

**EAST
ZONE**

TRAI AUDIT WIRELESS REPORT-ASSAM CIRCLE - JAS QUARTER, 2014

Prepared By -



Prepared For-



Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

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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 to 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 March 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated October 6, 2006 that provide the 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).
- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in Assam Circle.

2.3 IMPORTANT NOTE (CHANGE OF BENCHMARKS)

TRAI had recommended a change of benchmarks for all operators and IMRB in the month of September for two parameters.

- Resolution of billing/charging complaints
- Percentage of calls answered by operators (voice to voice)

Some of the operators have been able to change their systems as per the new benchmarks and IMRB has audited the data as per new benchmarks for those operators.

However, some operators are still in the process of changing their systems as per new benchmarks. Hence, IMRB has audited these operators as per previous benchmarks.

Thus, IMRB has reported the parameters as per the data availability with the operators. The key changes in the benchmark are given in the table below.

Parameter	Old Benchmark	New Benchmark
Resolution of billing complaints	100% within 4 weeks	98% within 4 weeks, 100% within 6 weeks
Percentage of calls answered by operators (voice to voice)	within 60 seconds: In 90% of the cases or more	within 90 seconds: In 95% of the cases or more

For resolution of billing/ charging complaints all operators provided the data as per old benchmark levels.

For calls answered by operators (voice to voice) following operators provided the data as per new benchmark levels.

- Aircel
- Airtel
- Idea
- Reliance GSM

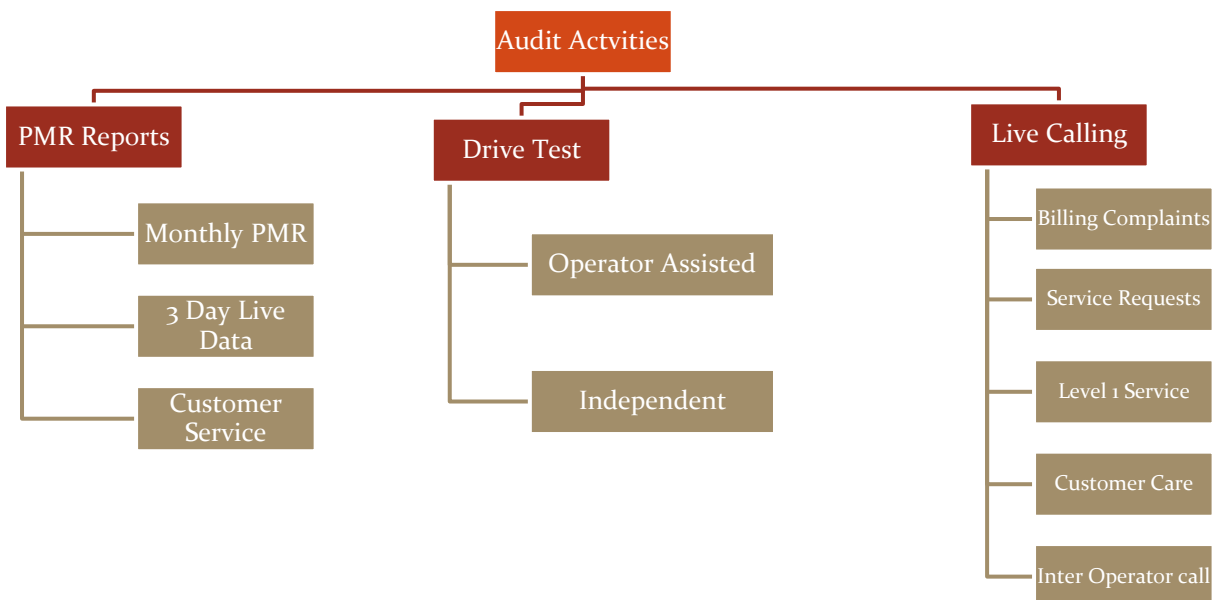
2.4 COVERAGE

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



Image Source: BSNL website

2.5 FRAMEWORK USED

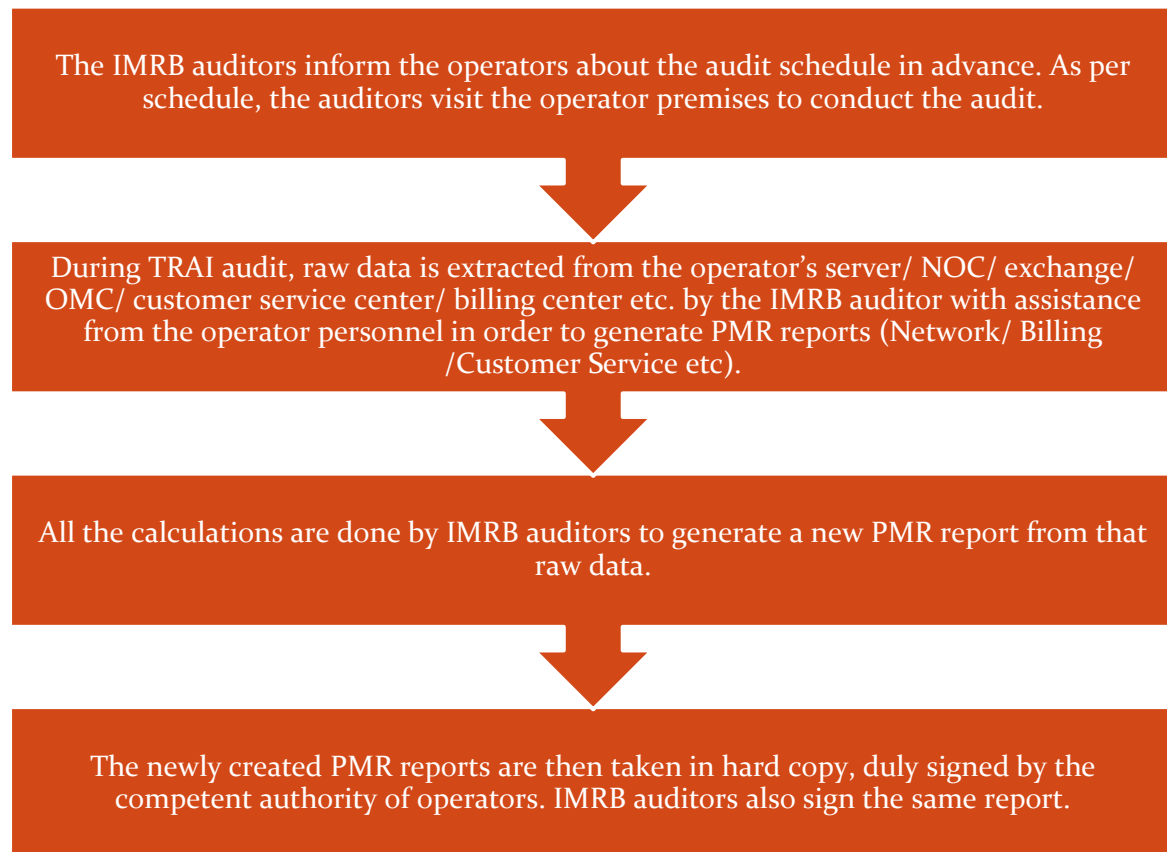


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.5.1 PMR REPORTS

2.5.1.1 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 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, August 2014 audit data was collected in the month of September 2014.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending September 2014 (JAS'14) was collected in the month of October 2014.

The raw data is extracted from operator's systems to create PMR in the following three formats.

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

Let us understand these formats in detail.

2.5.1.2 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were extracted in presence of IMRB representative from the operator's premises for the month of Jul, Aug and Sep 2014. 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 parameters in section 4 of the report. The benchmark values for each parameter have been given in the table below.

2.5.1.3 AUDIT PARAMETERS - NETWORK

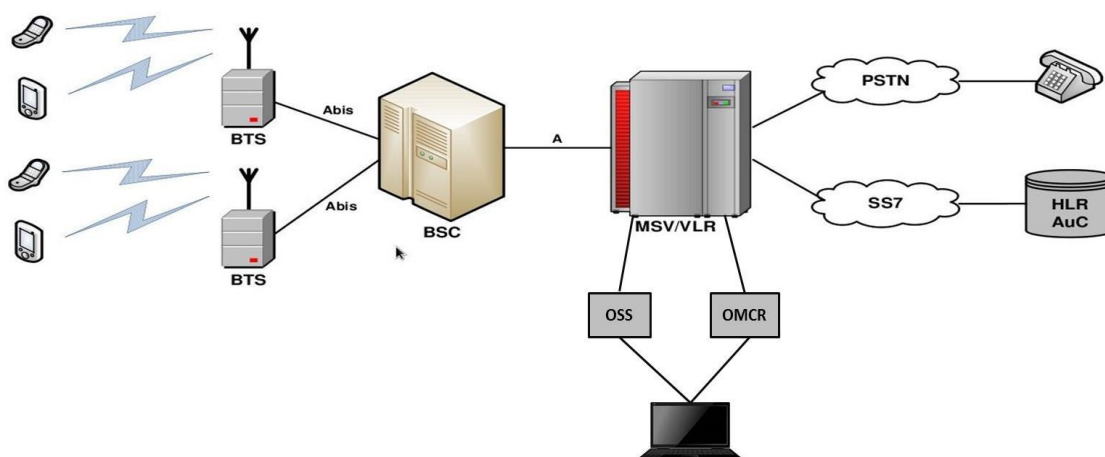
Let us now look at the various parameters involved in the audit reports.

Network Related

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

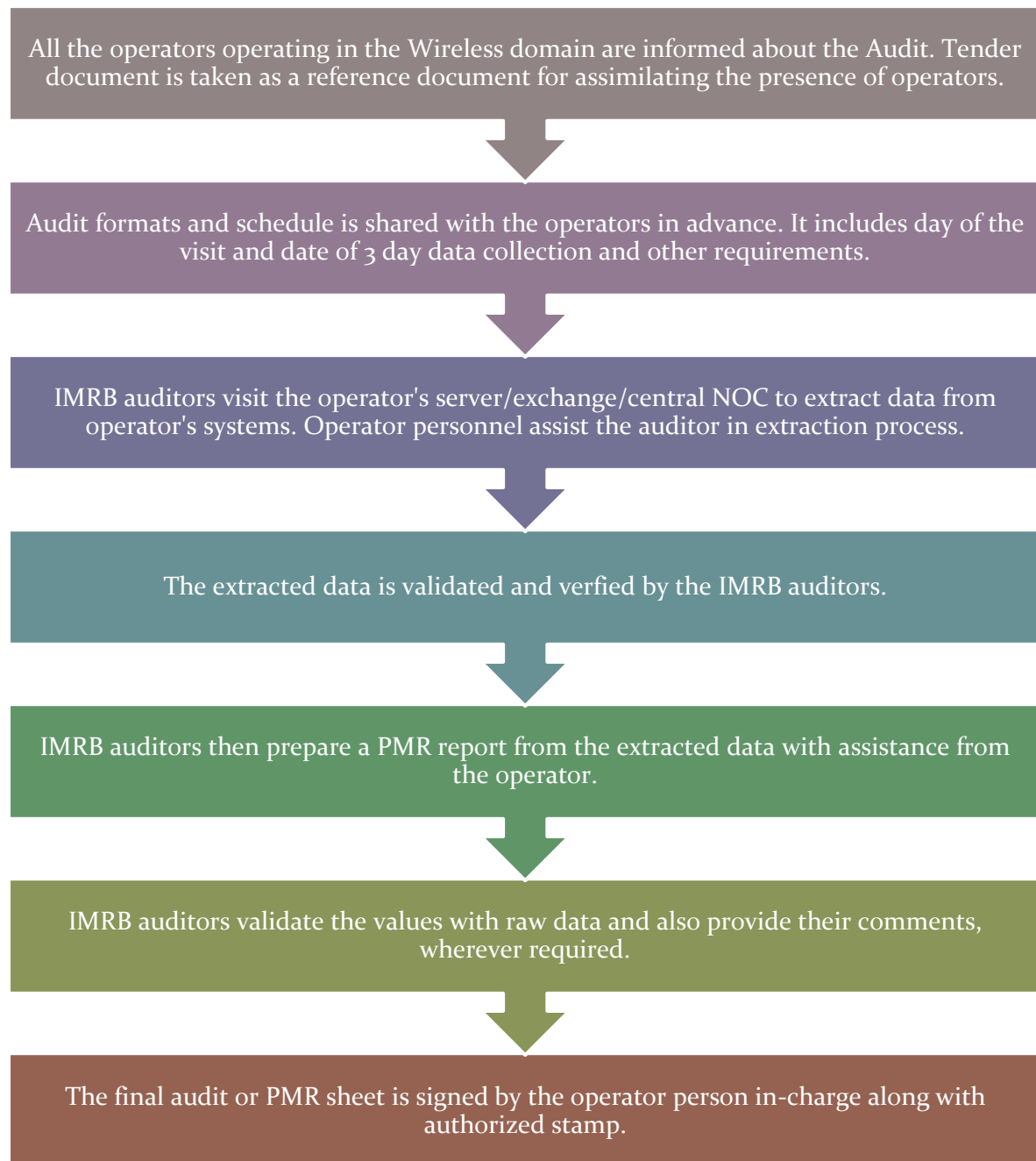
2.5.1.4 POINT OF DATA EXTRACTION

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



2.5.1.5 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 provided by the operators. The details of counters have been provided in section 8.15 of the report. The calculation methodology for each parameter has been stated in the table given below.

2.5.1.6 CALCULATION METHODOLOGY – NETWORK PARAMETERS

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100
SDCCH/ Paging Channel Congestion	$\text{SDCCH / TCH Congestion\%} = [(A_1 \times C_1) + (A_2 \times C_2) + \dots + (A_n \times C_n)] / (A_1 + A_2 + \dots + A_n)$ <p>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</p>
TCH Congestion	
POI Congestion	$\text{POI Congestion\%} = [(A_1 \times C_1) + (A_2 \times C_2) + \dots + (A_n \times C_n)] / (A_1 + A_2 + \dots + A_n)$ <p>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</p>
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.5.1.7 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 an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the network parameters discussed earlier. All the calculations are done on the basis of that raw data 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/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar to PMR report) to assess the various QoS parameters.

2.5.1.8 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour” or “TCBH” means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

During audit, the auditors identified from the raw data that the TCBH for all operators in JAS'14 was the time period between 20:00 to 21:00 hours.

2.5.1.9 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

During audit, the auditors identified from the raw data that the CBBH for the operators in JAS'14 was the time period as given below.

Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
20:00 - 21:00	20:00 - 21:00	19:00 - 20:00	20:00 - 21:00	20:00 - 21:00	20:00 - 21:00	19:00 - 20:00

2.5.1.10 CUSTOMER SERVICE PARAMETERS

The data to generate 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 Sep 2014 (JAS'14) was collected in the month of Oct 2014. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

- Metering and billing credibility (postpaid and prepaid)
- Resolution of billing/charging complaints
- Period of applying credit/waiver/adjustment to customer's account
- Response time to the customer for assistance
- Termination/closure of service
- Time taken for refund of security deposit after closures.

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle.

All the parameters have been described in detail along with key findings of the parameter in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.5.1.11 AUDIT PARAMETERS – CUSTOMER SERVICE

Metering and Billing Credibility	Benchmark
No of billing complaints received - Post paid	≤ 0.1%
No. of billing complaints received- Prepaid	≤ 0.1%
Resolution of billing/ charging complaints within 4 weeks (Old Benchmark)	100%
Resolution of billing/ charging complaints within 4 weeks (New Benchmark)	98%
Resolution of billing/ charging complaints within 6 weeks (New Benchmark)	100%
Period of applying credit/ waiver within 1 week of resolution of complaint	100%
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 (Old benchmark)	≥ 90%
Percentage of calls answered by the operators (voice to voice) within 90 seconds (New benchmark)	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

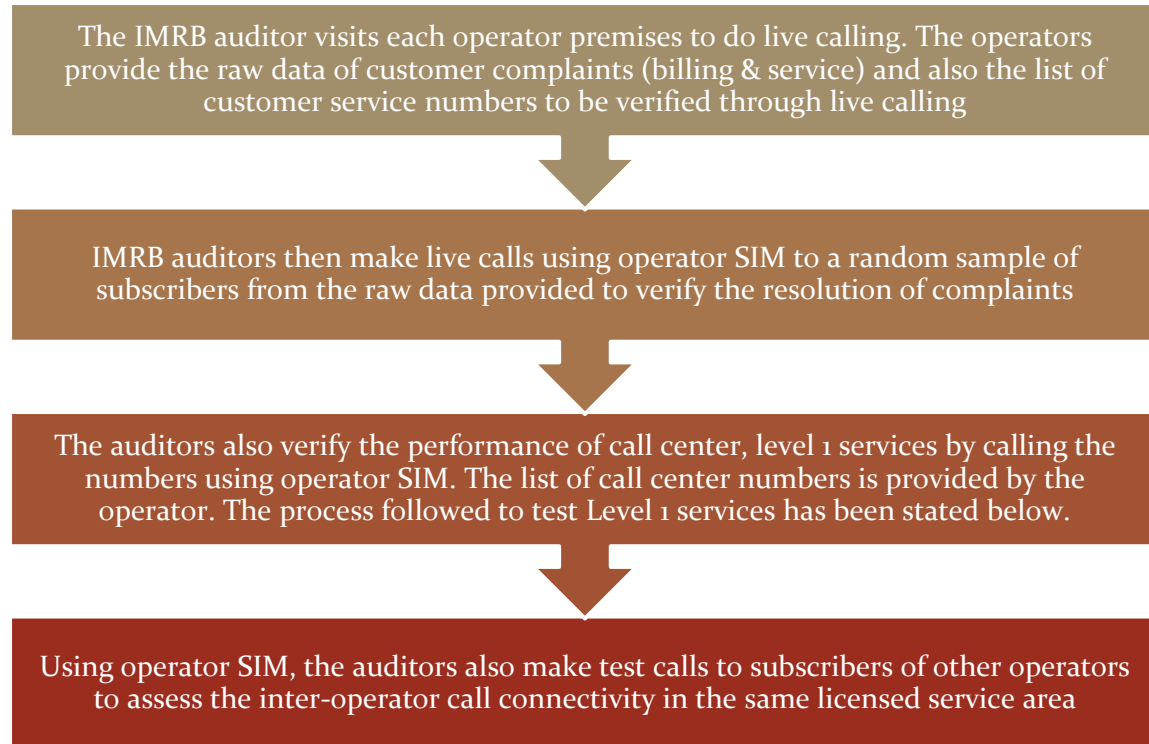
2.5.1.12 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Billing complaints per 100 bills issued - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle * 100
Charging complaints per 100 subscribers - Prepaid	Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter * 100
Resolution of billing/ charging complaints (Postpaid + Prepaid)	<p>There are two benchmarks involved here:</p> <p>Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100</p> <p>Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100</p>
Period of applying credit waiver	Number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver * 100
Call centre performance IVR (Calling getting connected and answered by IVR)	Number of calls connected and answered by IVR/ All calls attempted to IVR * 100
Call center performance (Voice to Voice)	<p>There are two benchmarks involved here (Old and New):</p> <p>Old Benchmark: Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) * 100</p> <p>New Benchmark: Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100</p> <p>The calculation excludes the calls dropped before 60 seconds (for old benchmark) and before 90 seconds (for new benchmark)</p>
Time taken for termination/ closure of service	Number of closures done within 7 days/ total number of closure requests * 100
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

2.5.2 LIVE CALLING

2.5.2.1 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. Below is a step wise procedure of live calling.



Live calling activity was carried out during the period of Sep-Oct 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 Aug 2014 was considered for live calling activity conducted in Sep 2014.

A detailed explanation of each parameter is explained below.

2.5.2.2 BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below.

- ✦ Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- ✦ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th March, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 5.1.1.

TRAI benchmark-

% of complaints resolved in 4 weeks – 100%

Metering and billing credibility–Post Paid- Not more than 0.1% of bills issued should be disputed over a billing cycle

Metering and billing credibility -- Prepaid - Not more than 1 complaint per 1000 customers i.e. 0.1% complaints for metering, charging, credit, and validity

Resolution of billing/ charging complaints - 100% within 4 weeks

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling has been done to check billing performance as per old benchmarks.

2.5.2.3 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.

2.5.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 150 test calls were made per service provider in the quarter.

While most of the Level 1 services are toll free, it has been observed that some Level 1 services may not be toll free. In JAS’14, IMRB has tried contacting only the toll free emergency L1 services for the purpose of live calling. The list of numbers tested by IMRB has been provided below.

L1 Code	Description	L1 Code	Description
100	Police	1072	Rail Accident Helpline
101	Fire	1073	Road Accident Helpline
102	Ambulance	1076	Chief Minister's Grievance Redressal
103	Traffic Police	1091	Women Helpline
104	State Health Information Helpline	1095	Traffic Control Helpline
1056	Emergency Medical Service	1096	Natural Disaster Helpline
1070	Natural Calamities Helpline	1098	Child Helpline
1071	Air Accident Helpline		

2.5.2.5 CUSTOMER CARE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center in terms of

- ✎ Calls getting connected and answered within 60 seconds by operator's IVR.
- ✎ % age of calls answered by operator / voice to voice) within 60 seconds: In 90% of the cases or more (Old Benchmark)
- ✎ % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more (New Benchmark)

The process for this parameter is stated below.

- ✎ Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.
- ✎ Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- ✎ All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling has been done to check call center performance (voice to voice) as per old benchmarks.

2.5.2.6 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.

2.5.3 DRIVE TEST

2.5.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the 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.

2.5.3.2 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.

2.5.3.3 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.

2.5.3.4 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 Ec/Io BINS (A)
 - ✓ Total Ec/Io 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) = $(B/A) \times 100$

2.6 OPERATORS COVERED

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

	Name of Operator	Number of Subscriber as per VLR
Operator 1	Aircel(DWL)	3334327
Operator 2	Airtel	4687183
Operator 3	BSNL CDMA	12426
Operator 4	BSNL GSM	1020062
Operator 5	Idea	608074
Operator 6	Reliance GSM	2016169
Operator 7	Vodafone	2800070

2.7 COLOUR CODES TO READ THE REPORT



Not Meeting the benchmark



Best Performing Operator

3 EXECUTIVE SUMMARY

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

Note: TCBH (Time Consistent Busy Hour) identified by auditors was 20:00 – 21:00 for all operators.

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED

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 (%)	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)	9.38%	43.78%	94.35%	1.54%	4.03%	2.03%	20.09%	90.10%
Airtel	0.35%	1.40%	98.12%	0.18%	0.78%	1.22%	1.13%	98.29%
BSNL CDMA	21.96%	34.85%	98.19%	2.02%	0.00%	2.21%	11.06%	91.96%
BSNL GSM	2.49%	4.85%	95.19%	0.91%	1.25%	34.16%	5.56%	95.20%
Idea	0.38%	0.61%	98.44%	0.32%	1.17%	1.32%	2.03%	95.14%
Reliance GSM	0.39%	1.72%	98.52%	0.03%	0.11%	0.71%	0.12%	98.39%
Vodafone	0.81%	1.71%	99.52%	0.12%	0.48%	0.72%	2.70%	97.57%

Following are the parameter wise observations for wireless operators for Assam circle:

BTSS Accumulated Downtime:

Aircel, BSNL CDMA & BSNL GSM did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.35%.

Worst Affected BTSS Due to Downtime:

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Minimum worst affected BTSS due to downtime was recorded for Idea at 0.61%.

Call Set-up Success Rate (CSSR):

Aircel did not meet the benchmark for CSSR. During the audits, the maximum CSSR was observed for Vodafone with 99.52%.

All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

Aircel and BSNL CDMA failed to meet the benchmark on SDCCH / Paging Channel Congestion and Aircel missed the benchmark on TCH congestion.

Reliance GSM recorded the best SDCCH / Paging Channel Congestion while BSNL CDMA recorded the best TCH congestion.

The calculation methodology (given in parameter description section) followed by the operators was found to be in complete accordance with what has been specified by TRAI.

Call Drop Rate:

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Minimum call drop rate was recorded for Reliance GSM at 0.71%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.12%.

Voice Quality

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Aircel & BSNL CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM at 98.39%.

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 parameters more or less corroborated with 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)	SDCCH/Paging Chl. Congestion (%)	TCH Congestion (%)	Call Drop Rate (%)	Worst affected cells having more than 3%	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	8.64%	8.97%	97.66%	0.68%	1.38%	1.70%	21.07%	91.73%
Airtel	0.24%	0.00%	98.21%	0.15%	0.72%	1.23%	1.12%	98.28%
BSNL CDMA	18.63%	3.44%	98.15%	2.37%	0.00%	2.03%	40.50%	91.96%
BSNL GSM	10.53%	2.12%	95.49%	0.68%	1.54%	34.06%	6.46%	95.16%
Idea	0.44%	0.23%	99.12%	0.14%	0.59%	1.10%	1.93%	95.74%
Reliance GSM	0.29%	1.06%	98.49%	0.03%	0.11%	0.67%	0.32%	98.36%
Vodafone	0.78%	0.07%	99.81%	0.12%	0.19%	0.64%	2.64%	97.94%

BTSs Accumulated Downtime:

Aircel, BSNL CDMA and BSNL GSM failed to meet the TRAI specified benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.24%.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL CDMA and BSNL GSM failed to meet the TRAI specified benchmark. Airtel was the best performer with 0% worst affected BTSs due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark on this parameter. During the audits the maximum CSSR was observed for Vodafone with 99.81% of their calls getting completed.

All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

Most of the operators met the TRAI specified benchmarks on the congestion parameters except BSNL CDMA on SDCCH / Paging Channel Congestion.

The calculation methodology (given in parameter description section) followed by the operators was found to be in complete accordance with what has been specified by TRAI.

Call Drop Rate:

BSNL GSM & BSNL CDMA failed to meet the TRAI specified benchmark for Call Drop Rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA & BSNL GSM did not meet the TRAI benchmark for Worst Affected Cells Having More than 3% TCH Drop.

Voice Quality

Aircel and BSNL CDMA failed to meet the benchmark. The highest %age of connection with good voice quality was recorded by Reliance GSM at 98.36%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing	Service Requests	Level 1 Service	Response time to customer for assistance	
	%age complaints resolved within 4 weeks	Complaint /Request attended to Satisfaction	Call answered in 60 seconds	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	100%		≥ 95%	≥ 95%	≥ 90%
Aircel(DWL)	60.00%	85.00%	67.33%	100.00%	100.00%
Airtel	61.00%	74.00%	42.00%	100.00%	85.00%
BSNL CDMA	No Raw Data	No Raw Data	42.00%	100.00%	66.00%
BSNL GSM	78.00%	84.00%	42.00%	100.00%	78.00%
Idea	72.00%	77.00%	52.67%	100.00%	95.00%
Reliance GSM	87.00%	48.00%	53.33%	100.00%	82.00%
Vodafone	72.00%	82.00%	47.33%	100.00%	92.00%

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling for metering and billing and Customer care (voice to voice) has been done to check billing performance as per old benchmarks.

Resolution of billing complaints

As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of 100%.

Note: Auditors did not receive the raw data for live calling from the central billing center of BSNL CDMA as the operator was unable to provide the same.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests.

Note: Auditors did not receive the raw data for live calling from the central customer service center of BSNL CDMA as the operator was unable to provide the same.

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered within 60 seconds. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect all the service providers meet the TRAI benchmark with 100% accessibility of all call center/customer care center which is well much above the TRAI benchmark of 95%.

Customer Care / Helpline Assessment

It was observed that only Aircel, Idea and Vodafone met TRAI benchmark of 90% of calls answered by the centres within 60 seconds while rest of the operators recorded below the benchmark.

3.4 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Billing Disputes		Billing Complaints		Response time to customer for assistance	Customer care		
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the operators IVR within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 90%	≥ 95%
Aircel(DWL)	0.02%	0.09%	100.00%	100.00%	100.00%	95.94%	NA	89.19%
Airtel	0.02%	0.01%	100.00%	100.00%	100.00%	No Data	NA	99.30%
BSNL CDMA	0.04%	0.01%	100.00%	100.00%	100.00%	No Raw Data	95.29%	NA
BSNL GSM	0.01%	0.01%	100.00%	100.00%	100.00%	79.01%	85.89%	NA
Idea	0.00%	0.03%	100.00%	100.00%	100.00%	98.90%	NA	97.58%
Reliance GSM	0.13%	0.10%	100.00%	100.00%	100.00%	98.98%	NA	94.12%
Vodafone	0.38%	0.06%	100.00%	100.00%	100.00%	99.83%	96.19%	NA

Note: For Customer Care (voice to voice), there are two different benchmarks (old – within 60 seconds and new – within 90 seconds). In the above table, if data was audited as per old benchmark, NA is written in the column showing data as per new benchmark and vice versa.

Billing Disputes – Postpaid Subscribers

For the billing disputes of postpaid subscribers, it was observed that Vodafone and Reliance GSM failed to meet the benchmark of 0.1%. Idea had the best performance with 0.00%.

Billing Disputes – Prepaid Subscribers

For the prepaid customers, Reliance GSM missed the benchmark of billing disputes. BSNL GSM performed the best with 0.01% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints.

Response Time to customer for assistance - % of cases in which advance waiver is received within one week

All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

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

BSNL GSM did not meet the benchmark of 95% of its IVR call being attended within 60 seconds. Vodafone recorded the best performance for the parameter.

Note: Auditors were not able to get the raw data from central customer service center of BSNL CDMA as the operator was unable to provide the same. Airtel had a technical issue in their system due to which they were not able to provide data for the parameter.

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

For voice to voice calls, Aircel, Airtel, Idea and Reliance GSM provided the data as per new benchmark guidelines while BSNL CDMA, BSNL GSM and Vodafone provided the data as per old guidelines. Aircel & BSNL GSM failed to meet the TRAI specified benchmarks.

3.5 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment							
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Aircel(DWL)	NA	93.00%	87.00%	89.00%	95.00%	92.00%	94.00%
Airtel	91.00%	NA	100.00%	92.00%	95.00%	92.00%	91.00%
BSNL CDMA	89.00%	92.00%	NA	89.00%	91.00%	93.00%	90.00%
BSNL GSM	85.00%	93.00%	95.00%	NA	93.00%	91.00%	91.00%
Idea	91.00%	89.00%	95.00%	90.00%	NA	91.00%	90.00%
Reliance GSM	89.00%	90.00%	94.00%	93.00%	91.00%	NA	92.00%
Vodafone	93.00%	91.00%	95.00%	91.00%	90.00%	89.00%	NA



Maximum Problem faced by the calling operator to other operator. The orange colour denotes performance below circle average.

In the inter-operator call assessment, all the operators faced problems in connecting to other operators. Airtel was the only operator that got connected from all operators.

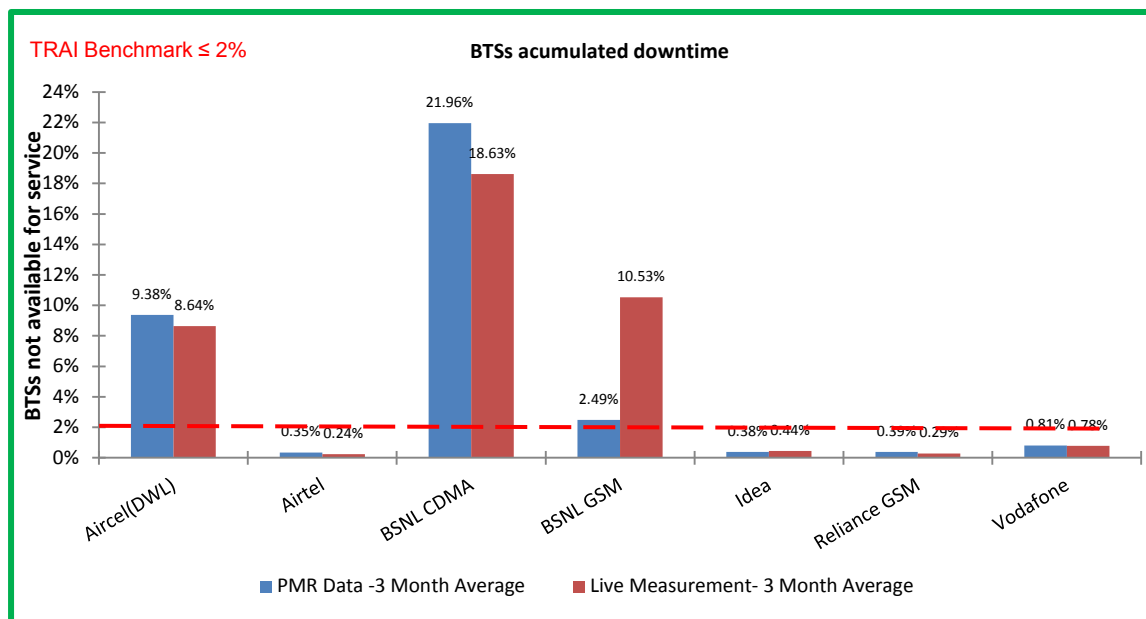
4 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA

4.1 BTS ACCUMULATED DOWNTIME

4.1.1 PARAMETER DESCRIPTION

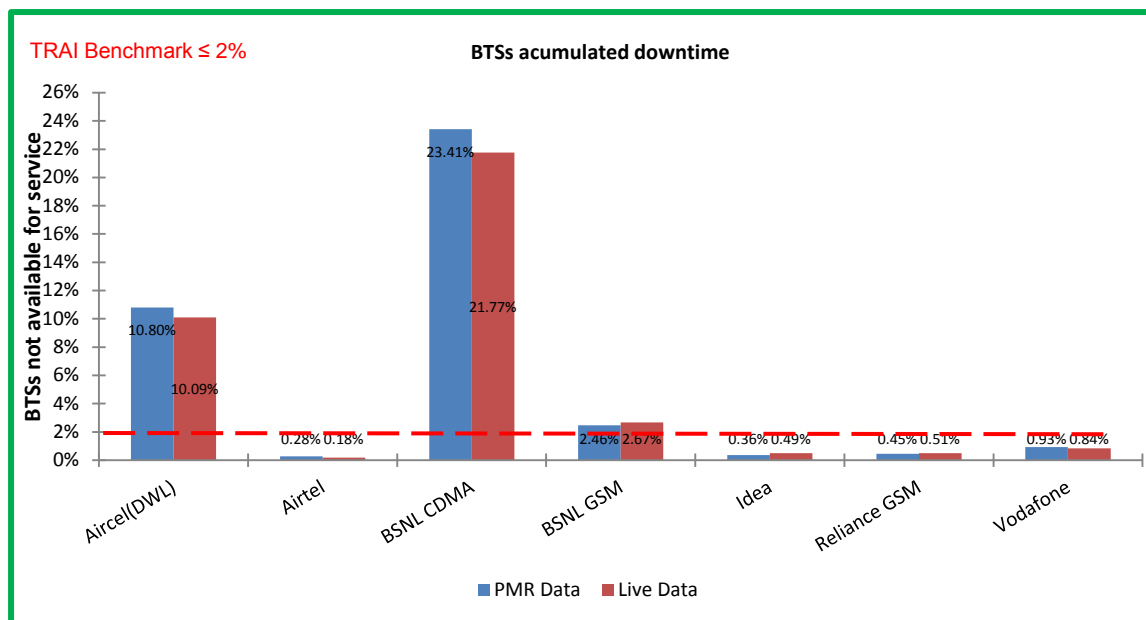
- The parameter of network availability would be measured from following sub-parameters
 1. BTSs Accumulated downtime (not available for service)
 2. Worst affected BTSs due to downtime
- 1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically 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) = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 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 - CONSOLIDATED

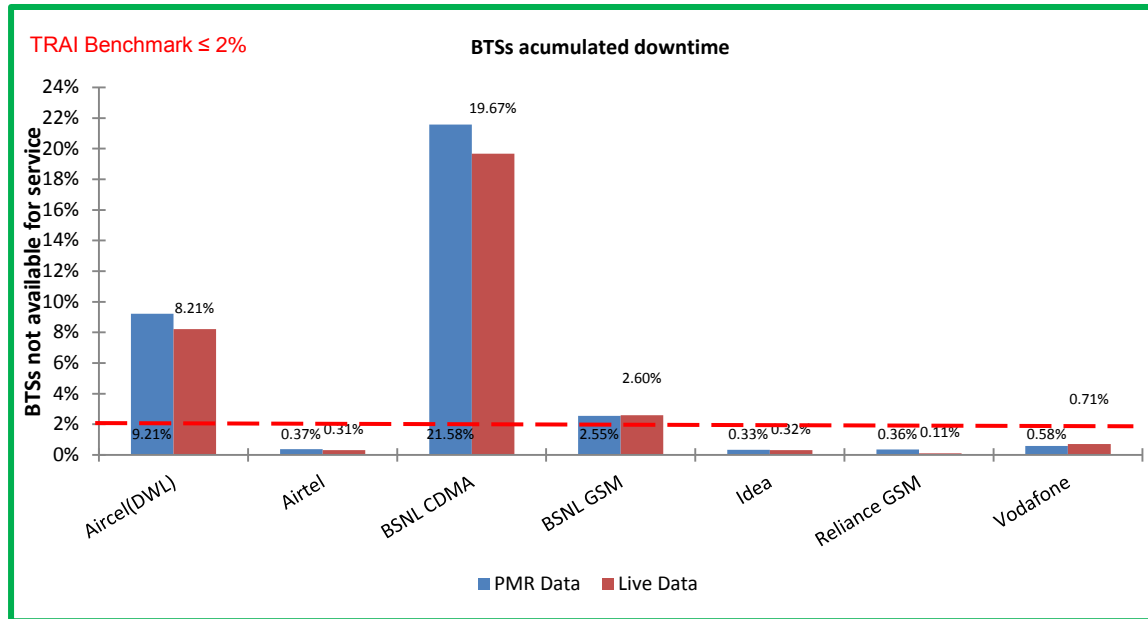


Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark on aspect of BTS accumulated downtime as per PMR data.

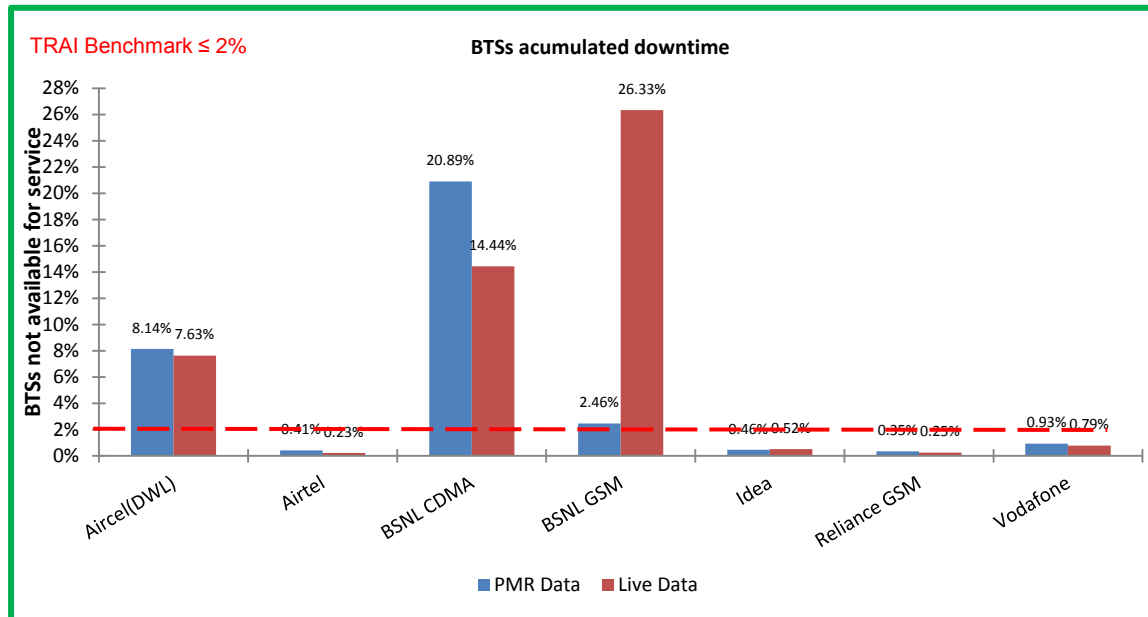
4.1.2.1 KEY FINDINGS – MONTH 1



4.1.2.2 KEY FINDINGS – MONTH 2



4.1.2.3 KEY FINDINGS – MONTH 3



4.2 WORST AFFECTED BTS DUE TO DOWNTIME

4.2.1 PARAMETER DESCRIPTION

1. **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.

2. **Computation Methodology –**

Worst affected BTSs due to downtime = (Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100

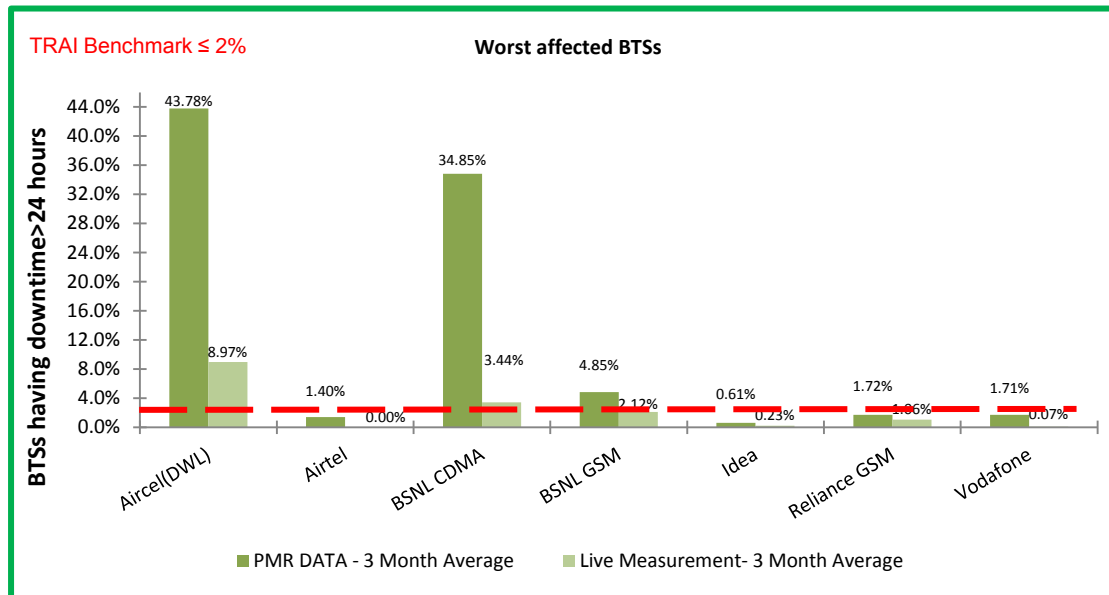
3. **TRAI Benchmark –**

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

4. **Audit Procedure –**

- i. 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.

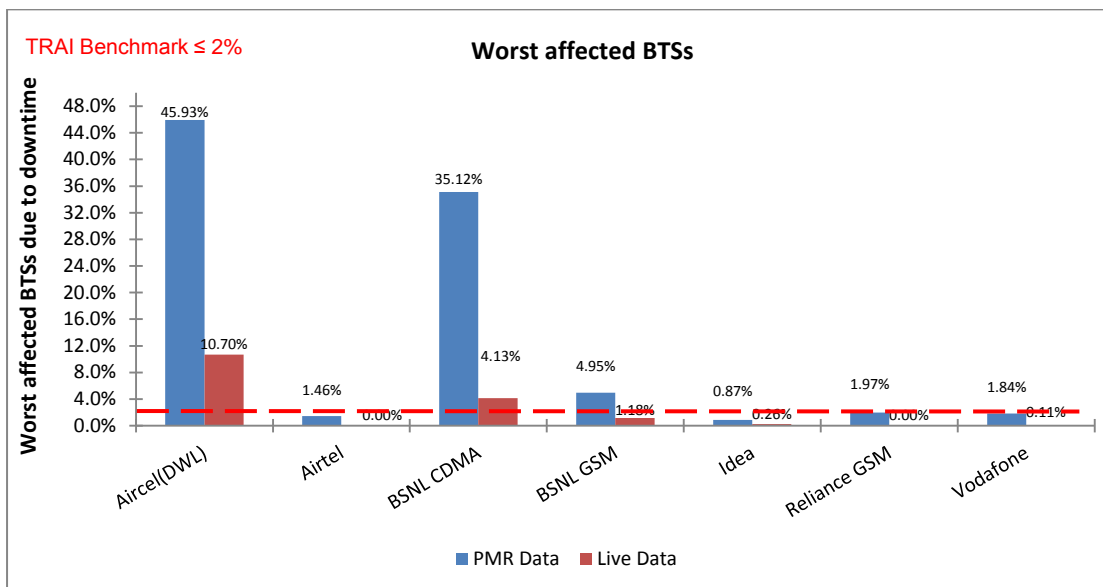
4.2.2 KEY FINDINGS - CONSOLIDATED



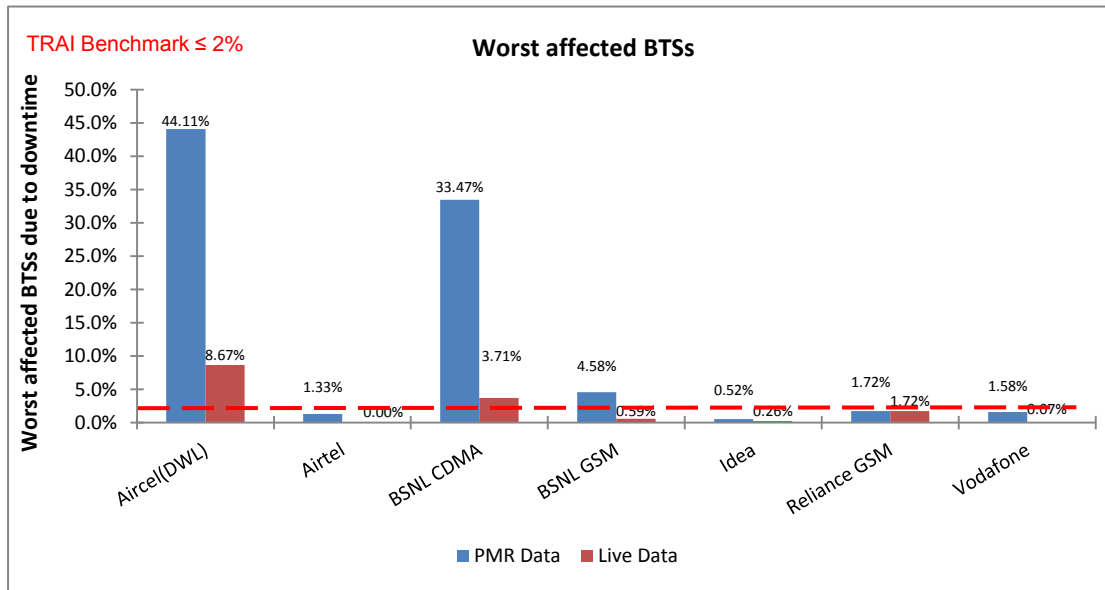
Aircel, BSNL CDMA, and BSNL GSM did not meet the benchmark for worst affected BTSs due to downtime as per PMR report.

Significant difference was observed between PMR & live measurement data for Aircel and BSNL CDMA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

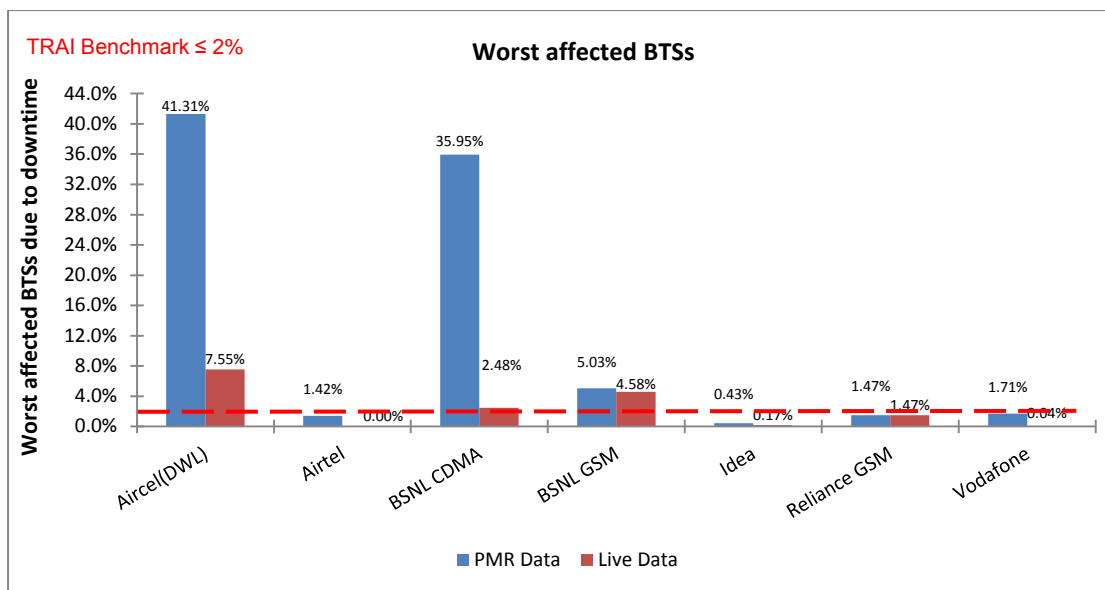
4.2.2.1 KEY FINDINGS – MONTH 1



4.2.2.2 KEY FINDINGS – MONTH 2



4.2.2.3 KEY FINDINGS – MONTH 3



4.3 CALL SET UP SUCCESS RATE

4.3.1 PARAMETER DESCRIPTION

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

2. **Computation Methodology-**

$$(\text{Calls Established} / \text{Total Call Attempts}) * 100$$

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

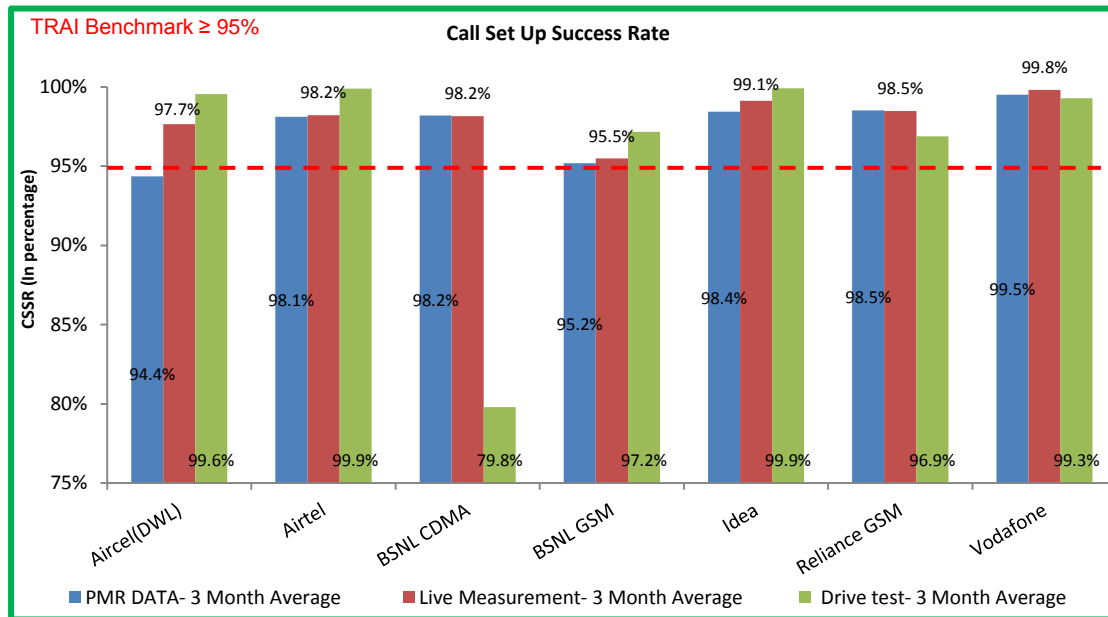
- ↳ call attempt is made
- ↳ the TCH is allocated
- ↳ the call is routed to the outward path of the concerned MSC

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

4. **Audit Procedure –**

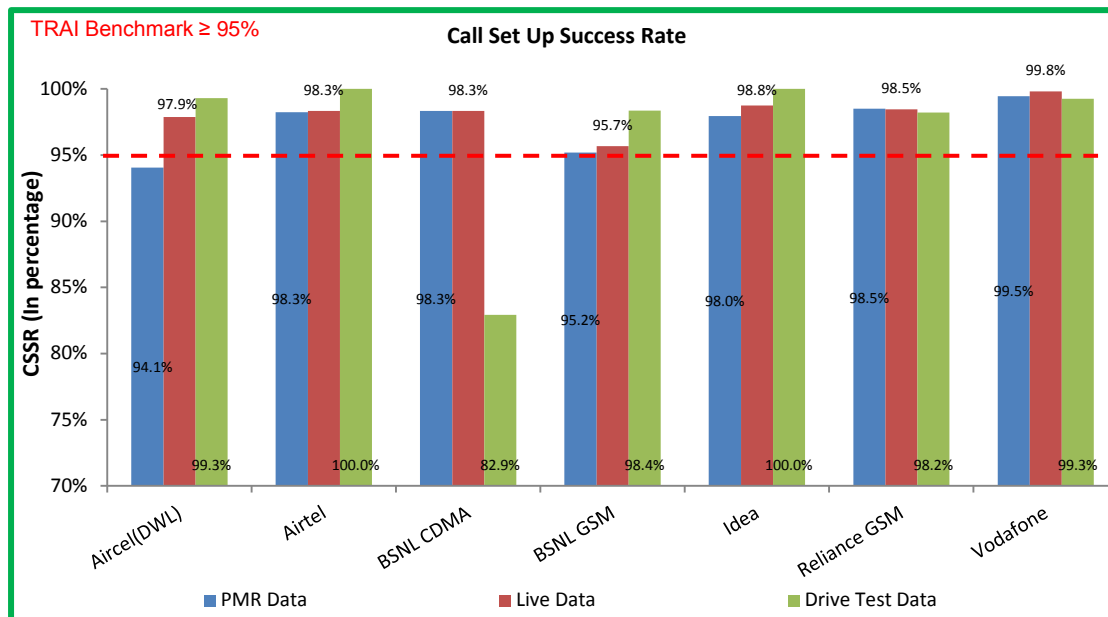
- ↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
- ↳ CSSR calculation should be measured using OMC generated data only
- ↳ Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
- ↳ Counter data is extracted 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 - CONSOLIDATED

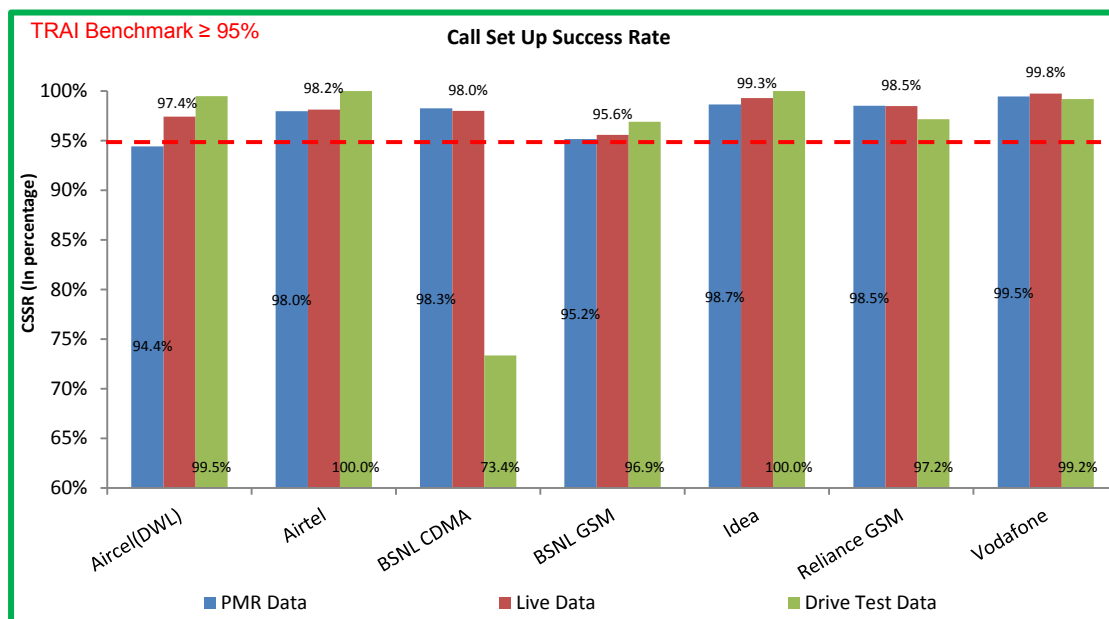


Aircel failed to meet the TRAI benchmark as per PMR data.

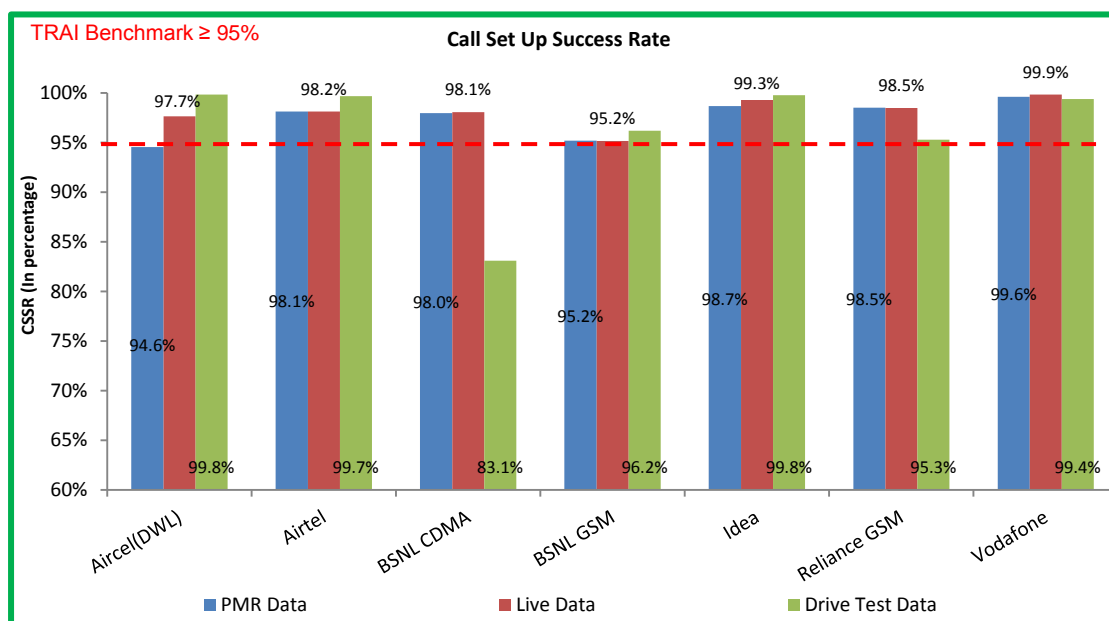
4.3.2.1 KEY FINDINGS – MONTH 1



4.3.2.2 KEY FINDINGS – MONTH 2



4.3.2.3 KEY FINDINGS – MONTH 3



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

4.4.1 PARAMETER DESCRIPTION

1. **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

2. **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

3. **Benchmark:**

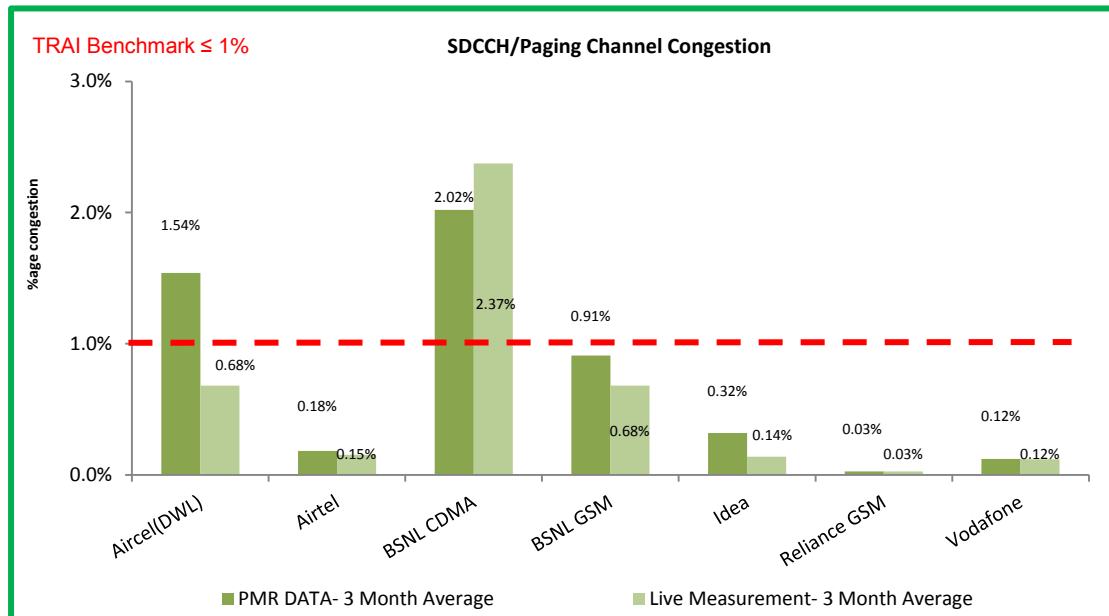
↳ SDCCH Congestion: $\leq 1\%$, TCH Congestion: $\leq 2\%$, POI Congestion: $\leq 0.5\%$

4. **Audit Procedure –**

↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC-Switch data only) would be conducted

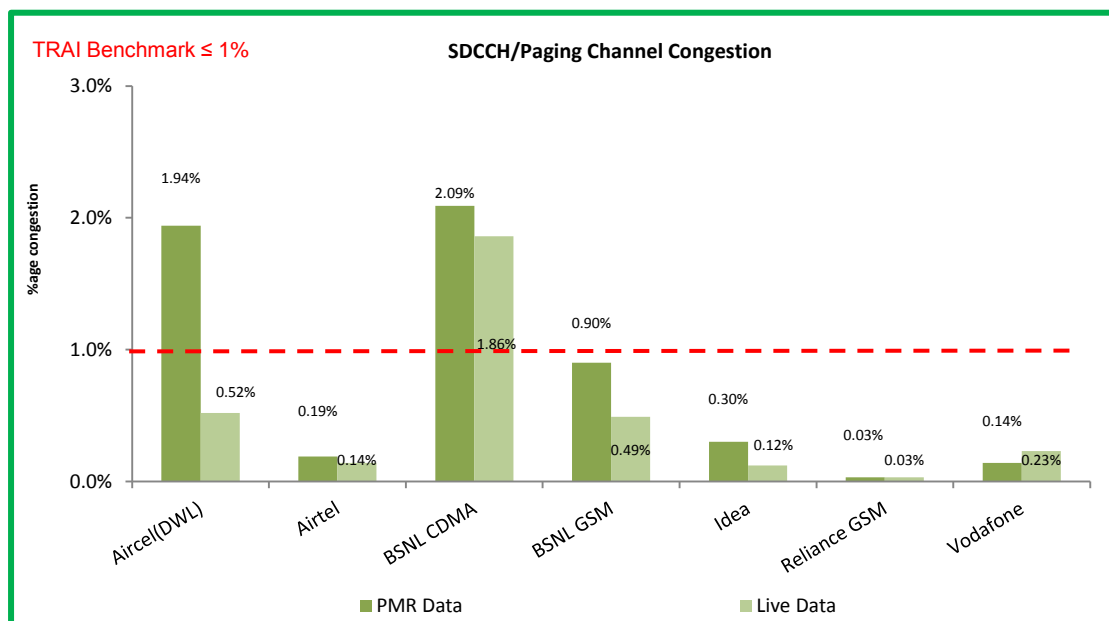
✎ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)

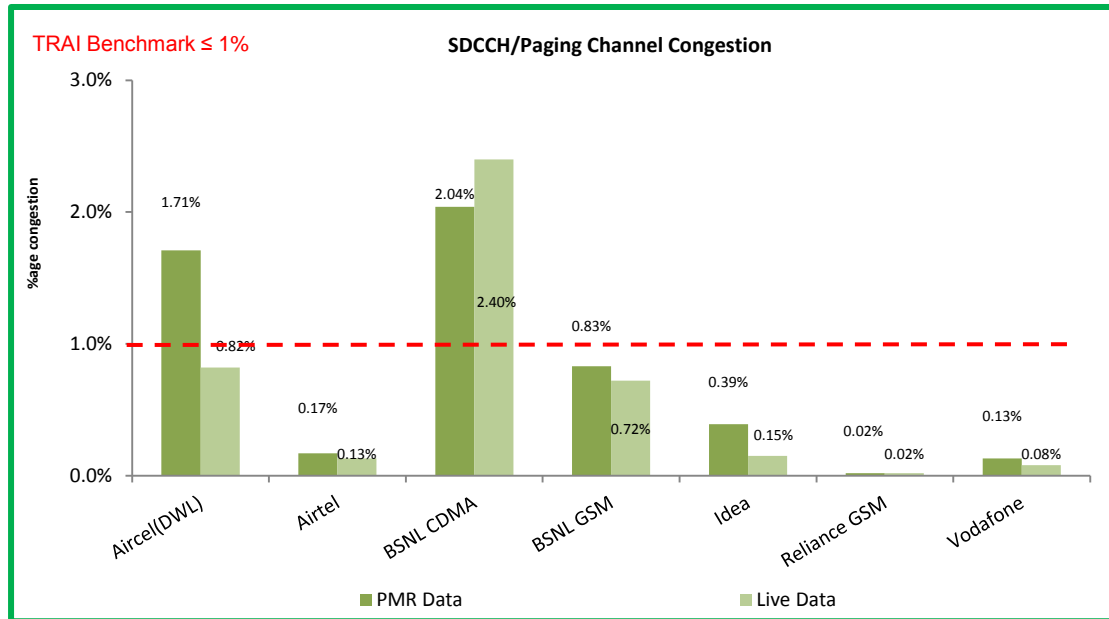


Aircel and BSNL CDMA failed to meet the benchmark as per PMR Data. Significant difference was observed between PMR & live measurement data for Aircel. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

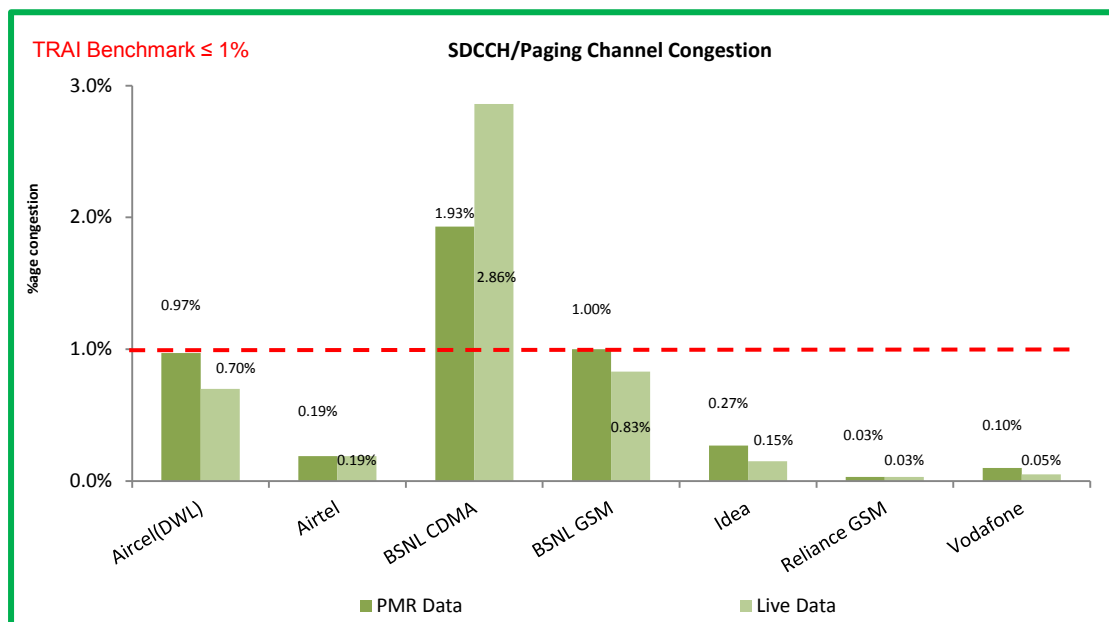
4.4.2.1 KEY FINDINGS – MONTH 1



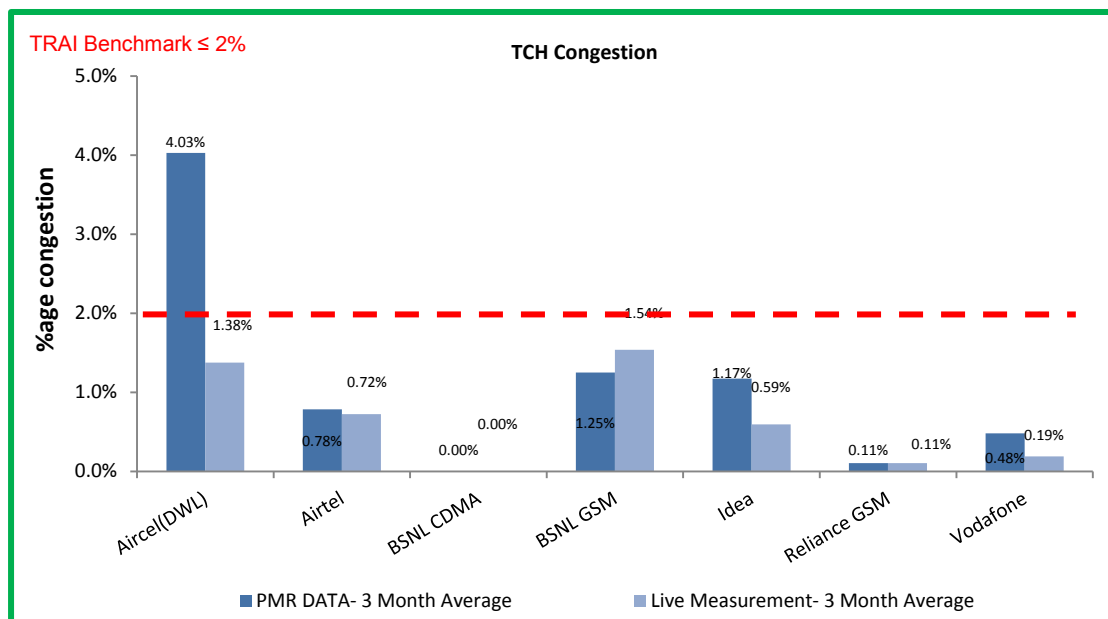
4.4.2.2 KEY FINDINGS – MONTH 2



4.4.2.3 KEY FINDINGS – MONTH 3

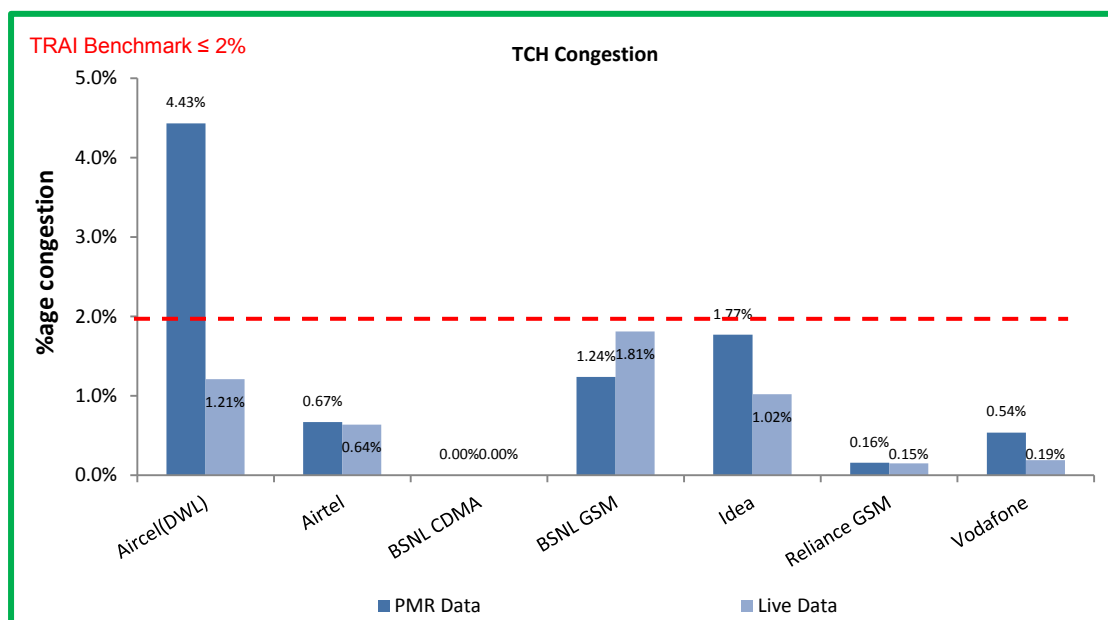


4.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

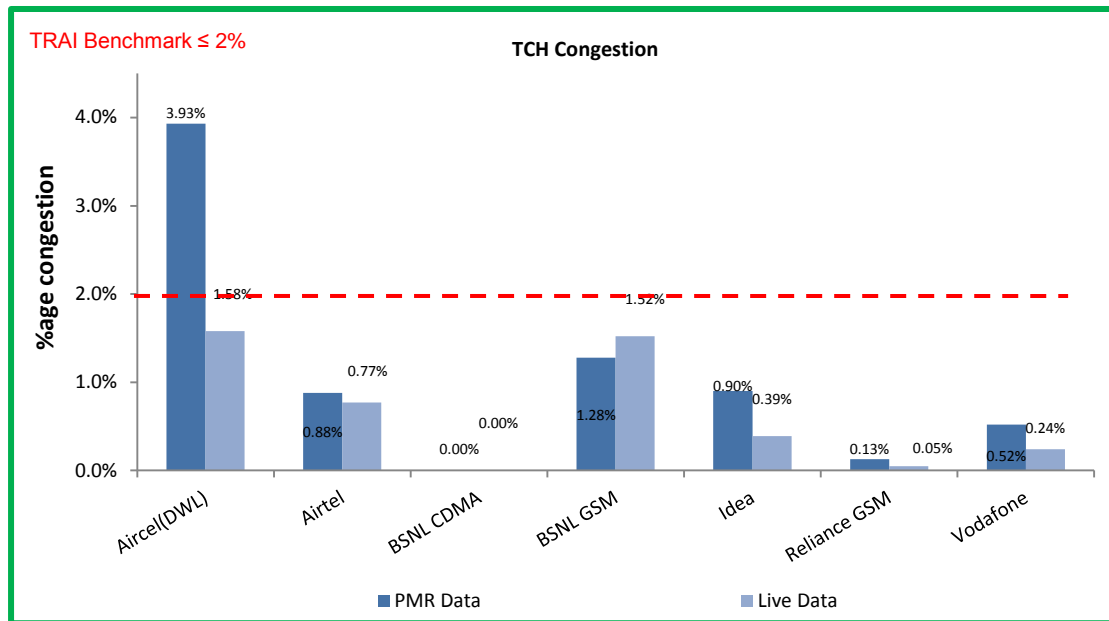


Aircel failed to meet the benchmark as per PMR report. Significant difference was observed between PMR & live measurement data for Aircel and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

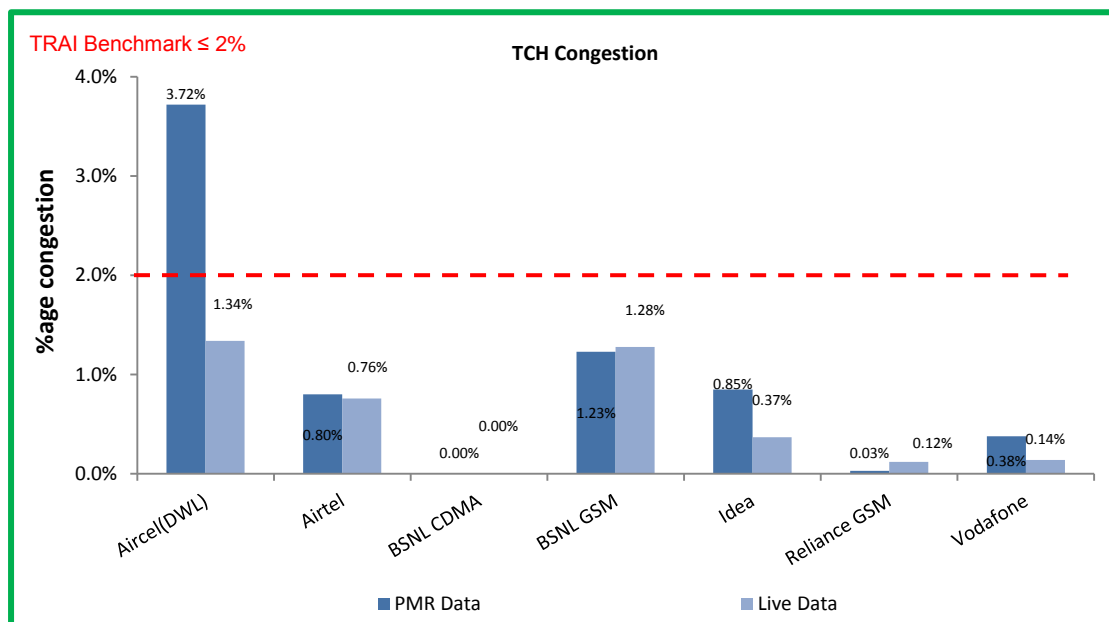
4.4.3.1 KEY FINDINGS – MONTH 1



4.4.3.2 KEY FINDINGS – MONTH 2



4.4.3.3 KEY FINDINGS – MONTH 3



4.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED)

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		48	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		83333	85939	NC	19515	19735	31810	59926524
Traffic served for all POIs (B)- in erlangs		52396	32066	NC	19931	12595	20157	15036462
POI congestion	≤ 0.5%	0.00%	0.00%	NC	1.05%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		49	15	NC	19	29	23	112
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		84411	86017	NC	19515	19542	31974	5986134
Traffic served for all POIs (B)- in erlangs		54091	32197	NC	18984	12598	20717	1494795
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.01%	0.00%	0.00%	0.00%

BSNL GSM did not meet the benchmark of POI Congestion as per PMR Data.

NC: Auditors were not able to get the POI data from BSNL as the operator was unable to provide the same. Hence it has been reported as Non Compliance.

4.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82394	86898	NC	19515	19642	31761	57636152
Traffic served for all POIs (B)- in erlangs		51938	31982	NC	19736	12296	20258	14650678
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82394	87098	NC	19515	19395	31730	6039058
Traffic served for all POIs (B)- in erlangs		52672	31547	NC	18496	12187	20591	1476208
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%

NC: Auditors were not able to get the POI data from BSNL as the operator was unable to provide the same. Hence it has been reported as Non Compliance.

4.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82221	85311	NC	19515	19207	31793	61950129
Traffic served for all POIs (B)- in erlangs		51829	32016	NC	20248	13069	20055	15317519
POI congestion	≤ 0.5%	0.00%	0.00%	NC	3.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	NC	19	29	23	280
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85453	84849	NC	19515	19525	31802	5939184
Traffic served for all POIs (B)- in erlangs		54945	32232	NC	18209	12512	20796	1501858
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%

NC: Auditors were not able to get the POI data from BSNL as the operator was unable to provide the same. Hence it has been reported as Non Compliance.

4.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85386	85608	NC	19515	20355	31875	60193290
Traffic served for all POIs (B)- in erlangs		53422	32199	NC	19809	12420	20158	15141189
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.15%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85386	86104	NC	19515	19705	32389	5980159
Traffic served for all POIs (B)- in erlangs		54655	32812	NC	20248	13095	20765	1506318
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.03%	0.00%	0.00%	0.00%

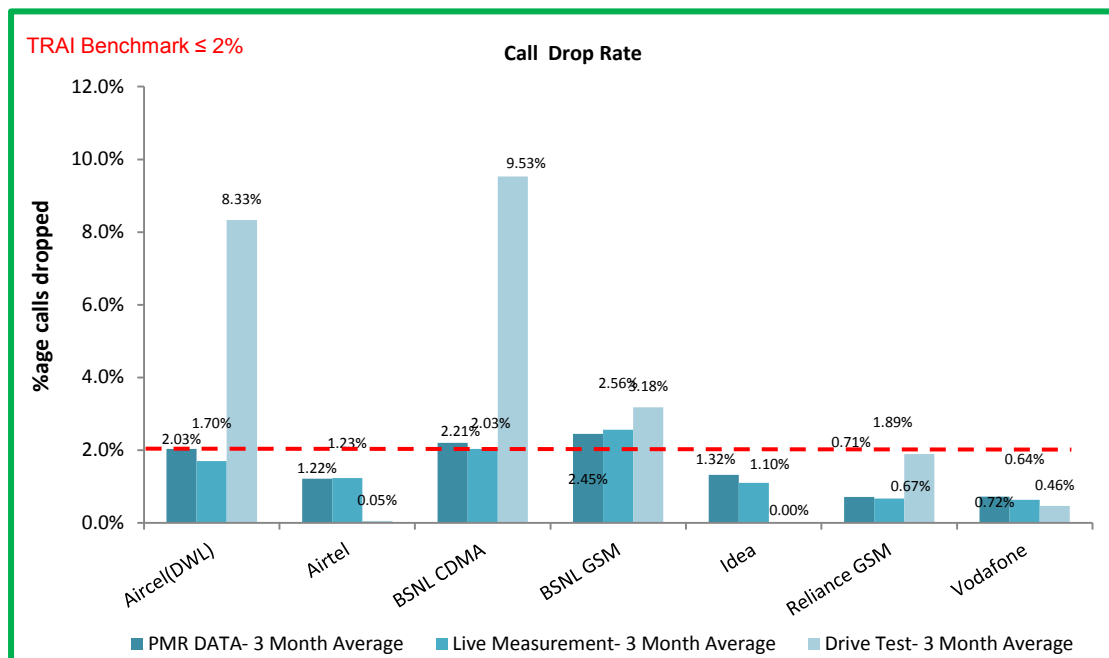
NC: Auditors were not able to get the POI data from BSNL as the operator was unable to provide the same. Hence it has been reported as Non Compliance.

4.5 CALL DROP RATE

4.5.1 PARAMETER DESCRIPTION

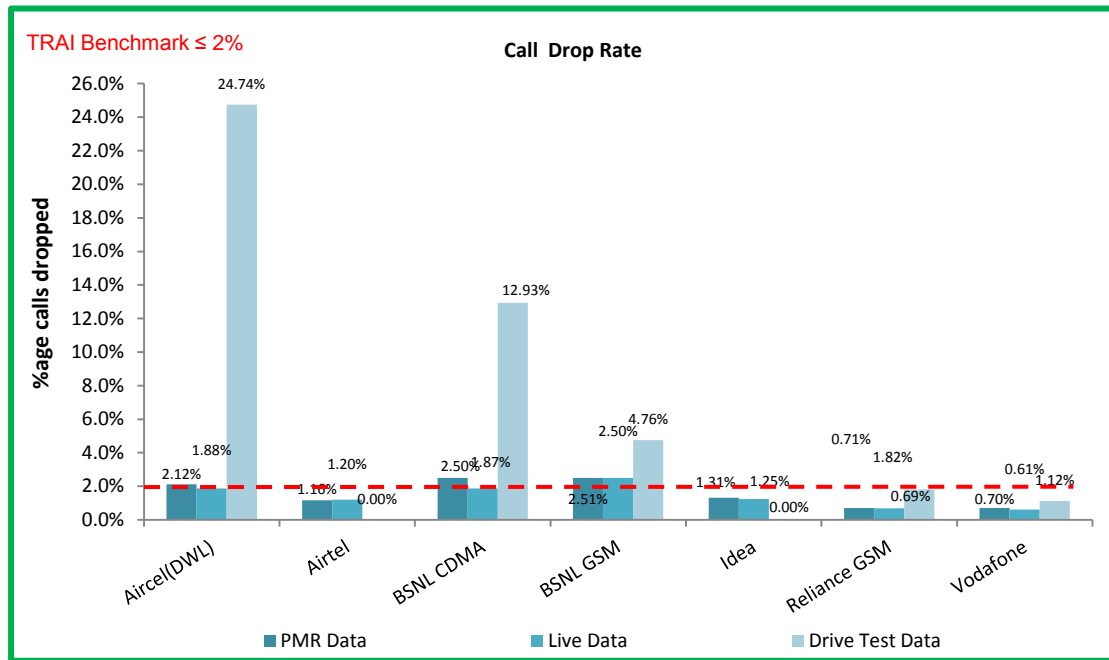
- Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
 - ✎ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
 - ✎ **Total 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 - CONSOLIDATED

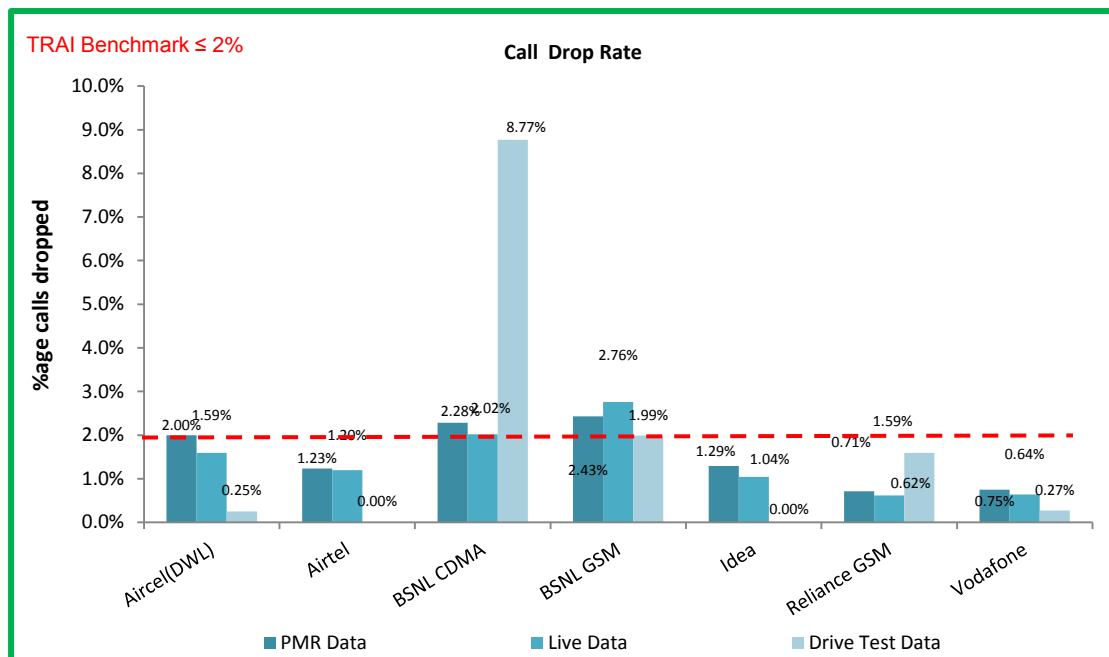


Aircel, BSNL GSM and BSNL CDMA failed to meet the benchmark for call drop rate during audit. The call drop rate during drive test was observed being higher than audit and live measurement for Aircel and BSNL CDMA.

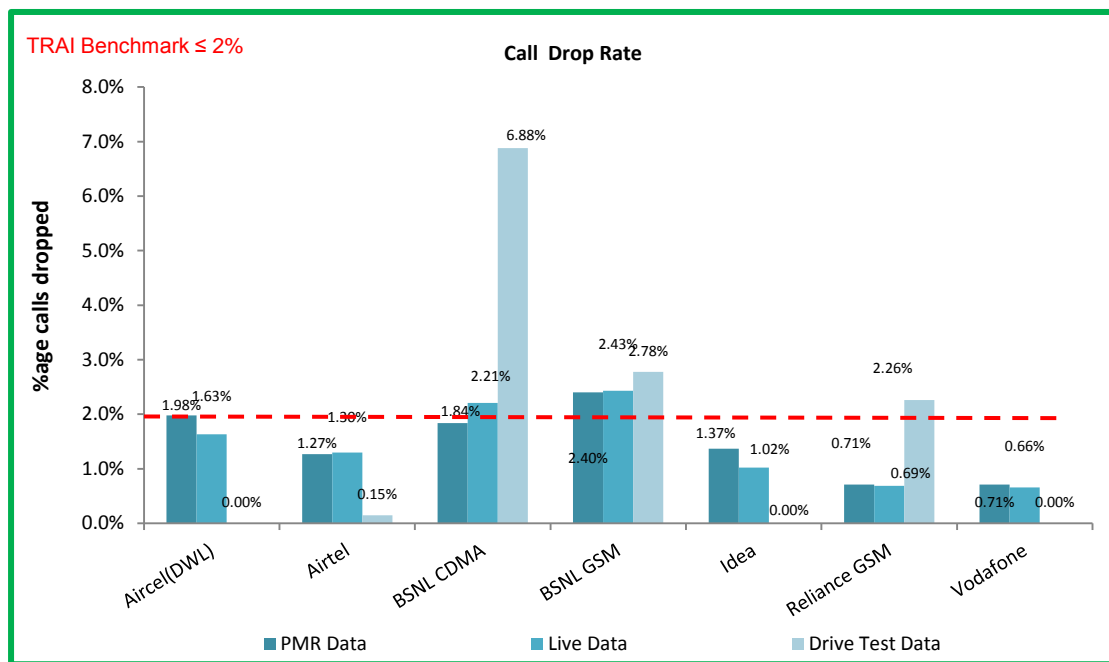
4.5.2.1 KEY FINDINGS – MONTH 1



4.5.2.2 KEY FINDINGS – MONTH 2



4.5.2.3 KEY FINDINGS – MONTH 3



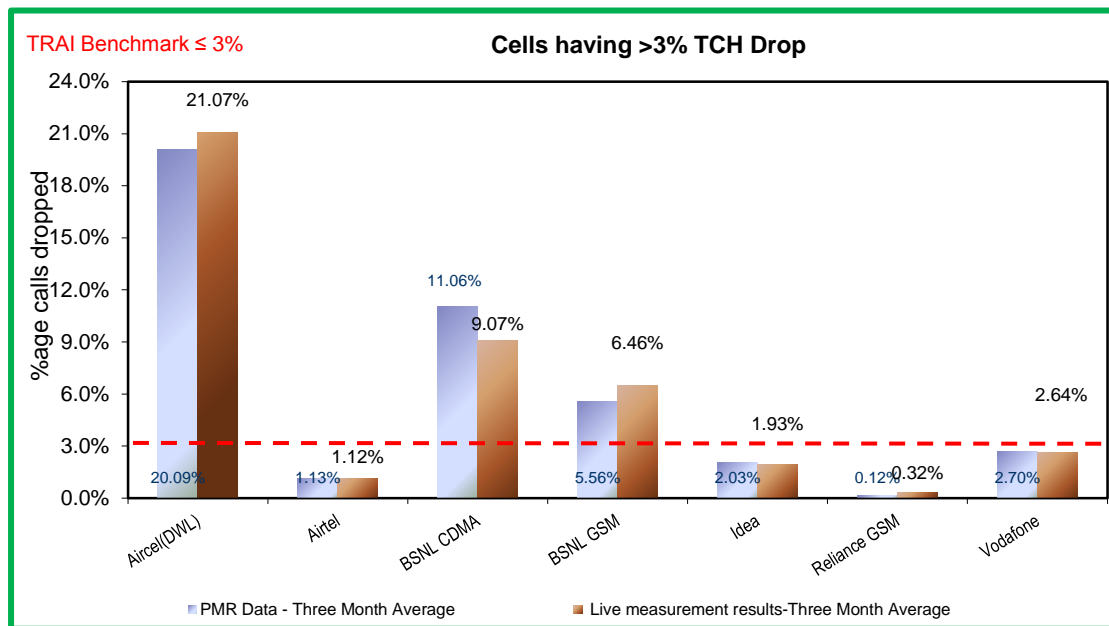
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

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:** $\left(\frac{\text{Total number of cells having more than 3\% TCH drop during CBBH}}{\text{Total number of cells in the network}} \right) \times 100$
- 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.

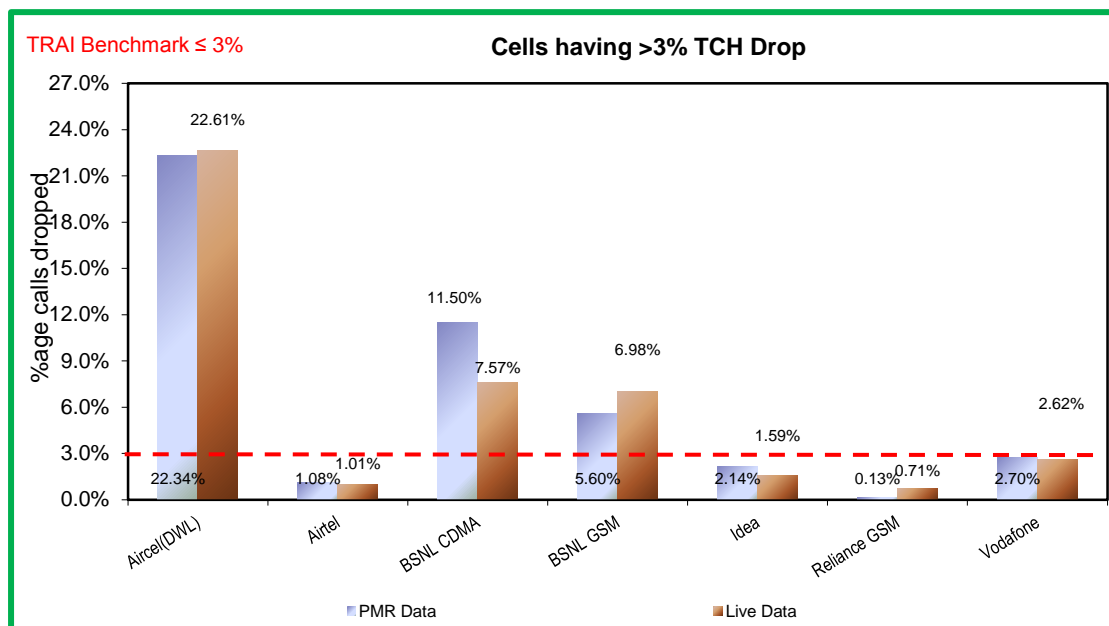
The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

4.6.2 KEY FINDINGS - CONSOLIDATED

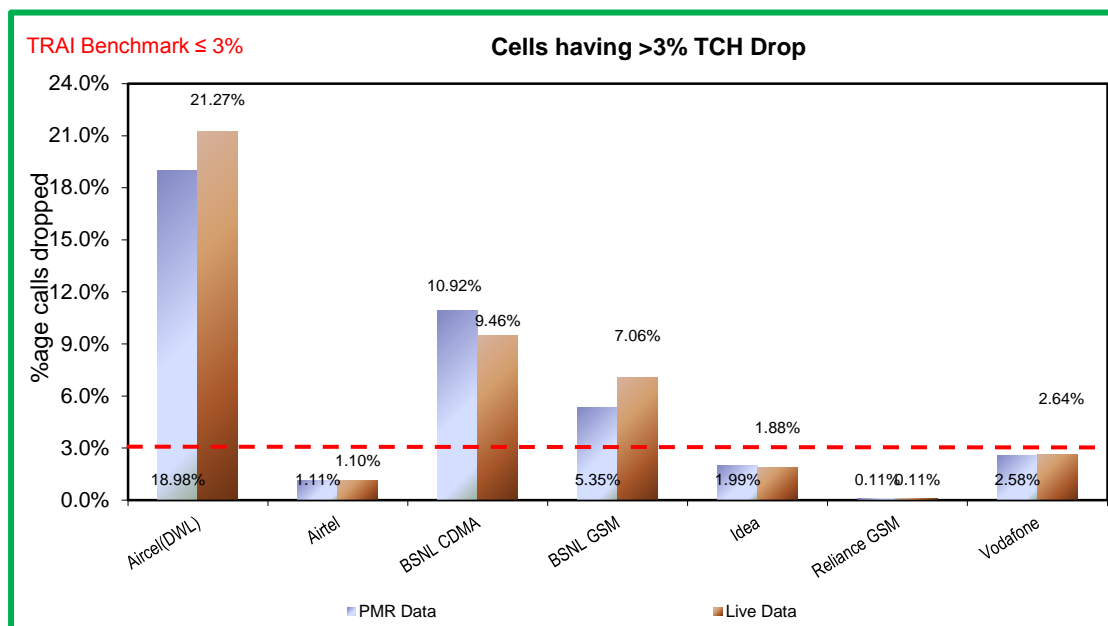


Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark during audit.

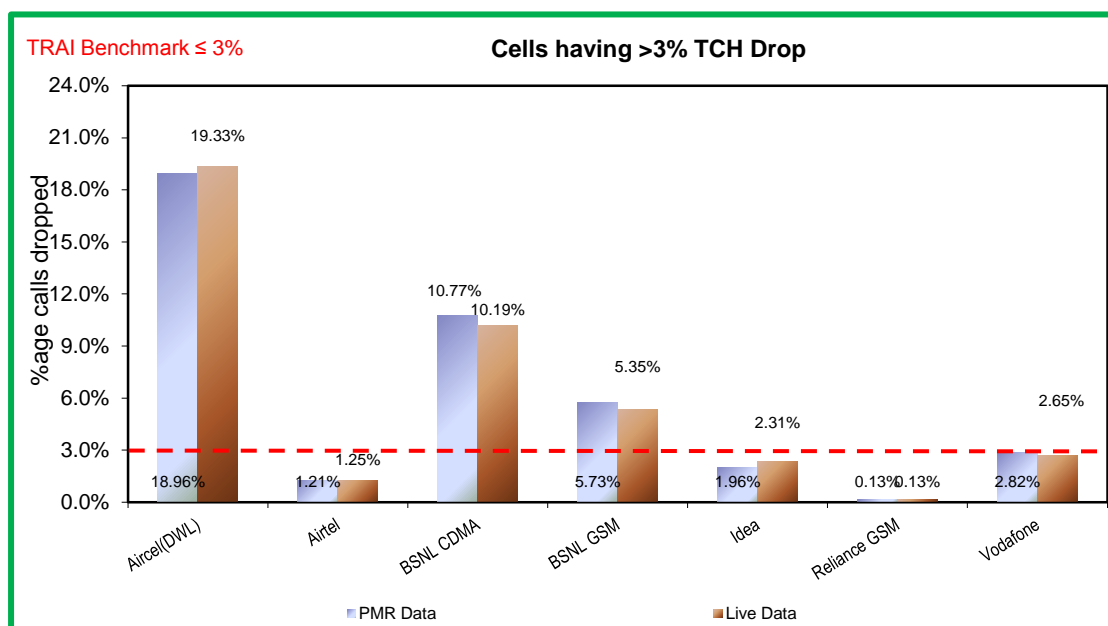
4.6.2.1 KEY FINDINGS – MONTH 1



4.6.2.2 KEY FINDINGS – MONTH 2



4.6.2.3 KEY FINDINGS – MONTH 3



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 its FER value lies between 0 – 4 %

2. Computational Methodology:

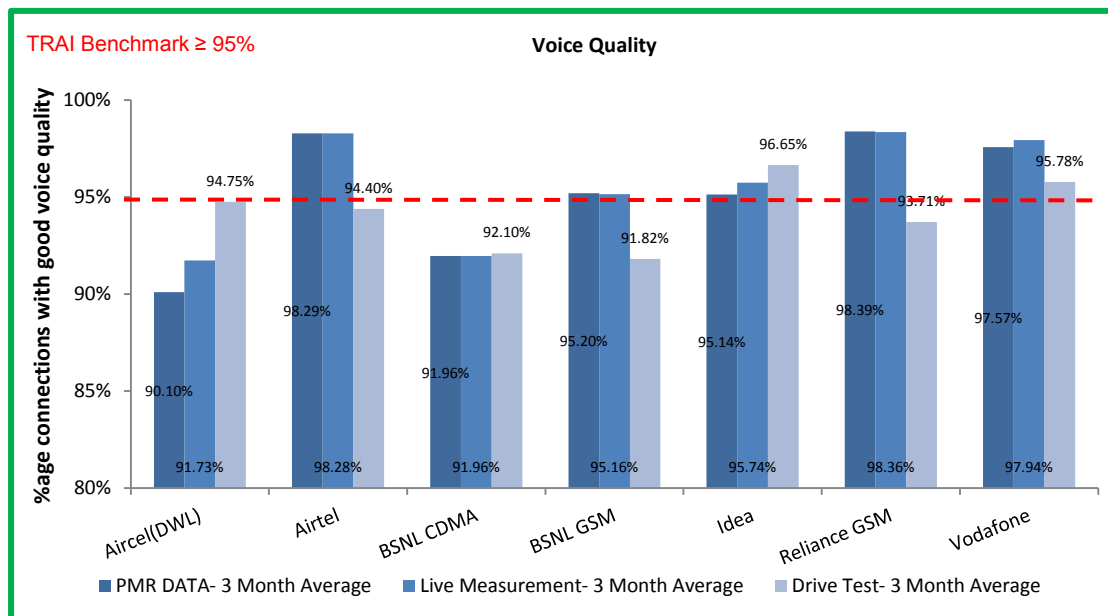
- ✍ **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

3. TRAI Benchmark: ≥ 95%

4. Audit Procedure –

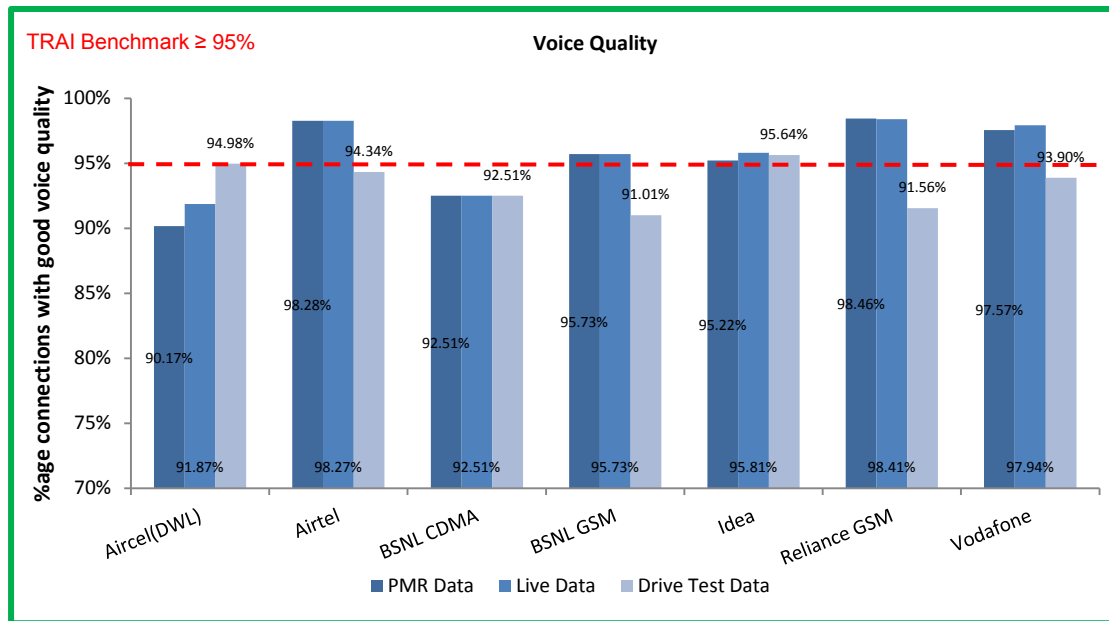
- a. A sample of calls would be taken randomly from the total calls established.
- b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

4.7.2 KEY FINDINGS

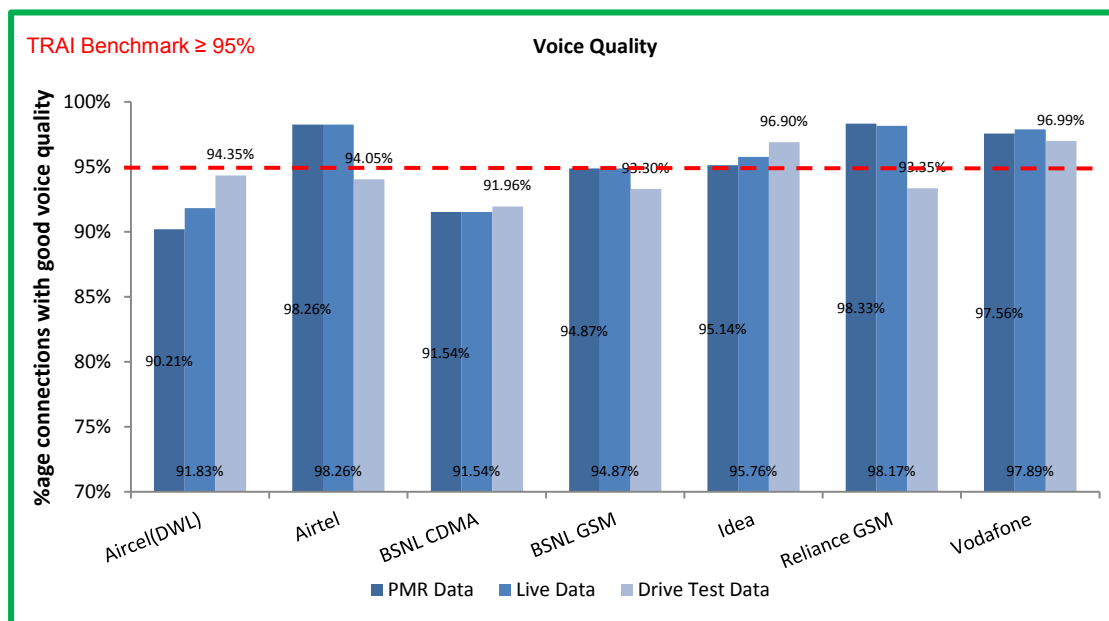


Aircel & BSNL CDMA were not able to meet the benchmark for Voice quality as per PMR data.

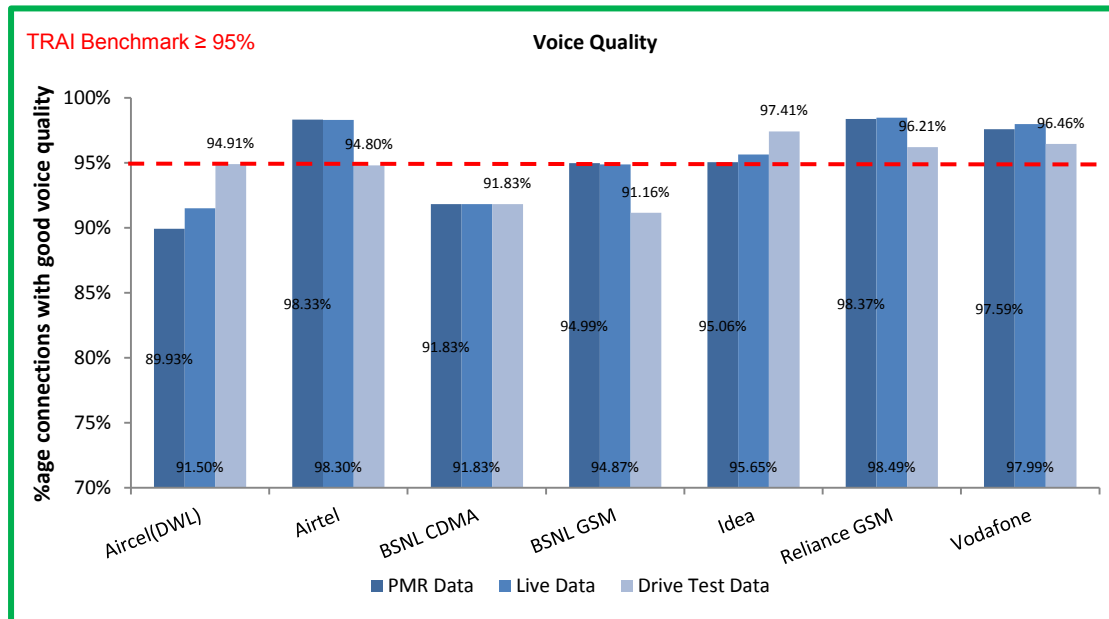
4.7.2.1 KEY FINDINGS – MONTH 1



4.7.2.2 KEY FINDINGS – MONTH 2



4.7.2.3 KEY FINDINGS – MONTH 3



5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

5.1 METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

5.1.1 PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th March, 2009 were covered. The types of billing complaints covered are listed below.

- ✎ Payments made and not credited to the subscriber account
- ✎ Payment made on time but late payment charge levied wrongly
- ✎ Wrong roaming charges
- ✎ Double charges
- ✎ Charging for toll free services

- ✍ Local calls charged/billed as STD/ISD or vice versa
- ✍ Calls or messages made disputed
- ✍ Validity related complaints
- ✍ Credit agreed to be given in resolution of complaint, but not accounted in the bill
- ✍ Charging for services provided without consent
- ✍ Charging not as per tariff plans or top up vouchers/ special packs etc.
- ✍ Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

➤ Computational Methodology:

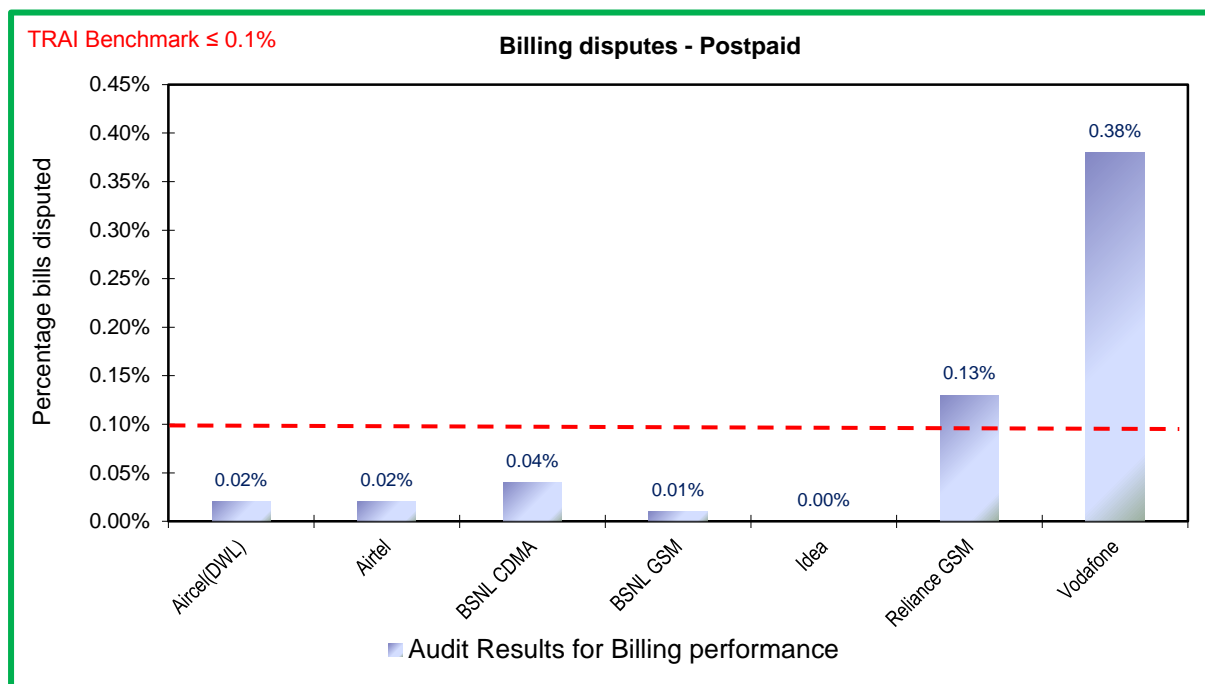
- ✍ **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
- ✍ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
- ✍ **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
- ✍ **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100

➤ TRAI Benchmark: <= 0.1%

➤ Audit Procedure:

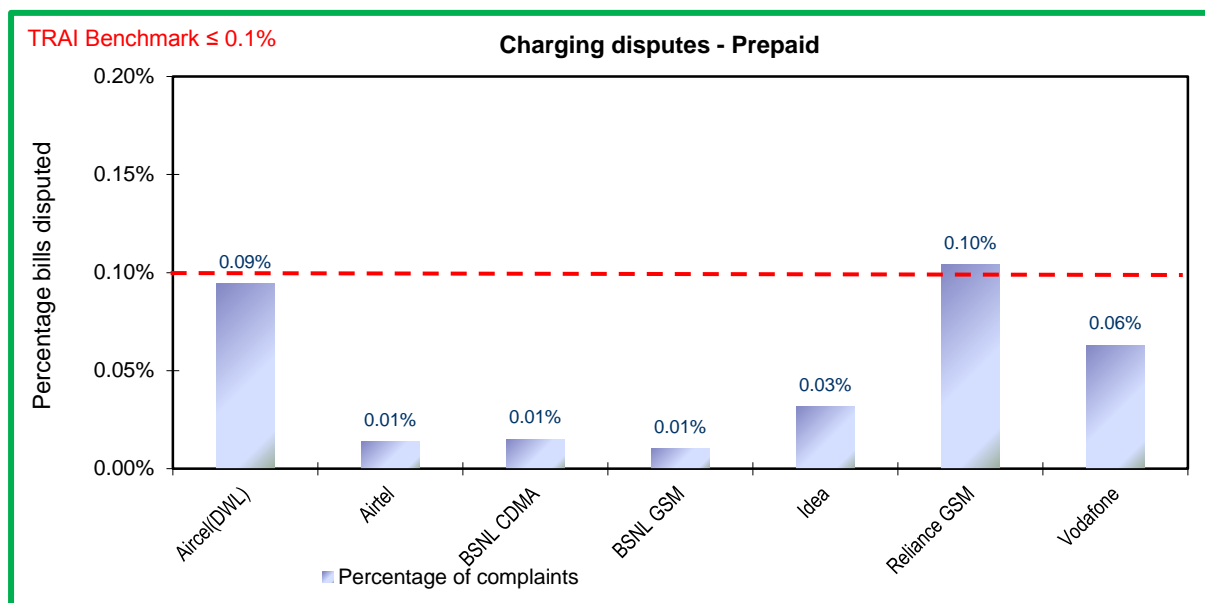
- ✍ Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
 - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
 - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

5.1.2 KEY FINDINGS – POSTPAID BILLING DISPUTES



Vodafone and Reliance GSM failed to meet the benchmark of 0.1% postpaid billing complaints.

5.1.3 KEY FINDINGS - PREPAID CHARGING DISPUTES



Reliance GSM missed the benchmark of charging disputes for prepaid.

5.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

5.2.1 PARAMETER DESCRIPTION

Important Note (Change of Benchmarks): TRAI had recommended a change of benchmarks to all operators and IMRB in the month of September for Resolution of billing complaints parameter.

For wireless audit of JAS'14 quarter, all operators provided the data for PMR preparation as per old benchmark levels.

The difference between the old and new benchmark has been given below.

Parameter	Old Benchmark	New Benchmark
Resolution of billing complaints	100% within 4 weeks	98% within 4 weeks, 100% within 6 weeks

➤ Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to calculate resolution of billing complaints.

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

✎ ****Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.**

➤ ***** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.**

➤

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling for metering and billing has been done to check billing performance as per old benchmarks.

5.2.2 KEY FINDINGS

Audit Findings

Name of Service Provider	Resolution of Billing Complaints	
	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks
Benchmark	≥ 98%	≥ 100%
Aircel(DWL)	100.00%	100.00%
Airtel	100.00%	100.00%
BSNL CDMA	100.00%	100.00%
BSNL GSM	100.00%	100.00%
Idea	100.00%	100.00%
Reliance GSM	100.00%	100.00%
Vodafone	100.00%	100.00%

Live Calling Results

Name of Service Provider	Metering and Billing
	%age complaints resolved within 4 weeks
Benchmark	100%
Aircel(DWL)	60.00%
Airtel	61.00%
BSNL CDMA	No Raw Data
BSNL GSM	78.00%
Idea	72.00%
Reliance GSM	87.00%
Vodafone	72.00%

All operators met the benchmark as per PMR data. However, as per live calling done to customers, the performance of all operators was observed to be far inferior to the PMR data.

Note: Auditors did not receive the raw data for live calling from the central billing center of BSNL CDMA as the operator was unable to provide the same.

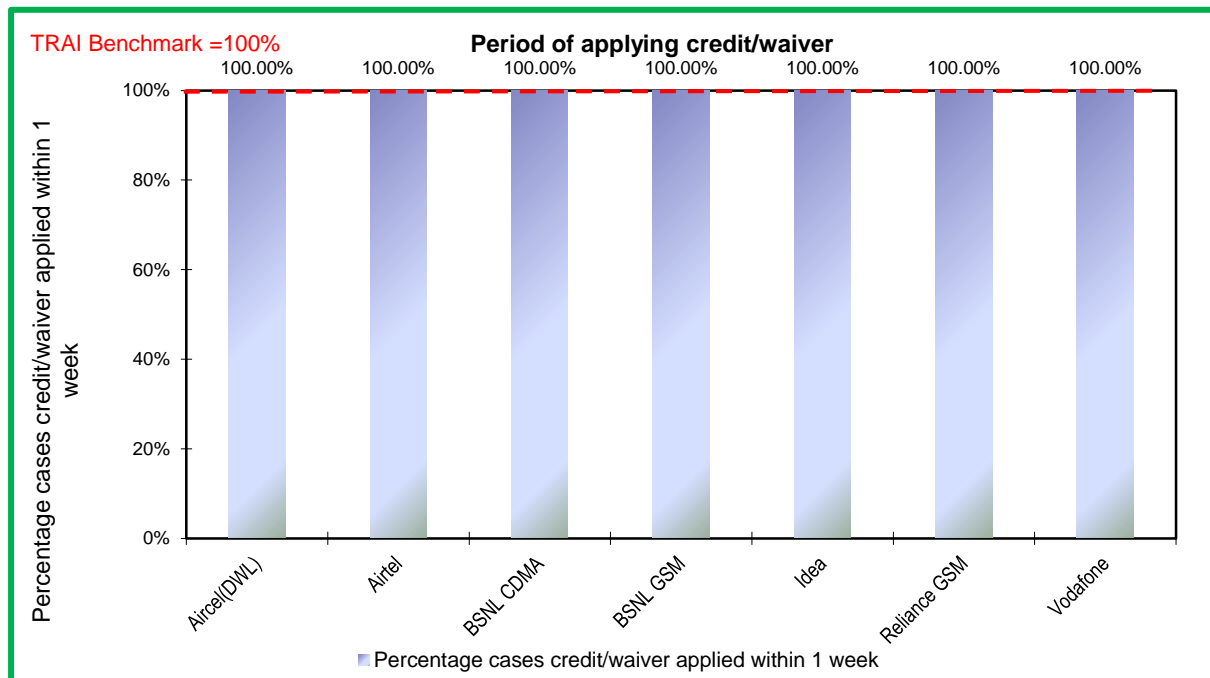
5.3 PERIOD OF APPLYING CREDIT/WAVIER

5.3.1 PARAMETER DESCRIPTION

- Computational Methodology:
 - ✦ **Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100**
- TRAI Benchmark:
 - ✦ Period of applying credit waiver within 7 days: 100%
- Audit Procedure:
 - ✦ Operator to provide details of:-
 - List of all eligible cases along with

- Date of applying credit waiver to all the eligible cases.
- Date of resolution of complaint for all eligible cases

5.3.2 KEY FINDINGS



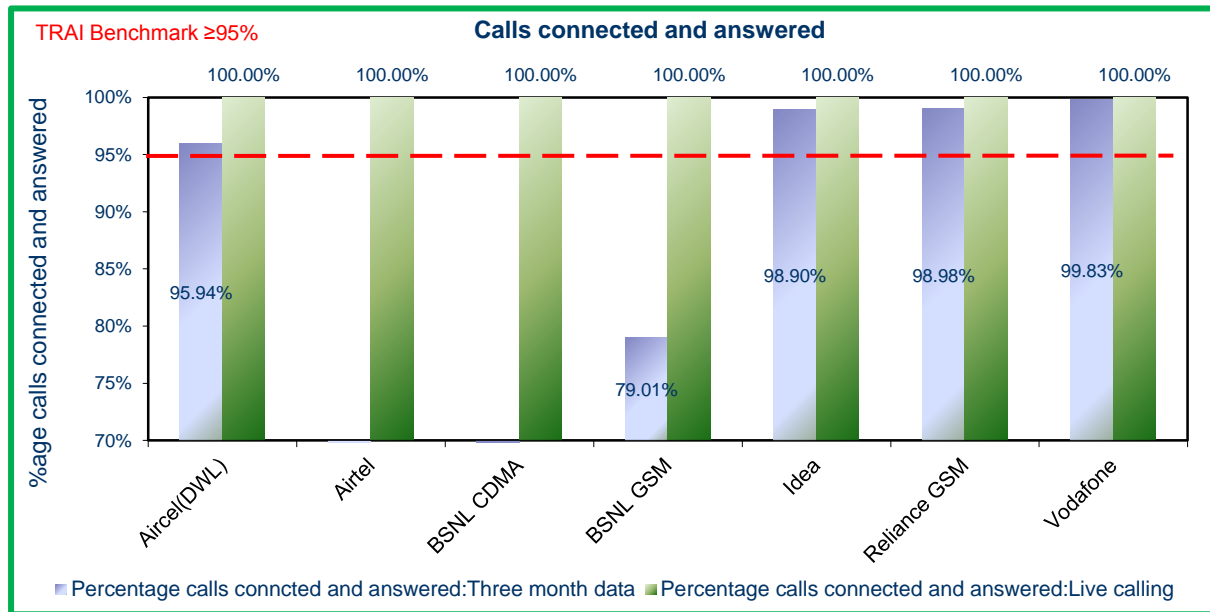
All operators met the benchmark for this parameter.

5.4 CALL CENTRE PERFORMANCE-IVR

5.4.1 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:
 - Operators provide details of the following from their central call centre/ customer service database:
 - 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

5.4.2 KEY FINDINGS



As per PMR report, BSNL GSM was not able to meet the benchmark.

Note: Auditors were not able to get the raw data from central customer service center of BSNL CDMA as the operator was unable to provide the same. Airtel had a technical issue in their system due to which they were not able to provide data for the parameter.

5.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

5.5.1 PARAMETER DESCRIPTION

➔ Computational Methodology:

There has been a change of benchmark levels for the parameter from Sep 2014.

Some of the operators have been able to change their systems as per the new benchmarks and IMRB has audited the data as per new benchmarks for those operators.

However, some operators are still in the process of changing their systems as per new benchmarks. Hence, IMRB has audited these operators as per previous benchmarks.

Thus, IMRB has reported the parameters as per the data availability with the operators. The key changes in the benchmark are given in the table below.

➔ **Old Benchmark:** Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) * 100

- ✍ **New Benchmark:** Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- ✍ The calculation excludes the calls dropped before 60 seconds (for old benchmark) and before 90 seconds (for new benchmark)

Parameter	Old Benchmark	New Benchmark
Percentage of calls answered by operators (voice to voice)	within 60 seconds: In 90% of the cases or more	within 90 seconds: In 95% of the cases or more

➡ Audit Procedure:

- ✍ Operators provide details of the following from their central call centre/ customer service database:

- Total calls connected and answered by operator within 60 seconds (old benchmark)
- Total calls connected and answered by operator within 90 seconds (new benchmark)
- Total calls attempted to connect to the operator

- ✍ Also live calling was done to test the calls answered within 60 seconds by the operator

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling for customer care (voice to voice) has been done to check performance as per old benchmarks.

5.5.2 KEY FINDINGS

Audit Findings

Live Calling Results

Name of Service Provider	Customer Care		Name of Service Provider	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 90 seconds		Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 90%	≥ 95%	Benchmark	≥ 90%
Aircel(DWL)	NA	89.19%	Aircel(DWL)	100.00%
Airtel	NA	99.30%	Airtel	85.00%
BSNL CDMA	95.29%	NA	BSNL CDMA	66.00%
BSNL GSM	85.89%	NA	BSNL GSM	78.00%
Idea	NA	97.58%	Idea	95.00%
Reliance GSM	NA	94.12%	Reliance GSM	82.00%
Vodafone	96.19%	NA	Vodafone	92.00%

Note: For Customer Care (voice to voice), there are two different benchmarks (old and new). In the above table, if data is audited as per old benchmark, NA is written in the column showing data as per new benchmark and vice versa.

Aircel and BSNL GSM were not able to meet the benchmark in the audit. However, as per live calling done to customers, the performance of all operators was far inferior to the PMR data.

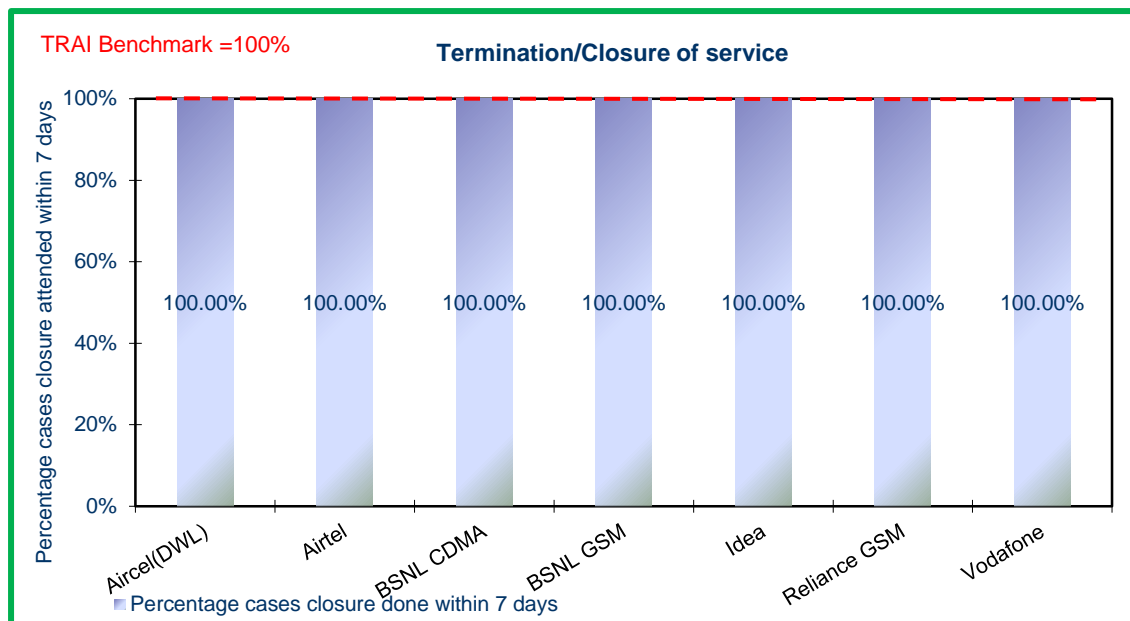
Also, auditors were not able to get the BSNL CDMA raw data as the operator did not cooperate despite multiple reminders and visits.

5.6 TERMINATION/CLOSURE OF SERVICE

5.6.1 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 provide details of the following from their central billing/CS database:
 - Date of lodging the closure request (all requests in given period)
 - Date of closure of service

5.6.2 KEY FINDINGS



All operators met the benchmark.

5.7 REFUND OF DEPOSITS AFTER CLOSURE

5.7.1 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:

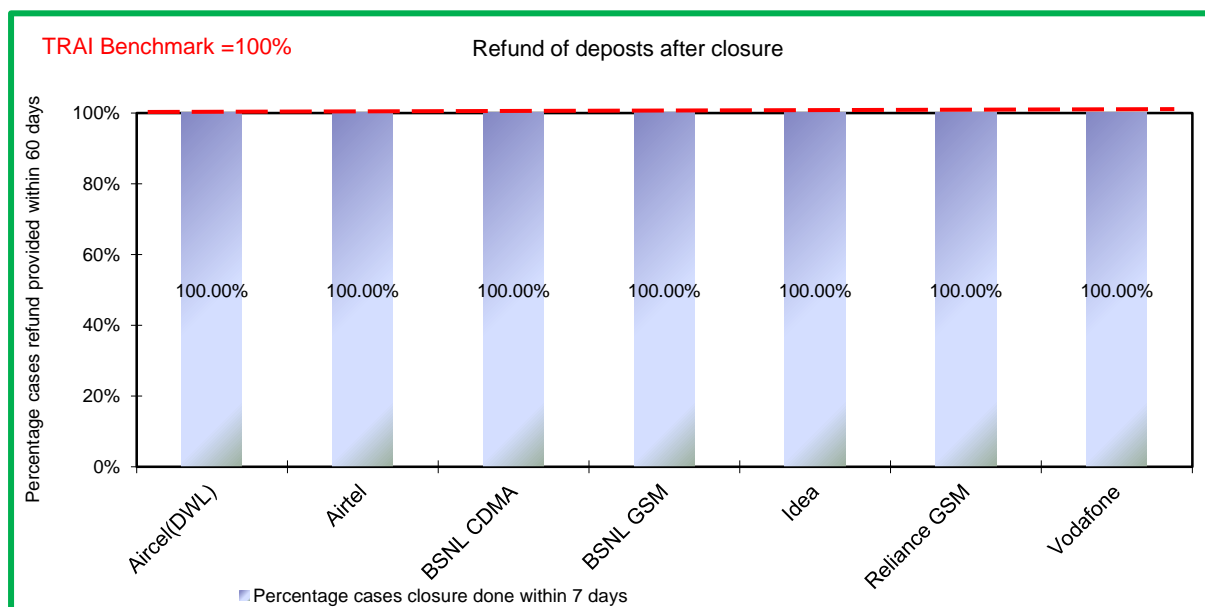
✍ Time taken for refund for deposit after closures: 100% within 60 days

➤ Audit Procedure:

✍ Operator provide details of the following from their central billing/refund database:

- Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
- Dates of refund pertaining to all closure request received during the relevant quarter

5.7.2 KEY FINDINGS



All operators met the TRAI benchmark.

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 Assam circle. As per the new directive given by TRAI headquarters, drive test for the month of July, August and September 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 post discussion with TRAI advisors. 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.

The schedule and operators involved in the operator assisted drive test for Assam circle are given below.

Month	Name of SSA Covered	Date of Drive Test
July	Kamrup	28th to 31st July, 2014
August	Silchar	27th to 29th Aug, 2014
September	Bongaigaon	15th, 16th and 19th Sep, 2014

	Name of Operator
Operator 1	Aircel(DWL)
Operator 2	Airtel
Operator 3	BSNL CDMA
Operator 4	BSNL GSM
Operator 5	Idea
Operator 8	Reliance GSM
Operator 10	Vodafone

6.1.1 JULY – KAMRUP SSA

Month	Name of SSA Covered	Date of Drive Test
July	Kamrup	28th to 31st July, 2014

6.1.1.1 ROUTE DETAILS – KAMRUP SSA

Category	Type of location	Assam-July		
		Kamrup		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Guwahati (Panbazar) to Rangia and Rangia to Guwahati via Hajo	Guwahati Pt I City Drive & Guwahati to Boko	Guwahati Pt II city Drive (including Dispur) & Dispur to Khetry and return to Guwahati via
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

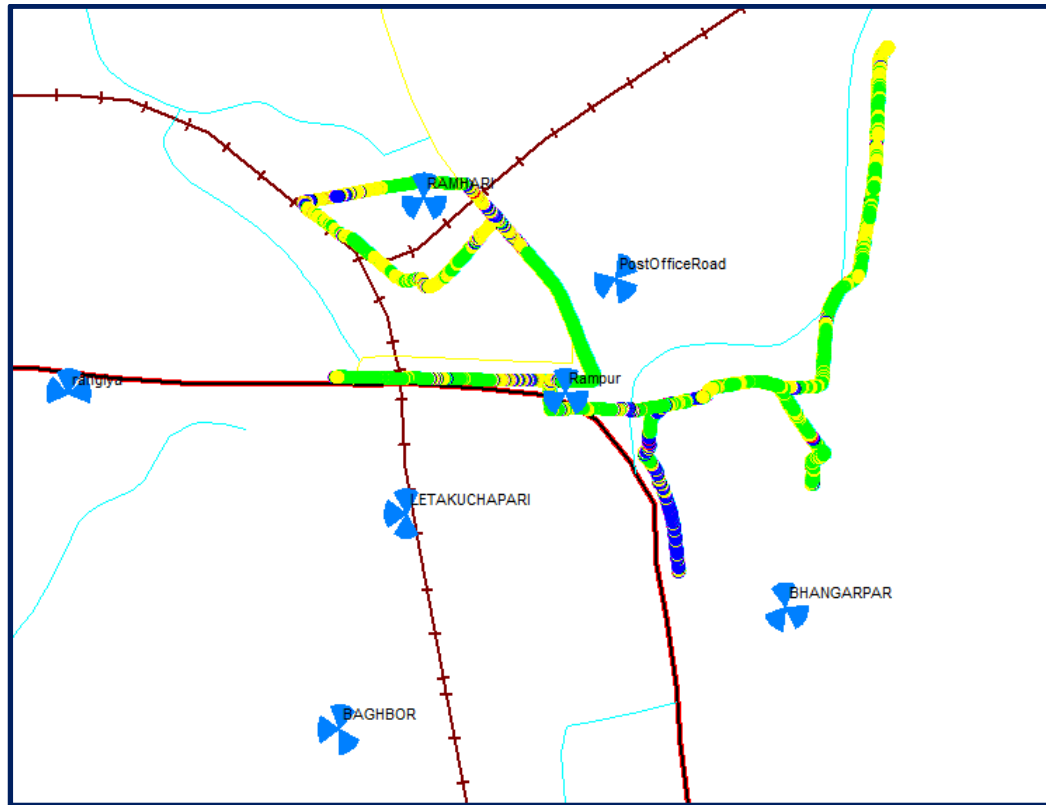
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

6.1.1.2 KILOMETERS TRAVELLED– KAMRUP SSA

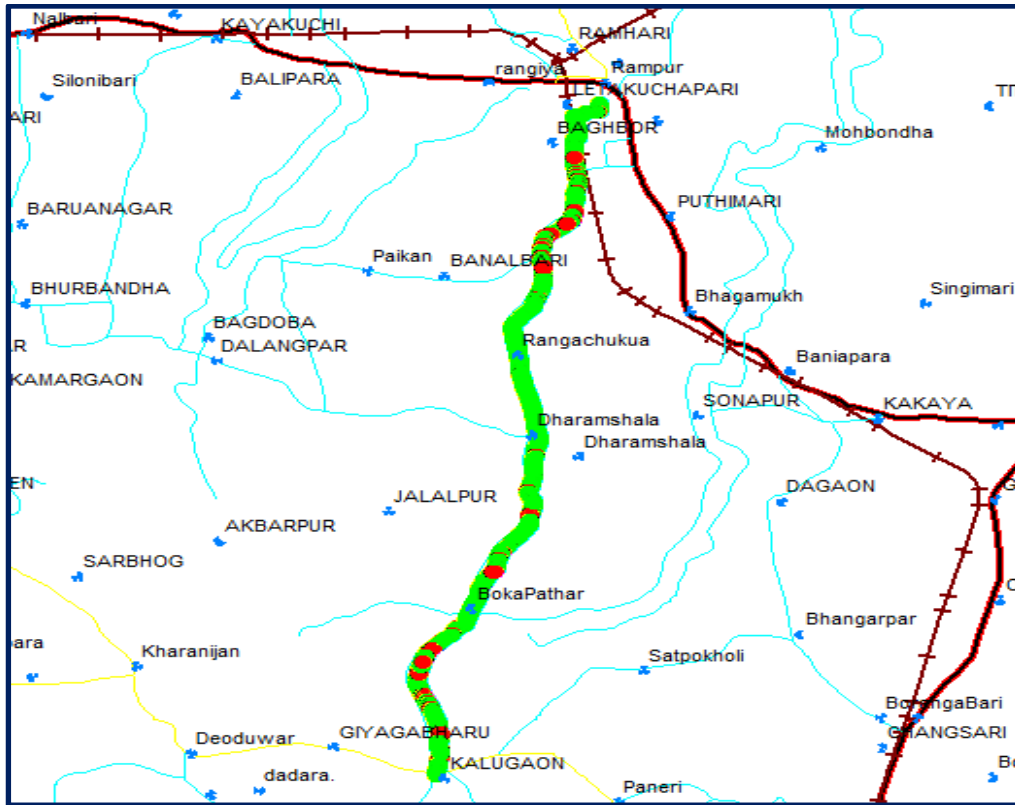
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Kamrup	123	86	95	304

6.1.1.3 ROUTE MAP KAMRUP DAY 1

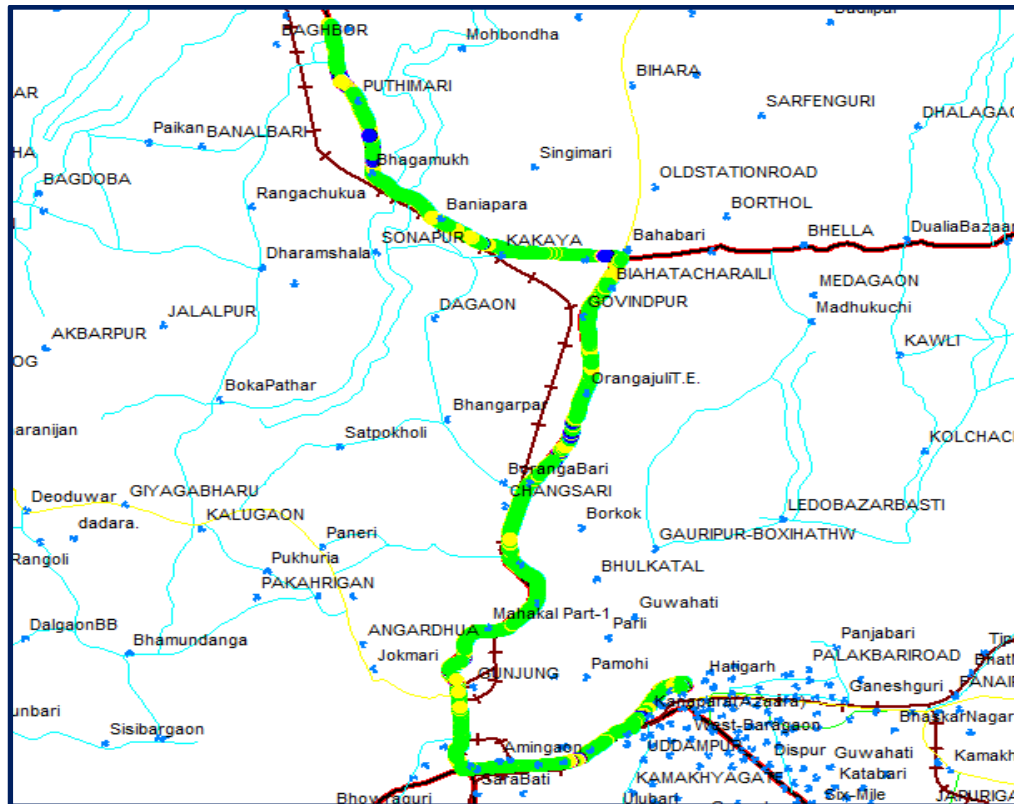
Day 1 – Within City



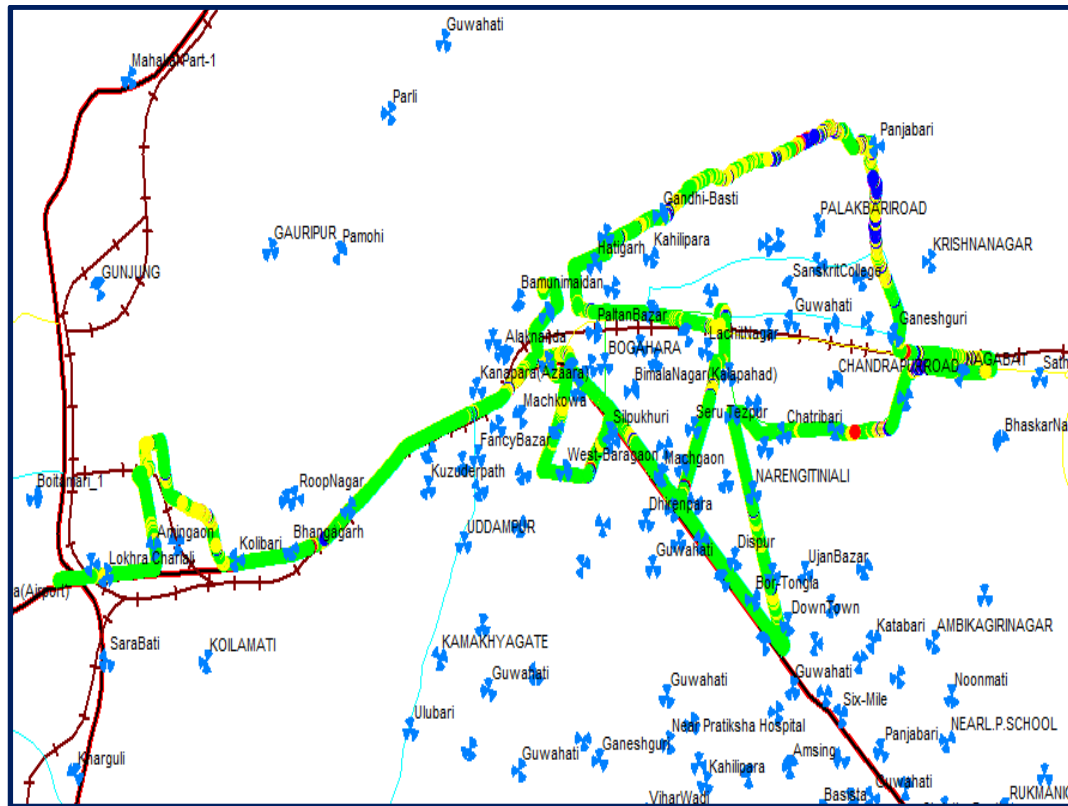
Day 1 – Major Roads



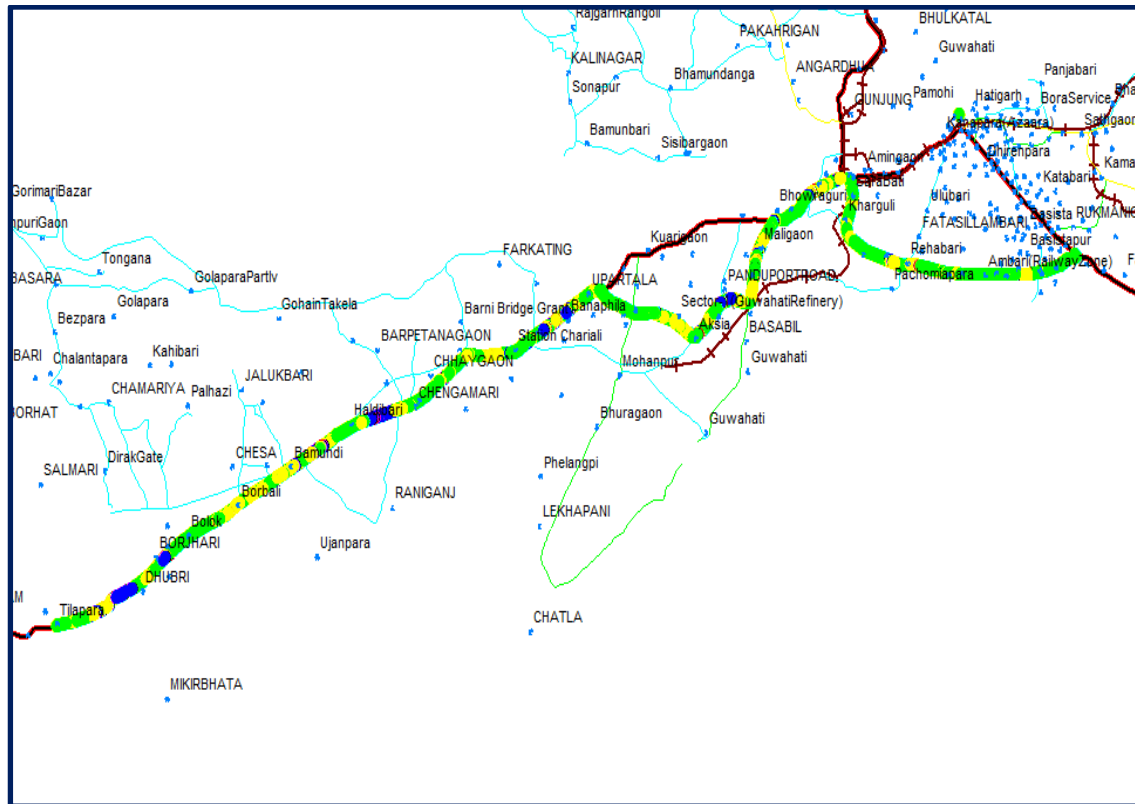
Day 1 – Highways



Day 2 – Within City

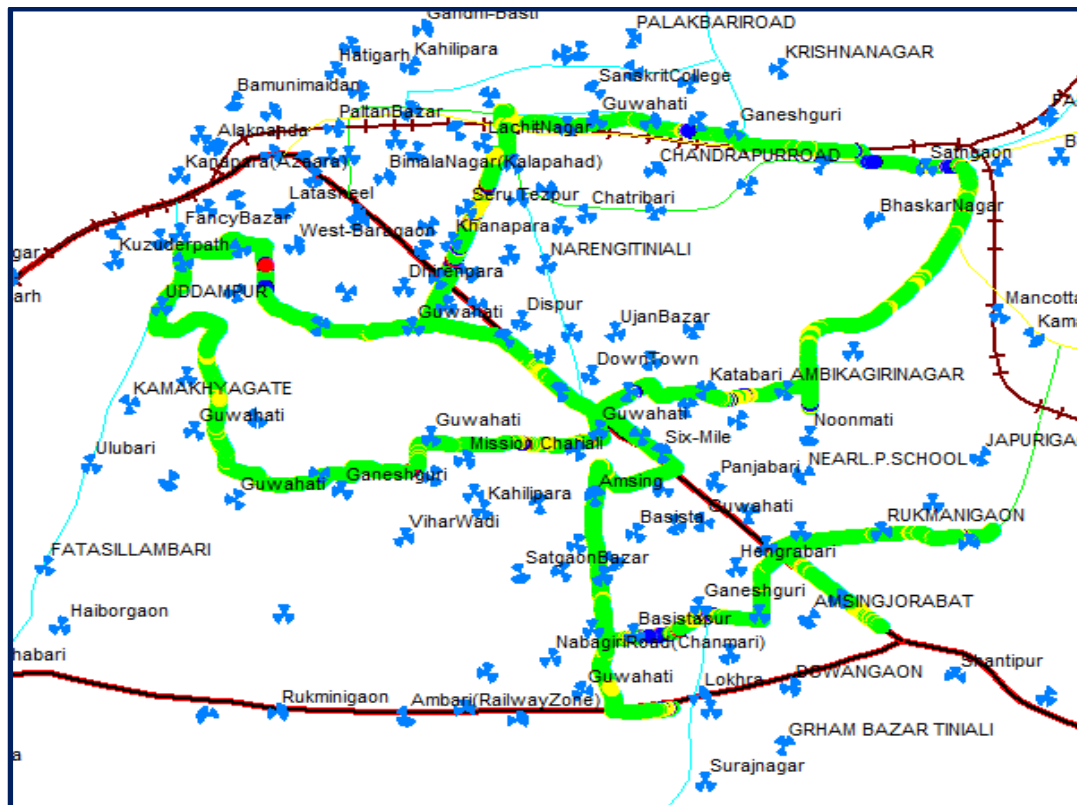


Day 2 – Highways

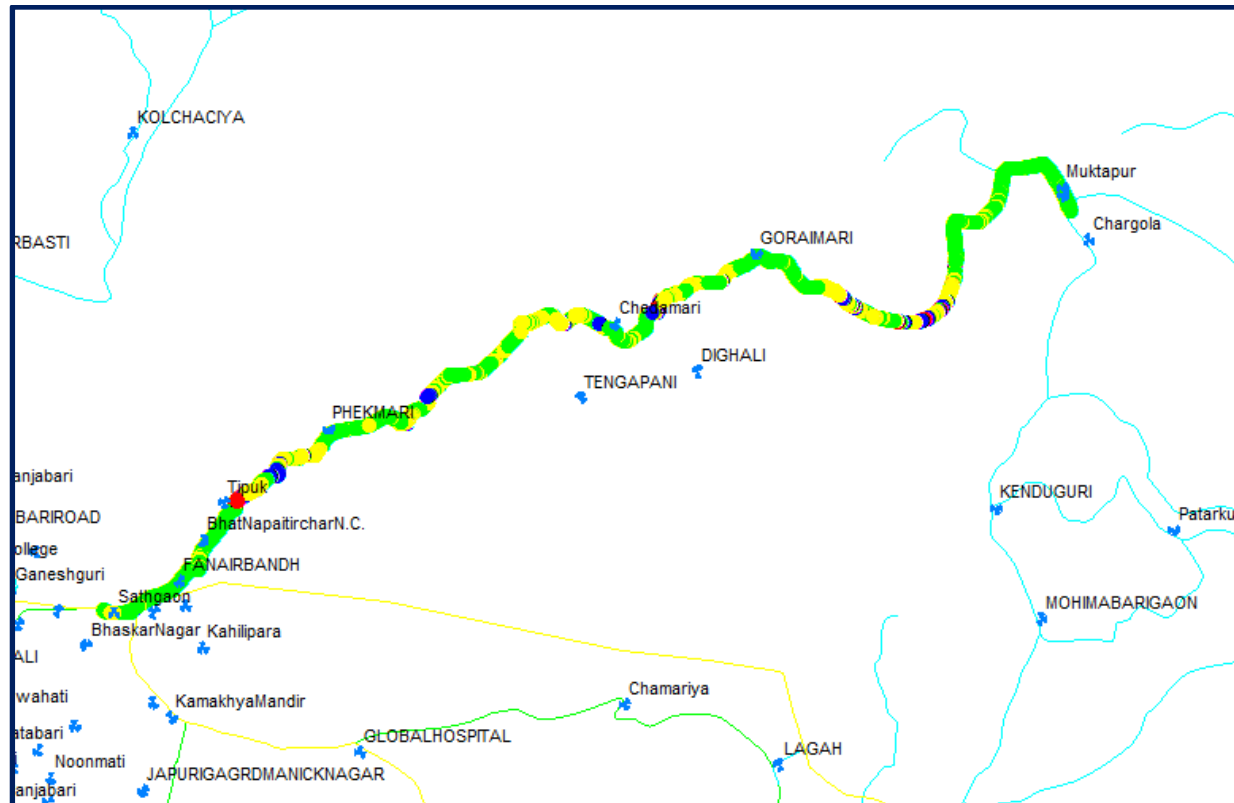


6.1.1.5 ROUTE MAP KAMRUP DAY 3

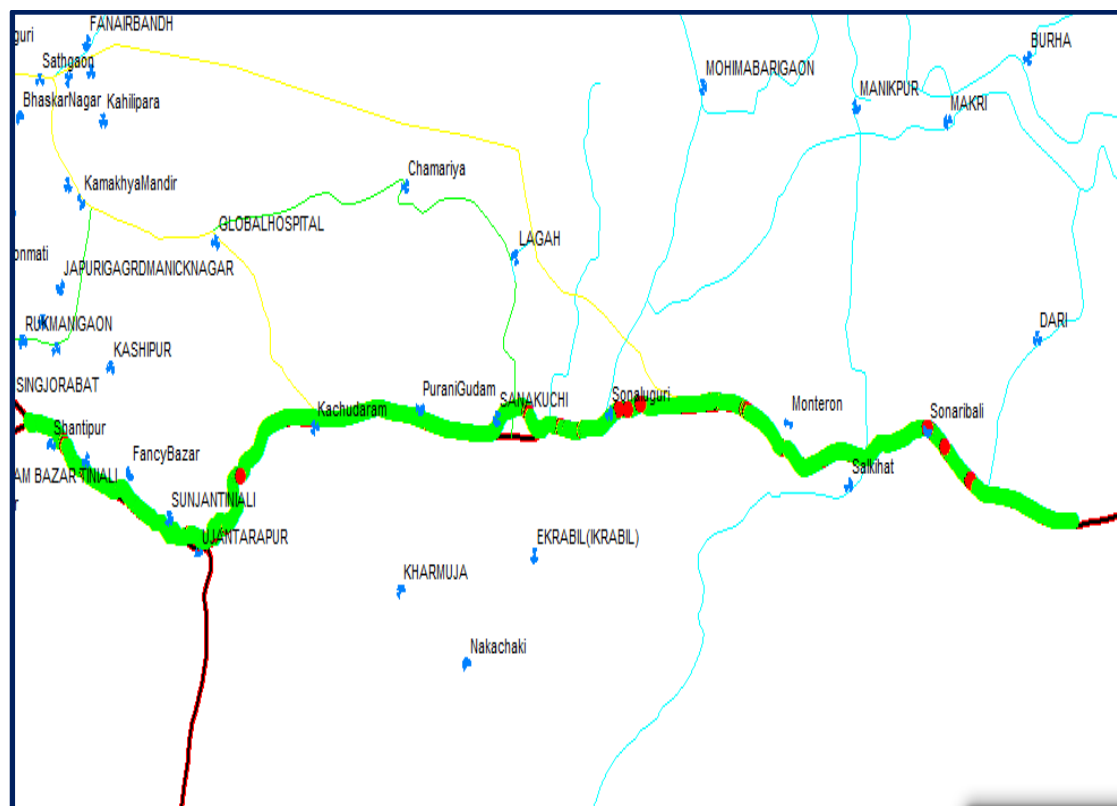
Day 3 – Within City



Day 3 – Major Roads



Day 3 – Highways



6.1.1.6 DRIVE TEST RESULTS – KAMRUP SSA

Executive Summary															
Parameter's	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		54.59%	62.97%	74.33%	70.88%	66.67%	27.97%	72.67%	22.39%	97.67%	55.75%	99.88%	55.49%	44.78%	50.62%
0 to -85 dBm		72.03%	90.87%	99.20%	91.88%	99.97%	53.88%	98.33%	55.52%	100.00%	80.50%	100.00%	84.22%	96.91%	84.63%
0 to -95 dBm		100.00%	100.00%	99.87%	98.25%	99.97%	71.13%	99.33%	83.48%	100.00%	96.00%	100.00%	95.86%	100.00%	100.00%
Voice quality	≥ 95%	97.33%	94.56%	97.70%	93.39%	98.39%	89.54%	97.64%	88.64%	99.63%	94.70%	97.64%	91.22%	98.98%	94.21%
CSSR	≥ 95%	100.00%	98.73%	100.00%	100.00%	98.81%	80.33%	100.00%	97.39%	100.00%	100.00%	100.00%	96.90%	100.00%	99.40%
%age Blocked calls		0.00%	1.27%	0.00%	0.00%	0.00%	0.00%	0.00%	5.75%	0.00%	0.00%	0.00%	2.06%	0.00%	0.61%
Call drop rate	≤ 2%	0.00%	37.50%	0.00%	0.00%	13.00%	14.85%	0.00%	7.04%	0.00%	0.00%	0.00%	2.91%	0.00%	1.58%
Hands off success rate		94.44%	97.59%	100.00%	100.00%	100.00%	100.00%	100.00%	95.61%	100.00%	100.00%	100.00%	98.62%	66.67%	78.34%

Voice Quality

None of the operators met the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

BSNL CDMA failed to meet the benchmark in outdoor locations.

Call Drop Rate

Aircel, BSNL CDMA, BSNL GSM and Reliance GSM failed to meet the benchmark in outdoor locations while BSNL CDMA failed to meet the benchmark in indoor areas as well.

6.1.2 AUGUST – SILCHAR SSA

Month	Name of SSA Covered	Date of Drive Test
August	Silchar	27th to 29th Aug, 2014

6.1.2.1 ROUTE DETAILS – SILCHAR SSA

Category	Type of location	Assam-August		
		Silchar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Silchar to Patharkandi via Karimganj - High Way No-53 Drive - 91 KMs Karimganj - City Drive – 15 KMs	Silchar to Hailakandi- High Way No-53 and 154 Drive via Algapur – 48 Kms Hailakandi - City Drive – 15 KMs Hailakandi to Silchar- Major Road Drive via Silcoorie Grant, Masimpur, Kanakpur – 54 KMs	Silchar to Lakhipur pt 1- High Way No 44 and 38 Drive via Tarapur – 56 KMs Lakhipur - City Drive – 15 KMs Silchar- City Drive – 25 KMs
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

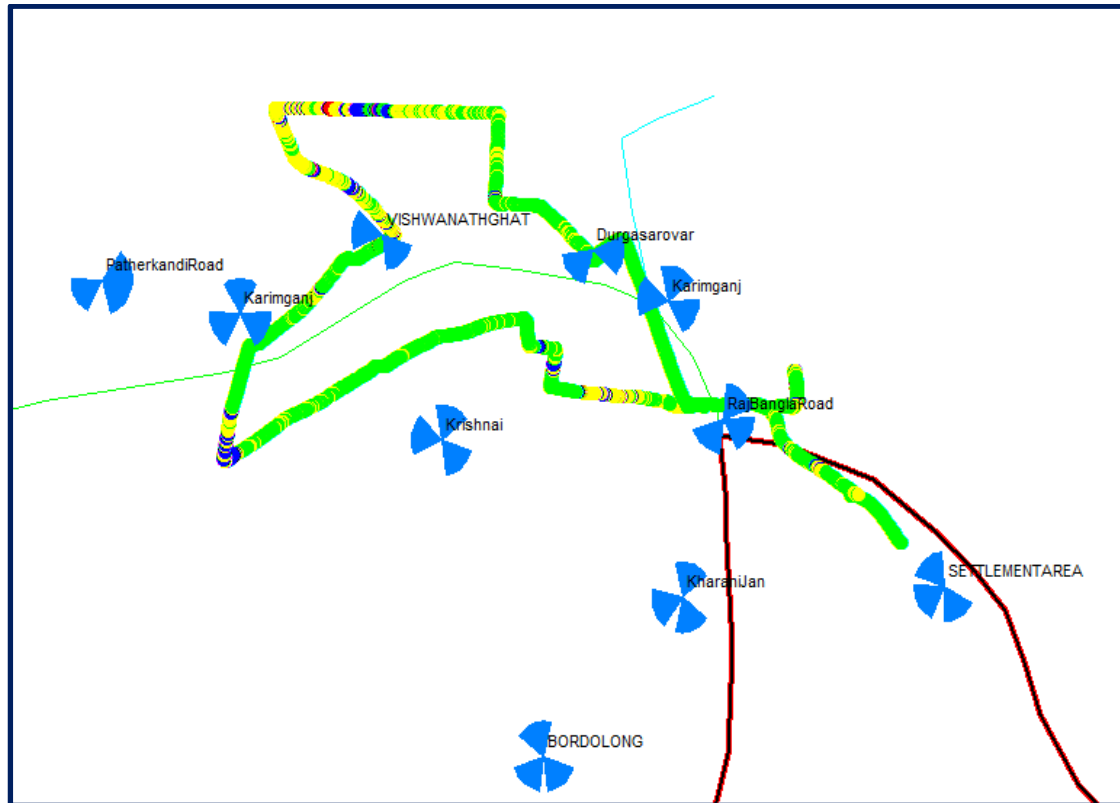
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

6.1.2.2 KILOMETERS TRAVELLED– SILCHAR SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Silchar	106	117	96	319

6.1.2.3 ROUTE MAP SILCHAR DAY 1

Day 1 – Within City

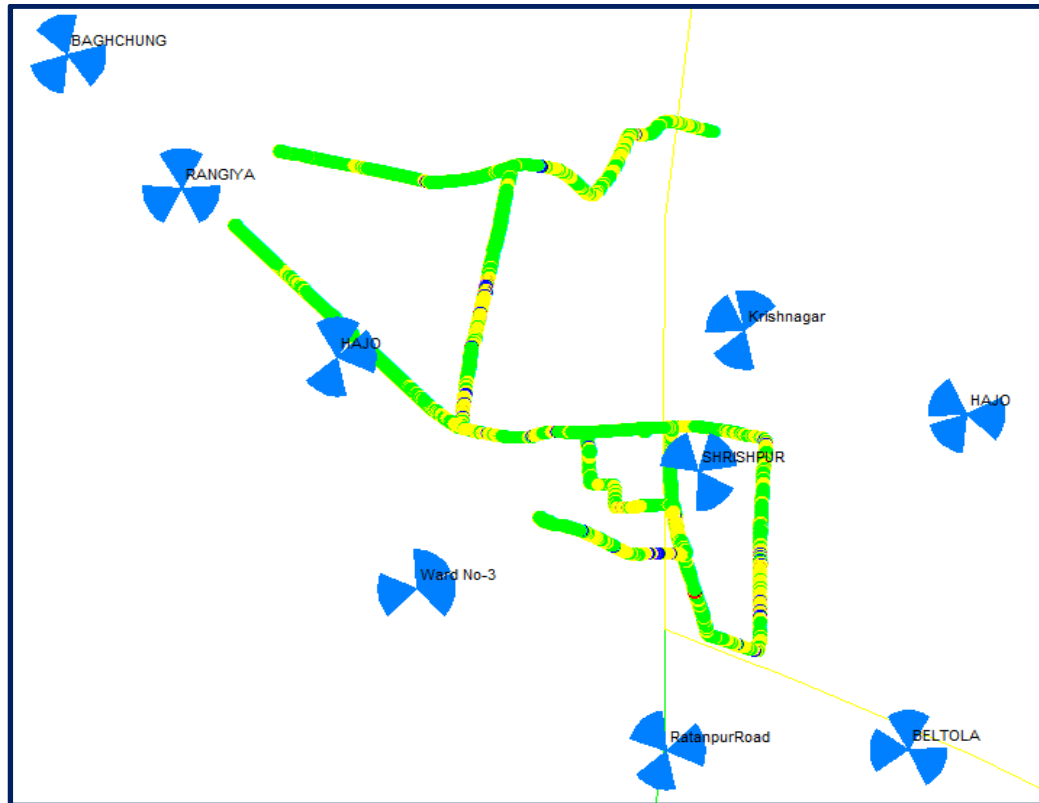


Day 1 – Highways

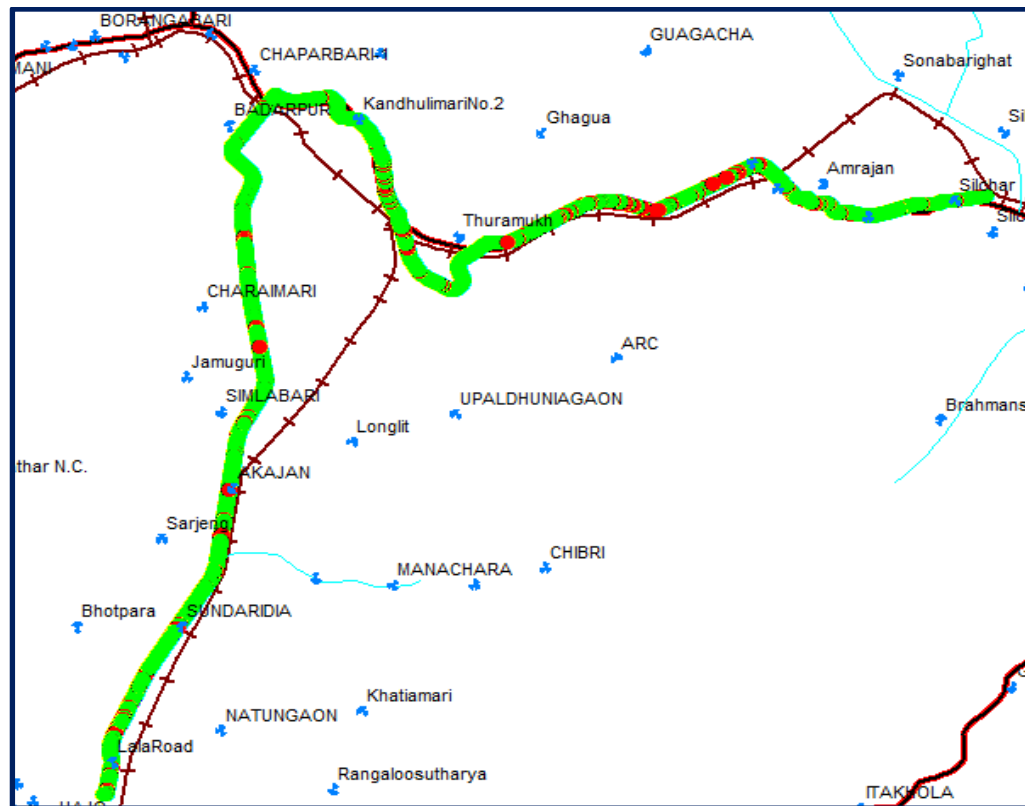


6.1.2.4 ROUTE MAP SILCHAR DAY 2

Day 2 – Within City

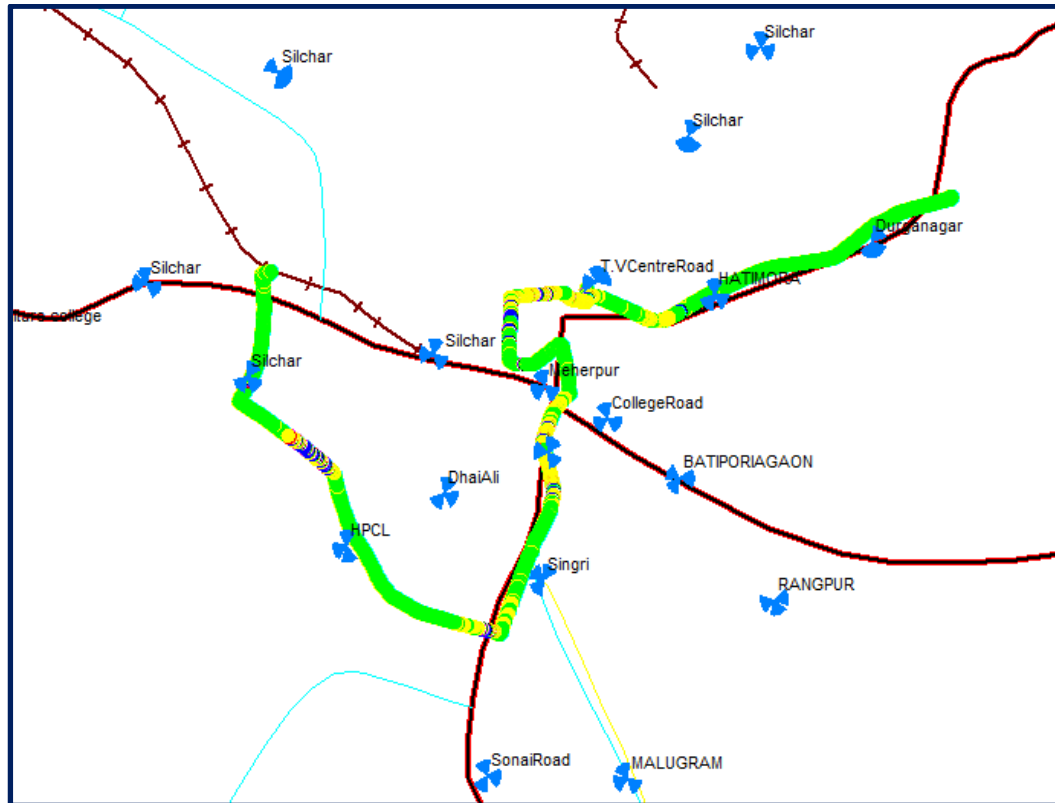


Day 2 – Highways

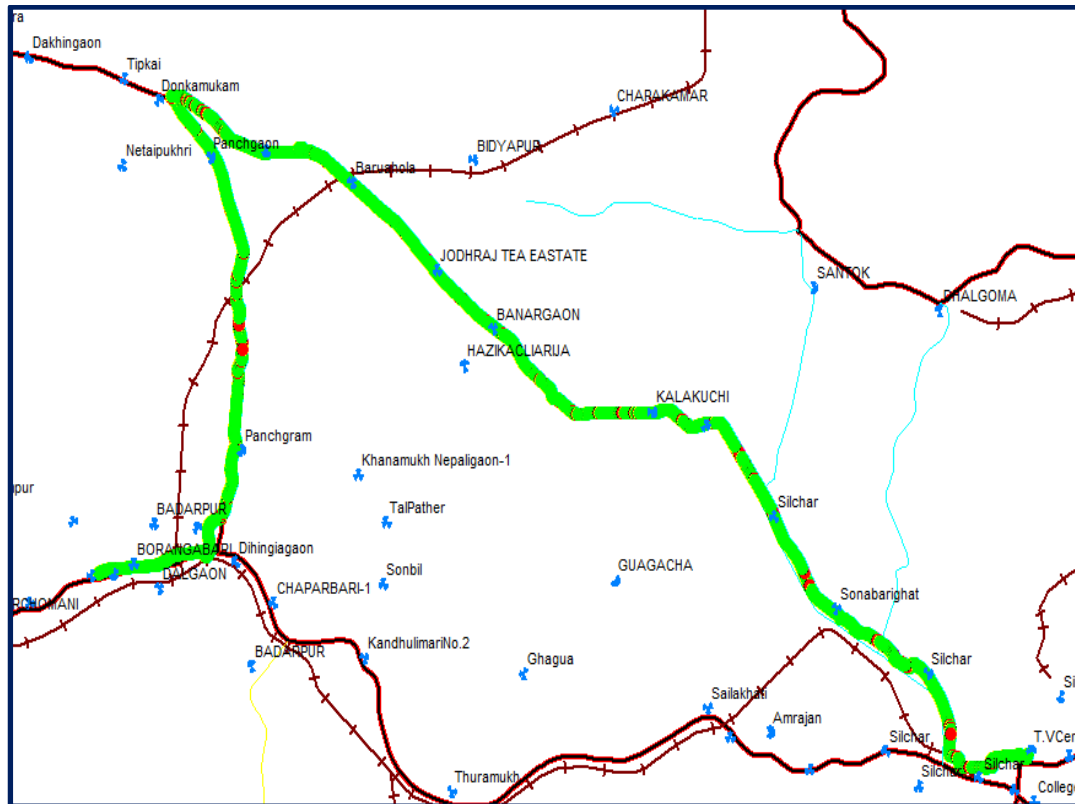


6.1.2.5 ROUTE MAP SILCHAR DAY 3

Day 3 – Within City



Day 3 – Highways



6.1.2.6 DRIVE TEST RESULTS – SILCHAR SSA

Executive Summary															
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		79.37%	79.43%	88.75%	71.33%	64.10%	14.55%	97.09%	45.33%	69.67%	50.17%	23.84%	44.21%	49.57%	61.40%
0 to -85 dBm		99.23%	95.54%	95.58%	93.17%	66.58%	38.27%	98.81%	80.67%	99.33%	81.00%	91.07%	77.54%	95.53%	90.79%
0 to -95 dBm		100.00%	100.00%	100.00%	99.33%	68.16%	69.48%	99.47%	99.85%	100.00%	96.83%	99.28%	95.18%	99.99%	101.16%
Voice quality	≥ 95%	98.19%	93.87%	99.39%	92.90%	99.19%	90.71%	99.37%	91.26%	98.94%	96.30%	98.62%	92.24%	98.83%	96.25%
CSSR	≥ 95%	100.00%	99.24%	100.00%	100.00%	100.00%	77.85%	100.00%	94.93%	100.00%	100.00%	100.00%	96.42%	100.00%	99.02%
%age Blocked calls		0.00%	0.76%	0.00%	0.00%	0.00%	22.15%	0.00%	3.13%	0.00%	0.00%	0.00%	1.14%	0.00%	0.98%
Call drop rate	≤ 2%	0.00%	0.20%	0.00%	0.00%	0.00%	9.28%	0.00%	2.84%	0.00%	0.00%	0.00%	2.10%	0.00%	0.33%
Hands off success rate		97.62%	96.18%	100.00%	100.00%	98.88%	96.83%	100.00%	97.94%	100.00%	99.84%	100.00%	95.12%	100.00%	99.28%

Voice Quality

Aircel, Airtel, BSNL CDMA, BSNL GSM and Reliance GSM did not meet the benchmark of 95% in outdoor areas.

Call Set Success Rate (CSSR)

BSNL CDMA and BSNL GSM failed to meet the benchmark in outdoor areas.

Call Drop Rate

BSNL CDMA, BSNL GSM and Reliance GSM did not meet the benchmark of 2% in outdoor areas.

6.1.3 SEPTEMBER – BONGAIGAON SSA

Month	Name of SSA Covered	Date of Drive Test
September	Bongaigaon	15th, 16th and 19th Sep, 2014

6.1.3.1 ROUTE DETAILS – BONGAIGAON SSA

Category	Type of location	Assam-September		
		Bongaigaon		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	GOALPARA-AGIA	NALBARI-BARPETA
	Highways	BONGAIGAON, SHYAMTHAIBARI, KOKRAJHAR, UDMARI PART IV, KHARAGHAT, DHUBRI	BILASIPARA-AGIA	BARPETA-BONGAIGAON
	With in the City	DHUBRI-SALBARI ROAD NO 2	GOALPARA-GOALPARA ROAD	NALBARI-SUNDARIDIA
Indoor	Shopping complex	BONGAIGAON		
	Office complex	BONGAIGAON		

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

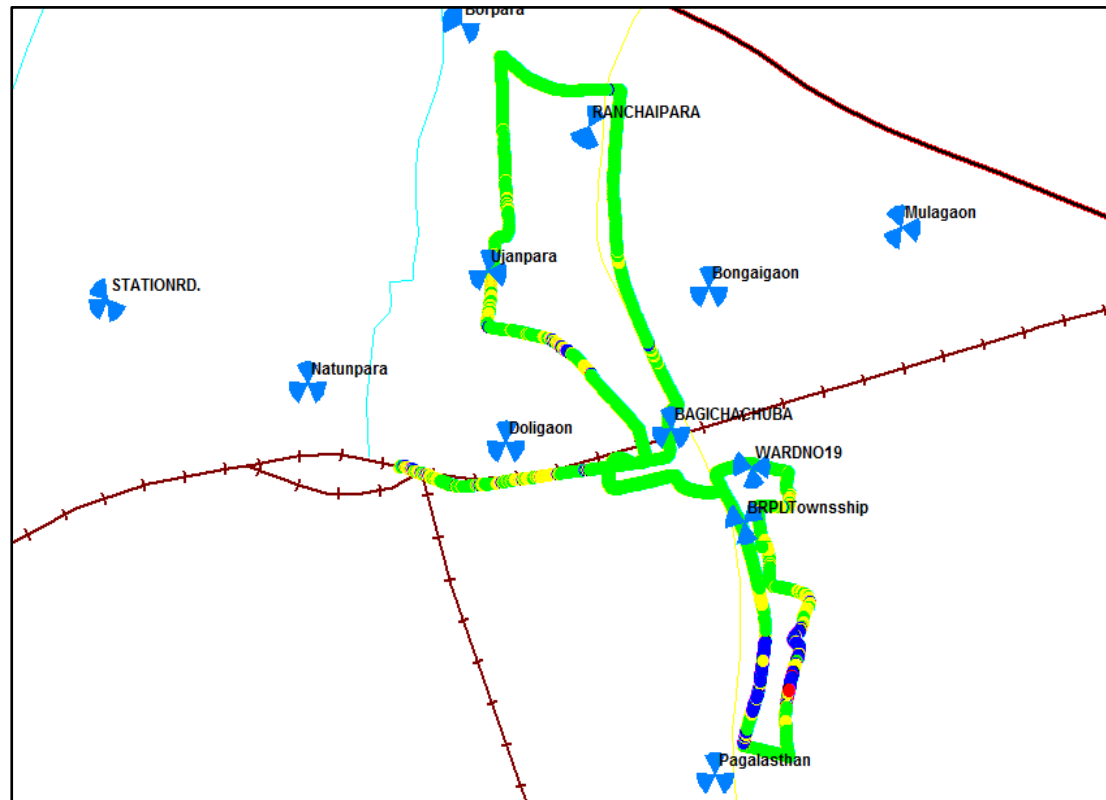
6.1.3.2 KILOMETERS TRAVELLED – BONGAIGAON SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Bongaigaon	102	165	131	398

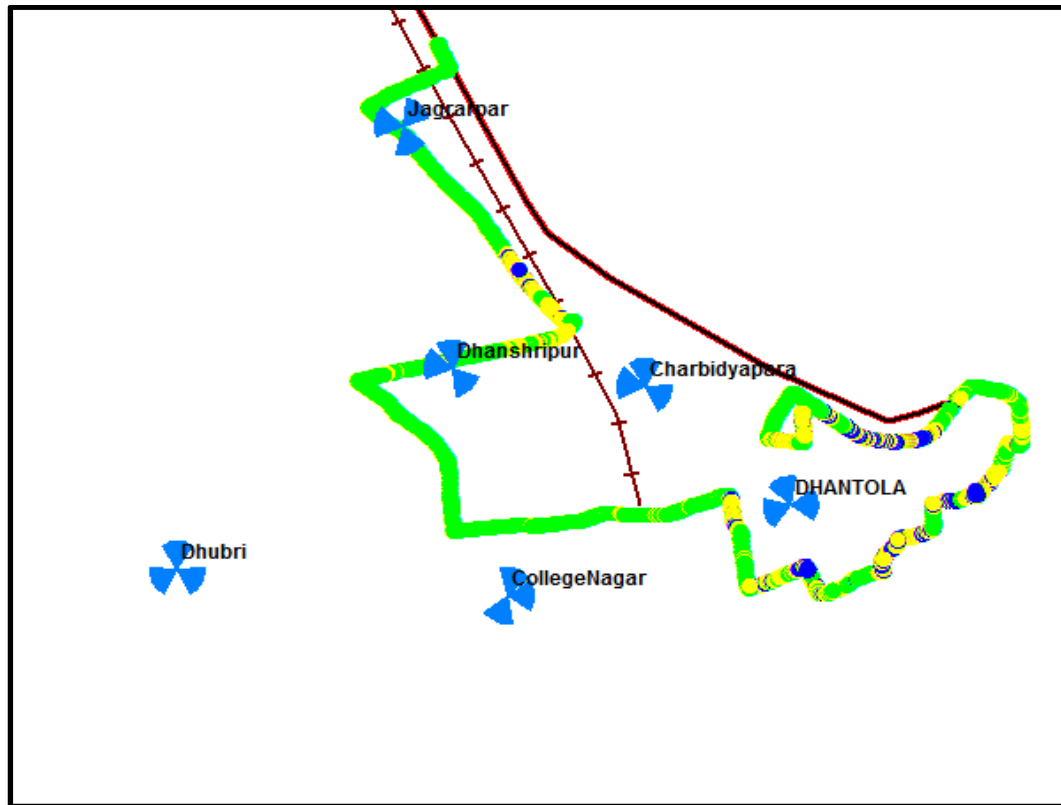
6.1.3.3 ROUTE MAP BONGAIGAON DAY 1

Day 1 – Within City

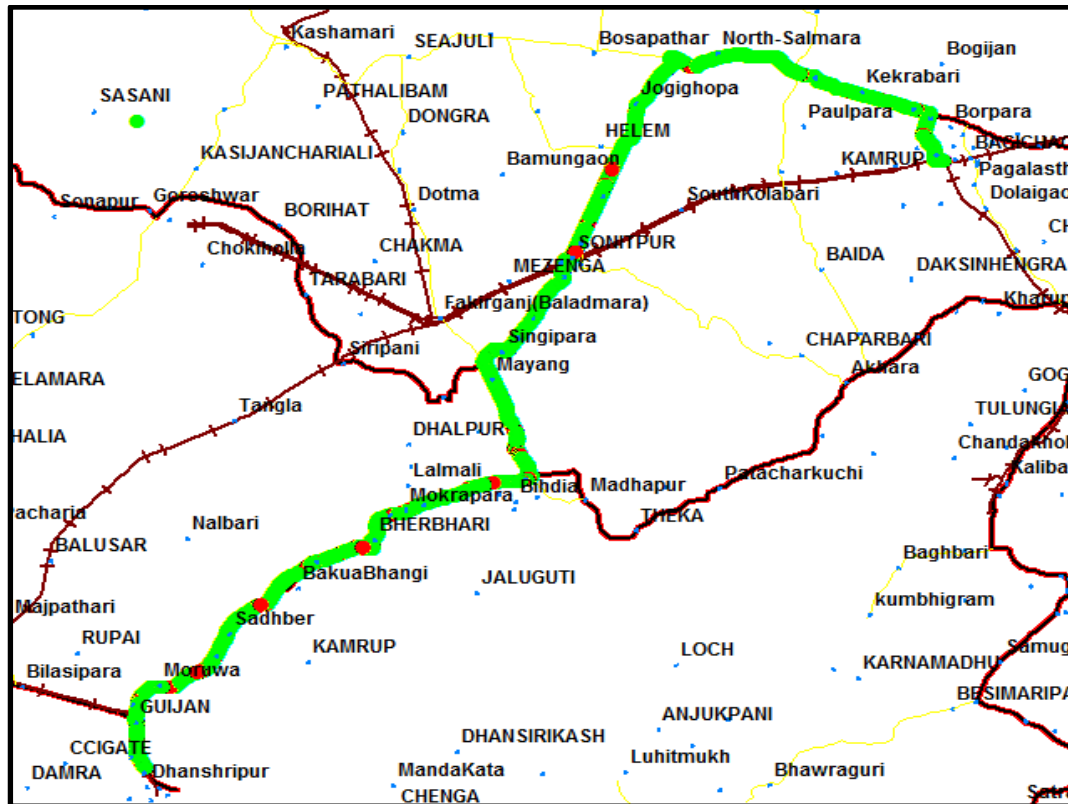
Bongaigaon



Dhubri



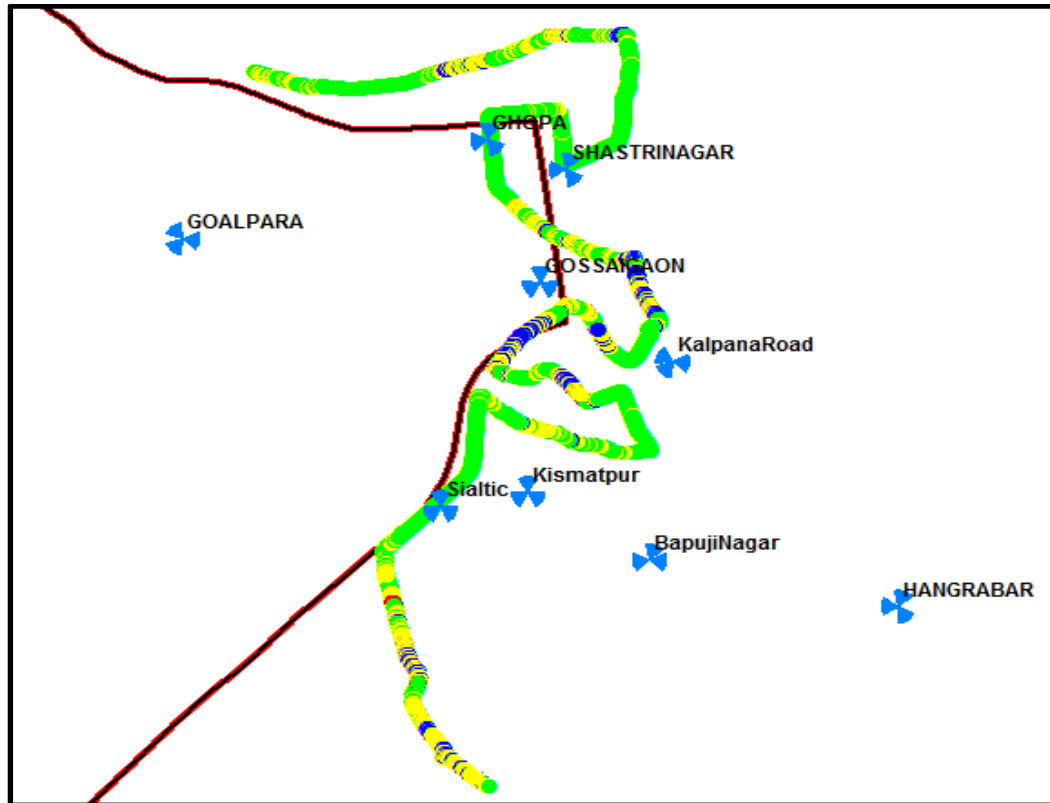
Day 1 – Highways



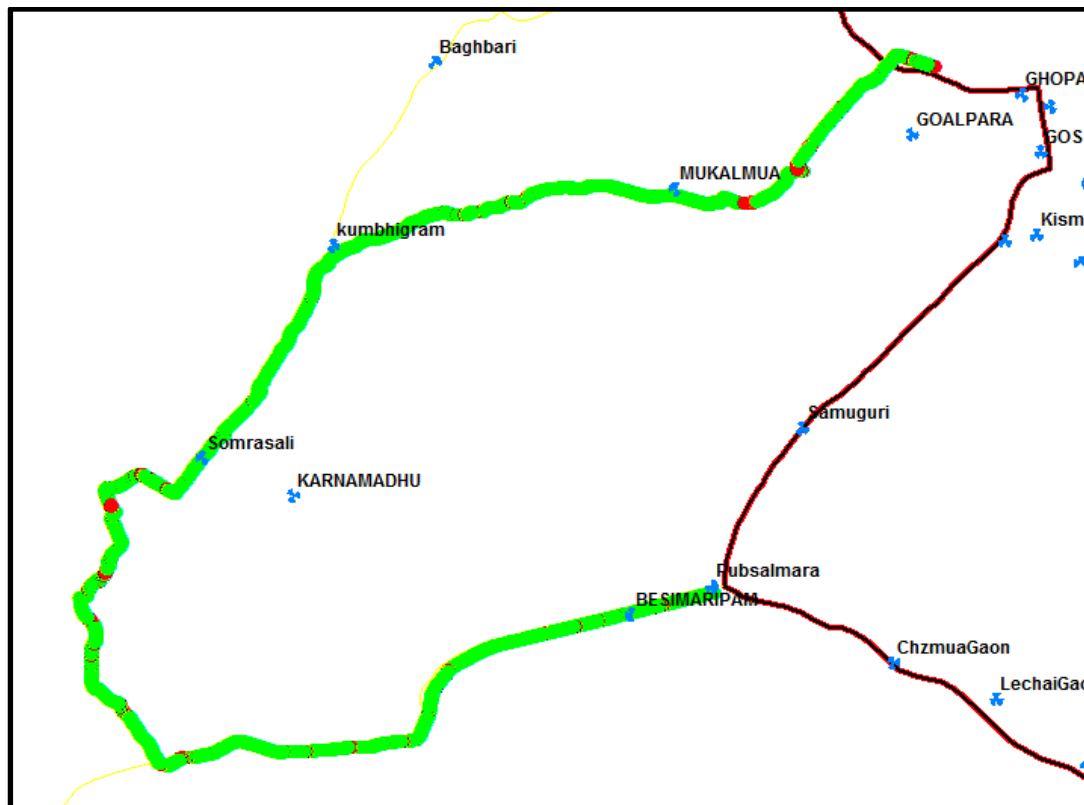
6.1.3.4 ROUTE MAP BONGAIGAON DAY 2

Day 2 – Within City

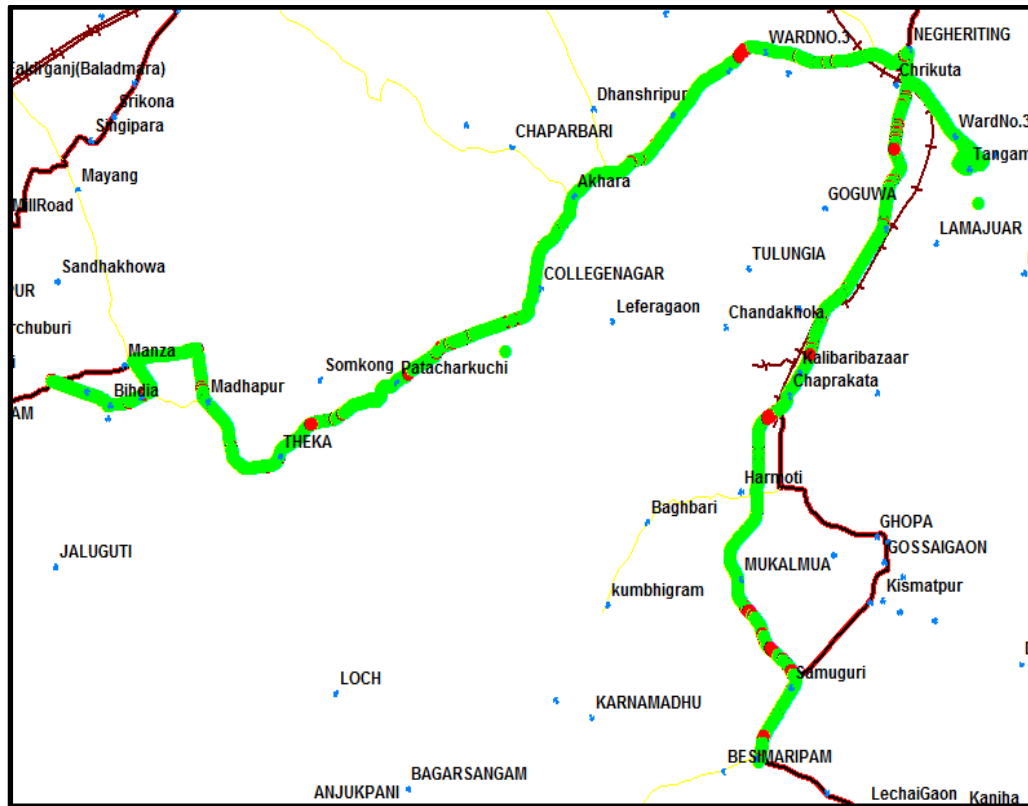
Goalpara



Day 2 – Major Roads



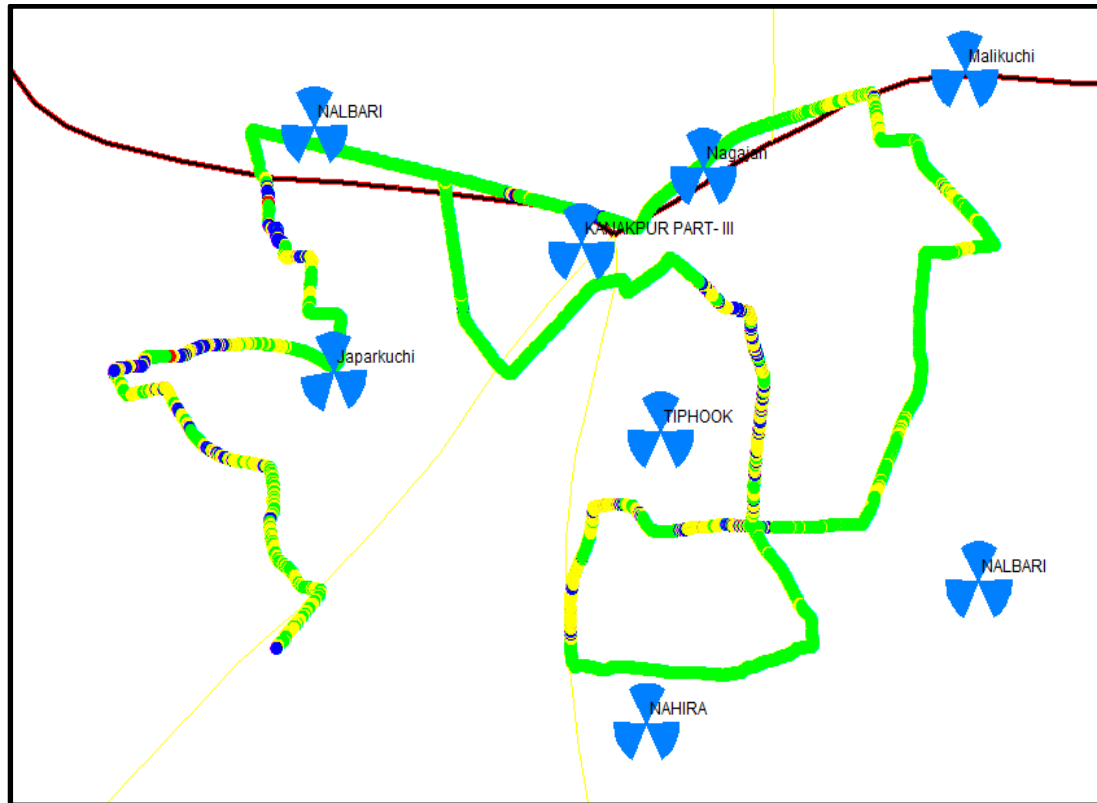
Day 2 – Highways



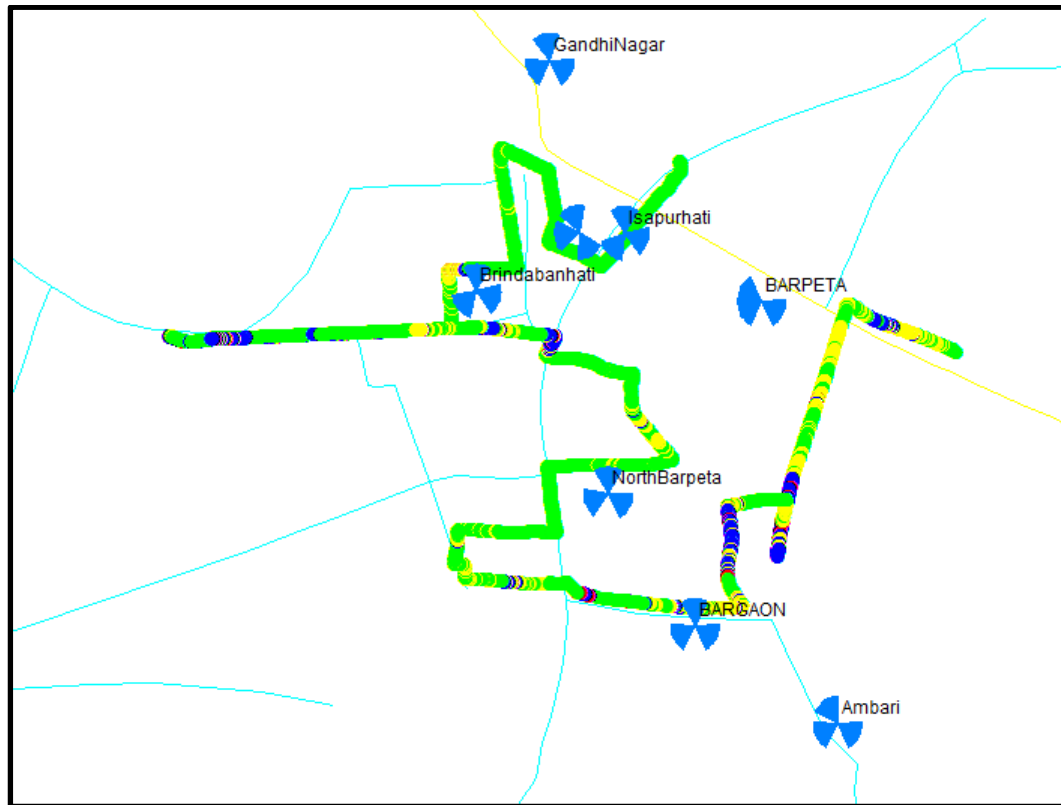
6.1.3.5 ROUTE MAP BONGAIGAON DAY 3

Day 3 – Within City

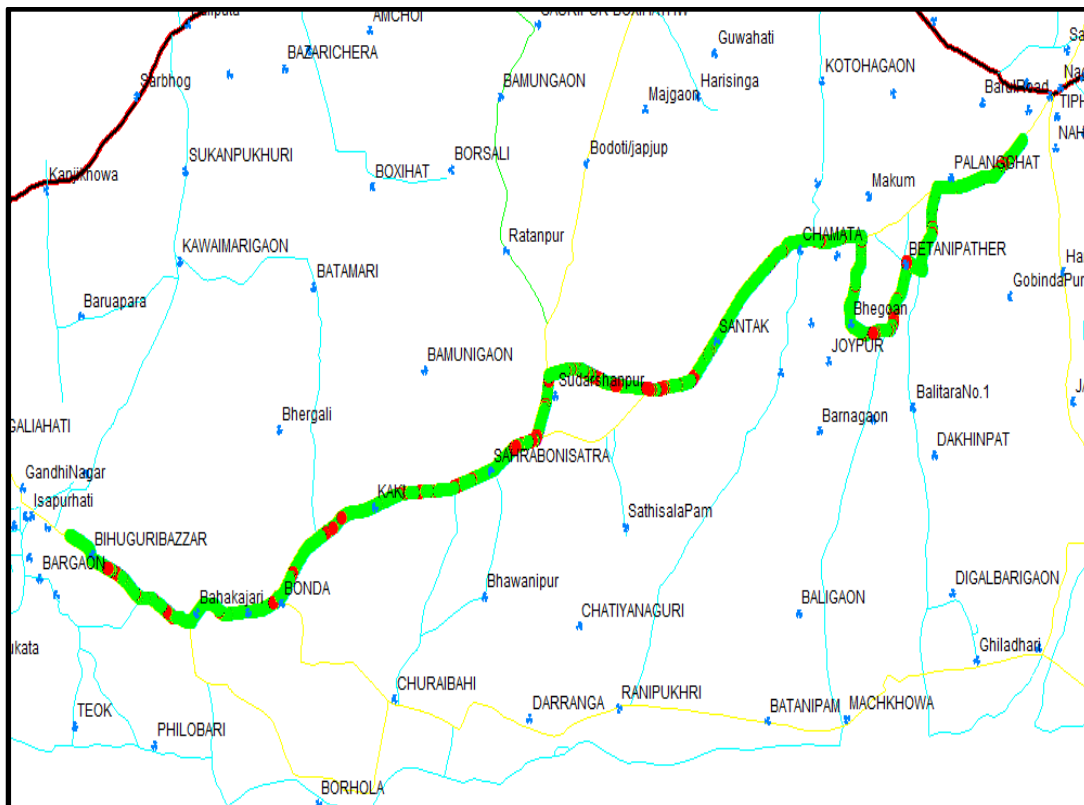
Nalbari



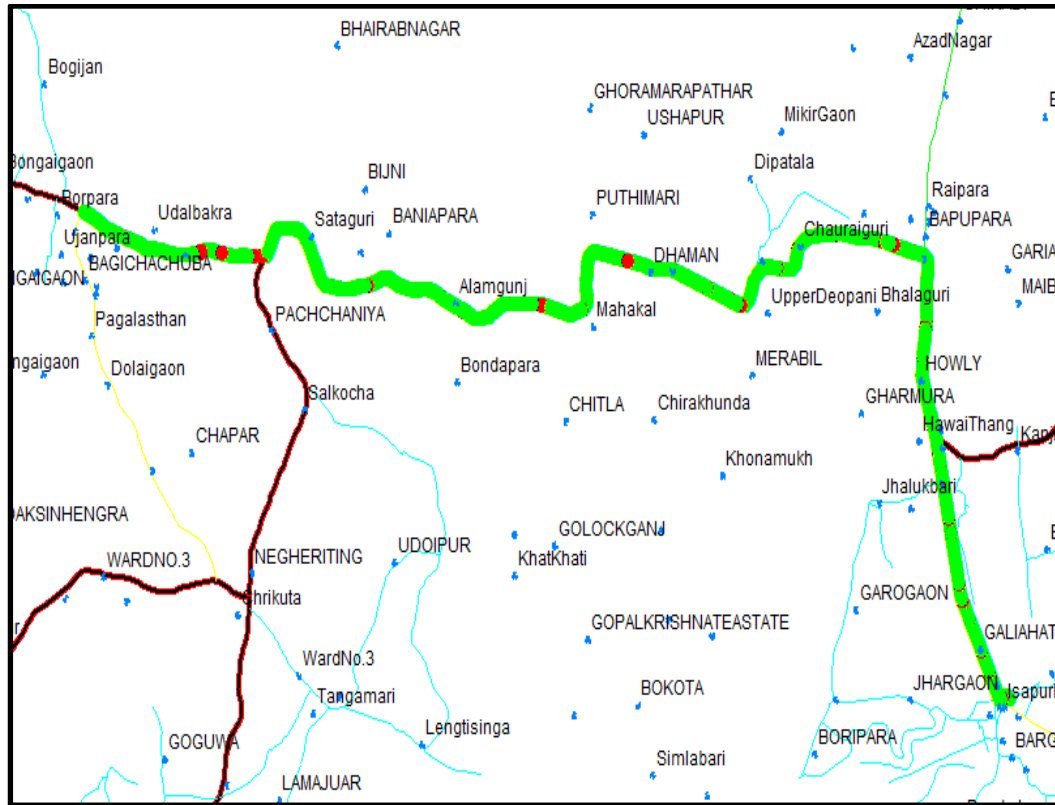
Barpeta



Day 3 – Major Roads



Day 3 – Highways



6.1.3.6 DRIVE TEST RESULTS – BONGAIGAON SSA

Executive Summary															
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		62.01%	59.64%	56.67%	48.88%	33.00%	16.38%	33.79%	35.86%	12.67%	47.00%	37.65%	49.96%	23.22%	56.68%
0 to -85 dBm		95.22%	84.92%	90.99%	78.50%	49.53%	48.63%	78.32%	62.63%	56.33%	74.75%	94.65%	76.16%	85.55%	87.41%
0 to -95 dBm		99.83%	98.88%	100.00%	100.00%	99.87%	100.00%	98.70%	89.99%	97.00%	95.88%	99.95%	92.53%	100.00%	100.00%
Voice quality	≥ 95%	97.57%	94.67%	98.45%	94.33%	99.84%	86.07%	88.79%	91.62%	99.12%	97.13%	95.36%	96.36%	97.30%	96.41%
CSSR	≥ 95%	100.00%	99.87%	100.00%	99.75%	93.95%	81.63%	94.27%	96.63%	100.00%	99.82%	100.00%	94.06%	100.00%	99.25%
%age Blocked calls		0.00%	0.13%	0.00%	0.13%	6.05%	18.37%	5.73%	2.99%	0.00%	0.18%	0.00%	0.00%	0.00%	0.75%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.13%	0.00%	8.32%	0.00%	3.11%	0.00%	0.00%	0.00%	2.78%	0.00%	0.00%
Hands off success rate		100.00%	97.18%	100.00%	100.00%	67.42%	99.66%	99.84%	85.92%	100.00%	100.00%	96.55%	98.10%	100.00%	99.69%

Voice Quality

Aircel, Airtel, BSNL CDMA and BSNL GSM failed to meet the benchmark in outdoor areas while BSNL GSM failed to meet the benchmark in indoor areas as well.

Call Set Success Rate (CSSR)

BSNL CDMA and Reliance GSM failed to meet the benchmark in outdoor areas while BSNL CDMA and BSNL GSM failed to meet the benchmark in indoor areas as well.

Call Drop Rate

BSNL CDMA, BSNL GSM and Reliance GSM failed to meet the benchmark in outdoor areas.

6.2 INDEPENDENT DRIVE TEST

The independent drive test was conducted for all the operators present in the Assam 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.

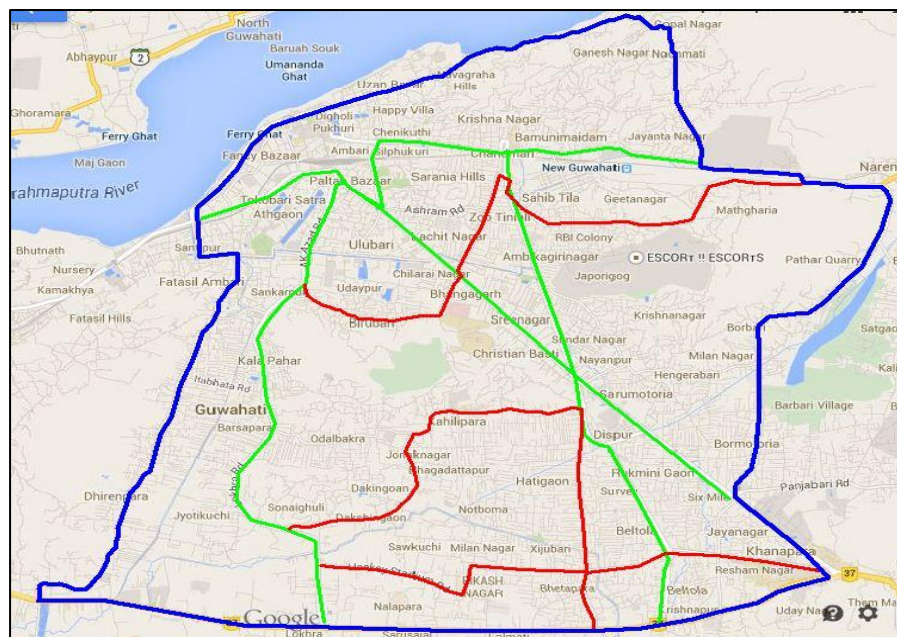
6.2.1 GUWAHATI

Name of the City	Guwahati
Date of Drive Test	11th & 12th Aug' 14
Name of the circle	Assam

Kilometers Travelled: 106

Independent Drive Test Route Details – Guwahati SSA

Guwahati	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	college of veterinary science- PWD IB Borbari-Guwahati Refinery Hospital-Bolo Bora Rd- Brahmaputra Cruise Private Limited- Snehalaya- SBOA Public School-NH37-college of veterinary science	Gita Nagar Rd- Orion Edutech-Rajgarh Rd-GMC Hospital Rd.Hatgaon Rd-Central IT College-Kahili pada Rd-Dakhingaoon Burha Masjid.Haky Stadium Rd-Betula bazar	Shoolin Heights-GS Rd-S.B.Deorah College-Bishnu Jyoti Railway Park.Lokhara Rd-Nehru Stadium- Assam Institute of Management.Basistha Complex- Damkan College Of Paramedical Science And Applied Technologies- Guwahati College of Architecture	Office of director of sarva sikshya abhijan mission	Pentaloons



Blue colour road represents Periphery of the city

Red colour road represents Congested Area

Green colour road represents Across the city

Independent Drive Test Results – Guwahati SSA

	B'mark	Aircel		Airtel		BSNL GSM		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		58.00%	68.33%	58.35%	55.90%	66.45%	58.53%	82.30%	71.87%	57.05%	54.60%	49.20%	49.17%	60.90%	96.90%
Signal Strength - 0 to -85 dBm		98.25%	92.20%	99.40%	92.77%	98.60%	91.40%	98.80%	94.17%	99.20%	90.00%	80.70%	82.57%	100.00%	100.00%
Signal Strength - 0 to -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%
Voice quality	≥ 95%	91.03%	83.62%	86.01%	88.61%	92.50%	87.92%	96.09%	90.67%	80.39%	86.90%	79.47%	84.96%	98.67%	97.12%
CSSR	≥ 95%	96.97%	95.66%	100.00%	97.96%	100.00%	99.09%	100.00%	98.68%	97.14%	99.10%	100.00%	97.57%	100.00%	98.84%
%age Blocked calls		3.03%	4.34%	0.00%	2.04%	0.00%	0.91%	0.00%	1.32%	2.86%	0.90%	0.00%	2.43%	0.00%	1.16%
Call drop rate	≤ 2%	0.00%	4.26%	0.00%	1.45%	0.00%	6.20%	0.00%	2.57%	3.03%	2.57%	0.00%	2.54%	2.38%	0.22%
Hands off success rate		100.00%	94.13%	100.00%	99.26%	99.18%	92.88%	100.00%	99.74%	98.28%	98.80%	98.84%	96.61%	100.00%	100.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel, Airtel, BSNL, Vodafone and Reliance GSM and for Outdoor Aircel, Airtel, BSNL, Idea, Vodafone and Reliance GSM.

Call Set Success Rate (CSSR)

All operators met the TRAI benchmark.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are Vodafone and BSNLCDMA and for Outdoor are Aircel, BSNL Idea, Vodafone and Reliance GSM.

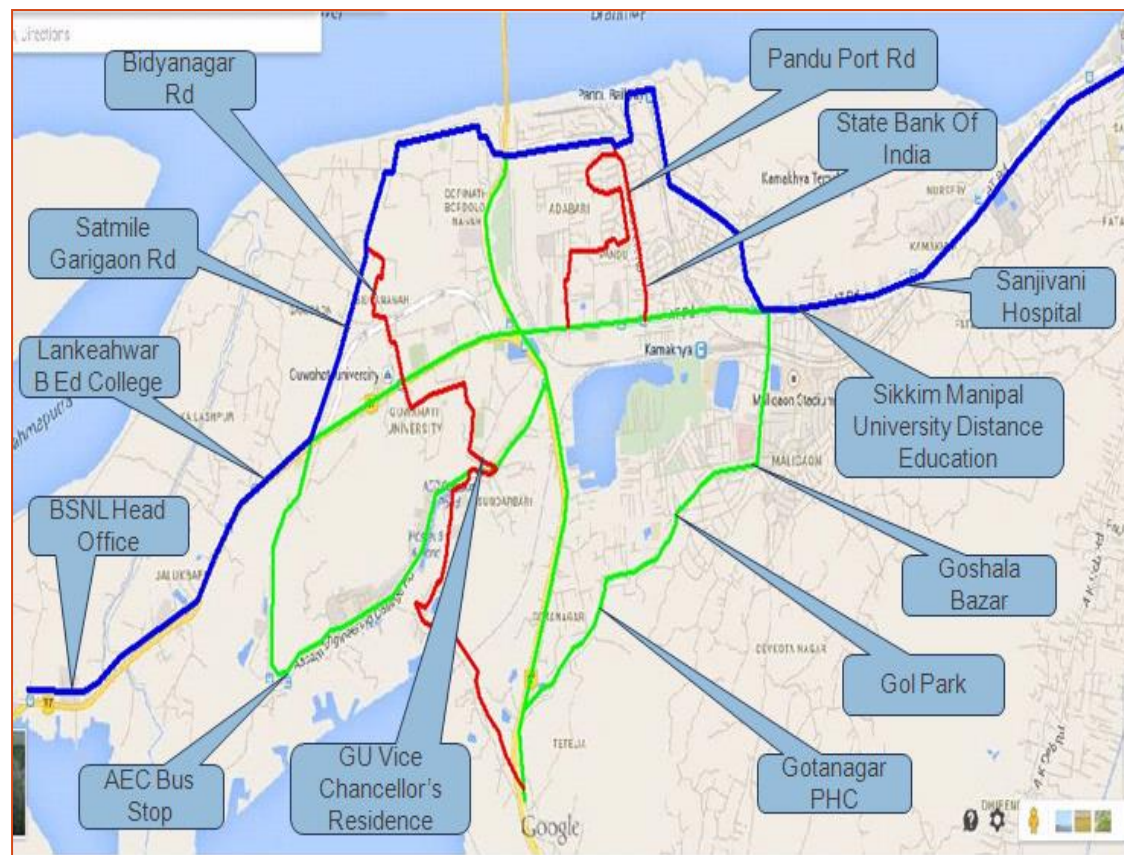
6.2.2 KAMRUP

Name of the City	Kamrup
Date of Drive Test	13th Aug' 14
Name of the circle	Assam

Independent Drive Test Route Details – Kamrup SSA

Kamrup	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Shemrock Prachee-Ifuture College of Technology and Management- Pandu Railway Station-Lankeshwar B Ed College-Madrassa Sadilapur Rd- BSNL Head Office	Adabari Tiniali Bus Stop-Pandu port Rd-North Jalukbari Eidgah-North Jalukbari Number 1 Masjid.Guwahati University Masjid-GU Main Gate Bus Stop	Bakul Path Bus Stop-AEC Bus Stop- Asam Engineeering collegeRd-Satmile Bus Stop-North Jalukbari Number 1 Masjid-Maligaon Bus Stand-Lachit Chowk	Guwahati University head Post Office	Kunja Plaza Commercial Complex

Kilometers Travelled: 112



Blue colour road represents Periphery of the city

Red colour road represents Congested Area

Green colour road represents Across the city

Independent Drive Test Results – Kamrup SSA

	B'mark	Aircel		Airtel		BSNL GSM		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		74.95%	59.17%	60.50%	37.67%	45.65%	23.53%	61.10%	23.33%	74.20%	32.93%	44.45%	17.53%	35.30%	29.67%
Signal Strength - 0 to -85 dBm		91.10%	91.63%	91.90%	88.87%	95.25%	66.37%	90.95%	76.77%	99.00%	91.33%	81.35%	72.60%	85.55%	81.13%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	99.90%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.93%	100.00%	100.00%
Voice quality	≥ 95%	86.55%	90.28%	85.25%	87.69%	95.94%	87.74%	98.89%	93.38%	96.13%	90.14%	87.25%	87.15%	94.80%	94.73%
CSSR	≥ 95%	100.00%	99.36%	100.00%	99.42%	100.00%	98.75%	100.00%	99.36%	100.00%	100.00%	100.00%	95.62%	95.45%	97.65%
%age Blocked calls		0.00%	0.64%	0.00%	0.58%	0.00%	1.25%	0.00%	0.64%	0.00%	0.00%	0.00%	4.38%	4.55%	2.35%
Call drop rate	≤ 2%	0.00%	1.96%	0.00%	2.53%	1.52%	6.35%	0.00%	2.57%	0.00%	0.00%	0.00%	0.63%	4.13%	5.46%
Hands off success rate		100.00%	99.70%	100.00%	98.57%	100.00%	81.86%	100.00%	100.00%	100.00%	96.47%	100.00%	97.27%	100.00%	100.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel, Airtel, Reliance GSM and BSNL CDMA and for Outdoor Airtel, BSNL, Idea, Vodafone, Reliance GSM and BSNL CDMA.

Call Set Success Rate (CSSR)

All operators met the TRAI benchmark.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are BSNL CDMA and for Outdoor are Airtel, BSNL, Idea and BSNL CDMA.

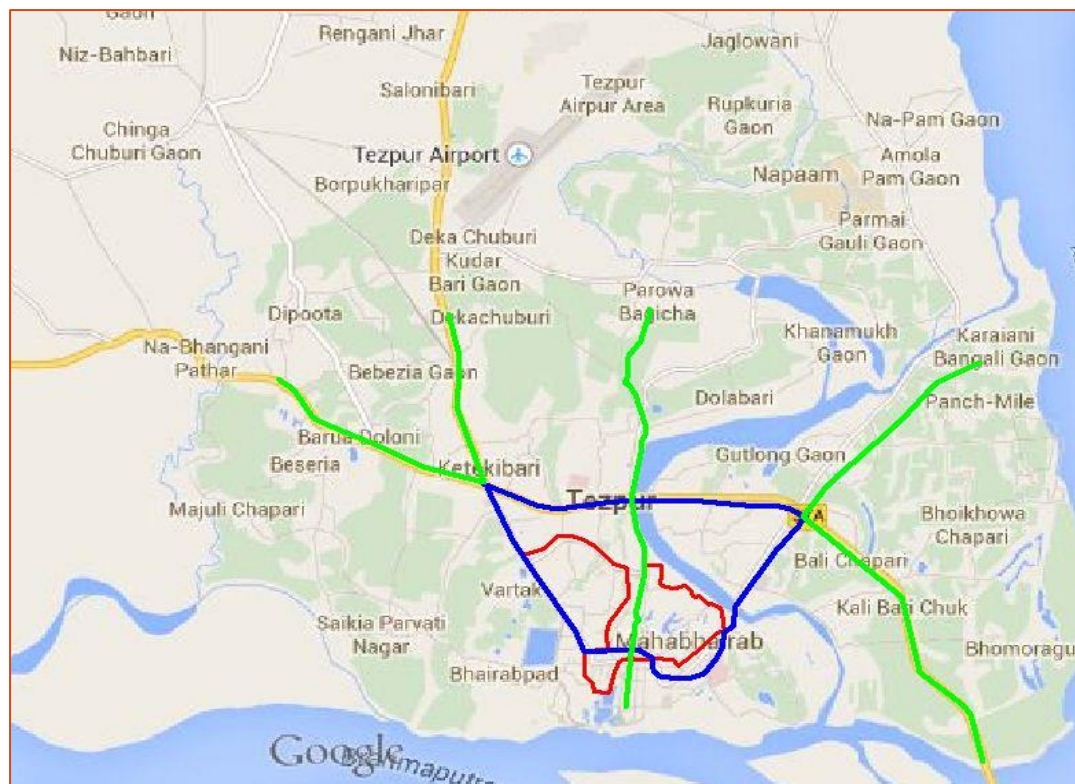
6.2.3 TEZPUR

Name of the City	Tezpur
Date of Drive Test	18th Aug' 14
Name of the circle	Assam

Independent Drive Test Route Details – Tezpur SSA

Tezpur	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Hotel KF-Tezpur Main Road- Edupur Society-DK Rd-Dolab- NH37A-Hotel KF	Varatok-Daranga College- Hatipilkhana-Kekorapul Private Bus StationKekorapul Private Bus Station-Trimurty Udyan-Hotel Royal Regency -Ex policeline Rd- Sunrise Hostel-	Dekargaon Rly Station-Hotel KF- Dipota Bus Stop.Paruwa bagicha- Parua Bus stop-Sunrise Hostel- Levis.Pancha mile College- Dolabari	Central Public Works Developments (Office of the Executive Engineer)	Vishal Megamart

Kilometers Travelled: 117



Blue colour road represents Periphery of the city

Red colour road represents Congested Area

Green colour road represents Across the city

Independent Drive Test Results – Tezpur SSA

	B'mark	Aircel		Airtel		BSNL GSM		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		61.85%	69.73%	41.00%	45.13%	78.85%	77.23%	70.60%	52.50%	25.90%	26.27%	25.90%	21.97%	0.05%	4.53%
Signal Strength - 0 to -85 dBm		93.20%	93.50%	64.30%	80.73%	99.65%	96.67%	98.55%	73.53%	90.95%	88.97%	90.95%	67.10%	24.45%	15.53%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.93%	100.00%	100.00%
Voice quality	≥ 95%	96.36%	89.69%	97.58%	91.28%	99.21%	83.76%	98.70%	93.63%	97.41%	92.93%	97.41%	91.03%	95.58%	93.17%
CSSR	≥ 95%	100.00%	96.97%	100.00%	96.48%	100.00%	96.77%	98.53%	99.40%	100.00%	100.00%	100.00%	94.43%	100.00%	98.24%
%age Blocked calls		0.00%	3.03%	0.00%	3.52%	0.00%	3.23%	1.47%	0.60%	0.00%	0.00%	0.00%	5.57%	0.00%	1.76%
Call drop rate	≤ 2%	1.47%	1.26%	0.00%	1.24%	3.13%	1.23%	0.00%	0.00%	0.00%	3.37%	0.00%	3.04%	1.00%	2.34%
Hands off success rate		100.00%	97.43%	100.00%	96.49%	99.25%	98.47%	100.00%	100.00%	100.00%	100.00%	100.00%	96.88%	100.00%	100.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Outdoor are Aircel, Airtel, BSNL, Idea, Vodafone, Reliance GSM and BSNL CDMA.

Call Set Success Rate (CSSR)

Reliance GSM failed to meet the benchmark in outdoor locations.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are BSNL and in Outdoor are Vodafone, Reliance GSM and BSNL CDMA.

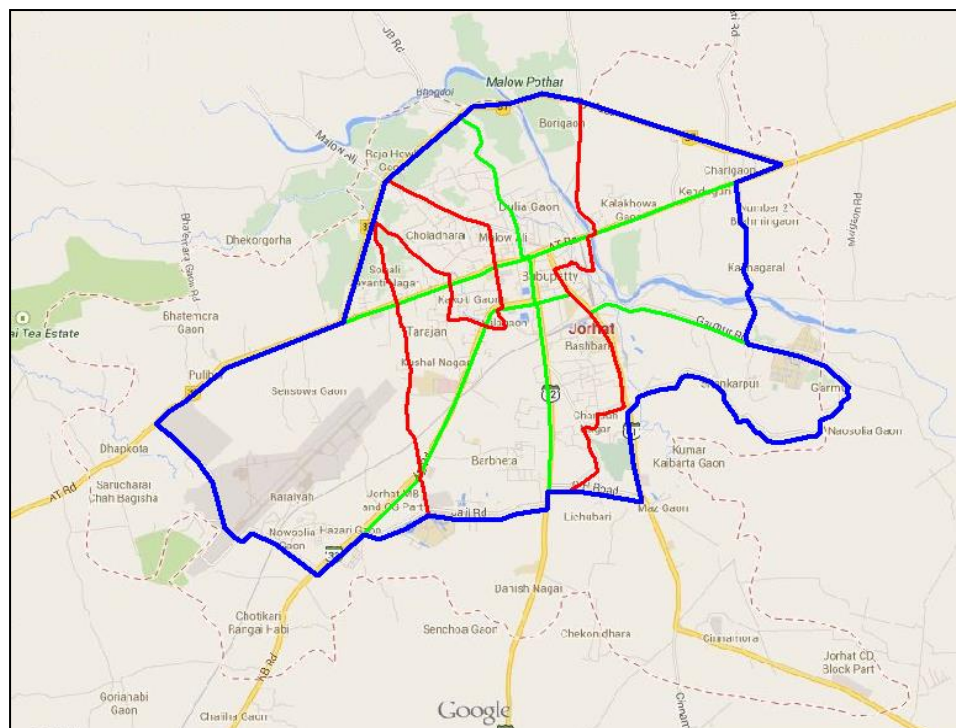
6.2.4 JORHAT

Name of the City	Jorhat
Date of Drive Test	25th Aug' 14
Name of the circle	Assam

Independent Drive Test Route Details – Jorhat SSA

Jorhat	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Cental College-JEC Rd-Meriani Rd-Assam Agricultural University-Rowriah Railway Station-AT Rd-Earl Grey Hotel-Central College	JK Sailia Homeopathic College-NANDANS' GUESTHOUSE-Garali Rd-Nemati Rd.THINK iOTA - Coaching Classes-Merryland High School-JB CollegeRd	Central College-AT Rd-Bishnuram Boorah Hall-Earl Grey Hotel.KB rd-Jorhat Civil Hospital-Ganesh Gogoi Kabita Kanan-Green Park	BSNL Office	Vishal Megamart

Kilometers Travelled: 110



Blue colour road represents Periphery of the city

Red colour road represents Congested Area

Green colour road represents Across the city

Independent Drive Test Results – Jorhat SSA

	B'mark	Aircel		Airtel		BSNL GSM		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		82.15%	60.20%	80.60%	58.23%	96.65%	48.73%	67.90%	49.43%	51.30%	44.37%	99.35%	41.37%	53.95%	27.87%
Signal Strength - 0 to -85 dBm		99.45%	88.77%	99.95%	87.33%	99.85%	84.20%	97.85%	78.40%	98.25%	86.90%	100.00%	84.07%	100.00%	72.60%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	99.97%	99.95%	99.97%	100.00%	99.97%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	95.78%	90.65%	94.04%	89.08%	90.44%	79.42%	97.21%	92.19%	94.13%	92.20%	99.37%	90.86%	99.79%	95.17%
CSSR	≥ 95%	100.00%	96.79%	80.84%	97.69%	100.00%	97.76%	96.87%	99.29%	83.96%	89.90%	98.44%	100.00%	100.00%	95.77%
%age Blocked calls		0.00%	3.21%	19.16%	2.31%	0.00%	2.24%	3.13%	0.71%	16.04%	10.10%	1.56%	0.00%	0.00%	4.23%
Call drop rate	≤ 2%	0.00%	1.36%	0.00%	0.54%	0.00%	1.19%	0.00%	2.68%	1.92%	3.04%	0.00%	3.28%	1.00%	4.20%
Hands off success rate		100.00%	98.12%	100.00%	98.04%	100.00%	96.76%	100.00%	97.92%	100.00%	89.03%	100.00%	98.10%	100.00%	100.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Airtel, BSNL and Vodafone and for Outdoor Aircel, Airtel, BSNL, Idea, Vodafone and Reliance GSM.

Call Set Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Indoor are Airtel & Vodafone and for Outdoor are Vodafone.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in for Outdoor are Idea, Vodafone, Reliance GSM and BSNL CDMA.

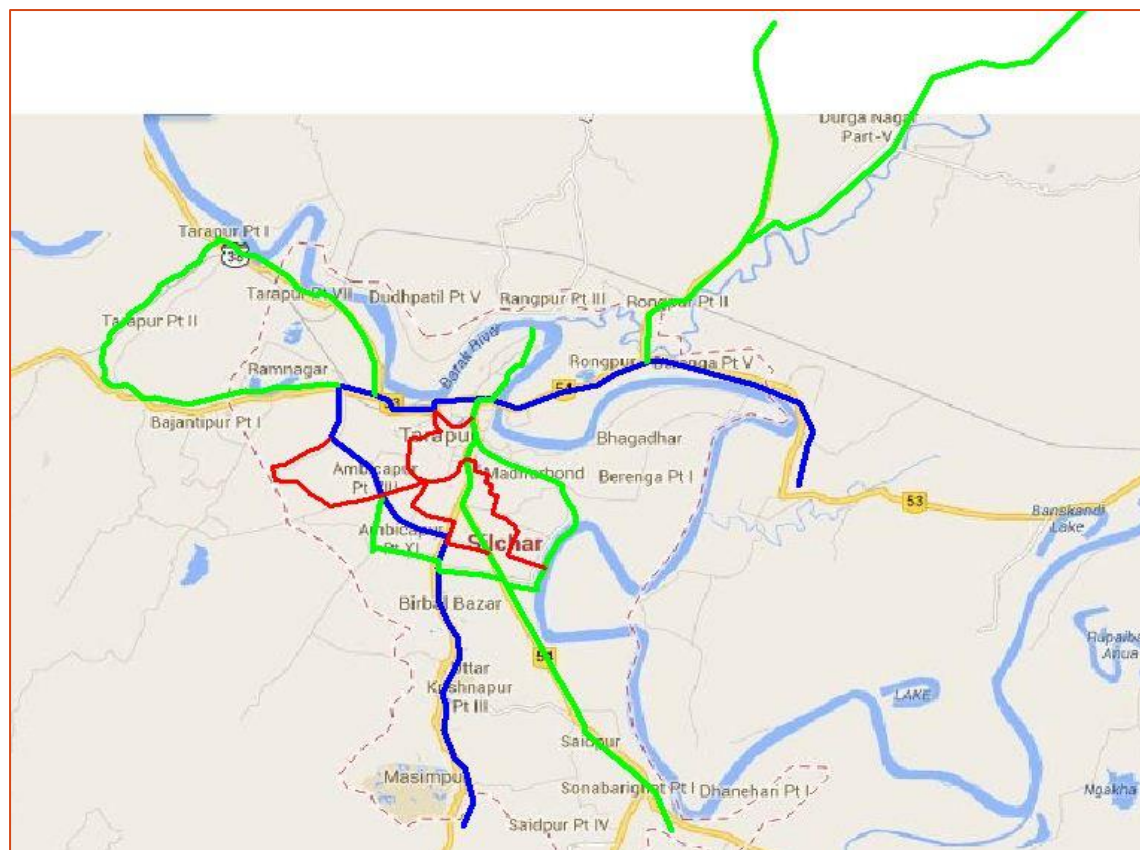
6.2.5 SILCHAR

Name of the City	Silchar
Date of Drive Test	3rd Sep' 14
Name of the circle	Assam

Independent Drive Test Route Details – Silchar SSA

Silchar	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Rongpur Masjid-Cachar College-Punjab Hotel-HK Rd-LICI Guest House-ASEB-National Institute of Technology Silchar	Gandhi Park-Alaya Rd-Vivekananda Rd-AVI Lane-Sarat Pally Rd.1st link rd-Panchayt Rd	Dudpatil Ferryghat-Surendra Memorial Junior College-Rangirkhari Bus Stop.Bara Masjid-Old Iakhipur Rd-Peskaror Ganggal Rd-2nd Link Rd-Khatal Rd	Municipality Board	Nahata Mall & Textiles

Kilometers Travelled: 123



Blue colour road represents Periphery of the city

Red colour road represents Congested Area

Green colour road represents Across the city

Independent Drive Test Results – Silchar SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		9.30%	36.80%	55.20%	39.13%	30.15%	47.27%	30.20%	47.90%	0.20%	28.30%	38.90%	33.50%	0.00%	10.57%
Signal Strength - 0 to -85 dBm		40.45%	81.77%	98.95%	81.40%	99.00%	87.20%	55.20%	78.80%	41.10%	74.83%	96.85%	80.20%	64.70%	49.40%
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%	99.95%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	95.82%	88.73%	96.80%	85.76%	99.09%	84.25%	86.55%	90.09%	62.48%	82.58%	96.54%	92.10%	98.39%	93.30%
CSSR	≥ 95%	100.00%	99.40%	100.00%	98.42%	98.53%	96.78%	96.77%	97.31%	90.42%	90.23%	100.00%	96.64%	100.00%	91.70%
%age Blocked calls		0.00%	0.60%	0.00%	1.58%	1.47%	3.22%	3.23%	2.69%	9.58%	9.77%	0.00%	3.36%	0.00%	8.30%
Call drop rate	≤ 2%	1.56%	2.63%	0.00%	2.52%	0.00%	3.13%	3.15%	2.21%	3.49%	0.33%	1.43%	0.99%	0.00%	2.07%
Hands off success rate		100.00%	96.93%	100.00%	97.95%	100.00%	95.11%	100.00%	100.00%	93.68%	96.11%	100.00%	100.00%	100.00%	100.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Idea and Vodafone and for Outdoor, none of the operators met the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

Vodafone did not meet the benchmark in outdoor as well as indoor locations while BSNL CDMA missed the benchmark in outdoor locations.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are Idea & Vodafone and for Outdoor are Aircel, Airtel, BSNL and Idea.

6.3 COMPARISON BETWEEN OPERATOR ASSISTED AND INDEPENDENT DRIVE TEST

6.3.1 KAMRUP SSA/ KAMRUP

The comparison has been made between operator assisted and independent drive tests respectively conducted in Kamrup SSA in the JAS'14 quarter.

The operator assisted drive test happened in entire Kamrup SSA for three days from 28 to 31 Jul 2014. However, the independent drive test was conducted with a focus on limited area in Kamrup region on 13 Aug 2014.

The results of the comparison between the two will be indicative and parameters for the two drive tests may not comply with each other due to following reasons.

- The distance covered in operator assisted drive test was a minimum of 300 kilometers over 3 days while the independent drive test was conducted for a minimum of 100 kilometers
- The route travelled was different for the two drive tests
- The drive tests were conducted on different days

Let us now look at the comparison between the two drive tests.

6.3.1.1 ROUTE DETAILS

Route Details – Independent Drive Test – Kamrup SSA

Kamrup	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Shemrock Prachee-Ifuture College of Technology and Management- Pandu Railway Station-Lankeshwar B Ed College-Madrassa Sadilapur Rd-BSNL Head Office	Adabari Tiniali Bus Stop-Pandu port Rd-North Jalukbari Eidgah-North Jalukbari Number 1 Masjid.Guwahati University Masjid-GU Main Gate Bus Stop	Bakul Path Bus Stop-AEC Bus Stop-Asam Engineering collegeRd-Satmile Bus Stop-North Jalukbari Number 1 Masjid-Maligaon Bus Stand-Lachit Chowk	Guwahati University head Post Office	Kunja Plaza Commercial Complex

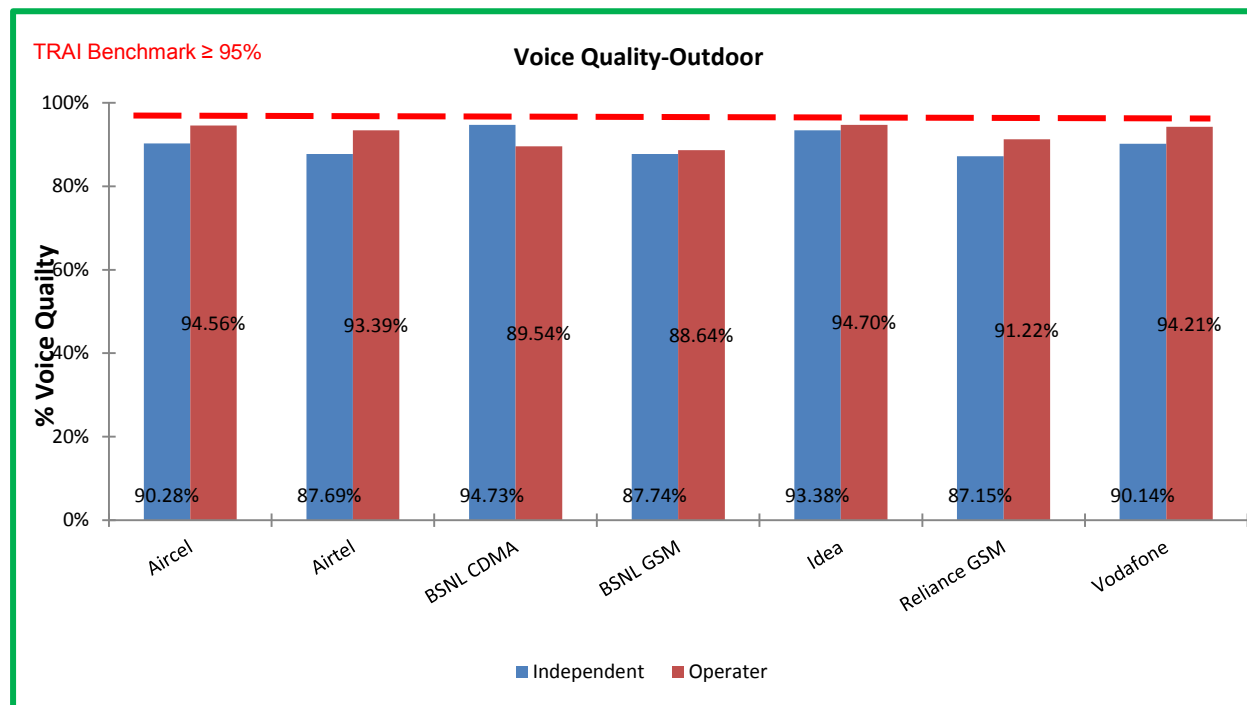
Route Details – Operator Assisted Drive Test – Kamrup SSA

Category	Type of location	Assam-July		
		Kamrup		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Guwahati (Panbazar) to Rangia and Rangia to Guwahati via Hajo	Guwahati Pt I City Drive & Guwahati to Boko	Guwahati Pt II city Drive (including Dispur) & Dispur to Khetry and return to Guwahati via
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

6.3.1.2 COMPARISON CHARTS AND ANALYSIS

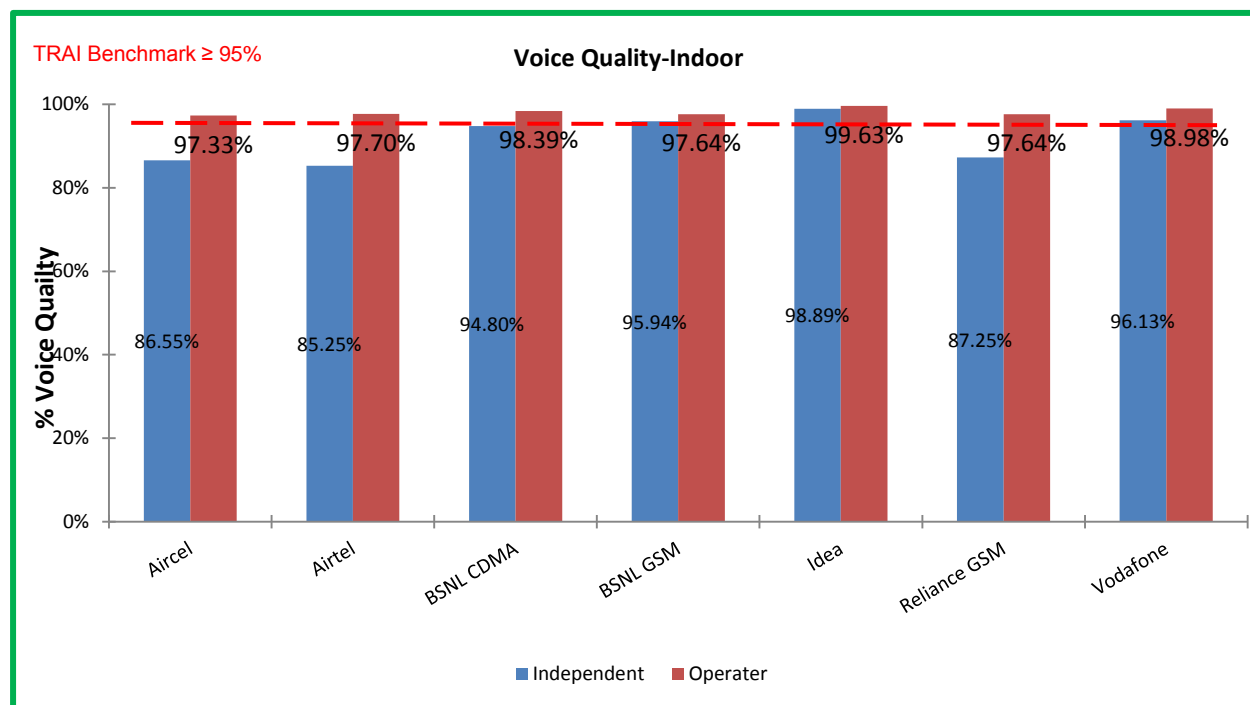
6.3.1.2.1 VOICE QUALITY

Outdoor Locations



In outdoor locations, all operators failed to meet the benchmark during independent as well as operator assisted drive test.

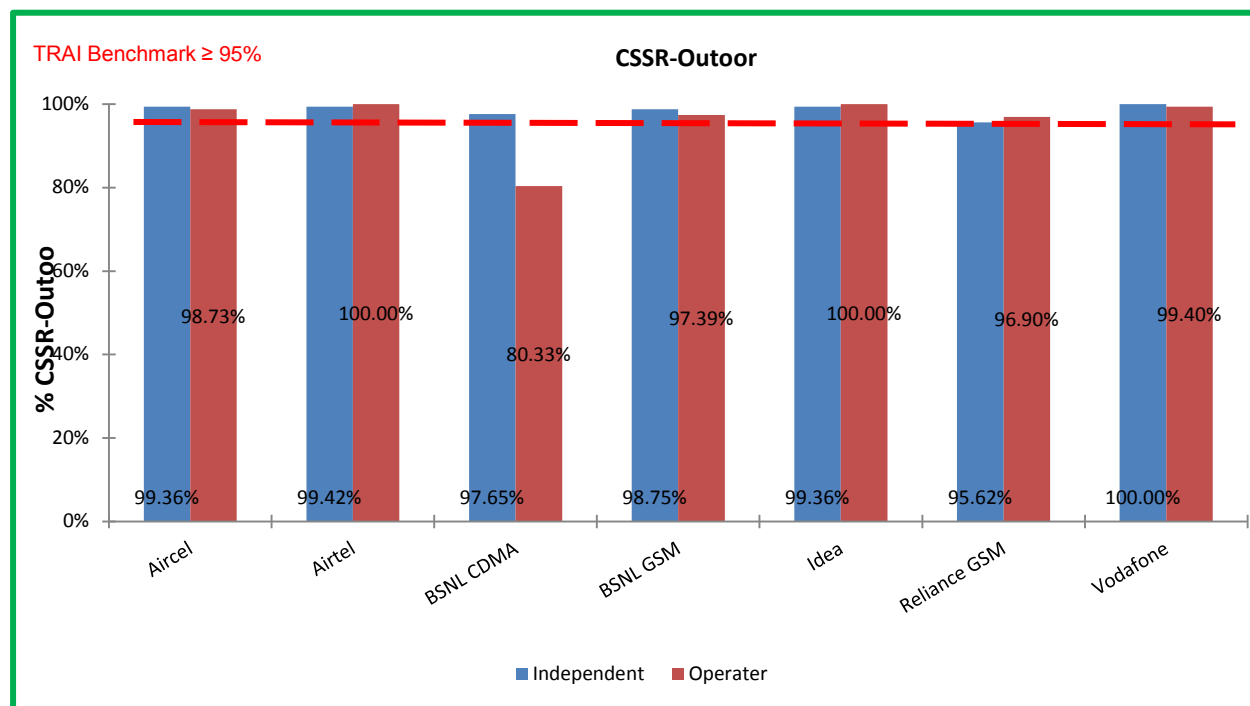
Indoor Locations



In indoor locations, Aircel, Airtel, BSNL CDMA and Reliance GSM failed to meet the benchmark during independent drive test. All operators met the benchmark during operator assisted drive test.

6.3.1.2.2 CALL SETUP SUCCESS RATE

Outdoor Locations



In outdoor locations, BSNL CDMA failed to meet the benchmark operator assisted drive test. All operators met the benchmark during independent drive test.

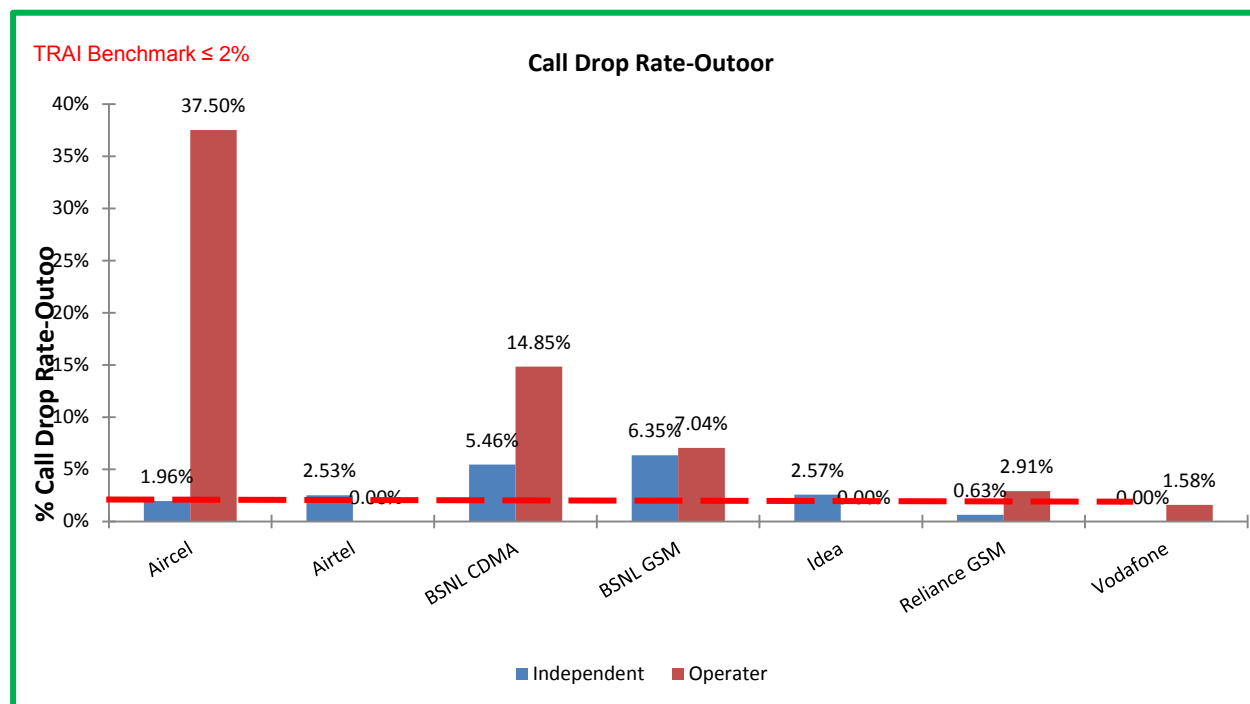
Indoor Locations



In indoor locations, all operators met the benchmark for CSSR in both the drive tests.

6.3.1.2.3 CALL DROP RATE

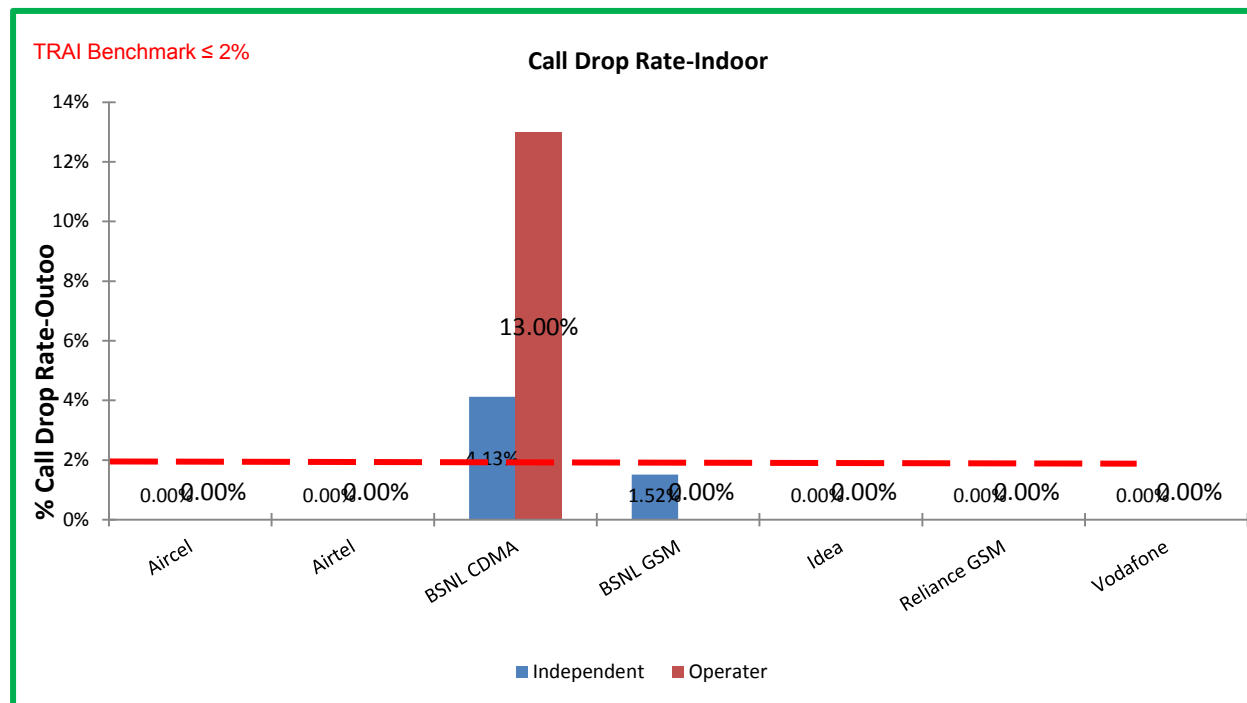
Outdoor Locations



In outdoor locations, BSNL CDMA and BSNL GSM failed to meet the benchmark in both the drive tests.

Aircel and Reliance GSM failed to meet the benchmark during operator assisted drive test while Airtel and Idea missed the benchmark during independent drive test.

Indoor Locations



In indoor locations, excluding BSNL CDMA, all operators met the benchmark.

6.3.2 SILCHAR SSA/ SILCHAR

The comparison has been made between operator assisted and independent drive tests respectively conducted in Silchar SSA in the JAS'14 quarter.

The operator assisted drive test happened in entire Silchar SSA for three days from 27 to 29 Aug 2014. However, the independent drive test was conducted with a focus on limited area in Silchar region on 3 Sep 2014.

The results of the comparison between the two will be indicative and parameters for the two drive tests may not comply with each other due to following reasons.

- The distance covered in operator assisted drive test was a minimum of 300 kilometers over 3 days while the independent drive test was conducted for a minimum of 100 kilometers
- The route travelled was different for the two drive tests
- The drive tests were conducted on different days

Let us now look at the comparison between the two drive tests.

6.3.2.1 ROUTE DETAILS

Route Details – Independent Drive Test – Silchar SSA

Silchar	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Rongpur Masjid-Cachar College-Punjab Hotel-HK Rd-LICI Guest House-ASEB-National Institute of Technology Silchar	Gandhi Park-Alaya Rd-Vivekananda Rd-AVI Lane-Sarat Pally Rd.1st link rd-Panchayt Rd	Dudpatil Ferryghat-Surendra Memorial Junior College-Rangirkhari Bus Stop.Bara Masjid-Old lakhipur Rd-Peskaror Ganggal Rd-2nd Link Rd-Khatal Rd	Municipality Board	Nahata Mall & Textiles

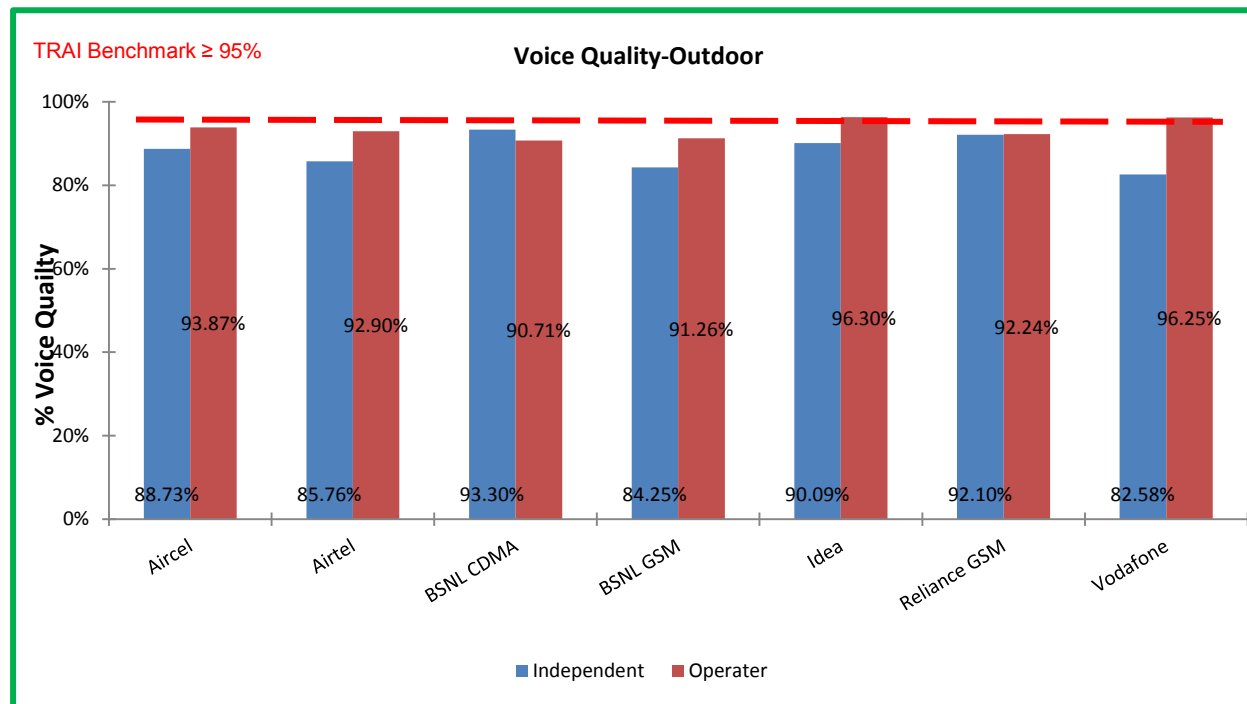
Route Details – Operator Assisted Drive Test – Silchar SSA

Category	Type of location	Assam-August		
		Silchar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Silchar to Patharkandi via Karimganj - High Way No-53 Drive - 91 KMs Karimganj - City Drive – 15 KMs	Silchar to Hailakandi- High Way No-53 and 154 Drive via Algapur – 48 Kms Hailakandi - City Drive – 15 KMs Hailakandi to Silchar- Major Road Drive via Silcoorie Grant, Masimpur, Kanakpur – 54 KMs	Silchar to Lakhipur pt 1- High Way No 44 and 38 Drive via Tarapur – 56 KMs Lakhipur - City Drive – 15 KMs Silchar- City Drive – 25 KMs
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

6.3.2.2 COMPARISON CHARTS AND ANALYSIS

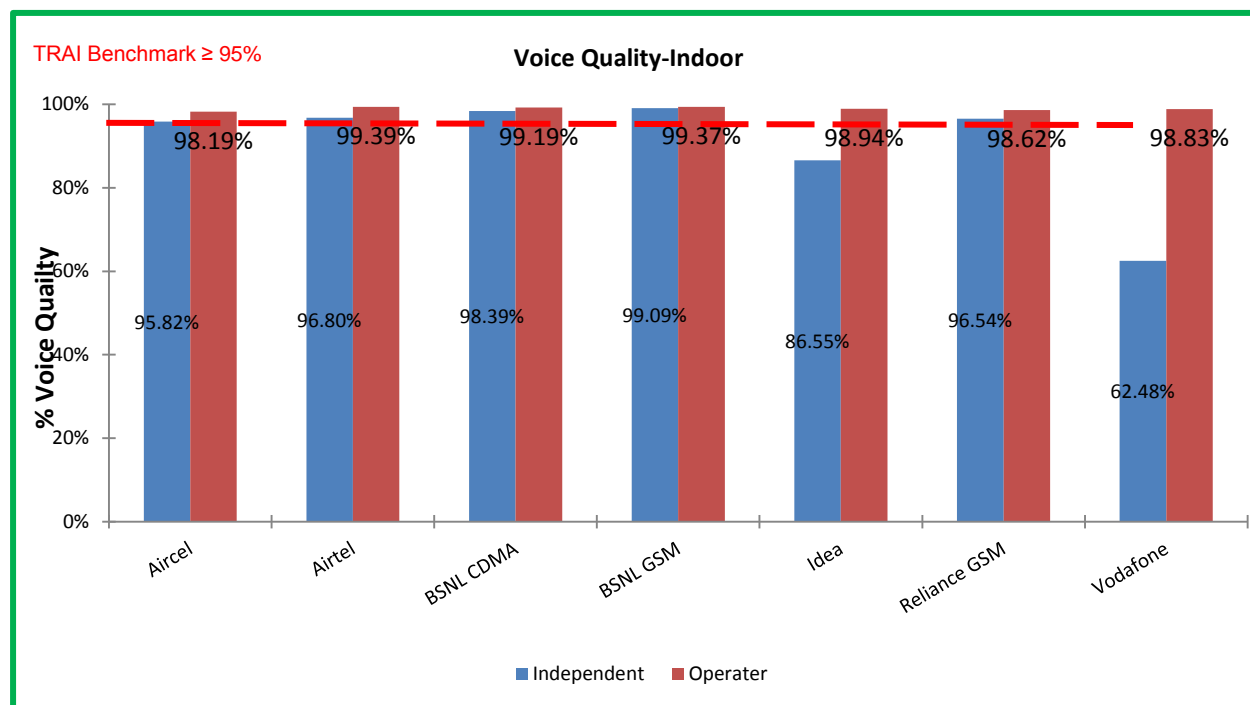
6.3.2.2.1 VOICE QUALITY

Outdoor Locations



In outdoor locations, all operators failed to meet the benchmark during independent drive test. However, during operator assisted drive test, Idea and Vodafone met the benchmark level.

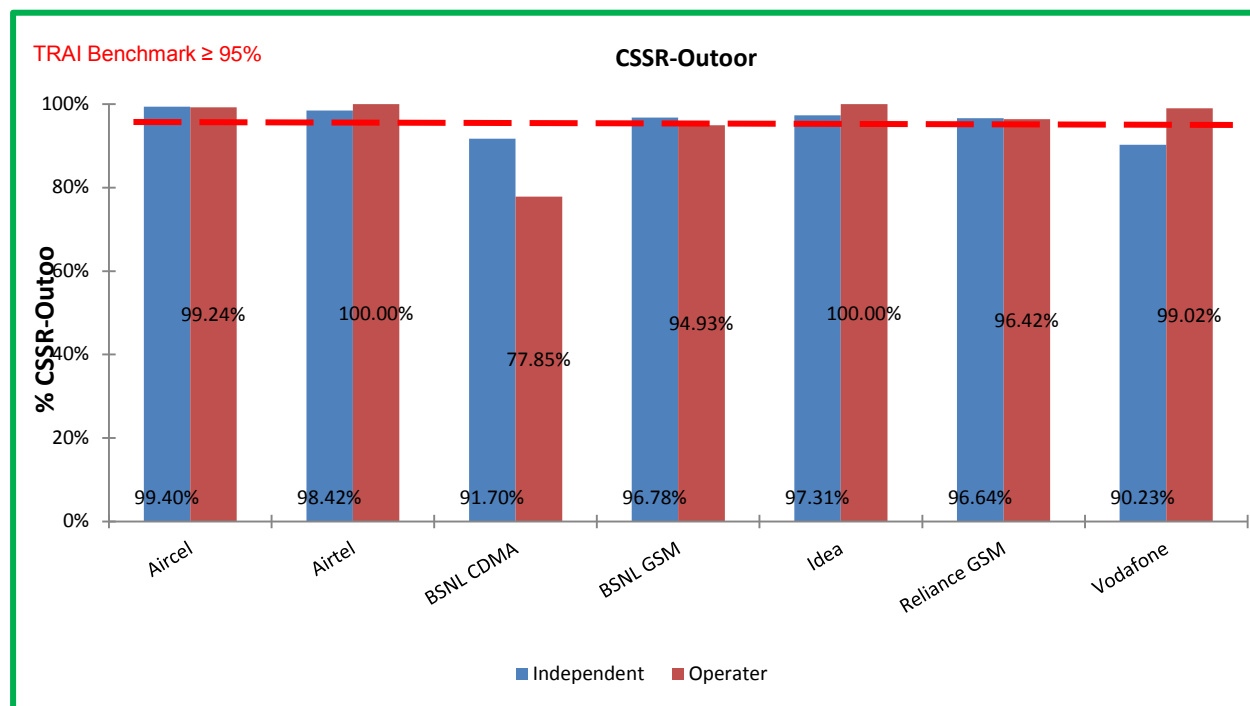
Indoor Locations



In indoor locations, Idea and Vodafone failed to meet the benchmark during independent drive test except Idea. All operators met the benchmark during operator assisted drive test.

6.3.2.2.2 CALL SETUP SUCCESS RATE

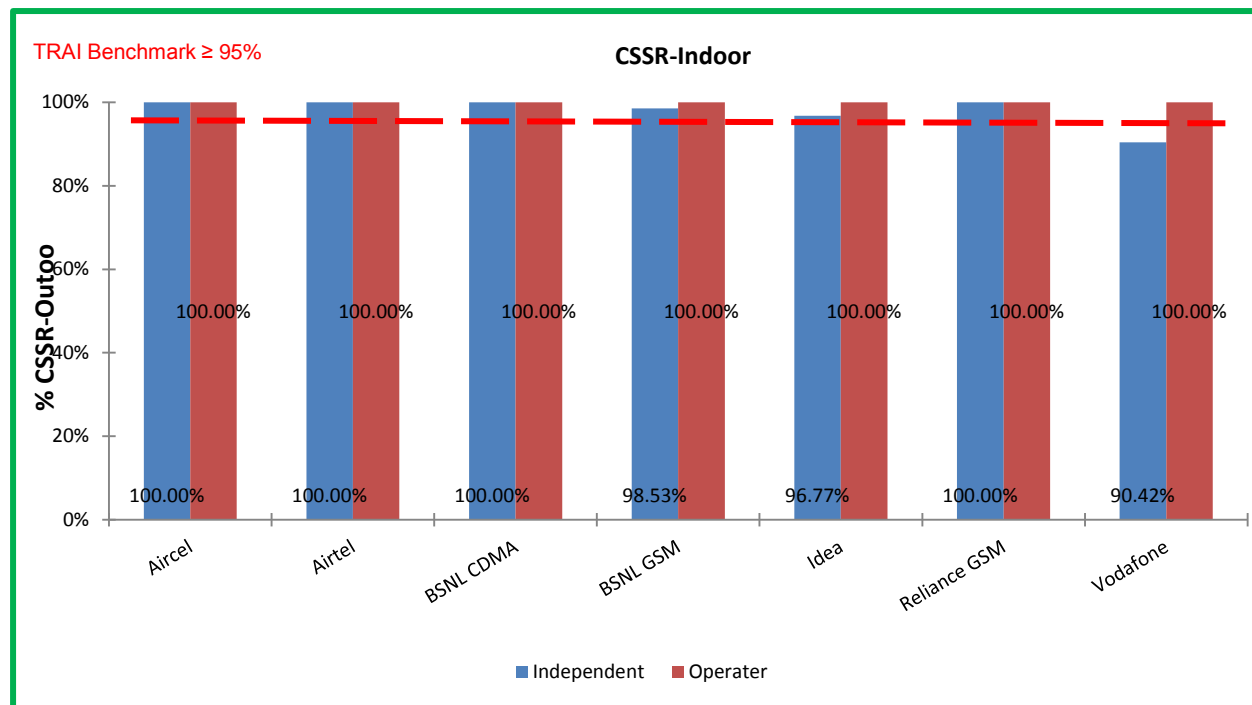
Outdoor Locations



In outdoor locations, BSNL GSM failed to meet the benchmark in both the drive tests.

Vodafone missed the benchmark during independent drive test but met the benchmark during operator assisted drive test. On the contrary, BSNL GSM missed the benchmark during operator assisted drive test.

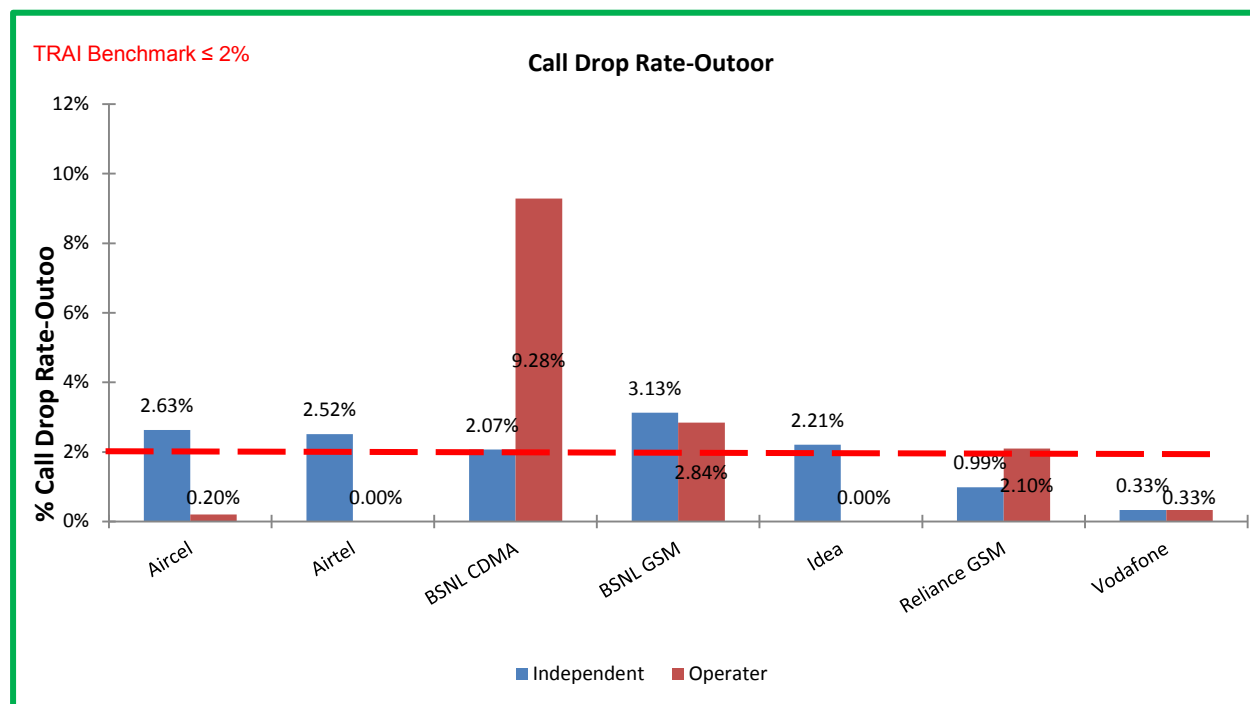
Indoor Locations



In indoor locations, all operators met the benchmark for CSSR in both the drive tests except Vodafone which did not meet the benchmark during independent drive test.

6.3.2.2.3 CALL DROP RATE

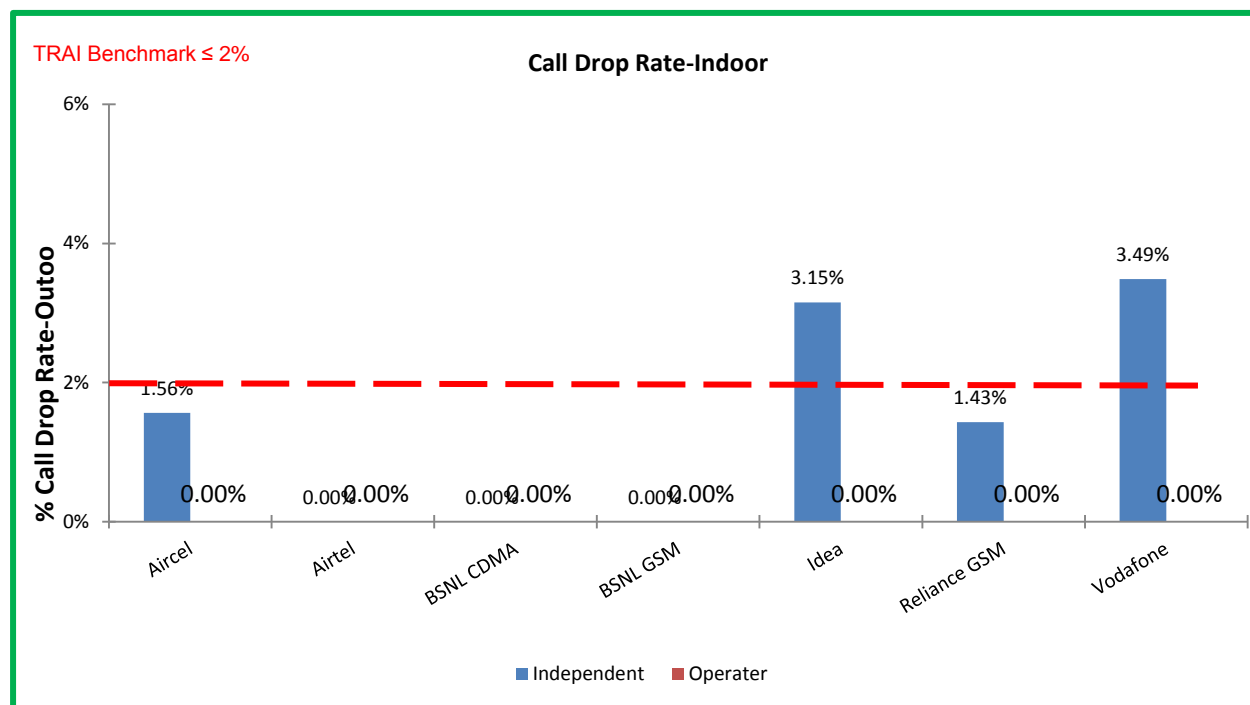
Outdoor Locations



In outdoor locations, BSNL CDMA and BSNL GSM failed to meet the benchmark in both the drive tests.

Aircel, Airtel and Idea failed to meet the benchmark during independent drive test while Reliance GSM did not meet the benchmark during operator assisted drive test.

Indoor Locations



In indoor locations, Idea and Vodafone missed the benchmark during independent drive test but met the benchmark during operator assisted drive test. All other operators met the benchmark during both drive tests.

7 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Aircel failed to meet the benchmark for all parameters.

BSNL CDMA and BSNL GSM also failed to meet the benchmark for majority network parameters.

3 Day Live Measurement (Network Parameters)

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark for majority network parameters.

Live Calling

None of the operators met the benchmark for complaints resolved within 4 weeks and Level 1 services. Also, for calls answered by operator (voice to voice), only Aircel met the benchmark.

Billing and Customer Service

Vodafone and Reliance GSM failed to meet the benchmark of postpaid billing disputes. Reliance GSM failed to meet the benchmark of prepaid charging disputes.

BSNL GSM did not meet the benchmark of IVR calls being attended within 60 seconds. Aircel and BSNL GSM did not meet the TRAI benchmark of calls answered by the operators (Voice to Voice).

Inter-Operator Call Assessment

In the inter-operator call assessment, it was observed that all operators faced problems in connecting to other operators. Airtel was the only operator that got connected from all operators.

Drive Test (Operator Assisted)

During all the drive tests, it was observed that BSNL CDMA is the key concern operator in terms of Voice Quality, CSSR and Call Drop Rate. BSNL GSM also missed benchmark for the key parameters during all drive tests.

In Kamrup, all operators faced voice quality issues in outdoor locations.

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 - CONSOLIDATED

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2501	3223	242	1353	1155	1570	2787
Sum of downtime of BTSs in a month (in hours)		174642	8521	39538	25060	3298	4527	16910
BTSs accumulated downtime (not available for service)	≤ 2%	9.38%	0.35%	21.96%	2.49%	0.38%	0.39%	0.81%
Number of BTSs having accumulated downtime >24 hours		1095	45	84	66	7	27	48
Worst affected BTSs due to downtime	≤ 2%	43.78%	1.40%	34.85%	4.85%	0.61%	1.72%	1.71%

Live Measurement- BTSs accumulated downtime								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2499	3210	242	1353	1155	1571	2787
Sum of downtime of BTSs in a month (in hours)		15559	560	3246	10262	366	330	1562
(not available for service)	≤ 2%	8.64%	0.24%	18.63%	10.53%	0.44%	0.29%	0.78%
Number of BTSs having accumulated downtime >24 hours		224	0	8	29	3	17	2
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	8.97%	0.00%	3.44%	2.12%	0.23%	1.06%	0.07%

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.35%	98.12%	98.19%	95.19%	98.44%	98.52%	99.52%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.54%	0.18%	2.02%	0.91%	0.32%	0.03%	0.12%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	4.03%	0.78%	0.00%	1.25%	1.17%	0.11%	0.48%
Live measurement results for CSSR, SDCCH and TCH congestion								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.66%	98.21%	98.15%	95.49%	99.12%	98.49%	99.81%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.68%	0.15%	2.37%	0.68%	0.14%	0.03%	0.12%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.38%	0.72%	0.00%	1.54%	0.59%	0.11%	0.19%

Drive test results for CSSR (Average of three drive tests) and blocked calls

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		541	541	676	494	424	486	524
Total number of successful calls established		539	540	544	480	423	471	520
CSSR	≥ 95%	99.55%	99.90%	79.80%	97.17%	99.93%	96.89%	99.28%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.45%	0.10%	20.20%	2.83%	0.07%	3.11%	0.72%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		163665686	161752962	613626	486180393	18872412	80341680	3832151
Total number of calls dropped		3332308	1970725	13573	11892413	249430	570217	27639
Call drop rate	≤ 2%	2.03%	1.22%	2.21%	2.45%	1.32%	0.71%	0.72%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7413	9693	687	3980	3467	4710	8581
Total number of cells having more than 3% TCH		1490	110	76	221	70	6	232
Worst affected cells having more than 3% TCH	≤ 3%	20.09%	1.13%	11.06%	5.56%	2.03%	0.12%	2.70%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		174609213	16081792	59058	202375120	24168795	36094726	1984378
Total number of calls dropped		2964148	197765	1202	4987071	265074	229038	12645
Call drop rate	≤ 2%	1.70%	1.23%	2.03%	2.56%	1.10%	0.67%	0.64%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7403	9653	687	3980	3466	4740	8581
Total number of cells having more than 3% TCH		1560	108	62	257	67	15	226
Worst affected cells having more than 3% TCH	≤ 3%	21.07%	1.12%	9.07%	6.46%	1.93%	0.32%	2.64%

Drive test results for Call drop rate (Average of three drive tests)

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		539	541	539	482	424	471	520
Total number of calls dropped		47	0	51	16	0	9	2
Call drop rate	≤ 2%	8.33%	0.05%	9.53%	3.18%	0.00%	1.89%	0.46%

8.4 VOICE QUALITY

Audit Results for Voice quality

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16548177434	19346585043	46745	49770	2596420533	12461546862	670921618
Total number of calls with good voice quality		14910782893	19015027617	42992	47391	2470212219	12260417120	654633837
%age calls with good voice quality	≥ 95%	90.10%	98.29%	91.96%	95.20%	95.14%	98.39%	97.57%

Live measurement results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16397020199	7766594769	46745	50748	2597584627	5429201452	325100644
Total number of calls with good voice quality		15041114061	7631562643	42992	48301	2486787379	5332024133	318413058
%age calls with good voice quality	≥ 95%	91.73%	98.28%	91.96%	95.16%	95.74%	98.36%	97.94%
Drive test results for Voice quality (Average of three drive tests)								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		799765	893338	46563	696822	712774	162179	858639
Total number of calls with good voice quality		758131	843681	42874	638369	688659	151901	824208
%age calls with good voice quality	≥ 95%	94.75%	94.40%	92.10%	91.82%	96.65%	93.71%	95.78%

8.5 POI CONGESTION

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		48	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		83333	85939	NC	19515	19735	31810	59926524
Traffic served for all POIs (B)- in erlangs		52396	32066	NC	19931	12595	20157	15036462
POI congestion	≤ 0.5%	0.00%	0.00%	NC	1.05%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		49	15	NC	19	29	23	112
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		84411	86017	NC	19515	19542	31974	5986134
Traffic served for all POIs (B)- in erlangs		54091	32197	NC	18984	12598	20717	1494795
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.01%	0.00%	0.00%	0.00%

NC: Auditors were not able to get the POI data from BSNL as the operator was unable to provide the same. Hence it has been reported as Non Compliance.

8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

July								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		819254	896684	43884	691901	795420	244700	640819
August								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		594816	735363	35005	489119	574556	35292	813400
September								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		985226	1047966	60799	909447	768346	206544	1121698

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance								
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Billing disputes - Postpaid								
Total bills generated during the period		70378	136890	14014	215660	22167	217995	209572
Total number of bills disputed		12	31	6	13	0	290	802
Percentage bills disputed	≤ 0.1%	0.02%	0.02%	0.04%	0.01%	0.00%	0.13%	0.38%
Billing disputes - Prepaid								
Number of complaints related to charging, credit & validity		3703	629	8	97	401	4352	5405
Total number of prepaid customers in that period		3932408	4635662	53565	952782	1264132	4190728	8590629
Percentage of complaints	≤ 0.1%	0.09%	0.01%	0.01%	0.01%	0.03%	0.10%	0.06%

Resolution of billing complaints								
Total number of billing/charging complaints		3768	703	16	114	401	4686	6227
Total complaints considered invalid		3422	542	10	61	110	1737	1032
Number of complaints resolved in 4 weeks		3768	703	16	114	401	4686	6227
Percentage complaints resolved within 4 weeks	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver								
Total number of complaints where credit/waiver is required		344	161	0	182	291	438	5195
Percentage cases in which credit/waiver was received within 1 week	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints								
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made		100	100	No Raw Data	100	100	100	100
Number of cases resolved in 4 weeks		60	61	No Raw Data	78	72	87	72
Percentage cases resolved in four weeks	100.00%	60.00%	61.00%	No Raw Data	78.00%	72.00%	87.00%	72.00%

Note: Auditors did not receive the raw data for live calling from the central billing center of BSNL CDMA as the operator was unable to provide the same.

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		5411663	No Data	No Raw Data	154520	3415413	8250970	10034579
Number of calls getting connected and answered (electronically)		5192053	No Data	No Raw Data	122093	3377936	8167013	10017533
Percentage calls getting connected and answered	≥ 95%	95.94%	No Data	No Raw Data	79.01%	98.90%	98.98%	99.83%
Total number of call attempts to calleeenter during TCBH		641697	2300805	NA	NA	315657	8250970	NA
No. of calls connected and answered successfully during TCBH		581534	2300455	NA	NA	315129	8167013	NA
Number of calls getting transferred to the operator (voice to voice)		NA	NA	446	1039692	NA	NA	3150950
Number of calls answered by operator (voice to voice) within 60 seconds		NA	NA	425	892961	NA	NA	3030814
Percentage calls answered within 60 seconds (V2V)	≥ 90%	NA	NA	95.29%	85.89%	NA	NA	96.19%
Number of calls getting transferred to the operator (voice to voice)		947388	3359047	NA	NA	794057	2123171	NA
Number of calls answered by operator (voice to voice) within 90 seconds		844929	3335667	NA	NA	774831	1998347	NA
Percentage calls answered within 90 seconds (V2V)	≥ 95%	89.19%	99.30%	NA	NA	97.58%	94.12%	NA

Note: For Customer Care (voice to voice), there are two different benchmarks (old and new). In the above table, if data is audited as per old benchmark, NA is written in the column showing data as per new benchmark and vice versa.

Live calling results for customer care (IVR)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	85	66	78	95	82	92
Percentage calls getting connected and answered	≥ 95%	100.00%	85.00%	66.00%	78.00%	95.00%	82.00%	92.00%

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service								
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		309	1261	699	1183	461	517	2018
Number of requests attended within 7 days		309	1261	699	1183	461	517	2018
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%

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits								
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		374	258	13	225	66	294	959
Total number of cases where refund was made within 60 days		374	258	13	225	66	294	959
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang							
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network	195797	140485	33750	108000	30173	132000	110638
Total taffic handled in erlang during TCBH	106916	118258	297	19809	15946	57110	94582
Total no. of customers served (as per VLR)	3334327.00	4687183.00	12426.00	1020062.00	608074.00	2016169.00	2800070.00

8.12 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests							
Resolution of service requests	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	No Raw Data	100	100	100	100
Number of cases resolved to satisfaction	85	74	No Raw Data	84	77	48	82
Percentage cases resolved in four weeks	0.85	0.74	No Raw Data	0.84	0.77	0.48	0.82

Note: Auditors did not receive the raw data for live calling from the central customer service center of BSNL CDMA as the operator was unable to provide the same.

8.13 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services								
Level 1 services		Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150
Calls answered in 60 sec		101	63	63	63	79	80	71
% of calls connected in 60 seconds	≥ 95%	67.33%	42.00%	42.00%	42.00%	52.67%	53.33%	47.33%

8.14 LEVEL 1 SERVICE CALLS MADE

Aircel				Airtel			
Level 1 service No	Total calls made	Able to connect	Not able to connect	Level 1 service No	Total calls made	Able to connect	Not able to connect
100	10	10	0	100	10	10	0
101	10	10	0	101	10	10	0
102	10	10	0	102	10	10	0
103	10	0	10	103	10	0	10
104	10	10	0	104	10	10	0
1056/108	10	10	0	1056/108	10	10	0
1070	17	17	0	1070	17	13	4
1071	23	23	0	1071	23	0	23
1072	8	0	8	1072	8	0	8
1073	4	0	4	1073	4	0	4
1091	7	0	7	1091	7	0	7
1095	9	0	9	1095	9	0	9
1096	11	0	11	1096	11	0	11
1098	11	11	0	1098	11	0	11

BSNL CDMA				BSNL GSM			
Level 1 service No	Total calls made	Able to connect	Not able to connect	Level 1 service No	Total calls made	Able to connect	Not able to connect
100	10	10	0	100	10	10	0
101	10	10	0	101	10	10	0
102	10	10	0	102	10	10	0
103	10	0	10	103	10	0	10
104	10	10	0	104	10	10	0
1056/108	10	10	0	1056/108	10	10	0
1070	17	13	4	1070	17	13	4
1071	23	0	23	1071	23	0	23
1072	8	0	8	1072	8	0	8
1073	4	0	4	1073	4	0	4
1091	7	0	7	1091	7	0	7
1095	9	0	9	1095	9	0	9
1096	11	0	11	1096	11	0	11
1098	11	0	11	1098	11	0	11

Idea				Reliance GSM			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0	100	10	10	0
101	10	10	0	101	10	9	1
102	10	0	10	102	10	9	1
103	10	0	10	103	10	0	10
104	30	30	0	104	30	30	0
1056/108	10	10	0	1056/108	10	9	1
1070	8	8	0	1070	8	2	6
1071	12	0	12	1071	12	0	12
1072	8	0	8	1072	8	0	8
1073	4	0	4	1078	4	0	4
1091	7	0	7	1091	7	0	7
1095	9	0	9	1095	9	0	9
1096	11	0	11	1096	11	0	11
1098	11	11	0	1098	11	11	0

Vodafone			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	2	8
102	10	10	0
103	10	0	10
104	30	26	4
1056/108	10	7	3
1070	8	5	3
1071	12	0	12
1072	8	0	8
1078	4	0	4
1091	7	0	7
1095	9	0	9
1096	11	0	11
1098	11	11	0

8.15 COUNTER DETAILS

SI No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	<p>No of established Calls = ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)]+[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])/No of Attempted Calls = ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])</p>
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	<p>SDCCH Failure= ([Channel Assignment Failures (All Channels Busy or Channels Unconfigured) in Immediate Assignment Procedure (SDCCH)] + [Failed Internal Intra-Cell Handovers (No Channel Available) (SDCCH)] + [Number of Unsuccessful Incoming Internal Inter-Cell Handovers (No Channel Available) (SDCCH)] + [Failed Incoming External Inter-Cell Handovers (No Channel Available) (SDCCH)])/SDCCH attempts = ([Channel Assignment Requests in Immediate Assignment Procedure (SDCCH)] + [Internal Intra-Cell Handover Requests (SDCCH)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)])</p>
3	TCH congestion= (TCH Failures /TCH Attempts)%	<p>TCH Failures= ((Failed TCH Seizures due to Busy TCH (Signaling Channel))+([Failed Assignments (First Assignment, No Channel Available in Assignment Procedure)]+[Failed Assignments (First Assignment, No Channel Available in Directed Retry Procedure)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Assignment)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Directed Retry)])/TCH Attempts = ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])</p>

4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	<p><u>The total no of dropped calls=</u> ([Call Drops on Radio Interface in Stable State (Traffic Channel)] + [Call Drops on Radio Interface in Handover State (Traffic Channel)] + [Call Drops Due to No MR from MS for a Long Time (Traffic Channel)] + [Call Drops due to Abis Terrestrial Link Failure (Traffic Channel)] + [Call Drops due to Equipment Failure (Traffic Channel)] + [Call Drops due to Forced Handover (Traffic Channel)] + [Call Drops due to local switching Start Failure] + [Call Drops due to Failures to Return to Normal Call from local switching])/<u>Total no of calls successfully established (where traffic channel is allotted)=</u> ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)]+[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])</p>
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	<p><u>Connection with good quality voice =</u> ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)) /<u>Total voice samples=</u> ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))</p>

8.15.1 ERICSSON

Ericsson provides network support to Vodafone, Aircel, Idea and Reliance GSM in the circle.

SI No.	KPI	Ericsson
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/TASSALL)*100
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion (TCH Failures /TCH Attempts)%= (CNRELCONG+TNRELCONG)/TASSALL)*100
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	Call Drop Rate (Total no dropped calls/No of established calls)%= (TNDROP)/TCASSALL*100
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH

CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.
TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

8.15.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel in the circle.

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	$\text{CSSR} = 100 - 100 * ((\text{SDCCH_BUSY_ATT}) - (\text{TCH_SEIZ_DUE_SDCCH_CON}) + (\text{SDCCH_RADIO_FAIL}) + (\text{SDCCH_RF_OLD_HO}) + (\text{SDCCH_USER_ACT}) + (\text{SDCCH_BCSU_RESET}) + (\text{SDCCH_NETW_ACT}) + (\text{SDCCH_BTS_FAIL}) + (\text{SDCCH_LAPD_FAIL}) + (\text{BLCK_8I_NOM}) / ((\text{CH_REQ_MSG_REC}) + (\text{PACKET_CH_REQ})) - ((\text{GHOST_CCCH_RES}) - (\text{REJ_SEIZ_ATT_DUE_DIST}))$
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	$\text{SDCCH congestion} = (\text{sdccch_busy_att} - \text{.tch_seiz_due_sdccch_con}) / ((\text{CH_REQ_MSG_REC}) + (\text{PACKET_CH_REQ})) - ((\text{GHOST_CCCH_RES}) - (\text{REJ_SEIZ_ATT_DUE_DIST}))$
3	TCH congestion= (TCH Failures /TCH Attempts)%	$\text{TCH congestion} = \text{BLCK_8I_NOM} / ((\text{TCH_NORM_SEIZ}) + (\text{MSC_I_SDCCH_TCH_AT}) + (\text{BSC_I_SDCCH_TCH_AT}))$

4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	$\text{TCH Drop} = (\text{drop_after_tch_assign}) - (\text{tch_re_est_release}) / \{(\text{TCH_NORM_SEIZ}) + (\text{MSC_I_SDCCH_TCH_AT}) + (\text{BSC_I_SDCCH_TCH_AT})\}$
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	$\text{Connection with good quality voice} = \frac{(\text{FREQ_DL_QUAL0} + \text{FREQ_DL_QUAL1} + \text{FREQ_DL_QUAL2} + \text{FREQ_DL_QUAL3} + \text{FREQ_DL_QUAL4} + \text{FREQ_DL_QUAL5})}{(\text{FREQ_DL_QUAL0} + \text{FREQ_DL_QUAL1} + \text{FREQ_DL_QUAL2} + \text{FREQ_DL_QUAL3} + \text{FREQ_DL_QUAL4} + \text{FREQ_DL_QUAL5} + \text{FREQ_DL_QUAL6} + \text{FREQ_DL_QUAL7})}$

9 ANNEXURE – JULY

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2504	3214	242	1353	1154	1572	2770
Sum of downtime of BTSs in a month (in hours)		201256	6769	42142	24783	3075	5283	19263
BTSs accumulated downtime (not available for service)	≤ 2%	10.80%	0.28%	23.41%	2.46%	0.36%	0.45%	0.93%
Number of BTSs having accumulated downtime >24 hours		1150	47	85	67	10	31	51
Worst affected BTSs due to downtime	≤ 2%	45.93%	1.46%	35.12%	4.95%	0.87%	1.97%	1.84%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2504	3194	242	1353	1154	1572	2770
Sum of downtime of BTSs in a month (in hours)		18195	423	3793	2602	403	578	1670
BTSs accumulated downtime (not available for service)	≤ 2%	10.09%	0.18%	21.77%	2.67%	0.49%	0.51%	0.84%
Number of BTSs having accumulated downtime >24 hours		268	0	10	16	3	0	3
Worst affected BTSs due to downtime	≤ 2%	10.70%	0.00%	4.13%	1.18%	0.26%	0.00%	0.11%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.06%	98.25%	98.34%	95.19%	97.96%	98.50%	99.46%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.94%	0.19%	2.09%	0.90%	0.30%	0.03%	0.14%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	4.43%	0.67%	0.00%	1.24%	1.77%	0.16%	0.54%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.89%	98.33%	98.34%	95.69%	98.75%	98.45%	99.81%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.52%	0.14%	1.86%	0.49%	0.12%	0.03%	0.23%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.21%	0.64%	0.00%	1.81%	1.02%	0.15%	0.19%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		573	540	680	491	465	559	541
Total number of successful calls established		569	540	564	483	465	549	537
CSSR	≥ 95%	99.30%	100.00%	82.94%	98.37%	100.00%	98.21%	99.26%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.70%	0.00%	17.06%	1.63%	0.00%	1.79%	0.74%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		173345189	177935363	622296	474581540	18991779	80348569	3849778
Total number of calls dropped		3668567	2064539	15544	11911997	248710	568531	27098
Call drop rate	≤ 2%	2.12%	1.16%	2.50%	2.51%	1.31%	0.71%	0.70%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7418	9667	687	3980	3463	4716	8366
Total number of cells having more than 3% TCH		1657	104	79	223	74	6	226
Worst affected cells having more than 3% TCH	≤ 3%	22.34%	1.08%	11.50%	5.60%	2.14%	0.13%	2.70%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		171638504	16846754	54922	55048663	22301863	8753246	1971343
Total number of calls dropped		3224290	201918	1028	1376217	279077	60611	12011
Call drop rate	≤ 2%	1.88%	1.20%	1.87%	2.50%	1.25%	0.69%	0.61%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7405	9600	687	3980	3463	4807	8366
Total number of cells having more than 3% TCH		1674	97	52	278	55	34	219

3% TCH								
Worst affected cells having more than 3% TCH	≤ 3%	22.61%	1.01%	7.57%	6.98%	1.59%	0.71%	2.62%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		570	540	549	483	465	549	538
Total number of calls dropped		141	0	71	23	0	10	6
Call drop rate	≤ 2%	24.74%	0.00%	12.93%	4.76%	0.00%	1.82%	1.12%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16522294311	19893526409	43884	54021	2509048967	12354580583	664536344
Total number of calls with good voice quality		14898619658	19550773653	40597	51715	2389153775	12164307282	648354910
%age calls with good voice quality	≥ 95%	90.17%	98.28%	92.51%	95.73%	95.22%	98.46%	97.57%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		15938481498	1916564087	43884	54021	2408724027	1233808516	316506241
Total number of calls with good voice quality		14642683968	1883471759	40597	51715	2307781040	1214227683	310000045
%age calls with good voice quality	≥ 95%	91.87%	98.27%	92.51%	95.73%	95.81%	98.41%	97.94%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
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Total number of sample calls		819254	896684	43884	691901	795420	244700	640819
Total number of calls with good voice quality		778116	845948	40597	629701	760770	224049	601722
%age calls with good voice quality	≥ 95%	94.98%	94.34%	92.51%	91.01%	95.64%	91.56%	93.90%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82394	86898	NC	19515	19642	31761	57636152
Traffic served for all POIs (B)- in erlangs		51938	31982	NC	19736	12296	20258	14650678
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82394	87098	NC	19515	19395	31730	6039058
Traffic served for all POIs (B)- in erlangs		52672	31547	NC	18496	12187	20591	1476208
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – AUGUST

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2503	3222	242	1353	1156	1569	2788
Sum of downtime of BTSs in a month (in hours)		171581	8921	38855	25653	2880	4232	12071
BTSs accumulated downtime (not available for service)	≤ 2%	9.21%	0.37%	21.58%	2.55%	0.33%	0.36%	0.58%
Number of BTSs having accumulated downtime >24 hours		1104	43	81	62	6	27	44
Worst affected BTSs due to downtime	≤ 2%	44.11%	1.33%	33.47%	4.58%	0.52%	1.72%	1.58%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2503	3212	242	1353	1156	1572	2788
Sum of downtime of BTSs in a month (in hours)		14791	714	3429	2530	264	126	1417
BTSs accumulated downtime (not available for service)	≤ 2%	8.21%	0.31%	19.67%	2.60%	0.32%	0.11%	0.71%
Number of BTSs having accumulated downtime >24 hours		217	0	9	8	3	27	2

Worst affected BTSs due to downtime	≤ 2%	8.67%	0.00%	3.71%	0.59%	0.26%	1.72%	0.07%
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2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.43%	97.99%	98.26%	95.17%	98.67%	98.53%	99.48%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.71%	0.17%	2.04%	0.83%	0.39%	0.02%	0.13%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.93%	0.88%	0.00%	1.28%	0.90%	0.13%	0.52%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.43%	98.15%	98.03%	95.60%	99.31%	98.50%	99.76%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.82%	0.13%	2.40%	0.72%	0.15%	0.02%	0.08%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.58%	0.77%	0.00%	1.52%	0.39%	0.05%	0.24%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		406	426	544	357	342	388	373

Total number of successful calls established		404	426	399	346	342	377	370
CSSR	≥ 95%	99.51%	100.00%	73.35%	96.92%	100.00%	97.16%	99.20%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.49%	0.00%	26.65%	3.08%	0.00%	2.84%	0.80%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		163994513	161435236	628098	500703324	19220278	79704314	3833059
Total number of calls dropped		3287648	1991265	14321	12167091	247960	568547	28576
Call drop rate	≤ 2%	2.00%	1.23%	2.28%	2.43%	1.29%	0.71%	0.75%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7423	9691	687	3980	3469	4707	8395
Total number of cells having more than 3% TCH		1409	108	75	213	69	5	217
Worst affected cells having more than 3% TCH	≤ 3%	18.98%	1.11%	10.92%	5.35%	1.99%	0.11%	2.58%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		180470844	16133263	65034	51373372	24734337	91143209	2002058
Total number of calls dropped		2874549	192825	1312	1417905	257162	568675	12881
Call drop rate	≤ 2%	1.59%	1.20%	2.02%	2.76%	1.04%	0.62%	0.64%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7408	9660	687	3980	3466	4707	8395
Total number of cells having more than 3% TCH		1576	106	65	281	65	5	222
Worst affected cells having more than 3% TCH	≤ 3%	21.27%	1.10%	9.46%	7.06%	1.88%	0.11%	2.64%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		404	426	399	351	342	378	370
Total number of calls dropped		1	0	35	7	0	6	1
Call drop rate	≤ 2%	0.25%	0.00%	8.77%	1.99%	0.00%	1.59%	0.27%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16721333490	19459326305	35553	49111	2630403216	12528243889	677995022
Total number of calls with good voice quality		15084955183	19120025848	32546	46594	2502535462	12318627503	661473028
%age calls with good voice quality	≥ 95%	90.21%	98.26%	91.54%	94.87%	95.14%	98.33%	97.56%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16451715975	19459326305	35553	49111	2588987540	13769304088	328509138
Total number of calls with good voice quality		15107755418	19120025848	32546	46594	2479183688	13516755821	321590920
%age calls with good voice quality	≥ 95%	91.83%	98.26%	91.54%	94.87%	95.76%	98.17%	97.89%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		594816	735363	35005	489119	574556	35292	813400
Total number of calls with good voice quality		561225	691592	32190	456337	556739	32944	788886
%age calls with good voice quality	≥ 95%	94.35%	94.05%	91.96%	93.30%	96.90%	93.35%	96.99%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82221	85311	NC	19515	19207	31793	61950129
Traffic served for all POIs (B)- in erlangs		51829	32016	NC	20248	13069	20055	15317519
POI congestion	≤ 0.5%	0.00%	0.00%	NC	3.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	NC	19	29	23	280
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85453	84849	NC	19515	19525	31802	5939184
Traffic served for all POIs (B)- in erlangs		54945	32232	NC	18209	12512	20796	1501858
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE - SEPTEMBER

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2496	3232	242	1353	1156	1569	2804
Sum of downtime of BTSs in a month (in hours)		151090	9874	37618	24743	3939	4067	19395
BTSs accumulated downtime (not available for service)	≤ 2%	8.14%	0.41%	20.89%	2.46%	0.46%	0.35%	0.93%
Number of BTSs having accumulated downtime >24 hours		1031	46	87	68	5	23	48
Worst affected BTSs due to downtime	≤ 2%	41.31%	1.42%	35.95%	5.03%	0.43%	1.47%	1.71%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2491	3225	242	1353	1156	1569	2804
Sum of downtime of BTSs in a month (in hours)		13691	543	2516	25653	432	287	1598
BTSs accumulated downtime (not available for service)	≤ 2%	7.63%	0.23%	14.44%	26.33%	0.52%	0.25%	0.79%
Number of BTSs having accumulated downtime >24 hours		188	0	6	62	2	23	1

Worst affected BTSs due to downtime	≤ 2%	7.55%	0.00%	2.48%	4.58%	0.17%	1.47%	0.04%
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2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.56%	98.13%	97.98%	95.22%	98.70%	98.54%	99.62%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.97%	0.19%	1.93%	1.00%	0.27%	0.03%	0.10%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.72%	0.80%	0.00%	1.23%	0.85%	0.03%	0.38%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.67%	98.15%	98.09%	95.17%	99.30%	98.51%	99.86%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.70%	0.19%	2.86%	0.83%	0.15%	0.03%	0.05%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.34%	0.76%	0.00%	1.28%	0.37%	0.12%	0.14%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		644	657	805	635	464	510	657

Total number of successful calls established		643	655	669	611	463	486	653
CSSR	≥ 95%	99.84%	99.70%	83.11%	96.22%	99.78%	95.29%	99.39%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.16%	0.30%	16.89%	3.78%	0.22%	4.71%	0.61%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		153657356	145888287	590484	483256314	18405178	80972156	3813617
Total number of calls dropped		3040709	1856370	10855	11598151	251621	573573	27243
Call drop rate	≤ 2%	1.98%	1.27%	1.84%	2.40%	1.37%	0.71%	0.71%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7398	9721	687	3980	3469	4707	8982
Total number of cells having more than 3% TCH		1403	118	74	228	68	6	253
Worst affected cells having more than 3% TCH	≤ 3%	18.96%	1.21%	10.77%	5.73%	1.96%	0.13%	2.82%

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 CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		171718291	15265360	57218	500703324	25470184	8387723	1979733
Total number of calls dropped		2793604	198551	1265	12167091	258983	57829	13043
Call drop rate	≤ 2%	1.63%	1.30%	2.21%	2.43%	1.02%	0.69%	0.66%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7396	9700	687	3980	3469	4707	8982
Total number of cells having more than 3% TCH		1430	121	70	213	80	6	238
Worst affected cells having more than 3% TCH	≤ 3%	19.33%	1.25%	10.19%	5.35%	2.31%	0.13%	2.65%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		643	658	669	611	464	486	653
Total number of calls dropped		0	1	46	17	0	11	0
Call drop rate	≤ 2%	0.00%	0.15%	6.88%	2.78%	0.00%	2.26%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16400904501	18686902415	60799	46177	2649809416	12501816115	670233489
Total number of calls with good voice quality		14748773837	18374283351	55834	43863	2518947421	12298316576	654073574
%age calls with good voice quality	≥ 95%	89.93%	98.33%	91.83%	94.99%	95.06%	98.37%	97.59%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16800863125	1923893915	60799	49111	2795042313	1284491751	330286554
Total number of calls with good voice quality		15372902798	1891190323	55834	46594	2673397408	1265088894	323648209
%age calls with good voice quality	≥ 95%	91.50%	98.30%	91.83%	94.87%	95.65%	98.49%	97.99%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		985226	1047966	60799	909447	768346	206544	1121698
Total number of calls with good voice quality		935053	993504	55834	829069	748467	198710	1082016
%age calls with good voice quality	≥ 95%	94.91%	94.80%	91.83%	91.16%	97.41%	96.21%	96.46%

5. POI Congestion**Audit Results for POI Congestion- PMR data**

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85386	85608	NC	19515	20355	31875	60193290
Traffic served for all POIs (B)- in erlangs		53422	32199	NC	19809	12420	20158	15141189
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.15%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	NC	19	29	23	28
No. of POIs not meeting benchmark		0	0	NC	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85386	86104	NC	19515	19705	32389	5980159
Traffic served for all POIs (B)- in erlangs		54655	32812	NC	20248	13095	20765	1506318
POI congestion	≤ 0.5%	0.00%	0.00%	NC	0.03%	0.00%	0.00%	0.00%

12 ABBREVIATIONS

Following terms/abbreviations have been used in this report. This section provides meaning of the abbreviations used in the report.

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JAS'14 – Refers to the quarter of July, August and September 2014
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH – Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing



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