

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

Report Period: April 2011 – June 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.

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 Haryana 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. This has resulted in high value for ‘Cell exceeding 3% TCH drop’ parameter for some of the service providers.

CHAPTER-2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Haryana Circle in 1st quarter (January – March 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period Oct – December 2010.

Following are the various operators covered in Haryana 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	June-2011	1900-2000 Hrs
2	Airtel Ltd	June-2011	1900-2000 Hrs
3	BSNL	May-2011	1900-2000 Hrs
4	Etisalat	June-2011	1900-2000 Hrs
5	Idea	June-2011	1900-2000 Hrs
6	Reliance Communication (GSM)	June-2011	1900-2000 Hrs
7	Tata Communications (GSM)	June-2011	1900-2000 Hrs
8	Loop Cellular	June-2011	1900-2000 Hrs
9	Videocon	May-2011	1900-2000 Hrs
10	Vodafone	June-2011	1900-2000 Hrs
CDMA Operators			
11	MTS (CDMA)	June-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	June-2011	1900-2000 Hrs
13	Tata Communications (CDMA)	June-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		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA DOCOMO	V-fone	Videocon	TATA CDMA	MTS	Rcom
S/N	Name of Parameter		GSM Operators										CDMA Operators		
1	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	99.5%	99.2%	98.7%	99.1%	98.8%	99.7%	99.0%	98.7%	98.8%	98.0%	99.7%	99.7%	99.3%
	b) SDCCH/PAGING congestion	<=1%	0.0%	0.1%	0.1%	0.0%	0.2%	0.1%	0.2%	0.0%	0.3%	0.1%	0%	0.0%	0%
	c) TCH congestion	<=2%	0.0%	0.3%	0.6%	0.0%	0.4%	0.1%	0.0%	0.3%	0.4%	1.0%	0.0%	0.0%	0.1%
2	Connection maintenance (retainability)														
	a) CDR	<=2%	0.9%	0.7%	2.0%	1.2%	0.8%	0.3%	0.0%	0.8%	1.0%	1.2%	0.2%	0.3%	0.6%
	b) Worst affected cells>3% TCH drop	<=3%	0.4%	0.7%	4.3%	1.0%	3.1%	0.9%	0.0%	6.5%	3.9%	3.0%	5.6%	0.8%	0.4%
	c) Good voice quality	>=95%	98.5%	98.4%	98.65%	98.6%	96.9%	97.5%	99.7%	97.1%	96.8%	98.6%	NA	100.0%	NA
3	No. of POI having congestion >0.5%		4	0	2	0	0	0	0	0	0	0	0	0	0
4	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	93.9%	100.0%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	91.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.0%	98.0%	100.0%	94.0%	94.8%

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large.

- In case of Network parameters, BSNL, Idea, Tata GSM, Vodafone & Tata CDMA are found to have high value for “Worst affected cells>3% TCH drop” with the value of 4.3%, 3.1%, 6.5%, 3.9% & 5.6% respectively.
- Aircel & BSNL have 4 & 2 POIs respectively with >=0.5% congestion.
- Performance related to customer care data is not found to be satisfactory for MTS for the parameter “Accessibility of call centre/Customer Care”.

One Month Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA GSM	V-fone	Videocon	TATA CDMA	MTS	Rcom	
S/N	Name of Parameter		GSM Operators										CDMA Operators			
(A)	Network Service Quality Parameter															
1	Network Availability															
	a) BTS Accumulated Downtime	<=2%	0.4%	0.1%	1.6%	0.8%	0.1%	0.2%	0.0%	0.0%	0.2%	0.2%	0.0%	0.2%	0.1%	
	b) Worst affected BTSs due to downtime	<=2%	0.0%	0.4%	1.9%	0.0%	0.0%	0.2%	0.0%	0.0%	0.9%	0.7%	0.0%	0.0%	0.1%	
2	Connection Establishment (Accessibility)															
	a) CSSR (Call Setup Success Rate)	>=95%	100%	99%	99%	99%	99%	99%	98%	99%	97%	98%	100%	100%	99%	
	b) SDCCH/PAGING congestion	<=1%	0.2%	0.1%	0.1%	0.0%	0.3%	0.2%	0.5%	0.0%	1.5%	0.1%	0.0%	0.0%	0.0%	
	c) TCH congestion	<=2%	0.1%	0.3%	0.5%	0.0%	0.4%	0.2%	0.7%	0.4%	1.5%	1.2%	0.0%	0.0%	0.5%	
3	Connection maintenance (retainability)															
	a) CDR	<=2%	1.1%	0.7%	2.0%	1.3%	0.9%	0.3%	0.0%	0.8%	1.0%	1.2%	0.2%	0.2%	0.6%	
	b) Worst affected cells>3% TCH drop	<=3%	1.8%	0.8%	4.8%	1.4%	3.0%	0.8%	0.0%	6.4%	4.5%	0.7%	5.2%	0.6%	0.4%	
	c) Good voice quality	>=95%	98%	99%	97%	98%	97%	97%	100%	97%	97%	98%	NA	100%	NA	
4	POI congestion	>=0.5%	4	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%	0.06%	0.06%	0.00%	NA	0.09%	0.10%	NA	0.40%	0.01%	NA	0.00%	0.88%	0.10%	
6	Metering /billing credibility-Pre paid	<= 0.1%	0.09%	0.00%	0.00%	0.14%	0.01%	0.01%	0.00%	0.29%	0.01%	0.36%	0.01%	0.01%	0.01%	
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	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%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
8	Response time to customers for assistance															
	a) Accessibility of call centre/Customer Care	>=95%	93%	100%	100%	99%	99%	100%	100%	99%	100%	100%	99%	90%	100%	
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	100%	96%	97%	99%	79%	79%	100%	94%	98%	99%	94%	90%	92%	
9	Termination/closure of service	<=7days	100%	100%	100%	NA	100%	100%	NA	100%	100%	NA	100%	NA	100%	
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	100%	100%	NA	100%	100%	NA	100%	NA	100%	
NA: Not Applicable, NR: Not Received																
From the month data assessment, it is found that all the operators are meeting the network parameters by and large. Deviations are found under the Network Parameter for the parameters like 'Worst affected cell>3%TCH Drop' for BSNL, Tata GSM, Vodafone & Tata CDMA, and 'SDCCH Congestion' for Vodafone only. Aircel & BSNL have 4 & 5 POIs respectively with >=0.5% congestion. Vodafone has below benchmark performance for SDCCH congestion.																
Performance related to customer care data is not found to be satisfactory for most of the operators especially for the parameter "Accessibility of call centre/Customer Care" for Aircel and MTS and "calls answered by operators (voice-to-voice)", with only Idea & Rel GSM.																
For ' Metering/billing credibility-Pre-paid ' Videocon & MTS are found not meeting the benchmark of 0.1% and in case of 'Postpaid', Etisalat, Tata GSM & Videocon are falling short of benchmark of 0.1%.																

Operator-Assisted Drive Test												
The Operator Assisted Drive Test was conducted in and around Haryana for all the operators. Route covered was about around 80-100Km and for all the operators the same route was followed. The speed limit of 30Km/hr was maintained throughout the Drive Test. In Haryana, zones were selected for covering different density areas (High, Medium & Low dense areas).												
SN	Parameter	City Name	Airtel	BSNL	Idea	RTL GSM	TATA DOCOMO	V-fone	Videocon	TATA CDMA	MTS	Rcom
1.1	Blocked Call Rate (<=3%)	Ambala	0.00%	5.90%	0.00%	0.96%	1.17%	2.24%	0.00%	0.00%	0.00%	0.00%
		Karnal	0.00%	6.67%	1.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Panipat	1.12%	2.38%	0.00%	0.00%	1.40%	1.06%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Ambala	0	2.7	0	0	2.3	2.24	0	0	0	0
		Karnal	0	0	0	0	1.17	0	0.51	0	0	0
		Panipat	0	0	0	0	1.4	0	0.42	0	0	0
1.3	Percentage of connections with good voice quality (>=95%)											
	(i) 0-4 (w/o frequency hopping)	Ambala								95.46	95.48	99
		Karnal								95.09	96.09	96
		Panipat								91.75	95.72	99
	(ii) 0-5 (with frequency hopping)	Ambala	95.2	91.33	94	95	96	97	97.37			
		Karnal	96.4	94.5	96	97	95.18	94.34	96.08			
		Panipat	95.9	93.47	94	95	95	95.39	95.56			
1.4	Call Setup Success Rate (>=95%)	Ambala	100%	94%	100%	99%	99%	98%	100%	100%	100%	100%
		Karnal	100%	93%	99%	100%	100%	100%	100%	100%	100%	100%
		Panipat	99%	98%	100%	100%	99%	99%	100%	100%	100%	100%
Key observations as could be derived from the table are as under:												
<ul style="list-style-type: none"> 'Blocked Call Rate', 'CSSR' and 'Drop Call rate' benchmarks are not met by BSNL in (Ambala, Karnal), Ambala & (Ambala, Karnal) respectively. For the parameter 'Percentage of connections with good voice quality ' it is found that BSNL (3 Cities), Idea (Panipat), Vodafone (Karnal) & Tata CDMA (Panipat) are not meeting the benchmark. Dropped Call Rate benchmark is not met by Tata Docomo (Ambala) & Vodafone (Ambala). 												

Independent Drive Test

The Independent Drive Test was conducted in and around Haryana. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Airtel	Idea	RTL GSM	TATA DOCOMO	V-fone	Videocon	TTML CDMA	MTS	Rcom
1.1	Blocked Call Rate (<=3%)	Ambala	0.0%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Ambala	0.0%	0.0%	0.0%	0.0%	2.2%	1.13%	0.0%	0.00%	0.00%
1.3	Percentage of connections with good voice quality (>=95%)										
	(i) 0-4 (w/o frequency hopping)	Ambala	0.96	NA	NA	NA	NA	NA	0.9577	NA	0.98
	(ii) 0-5 (with frequency hopping)	Ambala	1	0.95	0.97	0.95	0.97	0.9708	NA	0.9703	NA
1.4	Call Setup Success Rate (>=95%)	Ambala	100%	96%	100%	100%	100%	100%	100%	100%	100%

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

- 'Blocked Call Rate' and 'Drop Call rate' benchmarks are not met by Idea & Vodafone respectively.

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service

PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA DOCOMO	V-fone	Videocon	TTML CDMA	MTS	Rcom
S/N	Name of Parameter			GSM Operators										CDMA Operators		
(A)	Network Service Quality Parameter															
1	Network Availability															
	BTS Accumulated Downtime	<=2%	Reported	NA	0.10%	1.40%	1.21%	0.06%	0.28%	0.04%	0.02%	0.02%	0.13%	0.01%	0.23%	0.36%
			Verified	NA	0.10%	1.40%	1.21%	0.06%	0.28%	0.04%	0.02%	0.02%	0.13%	0.01%	0.23%	0.36%
	Worst affected BTSs due to downtime	<=2%	Reported	NA	0.21%	1.89%	5.65%	0.00%	0.12%	0.00%	0.00%	0.08%	0.34%	0.00%	0.00%	0.19%
			Verified	NA	0.21%	1.89%	5.65%	0.00%	0.12%	0.00%	0.08%	0.34%	0.00%	0.00%	0.19%	
2	Connection Establishment (Accessibility)															
	CSSR (Call Setup Success Rate)	>=95%	Reported	NA	99.2%	96.1%	99.2%	99.9%	99.7%	97.3%	99.2%	98.9%	98.0%	100.0%	98.8%	99.4%
			Verified	NA	99.2%	96.1%	99.2%	99.9%	99.7%	97.3%	99.2%	98.9%	98.0%	100.0%	98.8%	99.4%
	SDCCH/PAGING congestion	<=1%	Reported	NA	0.12%	0.18%	0.01%	0.26%	0.17%	0.47%	0.15%	0.19%	0.04%	0.00%	0.00%	0.00%
			Verified	NA	0.12%	0.18%	0.01%	0.26%	0.17%	0.47%	0.15%	0.19%	0.04%	0.00%	0.00%	0.00%
	TCH congestion	<=2%	Reported	NA	0.19%	1.21%	0.00%	0.72%	0.18%	0.00%	0.40%	0.63%	0.22%	0.03%	0.00%	0.28%
		Verified	NA	0.19%	1.21%	0.00%	0.72%	0.18%	0.00%	0.40%	0.63%	0.22%	0.03%	0.00%	0.28%	
3	Connection maintenance (retainability)															
	CDR	<=2%	Reported	NA	0.67%	1.90%	1.71%	0.92%	0.36%	0.66%	1.03%	1.04%	0.66%	0.29%	0.55%	0.79%
			Verified	NA	0.67%	1.90%	1.71%	0.92%	0.36%	0.66%	1.03%	1.04%	0.66%	0.29%	0.55%	0.79%
	Worst affected cells>3% TCH drop	<=5%	Reported	NA	1.00%	4.50%	13.77%	4.63%	1.75%	0.00%	1.95%	2.47%	1.30%	0.21%	4.83%	0.41%
			Verified	NA	1.00%	4.50%	13.77%	4.63%	1.75%	0.00%	1.95%	2.47%	1.30%	0.21%	4.83%	0.41%
	Good voice quality	>=95%	Reported	NA	98.7%	96.7%	98.4%	96.9%	98.7%	98.0%	96.9%	97.1%	98.4%	99.8%	99.3%	98.2%
		Verified	NA	98.7%	96.7%	98.4%	96.9%	98.7%	98.0%	96.9%	97.1%	98.4%	99.8%	99.3%	98.2%	
4	No. of POI having congestion	>=0.5%	Reported	NA	0	0	0	0	0	0	0	0	2	0	0	0
			Verified	NA	0	0	0	0	0	0	0	0	2	0	0	0
(B)	Customer Service Quality Parameters															
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	NA	0.05%	0.08%	NA	0.08%	0.08%	NA	0.00%	0.01%	NA	0.15%	0.00%	0.09%
			Verified	NA	0.05%	0.08%	NA	0.08%	0.08%	NA	0.00%	0.01%	NA	0.15%	0.00%	0.09%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.05%	0.02%	0.10%	0.00%	0.06%	0.04%	0.00%	0.01%	0.01%	0.01%	0.11%	0.08%	0.06%
			Verified	0.05%	0.02%	0.10%	0.00%	0.06%	0.04%	0.00%	0.01%	0.01%	0.01%	0.11%	0.08%	0.06%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NA	100%	100%	NA	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	NA	100%	100%	100%	100%	100%	100%

PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA DOCOMO	V-fone	Videocon	TTML CDMA	MTS	Rcom	
S/N	Name of Parameter			GSM Operators										CDMA Operators			
8	Response time to customers for assistance																
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	93%	100%	99%	99%	95%	100%	99%	100%	98%	89%	96%	86%	
			Verified	100%	93%	100%	99%	99%	95%	100%	99%	100%	98%	89%	96%	86%	
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	78.3%	56.0%	90.0%	96.5%	0.2%	78.0%	100.0%	94.0%	93.0%	100%	64.0%	95.3%	92.0%	
Verified			78.3%	56.0%	90.0%	96.5%	0.2%	78.0%	100.0%	94.0%	93.0%	100%	64.0%	95.3%	92.0%		
9	Termination/closure of service																
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	NA	100%	NA	NA	100%	100%	NA	100%	100%	NA	100%	100%	100%	
Verified			NA	100%	NA	NA	100%	100%	NA	100%	100%	NA	100%	100%	100%		
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	NA	100%	NA	NA	100%	100%	NA	NA	100%	NA	86%	100%	100%	
			Verified	NA	100%	NA	NA	100%	100%	NA	NA	100%	NA	86%	100%	100%	

Critical Analysis (PMR Verification):

- The figures proved by all the operators match the figures obtained on verification hence there is no discrepancy found.
- Under Network Parameter Section only Etisalat is found not meeting the benchmark for 'Worst affected BTSs due to downtime' and 'Worst affected cells>3% TCH drop '.
- Tata CDMA & Rel CDMA to Accessibility of call centre/Customer Care parameter does not meet the benchmark.
- "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by Aircel, Airtel, Idea and Tata.

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	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA DOCOMO	V-fone	Videocon	TTML CDMA	MTS	Rcom	
			GSM Operators										CDMA Operators			
A	Network Service Quality Parameter															
1	Connection Establishment (Accessibility)															
	a) CSSR	>=95%	99.5%	99.2%	98.7%	99.1%	98.8%	99.7%	99.0%	98.7%	98.8%	98.0%	99.7%	99.7%	99.3%	
	b) SDCCH/PAGING congestion	<=1%	0.00%	0.13%	0.05%	0.00%	0.16%	0.09%	0.15%	0.01%	0.30%	0.06%	0.00%	0.00%	0.00%	
	c) TCH congestion	<=2%	0.19%	0.14%	0.10%	0.03%	0.28%	0.20%	0.48%	0.02%	1.49%	0.09%	0.00%	0.00%	0.00%	
2	Connection maintenance															
	a) CDR	<=2%	0.89%	0.66%	2.01%	1.18%	0.84%	0.33%	0.00%	0.80%	1.01%	1.23%	0.20%	0.28%	0.61%	
	b) Cells having > 3% TCH drop	<=3%	0.40%	0.72%	4.25%	1.05%	3.09%	0.86%	0.00%	6.49%	3.86%	2.99%	5.63%	0.79%	0.40%	
	c) Good voice quality	>=95%	98.5%	98.4%	98.65%	98.6%	96.9%	97.5%	99.7%	97.1%	96.8%	98.6%	NA	100.0%	NA	
	d) No. of cells > 3% TCH drop															
	e) Total no. of cells in the network															
3	No. of POI having congestion > 0.5%		4	0	2	0	0	0	0	0	0	0	0	0	0	
	a) Name of POI not meeting the benchmark		VSNL/BTSOL/ BSNL; BSNL; BTSOL/BSNL; Vodafone		Bharti, Idea, Vodafone, Tata, Reliance											
	b) Total No. of circuits on POI		6,550	30,199	30,255	1,307	55,302	16,895	390	2,865	59,422	10,008	40,404	3,487	16,895	
	c) Avg No. of call attempts on POI		4,775	728,376	560,775	2,368	1,460,802	266,087	3	44,811	2,044,845	126,194	599,190	12,763	266,087	
	d) Avg traffic served on POI (Erlang)		344	11,067	9,437	84	33,899	7,502	0	915	34,630	4,222	17,377	230	7,502	
	e) Total number of working POI Service Area wise		24	29	30	43	55	23	14	10	26	27	109	35	23	
	f) Equipped Capacity of Network in respect of Traffic in erlang		5,619	83,903	126,464	466	81,205	50,000	119	82,346	118,850	45,940	14,336	12,600	56,000	
	g) Total traffic handled in TCBH in erlang		553	NA	65,147	18	75,443	NA	0	25,617	112,765	10,583	49,713	227	NA	
(B)	Customer Service Quality Parameters															
4	Response time to customers for assistance															
	a) Accessibility of call centre	>=95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	93.95%	100.00%	
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	91.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	98.00%	100.00%	94.00%	94.76%	

NA: Not Applicable, NR: Not Received

Parameter-wise Findings (Live Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Haryana Service Area are as given below:-

- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.02% and 99.70%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.3%.
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% and 0.6%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 2.0%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Except for BSNL, IDEA, Tata GSM, Vodafone & Tata CDMA with a value of 4.25%, 3.09%, 6.49%, 3.86% & 5.6% respectively, rest of the operators are satisfying the benchmark with value in between 0% and 2.99%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 96.8% and 100%.
- **No. of POI having Congestion $>0.5\%$:** Aircel & BSNL were found to have POIs with congestion more than 0.5%.. There was no congestion found overall on the POI for other operators, but cases were found where 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):** Except MTS with value 93.95%. All operators are meeting the benchmark with values lying between 93.95% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** All the operators meeting the benchmark with values lying between 91.0% to 100%.

(2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA DOCOMO	V-fone	Videocon	TATA CDMA	MTS	Rcom	
			GSM Operators									CDMA Operators				
(A)	Network Service Quality Parameter															
1	Network Availability															
	a) BTS Accumulated Downtime	<=2%	0.40%	0.14%	1.59%	0.79%	0.14%	0.17%	0.00%	0.05%	0.19%	0.16%	0.02%	0.20%	0.13%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.43%	1.95%	0.00%	0.00%	0.24%	0.00%	0.00%	0.90%	0.65%	0.00%	0.00%	0.11%	
	c) Total no. of BTSs in the licensed service area		166	2,584	1,539	21	2,163	1,243	6	1,433	2,565	1,228	527	153	894	
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		484	2,592	18,208	120	2,249	1,482	0	466	3,540	1,448	77	222	819	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	11	30	0	0	3	0	0	23	8	0	0	1	
2	Connection Establishment (Accessibility)															
	a) CSSR (Call Setup Success Rate)	>=95%	99.56%	99.25%	98.83%	99.22%	98.80%	98.69%	98.08%	98.70%	97.02%	98.23%	99.60%	99.59%	99.29%	
	b) SDCCH/PAGING congestion	<=1%	0.19%	0.14%	0.10%	0.03%	0.28%	0.20%	0.48%	0.02%	1.49%	0.09%	0.00%	0.00%	0.00%	
	c) TCH congestion	<=2%	0.08%	0.25%	0.45%	0.00%	0.44%	0.15%	0.67%	0.37%	1.46%	1.15%	0.00%	0.00%	0.46%	
3	Connection maintenance (retainability)															
	a) CDR	<=2%	1.10%	0.65%	1.96%	1.25%	0.87%	0.33%	0.00%	0.79%	0.97%	1.24%	0.19%	0.21%	0.61%	
	b) Worst affected cells>3% TCH drop	<=3%	1.77%	0.77%	4.82%	1.37%	2.95%	0.80%	0.00%	6.37%	4.48%	0.65%	5.15%	0.56%	0.40%	
	c) Good voice quality	>=95%	98.35%	98.72%	96.72%	98.08%	96.77%	97.39%	99.66%	97.01%	96.77%	98.37%	NA	99.99%	NA	
	d) Total No. of cells exceeding 3% TCH drop (call drop)		9	59	222	1	192	30	0	274	348	24	81	3	4	
	e) Total no. of cells in the network		498	7,678	4,608	63	6,507	3,729	18	4,299	7,765	3,679	1,580	464	894	
4	No. of POI having congestion > 0.5%		4	0	5	0	0	0	0	0	0	0	0	0	0	
	a) Name of POI not meeting the benchmark		VSNL/BTS OL/BSNL; BSNL; BTSOL/BSNL; Vodafone		Bharti, Idea, Vodafone, Tata, Reliance											
	b) Total No. of call attempts on POI (Avg.)		48,843	763,306	4,222,304	2,363	1,342,185	265,900	140	45,445	2,056,330	3,047,899	601,489	11,504	265,900	
	c) Total traffic served on POI (Erlang) (Avg.)		3,485	11,325	80,605	80	32,668	7,506	3	928	34,394	114,554	17,451	212	7,506	
	d) Total No. of circuits on POI		6,550	30,199	30,255	1,307	55,302	16,895	390	2,865	59,422	10,008	40,404	3,487	16,895	
	e) Total number of working POI Service Area wise		24	29	30	43	55	23	14	10	26	27	109	35	23	
	f) Capacity of POI		6,161	28,408	21,178	985	54,492	15,019	229	2,621	59,072	9,377	37,505	3,074	15,019	
5	Network Data															
	a) Equipped Capacity of Network Erlang		5,619	83,903	126,464	466	81,205	50,000	119	82,346	118,850	45,940	14,336	12,600	56,000	
	b) Total traffic in TCBH in erlang (Avg.)		NA	53,423	66,482	NA	76,417	47,336	NA	25,617	112,058	NA	48,892	204	27,885	
	c) Total no. of customers served (as per VLR) on last day of the month		322,351	1,968,378	1,434,156	1,830	2,860,678	NP	16	1,077,141	3,628,148	280,917	533,967	27,328	NP	

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	RTL GSM	Loop	TATA DOCOMO	V-fone	Videcon	TATA CDMA	MTS	Rcom	
			GSM Operators									CDMA Operators				
(B)	Customer Service Quality Parameters															
6	Metering/billing credibility-Post paid	<= 0.1%	0.06%	0.06%	0.00%	NA	0.09%	0.10%	NA	0.40%	0.01%	NA	0.00%	0.88%	0.10%	
	a) No. of bills issued during the period		3,442	53,114	22,809	NA	59,550	7,832	NA	10,294	52,770	NA	117,933	1,702	83,356	
	b) No. of bills disputed including billing complaints during the period		2	30	0	NA	54	8	NA	41	5	NA	4	15	85	
7	Metering /billing credibility-Pre paid	<= 0.1%	0.09%	0.00%	0.00%	0.14%	0.01%	0.01%	0.00%	0.29%	0.01%	0.36%	0.01%	0.01%	0.01%	
	a) No. of charging / credit / validity complaints during the quarter		489	61	0	11	287	275	0	5,245	257	3,294	163	117	110	
	b) Total no. of pre-paid customers at the end of the quarter		559,344	2,864,601	2,927,605	7,906	3,144,817	2,658,954	101	1,784,185	4,106,368	927,578	1,776,306	814,971	1,085,785	
8	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	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		491	3,290	0	11	1,748	283	0	5,286	262	3,294	1,351	215	195	
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		491	3,290	0	11	1,748	283	0	5,286	262	3,294	1,351	215	195	
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		374	91	0	0	341	36	0	13	232	98	167	132	77	
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		117	3,199	0	11	1,407	247	0	5,273	30	3,196	1,184	83	118	
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
9	Response time to customers for assistance															
	a) Accessibility of call centre/Customer Care	>=95%	92.76%	99.72%	100.00%	99.12%	99.32%	100.00%	100.00%	99.16%	100.00%	100.00%	98.59%	90.09%	100.00%	
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	100.00%	96.00%	97.00%	98.90%	79.00%	79.20%	100.00%	94.00%	98.00%	99.00%	94.45%	90.00%	92.42%	
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		173,642	3,146,855	760,511	1,136	34,299	761,939	1	219,286	6,049,248	1,162,194	250,164	1,746	456,748	
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		161,070	3,137,968	760,511	1,126	34,066	761,939	1	217,451	6,049,248	1,162,194	246,627	1,573	456,748	
10	Termination/closure of service	<=7days	100%	100%	100%	NA	100%	100%	NA	100%	100%	NA	100%	NA	100%	
	a) Total No. of requests for Termination / Closure of service received during the quarter		8	569	46378	NA	345	58	NA	141	847	NA	565	NA	252	
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		8	569	46378	NA	345	58	NA	141	847	NA	565	NA	252	
11	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	NA	100%	100%	NA	100%	100%	NA	100%	NA	100%	

NA: Not Applicable, NR: Not Received

Parameter-wise Findings (Month Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Haryana Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.59%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.95%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.02% and 99.60%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** Except Vodafone with values 1.5%, all operators are meeting the benchmark with values lying between 0% and 0.5%.
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% and 1.5%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 1.3%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Except for BSNL, Tata GSM, Vodafone & Tata CDMA with a value of 4.82%, 6.37%, 4.48% & 5.15%, all the operators are satisfying the benchmark with value in between 0% and 2.95%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.00% and 100%.
- **No. of POI having Congestion $>0.5\%$:** All the operators are meeting the benchmark. There was no congestion found overall on the POI, but cases were found where 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):** Except Aircel & MTS, all operators are meeting the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Except Idea & Rel GSM with values of 79% & 79.20%, all the operators are meeting the benchmark with values lying between 90% to 100%.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Except for Tata GSM & MTS with values of 0.40% & 0.88% respectively, all other operators are meeting the benchmark. With values lying between 0.00% to 0.09%.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** Except for Etisalat, Tata GSM, & Videocon with value of 0.14%, 0.29% & 0.36% , all the operators are meeting the benchmark with values lying between 0% and 0.09%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All 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.

(1) Sample Coverage

Switches/BSC/BTS details of operators:

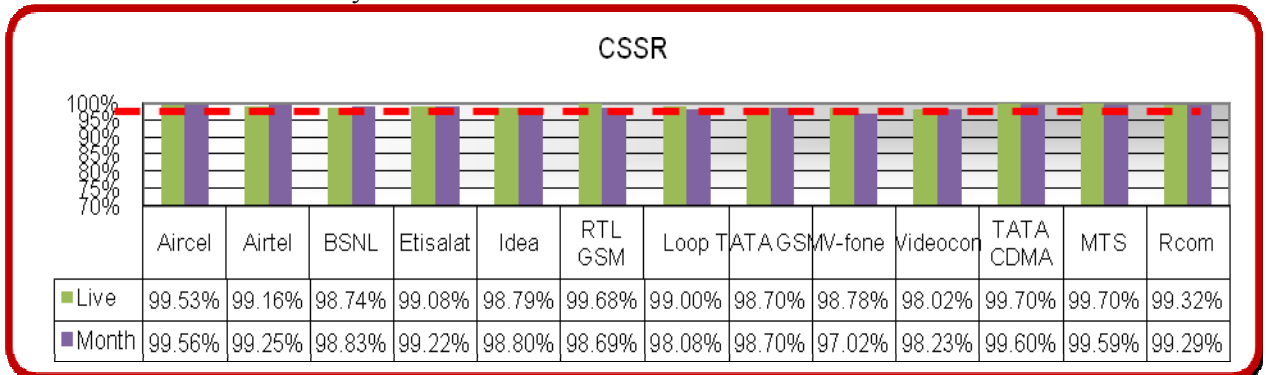
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	1	1	166
2	Airtel Ltd	7	23	2584
3	BSNL	4	23	1539
4	Etisalat	1	2	21
5	Idea	3	25	2163
6	Reliance Communication (GSM)	1	8	1243
7	Tata Communications (GSM)	2	12	1433
8	Loop	1	1	6
9	Videocon	1	1	1228
10	Vodafone	12	46	2565
CDMA Operators				
11	MTS (CDMA)	1	1	153
12	Reliance Communication (CDMA)	2	0	894
13	Tata Communications (CDMA)	4	13	527

(2) Performance (Graphical Representation)

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

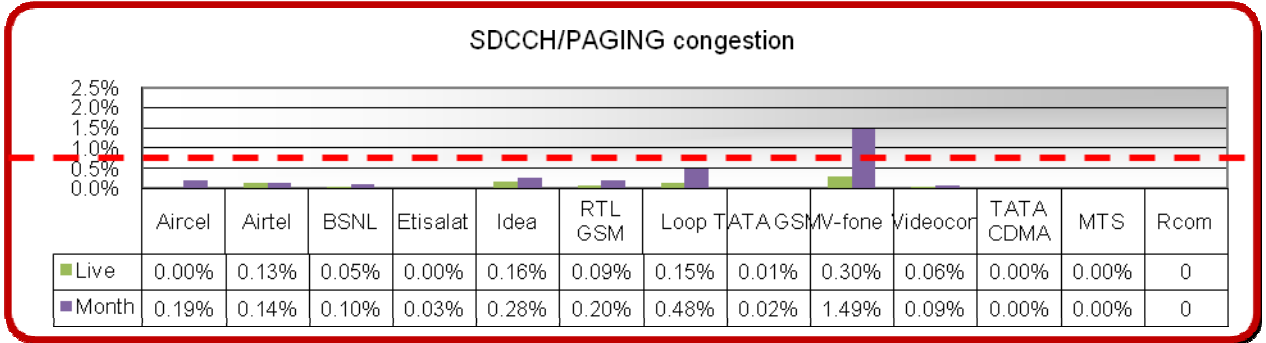
A) NETWORK PERFORMANCE

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

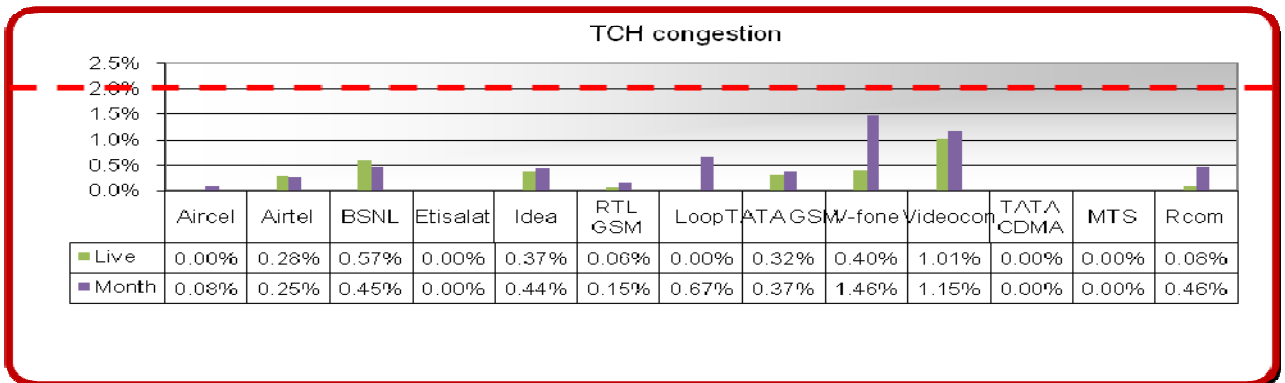


II. Blocked call rate:

SDCCH congestion (%): Except Vodafone with month data not meeting benchmark. All operators are meeting the TRAI benchmarks ($\leq 1\%$) for both one month data and 3 days live data taken in the month of audit.

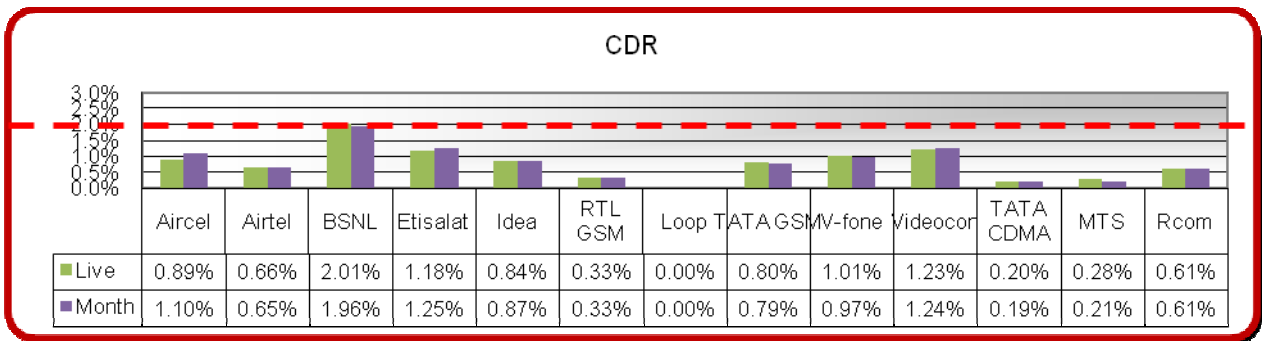


TCH congestion (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

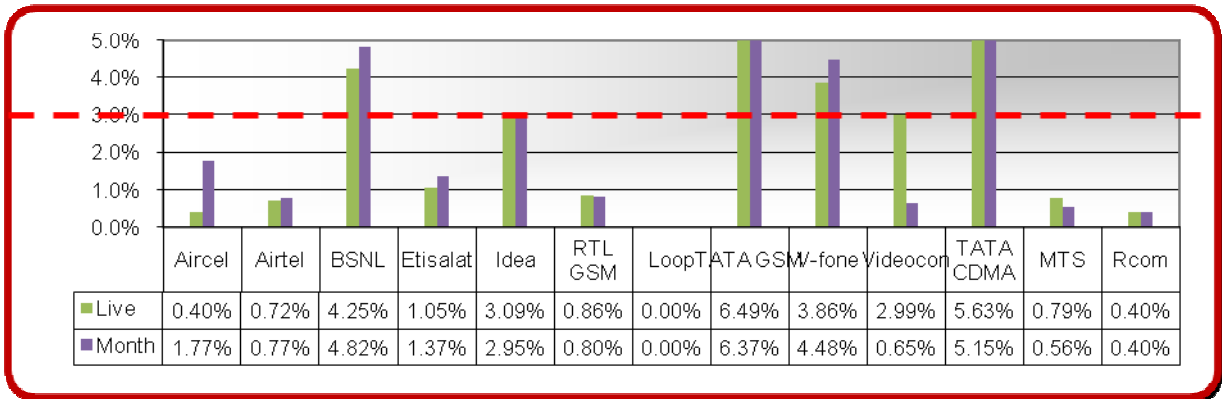


III. Connection Maintainability (Retainability):

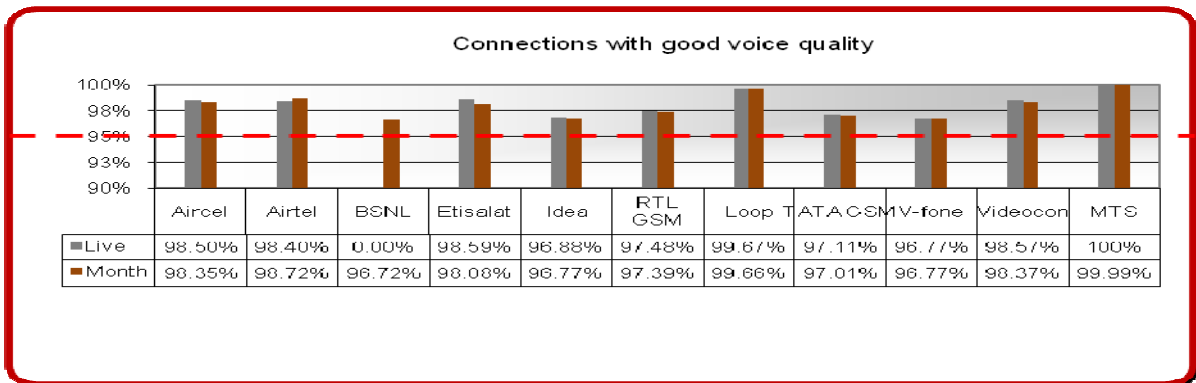
Call drop rate (%): Except BSNL with live data having values 2.01%. All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



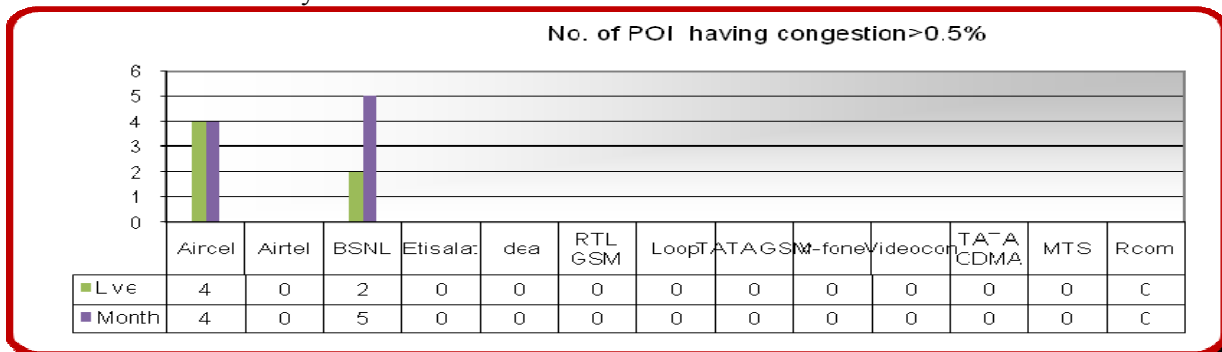
Worst affected Cell exceeding 3% TCH Drop: For both live and month data BSNL, Tata Docomo, Vodafone & Tata CDMA with a value of 4.25%, 4.82%; 6.49%, 6.37%; 3.86%, 4.48%; 5.63%, 5.15% respectively and Idea if live with value 3.09% is found not meeting the benchmark of $\leq 5\%$. Rest of the operators are meeting the benchmark for both cases.



Percentage of connections with good voice quality (benchmark $\geq 95\%$): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.



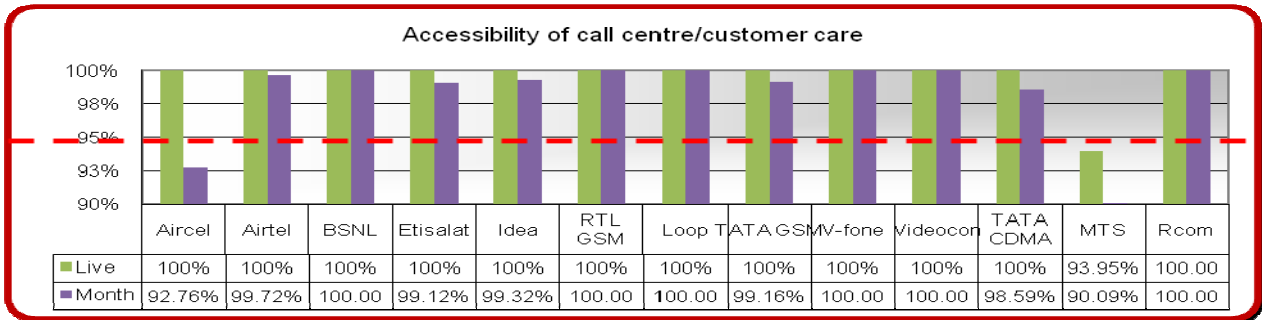
POI Congestion: All operators are meeting the TRAI benchmarks ($\geq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.



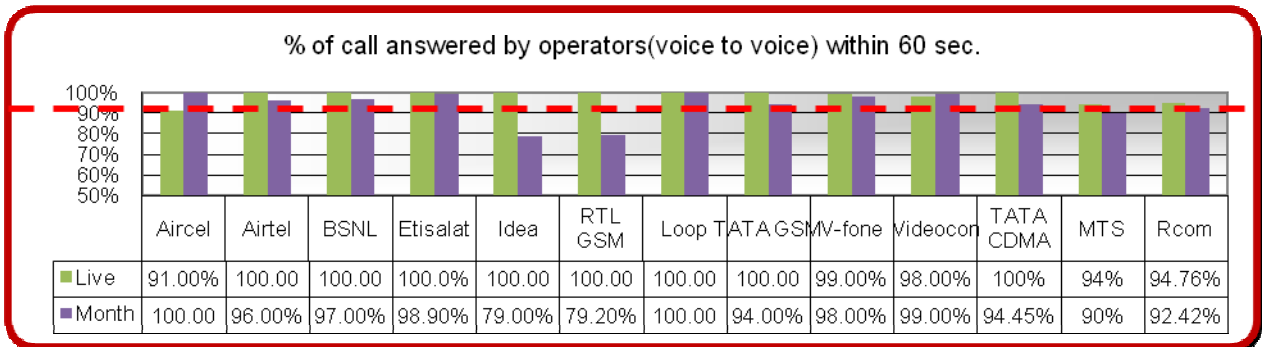
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): Except for Live & Month data of MTS not meeting benchmark, rest all operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.



Percentage of call answered by operators (Voice to voice) within 60 sec: For month data, only Idea & Rel_GSM are meeting the benchmark. Rest all the operators meeting the benchmark.



(3) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for parameters like “worst affected cells >3% TCH drop” (Tata-GSM & Tata CDMA), and “%age of calls answered by operator” (Idea & Rel_GSM).

(A) 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	Airtel	Idea	Reliance (GSM)	Tata (GSM)	Vodafone	Reliance (CDMA)	Tata (CDMA)
Total No. of calls	5	5	6	5	7	6	4
Cases resolved with 4 weeks	5	5	6	5	7	6	4
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%

3) Live calling to Call centre:

Fifty nos. of calls were made at Ambala in each half and below given no. of calls got connected to the call centre within 60 Secs.

	OPERATORS NAME												MT S
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Videocon	Vodafone	Loop	Rcom	Tata	
	GSM										CDMA		
1ST HALF (10AM TO 01 PM)	44	45	47	45	48	47	48	49	47	47	48	47	39
2ND HALF (04PM TO 07 PM)	47	42	43	44	39	38	42	44	45	46	40	41	40
In % age	91.00	87.00	90.00	89.00	87.00	85.00	90.00	93.00	92.00	93.00	88.00	88.00	79.00

4) Level 1 Calling:

Level 1 calling such as calling at emergency no. (Police, Fire, Hospital), Railway enquiry system etc were made so as to check the service of such short codes. In Ambala it was found to be functional.

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.

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

A sample of 2x50 test calls per Service Providers with in the licensed service area (Haryana Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs so that TCBH hours for all the operators were covered.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Loop	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Aircel	-	100%	100%	100%	100%	98%	100%	100%	100%	100%	100%	97%	96%
Airtel	100%	-	100%	100%	100%	97%	100%	100%	98%	100%	100%	99%	100%
BSNL	100%	100%	-	100%	100%	98%	100%	100%	100%	100%	100%	100%	100%
Etisalat	100%	100%	99%	-	100%	100%	100%	100%	100%	100%	100%	97%	99%
Idea	100%	100%	97%	100%	-	98%	100%	100%	100%	97%	100%	100%	100%
Reliance (GSM)	100%	100%	96%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	100%	100%	100%	100%	100%	97%	-	97%	100%	100%	100%	100%	100%
Loop	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	100%	96%	100%	100%	98%	100%	100%	-	99%	100%	100%	99%
Vodafone	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%	100%	-	100%
Tata (CDMA)	100%	100%	97%	100%	100%	96%	100%	100%	100%	97%	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.

(C) Drive test of the mobile network of service providers**i) Sample Coverage**

The Operator Assisted Drive Test was conducted at Haryana for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations***Ambala***

LOW DENSE: Grain Market, Sector 7 Near Electricity Office, Sector 9, VPO Rattangarh jalbera Rd Ambala, Railway Station Platform, Railway Electrification Micro, Ambala Model Town, Ambala Rly Stn., Model town ambala, Rai Market, Ambala Cantt, Totta Mohalla Behind Science Surgical House Near BD, school Railway tower DRM Office Ambala, Mohra Shahpur.

MEDIUM DENSE: City Vijay Cinema, City Shastri Colony, Cantt Durand Road Cantt. Ambala, Sadar bazaar Ambala, Urbna estate, BC Bazaar, Baldev nagar Ambala, Prem Nagar Urban Estate Ambala, Ambala Sector-7, Tau Devi Lal Chowk A/City, Palika vihar Ambala, Ambala Sec 9, Machi Mohalla.

HIGH DENSE: BC bazaar, Near Royal Palace Haryana Amritsar Highway Jasnmeet nagar Ambala city, Subhash nagar New Baldev Nagar Ambala, Virat Nagar, Model Town, Near Jandli Bridge, Ambala City, Sadar Bazaar, Sadar Bazaar, Ambala MSC IBS, Luxmi Park, Court Road, Jaggi Colony.

Karnal

LOW DENSE: Model Town Karnal, Kalra Market, Karnal, urban Estate, VPO Karnal Distt karnal Haryana, Kunjpura Road Karnal, Karnal (back Side Of Suvidha Garments), Prem Nagar Market, Karnal Subzi Mandi karnal, Sadar Bazaar (Railway road), Urban Estate, Karnal, Haryana, Maharana Partap Chowk, Sector 9 Market, Karnal, Karnal Sec 6, Karnal Sec 13, Liberty Chowk, Uchana Karnal.

MEDIUM DENSE: Model Town Karnal, Sec-8, Sector 14, Ram Nagar, Sector-13, Sector-6, Sec13 New, Bus Stand, Sec 7 Karnal, Nayai Puri, Sadar bazaar Karnal, sector-12 Karnal, Wajirchand Colony, Model Town, Ward No 4, Karnal., Janta Mandi, Nr Novelty Cinema Karnal., Sec 7 Karnal sector-12 Part 2.

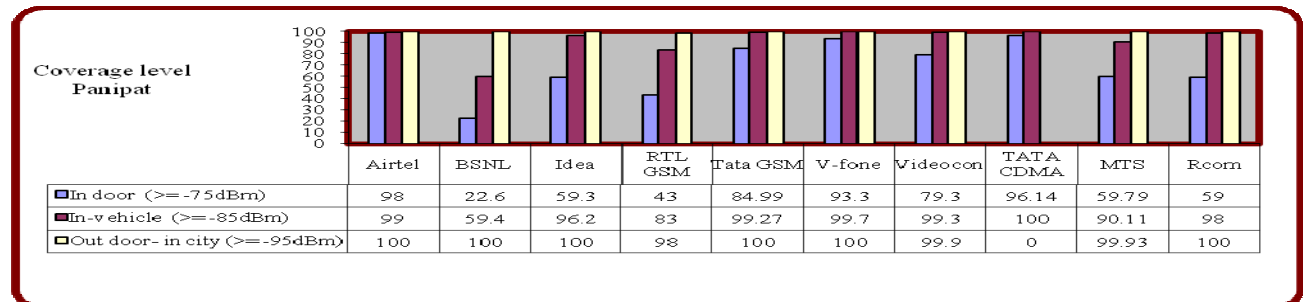
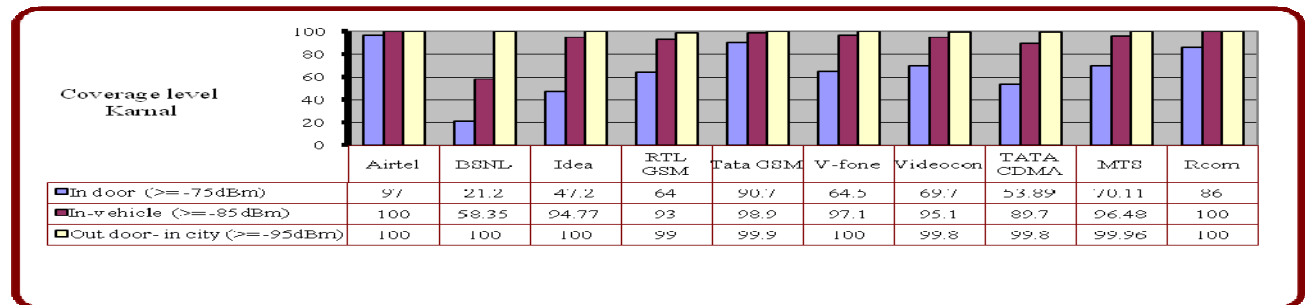
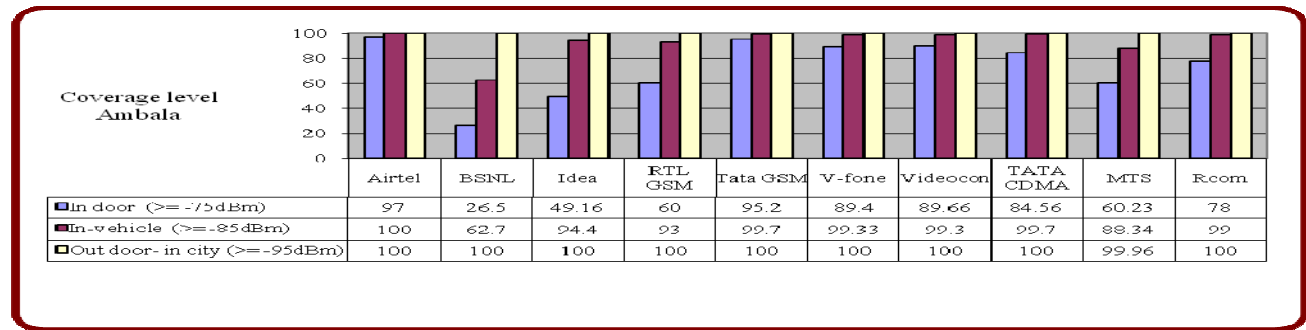
HIGH DENSE: Karnal City Haveli, Hotel Akshadeep, New Prem Colony, House No 1 Gali No 1, Kaithal Road, Gandhi Chock, Hotel Akashdeep sabji Mandi, BASANT VIHAR KARNAL, ITI Chowk Karnal, Choti Market.

Panipat

- LOW DENSE:** Kishanpura Panipat,197, Krishna Nagar, Tehsil Camp, Jattu Rd Nr Kaka Chowk,Shanti Colony, model town -2Jattal road, Insar chowk, Asandh Road, Panipat, GUPTA Weaving Factory, Opp R K School, Kautani Road, Panipat-sanoli Road Panipat city, Sec 11-12, Part 1 HUDA, Panipat. 23-L, Model Town Panipat, Nr Water Tank, Panipat. ,Ind area, Nr Kachha Kabdi Phatak, Panipat,Charanjit Bhatia colony, Assandh Rd Panipat,Bhatiya Colony,AshramRoad,ModelTown,Panipat,Pattialyana, samalkha,Samalkha TATA Shared,Azad Nagar,Near Samaj Sewa Semite Dharamshala,Samalkha,Distt. Panipat, Haryana, Smalkha Telephone Exchange, Sewah.
- MEDIUM DENSE:** TS sales Corp Near UCO Bank GT Road Panipat, Patti Rajputtan, Mahavir Colony, Panipat.,marido hotel,nangal kheri, gur mandi, deep complex, kishanpura,arya ngr., Subji Mandi, sawan park,kataria guest, Huda sec 11-12, insar chowk, sec 25 Huda, railway road Near Jathal Rd, Panipat, Panipat Near Bus Stand(Tehsil Camp), SEC-29 Panipat, Panipat-Huda, Ind. Area, Panipat,Sec. 25, Panipat, Old Area Panipat,Jatal Road, Panipat,Darpan Cinema, Old Jagannath Vihar, Near Devi Mandir Road,Pratap market , Bhatia Guest House, Red Light Chowk.
- HIGH DENSE:** Diwana (GB), VPO Karhans, Tehs Samalakha, Distt Panipat. ,Near Narulas NH 1,,shu Carpet, Barsat Road, Panipat Ind Area ,H No-70, Harish Kumar, Adarsh Nagar, Panipat.,N.H.B.C. Road , Model Town ,Tehsil road, behind civil hospital, Panipat,D.S. Woolen furnishers.

2) Performance												
SN	Parameter	City Name	Airtel	BSNL	Idea	RTL GSM	Tata GSM	V-fone	Videococ n	TATA CDMA	MTS	Rcom
			GSM Operators						CDMA Operators			
1.1	Call Attempts	Ambala	72	85	75	104	96	89	88	51	60	101
		Karnal	66	71	69	82	85	115	195	69	67	82
		Panipat	89	88	81	111	142	94	239	87	100	80
1.2	Blocked Call Rate (<=3%)	Ambala	0.00%	5.90%	0.00%	0.96%	1.17%	2.24%	0.00%	0.00%	0.00%	0.00%
		Karnal	0.00%	6.67%	1.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Panipat	1.12%	2.38%	0.00%	0.00%	1.40%	1.06%	0.00%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Ambala	0.00%	2.70%	0.00%	0.00%	2.30%	2.24%	0.00%	0.00%	0.00%	0.00%
		Karnal	0.00%	0.00%	0.00%	0.00%	1.17%	0.00%	0.51%	0.00%	0.00%	0.00%
		Panipat	0.00%	0.00%	0.00%	0.00%	1.40%	0.00%	0.42%	0.00%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (>=95%) (i) 0-4 (w/o frequency hopping)	Ambala	NA	NA	NA	NA	NA	NA	NA	95.46%	95.48%	99.00%
		Karnal	NA	NA	NA	NA	NA	NA	NA	95.09%	96.1%	96.00%
		Panipat	NA	NA	NA	NA	NA	NA	NA	91.75%	95.72%	99.00%
	(ii) 0-5 (with frequency hopping)	Ambala	95.20%	91%	94.0%	95.0%	96.00%	97.00%	97.37%	NA	96.07%	NA
		Karnal	96.40%	95%	96.0%	97%	95.18%	94.34%	96.1%	NA	97%	NA
		Panipat	95.90%	93.5%	94.0%	95%	95.00%	95.39%	95.56%	NA	96.3%	NA
1.5	Service Coverage In door (>= -75dBm)	Ambala	97	21.2	47.2	64	90.7	64.5	69.7	53.89	70.11	86
		Karnal	97	26.5	49.16	60	95.2	89.4	89.66	84.56	60.23	78
		Panipat	98	22.6	59.3	43	84.99	93.3	79.3	96.14	59.79	59
	In-vehicle (>= -85dBm)	Ambala	100	58.35	94.77	93	98.9	97.1	95.1	89.7	96.48	100
		Karnal	100	62.7	94.4	93	99.7	99.33	99.3	99.7	88.34	99
		Panipat	99	59.4	96.2	83	99.27	99.7	99.3	100	90.11	98
	Outdoor- in city (>= -95dBm)	Ambala	100	100	100	99	99.9	100	99.8	99.8	99.96	100
Karnal		100	100	100	100	100	100	100	100	99.96	100	
Panipat	100	100	100	98	100	100	100	99.9	NA	99.93	100	
1.6	Call Setup Success Rate (>=95%)	Ambala	100%	94.10%	100%	99.04%	98.83%	97.76%	100%	100%	100%	100%
		Karnal	100%	93.33%	98.56%	100%	100%	100%	100%	100%	100%	100%
		Panipat	98.88%	97.62%	100.00%	100.00%	98.60%	98.94%	100%	100%	100%	100%

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:

- BSNL is meeting all the benchmarks except showing deviation in Blocked Call Rate in Ambala (5.90%) & Karnal (6.67%), Percentage of connection with Good voice quality in Ambala, Karnal & Panipat with values (91.33%, 94.50% & 93.47%) and CSSR in Ambala(94.10%) and Karnal(93.33%) .
- Idea is meeting all the benchmarks except for Percentage of connection with Good voice quality in Panipat (94%)
- Vodafone is meeting benchmarks except Percentage of connection with Good voice quality in Karnal (94.34%) and CDR.
- Tata CDMA is meeting all the benchmarks except for Percentage of connection with Good voice quality in Panipat (91.75%)
- Tata Docomo is meeting all the benchmark except CDR.

(D) Independent Drive Test**(1) Sample Coverage**

The Independent Drive Test was conducted at Haryana after operators assisted drive test was over for respective operators. Route cover was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations**Ambala**

LOW DENSE: Grain Market, Sector 7 Near Electricity Office, ,Sector 9,VPO Rattangarh jalbera Rd Ambala , Railway Station Platform, Railway Electrification Micro, Ambala Model Town, ,Ambala Rly Stn.,Model town ambala,Rai Market , Ambala Cantt,Totta Mohalla Behind Science Surgical House Near BD ,school Railway tower DRM Office Ambala, Mohra Shahpur.

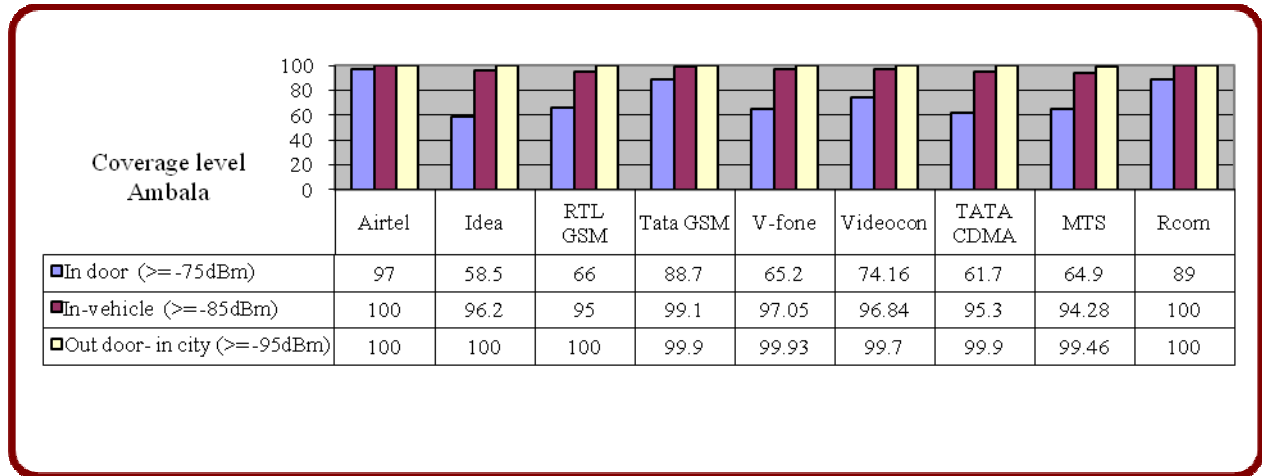
MEDIUM DENSE: City Vijay Cinema, City Shastri Colony, Cantt Durand Road Cantt. Ambala, Sadar bazaar ambala,Urbna estate,B C Bazar,Baldev nagar Ambala,Prem Nagar Urban Estate Ambala, Ambala Sector-7,Tau DeviLal Chowk A/City,Palika vihar Ambala, Ambala Sec 9,Machi Mohalla.

HIGH DENSE: BC bazaar, Near Royal Palace Haryana Amritsar Highway Jasnmeet nagar Ambala city ,Subhash nagar New Baldev Nagar Ambala, Virat Nagar, Model Town, Near Jandli Bridge, Ambala City, Sadar Bazaar ,Sadar Bazaar ,Ambala MSC IBS,Luxmi Park,Court Road ,Jaggi Colony.

2) Performance

SN	Parameter	City Name	Airtel	Idea	RTL GSM	Tata GSM	V-fone	Videocon	TATA CDMA	MTS	Rcom
			GSM Operators						CDMA Operators		
1.1	Call Attempts	Ambala	72	73	99	89	89	88	57	67	101
1.2	Blocked Call Rate (<=3%)	Ambala	0.00%	4.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Ambala	0.00%	0.00%	0.00%	0.00%	2.24%	1.13%	0.00%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)										
	(i) 0-4 (w/o frequency hopping)	Ambala	96%	NA	NA	NA	NA	NA	95.77%	NA	98.00%
	(ii) 0-5 (with frequency hopping)	Ambala	100.0%	95.0%	97.0%	95.00%	97.00%	97.1%	NA	97.03%	NA
1.5	Service Coverage										
	In door (>= -75dBm)	Ambala	97	58.5	66	88.7	65.2	74.16	61.7	64.9	89
	In-vehicle (>= -85dBm)	Ambala	100	96.2	95	99.1	97.05	96.84	95.3	94.28	100
	Outdoor- in city (>= -95dBm)	Ambala	100	100	100	99.9	99.93	99.7	99.9	99.46	100
1.6	Call Setup Success Rate (>=95%)	Ambala	100%	96%	100%	100%	100%	100%	100%	100%	100%

Graphical Representation



(3) Critical Analysis

- Idea is meeting all the benchmarks except for Blocked Call Rate in Ambala (4.10%).
- Vodafone is deviating from the benchmarks for Dropped Call Rate (2.24%) in Ambala.

(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 (Haryana) is by and large satisfactory for **Network Parameters**-parameters like 'Worst affected cell>3%TCH Drop' for BSNL, Tata GSM, Vodafone & Tata CDMA.

Under **Customer Service Quality Parameter** "operator answered calls (voice-to-voice) within 60 seconds" parameter it is found all operators are fulfilling TRAI benchmark of $\geq 90\%$. Apart from this, the "accessibility of call centre" parameter benchmark is not met by Aircel in Live and Idea & Reliance Gsm in Month.

Regarding **Metering/Billing Credibility** issues, MTS shows below benchmark value for Pre-paid & Videocon for Post-paid connections.

It is found that Aircel, Etisalat, Loop, Videocon & MTS have low customer database and Aircel, Videocon and MTS is on ICR in most of the Cities in Haryana Circle.

During **Drive Tests**, high Blocked Call Rates were found in case of BSNL (Ambala & Karnal). Similarly, dropped call rate benchmark was not met by BSNL (Ambala), Vodafone (Ambala) and %age of good voice quality was not met by BSNL (Ambala, Karnal & Panipat), Idea (Panipat), Vodafone (Karnal) & Tata CDMA (Panipat) and CSSR was not met by BSNL (Ambala & Karnal). Most of the GSM operators have meeting the benchmark.

III. Basic Telephone Service (Wireline) Providers

.....Audit not done for this quarter

IV. Broadband Service Providers

.....Audit not done for this quarter