



**EAST  
ZONE**

# **TRAI AUDIT WIRELESS REPORT-BIHAR & JHARKHAND CIRCLE-AMJ QUARTER, 2014**

**Prepared By -**



**Prepared For-**



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## 2 INTRODUCTION

### 2.1 ABOUT TRAI

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace that will enable India to play a leading role in the emerging global information society. One of the main objectives of 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 been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped the nurture the growth of multi operator multi service- an open competitive market from a government owned monopoly. Also, 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.

TRAI initiated a regulation- The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated the March 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated the October 6, 2006 provide for benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

### 2.2 OBJECTIVES

The primary objective of the Audit module is to-

- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).

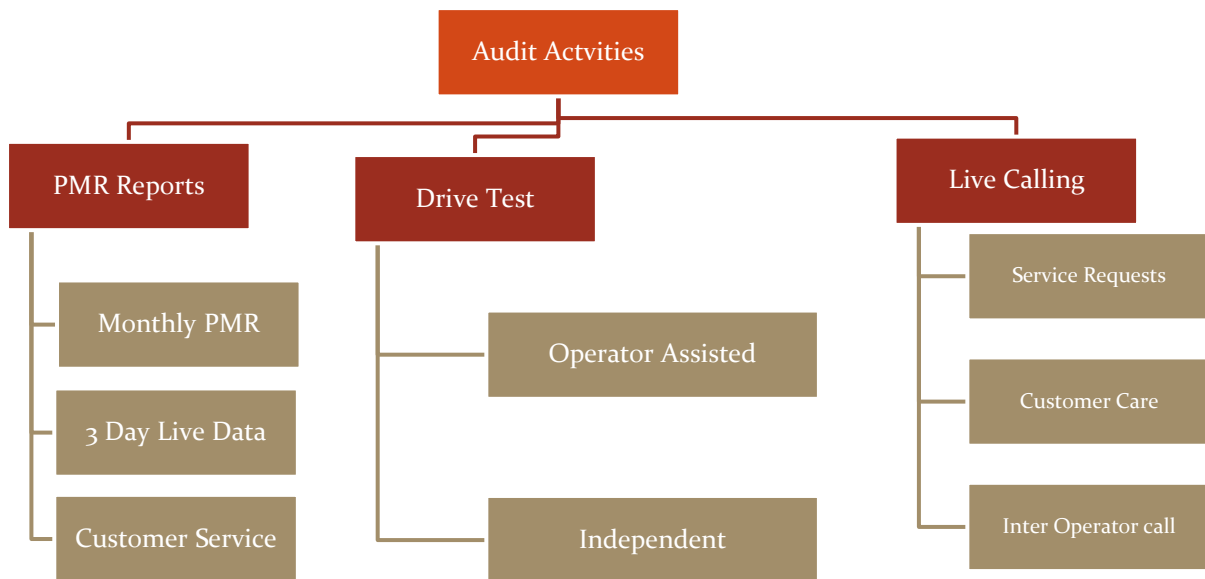
## 2.3 COVERAGE

The audit was conducted in Bihar & Jharkhand circle covering all the SSAs (Secondary Switching Areas).



Image Source: BSNL website

## 2.4 FRAMEWORK USED



Let's discuss each of the activity in detail and the methodology adopted for each of the module.

## 2.4.1 PMR REPORTS

### 2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated by operators to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.

The PMR is extracted in the following three formats.

- ↪ Monthly PMR (Network Parameters)
- ↪ 3 Day Live Measurement Data (Network Parameters)
- ↪ Customer Service Data

During audit, PMR is extracted from the server/NOC/exchange etc. in the presence of the auditor. All the calculations are done during the audit by the operators and IMRB auditors verify the calculations done by the operators.

The verified PMR reports are then submitted in hard copy by the operators to the auditor with authorized signatures of the operator personnel. Sometimes, operators also submit a soft copy of the same report along with hard copy for the sake of convenience.

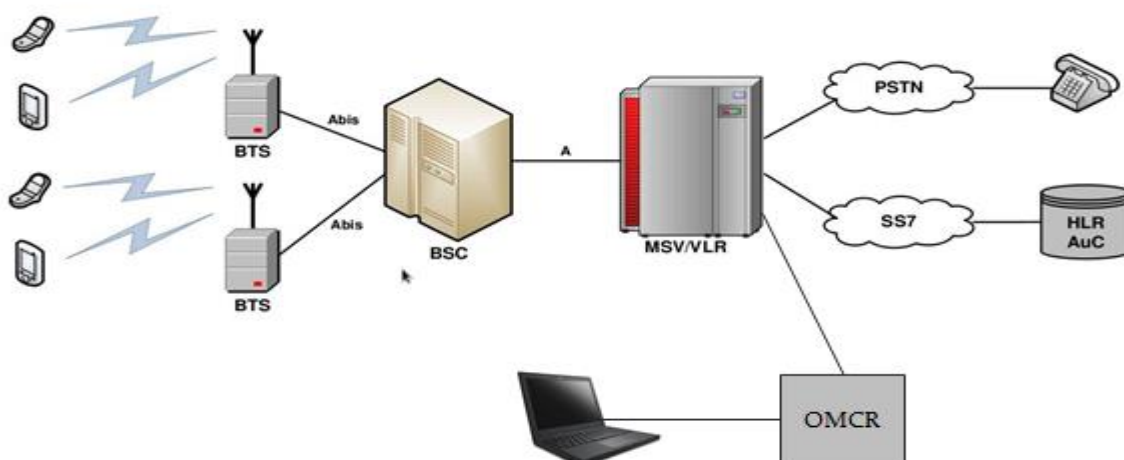
The PMR report for network parameters is taken for each month of the audit quarter and is generally extracted and verified in the first week of the subsequent month of the audit month. For example, June 2014 audit data was collected in the month of July 2014.

The PMR report for customer service parameters is extracted and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2014 (AMJ'14) was collected in the month of July 2014.

The operators are duly informed in advance about the audit schedule.

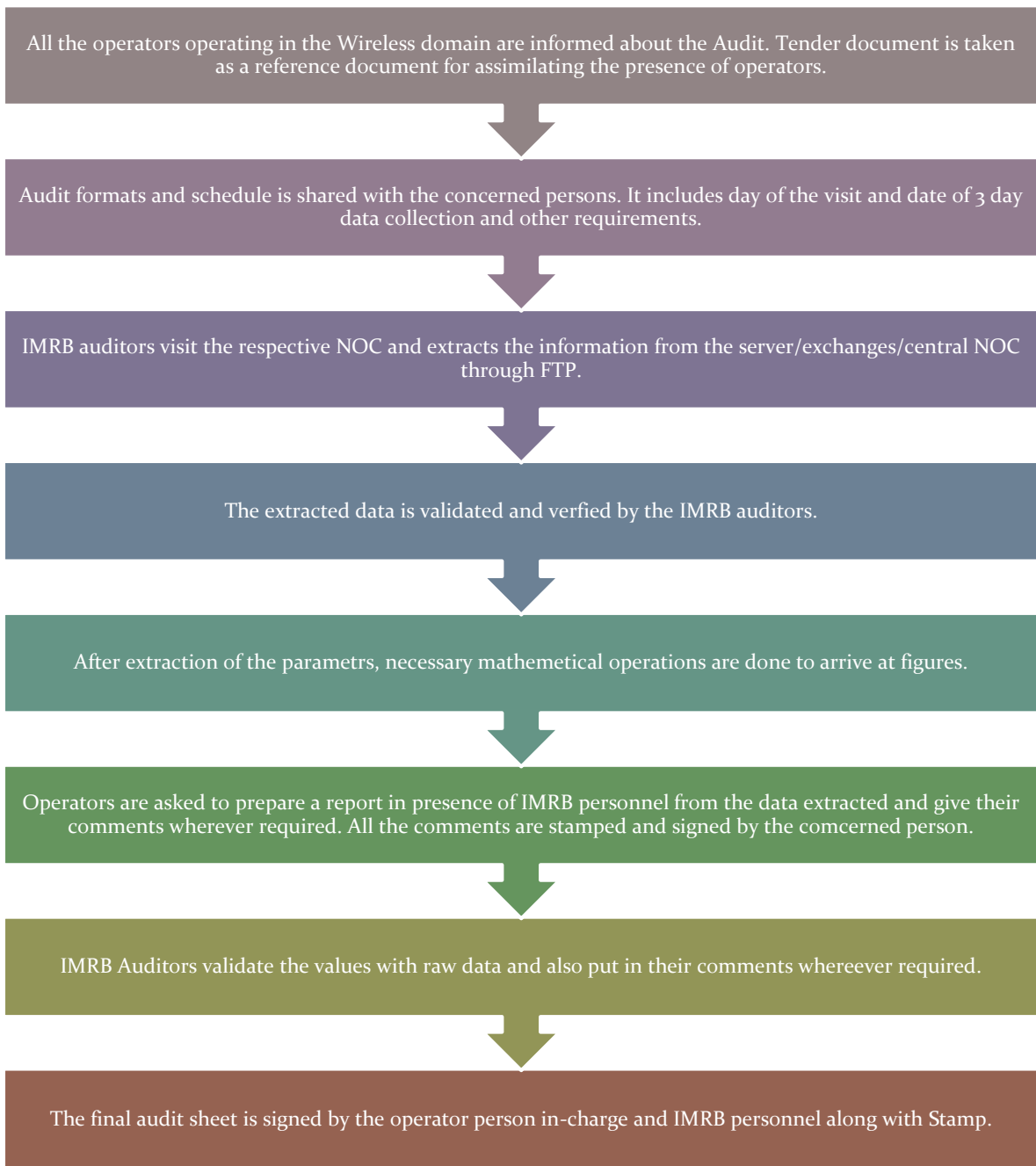
### 2.4.1.2 POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR on the operator network.



**2.4.1.3 STEP BY STEP AUDIT PROCEDURE**

The key steps followed for extraction of reports at the operator premises are given below.



Data has been extracted and calculated as per the counter details.



#### 2.4.1.4 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR's). The PMR reports were extracted in presence of IMRB representative from the operator's premises for the month of April, May and June. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

##### Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

##### Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

##### Network Congestion Parameters

- SDCCH/Paging Channel Congestion
- TCH Congestion
- Point of Interconnection

##### Connection Maintenance

- Call Drop rate
- Worst affected cells having more than 3% TCH drop

##### Voice Quality

- % Connections with good voice quality

All the parameters have been described in detail along with key findings of the parameter in section 4.

### 2.4.1.5 AUDIT PARAMETERS

Let us now look at the various parameters involved in the audit reports.

#### Network Related

Network Availability	
BTSs Accumulated downtime (not available for service)	≤ 2%
Worst affected BTSs due to downtime	≤ 2%
Connection Establishment (Accessibility)	
Call Set-up Success Rate (within licensee's own network)	≥ 95%
SDCCH/ Paging Channel Congestion	≤ 1%
TCH Congestion	≤ 2%
Connection Maintenance (Retainability)	
Call Drop Rate	≤ 2%
Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%
Connections with good voice quality	≥ 95%
Point of Interconnection	
(POI) Congestion ( on individual POI)	≤ 0.5%

#### Customer Service Quality-

Response Time to the Customer form Assistance	
Accessibility of call centre/customer care	≥ 95%
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

### 2.4.1.6 3 DAY LIVE DATA

The main purpose of 3 day live measurement is to evaluate the network parameters on intraday basis. While the monthly PMR report provides day end values, the 3 day live data is created by taking dump of network parameters on hourly basis. All the calculations are then done on the basis of that dump of 3 days.

The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak hours

Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server at the end of the 3<sup>rd</sup> day. The extracted data was analyzed to assess the various QoS parameters.

### 2.4.1.7 CUSTOMER SERVICE PARAMETERS

The PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2014 (AMJ'14) was collected in the month of July 2014.

The operators are duly informed in advance about the audit schedule.

The Customer Service Quality Parameters include response time to the customer for assistance, termination/closure of service and time taken for refund of security deposit after closures. All the customer service parameters were calculated on the quarterly basis.

All the parameters have been described in detail along with key findings of the parameter in section 5.

## 2.4.2 LIVE CALLING

### 2.4.2.1 SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers.

The IMRB auditor visits each operator premises to do live calling. The operators provide the data dump of customer service complaints and also the list of customer service numbers to be verified through live calling.

IMRB auditors then make live calls using operator SIM to a random sample of subscribers from the dump provided to verify the resolution of complaints.

The auditors also verify the performance of call center. Using operator SIM, the auditors also make test calls to subscribers of other operators to assess the inter-operator call connectivity in the same licensed service area.

Live calling activity was carried out during the period of July 2014. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of June'14 was considered for live calling activity conducted in July 2014.

A detailed explanation of each parameter is explained below.

#### 2.4.2.2 SERVICE COMPLAINTS REQUESTS

“Service request” means a request made to a service provider by its consumer pertaining to his account, and includes.

- ↳ A request for change of tariff plan
- ↳ A request for activation or deactivation of a value added service or a supplementary service or a special pack
- ↳ A request for activation of any service available on the service provider's network
- ↳ A request for shift or closure or termination of service or for billing details

All the complaints other than billing were covered. A total of 100 calls per service provider for each service in licensed service area were done by the IMRB auditors.

#### 2.4.2.3 CUSTOMER CARE

Overall sample size is 2\*50 calls per service provider per circle at different points of time, to be evenly distributed across the selected exchanges – 50 calls between 10:00 hours to 13:00 hours and 50 calls between 15:00 hours to 17:00 hours.

The time taken to answer the call through IVR and Customer Care is recorded by the audit agency.

TRAI Benchmark- Response time to the customer for assistance:

- (a) Accessibility of call center/customer care/IVR >= 95%
- (b) % age of calls answered by the operator (voice to voice): within 60 seconds = 90%

#### 2.4.2.4 INTER OPERATOR CALL ASSESEMENT

A total of 100 calls per service provider to all the other service providers in a licensed service area were done for the purpose of audit.

### 2.4.3 DRIVE TEST

#### 2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as its name suggests, is conducted to measure the outdoor coverage in a moving vehicle in a specified network coverage area.

The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

To assess the indoor coverage, the test is also conducted at two static indoor locations in each SSA, such as Malls, office buildings, shopping complexes, government buildings etc.

IMRB conducted two types of drive tests as mentioned below.

- ↪ Operator Assisted Drive Test
- ↪ Independent Drive Test

The main difference between the two is that in the operator assisted, operators participate in the drive test along with their hardware, software, phones etc. while in the independent drive test IMRB conducts the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the drive test being conducted.

A detailed explanation of the two methodologies has been provided below.

#### 2.4.3.2 OPERATOR ASSISTED DRIVE TEST

A total of 3 SSA were selected and audited in each quarter, 1 SSA in each month. The methodology adopted for the drive test-

- ↪ 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- ↪ On an average, a minimum of 100 kilometers were covered each day
- ↪ Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- ↪ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ↪ The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads and we can start from the point from where we had left last day (if possible).
- ↪ The route was classified as-
  - With In city
  - Major Roads
  - Highways
  - Shopping complex/ Mall
  - Office Complex/ Government Building
- ↪ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.

- ↻ The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- ↻ The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- ↻ The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- ↻ The speed of the vehicle was kept at around 30 km/hr.
- ↻ The holding period of each test call was 120 seconds.
- ↻ A test call was generated 10 seconds after the previous test call is completed.
- ↻ Height of the antenna was kept uniform in case of all service providers.

### 2.4.3.3 INDEPENDENT DRIVE TEST

The number of independent drive tests to be conducted and their locations are decided basis TRAI recommendation.

- ↻ A minimum of 100 kilometers was traversed during the independent drive test in a SSA. The SSA would be defined as per BSNL and SSA list will be finalized by regional TRAI office.
- ↻ Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- ↻ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ↻ The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- ↻ The route was classified as-
  - With In city
  - Major Roads
  - Highways
  - Shopping complex/ Mall
  - Office Complex/ Government Building
- ↻ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- ↻ The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- ↻ The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- ↻ The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- ↻ The speed of the vehicle was kept at around 30 km/hr.
- ↻ The holding period of each test call was 120 seconds.
- ↻ A test call was generated 10 seconds after the previous test call is completed.
- ↻ Height of the antenna was kept uniform in case of all service providers.

#### 2.4.3.4 PARAMETERS EVALUATED DURING DRIVE TEST

The parameters which were captured during the drive test include. Below are the parameters which are captured for the GSM and CDMA operators.

- ☞ Coverage-Signal strength (GSM)
  - ✓ Total calls made (A)
  - ✓ Number of calls with signal strength between 0 to -75 dBm
  - ✓ Number of calls with signal strength between 0 to -85 dBm
  - ✓ Number of calls with signal strength between 0 to -95 dBm
- ☞ Coverage-Signal strength (CDMA)
  - ✓ Total  $E_c/I_0$  BINS (A)
  - ✓ Total  $E_c/I_0$  BINS with less than -15 (B)
  - ✓ Low Interference =  $[1 - (B/A)] \times 100$
- ☞ Voice quality (GSM)
  - ✓ Total RxQual Samples- A
  - ✓ RxQual samples with 0-5 value - B
  - ✓ %age samples with good voice quality =  $B/A \times 100$
- ☞ Voice quality (CDMA)
  - ✓ Total FER BINS (forward FER) - A
  - ✓ FER BINS with 0-2 value (forward FER) - B
  - ✓ FER BINS with 0-4 value (forward FER) - C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) =  $B/A \times 100$
  - ✓ %age samples with FER bins having 0-4 value (forward FER) =  $C/A \times 100$
  - ✓ No. of FER samples with value  $> 4 = [A-C]$
- ☞ Call setup success rate
  - ✓ Total number of call attempts - A
  - ✓ Total Calls successfully established - B
  - ✓ Call success rate (%age) =  $(B/A) \times 100$
- ☞ Blocked calls
  - ✓ 100% - Call Set up Rate
- ☞ Call drop rate
  - ✓ Total Calls successfully established - A
  - ✓ Total calls dropped after being established - B
  - ✓ Call Drop Rate (%age) =  $(B/A) \times 100$

## 2.5 OPERATORS COVERED

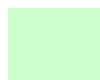
June'14 VLR data was considered for the number of subscribers.

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	3681792
Airtel	21607833
BSNL	643225
Idea	7052441
Reliance CDMA	2486443
Reliance GSM	6595151
TATA CDMA	425488
TATA GSM	911313
Uninor	4265261
Vodafone	7073494

## 2.6 COLOUR CODES TO READ THE REPORT



Not Meeting the benchmark



Best Performing Operator



### 3 EXECUTIVE SUMMARY

#### 3.1 PMR DATA – 3 MONTHS CONSOLIDATED

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the Bihar circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSS Accumulated downtime (not available for service)	Worst affected BTSS due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.90%	28.72%	94.65%	1.11%	4.86%	1.31%	7.12%	95.08%
Airtel	0.09%	0.31%	97.90%	0.73%	0.44%	0.57%	3.12%	97.70%
BSNL	4.34%	26.61%	76.43%	11.41%	4.90%	24.00%	7.60%	95.50%
Idea	0.67%	1.82%	98.40%	0.83%	1.58%	0.91%	2.78%	97.26%
Reliance CDMA	0.41%	1.13%	97.61%	0.46%	0.03%	0.36%	1.24%	99.81%
Reliance GSM	0.08%	0.21%	96.41%	0.46%	0.41%	0.52%	0.09%	97.93%
TATA CDMA	0.16%	0.00%	97.28%	0.20%	0.92%	0.86%	3.84%	98.23%
TATA GSM	0.00%	0.00%	99.33%	0.20%	0.15%	0.45%	0.82%	97.63%
Uninor	0.46%	1.83%	97.54%	0.84%	1.59%	0.55%	1.51%	93.78%
Vodafone	0.46%	1.79%	99.55%	0.13%	0.45%	0.73%	1.53%	97.92%

Following are the parameter wise observations for Wireless Operators for Bihar circle:

#### BTSS Accumulated Downtime:

The audit results showed that, most of the operators met the TRAI specified criteria for the outage due to downtime of the base transceiver stations (BTS) except for BSNL at 4.34% and Aircel at 4.90%. TATA GSM performed the best of the lot with no downtime reported followed by Reliance GSM and Airtel.

#### Worst Affected BTSS Due to Downtime:

During the audit it was found that most of the operators met the benchmark specified by TRAI except Aircel at 28.72% and BSNL at 26.61%. TATA CDMA at 0.00% and TATA GSM at 0.00% performed the best comparing with other competitors followed by Reliance GSM.

#### Call Set-up Success Rate (CSSR):

Most of the operators comfortably met the TRAI benchmark except Aircel at 94.65% and BSNL at 76.43%. Vodafone at 99.55% performed the best Comparing with other competitors.

### Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. Most of the operators met the TRAI specified benchmarks on TCH congestion parameters except Aircel at 4.86% and BSNL at 4.90% and for SDCCH/ Paging Channel Congestion, Aircel at 1.11% BSNL at 11.41% the calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI.

### Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Most of the service providers were found to be meeting the TRAI specified benchmark except BSNL at 24.00%. Reliance CDMA at 0.36% was the best on this parameter.

### Worst Affected Cells Having More than 3% TCH Drop:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. Aircel at 7.12%, Airtel at 3.12%, BSNL at 7.60% and Tata CDMA at 3.84% failed to meet the benchmark. Reliance GSM at 0.09% was the best performer on this parameter.

### Voice Quality:

During the audit it was found that most of the service providers were meeting the benchmark specified by TRAI barring Uninor at 93.78%. Reliance CDMA at 99.81% was the best of the lot.

## 3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators. It was seen from the live data collected, that the performance of the operators across all parameter more or less corroborated the audit data collected.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH	%age of connection with good voice quality
<b>Benchmark</b>	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	5.62%	0.00%	95.32%	0.90%	4.19%	1.42%	9.57%	94.86%
Airtel	0.21%	0.00%	97.95%	0.41%	0.11%	0.57%	3.21%	97.17%
BSNL	2.85%	4.85%	76.25%	12.03%	4.70%	24.00%	10.60%	95.68%
Idea	0.88%	0.17%	98.82%	0.79%	1.05%	0.90%	2.76%	97.08%
Reliance CDMA	0.41%	0.00%	98.04%	0.44%	0.02%	0.30%	0.00%	99.81%
Reliance GSM	0.08%	0.00%	96.66%	0.44%	0.39%	0.52%	0.00%	97.90%
TATA CDMA	0.15%	0.00%	98.60%	99.32%	0.34%	0.30%	3.84%	65.57%
TATA GSM	0.00%	0.00%	99.32%	0.20%	0.04%	0.42%	1.85%	97.78%
Uninor	0.46%	0.05%	97.76%	0.89%	1.42%	0.55%	1.55%	93.84%
Vodafone	0.68%	0.00%	99.57%	0.13%	0.43%	0.81%	2.68%	97.89%

### **BTSS Accumulated Downtime:**

Most of the operators met the TRAI specified criteria for the outage due to downtime of the base transceiver stations (BTS) except Aircel at 5.62% and BSNL at 2.85%. TATA GSM at 0.00% performed the best of the lot with no downtime reported, followed by Reliance GSM at 0.08%.

### **Worst Affected BTSS Due to Downtime:**

During the audit it was found that most of the operators met the benchmark specified by TRAI except BSNL which was at 4.85%.

### **Call Set-up Success Rate (CSSR):**

All other operators met the TRAI benchmark except BSNL at 76.25%. The best performance was recorded for the operator Vodafone at 99.57% CSSR.

### **Network Congestion parameters:**

Most of the operators met the TRAI specified benchmarks on TCH congestion parameters except Aircel at 4.19% and BSNL at 4.70% and for SDCCH/ Paging Channel Congestion, only BSNL at 12.03% did not meet the benchmark. The calculation methodology of these parameters was found to be in complete accordance with TRAI specifications.

### **Call Drop Rate:**

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Most of the service providers were found to be meeting the TRAI specified benchmark except BSNL at 24.00%.

### **Worst Affected Cells Having More than 3% TCH Drop:**

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. All the operators were comfortably meeting the benchmark on this parameter except Aircel at 9.57%, Airtel at 3.21%, BSNL at 10.60% and TATA CDMA at 3.84%. Reliance CDMA at 0.00% and Reliance GSM at 0.00% performed the best of the lot with no downtime.

### **Voice Quality:**

During the audit it was found that most of the service providers were meeting the benchmark specified by TRAI except Aircel at 94.86%, TATA CDMA at 65.57% and Uninor at 93.84%.

### 3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Service Requests	Response time to customer for assistance	
	Complaint /Request attended to Satisfaction	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
<b>Benchmark</b>		<b>≥ 95%</b>	<b>≥ 90%</b>
Aircel(DWL)	91.00%	100.00%	96.00%
Airtel	60.00%	100.00%	100.00%
BSNL	80.00%	100.00%	100.00%
Idea	77.00%	100.00%	100.00%
Reliance CDMA	72.00%	100.00%	98.00%
Reliance GSM	75.00%	100.00%	95.00%
TATA CDMA	52.00%	100.00%	98.00%
TATA GSM	66.00%	100.00%	100.00%
Uninor	52.00%	100.00%	67.00%
Vodafone	80.00%	100.00%	100.00%

#### Complaint/Request Attended to Satisfaction

TATA CDMA and Uninor, both at 52.00% had the lowest percentage of complaints attended to satisfaction. Aircel at 91.00% is performing better as compared to other operators on this parameter.

#### Accessibility of Call Centre/Customer Care-IVR

All the operators were meeting the TRAI specified benchmark of 95%. For IVR, 100% connectivity was observed for all the operators.

#### Customer Care / Helpline Assessment

It was seen that all the operators except Uninor met the TRAI benchmark of 90% of calls answered by the centres within 60 seconds.

### 3.4 CUSTOMER CARE – CONSOLIDATED

Name of Service Provider	Customer care	
	Percentage of calls answered by the operators IVR within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 95%	≥ 90%
Aircel(DWL)	69.41%	90.77%
Airtel	100.00%	86.00%
BSNL	80.78%	96.00%
Idea	95.29%	96.71%
Reliance CDMA	98.76%	34.25%
Reliance GSM	98.42%	72.59%
TATA CDMA	97.75%	96.00%
TATA GSM	95.97%	94.00%
Uninor	96.74%	96.25%
Vodafone	100.00%	89.90%

#### Customer Care Percentage of calls answered by the operators IVR within 60 seconds

Operators Aircel and BSNL failed to meet the benchmark of 95% with only 69.41% and 80.78% of IVR calls respectively were being attended within 60 seconds. Airtel and Vodafone performed better than other operators with 100% their calls being answered within the stipulated time.

#### Customer Care Percentage of calls answered by the operators (Voice to Voice) within 60 seconds

For the voice to voice calls, Airtel, Reliance CDMA, Reliance GSM and Vodafone did not meet the TRAI benchmark whereas Idea at 96.71% had the highest percentage of calls being answered within 60 seconds.

### 3.5 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Aircel(DWL)	NA	88.00%	95.00%	97.00%	100.00%	100.00%	88.00%	94.00%	100.00%	98.00%
Airtel	99.00%	NA	95.00%	100.00%	100.00%	98.00%	100.00%	88.00%	97.00%	99.00%
BSNL	87.00%	97.00%	NA	100.00%	97.00%	99.00%	98.00%	97.00%	93.00%	97.00%
Idea	100.00%	100.00%	100.00%	NA	93.00%	100.00%	100.00%	97.00%	100.00%	98.00%
Reliance CDMA	100.00%	95.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	96.00%	100.00%
Reliance GSM	100.00%	99.00%	99.00%	100.00%	NA	NA	99.00%	99.00%	98.00%	100.00%
TATA CDMA	100.00%	100.00%	93.00%	100.00%	100.00%	100.00%	NA	NA	97.00%	100.00%
TATA GSM	100.00%	99.00%	97.00%	100.00%	100.00%	99.00%	NA	NA	97.00%	100.00%
Uninor	98.00%	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	95.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	NA



Maximum Problem faced by the calling operator to other operator

Most of the operators faced issues while connecting to other operators. Idea, Reliance GSM and Vodafone were able to connect to other operators successfully. While receiving the calls from other operators, Reliance GSM and Vodafone the best performers.

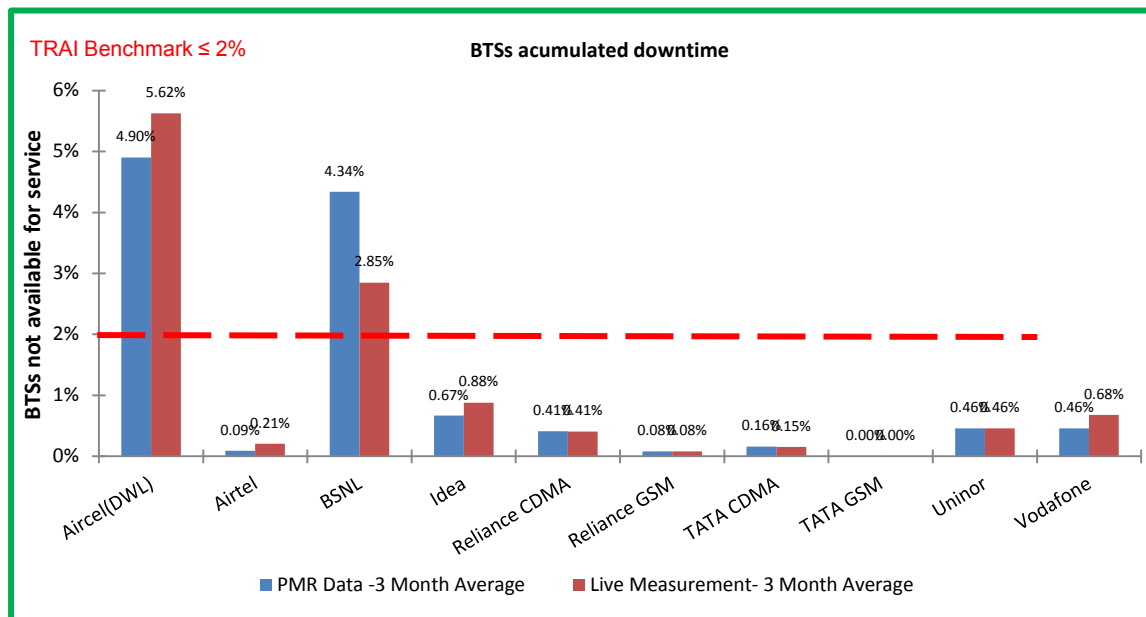
## 4 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA

### 4.1 BTS ACCUMULATED DOWNTIME

#### 4.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters
  1. BTSs Accumulated downtime (not available for service)
  2. Worst affected BTSs due to downtime
- 1. **Definition - BTSs accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.
- 2. **Computation Methodology -**  
**BTS accumulated downtime (not available for service) =  $\frac{\text{Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month}}{(24 \times \text{Number of days in a month} \times \text{Number of BTSs in the network in licensed service area}) \times 100}$**
- 3. **TRAI Benchmark -**
  - a. BTSs Accumulated downtime (not available for service)  $\leq 2\%$
- 4. **Audit Procedure -**
  - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
  - All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.
  - Any outage as a result of force majeure were not considered at the time of calculation
  - Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
  - List of operating sites with cell details and ids are taken from the operator.
  - When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

## 4.1.2 KEY FINDINGS



Barring Aircel and BSNL, all other operators met the benchmark during audit.

## 4.2 WORST AFFECTED BTS DUE TO DOWNTIME

### 4.2.1 PARAMETER DESCRIPTION

- Definition – Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

For measuring the parameter “Percentage of worst affected BTSs due to downtime” the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

- Computation Methodology –**

$$\text{Worst affected BTSs due to downtime} = \left( \frac{\text{Number of BTSs having accumulated downtime greater than 24 hours in a month}}{\text{Number of BTS in Licensed Service Area}} \right) * 100$$

- TRAI Benchmark –**

- Worst affected BTSs due to downtime  $\leq 2\%$

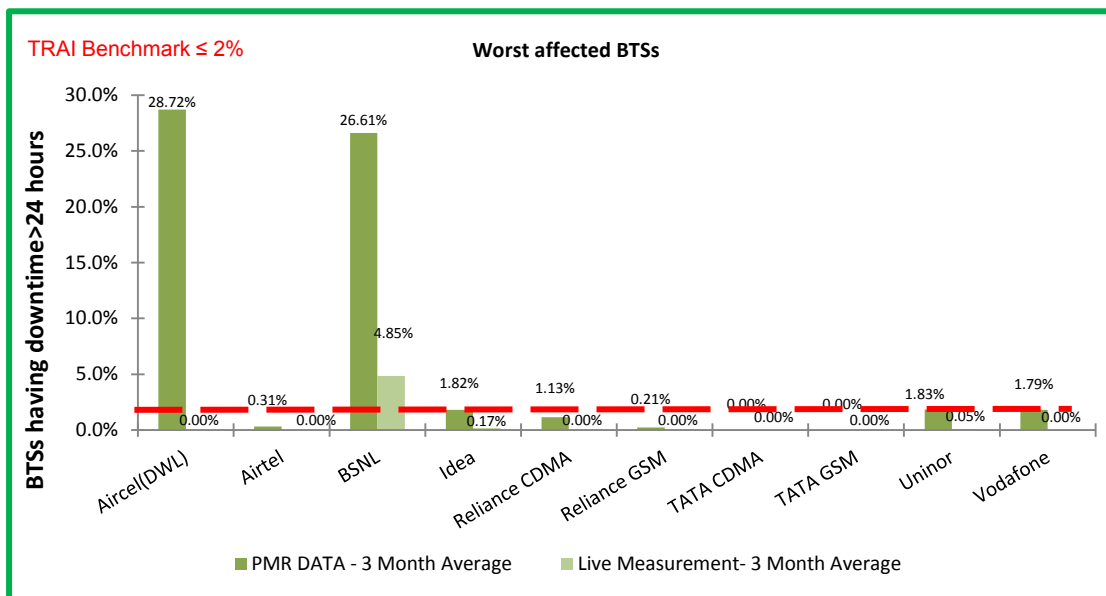
- Audit Procedure –**

- The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited



- ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.
- iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- iv. Any outage as a result of force majeure was not considered at the time of calculation.
- v. List of operating sites with cell details and ids are taken from the operator.
- vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

#### 4.2.2 KEY FINDINGS



Aircel and BSNL failed to meet the benchmark.

### 4.3 CALL SET UP SUCCESS RATE

#### 4.3.1 PARAMETER DESCRIPTION

1. **Definition:** The ratio of calls established to total calls is known Call Set-Up Success Rate (CSSR).
2. **Computation Methodology-**

$$\left( \frac{\text{Calls Established}}{\text{Total Call Attempts}} \right) * 100$$

Call Established means the following events have happened in call setup:-

- ↳ call attempt is made
- ↳ the TCH is allocated

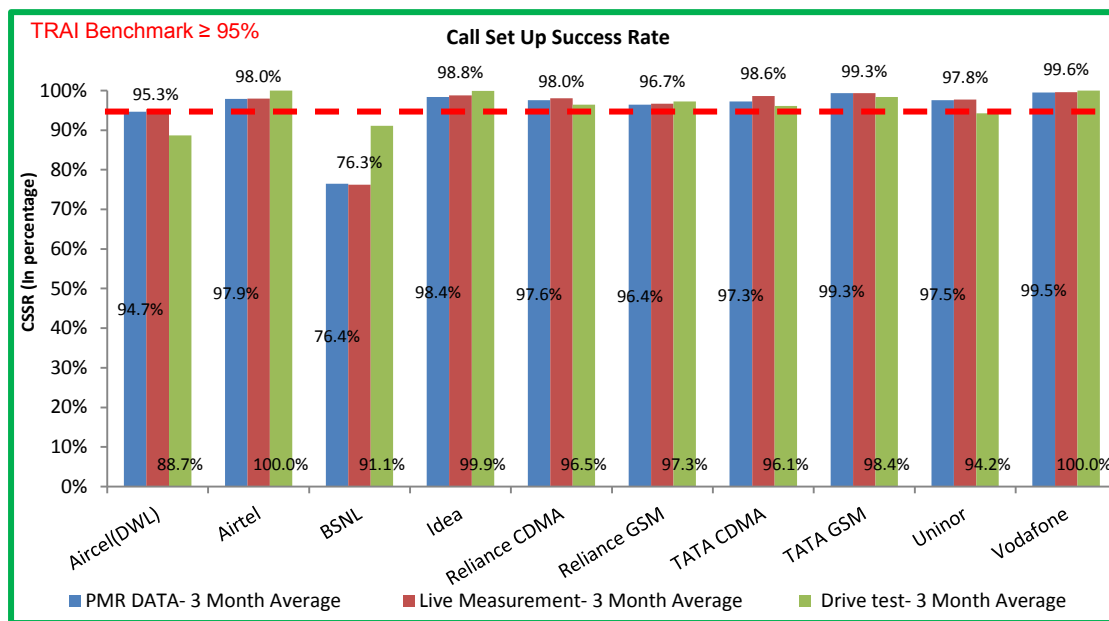
↳ the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark  $\geq 95\%$**

4. **Audit Procedure -**

- ↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
- ↳ CSSR calculation should be measured using OMC generated data only
- ↳ Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
- ↳ Counter data is extracted from the NOC of the operators.
- ↳ Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.
- ↳ The numerator and denominator values are derived from adding the counter values from the MSC.

4.3.2 KEY FINDINGS



BSNL and Aircel failed to meet the TRAI benchmark during audit.

## 4.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

### 4.4.1 PARAMETER DESCRIPTION

- Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:

- ↳ SDCCH Level: Stand-alone dedicated control channel
- ↳ TCH Level: Traffic Channel
- ↳ POI Level: Point of Interconnect

- Computational Methodology:**

↳ **SDCCH / TCH Congestion%** =  $[(A_1 \times C_1) + (A_2 \times C_2) + \dots + (A_n \times C_n)] / (A_1 + A_2 + \dots + A_n)$

- Where:- $A_1$  = Number of attempts to establish SDCCH / TCH made on day 1
- $C_1$  = Average SDCCH / TCH Congestion % on day 1
- $A_2$  = Number of attempts to establish SDCCH / TCH made on day 2
- $C_2$  = Average SDCCH / TCH Congestion % on day 2
- $A_n$  = Number of attempts to establish SDCCH / TCH made on day n
- $C_n$  = Average SDCCH / TCH Congestion % on day n

↳ **POI Congestion%** =  $[(A_1 \times C_1) + (A_2 \times C_2) + \dots + (A_n \times C_n)] / (A_1 + A_2 + \dots + A_n)$

- Where:- $A_1$  = POI traffic offered on all POIs (no. of calls) on day 1
- $C_1$  = Average POI Congestion % on day 1
- $A_2$  = POI traffic offered on all POIs (no. of calls) on day 2
- $C_2$  = Average POI Congestion % on day 2
- $A_n$  = POI traffic offered on all POIs (no. of calls) on day n
- $C_n$  = Average POI Congestion % on day n

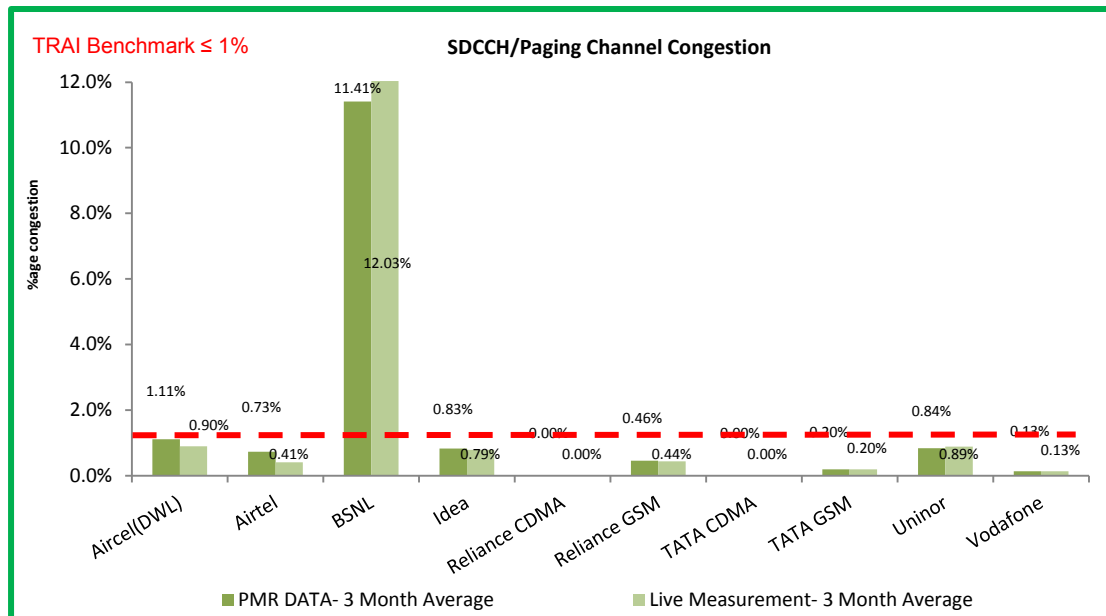
- Benchmark:**

- ↳ SDCCH Congestion:  $\leq 1\%$
- ↳ TCH Congestion:  $\leq 2\%$
- ↳ POI Congestion:  $\leq 0.5\%$

- Audit Procedure –**

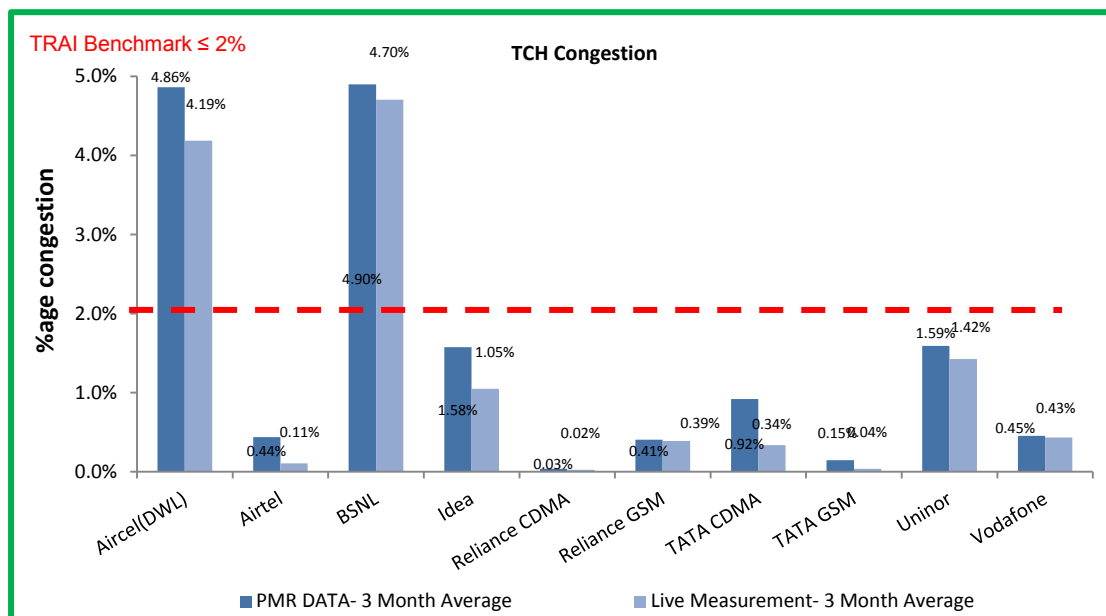
- ✎ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC-Switch data only) would be conducted
- ✎ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

**4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION**



BSNL failed to meet the TRAI benchmark as per PMR report.

**4.4.3 KEY FINDINGS – TCH CONGESTION**



Aircel and BSNL failed to meet the benchmark as per PMR data.

#### 4.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		50.33	769.00	215.67	76.67	94.00	98.67	208.67	19.00	60.33	57.00
No. of POIs not meeting benchmark		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capacity of all POIs (A) - in erlangs		93948.00	608373.28	5179.33	216264.74	39724.10	61911.31	8227.00	35086.08	60009.50	229110.07
Traffic served for all POIs (B)- in erlangs		63370.94	1588979.23	1609220.33	126611.17	10618.97	14356.75	25777.00	18169.38	47840.40	127451.26
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%
Live Measurement Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		50.33	769.00	215.00	76.67	94.00	98.67	208.67	19.00	59.67	57.00
No. of POIs not meeting benchmark		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capacity of all POIs (A) - in erlangs		93935.67	1023374.31	5179.33	216458.67	28186.55	61737.26	75423.00	35086.08	24323.09	230491.18
Traffic served for all POIs (B)- in erlangs		64921.87	662658.10	160057.67	131031.00	7530.42	14687.37	25480.67	18223.90	47711.77	125909.09
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%	0.00%	0.00%

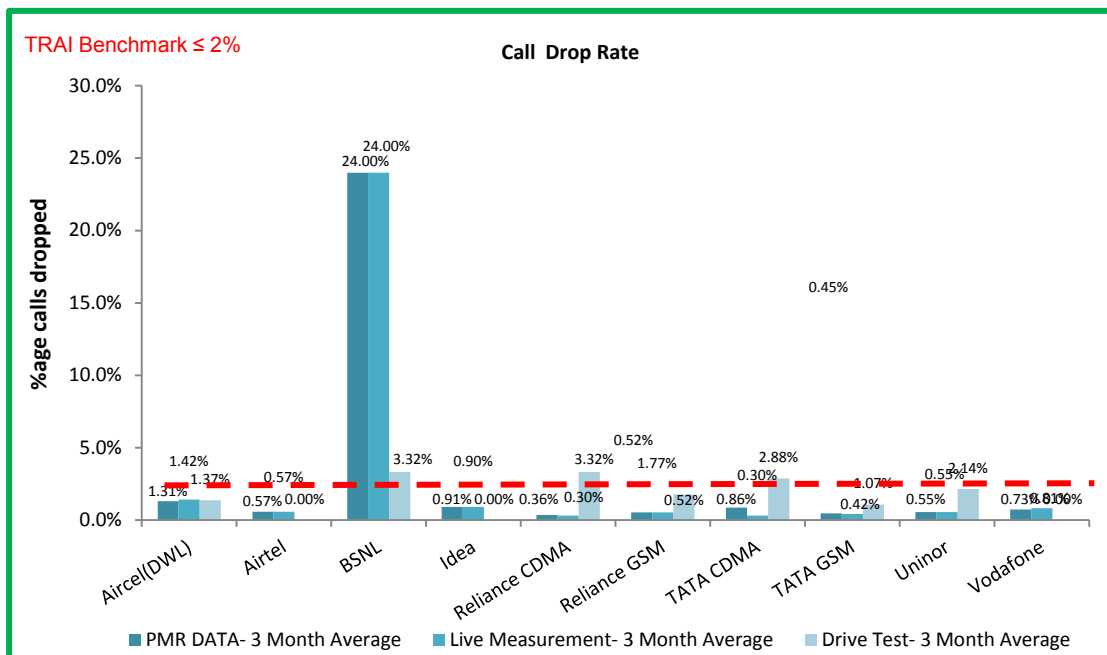
All the operators met the benchmark of POI congestion as per PMR data.

## 4.5 CALL DROP RATE

### 4.5.1 PARAMETER DESCRIPTION

- Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
  - Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
  - Total calls established** = All calls that have TCH allocation during busy hour
- Computational Methodology:**  $(\text{Total Calls Dropped} / \text{Total Calls Established}) \times 100$
- TRAI Benchmark** -
  - Call drop rate  $\leq 2\%$
- Audit Procedure** -
  - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
  - The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

### 4.5.2 KEY FINDINGS



BSNL was not able to meet the call drop rate benchmark during audit.

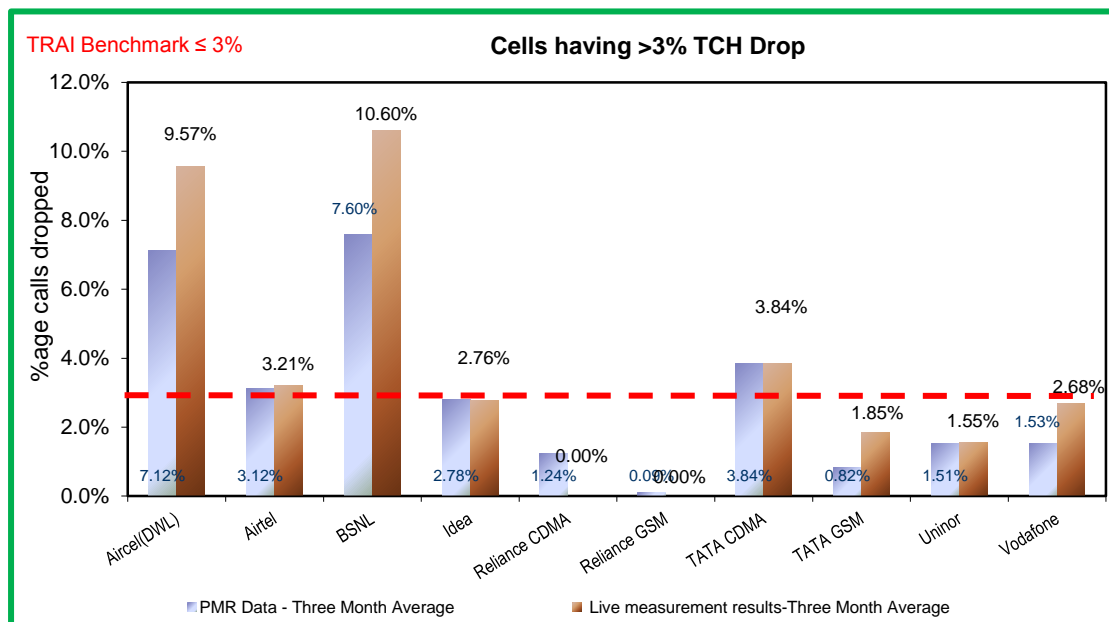
## 4.6 CELLS HAVING GREATER THAN 3% TCH DROP

### 4.6.1 PARAMETER DESCRIPTION

- Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.
- Computational Methodology:**  $(\text{Total number of cells having more than 3\% TCH drop} / \text{Total number of cells in the network}) \times 100$
- TRAI Benchmark –**
  - Worst affected cells having more than 3% TCH drop rate  $\leq 3\%$
- Audit Procedure –**
  - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

### 4.6.2 KEY FINDINGS



Aircel, Airtel, BSNL and TATA CDMA did not meet the benchmark as per PMR data.

## 4.7 VOICE QUALITY

### 4.7.1 PARAMETER DESCRIPTION

**1. Definition:**

- ↳ for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
- ↳ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

**2. Computational Methodology:**

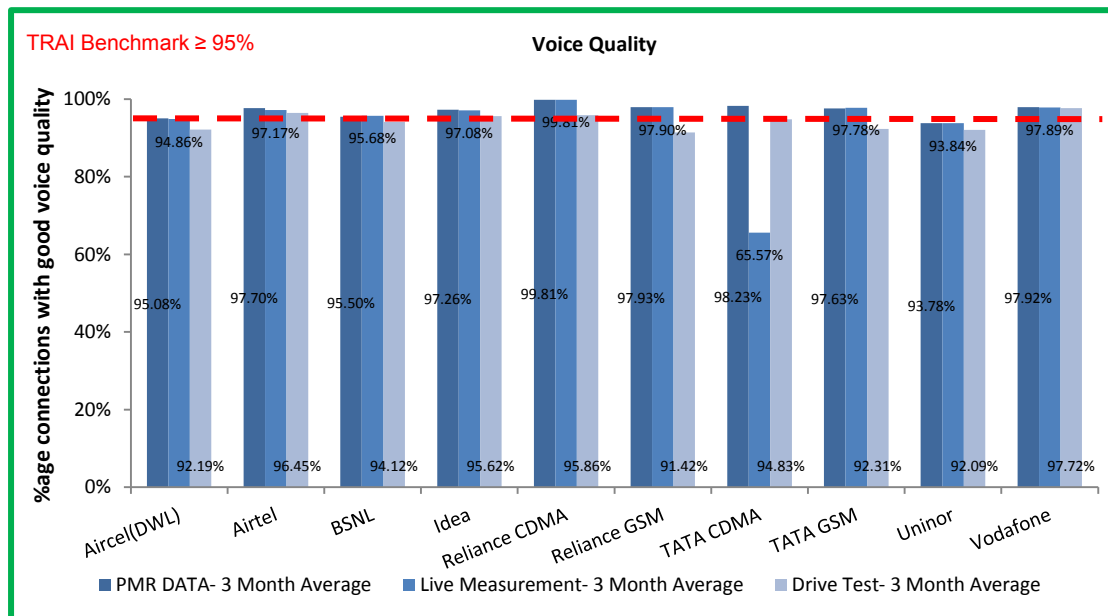
- ↳ **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

**3. TRAI Benchmark: ≥ 95%**

**4. Audit Procedure –**

- a. A sample of calls would be taken randomly from the total calls established.
- b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality

### 4.7.2 KEY FINDINGS



Uninor failed to meet the benchmark for voice quality during audit.



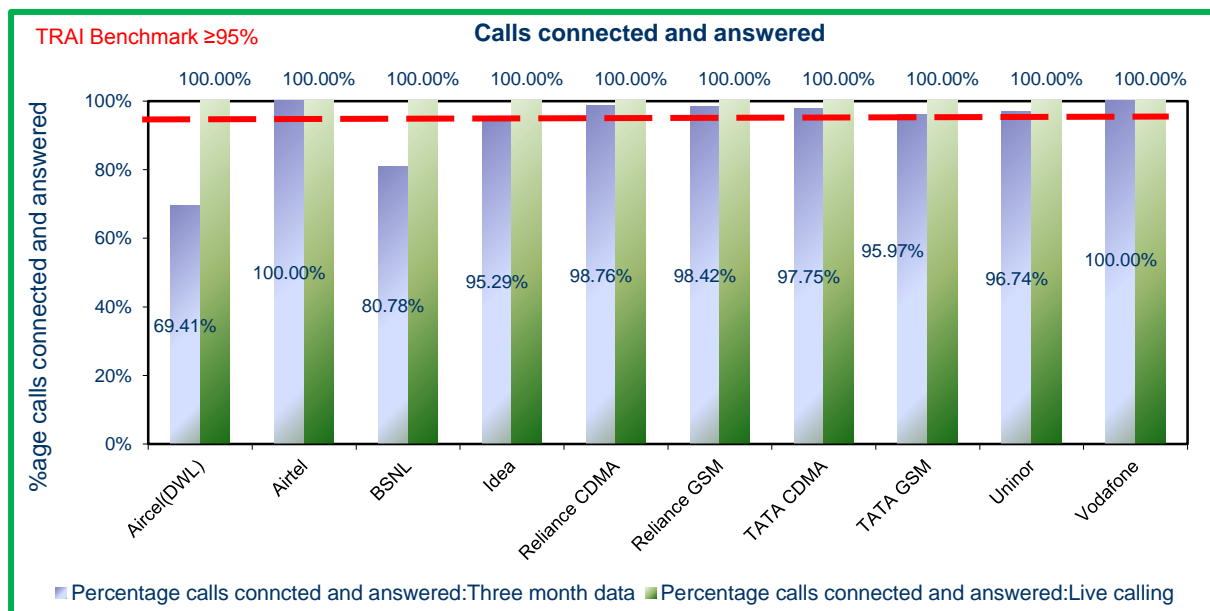
## 5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

### 5.1 CALL CENTRE PERFORMANCE-IVR

#### 5.1.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - ↳ **Call centre performance IVR = (Number of calls connected and answered by IVR/ All calls attempted to IVR) \* 100**
- TRAI Benchmark: >= 95%
- Audit Procedure:
  - ↳ Operator to provide details of:-
    - Total calls connected and answered by IVR
    - Total calls attempted to IVR
  - ↳ Also live calling is done to test the calls connected and answered by IVR

#### 5.1.2 KEY FINDINGS



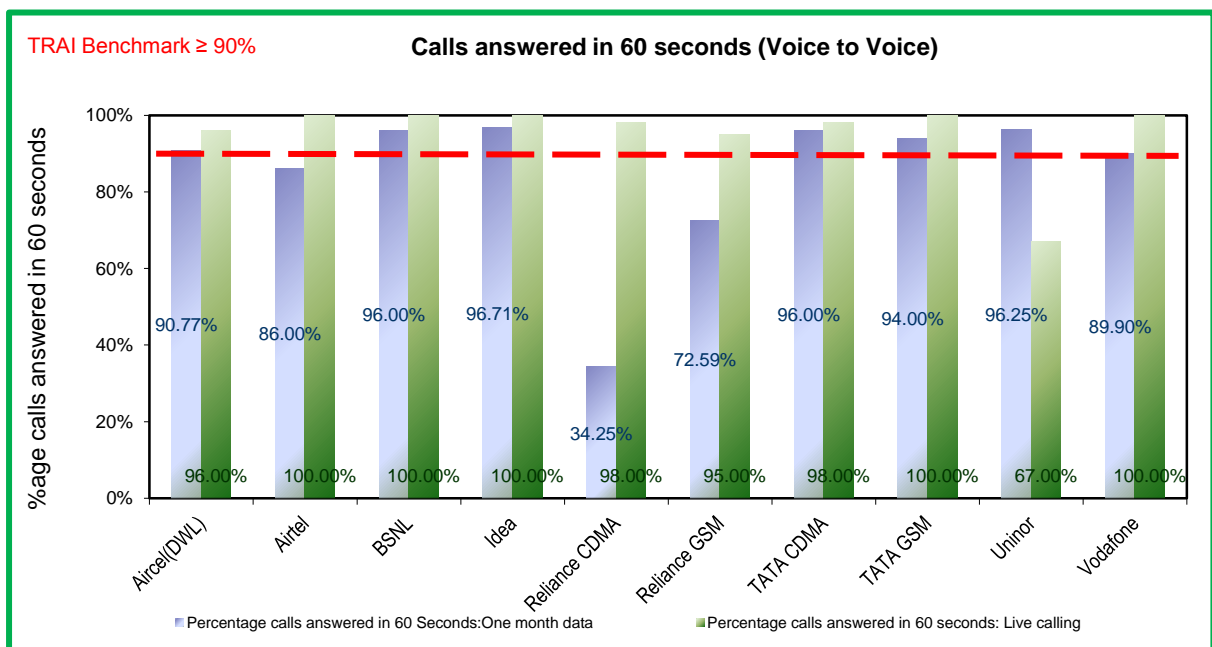
Aircel and BSNL failed to meet the benchmark as per audit data.

## 5.2 CALL CENTRE PERFORMANCE-VOICE TO VOICE

### 5.2.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - ↳ **Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) \* 100**
  - ↳ The calculation excludes the calls dropped before 60 seconds
- TRAI Benchmark: >= 90%
- Audit Procedure:
  - ↳ Operator to provide details of:-
    - Total calls connected and answered by operator within 60 seconds
    - Total calls attempted to connect to the operator
  - ↳ Also live calling is done to test the calls answered within 60 seconds by the operator

### 5.2.2 KEY FINDINGS



Airtel, Reliance CDMA and Reliance GSM failed to meet the benchmark for Calls answered in 60 seconds (Voice to Voice).

### 5.3 TERMINATION/CLOSURE OF SERVICE

#### 5.3.1 PARAMETER DESCRIPTION

➤ Computational Methodology:

↳ **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) \* 100**

➤ TRAI Benchmark:

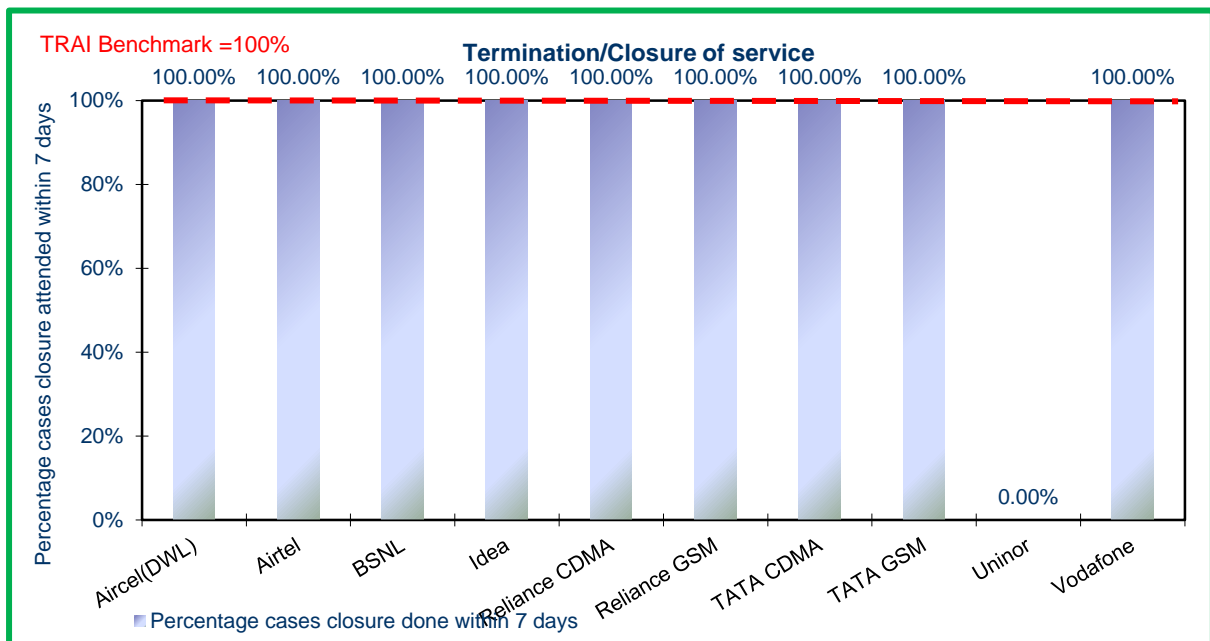
↳ Termination/Closure of Service: <=7 days

➤ Audit Procedure:

↳ Operator to provide details of:-

- Dates of lodging of all closure requests
- Dates of closure of service

#### 5.3.2 KEY FINDINGS



All the operators met the benchmark.

**Note: Uninor does not have postpaid service available in the circle**

## 5.4 REFUND OF DEPOSITS AFTER CLOSURE

### 5.4.1 PARAMETER DESCRIPTION

#### ➤ Computational Methodology:

↪ **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) \* 100**

↪ Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.

#### ➤ TRAI Benchmark:

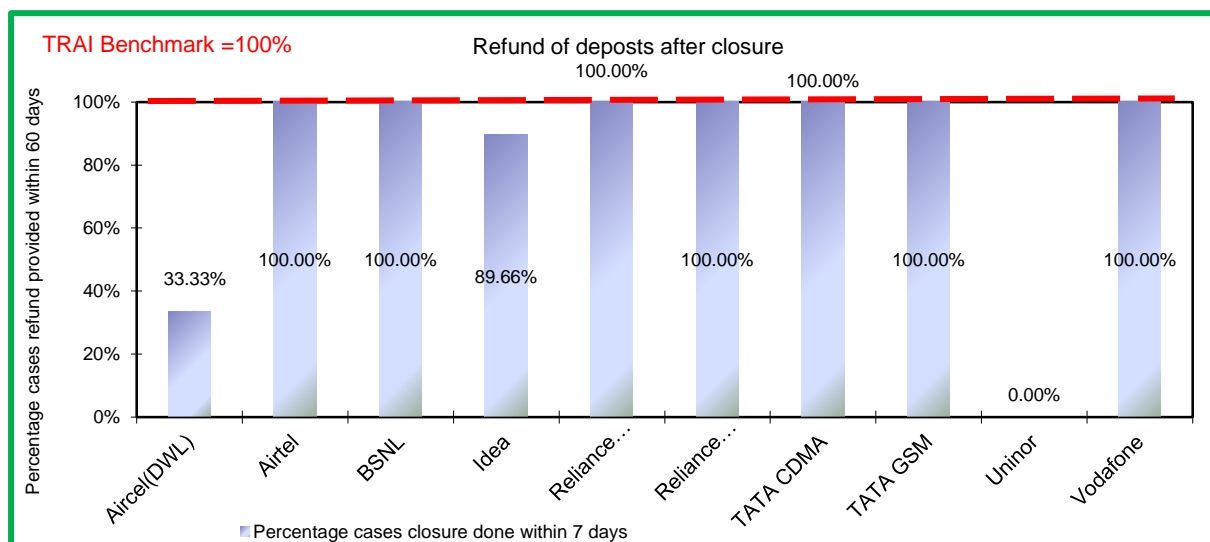
↪ Time taken for refund for deposit after closures: 100% within 60 days

#### ➤ Audit Procedure:

↪ Operator to provide details of:-

- ▶ Dates of lodging of all closure request resolved resulting in requirement of a refund by the operator.
- ▶ Dates of refund pertaining to all closure request received during the relevant quarter

### 5.4.2 KEY FINDINGS



Aircel and Idea failed to meet the benchmark.

**Note: Uninor does not have postpaid service available in the circle**

## 6 DETAILED FINDINGS - DRIVE TEST DATA

### 6.1 OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the Bihar circle. As per the new directive given by TRAI headquarters, drive test for the month of April, May and June, 2014 were conducted at a SSA level. Drive test was conducted for three days in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected on basis of the complaints received from the customers. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75 dbm for indoor, > -85 dbm for in-vehicle and > -95 dbm outdoor routes.

Below is the schedule of the drive test for the Bihar circle-

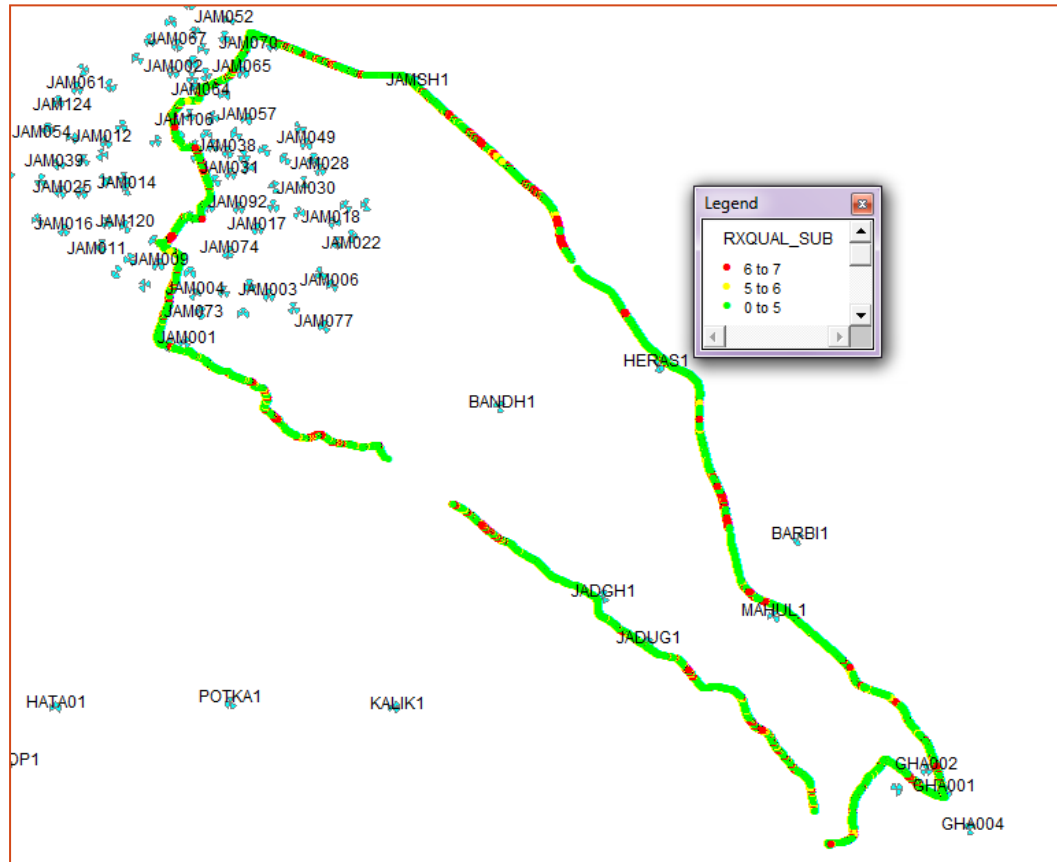
Month	Name of SSA Covered	Date of Drive Test
April	Jamshedpur	28th to 30th April
May	Motihari	28th to 30th May
June	Patna	25th to 27th June
Year	2014	

6.1.1 APRIL - JAMSHEDPUR

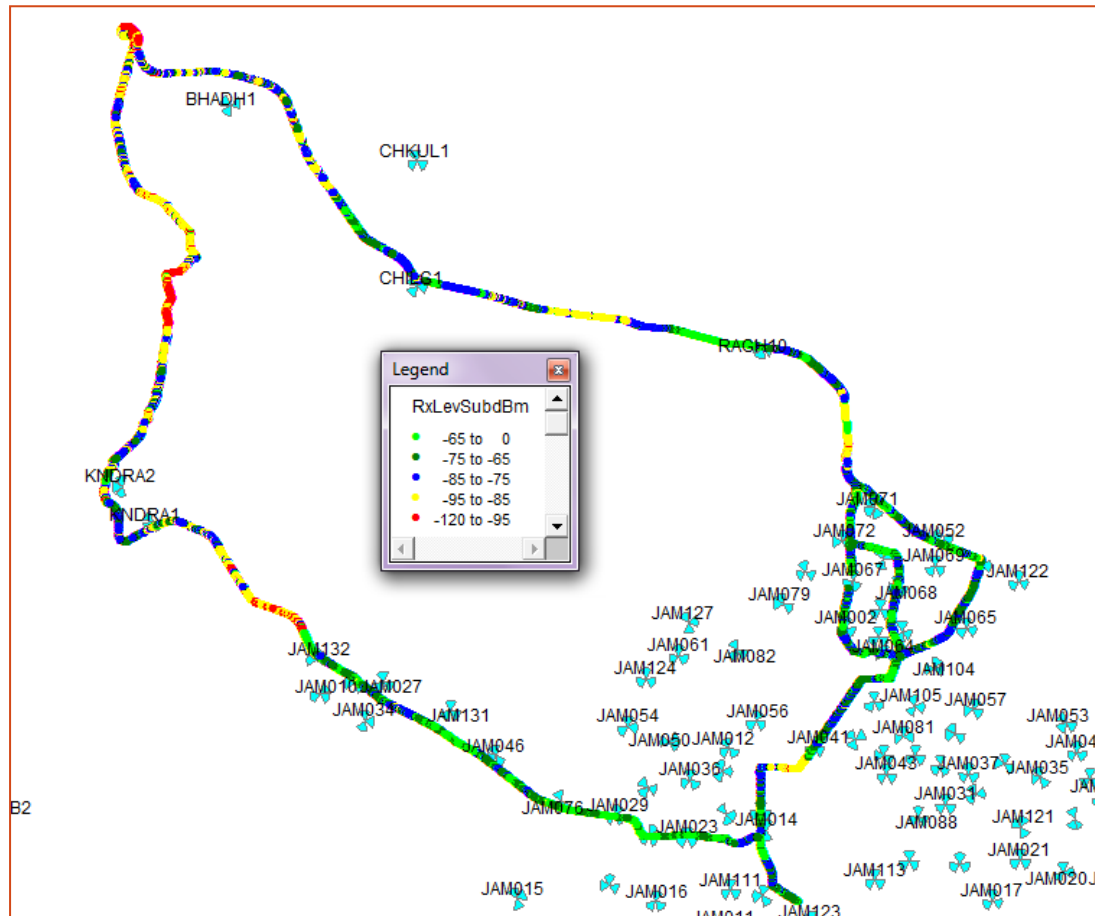
6.1.1.1 ROUTE DETAILS – JAMSHEDPUR SSA

		April		
		Jamshedpur		
	Type of location	Day 1	Day 2	Day 3
Outdoor	Major Roads	Rly. Station to Rly. Station Via Jadugora,		
	Highways		Rly. Station to LIC Buliding Via Chandil	
	Within the City			Rly.Station to Adityapur Via Sundarnagar, Chaibasa
Indoor	Office complex	Railway Station	LIC Building	Reliance Fresh

6.1.1.2 ROUTE MAP JAMSHEDPUR DAY 1

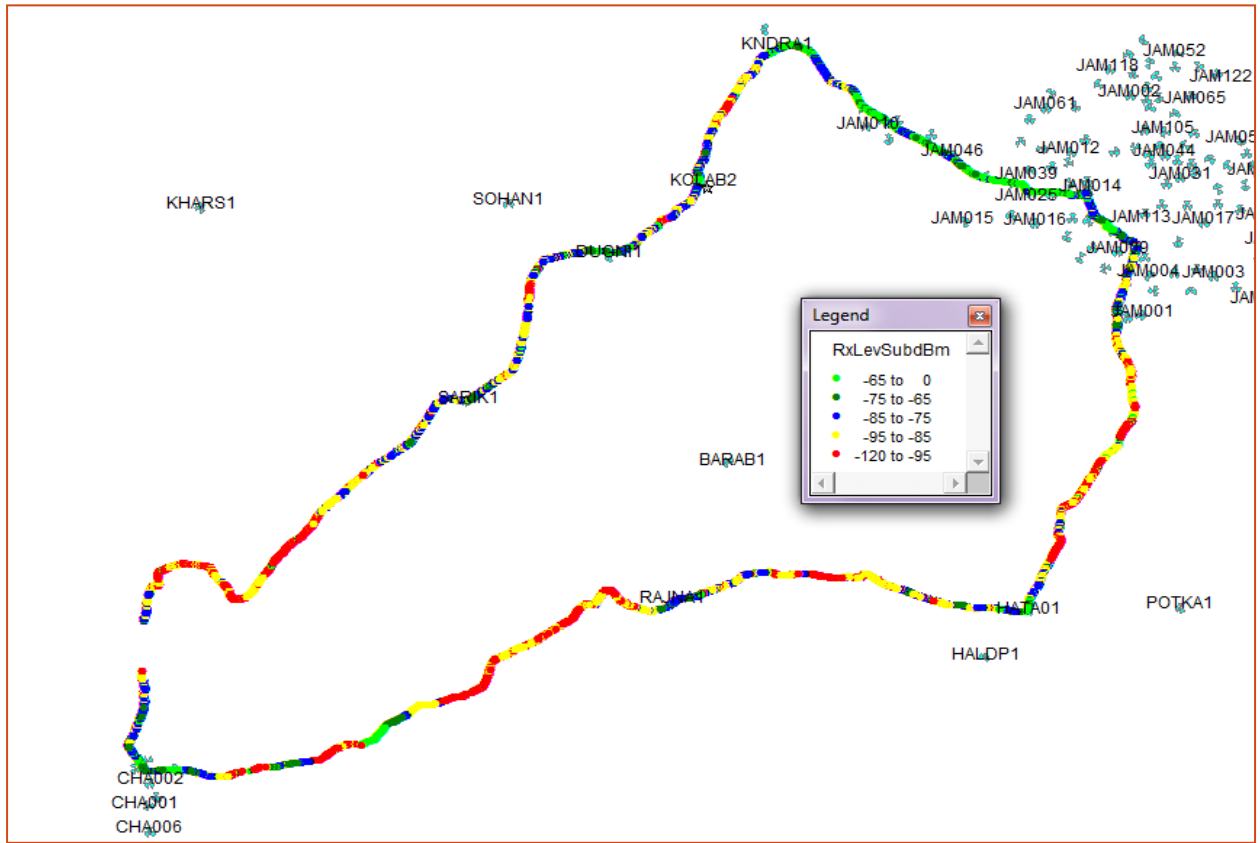


6.1.1.3 ROUTE MAP JAMSHEDPUR DAY 2





6.1.1.4 ROUTE MAP JAMSHEDPUR DAY 3



6.1.1.5 DRIVE TEST RESULTS – JAMSHEDPUR SSA

Name of SSA	Jamshedpur	Month	April	Consolidated																	
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Uninor		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
>= -75dBm		38.48%	35.66%	100.00%	87.85%	79.51%	51.73%	18.80%	70.02%	69.04%	36.46%	98.71%	47.65%	94.20%	52.16%	97.78%	60.03%	89.71%	37.40%	99.94%	84.33%
>= -85dBm		99.42%	70.38%	100.00%	97.58%	99.19%	81.56%	18.93%	84.11%	97.33%	60.18%	100.00%	79.46%	100.00%	76.83%	99.96%	84.27%	99.77%	73.24%	99.97%	95.67%
>= -95dBm		100.00%	100.00%	100.00%	100.00%	99.96%	96.90%	18.94%	94.31%	100.00%	84.76%	100.00%	94.57%	100.00%	94.89%	100.00%	93.72%	100.00%	99.99%	99.99%	99.33%
Voice quality	≥ 95%	99.32%	91.49%	99.60%	96.75%	98.33%	90.94%	98.84%	95.08%	97.26%	93.45%	97.11%	91.40%	99.95%	93.59%	98.92%	93.58%	98.51%	87.41%	99.23%	98.31%
CSSR	≥ 95%	32.29%	77.75%	100.00%	100.00%	93.87%	88.04%	100.00%	99.77%	98.15%	94.50%	100.00%	95.76%	100.00%	97.92%	100.00%	93.99%	100.00%	91.17%	100.00%	100.00%
%age Blocked calls		1.04%	19.66%	0.00%	0.00%	6.12%	11.90%	0.00%	0.22%	1.85%	6.50%	0.00%	4.24%	0.00%	1.64%	0.00%	3.88%	0.00%	8.69%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	5.97%	0.00%	0.00%	0.00%	3.16%	0.00%	0.00%	0.98%	5.97%	0.00%	1.74%	0.00%	1.77%	0.00%	1.08%	0.00%	3.58%	0.00%	0.00%
Hands off success rate		100.00%	93.62%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.20%	100.00%	99.86%	100.00%	96.14%	100.00%	100.00%	100.00%	100.00%

Voice Quality

Aircel at 91.49% , BSNL at 90.94%, Reliance CDMA 93.45%, Reliance GSM at 91.40%, TATA CDMA at 93.59% TATA GSM at 93.58% and Uninor at 87.41% failed to meet the benchmark in Outdoor area. All operators met the benchmark at indoor locations.

Call Set Success Rate (CSSR)

Aircel and BSNL missed the benchmark in both indoor and outdoor locations. Reliance CDMA at 94.50%, TATA GSM at 93.99% and Uninor at 91.17% were also not able to meet the benchmark in outdoor areas.

Call Drop Rate

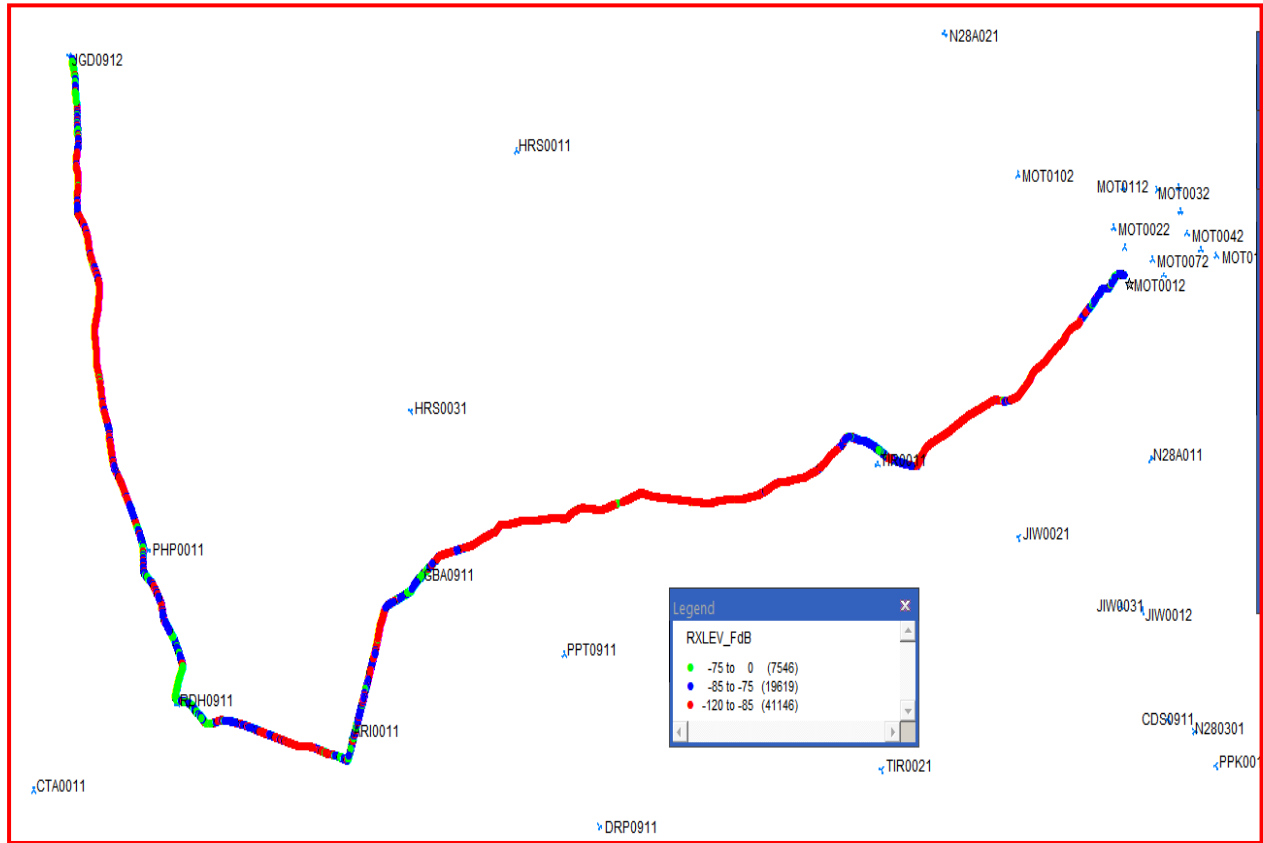
Aircel at 5.97%, BSNL at 3.16%, Reliance CDMA at 5.97% and Uninor at 3.58% were unable to meet the benchmark in outdoor areas.

6.1.2 MAY - MOTIHARI

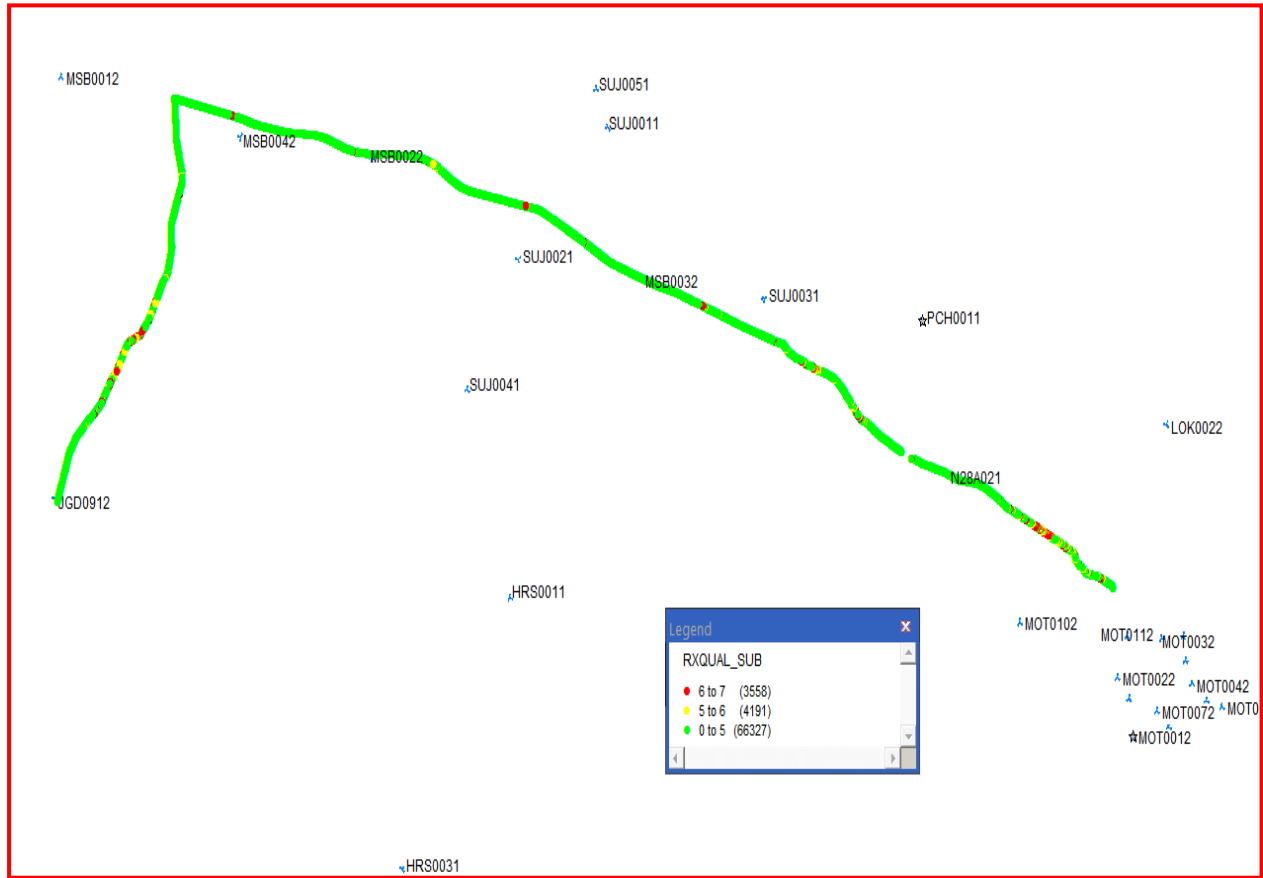
6.1.2.1 ROUTE DETAILS – MOTIHARI SSA

		May		
		Motihari		
	Type of location	Day 1	Day 2	Day 3
Outdoor	Major Roads	Jagdishpur to Motihari Via Paharpur,Areraj	Bhandar Chowk to Chatauni vias Pakridayal	Keshariya to mehsi via chakiya
	Highways	Bypass More to Jagdishpur Via Chapawa	Chatauni chowk to Bandar chowk Via Chairiya, Kadamua chaowk , dhaka	Hundai Showroom To Keshariya via kotwa , kahjuriya
	Within the City	Rly. Stn. To bypass more Via Balua chowk	Station, bypass, Chatauni chowk BSNL exchange	Station, town thana, balua chownk, Kachahri,Bypass to station
Indoor	Office complex	Rly Station	Meena Bazar	Sadar Hospital
	Shopping complex	V2 Mart	Vishal Mega Mart	Chataouni Chowk

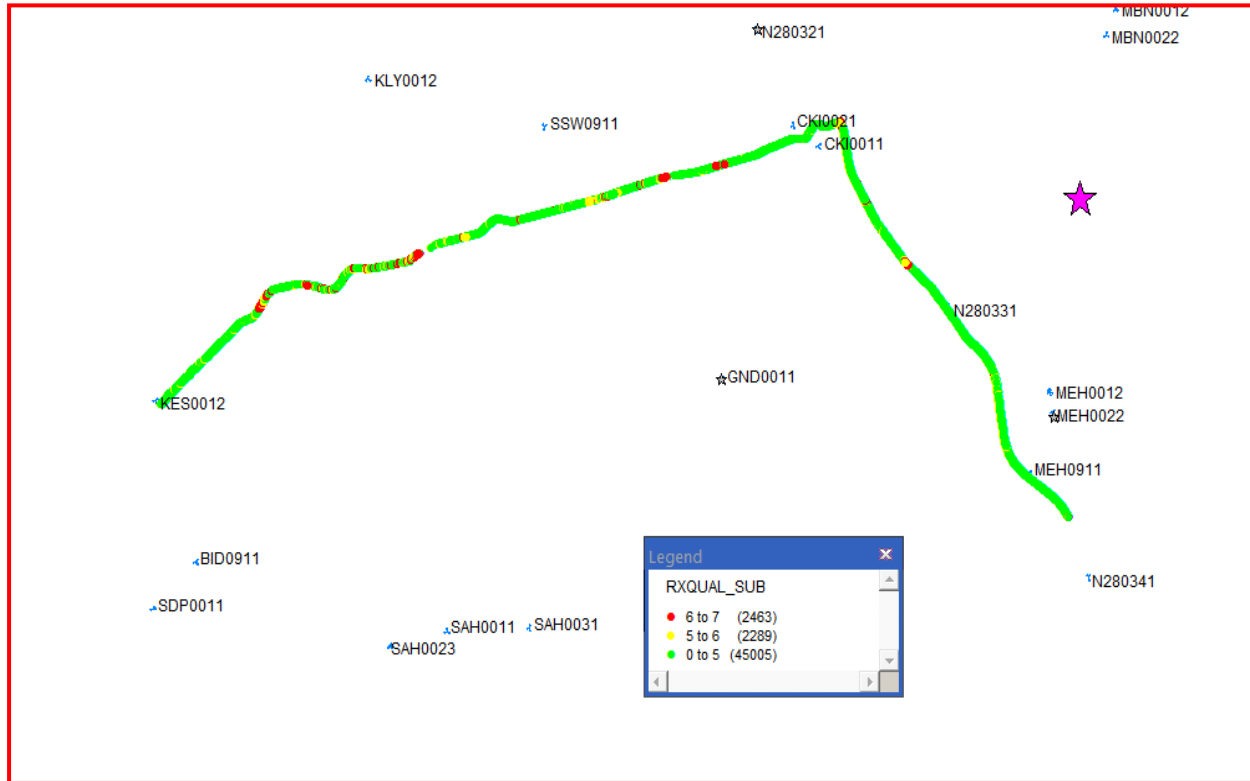
6.1.2.2 ROUTE MAP MOTIHARI DAY 1



6.1.2.3 ROUTE MAP MOTIHARI DAY 2



6.1.2.4 ROUTE MAP MOTIHARI DAY 3



6.1.2.5 DRIVE TEST RESULTS – MOTIHARI SSA

Name of SSA	Motihari	Month	May	Consolidated																		
					x																	
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Uninor		Vodafone		
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	
>= -75dBm		97.48%	32.69%	98.69%	80.14%	98.42%	67.90%	96.84%	76.11%	0.00%	17.78%	81.90%	58.72%	0.00%	17.78%	80.54%	61.97%	99.32%	55.26%	97.29%	74.95%	
>= -85dBm		100.00%	71.83%	100.00%	98.06%	99.58%	92.00%	99.91%	96.29%	9.67%	36.44%	99.02%	82.97%	9.63%	36.12%	97.03%	84.14%	99.79%	77.73%	99.91%	92.44%	
>= -95dBm		100.00%	100.00%	100.00%	100.00%	99.99%	99.96%	100.00%	100.00%	97.33%	68.56%	99.63%	96.74%	96.93%	67.89%	99.44%	97.45%	99.79%	100.02%	100.00%	98.60%	
Voice quality	≥ 95%	97.66%	87.68%	97.57%	96.29%	98.79%	93.78%	95.86%	95.67%	100.00%	93.35%	98.77%	90.74%	100.00%	92.02%	97.91%	90.70%	97.96%	89.86%	97.84%	97.00%	
CSSR	≥ 95%	100.00%	98.91%	100.00%	100.00%	97.78%	98.00%	100.00%	100.00%	100.00%	94.72%	100.00%	100.00%	100.00%	94.55%	100.00%	100.00%	100.00%	91.68%	100.00%	100.00%	
%age Blocked calls		0.00%	0.63%	66.67%	0.00%	2.22%	2.00%	33.33%	0.00%	0.00%	5.28%	0.00%	0.00%	0.00%	5.45%	0.00%	0.00%	0.00%	7.21%	0.00%	0.00%	
Call drop rate	≤ 2%	0.00%	0.63%	66.67%	0.00%	1.19%	3.01%	0.00%	0.00%	0.00%	2.93%	0.00%	0.00%	0.00%	4.14%	0.00%	0.00%	0.00%	4.77%	0.00%	0.00%	
Hands off success rate		100.00%	98.60%	100.00%	100.00%	100.00%	93.13%	100.00%	99.89%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

**Voice Quality**

Aircel at 87.68% , BSNL at 93.78%, Reliance CDMA at 93.35%, Reliance GSM at 90.74%, TATA CDMA at 92.02% TATA GSM at 90.70% and Uninor at 89.86% failed to meet the TRAI benchmark for voice quality in outdoor areas.

**Call Set Success Rate (CSSR)**

Reliance CDMA at 94.72%, TATA CDMA at 94.55% and Uninor at 91.68% failed to meet the benchmark in outdoor areas.

**Call Drop Rate**

Airtel at 66.67% in indoor; BSNL at 3.01%, Reliance CDMA at 2.93%, TATA CDMA at 4.14% and Uninor at 4.77% failed to meet the call drop rate benchmark in outdoor areas.

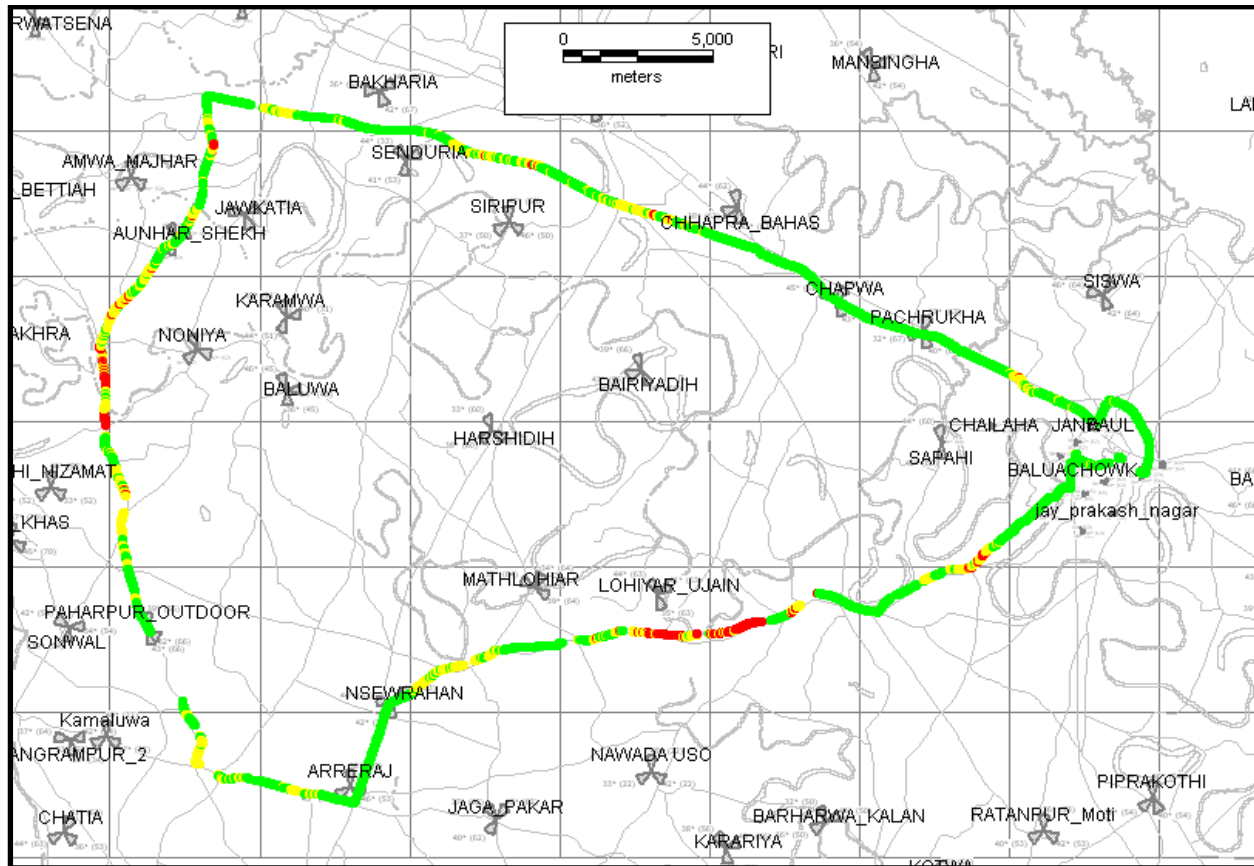
6.1.3 JUNE – PATNA

6.1.3.1 ROUTE DETAILS – PATNA SSA

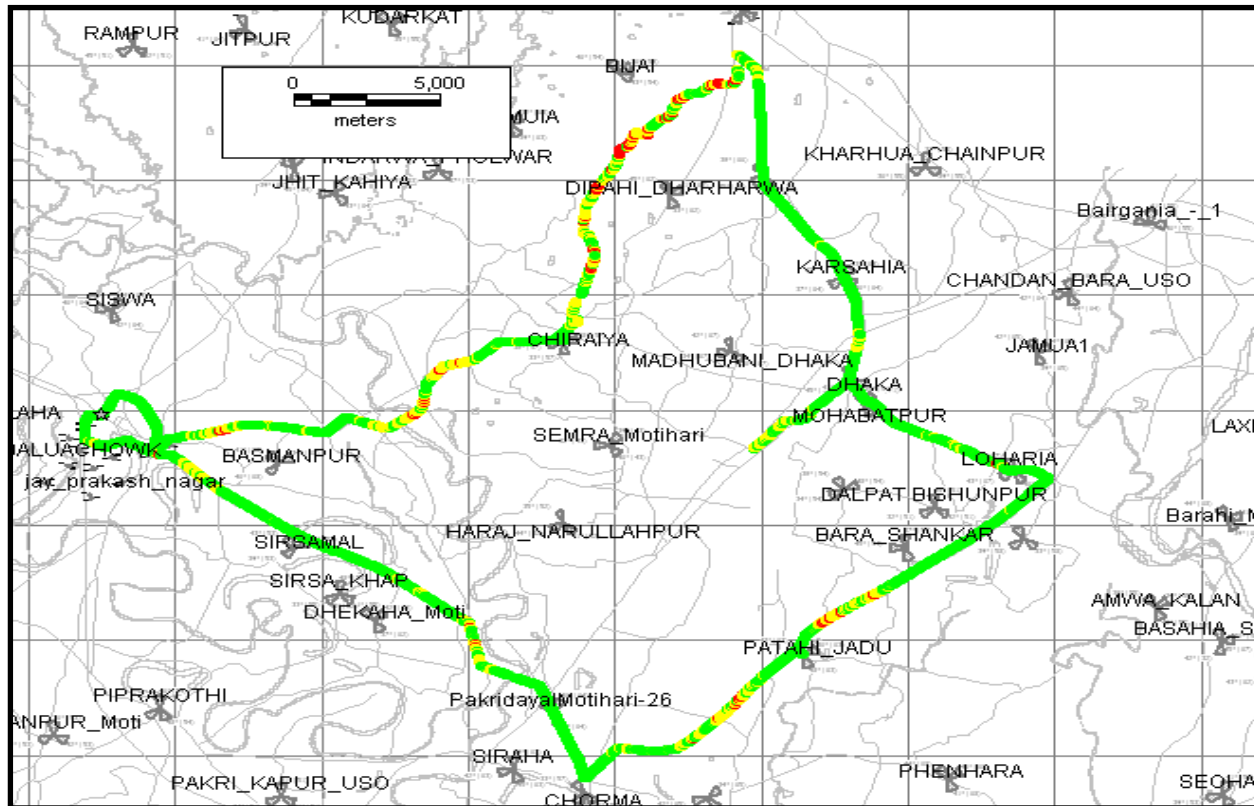
		June		
		Patna		
	Type of location	Day 1	Day 2	Day 3
Outdoor	Major Roads	Masaurhi to Siprapul via punpun	Fatua to harnaut via daniyama	Bikram to AIMS via Khagaul
	Highways	Zero mile to Masaurhi	Zero mile to harnaut via Baktiyarpur	Cant to pali via Maner , Bihta
	Within the City	Bus-stand to Zero mile via Jakkanpura	Bus Stand to zero mile via karbigahiya	Patna Junction to danapur Cant via Khurji, AIMS to Gandhi maidan via Karbigahiya,
Indoor	Office complex	Maurya Complex	IMRB Office	
	Shopping complex			



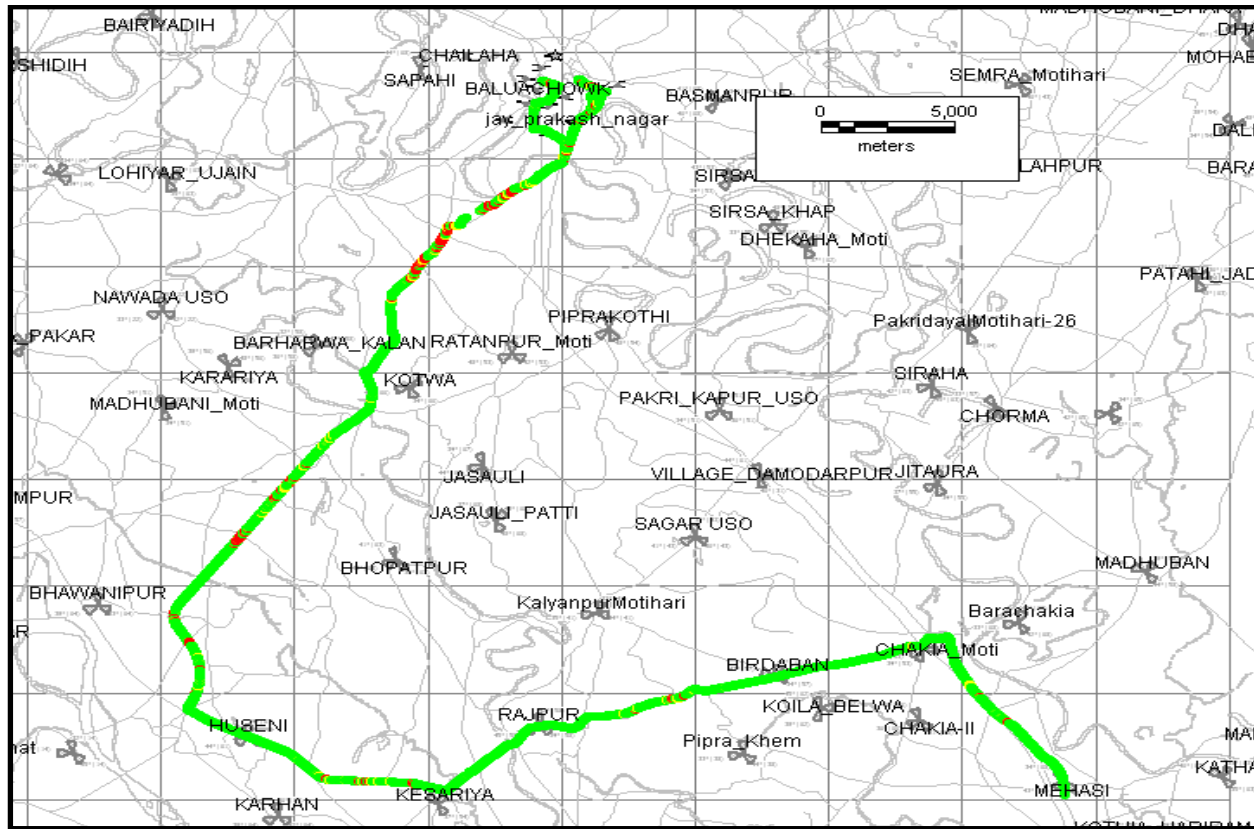
6.1.3.2 ROUTE MAP PATNA DAY 1



6.1.3.3 ROUTE MAP PATNA DAY 2



6.1.3.4 ROUTE MAP PATNA DAY 3



6.1.3.5 DRIVE TEST RESULTS – PATNA SSA

Name of SSA	Patna	Month	June	Consolidated																	
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Uninor		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
>= -75dBm		89.39%	45.91%	97.14%	78.07%	99.25%	43.93%	69.58%	73.02%	100.00%	18.64%	71.90%	41.69%	0.00%	25.83%	80.92%	63.35%	97.22%	41.30%	96.27%	88.19%
>= -85dBm		99.95%	80.18%	100.00%	96.99%	100.00%	79.14%	99.46%	98.21%	100.00%	51.90%	99.37%	78.09%	9.80%	52.95%	97.58%	86.13%	100.00%	77.58%	99.95%	97.54%
>= -95dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	97.46%	91.53%	97.95%	96.21%	100.00%	95.90%	97.39%	95.20%	99.76%	94.63%	98.76%	90.22%	100.00%	92.02%	97.91%	90.70%	99.25%	86.09%	98.49%	97.35%
CSSR	≥ 95%	100.00%	99.06%	100.00%	100.00%	100.00%	97.93%	100.00%	100.00%	100.00%	99.49%	100.00%	93.98%	100.00%	94.55%	100.00%	100.00%	100.00%	97.16%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	50.00%	0.00%	0.00%	2.07%	0.00%	0.00%	0.00%	0.00%	0.00%	6.02%	0.00%	0.00%	0.00%	0.00%	0.00%	2.28%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	4.46%	0.00%	0.00%	0.00%	2.55%	0.00%	2.00%	0.00%	4.14%	0.00%	0.00%	0.00%	0.56%	0.00%	0.00%
Handsoff success rate		NA	100.00%	100.00%	100.00%	NA	83.92%	100.00%	99.25%	100.00%	100.00%	100.00%	98.10%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%

Voice Quality

Aircel at 91.53%, Reliance CDMA at 94.63%, Reliance GSM at 90.22%, TATA CDMA at 92.02% TATA GSM at 90.70% and Uninor at 86.09% failed to meet the benchmark in outdoor areas. All operators met the benchmark at indoor locations.

Call Set Success Rate (CSSR)

Reliance GSM at 93.98% and TATA CDMA at 94.55% failed to meet the benchmark in outdoor areas.

Call Drop Rate

BSNL at 4.46%, Reliance CDMA at 2.55% and TATA CDMA 4.14% did not meet the benchmark in outdoor locations.

## 6.2 INDEPENDENT DRIVE TEST

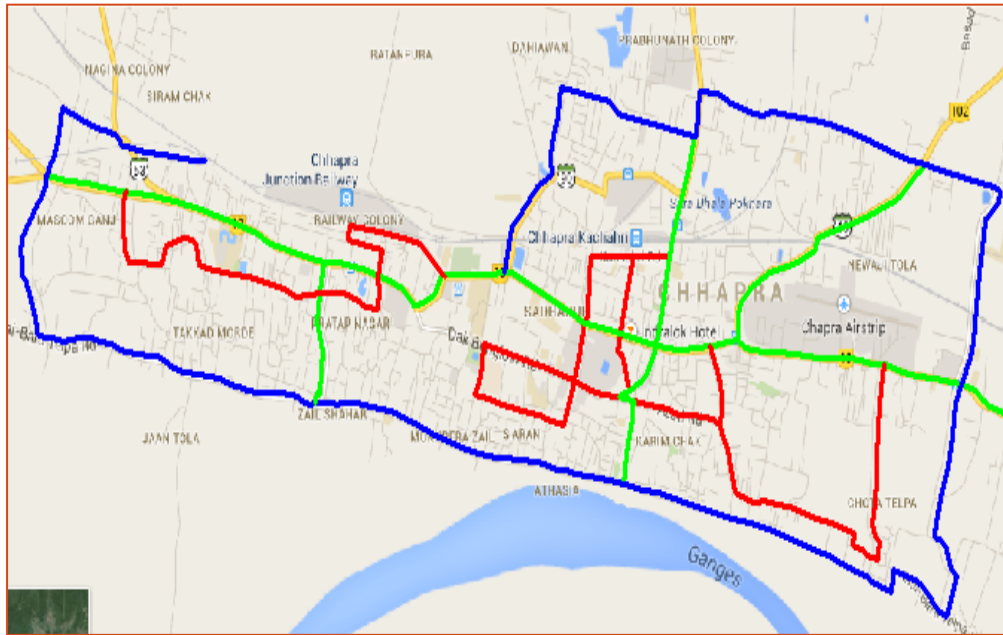
The independent drive test was conducted for all the operators present in the Bihar & Jharkhand circle. As per the new directive given by TRAI headquarters, drive test were conducted at a SSA level. A minimum of 100 kilometers were traversed in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI advisors. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength  $> -75$  dbm for indoor,  $-85$  dbm for in-vehicle and  $> -95$  dbm outdoor routes.

### 6.2.1 CHAPRA

Name of the City	Chapra
Date of Drive Test	26th & 27th May' 14
Name of the circle	Bihar/Jharkhand

### Independent Drive Test Route Details – Chapra SSA



Blue colour road represents Periphery of the city  
 Red colour road represents Congested Area  
 Green colour road represents Across the city

Chapra	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Jyoti Cinema, Maruti Suzuki Showroom, Chhapra Kacheri	Chhapra Civil court, Idralok Hotel, Chhapra Girls High School	Rajendra College, Real Estate Agent, Chhapra Electrical Sub-station, Maruti Suzuki Showroom	Post Office	Vagban Bajar

## Independent Drive Test Results – Chapra SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		Uninor		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		99.00%	26.80%	86.40%	39.43%	85.40%	41.53%	84.10%	48.57%	82.05%	47.73%	64.90%	27.37%	74.95%	19.00%	96.05%	41.83%	91.38%	35.48%	91.85%	33.06%
Signal Strength - 0 to -85 dBm		100.00%	76.13%	99.80%	86.57%	99.75%	87.50%	99.65%	85.10%	99.20%	83.23%	99.70%	68.57%	98.00%	68.93%	99.90%	77.50%	99.97%	54.46%	99.96%	57.43%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	99.95%	100.00%	100.00%	100.03%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	96.55%	80.74%	64.39%	83.96%	79.76%	77.00%	82.63%	88.66%	98.11%	93.00%	87.66%	86.24%	89.66%	82.08%	86.69%	78.48%	99.84%	96.38%	99.72%	95.80%
CSSR	≥ 95%	87.50%	90.55%	95.11%	98.70%	98.53%	98.38%	100.00%	99.52%	98.53%	98.38%	96.82%	91.07%	96.67%	85.16%	98.53%	93.06%	100.00%	98.46%	100.00%	84.35%
%age Blocked calls		12.50%	9.45%	4.89%	1.30%	1.47%	1.62%	0.00%	0.48%	1.47%	1.62%	3.18%	8.93%	3.33%	14.84%	1.47%	6.94%	0.00%	1.54%	0.00%	15.65%
Call drop rate	≤ 2%	0.00%	5.32%	0.00%	0.64%	0.00%	5.60%	0.00%	2.08%	0.00%	0.98%	0.00%	0.50%	0.00%	2.41%	0.00%	5.49%	0.00%	0.00%	0.00%	1.62%
Hands off success rate		100.00%	97.91%	100.00%	92.92%	100.00%	86.47%	99.48%	95.44%	100.00%	95.96%	100.00%	99.21%	99.44%	99.10%	88.46%	97.66%	100.00%	100.00%	100.00%	100.00%

### Voice Quality

Airtel, BSNL, Idea, Reliance GSM, TATA GSM and Uninor failed to meet the benchmark in indoor as well as outdoor areas. Aircel and Vodafone did not meet the voice quality benchmark in outdoor areas.

### Call Set Success Rate (CSSR)

Aircel failed to meet the benchmark in indoor as well as outdoor areas. Reliance GSM, TATA GSM, Uninor and TATA CDMA did not meet the voice quality benchmark in outdoor areas.

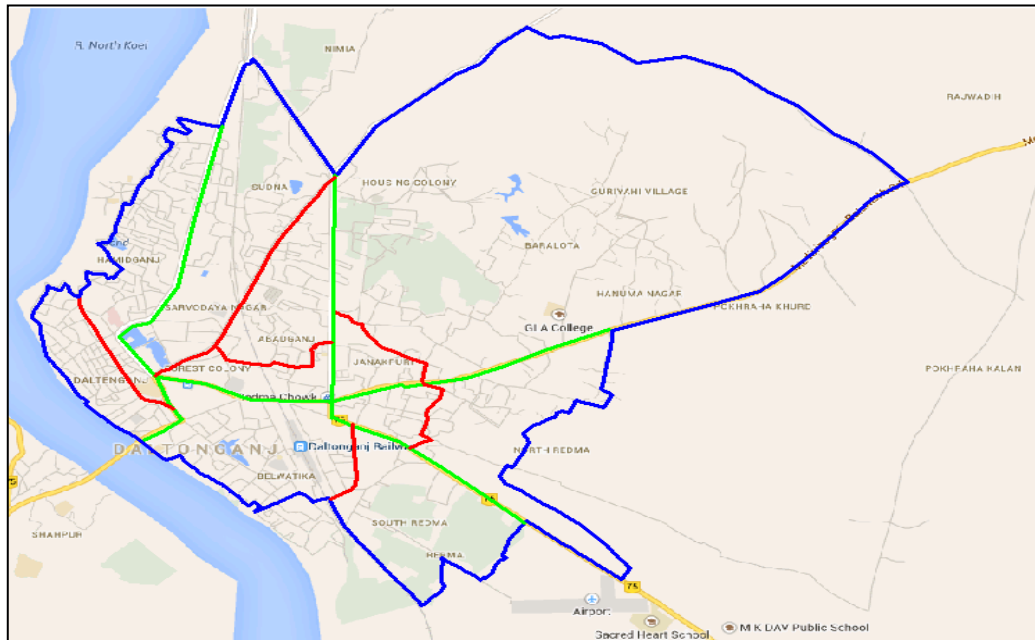
### Call Drop Rate

Aircel, BSNL, Idea, TATA GSM and Uninor did not meet the voice quality benchmark in outdoor areas.

6.2.2 DALTONGUNJ

Name of the City	Daltongunj
Date of Drive Test	6th June' 14
Name of the circle	Bihar/Jharkhand

Independent Drive Test Route Details – Daltongunj SSA



Blue colour road represents Periphery of the city  
 Red colour road represents Congested Area  
 Green colour road represents Across the city



Daltongunj	Outdoor Routes						Indoor Routes			
	Periphery of the City		Congested area		Across the City		Office Complex		Shopping Complex	
Route Details	Medininagar Balumath Rd-Bees Foota Pool-Saraswati Shishu Vidya Mandir		Gayatri Mandir-Mohan Theatre-TVS Showroom		Sardar Hospital-NCIT Education-Shri Ram Janki Mandir-Brightland School		Pranchal Gramya Bank		Bhagwan Bazar	

### Independent Drive Test Results – Daltongunj SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		Uninor		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		20.75%	25.37%	25.25%	39.57%	11.35%	43.17%	72.65%	74.57%	50.85%	47.13%	79.10%	55.40%	80.70%	37.07%	46.80%	42.97%	52.25%	57.27%	91.40%	33.70%
Signal Strength - 0 to -85 dBm		91.35%	69.80%	92.05%	88.07%	19.75%	83.60%	98.85%	94.00%	98.10%	92.53%	99.90%	89.23%	99.20%	79.23%	93.15%	88.47%	95.05%	88.03%	99.13%	48.83%
Signal Strength - 0 to -95 dBm		100.00%	100.03%	100.05%	100.00%	99.95%	100.00%	100.00%	99.97%	100.00%	100.00%	100.00%	99.93%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	99.97%
Voice quality	≥ 95%	99.68%	91.78%	97.97%	94.43%	99.11%	87.95%	99.09%	96.61%	98.85%	91.54%	92.20%	87.20%	99.43%	91.66%	83.38%	90.26%	99.20%	97.30%	99.96%	87.17%
CSSR	≥ 95%	95.05%	85.85%	100.00%	98.15%	100.00%	96.11%	100.00%	100.00%	100.00%	99.33%	100.00%	93.76%	100.00%	98.80%	88.71%	97.78%	95.31%	96.38%	98.39%	97.86%
%age Blocked calls		4.95%	14.15%	0.00%	1.85%	0.00%	3.89%	0.00%	0.00%	0.00%	0.67%	0.00%	6.24%	0.00%	1.20%	11.29%	2.22%	4.69%	3.62%	1.61%	2.14%
Call drop rate	≤ 2%	0.00%	1.55%	0.00%	0.00%	0.00%	1.37%	0.00%	0.00%	0.00%	0.68%	0.00%	1.38%	0.00%	1.19%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	89.18%	100.00%	97.09%	100.00%	100.00%	100.00%	98.64%	100.00%	98.69%	100.00%	96.23%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

### Voice Quality

Reliance GSM and Uninor failed to meet the benchmark in indoor as well as outdoor areas. Aircel, Airtel, BSNL GSM, Vodafone, TATA GSM and TATA CDMA did not meet the voice quality benchmark in outdoor areas.

### Call Set Success Rate (CSSR)

Uninor failed to meet the benchmark in indoor locations while Aircel and Reliance GSM did not meet the benchmark in outdoor locations.

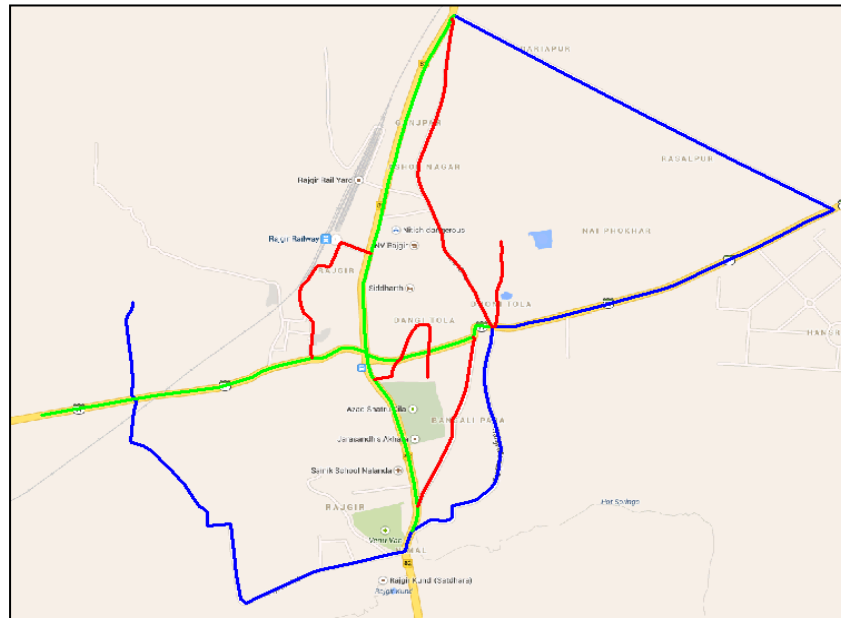
### Call Drop Rate

All operators met the TRAI benchmark.

6.2.3 RAJGIR

Name of the City	Rajgir
Date of Drive Test	2nd & 3rd June' 14
Name of the circle	Bihar/Jharkhand

Independent Drive Test Route Details – Rajgir SSA



Blue colour road represents Periphery of the city  
 Red colour road represents Congested Area  
 Green colour road represents Across the city

Rajgir	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Manish Fats food Resturant-Rajgir Khund-Venu Van	Azad Shatru Kila-Siddharth-Reliance tower Rajgir Railway station-Electricity Board ground	Bank Of Baroda-Sainik School Nalanda-Rajgiri Subdivision	Police Station Rajgiri	Bangali Para Bazar

### Independent Drive Test Results – Rajgir SSA

	B'mark	Airtel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		Uninor		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		86.60%	37.43%	23.35%	38.50%	89.80%	66.90%	37.15%	41.07%	91.45%	56.00%	58.25%	47.43%	89.95%	49.07%	6.30%	11.63%	62.25%	61.83%	72.25%	61.80%
Signal Strength - 0 to -85 dBm		99.85%	73.87%	92.05%	90.93%	98.80%	94.20%	94.80%	91.00%	99.50%	89.53%	97.20%	89.80%	99.85%	78.67%	70.40%	60.20%	98.78%	93.63%	94.10%	84.63%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%	99.63%	99.87%	99.85%	99.87%
Voice quality	≥ 95%	99.42%	96.15%	97.99%	97.28%	99.00%	98.08%	96.43%	94.86%	99.33%	96.17%	94.14%	94.22%	99.56%	97.27%	89.12%	85.58%	100.00%	99.88%	99.96%	96.60%
CSSR	≥ 95%	92.65%	95.22%	100.00%	100.00%	100.00%	99.44%	98.48%	100.00%	100.00%	98.72%	100.00%	99.45%	91.88%	90.54%	97.14%	97.84%	100.00%	100.00%	94.78%	95.31%
%age Blocked calls		7.35%	4.78%	0.00%	0.00%	0.00%	0.56%	1.52%	0.00%	0.00%	1.28%	0.00%	0.55%	8.12%	9.46%	2.86%	2.16%	0.00%	0.00%	5.22%	4.69%
Call drop rate	≤ 2%	0.00%	0.62%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	0.00%	0.00%	0.00%	3.84%
Hands off success rate		100.00%	99.24%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.89%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

### Voice Quality

Reliance GSM and Vodafone failed to meet the benchmark in indoor as well as outdoor areas, Idea did not meet the voice quality benchmark in outdoor areas.

### Call Set Success Rate (CSSR)

TATA GSM failed to meet the benchmark in indoor as well as outdoor areas; TATA CDMA did not meet the voice quality benchmark in indoor areas.

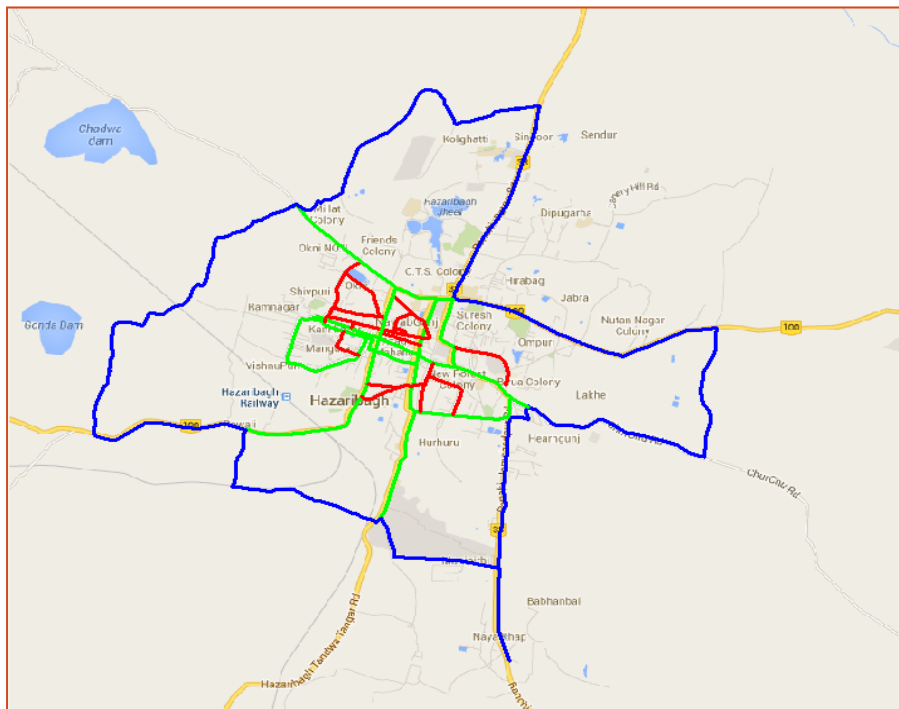
### Call Drop Rate

All operators met the TRAI benchmark.

6.2.4 HAZARIBAGH

Name of the City	Hazaribagh
Date of Drive Test	4th & 5th June' 14
Name of the circle	Bihar/Jharkhand

Independent Drive Test Route Details – Hazaribagh SSA



Blue colour road represents Periphery of the city  
 Red colour road represents Congested Area  
 Green colour road represents Across the city

Hazaribagh	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Aashraya - Ranchi jameshpur road - Goswani park - Pelawal road - Pelawal Road	Hazaribagh Town hall - Malvia Marg - Police training college - Losingna Road	Jaiprabha Nagar - Matwari - Pugmil - Kani Bazar - Jagdish Colony - New Forest Colony	BSNL Ex-change	New Bus Stand Market

### Independent Drive Test Results – Hazaribagh SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		Uninor		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		17.65%	6.50%	39.35%	29.37%	83.75%	26.40%	96.40%	71.70%	42.65%	47.23%	90.85%	51.17%	50.60%	43.23%	27.95%	20.53%	81.02%	59.32%	34.26%	48.32%
Signal Strength - 0 to -85 dBm		91.55%	39.80%	65.10%	78.07%	99.50%	67.50%	99.90%	96.03%	75.15%	90.07%	99.75%	85.67%	93.15%	82.27%	92.80%	65.33%	98.91%	91.55%	94.78%	83.29%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	99.93%	99.95%	100.00%	100.00%	100.00%	99.90%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	99.99%	100.00%
Voice quality	≥ 95%	96.24%	84.19%	95.14%	88.42%	99.55%	88.80%	92.71%	93.35%	87.61%	94.48%	93.89%	87.96%	91.66%	87.55%	95.74%	81.30%	82.97%	88.52%	81.90%	83.88%
CSSR	≥ 95%	95.45%	90.89%	96.88%	98.51%	93.75%	90.89%	96.88%	100.00%	100.00%	99.35%	100.00%	96.76%	73.49%	96.18%	91.88%	92.87%	95.35%	96.34%	100.00%	98.93%
%age Blocked calls		4.55%	9.11%	3.13%	1.49%	6.25%	9.11%	3.13%	0.00%	0.00%	0.65%	0.00%	3.24%	26.51%	3.82%	8.12%	7.13%	4.65%	3.66%	0.00%	1.07%
Call drop rate	≤ 2%	0.00%	1.23%	1.67%	0.52%	0.00%	2.27%	0.00%	0.60%	1.61%	3.15%	0.00%	1.61%	0.00%	3.89%	0.00%	3.74%	1.72%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	99.56%	97.75%	92.28%	100.00%	75.73%	100.00%	96.97%	100.00%	97.31%	100.00%	96.85%	94.12%	98.34%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

### Voice Quality

Idea, Vodafone, Reliance GSM, TATA GSM, Reliance CDMA and TATA CDMA failed to meet the benchmark in indoor as well as outdoor areas. Aircel, Airtel, BSNL and Uninor did not meet the voice quality benchmark in outdoor areas.

### Call Set Success Rate (CSSR)

BSNL and Uninor failed to meet the benchmark in indoor as well as outdoor areas; TATA GSM in indoor while Aircel in outdoor areas failed to meet the benchmark.

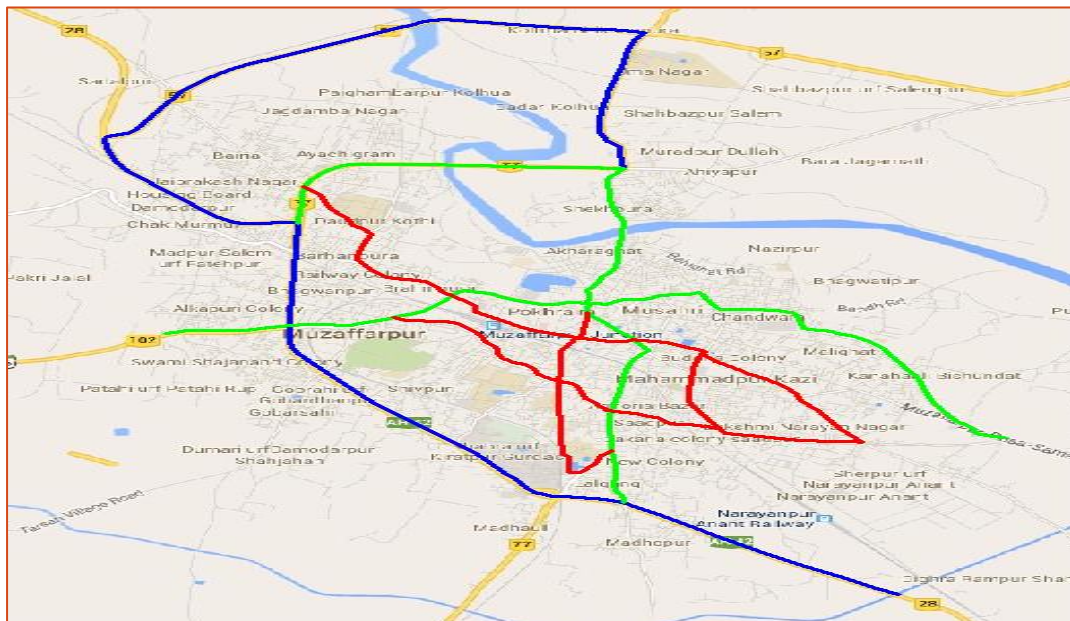
### Call Drop Rate

BSNL, Vodafone, TATA GSM and Uninor did not meet the voice quality benchmark in outdoor areas.

6.2.5 MUZAFFARPUR

Name of the City	Muzaffarpur
Date of Drive Test	29th & 30th May' 14
Name of the circle	Bihar/Jharkhand

Independent Drive Test Route Details – Muzaffarpur SSA



Blue colour road represents Periphery of the city  
 Red colour road represents Congested Area  
 Green colour road represents Across the city

Muzaffarpur	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Damodar Vegetable market, Sanjay Cinema Hall, L.S College ground, National thermal power corp., Holy mission school	Kalm Bagh Chhak, Institute of technical education, Mahant darshan Mahila College	Krishna cinema, Punjab National Bank, Banaras bank chhak, Muzaffarpur central jail	District Municipality	Muzaffarpur Market

### Independent Drive Test Results – Muzaffarpur SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		Uninor		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		8.00%	38.70%	58.80%	57.57%	78.50%	43.03%	58.40%	49.80%	51.00%	51.23%	68.30%	46.57%	51.00%	38.40%	77.35%	25.70%	49.76%	32.61%	84.20%	33.85%
Signal Strength - 0 to -85 dBm		89.45%	84.23%	96.70%	91.27%	98.95%	76.70%	92.10%	93.13%	97.45%	92.10%	97.15%	91.97%	94.15%	84.90%	99.65%	81.70%	85.13%	67.59%	99.59%	69.99%
Signal Strength - 0 to -95 dBm		99.95%	99.93%	100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	100.00%	99.97%	99.99%	99.99%	99.97%	99.98%
Voice quality	≥ 95%	70.64%	92.51%	73.13%	86.18%	92.96%	85.67%	82.92%	84.89%	97.78%	95.19%	90.94%	91.42%	82.81%	91.92%	86.84%	74.78%	99.79%	97.27%	97.00%	87.68%
CSSR	≥ 95%	98.48%	95.13%	100.00%	97.22%	93.60%	95.45%	100.00%	99.10%	98.48%	98.83%	100.00%	98.72%	95.05%	97.38%	100.00%	96.83%	100.00%	100.00%	95.05%	90.42%
%age Blocked calls		1.52%	4.87%	0.00%	2.78%	6.40%	4.55%	0.00%	0.90%	1.52%	1.17%	0.00%	1.28%	4.95%	2.62%	0.00%	3.17%	0.00%	0.00%	4.95%	9.58%
Call drop rate	≤ 2%	0.00%	1.13%	1.61%	1.76%	0.00%	1.54%	0.00%	0.58%	0.00%	0.00%	0.00%	1.00%	0.00%	1.73%	0.00%	6.51%	1.61%	0.53%	0.00%	4.11%
Hands off success rate		98.75%	100.00%	100.00%	96.55%	59.09%	92.21%	100.00%	99.38%	100.00%	99.60%	100.00%	99.31%	98.37%	99.13%	92.11%	91.91%	100.00%	100.00%	100.00%	100.00%

### Voice Quality

Aircel, Airtel, BSNL, Idea, Reliance GSM, TATA GSM and Uninor failed to meet the benchmark in indoor as well as outdoor areas. TATA CDMA GSM did not meet the voice quality benchmark in outdoor areas.

### Call Set Success Rate (CSSR)

BSNL did not meet the voice quality benchmark in indoor areas. TATA CDMA did not meet the voice quality benchmark in outdoor areas.

### Call Drop Rate

The call drop rate was below the TRAI benchmark in outdoor locations for Uninor and TATA CDMA.

## 7 CRITICAL FINDINGS

### PMR Consolidated (Network Parameters)

Aircel & BSNL are the key concern operators as these failed to meet the benchmark for majority network parameters.

### 3 Day Live Measurement (Network Parameters)

Aircel & BSNL are the key concern operators as these failed to meet the benchmark for majority network parameters.

### Live Calling

None of the operators met the benchmark for complaints resolved within 4 weeks. Also, for level 1 calls being answered within 60 seconds, most of the operators did not meet the benchmark.

### PMR (Customer Service Parameters)

TATA CDMA at 98.56% and TATA GSM at 99.67% failed to meet the benchmark for complaints resolved within 4 weeks.

Aircel and BSNL failed to meet the benchmark of IVR calls respectively were being attended within 60 seconds. Airtel, Reliance CDMA, Reliance GSM and Vodafone did not meet the TRAI benchmark of calls answered by the operators (Voice to Voice) within 60 seconds.

### Inter-Operator Call Assessment

Most of the operators faced issues while connecting to other operators. Idea, Reliance GSM and Vodafone were able to connect to other operators successfully. While receiving the calls from other operators, Reliance GSM and Vodafone the best performers.

### Drive Test (Operator Assisted)

Aircel, BSNL, Reliance CDMA and Uninor failed to meet the benchmark for all key parameters such as Voice Quality, CSSR and Call Drop Rate in Jamshedpur SSA.

Reliance CDMA, Tata CDMA and Uninor failed to meet the benchmark for all key parameters in Motihari SSA.

Tata CDMA failed to meet the benchmark for all key parameters in Patna SSA.

### Drive Test (Independent)

During all the drive tests, it was observed that Voice Quality has remained below benchmark for most of the operators in all SSAs.



## 8 ANNEXURE

### 8.1 NETWORK AVAILABILITY

Audit Results for Network Availability											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2753	8852	1892	6777	1692	3635	612	952	2524	7569
Sum of downtime of BTSs in a month (in hours)		100512	6183	66768	33547	5120	2216	734	16	8653	25821
BTSs accumulated downtime (not available for service)	≤ 2%	4.90%	0.09%	4.34%	0.67%	0.41%	0.08%	0.16%	0.00%	0.46%	0.46%
Number of BTSs having accumulated downtime >24 hours		791	27	582	123	19	8	0	0	46	136
Worst affected BTSs due to downtime	≤ 2%	28.72%	0.31%	26.61%	1.82%	1.13%	0.21%	0.00%	0.00%	1.83%	1.79%
Live Measurement- BTSs accumulated downtime											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2753	8852	1892	6755	1692	3635	612	952	2598	7569
Sum of downtime of BTSs in a month (in hours)		11153	1316	4076	4276	490	212	63	0	873	3701
(not available for service)	≤ 2%	5.62%	0.21%	2.85%	0.88%	0.41%	0.08%	0.15%	0.00%	0.46%	0.68%
Number of BTSs having accumulated downtime >24 hours		0	0	101	12	0	0	0	0	1	0
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	4.85%	0.17%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%

## 8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	94.65%	97.90%	76.43%	98.40%	97.61%	96.41%	97.28%	99.33%	97.54%	99.55%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.11%	0.73%	11.41%	0.83%	0.00%	0.46%	0.00%	0.20%	0.84%	0.13%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	4.86%	0.44%	4.90%	1.58%	0.03%	0.41%	0.92%	0.15%	1.59%	0.45%

Live measurement results for CSSR, SDCCH and TCH congestion											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	95.32%	97.95%	76.25%	98.82%	98.04%	96.66%	98.60%	99.32%	97.76%	99.57%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.90%	0.41%	12.03%	0.79%	0.00%	0.44%	0.00%	0.20%	0.89%	0.13%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	4.19%	0.11%	4.70%	1.05%	0.02%	0.39%	0.34%	0.04%	1.42%	0.43%

Drive test results for CSSR (Average of three drive tests) and blocked calls											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		441	639	560	564	625	604	547	516	417	599
Total number of successful calls established		398	639	512	564	602	588	525	509	393	599
CSSR	≥ 95%	88.68%	100.00%	91.09%	99.94%	96.47%	97.28%	96.08%	98.39%	94.23%	100.00%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
%age blocked calls		11.32%	0.00%	8.91%	0.06%	3.53%	2.72%	3.92%	1.61%	5.77%	0.00%

### 8.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		157498018	863409859	1152615783	239134942	69846152	162104066	29504533	29366076	213717437	246946009
Total number of calls dropped		2068647	4899741	30788918	2162645	247116	843137	252767	132200	1174319	1809747
Call drop rate	≤ 2%	1.31%	0.57%	24.00%	0.91%	0.36%	0.52%	0.86%	0.45%	0.55%	0.73%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8254	26599	5658	20398	5076	10906	1938	12189913	7583	22728
Total number of cells having more than 3% TCH		588	831	459	567	61	10	74	54237	115	349
Worst affected cells having more than 3% TCH	≤ 3%	7.12%	3.12%	7.60%	2.78%	1.24%	0.09%	3.84%	0.82%	1.51%	1.53%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		4957317	1438953522	5571622	22600403	6387615	16145055	77012564	35595045	20859383	23909588
Total number of calls dropped		70434	8405373	854760	201488	19365	83908	234016	151808	114071	193000
Call drop rate	≤ 2%	1.42%	0.57%	24.00%	0.90%	0.30%	0.52%	0.30%	0.42%	0.55%	0.81%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		44143	79708	5658	20332	5076	10940	1938	2864	7585	22728
Total number of cells having more than 3% TCH		4479	2558	656	561	0	0	74	53	117	608
Worst affected cells having more than 3% TCH	≤ 3%	9.57%	3.21%	10.60%	2.76%	0.00%	0.00%	3.84%	1.85%	1.55%	2.68%

Drive test results for Call drop rate (Average of three drive tests)											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		418	639	529	564	602	588	525	508	409	599
Total number of calls dropped		5	0	18	0	20	11	16	4	9	0
Call drop rate	≤ 2%	1.37%	0.00%	3.32%	0.00%	3.32%	1.77%	2.88%	1.07%	2.14%	0.00%

## 8.4 VOICE QUALITY

Audit Results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		19557102933	127572818367	15713	39687330065	NA	7488527238	111915765504	4888670572	30484075668	43354230612
Total number of calls with good voice quality		18594369991	124598760487	14718	38600424367	NA	7333763213	109922648618	4772712674	28588062763	42452309140
%age calls with good voice quality	≥ 95%	95.08%	97.70%	95.50%	97.26%	99.81%	97.93%	98.23%	97.63%	93.78%	97.92%
Live measurement results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		627165512	11856693337	3197	3779456937	NA	797480061	83968505439	5730892200	3020821937	4070149246
Total number of calls with good voice quality		595004704	11519960931	2998	3668520861	NA	780745487	82428387304	5603779812	2834665160	3983718347
%age calls with good voice quality	≥ 95%	94.86%	97.17%	95.68%	97.08%	99.81%	97.90%	65.57%	97.78%	93.84%	97.89%
Drive test results for Voice quality (Average of three drive tests)											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		683554	1104614	302291	972817	NA	174003	NA	375435	728283	1002404
Total number of calls with good voice quality		629723	1065025	279727	930268	NA	159030	NA	350948	667787	978854
%age calls with good voice quality	≥ 95%	92.19%	96.45%	94.12%	95.62%	95.86%	91.42%	94.83%	92.31%	92.09%	97.72%

Note: - On the aspect of Voice quality, Reliance CDMA only shared the overall value. Current equipment used by Reliance does not have capability to fetch these parameters. A supporting document has been added to the annexure.

## 8.5 POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		50.33	769.00	215.67	76.67	94.00	98.67	208.67	19.00	60.33	57.00
No. of POIs not meeting benchmark		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capacity of all POIs (A) - In erlangs		93948.00	608373.28	5179.33	216264.74	39724.10	61911.31	8227.00	35086.08	60009.50	229110.07
Traffic served for all POIs (B)- In erlangs		63370.94	1588979.23	1609220.33	126611.17	10618.97	14356.75	25777.00	18169.38	47840.40	127451.26
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%
Live Measurement Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		50.33	769.00	215.00	76.67	94.00	98.67	208.67	19.00	59.67	57.00
No. of POIs not meeting benchmark		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capacity of all POIs (A) - In erlangs		93935.67	1023374.31	5179.33	216458.67	28186.55	61737.26	75423.00	35086.08	24323.09	230491.18
Traffic served for all POIs (B)- In erlangs		64921.87	662658.10	160057.67	131031.00	7530.42	14687.37	25480.67	18223.90	47711.77	125909.09
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%	0.00%	0.00%

## 8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

April										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls	565596	994453	848251	928727	NA	120804	NA	759159	722780	837852
May										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls	788351	1100421	52976	1038011	NA	161472	NA	183573	625158	1125512
June										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls	696716	1218967	5645	951713	NA	239733	NA	183573	836911	1043849

Note: - IMRB International, ensures minimum of 100 km is travelled on each day.

## 8.7 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts to customer care for assistance		30732917.00	8483963.00	3272.00	869030.00	8537438.00	16593148.00	120313.00	548663.00	30021140.00	22869370.00
Number of calls getting connected and answered (electronically)		21332895.00	8483840.00	2643.00	828102.00	8431952.00	16330810.00	117605.00	526539.00	29043717.00	22869370.00
Percentage calls getting connected and answered	≥ 95%	69.41%	100.00%	80.78%	95.29%	98.76%	98.42%	97.75%	95.97%	96.74%	100.00%
Number of calls getting transferred to the operator (voice to voice)		5380650.00			3031755.00	566760.00	4501590.00	127494.00	630296.00	5460321.00	6922844.00
Number of calls answered by operator (voice to voice) within 60 seconds		4884096.00			2789501.00	194109.00	3267794.00			5255533.00	6223560.00
Percentage calls answered within 60 seconds (V2V)	≥ 90%	90.77%	86.00%	96.00%	96.71%	34.25%	72.59%	96.00%	94.00%	96.25%	89.90%

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts to customer care for assistance		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Number of calls getting connected and answered (electronically)		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%



Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total Number of calls received		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total Number of calls getting connected and answered		96.00	100.00	100.00	100.00	98.00	95.00	98.00	100.00	67.00	100.00
Percentage calls getting connected and answered	≥ 95%	96.00%	100.00%	100.00%	100.00%	98.00%	95.00%	98.00%	100.00%	67.00%	100.00%

Audit results for termination / closure of service											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of closure request		4.00	1098.00		99.00	331.00	763.00	374.00	273.00	NA	1289.00
Number of requests attended within 7 days		4.00	1098.00		99.00	331.00	763.00	374.00	273.00	NA	1289.00
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Note: Uninor does not offer postpaid services.

Audit results for refund of deposits											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cases requiring refund of deposits		12.00	73.00		29.00	644.00	532.00	148.00	137.00	NA	312.00
Total number of cases where refund was made within 60 days		4.00	73.00		26.00	644.00	532.00	148.00	137.00	NA	312.00
Percentage cases in which refund was receive within 60 days	100.00%	33.33%	100.00%	100.00%	89.66%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Note: - Uninor does not offer postpaid services.

## 8.8 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang											
Traffic in Erlang		Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Equipped capacity of the network		156489.00	728477.47	122600.00	203995.43	146000.00	235000.00	94915.00	49223.20	128545.14	226590.00
Total traffic handled in erlang during TCBH		121503.00	584259.21	15087.00	186932.14	81911.00	125902.53	22503.00	23660.50	181271.46	203303.00

Total number of customers as per VLR											
		Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total no. of customers served (as per VLR)		3681792.00	21607833.00	643225.00	7052441.00	2486443.00	6595151.00	425488.00	911313.00	4265261.00	7073494.00

Live calling results for resolution of service requests											
Resolution of service requests	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total Number of calls made		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Number of cases resolved to satisfaction		91.00	60.00	80.00	77.00	72.00	75.00	52.00		52.00	80.00
Percentage cases resolved in four weeks		91.00%	60.00%	80.00%	77.00%	72.00%	75.00%	52.00%	0.00%	52.00%	80.00%

### 8.9 COMPARISON OF IMRB & OPERATOR PMR REPORTS – NETWORK RELATED PARAMETERS

Name of Service Area	Name of Service Provider	Network Related Parameters																	
		Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
		BTSs Accumulated downtime (not available for service) (%age)	BTSs Accumulated downtime (not available for service) (%age)	Worst affected BTSs due to downtime (%age)	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	Connection with good voice quality	Connection with good voice quality	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
Bihar	Aircel	5.02	4.90	28.72	28.72	94.65	94.65	1.11	1.11	4.87	4.86	1.31	1.31	7.12	7.12	95.08	95.08	0	0.00
	Airtel	0.10	0.09	0.31	0.31	97.90	97.90	0.73	0.73	0.44	0.44	0.57	0.57	2.55	3.12	97.70	97.70	0	0.00
	BSNL	6.62	4.34	13.67	26.61	97.17	76.43	0.62	11.41	1.03	4.90	2.75	24.00	8.42	7.60	96.20	95.50	0	0.00
	Idea	0.69	0.67	1.81	1.82	98.40	98.40	0.83	0.83	1.58	1.58	0.90	0.91	2.78	2.78	97.26	97.26	0	0.00
	RCOM CDMA	0.43	0.41	1.15	1.13	97.61	97.61	0.00	0.00	0.03	0.03	0.35	0.36	1.23	1.24	99.77	99.81	0	0.00
	RTL	0.08	0.08	0.21	0.21	96.41	96.41	0.19	0.46	0.11	0.41	0.52	0.52	0.09	0.09	97.93	97.93	0	0.00
	TATA CDMA	0.17	0.16	0.00	0.00	97.28	97.28	0.00	0.00	0.92	0.92	0.86	0.86	2.05	3.84	98.22	98.23	0	0.00
	TATA GSM	0.00	0.00	0.00	0.00	99.05	99.33	0.19	0.20	0.14	0.15	0.45	0.45	0.34	0.82	97.63	97.63	0	0.00
	Telewings	0.47	0.46	1.84	1.83	97.54	97.54	0.84	0.84	1.59	1.59	0.55	0.55	1.51	1.51	93.78	93.78	0	0.00
Vodafone	0.46	0.46	1.79	1.79	99.55	99.55	0.13	0.13	0.45	0.45	0.73	0.73	2.57	1.53	97.92	97.92	0	0.00	

Value calculated by Operator and IMRB match		Value calculated by Operator and IMRB do not match	
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**8.10 COMPARISON OF IMRB & OPERATOR PMR REPORTS – CUSTOMER SERVICE QUALITY PARAMETERS**

Name of Service Area	Name of Service Provider	Customer Service Quality Parameters							
		Response time to the customer for assistance				Termination / closure of service			
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
		Accessibility of call centre/ customer care	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds	%age requests for Termination / Closure of service	%age requests for Termination / Closure of service	Time taken for refund of deposits after closures	Time taken for refund of deposits after closures
		≥ 95%	≥ 95%	≥ 90%	≥ 90%	100% within 7 days	100% within 7 days	100% within 60 days	100% within 60 days
Bihar	Aircel	69.41	69.41	90.77	90.77	100.00	100.00	33.33	33.33
	Airtel	100.00	100.00	86.00	86.00	100.00	100.00	100.00	100.00
	BSNL	90.50	80.78	96.15	96.00	100.00	100.00	100.00	100.00
	Idea	97.87	95.29	96.61	96.71	100.00	100.00	100.00	89.66
	RCOM CDMA	98.76	98.76	34.25	34.25	100.00	100.00	100.00	100.00
	RTL	98.42	98.42	72.59	72.59	100.00	100.00	100.00	100.00
	TATA CDMA	97.75	97.75	95.96	96.00	100.00	100.00	100.00	100.00
	TATA GSM	95.97	95.97	93.52	94.00	100.00	100.00	100.00	100.00
	Telewings	96.81	96.74	95.90	96.25	NA	NA	NA	NA
Vodafone	100.00	100.00	89.90	89.90	100.00	100.00	100.00	100.00	

Value calculated by Operator and IMRB match		Value calculated by Operator and IMRB do not match	
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## 8.11 RELIANCE CDMA VOICE QUALITY DATA NOT PRESENT - MAIL

PMR and 3 day live data

- Why we have only percentage values for Voice Quality for Reliance CDMA and TATA CDMA? How to calculate the percentage without numerator and denominator:- [As discussed with operator, this value is an average value so no numerator and denominator.](#)

**9 ANNEXURE – APRIL**

**1. Network Availability**

**Audit Results for Network Availability- PMR data**

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2744	8825	2199	6734	1769	3779	690	949	2516	7486
Sum of downtime of BTSs in a month (in hours)		90132	6052	82357	26812	3910	2152	809	39	7565	17929
BTSs accumulated downtime (not available for service)	≤ 2%	4.41%	0.09%	5.03%	0.54%	0.30%	0.08%	0.16%	0.01%	0.40%	0.32%
Number of BTSs having accumulated downtime >24 hours		666	23	811	117	11	8	0	0	46	112
Worst affected BTSs due to downtime	≤ 2%	24.27%	0.26%	36.88%	1.74%	0.62%	0.21%	0.00%	0.00%	1.83%	1.50%

**Live Measurement Results for Network Availability- 3 Day live data**

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed		2744	8825	2199	6682	1769	3779	690	949	2515	7486

service area											
Sum of downtime of BTSs in a month (in hours)		10401	1617	5458	2493	472	255	13	0	488	2130
BTSs accumulated downtime (not available for service)	≤ 2%	5.26%	0.25%	3.45%	0.52%	0.37%	0.09%	0.03%	0.00%	0.27%	0.40%
Number of BTSs having accumulated downtime >24 hours		0	0	122	5	0	0	0	0	2	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	5.55%	0.07%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%

## 2. Connection Establishment (Accessibility)

### Audit Results for CSSR, SDCCH and TCH congestion- PMR data

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	97.95%	98.24%	66.85%	98.11%	97.87%	96.52%	97.45%	99.15%	97.40%	99.60%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.78%	0.41%	17.58%	0.86%	0.00%	0.10%	0.00%	0.21%	0.83%	0.09%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion											

TCH congestion	≤ 2%	1.46%	0.14%	6.42%	1.86%	0.03%	0.10%	0.78%	0.14%	1.76%	0.40%
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**Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data**

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	97.74%	98.23%	67.17%	98.55%	98.35%	95.78%	99.65%	99.40%	97.85%	99.66%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.80%	0.41%	15.09%	0.61%	0.00%	0.08%	0.00%	0.11%	0.74%	0.05%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	1.63%	0.13%	6.23%	1.43%	0.02%	0.08%	0.35%	0.04%	1.36%	0.34%

**Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data**

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		375	546	598	530	675	639	400	429	378	504
Total number of successful calls established		254	546	532	529	635	616	389	406	353	504
CSSR	≥ 95%	67.73%	100.00%	88.96%	99.81%	94.07%	96.40%	97.25%	94.64%	93.39%	100.00%



Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
%age blocked calls		32.27%	0.00%	11.04%	0.19%	5.93%	3.60%	2.75%	5.36%	6.61%	0.00%

### 3. Connection Maintenance (Retainability)

#### Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		148505250	856258846	33857028	228913955	69876249	140432394	30290208	29929928	202478055	236440271
Total number of calls dropped		1852950	2609027	11849323	1891304	213718	729203	258570	120962	1093011	1540729
Call drop rate	≤ 2%	1.25%	0.30%	35.00%	0.83%	0.31%	0.52%	0.85%	0.40%	0.54%	0.65%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8227	26510	6599	20267	5307	11337	2193	2859	7563	22478
Total number of cells having more than 3% TCH		284	583	271	566	47	9	72	3	112	273
Worst affected cells having more than 3% TCH	≤ 3%	3.45%	2.20%	4.11%	2.79%	0.89%	0.08%	3.28%	0.10%	1.48%	1.21%

#### Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		5206861	2042711348	3546171	23345149	6455390	16979515	79805474	34793615	21524401	23986750
Total number of calls dropped		70703	7343877	1241091	174937	17511	84598	225753	132343	106560	148098
Call drop rate	≤ 2%	1.36%	0.36%	35.00%	0.75%	0.27%	0.50%	0.28%	0.38%	0.50%	0.62%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		NDR	79530	6599	20110	5307	11337	2193	2856	7555	22478
Total number of cells having more than 3% TCH		NDR	1745	879	563	0	0	72	3	99	499
Worst affected cells having more than 3% TCH	≤ 3%	NDR	2.19%	13.32%	2.80%	0.00%	0.00%	3.28%	0.11%	1.31%	2.22%

**Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data**

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		314	546	532	529	635	616	388	406	353	504
Total number of calls dropped		11	0	14	0	33	23	6	13	9	0
Call drop rate	≤ 2%	3.50%	0.00%	2.63%	0.00%	5.20%	3.73%	1.55%	3.20%	2.55%	0.00%

### 4. Voice quality

#### Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		19608637041	127458705500	40580	39062432728		6568947435	124834481233	4873421577	30410371994	42451327608
Total number of calls with good voice quality		18609373282	124767336749	37780	37926055906		6432124034	122569432218	4764394905	28542041146	41530966031
%age calls with good voice quality	≥ 95%	94.90%	97.89%	93.10%	97.09%	99.80%	97.92%	98.19%	97.76%	93.86%	97.83%

#### Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		652513064	12683247412	8116	3922487758		837477536	126480032008	5707734071	3126811103	4265162182
Total number of calls with good voice quality		619591217	12284340612	7556	3792470125		819716989	124196271349	5590880599	2935924494	4172889642
%age calls with good voice quality	≥ 95%	94.95%	96.85%	93.10%	96.69%	99.81%	97.88%	98.19%	97.95%	93.90%	97.84%

#### Drive test results for Voice quality (Average of three drive tests) - DT data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
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Total number of sample calls		565596	994453	848251	928727		120804		759159	722780	837852
Total number of calls with good voice quality		523820	966336	783811	888974		110943		718157	652009	825007
%age calls with good voice quality	≥ 95%	92.61%	97.17%	92.40%	95.72%	97.00 %	91.84%	96.47%	94.60%	90.21%	98.47%

### 5. POI Congestion

#### Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		51	770	317	76	95	99	210	19	60	57
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		93424.00	589803.22	0.00	210684.23	39116.36	62642.82	209.00	36792.25	57657.20	230519.01
Traffic served for all POIs (B)- in erlangs		62949	3956737	2364845	131010	10705	14945	26731	18243	46589	128438
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

#### Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		51	770	319	76	95	99	210	19	59	57
No. of POIs not meeting		0	0	0	0	0	0	0	0	0	0

benchmark											
Total Capacity of all POIs (A) - in erlangs		93301.00	586650.73	0.00	211250.00	4052.40	62453.66	76130.00	36792.25	5723.36	230867.50
Traffic served for all POIs (B)- in erlangs		64460	393343	241340	130741	1162	15795	26530	18629	47636	128454
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

**10 ANNEXURE – MAY**

**1. Network Availability**

**Audit Results for Network Availability- PMR data**

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2747	8858	2221	6798	1769	3746	573	953	2522	7536
Sum of downtime of BTSs in a month (in hours)		99942	6073	99747	40381	5434	2007	612	1	9926	25633
BTSs accumulated downtime (not available for service)	≤ 2%	4.89%	0.09%	6.04%	0.80%	0.41%	0.07%	0.14%	0.00%	0.53%	0.46%
Number of BTSs having accumulated downtime >24 hours		793	27	910	125	17	6	0	0	46	146
Worst affected BTSs due to downtime	≤ 2%	28.87%	0.30%	40.97%	1.84%	0.96%	0.16%	0.00%	0.00%	1.82%	1.94%

**Live Measurement Results for Network Availability- 3 Day live data**

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2747	8858	2221	6784	1769	3746	573	953	2747	7536
Sum of downtime of BTSs in a		11713	2291	4963	7113	504	199	67	0	1407	5482

month (in hours)											
BTSs accumulated downtime (not available for service)	≤ 2%	5.92%	0.36%	3.10%	1.46%	0.40%	0.07%	0.16%	0.00%	0.71%	1.01%
Number of BTSs having accumulated downtime >24 hours		0	0	156	23	0	0	0	0	2	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	7.02%	0.34%	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%

## 2. Connection Establishment (Accessibility)

### Audit Results for CSSR, SDCCH and TCH congestion- PMR data

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	93.42%	97.12%	66.84%	98.46%	97.70%	96.42%	97.21%	99.05%	97.46%	99.60%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.21%	0.84%	15.65%	0.82%	0.00%	0.99%	0.00%	0.17%	0.87%	0.11%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	6.16%	0.59%	6.29%	1.51%	0.03%	0.99%	1.02%	0.17%	1.61%	0.40%

**Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data**

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	95.36%	97.25%	65.58 %	98.99%	98.04 %	97.23%	97.97%	99.29%	98.03%	99.63%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.67%	0.81%	20.00 %	0.99%	0.00%	0.99%	0.00%	0.36%	0.99%	0.11%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	4.21%	0.18%	5.90%	0.64%	0.02%	0.99%	0.25%	0.04%	1.12%	0.37%

**Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data**

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		508	633	486	600	650	582	621	559	442	673
Total number of successful calls established		504	633	422	600	622	582	593	562	409	673
CSSR	≥ 95%	99.21%	100.00%	86.83 %	100.00%	95.69 %	100.00%	95.49%	100.54%	92.53%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
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						CDMA					
%age blocked calls		0.79%	0.00%	13.17%	0.00%	4.31%	0.00%	4.51%	-0.54%	7.47%	0.00%

### 3. Connection Maintenance (Retainability)

#### Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		163926082	891904858	36479768	247408113	71623341	181390545	30102148	31084142	221632157	252358452
Total number of calls dropped		2051452	4682061	12767219	2143420	248555	939132	262023	133362	1212186	1758121
Call drop rate	≤ 2%	1.25%	0.52%	35.00%	0.87%	0.35%	0.52%	0.87%	0.43%	0.55%	0.70%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8236	26617	6663	20463	5307	11238	1811	2868	7575	22628
Total number of cells having more than 3% TCH		657	674	929	568	53	11	76	55	115	316
Worst affected cells having more than 3% TCH	≤ 3%	7.98%	2.53%	13.94%	2.78%	1.00%	0.10%	4.20%	1.93%	1.52%	1.40%

**Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data**

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		4430730	80107859	3214798	21063674	6354664	15339298	75872912	35427508	19713055	23119596
Total number of calls dropped		62379	451268	1125107	201322	22046	81929	238147	160428	113204	201665
Call drop rate	≤ 2%	1.41%	0.56%	35.00%	0.96%	0.35%	0.53%	0.31%	0.45%	0.57%	0.87%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8236	79581	6663	20420	5307	11340	1811	2868	7596	22628
Total number of cells having more than 3% TCH		729	2027	912	558	0	0	76	55	130	653
Worst affected cells having more than 3% TCH	≤ 3%	8.85%	2.55%	13.69%	2.73%	0.00%	0.00%	4.20%	1.93%	1.71%	2.89%

**Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data**

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		504	633	472	600	622	582	593	559	442	673
Total number of calls dropped		3	0	16	0	16	0	21	0	13	0
Call drop rate	≤ 2%	0.60%	0.00%	3.39%	0.00%	2.57%	0.00%	3.54%	0.00%	2.94%	0.00%

### 4. Voice quality

#### Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		19764806 851	14042063 4388	5460	40610174 985		8218462 494	12396224 2134	4871528 630	30981666 197	44426804 208
Total number of calls with good voice quality		18798477 768	13648507 7905	5318	39581478 053		8049223 325	12176423 4412	4755127 052	29072967 783	43569536 787
%age calls with good voice quality	≥ 95%	95.11%	97.20%	97.40 %	97.47%	99.81 %	97.94%	98.23%	97.61%	93.84%	98.07%

#### Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		58896868 5	11490822 773	1365	35116854 12		7670804 82	12535012 5004	5628681 053	27880303 93	36594792 09
Total number of calls with good voice quality		55696855 8	11113540 047	1332	34218424 28		7507060 07	12308865 2417	5499822 524	26180070 30	35877123 87
%age calls with good voice quality	≥ 95%	94.57%	96.72%	97.58 %	97.44%	99.80 %	97.87%	98.20%	97.71%	93.90%	98.04%

#### Drive test results for Voice quality (Average of three drive tests) - DT data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
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Total number of sample calls		788351	1100421	52976	1038011		161472		183573	625158	1125512
Total number of calls with good voice quality		719351	1057565	49970	994413		146876		167344	607493	1092272
%age calls with good voice quality	≥ 95%	91.25%	96.11%	94.33 %	95.80%	95.01 %	90.96%	94.01%	91.16%	97.17%	97.05%

## 5. POI Congestion

### Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		51	772	315	77	93	98	208	19	60	57
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		93888.00	604131.56	0.00	218376.00	40000.85	61828.25	0.00	34233.00	60374.50	231104.89
Traffic served for all POIs (B)- in erlangs		59966	389558	2448530	115825	10202	14737	26128	18130	47519	129272
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%

### Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		51	772	311	77	93	98	208	19	60	57
No. of POIs not meeting		0	0	0	0	0	0	0	0	0	0

benchmark											
Total Capacity of all POIs (A) - in erlangs		93888.00	611479.01	0.00	218392.00	40527.63	61306.08	75963.00	34233.00	60950.62	233052.00
Traffic served for all POIs (B)- in erlangs		63103	365479	224547	129372	10438	14561	25740	18013	45225	123243
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%

**11 ANNEXURE – JUNE**

**1. Network Availability**

**Audit Results for Network Availability- PMR data**

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2768	8874	1256	6798	1538	3381	573	953	2534	7686
Sum of downtime of BTSs in a month (in hours)		111463	6424	18199	33447	6016	2489	782	8	8469	33900
BTSs accumulated downtime (not available for service)	≤ 2%	5.41%	0.10%	1.95%	0.66%	0.53%	0.10%	0.18%	0.00%	0.45%	0.59%
Number of BTSs having accumulated downtime >24 hours		914	32	25	127	28	9	0	0	47	149
Worst affected BTSs due to downtime	≤ 2%	33.02%	0.36%	1.99%	1.87%	1.82%	0.27%	0.00%	0.00%	1.85%	1.94%

**Live Measurement Results for Network Availability- 3 Day live data**

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2768	8874	1256	6798	1538	3381	573	953	2532	7686
Sum of downtime of BTSs in a		11345	40	1807	3220	494	184	110	0	724	3492

month (in hours)											
BTSs accumulated downtime (not available for service)	≤ 2%	5.69%	0.01%	2.00%	0.66%	0.45%	0.08%	0.27%	0.00%	0.40%	0.63%
Number of BTSs having accumulated downtime >24 hours		0	0	25	7	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.99%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

## 2. Connection Establishment (Accessibility)

### Audit Results for CSSR, SDCCH and TCH congestion- PMR data

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	92.58%	98.34%	95.60%	98.62%	97.25%	96.28%	97.19%	99.80%	97.76%	99.44%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.34%	0.94%	1.00%	0.80%	0.00%	0.29%	0.00%	0.21%	0.83%	0.20%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	6.97%	0.58%	1.99%	1.36%	0.04%	0.13%	0.96%	0.13%	1.40%	0.56%

**Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data**

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	92.85%	98.37%	96.00%	98.91%	97.72 %	96.98%	98.18%	99.26%	97.39%	99.41%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.24%	0.01%	1.00%	0.78%	0.00%	0.25%	0.00%	0.13%	0.95%	0.24%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
TCH congestion	≤ 2%	6.72%	0.01%	1.98%	1.07%	0.04%	0.09%	0.41%	0.03%	1.79%	0.59%

0

**Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data**

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		439	739	597	563	551	592	621	559	432	620
Total number of successful calls established		435	739	582	563	549	565	593	559	418	620
CSSR	≥ 95%	99.09%	100.00%	97.49%	100.00%	99.64 %	95.44%	95.49%	100.00%	96.76%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
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						CDMA					
%age blocked calls		0.91%	0.00%	2.51%	0.00%	0.36%	4.56%	4.51%	0.00%	3.24%	0.00%

### 3. Connection Maintenance (Retainability)

#### Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		1600627 21	84206587 3	3387510 553	2410827 57	68038 865	1644892 58	2812124 4	2708415 7	2170420 98	2520393 05
Total number of calls dropped		2301539	7408134	6775021 1	2453211	27907 5	861075	237708	142277	1217759	2130391
Call drop rate	≤ 2%	1.44%	0.88%	2.00%	1.02%	0.41%	0.52%	0.85%	0.53%	0.56%	0.85%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8299	26671	3711	20465	4614	10143	1811	3656401 2	7611	23078
Total number of cells having more than 3% TCH		823	1235	176	568	84	10	73	162653	117	459
Worst affected cells having more than 3% TCH	≤ 3%	9.92%	4.63%	4.74%	2.78%	1.82%	0.10%	4.03%	0.44%	1.54%	1.99%

#### Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
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						CDMA					
Total number of calls established		5234359	21940413 60	9953896	2339238 7	63527 92	1611635 2	7535930 5	3656401 2	2134069 4	2462241 7
Total number of calls dropped		78221	17420975	198082	228205	18537	85196	238147	162653	122450	229237
Call drop rate	≤ 2%	1.49%	0.79%	1.99%	0.98%	0.29%	0.53%	0.32%	0.44%	0.57%	0.93%

Cells having more than 3% TCH	Benchm ark	Aircel(D WL)	Airtel	BSNL	Idea	Relianc e CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		80049	80013	3711	20465	4614	10143	1811	2869	7605	23078
Total number of cells having more than 3% TCH		8229	3901	178	563	0	0	73	101	123	673
Worst affected cells having more than 3% TCH	≤ 3%	10.28%	4.88%	4.80%	2.75%	0.00%	0.00%	4.03%	3.52%	1.62%	2.92%

**Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data**

Call drop rate	Benchm ark	Aircel(D WL)	Airtel	BSNL	Idea	Relianc e CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		435	739	582	563	548	565	593	559	432	620
Total number of calls dropped		0	0	23	0	12	9	21	0	4	0
Call drop rate	≤ 2%	0.00%	0.00%	3.95%	0.00%	2.19%	1.59%	3.54%	0.00%	0.93%	0.00%

### 4. Voice quality

#### Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		1929786 4907	11483911 5212	1100	3938938 2483		7678171 785	8695057 3146	4921061 509	3006018 8814	4318456 0021
Total number of calls with good voice quality		1837525 8924	11254386 6807	1056	3829373 9142		7519942 280	8543427 9225	4798616 065	2814917 9361	4225642 4601
%age calls with good voice quality	≥ 95%	95.22%	98.00%	96.00%	97.22%	99.81 %	97.94%	98.26%	97.51%	93.64%	97.85%

#### Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		6400147 86	11396009 826	110	3904197 642		7878821 66	7535930 5	5856261 477	3147624 316	4285806 346
Total number of calls with good voice quality		6084543 36	11162002 135	106	3791250 029		7718134 65	238147	5720636 314	2950063 955	4190553 013
%age calls with good voice quality	≥ 95%	95.07%	97.95%	96.36%	97.11%	99.81 %	97.96%	0.32%	97.68%	93.72%	97.78%

#### Drive test results for Voice quality (Average of three drive tests) - DT data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		696716	1218967	5645	951713		239733		183573	836911	1043849

Total number of calls with good voice quality		645998	1171173	5399	907416		219271		167344	743860	1019282
%age calls with good voice quality	≥ 95%	92.72%	96.08%	95.64%	95.35%	95.56%	91.46%	94.01%	91.16%	88.88%	97.65%

## 5. POI Congestion

### Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		49	765	15	77	94	99	208	19	61	57
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		94532.00	631185.07	15538.00	219734.00	40055.08	61262.86	24472.00	34233.00	61996.80	225706.32
Traffic served for all POIs (B)- in erlangs		67198	420643	14286	132999	10950	13388	24472	18136	49413	124643
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%

### Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		49	765	15	77	94	99	208	19	60	57
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0

Total Capacity of all POIs (A) - in erlangs		94618.00	1871993.20	15538.00	219734.00	39979.61	61452.03	74176.00	34233.00	6295.29	227554.05
Traffic served for all POIs (B)- in erlangs		67203	1229152	14286	132980	10991	13706	24172	18029	50275	126030
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%



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