REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

NORTH ZONE – RAJASTHAN CIRCLE

Report Period: October 2011 – December 2011

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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 lay 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)   Emergency (level 1) calls 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 Rajasthan 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 Rajasthan Circle in 4th quarter (October – December 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period April – June 2011.

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

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	Nov-2011	1900-2000 Hrs
2	Airtel Ltd	Nov-2011	2000-2100 Hrs
3	BSNL	Nov-2011	1900-2000 Hrs
4	Etisalat	Nov-2011	2000-2100 Hrs
5	Idea	Nov-2011	1900-2000 Hrs
6	Loop	Nov-2011	2000-2100 Hrs
7	Reliance Communication (GSM)	Nov-2011	1900-2000 Hrs
8	Tata Communications (GSM)	Nov-2011	1900-2000 Hrs
9	Videocon	Nov-2011	2000-2100 Hrs
10	Vodafone	Nov-2011	1900-2000 Hrs
CDMA Operators			
11	MTS	Nov-2011	2000-2100 Hrs
12	Reliance Communication	Nov-2011	1900-2000 Hrs
13	Tata Communications	Nov-2011	1900-2000 Hrs

Note: During Audit & Drive Test, it was found that:
1. *Aircel is on ICR with Tata GSM in Ajmer while Tata GSM is on ICR with Idea in Jodhpur.*
2. *No services for Tata GSM in Shri Ganganagar.*
3. *Etisalat, Loop & Videocon are under roll out obligation, and therefore drive test not conducted for them in Rajasthan Circle.*

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

(A) Cellular Mobile Telephone Services

S/N	Name of Parameter (3 days Live Data Audit)	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators											CDMA Operators	
1	**Network Availability**														
	a) BTS Accumulated Downtime	<=2%	0.05%	0.10%	1.80%	1.48%	0.21%	1.40%	0.01%	0.94%	0.00%	0.09%	0.10%	1.15%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.92%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%	0.00%
	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	96.68%	99.23%	97.77%	99.61%	98.43%	99.67%	97.65%	100%	98.59%	98.87%	98.91%	99.22%	98.70%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.12%	0.61%	0.06%	0.26%	0.03%	0.05%	0.00%	0.51%	0.43%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.36%	1.10%	0.00%	1.02%	0.04%	0.07%	0.00%	0.00%	0.33%	0.15%	0.08%	0.05%
2	**Connection maintenance (Retainability)**														
	a) CDR	<=2%	0.99%	1.16%	0.71%	0.79%	1.47%	0.56%	1.03%	0.00%	0.41%	0.91%	0.64%	0.65%	0.00%
	b) Worst affected cells>3% TCH drop	<=3%	4.47%	2.73%	4.87%	1.52%	2.81%	0.21%	5.90%	0.00%	0.00%	2.51%	1.17%	0.19%	0.05%
	c) Good voice quality	>=95%	96.96%	98.90%	98.07%	98.04%	96.14%	99.02%	98.28%	99.22%	99.58%	97.79%	98.25%	NA	NA
3	**No. of POI's having congestion >0.5%**	<=0.5%	0	0	2	0	0	0	1	1	0	0	2	0	0
4	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	100%	99.35%	98.50%	99.41%	93.92%	98.87%	70.18%	100%	100%	100%	98.45%	98.48%	66.20%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	86.90%	87.32%	96.50%	100%	61.70%	98.68%	98.69%	100%	100%	63.00%	98.96%	99.27%	99.53%

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting most of the network parameters except for BSNL, Aircel & Tata GSM for "Worst affected cells>3% TCH drop" parameter.

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter "calls answered by operators (voice-to-voice)" except for Aircel, Airtel, and Idea & Vodafone. Tata GSM, Tata CDMA & Idea are showing a below benchmark value for the parameter "accessibility of call centre".

One Month Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	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%*	0.03%	0.11%	1.88%	1.03%	0.15%	0.45%	0.01%	0.44%	0.17%	0.10%	0.12%	0.55%	0.03%
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.20%	1.97%	0.00%	0.00%	1.21%	0.00%	0.00%	0.00%	0.68%	0.00%	0.98%	0.00%
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	*>=95%*	96.82%	99.29%	96.39%	99.29%	98.54%	99.65%	97.67%	99.50%	99.11%	98.92%	98.76%	99.23%	98.70%
	b) SDCCH/PAGING congestion	*<=1%*	0.02%	0.22%	0.17%	0.10%	0.40%	0.09%	0.05%	0.16%	0.31%	0.39%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.04%	0.38%	0.71%	0.23%	0.93%	0.08%	0.06%	0.00%	0.09%	0.34%	0.14%	0.09%	0.06%
3	**Connection maintenance (Retainability)**														
	a) CDR	*<=2%*	0.93%	1.26%	1.33%	0.83%	1.44%	0.57%	1.04%	1.39%	1.05%	0.88%	0.67%	0.62%	0.59%
	b) Worst affected cells>3% TCH drop	*<=3%*	1.92%	2.79%	4.94%	1.52%	2.63%	0.15%	2.93%	0.00%	0.00%	2.04%	0.92%	0.16%	2.80%
	c) Good voice quality	*>=95%*	97.04%	98.91%	98.34%	97.90%	96.16%	98.99%	98.25%	97.90%	99.21%	97.81%	98.25%	NA	NA
4	**No. of POI's having congestion >0.5%**	*<=0.5%*	0	0	2	0	2	0	1	1	0	0	2	0	0
(B)	**Customer Service Quality Parameters**														
5	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.04%	0.05%	0.07%	NA	0.02%	0.05%	0.02%	NA	NA	0.11%	0.01%	0.01%	0.00%
6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.10%	0.00%	0.03%	0.00%	0.06%	0.08%	0.00%	NA	NA	0.04%	0.00%	0.09%	0.01%
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	100%	100%	100%	100%	100%	NA	NA	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%	NA	NA	100%	100%	100%	100%
8	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	*>=95%*	100%	98.87%	97.41%	99%	93.95%	98.96%	99.30%	100%	100%	100%	97.93%	98.62%	95.95%
	b) % call answered by operators(voice to voice) within 60 sec.	*>=90%*	90.92%	95.97%	NR	99.61%	62.49%	97.07%	NR	100%	99.32%	62.83%	94.64%	97.85%	NR
9	**Termination/closure of service**	*<=7days*	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%
10	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	100%	99.12%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting most of the network parameters except for BSNL for the parameter "Worst affected cells>3% TCH drop".

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter "calls answered by operators (voice-to-voice)", with only Idea & Vodafone are not meeting the 90% benchmark. A below benchmark performance is observed in case of Idea for "accessibility of call centre" parameter. Under "Metering/Billing Credibility (Post-Paid)" section, Vodafone is not meeting the prescribed benchmark. Similarly, Airtel is not meeting the benchmark for the parameter "time taken for refunds of deposits after closures" with 3 cases was found beyond 60 days.

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in Rajasthan for all the operators. The main agenda of this Drive Test was to capture the actual picture of all Service Providers on ground level and for that cities chosen were Ajmer, Jodhpur & Shri Ganganagar. During test drive, route covered was about around 40-150 Km depending on city areas within the speed limit of 30Km/hr. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Ajmer	ICR (Tata GSM)	0	11.11	2.56	1.07	0	0	0	1.06	0
		Jodhpur	1.61	0	5.17	0	0.92	ICR (Idea)	0	0	0	0
		Shri Ganganagar	0	0	0	0	0	No Service	0	0	1	0
1.2	Dropped Call Rate (<=2%)	Ajmer	ICR (Tata GSM)	0	3.41	0	0	0	0	0	1.08	0
		Jodhpur	0	0	1.82	1.79	0.46	ICR (Idea)	0	0	0	0.4
		Shri Ganganagar	0	0	1.32	0	0	No Service	0	0	0	0
1.3	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Ajmer								99.9	96.2	96.39
		Jodhpur								99.9	97.06	99.62
		Shri Ganganagar								99.71	98.19	99.92
	(ii) 0-5 (with frequency hopping)	Ajmer	ICR (Tata GSM)	96.13	91.96	97.47	96.36	93.45	96.51			
		Jodhpur	95.37	96.37	91.98	97.86	97.61	ICR (Idea)	95.74			
		Shri Ganganagar	95.59	97.41	89.61	99.06	95.94	No Service	95.62			
1.4	Call Setup Success Rate (>=95%)	Ajmer	ICR (Tata GSM)	100	88.89	97.44	98.93	100	100	100	98.94	100
		Jodhpur	98.39	100	94.83	100	99.08	ICR (Idea)	100	100	100	100
		Shri Ganganagar	100	100	100	100	100	No Service	100	100	99	100

Key observations as could be derived from the table are as under:
+ Blocked call rate parameter is not met by BSNL in Ajmer & Jodhpur.
+ Dropped call rate parameter is not met by BSNL in Ajmer.
+ CSSR parameter is not met by BSNL in Ajmer and Jodhpur.
+ Good Voice quality parameter is not met by Tata GSM in Ajmer and BSNL in Jodhpur, Ajmer & Shri Ganganagar.

Independent Drive Test

SN	Parameter	BSNL	Idea	MTS	Tata GSM	Tata CDMA
		Nagaur		Chittaurgarh	Sawai Madhopur	
1.1	Blocked Call Rate (<=3%)	3.07	1.67	0.00	2.38	0.00
1.2	Dropped Call Rate (<=2%)	3.17	1.69	0.00	0.00	0.00
1.3	Percentage of connections with good voice quality (=>95%)					
	(i) 0-4 (w/o frequency hopping)			99.66		99.54
	(ii) 0-5 (with frequency hopping)	88.79	96.43		98.05	
1.4	Call Setup Success Rate (>=95%)	96.93	98.33	100	97.62	100

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

- "Blocked call rate", "Dropped call rate" & "Good voice quality" parameters are not met by BSNL in Nagaur Town.

(B) Basic Telephone Service (Wireline) 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**

S/N	Name of Parameter (PMR)	Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	V-con	V-fone	MTS	Rcom CDMA	Tata CDMA
				GSM Operators										CDMA Operators		
(A)	**Network Service Quality Parameter**															
1	**Network Availability**															
	BTS Accumulated Downtime	<=2%	Reported	0.14%	0.10%	1.81%	0.30%	0.13%	0.00%	0.02%	0.01%	0.23%	0.06%	0.14%	0.00%	0.02%
			Verified	0.14%	0.10%	1.81%	0.30%	0.13%	0.00%	0.02%	0.01%	0.23%	0.06%	0.14%	0.00%	0.02%
	Worst affected BTSs due to downtime	<=2%	Reported	0%	0.25%	2.00%	3.05%	0.08%	0.01%	0.00%	0.00%	0.00%	0.31%	0%	0.00%	0.00%
			Verified	0%	0.25%	2.00%	3.05%	0.08%	0.01%	0.00%	0.00%	0.00%	0.31%	0%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**															
	CSSR (Call Setup Success Rate)	>=95%	Reported	97.00%	99.00%	99.00%	99.00%	98.00%	100%	97.00%	99%	99.00%	99.00%	99.00%	100%	99.00%
			Verified	97.00%	99.00%	99.00%	99.00%	98.00%	100%	97.00%	99%	99.00%	99.00%	99.00%	100%	99.00%
	SDCCH/PAGING congestion	<=1%	Reported	0.02%	0.21%	0.15%	0.07%	0.52%	0.00%	0.11%	0.04%	0.16%	0.00%	0%	0%	0%
			Verified	0.02%	0.21%	0.15%	0.07%	0.52%	0.00%	0.11%	0.04%	0.16%	0.00%	0%	0%	0%
	TCH congestion	<=2%	Reported	0.02%	0.28%	0.71%	0.14%	1.25%	0.00%	0.29%	0%	0.34%	0.00%	0.07%	0%	0.09%
			Verified	0.02%	0.28%	0.71%	0.14%	1.25%	0.00%	0.29%	0%	0.34%	0.00%	0.07%	0%	0.09%
3	**Connection maintenance (Retainability)**															
	CDR	<=2%	Reported	1.35%	1.00%	1.35%	0.53%	1.27%	0.00%	1.03%	0.00%	0.95%	0.01%	0.60%	0.00%	0.78%
			Verified	1.35%	1.00%	1.35%	0.53%	1.27%	0.00%	1.03%	0.00%	0.95%	0.01%	0.60%	0.00%	0.78%

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Telecommunications Consultants India Limited

	Worst affected cells>3% TCH drop	<=3%	Reported	0.08%	0.03%	4.98%	6.12%	2.88%	0.00%	2.15%	0%	0.00%	0.02%	2.72%	0.00%	3.43%
			Verified	0.08%	0.03%	4.98%	6.12%	2.88%	0.00%	2.15%	0%	0.00%	0.02%	2.72%	0.00%	3.43%
	Good voice quality	>=95%	Reported	97.00%	99.00%	98.00%	99.00%	97.00%	99%	98.00%	100%	99.00%	98.00%	99.00%	99.00%	99.00%
			Verified	97.00%	99.00%	98.00%	99.00%	97.00%	99%	98.00%	100%	99.00%	98.00%	99.00%	99.00%	99.00%
4	**No. of POI's having congestion >0.5%**		Reported	2	0	0	0	0	0	0	0	0	0	0	0	0
			Verified	2	0	0	0	0	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**															
5	**Metering/billing credibility- Post paid**	<= 0.1%	Reported	0.00%	0.00%	0.08%	NA	0.00%	0.00%	0.00%	0%	0.00%	0.00%	0.04%	0%	0.00%
			Verified	0.00%	0.00%	0.08%	NA	0.00%	0.00%	0.00%	0%	0.00%	0.00%	0.04%	0%	0.00%
6	**Metering /billing credibility- Pre paid**	<= 0.1%	Reported	0.05%	0.00%	0.08%	0.0%	0.00%	0.00%	0.00%	0%	0.00%	0.00%	0.02%	0%	0.00%
			Verified	0.05%	0.00%	0.08%	0.0%	0.00%	0.00%	0.00%	0%	0.00%	0.00%	0.02%	0%	0.00%
7	**Resolution of billing/ charging complaints**	100% within 4 weeks	Reported	100%	100%	98%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
			Verified	100%	100%	98%	100%	100%	100%	100%	NA	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%	NA	100%	100%	100%	NA	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	100%	100%	100%	100%	100%
8	**Response time to customers for assistance**															
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	100%	100%	NR	98%	100%	99%	100%	97%	97%	96%	100%	97%
			Verified	100%	100%	100%	NR	98%	100%	99%	100%	97%	97%	96%	100%	97%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	93%	93%	91%	NR	64%	91%	88%	100%	95%	95%	96%	91%	90%
			Verified	93%	93%	91%	NR	64%	91%	88%	100%	95%	95%	96%	91%	90%
9	**Termination/closure of**															

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	service															
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%
10	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	Reported	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%

     No Deviation is found when compared with Operator 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 measurement Data assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
A	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.05%	0.10%	1.80%	1.48%	0.21%	1.40%	0.01%	0.94%	0.00%	0.09%	0.10%	1.15%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0%	0%	0.92%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0%	0%	0%	0%
	c) Total no. of BTSs in the licensed service area		1066	7019	3604	22	3276	2483	1458	6	4	6199	1591	1431	929
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		36	518	4667	24	489	2502	9	4	0	391	116	1183	17
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	33	0	0	2	0	0	0	0	0	2	0
	f) CSSR	>=95%	96.68%	99.23%	97.77%	99.61%	98.43%	99.67%	97.65%	100%	98.59%	98.87%	98.91%	99.22%	98.70%
	g) SDCCH/PAGING congestion	<=1%	0.01%	0.12%	0.61%	0.06%	0.26%	0.03%	0.05%	0.00%	0.51%	0.43%	0.00%	0.00%	0.00%
	h) TCH congestion	<=2%	0.02%	0.36%	1.10%	0.00%	1.02%	0.04%	0.07%	0.00%	0.00%	0.33%	0.15%	0.08%	0.05%
2	Connection maintenance														0.00%
	a) CDR	<=2%	0.99%	1.16%	0.71%	0.79%	1.47%	0.56%	1.03%	0.00%	0.41%	0.91%	0.64%	0.65%	0.59%
	b) Cells having > 3% TCH drop	<=3%	4.47%	2.73%	4.87%	1.52%	2.81%	0.21%	5.90%	0.00%	0.00%	2.51%	1.17%	0.19%	2.80%
	c) Good voice quality	>=95%	96.96%	98.90%	98.07%	98.04%	96.14%	99.02%	98.28%	99.22%	99.58%	97.79%	98.25%	NA	NA
	d) No. of cells > 3% TCH drop		142	572	517	1	275	16	257	0	0	466	57	8	80

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	e) Total no. of cells in the network		3179	20925	10626	66	9779	7449	4358	18	12	18567	4880	4293	2853
3	No. of POI's having congestion >0.5%	<=0.5%	0	0	2	0	0	0	1	1	0	0	2	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	L1 MI Road, L1 Bajaj Nagar	Nil	Nil	Nil	BSNL L1 Bajaj Nagar-JPR	JAIPUR AIRTEL OG	Nil	Nil	BSNL-Cellone, Airtel Jodhpur	Nil	Nil
	b) Total No. of circuits on POI		36,149	136,721	44,234	4,213	69,233	12,803	38,971	452	630	135,801	34,170	22,359	42,613
	c) Avg No. of call attempts on POI		823,170	4,221,589	666,662	2,832	1,927,387	206,231	639,032	92	19	3,359,137	565,843	197,112	716,310
	d) Avg traffic served on POI (Erlang)		26,547	92,271	30,662	88	38,157	6,222	21,995	3	49	77,983	12,144	8,413	18,817
	e) Total number of working POI Service Area wise		30	93	40	24	77	17	36	18	19	69	57	69	179
	f) Capacity of POI		34503	133008	39953	3845	66468	12045	37678	263	414	130815	32290	20385	38765
	g) Equipped Capacity of Network in respect of Traffic in erlang		48526	443648	265400	541	120111	102000	59199	133	5000	233000	82200	202000	263958
	h) Total traffic handled in TCBH in erlang		21206	299770	125132	97	108111	92160	26259	1	1	203203	44807	39245	42119
(B)	Customer Service Quality Parameters														
4	Response time to customers for assistance														
	a) Accessibility of call centre	>=95%	100%	99.35%	98.50%	99.41%	93.92%	98.87%	70.18%	100%	100%	100%	98.45%	98.48%	66.20%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	86.90%	87.32%	96.50%	100%	61.70%	98.68%	98.69%	100%	100%	63.00%	98.96%	99.27%	99.53%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		17,478	181,886	200	113	257,342	619,118	112,661	1	2	1,206,430	99,930	105,076	30,168
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		17,478	180,716	200	112	241,684	612,104	79,062	1	2	1,206,430	98,385	103,476	19,972

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 Rajasthan Service Area are as given below:-

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting benchmark with values lying between 0% and 1.8%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting benchmark with values lying between 0% and 0.92%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96.68% and 100%. Loop is showing 100% CSSR as it has very low subscriber base.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.61%.
  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 1.10%.
- **Call drop rate (benchmark <= 2%):** All other operators are meeting the benchmark with values lying between 0% and 1.47%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Aircel(4.47%) ,Bsnl(4.87%),Tata GSM(5.90%), rests of the operators are satisfying the benchmark with value in between 0% and 2.81%.
- **Connections with good voice quality (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96.14% and 99.58%. For this parameter, **RCOM CDMA & Tata CDMA values are not system generated.**
- **No. of POI's having Congestion >0.5%:** For this parameter, mostly Operators found overall no congestion, However few cases are observed for some operators like BSNL, Tata GSM, Loop & MTS having calls failures >0.5% with nos. 2, 1, 1 & 1 respectively. It was also observed that 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 for Idea, Tata GSM & Tata CDMA, rest of the operators is meeting the benchmark with values lying between 98.45% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** Except for Aircel, Airtel, Idea & Vodafone, rest of the operator are meeting the benchmark with value in between 91.06% and 100%. Data not received from BSNL, Tata GSM & Tata CDMA.

(2) One month audit Data report & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
(A)	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.03%	0.11%	1.88%	1.03%	0.15%	0.45%	0.01%	0.44%	0.17%	0.10%	0.12%	0.55%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.20%	1.97%	0.00%	0.00%	1.21%	0.00%	0.00%	0.00%	0.68%	0.00%	0.98%	0.00%
	c) Total no. of BTSs in the licensed service area		1,066	7,020	3,604	22	3,314	2,483	1,458	6	4	6,199	1,591	1,431	929
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		247.9	5405	48862	163.88	3490	8036	142.62	19.01	5.03	4662	1326.4	5692	175.55
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	14	71	0	0	30	0	0	0	42	0	14	0
2	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	96.82%	99.29%	96.39%	99.29%	98.54%	99.65%	97.67%	99.50%	99.11%	98.92%	98.76%	99.23%	98.70%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.22%	0.17%	0.10%	0.40%	0.09%	0.05%	0.16%	0.31%	0.39%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.38%	0.71%	0.23%	0.93%	0.08%	0.06%	0.00%	0.09%	0.34%	0.14%	0.09%	0.06%
3	Connection maintenance (Retainability)														
	a) CDR	<=2%	0.93%	1.26%	1.33%	0.83%	1.44%	0.57%	1.04%	1.39%	1.05%	0.88%	0.67%	0.62%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	1.92%	2.79%	4.94%	1.52%	2.63%	0.15%	2.93%	0.00%	0.00%	2.04%	0.92%	0.16%	2.77%
	c) Good voice quality	>=95%	97.04%	98.91%	98.34%	97.90%	96.16%	98.99%	98.25%	97.90%	99.21%	97.81%	98.25%	NA	NA

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
							GSM operators							**CDMA Operators**	
	d) Total No. of cells exceeding 3% TCH drop (call drop)		61	585	525	1	261	11	128	0	0	379	45	7	79
	e) Total no. of cells in the network		3179	20943	10626	66	9940	7449	4367	18	12	18573	4880	4293	2853
4	**No. of POI's having congestion >0.5%**	*<=0.5%*	0	0	2	0	2	0	1	1	0	0	2	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	L1 MI Road, L1 Bajaj Nagar	Nil	VODAFONE_NLD_MUMBAI_MGW2_O/G, TATACOMM_NLD_AHMEDABAD_MGW2	Nil	BSNL L1 Bajaj Nagar-JPR	JAIPUR AIRTEL OG	Nil	Nil	BSNL-Cellone, Airtel Jodhpur	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		836,102	4,209,673	717,651	2,831	1,907,043	203,437	630,615	903	38	3,363,523	575,139	169,690	718,954
	c) Total traffic served on POI (Erlang) (Avg.)		25,853	90,436	32,461	75	38,218	6,223	21,917	26	45	77,576	12,303	7,478	18,435
	d) Total No. of circuits on POI		36,149	136,263	44,234	4,213	69,233	12,801	38,971	452	630	135,801	34,170	20,107	42,613
	e) Total number of working POI Service Area wise		30	93	40	24	77	17	36	18	19	69	57	69	179
	f) Capacity of POI		34,503	132,537	NR	3,845	66,468	12,049	37,678	263	414	130,815	32,290	18,321	38,765
5	**Network Data**														
	a) Equipped Capacity of Network Erlang		48526	443648	265400	23000	120111	102000	59199	5000	5000	233000	82200	202000	263958
	b) Total traffic in TCBH in erlang (Avg.)		20050	338492	120773	105	106836	97600	27075	1	1	191831	46805	46513	41274
	c) Total no. of customers served (as per VLR) on last day of the month		1089191	12364065	2736775	6524	3769638	3193281	1149348	62	457	7378444	999187	1354916	809502
(B)	**Customer Service Quality Parameters**														

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
5	Metering/billing credibility-Post paid	<= 0.1%	0.04%	0.05%	0.07%		0.02%	0.05%	0.02%			0.11%	0.01%	0.01%	0.00%
	a) No. of bills issued during the period		4586	187675	251291	NA	42210	13182	10630	NA	NA	177699	37111	115826	77926
	b) No. of bills disputed including billing complaints during the period		2	94	176		9	6	2			190	2	6	3
6	Metering /billing credibility-Pre paid	<= 0.1%	0.10%	0.00%	0.03%	0.00%	0.06%	0.08%	0.00%	0.00%	0.00%	0.04%	0.00%	0.09%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		1131	480	1923	1	2150	4285	3	0	0	3676	0	1947	261
	b) Total no. of pre-paid customers at the end of the quarter		1,130,333	13,088,750	6,199,260	30,936	3,400,675	5,255,488	1,932,140	366	10,391	8,830,865	2,279,110	2,234,874	1,873,462
7	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		1133	2849	2099	1	2159	5268	8837	0	0	5139	144	2349	3344
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		1133	2849	2099	1	2159	5268	8837	0	0	5139	144	2349	3344
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		1133	574	2099	0	2159	4291	5	0	0	3866	2	1953	264
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		0	2275	0	1	0	977	8832	0	0	1273	142	396	3080

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
							GSM Operators							CDMA Operators	
	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%
8	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	100%	98.87%	97.41%	99.17%	93.95%	98.96%	99.30%	100%	100%	100%	97.93%	98.62%	95.95%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	90.92%	95.97%	NR	99.61%	62.49%	97.07%	NR	100%	99.32%	62.83%	94.64%	97.85%	NR
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		163,983	2,381,707	5,104	3,619	776,648	6,697,468	333,597	4	108	12,435,676	952,408	1,080,000	111,013
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		163,983	2,354,716	4,972	3,589	729,674	6,627,778	331,276	4	108	12,435,676	932,693	1,065,136	106,522
9	**Termination/closure of service**	<=7days	100%	100%	100%		100%	100%	100%			100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		91	527	97		246	90	426			738	222	392	822
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		91	527	97	NA	246	90	426	NA	NA	738	222	392	822
10	**Time taken for refunds of deposits after closures.**	100% within 60 days	100%	99.12%	100%		100%	100%	100%			100%	100%	100%	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 Rajasthan Service Area are as given below:-

➢ **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.88%.
➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.97%.
➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96.39% and 99.65%.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.40%.
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 0.93%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.57% and 1.44%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for BSNL (4.94%), rests of the operators are satisfying the benchmark with value in between 0% and 2.93%.
➢ **Connections with good voice quality (benchmark >= 95%):** All the GSM operators are meeting the benchmark with values lying between 96.16% and 99.21%. For this parameter, **RCOM CDMA & Tata CDMA values are not system generated.**
➢ **No. of POI's having Congestion >0.5%:** For this parameter, mostly Operators found overall no congestion, However few cases are observed for some operators like BSNL, Tata GSM, Idea, Loop & MTS having call failures >0.5% with nos. 2, 1, 2,1, 2 respectively. It was also observed that some operators 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 for Idea, rests of the operators are meeting the benchmark with values lying between 95.92% to 100%.
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Idea & Vodafone, rests of the operators are meeting the benchmark with values lying between 90.49% to 100%. Data not reported by BSNL, Tata GSM & Tata CDMA.
➢ **Metering and billing credibility-Postpaid (benchmark <= 0.1%):** Except Vodafone, rest of the operators are meeting the benchmark.
➢ **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** All the operators are meeting the benchmark with values lying between 0% and 0.10%.
➢ **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):** Except for Airtel, all operators have satisfied the benchmark.

3) Sample Coverage

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	1	9	1066
2	Airtel Ltd	42	79	7019
3	BSNL	13	50	3604
4	Etisalat	1	1	22
5	Idea	9	23	3314
6	Reliance Communication	4	14	2483
7	Tata Communications	2	12	1458
8	Loop	1	1	6
9	Videocon	1	1	4
10	Vodafone	25	74	6199
CDMA Operators				
11	MTS	2	5	1591
12	Reliance Communication	7	6	1431
13	Tata Communications	7	10	929

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 (>= 2%) for both one month data and 3 days live data taken in the month of audit.

BTS Accumulated Downtime

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videoc on	Vodafo ne	MTS	Rcom CDMA	Tata CDMA
Live	0.05%	0.10%	1.80%	1.48%	0.21%	1.40%	0.01%	0.94%	0.00%	0.09%	0.10%	1.15%	0.03%
Month	0.03%	0.11%	1.88%	1.03%	0.15%	0.45%	0.01%	0.44%	0.17%	0.10%	0.12%	0.55%	0.03%
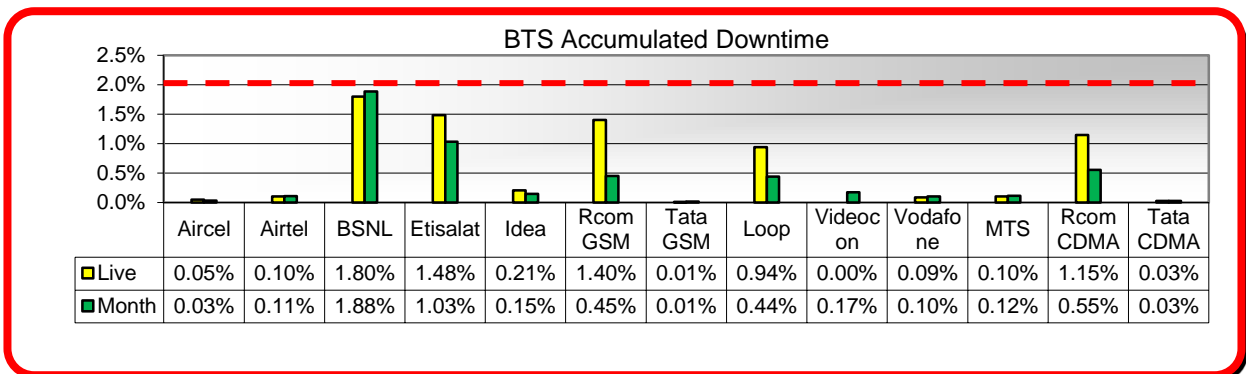
Worst affected BTSs due to downtime: All operators are meeting the TRAI benchmarks (>= 2%) for both one month data and 3 days live data taken in the month of audit.

Worst affected BTSs due to downtime

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	0%	0%	0.92%	0%	0%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%	0.00%
Month	0.00%	0.20%	1.97%	0.00%	0.00%	1.21%	0.00%	0.00%	0.00%	0.68%	0.00%	0.98%	0.00%
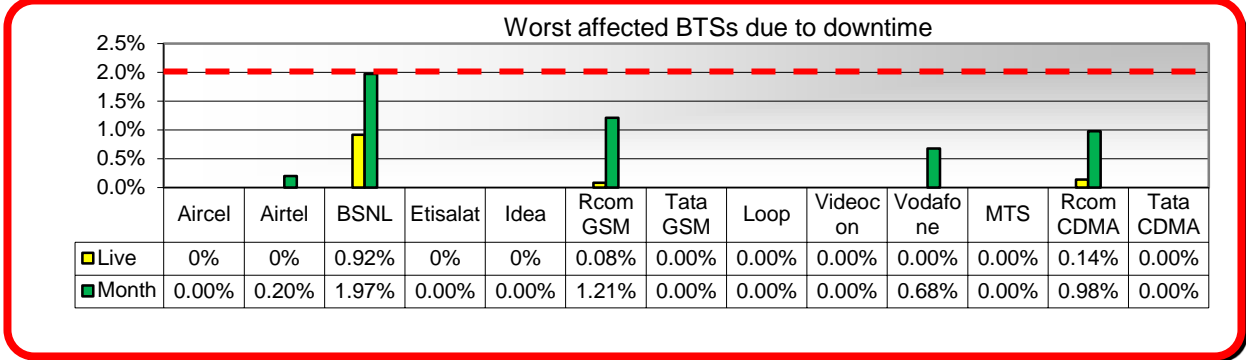
Call Setup Success Rate (CSSR): All operators are meeting the TRAI benchmarks (>= 95 %) for both one month data and 3 days live data taken in the month of audit.

CSSR

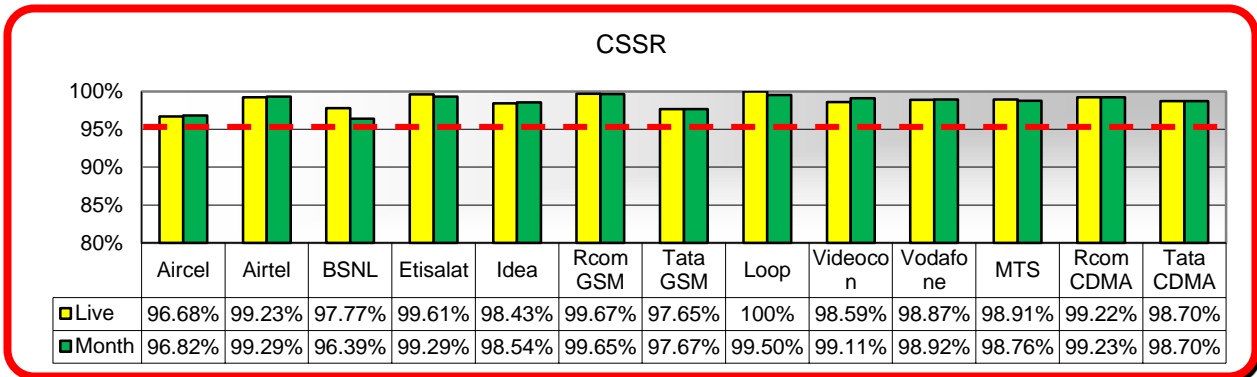|	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	96.68%	99.23%	97.77%	99.61%	98.43%	99.67%	97.65%	100%	98.59%	98.87%	98.91%	99.22%	98.70%
Month	96.82%	99.29%	96.39%	99.29%	98.54%	99.65%	97.67%	99.50%	99.11%	98.92%	98.76%	99.23%	98.70%

Blocked call rate:

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

SDCCH/PAGING congestion

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	0.01%	0.12%	0.61%	0.06%	0.26%	0.03%	0.05%	0.00%	0.51%	0.43%	0.00%	0.00%	0.00%
Month	0.02%	0.22%	0.17%	0.10%	0.40%	0.09%	0.05%	0.16%	0.31%	0.39%	0.00%	0.00%	0.00%

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

TCH congestion	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	0.02%	0.36%	1.10%	0.00%	1.02%	0.04%	0.07%	0.00%	0.00%	0.33%	0.15%	0.08%	0.05%
Month	0.04%	0.38%	0.71%	0.23%	0.93%	0.08%	0.06%	0.00%	0.09%	0.34%	0.14%	0.09%	0.06%

Connection Maintainability (Retainability):

Call Drop Rate (CDR) (%): Except Videocon for live data, rests of the operators are meeting the TRAI benchmarks (<=2%) for both one month data and 3 days live data.

CDR	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	0.99%	1.16%	0.71%	0.79%	1.47%	0.56%	1.03%	0.00%	0.41%	0.91%	0.64%	0.65%	0.59%
Month	0.93%	1.26%	1.33%	0.83%	1.44%	0.57%	1.04%	1.39%	1.05%	0.88%	0.67%	0.62%	0.59%

Worst affected Cell exceeding 3% TCH Drop: For live data, Aircel, BSNL & Tata GSM with a value of 4.47%, 4.87% & 5.90% respectively while BSNL with a value of 4.94% for month data were not meeting the benchmark of <=3%. Rests of the operators are meeting the benchmark for both cases.

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	4.47%	2.73%	4.87%	1.52%	2.81%	0.21%	5.90%	0.00%	0.00%	2.51%	1.17%	0.19%	2.80%
Month	1.92%	2.79%	4.94%	1.52%	2.63%	0.15%	2.93%	0.00%	0.00%	2.04%	0.92%	0.16%	2.80%

Percentage of connections with good voice quality (benchmark >= 95%): All operators are meeting the TRAI benchmarks (=> 95%) for both one month data and 3 days live data taken in the month of audit. For RCOM CDMA and Tata CDMA values are not system generated.
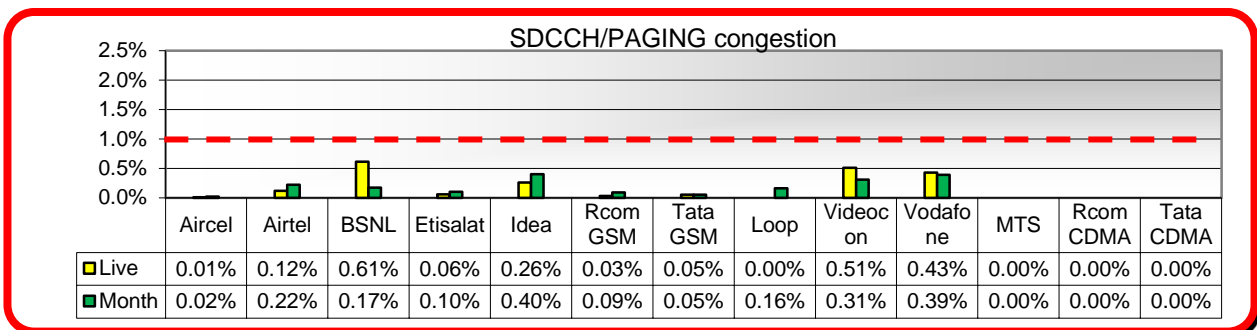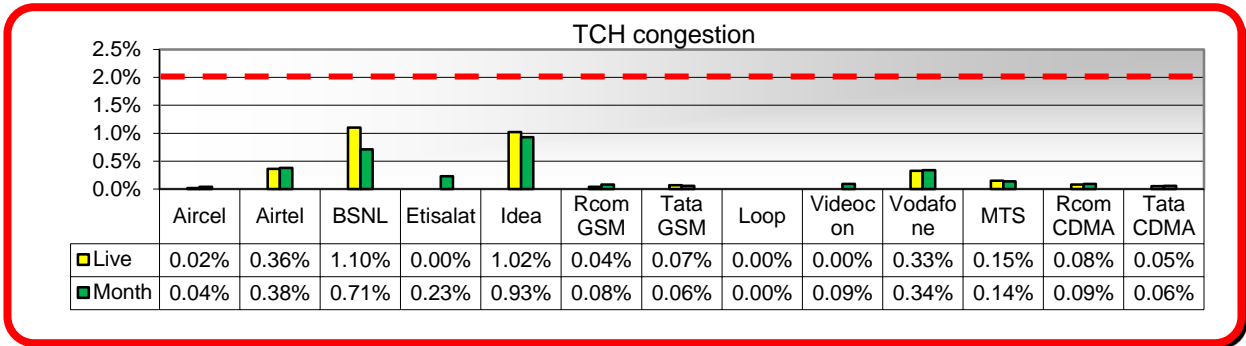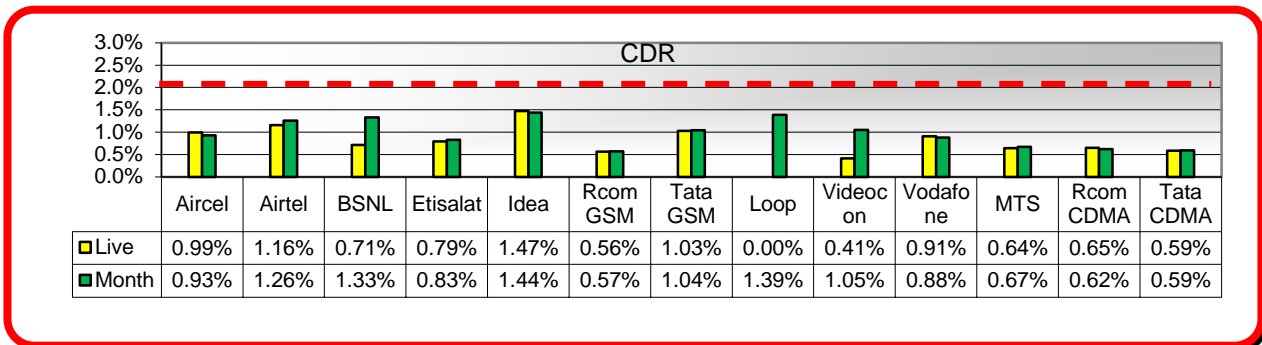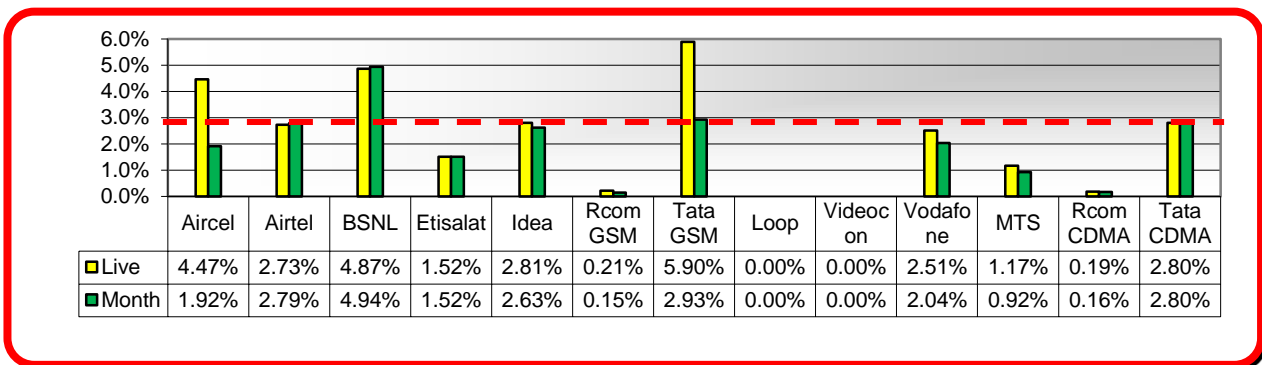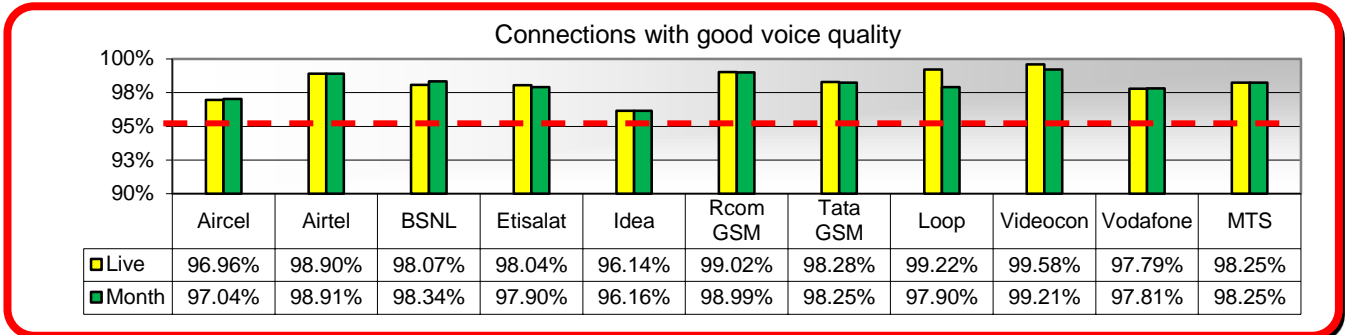
Connections with good voice quality

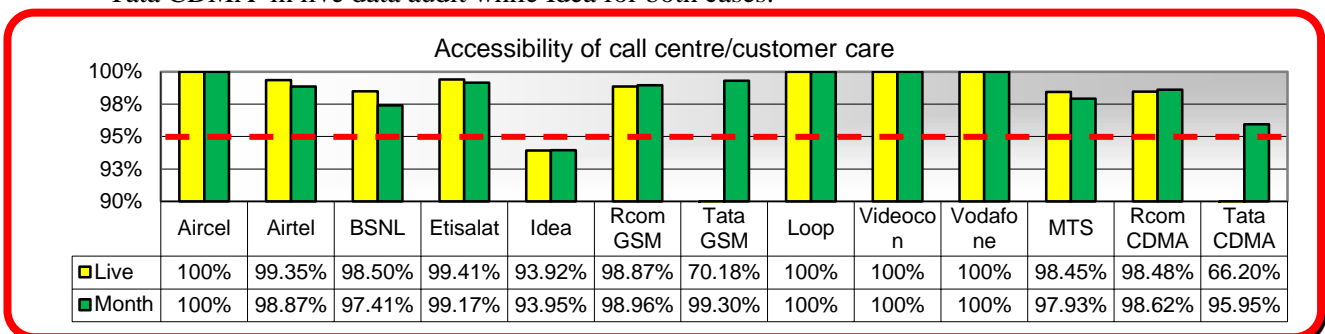|	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS
Live	96.96%	98.90%	98.07%	98.04%	96.14%	99.02%	98.28%	99.22%	99.58%	97.79%	98.25%
Month	97.04%	98.91%	98.34%	97.90%	96.16%	98.99%	98.25%	97.90%	99.21%	97.81%	98.25%

No of POI's having Congestion >0.5%: For both Live and month audit, BSNL (2), Tata GSM (1), Loop (1) & MTS (2) respectively while Idea (2) only for month audit were having call failures >0.5% on their respective POI's.
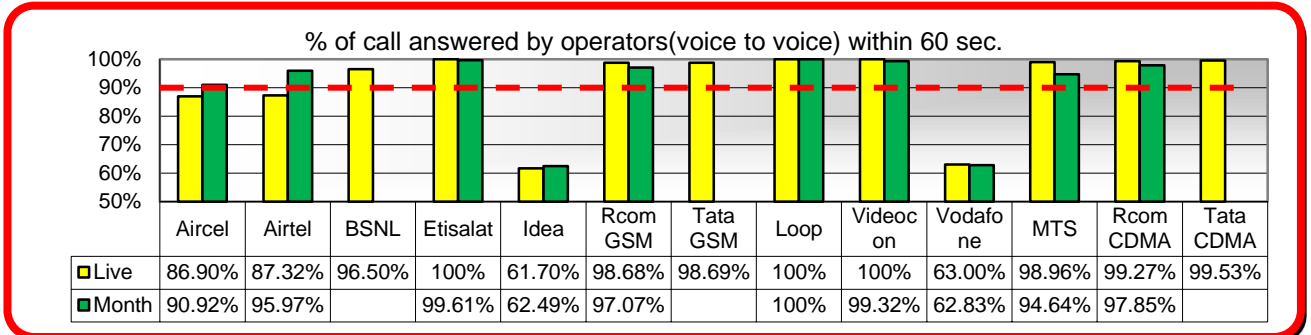
No. of POI's having congestion

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	0	0	2	0	0	0	1	1	0	0	2	0	0
Month	0	0	2	0	2	0	1	1	0	0	2	0	0
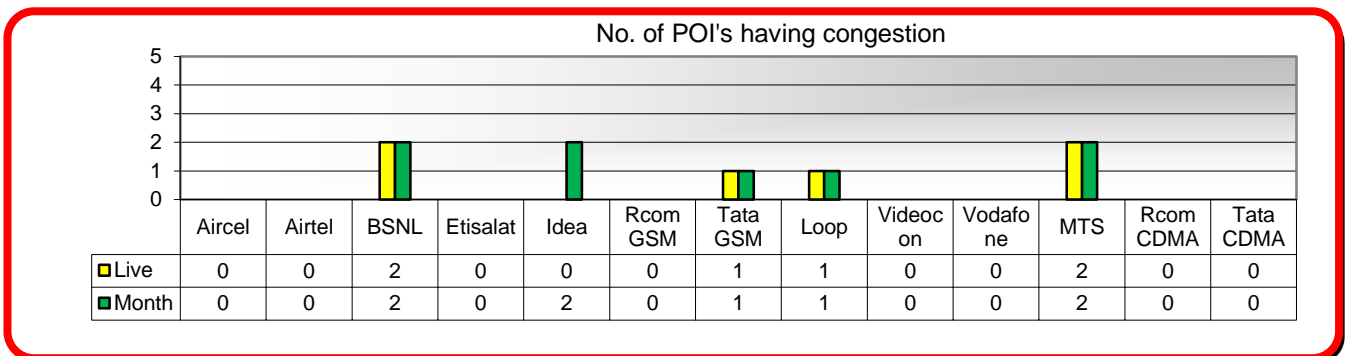
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data except for Tata GSM & Tata CDMA in live data audit while Idea for both cases.

Accessibility of call centre/customer care

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	100%	99.35%	98.50%	99.41%	93.92%	98.87%	70.18%	100%	100%	100%	98.45%	98.48%	66.20%
Month	100%	98.87%	97.41%	99.17%	93.95%	98.96%	99.30%	100%	100%	100%	97.93%	98.62%	95.95%

Percentage of call answered by operators (Voice to voice) within 60 sec: For Live data, only Aircel &Airtel, while Idea & Vodafone for both cases were not meeting the benchmark. Rest all operators are meeting benchmark for both cases. Data not reported by BSNL, Tata GSM & Tata CDMA for month audit.

% of call answered by operators(voice to voice) within 60 sec.

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videoc on	Vodafo ne	MTS	Rcom CDMA	Tata CDMA
Live	86.90%	87.32%	96.50%	100%	61.70%	98.68%	98.69%	100%	100%	63.00%	98.96%	99.27%	99.53%
Month	90.92%	95.97%		99.61%	62.49%	97.07%		100%	99.32%	62.83%	94.64%	97.85%	

5) Critical Analysis

From the data table it can be seen that Aircel, BSNL & Tata GSM are not meeting the benchmark for the parameter of 'Worst affected cells having more than 3% TCH drop rate' with high margins. This may have happened due to mainly in the change adopted for calculating the parameter considering CBBH instead of TCBH, which reflects more practical way of calculating TCH drop keeping in view customer satisfaction.

Regarding %age of connections with good voice quality all the operators are found to be performing quite well in terms of meeting the benchmark (<= 95%).

In case of POI congestion, except for BSNL, Idea, Loop, Tata GSM & MTS, rest of the operators are found to be performing quite well in terms of meeting the benchmark (<= 0.5%). It is noticed that most of the operators are having individual POI satisfying the benchmark. But in some case overflows on individual POI are noticed causing traffic diversions to obtain the net result for POI congestion.

(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	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	57	100	100	1	100	1	100	26
Total No. of calls Answered	96	55	97	95	1	96	1	99	26
Cases resolved with 4 weeks	96	55	97	95	1	96	1	99	26
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%

3) Live calling to call center:
Fifty nos. of calls were made in each half and below given no. of calls got connected to the call center within 60 sec.

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	100	90	92	80	100	100	96	97	99	99
%age of calls got answered	100%	90%	92%	80%	100%	100%	96%	97%	99%	99%

4) Level 1 Calling:
Level 1 calling such as calling at emergency no. (Police, Fire, and Hospital), Railway enquiry systems etc were made as shown in table below so as to check the service of such short codes. In all 3 cities, it was found to be functional for respective providers.

Emergency no.		Calls attempted	Airtel	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	MTS	RCOM CDMA	Tata CDMA
						Ajmer					
100	Police	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1
102/108	Ambulance	1	1	1	1	1	1	1	1	1	1
139	Railway	2	2	2	2	2	2	2	2	2	2

Emergency no.		Calls attempted	Aircel	Airtel	BSNL	Idea	RCOM GSM	Vodafone	MTS	RCOM CDMA	Tata CDMA
						Jodhpur					
100	Police	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1
102/108	Ambulance	1	1	1	1	1	1	1	1	1	1
139	Railway	2	2	2	2	2	2	2	2	2	2

Emergency no.		Calls attempted	Aircel	Airtel	BSNL	Idea	RCOM GSM	Vodafone	MTS	RCOM CDMA	Tata CDMA
						Shri Ganganagar					
100	Police	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1
102/108	Ambulance	1	1	1	1	1	1	1	1	1	1
139	Railway	2	2	2	2	2	2	2	2	2	2

5)   Critical Analysis

Random numbers were selected from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint Redressal. It was found that the operators had made refunds in 100% cases as claimed by their records. Similarly, 50-50 live calls were made to call center in each half i.e. 11 to 1pm and 4 to 7pm and it was found that except Idea, rest of the operators are meeting the 90% benchmark. Level 1 call testing was satisfactory for all service providers.

(C)   Inter operator call assessment

(1)   Sample coverage

A sample of 2x50 test calls per Service Providers with in the licensed service area (Rajasthan Circle) were made between 1900 to 2000 hrs and between 2000 to 2100 hrs so that TCBH hours for all the operators were covered.

(2)   Performance based on live calling

Calling Operator	Aircel	Airtel	BSNL	Idea	Reliance (GSM)	Tata (GSM)	Vodaf one	MTS	Reliance (CDMA)	Tata (CDMA)
					Jaipur					
Aircel	-	100%	98%	100%	99%	100%	100%	100%	100%	100%
Airtel	100%	-	96%	100%	100%	100%	100%	99%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	95%	99%	100%
Idea	100%	98%	98%	-	100%	100%	100%	99%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Tata (GSM)	99%	96%	94%	100%	97%	-	100%	97%	100%	100%
Vodafone	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	97%	99%	100%	100%	100%	98%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	-	100%
Tata (CDMA)	98%	100%	100%	99%	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 Rajasthan for all the operators. Route covered was about around 45-150Km depending on city areas within the speed limit of 30Km/hr.

DRIVE TEST LOCATIONS

AJMER

LOW DENSE: Ajaynagar, HanumanNgrAJM, DargahBazaar, BalupuraRd, DholaBatta, PatrolNo9

MEDIUM DENSE: PatelMaidan, CivilLinesAJM, Krishiaanganj_A, LICColony, KrishnaColony_T, ChatriyaYojna_T

HIGH DENSE: AgraGate,Shikshasansthan,SaraswatiSchool,KhalsaChamber, RC_LaxmiMarket

JODHPUR

LOW DENSE: Pratap Nagar,Soorsagar,Kali Beri,Nagouri Gate,Shikargarh,Pabu Pura, Basni Ind Area.

MEDIUM DENSE: Pal Road,Jalori Gate,Ratanada,Paota,Mahamandir,Residency Road,Housing Board,Akhaliya Chouraha

HIGH DENSE: Sardarpura A,B,C,D Road,Jaljog Chouraha,Nehru Park,Jalori Gate,Sanicschar Ji Ka Than
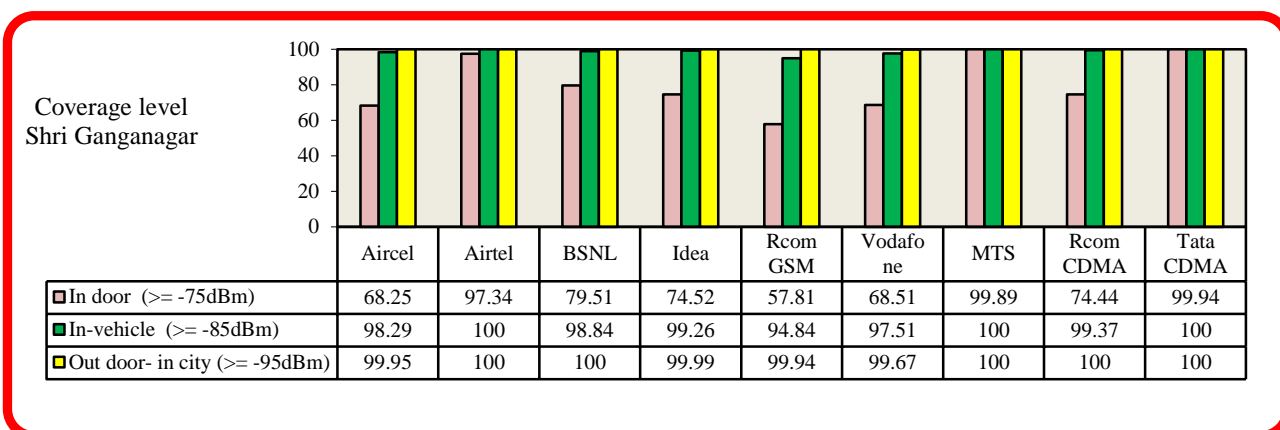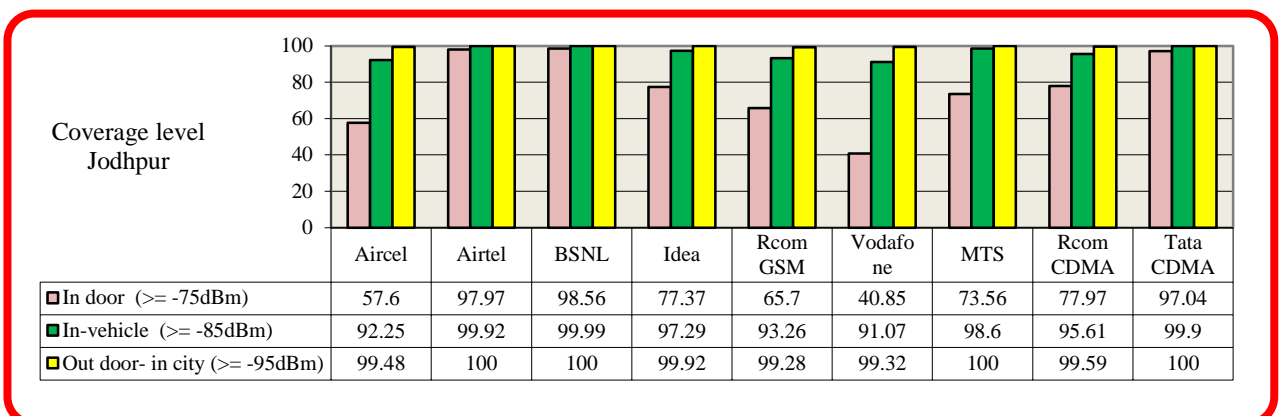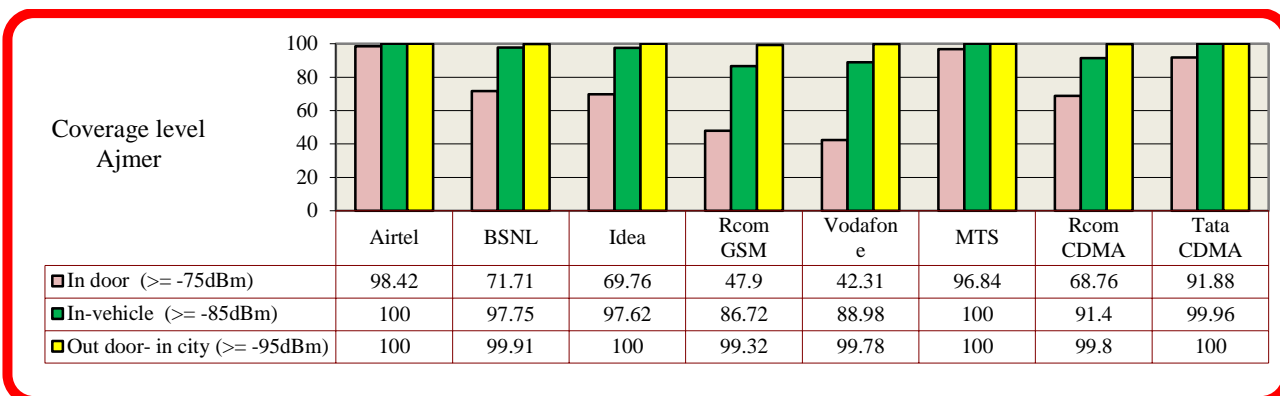
SHRI GANGANAGAR

LOW DENSE: Sukhadia circle, station road, gangasingh chowk, telephone exchange, setia colony, Shiv chowk, Aggarsain nagar, meera chowk, Sukhadia circle.

MEDIUM DENSE: Telehone exchange, purani abadi, tower road, Green Park, vinoba basti, sukhadia circle, shive chowk, Aggarsain nagar, meera chowk, Sukhadia circle, birble chowk, telephone exchange.

HIGH DENSE: Sukhadia circle, Gole bazaar, Ashok nagar, Aggarsain nagar, shiv chowk sukhadia circle.

2) Performance (for the respective cities for Rajasthan Circle)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
1.1	**Call Attempts**	Ajmer	*ICR (Tata GSM)*	80	99	78	93	104	100	108	94	133
		Jodhpur	248	202	174	224	218	*ICR (Idea)*	238	225	217	249
		Shri Ganganagar	132	71	76	82	99	*No Service*	91	92	100	82
1.2	**Blocked Call Rate (<=3%)**	Ajmer	*ICR (Tata GSM)*	0	11.11	2.56	1.07	0	0	0	1.06	0
		Jodhpur	1.61	0	5.17	0	0.92	*ICR (Idea)*	0	0	0	0
		Shri Ganganagar	0	0	0	0	0	*No Service*	0	0	1	0
1.3	**Dropped Call Rate (<=2%)**	Ajmer	*ICR (Tata GSM)*	0	3.41	0	0	0	0	0	1.08	0
		Jodhpur	0	0	1.82	1.79	0.46	*ICR (Idea)*	0	0	0	0.4
		Shri Ganganagar	0	0	1.32	0	0	*No Service*	0	0	0	0
1.4	**Percentage of connections with good voice quality (=>95%)**											
	(i) 0-4 (w/o frequency hopping)	Ajmer								99.9	96.2	96.39
		Jodhpur								99.9	97.06	99.62
		Shri Ganganagar								99.71	98.19	99.92
	(ii) 0-5 (with frequency hopping)	Ajmer	*ICR (Tata GSM)*	96.13	91.96	97.47	96.36	93.45	96.51			
		Jodhpur	95.37	96.37	91.98	97.86	97.61	*ICR (Idea)*	95.74			
		Shri Ganganagar	95.59	97.41	89.61	99.06	95.94	*No Service*	95.62			
1,5	**Service Coverage (%)**											
	In door (>= -75dBm)	Ajmer	*ICR (Tata GSM)*	98.42	71.71	69.76	47.9	90.33	42.31	96.84	68.76	91.88
		Jodhpur	57.6	97.97	98.56	77.37	65.7	*ICR (Idea)*	40.85	73.56	77.97	97.04
		Shri Ganganagar	68.25	97.34	79.51	74.52	57.81	*No Service*	68.51	99.89	74.44	99.94
	In-vehicle (>= -85dBm)	Ajmer	*ICR (Tata GSM)*	100	97.75	97.62	86.72	99.31	88.98	100	91.4	99.96
		Jodhpur	92.25	99.92	99.99	97.29	93.26	*ICR (Idea)*	91.07	98.6	95.61	99.9
		Shri Ganganagar	98.29	100	98.84	99.26	94.84	*No Service*	97.51	100	99.37	100
	Outdoor- in city (>= -95dBm)	Ajmer	*ICR (Tata GSM)*	100	99.91	100	99.32	99.88	99.78	100	99.8	100
		Jodhpur	99.48	100	100	99.92	99.28	*ICR (Idea)*	99.32	100	99.59	100
		Shri Ganganagar	99.95	100	100	99.99	99.94	*No Service*	99.67	100	100	100
1.6	**Call Setup Success Rate (>=95%)**	Ajmer	*ICR (Tata GSM)*	100	88.89	97.44	98.93	100	100	100	98.94	100
		Jodhpur	98.39	100	94.83	100	99.08	*ICR (Idea)*	100	100	100	100
		Shri Ganganagar	100	100	100	100	100	*No Service*	100	100	99	100

Graphical Representation

The Radio coverage level as was found in the operator assisted drive test result is shown graphical below:

Coverage level Ajmer	Airtel	BSNL	Idea	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
In door (>= -75dBm)	98.42	71.71	69.76	47.9	42.31	96.84	68.76	91.88
In-vehicle (>= -85dBm)	100	97.75	97.62	86.72	88.98	100	91.4	99.96
Out door- in city (>= -95dBm)	100	99.91	100	99.32	99.78	100	99.8	100

Coverage level Jodhpur	Aircel	Airtel	BSNL	Idea	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
In door (>= -75dBm)	57.6	97.97	98.56	77.37	65.7	40.85	73.56	77.97	97.04
In-vehicle (>= -85dBm)	92.25	99.92	99.99	97.29	93.26	91.07	98.6	95.61	99.9
Out door- in city (>= -95dBm)	99.48	100	100	99.92	99.28	99.32	100	99.59	100

Coverage level Shri Ganganagar	Aircel	Airtel	BSNL	Idea	Rcom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
In door (>= -75dBm)	68.25	97.34	79.51	74.52	57.81	68.51	99.89	74.44	99.94
In-vehicle (>= -85dBm)	98.29	100	98.84	99.26	94.84	97.51	100	99.37	100
Out door- in city (>= -95dBm)	99.95	100	100	99.99	99.94	99.67	100	100	100

(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:

- Performance of all Operators in **Ajmer town** was satisfactory for most of the KPI parameters except for BSNL and Tata GSM for "Good voice quality" parameter. Also, BSNL was not meeting benchmark for the other parameters such as "Blocked call rate", "Dropped Call rate" & "CSSR" with high margins. During Drive Test, route was covered about 50 Km and CSSR was observed between 88.89% and 100%. Under Voice Quality Section, Idea among GSM and MTS among CDMA Operator performed slightly better than others. As far as RF coverage level considered, Airtel achieved Max. Nos. of percentage of samples within -75dBm. During Drive Test, it was observed that Handover Success Rate values were lying between 97.86% & 100%.

- Performance in **Jodhpur Town** was satisfactory for most of the operators except for BSNL which fails to meet benchmark for the KPI parameters namely "Blocked call rate", "Dropped call rate", Good voice quality" & "CSSR". Under RF coverage level section, Airtel performed quite better than others. During Drive, route was covered about 150 Km and in that CSSR values were getting between 94.83% & 100%. Under Voice quality section, MTS & Idea showing performance slightly better than other service providers. It was observed that, HOSR values were lying between 95.40% & 100%.

- Similarly, performance in **Shri Ganganagar Town** was satisfactory for all operators for the most of the KPI parameters, except for BSNL for the parameter "Good voice quality". During drive, route was covered about 45 Km and in that CSSR was 100% for all operators. Under Voice quality section, Idea & Tata CDMA showing slightly higher values than others. As far as RF coverage level considered, MTS performed quite better than other operators.

(E) Independent Drive test

1. Sample Coverage

The independent drive test activity was conducted in Rajasthan Circle for various service providers in three different cities namely **"Nagaur, Chittaurgarh & Sawai Madhopur"**. For testing the service provider performance on ground level, TCIL auditors carried out Drive Test and check the radio coverage along with different KPI parameters by making test calls of 120 sec. in different areas on different days. During Drive test, Route was covered about between 25 to 45 Km for all 3 cities depending upon the city areas within the speed limit of 30-40Km/hr.

Drive Test Locations and Service Provider's name:

1. *Nagaur* - *BSNL (**10 BTS**), Idea (**8 BTS**)*
2. *Chittaurgarh* - *MTS (**2 BTS**)*
3. *Sawai Madhopur* - *Tata GSM (**9 BTS**), Tata CDMA(**2 BTS**)*

Area Coverage Details:

1) Nagaur

Gandhi Chowk, Baldev ram Mirdha College, Moolwa Chauraha, Vijay Vallabh chowk, bus stand, Delhi darwaja, mahi darwaja, naya darwaja, kumara darwaja, railway station, Phalodhi stand, Sanjay colony, Manasar.

2) Chittaurgarh

Pratap place, AKC IT, Govt. Girls College, Govt. Hospital, Apsara Cinema, Gaurav Palace, BSNL colony, Gadla Lahore School, CBI of Narcotics. Nagar Palika petrol pump.

3) Sawai Madhopur

MG colony, Railway Station, Ranthambor Circle, Sadar Bazar, Dausa Road, Jaipur Road, Airport, BSNL Exchange, Bus stand, distt. Court, civil lines, Collectrate, Cement factory, Mountown School, Janta talkies.

2) Performance (for the respective cities for Rajasthan Circle)

SN	Parameter	BSNL	Idea	MTS	Tata GSM	Tata CDMA
		Nagaur		*Chittaurgarh*	*Sawai Madhopur*	
1.1	Call Attempts	65	60	42	42	51
1.2	Blocked Call Rate (<=3%)	3.07	1.67	0	2.38	0
1.3	Dropped Call Rate (<=2%)	3.17	1.69	0	0	0
1.4	Percentage of connections with good voice quality (=>95%)					
	(i) 0-4 (w/o frequency hopping)			99.66		99.54
	(i) 0-5 (with frequency hopping)	88.79	96.43		98.05	
1.5	Service Coverage (%)					
	In door (>= -75dBm)	97.7	81.87	71.83	76.13	80.09
	In-vehicle (>= -85dBm)	99.99	98.34	98.6	99.25	97.01
	Outdoor- in city (>= -95dBm)	100	99.78	100	100	99.99
1.6	Call Setup Success Rate (>=95%)	96.93	98.33	100	97.62	100

Graphical Representation

The Radio coverage level as was found in the operator assisted drive test result is shown graphical below:

Coverage level Rajasthan	Nagaur BSNL	Nagaur Idea	Chittaurgarh MTS	Sawai Madhopur Tata GSM	Sawai Madhopur Tata CDMA
In door (>= -75dBm)	97.7	81.87	71.83	76.13	80.09
In-vehicle (>= -85dBm)	99.99	98.34	98.6	99.25	97.01
Out door- in city (>= -95dBm)	100	99.78	100	100	99.99
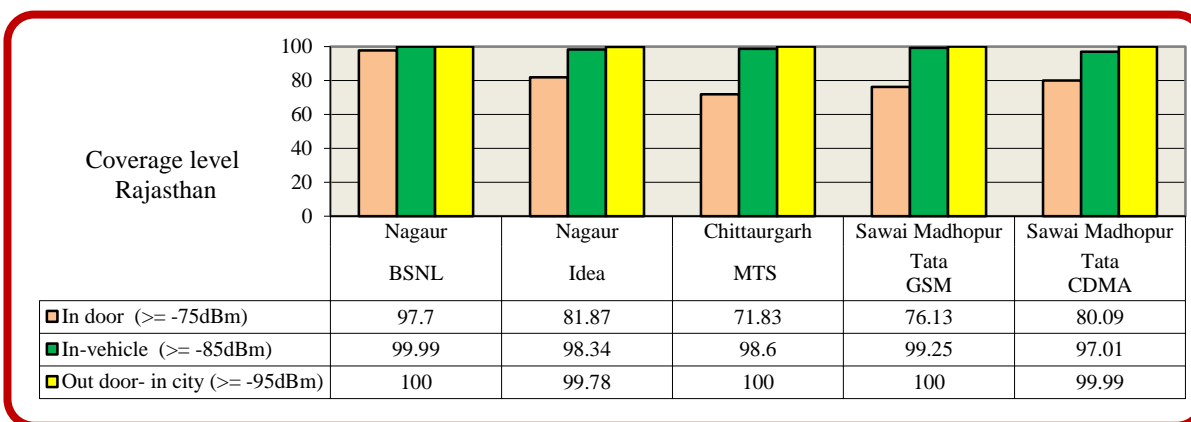
(3)   Critical Analysis

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

- During Drive Test for **BSNL and Idea in Nagaur Town**, a total of **65 and 60 test calls** were made and out of that **63 and 59 calls** got successfully established for respective service provider. Under **RF coverage level section**, **BSNL** performed better than **Idea** as they got 97.7% of samples within   -75dBm. But in case of **Voice quality section**, Idea showing better results than BSNL as they achieving **96.43% of samples within 0-5 number** indicating good voice quality. While on the other hand BSNL failed to meet benchmark with a value of **88.79%** for the same parameter. The mainly areas where the quality degraded for **BSNL** was found between **bakhat sagar & Tarkeen Dargah road and also near Sanjay colony.** It was also observed that **BSNL** failed to meet benchmark for **"Dropped call rate"** parameter with **2 drops near Govt. Senior secondary School and BSNL office** while **Idea** satisfied the benchmark with **1 drop near Nagaur fort (Ajmeri Gate)** only. During testing, a total of 89 (BSNL) and 116 (Idea) handover attempts were made which results into 95.5% and 100% **Handover Success Rate (HOSR)** for the respective service providers.

- **MTS** performance in **Chittaurgarh Town** was found to be satisfactory for all parameter. The **RF coverage level** was found average throughout the town with **71.83% of samples** within **-75dBm Rx lev** and achieved no blocked or dropped calls. As far as **Voice quality parameter** concerned, operator achieved **99.66% of samples** within **0-4 number**. During testing, a total of **42 test calls** and **312 Handover attempts** were made and all were successfully connected & completed which results into **100% CSSR & HOSR** respectively.

- Performance of **Tata GSM & CDMA** in **Sawai Madhopur Town** found to be satisfactory for all parameters. A total of **42 and 51 test calls** were made and out of that 41 and 51 calls got successfully established for respective service provider. The **RF coverage level** was found average for **Tata GSM** in the town, as **76.13% of samples** were within -75dBm Rx lev while **Tata CDMA** coverage was good with **80.09%** of samples within -75dBm. Under **Voice quality section**, both operators performed well and got samples around **98.05%** & **99.54%** respectively.

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

From live, month and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Rajasthan) is satisfactory for most of the **Network Parameters**. However, the benchmark of <=3% for "worst affected cells >3% TCH drop" is not met by Aircel, BSNL &Tata GSM. Under Drive Test section, BSNL failed to meet benchmark for "Good Voice quality" in all 3 towns while Tata GSM in Ajmer only.

Under **Customer Service Quality Parameter** "operator answered calls (voice-to-voice) within 60 seconds" parameter it is found that most of the operators are fulfilling TRAI benchmark of >=90%. Apart from this, the "accessibility of call centre" parameter benchmark is not met by Idea, Tata GSM & Tata CDMA.

Regarding **Metering/Billing Credibility** issues, only Vodafone shows below benchmark value for Post-paid connections.

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

III. Broadband Service Providers
                     - Not conducted for this quarter