



**Telecom Regulatory Authority of India**



**Consultation Paper on  
Compensation to the Consumers in the Event of  
Dropped Calls**

New Delhi, 04.09.2015

**Stakeholders are requested to furnish their written comments by 21<sup>st</sup> September, 2015 and counter-comments by 28<sup>th</sup> September, 2015 to Smt. Vinod Kotwal, Advisor (F&EA), TRAI. The comments may also be sent by e-mail to [advisorfea1@trai.gov.in](mailto:advisorfea1@trai.gov.in). Comments and counter-comments would be posted on TRAI's website [www.trai.gov.in](http://www.trai.gov.in). For any clarification/information, Advisor (F&EA) may be contacted at Tel. No. +91-11-23230752, Fax: +91-11-23236650.**

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## **Chapter-I**

### **Introduction**

- 1.1. Telecom Regulatory Authority of India (hereinafter, referred to as the Authority) was established in 1997. The Authority is mandated to regulate the telecommunication services, to protect the interests of service providers and consumers of the telecom sector and to promote and ensure orderly growth of the telecom sector in the country<sup>1</sup>. Safeguarding consumer interests is of paramount importance to the Authority.
- 1.2. The growth story of the telecommunication services market in the country has been impressive. Most of the growth has come from mobile telephony. From a modest mobile tele-density of 1.2<sup>2</sup> in March, 1999, the mobile tele-density of India leapfrogged to 77.27<sup>3</sup> in March, 2015. During this period, the average mobile tariff for outgoing calls declined from ₹ 16.93 per minute (March, 1999) to ₹ 0.50 per minute (March, 2015). With the telecommunication services becoming increasingly affordable, a consumer with low income can also avail the telecommunication services.
- 1.3. Today, the telecom services are ubiquitous and are consumed not only in the bustling streets of a metropolis but also in the hinterland villages of the country. This augurs well for the telecom services providers (TSPs) in the country; their revenue streams have been growing steadily with the increase in subscriber base. Besides, with the recent introduction of data-focused technologies (3G/4G) in the telecommunication networks in the country, the TSPs have witnessed a significant surge in consumer spending towards Internet (data) services. As a result, the Adjusted Gross Revenue (AGR) of

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<sup>1</sup> Source: The Telecom Regulatory Authority of India Act, 1997

<sup>2</sup> Source: Indian Telecommunication Statistics 2004 (Policy Framework, Status and Trends) published by Department of Telecommunications

<sup>3</sup> Source: TRAI's Press Release on 'Telecom Subscription Data as on 31st March, 2015' dated 12.05.2015

telecommunication services sector in the country has grown by more than 11% on year-on-year (Y-o-Y) basis in the past two years<sup>4</sup>.

- 1.4. The growth in overall demand of the telecommunication services has contributed to the increase in the revenue streams of the TSPs. At the same time, the growth in demand puts an onus on the TSPs to ramp up their supply (size of telecommunication network) adequately. As one would intuitively expect, if TSPs do not upgrade their telecommunication networks suitably, the service performance would deteriorate and, in turn, consumer expectations from the service delivery would not be met.

### **Consumer complaints about call drops**

- 1.5. In the past one year, consumers, at various fora, have raised the issue of call drops, complaining that their experience of making voice calls has deteriorated. They contend that they are unable to complete their conversations without their calls getting dropped during the course of a conversation. The consumers seem to be asking a simple question: *Having paid for the service, why should I be denied a reasonable call quality?*
- 1.6. The problem of call drops in the country appears to have aggravated with the passage of time. In order to assess the situation, the Authority, in June/ July, 2015, conducted special drive-tests on certain routes of Mumbai and Delhi. In the drive-tests, it was found that Call Drop Rate of most of the TSPs was higher than the benchmark of  $\leq 2\%$ , set by the Authority.
- 1.7. The issue of too frequent call drops seems to have annoyed not only the consumers and businesses but also has become a major cause of concern for policymakers and parliamentarians. Essentially, the problem of call drops needs to be examined in its entirety and requires adoption of multi-pronged

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<sup>4</sup> As per the information furnished by the TSPs to the Authority as part of GR/AGR report, the AGR of the telecommunication services sector grew from ₹1,40,779 crore in F.Y. 2012-13 to ₹ 1,58,042 crore in F.Y. 2013-14, thereby registering a Y-o-Y growth of 12.3%. In F.Y. 2014-15, the AGR of the telecommunication services sector grew by 11.3% to ₹ 1,75,830 crore.

approach. The Authority is also considering to make it mandatory for the TSPs to make periodic disclosures about their network capacities and the steps taken to optimize their networks to address the problem of call drops. The Authority has already got conducted Independent Drive Tests (IDT) in the cities of Mumbai and Delhi in June/ July, 2015 and would be conducting such drive tests across various cities in the country. While all these steps are being contemplated, the Authority cannot remain a silent spectator to the problem of call drops encountered by the consumers.

- 1.8. In this background, the following chapter presents an analysis of the issue and explores ways to devise a framework to protect the interests of the consumers through a consultative process.

## **Chapter-II**

### **Analysis of the issue of Call Drops**

- 2.1 As per the Section 11 of the Telecom Regulatory Authority of India Act, 1997, the function of the Authority shall be, *inter-alia*, to lay down the standards of quality of service to be provided by the service providers and to ensure the quality of service and conduct the periodical survey of such service provided by the service providers so as to protect the interests of the consumers of telecommunication service.
- 2.2 In exercise of these powers, the Authority laid down the Quality of Service (QoS) Standards for Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service initially in July, 2000. These standards were reviewed in 2005 and revised regulations were issued in July, 2005. These regulations were further reviewed in 2008-09 and the Authority issued "The Standards of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service Regulations, 2009" on 20.03.2009. These regulations were amended by the Standards of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service (Amendment) Regulations, 2012 dated 07.05.2012 to extend the benchmarks for the network related parameters to the 3G mobile networks. These regulations were further amended by the Standards of Quality of Service for Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service (Second Amendment) Regulations, 2012 dated 08.11.2012. Through the amendment regulations, the Authority prescribed financial disincentive on TSPs for failure to meet the quality of service benchmarks so as to strengthen the effectiveness and compliance of the regulations.
- 2.3 Through these regulations, *inter-alia*, benchmarks for Call drop (term commonly used for 2G networks) and circuit switched voice drop (CSV Drop) in 3G networks have been laid down for Cellular mobile Telephone Service as  $\leq 2\%$ .

**A- What is a Call Drop?**

- 2.4 Call drop represents the service provider's inability to maintain a call once it has been correctly established. The objective of this parameter is to provide the consumer with an expectation of how successful a mobile network will be at retaining the signal throughout the duration of the call. This parameter includes both incoming calls and outgoing calls which, once they have been established and have an assigned traffic channel (TCH), are dropped or interrupted prior to their normal completion by the user, the cause of the early termination being within the service provider's network.
- 2.5 As per 'The Standards of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Regulations, 2009', Call Drop Rate (averaged over a calendar month) of any cellular mobile telephone service provider should not exceed 2%. Call Drop Rate is computed as below:

$$\text{Call Drop Rate} = A \times 100 / B$$

Where

A = No. of calls interrupted prior to their normal completion (dropped calls)

B = Total number of calls successfully established (where traffic channel is allotted)

These measurements have to be taken during the time consistent busy hour (TCBH).

- 2.6 In 3G networks, the Circuit Switched Voice Drop Rate (CSV Drop Rate) is computed as below:

CSV Drop Rate

$$= 100 * \left[ 1 - \frac{\text{\#RAB Normal Release (CSV)}}{\text{\#RAB Normal Release (CSV) + \#RAB Abnormal Release (CSV)}} \right]$$

Where

\#RAB Normal Release (CSV) = Number of voice RAB normally released

\#RAB Abnormal Release (CSV) = Number of voice RAB abnormally released

RAB stands for Radio Access Bearer.

- 2.7 In the following discussion, both the Call Drop (in 2G network) and CSV Call Drop (in 3G network) have collectively been referred to as Call Drop.



2.8 The Call Drop Rate is one of the key performance indicators (KPI) to assess the performance of telecommunication networks. It is assumed to have a direct influence on the consumer satisfaction with the service provided by a TSP. The Authority collects the information on various network performance parameters including Call Drop Rate from the TSPs and publishes it on its web-site on a quarterly basis.

**B- Why calls are dropped?**

2.9 Call drops in mobile networks occur due to a variety of reasons. The main reasons for dropped calls are as below:

- (i) lack of radio coverage;
- (ii) radio interference between neighboring cells;
- (iii) imperfections in the functioning of the network (such as failed handover or cell-reselection attempts);
- (iv) capacity constraints and overload of the different elements of the network (such as cells);
- (v) antenna related problems;
- (vi) transmission media related problems;
- (vii) unauthorized repeaters etc.

2.10 Apart from the afore-mentioned network related reasons, the TSPs have contended that (i) spectrum crunch and (ii) resistance of resident welfare associations (RWAs) against installation of towers in residential colonies have resulted in increase in Call Drop Rates. The TSPs have argued that they are facing shortage of spectrum due to high growth of subscribers; besides there are delays in allocation of additional spectrum by the Government. Regarding the resistance of the RWAs, the TSPs have contended that the RWAs are not letting new mobile towers to come up in residential colonies and are insisting on removal of the existing ones.

2.11 So far as the spectrum issue is concerned, the allocation of spectrum is guided by the rules of the Government. On the other hand, resistance of the

RWAs is a matter to be resolved by the TSPs with the involvement of the concerned stakeholders.

### **C- Call Drop Rates in various telecom networks in India**

2.12 All access service providers in the country furnish their performances on the quality of service parameters on a monthly basis against the benchmarks set for each parameter to the Authority. As indicated before, the benchmark for Call Drop Rate as prescribed by the Authority is  $\leq 2\%$ . While most of the TSPs have reported to the Authority that they are meeting the benchmark on call drop; due to a large number of consumers complaints about call drops, the Authority decided to conduct independent Drive Tests (IDTs) in the cities of Mumbai and Delhi.

2.13 The independent Drive Tests (IDTs) were conducted by M/s TUV SUD, on behalf of the Authority, in Mumbai (in June, 2015) and in Delhi (in July, 2015). The results on Call Drop Rates for various TSPs obtained from these drive tests<sup>5</sup> conducted on the pre-selected routes are presented in the Table 2.1 below:

**Table 2.1: Call Drop Rates observed in the Independent Drive Tests conducted in the cities of Delhi and Mumbai in June/July 2015**

<b>Delhi LSA</b>		<b>Mumbai LSA</b>	
<b>TSP</b>	<b>Call Drop Rate</b>	<b>TSP</b>	<b>Call Drop Rate</b>
TSP-1	5.18%	TSP-a	3.19%
TSP-2	2.84%	TSP-b	0.97%
TSP-3	4.28%	TSP-c	5.56%
TSP-4	8.04%	TSP-d	2.29%
TSP-5	17.29%	TSP-e	5.51%
TSP-6	0.84%	TSP-f	4.83%

<sup>5</sup> A Drive Test is conducted by driving a vehicle at a steady speed over the selected routes. The vehicle carries the testing equipment which measures the key performance indicator (KPIs) by repeatedly making calls, establishing calls, recording the quality of connection, measuring dropped calls etc. in accordance with the predetermined parameters.

Determining the Drive Test Route is the first and the most important step. The route is defined on the basis of several factors that include- areas from where call drop complaints are commonly received, areas of heavy usage, residential areas away from arterial roads, office areas, area where previous Drive Tests showed network issues.

2.14 As can be seen from the above table, Call Drop Rate of none of the TSPs except one in Delhi LSA and Mumbai LSA was within the prescribed benchmark of  $\leq 2\%$ . The Authority would be conducting IDTs in other parts of the country in due course.

2.15 Arguably, the TSPs can reduce Call Drop Rate to a large extent by way of improving radio coverage, expanding the capacity of the network and optimizing the performance of various network elements, which requires both effort and investments on part of the TSPs. With a view to assess the adequacy of wireless telephony networks, the growth in demand (network load) vis-à-vis supply (number of BTS/ Node B) for GSM networks during the period from June, 2013 to March, 2015 has been analyzed in the Table 2.2 below.

**Table 2.2: Usage and Capacity of GSM Networks in the country**

Quarter ending	Usage				Capacity		
	Total Minutes of Usage of GSM subscribers (MOU) (in billion)	Total Data usage of GSM subscribers (in Peta Byte*)			No. of GSM BTS/ Node B (in thousand)		
		2G	3G	Total	2G (BTS)	3G (Node B)	Total
	(a)	(b)	(c)	(d) = (b)+(c)	(e)	(f)	(g) = (e) + (f)
Q.E. Jun-13	927	52	37	89	585	106	690
Q.E. Sep-13	906	61	45	107	590	109	699
Q.E. Dec-13	928	63	52	116	599	115	714
Q.E. Mar-14	975	70	64	134	609	126	734
Q.E. Jun-14	998	78	78	156	605	134	739
Q.E. Sep-14	978	87	88	175	616	145	761
Q.E. Dec-14	995	97	111	208	619	153	772
Q.E. Mar-15	1,038	106	130	236	629	170	799
<b>Percent growth in Q.E. March, 2015 w.r.t. Q.E. June, 2013</b>	<b>12%</b>	<b>106%</b>	<b>252%</b>	<b>166%</b>	<b>8%</b>	<b>61%</b>	<b>16%</b>

Source: Information furnished by the TSPs to the Authority

\* 1 Peta Byte =1,024 Tera Byte

# In the above table, the usage of GSM network has been represented in terms of main usage items viz. voice usage and data (Internet) usage.

- 2.16 From the above table, it can be seen that, during the period from quarter ending (Q.E.) June, 2013 to Q.E. March, 2015, the growth in minutes of usage (MOU) of GSM network has been 12% and increase in 2G data usage has been 106%. However, the number of 2G BTSs grew by 8% during this period. Similarly, the growth in 3G data was 252% whereas the number of Nodes B increased by 61% during the same period.
- 2.17 The Table 2.3 below depicts the investments made in upgrading the network infrastructure (other than radio spectrum) of wireless access service segment in F.Y. 2013-14.

**Table 2.3: Investments in network infrastructure (other than radio spectrum) of wireless access service segment in F.Y. 2013-14**

<b>Gross Block of network infrastructure* (other than radio spectrum) of wireless access service segment (in Rs. Crore)</b>		<b>Investment made in network infrastructure (other than radio spectrum) in wireless access service segment in F.Y. 2013-14 (in Rs. Crore)</b>
<b>F.Y. 2013-14</b>	<b>F.Y. 2012-13</b>	
(a)	(b)	(c)= (a)-(b)
2,11,691	2,02,366	9,325

\* Network infrastructure - Plant & Machinery including wires & cables

Source: Information furnished by the TSPs to the Authority

- 2.18 As may be observed from the above table, the investment made in the network infrastructure (other than radio spectrum) in wireless access service segment rose by 4.6% from Rs. 2,02,366 crore in F.Y. 2012-13 to Rs. 2,11,691 crore in F.Y. 2013-14. During this period, the minutes of usage grew by 6.8%<sup>6</sup>. Clearly, investment has not kept pace with the usage. Thus, *prima facie*, it appears that lack of investment in network infrastructure by the wireless access providers may be one of the main reasons for the problem of call drops.

<sup>6</sup> During this period, data usage grew by more than 100%, albeit from a low base.

- 2.19 Some stakeholders have also argued that when a consumer, who is on a per-minute-pulse, makes a call, he has to pay for at least a minute of call even if he talks for only a second; as the call got dropped before completion of the conversation, the consumer is likely to re-attempt the call, in which case the TSP would again levy charges as per the applicable tariff; further, as the last call had got interrupted midway, the consumer would spend some time either apologizing or berating about the call interruption and then restart the conversation after picking up the threads of the last conversation; this would result in longer call duration and thereby greater call revenue to the TSP.
- 2.20 The TSPs, on the other hand, rebut such claims. They contend that given the fact that there are seven to ten access service providers in each LSA and the facility of mobile number portability (MNP) is available to the consumers, no TSP would resort to such a malpractice at the cost of potential churn out of its (dissatisfied) consumer and erosion of its brand name in the market. The TSPs and their industry associations also argue that most of the mobile consumers are on per-second-billing and therefore, a TSP gets no financial benefit when a call is dropped.
- 2.21 It would be pertinent to verify the veracity of the contention of the TSPs and their industry associations that most of the mobile consumers are on per-second-billing-pulse. As per the information furnished by the TSPs to the Authority for the quarter ending March, 2015, 71% of the mobile consumers on a pan-India basis were on per-second-billing tariff plans; however only 59% of the total outgoing voice usage happened on per-second basis<sup>7</sup>. Thus, the contention of the TSPs is only partly correct as about 41% of the total voice consumption happens on a per-minute-pulse in the country.

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<sup>7</sup>The difference in number of consumers and their usage could be largely attributed to the fact that a significant proportion of consumers purchase free minutes in-lieu-of an upfront payment through special packs. For such consumers, even if they are on per-second-billing tariff plan, minutes (and not seconds) would be depleted upon usage till the expiry of such free minutes.

- 2.22 The consumers have also argued that while on personal level, a call drop makes an individual annoyed, on professional level, it reduces their productivity owing to reduced efficiencies and lost business opportunities.
- 2.23 The problem of call drops seems to have accentuated in the recent past and is causing significant consumer dissatisfaction. The following section explores methods for evolving consumer relief measures through a consultative process.

**D- Consumer relief measures against the call drops in the country**

- 2.24 It is understood that the main causes of call drops are (i) insufficient radio (BTSs/ Node B) and (ii) inadequately optimized radio network. While the TSPs choose the promptness (or the lack of it) to embark upon improving these aspects, the consumers cannot be left high and dry. While increasing the amount of financial disincentive to be imposed by the Authority on the TSPs for not meeting the benchmark of  $\leq 2\%$  for Call Drop Rate may appear to be one option, it would not necessarily solve the problem for all consumers because it is expected that some consumers would still face the problem of call drop more than others because of sporadic gaps in the radio network of individual TSPs. Further, a TSP, which has many pockets with acute problem of call drop, may still meet the benchmark of  $\leq 2\%$  for Call Drop Rate because this parameter is computed on pan-LSA basis and sometimes averages may not give the full picture.
- 2.25 It appears that a consumer relief measure against call drops would be effective only if it reaches the affected consumers. These measures could extend from not charging the consumers for dropped calls to compensating them by crediting talk-time or amounts in their accounts.

**(1) Provision of not charging for the dropped calls**

- 2.26 In case of a call drop, the service, which was due to the consumer, is not delivered to the full. Hence, there is little rationale for levying full charges on the consumers in such cases. In wire-line telephony, a system of rebates

upon interruption in service has been in existence for decades. Thus, there is a precedent for not charging the consumer in case of interruption in service by the TSPs.

2.27 An analysis of call samples reveals that a substantial number of calls are dropped within a few seconds after the call is established. Incomplete communication upon a call drop causes annoyance to the consumers. One option to provide relief to such consumers could be to mandate that any call which gets dropped within five seconds would not be charged. Further, it appears reasonable to mandate that, in case, a call gets dropped any time after five seconds, the last pulse of the call should not be included for the purpose of charging. This would mean the following:

- (i) If a consumer is on a per-minute-pulse and his call gets dropped after 3 minutes and 45 seconds, call charges for only 3 minutes (and not 4 minutes) would be levied upon him; and
- (ii) If a consumer is on a '2 second' pulse and his call dropped after 31 seconds, call charges for only 30 seconds (and not 32 seconds) would be levied upon him, etc.

**Q1: Do you agree that calling consumers should not be charged for a call that got dropped within five seconds? In addition, if the call gets dropped any time after five seconds, the last pulse of the call (minute/second), which got dropped, should not be charged. Please support your viewpoint with reasons along with the methodologies for implementation.**

**(2) Provision of providing credit to the consumers for dropped calls**

2.28 Internationally, many TSPs in various countries offer a credit of talk-time for a dropped call to their consumers. According to a report, Communications Regulatory Commission (CRC), the regulatory body in Columbia, since January 2015, has mandated automatic compensation to the consumers for deficiency

in service provisioning such as call drops. In the United States of America (USA), Alltel Wireless offers an automatic minute back guarantee to its subscribers in case a call is dropped. Sprint also has a scheme of giving credits for dropped calls; for this the subscriber has to call Sprint Call Center after he experiences a call drop. Grameenphone and Banglalink, the leading TSPs in Bangladesh, offer 'Minute back on call drop' schemes. In Pakistan, Mobilink has also launched 'Minute Back on Call-Drop' scheme. DTAC in Thailand and Bmobile in Trinidad and Tobago also compensate their consumers upon call drops.

- 2.29 In India, one TSP has a scheme for crediting talk-time in the event of call drops. The TSP provides an acknowledgement of call drop instantly to the subscriber whenever call drop occurs. Within 15 to 30 minutes, a free minute is credited in the account of the subscriber. The subscriber must consume the free minute within 24 hours from the time of credit in his/her account else it will elapse; the free minute can be used only on on-net<sup>8</sup> calls.
- 2.30 Considering the fact that the provision of credit of talk-time in consumer's account provides direct relief to the consumer, *prima facie*, it may be another option for providing relief to consumers against call drops.

**Q2: Do you agree that calling consumers should be compensated for call drops by the access service providers? If yes, which of the following methods would be appropriate for compensating the consumers upon call drop:**

**(i) Credit of talk-time in minutes/ seconds**

**(ii) Credit of talk-time in monetary terms**

**(iii) Any other method you may like to suggest**

**Please support your viewpoint with reasons along with the methodologies for implementation.**

<sup>8</sup> An on-net call for a subscriber of any TSP means a call on the own network of the TSP i.e. a call between subscribers of the same TSP.



2.31 While provision of crediting talk-time in the consumer's account upon call drop is being envisaged, there may be a need to prescribe conditions and limits governing the credit of talk-time upon call drop in order to ensure fair usage of the credited talk-time. Internationally, where credit of talk-time for dropped calls is provided, there is, generally, a cap on total talk-time which may be cumulatively credited upon call drop in a consumer's account in a day. Besides, there are some additional conditions viz. the talk-time so credited must be consumed within a fixed span of time.

2.32 The conditions/ limits governing the credit of talk-time upon call drop would require deliberation on issues such as following:

- (i) What amount of talk-time should be credited in case of call drop to the calling consumer's account whose current usage is on a per-minute-pulse? Should it be lower for consumers whose current usage is on a per-second-pulse? If yes, what amount should it be?
- (ii) Should there be a cap on the total talk-time which may be cumulatively credited upon a call drop in a consumer's account in a day?
- (iii) Should there be a restriction on usage of the free talk-time credited upon call drop?

**Q3: If the answer to the Q2 is in the affirmative, suggest conditions/limits, if any, which should be imposed upon the provision of crediting talk-time upon call drop and usage thereof.**

### **(3) Other issues related to call drops**

2.33 While the measures explained above provide a few options to compensate the consumers for call drops; the TSPs would have to take more pro-active measures to curb the problem and make consumer satisfaction a priority.

**Q4: Is there any other relevant issue which should be considered in the present consultation on the issue of call drops?**

2.34 The following chapter lists the issues for consultation with the stakeholders.

### **Chapter-III**

#### **Issues for Consultation**

It may please be noted that answers/ comments to the issues given below should be provided with appropriate justification.

Q1: Do you agree that calling consumers should not be charged for a call that got dropped within five seconds? In addition, if the call gets dropped any time after five seconds, the last pulse of the call (minute/second) which got dropped, should not be charged. Please support your viewpoint with reasons along with the methodologies for implementation.

Q2: Do you agree that calling consumer should also be compensated for call drops by the access service providers? If yes, which of the following methods would be appropriate for compensating the consumers upon call drop:

- (i) Credit of talk-time in minutes/ seconds
- (ii) Credit of talk-time in monetary terms
- (iii) Any other method you may like to suggest

Please support your viewpoint with reasons along with the methodologies for implementation.

Q3: If the answer to the Q2 is in the affirmative, suggest conditions/limits, if any, which should be imposed upon the provision of crediting talk-time upon call drop and usage thereof.

Q4: Is there any other relevant issue which should be considered in the present consultation on the issue of call drops?

**List of Acronyms**

<b>S. No.</b>	<b>Acronym</b>	<b>Description</b>
1	3G	3rd Generation
2	4G	4th Generation
3	AGR	Adjusted Gross Revenue
4	BTS	Base Transceiver Station
5	CDMA	Code Division Multiple Access
6	CRC	Communications Regulatory Commission
7	F&EA	Financial and Economic Analysis
8	F.Y.	Financial Year
9	GSM	Global System for Mobile Communications
10	KPI	Key Performance Indicators
11	LSA	Licensed Service Area
12	MNP	Mobile Number Portability
13	MOU	Minutes of Usage
14	RWAs	Resident Welfare Associations
15	TRAI	Telecom Regulatory Authority of India
16	TSPs	Telecom Services Providers
17	USA	United States of America
18	Y-o-Y	Year on Year
19	GR	Gross Revenue
20	QoS	Quality of Service
21	TCH	Traffic Channel
22	CSV Drop	Circuit Switched Voice Drop
23	TCBH	Time Consistent Busy Hour
24	RAB	Radio Access Bearer
25	IDTs	Independent Drive Tests