

REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICE
FOR
NORTH ZONE – DELHI-NCR CIRCLE

Report Period: October 2011 – December 2011

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- 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.
- vii) Level 1 (Emergency) testing.

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 4th quarter (October–December 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period April-June 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	Nov-2011	1900-2000 hrs
2	Airtel Ltd	Nov-2011	2000-2100 hrs
3	MTNL	Nov-2011	2000-2100 hrs
4	Etisalat	Nov-2011	2000-2100 hrs
5	Idea	Nov-2011	2000-2100 hrs
6	Reliance Communication (GSM)	Nov-2011	2000-2100 hrs
7	Vodafone	Nov-2011	1900-2000 hrs
CDMA Operators			
8	MTS (CDMA)	Nov-2011	1900-2000 hrs
9	Reliance Communication (CDMA)	Nov-2011	2000-2100 hrs
10	Tata Communications (CDMA)	Nov-2011	1900-2000 hrs

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

(A) Cellular Mobile Telephone Services

3 days Live Data Audit												
S/N	Name of Parameter	Bench- mark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators			
1	Network Availability											
	a) BTS Accumulated Downtime	<=2%	0.16%	0.019%	0.79%	0.12%	0.23%	0.18%	0.02%	0.16%	0.11%	0.013%
	b) Worst affected BTSs due to downtime	<=2%	0.14%	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	98.48%	99.87%	99.32%	99.77%	97.24%	99.64%	99.99%	98.74%	99.04%	98.82%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.02%	0.03%	0.32%	0.11%	0.02%	0.66%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.06%	0.04%	0.71%	1.13%	0.09%	0.59%	0.47%	0.57%	0.002%
3	Connection maintenance (Retainability)											
	a) CDR	<=2%	0.77%	0.61%	1.20%	0.74%	1.57%	0.75%	0.96%	0.47%	0.70%	0.71%
	b) Worst affected cells>3% TCH drop	<=3%	2.81%	0.99%	2.83%	2.35%	2.67%	0.24%	3.30%	1.69%	0.28%	1.08%
	c) Good voice quality	>=95%	97.13%	98.96%	97.17%	98.10%	97.34%	99%	97.68%	100%	98.48%	NA
4	No. of POI having congestion >0.5%	<=0.5%	0	0	0	0	0	0	0	0	0	0
5	Response time to customers for assistance											
	a) Accessibility of call centre/Customer Care	>=95%	72%	100%	100%	99.27%	99.97%	98.63%	100%	95.60%	99.47%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98%	94%	98%	100%	98.98%	91.04%	98.91%	96.82%	93.76%	99.88%

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 Vodafone not meeting the benchmark for “Worst affected cells>3% TCH drop” with the value of 3.30%. All operators shows that none of the POI having congestion..

Performance related to customer care data is found to be satisfactory for all the operators. Data has not been provided by Etisalat for the parameters "Response time to the customers for assistance". So value has been picked from live calling.

One Month Data Audit		Bench-mark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators							CDMA Operators		
(A)	Network Service Quality Parameter											
1	Network Availability											
	a) BTS Accumulated Downtime	<=2%	0.16%	0.01%	0.85%	0.09%	0.36%	0.23%	0.02%	0.05%	0.12%	0.008%
	b) Worst affected BTSs due to downtime	<=2%	0.47%	0%	0%	0.03%	1.54%	0.40%	0.04%	0.36%	0%	0%
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	98.46%	99.86%	99.19%	99.72%	97.50%	99.56%	99.99%	99.03%	98.91%	98.80%
	b) SDCCH/PAGING congestion	<=1%	0.09%	0.03%	0.03%	0.75%	0.17%	0.02%	0.65%	0%	0%	0.00%
	c) TCH congestion	<=2%	0.10%	0.05%	0.10%	0.90%	1.25%	0.12%	0.59%	0.18%	0.64%	0.02%
3	Connection maintenance (Retainability)											
	a) CDR	<=2%	0.79%	0.62%	1.15%	0.71%	1.46%	0.79%	0.98%	0.42%	0.74%	0.71%
	b) Worst affected cells>3% TCH drop	<=3%	2.81%	0.95%	2.99%	2.16%	2.52%	0.35%	3.42%	1.88%	0.25%	1.01%
	c) Good voice quality	>=95%	97.45%	98.99%	97.24%	98.07%	97.71%	98.95%	97.65%	100%	98.45%	NA
4	No. of POI's having congestion >0.5%	<=0.5%	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters											
5	Metering/billing credibility-Post paid	<= 0.1%	0.10%	0.04%	NA	0.09%	0.28%	0.099%	0.05%	0.41%	0.07%	0.005%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.03%	0.046%	0.03%	0.016%	0.007%	0.10%	0.01%	0.002%	0.06%	0.004%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	98.94%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customer's 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%	90%	99.46%	99.03%	96.78%	99.82%	98.87%	100%	95.66%	99.43%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	97.19%	88.79%	99.49%	98.15%	99.80%	88.65%	98.60%	95.80%	93.23%	96.28%
9	Termination/closure of service	<=7days	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	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 Vodafone not meeting the benchmark for “Worst affected cells>3% TCH drop” with the value of 3.42%. All operators shows that none of the POI having POI congestion.

Performance related to customer care data is found to be satisfactory for most of the operators. While Aircel is not meeting the benchmark for the parameter "accessibility of call centre" as well as Airtel & Reliance GSM are not meeting the benchmark “calls answered by operators (voice-to-voice)”. MTNL has not provided data for the parameter "Time taken for refunds of deposits after closures".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in Delhi-NCR circle for all the operators. Route covered was about around 300 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	2.09%	0.19%	2.32%	0.71%	2.70%	1.63%	2.27%	0.00%	0.00%	0.23%
1.2	Dropped Call Rate (<=2%)	Delhi-NCR	1.38%	0.00%	0.00%	1.20%	5.90%	1.66%	0.82%	0.76%	0.00%	0.23%
1.3	Percentage of connections with good voice quality (>=95%)	Delhi-NCR										
	(i) 0-4 (w/o frequency hopping)									93.07%	97.70%	98.60%
	(ii) 0-5 (with frequency hopping)		93.50%	91.57%	91.35%	94.00%	88.00%	88.38%	97.40%			
1.4	Call Setup Success Rate (>=95%)	Delhi-NCR	94.76%	99.80%	92.03%	99.04%	97.00%	95.64%	97.70%	99.62%	95.62%	99.66%

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

- It is found that MTNL is not meeting the benchmark for "Dropped call rate".
- Except Vodafone, Rcom CDMA & Tata CDMA, rest of the operators fails to meet the TRAI benchmark for "%age of good voice quality connections".
- It is found that Aircel & Etisalat are not meeting the benchmark for "CSSR".

(B) Basic Telephone (Wireline) Service Providers

-Not conducted for this quarter

(C) Broadband Service Providers

-Not conducted for this quarter

- **No deviation found when compared to Operators reported data.**

II. Basic Service (Wireline) Service

- **Not conducted for this quarter**

III. Broadband Service

- **Not conducted for this quarter**

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%	0.16%	0.019%	0.79%	0.12%	0.23%	0.18%	0.02%	0.16%	0.11%	0.013%
	b) Worst affected BTSs due to downtime	<=2%	0%	0%	0%	0%	0.08%	0%	0%	0%	0%	0%
	c) Total no. of BTSs in the licensed service area		2768	4648	1364	3433	1236	2479	4869	844	954	1195
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		322.68	63.00	779.22	286.64	204.68	321.27	69.55	98.00	75.55	11.17
	e) No. of BTSs having accumulated downtime of >24 hours in a month		4	0	0	0	1	0	0	0	0	0
1	Connection Establishment (Accessibility)											
	a) CSSR	>=95%	98.48%	99.87%	99.32%	99.77%	97.24%	99.64%	99.99%	98.74%	99.04%	98.82%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.02%	0.03%	0.32%	0.11%	0.02%	0.66%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.06%	0.04%	0.71%	1.13%	0.09%	0.59%	0.47%	0.57%	0.00%
2	Connection maintenance											
	a) CDR	<=2%	0.77%	0.61%	1.20%	0.74%	1.57%	0.75%	0.96%	0.47%	0.70%	0.71%
	b) Cells having > 3% TCH drop	<=3%	2.81%	0.99%	2.83%	2.35%	2.67%	0.24%	3.30%	1.69%	0.28%	1.08%
	c) Good voice quality	>=95%	97.13%	98.96%	97.17%	98.10%	97.34%	99%	97.68%	100%	98.48%	NA
	d) No. of cells > 3% TCH drop		219	109	115	211	96	18	398	44	8	45
	e) Total no. of cells in the network		7797	11118	4091	8974	3604	7437	12048	2610	2862	4148
3	No. of POI's having congestion >0.5%	<=0.5%	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	NIL	Nil	Nil	Nil	Nil	NIL	Nil	Nil	Nil

S.No	Name of the Parameter	Bench- mark	Aircel	Airtel	Etisalat	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators			
	b) Total No. of circuits on POI		62356	303546	12557.6667	128566	43792	11730	220832	16162.0 0	22194	355947
	c) Avg No. of call attempts on POI		632119.333	4561312.00	210333.333	2331343.90	628634.00	248034	4285344	193020	515215	3730832
	d) Avg traffic served on POI (Erlang)		12489.05	186149	6202.27667	65895.03	15149	5837.6	119451.447	6607.72	9127.4	188406. 63
	e) Total number of working POI Service Area wise		71	260	26	92	48	79	18	70	79	121
	f) Equipped Capacity of Network in respect of Traffic in erlang		91609.27	345001.02	34963.48	140615.49	100000	96000	288561	33600	224000	224000
	g) Total traffic handled in TCBH in erlang		31678	191443	7335	106030	28671	90347	233088	8756	122118	140480
(B)	Customer Service Quality Parameters											
4	Response time to customers for assistance											
	a) Accessibility of call centre	>=95%	72%	100%	100%	99.3%	99.97%	98.63%	100%	95.60%	99.47%	100.0%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	98%	94%	98%	100%	98.98%	91.04%	98.91%	96.82%	93.76%	99.88%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		261459	107784	100	34543	76794	1508238	906252	4680	193122	267994
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		187713	107784	100	34293	76784	1487616	906252	4474	192094	267994

NA: Not Applicable, NP: Data Not Provided

Parameter-wise Findings (Live Data Assessment):

The parameter wise key takeouts 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 0.013% and 0.79%.
- **Worst affected BTSs due to downtime (benchmark <= 2%)**: All operators are meeting the benchmark with values lying between 0% and 0.14%.
- **Call setup success rate (benchmark >= 95%)**: All operators are meeting the benchmark with values lying between 97.24% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%)**: All operators are meeting the benchmark with values lying between 0% and 0.66%.
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 0.002% and 1.13%.
- **Call drop rate (benchmark <= 2%)**: All operators are meeting the benchmark with values lying between 0.47% and 1.57%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%)**: Except for Vodafone, rests of the operators are satisfying the benchmark with value in between 0.24% and 2.83%.
- **Connections with good voice quality (benchmark >= 95%)**: Tata CDMA has declared that the parameter is not system generated. Rests of operators are meeting the benchmark with values lying between 97.13% and 100%.
- **No. of POI's having Congestion >0.5%**: All operators have shown that none of the POI's having congestion over 0.5%. 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.
- **%age of call answered by operator (electronically) (benchmark >95%)**: Except for Aircel, rests of the operators are meeting the benchmark with values lying between 95.60% and 100%. Value of Etisalat has been picked from the live calling.
- **%age of call answered by operator (Voice to voice) (benchmark >90%)**: All the operators are meeting the benchmark with values lying between 91.04% and 100%. Value of Etisalat is picked from the live calling result.

(2) One month audit data report & 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%	0.16%	0.014%	0.85%	0.09%	0.36%	0.23%	0.02%	0.05%	0.12%	0.008%
	b) Worst affected BTSs due to downtime	<=2%	0.47%	0.00%	0.00%	0.03%	1.54%	0.40%	0.04%	0.36%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2,768	4,648	1,364	3,433	1,236	2,479	4,869	844	954	1,195
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		3,242.10	460	8,316.83	2,371.38	3,317	4,099	633.53	302	847	70.65
	e) No. of BTSs having accumulated downtime of >24 hours in a month		13	0	0	1	19	10	2	3	0	0
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	98.46%	99.86%	99.19%	99.72%	97.50%	99.56%	99.99%	99.03%	98.91%	98.80%
	b) SDCCH/PAGING congestion	<=1%	0.09%	0.03%	0.03%	0.75%	0.17%	0.02%	0.65%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.10%	0.05%	0.10%	0.90%	1.25%	0.12%	0.59%	0.18%	0.64%	0.02%
3	Connection maintenance (Retainability)											
	a) CDR	<=2%	0.79%	0.62%	1.15%	0.71%	1.46%	0.79%	0.98%	0.42%	0.74%	0.71%
	b) Worst affected cells>3% TCH drop	<=3%	2.81%	0.95%	2.99%	2.16%	2.52%	0.35%	3.42%	1.88%	0.25%	1.01%
	c) Good voice quality	>=95%	97.45%	98.99%	97.24%	98.07%	97.71%	98.95%	97.65%	100.00%	98.45%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		219	105	121	193	91	26	410	49	7	42
	e) Total no. of cells in the network		7,797	11,118	4,091	8,974	3,604	7,437	12,048	2,610	2,862	4,148
4	POI congestion	<=0.5%	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	NIL	Nil	Nil	Nil	Nil	NIL	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		672126	4468107	217822	2391249	614221	251495	4168902	181913	532068	3634325
	c) Total traffic served on POI (Erlang) (Avg.)		12776	179791	6270	65539	15316	5879.02	114721	6318	9302	184506
	d) Total No. of circuits on POI		62356	303546	12557.667	128566	43792	11730	220832	16162.00	22194	355947
	e) Total number of working POI Service Area wise		71	260	26	92	48	79	18	70	79	121
	f) Capacity of POI		59710.579	293622.00	11494.967	125644.08	43792	10878.59	217196	15464.74	18758.62	355947

5	Network Data											
	a) Equipped Capacity of Network Erlang		91609.273	345001.02	34963.48	140615.49	100000	96000	288561	33600	224000	224000
	b) Total traffic in TCBH in erlang (Avg.)		31787	193570.93	7594.47	106768.90	28097	91430.29	233237.00	8457.3	126136	126135.99
	c) Total no. of customers served (as per VLR) on last day of the month		2485336	6762898	264781	3833430	1083944	3416457	7038952	262177	3071699	2317308
(B)	Customer Service Quality Parameters											
5	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.1%	0.04%	NA	0.09%	0.28%	0.10%	0.05%	0.41%	0.07%	0.01%
	a) No. of bills issued during the period		47680	1094899	NA	569968	303664	52425	776258	4611	486185	386486
	b) No. of bills disputed including billing complaints during the period		46	506	NA	502	858	52	361	19	320	19
6	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.03%	0.05%	0.03%	0.02%	0.01%	0.10%	0.01%	0.002%	0.06%	0.004%
	a) No. of charging / credit / validity complaints during the quarter		670	4,091	218	634	166	4,409	82	23	2,136	221
	b) Total no. of pre-paid customers at the end of the quarter		2235000	8879934.00	736135	3949448	2309677	4409347	7066419	1025003	3551775	4919506
7	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	99%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		285	4597	0	1124	1024	4431	322	29	1215	240
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		285	4597	0	1136	1024	4431	322	29	1215	240
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		285	4597	0	1136	1024	4431	322	29	1215	240
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		431	15455	218	1536	0	30	121	13	1241	14419
	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	$\geq 95\%$	89.63%	99.46%	99.03%	97%	99.82%	98.87%	100.00%	95.66%	99.43%	100.00%
	b) % call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	97.19%	88.79%	99.49%	98%	99.80%	88.65%	98.60%	95.80%	93.23%	96.28%

	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		2614590	964740	415745	430952	68437	23211172	9211765	48857	2116492	2772426
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		2343459	959540	411722	417108	68315	22949378	9211765	46738	2104404	2772426
9	Termination/closure of service	<i><=7days</i>	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		676	6575	NA	1682	8497	213	2417	2	833	3737
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		676	6575	NA	1682	8497	213	2417	2	833	3737
10	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	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 takeouts for the Cellular Mobile Telephone Services providers in Delhi-NCR Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.008% and 0.36%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.54%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.50% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.75%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.02% and 1.25%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.42% and 1.46%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** Except for Vodafone, all the operators are satisfying the benchmark with value in between 0.25% and 2.99%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** Tata CDMA has declared that the parameter is not system generated. All the operators are meeting the benchmark with values lying between 97.24% and 100%.
- **No. of POI's having congestion $>0.5\%$:** It is found that none of the POI is having congestion. Here POI congestion indicates that there were call failure greater than 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 Aircel, all the operators are meeting the benchmark with values lying between 95.66% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Except for Airtel & Reliance GSM, all the operators are meeting the benchmark with values lying between 93.23% and 99.80%.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Except for MTNL & MTS, All the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** All the operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** Except for Idea, 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:

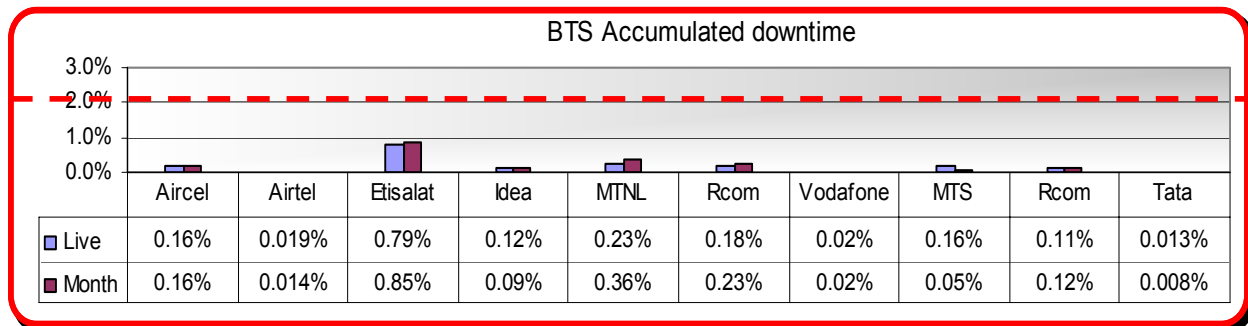
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	24	2768
2	Airtel Ltd	28	52	4648
3	MTNL	8	31	1236
4	Etisalat	1	8	1364
5	Idea	8	35	3362
6	Reliance Communication (GSM)	4	14	2479
7	Vodafone	16	53	4869
CDMA Operators				
8	MTS (CDMA)	1	3	844
9	Reliance Communication (CDMA)	10	--	954
10	Tata Communications (CDMA)	8	--	1195

(4) Performance (Graphical Representation)

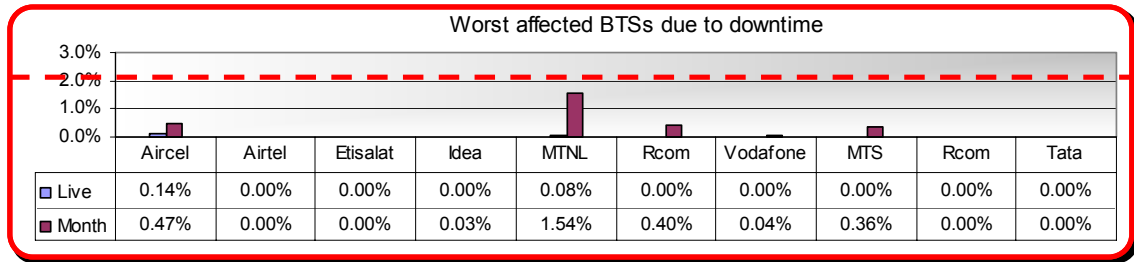
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

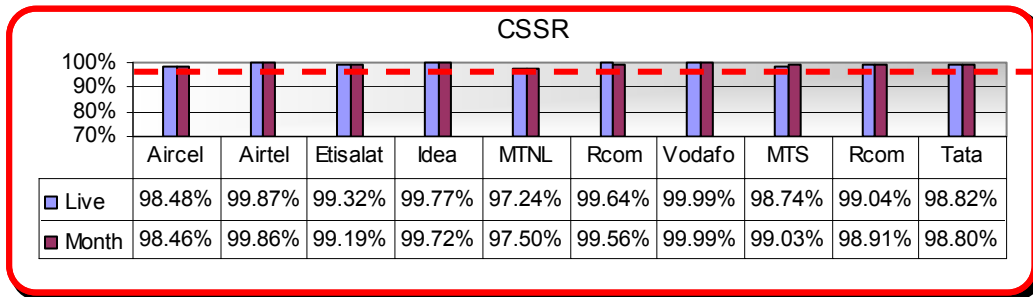
BTS Accumulated downtime: All operators are meeting the TRAI benchmarks for both one month data and 3 days live data.



Worst affected BTSs due to downtime: All operators are meeting the TRAI benchmarks for both one month data and 3 days live data.

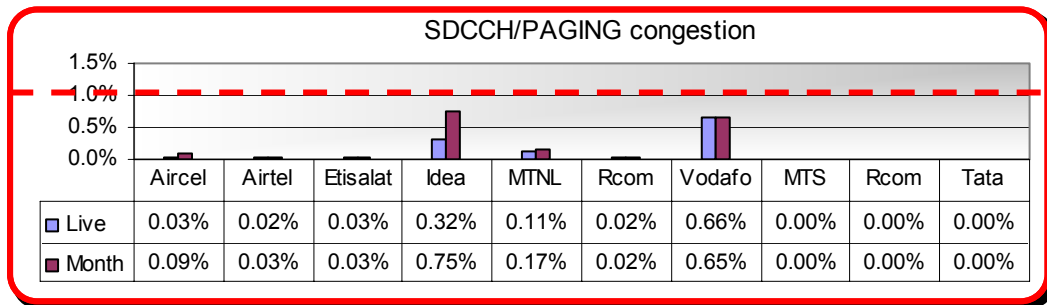


Call setup success rate: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.

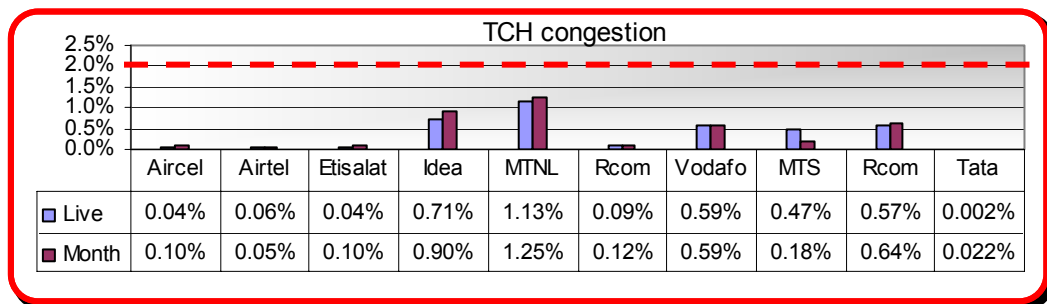


Blocked call rate:

SDCCH congestion: All operators are meeting the TRAI benchmarks ($\leq 1\%$) for both one month data and 3 days live data.

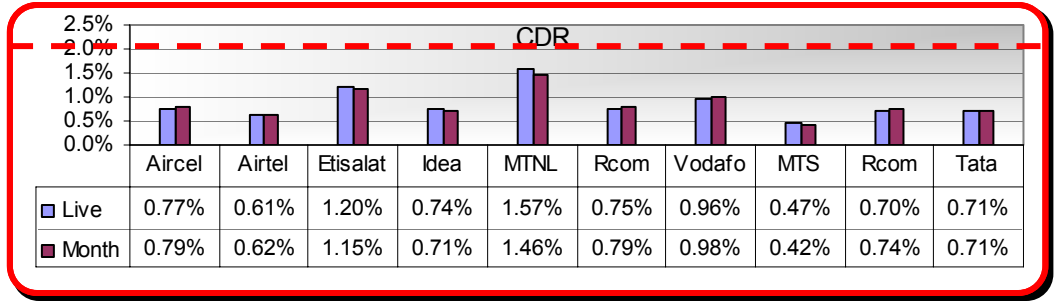


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.

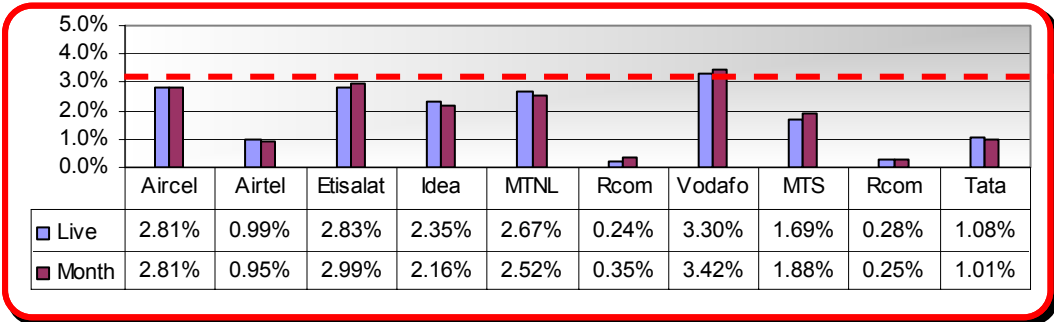


Connection Maintainability (Retain ability):

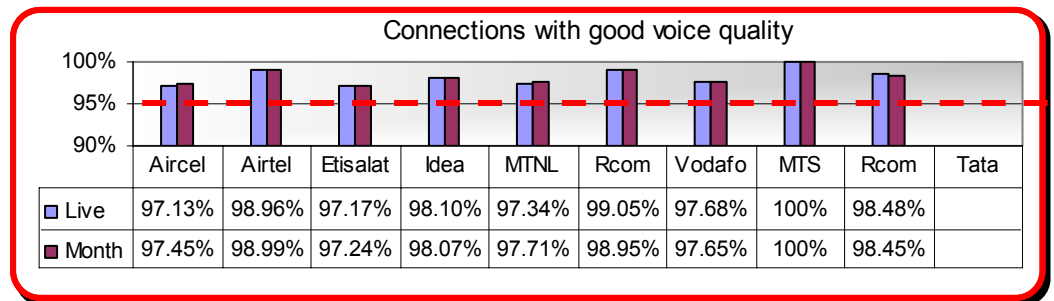
Call drop rate: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.



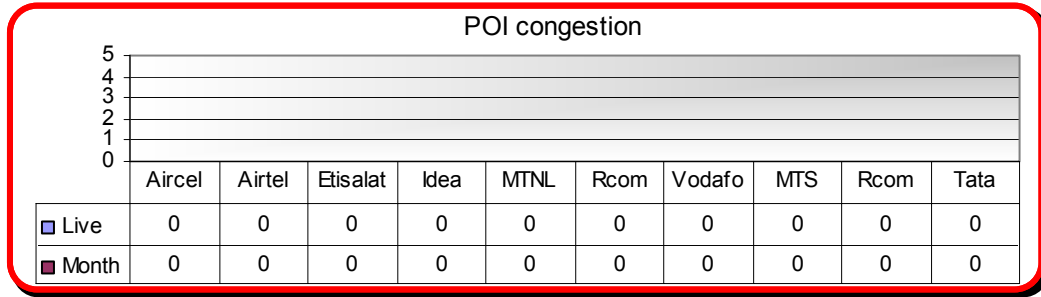
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, It is found that only Vodafone has failed to meet the benchmark of $\leq 3\%$. Rests of the operators are meeting the benchmark for both cases.



Percentage of connections with good voice quality: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data. Tata CDMA did not submit the value as the same is not system generated.



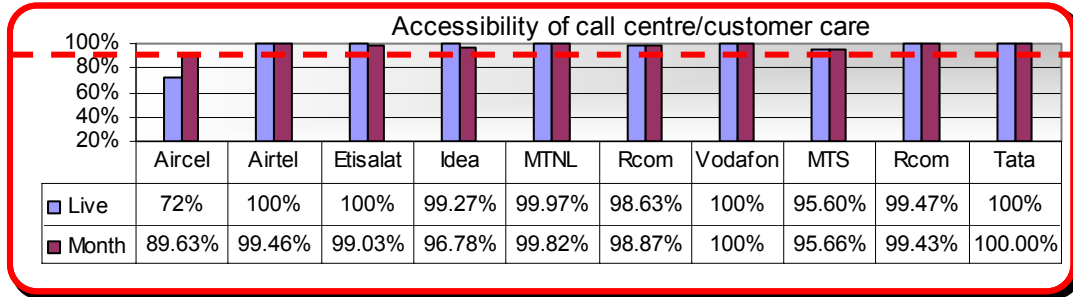
No. of POI's having Congestion >0.5%: All operators have shown that none of the POI is having congestion.



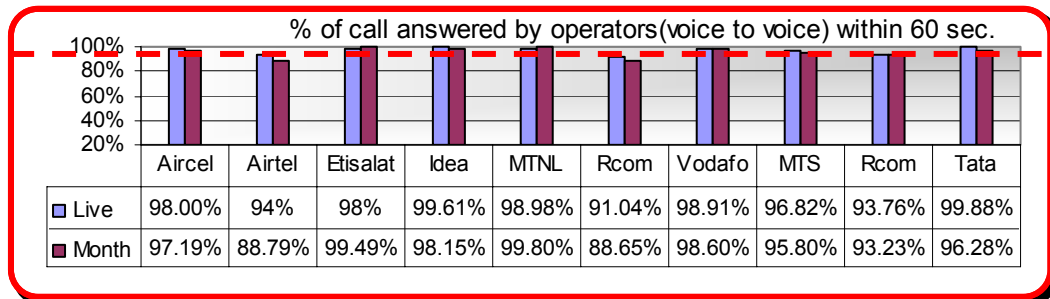
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data except for Aircel. Data has not been provided by Etisalat for live measurement against this parameter. For Etisalat, value has been picked from live calling.



Percentage of call answered by operators (Voice to voice) within 60 sec: It is found that Airtel & 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 Etisalat for the live measurement against this parameter. For Etisalat, value has been picked from live calling.



(5) Critical Analysis

The above comparative study between live data & month data shows similar trends & consistency in both the cases. However, Vodafone is not meeting the benchmark for “Worst affected cells>3% TCH drop”. All operators have shown that none of the POI is having congestion

It is found that MTNL & MTS are not meeting the benchmark for the parameter “Metering/billing credibility for post paid”. “Resolution of billing/ charging complaints” parameter is not met by Idea only. “Accessibility of call centre/ customer care” parameter is not met by Aircel for live & month both as well as for the parameter “Percentage of call answered by operators” is not met by Airtel & Rcom GSM for month of audit.

(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 based on live calling for billing complaints

Calling Operator	Aircel	Airtel	Idea	Reliance (GSM)	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Total No. of calls	30	100	100	100	35	10	100	25
Total No. of calls Answered	30	100	100	100	35	10	100	25
Cases resolved with 4 weeks	30	100	100	100	35	10	100	25
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	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	89	92	98	95	96	93	97	97	91	94
%age of calls got answered	89%	92%	98%	95%	96%	93%	97%	97%	91%	94%

(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	5	5	5	5	5	5	5	5	5	5	5
101	5	5	5	5	5	5	5	5	5	5	5
102	5	5	5	5	5	5	5	5	5	5	5
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% cases as claimed by their records.

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

A sample of 2x50 test calls per Service Providers within 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%	-	100%	100%	100%	100%	99%	100%	100%	100%
MTNL	100%	98%	-	100%	100%	100%	100%	100%	100%	100a%
Etisalat	100%	100%	100%	-	100%	100%	100%	100%	100%	100%
Idea	100%	100%	100%	100%	-	98%	100%	100%	99%	100%
Reliance (GSM)	99%	100%	99%	100%	100%	-	100%	100%	100%	100%
Vodafone	98%	99%	98%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	99%	100%	100%	98%	-	100%
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 300Km depending on city areas within the speed limit of 40Km/hr.

Drive Test Locations***DELHI-NCR***

HIGH DENSE: Greater Kailash1, Greater Kailash-2, Madangiri, Tughlaqabad, Govind puri, Okhla phase-2, Kalkaji, Srinivaspuri, Lajpat Nagar, Inner Ring Road, AIIMS, Hayat Hotel, Mti bagh, Dhula Kuan, Naraina, Rajouri garden, Punjabi Bagh, Keshav puram, Azad Pur, GT road, Shakti nagar, Sadar bazar, Motia Khan, CP, Sansad Marg, India gate, Copernicus Marg, ITO, Vikash Marg, Laxmi nagar, Preet Vihar, Patparganj Indl Area, Anand Vihar ISBT.

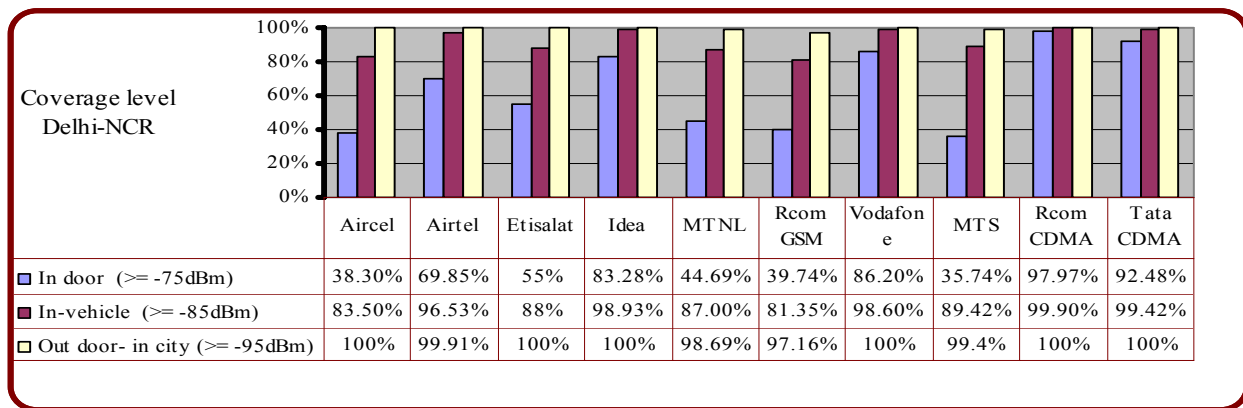
MEDIUM DENSE: Greater Kailash, Nehru place, Mathura Road, Sarita Vihar, Badarpur, NH-2, Sec-32 Faridabad, Indira Gandhi Chowk, Sec-15 A, Sec 11, Sec-9, Sec-17, Old Chungi, Badkhal Road, Badkhal Chowk, Badkhal. DLF phase 1 Gurgaon, DLG Golf Course, Sushant Lok, Sikanderpur, Iffco Chowk, NH-8, Rajiv Chowk, Civil Line, Dayanand Colony, Sec-5, Sec-13 Gurgaon, Raj nagar, Bus Stand Gurgaon, M.G. Road, Iffco Chowk, DLF Phase -3, M.G. Road, Sultanpur, Arun Avrt Marg, IIT, Outer Ring Road, Greater Kailash.

LOW DENSE: Greater Kailash, Nehru Place, Ashram Chowk, Nizamuddin Bridge, Mayur Vihar Phase-3, Ghazipur, NH-24, Sec-62 Noida, Sec-61 Noida, Sec-52, Golf Course Noida, Atta Market, Sec-25 Noida, Sec-23 Noida, Sec-53 Noida, Sec-66 Noida, Shipra Suncity, Shakti khand, Vasundhra, Mohan nagar, NH-24, Mukund Nagar, Naya Ganj, Maliwara, RajNagar, Kavi nagar, Ashok nagar.,

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	382	501	301	419	296	367	484	528	434	436
1.2	Blocked Call Rate (<=3%)	Delhi-NCR	2.09%	0.19%	2.32%	0.71%	2.70%	1.63%	2.27%	0%	0%	0.23%
1.3	Dropped Call Rate (<=2%)	Delhi-NCR	1.38%	0%	0%	1.2%	5.90%	1.66%	0.82%	0.76%	0%	0.23%
1.4	Percentage of connections with good voice quality (>=95%)	Delhi-NCR										
	(i) 0-4 (w/o frequency hopping)									93.07%	97.7%	98.60%
	(ii) 0-5 (with frequency hopping)		93.50%	91.57%	91.35%	94%	88%	88.38%	97.40%			
1.5	Service Coverage	Delhi-NCR										
	In door (>= -75dBm)		38.30%	69.85%	55%	83.28%	44.69%	39.74%	86.20%	35.74%	97.97%	92.48%
	In-vehicle (>= -85dBm)		83.50%	96.53%	88%	98.93%	87.00%	81.35%	98.60%	89.42%	99.90%	99.42%
	Out door- in city (>= -95dBm)		100.00%	99.91%	100%	100%	98.69%	97.16%	100%	99.4%	100%	100%
1.6	Call Setup Success Rate (>=95%)	Delhi-NCR	94.76%	99.80%	92.03%	99.04%	97%	95.64%	97.70%	99.62%	95.62%	99.66%

Graphical Representation



(3) 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 MTNL is not meeting the benchmark for "Dropped call rate".
- Except Vodafone, Rcom CDMA & Tata CDMA, rest of the operators fails to meet the TRAI benchmark for "%age of good voice quality connections".
- It is found that Aircel & Etisalat are not meeting the benchmark for CSSR.

(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, Vodafone is not meeting the benchmark for “Worst affected cells>3% TCH drop” in case of live measurement & month of audit data. In PMR report, it is found that only Etisalat is not meeting the parameters “worst affected cells” as well Etisalat is having congestion in 2.3 no POIs. But in case of month & live data, Etisalat is improved.

Under **Customer Service Quality Parameter** “operator answered calls (voice-to-voice) within 60 seconds” parameter is not met by Airtel & Reliance GSM as well as for the parameter “accessibility of call centre”, Aircel is not meeting the benchmark in live and month both. In case of PMR report, most of the operators are not meeting the benchmark for this parameter.

Regarding **Metering/Billing Credibility** issues, in month of audit data, MTNL & MTS are not meeting the benchmark for Post-paid connections. For the parameter “Resolution of billing/charging complaints”, Idea fails to meet the benchmark.

During **Drive Tests**, for the parameter “CSSR”, Aircel & Etisalat are not meeting the benchmark. It is found that only MTNL is not meeting the benchmark for "Dropped call rate". Except for Vodafone, Room CDMA & Tata CDMA, rest of the operators fails to meet the TRAI benchmark for "%age of good voice quality connections".

II. Basic Telephone Service (Wireline) Providers

.....Audit not done for this quarter

III. Broadband Service Providers

.....Audit not done for this quarter