

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

Report Period: January 2012 – March 2012

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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 1st quarter (January–March 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July-September 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	Jan-2012	1900-2000 hrs
2	Airtel Ltd	Jan-2012	2000-2100 hrs
3	MTNL	Jan-2012	2000-2100 hrs
4	Idea	Jan-2012	1900-2000 hrs
5	Reliance Communication (GSM)	Feb-2012	1900-2000 hrs
6	Vodafone	Jan-2012	1900-2000 hrs
CDMA Operators			
7	MTS (CDMA)	Jan-2012	1900-2000 hrs
8	Reliance Communication (CDMA)	Feb-2012	1900-2000 hrs
9	Tata Communications (CDMA)	Jan-2012	1900-2000 hrs

M/s. Etisalat have stopped their operations and hence, audit was not conducted in this case.

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

(A) Cellular Mobile Telephone Service Providers

3 days Live Data Audit		Bench- mark	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter										
1	Network Availability										
	a) BTS Accumulated Downtime	<=2%	0.21%	0.014%	0.10%	0.47%	0.18%	0.01%	0.03%	0.10%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.07%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)										
	a) CSSR (Call Setup Success Rate)	>=95%	98.23%	99.92%	99.74%	96.38%	99.64%	99.99%	99.15%	97.39%	98.91%
	b) SDCCH/PAGING congestion	<=1%	0.03%	2.30%	0.36%	0.18%	0.01%	0.81%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.09%	0.07%	0.93%	1.47%	0.05%	1.00%	0.06%	1.93%	0.00%
3	Connection maintenance (retainability)										
	a) CDR	<=2%	0.84%	0.61%	0.69%	1.57%	0.61%	1.02%	0.45%	0.91%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	2.92%	1.27%	1.88%	2.74%	0.03%	3.12%	2.11%	1.43%	0.88%
	c) Good voice quality	>=95%	97.12%	99.07%	98.09%	97.38%	99.09%	97.58%	100%	98.28%	NA
4	No of POI having congestion	<=0.5%	0	06	0	0	0	0	0	0	0
5	Response time to customers for assistance										
	a) Accessibility of call centre/Customer Care	>=95%	100%	100%	99.27%	99.97%	98.15%	100%	99.30%	99.15%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	92.38%	90.87%	99.28%	93.41%	96.40%	99.28%	96.10%	95.69%	90.38%

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters except for Vodafone not meeting "worst affected cells >3% TCH drop", Airtel not meeting "SDCCH/PAGING congestion" parameter. Tata CDMA has declared the KPI "%age of connections with Good Voice Quality" is not system generated.

Customer care data is found to be satisfactory for all the operators.

One Month Data Audit		Bench-mark	Aircel	Airtel	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%	0.31%	0.002%	0.09%	0.42%	0.19%	0.03%	0.07%	0.11%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	1.59%	0.00%	0.10%	1.78%	0.12%	0.00%	0.23%	0.00%	0.00%
2	Connection Establishment (Accessibility)										
	a) CSSR (Call Setup Success Rate)	>=95%	98.13%	99.87%	99.76%	96.90%	99.63%	99.99%	98.96%	98.25%	98.92%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.04%	0.29%	0.16%	0.04%	0.74%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.10%	0.05%	0.77%	1.65%	0.05%	1.00%	0.17%	1.68%	0.02%
3	Connection maintenance (retainability)										
	a) CDR	<=2%	0.83%	0.62%	0.74%	1.49%	0.64%	1.02%	0.44%	0.77%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	2.92%	0.99%	1.95%	2.71%	0.04%	3.23%	1.77%	1.38%	0.84%
	c) Good voice quality	>=95%	97.07%	99.02%	98.10%	97.60%	98.87%	97.66%	100%	98.39%	NA
4	No of POI having congestion	<=0.5%	0	04	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters										
5	Metering/billing credibility-Post paid	<= 0.1%	0.02%	0.02%	0.09%	0.08%	0.10%	0.04%	0.05%	0.03%	0.01%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.00%	0.01%	0.02%	0.00%	0.10%	0.00%	0.00%	0.03%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%
	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%
8	Response time to customers for assistance										
	a) Accessibility of call centre/Customer Care	>=95%	90.44%	100%	96.78%	99.90%	98.70%	100%	98.10%	99.10%	98.80%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	91.94%	92.54%	96.79%	98.91%	94.65%	99.42%	95.22%	95.15%	91.54%
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	100%	100%	100%	100%	99.65%

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. Deviations are found in a case of Vodafone having a high %age of 'Worst affected cells>3% TCH drop'. Tata CDMA has declared the KPI "%age of connections with Good Voice Quality" is not system generated.

Performance related to customer service data is also found to be satisfactory for most of the operators except for Aircel for the parameter Accessibility of call centre/Customer Care. Tata CDMA is taking more than 60 days "refunds of deposits after closure".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in Delhi-NCR (Noida, Gurgaon & Faridabad) circle for all the operators. Route covered was about 300 Km. The speed limit of 30-35Km/hr was maintained throughout the Drive Test. Zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	Aircel	Airtel	Idea	MTNL	Rcom GSM	Voda fone	MTS	Rcom CDMA	Tata CDMA
		GSM Operators					CDMA Operators			
1.1	Blocked Call Rate (<=3%)	1.73%	1.15%	0.00%	1.38%	3.93%	0.30%	0.00%	0.38%	0.64%
1.2	Dropped Call Rate (<=2%)	0.89%	0.39%	0.00%	5.32%	0.45%	0.90%	1.51%	0.00%	0.65%
1.3	Percentage of connections with good voice quality (>=95%)									
	(i) 0-4 (w/o frequency hopping)							95.20%	97.68%	97.75%
	(ii) 0-5 (with frequency hopping)	84.88%	90.70%	79.53%	92.67%	91.76%	97.60%			
1.4	Call Setup Success Rate (>=95%)	97.40%	98.85%	98.59%	97.57%	96.07%	99.01%	99.00%	99.62%	99.36%

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

- 'Blocked Call Rate' benchmark is not met by Rcom GSM.
- 'Dropped Call Rate' benchmark is not met by MTNL.
- Below benchmark performance for the parameter '%age of connections with good voice quality', is found in case of most of the GSM operators (Aircel, Airtel, Idea, MTNL and Rcom GSM).

Independent Drive Test

-Not conducted for this quarter

(B) Basic Telephone (Wireline) Service Providers

-Not conducted for this quarter

(C) Broadband Service Providers

-Not conducted for this quarter

Chapter 3 AUDIT PMR DATA VERIFICATION RESULTS

I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	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											
	BTS Accumulated Downtime	<=2%	Reported	0.15%	0.01%	0.11%	0.43%	0.25%	0.02%	0.08%	0.13%	0.01%
			Verified	0.15%	0.01%	0.11%	0.43%	0.25%	0.02%	0.08%	0.13%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.70%	0.00%	0.01%	1.61%	0.31%	0.00%	0.04%	0.00%	0.00%
	Verified		0.70%	0.00%	0.01%	1.61%	0.31%	0.00%	0.04%	0.00%	0.00%	
2	Connection Establishment (Accessibility)											
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.03%	99.86%	99.63%	97.36%	99.78%	99.99%	99.08%	99.51%	98.59%
			Verified	98.03%	99.86%	99.63%	97.36%	99.78%	99.99%	99.08%	99.51%	98.59%
	SDCCH/PAGING congestion	<=1%	Reported	0.08%	0.05%	0.38%	0.13%	0.17%	0.55%	0.00%	0.01%	0.00%
	Verified		0.08%	0.05%	0.38%	0.13%	0.17%	0.55%	0.00%	0.01%	0.00%	
	TCH congestion	<=2%	Reported	0.07%	0.06%	0.87%	1.49%	0.26%	1.35%	0.00%	0.03%	0.00%
			Verified	0.07%	0.06%	0.87%	1.49%	0.26%	1.35%	0.00%	0.03%	0.00%
3	Connection maintenance (retainability)											
	CDR	<=2%	Reported	0.91%	0.64%	0.85%	1.68%	0.22%	1.38%	0.33%	0.30%	0.87%
			Verified	0.91%	0.64%	0.85%	1.68%	0.22%	1.38%	0.33%	0.30%	0.87%
	Worst affected cells>3% TCH drop	<=3%	Reported	2.31%	0.98%	2.37%	2.76%	1.14%	5.71%	0.42%	0.88%	2.25%
	Verified		2.31%	0.98%	2.37%	2.76%	1.14%	5.71%	0.42%	0.88%	2.25%	
	Good voice quality	>=95%	Reported	97.22%	99.00%	98.09%	97.86%	99.79%	97.58%	99.97%	99.36%	98.20%
			Verified	97.22%	99.00%	98.09%	97.86%	99.79%	97.58%	99.97%	99.36%	98.20%
4	POI congestion	<=0.5%	Reported	0	0	0	0	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters											
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.09%	0.04%	0.05%	0.06%	0.10%	0.05%	0.00%	0.06%	0.00%
			Verified	0.09%	0.04%	0.05%	0.06%	0.10%	0.05%	0.00%	0.06%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.10%	0.04%	0.02%	0.05%	0.10%	0.00%	0.00%	0.05%	0.00%
			Verified	0.10%	0.04%	0.02%	0.05%	0.10%	0.00%	0.00%	0.05%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	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%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance											
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	100%	99.06%	99.90%	98.98%	100%	97.81%	99.02%	99%
			Verified	100%	100%	99.06%	99.90%	98.98%	100%	97.81%	99.02%	99%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	92.44%	88.00%	67.20%	100%	93.00%	95.54%	90.63%	94.66%	96%
Verified			92.44%	88.00%	67.20%	100%	93.00%	95.54%	90.63%	94.66%	96%	

PMR		Bench- mark	Audit	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA	
S/N	Name of Parameter												
GSM Operators										CDMA Operators			
9	Termination/closure of service												
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	≤ 7 days	Reported	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	100%	100%	100%	100%	0%	100%	99%
			Verified	100%	100%	100%	100%	100%	100%	100%	0%	100%	99%

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 measurement data assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	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%	0.21%	0.014%	0.10%	0.47%	0.18%	0.01%	0.03%	0.10%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.07%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2768	4703	3153	1177	2585	4932	868	1023	1226
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		416.93	48.11	215.86	395.34	330	24.7	19.2	73	0.052
	e) No. of BTSs having accumulated downtime of >24 hours in a month		2	0	0	2	0	0	0	0	0
2	Connection Establishment (Accessibility)										
	a) CSSR	>=95%	98.23%	99.92%	99.74%	96.38%	99.64%	99.99%	99.15%	97.39%	98.91%
	b) SDCCH/PAGING congestion	<=1%	0.03%	2.30%	0.36%	0.18%	0.01%	0.81%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.09%	0.07%	0.93%	1.47%	0.05%	1.00%	0.06%	1.93%	0.00%
3	Connection maintenance										
	a) CDR	<=2%	0.84%	0.61%	0.69%	1.57%	0.61%	1.02%	0.45%	0.91%	0.59%
	b) Cells having > 3% TCH drop	<=3%	2.92%	1.27%	1.88%	2.74%	0.03%	3.12%	2.11%	1.43%	0.88%
	c) Good voice quality	>=95%	97.12%	99.07%	98.09%	97.38%	99.09%	97.58%	100%	98.28%	NA
	d) No. of cells > 3% TCH drop		228	428	173	97	3	383	58	44	38
	e) Total no. of cells in the network		7,797	11,245	9,208	3,545	7,755	12,253	2,753	3,069	4,294

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators		
4	No of POI having congestion	$\leq 0.5\%$	0	06	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	In GMSC 2,3,4,7	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		672,182	44,13,055	2,445,628	601,875	184,097	4,387,596	183,396	334,646	3,562,603
	c) Total traffic served on POI (Erlang) (Avg.)		13,123	1,31,524	68,475	22,995	4,817	123,032	4,415	15,546	184,034
	d) Total No. of circuits on POI		33,128	2,11,363	132,979	44,245	292,404	231,514	NP	1,078,393	NP
	e) Total number of working POI Service Area wise		70	148	97	48	16	19	70	35	511
	f) Equipped Capacity of Network in respect of Traffic in erlang		91,609	3,48,732	137,766	NP	96,000	291,827	33,600	196,000	175,000
	g) Total traffic handled in TCBH in erlang		33,748	2,23,780	106,030	31,847	88,695	229,272	9,245	125,486	139,623
(B)	Customer Service Quality Parameters										
5	Response time to customers for assistance										
	a) Accessibility of call centre	$\geq 95\%$	100%	100%	99.27%	99.97%	98.15%	100%	99.30%	99.15%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	$\geq 90\%$	92.38%	90.87%	99.28%	93.41%	96.40%	99.28%	96.10%	95.69%	90.38%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		25,746	106,845	34,543	37,006	53,687	825,403	1,444	17,165	919,100
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		23,784	97,093	34,293	34,567	51,754	819,490	1,388	16,424	830,669

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% and 0.47%.
- **Worst affected BTSs due to downtime (benchmark <= 2%)**: All operators are meeting the benchmark with values lying between 0% and 0.17%.
- **Call setup success rate (benchmark >= 95%)**: All operators are meeting the benchmark with values lying between 96.38% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%)**: Except for Airtel, all operators are meeting the benchmark with values lying between 0% and 0.81%.
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% and 1.93%.
- **Call drop rate (benchmark <= 2%)**: All operators are meeting the benchmark with values lying between 0.45% and 1.57%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%)**: Except for Vodafone, all the operators are satisfying the benchmark with value in between 0.03% and 2.92%.
- **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 97.12% and 100%.
- **No. of POI's having Congestion >0.5%**: Except for Airtel with 06 nos. of POI with congestion no other operator has any POI with congestion over 0.5%. However, in no congestion cases, 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%)**: All the operators are meeting the benchmark with values lying between 98.15% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%)**: All the operators are meeting the benchmark with values lying between 90.38% and 99.28%.

(2) One month audit data report & summarized findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	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%	0.31%	0.002%	0.09%	0.42%	0.19%	0.03%	0.07%	0.11%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	1.59%	0.00%	0.10%	1.78%	0.12%	0.00%	0.23%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2,768	4,703	3,153	1,177	2,585	4,932	868	1,023	1,226
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		6,333	475	2,121	3,715	3,450	1,044	481	807	169
	e) No. of BTSs having accumulated downtime of >24 hours in a month		44	0	3	21	3	0	2	0	0
2	Connection Establishment (Accessibility)										
	a) CSSR (Call Setup Success Rate)	>=95%	98.13%	99.87%	99.76%	96.90%	99.63%	99.99%	98.96%	98.25%	98.92%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.04%	0.29%	0.16%	0.04%	0.74%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.10%	0.05%	0.77%	1.65%	0.05%	1.00%	0.17%	1.68%	0.02%
3	Connection maintenance (retainability)										
	a) CDR	<=2%	0.83%	0.62%	0.74%	1.49%	0.64%	1.02%	0.44%	0.77%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	2.92%	0.99%	1.95%	2.71%	0.04%	3.23%	1.77%	1.38%	0.84%
	c) Good voice quality	>=95%	97.07%	99.02%	98.10%	97.60%	98.87%	97.66%	100%	98.39%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		228	3,441	180	96	3	396	49	42	36
	e) Total no. of cells in the network		7,797	11,245	9,208	3,545	7,755	12,253	2,753	3,069	4,294

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators		
4	No of POI having congestion	$\leq 0.5\%$	0	04	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	In GMSC 2 & 3	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		693,986	43,54,280	2,468,533	589,464	180,128	4,482,253	193,105	347,459	3,699,282
	c) Total traffic served on POI (Erlang) (Avg.)		13,383	1,20,320	68,913	22,555	4,815	123,407	4,648	15,842	184,506
	d) Total No. of circuits on POI		33,128	2,11,083	132,979	44,245	292,404	231,514	NP	1,078,393	NP
	e) Total number of working POI Service Area wise		70	146	97	48	16	19	70	35	511
5	Network Data										
	a) Equipped Capacity of Network Erlang		91,609	3,48,732	137,766	NP	96,000	291,827	33,600	196,000	175,000
	b) Total traffic in TCBH in erlang (Avg.)		33,598	2,11,154	106,769	NP	87,312	233,403	9,415	124,451	138,028
	c) Total no. of customers served (as per VLR) on last day of the month		1,305,580	70,66,073	4,055,038	1,125,609	3,644,623	7,516,054	290,512	3,093,846	2,260,249
(B)	Customer Service Quality Parameters										
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.02%	0.02%	0.09%	0.08%	0.10%	0.04%	0.05%	0.03%	0.01%
	a) No. of bills issued during the period		57,416	1,157,610	569,968	147,933	65,576	745,759	7,593	486,185	391,476
	b) No. of bills disputed including billing complaints during the period		11	234	502	123	64	290	4	158	29
7	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.00%	0.01%	0.02%	0.00%	0.10%	0.00%	0.00%	0.03%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		63	698	634	31	4,380	214	7	1,057	168
	b) Total no. of pre-paid customers at the end of the quarter		2,218,190	8,792,820	3,949,448	2,401,262	4,527,490	7,191,788	1,094,601	3,551,775	4,361,454

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators		
8	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	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		364	11,203	2,672	343	4,496	779	14,658	2,456	15,554
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		364	11,203	2,672	343	4,496	779	14,658	2,456	15,554
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		74	932	1,136	154	4,444	504	11	1,215	197
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		290	10,271	1,536	189	52	275	14,647	1,241	15,357
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i><=1 week</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	Response time to customers for assistance										
	a) Accessibility of call centre/Customer Care	<i>>=95%</i>	90.44%	100%	96.78%	99.90%	98.70%	100%	98.10%	99.10%	98.80%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>>=90%</i>	91.94%	92.54%	96.79%	98.91%	94.65%	99.42%	95.22%	95.15%	91.54%
	c) Total no. of call attempts to call centre& customer care nos. during TCBH (Avg.).		26,643	103,857	430,952	24,648	48,270	828,305	1,587	15,689	895,348
	d) No. of calls connected and answered successfully to call centre& customer care nos. during TCBH (Avg.).		24,495	103,857	417,108	24,379	45,685	823,475	1,511	14,927	819,586

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators		
10	Termination/closure of service	<i><=7days</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		858	6,588	1,682	5,606	491	2,709	5	833	4,979
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		858	6,588	1,682	5,606	491	2,709	5	833	4,979
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	100%	100%	100%	100%	100%	99.65%

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 0.002% and 0.42%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.78%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 96.90% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.74%.
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 1.68%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.44% and 1.49%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** Except for Vodafone, all the operators are satisfying the benchmark with value in between 0.04% and 2.92%.
- **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 97.07% and 100%.
- **No. of POI's having congestion $> 0.5\%$:** Airtel was found to have 04 nos. of POI having congestion. Rest of the POI of the operators was found having no congestion though there may be cases of failure. 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 96.78% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $> 90\%$):** All the operators are meeting the benchmark with values lying between 91.54% and 99.42%.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** 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):** 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 except for Tata CDMA (refunds made in 861 cases out of 864).

(3) Sample Coverage

Switches/BSC/BTS details of operators:

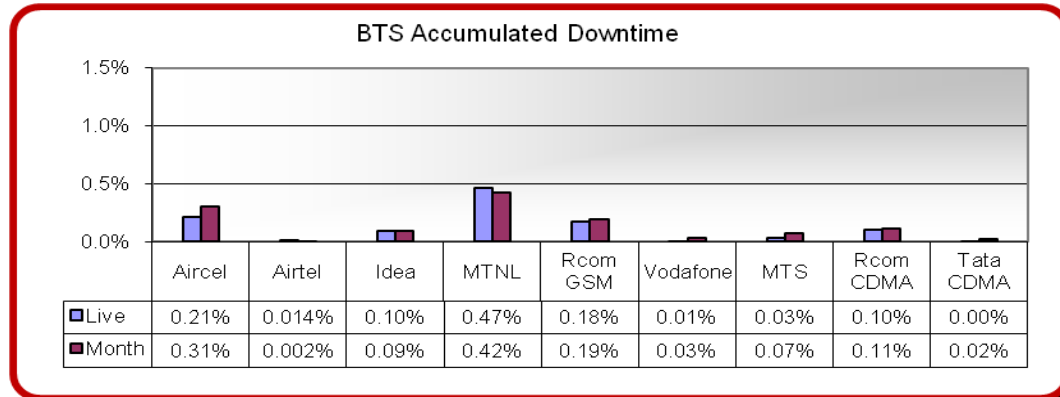
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	24	2768
2	Airtel	28	52	4703
3	MTNL	8	31	1177
4	Idea	9	37	3153
5	Reliance Communication	4	14	2585
6	Vodafone	16	54	4932
CDMA Operators				
7	MTS	1	3	868
8	Reliance Communication	10	--	1023
9	Tata Communications	8	--	1226

(4) Performance (Graphical Representation)

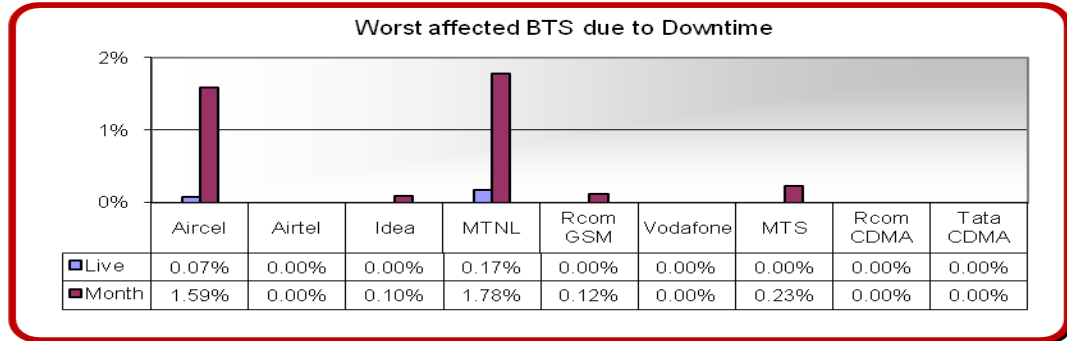
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

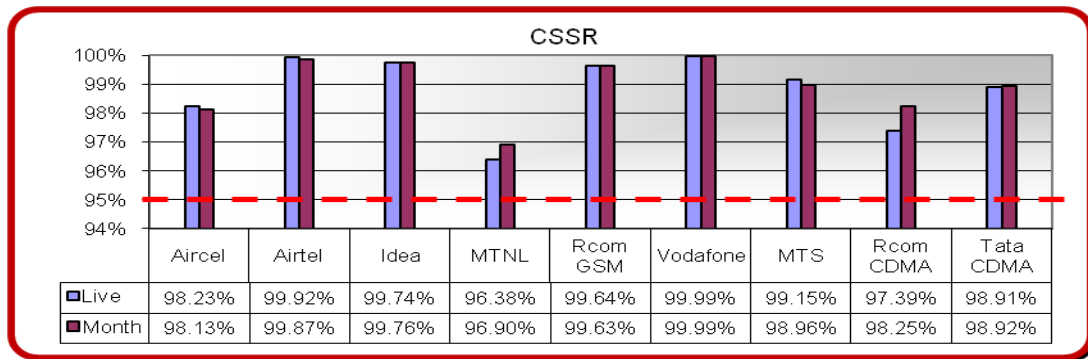
BTS Accumulated downtime: All operators are meeting the TRAI benchmarks for both one month data and 3 days live data.



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

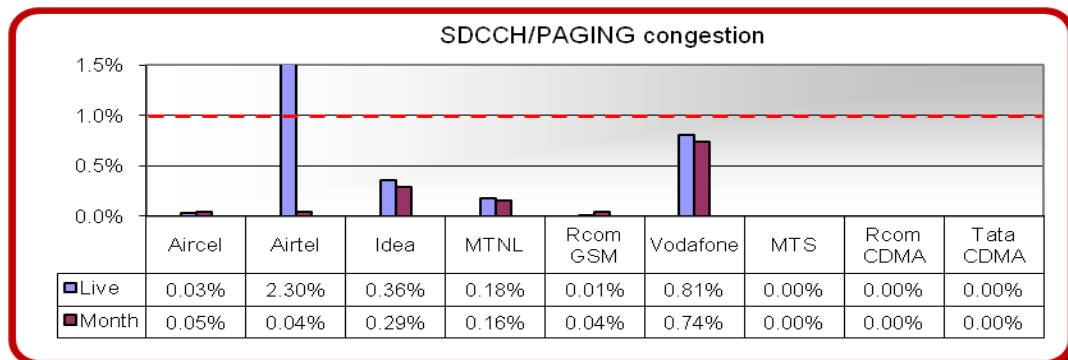


Call setup success rate: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.

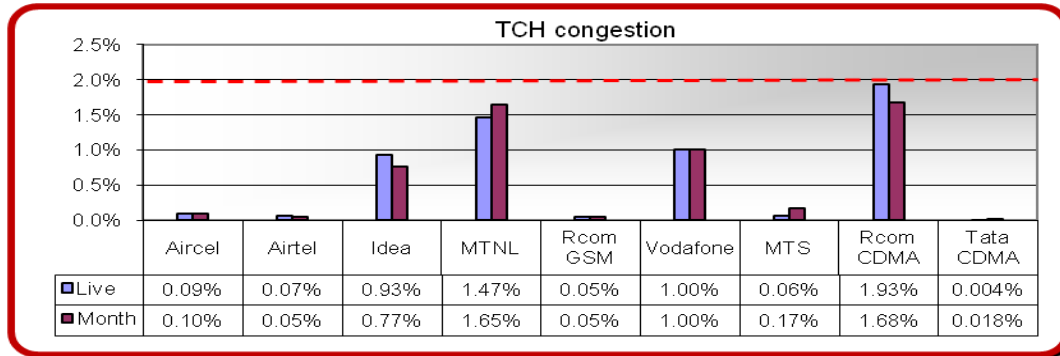


Blocked call rate:

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

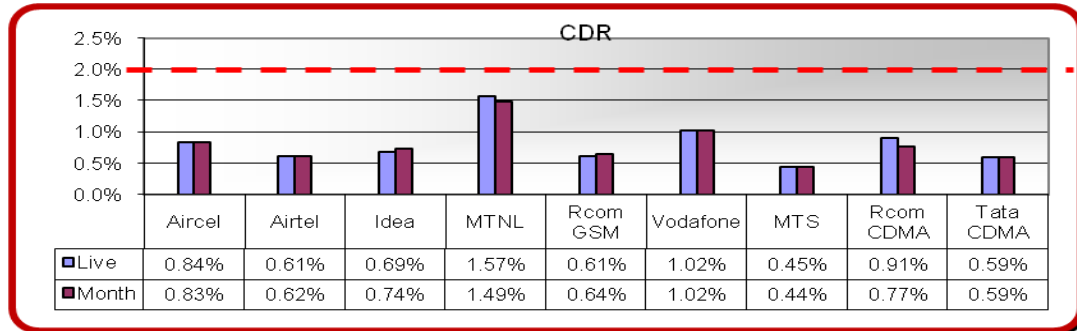


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.

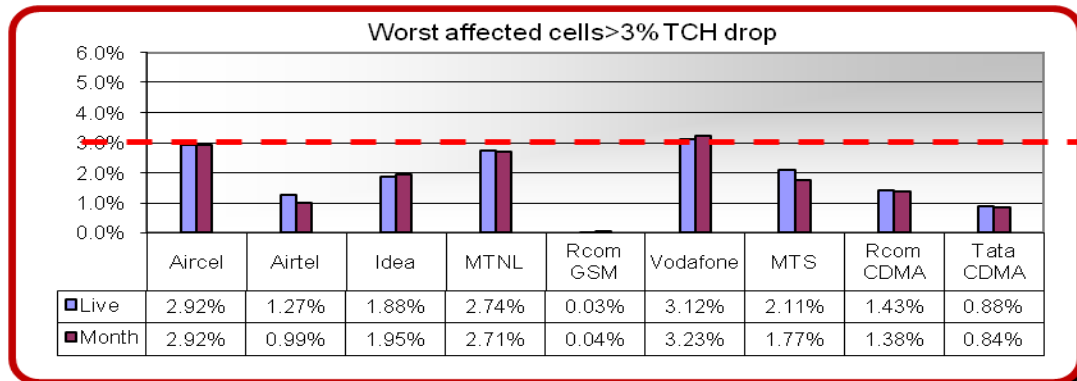


Connection Maintainability (Retainability):

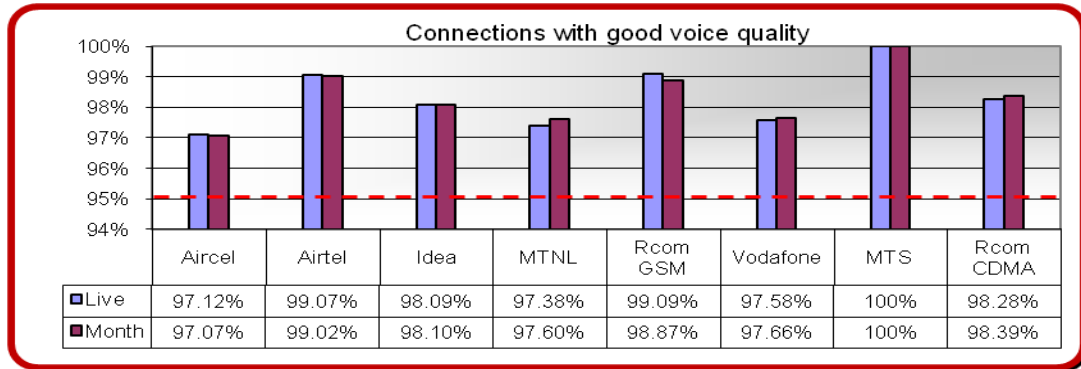
Call drop rate: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.



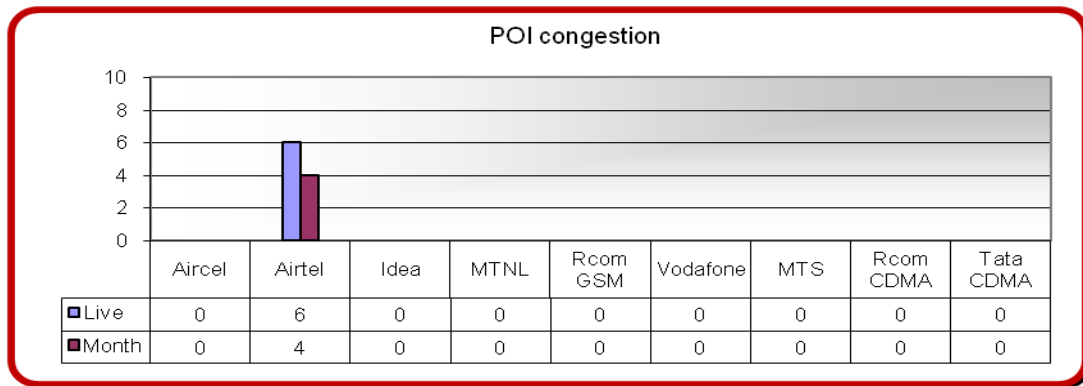
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, It is found that only Vodafone has failed to meet the benchmark of $\leq 3\%$. Rests of the operators are meeting the benchmark for both cases.



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



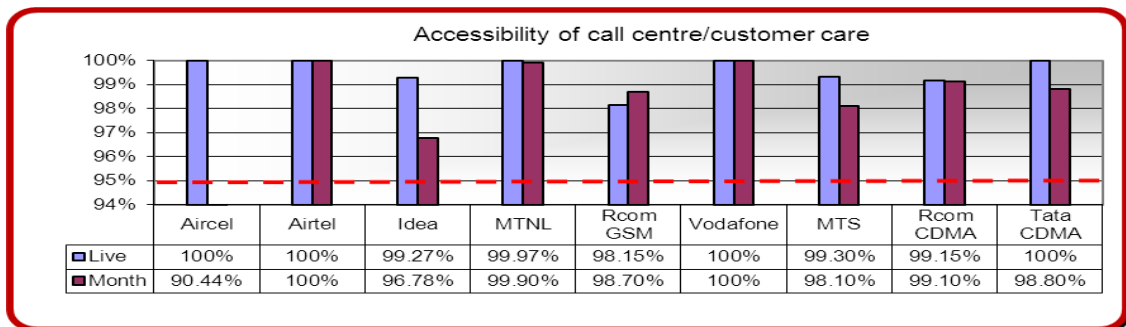
No. of POI's having Congestion > 0.5%: Except for Airtel rest of the other operators have shown that none of the POI is having congestion.



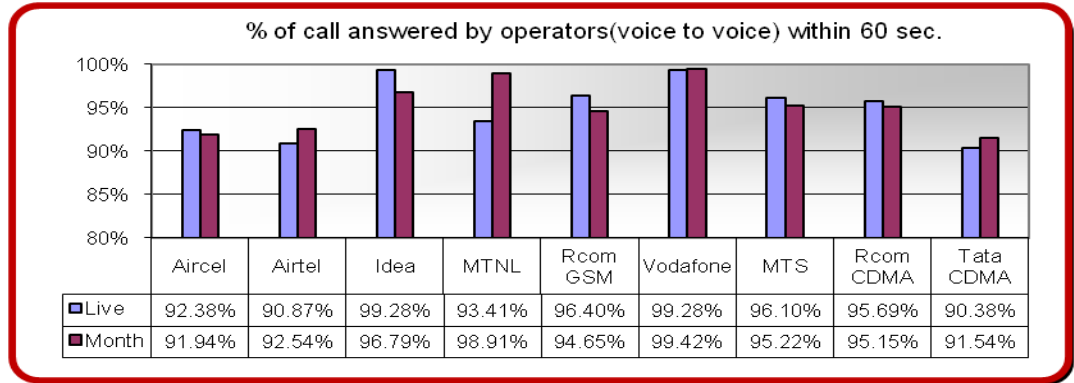
B) CUSTOMER SERVICE QUALITY PARAMETERS

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.



Percentage of call answered by operators (Voice to voice) within 60 sec:All the operators are meeting the benchmark for live & month both.



(5) Critical Analysis

The above comparative study between live data & month data shows similar trends & consistency in both the cases.

Airtel is not meeting the benchmark for the parameter “SDCCH/PAGING congestion” while Vodafone failed to meet benchmark for the parameter “Worst affected cells>3% TCH drop”. Except for Airtel, rests of the operators have shown that none of the POI is having congestion. “Accessibility of call centre/ customer care” parameter is not met by Aircel for month data. Tata CDMA has 99.65% cases where refunds were made with 60 days from termination/closure of service.

(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	MTNL	Reliance (GSM)	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Total No. of calls	74	100	100	100	100	100	11	100	100
Total No. of calls Answered	30	70	65	68	45	48	8	74	76
Cases resolved with 4 weeks	30	70	65	68	45	48	8	74	76
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%

(3) Live calling to call centre

Calling Operator	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	96	100	99	100	98	100	100	100	99
Calls got connected to agent within 60 Sec	91	96	95	97	91	94	96	90	90
%age of calls got answered	91.91%	96%	95%	95.95%	92.86%	94%	96%	90%	90.91%

(4) Level 1 live calling

Emergency no.	No. of calls made	Aircel	Airtel	Idea	MTNL	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
100	Police	4	4	4	4	4	4	4	4	4
101	Fire	4	4	2	4	4	4	2	4	4
102	Ambulance	4	4	2	3	4	4	2	4	4
139	Railway	4	4	2	3	4	4	3	4	4

(5) Critical Analysis

Random numbers were selected from the operators' available database of billing/metering complaints (valid and resolved) and calls were made to the customers to get their feedback for complaint redressal. Not all the calls were successful due to the various reasons such as customer not reachable, number busy or switched off etc. Among the successful calls, it was found that the operators had made refund 100% in all of the cases as claimed by their records.

Calls were made from Operators office at Delhi for Call Centre test calls. 100 calls total made i.e. call centre calls were successfully connected within the 60 seconds time for all the operators.

Most of the level 1 call got connected within local area of calling. It was confirmed from the called party that the location was nearer to the calling place. However there were occasion calls did not get connected for Airtel, Idea and MTS in Noida area as shown in the table above.

(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 calling

Calling Operator	Aircel	Airtel	MTNL	Idea	Reliance (GSM)	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	99%	100%	100%	100%
MTNL	100%	98%	-	100%	100%	100%	100%	100%	100a%
Idea	100%	100%	100%	-	98%	100%	100%	99%	100%
Reliance (GSM)	99%	100%	99%	100%	-	100%	100%	100%	100%
Vodafone	98%	99%	98%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	99%	100%	100%	98%	-	100%
Tata (CDMA)	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 30-35Km/hr.

Drive Test Locations

DELHI: Chirag Enclave, Kalu Sarai, Lado Sarai, Andheria More, Ghitorni, Badarpur Border, SaritaVihar, Nehru Place, Mathura Road, KalindiKunj, IIT, Arunvart Marg, Kalkaji Mandir

GURGAON: Arjungarh, DLF city Phase I, Sushantlok, DLF Phase- IV, Sikandarpur, IFFCO Chowk, Rajiv Chowk, Ashok Vihar, Gurgaon Bus Stand, Pahari Road

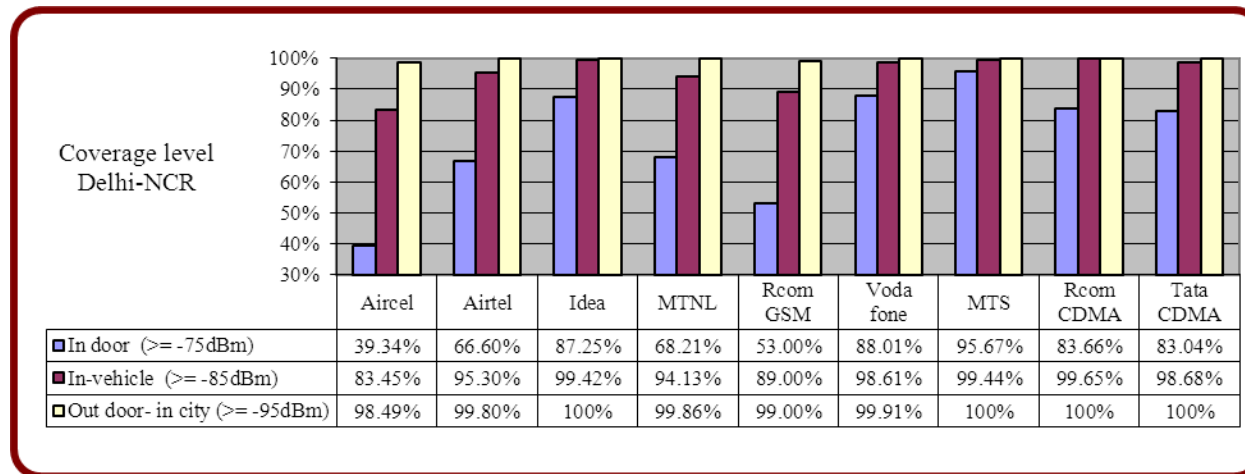
FARIDABAD: Badkhal road, Sec-21, Sec 28, Sec-29, Sec-18, Sec-14, Sec-13, Sec-9, NeelamChowk, SaraiChowk

NOIDA: Noida film city, Botanical Garden, Sec-60, 62, 55, 12, 10, 09, 16, 06, 15, 95, 20, 4, 27, 26, 61, 32, 15, 16, 1, 6, 127, Greater Noida Expressway, Pari Chowk, Golf Road, Mamura, NH-24, DadriRoad, AmarpaliMarg, Greater Noida Expressway

2) Performance (for the respective cities) - Operator Assisted Drive Test

SN	Parameter	Aircel	Airtel	Idea	MTNL	Rcom GSM	Voda fone	MTS	Rcom CDMA	Tata CDMA
1.1	Call Attempts	231	262	284	289	229	333	201	265	311
1.2	Blocked Call Rate (<=3%)	1.73%	1.15%	0.00%	1.38%	3.93%	0.30%	0.00%	0.38%	0.64%
1.3	Dropped Call Rate (<=2%)	0.89%	0.39%	0.00%	5.32%	0.45%	0.90%	1.51%	0.00%	0.65%
1.4	Percentage of connections with good voice quality (=>95%)									
	(i) 0-4 (w/o frequency hopping)							95.20%	97.68%	97.75%
	(ii) 0-5 (with frequency hopping)	84.88%	90.70%	79.53%	92.67%	91.76%	97.60%			
1.5	Service Coverage									
	In door (>= -75dBm)	39.34%	66.60%	87.25%	68.21%	53.00%	88.01%	95.67%	83.66%	83.04%
	In-vehicle (>= -85dBm)	83.45%	95.30%	99.42%	94.13%	89.00%	98.61%	99.44%	99.65%	98.68%
	Outdoor- in city (>= -95dBm)	98.49%	99.80%	100%	99.86%	99.00%	99.91%	100%	100%	100%
1.6	Call Setup Success Rate (>=95%)	97.40%	98.85%	98.59%	97.57%	96.07%	99.01%	99.00%	99.62%	99.36%

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:

- 'Blocked Call Rate' benchmark is not met by Rcom GSM.
- 'Dropped Call Rate' benchmark is not met by MTNL.
- Below benchmark performance for the parameter '%age of connections with good voice quality', is found in case of most of the GSM operators (Aircel, Airtel, Idea, and MTNL&Rcom GSM).

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

From live & month 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, Airtel is not meeting the parameter "SDCCH/PAGING congestion", Vodafone is not meeting the benchmark for "Worst affected cells>3% TCH drop".

Under **Customer Service Quality Parameter** "accessibility of call centre", Aircel is not meeting the benchmark.

For the parameter "Refund of deposits with 60 days after termination/closure of service", Tata CDMA has shown a little deviation.

During **Drive Tests**, for the parameter "%age of connections with good voice quality", Aircel, Airtel, Idea, MTNL & Rcom GSM are not meeting the benchmark. It is also found that only MTNL is not meeting the benchmark for "Dropped call rate" and Rcom GSM is having high "Blocked Call Rate".

II. Basic Telephone Service (Wireline) Providers

.....Audit not done for this quarter

III. Broadband Service Providers

.....Audit not done for this quarter