REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

NORTH ZONE – DELHI-NCR CIRCLE

Report Period: July 2011 – September 2011

Table of Contents

(C) Inter operator call assessment
1) Sample coverage
2) Performance based on live measurement
3) Critical Analysis

(D) Drive test of the mobile network of service providers
1) Sample Coverage
2) Performance (for the respective cities)
3) Graphical Representation
4) Critical Analysis

(E) Compliance report (Status of service providers with respect to the QoS)

II. Basic Telephone Service (Wireline) Providers
      - *Not conducted for this quarter*

III. Broadband Service Providers
      - *Not conducted for this quarter*

CHAPTER-1: INTRODUCTION

I. Background

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace, which will enable India to play a leading role in emerging global information society. One of the main objectives of Telecom Regulatory Authority of India (TRAI) is to provide a fair and transparent policy environment, which promotes a level playing field and facilitates fair competition.

In pursuance of above objective TRAI has issued from time to time a large number of regulations, orders and directives to deal with issues coming before it and provided the required direction to the evolution of Indian telecom market from a Government owned monopoly to a multi-operator multi service open competitive market.

The directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

The purpose of laying down Quality of Service Parameters is to:

i) Create conditions for consumer satisfaction by making known the quality of service, which the service provider is required to provide, and the user has a right to expect.

ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.

iii) Generally protect the interests of consumers of telecommunication services.

TRAI has been carrying out regular reviews of the status of quality of service of the networks of all operators. In continuation to these efforts, TRAI has selected through bidding process TCIL as the Audit Agency to audit and assess the Quality of Service rendered by the service providers' namely Basic (Wireline) Services, Cellular Mobile Telephone (Wireless) Services and Broadband Services. The Audit for various telecom circles within the Zones has been distributed across four quarterly periods.

The parameters that need to be measured for Basic and Cellular Mobile Services have been specified in the TRAI notification on Quality of Service of Basic (Wireline) and Cellular Mobile (wireless) Services, 2009. The parameters for Broadband Services have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006.

II. Objectives and Methodology

The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband services against the parameters notified by TRAI. The audit and assessment of Quality of Service is conducted for all the basic service providers, unified access service providers, cellular mobile service providers and ISPs (Internet Service Provider) for basic wireline, Cellular Mobile Telephone Services and broadband service. TCIL has undertaken the following audit works as per the Terms of Reference (TOR):

i) Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.

ii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.

iii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire month during which the live measurement is carried out.

iv) Drive tests of the mobile networks both operators assisted and independent drive test (as and where required).

v) Billing and call center's data verification.

vi) Live testing of the efficiency of the call center / customer care help line.

To fulfill the above mentioned Scope of Work audit was performed on different Systems, Facilities and Field data collection.

Systems audited:-
1. Network Switching Centre (NSS)
2. Base Station Subsystem(BSS)
3. Billing Applications
4. Customer Care applications

Facilities audited:-
1. Billing documents.
2. Customer Care records.

Field data collections carried out:-
1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency
5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

In order to carry out the above scope of work:-

✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.

✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.

✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).

✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.

✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).

✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.

✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.

✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Delhi-NCR circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009.

CHAPTER-2: EXECUTIVE SUMMARY

I.   Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Delhi-NCR Circle in 3rd quarter (July–September 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period January-March 2011.

Following are the various operators covered in Delhi-NCR circle (North Zone) for Cellular Mobile (Wireless) services QoS audit & assessment. The Month of audit & TCBH information is also given below:

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	July-2011	2000-2100 hrs
2	Airtel Ltd	July-2011	2000-2100 hrs
3	MTNL	July-2011	2000-2100 hrs
4	Etisalat	July-2011	2000-2100 hrs
5	Idea	July-2011	1900-2000 hrs
6	Reliance Communication (GSM)	July-2011	1900-2000 hrs
7	Vodafone	July-2011	2000-2100 hrs
CDMA Operators			
8	MTS (CDMA)	July-2011	1900-2000 hrs
9	Reliance Communication (CDMA)	July-2011	2000-2100 hrs
10	Tata Communications (CDMA)	July-2011	2000-2100 hrs

II. Findings from Quality of Service Audit (Operator wise for each parameter)

(A) Cellular Mobile Telephone Services

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
	3 days Live Data Audit					GSM Operators					CDMA Operators	
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	0.02%	0.02%	0.82%	0.04%	0.38%	0.08%	0.03%	0.17%	0.05%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	98.36%	99.90%	99.03%	99.53%	96.67%	99.92%	98.88%	99.24%	99.67%	99.68%
	b) SDCCH/PAGING congestion	<=1%	0.04%	0.02%	0.12%	0.29%	0.27%	0.12%	0.54%	0.00%	0.00%	0.01%
	c) TCH congestion	<=2%	0.04%	0.05%	0.32%	0.73%	1.27%	0.17%	0.75%	0.07%	0.03%	0.02%
3	**Connection maintenance (retainability)**											
	a) CDR	<=2%	0.81%	0.63%	1.53%	0.87%	1.39%	0.25%	1.42%	0.24%	0.26%	0.87%
	b) Worst affected cells>3% TCH drop	<=3%	2.77%	1.01%	6.67%	2.34%	2.52%	1.45%	6.52%	0.64%	0.88%	2.08%
	c) Good voice quality	>=95%	97.47%	99.05%	96.01%	98.21%	97.94%	100%	97.56%	100%	NA	NA
4	**POI congestion**	<=0.5%	5	4	2	0	0	0	0	0	0	0
5	**Response time to customers for assistance**											
	a) Accessibility of call centre/Customer Care	>=95%	97.33%	100%	99.10%	99.30%	99.98%	98.92%	100%	NP	98.98%	NP
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	90.00%	100%	99%	97%	95.56%	98.97%	99.02%	NP	95.40%	NP

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that most of the operators are meeting the network parameters. Except for Etisalat & Vodafone, rest of the operators are meeting the benchmark for "Worst affected cells>3% TCH drop". Aircel, Airtel and Etisalat are having 5, 4 and 2 no. of POI's with congestion. Performance related to customer care data is found to be satisfactory for all the operators. Data has not been provided by MTS & Tata CDMA for the parameters related to "Response time to customers for assistance".

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
	One Month Data Audit											
			GSM Operators							CDMA Operators		
(A)	**Network Service Quality Parameter**											
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	0.12%	0.01%	1.05%	0.10%	0.31%	0.25%	0.02%	0.08%	0.24%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.40%	0%	0%	0.09%	1.49%	0.43%	0.02%	0.12%	0%	0%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	98.40%	99.86%	98.58%	99.51%	97.26%	99.78%	98.62%	99.24%	99.50%	98.62%
	b) SDCCH/PAGING congestion	<=1%	0.07%	0.05%	0.26%	0.41%	0.10%	0.16%	0.49%	0%	0%	0.03%
	c) TCH congestion	<=2%	0.07%	0.06%	0.73%	0.90%	1.52%	0.28%	1.04%	0.04%	0.03%	0.07%
3	**Connection maintenance (retainability)**											
	a) CDR	<=2%	0.83%	0.64%	1.59%	0.83%	1.58%	0.22%	1.40%	0.26%	0.30%	0.86%
	b) Worst affected cells>3% TCH drop	<=3%	2.82%	0.96%	7.26%	2.41%	2.79%	1.40%	6.21%	0.57%	0.87%	2.24%
	c) Good voice quality	>=95%	97.45%	94.25%	96.00%	98.22%	98.11%	99.82%	97.60%	100%	NA	NA
4	**POI congestion**	<=0.5%	13	5	2	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**											
5	**Metering/billing credibility-Post paid**	<= 0.1%	0%	0.04%	NA	0.06%	NP	0.10%	0.01%	0.02%	0.05%	0%
6	**Metering /billing credibility-Pre paid**	<= 0.1%	0%	0%	0.07%	0.03%	0.05%	0.10%	0.00%	0.02%	0.03%	0%
7	**Resolution of billing/ charging complaints**	100% within 4 weeks	100%	100%	100%	100%	NP	100%	100%	100%	100%	99%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	**Response time to customers for assistance**											
	a) Accessibility of call centre/Customer Care	>=95%	NP	NP	98.91%	99%	99.81%	94.78%	NP	NP	98.98%	NP
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.08%	97.66%	99.56%	95%	99.24%	87.18%	97.66%	NP	95.38%	NP
9	**Termination/closure of service**	<=7days	100%	100%	NA	100%	NP	100%	100%	100%	100%	100%
10	**Time taken for refunds of deposits after closures.**	100% within 60 days	100%	NP	NA	100%	NP	100%	100%	100%	100%	100%

NA: Not Applicable, NP: Data Not Provided

From the month data assessment, it is found that most of the operators are meeting the network parameters. Except for Etisalat & Vodafone, rest of the operators are meeting the benchmark for "Worst affected cells>3% TCH drop". Airtel is not meeting the benchmark for "Good voice quality". Aircel, Airtel and Etisalat are having POI's with congestion.

Performance related to customer care data is found to be satisfactory for most of the operators. While Reliance GSM is not meeting the benchmark for the parameter "accessibility of call center" & "calls answered by operators (voice-to-voice)". Data has not been provided by Aircel, Airtel, MTS, Vodafone& Tata CDMA for the parameters "Accessibility of call centre". MTS & Tata CDMA have not provided data for the parameter "%age of call answered by operators (Voice to voice) within 60 sec".

It is found that Tata CDMA is not meeting the benchmark for the parameter "Resolution of billing/charging complaints".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in Delhi-NCR circle for all the operators. Route covered was about around 200 Km within the speed limit of 40Km/hr. Zones was selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Delhi-NCR	5.96%	1.95%	2.07%	0.00%	6.19%	9.05%	3.98%	0.00%	0.00%	0%
1.2	Dropped Call Rate (<=2%)	Delhi-NCR	3.90%	2.39%	0.53%	0.00%	8.40%	1.72%	3.68%	1.52%	2.55%	0%
1.3	Percentage of connections with good voice quality (=>95%)	Delhi-NCR										
	(i) 0-4 (w/o frequency hopping)									97.01%	98.00%	97.08%
	(ii) 0-5 (with frequency hopping)		92.85%	90.23%	88.30%	94.47%	88.62%	90.00%	97.18%			
1.4	Call Setup Success Rate (>=95%)	Delhi-NCR	94.03%	98.05%	97.93%	98.51%	94%	90.95%	94.50%	98.52%	100%	100%

Key observations as could be derived from the table are as under:

• It is found that Aircel, MTNL, Rcom GSM & Vodafone are not meeting the benchmark for the parameter "Blocked call rate" & "CSSR".

• It is found that Aircel, Airtel, MTNL, Vodafone &Rcom CDMA are not meeting the benchmark for "Dropped call rate".

• Except Vodafone, all GSM operators fail to meet the TRAI benchmark for "%age of good voice quality connections".

Chapter 3 PMR DATA VERIFICATION RESULTS

S/N	Name of Parameter	Bench-mark	Audit	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
	PMR						GSM Operators					CDMA Operators	
(A)	**Network Service Quality Parameter**												
1	**Network Availability**												
	BTS Accumulated Downtime	<=2%	Reported	0.6	0.01	3.85	0.07	0.61	0.21	0.02	0.14	0.35	0.01
			Verified	0.6	0.01	3.85	0.07	0.61	0.21	0.02	0.14	0.35	0.01
	Worst affected BTSs due to downtime	<=2%	Reported	0.28%	0.00%	17.92%	0.00%	3.71%	0.77%	0.00%	0.00%	0.04%	0%
			Verified	0.28%	0.00%	17.92%	0.00%	3.71%	0.77%	0.00%	0.00%	0.04%	0%
2	**Connection Establishment (Accessibility)**												
	CSSR (Call Setup Success Rate)	>=95%	Reported	97.90%	99.89%	96.15%	99.72%	97.18%	99.69%	99.09%	99.23%	98.63%	99.34%
			Verified	97.90%	99.89%	96.15%	99.72%	97.18%	99.69%	99.09%	99.23%	98.63%	99.34%
	SDCCH/PAGING congestion	<=1%	Reported	0.07%	0.03%	0.51	0.41%	0.11%	0.22%	0.32%	0%	0%	0%
			Verified	0.07%	0.03%	0.51	0.41%	0.11%	0.22%	0.32%	0%	0%	0%
	TCH congestion	<=2%	Reported	0.06%	0.04%	1.18%	0.93%	0.03%	0.69%	0.75%	0%	0.92%	0.04%
			Verified	0.06%	0.04%	1.18%	0.93%	0.03%	0.69%	0.75%	0%	0.92%	0.04%
3	**Connection maintenance (retainability)**												
	CDR	<=2%	Reported	0.88%	0.58%	3.11%	0.77	1.66%	0.35%	0.95%	0.11%	0.84%	0.46%
			Verified	0.88%	0.58%	3.11%	0.77	1.66%	0.35%	0.95%	0.11%	0.84%	0.46%
	Worst affected cells>3% TCH drop	<=5%	Reported	2.41%	0.87%	24.99%	2.14%	4.89%	0.60%	3.41%	0.61%	3.50%	0.06%
			Verified	2.41%	0.87%	24.99%	2.14%	4.89%	0.60%	3.41%	0.61%	3.50%	0.06%
	Good voice quality	>=95%	Reported	97.12%	99.09%	96.33%	98.25%	98.23%	98.15%	98.35%	98.23%	98.56%	99.70%
			Verified	97.12%	99.09%	96.33%	98.25%	98.23%	98.15%	98.35%	98.23%	98.56%	99.70%
4	**POI congestion**	<=0.5%	Reported	0	0	4	0	0	0	0	0	0	0
			Verified	0	0	4	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**												
5	**Metering/billing credibility-Post paid**	<= 0.1%	Reported	0.09%	0.03%	NA	NR	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
			Verified	0.09%	0.03%	NA	NR	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
6	**Metering /billing credibility-Pre paid**	<= 0.1%	Reported	0.10%	0.09%	3.10%	NR	0.03%	0.08%	0.00%	0.09%	0.06%	0.13%
			Verified	0.10%	0.09%	3.10%	NR	0.03%	0.08%	0.00%	0.09%	0.06%	0.13%
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	Reported	100%	100%	100%	NR	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NR	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NR	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NR	100%	100%	100%	100%	100%	100%
8	**Response time to customers for assistance**												
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	84%	97.67%	NR	99.96%	59%	100%	97.00%	100%	95%
			Verified	100%	84%	97.67%	NR	99.96%	59%	100%	97.00%	100%	95%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	60.64%	62%	98.35%	NR	99.59%	76%	58%	91.98%	88%	72%
			Verified	60.64%	62%	98.35%	NR	99.59%	76%	58%	91.98%	88%	72%
9	**Termination/closure of service**												
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100%	100%	NA	NR	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	NA	NR	100%	100%	100%	100%	100%	100%
10	**Time taken for refunds of deposits after closures.**	*100%*	Reported	100%	100%	NA	NR	100%	100%	100%	100%	100%	82%

		within 60 days	Verified	100%	100%	NA	NR	100%	100%	100%	100%	100%	82%

Critical Analysis (PMR Verification):

a. The figures proved by all the operators match the figures obtained on verification.

b. For "BTS accumulated downtime" parameters, Etisalat is not meeting the benchmark & for "Worst affected BTSs due to downtime", Etisalat & MTNL not meeting the benchmark.

c. Etisalat fails to meet the benchmark for "Dropped call rate" & "worst affected cells>3% TCH drop".

d. For the parameter "Metering/billing credibility for Postpaid" is not met by Tata CDMA only & for the "Prepaid", Etisalat & Tata both are not meeting the benchmark.

e. Airtel &RCom GSM are not meeting the benchmark for the parameter "Accessibility of call centre".

f. %age of call answered by operators (voice to voice) with in 60 sec" is not met by Aircel, Airtel, Vodafone, RCom GSM, Rcom CDMA & Tata CDMA.

g. It is found that Tata CDMA fails to meet the benchmark for "Time taken for refunds of deposits after closures".

CHAPTER-4: DETAILED FINDINGS & ANALYSIS

I. Cellular Mobile Telephone Service
(A) MSC Audit
(1) 3 Days Live Data Assessment & Summarized Findings

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
A	**Network Service Quality Parameter**											
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	0.02%	0.02%	0.82%	0.04%	0.38%	0.08%	0.03%	0.17%	0.05%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0%	0%	0%	0%	0.28%	0%	0%	0%	0%	0%
	c) Total no. of BTSs in the licensed service area		2758	4609	1364	3362	1072	2335	4557	820	833	1147
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		38.82	62.00	803.70	85.00	292.00	139.00	114.42	98.00	32.00	8.87
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	0	0	3	0	0	0	0	0
1	**Connection Establishment (Accessibility)**											
	a) CSSR	>=95%	98.36%	99.90%	99.03%	99.53%	96.67%	99.92%	98.88%	99.24%	99.67%	99.68%
	b) SDCCH/PAGING congestion	<=1%	0.04%	0.02%	0.12%	0.29%	0.27%	0.12%	0.54%	0.00%	0.00%	0.01%
	c) TCH congestion	<=2%	0.04%	0.05%	0.32%	0.73%	1.27%	0.17%	0.75%	0.07%	0.03%	0.02%
2	**Connection maintenance**											
	a) CDR	<=2%	0.81%	0.63%	1.53%	0.87%	1.39%	0.25%	1.42%	0.24%	0.26%	0.87%
	b) Cells having > 3% TCH drop	<=3%	2.77%	1.01%	6.67%	2.34%	2.52%	1.45%	6.52%	0.64%	0.88%	2.08%
	c) Good voice quality	>=95%	97.47%	99.05%	96.01%	98.21%	97.94%	100%	97.56%	100%	NA	NA
	d) No. of cells > 3% TCH drop		215	110	273	204	77	44	741	16	7	84
	e) Total no. of cells in the network		7764	10911	4091	8700	3044	3003	11358	2481	833	4030
3	**POI congestion>=.5%**	<=0.5%	5	4	2	0	0	0	0	0	0	0

			Airtel local, BTSOL ILD, MTNL basic & WLL, VSNL ILD	MTBC51I-MTBC51O, MTF14I1 MTF14O1, SHTC41I-SHTC41O, MTL24I MTL24O	Rcom GSM, Rcom CDMA & Wireline							
	a) Name of POI not meeting the benchmark					Nil	Nil	Nil	NIL	Nil	Nil	Nil
	b) Total No. of circuits on POI		31480	207660	10334	108621	41435	40623	219716	10984.67	40623	279121.87
	c) Avg No. of call attempts on POI		693305	4602460.33	269982	2483048.22	616387.67	739142	4029521	119463	739142	3540242
	d) Avg traffic served on POI (Erlang)		12973.70	136575.85	6099.98	45605.73	13864.97	17992.7	103591	2472.91	17992.7	78764.55
	e) Total number of working POI Service Area wise		99	216	26	90	47	77	229	46	77	236
	f) Equipped Capacity of Network in respect of Traffic in erlang		93835.24	337266.53	38221.57	129251.72	100000	NP	260617	33600	NP	375000
	g) Total traffic handled in TCBH in erlang		30932.99	212589.33	8770.31	107225.32	29171.67	NP	226697.62	5520.7	NP	142266.79
(B)	**Customer Service Quality Parameters**											
4	**Response time to customers for assistance**											
	a) Accessibility of call centre	>=95%	97.33%	100%	99.10%	99.3%	99.98%	98.92%	100%	NP	98.98%	NP
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	90.00%	100%	99.00%	97%	95.56%	98.97%	99.02%	NP	95.40%	NP
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		94788	1485847	30432	46324	84363	647618	10550366	100	378550	
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		92258	1485847	30158	46028	84351	640672	10550366	96	374698	95

NA: Not Applicable, NP: Data Not Provided

Parameter-wise Findings (Live Data Assessment):

The parameter wise key takeout's for the Cellular Mobile Telephone Services providers in Delhi-NCR Service Area are as given below:-

➢ **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 0.82%.
➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.28%.
➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96.67% and 99.92%.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.54%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.02% and 1.27%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.24% and 1.53%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Etisalat & Vodafone, all the operators are satisfying the benchmark with value in between 0.64% and 2.77%.
➢ **Connections with good voice quality (benchmark >= 95%):** Rcom CDMA & Tata CDMA has declared that the parameter is not system generated. Rests of operators are meeting the benchmark with values lying between 96.01% and 100%.
➢ **POI Congestion (benchmark <= 0.5%):** Aircel, Airtel, & Etisalat were found 5, 4 & 2 no of POIs having congestion. However, in such cases too, some individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
➢ **%age of call answered by operator (electronically) (benchmark >95%):** All the operators are meeting the benchmark with values lying between 97.33% and 100
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** All the operators are meeting the benchmark with values lying between 90% and 100%. Value of MTS & Tata CDMA is picked from the live calling result.

(2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
(A)	**Network Service Quality Parameter**											
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	0.12%	0.01%	1.05%	0.10%	0.31%	0.25%	0.02%	0.08%	0.24%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.40%	0.00%	0.00%	0.09%	1.49%	0.43%	0.02%	0.12%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2,758	4,609	1,364	3,362	1,072	2,335	4,557	820	833	1,147
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		2,495.70	492.00	10,691.15	2,524.02	2,453.50	4,351.00	766.77	478.00	825.00	104.77
	e) No. of BTSs having accumulated downtime of >24 hours in a month		11	0	0	3	16	10	1	1	0	0
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	98.40%	99.86%	98.58%	99.51%	97.26%	99.78%	98.62%	99.24%	99.50%	98.62%
	b) SDCCH/PAGING congestion	<=1%	0.07%	0.05%	0.26%	0.41%	0.10%	0.16%	0.49%	0.00%	0.00%	0.03%
	c) TCH congestion	<=2%	0.07%	0.06%	0.73%	0.90%	1.52%	0.28%	1.04%	0.04%	0.03%	0.07%
3	**Connection maintenance (retainability)**											
	a) CDR	<=2%	0.83%	0.64%	1.59%	0.83%	1.58%	0.22%	1.40%	0.26%	0.30%	0.86%
	b) Worst affected cells>3% TCH drop	<=3%	2.82%	0.96%	7.26%	2.41%	2.79%	1.40%	6.21%	0.57%	0.87%	2.24%
	c) Good voice quality	>=95%	97.45%	94.25%	96%	98.22%	98.11%	99.82%	97.60%	100%	NA	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		219	105	297	210	85	42	705	14	7	90
	e) Total no. of cells in the network		7,764	10,911	4,091	8,700	3,044	3,003	11,358	2,481	833	4,030
4	**POI congestion**	<=0.5%	13	5	2	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		ABS NLD; Airtel local; BSNL NLD (tax); BTSOL NLD & ILD; MTNL basic, WLL, level-1, lxmingr&jorbag; VSNL ILD; SSTL local; Rcom NLD	MTBC51I-MTBC51O, MTF14I1 MTF14O1, SHTC41I-SHTC41O, MTL24I MTL24O, MTW24I MTW24O	Rcom GSM, Rcom CDMA & Wireline	Nil	Nil	Nil	NIL	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		697476.55	4454423.83	291069.68	2347162.30	616844.63	733799	3874660	115595.29	733799	3598561.645
	c) Total traffic served on POI		12856.798	128952.58	6184.2	58642.11	13486.60	18347.4	82237	2378.38	18347.4	77570.31706

	(Erlang) (Avg.)											
	d) Total No. of circuits on POI		31480	207660	10334	108621	41435	40623	219716	10984.67	40623	279121.87
	e) Total number of working POI Service Area wise		99	216	26	90	47	77	229	46	77	236
	f) Capacity of POI		30133.26	201447.76	9409	105000.06	41435	37224.58	212845	10036.94	37224.58	279121.87
5	**Network Data**											
	a) Equipped Capacity of Network Erlang		93835.245	337266.53	38221.57	129251.72	100000	NP	260617	33600	NP	375000
	b) Total traffic in TCBH in erlang (Avg.)		30504.118	204046.84	8782.55	105742.07	29084.73	NP	221886.58	5301.22	NP	137822.3538
	c) Total no. of customers served (as per VLR) on last day of the month		1107335.9	6631647	228046	3674119	1061002	NP	6521424	201667	NP	2342468
(B)	**Customer Service Quality Parameters**											
5	**Metering/billing credibility-Post paid**	*<= 0.1%*	0%	0.04%	NA	0.06%	NP	0.10%	0.01%	0.02%	0.05%	0.00%
	a) No. of bills issued during the period		5314	1102782	NA	517570	NP	43510	785045	2598	501242	561835
	b) No. of bills disputed including billing complaints during the period		0	461	NA	287	871	43	87	18	261	17
6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0%	0%	0.07%	0.03%	0.05%	0.10%	0%	0.02%	0.03%	0%
	a) No. of charging / credit / validity complaints during the quarter		74	186	503	1,145	1,210	4,392	78	114	1,121	232
	b) Total no. of pre-paid customers at the end of the quarter		2235000	8550741.33	714155	3729320	2241462	4393087	6894801	713372	3464589	5809035
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	100%	100%	NP	100%	100%	100%	100%	99%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		74	461	503	1,432	NP	4,435	165	132	1,382	247
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		74	461	503	1,432	NP	4,435	165	132	1,382	249
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		39	12,340	0	1,432	NP	292	165	28	238	249
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		35	11,693	503	3,067	NP	4,143	86	104	1,144	7,411
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	*<=1 week*	100%	100%	100%	100%	NP	100%	100%	100%	100%	100%
8	**Response time to customers for assistance**											

	a) Accessibility of call centre/Customer Care	>=95%	NP	NP	98.91%	99.00%	99.81%	94.78%	NP	NP	98.98%	NP
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.08%	97.66%	99.56%	95.00%	99.24%	87.18%	97.66%	NP	95.38%	NP
	c) Total no. of call attempts to call centre& customer care nos. during TCBH (Avg.).		NP	NP	473685	506918	65561	26533532	NP	NP	3836860	NP
	d) No. of calls connected and answered successfully to call centre& customer care nos. during TCBH (Avg.).		NP	NP	468539	503830	65437	26259988	NP	NP	3797536	NP
9	**Termination/closure of service**	<=7days	100%	100%	NA	100%	NP	100%	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		189	7734	NA	3359	NP	433	3819	Nil	2020	856
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		189	7734	NA	3359	NP	433	3819	Nil	2020	856
10	Time taken for refunds of deposits after closures.	*100% within 60 days*	100%	NP	NA	100%	NP	100%	100%	100%	100%	100%

NA: Not Applicable, NP: Data Not Provided

Parameter-wise Findings (Month Data Assessment):

The parameter wise key takeout's for the Cellular Mobile Telephone Services providers in Delhi-NCR Service Area are as given below:-

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.05%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.49%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.26% and 99.86%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.49%.
  Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.03% and 1.52%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.22% and 1.59%.
- **Cell exceeding 3% TCH drop (benchmark <= 5%):** Except for Etisalat & Vodafone ,all the operators are satisfying the benchmark with value in between 0.57% and 2.82%.
- **Connections with good voice quality (benchmark >= 95%):** CDMA (Rcom& Tata) service providers have declared that the parameter is not system generated. Except for Airtel, Rests of the operators are meeting the benchmark with values lying between 96% and 100%.
- **POI Congestion (benchmark <= 0.5%):**Aircel, Airtel & Etisalat were found 13, 5 & 2 no of POIs having congestion. Other operators are meeting the benchmark with value of 0%. Here POI congestion indicates that there were call failure greater then 0.5% on that particular POI. The call here indicates only those calls which have been already being seized by the switch and processed. But cases were found where individual POIs are showing high utilization/usage which is managed by overflow technique i.e. extra traffic is carried over by some other operating POI as has been designed to do so.

- ***%age of call answered by operator (electronically) (benchmark >95%):*** Except for Reliance GSM, all the operators are meeting the benchmark with values lying between 98.91% and 99.81%.
- ***%age of call answered by operator (Voice to voice) (benchmark >90%):***Except for Reliance GSM, all the operators are meeting the benchmark with values lying between 95% and 99.56%.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** All the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):**All the operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):**Except for Tata CDMA, all the operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** All operators have satisfied the benchmark.

(3)   Sample Coverage

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	23	2760
2	Airtel Ltd	10	51	4609
3	MTNL	2	31	1072
4	Etisalat	1	8	1364
5	Idea	8	35	3362
6	Reliance Communication (GSM)	4	12	2335
7	Vodafone	14	50	4633
CDMA Operators				
8	MTS (CDMA)	1	3	820
9	Reliance Communication (CDMA)	10	--	833
10	Tata Communications (CDMA)	8	--	1147

(4)   Performance (Graphical Representation)

Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A)   NETWORK PERFORMANCE

I.   **BTS Accumulated downtime:** All operators are meeting the TRAI benchmarks for both one month data and 3 days live data.

BTS Accumulated downtime	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafone	MTS	Rcom	Tata
Live	0.02%	0.02%	0.82%	0.04%	0.38%	0.08%	0.03%	0.17%	0.05%	0.01%
Month	0.12%	0.01%	1.05%	0.10%	0.31%	0.25%	0.02%	0.08%	0.24%	0.01%
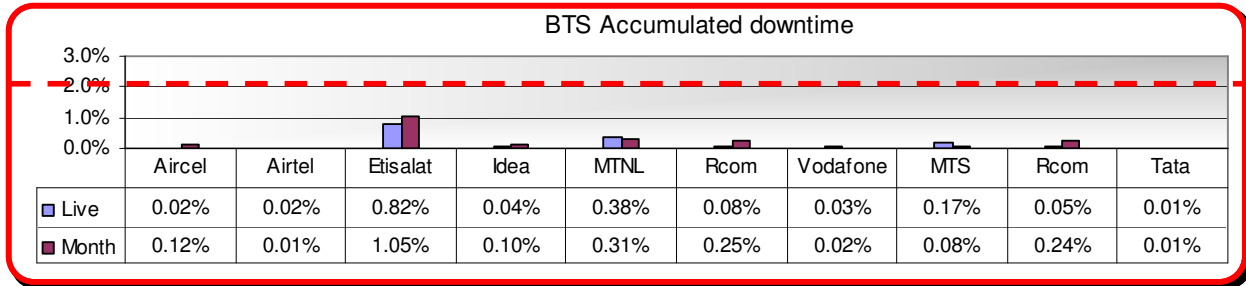
II. **Worst affected BTSs due to downtime:** All operators are meeting the TRAI benchmarks for both one month data and 3 days live data.

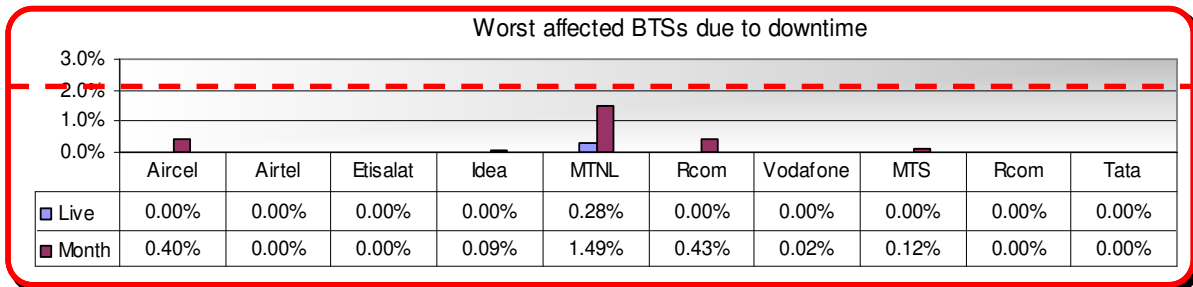| Worst affected BTSs due to downtime	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafone	MTS	Rcom	Tata
Live	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%
Month	0.40%	0.00%	0.00%	0.09%	1.49%	0.43%	0.02%	0.12%	0.00%	0.00%

III. **Call setup success rate:** All operators are meeting the TRAI benchmarks (>= 95 %) for both one month data and 3 days live data.

CSSR	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
Live	98.36%	99.90%	99.03%	99.53%	96.67%	99.92%	98.88%	99.24%	99.67%	99.68%
Month	98.40%	99.86%	98.58%	99.51%	97.26%	99.78%	98.62%	99.24%	99.50%	98.62%
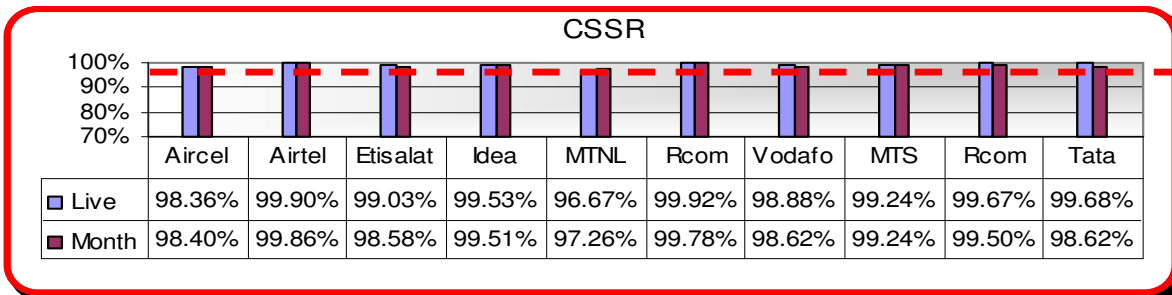
IV. Blocked call rate:

SDCCH congestion: All operators are meeting the TRAI benchmarks (<= 1 %) for both one month data and 3 days live data.
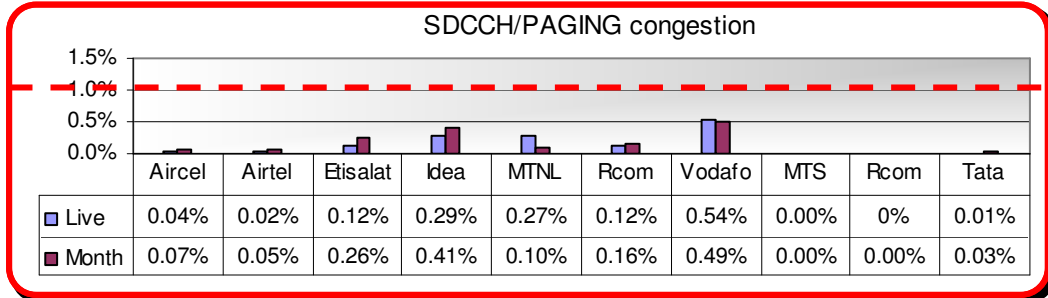
	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
Live	0.04%	0.02%	0.12%	0.29%	0.27%	0.12%	0.54%	0.00%	0%	0.01%
Month	0.07%	0.05%	0.26%	0.41%	0.10%	0.16%	0.49%	0.00%	0.00%	0.03%

TCH congestion: All operators are meeting the TRAI benchmarks (<= 2%) for both one month data and 3 days live data.

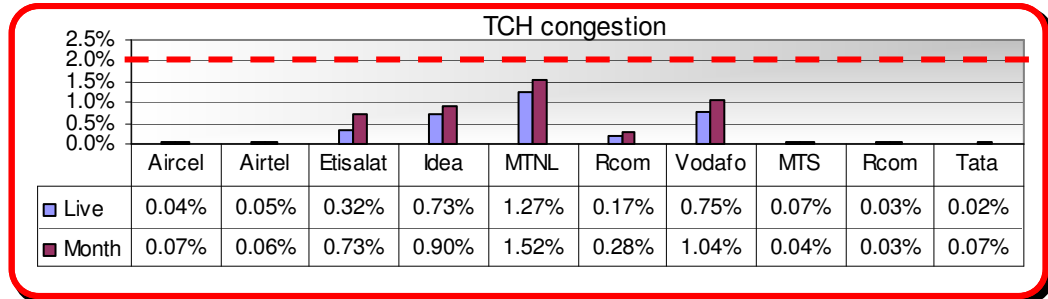|	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
Live	0.04%	0.05%	0.32%	0.73%	1.27%	0.17%	0.75%	0.07%	0.03%	0.02%
Month	0.07%	0.06%	0.73%	0.90%	1.52%	0.28%	1.04%	0.04%	0.03%	0.07%

V. Connection Maintainability (Retain ability):

Call drop rate: All operators are meeting the TRAI benchmarks (<=2%) for both one month data and 3 days live data.

	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
Live	0.81%	0.63%	1.53%	0.87%	1.39%	0.25%	1.42%	0.24%	0.26%	0.87%
Month	0.83%	0.64%	1.59%	0.83%	1.58%	0.22%	1.40%	0.26%	0.30%	0.86%
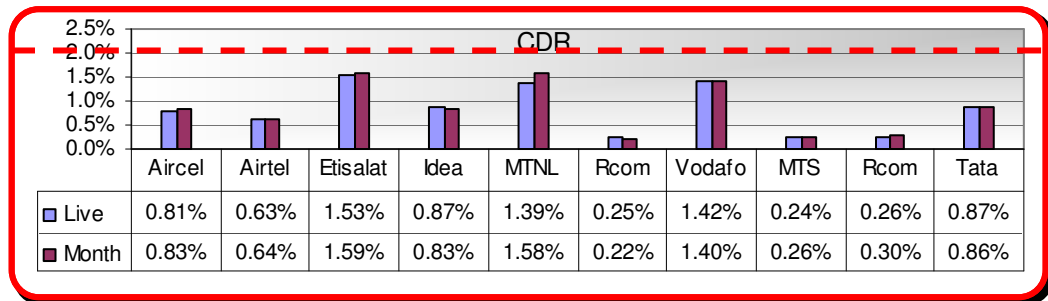
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, It is found thatEtisalat & Vodafone arefails to meet the benchmark of <=3%. Rests of the operators are meeting the benchmark for both cases.

	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
☐ Live	2.77%	1.01%	6.67%	2.34%	2.52%	1.45%	6.52%	0.64%	0.88%	2.08%
■ Month	2.82%	0.96%	7.26%	2.41%	2.79%	1.40%	6.21%	0.57%	0.87%	2.24%
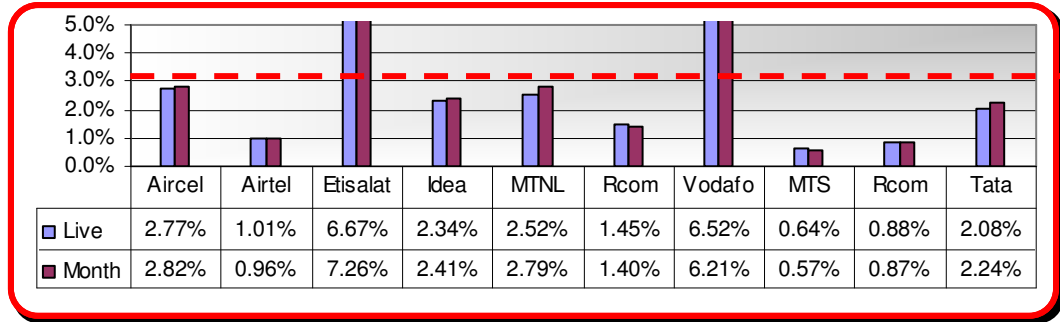
Percentage of connections with good voice quality: It is found that Airtel is not meeting the benchmark for month of audit. Rest of the operators are meeting the TRAI bench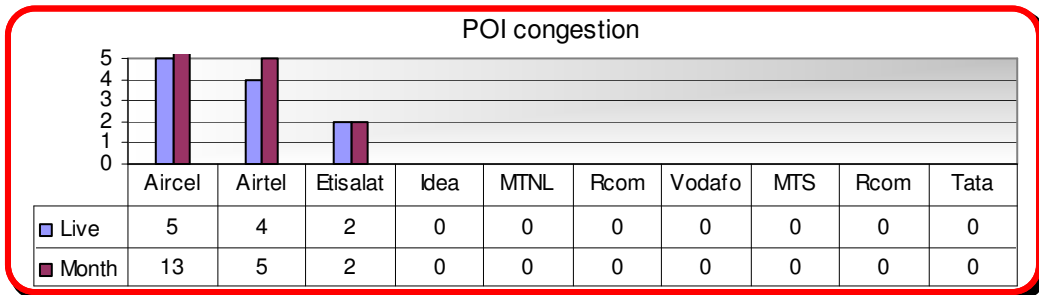marks (=> 95%) for both one month data and 3 days live data. RCOM CDMA & Tata CDMA did not submit the value as the same is not system generated.

Connections with good voice quality

	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
☐ Live	97.47%	99.05%	96.01%	98.21%	97.94%	100.00%	97.56%	100.00%		
■ Month	97.45%	94.25%	96.00%	98.22%	98.11%	99.82%	97.60%	100.00%		
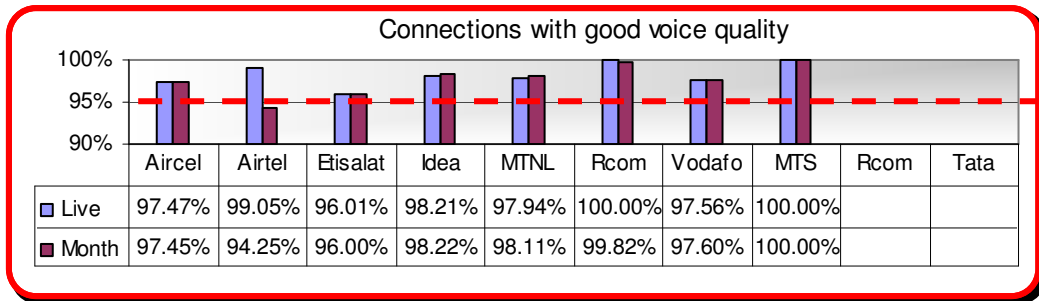
POI Congestion: Aircel, Airtel & Etisalat are found to have 5, 4 &2no of POIs respectively with >=0.5% congestion during Live data audit. During the month data audit, Aircel has 13, Airtel has 5 and Etisalat has 2 such POIs.

POI congestion

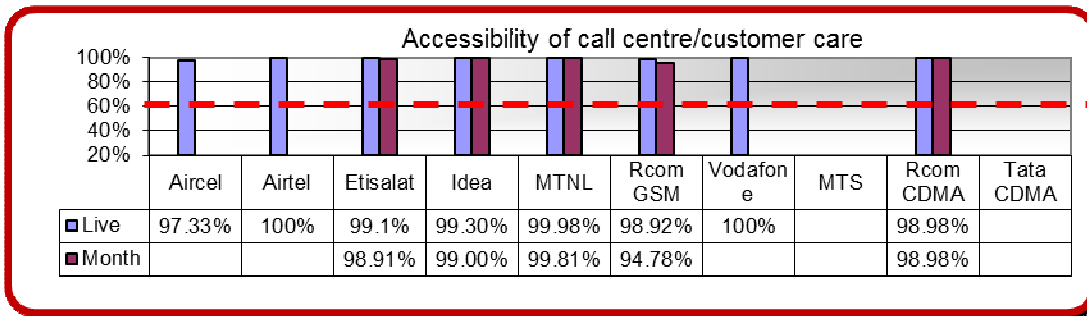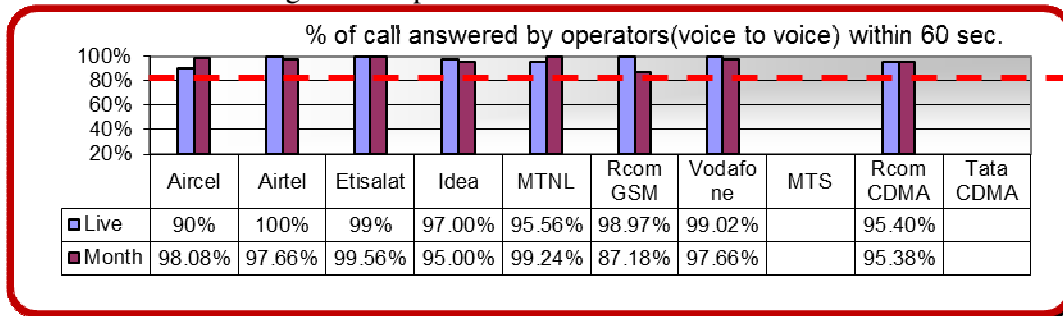|	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom	Vodafo	MTS	Rcom	Tata
☐ Live	5	4	2	0	0	0	0	0	0	0
■ Month	13	5	2	0	0	0	0	0	0	0

B)   CUSTOMER SERVICE QUALITY PARAMETERS

(A)   Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data except for Reliance GSM in month data audit. Data has not been provided by Aircel, Airtel & Vodafone for the month against this parameter. MTS & Tata also have not provided data for live & month measurement both..

	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	97.33%	100%	99.1%	99.30%	99.98%	98.92%	100%		98.98%	
Month			98.91%	99.00%	99.81%	94.78%			98.98%	

Percentage of call answered by operators (Voice to voice) within 60 sec: It is found that RCom GSM is not meeting the benchmark for month of audit. Rests of the operators are meeting the benchmark for live & month both. Data has not been provided by MTS & Tata for the live & month both against this parameter.

	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	90%	100%	99%	97.00%	95.56%	98.97%	99.02%		95.40%	
Month	98.08%	97.66%	99.56%	95.00%	99.24%	87.18%	97.66%		95.38%	

(5)   Critical Analysis

The above comparative study between live data & month data shows similar trends & consistency in both the cases. However, Etisalat & Vodafone are not meeting the benchmark for "Worst affected cells>3% TCH drop". It is found that Airtel is having the value below the benchmark for "Good voice quality" in case of month. Aircel, Airtel and Etisalat have shown POI congestion.
Inconsistency in live & month data was found for parameter "%age of calls answered by operator" for Etisalat & Reliance GSM.

(B) Redressal

(1) Sample coverage

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

(2) Performance (live calling for billing complaints)

Calling Operator	Aircel	Airtel	Etisalat	Idea	MTNL	Reliance (GSM)	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Total No. of calls	100	100	100	100	100	100	100	100	100	100
Total No. of calls Answered	90	89	95	94	80	86	88	82	92	96
Cases resolved with 4 weeks	90	89	92	93	76	84	88	80	91	96
%age of cases resolved	100%	100%	97%	99%	95%	98%	100%	98%	99%	100%

(3) Live calling to call centre

Calling Operator	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	98	100	100	99	100	100	100	100	100	99
Calls got connected to agent within 60 Sec	92	97	99	96	93	95	98	96	97	95
%age of calls got answered	92%	97%	99%	96%	93%	95%	98%	96%	97%	95%

(4) Level 1 live calling

Emergency no.	No. of calls made	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
100	4	4	4	4	4	4	4	4	4	4	4
101	4	4	4	4	4	4	4	4	4	4	4
102	4	4	4	4	4	4	4	4	4	4	4
139	2	2	2	2	2	2	2	2	2	2	2

(5) Critical Analysis

Random numbers were selected from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint redressal. It was found that the operators had made refunds in 100% in most of the cases as claimed by their records.

(C)   Inter operator call assessment
(1)   Sample coverage

A sample of 2x50 test calls per Service Providers with in the licensed service area (Delhi-NCR Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs.

(2)   Performance based on live measurement

Calling Operator	Aircel	Airtel	MTNL	Etisalat	Idea	Reliance (GSM)	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	98%	100%	99%	100%	100%	100%	100%	100%
MTNL	98%	99%	-	100%	100%	99%	98%	100%	100%	100%
Etisalat	100%	100%	100%	-	100%	100%	100%	100%	99%	100%
Idea	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
Vodafone	100%	99%	100%	100%	100%	98%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	-	98%
Tata (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

(3)   Critical Analysis

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator networks.

(D)   Drive test of the mobile network of service providers

(1) Sample Coverage

The Operator Assisted Drive Test was conducted at Delhi-NCR for all the operators. Route covered was about around 200Km depending on city areas within the speed limit of 40Km/hr.

Drive Test Locations

DELHI-NCR

HIGH DENSE: TCIL, South Ex, Pandara Rd, KG Marg, Connaught Place, Delhi Gate, ChandniChowk, Ito, Shakarpur, Laxmi Nagar, Koushambi, Shipra, Nitikhand, Noida sec 62

MEDIUM DENSE: TCIL, Chirag Delhi, HouzKhas, LadoSaraiMehrauli, Vasantrd, Chhattarpur, Ghatorni, DLF City, Sushanklok,

LOW DENSE: Koushambi, Shipra, Nitikhand, Noida sec 62, Gurgaon Sec56, Jharsa, Ncr Sec 17, UdyogVihar,

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
1.1	Call Attempts	Delhi-NCR	218	256	193	269	226	232	201	197	157	223
1.2	Blocked Call Rate (<=3%)	Delhi-NCR	5.96%	1.95%	2.07%	0%	6.19%	9.05%	3.98%	0%	0%	0%
1.3	Dropped Call Rate (<=2%)	Delhi-NCR	3.90%	2.39%	0.53%	0%	8.40%	1.72%	3.68%	1.52%	2.55%	0%
1.4	Percentage of connections with good voice quality (=>95%)	Delhi-NCR										
	(i) 0-4 (w/o frequency hopping)									97.01%	98%	97.08%
	(ii) 0-5 (with frequency hopping)		92.85%	90.23%	88.30%	94.47%	88.62%	90%	97.18%			
1,5	Service Coverage	Delhi-NCR										
	In door (>= -75dBm)		58.90%	70.32%	39.85%	74.48%	25.30%	55%	85.30%	88.39%	82%	85.76%
	In-vehicle (>= -85dBm)		88.90%	95.26%	77.61%	97.63%	72.55%	89%	97.80%	99.65%	99%	99.87%
	Out door- in city (>= -95dBm)		98.75%	99.80%	96.49%	100%	96.96%	99%	100%	100%	100%	100%
1.6	Call Setup Success Rate (>=95%)	Delhi-NCR	94.03%	98.05%	97.93%	98.51%	94%	90.95%	94.50%	98.52%	100%	100%

(3) Graphical Representation

Coverage level Delhi-NCR	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
In door (>= -75dBm)	58.90%	70.32%	39.85%	74.48%	25.30%	55%	85.30%	88.39%	82%	85.76%
In-vehicle (>= -85dBm)	88.90%	95.26%	77.61%	97.63%	72.55%	89%	97.80%	99.65%	99%	99.87%
Out door- in city (>= -95dBm)	98.75%	99.80%	96.49%	100%	96.96%	99%	100%	100%	100%	100%
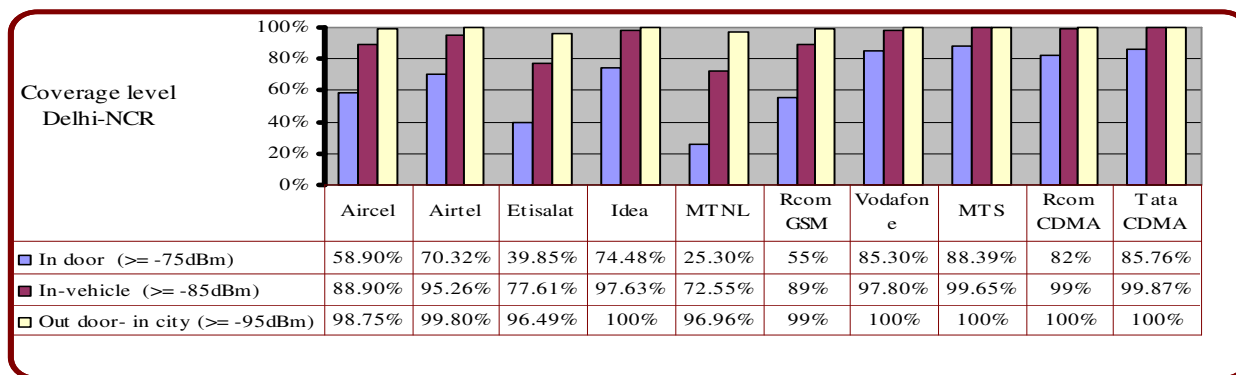
(4) Critical Analysis

The drive test data was found to be satisfactory for most of the parameters. However, a few deviations found are listed below:

- It is found that Aircel, MTNL, Rcom GSM & Vodafone are not meeting the benchmark for the parameter "Blocked call rate" & "CSSR"
- It is found that Aircel, Airtel, MTNL, Vodafone &Rcom CDMA are not meeting the benchmark for "Dropped call rate".
- Except Vodafone, all GSM operators fail to meet the TRAI benchmark for "%age of good voice quality connections".

(E)   Compliance report (Status of service providers with respect to the QoS)

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Delhi-NCR) is satisfactory for **Network Parameters**. However, Etisalat& Vodafone are not meeting the benchmark for "Worst affected cells>3% TCH drop". In PMR report, it is found that Etisalat is not meeting most of parameters. But in case of month & live data, Etisalat is improved. It is found that Airtel is not meeting the benchmark for "Good voice quality" in case of month. Aircel, Airtel and Etisalat have shown POI congestion.

Under **Customer Service Quality Parameter** "operator answered calls (voice-to-voice) within 60 seconds" parameter, Reliance GSM is not fulfilling TRAI benchmark of >=90%& "accessibility of call centre" parameter both in case of month. In case of PMR report, most of the operators are not meeting the benchmark for this parameter.

Regarding **Metering/Billing Credibility** issues, in PMR report, Tata CDMA has shown a below benchmark value for Post-paid connections. Similar result has been found for Etisalat for pre-paid connections. In case of live & month audit, all operators are satisfying the benchmark.

During **Drive Tests**, for the parameter "Blocked call rate" & "CSSR", Aircel, MTNL, Rcom GSM & Vodafone are not meeting the benchmark. It is found that Aircel, Airtel, MTNL, Vodafone &Rcom CDMA are not meeting the benchmark for "Dropped call rate". Except for Vodafone, all GSM operators fail to meet the TRAI benchmark for "%age of good voice quality connections".

III.   Basic Telephone Service (Wireline) Providers
……..Audit not done for this quarter

IV.   Broadband Service Providers
……..Audit not done for this quarter