether the country's mobile providers can together force BTTB to expand the fixed network, or whether the mobile network will completely supplant the fixed-line infrastructure.

A decision by BTTB to launch its own GSM network in the second half of 2001, following the construction of necessary infrastructure in Dhaka, may lead to formidable competition for GP. BTTB will be exempt from obligations and conditions imposed on private operators, such as operating license fees, base station rents, and interconnection problems, and will have full access to fixed-line services, not to mention financial resources and political support unavailable to GP or any of the country's other mobile providers.

"…We regret that BTTB continues not to support the mobile operators with the possibility to interconnect to the fixed-line telephones. Even worse—instead of improving the fixed-line network, including international lines, BTTB is planning to launch its own GSM mobile services."
Ola Ree, Managing Director, GrameenPhone in March 2001 newsletter

GSM—An Inefficient Infrastructure

GP's business plan is to provide affordable Global System Mobile (GSM) cellular service nationwide.[16] GSM technology has enabled GP to deploy a nationwide, truly mobile system; its base stations are strategically located so that major transportation routes between urban areas have mobile phone service, providing essentially continuous coverage. While this advantage does not apply to the essentially stationary phone businesses in villages, it enables GP to market its services to higher-income urban dwellers who wish to use their phones as they travel around Bangladesh and to other countries.[17]

The Village Phones typically remain grounded in public phone offices and do not move from place to place. Hence, the technology may be more advanced, and expensive, than necessary for the functions of the Village Phone business.

The Village Phone faces competition from two private rural telecom companies, the Bangladesh Rural Telephone Authority (BRTA) in the north, and Sheba in the south. Both BRTA and Sheba use lower-cost fixed wireless local

loop technology, which is less expensive to construct because the towers reach ten times as far as GSM towers (50km compared to 5km) and the handsets are typically cheaper.

Although BRTA is a private company, it has wide powers to grant concessions, determine spectrum frequencies and operate mobile, paging and value-added network services. In a project with US-based Phoenix Wireless, BRTA has installed a fixed wireless phone system to serve up to 250,000 subscribers in Dhaka. Sheba Telecom uses a wireless local loop system to provide service to subscribers spread across five towns and cities in southern Bangladesh. Incorporated in 1995, Sheba Telecom Ltd has a 25-year license that is restricted to rural areas and that mandates provision of services to 191 villages. It is among the smallest companies in the mobile market, with less than a 7% share as of 2000, and its service area encompasses only in a limited region in the south, around Chittagong.

GrameenPhone's Village Phone venture has two important competitive advantages that, for at least the near future, outweigh the higher cost of its GSM telephone technology. One is first-mover advantage. GrameenPhone started up earlier and more extensively than either BRTA or Sheba. Hence, it captured key markets in urban, peri-urban, and rural areas. The second is the breadth of its GSM network, which is critical because many of its accounts are for phones that operate within the network, not between the network and the fixed-line telephones. Having a critical mass of Grameen phones helped to create a market for these GSM-only telephones.

GP's competitors, BRTA and Sheba, cannot expand their markets because they cannot get additional interconnections to the fixed network. Apparently, BRTA purchased millions of dollars of wireless loop equipment that has been warehoused simply because BTTB refuses to make interconnections available. Without interconnections, the value of a BRTA or Sheba phone, which for the most part can only connect to other BRTA or Sheba phones, is dramatically diminished. In part, this limitation on fixed-line connection is responsible for GrameenPhone's ability to roll out GSM technology in rural areas with little competition from BRTA or Sheba. Ironically, if reforms cause BTTB to increase interconnection capacity, competitors like Sheba and BRTA, using lower cost WLL technologies, may be better positioned to compete with GP in the rural market.

POLICY

A number of regulatory obstacles have hindered the development of phone service in Bangladesh and have hampered GT's efforts to expand the Village Phone to more communities. Chief among them are the country's telephone regulations, which are both antiquated and unfair. They permit BTTB to maintain sole control over the fixed network without being obligated to expand its capacity. Because of scarce landline phones, Bangladeshis must pay large sums (allegedly both legal and illegal) to BTTB officials to obtain a phone line. For mobile operators, the stranglehold over the fixed network limits the number of mobile channels that providers like GP can connect to the fixed-line network.

By regulation, all international calls, including international roaming calls made from GP phones used in other countries, must use BTTB lines, which further reduces the capacity of the fixed network and ultimately GP's ability to carry international voice traffic. If the current regulations were lifted, GP and presumably other mobile providers could obtain satellite phone service for international calls.

In response to BTTB's failure to improve service and attract foreign investment, Bangladesh's Parliament has recently approved legislation establishing a regulatory body called the Telecommunications Control Commission that will assume some of the powers previously held by BTTB, including allocating frequencies, fixing tariffs, intervening in complaints by subscribers, and regulating Internet communications. New commission notwithstanding, BTTB will maintain authority over fixed-line telephone services.

Currency Constraints

Bangladesh has made efforts to keep its currency from flowing excessively to other countries. One consequence of this policy is that contracts with mobile phone operators in other countries often allow for only one-way roaming, routed through the BTTB network, to avoid paying phone fees to those countries. This restriction further limits network capacity and the ability of GP to negotiate roaming agreements with a wider range of nations.

Taxes

With such low per capita incomes, taxes can price many products out of the reach of most Bangladeshis. Customs duties and value-added taxes levied on mobile handsets can total roughly 60% of their cost. In addition, royalties of $19 per year on mobile phones—because they are defined as luxury items, not productive tools—make handsets prohibitively expensive for many middle class Bangladeshis.

ENTERPRISE

Given the profitability and high revenue flows of Village Phones, the venture would in principle be feasible without the access to credit provided by Grameen Bank; GT could, in theory, finance the phones itself or simply give them to its operators. But Grameen Bank's ancillary services are as important as its financing of telephones. Grameen Bank's screening process ensures that operators are of very high caliber. The bank's efficient system of weekly meetings for collecting fees reduces GT's costs. Its regular meetings also enable borrowers to discuss problems before they escalate, thus minimizing defaults. Grameen Bank branch managers remain responsible for collecting bills from the operators, ensuring efficient and prompt payment to GP. In contrast, competing phone companies BRTA and Sheba must collect fees directly from customers who lack the same level of commitment to repay as Grameen Bank members, without a peer network to encourage and facilitate payment.

In some cases, local Grameen Bank managers have constrained the expansion of Village Phone services.[18] Villages that were technically capable of receiving a Village Phone were sometimes passed over due to poor credit ratings. In the southern coastal area, the Bank's lending efforts were so new that officers did not want to risk financing a Village Phone business. In one zone with a 100% loan repayment rate and good network coverage, local bank officials reportedly did not want to finance a Village Phone enterprise, fearing the new venture would fail and ruin their record (Latif, 2000).

CONTENT

GP does not provide specific "content" on its Village Phones, such as information services or Internet access. Nonetheless, underdevelopment of Bangladesh's phone system has resulted in pent-up demand for telephone services, including in the poor, rural communities where three quarters of the population live.

While the urban Grameen Phone uses traditional marketing techniques, from billboards to traditional print media, Grameen Telecom's clients are generally illiterate or semi-literate individuals with significantly less exposure to traditional media. While some phone providers print up business cards or make signs to indicate the existence of a telephone center (most phone houses have a sign outside with the Grameen logo and explanation of the services offered inside), much of the marketing is by word of mouth, according to research by the ILO.

Demand for telephone service in rural Bangladesh remains high despite relatively limited marketing and no overt content development by GT or GP. In large measure this is because the Village Phone offers tremendous economic value to users who would otherwise have to spend hours or days traveling to other towns to make a phone call.

Income Impacts

The Village Phone has had direct and indirect impacts on the incomes of village residents. Approximately 8% of calls are made by farmers and business people to get better prices from middlemen. According to one study, researchers found that the ability to check market prices by telephone contributed to higher prices obtained for eggs, chickens, and ducks and lower prices paid for poultry feed. The ability to plan shipments more accurately also reduced the spoilage of perishable products (Bayes, 1999). Many of the Village Phone operators have developed side businesses as information intermediaries, collecting the prices of frequently-traded commodities and supplying them to the local business people for a small fee.

The Village Phones are reportedly used 86% of the time to discuss a wide range of financial issues. Even calls described as "social" in nature frequently involve transfer of information about market prices, market trends, and currency exchange rates, making the phone an important tool for households to keep abreast of market information and thereby improve their livelihoods.

Approximately 42% of all calls involve remittances from family members living in larger Bangladeshi cities or overseas. In fact, having a family member working overseas was found to be the most important independent variable in determining phone use. In a country with a significant number of citizens employed in other countries, calls to request, schedule, track, and report on remittance payments are in some sense a loosely arranged alternative to the banking system. Given the lack of access by the poor to banks and usurious overhead charged by money transfer services, phone calls can significantly reduce the risk and cost of transfers and enable recipients to get the best possible currency conversion rates. According to one study, a single phone call made to facilitate a remittance from a family member working as a wage laborer in Dhaka City saves from 2.64% to 9.8% of the family's average monthly household income. The cost of traveling to another town to make a phone call ranges from 1.93 to 8.44 times the cost of the call on a phone located within one's own village.

Mobile telephones have emerged as economical and efficient alternatives to landline telephone systems in many developing countries. Where sluggish, monopoly-controlled telecom sectors have led to insufficient network infrastructure and phone waiting lists measured in years, consumers have flocked to mobile phone providers.[19] Mobile phones now account for 25.6% of total telephone subscribers in Bangladesh, according to data from the ITU.

CONCLUSIONS

Bangladesh remains desperately poor, despite growth rates of 4 to 5% in recent years. The economy has structural problems, from a weak financial sector to an unproductive, corrupt, and chronically money-losing public sector (US State Department, 2001). Poor infrastructure and a susceptibility to floods and cyclones regularly cause economic and environmental disruption. And, although agricultural output has increased steadily since independence and the country is nearly self-sufficient in food during normal years, rural poverty remains endemic.

The provision of telephone connectivity to rural areas has served two important purposes: promoting economic development by helping individuals and businesses gain efficiency through communications, and promoting social and economic development for the individuals who own and operate the telephone enterprises.

In the future, the Village Phone venture may help older or disabled bank members by enabling them to invest for their retirement.

Digital telecommunications technology can support a wide range of economic and social goals and become part

of a far-reaching development strategy. By connecting people with jobs abroad, the technology can provide employment in services for literate Bangladeshis. In India, this strategy has been effective in the software industry and in facilitating multinational investment in back-office services like call centers. More effective connectivity reduces one substantial obstacle to foreign firms that might consider locating in Bangladesh. Better telecommunications—including village-level Internet connectivity—may also help to connect local markets for handmade goods to buyers in distant locations, supporting indigenous craftspeople.

Environmental, Health, and Safety Impacts

For villages moving from having no phone to one phone, the marginal benefits to health and safety can be significant, ranging from the ability to signal distress or reach public safety officials during natural disasters to access to emergency medical advice. And, unlike fixed-line phones, the mobile phones can be carried out of the village if evacuation is necessary. The phones not only offer access to emergency personnel, but also can be used to contact government officials or the media to report problems, nuisances, or hazards. The Village Phone is also used by rural families to share information about the family's physical and economic health with overseas relatives. Without the Village Phone, there are few alternatives for keeping in touch.

It is difficult to forecast the broader environmental impacts that village telephone connectivity may have. Increased phone contact may substitute some trips (e.g. to get to a telephone), but it may also induce greater mobility and travel as individuals become better connected to people living in distant cities. Increased income at the village level will lead to increased consumption, quite possibly of goods and services that are produced or used in environmentally harmful ways.

In the absence of policy and infrastructure barriers, Grameen Telecom's Village Phones might already serve all of Bangladesh's rural villages. The high revenues generated by the shared-access business model make the Village Phone a profitable enterprise. And as a development-centered IT strategy, the Village Phone program promises broad development benefits, including enhanced productivity and social welfare and new sources of rural income.

Nonetheless, the Grameen Telecom business model relies on subsidies from urban cellular users, on financing and other support from Grameen Bank, and on GSM cellular technology that is unsuited (or at least very high-cost) for sparsely-populated rural areas, for fixed phone centers, or for data transmission. The wireless local loop technologies used by GT's rural competitors or wireless multi-point distribution technologies—already being deployed by the TeNeT group and their partners in rural India—promise lower costs and higher data bandwidths. Under favorable policy environments, such rural networks combined with shared-access strategies that concentrate demand and generate efficient usage may well enable profitable, market-driven approaches to providing connectivity and infrastructure in rural areas.

NOTES

[1] As of March, 2001, GP had 57% of the mobile telecom market in Bangladesh.

[2] Grameen Bank chooses the entrepreneurs, 95% of whom are women; phone loans are approximately US $420, more than average annual income.

[3] Roughly 88% of GP's 243,000 urban phone subscriptions (as of March 2001) are for plans that restrict customers to calling other mobile phones.

[4] Calls to initiate or track remittances account for 42% of all calls.

[5] GP was funded by the International Finance Corporation, Commonwealth Development Corporation, and the Asian Development Bank ($50 million), as well as Norway's Telenor, Japan's Marubeni Corporation, and the US' Gonofone ($55 million). GT received a $10.6 million loan from the Soros Foundation.

[6] In communities without electricity, GT also provides a solar generator supplied by another subsidiary of Grameen Bank, Grameen Shakti, for approximately US$150.

[7] Bangladesh's annual per capita income is approximately $370 nationwide, but much lower in rural areas, according to the World Bank (http://www.developmentgoals.org/findout-definitions.html).

[8] GP charges $0.04 per minute for local peak calls made by the Village Phones, half the rate charged to urban customers. Local calls to the fixed BTTB network are assessed an additional $.03 per call fee. For national and international calls, GP charges BTTB long distance rates plus VP airtime charges and 15% VAT. GT adds an additional 13% (15%?) service charge. Each VP operator earns, on average, a net profit of US$4.80 per week, according to research by Bayes (1999).

[9] December, 2000 is the latest date for which comparative data are available.

[10] Market rate = 6 taka per minute (at 57.4 taka/dollar). VP operator pays 4.5 taka for the first minute; 3 taka for each additional minute.

[11] Nevertheless, the Village Phone operator remains in control of her business; call charges often vary according to the relationship between the operator and the customer and are typically discounted when the call brings bad news (e.g. a death in the family).

[12] The income that Village Phone operators earn has been reported to comprise about 24% of the average household income, and in some cases was 40% of total household income.

[13] Bangladesh's population density is 981 per square kilometer, one of the highest in the world; geographically, it covers an area approximately the size of Wisconsin.

[14] The fiber network was built with support from the Norwegian Agency for Development Cooperation (NORAD), which was a Grameen Bank lender in the 1980s.

[15] GP's lease to operate the Bangladesh Railway's fiber optics transmission network has not only given it "first-mover advantage" by enabling it to roll out national mobile service, but also enabled it to sub-lease the valuable excess fiber optic capacity to different businesses, including a competing mobile operator, Aktel, and the Bangladesh Navy.

[16] GSM is a cellular technology that allows the user to move from cell to cell, and to use the phone in other countries with GSM technology that have roaming agreements with GP.

[17] All GP prepaid subscribers (and a portion of postpaid subscribers) have roaming privileges within Bangladesh and customers subscribing to international dialing services can use their handsets in select foreign countries.

[18] The Village Phone program does not add significantly to the profitability of bank branches and represents a small part of the total operation of the bank. Local managers have neither targets to meet under the Village Phone program nor pressure to focus on Village Phone expansion (Latif, 2000).

[19] In poor nations like the Ivory Coast and Cambodia, for example, the number of mobile phones now exceeds the number of landline phones (ITU, 2000).

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COMMENTS ON THE TRAI CONSULTATION PAPER ON "**GROWTH OF TELECOM SERVICES IN RURAL INDIA – THE WAY FORWARD"** DATED 27TH OCTOBER, 2004

Some of the issues raised in the paper relate, *inter-alia,* to spectrum policy, the concept of niche operators and broadband policy. These issues have already formed the subject of separate consultation processes initiated earlier by TRAI. In fact, the broad-band policy of Government has been formulated after taking into account the recommendations of the TRAI on the subject. The concept of niche operators has been discussed at length in the draft recommendations on Unified Licencing of TRAI. USO Fund Administration's comments have already been furnished to TRAI on the concept of Niche operators. As regards spectrum policy, TRAI is in the process of formulating its recommendations. These three issues also seem to form the core of the present consultation paper. Therefore, it may have been worthwhile to expedite the finalization of the recommendations on Unified Licencing and Spectrum before initiating consultations on a matter regarding which the decisions taken on these two issues could have a significant impact.

2. The objectives of universal services forms part of the New Telecom Policy – 1999. TRAI had been consulted regarding the scope and funding of universal services. Government had framed the guideline of Universal Service Support Policy in 2002 after taking into account the recommendations of TRAI. The Indian Telegraph Act had to be amended in 2004 to give statutory status to the Universal Service Fund and rules have been framed thereunder in 2004 detailing the scope and the procedure to be adopted for implementing Universal Service Policy. TRAI would have no doubt taken into account the possibility that Universal Service Support Policy may

be construed to be more in the realm of policy making by Government, before initiating steps for making *suo moto* recommendations on the subject particularly since statutory provisions have been enacted less than one year ago.

3. There is no gainsaying the fact that access to communications has to be accelerated in all the geographical areas of the country. However, the premise that there is slow down in providing VPTs and rural DELs has to be evaluated in the context of the following factors:-

a) **Village Public Telephones**:- The Universal Service Fund is already supporting operation and maintenance of more than 5,20,000 village public telephones. It may also be recalled that the Government decided that village public telephones will be provided in all villages having population of more than 100. Further, the obligation of providing village public telephones by Basic Services Operators had been done away with when they migrated to the Unified Access License regime. It was, therefore, decided to provide capital expenditure as well as operational expenditure support for the balance 66,000 odd villages where VPTs remain to be provided. Agreements have already been finalized for providing coverage to these villages including coverage in 14,183 villages with satellite based terminals. Therefore, there is no reason to conclude that there has been slow down in growth of installing VPTs when nearly 90% of the villages are already covered and the remaining are also getting covered now in a time-bound manner.

b) **Rural DELs :** It has also been observed in the consultation paper that there is a slow down in providing rural DELs. It is noticed from the consultation paper that provision of rural DELs peaked in 2000-01. However, while in 2002-03 and 2003-04 there was a reduction in the total number of new Rural DELs provided, still they exceeded those provided in 1998-99 and 1999-2000 when the Basic Service Operators had an obligation to provide Rural DELs. The TRAI paper also indicates that rural teledensity had grown from 0.5% in 1999 to 1.7% in the year 2004(exceeding three times growth). During the same period urban tele-density increased from 6.9% to 19.7% (less than three times growth) and the overall teledensity increased from 2.3% to 7.4% (nearly 3 times growth). That this has happened in spite of the phenomenal growth of cellular telephones in urban areas, should perhaps be recognized when comparing absolute numbers of rural and urban subscribers. These must be also viewed in the context of the fact that the rural DELs in 2001-02 and 2002-03 have been installed so far without any support from the Universal Service Fund though there is now a statutory obligation to provide financial support for the eligible DELs, which will now be provided. Further, the obligation of providing rural DELs which had been earlier imposed on the basic service operators has also been removed in the unified access service regime.

4. The consultation paper gives the impression that only Rs. 500 crores has been disbursed, although substantial amounts are available because of the contributions made by the telecom operators to the Universal Service Fund. It has not recognized that the amount disbursed was what was released to the U.S.Fund Administration. It is a fact that the pace of release of funds has not kept up with the speed of

implementation of Universal Services undertaken by the Universal Services Fund Administration. There are substantial amounts of outstanding claims. In fact one of the objectives of giving statutory status to the Universal Service Fund was to ensure that the funds collected as Universal Service levy are automatically made available to the Universal Service Fund which has not happened so far. There are indications that in future, including rest of the current year, there will be enhanced fund flow for this purpose to cover all the activities provided in the statutory rules under Universal Service and meet all the outstanding and current claims. The consultation paper, for reasons not so obvious, has not taken note of this position although TRAI is fully aware of it.

5. The consultation paper has included the guidelines for implementation of Universal Service support. These guidelines had been formulated in April, 2002. Thereafter, the Indian Telegraph (Amendment) Rules have been brought into effect and perhaps it would have been more relevant to refer to these rules because there have been certain changes in the rules in the scope of coverage of Universal Service in the light of subsequent developments, like doing away with the obligation of the Basic Service operators for providing VPTs and Rural DELs and the delay in implementing the Access Deficit Regime.

6. The support for Universal Service is now being provided in accordance with the provisions of the Indian Telegraph (Amendment) Rules, 2004. Providing telephones on demand in urban areas is not within the ambit of these rules nor certain other matters relating to provision of internet / data access referred to in Para 2.6 Table 2.1 of the Consultation Paper. In respect of providing broad-band services,

perhaps a distinction needs to be made in providing **public** broad band access as compared to **individual** broad-band connectivity. Even in most developed countries the penetration of household broad-band services is rather low. Developing countries are giving preference to providing public access vis-à-vis household connectivity. Therefore, the policy should support more and more broad-band public access so that larger and larger numbers of villages get covered with at least a public access. In fact, universal broad-band public access in larger villages is very much within the ambit of the present dispensation of Universal Services.

7. The paper makes a reference to some estimate about providing cellular mobile coverage to 75% of the population by the year 2006. It is not known as to on what basis such an estimate has been made. While this is certainly a laudable objective, it must also take into account the fact that perhaps the obligation of covering 50% of the district headquarters within three years of commencement of operation by the cellular mobile operators is still to be achieved by all the operators. No doubt, there will be pressure based on demand to provide more and more coverage to more and more subscribers in the rural areas. However, it may be difficult to get a critical mass of subscribers in the sparsely populated rural and remote areas to provide such services at optimal costs. The question of affordability of cellular services would also have to be kept in mind. While competition and economics of scale where feasible, can further reduce cellular tariffs, it may not reach the current levels of concessional rural tariff for quite some time in view of the need to provide affordable services. The cost of handsets to be procured by the subscribers can also be a deterrent in this regard. Non-availability of assured power supply could be a constraint adversely affecting costs and thereby affordability of such services by the subscribers in rural and remote

areas. In this context, it may be premature to question sustainability of the USO subsidy model. The question of providing financial support to high cost and low income subscribers is a basic principle of Universal Services even in a developed country like USA where capital cost of providing such services is not covered by the Universal Service Fund but is provided by a separate agency. In India no such agency is likely to be established in the foreseeable future. Of course, the number of rural DELs to be provided will be determined by the availability of funds. With the projected buoyancy in the revenues of operators, it should be possible to support sufficient number of DELs to achieve the prescribed rural teledensity targets. With a technology neutral approach, it should be possible to reap the benefits of the most cost effective technology, including emerging technologies. The question of providing some financial support for access infrastructure for wireless services that would facilitate effective utilization of the available backbone network, particularly for providing universal broadband public access capable of giving multi-media services can always be explored and operationalised. This could also facilitate providing even cellular mobile services in rural areas, where the subscribers can afford to avail such facilities without any concessional tariff. It is, therefore, surprising that the consultation paper refers to both slow growth in rural telecom services and the sustainability of the USO model, when a developed country like USA is providing more funds for covering high cost rural areas constituting only 10% of the total area of that country as against 70% of the total area in India being high cost rural area.

Fri, 03 Dec 2004 10:16:39 +0530

From: "cvoice" <voice1@eth.net> Add to Address Book

Subject: Fw: COMMENTS ON CONSULTATION PAPER ON Growth of Telecom services in rural india

To: jmukhija@yahoo.com

----- Original Message -----

From: cvoice

To: jmukija@yahoo.com ; consumer

Sent: Thursday, December 02, 2004 3:59 PM

Subject: COMMENTS ON CONSULTATION PAPER ON Growth of Telecom services in rural india

VOLUNTARY ORGANISATION IN INTEREST OF

CONSUMER EDUCATION (VOICE)

(Recognized by: GOVT .OF INDIA)

441 (BASEMENT),JANG PURA,MAnruRAROAD,NEwDELm -110014 (INDIA)
TEL: 011-24319079, 80 TELEFAX: 24319081
E-mail : cvoice@vsnl.net Website : www.consumcr-voice.org

URGENT

24 Nov 0

Telecom Regulatory Authority of India,
A-2/14, Safdarjung Enclave,
New Delhi – 29.

Kind Attention : Advisor [MN]

Sir,

COMMENTS ON CONSULTATION PAPER ON
"GROWTH OF TELECOM SERVICES IN RURAL INDIA"

1. **Villages connected :**
The number of villages connected is much less than 4 lakh as most of those working with MARR were non-functional immediately after inauguration. Hence the paradoxical situation becomes more intense. Exact figure must be known.

2. **Prioritization & Classification :**
   a) Not Connected so far

i) The villages not connected so far must be accorded first priority. Based on the degree of inaccessibility, villages in hilly areas of J&K, Himachal, Mizoram, Arunachal, Uttaranchal, Sikkim and other North Eastern states may only be connected through satellite. For this VSAT sevice providers may be encouraged to enter as NICHE Operators with support from USO.

ii) Biding by the Unified licensees for the remaining villages.

iii) If the Unified licensees fail to meet the bench mark, consider NICHE operators for the USO support.

iv) Replacements : The incumbent operator [BSNL] must be tasked to replace the MARR VPTs on bench marked price with modern technology without delay as the onus for their proper functioning lied on it. It is a matter of shame that these villages are treated as STATISTCALLY connected. USO fund must provide the necessary support.

3. **ADC Review**

Access deficit has hurt the industry as well as the subscribers. It is based on assumptions in the era of transparency and hard facts.

a) The rentals and the call charges are not below cost. What is the cost? For the last siz years BSNL has been stating inflated figure, which includes cost of corruption in tendering, contracts and inefficiency. Secretary DoT has admitted that the capital expenditure on A DEL is less than ten thousand. Why has the regulator accepted BSNL figures on face value, after seven years in existence?

b) In urban area, the forbearance has allowed rentals as cost plus. [Rs. 250 pm)

c) The deficit from rural and non-remunerative area is met from USO.

Hence where is the deficit? It is neither good business nor transparent accounting. Why pay twice- from USO as well as ADC?

To kill competition and promote corruption / inefficiency?

ADC goes against the level playing field, competition and tariff forbearance.

4. **Revision of Rural Connectivity**

Objective of rural connectivity must be changed to BROADBAND connectivity. All the new connections must be planned with this objective.

5. **Linking with efforts of state, administrative reforms by the center, corporate houses and GDP.**

a) The central government is committed to administrative reforms which Include

i) Transparency and accountability

ii) Efficient administration

iii) Growth and development

iv) Eradication of corruption

v) Reduction in deficit financing – removal of leakage in PDS, reduction in subsidies in various sectors [kerosene, diesel, fertilizers],

All these need correct data, information and management for which the communication is the instrument. Thus TELECOM is the instrument of growth and future in which KOREA and other co nitres invested.

All the concerned ministries can pool their efforts – correct data implies right use of subsidies, no pilferage and efficient / less corrupt bureaucracy.

b) The state governments have their plans for e-governance. This effort can be synergised. States may be willing to provide infrastructure for the development of their villages.

c) The corporate sector wants to reach the source of supply of raw material to reduce input cost and the rural market to increase their retail business. E-chaupal by ITC is an example.

d) Infosys and WIPRO have offered to provide cheap hardware and software for development of rural economy. This must be coordinated and exploited. Rightly

VOICE comments on the ISSUES FOR CONSIDERATION

1. This consultation Paper has discussed various issues related to Growth of Telecom Services in rural areas Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India. **VOICE c;o"li~Qrs tel,com for rural area as the mo$t important infrastructure for their growth. Instead of seeking revenue from telecom operations, the government must provide funds if USO is inadequate.**

2. Should Niche Operators as discussed in this Consultation Paper get a support from Universal Service Fund? **YES**

3. Instead of subsidizing final product, should the subsidy be given on inputs like Bandwidth and spectrum charges? **YES**

4. In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wirel(~ss technologies for access offer a near self sustaining model in rurcll areas which can be implemented through subsidization of input costs from Universal Obligation fund. Do you agree with this proposition? Offer your (;omments.
The PCOs may be converted into PTIC for which the cheap ~:inance should be made available by the state / banks as done in Andhra Pradesh. The input cost can be subsidized from USO.

5. For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through ..~gulation with appropriate commercial compensation being provided to owners through regulatory intervention? YES

6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

The villages not connected are those which are difficult to reach and economically non-viable for Unified License operators. V SAT IlsP can be the niche operators for providing Broadband connectivity with support from UsO.

For broadband connectivity of other rural areas , *scheme* of *refund* of *USO levv to the service provider after* two *years* [like refund of sales tax in states] may be considered. This will be motivating factor with need of good reliable connectivity and protection from abuse of funds.

L Do you think that we can sustain USO subsidy model in the long run?
YES. The growth and economic well being will make the Model viable. With time the revenue will increase, USO fund input will increase and Rural communication will become economically viable.

~ Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?Our IT industry is quite advanced and the good news is INFOSYS, WIPRO and other IT companies are willing to assist with hardware and soft ware. Government must identify the exact requirement and coordinate their effort. The funds may be provided by USO and the government. KOREA can be the model for us to increase broadband connectivity where the state invested heavily in the initial stage.

identified for different areas.

6. Answer to issues raised are enclosed.

Thanking you,

Yours sincerely,

Col. S.N. Aggarwal (Retd)
Advisor Telecom

Grameen Phone in Bangladesh is the classic example of growth of rural economy linked to telecom services.

9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area
with particular reference to rural area economy.

AUSPI'S RESPONSE TO TRAI CONSULTATION PAPER NO. 16/2004 ON GROWTH OF TELECOM SERVICES IN RURAL INDIA: THE WAY FORWARD

INTRODUCTION

Spread of telecommunications to rural area should be a strategic policy from all angles. It would help rural areas to access market place through telecommunications, thus providing a good opportunity in the country's economy. A rural spread requires not only access through telecom network but also effective policies, incentives and involvement of people.

The TRAI in its consultation paper has rightly acknowledged two very crucial aspects relating to telecommunications development in our country:

i) That telecommunications networks are an aid to enhance the growth of the national economy.
ii) That though overall tele-density in the country has shown impressive growth, rural telecom growth continues to be slow

In this context the roll out and availability of a robust telecom infrastructure in rural areas should be a key strategic initiative by the policy maker and regulator alike. All stakeholders – including the private sector – should be made stakeholders to achieve this objective. A widely available rural telecom network would provide unprecedented opportunities for growth of our country's economy as a whole. As such an enabling policy framework with incentives is a key requisite for this.

As a first step, the development of telecommunications infrastructure in rural areas would have to aim at providing community based services (like tele-centres or kiosks with internet connectivity). Though this has already been partially envisaged in the USO policy its implementation is still unsatisfactory. In order to achieve these targets the key requirements would be:

a) A mandated policy for interconnection availability on demand in rural areas
b) Participation of state and local government to utilize infrastructure created in rural areas for promoting e-governance services
c) Provision of loans from local financial institutions at nominal rates
d) A facilitating environment for encouraging agri-based commerce online

TRAI has mentioned a few issues in this consultation paper for achieving higher growth of telecom services in the rural areas and has proposed introduction of 'Niche Operators' to provide fixed telecom services in SDCAs having fixed rural teledensity of less than 1%.

The above definition is ambiguous/confusing. The confusion is further compounded in view of para 2, clause 3.2.1 of consultation paper.

Quote

" …….. It may be recalled that mobile networks will only cover about half the villages. ……. Several other villages could be covered through 'Niche Operator' concept. These villages will be those that have less than 1% teledensity, as defined for the 'Niche Operator' concept in the Unified Licensing draft recommendations."

Unquote

Our submission is that based on the above description in the consultation paper if niche operators are introduced, the definition should be "Niche Operators to provide fixed telecom services **in rural SDCAs** having fixed teledensity of less than 1%."

Introduction of 'Niche Operators' by carving out parts of Unified Licensse's service area and bestowing them sops like no registration fee etc. will create unnecessary complications of level playing field issues.

It is further submitted that TRAI should not rule out the possibility that Niche Operators can be franchisees of the bigger network operators. This is especially important since the growth of rural tele-density should envision and encompass provision of high speed data connectivity including broadband application since a rural broadband network has to be designed to capture all possible revenue streams.

FINANCIAL INCENTIVES & REGISTRATION FEE

Adequate financial incentives are also crucial to encourage faster roll out in rural areas and this would expedite the achievement of rural teledensity targets. In this context we would like to propose the complete removal of the following levies:

i) Access Deficit Charge on all operators
ii) Service Tax for telecom services in rural areas
iii) Customs and Sales Tax levies on infrastructure equipment used for network roll out in rural areas

We would also like to state that introduction of "Niche Operators' without the right registration and entry fee charges as paid by other operators (including the Unified Access Service Operators) will raise other issues of level playing field and this should be adequately addressed as has been done in the past.

It would also be useful if information relating to the number and details of SDCAs which have fixed rural teledensity of less than 1% were to be made available for the benefit of all operators.

Finally we would like to highlight that it would be essential to clearly indicate the exact spectrum allocation procedures and policies to be adopted for Niche Operators. The frequency bands in which they are proposed to be introduced

and the pricing principles for the same including the types of services that can be offered on that band. It is necessary that bands already reserved for mobile services (CDMA and GSM) should be excluded since there is already a scarcity of spectrum in these bands for all operators. The NFAP should also adequately address this aspect.

Addressing all the above issues would be extremely important in order to define a transparent and unambiguous policy framework for achieving rural teledensity by introducing Niche Operators.

ISSUES FOR CONSIDERATION

1. **This consultation paper has discussed various issues related to Growth of Telecom Services in rural areas. Please give your comments on them and suggest any additional point to achieve higher growth of telecom services in rural India.**

   The most important issue is the need to have lower prices for services. This pricing is due to access primarily. Our suggestion, therefore, is that there is a great need for enhancing the fiscal incentives including lower taxes, lower duties and tariff forbearance for operators to create access and broadband networks in rural areas.

   As has been highlighted by the recent CII study on Broadband, the effective impact of customs duties on capital expenditure is between 20 to 25% thereby making setting up of kiosks and networks in rural areas unviable. Other taxes like entertainment tax and service tax affect the operating costs to the extent of over 35 to 40% of revenues. This distorts the sustainability and breakeven points for rural markets. It is, therefore, recommended that the government should waive all duties and taxes for all rural telecom and broadband investments.

   In addition to policy issue, a broad agreement has to be reached by the Regulator and Govt. with other stake holders for the growth of telecom services in rural areas. This synchronization is essential for the spread of telecommunications in unserved areas.

   It is thus our submission that regulatory incentives for rural markets should take into account the business and commercial imperatives for rolling out networks in these areas.

   TRAI has discussed various issues to enhance growth of telecom services in rural areas and has opined that a largely self sustainable business model can be created for the telecom services even in most backward areas.

   Our comments on some of the issues identified are as follows:

   - **Coverage of mobile networks mostly urban areas (1700 towns covering 200 million people):** Over the last two years, and specially with launch of CDMA services on a country-wide basis, mobile telephony has expanded rapidly. All service providers rapidly expanded their networks to reach out to uncovered areas. Primarily, these have been urban and semi-urban areas which have got cellular coverage but rural areas coverage is there in a very limited manner. This has led to about 20% teledensity in urban areas. The Authority has in the Consultation Paper elucidated the future plans (next two years) of all mobile operators comprehensively which shows that over 4900 out of the 5200 towns would be covered along with 3.5 lakh villages out of the total 6.07 lakhs. It has been further explained that this would translate into telephone access

to 300 million people in urban areas as well as 450 million people in rural areas thereby covering 75% of the population.

In the following paragraphs, we explain what has led the operators to go into the rural areas on such a large scale in a short span of two years, something which has not been achieved in the last 10 years ever since we have been making concerted efforts to provide rural access.

- **High penetration levels reached in urban areas:** With increasing competition and falling tariffs, ARPUs have also fallen substantially in urban / semi-urban areas where operators are providing services today. Affordability of services is a key factor which has led to this exponential growth in the last two years. With marginal levels of tariff having been reached, profitability and long-term sustainability can only be achieved with an expanded coverage of the networks. This explains the rush towards rolling out services in smaller towns and rural areas in the next two years. Certainly, an early-mover advantage would prevail and no operator is leaving any stone unturned to cash in on this opportunity. TRAI has correctly termed this as an opportunity rather than an obligation. It is without doubt that local content along with innovative value-added services would fuel growth in hitherto uncovered areas, particularly rural areas. What is primarily needed is network expansion which will yield an expanded market with tariff forbearance.

- **Slowdown in VPTs / rural DELs in last 3 years:** With the tremendous cost advantages of wireless networks, operators had directed /are directing their maximum efforts in rapidly rolling out mobile services in uncovered areas.

- **Overall ICT usage lagging behind due to high cost / price to the end subscribers:** Serious efforts from policy makers and industry alike would need to be made towards reducing the cost of services to the end subscriber. While tariffs for telephony may have come down to very low levels, they still remain considerably high for other segments in the ICT arena, thus impeding growth. Parallel work needs to be done to develop locally relevant content both from the Government as well as the industry's side apart from reducing tariffs which will spur growth. We cannot let a "chicken and egg" situation to happen and non-action on any front may result in a lost opportunity which will be detrimental to the nation as a whole.

- **Availability of finance - USO Support:** In line with the USO Policy, finance should be made available for provision of rural telephony which means that this should be available for provision of broadband and voice connectivity in rural areas through internet dhabas and net high cost DELs in rural SDCAs. Funds should be available to all operators going to rural areas for both capital as well as operational expenses.

2. Should 'Niche Operators' as discussed in this consultation paper get support from Universal Service Fund?

AUSPI has maintained that the concept of 'niche operators' can cause serious disruptions in the level playing field scenario. **Instead if the benefits envisaged for 'niche operators' were to be extended to the present network operators they would be able to fulfill the same targets** with their already existing networks in place. Even if niche operators are to be allowed, all the benefits granted to them should also be made available to the unified licensees who also set up networks in these remote areas. This is important since unified licensees have paid high registration charges.

If Niche Operators are introduced, support from the Universal Service Fund could be **provided to them on the same lines as that available to other Access Providers**.

Further, AUSPI suggests a 'franchisee model' for spread of telecom service in the rural SDCAs. It would be in this direction TRAI should work out a 'model franchisee agreement' to be followed by the Unified Service licensees.

3. Instead of subsidizing final product, should the subsidy be given on inputs like bandwidth and spectrum charges?

Support from Universal Service Fund should be the way forward. However, subsidy on inputs like interconnection, bandwidth, co-location with the incumbent, spectrum charges, facility for interconnection with incumbent etc. be given, instead of subsidizing final product.

It would also help if the following additional measures were adopted for rural network roll out:

1. Permit use of available electric poles for laying overhead fibre
2. No WPC License fees for VSAT connectivity apart from leasing satellite bandwidth on subsidized price
3. Permit operators to allot a range of numbers for Rural Communications and inform DoT of the same. This range should then be made available to all other operators. No IUC charges should be levied for both originating & terminating calls on these numbers.

4. **In this paper it has been proposed that telecommunication facilities capable of offering multiple services including telephony using modern wireless technologies for access offer a near self sustaining model in rural areas which can be implemented through subsidization of input costs from Universal Obligation Fund. Do you agree with this proposition? Offer your comments.**

   Yes, we agree. It would be viable to allow provision of entire range of services in rural areas. i.e., the viable rural model would be the aggregator approach – like that of a tele-centre or kiosk. This would essentially mean the deployment of broadband networks for voice, data, video and e-governance applications all rolled into one.

   Multiple services being derived from modern wireless technologies for access are similar to the concept of by-products in a manufacturing activity. This will certainly generate revenues which will be helpful since it will reduce the dependence on subsidies from USO and gradually move towards self-sustainability.

5. **For increasing the percentage population exposure to cellular mobile services, should sharing of infrastructure such as buildings, tower, etc. be mandated through regulation with appropriate commercial compensation being provided to owners through regulatory intervention?**

   For increasing the percentage population exposure not only to cellular mobile services but to all telecom services, sharing of physical infrastructure such as buildings, towers etc. should be on mutually agreed commercial terms. In the event of discord, TRAI may intervene to meditate.

6. Do you visualize any other initiative which should be taken by TRAI as to achieve the growth of telecom services in rural India?

The rural economy in India which houses 70% of the population exhibits tremendous robustness which is evident from the fact that it accounts for a large pie of FMCG, consumer durables / white goods, automobile / two-wheeler / tractor sales among a host of other industry sectors in our country. Therefore, the problem is not of affordability. With the present tariff structure, telephony is certainly affordable for the rural masses. However, the rural folk need to be shown the benefits they could derive from this connectivity.

It is here that the Government - both Central and State can step in as a major user and help fulfill its social objectives in health and education. Rural artisans can market their handicrafts through the internet and sell their products in a global marketplace. Farmers can access information related to the crops they sow, from agricultural universities and wholesale markets where they will sell their produce. Therefore, it is all about local content development. Large scale efforts from the Government and Industry need to be made towards this end if we are to reap the benefits of ICTs. Apart from this, some specific actions which are necessary to kick-start the entire process are given below:

- Removal of all kinds of levies / taxes, etc. which go to increase the input costs thus pushing up end costs – no service tax, spectrum charges, etc.

- PC ownership to be facilitated for village community centre (public access through kiosk) through availability of zero-interest loans.

7. Do you think that we can sustain USO subsidy model in the long run?

USO subsidy model has to continue till the time teledensity reaches the expected level.

The USO subsidy model is a self sustaining model in the long run since the market is expanding and with turnover increasing the USO Contribution is also going to increase. Consequently, over time more areas are going to be covered under telecom networks which will over time reduce the dependence on USO subsidy. Therefore, the subsidy model is essential today to reach the uncovered areas and soon the rural economy in these areas will generate revenues for its long term self sustainability. The USO target of 7 years seems workable to connect all of India’s villages with public telephone access.

8. Locally relevant software will have to be developed. What steps could be taken to develop such software and data base and what should be government role in this?

The most important issue is the availability of relevant local content. The availability of this content would encourage the usage and development. In this direction our views are that the following steps may be taken by the Govt. to develop locally relevant software and data base creating awareness in the various sectors:

a. Promote all major national languages for the internet usage.

b. Proper support for unicoding these national languages.

c. National plan for state wise E-vision development programme.

d. Participation of all related ministries/ Departments of central and state Govt. to push programmes for rural development, agricultural services/ training to the farmer etc.

e. Placement of all programmes/ data base on the internet.

There have been encouraging announcements / developments recently reported in the media that global software giant Microsoft is soon developing software in major Indian languages. This will promote use of ICTs immediately in all rural areas as the rural community will be able to use computers in the languages they understand. This is one of the major reasons for the success of internet in some of the East Asian economies. English language is not commonly used in these countries, but due to Windows and MS Office being available in major local languages, the use of computers is very high. This success can be replicated in India too.

Apart from such initiatives being taken by global software companies, the Government, particularly state governments will have to step in as a major contributor to content development that too in the local languages so that the information can be used by the rural community. Government can fulfill many of its social objectives through the internet. It is when such content is available that usage will rapidly increase. State Governments can effectively host wide ranging information which can be accessed by villagers across the state as and when it is needed. That is when there will be value for the rural population.

Industry too will have to leverage the internet to maximize their revenues through e-commerce and bulk of this will have to be in local languages otherwise there will be very little off-take. The banking and insurance industry can gain significantly with local content development to effectively market themselves. In this manner, the rural economy can be integrated with the global economy.

The key area of support would be :

a) e-governance
b) e-health
c) e-education
d) e-entertainment
e) e-commerce

9. Share your experiences within and outside the country which establishes the linkage between growth of telecom services and economic growth of an area with particular reference to rural area economy.

It has been found by many researchers that investment in telecommunications infrastructure and the resulting improvement in telecommunications services have consistently led to economic growth. Improved telecommunications has helped both urban and rural communities.

Studies have found that economic benefits of telecommunications investment stem from the increased productivity of business using telecommunications and the improved education, health and social services the telecommunications made possible. In all cases, telecommunications is a catalyst for or a complement of other development activities. Telecommunication access would increase the awareness level and thus encouraging the same for use for market place activities.

The “net” is an important business opportunity for rural businesses seeking to expand their markets, but that avenue of growth is blocked for them if no local internet provider can offer a network server on which local business could put up their “home pages” or give consulting help to show them how to do it.

Telecommunications-intensive applications like e-commerce, e-education, telemedicine etc. will be the way rural communities use improved telecommunications to improve their economies and their quality of life. The relationship between telecommunications investment and rural development is not some distant, abstract concept. It is the practical business of installing in rural communities the networking capabilities that will make a difference to the lives of rural residents.

Netherlands Foreign Investment Agency news report (posted November 10, 2003) says Investment in ICT boosted GDP growth in Netherlands.

It is believed that investments in information and communication technology (ICT) by the Netherlands, the United States, Canada and Australia boosted the gross domestic products (GDP) of those countries more than the other member nations of the Organisation for Economic Cooperation and Development (OECD) between 1995 and 2001, according to the “OECD Science, Technology and Industry Scoreboard 2003.”

ASSOCIATION OF UNIFIED TELECOM SERVICE PROVIDERS OF INDIA

Response to
TRAI Consultation Paper

On

GROWTH OF TELECOM SERVICES IN RURAL INDIA

The Way Forward

Consultation Paper No.16/2004 dated October 27,2004

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