

**REPORT**

**ON**

**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**

**OF**

**CELLULAR MOBILE TELEPHONE SERVICE**

**FOR**

**NORTH ZONE – UP (EAST) CIRCLE**

*Report Period: Jan 2012 - March 2012*

**Telecommunications Consultants India Ltd.**  
TCIL Bhawan, Greater Kailash Part – I  
New Delhi – 110048  
Phone: +91-11-26202020 Fax: +91-1126242266  
Website: <http://www.tcil-india.com>

## **Table of Contents**

### **CHAPTER-1: Introduction**

- I. Background
- II. Objectives and Methodology

### **CHAPTER-2: Executive Summary**

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

#### **(A) Cellular Mobile Telephone Service Providers**

- 3 days Live Data Audit
- One Month Data Audit
- Operator Assisted Drive Test
- Independent Drive Test

### **CHAPTER-3: Audit-PMR data verification results**

- I. Cellular Mobile Telephone Service

### **CHAPTER-4: Detailed Findings & Analysis**

- I. Cellular Mobile Telephone Service

#### **(A) MSC audit**

- 1) 3 days live measurement data assessment & summarized findings
- 2) One month audit data assessment & summarized findings
- 3) Sample coverage
- 4) Performance (Graphical Representation)
- 5) Critical Analysis

#### **(B) Redressal**

- 1) Sample coverage
- 2) Performance based on live calling for billing complaints
- 3) Live Calling to Call Centre
- 4) Level 1 Live Calling
- 5) Critical Analysis

#### **(C) Inter operator call assessment**

- 1) Sample coverage
- 2) Performance based on live measurement
- 3) Critical Analysis

#### **(D) Drive test of the mobile network of service providers**

- 1) Sample Coverage
- 2) Performance (for the respective cities)
- 3) Critical Analysis

#### **(E) Independent Drive Test**

- 1) Sample coverage
- 2) Performance (for the respective cities)
- 3) Critical Analysis

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

## CHAPTER-1: INTRODUCTION

### I. Background

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

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

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

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

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

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

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

## II. Objectives and Methodology

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

- i) Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.
- ii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.
- iii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire month during which the live measurement is carried out.
- iv) Drive tests of the mobile networks both operators assisted and independent drive test (as and where required).
- v) Billing and call center's data verification.
- vi) Live testing of the efficiency of the call center / customer care help line.
- vii) Emergency (Level-1) call 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 UP (East) circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009.

## CHAPTER-2: EXECUTIVE SUMMARY

### I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Service in UP (East) Circle in 1<sup>st</sup> quarter (Jan - March 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period July- Sep 2011.

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

S/N	Name of Service Provider	Month of Audit	TCBH Hour
<b>GSM Operators</b>			
1	Aircel Ltd	Feb - 2012	20 - 21 Hrs
2	Airtel Ltd	Feb - 2012	20 - 21 Hrs
3	BSNL	Feb - 2012	19 - 20 Hrs
4	Idea	Feb - 2012	20 - 21 Hrs
5	Tata Communications (GSM)	Feb - 2012	20 - 21 Hrs
6	Vodafone	Feb - 2012	20 - 21 Hrs
7	Reliance Communication (GSM)	Feb - 2012	19 - 20 Hrs
8	Uninor	Feb - 2012	19 - 20 Hrs
9	Videocon	Feb - 2012	19 - 20 Hrs
<b>CDMA Operators</b>			
10	MTS (CDMA)	Feb - 2012	20 - 21 Hrs
11	Reliance Communication (CDMA)	Feb - 2012	19 - 20 Hrs
12	Tata Communications (CDMA)	Feb - 2012	19 - 20 Hrs

**Note:** Etisalat has stopped its operation in UP (East) Circle.

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

### (A) Cellular Mobile Telephone Services

3 days Live Data Audit	Bench -mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
		GSM Operators								CDMA Operators			
<b>Network Availability</b>													
a) BTS Accumulated Downtime	≤2%	0.29%	0.26%	1.27%	0.23%	0.58%	0.01%	1.35%	0.025%	2.07%	0.15%	0.72%	0.05%
b) Worst affected BTSs due to downtime	≤2%	0.00%	0.18%	1.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%
a) CSSR (Call Setup Success Rate)	≥95%	98.83%	99.59%	96.50%	99.97%	99.25%	98.70%	97.27%	99.50%	96.09%	99.30%	97.17%	96.91%
b) SDCCH/PAGING congestion	≤1%	0.11%	0.05%	0.65%	0.86%	0.13%	0.16%	0.64%	0.02%	0.84%	0.00%	0.00%	0.00%
c) TCH congestion	≤2%	0.64%	0.24%	1.85%	1.42%	0.12%	1.19%	1.70%	0.00%	1.01%	0.00%	1.58%	0.00%
<b>Connection maintenance (retainability)</b>													
a) CDR	≤2%	0.40%	0.90%	1.42%	1.05%	0.69%	0.95%	1.49%	1.30%	1.29%	0.69%	1.07%	0.66%
b) Worst affected cells>3% TCH drop	≤3%	2.44%	2.81%	0.41%	2.64%	0.00%	8.72%	1.73%	0.00%	2.38%	2.16%	1.97%	2.89%
c) Good voice quality	≥95%	97.05%	98.57%	96.50%	96.55%	98.46%	97.10%	95.51%	98.71%	95.70%	99.90%	98.82%	NA
<b>Number of POI having ≥0.5% POI congestion</b>	≤0.5%	0	0	0	0	0	0	6	0	0	0	0	0
<b>Response time to customers for assistance</b>													
a) Accessibility of call centre/Customer Care	≥95%	100%	92.05%	96.00%	100%	90.89%	100%	97.16%	100%	100%	99.84%	90.98%	100%
b) % call answered by operators(voice to voice) within 60 sec.	≥90%	90.41%	78.64%	91.75%	96.95%	99.80%	97.16%	91.88%	100.00%	96.51%	95.44%	99.61%	92.50%

NA: Not Applicable, NP: Not Provided

From the above 3 days live data assessment table, it is found that the operators are meeting most the network parameter except for parameter “BTS Accumulated Downtime” as seen for V-fone is not satisfying the benchmark & for the parameter “Worst affected cells >3% TCH drop” it is seen that Tata (GSM) is not satisfying the benchmark. Among the Technical Parameters it is also found that for parameter POI congestion Uninor having > 0.5% congestion in 6 nos.of POIs.

In case of “Good voice quality” Tata (CDMA) reported that the data is not system generated data. Rest of the operators satisfying the benchmark successfully.

In case of performance related to Customer Care data it is seen that for the parameters “% call answered by operators (voice to voice) within 60 sec” Airtel & RCom (GSM&CDMA) performance are not satisfactory.





One Month Data Audit		B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	MTS	RCom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators									CDMA Operators		
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	≥95%	100%	91.86%	96.52%	100%	98.36%	99.23%	97.12%	100%	100%	95.34%	98.06%	100.0%
	b) % call answered by operators(voice to voice) within 60 sec.	≥90%	91.06%	81.36%	93.00%	97.48%	97.33%	97.88%	96.95%	98.00%	96.18%	95.16%	96.98%	93.37%
9	Termination/closure of service (≤7days)	100.0%	100.0%	100.0%	59.80%	100.0%	100.0%	100.0%	NA	NA	100.0%	100.0%	100.0%	100.0%
10	Time taken for refunds of deposits after closures (within 60 days).	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	NA	NA	100.0%	100.0%	100.0%	100.0%

**NA:** Not Applicable, **NP:** Not Provided

From the above month data assessment table, under Network Parameters category it is found that two nos. of operators are not meeting the parameter “Worst affected cells>3% TCH drop” Namely Aircel & Tata (GSM). Also to be noted that Uninor is found to have 6 nos. of POI under congestion > 0.5%. In case of “Good voice quality” Tata (CDMA) reported that the data is not system generated. Rests of the operators are found satisfying the benchmarks successfully.

In case of performance related to Customer Care data it is found that for the parameters “Metering/billing credibility-Post paid” and “Metering/billing credibility-Pre paid” all the operators are satisfying the benchmark.

For parameters “Accessibility of call centre/Customer Care (IVR)” & “calls answered by operators (voice-to-voice) within 60 sec” it is found that Airtel is not satisfying the benchmark.

In case of “Termination/closure of service” it is seen that BSNL performance is not satisfactory.

## Operator-Assisted Drive Test

The Operator assisted Drive Test was conducted at UP (East) for all the operators. Route covered was about around 80-100 Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Jaunpur, Azamgarh & Hardoi. In all the cities, zones were selected in order to cover different density areas (High, Medium & Low).

S/N	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	V-fone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators								CDMA Operators			
1.1	Blocked Call Rate ( $\leq 3\%$ )	Jaunpur	1.55%	0.00%	17.30%	2.29%	0.00%	0.00%	0.93%	0.00%	0.00%	0.54%	0.00%	
		Azamgarh	1.69%	0.00%	17.57%	0.00%	0.00%	0.00%	0.87%	0.00%	No Service	1.59%	0.00%	
		Hardoi	0.00%	0.00%	3.52%	4.55%	0.92%	0.67%	7.03%	0.00%	No Service	0.93%	0.00%	
1.2	Dropped Call Rate ( $\leq 2\%$ )	Jaunpur	0.52%	0.00%	8.44%	0.00%	1.29%	0.00%	0.00%	0.00%	0.00%	1.09%	0.00%	
		Azamgarh	0.00%	0.00%	8.11%	1.41%	0.00%	0.00%	0.87%	0.00%	No Service	0.00%	0.00%	
		Hardoi	0.00%	0.00%	0.70%	0.00%	1.83%	0.00%	1.56%	0.00%	No Service	1.87%	0.00%	
1.3	% of connections with good voice quality ( $\geq 95\%$ )													
	(i) 0-4 (w/o frequency hopping)	Jaunpur										99.59%	98.00%	95.23%
		Azamgarh										No Service	99.00%	95.14%
		Hardoi										No Service	99.00%	99.48%
	(ii) 0-5 (with frequency hopping)	Jaunpur	95.30%	96.60%	96.27%	95.00%	96.00%	95.70%	94.02%	96.80%				
Azamgarh		93.30%	96.50%	93.70%	93.00%	96.00%	95.90%	92.16%	95.50%					
Hardoi		93.72%	97.10%	98.29%	98.00%	95.00%	98.20%	91.04%	95.63%					
1.4	Call Setup Success Rate ( $\geq 95\%$ )	Jaunpur	98.4%	100.0%	82.70%	97.71%	100.0%	100.0%	99.07%	100.0%	100.0%	99.46%	100.0%	
		Azamgarh	98.31%	100.0%	82.43%	100.0%	100.0%	100.0%	99.13%	100.0%	No Service	98.41%	100.0%	
		Hardoi	100.0%	100.0%	96.48%	95.45%	99.08%	99.33%	92.97%	100.0%	No Service	99.07%	100.0%	

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

- “Blocked Call Rate” benchmark is not met by BSNL (all 3 cities), Idea (Hardoi) & Uninor (Hardoi)
- “Dropped Call Rate” benchmark is not met by BSNL (Jaunpur & Azamgarh).
- “% of connection with good voice quality” benchmark is not met by Aircel (Azamgarh & Hardoi), BSNL (Azamgarh) Idea (Azamgarh) & Uninor (all 3 cities).
- “Call Setup Success Rate” benchmark is not met by BSNL (Jaunpur & Azamgarh) & Uninor (Hardoi).

**Note :** MTS has no service (Spectrum) in Azamgarh & Hardoi, similarly Videocon has no service in Jaunpur, Azamgarh & Hardoi cities.

## Independent Drive Test

The Independent Drive Test was conducted at UP (East) in Sitapur & Balia cities for the operators as shown on the table. Route covered was about around 70 to 80 Km depending on city areas within the speed limit of 25Km/hr. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

Operators Name	City	Blocked Call Rate ( $\leq 3\%$ )	Dropped Call Rate ( $\leq 2\%$ )	% of connections with good voice quality ( $\geq 95\%$ )	Call Setup Success Rate ( $\geq 95\%$ )
				(ii) 0-5 ( with frequency hopping)	
Vodafone	Sitapur	4.55%	0.00%	95.50%	95.45%
BSNL		3.08%	1.54%	96.37%	96.92%
Uninor	Balia	0.73%	0.00%	94.10%	99.27%

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

- In case of “Blocked Call Rate” benchmark is not met by Vodafone & BSNL in Sitapur town.
- In case of “Dropped Call Rate” no deviation were found against in Sitapur & Balia town.
- “% of connection with good voice quality” benchmark is not met by Uninor in Balia town.
- In case of “Call Setup Success Rate” it is found that all the operators meeting the benchmark in all 3 towns.

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter														
(A)	<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>														
	BTS Accumulated Downtime	≤2%	Reported	0.33%	0.35%	0.77%	0.18%	0.50%	0.12%	1.77%	1.44%	0.15%	0.23%	0.19%	0.06%
			Verified	0.33%	0.35%	0.77%	0.18%	0.50%	0.12%	1.77%	1.44%	0.15%	0.23%	0.19%	0.06%
	Worst affected BTSs due to downtime	≤2%	Reported	1.72%	0.63%	2.30%	0.22%	1.42%	0.07%	1.92%	1.46%	0.67%	0.00%	1.67%	0.00%
Verified			1.72%	0.63%	2.30%	0.22%	1.42%	0.07%	1.92%	1.46%	0.67%	0.00%	1.67%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>														
	CSSR (Call Setup Success Rate)	≥95%	Reported	98.30%	99.20%	97%	99.78%	99.57%	97.41%	95.76%	98.33%	98.20%	99.26%	98.93%	99.23%
			Verified	98.30%	99.20%	97%	99.78%	99.57%	97.41%	95.76%	98.33%	98.20%	99.26%	98.93%	99.23%
	SDCCH/PAGING congestion	≤1%	Reported	0.11%	0.12%	0.70%	0.95%	0.41%	0.17%	0.62%	0.40%	0.46%	0.00%	0.30%	0.00%
			Verified	0.11%	0.12%	0.70%	0.95%	0.41%	0.17%	0.62%	0.40%	0.46%	0.00%	0.30%	0.00%
	TCH congestion	≤2%	Reported	0.47%	0.33%	1.50%	1.39%	0.83%	1.13%	2.01%	0.14%	1.09%	0.00%	0.93%	0.02%
Verified			0.47%	0.33%	1.50%	1.39%	0.83%	1.13%	2.01%	0.14%	1.09%	0.00%	0.93%	0.02%	
3	<b>Connection maintenance (retainability)</b>														
	CDR	≤2%	Reported	0.70%	1.21%	1.60%	1.35%	0.77%	1.35%	1.89%	1.05%	1.62%	0.43%	0.81%	0.68%
			Verified	0.70%	1.21%	1.60%	1.35%	0.77%	1.35%	1.89%	1.05%	1.62%	0.43%	0.81%	0.68%
	Worst affected cells>3% TCH drop	≤3%	Reported	2.08%	2.89%	4%	2.95%	2.13%	5.37%	4.49%	1.81%	4.29%	0.44%	1.88%	1.58%
			Verified	2.08%	2.89%	4%	2.95%	2.13%	5.37%	4.49%	1.81%	4.29%	0.44%	1.88%	1.58%
	Good voice quality	≥95%	Reported	96.27%	98.38%	96.33%	95.79%	98.41%	96.38%	96.02%	97.72%	95.81%	99.47%	98.35%	99.07%
Verified			96.27%	98.38%	96.33%	95.79%	98.41%	96.38%	96.02%	97.72%	95.81%	99.47%	98.35%	99.07%	
4	Number of POI having ≥ 0.5% POI congestion		Reported	0	0	0	0	0	0	4	0	0	0	0	
			Verified	0	0	0	0	0	0	4	0	0	0	0	
(B)	<b>Customer Service Quality Parameters</b>														
5	Metering/billing credibility-Post paid	≤0.1 %	Reported	0.07%	0.01%	0.10%	0.02%	0.09%	0.00%	NA	NA	0.07%	0.00%	0.08%	0.00%
			Verified	0.07%	0.01%	0.10%	0.02%	0.09%	0.00%			0.07%	0.00%	0.08%	0.00%
6	Metering /billing credibility-Pre paid	≤0.1 %	Reported	0.00%	0.00%	0.10%	0.01%	0.09%	0.00%	0.03%	0.00%	0.02%	0.00%	0.07%	0.02%
			Verified	0.00%	0.00%	0.10%	0.01%	0.09%	0.00%	0.03%	0.00%	0.02%	0.00%	0.07%	0.02%

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators		
7	Resolution of billing/ charging complaints (within 4 weeks)	100%	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%
	Period of applying credit/waiver/adjustment to the customer's A/C from the date of resolutions of complaints	≤1 week	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%
8	<b>Response time to customers for assistance</b>														
	Accessibility of call centre/Customer Care	≥95%	Reported	100%	76%	98%	99.95%	99.02%	99%	96.96%	100%	100%	99%	98.98%	98%
			Verified	100%	76%	98%	99.95%	99.02%	99%	96.96%	100%	100%	99%	98.98%	98%
	% call answered by operators(voice to voice) within 60 sec.	≥90%	Reported	81.36%	86%	91%	89.46%	91%	98%	96.11%	98.37%	96.47%	95.07%	92.25%	96%
Verified			81.36%	86%	91%	89.46%	91%	98%	96.11%	98.37%	96.47%	95.07%	92.25%	96%	
9	<b>Termination/closure of service</b>														
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	≤7days	Reported	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%			100%	100%		
	Time taken for refunds of deposits after closures.(within 60 days)	100%	Reported	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%
Verified			100%	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%

NA – Not Applicable, NR – Not Reported

### Critical Analysis (PMR Verification):

No deviations were found in compare to operators reported data.

## CHAPTER-4: DETAILED FINDINGS & ANALYSIS

### I. Cellular Mobile Telephone Service

#### (A) MSC Audit

##### (1) 3 Days Live Data Assessment & Summarized Findings

S/N	Name of Parameter	B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
A	<b>Network Service Quality Parameter</b>													
	a) BTS Accumulated Downtime		0.29%	0.26%	1.27%	0.23%	0.58%	0.01%	1.35%	0.025%	2.07%	0.15%	0.72%	0.05%
	b) Worst affected BTSs due to downtime		0.00%	0.18%	1.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2587	8297	6090	5665	3350	2502	3315	55	8544	369	1899	800
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		547	1574	5589	945	1409	19	3232	1	12712	40	983	31
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0.00	15	67	0.00	0.00	0.00	0.00	0.00	47	0	0.00	0.00
	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR	≥95%	98.83%	99.59%	96.50%	99.97%	99.25%	98.70%	97.27%	99.50%	96.09%	99.30%	97.17%	96.91%
	b) SDCC/PAGING congestion	≤1%	0.11%	0.05%	0.65%	0.86%	0.13%	0.16%	0.64%	0.02%	0.84%	0.00%	0.00%	0.00%
	c) TCH congestion	≤2%	0.64%	0.24%	1.85%	1.42%	0.12%	1.19%	1.70%	0.00%	1.01%	0.00%	1.58%	0.00%
2	<b>Connection maintenance</b>													
	a) CDR	≤2%	0.40%	0.90%	1.42%	1.05%	0.69%	0.95%	1.49%	1.30%	1.29%	0.69%	1.07%	0.66%
	b) Cells having > 3% TCH drop	≤3%	2.44%	2.81%	0.41%	2.64%	0.00%	8.72%	1.73%	0.00%	2.38%	2.16%	1.97%	2.89%
	c) Good voice quality	≥95%	97.05%	98.57%	96.50%	96.55%	98.46%	97.10%	95.51%	98.71%	95.70%	99.90%	98.82%	NA
	d) No. of cells > 3% TCH drop		570	2,098	223	1,348	0	1,958	519	0	1,828	76	336	209
	e) Total no. of cells in the network		7790	24911	18270	17033	10050	7482	9996	165	25597	1173	5697	2412
3	<b>Number of POI having ≥0.5% POI congestion</b>	≤0.5%	0	0	0	0	0	0	6	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Nil	Bsnl,Airtel, v-fone, Reliance, Idea, Vi-con	Nil	Nil	Nil	Nil	Nil
	b) Total No. of circuits on POI		51042	180283	95961	201202	1257024	6424	103788	68	220961	12254	1315873	71585
	c) Avg No. of call attempts on POI		1138069	5809004	1546786	3137832	25077191	26658	2036636	77	5216751	138691	1068734	965915
	d) Avg traffic served on POI (Erlang)		34247	170615	24926	121502	68293	451	56497	10	126004	3879	47064	28343

S/N	Name of Parameter	B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	MTS	Rcom CDM A	Tata CDMA
			GSM Operators										CDMA Operators	
	e) Total number of working POI Service Area wise		127	145	84	286	98	10	20	28	223	50	94	226
	f) Equipped Capacity of Network in respect of Traffic in erlang		91219	480680	426800	229411	140000	130668	134169	1621	532136	10500	292000	88564
	g) Total traffic handled in TCBH in erlang		45387	400268	233832	152744	135163	57961	135251	22	375229	3985	120402	137340
(B)	<b>Customer Service Quality Parameters</b>													
4	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre	≥95%	100%	92.05%	96.00%	100%	90.89%	100%	97.16%	100%	100%	99.84%	90.98%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	≥90%	90.41%	78.64%	91.75%	96.95%	99.80%	97.16%	91.88%	100.00%	96.51%	95.44%	99.61%	92.50%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		123225	502632	6858	13642	102523	116804	243795	7	279394	10087	50327	16449
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		111405	395293	6292	13226	102317	113481	223987	7	269656	9627	50132	15216

**NA:** Not Applicable, **NP:** Not Provided

## Parameter wise Findings (Live Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in UP (East) Service Area is as given below:-

- ***BTS accumulated downtime (benchmark  $\leq 2\%$ ):***  
Except Vodafone, rests of the operators are satisfying the benchmark with values laying between 0.01% and 1.35%.
- ***Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):***  
All operators are satisfying the benchmark with values laying between 0.01% and 0.92%.
- ***Call setup success rate (benchmark  $\geq 95\%$ ):*** All operators are satisfying the benchmark with values laying between 96.70% and 99.96%.
- ***SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):*** All operators are satisfying the benchmark with values laying between 0% and 0.86%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- ***TCH congestion (benchmark  $\leq 2\%$ ):*** All the operators are satisfying the benchmark with values laying between 0% and 1.85%.
- ***Call drop rate (benchmark  $\leq 2\%$ ):*** All the operators are satisfying the benchmark with values laying between 0.40% and 1.42%.
- ***Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):*** Except for Tata (GSM), rest of the operators are satisfying the benchmark with value in between 0.00% and 2.89%.
- ***Connections with good voice quality (benchmark  $\geq 95\%$ ):*** Tata (CDMA) service providers have declared that the parameter is not system generated. Rests of operators are satisfying the benchmark with values laying between 95.51% and 99.90%.
- ***Number of POI having  $\geq 0.5\%$  POI congestion:*** All the operators are satisfying the benchmark except Uninor showing greater than  $\geq 0.5\%$  POI congestion in 6 nos. of POIs.
- ***%age of call answered by operator (electronically) (benchmark  $>95\%$ ):*** Except Airtel & RCom (GSM&CDMA), rest of the operators are satisfying the benchmark with values laying between 96.00% to 100%.
- ***%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):*** Except Airtel, rest of the operators are satisfying the benchmark.



## (2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	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%	0.34%	0.19%	0.53%	0.19%	0.49%	0.01%	0.92%	0.033%	0.21%	0.12%	0.46%	0.03%
	b) Worst affected BTSs due to downtime	≤2%	1.70%	0.43%	2.00%	0.28%	1.34%	0.00%	1.12%	0.00%	1.38%	0.00%	1.63%	0.00%
	c) Total no. of BTSs in the licensed service area		2587	8297	6090	5665	3350	2502	3315	55	8544	369	1899	800
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		6380	11216	23366	7930	11892	95	22012	13	12708	325	6328	187
	e) No. of BTSs having accumulated downtime of >24 hours in a month		44	36	122	16	45	0.00	37	0.00	118	0	31	0.00
2	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	≥95%	98.84%	99.56%	97.00%	99.96%	99.26%	98.68%	96.88%	99.21%	95.77%	99.40%	98.31%	96.70%
	b) SDCCH/PAGING congestion	≤1%	0.13%	0.08%	0.70%	0.79%	0.06%	0.21%	0.49%	0.15%	0.92%	0.00%	0.00%	0.00%
	c) TCH congestion	≤2%	0.52%	0.25%	1.60%	1.60%	0.11%	0.97%	1.95%	0.11%	1.09%	0.00%	0.80%	0.00%
3	<b>Connection maintenance (retainability)</b>													
	a) CDR	≤2%	0.44%	0.96%	1.50%	1.10%	0.71%	1.03%	1.58%	0.87%	1.30%	0.60%	0.99%	0.77%
	b) Worst affected cells>3% TCH drop	≤3%	3.09%	2.80%	3.50%	2.60%	0.00%	9.17%	0.09%	0.00%	2.72%	2.37%	1.55%	2.79%
	c) Good voice quality	≥95%	97.08%	98.52%	98.00%	96.39%	98.48%	96.85%	95.75%	98.67%	95.60%	99.99%	98.81%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		6,986	20,242	18,531	12,856	0	19,906	259	0	20,206	805	2,563	1,951
	e) Total no. of cells in the network		7790	24911	18270	17033	10050	7482	9996	165	25597	1173	5697	2412
4	<b>Number of POI having ≥0.5% POI congestion</b>		0	0	0	0	0	0	6	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Nil	Bsnl,Airtel, v-fone, Reliance, Idea, Vi-con	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		1053113	5657145	1553232	2980614	2736839	25097	1743333	80	5235932	130900	11574052	954928
	c) Total traffic served on POI (Erlang) (Avg.)		32555	169584	25227	119959	70092	432	52315	11	124479	3810	494613	28000
	d) Total No. of circuits on POI		51042	180283	95961	201202	1257024	6424	103788	68	220961	12254	1315873	71585
	e) Total number of working POI Service Area wise		127	145	84	286	98	10	20	28	223	50	94	226
	f) Capacity of POI		50903	181016	NP	192043	1187025	5988	96953	54	214539	11912	NP	500074

S/N	Name of Parameter	B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videococ n	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators			
5	<b>Network Data</b>													
	a) Equipped Capacity of Network Erlang		91219	480680	426800	229411	140000	130668	134169	1621	532136	10500	292000	88564
	b) Total traffic in TCBH in erlang (Avg.)		45387	400268	233832	152744	135163	57961	135251	22	375229	3985	120402	137340
	c) Total no. of customers served (as per VLR) on last day of the month		1680346	13786178	4414154	6841105	5496429	1927132	3419577	1290	13334949	225856	3081447	500074
(B)	<b>Customer Service Quality Parameters</b>													
5	<b>Metering/billing credibility-Post paid</b>	≤0.1%	0.00%	0.01%	0.03%	0.096%	0.06%	0.02%	NA	NA	0.03%	0.06%	0.005%	0.00%
	a) No. of bills issued during the period		2663	62496	104169	44660	8222	15761	NA	NA	231018	3456	118420	55864
	b) No. of bills disputed including billing complaints during the period		0	7	35	43	5	3	NA	NA	62	2	6	0
6	<b>Metering /billing credibility-Pre paid</b>	≤0.1%	0.00004%	0.042%	0.01%	0.007%	0.10%	0.00%	0.009%	0.00%	0.00%	0.005%	0.10%	0.009%
	a) No. of charging / credit / validity complaints during the quarter		1	531	610	456	7257	0	625	0.00	295	21	5074	69
	b) Total no. of pre-paid customers at the end of the quarter		2363311	1264064	9548881	6961767	7252711	3557952	6799287	16722	14333601	457436	5119935	784302
7	<b>Resolution of billing/ charging complaints(within 4 weeks)</b>	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		1	538	645	499	7262	3	625	0	357	23	5080	69
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		1	538	645	499	7262	3	625	0	357	23	5080	69
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		1	538	645	499	7262	3	625	0	357	23	5080	69
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		0	0	0	0	0	0	0	0	0	0	0	0
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints (≤1week)	100%	100.0%	99.44%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators	
(B)	Customer Service Quality Parameters													
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	≥95%	100.0%	91.86%	96.52%	100.0%	98.36%	99.23%	97.12%	100.0%	100.0%	95.34%	98.06%	100.0%
	b) % call answered by operators(voice to voice) within 60 sec.	≥90%	91.06%	81.36%	93.00%	97.48%	97.33%	97.88%	96.95%	98.00%	96.18%	95.16%	96.98%	93.37%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		1169762	5156920	75363	135742	1130205	1123666	2031727	50	2622160	12570	521296	161908
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		1065188	4195678	70088	132321	1100001	1099867	1969678	49	2521933	11962	505569	151177
9	Termination/closure of service	≤7days	100.0%	100.0%	59.80%	100.0%	100.0%	100.0%			100.0%	100.0%	100.0%	100.0%
	a) Total No. of requests for Termination / Closure of service received during the quarter		24	373	510	103	22	222			2165	99	337	789
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		24	373	305	103	22	222	NA	NA	2165	99	337	789
10	Time taken for refunds of deposits after closures.( within 60 days)	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			100.0%	100.0%	100.0%	100.0%

NA: Not Applicable, NP: Not Provided

## Parameter-wise Findings (Month Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in UP (East) Service Area is as given below:-

- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):**  
All operators are satisfying the benchmark with values laying between 0.01% and 0.92%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):**  
All the operators are satisfying the benchmark with values laying between 0% and 2.00%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):**  
All operators are satisfying the benchmark with values laying between 96.09% and 99.97%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):**  
All operators are satisfying the benchmark with values laying between 0% and 0.92%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):**  
All the operators are satisfying the benchmark with values laying between 0% and 1.60%.
- **Call drop rate (benchmark  $\leq 2\%$ ):**  
All operators are satisfying the benchmark with values laying between 0.44% and 1.58%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):**  
Except Airtel, BSNL & Tata (GSM), rest of the operators are satisfying the benchmark with value in between 0.00% and 2.80%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):**  
Tata (CDMA) service providers have declared that the parameter is not system generated. Rests of the operators are satisfying the benchmark with values laying between 95.75% and 99.99%.
- **Number of POI having  $\geq 0.5\%$  POI congestion:**  
All the operators satisfying the benchmark except Uninor showing high POI congestion for 6 nos. of POIs.
- **%age of call answered by operator (electronically) (benchmark  $>95\%$ ):**  
Except Airtel, rests of the operators are satisfying the benchmark with values laying between 95.34% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):**  
Except Airtel, rests of the operators are satisfying the benchmark with values laying between 91.06% & 98.00%.
- **Metering and billing credibility-Post paid (benchmark  $\leq 0.1\%$ ):**  
All the operators are satisfying the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):**  
All the operators are satisfying the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):**  
All the operators are satisfying the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):**  
Except BSNL, rest of the operators are satisfying the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):**  
All the operators are satisfying the benchmark.

**(3) Sample Coverage***Switches/BSC/BTS details of operators:*

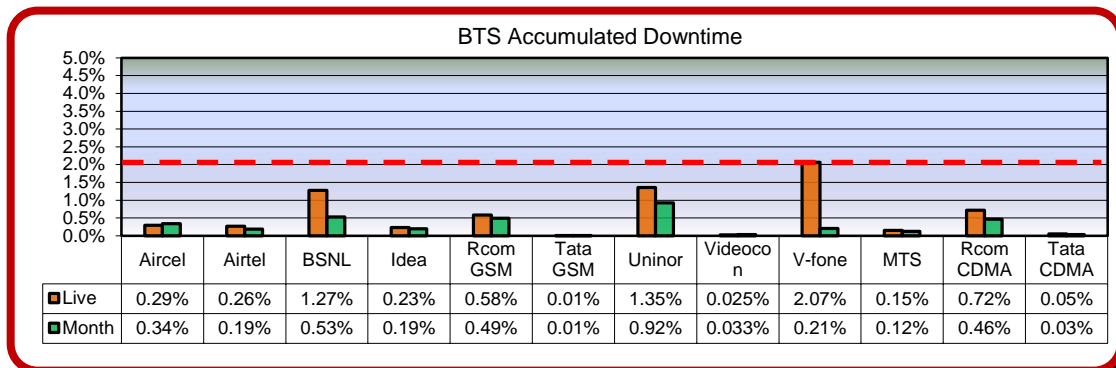
S/N	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	2	23	2587
2	Airtel Ltd	41	96	8297
3	BSNL	25	100	6090
4	Idea	8	38	5665
5	Reliance Communication (GSM)	4	19	3350
6	Tata Communications (GSM)	4	22	2506
7	Vodafone	31	132	8544
8	Videocon	1	1	55
9	Uninor	8	22	3315
10	Etisalat	Service Closed		
<b>CDMA Operators</b>				
11	MTS (CDMA)	1	1	369
12	Reliance Communication (CDMA)	13	12	1899
13	Tata Communications (CDMA)	5	10	800

**(4) Performance (Graphical Representation)**

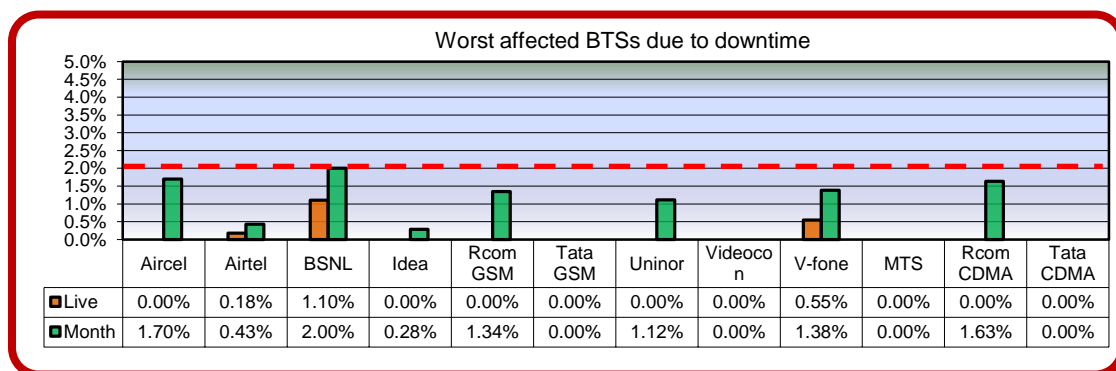
**Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services**

**A) NETWORK PERFORMANCE**

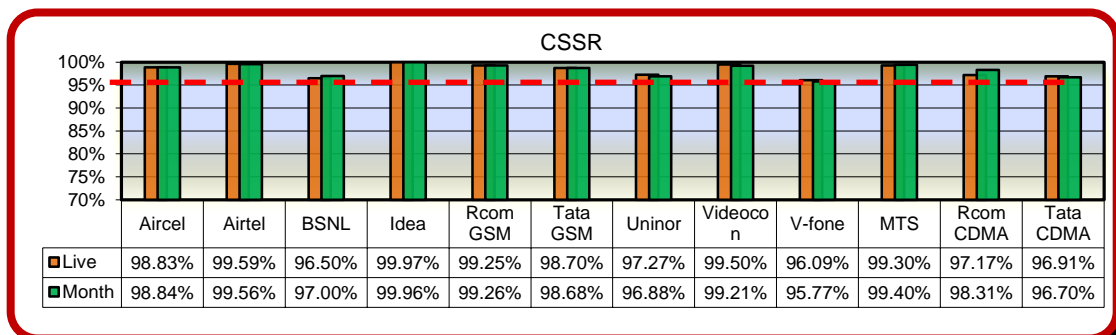
**I. (a) BTS accumulated downtime (benchmark  $\leq 2\%$ ):** Except Vodafone, rest of the operators are Satisfying the TRAI benchmarks ( $\geq 95\%$ ) for both live & month audit.



**(b) Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All the operators are satisfying the TRAI benchmark ( $\geq 95\%$ ) for both live & month audit.

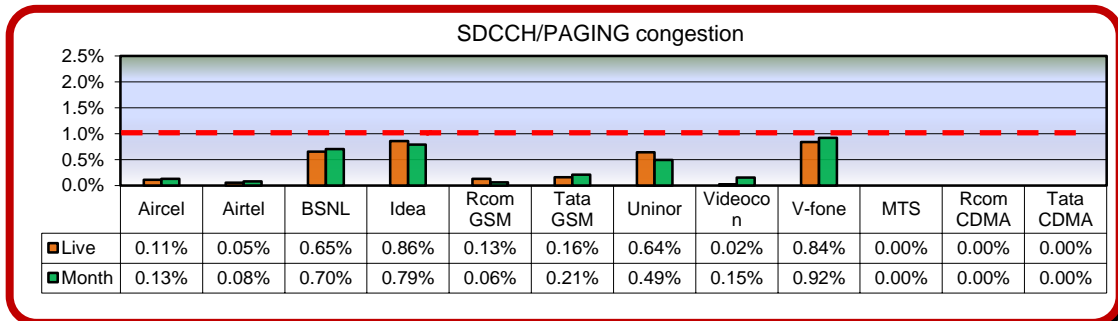


**II. Call setup success rate:** All operators are satisfying the TRAI benchmark ( $\geq 95\%$ ) for both live & month audit.

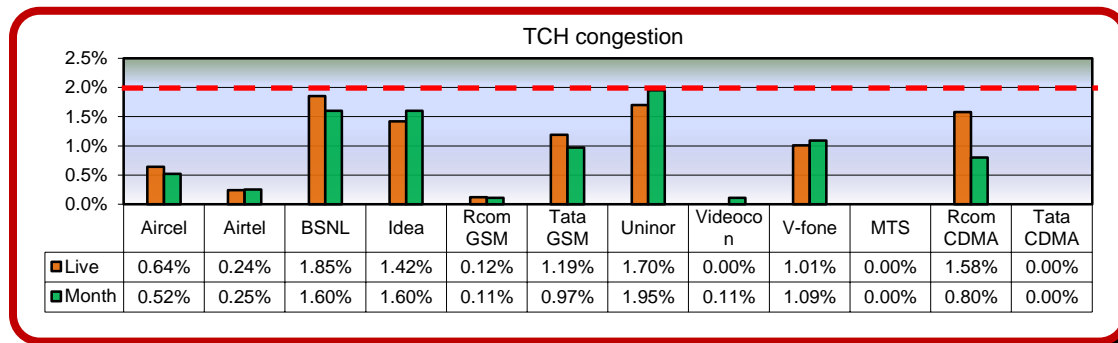


**III. Blocked call rate:**

**SDCCH congestion:** All operators are satisfying the TRAI benchmarks ( $\leq 1\%$ ) for both live & month audit.

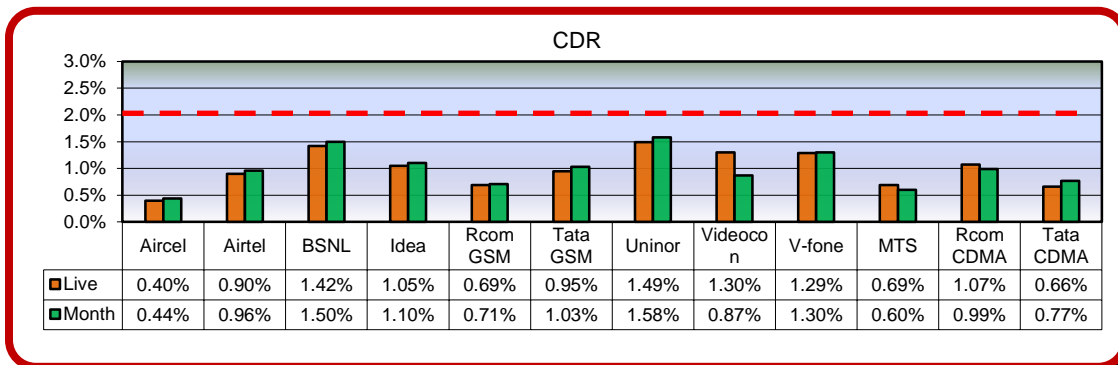


**TCH congestion:** All operators are satisfying the TRAI benchmarks ( $\leq 2\%$ ) for both live & month audit.

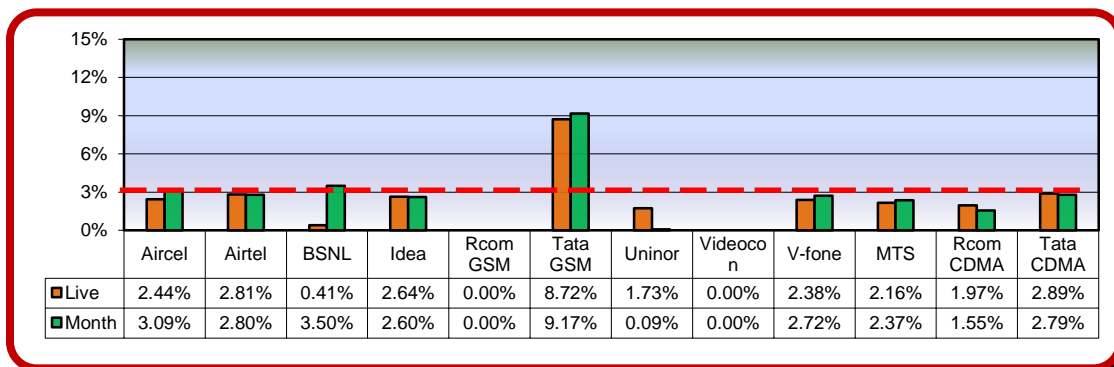


**IV. Connection Maintainability (Retainability):**

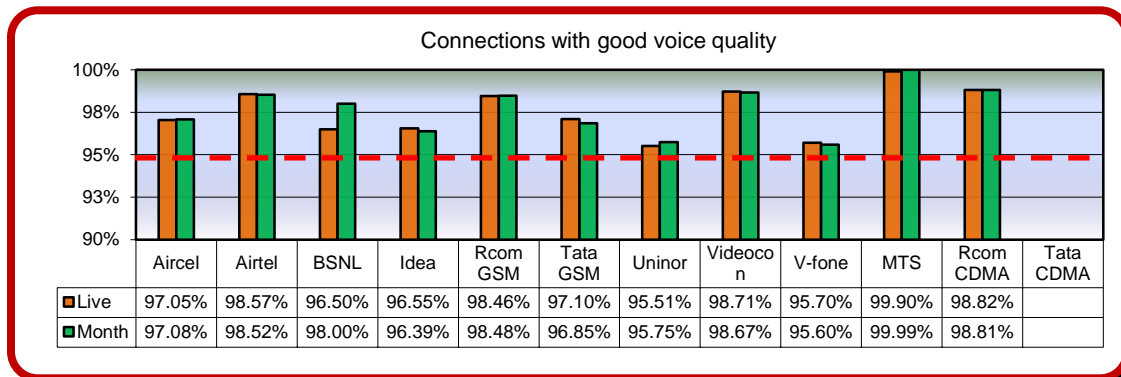
**Call drop rate:** All operators are satisfying the TRAI benchmarks ( $\leq 2\%$ ) for both live & month audit.



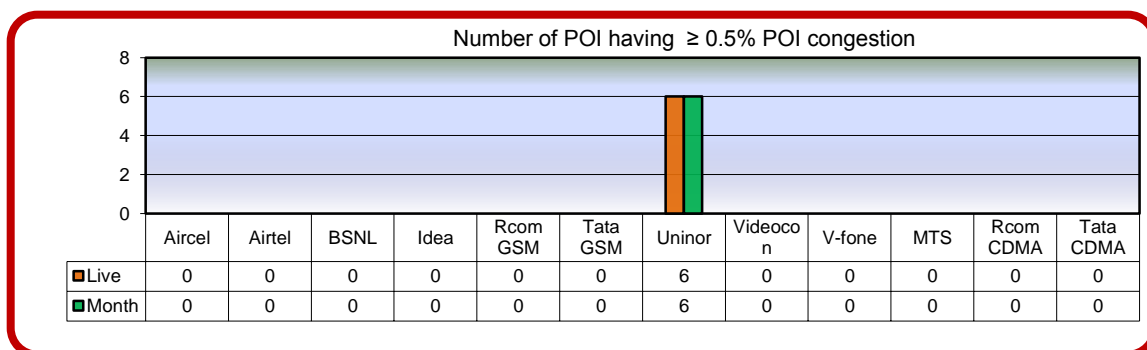
**Worst affected Cell exceeding 3% TCH Drop:** Aircel, BSNL & Tata (GSM) are found not satisfying the benchmark of  $\leq 3\%$ . Rests of the operators are satisfying the benchmark for both cases.



**Percentage of connections with good voice quality:** All operators are satisfying the TRAI benchmarks ( $\geq 95\%$ ) for both live & month audit. Tata (CDMA) reported that the data is not system generated.



**POI Congestion:** For both live and month data, 6 nos. of POIs for Uninor are found not satisfying the benchmark  $\geq 0.5\%$ . For rest of the operators no POI was found having congestion  $\geq 0.5\%$  for both month & live cases.

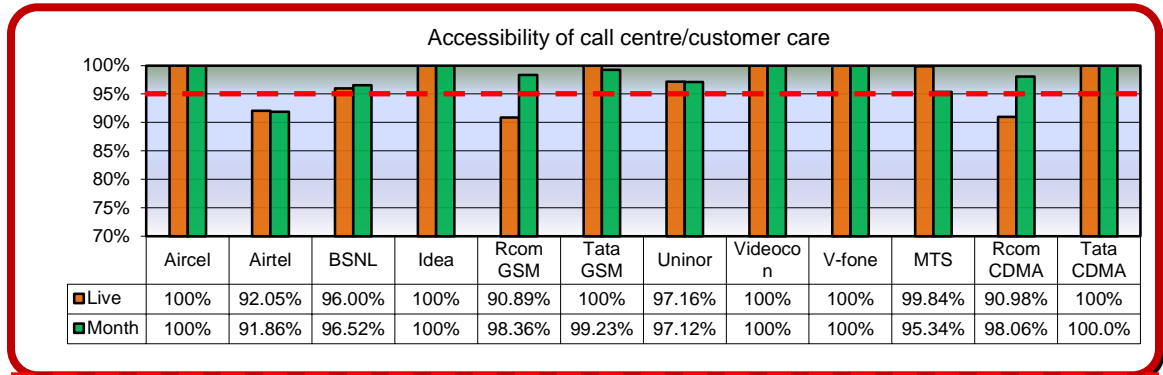




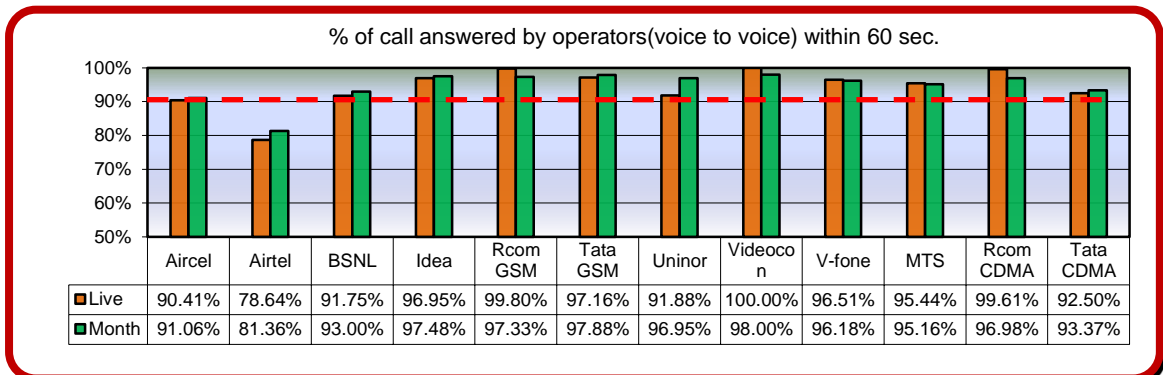
**B) CUSTOMER SERVICE QUALITY PARAMETERS**

**(A) Response time to the customer for assistance:**

**Percentage of call answered (Electronically):** Except Airtel & RCom (GSM&CDMA), rest of the operators are satisfying the TRAI benchmarks ( $\geq 95\%$ ) for both live & month audit.



**Percentage of call answered by operators (Voice to voice) within 60 sec:** Except Airtel in live & one-month audit respectively, rest of the operators satisfying the TRAI benchmarks ( $\geq 90\%$ ) for both live & month audit.



**(5) Critical Analysis**

The above comparative study between live data & month data shows similar trends & consistency in both the cases. However, inconsistency in live & month data was found for parameter “%age of calls answered by operator” for Airtel & RCom (GSM&CDMA).

Under network parameter “Worst affected cells>3% TCH drop” it is found that Airtel, BSNL & TATA (GSM) performance are not satisfactory.

In case of “Number of POI having  $\geq 0.5\%$  POI congestion” it is found that only Uninor shows 6 nos. of POI congestion for both live & month audit.

## Redressal

- (1) **Sample coverage:** A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

(2) **Performance (live calling for billing complaints)**

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	80	100	100	100	100	100	100	100	23	100	100
Total No. of calls Answered	58	80	85	89	86	92	91	92	22	84	93
Cases resolved with 4 weeks	58	80	85	89	86	92	91	92	22	84	93
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: The difference between call attempts and call answer is because of either Number busy, No response, or out of reach in the Network.

(3) **Live calling to Call Center**

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Call Centre No.	121	121	1503	198/123 45	333	121	198	No service in Lucknow	111	155	*333	121
Total No. of Calls Attempted	100	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	100
Calls got connected to agent within 60 Sec	100	87	74	97	98	94	45		100	100	97	96
%age of calls got answered	100.0%	87.00%	74.00%	97.00%	98.00%	94.00%	45.00%		100.0%	100%	97.00%	96.00%

**(4) Level 1 calling**

UP(East) Circle	Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
	Lucknow													
	100	1	2	2	2	2	2	2	2	No service in Lucknow	2	2	2	2
	101	1	2	2	2	2	2	2	2		2	2	2	2
	102	1	2	2	2	2	2	2	2		2	2	2	2
	139	2	5	5	5	5	5	5	5		5	5	5	5
Jaunpur														
	100	1	2	2	2	2	2	2	2	No service in Jaunpur	2	2	2	2
	101	1	2	2	2	2	2	2	2		2	2	2	2
	102	1	2	2	2	2	2	2	2		2	2	2	2
	139	2	5	5	5	5	5	5	5		5	5	5	5
Azamgarh														
	100	1	2	2	2	2	2	2	2	No service in Azamgarh	2	2	2	2
	101	1	2	2	2	2	2	2	2		2	2	2	2
	102	1	2	2	2	2	2	2	2		2	2	2	2
	139	2	5	5	5	5	5	5	5		5	5	5	5
Hardoi														
	100	1	2	2	2	2	2	2	2	No service in Hardoi	2	2	2	2
	101	1	2	2	2	2	2	2	2		2	2	2	2
	102	1	2	2	2	2	2	2	2		2	2	2	2
	139	2	5	5	5	5	5	5	5		5	5	5	5

**(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.

As per test result of operator's Call Center it was found that Airtel, BSNL & Uninor performance are below benchmark level. For UP (East) a conclusion may be derived that call center calls are only getting failed after IVR call gets mature whereas for IVR call there are no failure for any of the operators.

Level 1 calling i.e. emergency call is getting connected in UP (East) circle, in Lucknow, Jaunpur, Azamgarh & Hardoi cities.

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

A sample of 2x50 test calls per Service Providers with in the licensed service area (UP (East) Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs.

**(2) Performance based on live measurement**

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Aircel	-	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	99%	-	97%	99%	98%	97%	100%	100%	100%	97%	98%
Idea	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
Reliance-GSM	98%	97%	99%	100%	-	98%	97%	100%	100%	100%	100%	100%
Tata (GSM)	99%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%
Uninor	98%	97%	98%	100%	96%	98%	-	99%	98%	100%	97%	100%
Videocon	97%	100%	100%	100%	98%	100%	100%	-	100%	100%	100%	98%
Vodafone	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
RCom-CDMA	99%	100%	98%	100%	100%	97%	98%	97%	100%	100%	-	99%
Tata (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

**(3) Critical Analysis**

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator networks.

**(C) Drive test of the mobile network of service providers****(1) Sample Coverage**

The Operator Assisted Drive Test was conducted in UP (East) for all the operators. Route covered was about around 80-100 Km depending on city areas within the speed limit of 25Km/hr.

**Drive Test Locations****Jaunpur**

HIGH DENSE: Olanganj, Kotwalichauraha, Mullatola, Urdubazar, Hotel Shivam, Rasmandal

MEDIUM DENSE: Jagdish Pur, Line Bazar, Chandmari, Poletechnic Chauraha, Shashtrinagar

LOW DENSE: Phulpurjnp, Ramdayalganj, Lakhnawa Bazar, Jafrabad, Bus Station, Purvanchal University, Lapari, Guraini, Khetasarai, Imranganj, Thitholia, Thomasroad, Shahganj

**Azamgarh**

HIGH DENSE: Azamgarh Chowk, Alwalpur, Chakla, Quila, Mukeri

MEDIUM DENSE: Rahul Nagar, Bus Stop, Civil Lines, Trimuhani, Sidhari, Safurddinpur

LOW DENSE: Harwanspur, Aribagh, Bhawarnath, Hirapatti, Hazipur Ukraura, Kishundaspur

**Hardoi**

HIGH DENSE: Hrdcinemas, Cinemaavc, Dharamss, Badas, Pattharwalikothi, Saraitok, Ids, Nagheta, Aircivils

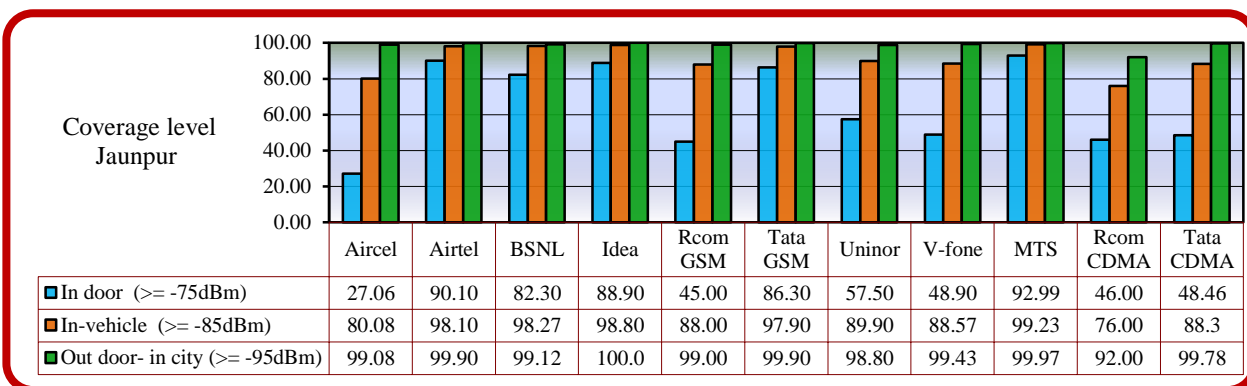
MEDIUM DENSE: Azadnagar, Bawanchus, Chauhtks, Zlchauhathok, Industrialestate, Rlwaygnj, gibsonganj, indrprshtaclly nagar, sootarganj, rooma, Radhapuram, railbazar, kakadev kanpur, kda colony, yashoda nagar, nobasta, Yogender Vihar, Naubasta, Girja Nagar, Mangla Vihar, Gautam Vihar, Vikas Nagar (Near Lakhanpur), Hanspuram, Gajju Purwa

LOW DENSE: Asha, Koriya, Kaura, Kashipr, Nayagaon, Hardoi, Baghauri

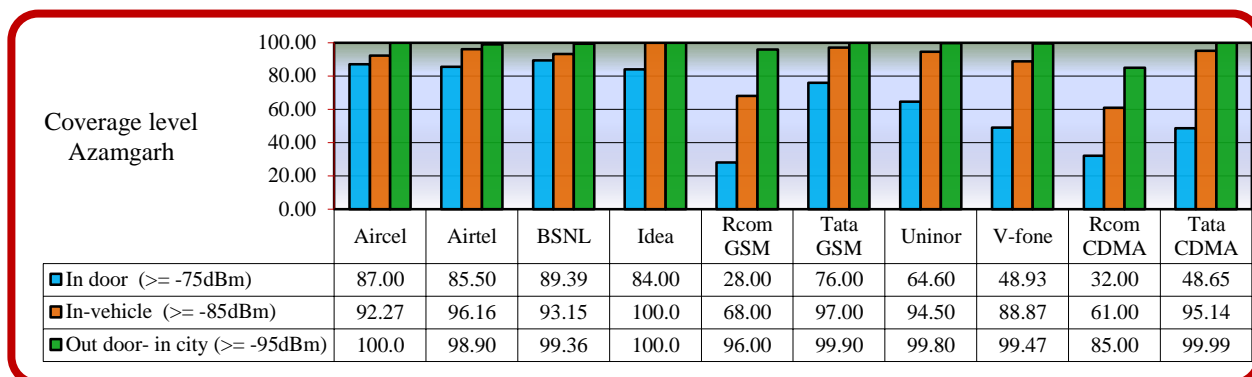
## 2) Performance (for the respective cities)

S/N	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	V-fone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators									CDMA Operators		
1.1	Call Attempts	Jaunpur	193	84	237	175	155	139	216	175	92	184	112	
		Azamgarh	118	153	222	142	110	118	115	114	No servive	126	100	
		Hardoi	98	107	142	88	109	149	128	135	No servive	107	105	
1.2	Blocked Call Rate (≤3%)	Jaunpur	1.55%	0.00%	17.30%	2.29%	0.00%	0.00%	0.93%	0.00%	0.00%	0.54%	0.00%	
		Azamgarh	1.69%	0.00%	17.57%	0.00%	0.00%	0.00%	0.87%	0.00%	No servive	1.59%	0.00%	
		Hardoi	0.00%	0.00%	3.52%	4.55%	0.92%	0.67%	7.03%	0.00%	No servive	0.93%	0.00%	
1.3	Dropped Call Rate (≤2%)	Jaunpur	0.52%	0.00%	8.44%	0.00%	1.29%	0.00%	0.00%	0.00%	0.00%	1.09%	0.00%	
		Azamgarh	0.00%	0.00%	8.11%	1.41%	0.00%	0.00%	0.87%	0.00%	No servive	0.00%	0.00%	
		Hardoi	0.00%	0.00%	0.70%	0.00%	1.83%	0.00%	1.56%	0.00%	No servive	1.87%	0.00%	
1.4	% of connections with good voice quality (≥95%)													
	(i) 0-4 (w/o frequency hopping)	Jaunpur										99.59%	98.00%	95.23%
		Azamgarh										No servive	99.00%	95.14%
		Hardoi										No servive	99.00%	99.48%
	(ii) 0-5 (with frequency hopping)	Jaunpur	95.30%	96.60%	96.27%	95.00%	96.00%	95.70%	94.02%	96.80%				
		Azamgarh	93.30%	96.50%	93.70%	93.00%	96.00%	95.90%	92.16%	95.50%				
Hardoi		93.72%	97.10%	98.29%	98.00%	95.00%	98.20%	91.04%	95.63%					
1.5	Service Coverage													
	In door (≥ -75dBm)	Jaunpur	27.06	90.1	82.30	88.90	45.00	86.30	57.50	48.90	92.99	46.00	48.46	
		Azamgarh	100.0	85.5	89.39	84.00	28.00	76.00	64.60	48.93	No servive	32.00	48.65	
		Hardoi	46.08	90	91.23	48.80	32.00	61.50	74.30	42.87	No servive	71.00	60.66	
	In-vehicle (≥ -85dBm)	Jaunpur	53.02	8	98.27	98.80	88.00	97.90	89.90	88.57	99.23	76.00	88.3	
		Azamgarh	70.10	11.6	93.15	100.0	68.00	97.00	94.50	88.87	No servive	61.00	95.14	
		Hardoi	51.11	8.3	96.27	85.70	69.00	93.20	95.60	89.50	No servive	93.00	93.47	
	Outdoor- in city (≥ -95dBm)	Jaunpur	21.67	1.9	99.12	100.0	99.00	99.90	98.80	99.43	99.97	92.00	99.78	
		Azamgarh	20.11	2.9	99.36	100.0	96.00	99.90	99.80	99.47	No servive	85.00	99.99	
Hardoi		13.99	1.7	99.29	99.0	96.00	99.70	99.70	98.93	No servive	100.0	99.41		
1.6	CSSR (≥95%)	Jaunpur	98.4%	100.0%	82.70%	97.71%	100.0%	100.0%	99.07%	100.0%	100.0%	99.46%	100.0%	
		Azamgarh	98.31%	100.0%	82.43%	100.0%	100.0%	100.0%	99.13%	100.0%	No servive	98.41%	100.00%	
		Hardoi	100.0%	100.0%	96.48%	95.45%	99.08%	99.33%	92.97%	100.0%	No servive	99.07%	100.0%	

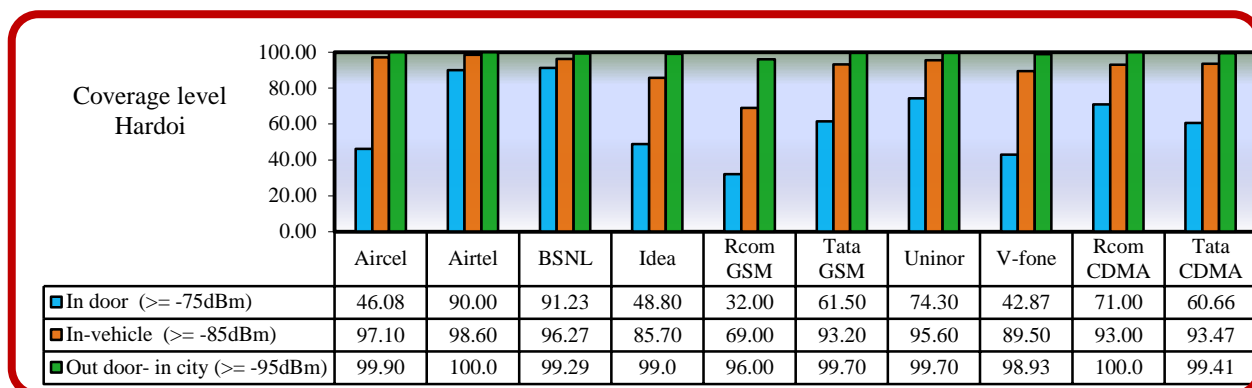
### Graphical Representation (Jaunpur):



### Graphical Representation (Azamgarh):



### Graphical Representation (Hardoi):



***Critical Analysis***

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

**Jaunpur**

- For parameter “Blocked Call Rate” BSNL is not satisfying the benchmark.
- For parameter “Dropped Call Rate” BSNL is not satisfying the benchmark.
- For parameter “Percentage of connections with good voice quality” Uninor is not satisfying the benchmark.
- For parameter “CSSR” BSNL is not satisfying the benchmark.

**Azamgarh**

- For parameter “Blocked Call Rate” BSNL is not satisfying the benchmark.
- For parameter “Dropped Call Rate” BSNL is not satisfying the benchmark.
- For parameter “Percentage of connections with good voice quality” Aircel, BSNL, Idea & Uninor are not satisfying the benchmark.
- For parameter “CSSR” BSNL is not satisfying the benchmark.

**Hardoi**

- For parameter “Blocked Call Rate” BSNL, Idea & Uninor are not satisfying the benchmark.
- For parameter “Percentage of connections with good voice quality” Aircel & Uninor are not satisfying the benchmark.
- For parameter “CSSR” Uninor is not satisfying the benchmark.

*Note: MTS has no service (Spectrum) in Azamgarh & Hardoi, similarly Videocon has no service in Jaunpur, Azamgarh & Hardoi cities.*



## (D) Independent Drive Test

### 1. Sample Coverage

The Independent Drive Test was conducted at UP (East) in Sitapur & Balia cities. Route cover was about around 70-80 Km depending on city areas within the speed limit of 25Km/hr.

#### Drive Test Locations

##### Sitapur

HIGH DENSE: Sadarbazar, Autostand, Greekganj, Butsganj, Aryanagar, Chungi

MEDIUM DENSE: Railtel, Bijwar, Lalkurti, Patiya, Awasvikas, Idgah, Rotigodam

LOW DENSE: Khairabad, Kasraila, Adhawal, Pitpur, Ramkot

##### Balia

HIGH DENSE: Behri Ballia Mkt., Bhriquashram Mkt., Chatta Village

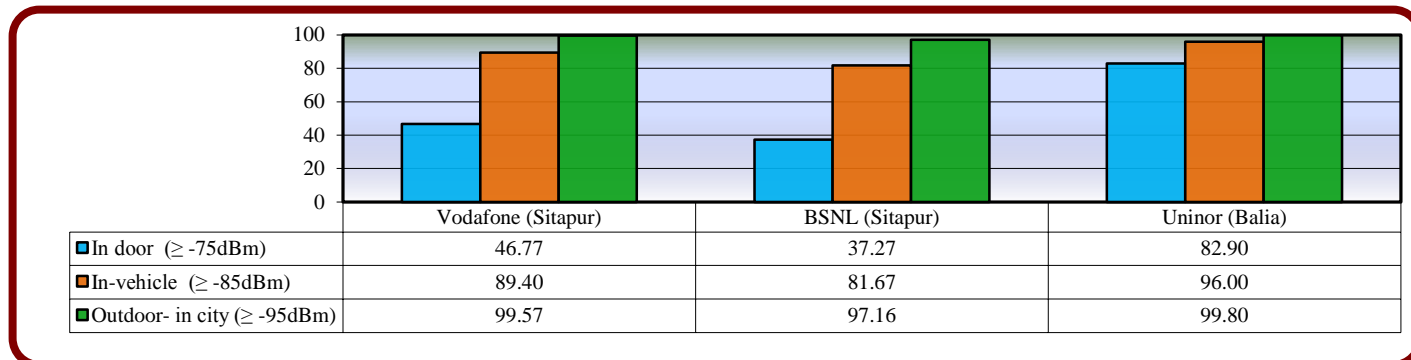
MEDIUM DENSE: Chitbadagaon, Harpur Middhi Road, Joplinganj Colony, Kacheri Road, Karnai Village, Mahabir Hospital, Professor colony

LOW DENSE: Rampur Chit Village, Sp Office, Station Rd1, Subhanta, Subhash Nagar, Sukhpura Mkt., Taghrauli Village)

## 2) Performance (for the Independent respective city)

Operators Name	City	Call Attempts	Blocked Call Rate ( $\leq 3\%$ )	Dropped Call Rate ( $\leq 2\%$ )	% of connections with good voice quality ( $\geq 95\%$ )	Service Coverage			Call Setup Success Rate ( $\geq 95\%$ )
					(ii) 0-5 (with frequency hopping)	In door ( $\geq -75dBm$ )	In-vehicle ( $\geq -85dBm$ )	Outdoor- in city ( $\geq -95dBm$ )	
Vodafone	Sitapur	154	4.55%	0.00%	95.50%	46.77	89.40	99.57	95.45%
BSNL		130	3.08%	1.54%	96.37%	37.27	81.67	97.16	96.92%
Uninor	Balia	137	0.73%	0.00%	94.10%	82.90	96.00	99.80	99.27%

### Graphical Representation



### (3) Critical Analysis

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

- For parameter “Blocked Call Rate” Vodafone & BSNL are not satisfying the benchmark in Sitapur city.
- For parameter “Percentage of connections with good voice quality” Uninor is not satisfying the benchmark in Balía city.

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

From live, month & Drive test findings, it can be concluded that on an average, performance of the operators in the service area (UP (East)) is satisfactory for the **Network Parameters**. However only for the parameter "*Worst affected cells > 3% TCH drop*" it is found that Aircel, BSNL & TATA (GSM) performance are not satisfactory.

In case of "*Number of POI having  $\geq 0.5\%$  POI congestion*" it is found that only Uninor is showing more than 0.5% congestion in 6 nos. of POIs.

Under **Customer Service Quality Parameter** "*operator answered calls (voice-to-voice) within 60 sec*" parameter Airtel is not fulfilling TRAI benchmark of  $\geq 90\%$ .

### During Drive Tests

High "*Blocked Call Rates*" were found in case of BSNL, Vodafone, Idea & Uninor.

High "*Dropped Call Rates*" were found in case of BSNL.

"*Percentage of connections with good voice quality*" parameter is not met by Aircel, BSNL, Idea & Uninor.

"CSSR" parameter is not satisfying by BSNL & Uninor.

