

**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**RAJASTHAN CIRCLE**  
**(NORTH ZONE)**

***Report Period: January 2012 – March 2012***

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

## CHAPTER-1: INTRODUCTION

### I. Background

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

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

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

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

- i) Create conditions for consumer satisfaction by making known the quality of service, which the service provider is required to provide, and the user has a right to expect.
- ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.
- iii) Generally protect the interests of consumers of telecommunication services.

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

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

## II. Objectives and Methodology

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

- i) Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.
- ii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.
- iii) Verification of the performance of service providers against the Quality of Service benchmarks 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 1<sup>st</sup> quarter (January – March 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – September 2011.

Following are the various operators covered in 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
<b>GSM Operators</b>			
1	Aircel Ltd	Feb-2012	2000-2100 Hrs
2	Airtel Ltd	Feb-2012	1900-2000 Hrs
3	BSNL	Feb-2012	1900-2000 Hrs
4	Idea	Feb-2012	2000-2100 Hrs
5	Loop	Feb-2012	2000-2100 Hrs
6	Reliance Communication	Feb-2012	2000-2100 Hrs
7	TATA	Feb-2012	1900-2000 Hrs
8	Videocon	Feb-2012	2000-2100 Hrs
9	Vodafone	Feb-2012	2000-2100 Hrs
<b>CDMA Operators</b>			
10	MTS	Feb-2012	2000-2100 Hrs
11	Reliance Communication	Feb-2012	1900-2000 Hrs
12	TATA	Feb-2012	1900-2000 Hrs

**Note: During Audit & Drive Test, it was found that:**

1. Aircel is on ICR with Tata GSM in Sikar Town.
2. Tata GSM is on ICR with Idea in Jaipur & with Vodafone in Barmer Town.
3. Etisalat DB telecom has closed their services in Rajasthan Circle.

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

### (A) Cellular Mobile Telephone Services

<b>3 days Live Data Audit</b>														
S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
<b>1</b>	<b>Network Availability</b>													
	a) BTS Accumulated Downtime	<=2%	0.03%	0.02%	1.82%	0.05%	0.57%	0.15%	16.26%	0.59%	0.10%	0.04%	0.67%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	1.33%	0.00%	0.08%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%
	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	>=95%	97.18%	99.43%	98.75%	98.33%	99.66%	98.38%	99.36%	99.62%	99.17%	99.07%	99.20%	98.92%
	b) SDCCH/PAGING congestion	<=1%	0.00%	0.12%	0.72%	0.23%	0.01%	0.04%	0.12%	0.61%	0.22%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.06%	0.22%	1.67%	0.99%	0.05%	0.04%	0.41%	0.00%	0.21%	0.13%	0.15%	0.03%
<b>2</b>	<b>Connection maintenance (Retainability)</b>													
	a) CDR	<=2%	0.81%	1.09%	1.59%	1.57%	0.48%	0.76%	0.00%	1.02%	0.85%	0.61%	0.50%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	1.90%	2.71%	2.96%	2.86%	0.04%	2.92%	0.00%	0.00%	2.56%	1.17%	1.04%	5.86%
	c) Good voice quality	>=95%	96.62%	98.95%	98.40%	95.98%	99.12%	98.24%	98.63%	99.95%	97.72%	99.35%	98.47%	NA
<b>3</b>	<b>No. of POI's having congestion &gt;0.5%</b>		0	0	2	4	0	0	0	0	0	2	2	0
<b>4</b>	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre/Customer Care	>=95%	100%	98.42%	98.50%	97.28%	99.00%	70.04%	100%	100%	100%	98.97%	99.11%	70.51%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.55%	71.44%	92.50%	79.24%	92.71%	86.14%	100%	100%	94.62%	98.79%	95.07%	98.56%

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 Loop for the parameter “BTS Accumulated Downtime” & “Worst affected BTSs due to downtime”. Similarly, Tata CDMA is not meeting benchmark 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 Tata GSM, Airtel & Idea. Similarly, Tata GSM & Tata CDMA are showing a below benchmark value for the parameter “accessibility of call centre”.



One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators							CDMA Operators				
(A)	<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>													
	a) BTS Accumulated Downtime	<=2%	0.02%	0.11%	1.84%	0.08%	0.51%	0.03%	3.63%	0.57%	0.11%	0.06%	0.65%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.16%	1.99%	0.00%	1.92%	0.00%	66.67%	0.00%	0.67%	0.00%	1.53%	0.00%
2	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	>=95%	97.29%	99.33%	99.00%	98.50%	99.66%	98.19%	99.41%	99.26%	99.08%	99.50%	99.09%	98.93%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.28%	0.78%	0.24%	0.03%	0.04%	0.06%	0.29%	0.34%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.06%	0.33%	0.86%	0.72%	0.04%	0.05%	0.44%	0.10%	0.19%	0.13%	0.22%	0.13%
3	<b>Connection maintenance (Retainability)</b>													
	a) CDR	<=2%	0.81%	1.24%	1.40%	1.58%	0.48%	0.83%	1.11%	0.81%	0.85%	0.57%	0.54%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	1.06%	2.80%	2.98%	2.76%	0.04%	1.37%	0.00%	0.00%	1.47%	0.81%	0.86%	2.77%
	c) Good voice quality	>=95%	96.70%	98.92%	98.40%	96.01%	99.11%	98.18%	98.92%	99.13%	97.71%	99.36%	98.43%	NA
4	<b>No. of POI's having congestion &gt;0.5%</b>		0	0	2	4	0	0	0	0	0	2	2	0
(B)	<b>Customer Service Quality Parameters</b>													
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.02%	0.02%	0.07%	0.04%	0.03%	0.04%	NA		0.09%	0.00%	0.00%	0.00%
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.01%	0.00%	0.09%	0.06%	0.10%	0.00%	0.00%	0.00%	0.05%	0.00%	0.10%	0.01%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre/Customer Care	>=95%	100%	99.75%	97.48%	97.28%	98.97%	99.33%	100%	100%	100%	98.34%	100%	95.72%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	73.04%	46.59%	90.19%	74.10%	90.83%	90.18%	100%	97.83%	97.54%	96.01%	96.00%	93.50%
9	<b>Termination/closure of service</b>	<=7days	100%	100%	100%	100%	100%	100%	NA		100%	100%	100%	100%
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	100%	100%	100%	100%	100%	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 Loop for the parameter “BTS Accumulated downtime” & Worst affected BTSs due to downtime”.

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 Aircel, Airtel & Idea are not meeting the 90% benchmark.

## 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 Jaipur, Sikar & Barmer. During test drive, route covered was about around 60-350 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%)	Jaipur	2.22	0.00	0.42	1.57	0.79	ICR (Idea)	0.42	0.00	0.57	1.54
		Sikar	ICR (Tata GSM)	0.00	0.67	2.22	0.75	0.00	0.70	0.00	0.74	0.00
		Barmer	1.81	0.00	6.03	3.76	0.93	ICR (Vodafone)	0.63	0.00	0.00	1.42
1.2	Dropped Call Rate (<=2%)	Jaipur	1.51	0.00	0.21	0.27	0.79	ICR (Idea)	0.21	0.00	0.26	0.19
		Sikar	ICR (Tata GSM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Barmer	0.00	0.00	0.92	1.56	0.00	ICR (Vodafone)	0.00	0.00	0.00	0.00
1.3	Percentage of connections with good voice quality (>=95%)											
	(i) 0-4 (w/o frequency hopping)	Jaipur								98.05	98.8	98.23
		Sikar								98.11	97.64	99.91
		Barmer								99.85	96.48	99.88
	(ii) 0-5 (with frequency hopping)	Jaipur	95.51	95.52	95.40	95.70	96.71	ICR (Idea)	95.40			
		Sikar	ICR (Tata GSM)	95.19	97.40	97.51	95.22	94.21	95.90			
Barmer		95.73	95.04	94.10	96.70	98.51	ICR (Vodafone)	95.20				
1.4	Call Setup Success Rate (>=95%)	Jaipur	97.78	100	99.58	98.43	99.21	ICR (Idea)	99.58	100	99.43	98.46
		Sikar	ICR (Tata GSM)	100	99.33	97.78	99.25	100	99.3	100	99.26	100
		Barmer	98.19	100	93.97	96.24	99.07	ICR (Vodafone)	99.37	100	100	98.58

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

- ✚ BSNL is not meeting the benchmark for the parameter “Blocked Call Rate”, “Good Voice Quality” & “CSSR” in Barmer Town.
- ✚ Idea is not meeting the benchmark for the parameter “Blocked call rate” in Barmer Town.
- ✚ Tata GSM is not meeting the benchmark for the parameter “Good voice quality” in Sikar Town.

### Independent Drive Test

SN	Parameter	Bharti Airtel	MTS	RCOM GSM	RCOM CDMA
		Sirohi	Banswara	Churu	
1.1	Blocked Call Rate (<=3%)	0.00	0.00	0.00	1.09
1.2	Dropped Call Rate (<=2%)	0.00	0.00	0.00	1.10
1.3	Percentage of connections with good voice quality (>=95%)				
	(i) 0-4 (w/o frequency hopping)		99.86		97.45
	(ii) 0-5 ( with frequency hopping)	98		98.94	
1.4	Call Setup Success Rate (>=95%)	100	100	100	98.91

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

✚ All Operators are meeting the TRAI benchmark.

(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

PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Loop	V-con	V-fone	MTS	Rcom CDMA	Tata CDMA	
S/N	Name of Parameter			GSM Operators									CDMA Operators			
(A)	Network Service Quality Parameter															
1	Network Availability															
	BTS Accumulated Downtime	<=2%	Reported	0.07%	0.14%	1.80%	0.15%	0.27%	0.03%	1.21%	0.03%	0.13%	0.16%	0.26%	0.02%	
			Verified	0.07%	0.14%	1.80%	0.15%	0.27%	0.03%	1.21%	0.03%	0.13%	0.16%	0.26%	0.02%	
	Worst affected BTSs due to downtime	<=2%	Reported	0%	0.28%	2.00%	0.21%	0.56%	0.02%	0.00%	0.00%	0.92%	0%	0.24%	0.00%	
Verified			0%	0.28%	2.00%	0.21%	0.56%	0.02%	0.00%	0.00%	0.92%	0%	0.24%	0.00%		
2	Connection Establishment (Accessibility)															
	CSSR (Call Setup Success Rate)	>=95%	Reported	96.59%	99.38%	99.05%	97.68%	99.78%	97.56%	99.95%	99.20%	99.18%	98.67%	99.74%	98.86%	
			Verified	96.59%	99.38%	99.05%	97.68%	99.78%	97.56%	99.95%	99.20%	99.18%	98.67%	99.74%	98.86%	
	SDCCH/PAGING congestion	<=1%	Reported	0.02%	0.24%	0.18%	0.65%	0.16%	0.15%	0.00%	0.18%	0.26%	0%	0.02%	0%	
			Verified	0.02%	0.24%	0.18%	0.65%	0.16%	0.15%	0.00%	0.18%	0.26%	0%	0.02%	0%	
	TCH congestion	<=2%	Reported	0.03%	0.38%	0.70%	1.56%	0.12%	0.26%	0.62%	0.09%	0.22%	0.50%	0.05%	0.07%	
Verified			0.03%	0.38%	0.70%	1.56%	0.12%	0.26%	0.62%	0.09%	0.22%	0.50%	0.05%	0.07%		
3	Connection maintenance (Retainability)															
	CDR	<=2%	Reported	1.30%	1.25%	1.34%	1.51%	0.28%	1.23%	0.00%	1.15%	1.13%	0.80%	0.38%	0.73%	
			Verified	1.30%	1.25%	1.34%	1.51%	0.28%	1.23%	0.00%	1.15%	1.13%	0.80%	0.38%	0.73%	
	Worst affected cells>3% TCH drop	<=3%	Reported	6.39%	2.90%	4.95%	2.92%	1.46%	4.20%	0.00%	0.00%	2.76%	2.10%	0.18%	2.70%	
			Verified	6.39%	2.90%	4.95%	2.92%	1.46%	4.20%	0.00%	0.00%	2.76%	2.10%	0.18%	2.70%	
	Good voice quality	>=95%	Reported	97.11%	98.92%	98.23%	95.80%	99.07%	97.91%	96.94%	99.13%	97.51%	99.02%	99.39%	99.40%	
Verified			97.11%	98.92%	98.23%	95.80%	99.07%	97.91%	96.94%	99.13%	97.51%	99.02%	99.39%	99.40%		

4	No. of POI's having congestion >0.5%		Reported	2	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	0.07%	0.02%	0.10%	0.03%	0.10%	0.03%	NA	NA	0.12%	0.00%	0.09%	0.01%	
			Verified	0.07%	0.02%	0.10%	0.03%	0.10%	0.03%			0.12%	0.00%	0.09%	0.01%	
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.10%	0.00%	0.10%	0.04%	0.08%	0.00%	0.00%	0.00%	0.04%	0.00%	0.06%	0.02%	
			Verified	0.10%	0.00%	0.10%	0.04%	0.08%	0.00%	0.00%	0.00%	0.04%	0.00%	0.06%	0.02%	
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	NR	100%	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	NR	100%	100%	100%	100%	100%	
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	100%	100%	100%	NR	100%	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	NR	100%	100%	100%	100%	100%	
8	Response time to customers for assistance		Reported													
			Verified													
	Accessibility of call centre/Customer Care	>=95 %	Reported	100%	100%	96.00%	85.29%	98.71%	99.00%	100%	100%	100%	97.00%	98.42%	99.00%	
			Verified	100%	100%	96.00%	85.29%	98.71%	99.00%	100%	100%	100%	97.00%	98.42%	99.00%	
% call answered by operators(voice to voice) within 60 sec.	>=90 %	Reported	65.26%	90.00%	91.00%	59.16%	93.00%	95.00%	100%	98.37%	91.67%	90.00%	95.75%	95.00%		
		Verified	65.26%	90.00%	91.00%	59.16%	93.00%	95.00%	100%	98.37%	91.67%	90.00%	95.75%	95.00%		
9	Termination/closure of service		Reported													
			Verified													
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7d ays	Reported	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%	
Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%	100%
		Verified	100%	100%	100%	100%	100%	100%	100%			100%	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	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators	
A	<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>													
	a) BTS Accumulated Downtime	<=2%	0.03%	0.02%	1.82%	0.05%	0.57%	0.15%	16.26%	0.59%	0.10%	0.04%	0.67%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	1.33%	0.00%	0.08%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		1077	7054	3610	3435	2500	1488	6	13	6269	1605	1438	928
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		21	122	4731	130	1023	156	70	5	453	49	698	3
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	48	0	2	0	2	0	0	0	0	0
	c) CSSR	>=95%	97.18%	99.43%	98.75%	98.33%	99.66%	98.38%	99.39%	99.62%	99.17%	99.07%	99.20%	98.92%
	d) SDCCH/PAGING congestion	<=1%	0.00%	0.12%	0.72%	0.23%	0.01%	0.04%	0.12%	0.61%	0.22%	0.00%	0.00%	0.00%
	e) TCH congestion	<=2%	0.06%	0.22%	1.67%	0.99%	0.05%	0.04%	0.41%	0.00%	0.21%	0.13%	0.15%	0.03%
2	<b>Connection maintenance</b>													
	a) CDR	<=2%	0.81%	1.09%	1.59%	1.57%	0.48%	0.76%	0.00%	1.02%	0.85%	0.61%	0.50%	0.54%
	b) Cells having > 3% TCH drop	<=3%	1.90%	2.71%	2.96%	2.86%	0.04%	2.92%	0.00%	0.00%	2.56%	1.17%	1.04%	5.86%
	c) Good voice quality	>=95%	96.62%	98.95%	98.40%	95.98%	99.12%	98.24%	98.63%	99.95%	97.72%	99.35%	98.47%	NA
	d) No. of cells > 3% TCH drop		61	571	315	296	3	130	0	0	481	58	45	167
	e) Total no. of cells in the network		3211	21063	10640	10339	7500	4457	18	42	18806	4950	4314	2850

<b>3</b>	<b>No. of POI's having congestion &gt;0.5%</b>		0	0	2	4	0	0	0	0	0	2	2	0
	a) Name of POI not meeting the benchmark		Nil	Nil	L1 MI Road, L1 Bajaj Nagar	Airtel Udaipur, BSNL MI Road, Idea NLD Huawei NGN, Inter MSC JPRMGW	Nil	Nil	Nil	Nil	Nil	Aircel Jaipur, Airtel Jodhpur	Ajmer L2 Tax, Airtel GMSC	Nil
	b) Total No. of circuits on POI		43,079	145,426	40,597	73,710	13,079	40,427	452	483	134,000	35,049	22,778	59,624
	c) Avg No. of call attempts on POI		1,038,070	4,638,455	751,571	2,120,516	179,700	592,479	107	80	3,297,652	658,478	186,698	687,649
	d) Avg traffic served on POI (Erlang)		34,966	104,216	11,548	52,456	4,880	23,109	4	26	80,978	13,746	7,905	3,305
	e) Total number of working POI Service Area wise		34	93	26	90	18	36	18	15	187	63	69	262
	f) Capacity of POI		41287	141576	35892	70620	10726	39114	263	314	129797	33246	20735	54269
	g) Equipped Capacity of Network in respect of Traffic in erlang		53253	447341	265400	128102	102000	67091	133	5000	250000	82200	116000	270395
	h) Total traffic handled in TCBH in erlang		29495	322337	133356	130871	97812	30119	1	5	217832	50978	48164	61650
<b>(B)</b>	<b>Customer Service Quality Parameters</b>													
<b>4</b>	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre	>=95%	100%	98.42%	98.50%	97.28%	99.00%	70.04%	100%	100%	100%	98.97%	99.11%	70.51%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	98.55%	71.44%	92.50%	79.24%	92.71%	86.14%	100%	100%	94.62%	98.79%	95.07%	98.56%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		17,478	181,886	200	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	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%)**: Except Loop Telecom, rest of the operators are meeting benchmark with values lying between 0% and 1.82%.
- **Worst affected BTSs due to downtime (benchmark <= 2%)**: Except Loop Telecom, rest of the operators are meeting benchmark with values lying between 0% and 1.33%.
- **Call setup success rate (benchmark >= 95%)**: All operators are meeting the benchmark with values lying between 97.18% and 99.66%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%)**: All operators are meeting the benchmark with values lying between 0% and 0.72%.  
*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 1.67%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%)**: Except for Tata CDMA, rests of the operators are satisfying the benchmark with value in between 0% and 2.96%.
- **Connections with good voice quality (benchmark >= 95%)**: All operators are meeting the benchmark with values lying between 95.98 and 99.95%. For this parameter, 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, Idea, MTS & RCOM CDMA were having calls failures >0.5% with nos. 2, 4, 2, 2 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 Tata GSM & Tata CDMA, rest of the operators is meeting the benchmark with values lying between 97.28% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %**: Except for Airtel, Idea & Tata GSM, rest of the operator are meeting the benchmark with value in between 92.50% and 100%.



## (2) One month audit Data report &amp; Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators				
(A)	<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>													
	a) BTS Accumulated Downtime	<=2%	0.02%	0.11%	1.84%	0.08%	0.51%	0.03%	3.63%	0.57%	0.11%	0.06%	0.65%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.16%	1.99%	0.00%	1.92%	0.00%	66.67%	0.00%	0.67%	0.00%	1.53%	0.00%
	c) Total no. of BTSs in the licensed service area		1,077	7,054	3,610	3,435	2,500	1,488	6	13	6,269	1,605	1,438	928
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		128.10	5276.66	46231	1886	8950	259.22	151.75	51.19	4890	723.12	6471	82.38
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	11	72	0	48	0	4	0	42	0	22	0
2	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	>=95%	97.29%	99.33%	99.00%	98.50%	99.66%	98.19%	99.41%	99.26%	99.08%	99.50%	99.09%	98.93%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.28%	0.78%	0.24%	0.03%	0.04%	0.06%	0.29%	0.34%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.06%	0.33%	0.86%	0.72%	0.04%	0.05%	0.44%	0.10%	0.19%	0.13%	0.22%	0.13%
3	<b>Connection maintenance (Retainability)</b>													
	a) CDR	<=2%	0.81%	1.24%	1.40%	1.58%	0.48%	0.83%	1.11%	0.81%	0.85%	0.57%	0.54%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	1.06%	2.80%	2.98%	2.76%	0.04%	1.37%	0.00%	0.00%	1.47%	0.81%	0.86%	2.77%
	c) Good voice quality	>=95%	96.70%	98.92%	98.40%	96.01%	99.11%	98.18%	98.92%	99.13%	97.71%	99.36%	98.43%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		34	589	317	285	3	61	0	0	277	40	37	79
	e) Total no. of cells in the network		3211	21063	10640	10339	7500	4457	18	42	18806	4950	4314	2850
4	<b>No. of POI's having congestion &gt;0.5%</b>	<=0.5%	0	0	2	4	0	0	0	0	0	2	2	0

	a) Name of POI not meeting the benchmark		Nil	Nil	L1 MI Road, L1 Bajaj Nagar	Airtel Udaipur, BSNL MI Road, Idea NLD Huawei NGN, Inter MSC JPRMGW	Nil	Nil	Nil	Nil	Nil	Aircel Jaipur, Airtel Jodhpur	Ajmer L2 Tax, Airtel GMSC	Nil
	b) Total No. of call attempts on POI (Avg.)		1,029,901	4,641,117	742,673	2,146,340	191,863	622,935	936	103	3,643,501	8,465,283	184,975	680,073
	c) Total traffic served on POI (Erlang) (Avg.)		33,644	101,545	11,631	50,572	5,490	25,345	26	28	90,441	178,825	7,689	4,108
	d) Total No. of circuits on POI		43,079	145,426	40,597	72,095	13,079	40,427	452	483	153,924	35,049	22,778	59,264
	e) Total number of working POI Service Area wise		34	93	26	90	18	36	18	15	236	63	69	262
	f) Capacity of POI		41,287	141,576	35892	69,025	11,948	39,114	263	314	148,354	33,246	20,767	54,269
<b>5</b>	<b>Network Data</b>													
	a) Equipped Capacity of Network Erlang		53253	447341	265400	128102	102000	67091	133	5000	250000	82200	116000	270395
	b) Total traffic in TCBH in erlang (Avg.)		27400	325973	124562	125785	96736	29768	45	4	209143	49787	47905	60319
	c) Total no. of customers served (as per VLR) on last day of the month		1429353	13091153	2766879	4252733	3360436	1201207	62	456	7077217	1073797	1318593	781103
<b>(B)</b>	<b>Customer Service Quality Parameters</b>													
<b>5</b>	<b>Metering/billing credibility-Post paid</b>	$\leq 0.1\%$	0.02%	0.02%	0.07%	0.04%	0.03%	0.04%	Only Prepaid services		0.09%	0.00%	0.00%	0.00%
	a) No. of bills issued during the period		9187	199102	253262	45174	15768	14837			187616	42893	116944	75287
	b) No. of bills disputed including billing complaints during the period		2	32	173	18	5	6			160	1	0	0
<b>6</b>	<b>Metering /billing credibility-Pre paid</b>	$\leq 0.1\%$	0.01%	0.00%	0.09%	0.06%	0.10%	0.00%	0.00%	0.00%	0.05%	0.00%	0.10%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		175	500	5478	2113	5273	0	0	0	4949	0	2248	191

	b) Total no. of pre-paid customers at the end of the quarter		1,395,491	16,225,640	5,987,231	3,647,090	5,288,971	2,088,266	400	10,570	9,228,729	2,315,311	2,250,953	1,463,185
7	<b>Resolution of billing/ charging complaints</b>	<i>100% within 4 weeks</i>	100%	100%	100%	100%	100%	100%	No complaints		100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		177	5753	5651	2131	5288	8188			5337	270	2364	5187
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		177	5753	5651	2131	5288	8188			5337	270	2364	5187
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		177	532	5651	2131	5278	6			5109	1	2248	191
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		0	5221	0	0	10	8180			228	269	116	4996
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i>&lt;=1 week</i>	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%
8	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre/Customer Care	<i>&gt;=95%</i>	100%	99.75%	97.48%	97.28%	98.97%	99.33%	100%	100%	100%	98.34%	100.00%	95.72%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>&gt;=90%</i>	73.04%	46.59%	90.19%	74.10%	90.83%	90.18%	100%	97.83%	97.54%	96.01%	96.00%	93.50%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		177,965	2,080,732	50,184	893,531	4,218,614	340,922	22	53	11,551,893	3,124,640	1,144,317	106,642
	d) No. of calls connected and answered successfully to call		177,965	2,075,565	48,921	869,218	4,175,238	338,648	22	53	11,551,893	3,072,918	1,144,317	102,075

	centre & customer care nos. during TCBH (Avg.).													
<b>9</b>	<b>Termination/closure of service</b>	<i>&lt;=7 days</i>	100%	100%	100%	100%	100%	100%	No cases	100%	100%	100%	100%	
	a) Total No. of requests for Termination / Closure of service received during the quarter		297	459	850	265	75	637		1,400	545	453	1,070	
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		297	459	850	265	75	637		1,400	545	453	1,070	
<b>10</b>	<b>Time taken for refunds of deposits after closures.</b>	<i>100% within 60 days</i>	100%	100%	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%)**: Except Loop Telecom, rest of the operators are meeting the benchmark with values lying between 0.01% and 1.84%.
- **Worst affected BTSs due to downtime (benchmark <= 2%)**: Except Loop Telecom, all operators are meeting the benchmark with values lying between 0% and 1.99%.
- **Call setup success rate (benchmark >= 95%)**: All operators are meeting the benchmark with values lying between 97.29% and 99.66%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%)**: All operators are meeting the benchmark with values lying between 0% and 0.78%.  
*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 0.04% and 0.86%.
- **Call drop rate (benchmark <= 2%)**: All operators are meeting the benchmark with values lying between 0.48% and 1.58%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%)**: All operators are satisfying the benchmark with value in between 0% and 2.98%.
- **Connections with good voice quality (benchmark >= 95%)**: All the GSM operators are meeting the benchmark with values lying between 96.01% and 99.36%. For this parameter, 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, Idea, MTS & RCOM CDMA were having call failures >0.5% with nos. 2, 4, 2, 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)**: All the operators are meeting the benchmark with values lying between 95.72% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%)**: Except for Aircel, Airtel & Idea, rests of the operators are meeting the benchmark with values lying between 90.18% and 100%.
- **Metering and billing credibility-Postpaid (benchmark <= 0.1%)**: All the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%)**: All the operators are meeting the benchmark 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)**: All operators have satisfied the benchmark.

### 3) Sample Coverage

Switches/BSC/BTS details of operators:

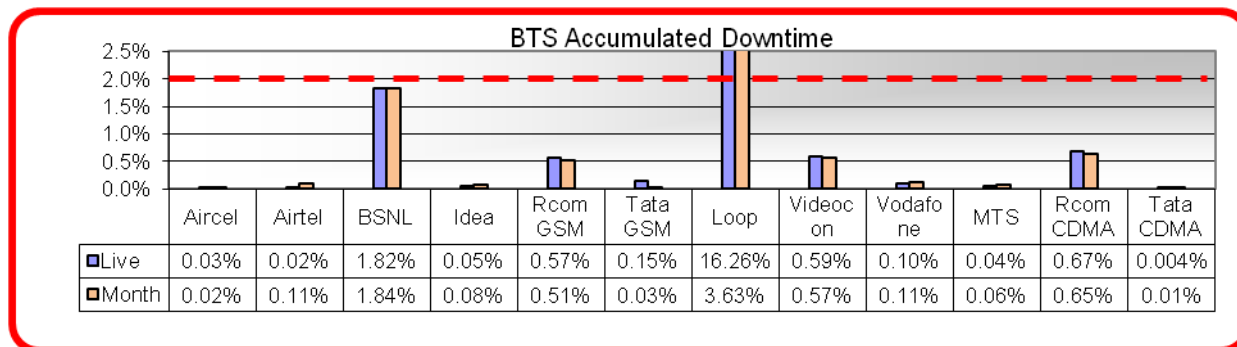
Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	1	10	1077
2	Airtel Ltd	42	78	7054
3	BSNL	14	50	3610
4	Idea	9	23	3345
5	Reliance Communication	4	15	2500
6	Tata	2	12	1488
7	Loop	1	1	6
8	Videocon	1	1	13
9	Vodafone	25	77	6269
<b>CDMA Operators</b>				
10	MTS	2	5	1605
11	Reliance Communication	6	6	1438
12	Tata	7	10	928

### 4) Performance (Graphical Representation)

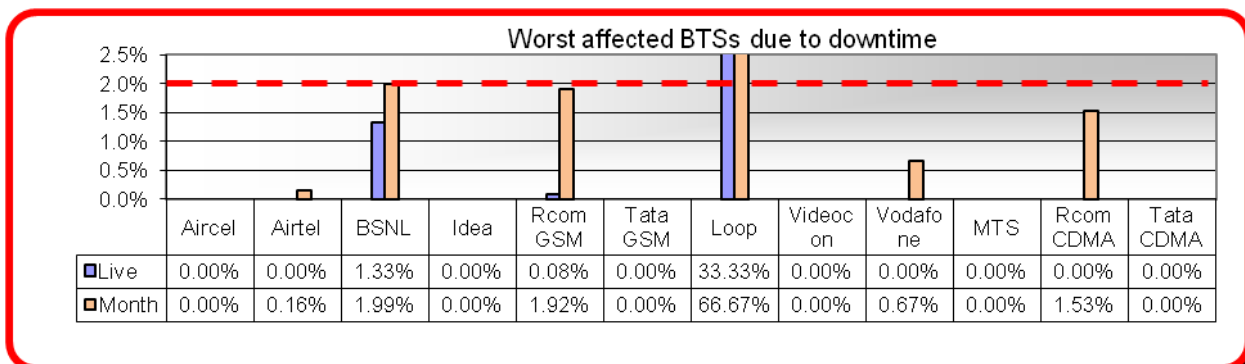
**Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services**

#### A) NETWORK PERFORMANCE

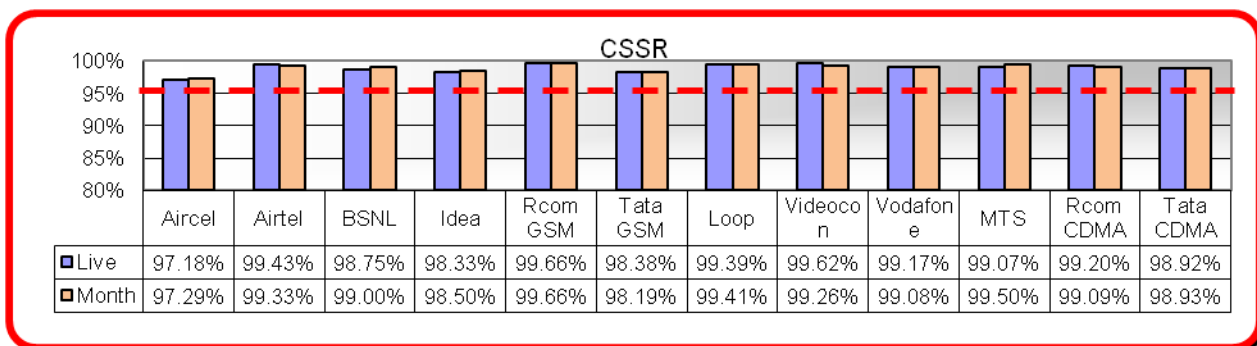
**BTS accumulated downtime:** Except Loop Telecom, rests of the operators are meeting the TRAI benchmarks ( $\geq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



**Worst affected BTSs due to downtime:** Except Loop Telecom, rest of the operators are meeting the TRAI benchmarks ( $\geq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

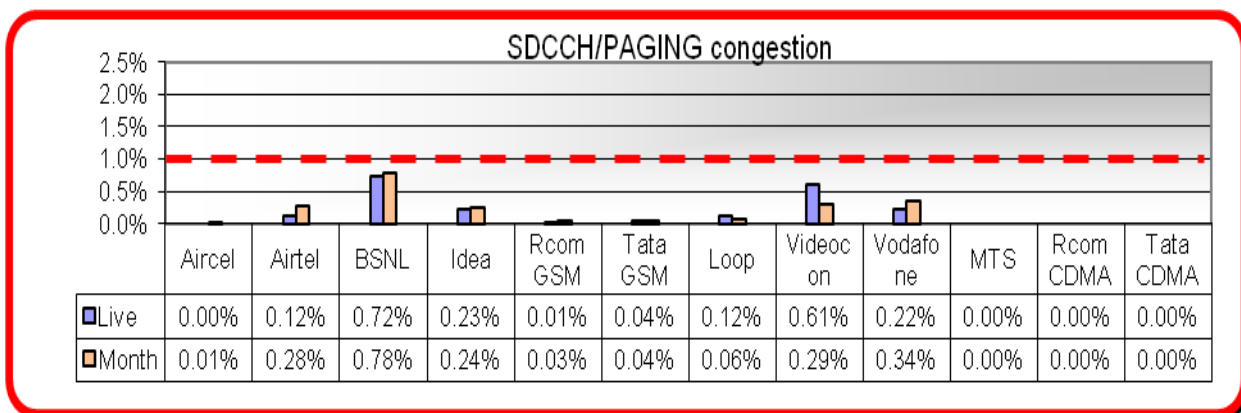


**Call Setup Success Rate (CSSR):** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit.

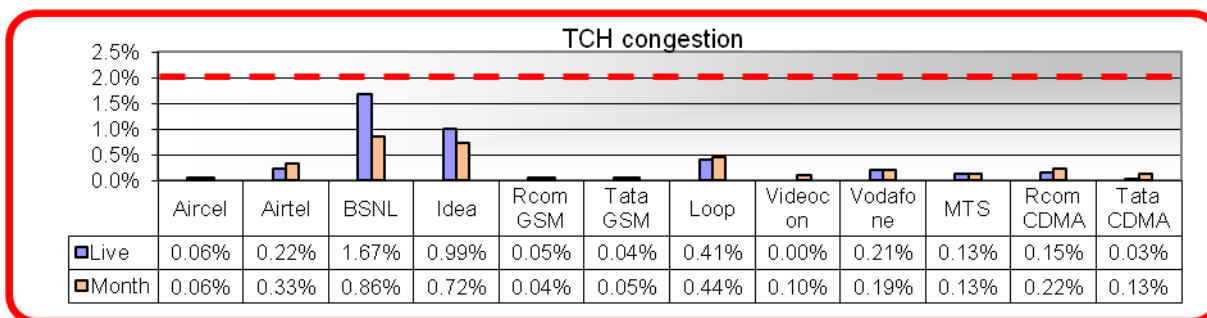


**Blocked call rate:**

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

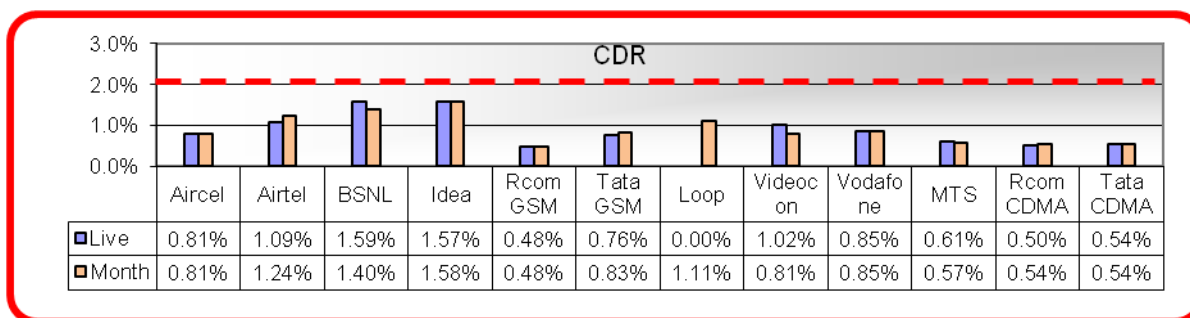


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data.

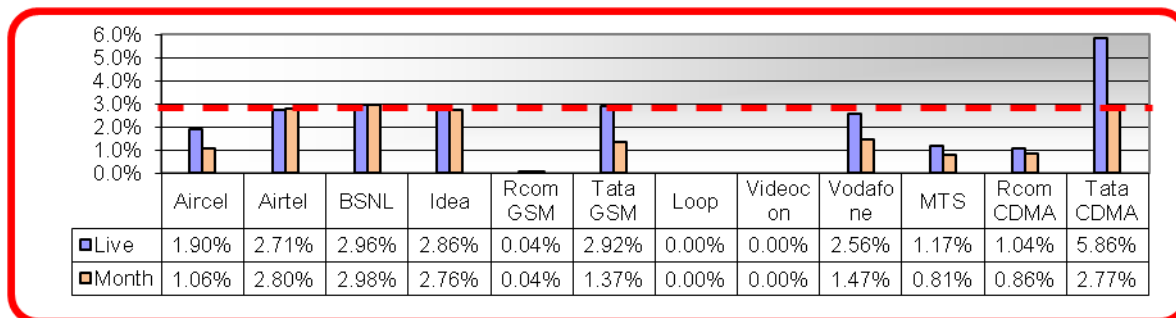


### Connection Maintainability (Retainability):

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

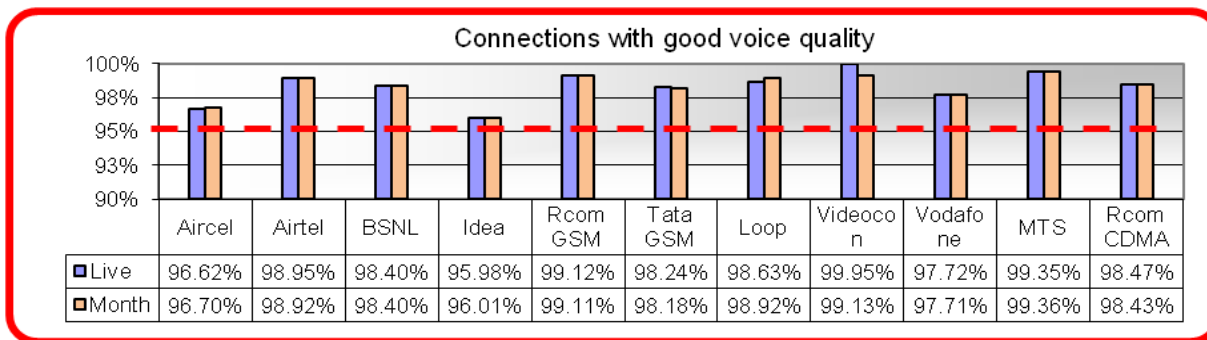


**Worst affected Cell exceeding 3% TCH Drop:** Except Tata CDMA for live data, rests of the operators are meeting the benchmark for both cases.

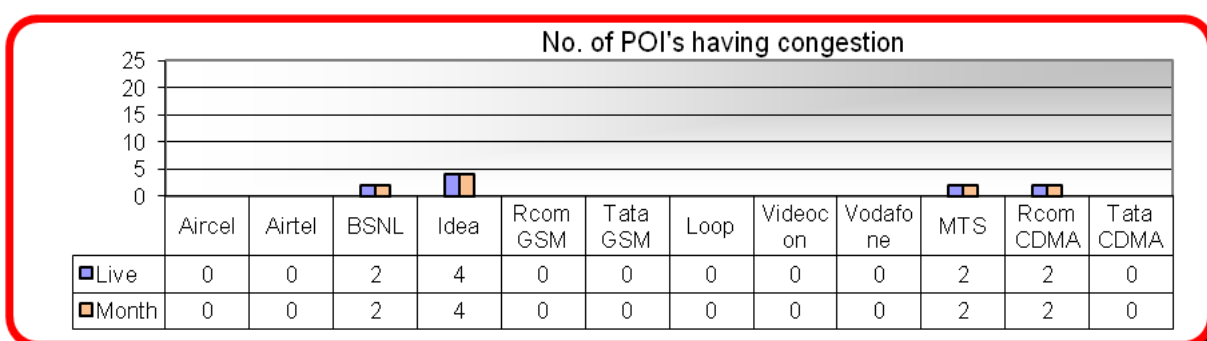


**Percentage of connections with good voice quality (benchmark  $\geq 95\%$ ):** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit. For Tata CDMA values are not system generated.





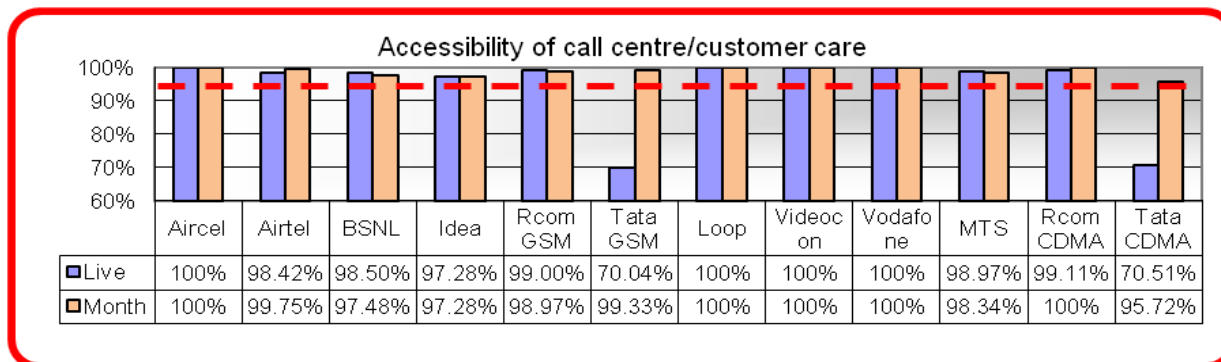
**No of POI's having Congestion >0.5%:** For both Live and month audit, BSNL (2), Idea(4), MTS (2) & RCOM CDMA (2) respectively were having call failures >0.5% on their respective POI's.



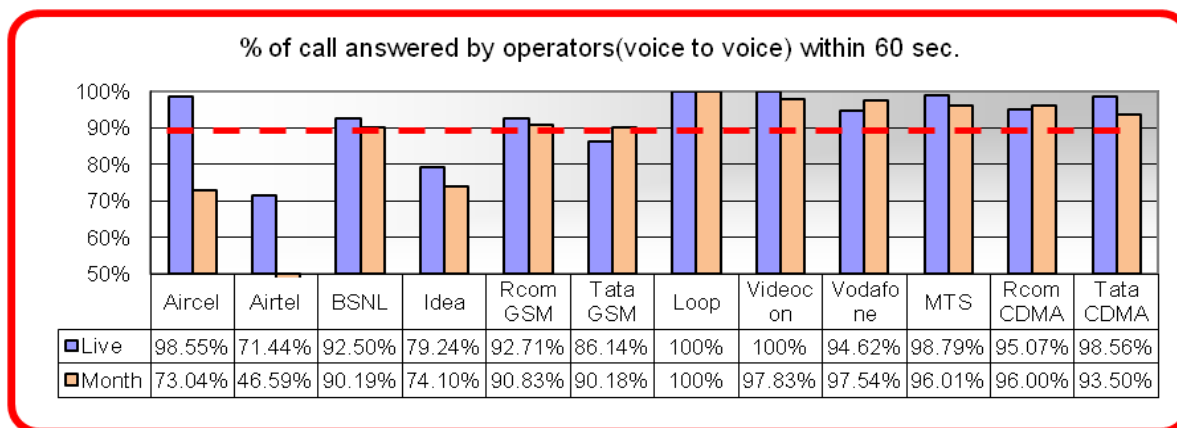
## B) CUSTOMER SERVICE QUALITY PARAMETERS

**Response time to the customer for assistance:**

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



**Percentage of call answered by operators (Voice to voice) within 60 sec:** For Live data, only Tata GSM, while Airtel & Idea for both cases were not meeting the benchmark. Similarly, Airtel is not meeting in case of month audit. Rest all operators are meeting benchmark for both cases.



## 5) Critical Analysis

From the data table it can be seen that only Tata CDMA is not meeting the benchmark for the parameter of ‘Worst affected cells are 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. In Case of Network Service quality parameters, Loop Telecom failed to meet benchmark for both the parameter i.e. BTS Accumulated downtime & Worst affected BTSs due to downtime.

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

In case of POI congestion, except for BSNL, Idea, MTS & RCOM CDMA, rest of the operators are found to be performing quite well in terms of meeting the benchmark ( $\leq 0.5\%$ ). 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.

In case of response time to customer assistance, Tata GSM & Tata CDMA not meeting benchmark for parameter “Accessibility of call centre” while Airtel, Idea & Tata GSM not meeting in for the parameter “% call answered by voice-voice.

**(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	BSNL	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	6	No Valid complaints	No Valid complaints	100	1	100	100
Total No. of calls Answered	91	88	81	90	93	6			92	1	87	94
Cases resolved with 4 weeks	91	88	81	90	93	6			92	1	87	94
%age of cases resolved	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%

Note: The difference shows between the attempted and answered calls is because of the possibility of not reachable, switched off etc.

**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	50	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	49	96	92	97	100	98	100	100	100	99
%age of calls got answered	98%	96%	92%	97%	100%	98%	100%	100%	100%	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.		Aircel	Airtel	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	MTS	RCOM CDMA	Tata CDMA
Jaipur											
100	Police	1	1	1	1	1	ICR (Idea)	1	1	1	1
101	Fire	1	1	1	1	1		1	1	1	1
108	Ambulance	1	1	1	1	1		1	1	1	1
139	Railway	2	2	2	2	2		2	2	2	2
Sikar											
100	Police	ICR (Tata GSM)	1	1	1	1	1	1	1	1	1
101	Fire		1	1	1	1	1	1	1	1	1
108	Ambulance		1	1	1	1	1	1	1	1	1
139	Railway		2	2	2	2	2	2	2	2	2
Barmer											
100	Police	1	1	1	1	1	ICR (Vodafone)	1	1	1	1
101	Fire	1	1	1	1	1		1	1	1	1
108	Ambulance	1	1	1	1	1		1	1	1	1
139	Railway	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 all the operators are meeting the 90% benchmark. The values were lying between 92% and 100%.

Level 1 call testing was done in all the listed Drive test locations (Jaipur, Sikar & Barmer) to the nos. (100, 101, 108 & 139) emergency calls were connecting to their local canters. Overall result 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)	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
	Jaipur									
<b>Aircel</b>	-	100%	99%	100%	99%	100%	100%	100%	100%	100%
<b>Airtel</b>	100%	-	98%	100%	100%	100%	99%	99%	100%	100%
<b>BSNL</b>	100%	99%	-	98%	100%	100%	100%	99%	100%	100%
<b>Idea</b>	100%	98%	99%	-	100%	100%	100%	99%	100%	100%
<b>Reliance (GSM)</b>	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
<b>Tata (GSM)</b>	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
<b>Vodafone</b>	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
<b>MTS</b>	99%	98%	99%	100%	100%	100%	100%	-	100%	100%
<b>Reliance (CDMA)</b>	100%	99%	100%	100%	100%	100%	100%	100%	-	100%
<b>Tata (CDMA)</b>	99%	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. However cases were observed when some of the operators namely BSNL, MTS, Idea & RCOM CDMA show congestion between 1 & 2% on their individual inter operator POI's.

**(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 60-350Km depending on city areas within the speed limit of 30Km/hr.

**DRIVE TEST LOCATIONS*****JAIPUR***

LOW DENSE: Mansarovar, VKI, Vaishali Nagar, Jothwara, Nirman Nagar, Pratap Nagar, Sitapura  
 MEDIUM DENSE: Sodala, Ajmer Road, Civil Lines, C-scheme, Tonk Road  
 HIGH DENSE: Wall City, Choda Rasta, Ramgarh Road, Rangang.

***SIKAR***

LOW DENSE: Industrial Area, Collectrate, Tabela.  
 MEDIUM DENSE: Station Road, Ramlila Ground, Kalyan Circle.  
 HIGH DENSE: Ghanta ghar, Subhash Chowk, Bus Stand.

***BARMER***

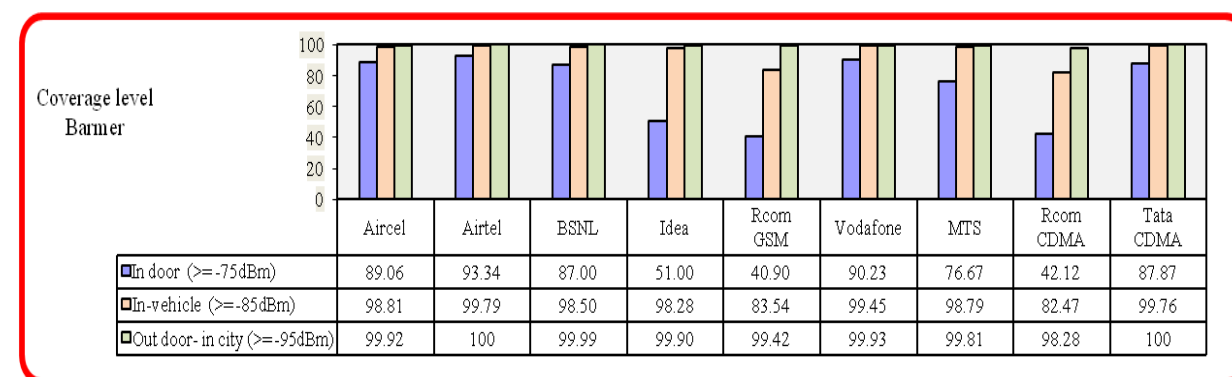
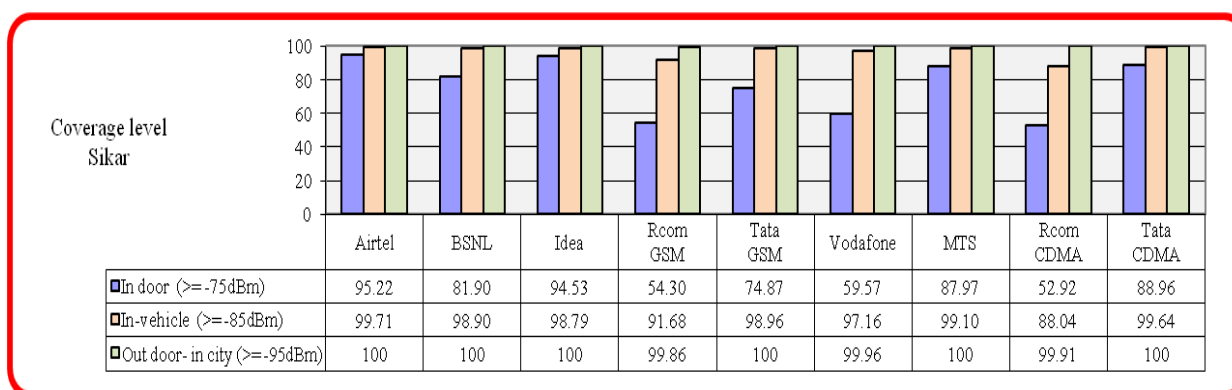
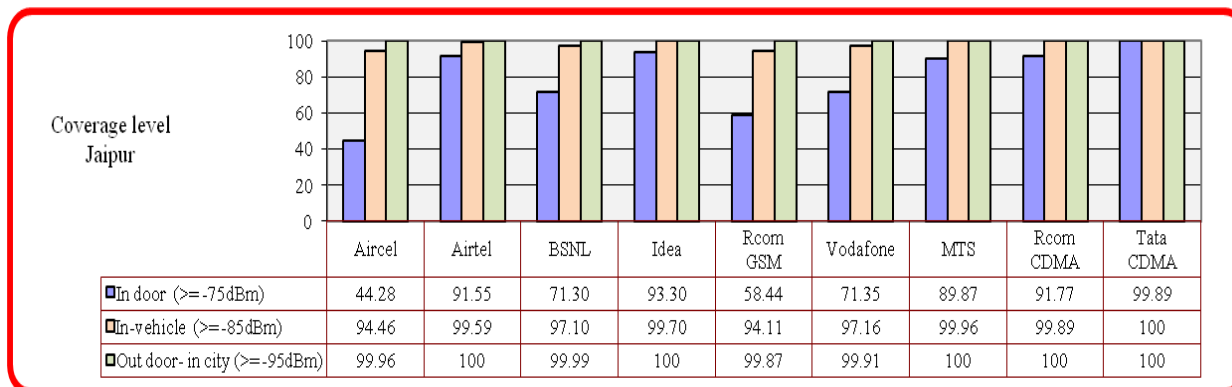
LOW DENSE: Utarlai Road, Sindari Road, Gadra Road, Choutan Road, Sanchoe H/W.  
 MEDIUM DENSE: Shastri Nagar, Rai Colony, Akashwani, Indra Colony.  
 HIGH DENSE: Pratap Ji Ki pole, Baldev Nagar, Station road.

## 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	Jaipur	406	429	479	383	381	ICR (Idea)	479	555	386	513
		Sikar	ICR (TATA GSM)	218	149	135	133	144	143	187	135	213
		Barmer	165	134	116	133	108	ICR (Vodafone)	160	119	107	141
1.2	Blocked Call Rate (<=3%)	Jaipur	2.22	0.00	0.42	1.57	0.79	ICR (Idea)	0.42	0.00	0.57	1.54
		Sikar	ICR (TATA GSM)	0.00	0.67	2.22	0.75	0.00	0.70	0.00	0.74	0.00
		Barmer	1.81	0.00	6.03	3.76	0.93	ICR (Vodafone)	0.63	0.00	0.00	1.42
1.3	Dropped Call Rate (<=2%)	Jaipur	1.51	0.00	0.21	0.27	0.79	ICR (Idea)	0.21	0.00	0.26	0.19
		Sikar	ICR (TATA GSM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Barmer	0.00	0.00	0.92	1.56	0.00	ICR (Vodafone)	0.00	0.00	0.00	0.00
1.4	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Jaipur								98.05	98.80	98.23
		Sikar								98.11	97.64	99.91
		Barmer								99.85	96.48	99.88
	(ii) 0-5 (with frequency hopping)	Jaipur	95.51	95.52	95.40	95.70	96.71	ICR (Idea)	95.40			
		Sikar	ICR (TATA GSM)	95.19	97.40	97.51	95.22	94.21	95.90			
Barmer		95.73	95.04	94.10	96.70	98.51	ICR (Vodafone)	95.20				
1.5	Service Coverage (%)											
	In door (>= -75dBm)	Jaipur	44.28	91.55	71.30	93.30	58.44	ICR (Idea)	71.35	89.87	91.77	99.89
		Sikar	ICR (TATA GSM)	95.22	81.90	94.53	54.30	74.87	59.57	87.97	52.92	88.96
		Barmer	89.06	93.34	87.00	51.00	40.90	ICR (Vodafone)	90.23	76.67	42.12	87.87
	In-vehicle (>= -85dBm)	Jaipur	94.46	99.59	97.10	99.70	94.11	ICR (Idea)	97.16	99.96	99.89	100
		Sikar	ICR (TATA GSM)	99.71	98.90	98.79	91.68	98.96	97.16	99.10	88.04	99.64
		Barmer	98.81	99.79	98.50	98.28	83.54	ICR (Vodafone)	99.45	98.79	82.47	99.76
	Outdoor- in city (>= -95dBm)	Jaipur	99.96	100	99.99	100	99.87	ICR (Idea)	99.91	100	100	100
		Sikar	ICR (TATA GSM)	100	100	100	99.86	100	99.96	100	99.91	100
		Barmer	99.92	100	99.99	99.90	99.42	ICR (Vodafone)	99.93	99.81	98.28	100
1.6	Call Setup Success Rate (>=95%)	Jaipur	97.78	100	99.58	98.43	99.21	ICR (Idea)	99.58	100	99.43	98.46
		Sikar	ICR (TATA GSM)	100	99.33	97.78	99.25	100	99.30	100	99.26	100
		Barmer	98.19	100	93.97	96.24	99.07	ICR (Vodafone)	99.37	100	100	98.58

### Graphical Representation

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





**(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 **Jaipur town** was satisfactory for all KPI. During Drive Test, route was covered about 350 Km and CSSR was observed between 97.78% and 100%. Under Voice Quality Section, Reliance GSM and Reliance CDMA performed slightly better than others. As far as RF coverage level considered, Idea achieved Max. Nos. of percentage of samples within -75dBm.
- ✚ Performance in **Sikar Town** was satisfactory for all the operators for most of the KPI parameters, except for Tata GSM for the parameter “Good Voice Quality”. Under RF coverage level section, Airtel performed quite better than others. During Drive, route was covered about 70 Km and in that CSSR values were getting between 97.78% & 100%. Under Voice quality section, Tata CDMA & Idea showing performance slightly better than other service providers.
- ✚ Similarly, performance in **Barmer Town** was satisfactory for all operators for the most of the KPI parameters, except for BSNL for the parameter namely “Blocked call Rate”, “Good voice quality” & “CSSR”. During drive, route was covered about 60 Km and in that CSSR was observed between 93.97% and 100% for all operators. Under Voice quality section, Reliance GSM & Tata CDMA showing slightly higher values than others. As far as RF coverage level considered, Airtel 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 “**Sirohi, Banswara & Churu**”. 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 30 to 60 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. Sirohi   | - | Bharti Airtel (2 BTS)                       |
| 2. Banswara | - | MTS (2 BTS)                                 |
| 3. Churu    | - | Reliance GSM (8 BTS), Reliance CDMA (3 BTS) |

**Area Coverage Details:****1) Sirohi**

Government College, Mahakal Nagar, Bus Stand, Sirohi Road, Abu road H/W, Hotel Baba Ramdev, Choudhary Hospital, Adarsh vidya Mandir School.

**2) Banswara**

Government Sen. Sec. School, Shri raj mandir, Bus Stand, Forest Department, Gorakh masjid, sainath hotel road.

**3) Churu**

Churu fort, Bus Stand, Bhawani Resorts, Modern Public School, Railway Station, Gandhi Nagar, Agrasen Nagar, Loco Colony, Shekhawat Colony, Poonia Colony, Van Vihar.

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

SN	Parameter	Bharti Airtel	MTS	RCOM GSM	RCOM CDMA
		Sirohi	Banswara	Churu	
1.1	Call Attempts	38	91	90	92
1.2	Blocked Call Rate (<=3%)	0.00	0.00	0.00	1.09
1.3	Dropped Call Rate (<=2%)	0.00	0.00	0.00	1.10
1.4	Percentage of connections with good voice quality (=>95%)				
	(i) 0-4 (w/o frequency hopping)		99.86		97.45
	(i) 0-5 ( with frequency hopping)	98.00		98.94	
1.5	Service Coverage (%)				
	In door (>= -75dBm)	59.40	76.50	54.01	71.08
	In-vehicle (>= -85dBm)	95.10	98.94	91.16	95.13
	Outdoor- in city (>= -95dBm)	99.99	100	99.69	100
1.6	Call Setup Success Rate (>=95%)	100	100	100	98.91

### Graphical Representation

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



**(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:

- ✚ **Airtel** performance in **Sirohi Town** was found to be satisfactory for all parameter. The RF coverage level was found average throughout the town with 59.84% of samples within -75dBm Rx lev and achieved no blocked or dropped calls. As far as Voice quality parameter concerned, operator achieved 98.0% of samples within 0-5 number. During testing, a total of 38 test calls and 65 Handover attempts were made and all were successfully connected & completed which results into 100% CSSR & HOSR respectively.
- ✚ **MTS** performance in **Banswara Town** was found to be satisfactory for all parameter. The RF coverage level was found average throughout the town with 76.50% of samples within -75dBm Rx lev and achieved no blocked or dropped calls. As far as Voice quality parameter concerned, operator achieved 99.86% of samples indicating good voice quality. During testing, a total of 91 test calls and 581 Handoff attempts were made and all were successfully connected & completed which results into 100% CSSR & HOSR respectively.
- ✚ Performance of **Reliance GSM & CDMA** in **Churu Town** found to be satisfactory for all parameters. A total of 90 and 92 test calls were made and out of that 90 and 91 calls got successfully established for respective service provider. The RF coverage level was found average for both Reliance GSM & Reliance CDMA in the town, Under Voice quality section, both operators performed well and got samples around 98.94% & 97.45%.

**(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  $\leq 3\%$  for “worst affected cells  $> 3\%$  TCH drop” is not met by Tata CDMA. In Case of Network Service quality parameters, Loop Telecom failed to meet benchmark for both the parameter i.e. BTS Accumulated downtime & Worst affected BTSs due to downtime.

Under Drive Test section, BSNL failed to meet benchmark for “Good Voice quality” in Barmer while Tata GSM in Sikar.

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  $\geq 90\%$ . Apart from this, the “accessibility of call centre” parameter benchmark is not met by Tata GSM & Tata CDMA.

Regarding **Metering/Billing Credibility** issues, all operators are meeting the benchmark.

**II. Basic Telephone Service (Wireline) Providers**

*- Not conducted for this quarter*

**III. Broadband Service Providers**

*- Not conducted for this quarter*