EAST ZONE

TRAI AUDIT WIRELESS REPORT-NORTH EAST CIRCLE - JAS QUARTER, 2014

Prepared By -

IMRB International | eTech

Prepared For-

TRAI

सत्यमेव जयते

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

1 TABLE OF CONTENTS

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 North East 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.

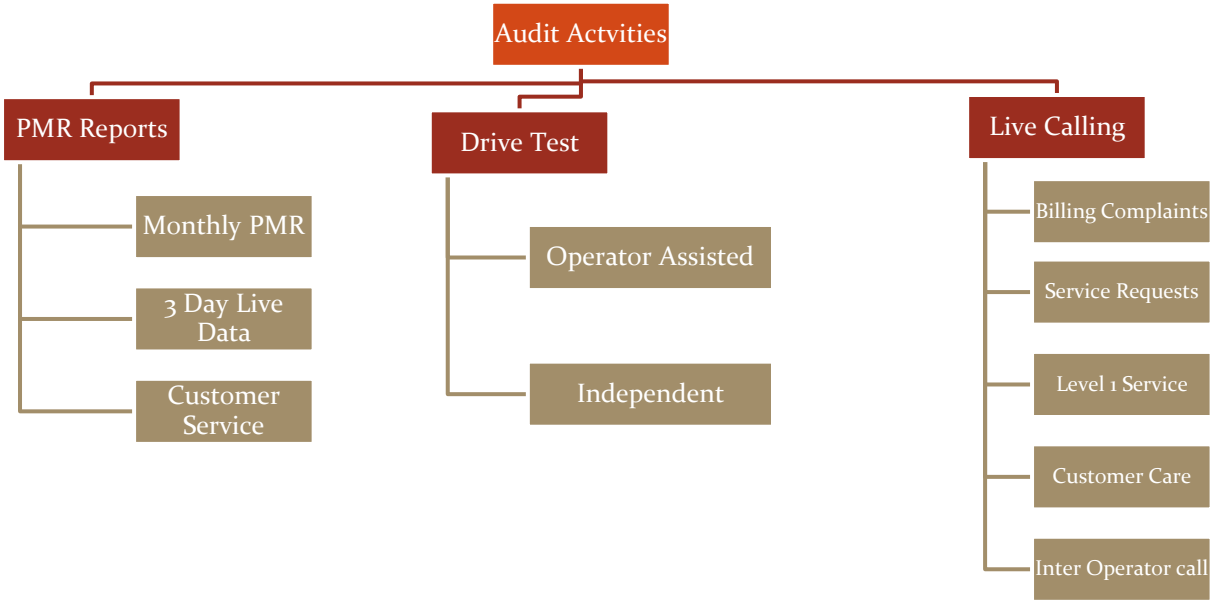
For calls answered by operators (voice to voice) following operators provided the data as per new benchmark levels.

- Aircel
- Airtel
- BSNL CDMA
- BSNL GSM
- Idea
- Reliance GSM

2.4 COVERAGE

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

2.5 FRAMEWORK USED

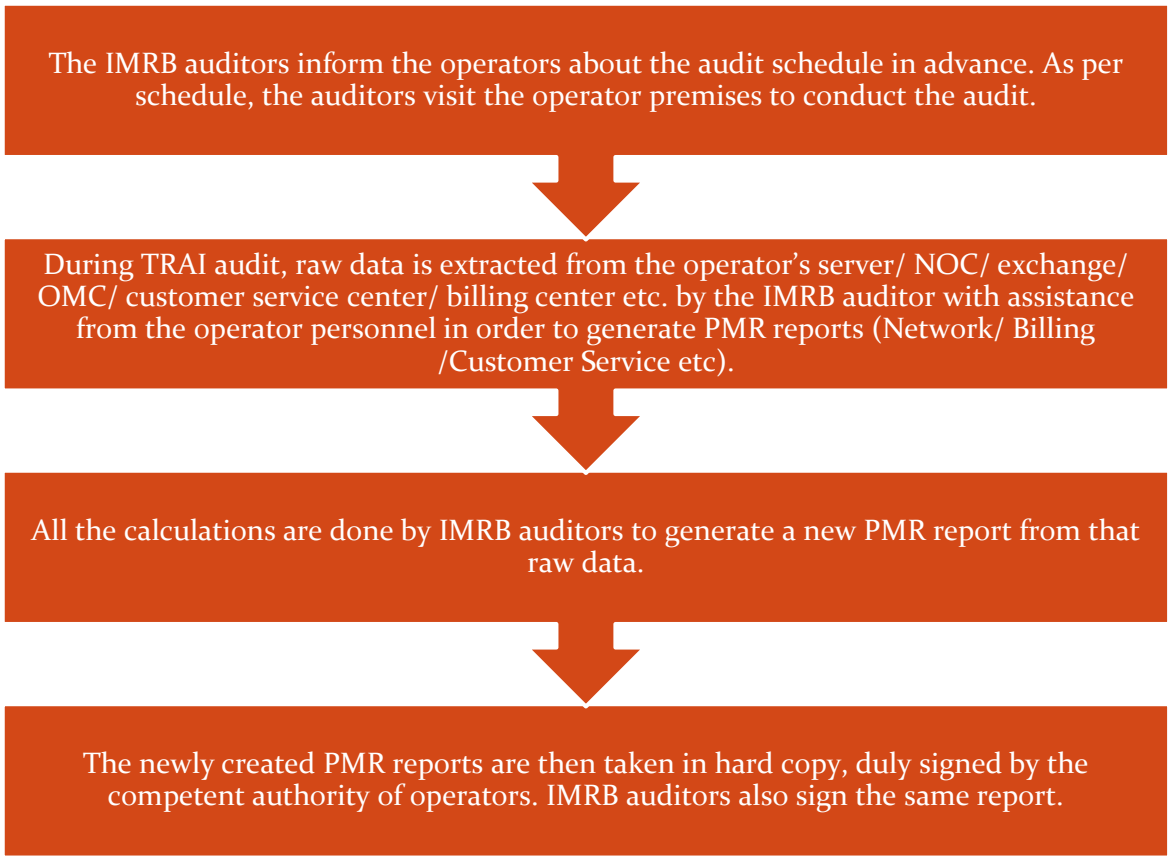


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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

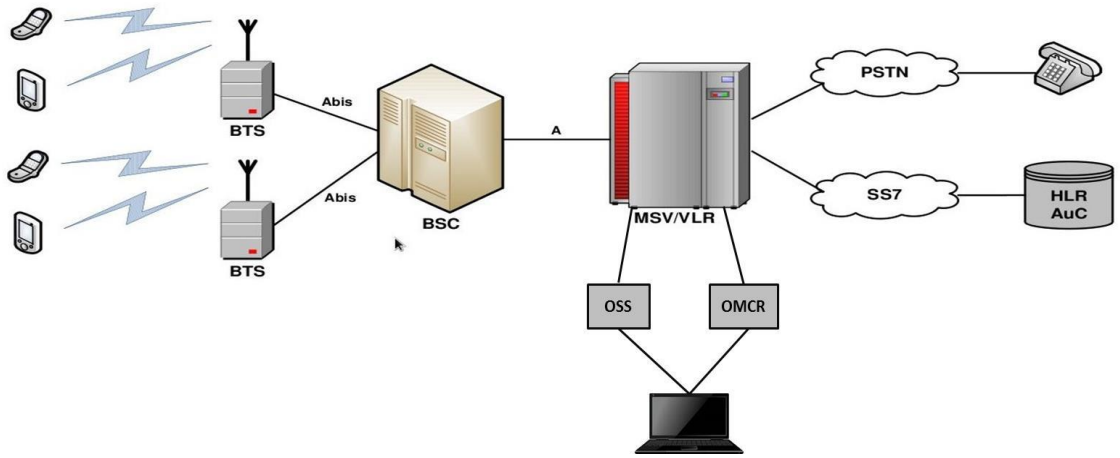
Let us now look at the various parameters involved in the audit reports.

Network Related

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

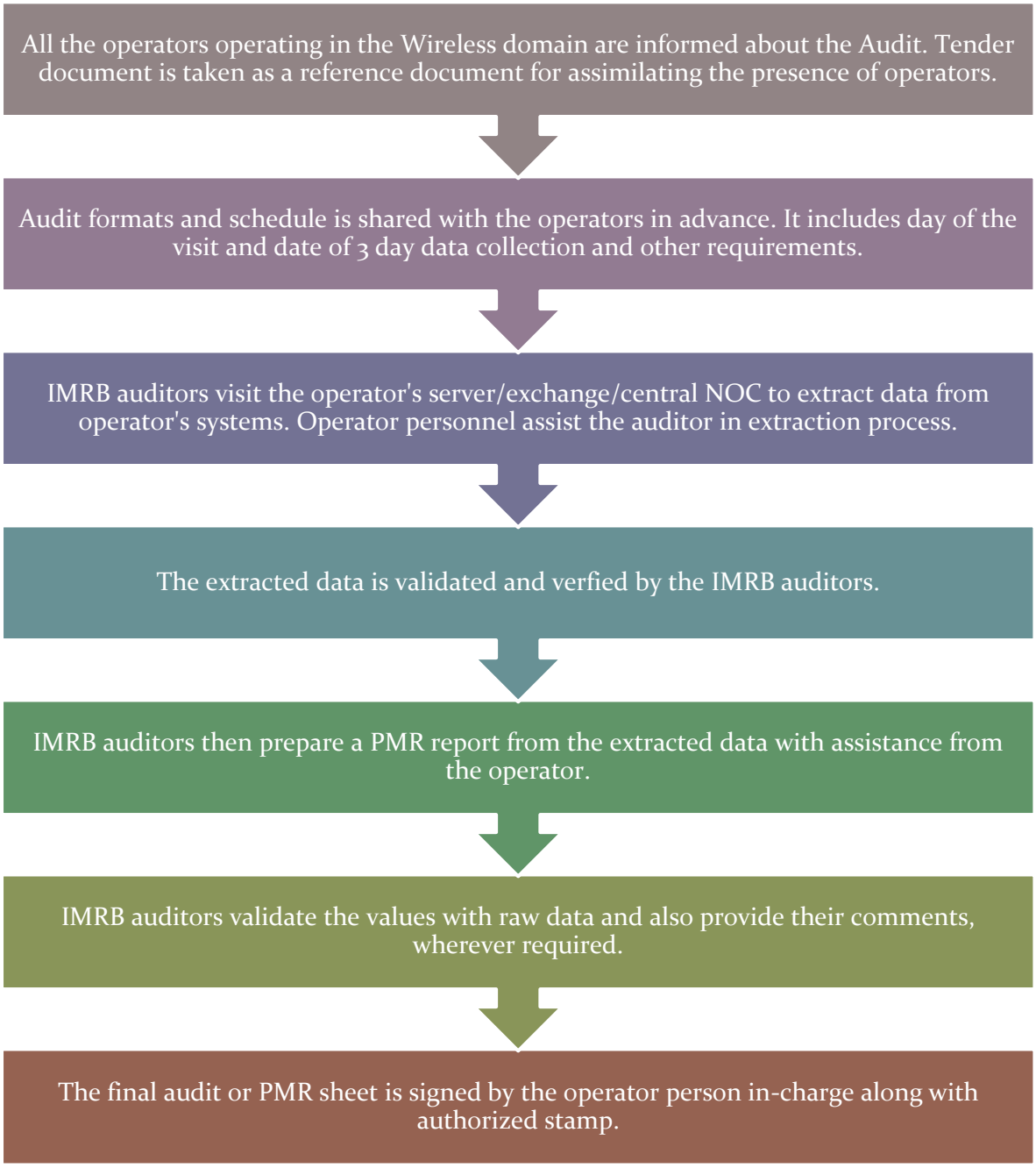
2.5.1.4 POINT OF DATA EXTRACTION

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	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
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(DWL)	Airtel	BSNL NE 2 CDMA	BSNL NE 1 GSM
20:00 - 21:00	20:00 - 21:00	19:00 - 20:00	20:00 - 21:00
BSNL NE 2 GSM	**Idea**	**Reliance GSM**	**Vodafone**
19:00 - 20:00	20:00 - 21:00	20:00 - 21:00	20:00 - 21:00

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 for a quarter.

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)	There are two benchmarks involved here: Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100 Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100
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)	There are two benchmarks involved here (Old and New): 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)
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.

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

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

The auditors also verify the performance of call center, level 1 services by calling the numbers using operator SIM. The list of call center numbers is provided by the operator. The process followed to test Level 1 services has been stated below.

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

Live calling activity was carried out during the period of 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 Heath 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)] x 100
- Voice quality (GSM)
  - ✓ Total RxQual Samples– A
  - ✓ RxQual samples with 0-5 value – B
  - ✓ %age samples with good voice quality = B/A x 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 x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 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) x 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) x 100

2.6 OPERATORS COVERED

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	1750927
Airtel	3074744
BSNL NE 1 CDMA	6409
BSNL NE 2 CDMA	29950
BSNL NE 1 GSM	375964
BSNL NE 2 GSM	555344
Idea	339176
Reliance GSM	635561
Vodafone	1044892

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

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 North East circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

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

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 (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	12.80%	63.11%	95.42%	3.44%	3.64%	2.67%	27.92%	92.50%
Airtel	0.33%	1.39%	97.47%	0.54%	0.50%	1.09%	1.03%	98.80%
BSNL NE 1 CDMA	10.65%	19.46%	97.18%	No Data	No Data	1.69%	No Data	No Data
BSNL NE 2 CDMA	9.52%	16.60%	88.22%	0.08%	0.17%	1.20%	3.80%	100.00%
BSNL NE 1 GSM	1.93%	1.84%	97.39%	0.94%	1.85%	1.20%	2.95%	97.33%
BSNL NE 2 GSM	9.67%	37.67%	84.02%	0.53%	0.86%	5.70%	24.97%	86.37%
Idea	1.25%	1.08%	97.61%	0.35%	1.45%	1.51%	2.36%	95.33%
Reliance GSM	0.33%	1.34%	98.57%	0.02%	0.26%	0.67%	0.07%	98.31%
Vodafone	1.63%	1.87%	99.21%	0.21%	0.79%	0.79%	2.49%	97.82%

Note: Auditors were not able to get the data for SDCCH Congestion, TCH Congestion, Worst affected cells having more than 3% TCH drop and Voice quality from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

The above table represents the parameter wise observations for Wireless Operators for North East circle:

BTSs Accumulated Downtime:

In North East, Aircel, BSNL NE I CDMA, BSNL NE II CDMA and BSNL NE II GSM did not meet the benchmark. Airtel performed the best among all operators by recording 0.33%.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL NE I CDMA, BSNL NE II CDMA and BSNL NE II GSM were unable to meet the benchmark. Idea had minimum worst affected BTSs due to downtime at 1.08%.

Call Set-up Success Rate (CSSR):

BSNL NE II CDMA and BSNL NE II GSM did not meet the benchmark on CSSR. During the audits, the maximum CSSR was observed for Vodafone with 99.21% of their calls getting completed.

All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH are the key network congestion parameters.

Aircel failed to meet the benchmark for both SDCCH Paging TCH congestion parameters.
Reliance GSM performed the best on SDCCH Paging Channel Congestion and BSNL NE II CDMA performed the best on TCH congestion.

The calculation methodology of these parameters was found to be in complete accordance with TRAI specifications.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators.

While Aircel and BSNL NE II GSM missed the benchmark, Reliance GSM was the best performer by recording call drop rate of 0.67%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL NE II CDMA and BSNL NE II GSM failed to meet the benchmark while Reliance GSM had minimum worst affected cells at 0.07%.

Voice Quality:

During the audit it was found that Aircel and BSNL NE II GSM did not meet the benchmark in terms of voice quality. BSNL NE II CDMA was the best by recording 100%.

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 network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	8.69%	8.96%	95.95%	4.20%	3.13%	2.69%	27.84%	92.63%
Airtel	0.21%	0.00%	97.68%	0.50%	0.47%	1.10%	1.01%	98.82%
BSNL NE 1 CDMA	8.32%	6.80%	97.09%	No Data	No Data	1.71%	No Data	No Data
BSNL NE 2 CDMA	7.30%	10.70%	88.09%	0.04%	0.42%	0.92%	3.87%	100.00%
BSNL NE 1 GSM	1.34%	1.84%	96.91%	0.88%	1.81%	1.72%	2.91%	97.62%
BSNL NE 2 GSM	3.66%	22.39%	82.61%	0.48%	0.83%	5.72%	17.57%	85.68%
Idea	0.90%	0.63%	99.16%	0.39%	0.45%	1.28%	2.46%	95.48%
Reliance GSM	0.19%	0.94%	98.77%	0.02%	0.24%	0.64%	0.09%	98.28%
Vodafone	1.15%	0.37%	99.49%	0.26%	0.51%	0.72%	2.47%	97.96%

Note: Auditors were not able to get the data for SDCCH Congestion, TCH Congestion, Worst affected cells having more than 3% TCH drop and Voice quality from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

The above table represents the parameter wise observations for Wireless Operators for North East circle:

BTSs Accumulated Downtime:

In North East, Aircel, BSNL NE I CDMA, BSNL NE II CDMA and BSNL NE II GSM did not meet the benchmark. Reliance GSM performed the best among all operators by recording 0.19% BTS downtime.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL NE I CDMA, BSNL NE II CDMA and BSNL NE II GSM were unable to meet the benchmark. Airtel had minimum worst affected BTSs due to downtime at 0%.

Call Set-up Success Rate (CSSR):

BSNL NE II CDMA and BSNL NE II GSM did not meet the benchmark on CSSR. The maximum CSSR was observed for Vodafone with 99.49% of their calls getting completed.

All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH are the key network congestion parameters.

Aircel failed to meet the benchmark for both SDCCH Paging TCH congestion parameters.
Reliance GSM performed the best on SDCCH Paging Channel Congestion as well as TCH congestion.

The calculation methodology of these parameters was found to be in complete accordance with TRAI specifications.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators.

While Aircel and BSNL NE II GSM missed the benchmark, Reliance GSM was the best performer by recording call drop rate of 0.64%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL NE II CDMA and BSNL NE II GSM failed to meet the benchmark while Reliance GSM had minimum worst affected cells at 0.09%.

Voice Quality:

During the audit it was found that Aircel and BSNL NE II GSM did not meet the benchmark in terms of voice quality. BSNL NE II CDMA was the best by recording 100%.

3.3 LIVE CALLING DATA – CONSOLIDATED

Name of Service Provider	Metering and Billing		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)	66.00%	69.00%	68.67%	100.00%	85.00%
Airtel	72.00%	88.00%	44.00%	100.00%	95.00%
BSNL NE 1 CDMA	No Raw Data	No Raw Data	73.33%	100.00%	65.00%
BSNL NE 2 CDMA	No Raw Data	No Raw Data	20.67%	100.00%	60.00%
BSNL NE 1 GSM	72.92%	64.52%	73.33%	100.00%	66.00%
BSNL NE 2 GSM	72.00%	70.00%	73.33%	100.00%	67.00%
Idea	37.50%	82.00%	68.67%	100.00%	93.00%
Reliance GSM	72.00%	59.00%	44.00%	100.00%	80.00%
Vodafone	85.00%	81.00%	38.00%	100.00%	89.00%

Note: Auditors were not able to get billing complaints and Service Request raw data from BSNL NE 1 CDMA and BSNL NE2 CDMA as the operators were unable to provide the same.

Also, 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.

Complaints Resolved within 4 weeks

As per the live calling made to consumers, none of the operators met the benchmark.

Complaint/Request Attended to Satisfaction

Though there is no benchmark set by TRAI for the parameter, operators Aircel, BSNL NE I GSM, BSNL NE II GSM and Reliance GSM performing below circle average of 73.36%.

Level 1 Service

None of the operators were able to meet the benchmark for level 1 service 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.

Customer Care / Helpline Assessment

Only Airtel and Idea were found to be meeting the benchmark for the parameter.

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)	0.12%	0.01%	100.00%	100.00%	100.00%	97.05%	NA	91.28%
Airtel	0.04%	0.03%	100.00%	100.00%	100.00%	No Data	NA	98.10%
BSNL NE 1 CDMA	0.08%	0.02%	100.00%	100.00%	100.00%	No Data	NA	90.73%
BSNL NE 2 CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	No Data	NA	No Data
BSNL NE 1 GSM	0.03%	0.03%	100.00%	100.00%	100.00%	41.92%	NA	76.05%
BSNL NE 2 GSM	0.01%	0.00%	89.00%	100.00%	100.00%	50.94%	NA	71.33%
Idea	0.00%	0.01%	100.00%	100.00%	100.00%	99.87%	NA	98.78%
Reliance GSM	0.08%	0.04%	100.00%	100.00%	100.00%	98.50%	NA	97.53%
Vodafone	0.28%	0.04%	100.00%	100.00%	100.00%	99.98%	95.02%	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 postpaid customers, Aircel and Vodafone did not meet the benchmark. BSNL NE II CDMA and Idea were the best performers in the circle.

Billing Disputes – Prepaid Subscribers

For prepaid, it was seen that all operators met the benchmark. BSNL NE II CDMA was the best performer in the circle.

Billing Complaints -% of complaints resolved in 4 weeks

It was seen that that all the operators met the TRAI criteria of resolution of complaint within 4 weeks except BSNL NE II GSM.

Response Time to customer for assistance - % of cases in which advance wavier 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 operators IVR within 60 seconds

BSNL NE I GSM and BSNL NE II GSM did not meet the benchmark of 95% of its IVR call being attended within 60 seconds.

Note: Auditors were not able to get the raw data for the parameter from BSNL NE II CDMA and BSNL NE II CDMA as the operators were unable to provide the same. Airtel reported a technical issue in their system due to which auditors could not get the data for the parameter.

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

BSNL NE I GSM and BSNL NE II GSM did not meet the benchmark while Idea had the highest percentage of calls being answered at 98.78%.

Note: Auditors were not able to get the raw data for the parameter from BSNL NE II CDMA as the operator was unable to provide the same. Also, Vodafone had the data availability as per old benchmark guidelines.

3.5 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

6. Inter Operator Call Assessment							
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL NE CDMA	BSNL NE GSM	Idea	Reliance GSM	Vodafone
Aircel(DWL)	NA	87.00%	87.00%	88.00%	87.00%	89.00%	87.00%
Airtel	89.00%	NA	92.00%	89.00%	90.00%	89.00%	88.00%
BSNL NE 1 CDMA	89.00%	92.00%	NA	89.00%	91.00%	93.00%	90.00%
BSNL NE 2 CDMA	89.00%	92.00%	NA	89.00%	91.00%	93.00%	90.00%
BSNL NE 1 GSM	85.00%	93.00%	95.00%	NA	93.00%	91.00%	91.00%
BSNL NE 2 GSM	85.00%	93.00%	95.00%	NA	93.00%	91.00%	91.00%
Idea	87.00%	91.00%	92.00%	92.00%	NA	93.00%	90.00%
Reliance GSM	92.00%	91.00%	89.00%	91.00%	91.00%	NA	89.00%
Vodafone	89.00%	92.00%	89.00%	89.00%	90.00%	88.00%	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, it was observed that all operators faced problems in connecting to other 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

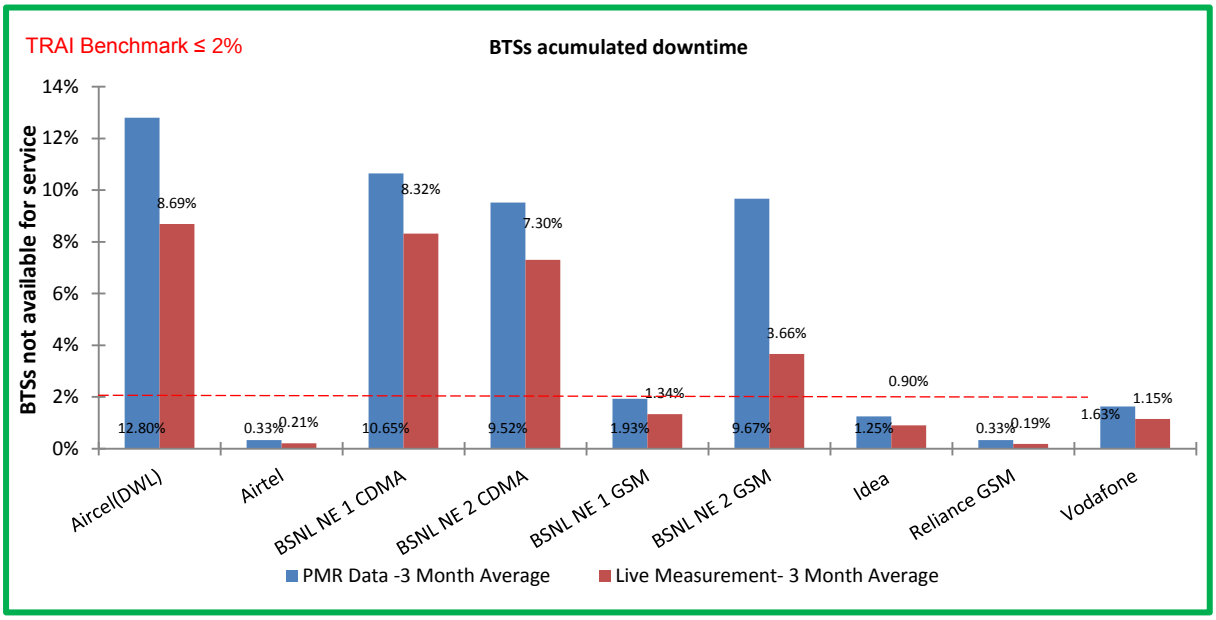
3. **TRAI Benchmark –**

    a. BTSs Accumulated downtime (not available for service) ≤ 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.

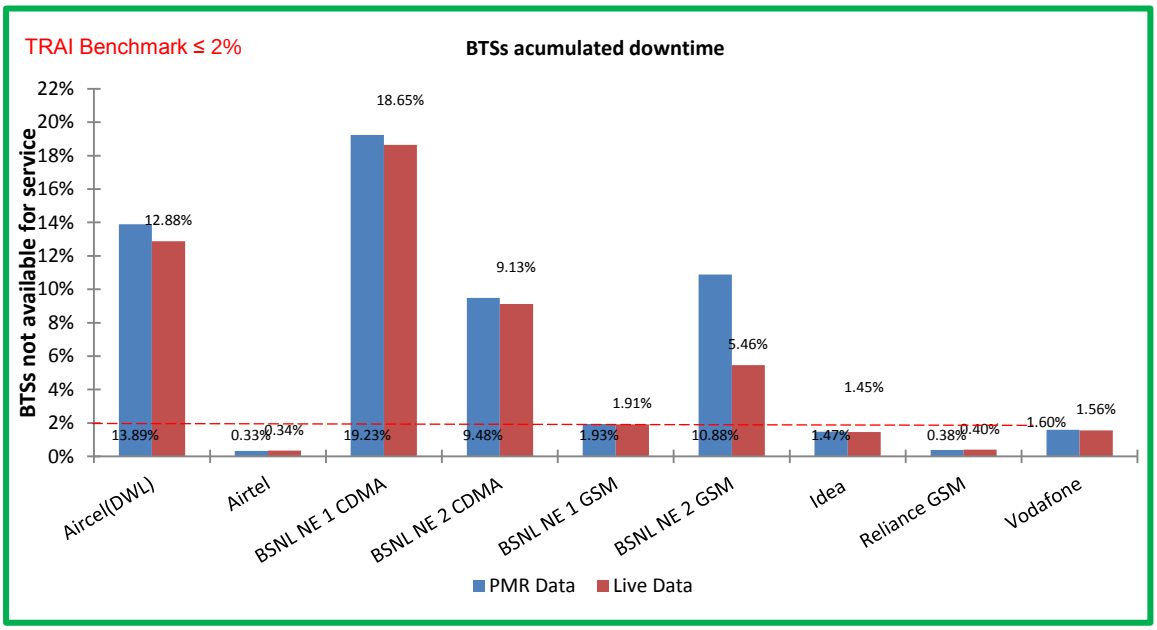
4.1.2 KEY FINDINGS – CONSOLIDATED



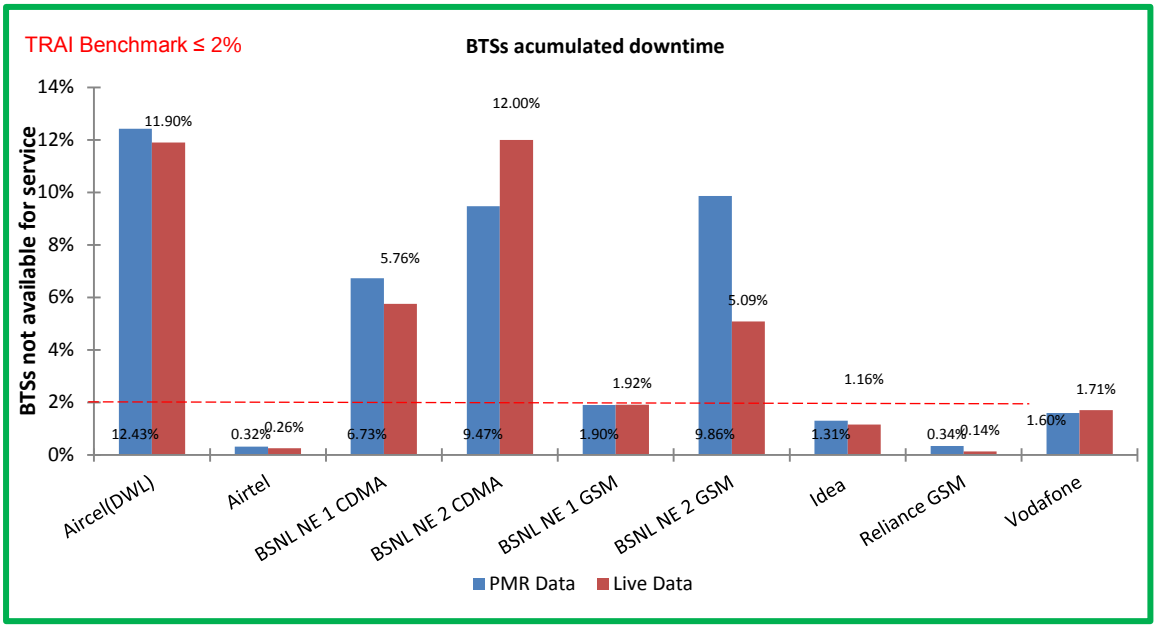
Aircel, BSNL NE I CDMA, BSNL NE II CDMA and BSNL NE II GSM failed to meet the benchmark during audit.

Also, significant difference was observed between PMR & live measurement data for the above mentioned operators. The possible reason for the variation could be the variation in time frame of data as PMR data is for 30 days and live measurement data is for three days.

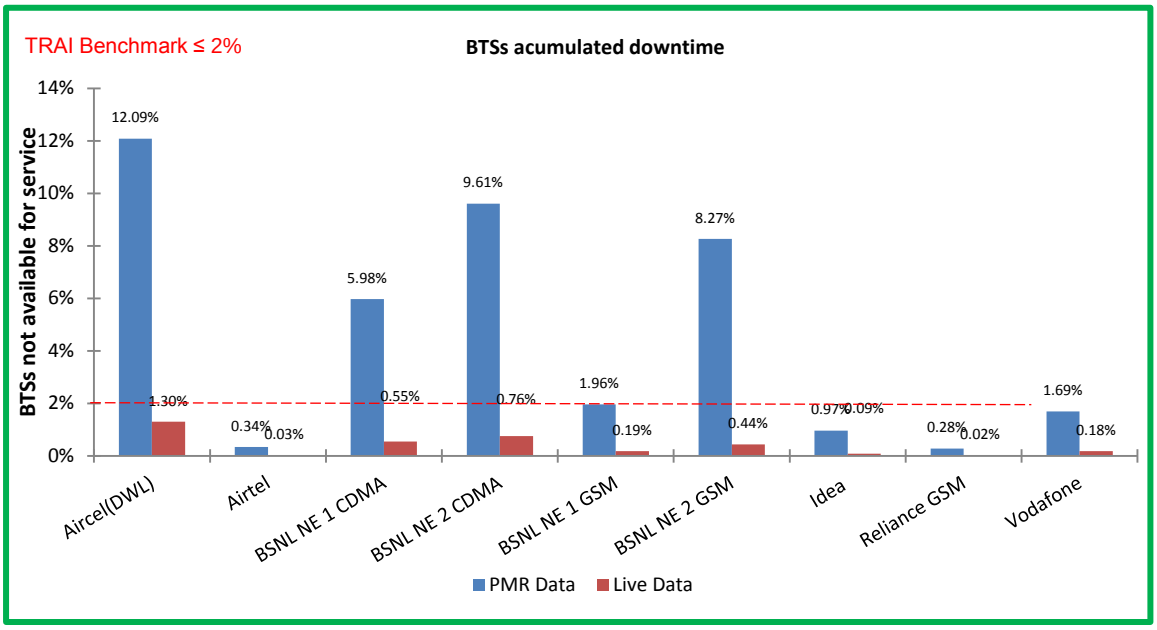
4.1.2.1 KEY FINDINGS – MONTH 1



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 ≤ 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.

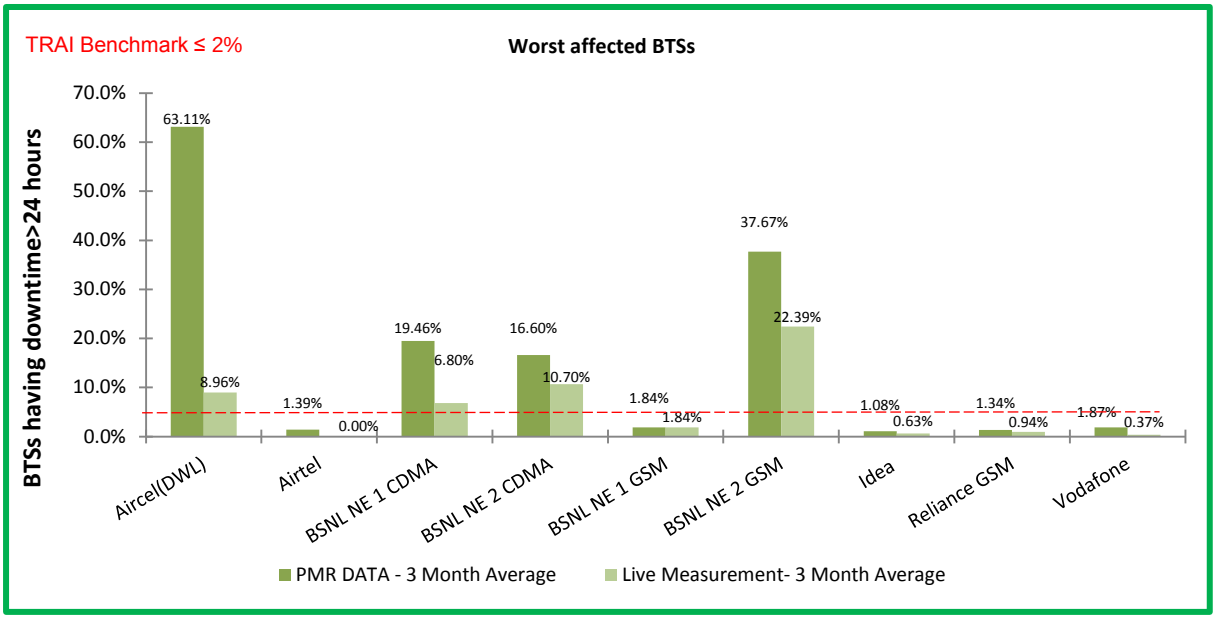
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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.

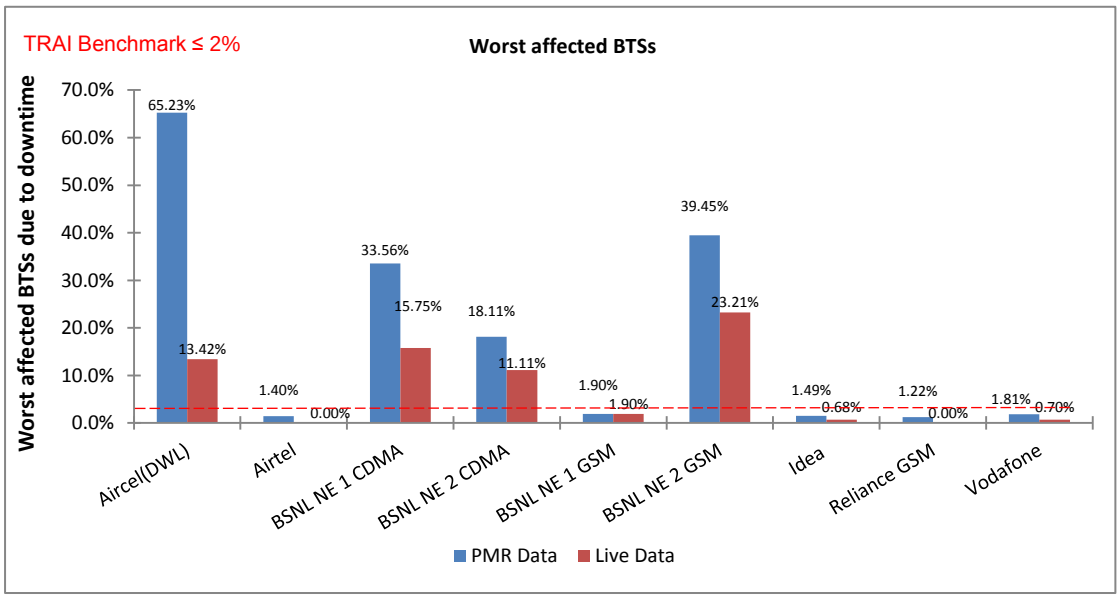
   vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

4.2.2 KEY FINDINGS – CONSOLIDATED

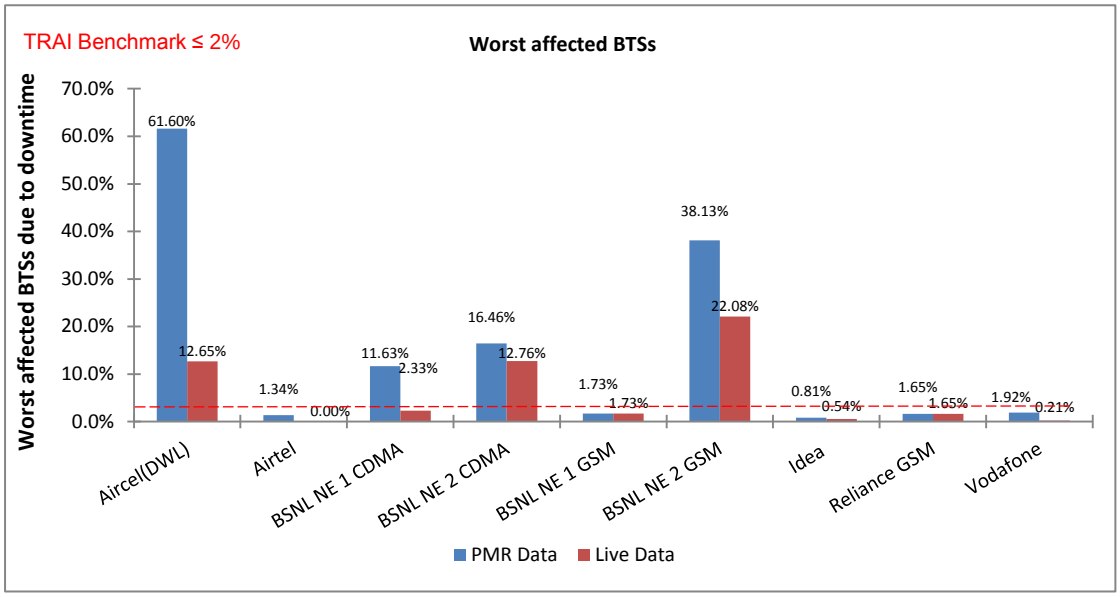


Aircel, BSNL NE I CDMA, BSNL NE II CDMA and BSNL NE II GSM did not meet the TRAI benchmark for downtime due to worst affected BTS during audit.
Significant difference was observed between PMR & live measurement data for the above mentioned operators. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

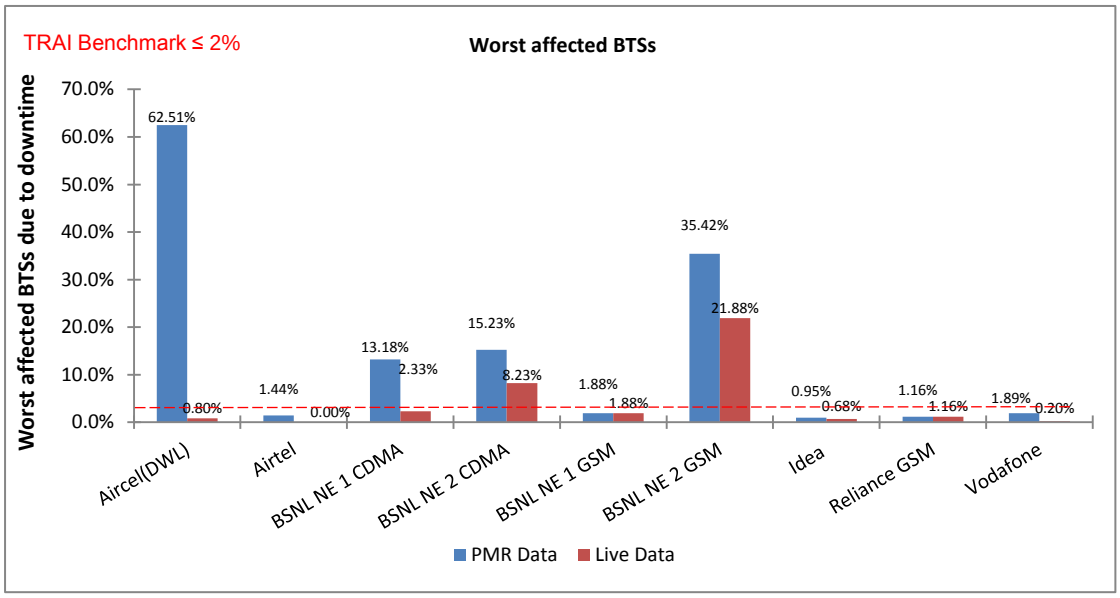
4.2.2.1 KEY FINDINGS – MONTH 1



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-**

   (Calls Established / Total Call Attempts) * 100

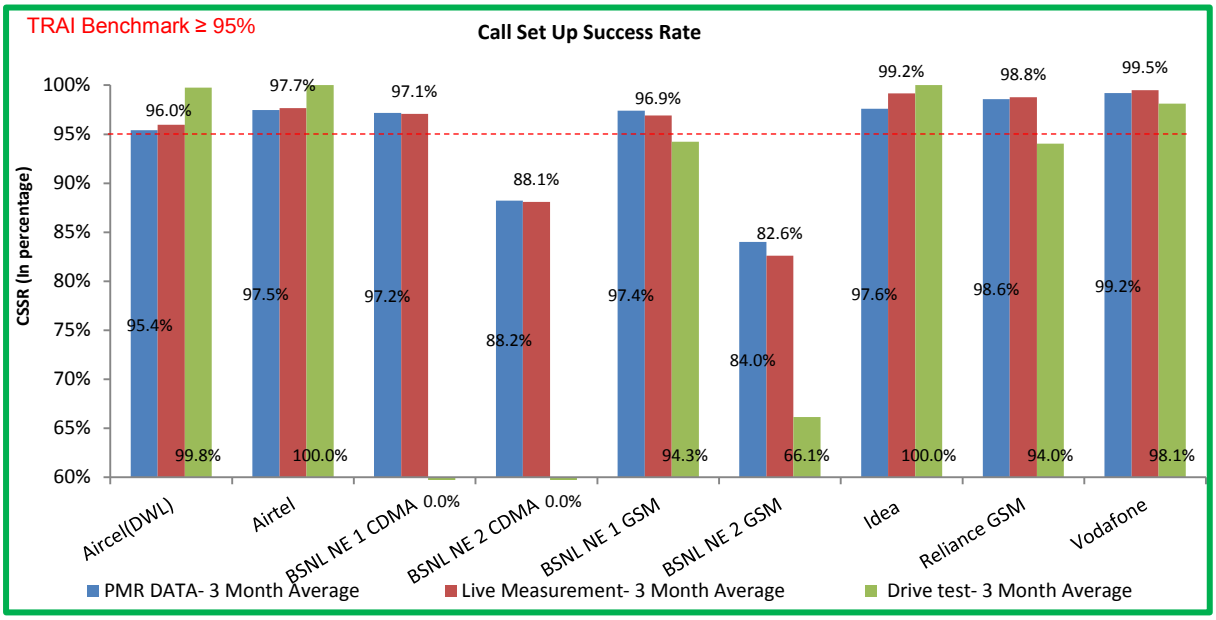
   Call Established means the following events have happened in call setup:-

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

3. **TRAI Benchmark ≥** 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.

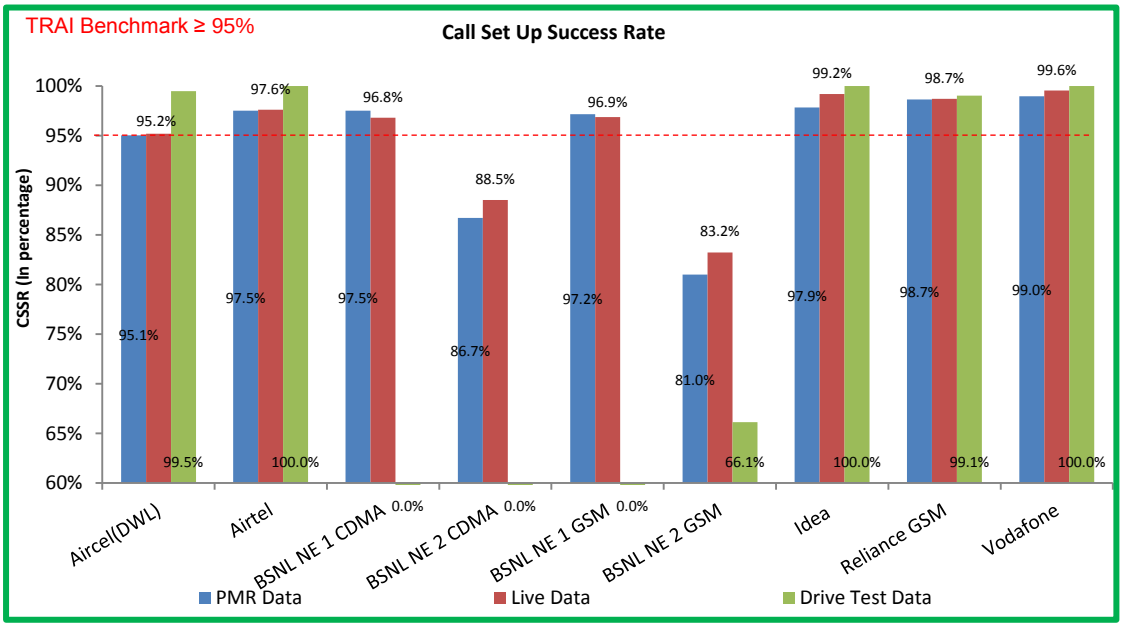
4.3.2 KEY FINDINGS – CONSOLIDATED



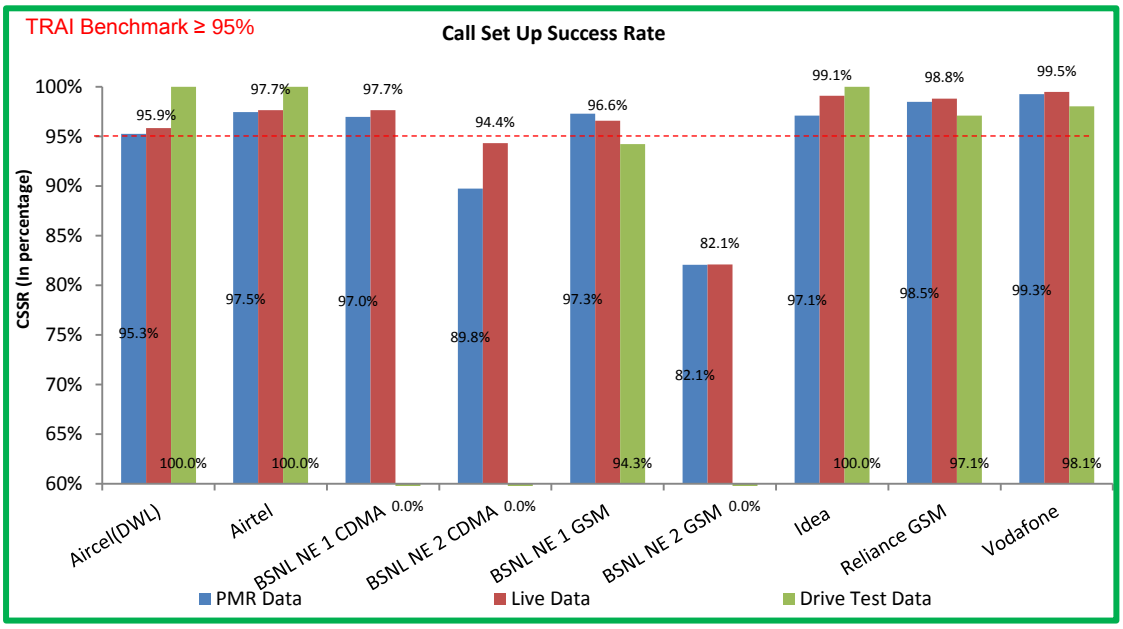
Note: Operators BSNL CDMA (NE I & NE II) did not submit the drive test data with the auditor.

BSNL NE II CDMA and BSNL NE II GSM did not meet the benchmark on CSSR.

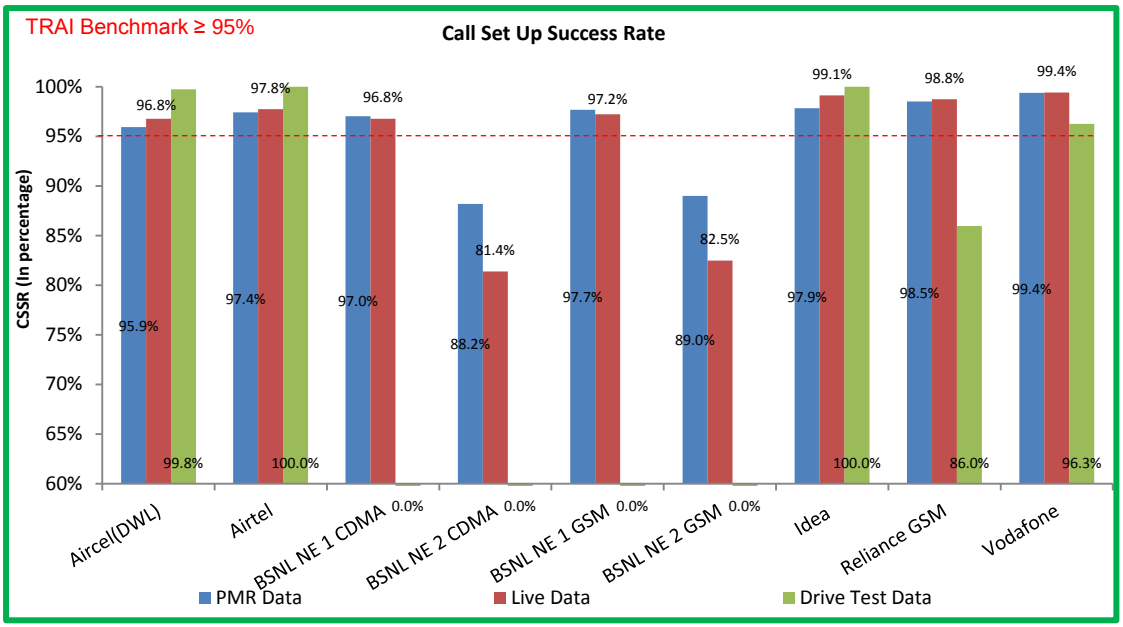
4.3.2.1 KEY FINDINGS – MONTH 1



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% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
  - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
  - C1 = Average SDCCH / TCH Congestion % on day 1
  - A2 = Number of attempts to establish SDCCH / TCH made on day 2
  - C2 = Average SDCCH / TCH Congestion % on day 2
  - An = Number of attempts to establish SDCCH / TCH made on day n
  - Cn = Average SDCCH / TCH Congestion % on day n
- **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
  - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
  - C1 = Average POI Congestion % on day 1
  - A2 = POI traffic offered on all POIs (no. of calls) on day 2
  - C2 = Average POI Congestion % on day 2
  - An = POI traffic offered on all POIs (no. of calls) on day n
  - Cn = Average POI Congestion % on day n

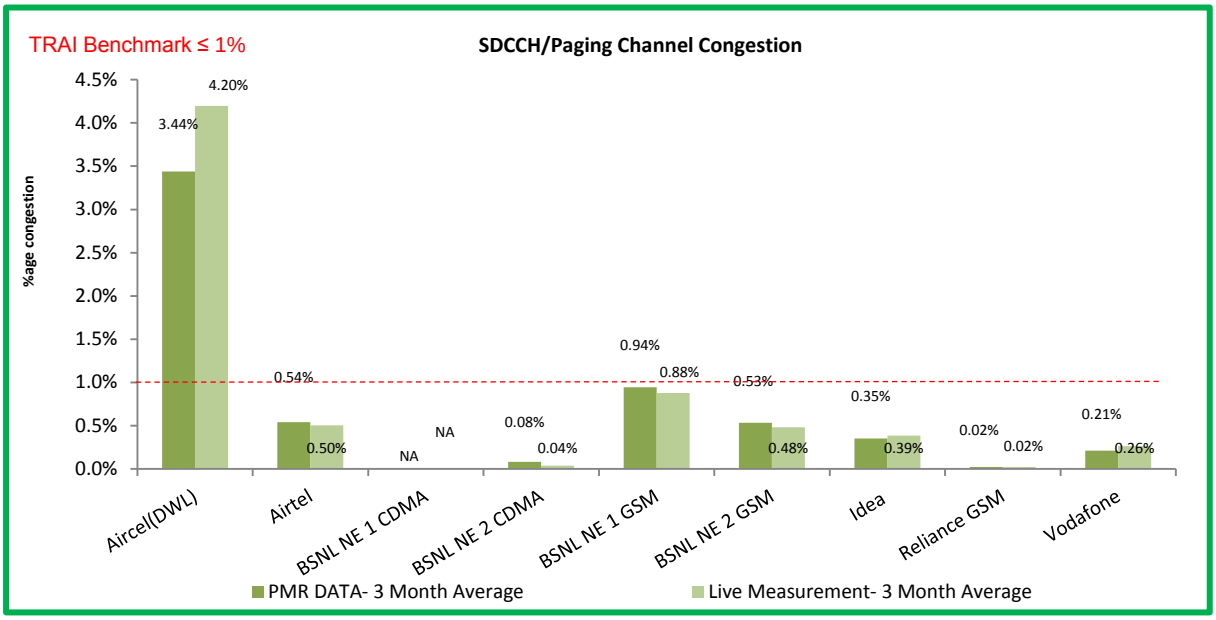
3. **Benchmark:**

- SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 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

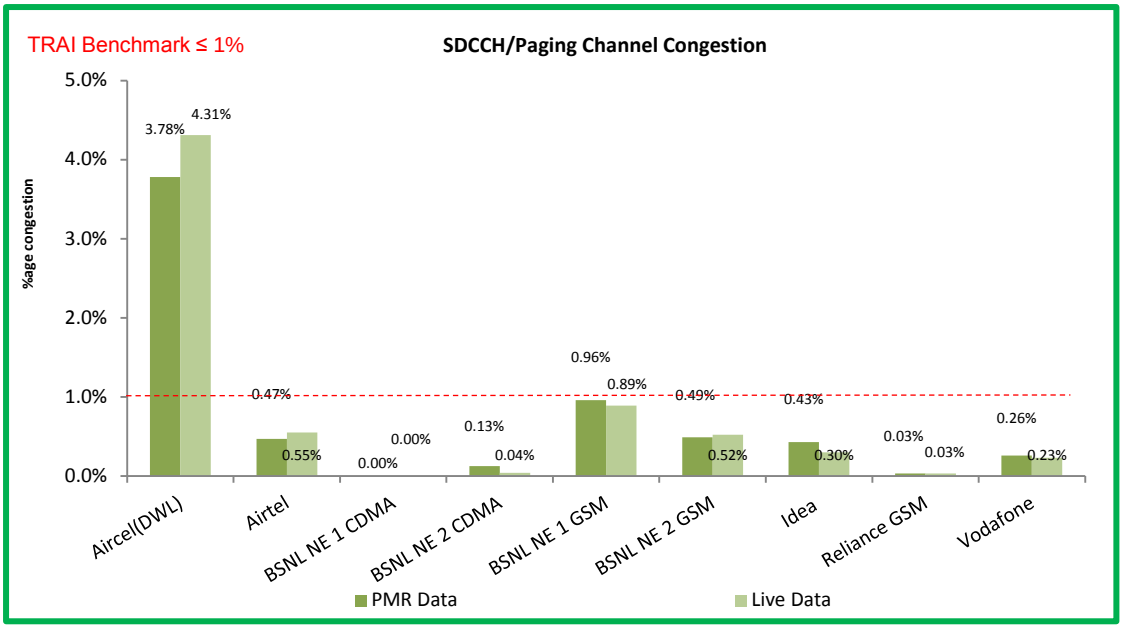
4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION



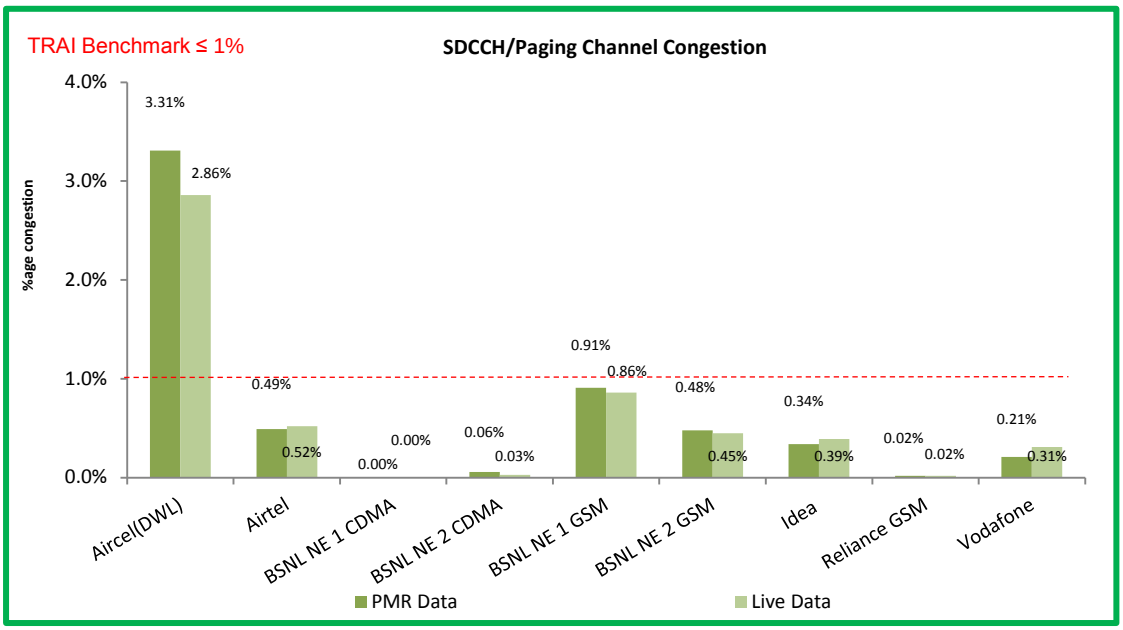
Aircel failed to meet the benchmark while all other operators met the TRAI benchmark of 1% as per PMR.

NA: Auditors were not able to get the data for SDCCH Congestion as operator reported a technical problem in their systems.

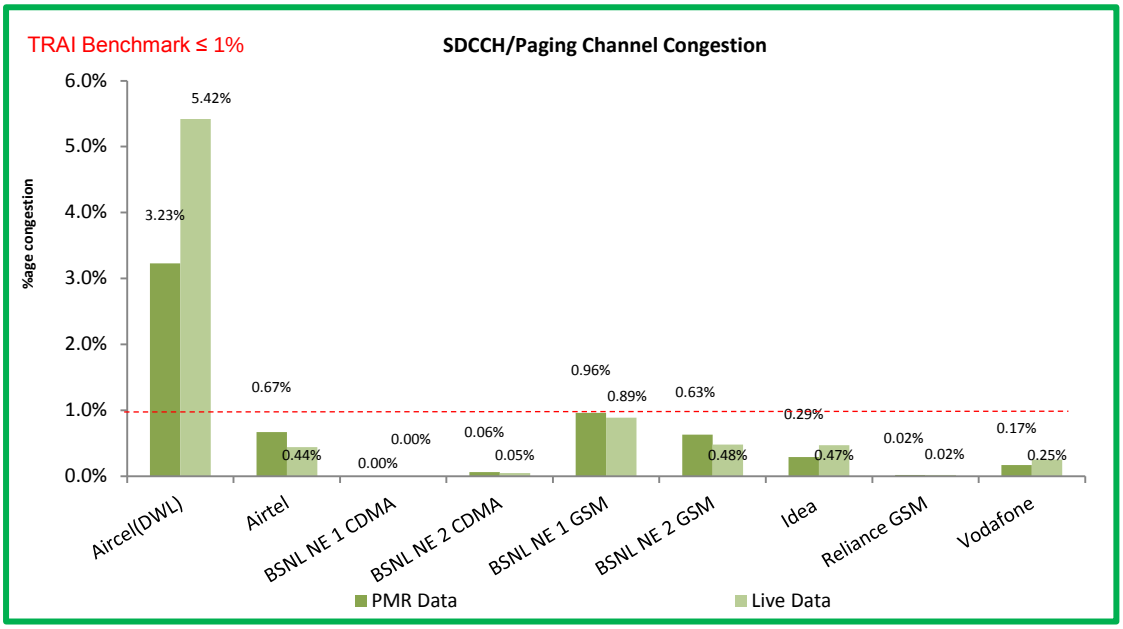
4.4.2.1 KEY FINDINGS – MONTH 1



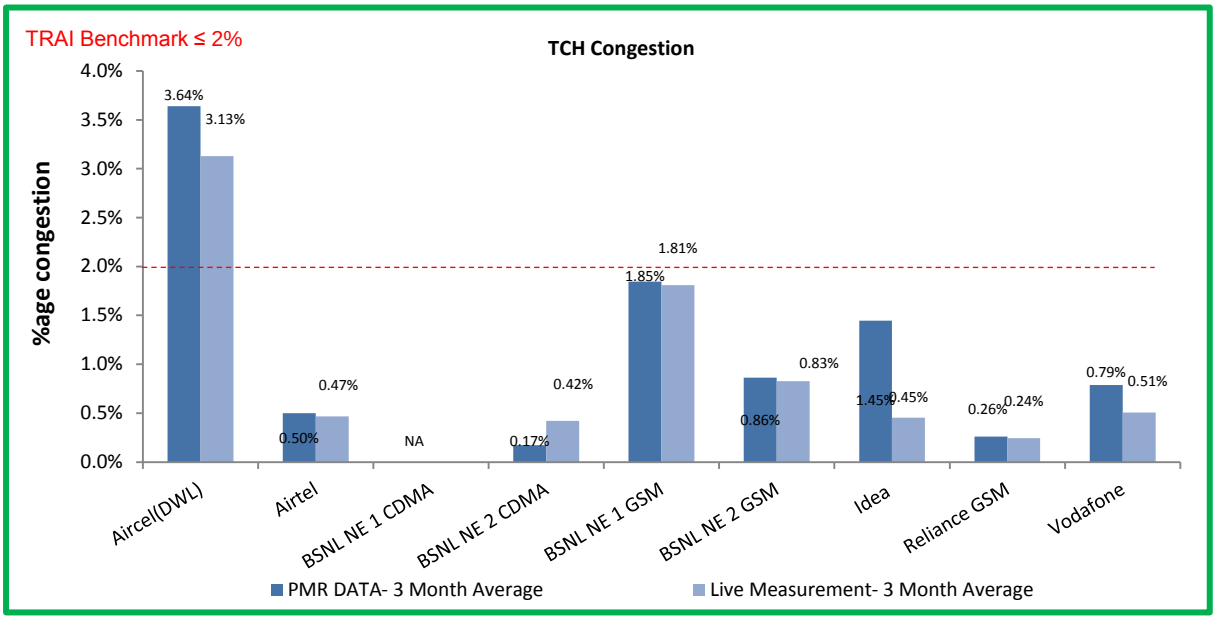
4.4.2.2 KEY FINDINGS – MONTH 2



4.4.2.3 KEY FINDINGS – MONTH 3



4.4.3 KEY FINDINGS – TCH CONGESTION

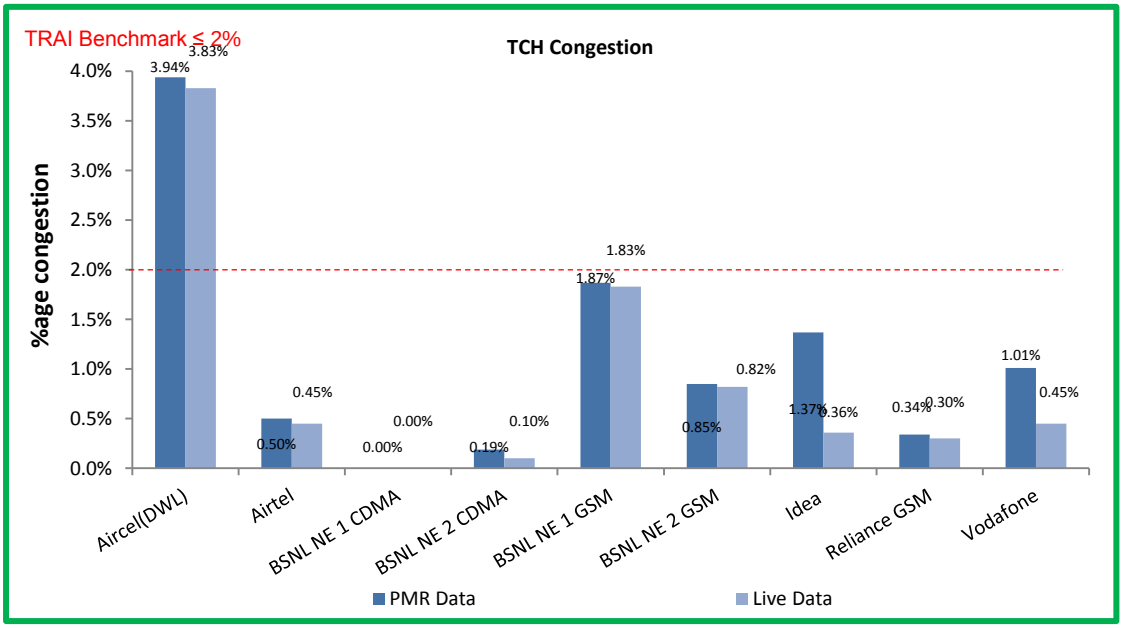


Aircel failed to meet the benchmark while all other operators met the TRAI benchmark of 2% during audit.

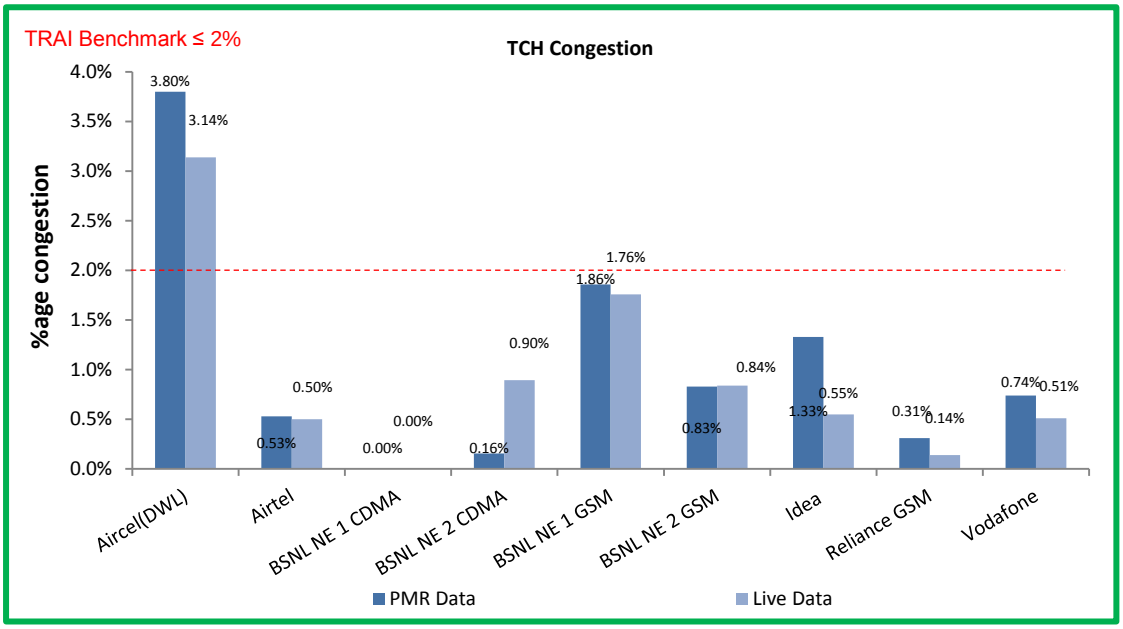
Significant difference was observed between PMR & live measurement data for Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

NA: Auditors were not able to get the data for TCH Congestion from BSNL NE 1 CDMA as operator reported a technical problem in their systems.

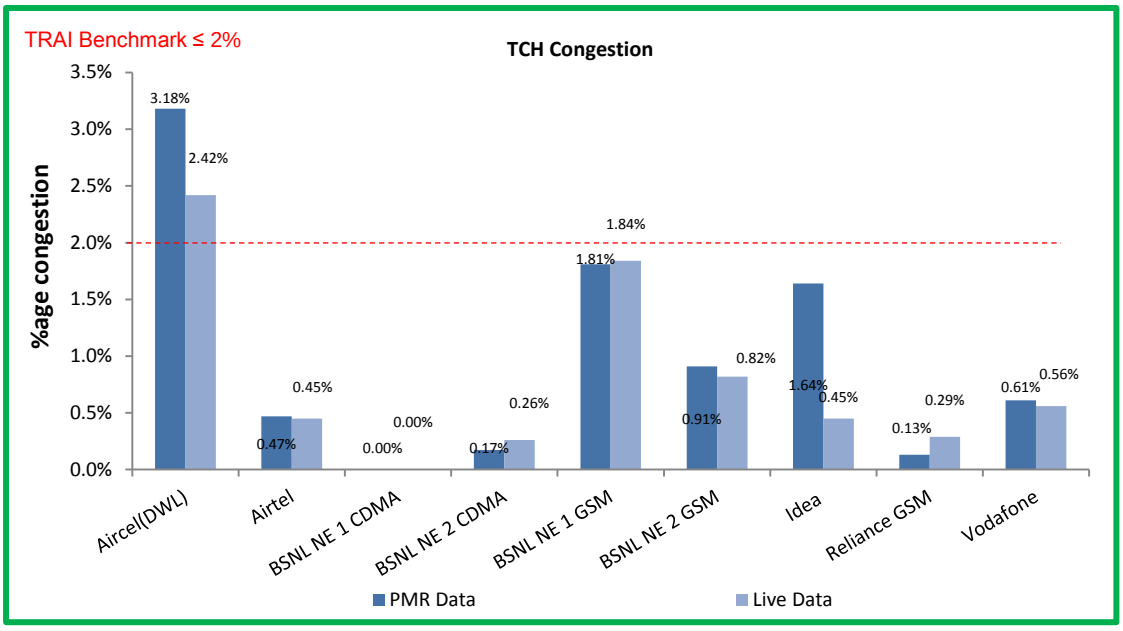
4.4.3.1 KEY FINDINGS – MONTH 1



4.4.3.2 KEY FINDINGS – MONTH 2



4.4.3.3 KEY FINDINGS – MONTH 3



4.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	No Data	No Data	40	No Data	27	14	31
No. of POIs not meeting benchmark		0	0	No Data	No Data	0	No Data	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50240	No Data	No Data	28840	No Data	13152	8696	27735600
Traffic served for all POIs (B)- in erlangs		23755	19908	No Data	No Data	15082	No Data	8110	4643	5766048
POI congestion	≤ 0.5%	0.00%	0.00%	No Data	No Data	0.32%	No Data	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	No Data	No Data	40	No Data	27	14	31
No. of POIs not meeting benchmark		0	0	No Data	No Data	0	No Data	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50227	No Data	No Data	28840	No Data	13226	8528	916889
Traffic served for all POIs (B)- in erlangs		22280	19931	No Data	No Data	15057	No Data	8072	4288	187101
POI congestion	≤ 0.5%	0.00%	0.00%	No Data	No Data	0.32%	No Data	0.00%	0.00%	0.00%

All the operators met the benchmark of POI congestion as per PMR data. Auditors were not able to get the data from BSNL NE 1 CDMA, BSNL NE2 CDMA and BSNL NE2 GSM as the operator (BSNL) had technical issues.

4.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50361	0	0	29075	0	13099	8690	28401497
Traffic served for all POIs (B)- in erlangs		24163	19418	0	0	15190	0	7722	4751	5801418
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50277	0	0	29075	0	13130	8194	916177
Traffic served for all POIs (B)- in erlangs		21074	19980	0	0	15408	0	7710	3714	186041
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

4.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50255	0	0	29075	0	13139	8708	28401497
Traffic served for all POIs (B)- in erlangs		22940	20078	0	0	15082	0	8177	4675	5814855
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50263	0	0	29075	0	13156	8708	916177
Traffic served for all POIs (B)- in erlangs		21602	20091	0	0	15486	0	8346	4736	188317
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%

4.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	35	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50104	0	0	28369	0	13217	8691	26403806
Traffic served for all POIs (B)- in erlangs		24163	20228	0	0	14973	0	8430	4503	5681871
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%

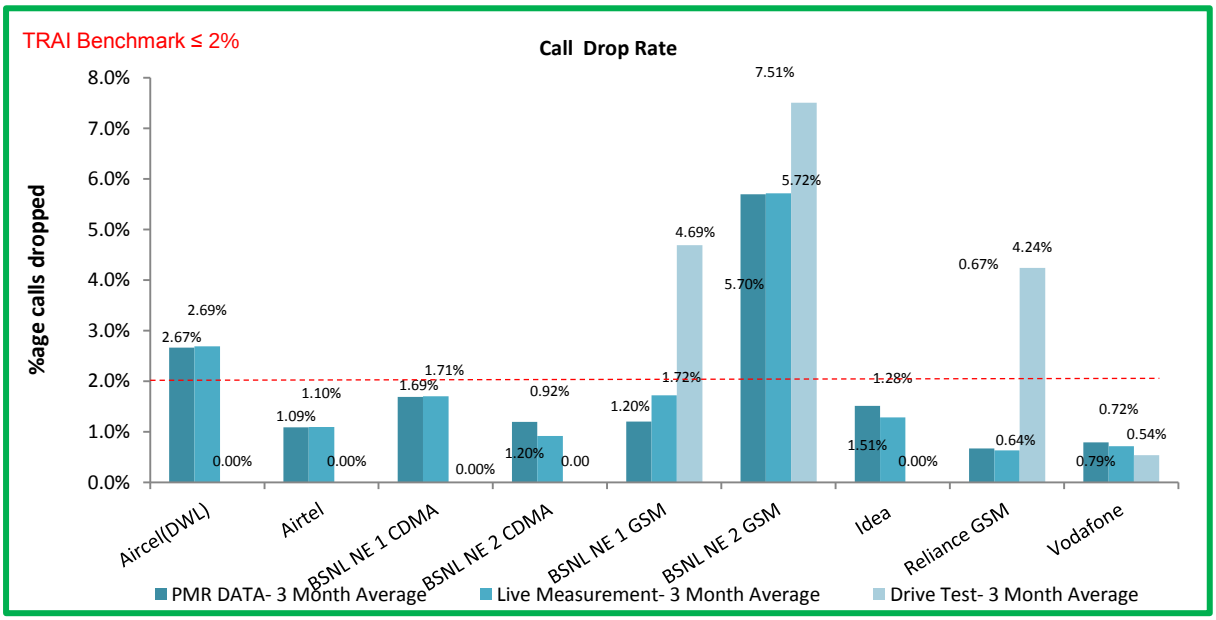
Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	35	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50140	0	0	28369	0	13393	8681	918311
Traffic served for all POIs (B)- in erlangs		24163	19722	0	0	14276	0	8161	4414	186944
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	100.00%	0.50%	0.00%	0.00%	0.00%	0.00%

4.5 CALL DROP RATE

4.5.1 PARAMETER DESCRIPTION

1. **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
2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**
3. **TRAI Benchmark** –
   - Call drop rate ≤ 2%
4. **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.

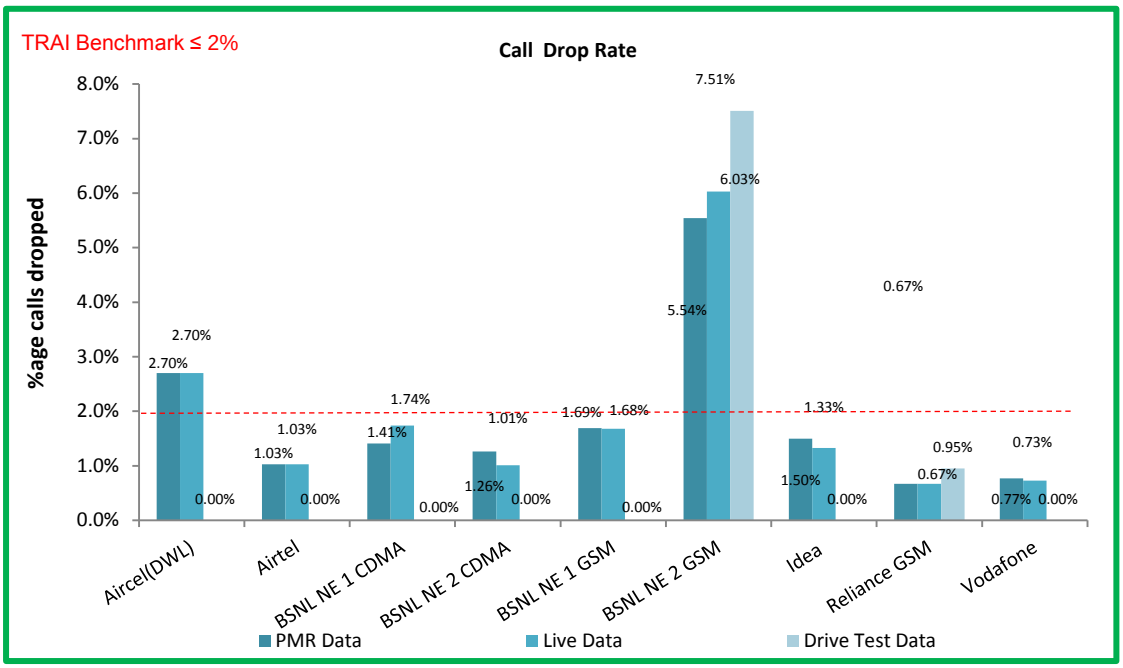
4.5.2 KEY FINDINGS – CONSOLIDATED



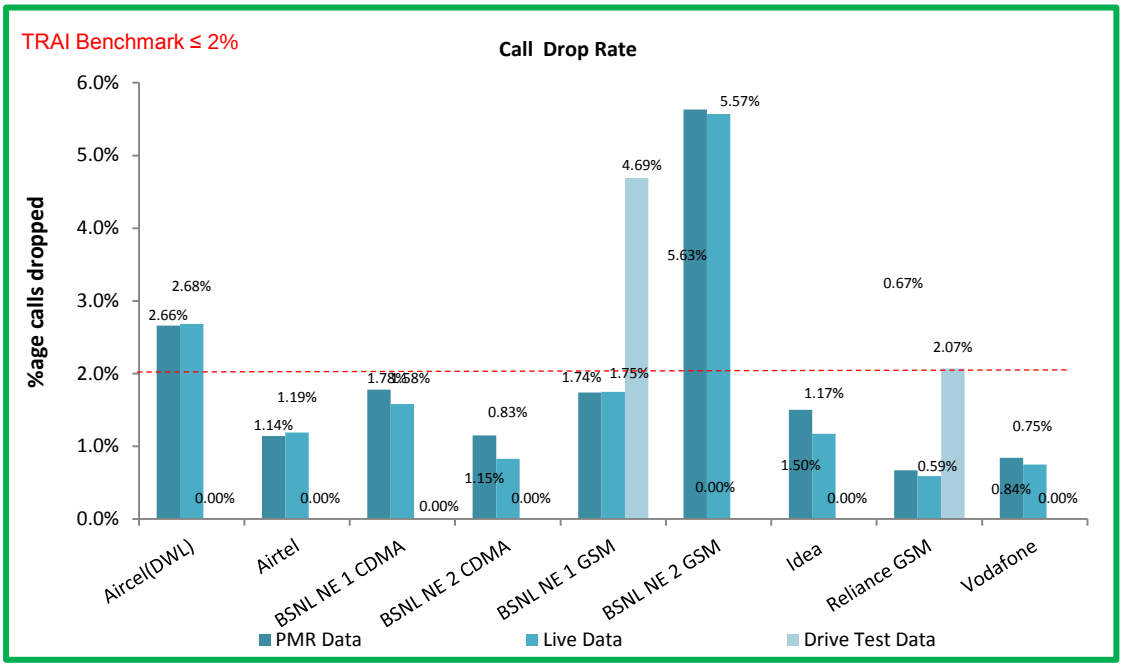
Note: Drive Test data not provided by BSNL CDMA (NE I & NE II).

BSNL NE II GSM and Aircel did not meet the TRAI specified benchmark.

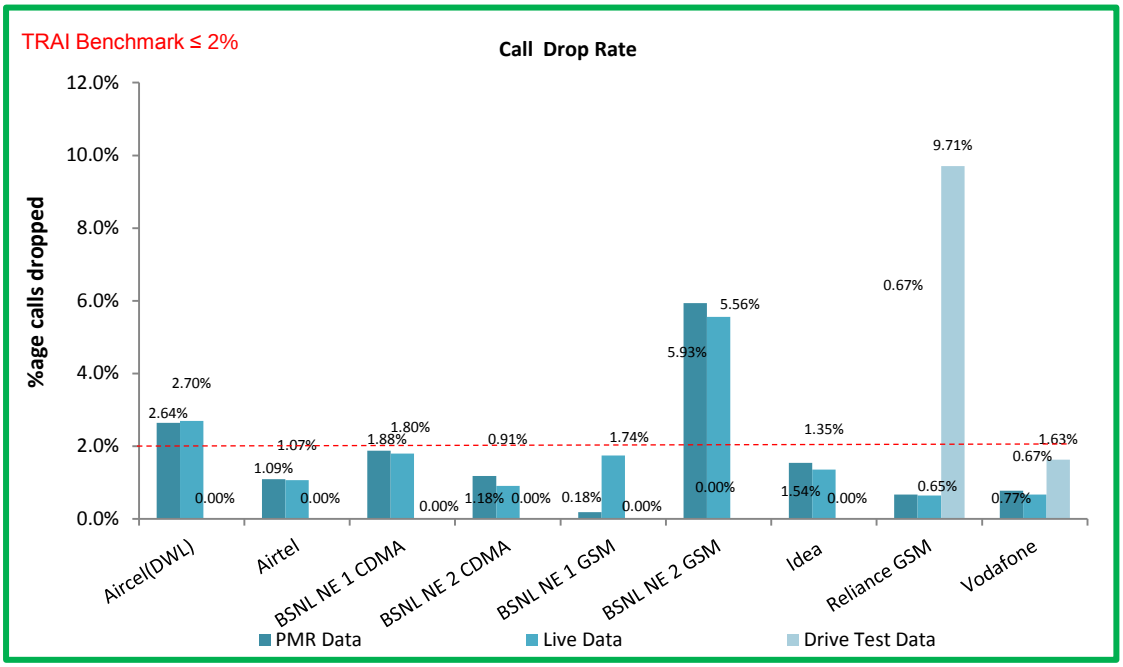
4.5.2.1 KEY FINDINGS – MONTH 1



4.5.2.2 KEY FINDINGS – MONTH 2



4.5.2.3 KEY FINDINGS – MONTH 3



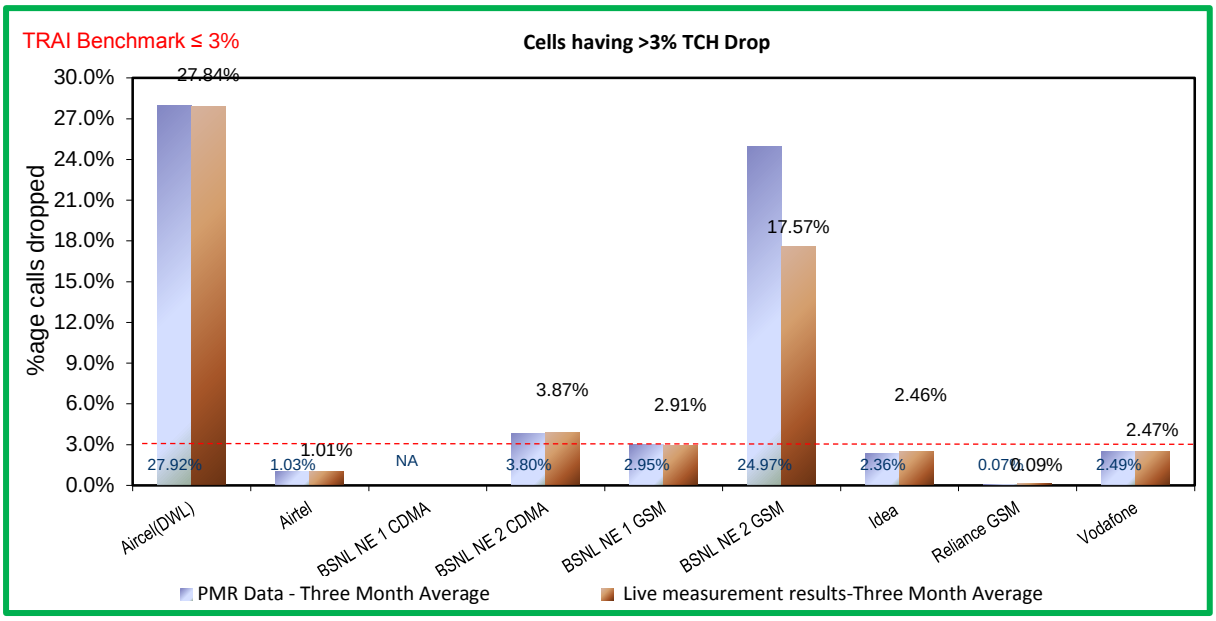
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

4.6.1 PARAMETER DESCRIPTION

1. **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.
2. **Computational Methodology: (Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**
3. **TRAI Benchmark –**
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%
4. **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.

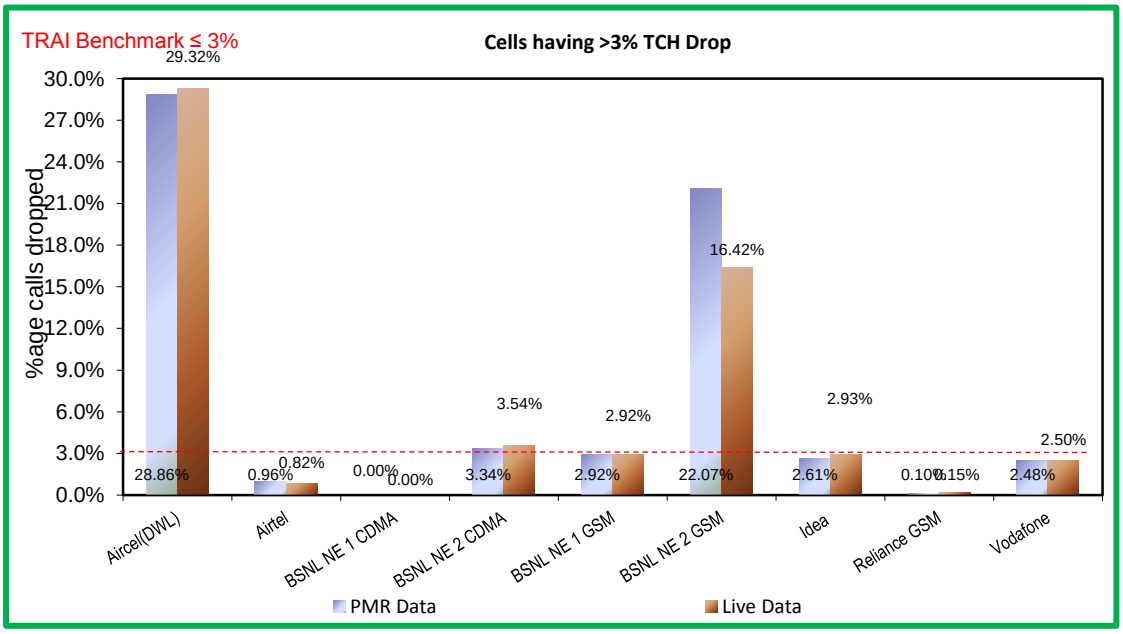
4.6.2 KEY FINDINGS – CONSOLIDATED



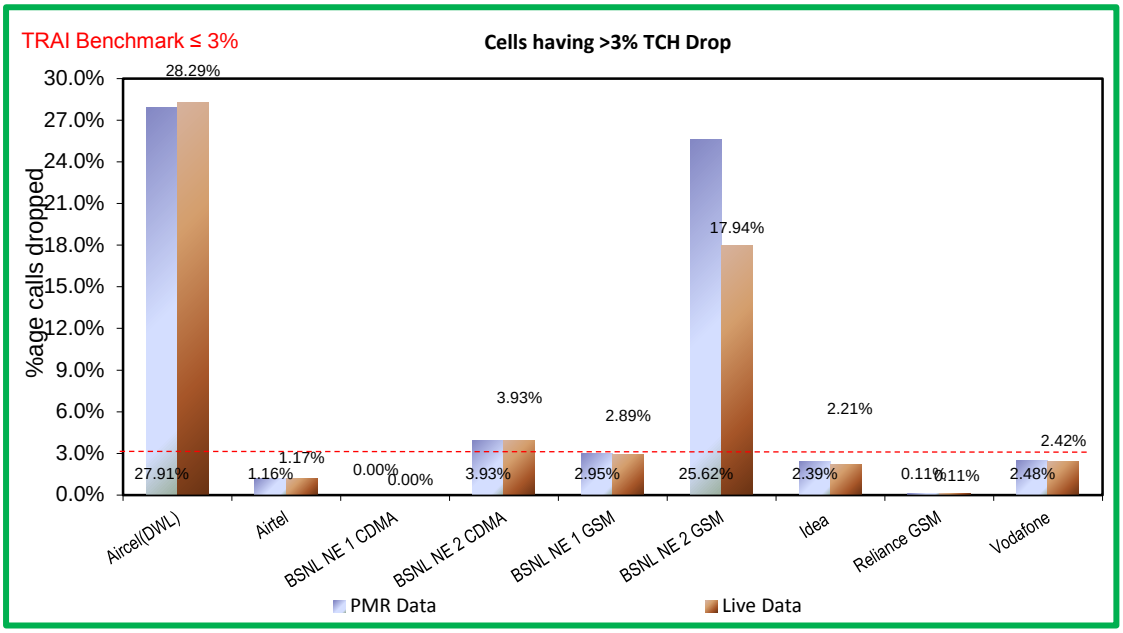
Aircel and BSNL NE II GSM did not meet the TRAI benchmark during audit.

NA: Auditors were not able to get the data for Worst affected cells having more than 3% TCH drop from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

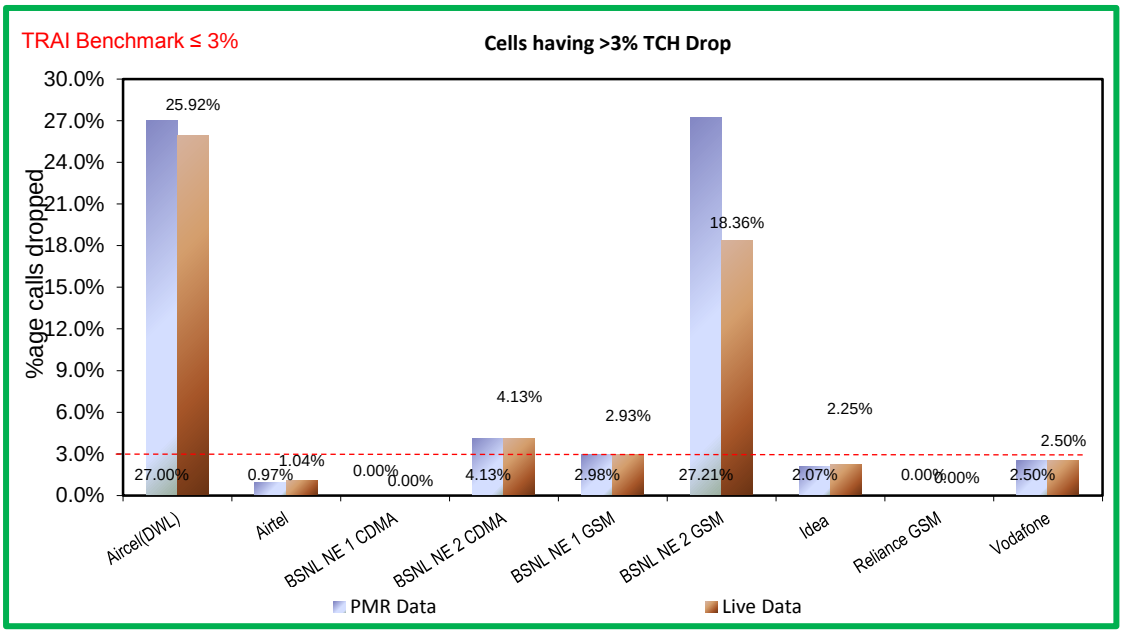
4.6.2.1 KEY FINDINGS – MONTH 1



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 it FER value lies between 0 – 4 %

2. **Computational Methodology:**

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

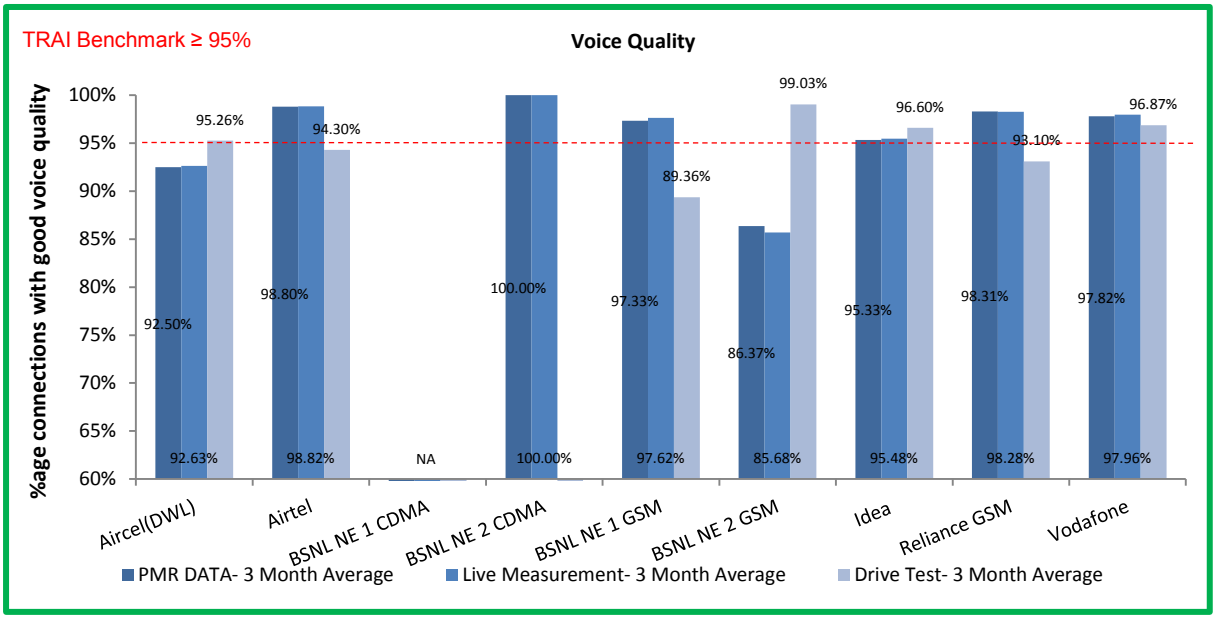
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

   a. A sample of calls would be taken randomly from the total calls established.

   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

4.7.2 KEY FINDINGS – CONSOLIDATED

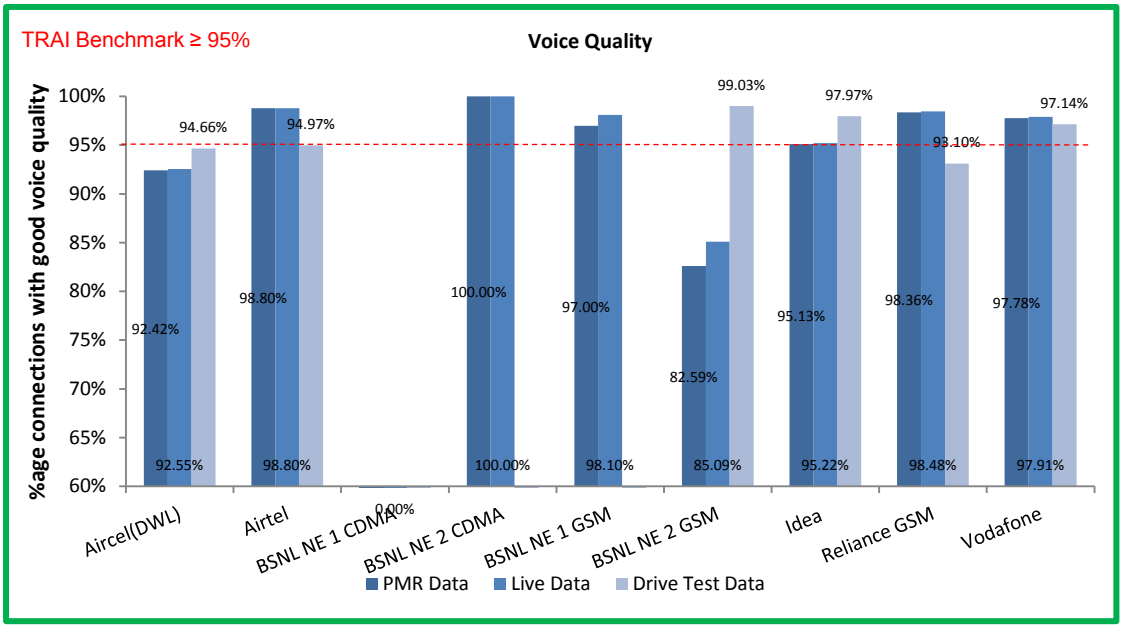


Note: Drive Test data not provided by BSNL CDMA (NE I & NE II).

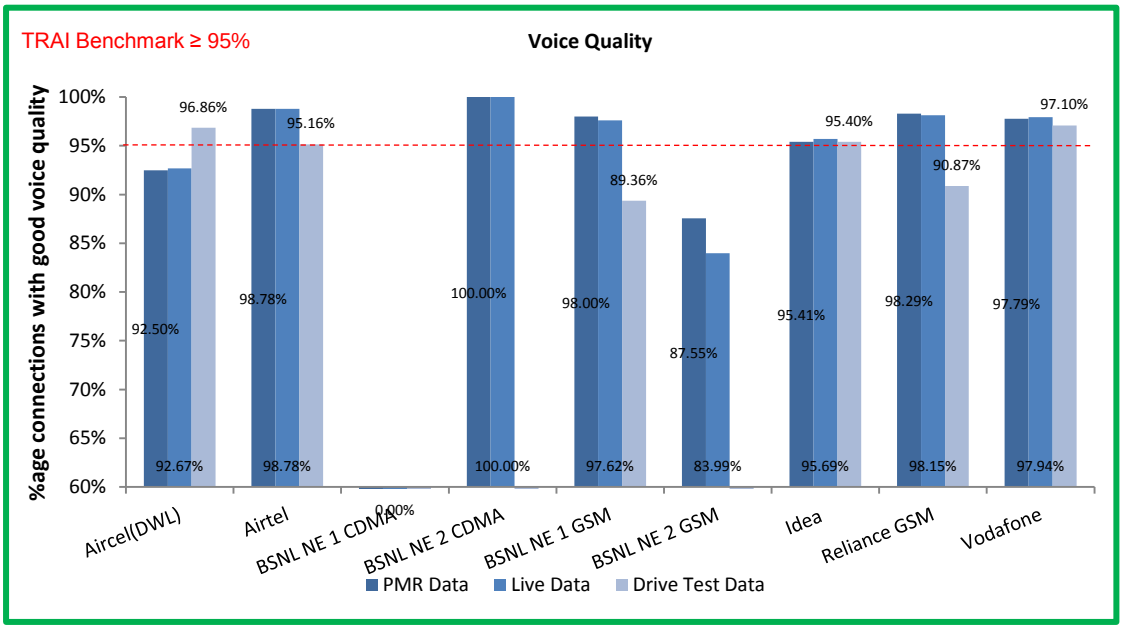
Aircel and BSNL NE II GSM missed the benchmark during audit.

NA: Auditors were not able to get the data for Voice quality from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

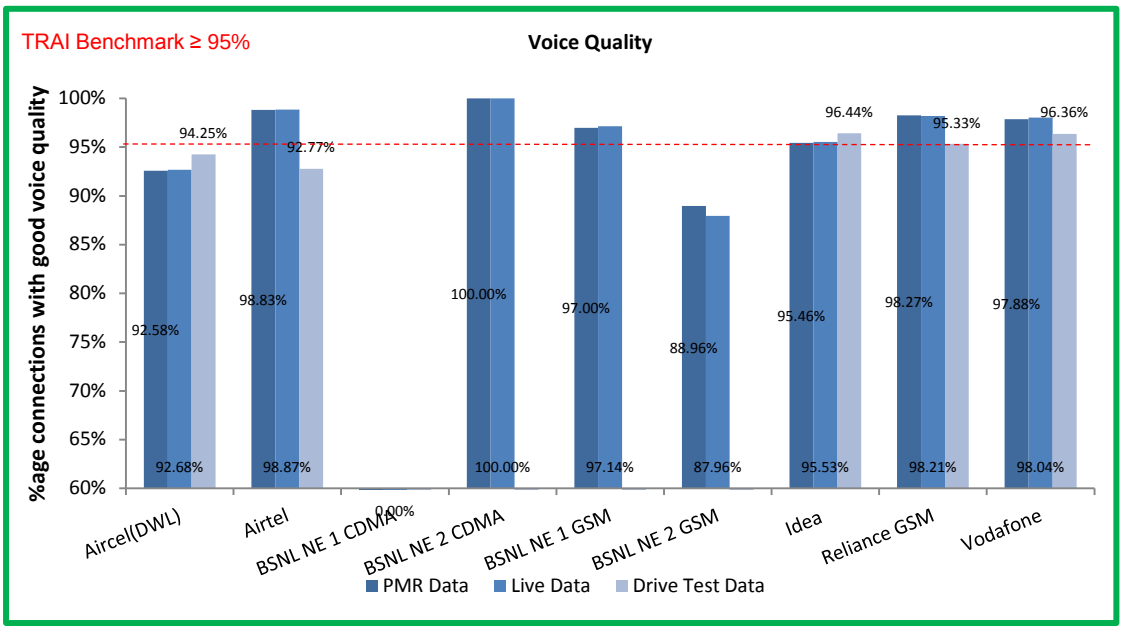
4.7.2.1 KEY FINDINGS – MONTH 1



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

Note: Auditors were not able to get billing and customer service from the central billing and customer service centers respectively of BSNL CDMA, as the operator was unable to provide the same; hence it is mentioned as 0.00% in all charts for 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.

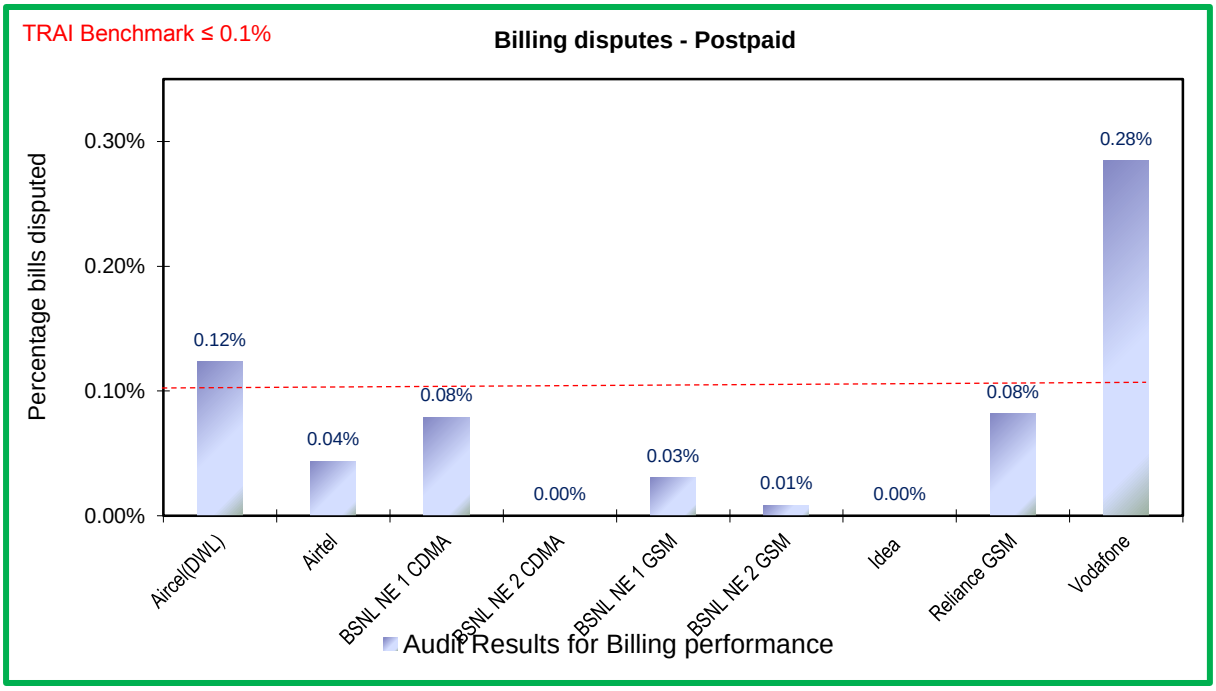
- Payments made and not credited to the subscriber account
- Payment made on time but late payment charge levied wrongly

- 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.

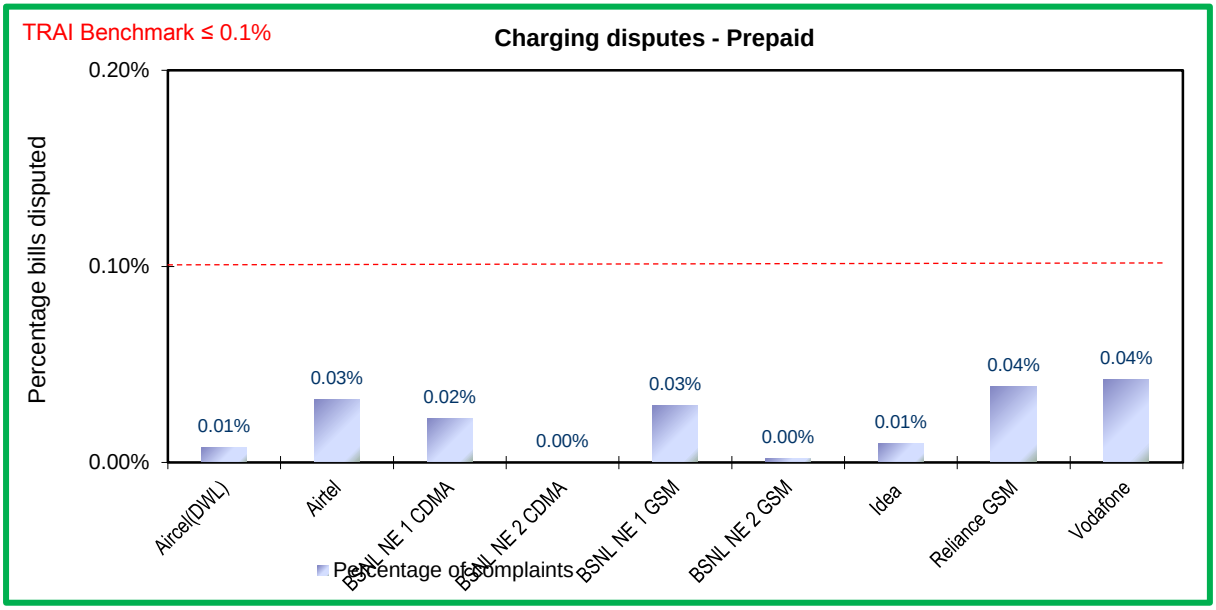
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would 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



For postpaid services, Aircel and Vodafone failed to meet the billing disputes benchmark.

5.1.3 KEY FINDINGS - PREPAID CHARGING DISPUTES



All the operators met the TRAI benchmark for percentage charging disputes for prepaid.

5.2 RESOLUTION OF BILLING 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 **Live Calling Results**

Name of Service Provider	Resolution of billing complaints		Resolution of Billing Complaints
	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	%age complaints resolved within 4 weeks
Benchmark	≥ 98%	≥ 100%	100.00%
Aircel(DWL)	100.00%	100.00%	66.00%
Airtel	100.00%	100.00%	72.00%
BSNL NE 1 CDMA	100.00%	100.00%	No Raw Data
BSNL NE 2 CDMA	100.00%	100.00%	No Raw Data
BSNL NE 1 GSM	100.00%	100.00%	72.92%
BSNL NE 2 GSM	89.00%	100.00%	72.00%
Idea	100.00%	100.00%	37.50%
Reliance GSM	100.00%	100.00%	72.00%
Vodafone	100.00%	100.00%	85.00%

Note: Auditors were not able to get any raw data for the purpose of live calling from BSNL NE I CDMA and BSNL NE II CDMA as the operator was unable to provide the same.

The audit results showed that, except BSNL NE 2 GSM, all the operators met the TRAI benchmark for 100% resolution of complaints within four weeks. However, as per live calling done to customers, the performance of all operators was far inferior to the PMR data.

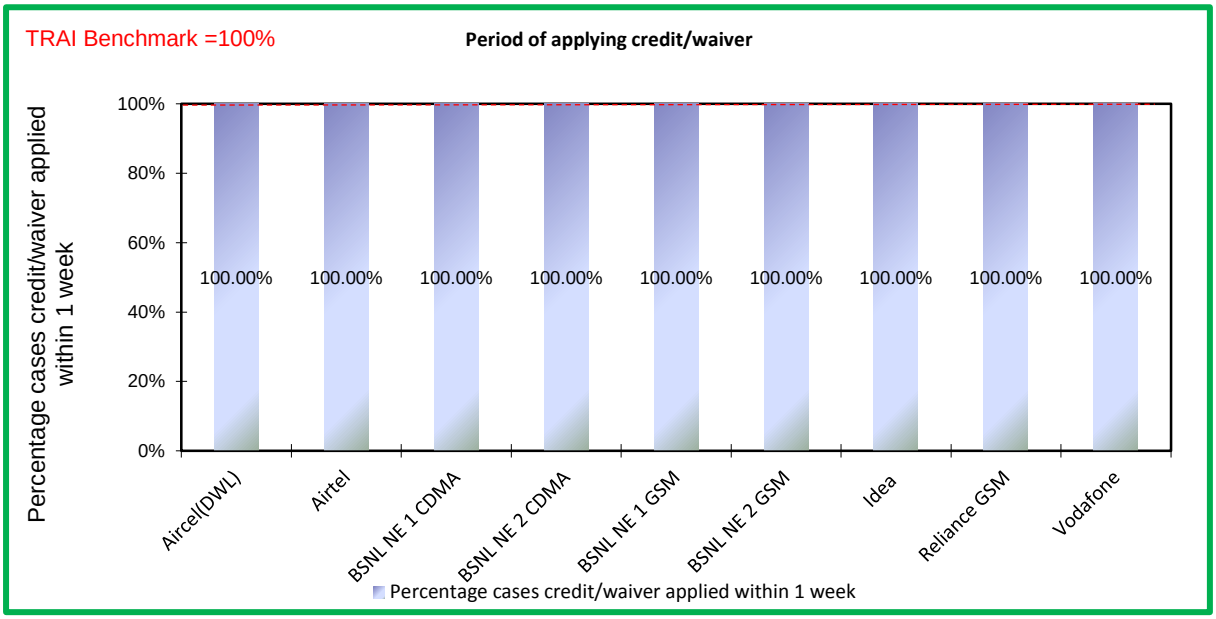
5.3 PERIOD OF APPLYING CREDIT/WAVIER

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



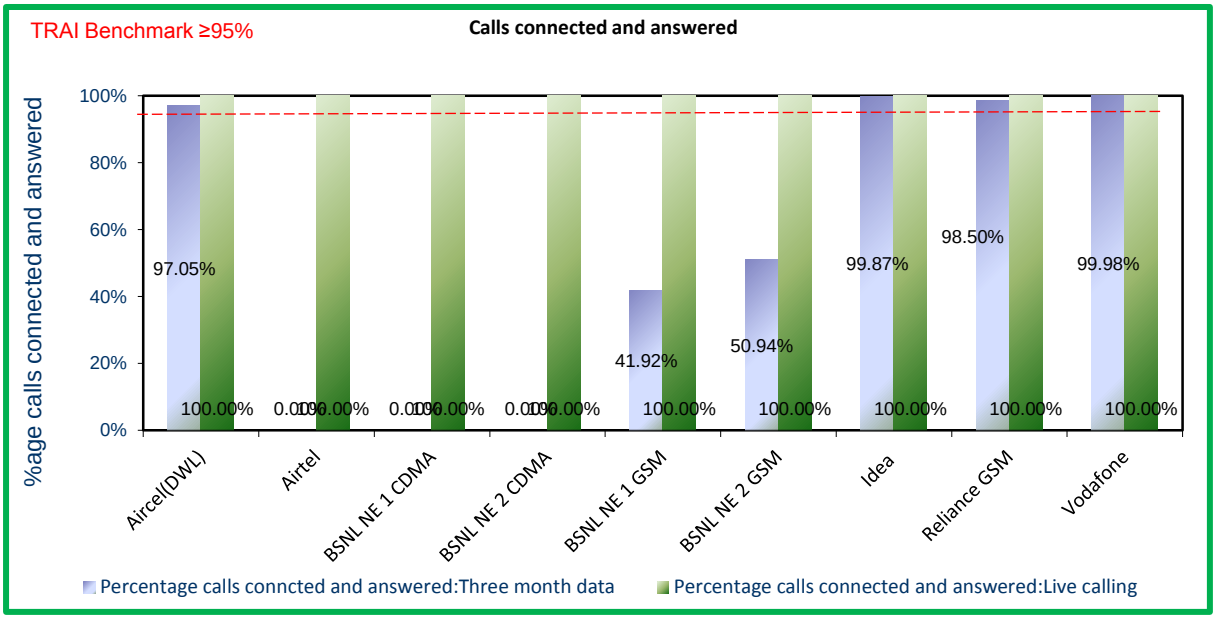
All operators met the benchmark for the parameter.

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



Note: Auditors were not able to get the raw data for the parameter from BSNL NE II CDMA and BSNL NE II CDMA as the operators were unable to provide the same. Airtel reported a technical issue in their system due to which auditors could not get the data for the parameter.

As per PMR data, BSNL NE 1 GSM and BSNL NE 2 GSM failed to meet the benchmark.

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

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
Benchmark	≥ 90%	≥ 95%
Aircel(DWL)	NA	91.28%
Airtel	NA	98.10%
BSNL NE 1 CDMA	NA	90.73%
BSNL NE 2 CDMA	NA	No Data
BSNL NE 1 GSM	NA	76.05%
BSNL NE 2 GSM	NA	71.33%
Idea	NA	98.78%
Reliance GSM	NA	97.53%
Vodafone	95.02%	NA

Live Calling Results

Name of Service Provider	Response time to customer for assistance
	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 90%
Aircel(DWL)	85.00%
Airtel	95.00%
BSNL NE 1 CDMA	65.00%
BSNL NE 2 CDMA	60.00%
BSNL NE 1 GSM	66.00%
BSNL NE 2 GSM	67.00%
Idea	93.00%
Reliance GSM	80.00%
Vodafone	89.00%

Note: Auditors were not able to get the data for the parameter from BSNL NE II CDMA as the operator was unable to provide the same.

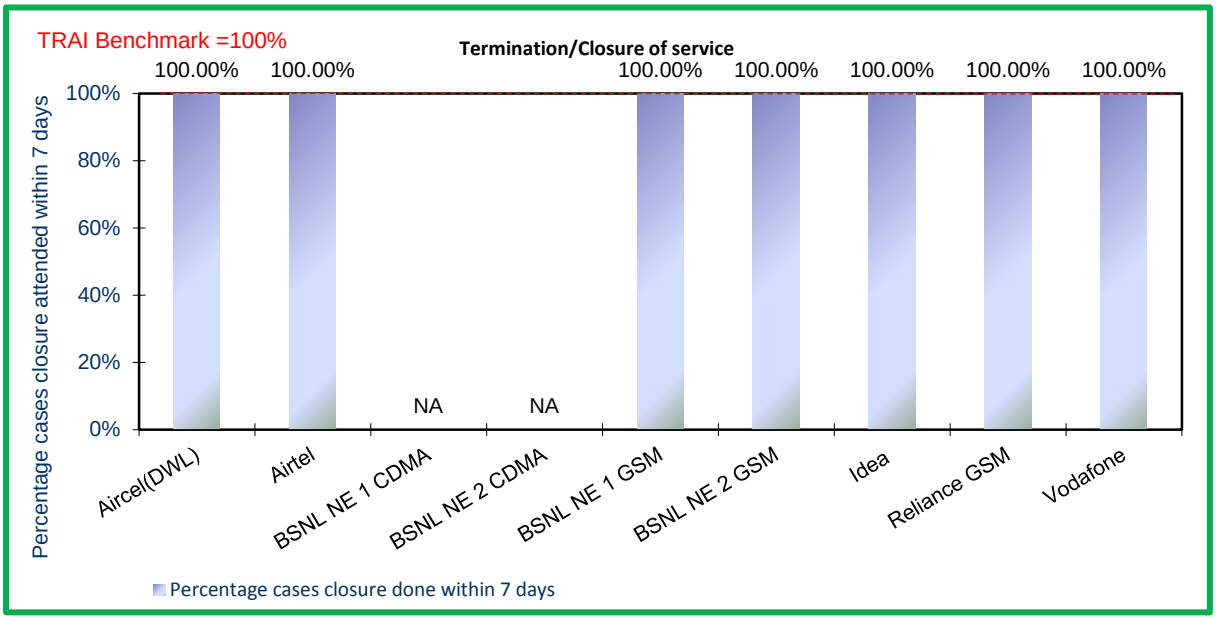
As per PMR Data, Aircel, BSNL NE 1 CDMA, BSNL NE 1 GSM and BSNL NE 2 GSM did not meet the benchmark.

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



NA: Auditors were not able to get the data for the parameter from BSNL NE I CDMA and BSNL NE II CDMA as the operators were unable to provide the same.

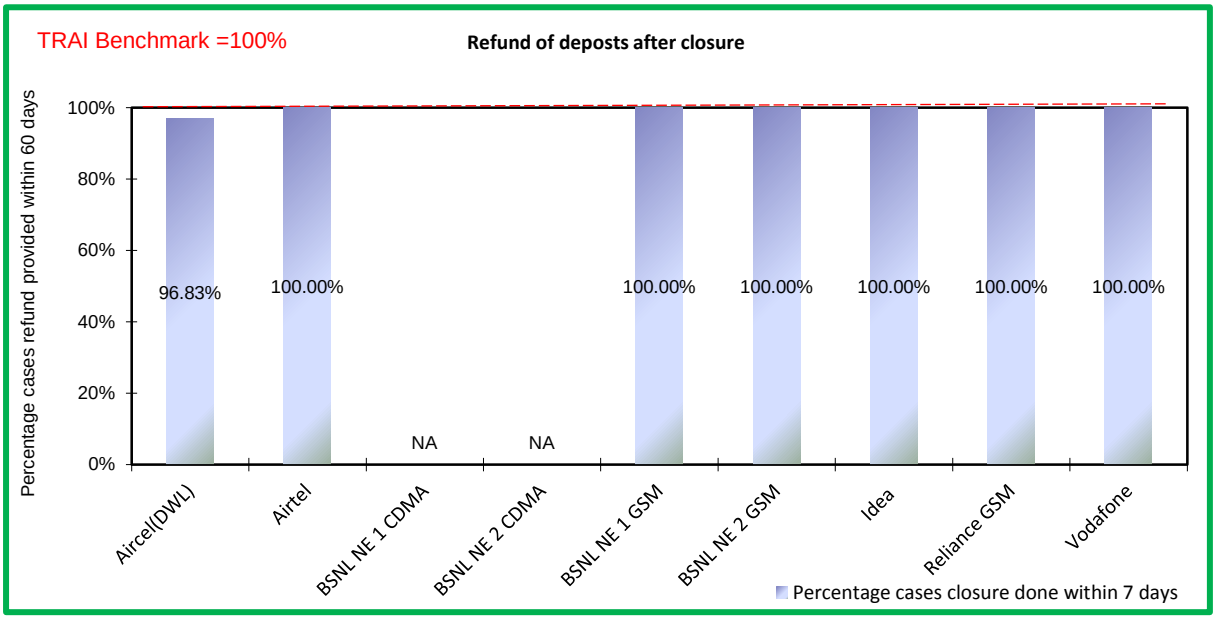
All operators met the benchmark.

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



NA: Auditors were not able to get the data for the parameter from BSNL NE I CDMA and BSNL NE II CDMA as the operators were unable to provide the same.

All the operators met the TRAI benchmark except Aircel 96.83%.

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 North East 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 the North East circle are given below.

Month	Name of SSA Covered	Date of Drive Test
January	Manipur	22nd to 24th July, 2014
August	Meghalaya	20th to 22nd, August 2014
September	Mizoram	25th to 26th, 29th September 2014

Name of Operator
Aircel(DWL)
Airtel
BSNL NE 1 CDMA
BSNL NE 2 CDMA
BSNL NE 1 GSM
BSNL NE 2 GSM
Idea
Reliance GSM
Vodafone

Note: - It is important to highlight that in case we are covering BSNL NE 1 GSM area then BSNL NE 2 GSM will be Not Applicable for that month hence values will be 'NA'.

BSNL NE 1 and NE 2 CDMA did not submit the Drive Test report so it is mentioned as NDR (NO DATA RECEIVED)

6.1.1 JULY – MANIPUR

Month	Name of SSA Covered	Date of Drive Test
July	Manipur	22nd to 24th July, 2014

6.1.1.1 ROUTE DETAILS – MANIPUR SSA

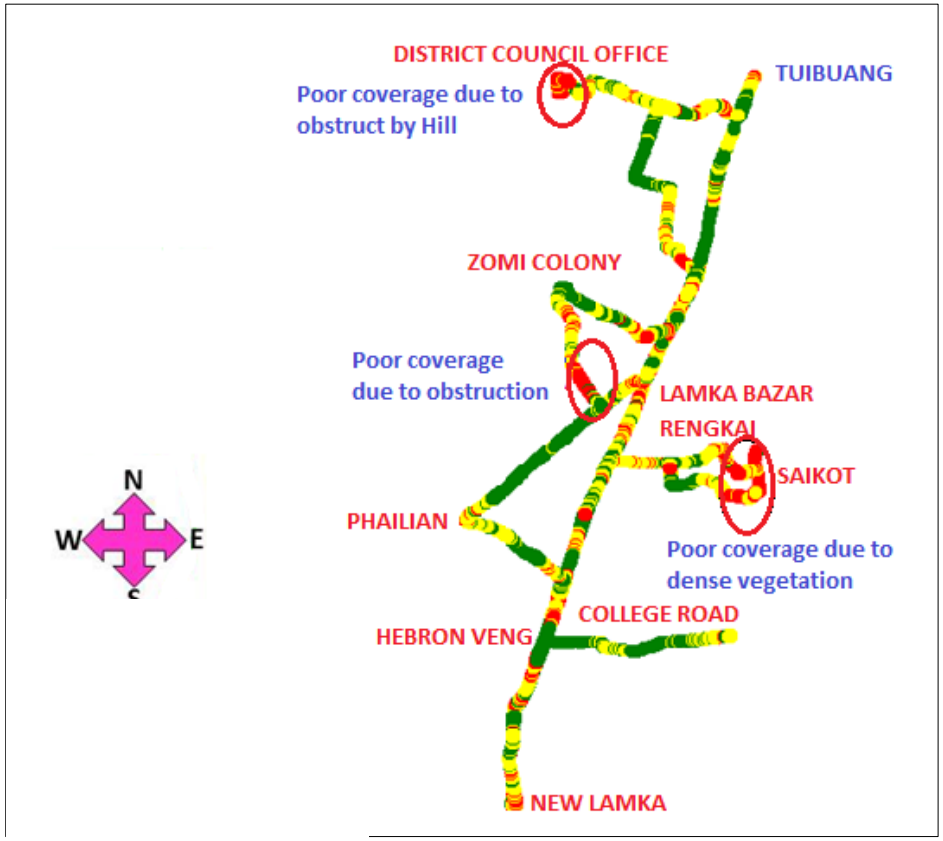
Category	Type of location	North East-July		
		Manipur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Imphal to Churachandpur via Bishnupur & Churachandpur	Imphal to Moreh via Thoubal & Thoubal Town Drive	Imphal City Drive & Imphal to Senapati,(
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

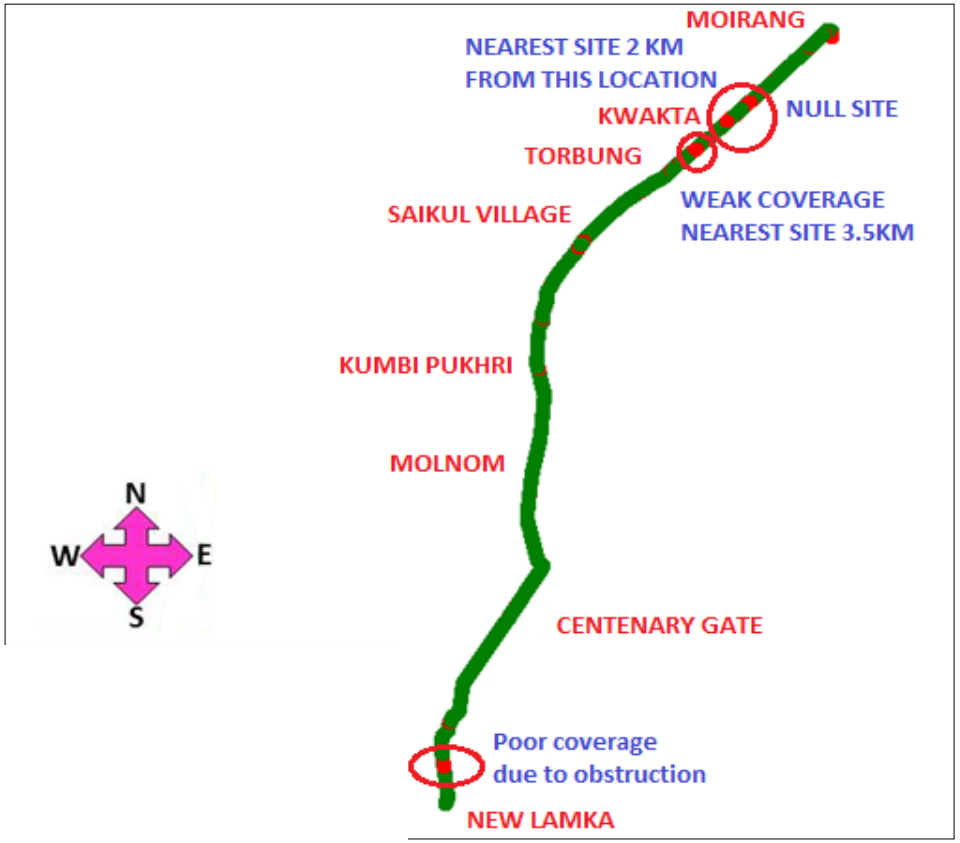
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.1.2 KILOMETERS TRAVELLED– MANIPUR SSA

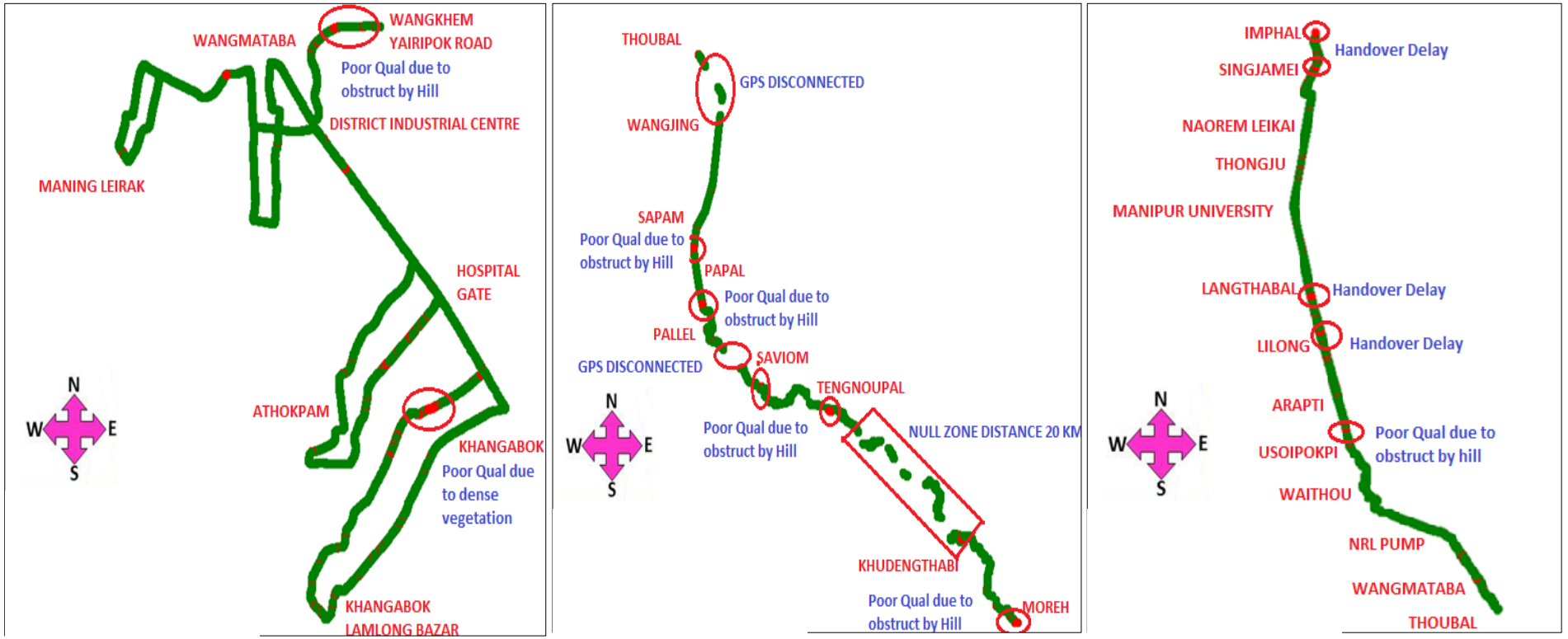
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Manipur	74	125	108	307

6.1.1.3 ROUTE MAP MANIPUR DAY 1

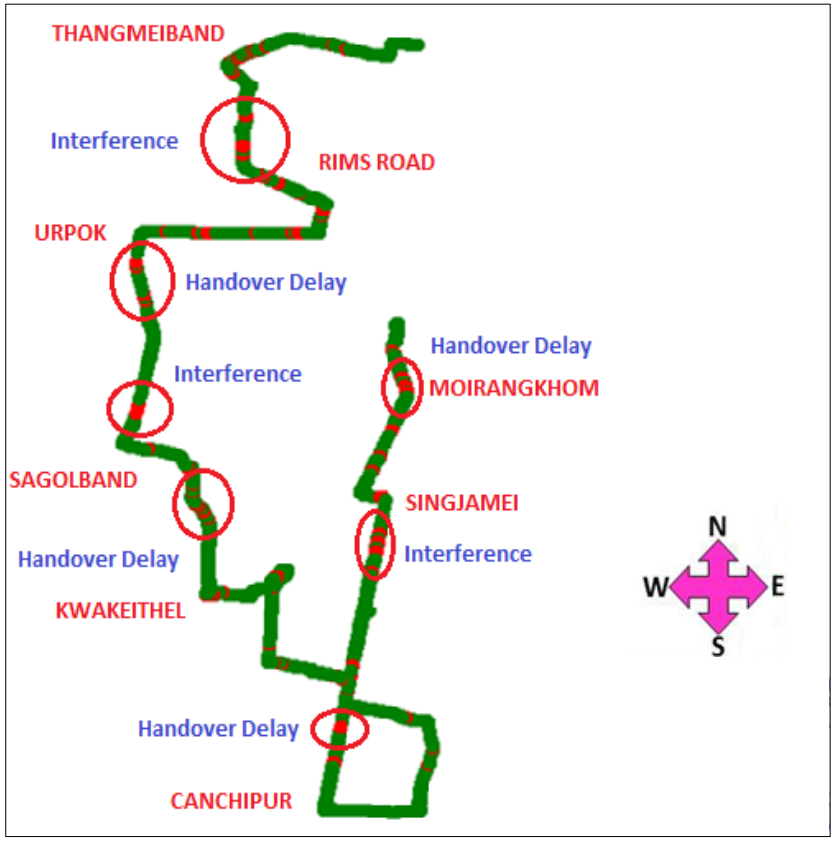


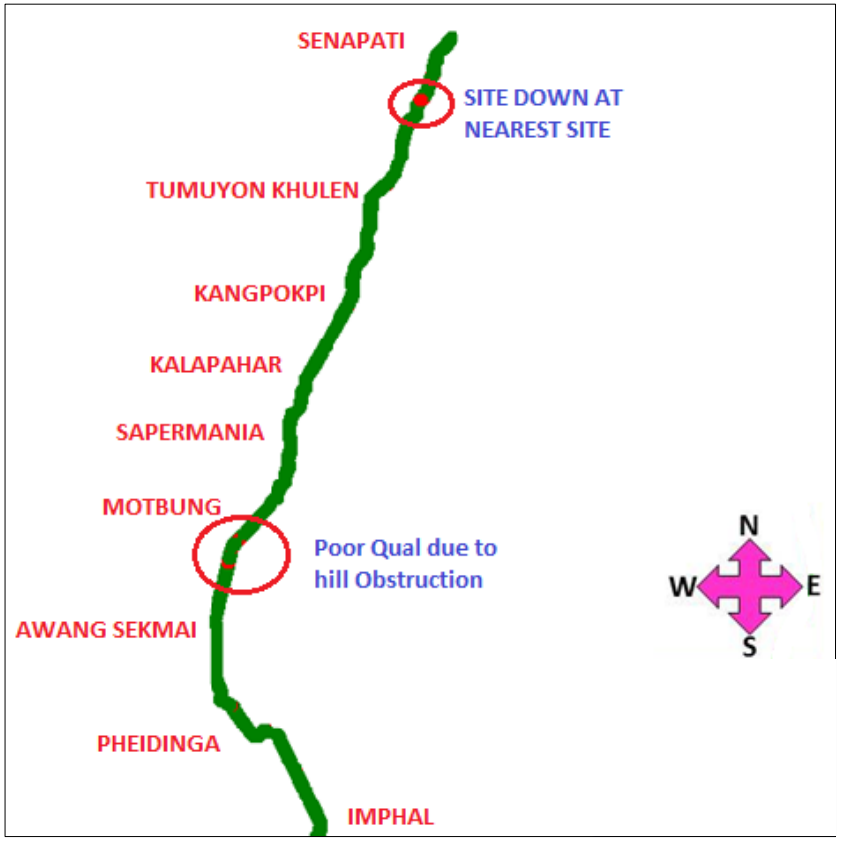


6.1.1.4 ROUTE MAP MANIPUR DAY 2



6.1.1.5 ROUTE MAP MANIPUR DAY 3





6.1.1.6 DRIVE TEST RESULTS – MANIPUR SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA NE 1		BSNL CDMA NE 2		BSNL GSM NE 1		BSNL GSM NE 2		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.67%	65.14%	93.22%	57.21%	NA		NP		NA		NA	33.44%	76.00%	67.96%	86.68%	44.56%	13.85%	39.25%
0 to -85 dBm		100.00%	87.70%	99.99%	83.76%							NA	63.11%	99.33%	90.47%	99.97%	76.64%	73.56%	77.31%
0 to -95 dBm		100.00%	100.00%	99.99%	99.76%							NA	100.00%	100.00%	98.64%	100.00%	93.84%	103.12%	99.95%
Voice quality	≥ 95%	97.99%	93.81%	98.01%	93.75%							NA	99.05%	99.69%	97.36%	97.47%	92.14%	99.15%	96.22%
CSSR	≥ 95%	100.00%	99.49%	100.00%	100.00%							NA	77.49%	100.00%	100.00%	100.00%	98.38%	100.00%	100.00%
%age Blocked calls		0.00%	0.51%	0.00%	0.00%							NA	22.51%	0.00%	0.00%	0.00%	1.62%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%							NA	6.19%	0.00%	0.00%	0.00%	1.36%	0.00%	0.00%
Hands off success rate		100.00%	99.65%	100.00%	99.47%							NA	92.73%	100.00%	100.00%	100.00%	97.38%	100.00%	100.00%

Note: Drive Test conducted in NE 2 region; hence BSNL NE 1 region is not applicable. No data received for BSNL NE 2 CDMA. BSNL NE 2 GSM did not participate in test at indoor locations due to technical difficulties, as reported by the operator during the drive test.

Voice quality:

Aircel, Airtel and Reliance GSM did not meet the benchmark on voice quality in outdoor areas. The benchmark for voice quality is 95%.

CSSR:

BSNL NE II GSM did not meet the benchmark in outdoor areas.

Call drop rate:

BSNL NE II GSM did not meet the benchmark for the criteria in outdoor locations.

6.1.2 AUGUST – MEGHALAYA

Month	Name of SSA Covered	Date of Drive Test
August	Meghalaya	20th to 22nd, August 2014

6.1.2.1 ROUTE DETAILS – MEGHALAYA SSA

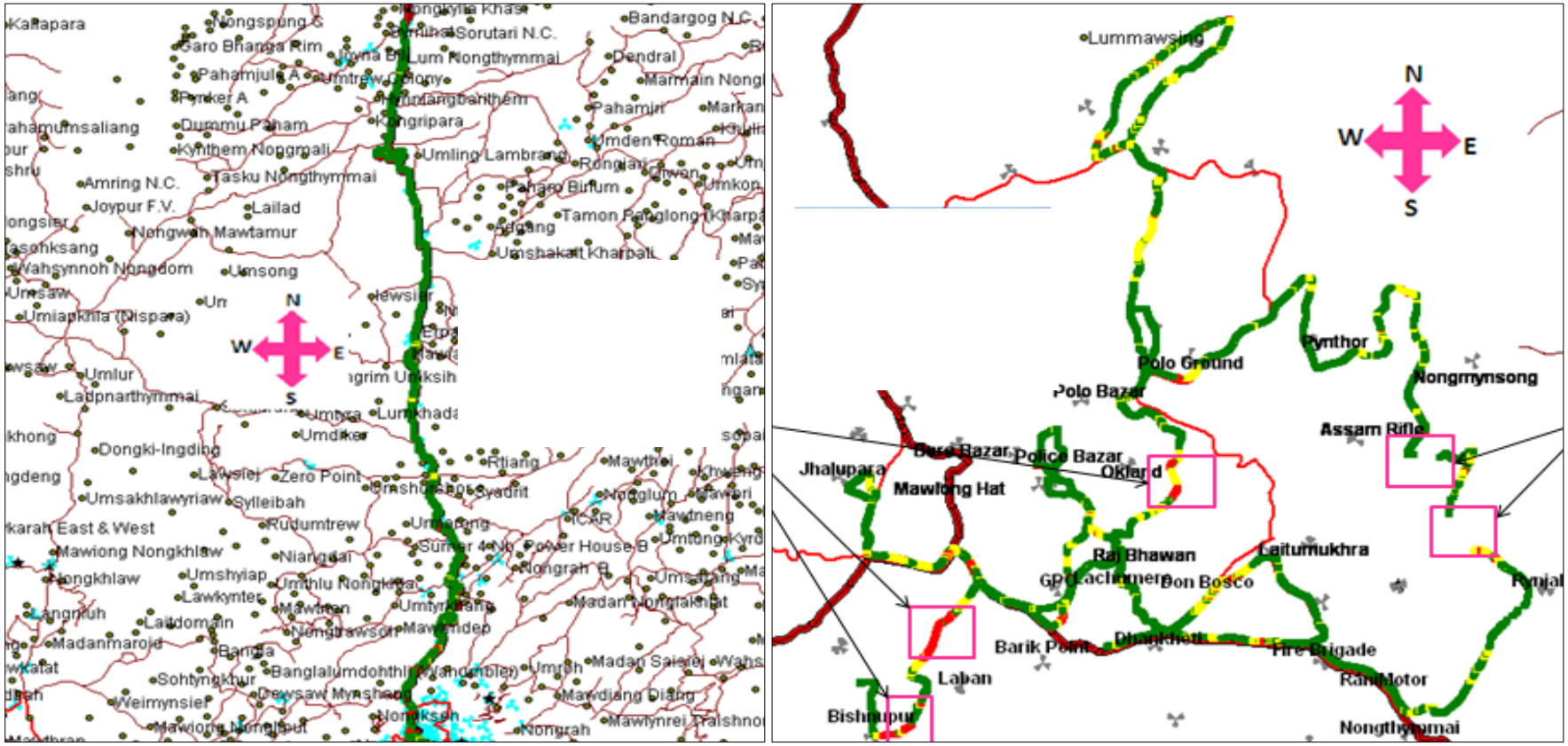
Category	Type of location	North East-August		
		Meghalaya		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	Cherrapungji to	NA
	Highways	Barapani	Cherrapunji	Umulong
	With in the City	Bishnupur	Cherrapunji town	Jowai Town
Indoor	Shopping complex	Padmini Complex(Sonepur), Goel Super Bazar (Titlagarh)	NA	NA
	Office complex	BSNL Telephone Exchange (Sonepur), Bishnupur, BSNL telephone Exchange(Kantabanji)	Cherrapunji town	Jowai Town

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.

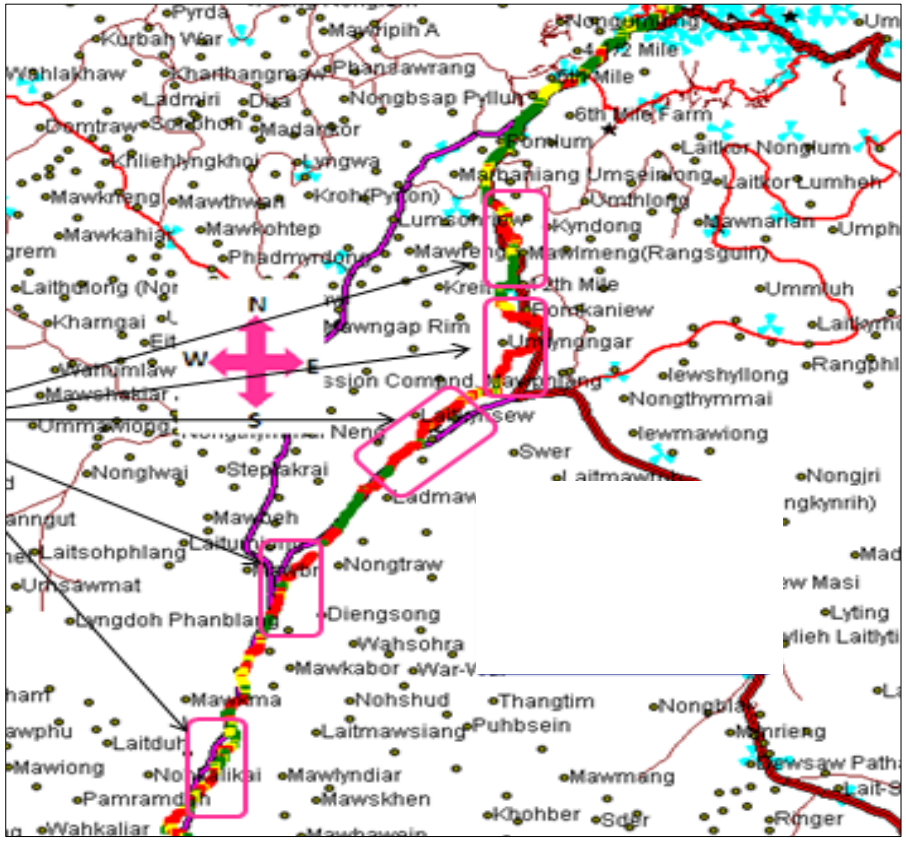
6.1.2.2 KILOMETERS TRAVELLED– MEGHALAYA SSA

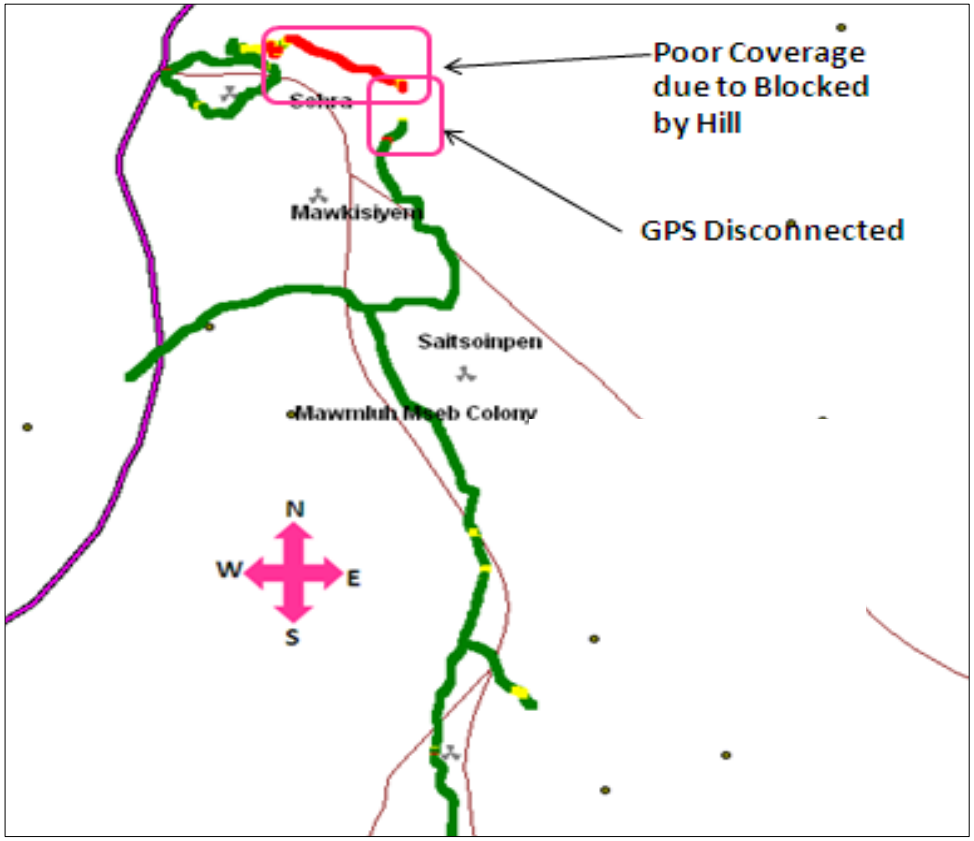
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Meghalaya	106	95	111	312

6.1.2.3 ROUTE MAP MEGHALAYA DAY 1

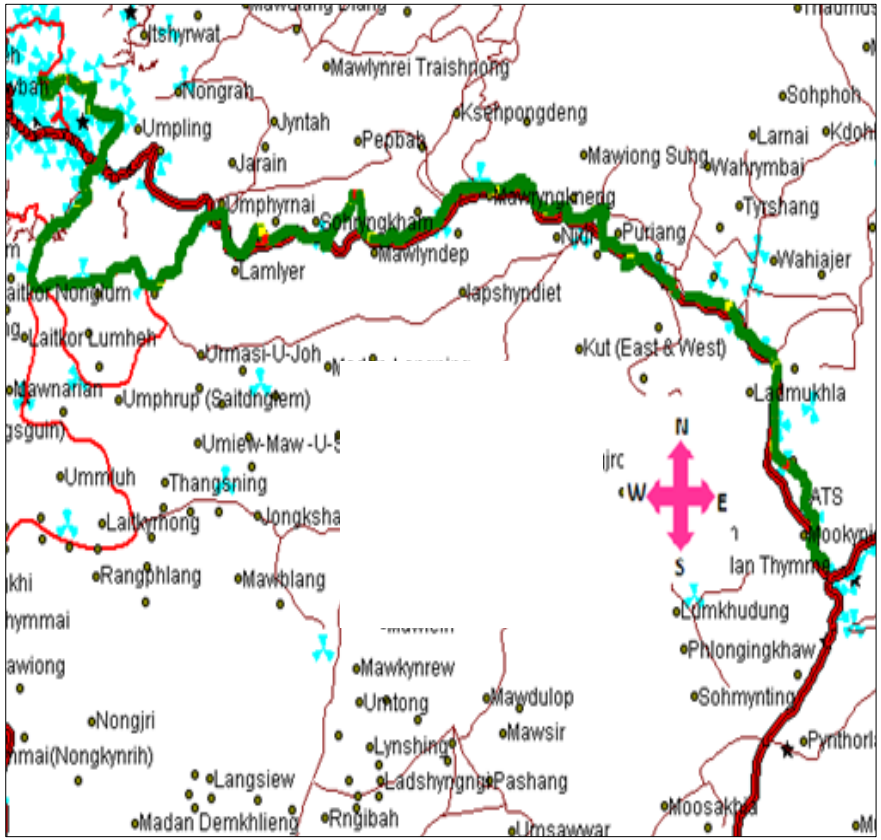


6.1.2.4 ROUTE MAP MEGHALAYA DAY 2





6.1.2.5 ROUTE MAP MEGHALAYA DAY 3



6.1.2.6 DRIVE TEST RESULTS – MEGHALAYA SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA NE 1		BSNL CDMA NE 2		BSNL GSM NE 1		BSNL GSM NE 2		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.84%	82.34%	98.40%	78.43%	NP		NA		83.60%	37.96%	NA		79.50%	53.48%	76.66%	51.20%	92.13%	62.26%
0 to -85 dBm		99.99%	96.68%	99.07%	93.71%					99.32%	65.22%			95.00%	72.68%	99.61%	76.61%	99.91%	86.61%
0 to -95 dBm		100.00%	99.37%	99.97%	99.00%					99.99%	100.00%			100.00%	91.68%	100.00%	91.93%	100.00%	100.00%
Voice quality	≥ 95%	98.32%	96.65%	98.26%	94.57%					89.96%	88.57%			99.53%	94.36%	96.12%	89.43%	99.61%	96.32%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%					98.96%	92.33%			100.00%	100.00%	100.00%	97.24%	100.00%	97.83%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%					1.04%	7.67%			0.00%	0.00%	0.00%	2.76%	0.00%	0.49%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%					0.00%	6.13%			0.00%	0.00%	0.00%	6.46%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%					59.11%	89.61%			100.00%	99.74%	100.00%	98.76%	100.00%	97.99%

Note: Drive Test conducted in NE I region; hence BSNL NE II region is not applicable. No data received for BSNL NE I CDMA.

Voice quality:

Airtel, BSNL NE 1 GSM, Idea and Reliance GSM did not meet the voice quality benchmark of 95% in outdoor locations. BSNL NE 1 GSM also missed the benchmark in indoor locations.

CSSR:

BSNL NE 1 GSM also missed the benchmark in outdoor locations.

Call drop rate:

BSNL NE 1 GSM also missed the benchmark in outdoor locations.

6.1.3 SEPTEMBER – MIZORAM

Month	Name of SSA Covered	Date of Drive Test
September	Mizoram	25th to 26th, September 2014

6.1.3.1 ROUTE DETAILS – MIZORAM SSA

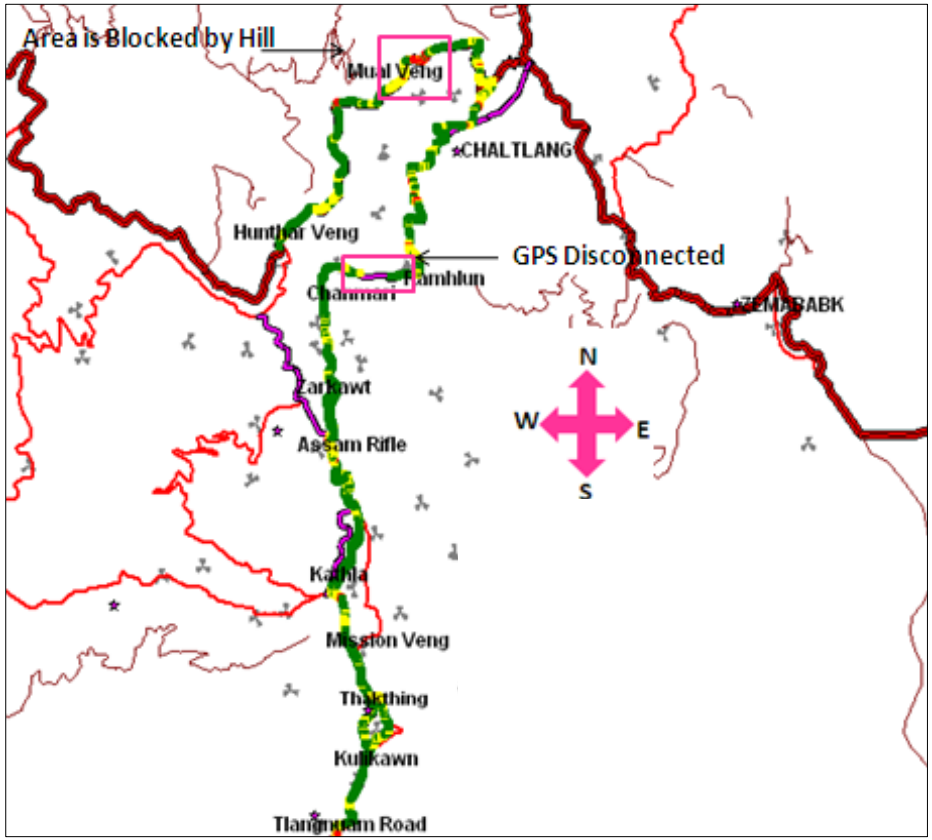
Category	Type of location	North East-September		
		Mizoram		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	NA	NA
	Highways	Vierengte, Konpui, Kolashib, Kamarang, Aizwal	Aizwal, Samtalang, Maulungthu, Sateek, Sherchif	Lunglei, Hanithal, Pengzwal, Bungtlang, Rawpui
	With in the City	Kulikaun, Khatla, Zarkwart, MC hill, Bethehem, Barabazar, Chanmari, Chaltang, Bawnkawn	Serchif	Lunglei
Indoor	Shopping complex	Goel Super Bazar (Titlagarh)		
	Office complex	BSNL telephone Exchange(Kantabanji), Aizwal		

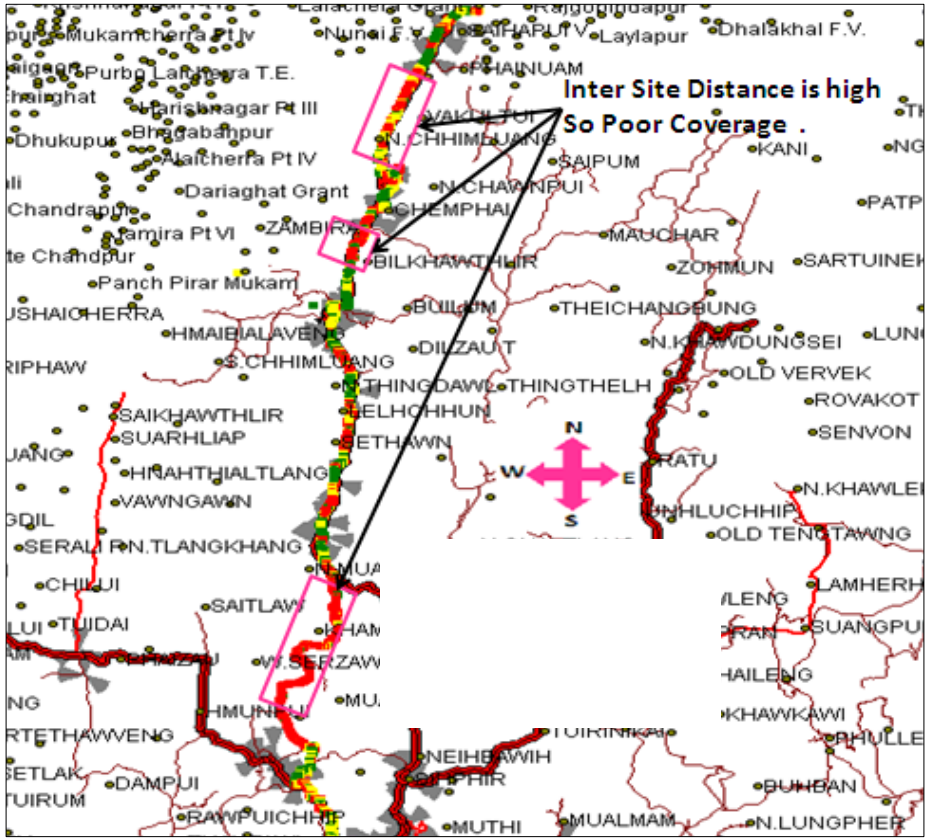
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.3.2 KILOMETERS TRAVELLED– MIZORAM SSA

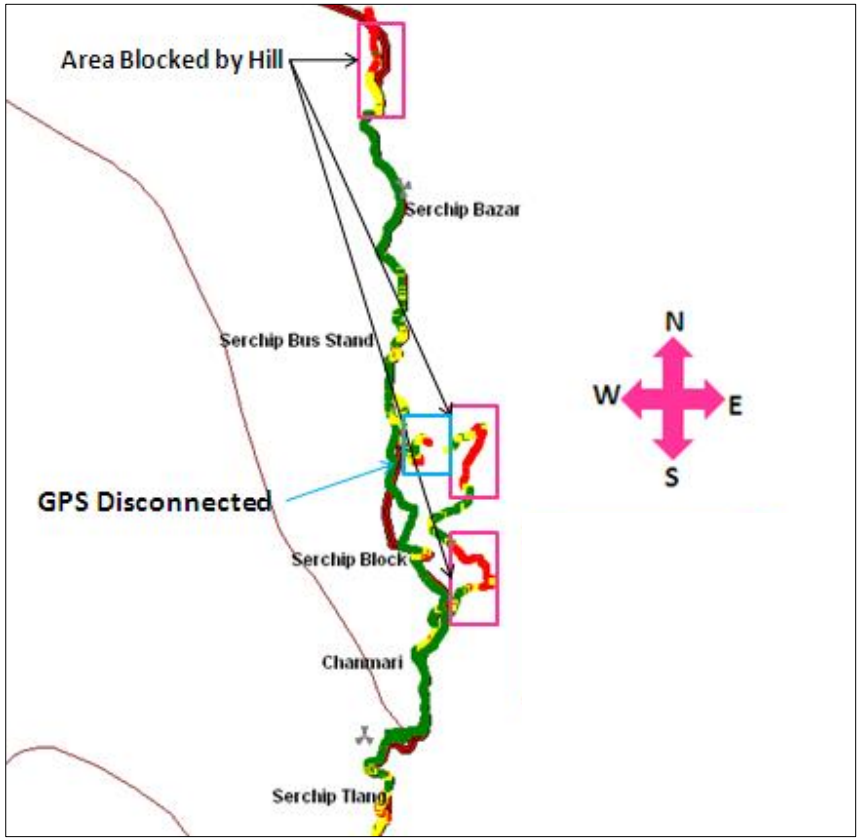
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Mizoram	125	107	119	351

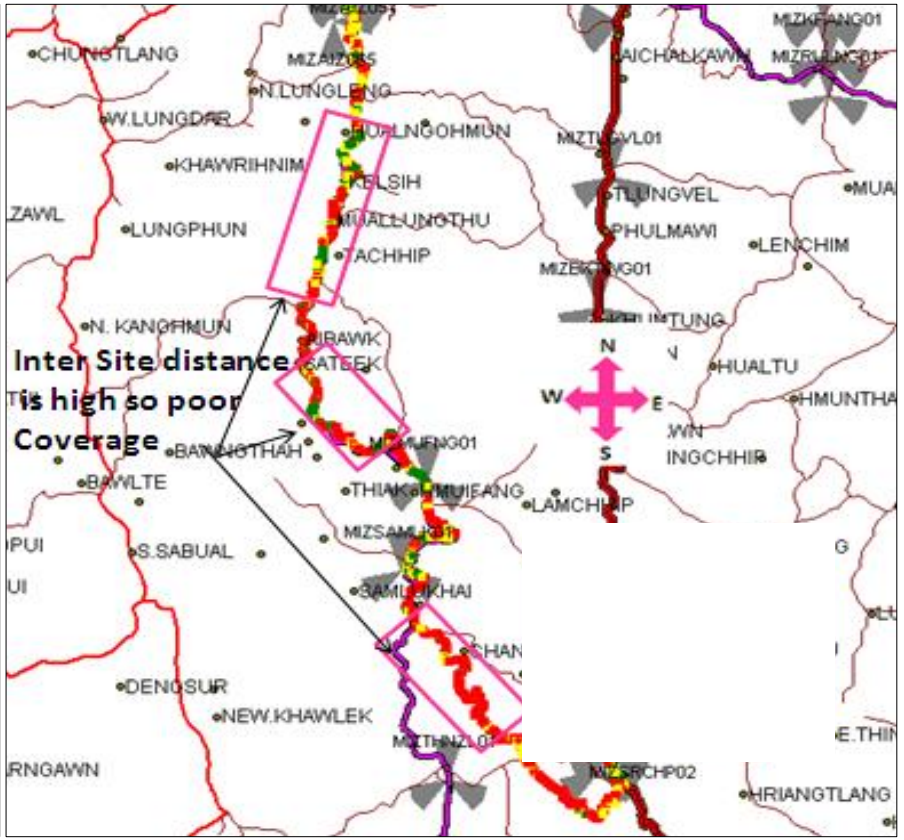
6.1.3.3 ROUTE MAP MIZORAM DAY 1



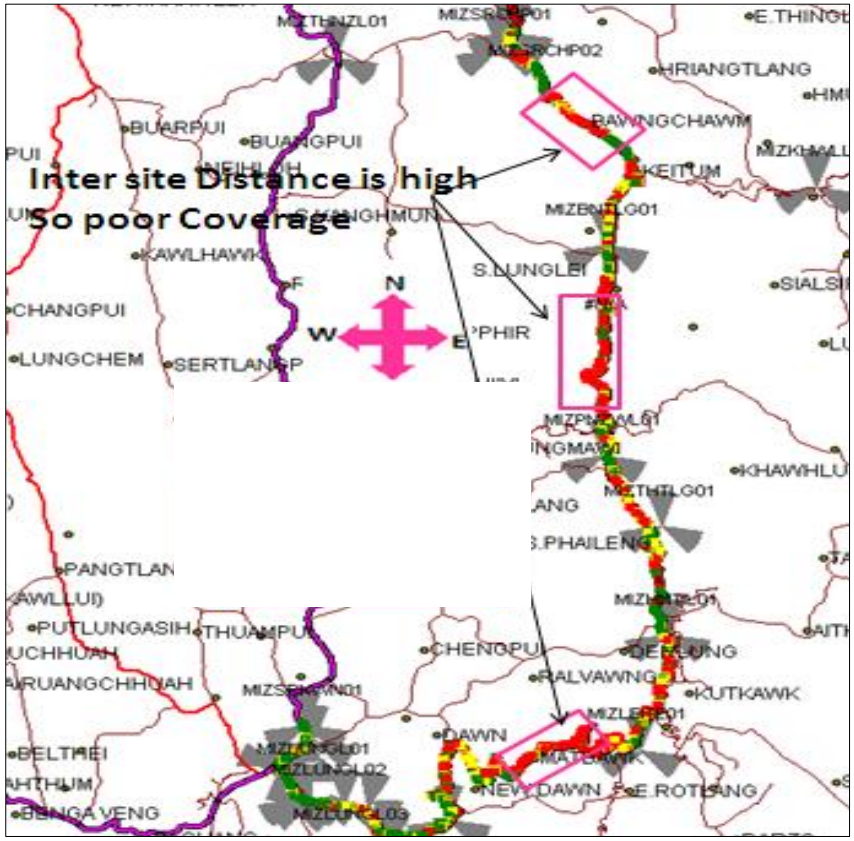


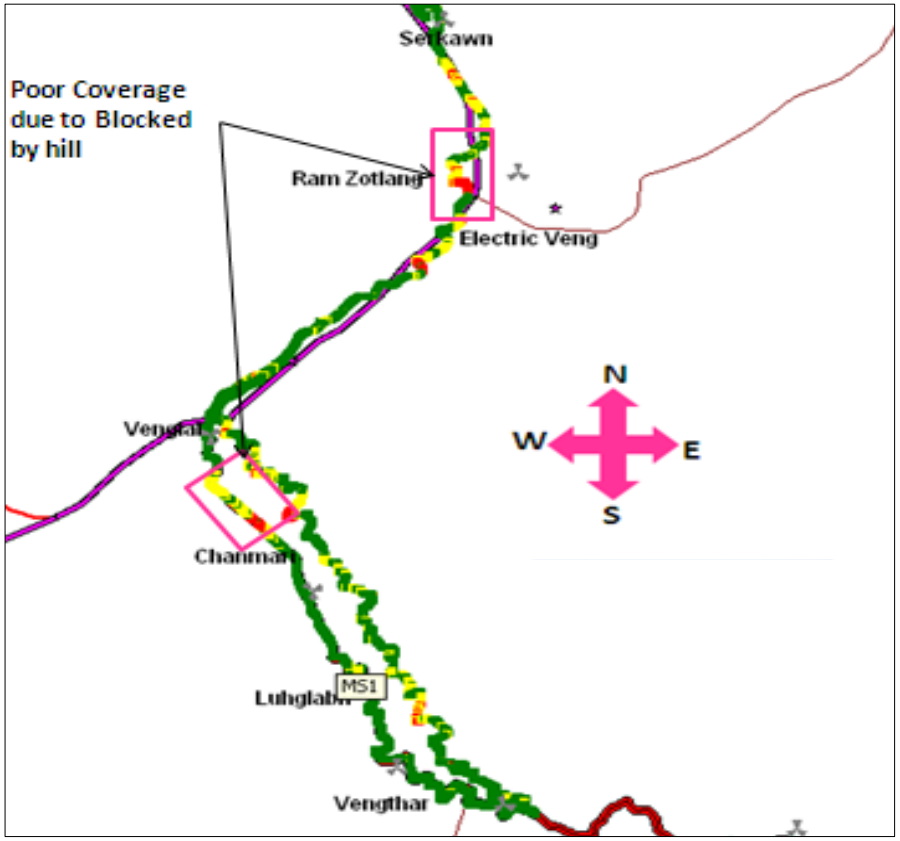
6.1.3.4 ROUTE MAP MIZORAM DAY 2





6.1.3.5 ROUTE MAP MIZORAM 3





6.1.3.6 DRIVE TEST RESULTS – MIZORAM SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA NE 1		BSNL CDMA NE 2		BSNL GSM NE 1		BSNL GSM NE 2		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.83%	63.70%	73.69%	63.83%	NDR		NA		NDR		NA		77.67%	62.17%	78.28%	61.42%	71.54%	60.78%
0 to -85 dBm		100.00%	84.21%	99.84%	84.83%									22.33%	86.33%	99.96%	78.28%	99.67%	78.08%
0 to -95 dBm		100.00%	99.33%	100.07%	95.83%									100.00%	97.50%	100.00%	90.16%	100.00%	100.00%
Voice quality	≥ 95%	96.24%	94.06%	98.12%	92.37%									99.38%	94.64%	99.94%	95.70%	98.56%	95.88%
CSSR	≥ 95%	100.00%	99.76%	100.00%	100.00%									100.00%	100.00%	100.00%	87.59%	100.00%	97.06%
%age Blocked calls		0.00%	0.24%	0.00%	0.00%									0.00%	0.00%	0.00%	12.43%	0.00%	2.35%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%									0.00%	0.00%	0.00%	8.91%	0.00%	1.39%
Hands off success rate		100.00%	99.61%	100.00%	100.00%									100.00%	94.88%	100.00%	95.59%	100.00%	96.95%

Note: Drive Test conducted in NE I region; hence BSNL NE II region is not applicable. No data received for BSNL NE I CDMA and BSNL NE I GSM.

Voice quality:

In outdoor areas, Aircel, Airtel and Idea failed to meet the benchmark of 95% for voice quality.

CSSR:

Excluding Reliance GSM, all the operators met the TRAI benchmark in outdoor areas.

Call drop rate:

Excluding Reliance GSM, all the operators met the TRAI benchmark in outdoor areas.

6.2 INDEPENDENT DRIVE TEST

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

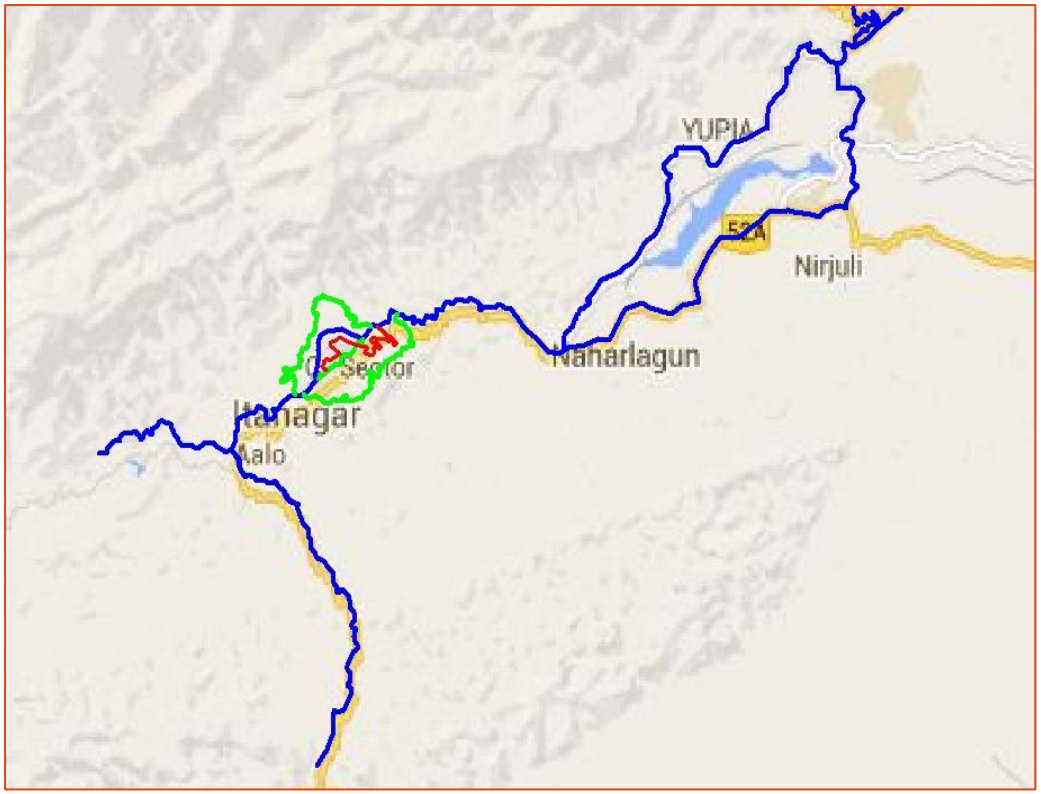
6.2.1 ITANAGAR

Name of the City	Itanagar
Date of Drive Test	20th Aug' 14
Name of the circle	North-East

Independent Drive Test Route Details – ITANAGAR SSA

Itanagar	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Hotel TODO-Kidzee-GreenValley Bus Counter-NH52A-Trafic Park-Hotel Bomdila-T D Foundation Private Girl's Hostel-Hotel Pratigya	Moomsie Hotel-P Sector-Indira Gandhi Park-E sector-BB Plaza-I.G Park	Blue Hill Bus Counter-Circuit House-Raj Bhawan Helipad-FCI-Hotel Arjun Subansiri-Rajbhwan guest House	Office Of Director of Suply & Transport	Ganga Market

Kilometers Travelled: 125



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 – ITANAGAR SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		84.35%	77.67%	86.90%	62.03%	50.00%	73.87%	99.45%	84.27%	96.55%	70.70%	77.75%	35.43%	75.85%	41.97%
Signal Strength - 0 to -85 dBm		99.85%	92.57%	99.85%	94.63%	67.80%	93.03%	99.95%	95.37%	100.00%	89.67%	99.20%	82.47%	99.55%	85.60%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.97%	100.00%	99.97%	100.00%	100.00%	100.00%	99.97%
Voice quality	≥ 95%	80.85%	78.02%	84.54%	88.93%	99.63%	97.88%	94.96%	81.82%	98.78%	94.04%	82.57%	89.22%	94.59%	89.09%
CSSR	≥ 95%	98.48%	89.51%	100.00%	93.68%	100.00%	98.79%	83.33%	82.39%	100.00%	94.86%	100.00%	91.37%	100.00%	98.99%
%age Blocked calls		1.52%	10.49%	0.00%	6.32%	0.00%	1.21%	16.67%	17.61%	0.00%	5.14%	0.00%	8.63%	0.00%	1.01%
Call drop rate	≤ 2%	0.00%	3.98%	1.52%	3.24%	1.00%	1.80%	0.00%	6.11%	1.61%	2.88%	1.61%	2.94%	1.56%	0.81%
Hands off success rate		100.00%	99.62%	97.37%	97.11%	100.00%	100.00%	100.00%	73.09%	100.00%	100.00%	100.00%	98.92%	100.00%	93.70%

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 GSM, Idea, Vodafone and Reliance GSM.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

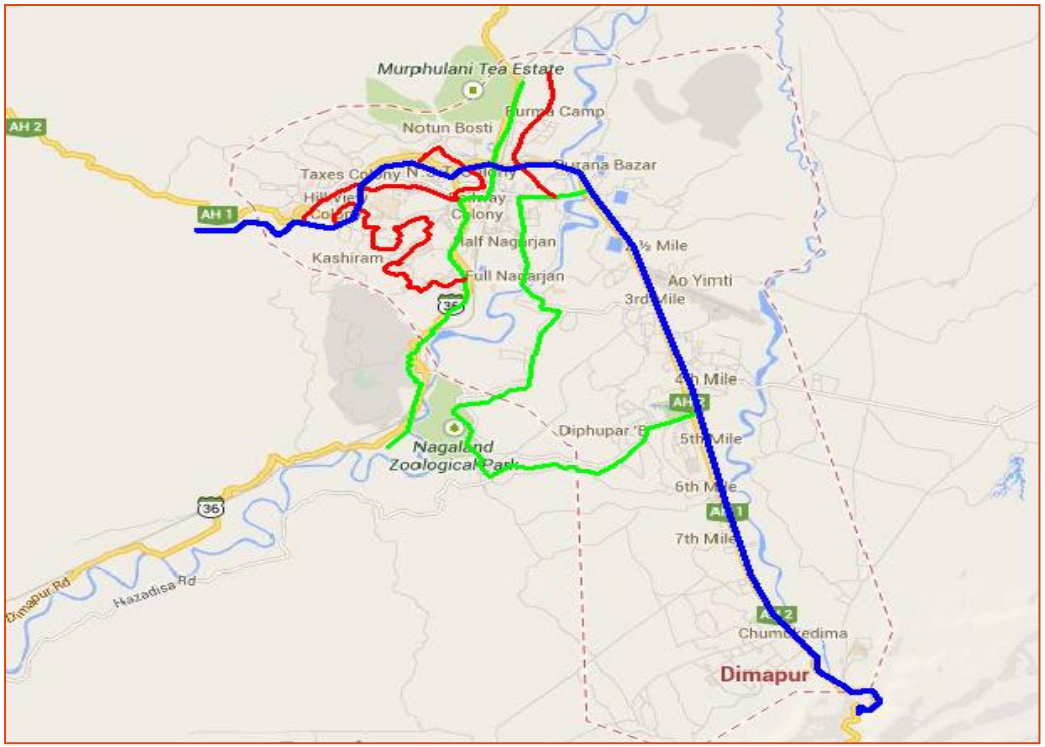
6.2.2 DIMAPUR

Name of the City	Dimapur
Date of Drive Test	27th Aug' 14
Name of the circle	North-East

Independent Drive Test Route Details – DIMAPUR SSA

Dimapur	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Star Ex Kindergarten School-Nagaland Post-Bible College-impressions print services-St John Higher Secondary School	Notan Bosti Rd-LivingStone Foundation Senior Higher Secondary School-ELLIDE-Dimapur Hospital-KMC Boys Hostel.Nagaland Engineering & Management College-Sewak Rd	Rangapahar Railway Station-lungdung Dimapur Rd-Dimapur Railway Station.supar Market Rd-town Hall-Half Nagrajan Rd-Tetso College	LIC Office	Naga super Market

Kilometers Travelled: 129



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 – DIMAPUR SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		99.45%	56.80%	33.10%	41.53%	80.35%	43.77%	95.25%	55.57%	65.20%	49.37%	41.30%	39.03%	80.70%	54.47%
Signal Strength - 0 to -85 dBm		100.00%	84.90%	95.90%	81.37%	100.00%	76.27%	100.00%	85.03%	98.90%	81.73%	97.80%	77.50%	99.55%	90.23%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	92.01%	79.97%	91.72%	81.26%	97.10%	83.70%	91.36%	80.10%	92.01%	85.77%	91.05%	84.15%	95.94%	91.29%
CSSR	≥ 95%	89.32%	98.06%	98.33%	93.46%	96.97%	78.50%	82.50%	71.13%	95.16%	96.19%	96.67%	96.87%	94.12%	93.33%
%age Blocked calls		10.68%	1.94%	1.67%	6.54%	3.03%	21.50%	17.50%	28.87%	4.84%	3.81%	3.33%	3.13%	5.88%	6.67%
Call drop rate	≤ 2%	0.00%	8.97%	0.00%	9.06%	4.69%	9.08%	0.00%	4.02%	0.00%	7.51%	1.79%	2.80%	1.67%	0.00%
Hands off success rate		100.00%	96.56%	100.00%	94.66%	100.00%	100.00%	100.00%	90.26%	100.00%	98.97%	100.00%	93.90%	100.00%	98.39%

Voice Quality

All operators failed to meet the benchmark in outdoor areas. Operators who have not met the benchmark for Voice Quality in Indoor are Aircel, Airtel, BSNL GSM, Idea and Reliance GSM.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

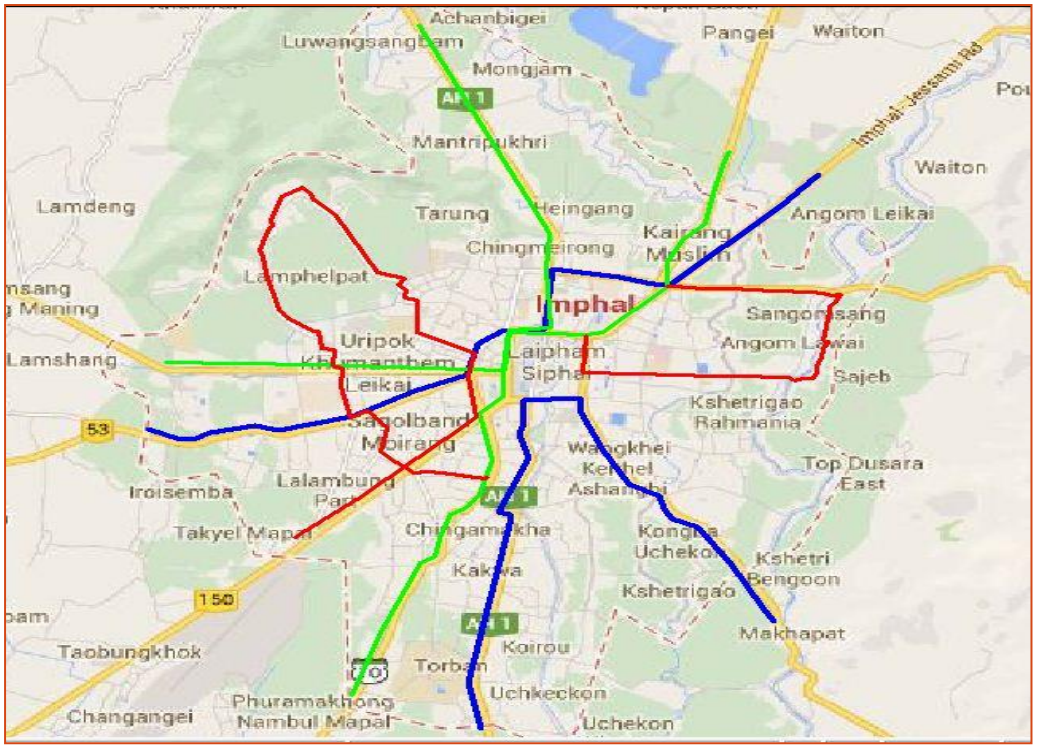
6.2.3 IMPHAL

Name of the City	Imphal
Date of Drive Test	29th Aug' 14
Name of the circle	North-East

Independent Drive Test Route Details – Imphal SSA

Imphal	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	National Institute of Technology Manipur-Meino Leirak Mutlipurpose Community Hall-Nagarpal Rd-Mummys Pre-School.BK Hotel-Standard College-Maharaj Bodhchandra College-NH39-Department of Physical Education and Sports Science	Imphal College-Hotel Bheigo-Evangelical Churches Association-CENTRAL INSTITUE OF PLASTICS ENGINEERING AND TECHNOLOGY-Manipur College.Mummys Pre-School-Khurai Ningthoubung Ground-Khongnanga Makhang Rd	Central Agricultural College-MPSC-Liberal College.Mummys Pre-School-Imphal Jessami Rd-Raj Bhavan-Manipur College	LIC Office	Vishal Mega Mart

Kilometers Travelled: 108



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 – Imphal SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		98.40%	88.60%	76.00%	63.10%	42.70%	49.87%	46.30%	35.77%	93.60%	68.13%	79.80%	66.07%	44.50%	54.10%
Signal Strength - 0 to -85 dBm		100.00%	98.37%	99.85%	92.83%	100.00%	86.37%	79.85%	68.33%	99.95%	94.13%	99.85%	96.67%	93.80%	92.83%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	91.43%	86.99%	90.10%	82.06%	99.51%	97.71%	72.50%	62.17%	98.68%	89.32%	87.33%	84.46%	94.82%	83.70%
CSSR	≥ 95%	100.00%	98.79%	100.00%	99.39%	100.00%	99.38%	95.16%	79.18%	100.00%	98.18%	100.00%	99.33%	95.31%	88.33%
%age Blocked calls		0.00%	1.21%	0.00%	0.61%	0.00%	0.62%	4.84%	20.82%	0.00%	1.82%	0.00%	0.67%	4.69%	11.67%
Call drop rate	≤ 2%	0.00%	6.26%	0.00%	3.80%	0.00%	2.47%	1.61%	12.01%	0.00%	5.60%	0.00%	0.00%	5.06%	6.51%
Hands off success rate		100.00%	97.27%	100.00%	89.52%	100.00%	100.00%	95.16%	61.37%	100.00%	96.70%	92.86%	94.10%	100.00%	79.99%

Voice Quality

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

Call Set Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in for Outdoor are BSNL GSM and Vodafone.

Call Drop Rate

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

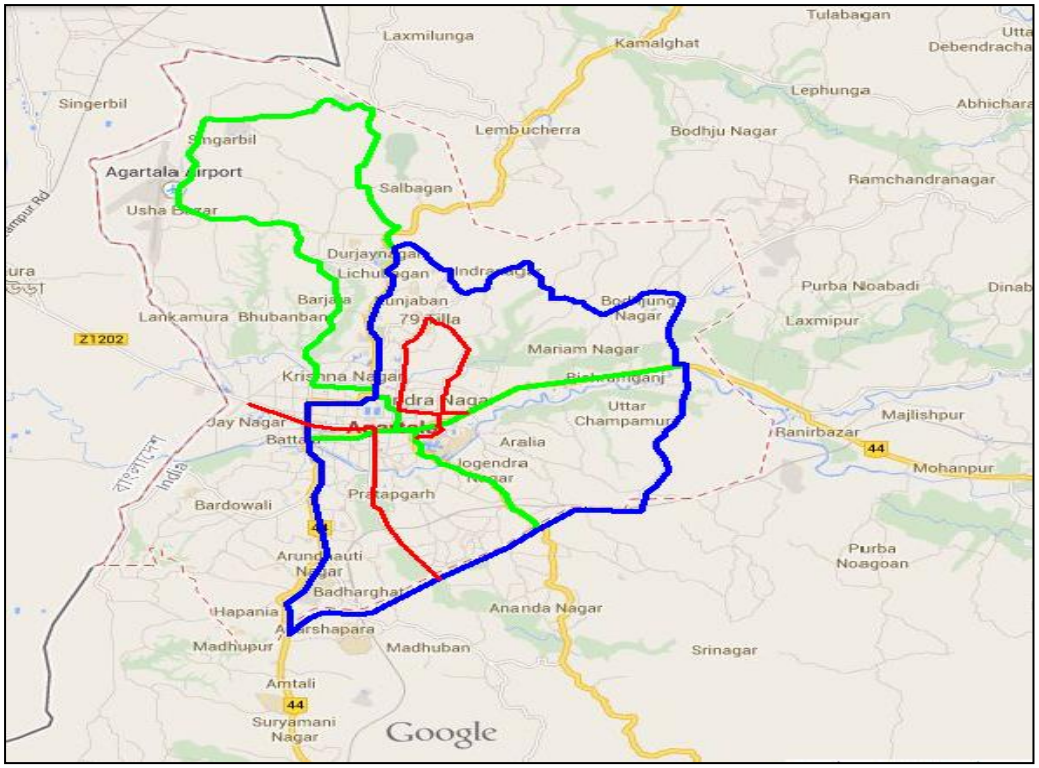
6.2.4 AGARTALA

Name of the City	Agartala
Date of Drive Test	5th Sep' 14
Name of the circle	North-East

Independent Drive Test Route Details – Agartala SSA

Agartala	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Tripura Tourism Development Corporation-Ramthakur College-Khayerpur-Ginger Hotel-Lichu bagan	Union bank, Bodhjung Girls High School, World Of Titan, Radha International, Bandhan Marriage Hall-Ramakrishna Mission-Jail Asram Rd	Umakanta Academy Ground-NH44-Khayerpur.Jogendra Nagar Railway Station-Pragati Childrens Park-Airport	S.D.O (ELECT) I.E Sub Division	Battla super Market

Kilometers Travelled: 115



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 – Agartala SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		74.45%	60.83%	21.05%	69.43%	51.60%	61.77%	62.90%	56.63%	89.75%	50.43%	82.25%	52.07%	47.55%	62.33%
Signal Strength - 0 to -85 dBm		99.95%	89.70%	91.55%	93.63%	96.20%	81.60%	98.60%	84.60%	99.90%	81.30%	99.60%	86.40%	93.85%	89.47%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	92.67%	84.28%	82.09%	85.59%	99.63%	91.70%	88.09%	81.66%	95.89%	90.77%	97.40%	88.47%	95.03%	89.11%
CSSR	≥ 95%	100.00%	91.94%	89.39%	94.95%	92.42%	90.14%	76.81%	97.84%	100.00%	82.39%	95.31%	93.22%	83.54%	88.82%
%age Blocked calls		0.00%	8.06%	10.61%	5.05%	7.58%	9.86%	23.19%	2.16%	0.00%	17.61%	4.69%	6.78%	16.46%	11.18%
Call drop rate	≤ 2%	0.00%	1.75%	1.85%	5.06%	0.00%	8.93%	0.00%	3.02%	0.00%	3.79%	0.00%	0.63%	0.00%	3.41%
Hands off success rate		100.00%	96.06%	75.00%	97.22%	100.00%	100.00%	100.00%	84.81%	100.00%	99.46%	100.00%	97.83%	100.00%	92.13%

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

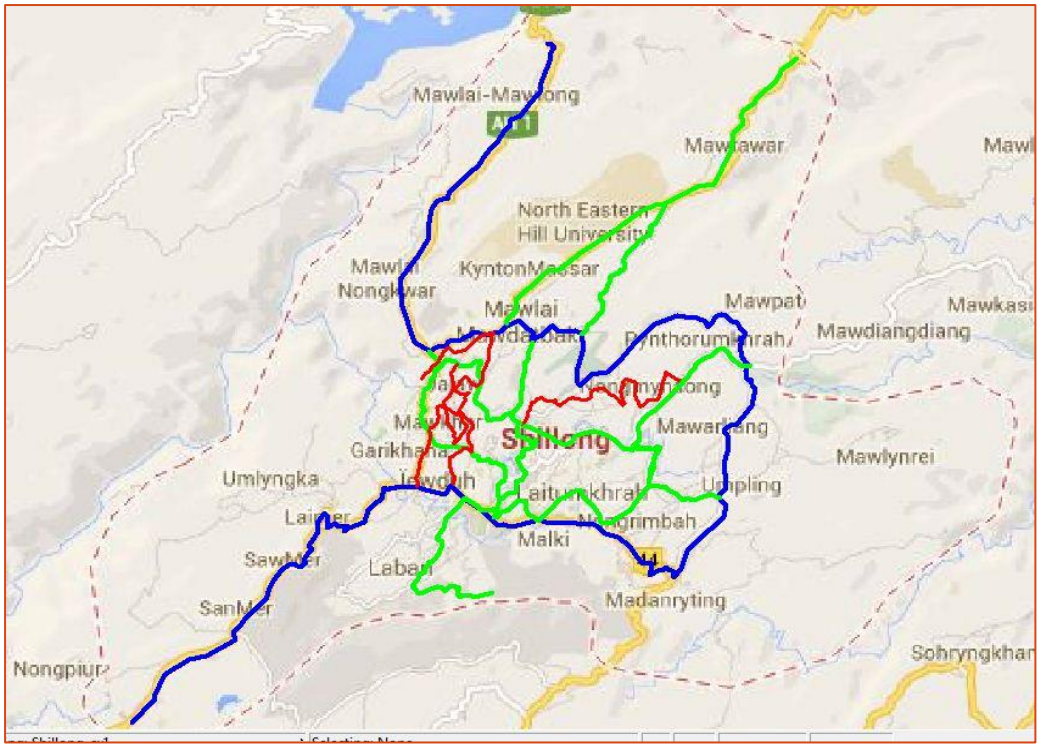
6.2.5 SHILLONG

Name of the City	Shillong
Date of Drive Test	1st & 2nd Sep' 14
Name of the circle	North-East

Independent Drive Test Route Details – Shillong SSA

Shillong	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Shillong Heliport-Vidya Bajoria Park-St. Peter's College-Sawlad Bus Stop-Lapalang Bus Stop-Itshyrwat-Mawroh Presbyterian Church-Greater Mawlai College-Mawïong MLP Bus Stop	Umkdait Bus Stop-BK Bajoria School/College-Golf Link Bus Stand-Sports Centre.Rilbong Point Bus Stop-Garikhana Mosque-Mawkhar Presbyterian Church-Anjali	Greater Mawlai College-GS Rd-Police Bazar-Martin Luther Christian University-Vidya Bajoria Park-Laban.Martin Luther Christian University-CMJ University-Umkdait Bus Stop-Itshyrwat	Doordarshan Kendra	Police Bazar

Kilometers Travelled: 107



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 – Shillong SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		99.80%	82.87%	99.85%	57.50%	97.40%	62.90%	37.25%	49.07%	41.60%	51.03%	33.30%	31.90%	87.50%	41.30%
Signal Strength - 0 to -85 dBm		100.00%	98.67%	100.00%	89.40%	100.00%	96.30%	91.50%	86.37%	93.05%	82.83%	90.50%	73.83%	99.50%	80.53%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	97.29%	76.13%	96.66%	69.71%	99.66%	91.78%	88.03%	86.72%	63.71%	85.84%	95.22%	85.22%	99.15%	85.13%
CSSR	≥ 95%	98.44%	88.92%	100.00%	93.33%	100.00%	93.23%	92.19%	85.40%	93.73%	91.17%	100.00%	93.39%	92.23%	88.34%
%age Blocked calls		1.56%	11.08%	0.00%	6.67%	0.00%	6.77%	7.81%	14.60%	6.27%	8.83%	0.00%	6.61%	7.77%	11.66%
Call drop rate	≤ 2%	0.00%	11.70%	0.00%	18.81%	1.47%	5.50%	0.00%	4.26%	1.56%	5.59%	0.00%	3.24%	0.00%	3.41%
Hands off success rate		100.00%	94.43%	100.00%	91.24%	100.00%	100.00%	93.75%	83.87%	90.24%	99.38%	100.00%	95.69%	100.00%	96.44%

Voice Quality

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

Call Set Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Indoor are BSNL, Idea and Vodafone and for Outdoor, all operators failed to meet the benchmark.

Call Drop Rate

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

6.3 COMPARISON BETWEEN OPERATOR ASSISTED AND INDEPENDENT DRIVE TEST

6.3.1 MANIPUR SSA/ IMPHAL

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

The operator assisted drive test happened in entire Manipur SSA for three days from 22 to 24 Jul 2014. However, the independent drive test was conducted with a focus on Imphal city area along with adjoining areas on 29 Aug 2014.

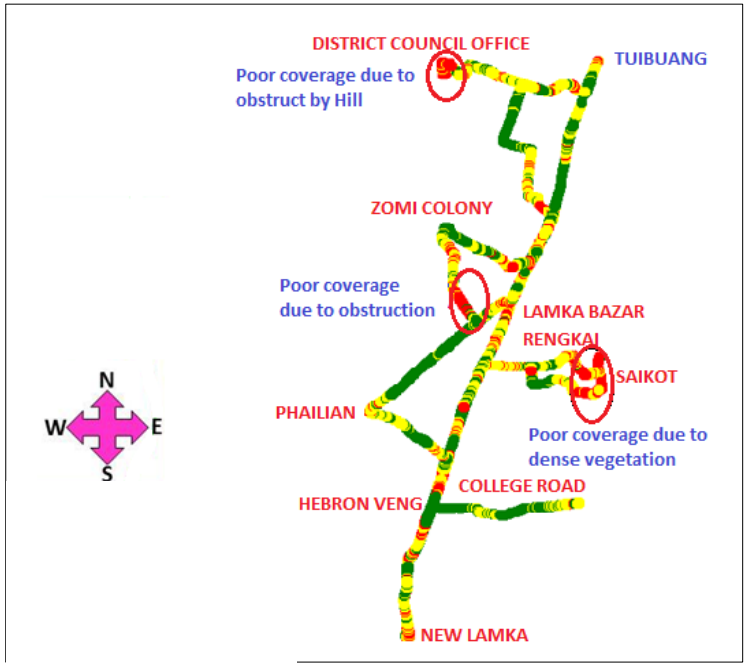
The results of the comparison between the two will be indicative and parameters for the two drive tests may not comply with each other due to following reasons.

- 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

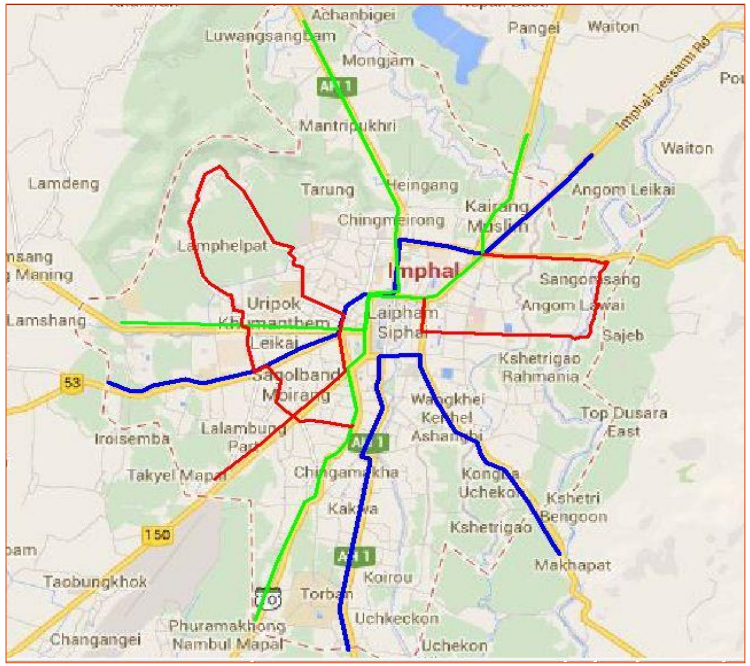
Let us now look at the comparison between the two drive tests.

6.3.1.1 ROUTE DETAILS

Operator Assisted Drive Test



Independent Drive Test



Route Details – Independent Drive Test – Imphal SSA

Imphal	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	National Institute of Technology Manipur-Meino Leirak Mutlipurpose Community Hall-Nagarpal Rd-Mummys Pre-School.BK Hotel-Standard College-Maharaj Bodhchandra College-NH39-Department of Physical Education and Sports Science	Imphal College-Hotel Bheigo-Evangelical Churches Association-CENTRAL INSTITUE OF PLASTICS ENGINEERING AND TECHNOLOGY-Manipur College.Mummys Pre-School-Khurai Ningthoubung Ground-Khongnanga Makhang Rd	Central Agricultural College-MPSC-Liberal College.Mummys Pre-School-Imphal Jessami Rd-Raj Bhavan-Manipur College	LIC Office	Vishal Mega Mart

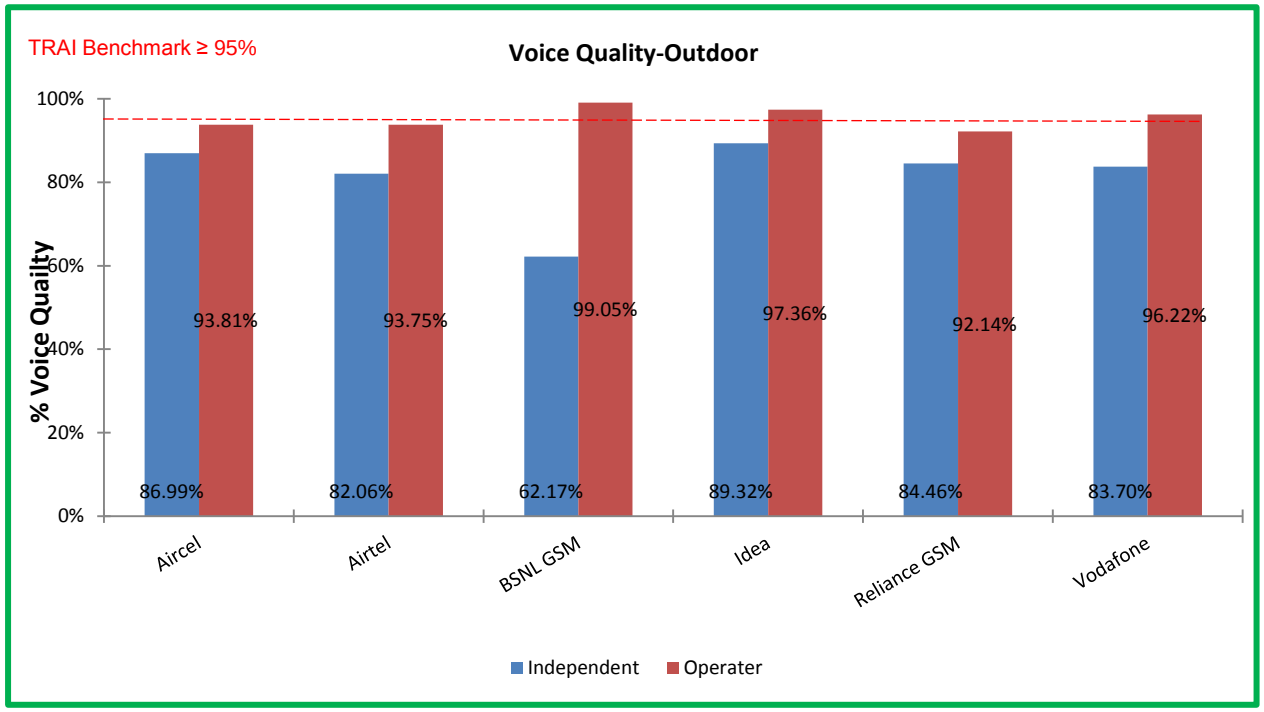
Route Details – Operator Assisted Drive Test – Manipur SSA

Category	Type of location	North East-July		
		Manipur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Imphal to Churachandpur via Bishnupur & Churachandpur	Imphal to Moreh via Thoubal & Thoubal Town Drive	Imphal City Drive & Imphal to Senapati,(
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

6.3.1.2 COMPARISON CHARTS AND ANALYSIS

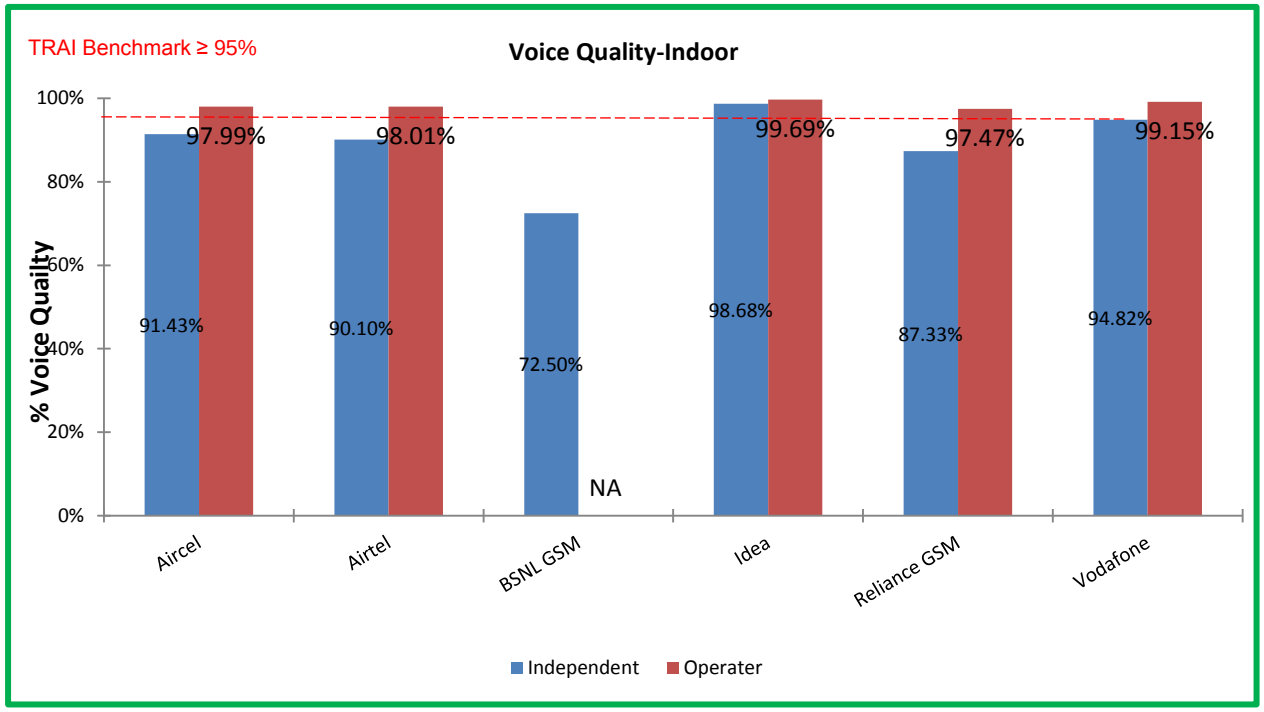
6.3.1.2.1 VOICE QUALITY

Outdoor Locations



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

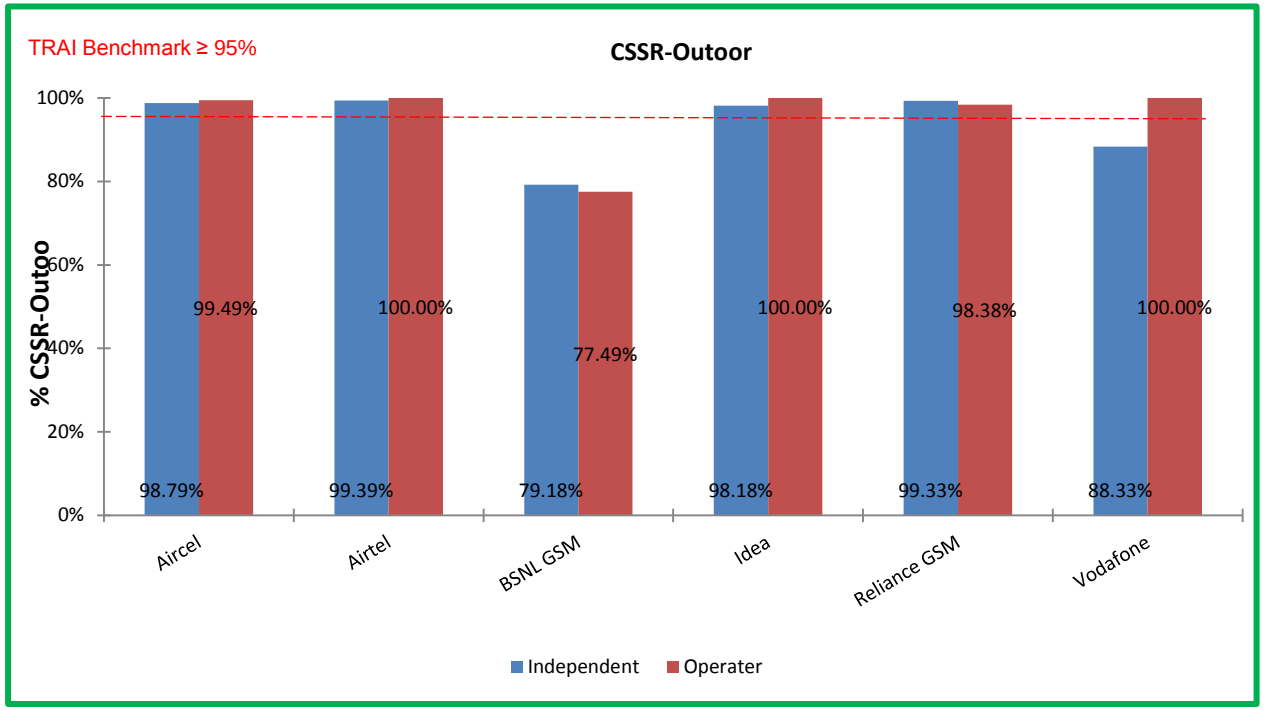
Indoor Locations



In indoor locations, all operators failed to meet the benchmark during independent drive test except Idea. All operators met the benchmark during operator assisted drive test. BSNL GSM did not participate in test at indoor location due to technical issue.

6.3.1.2.2 CALL SETUP SUCCESS RATE

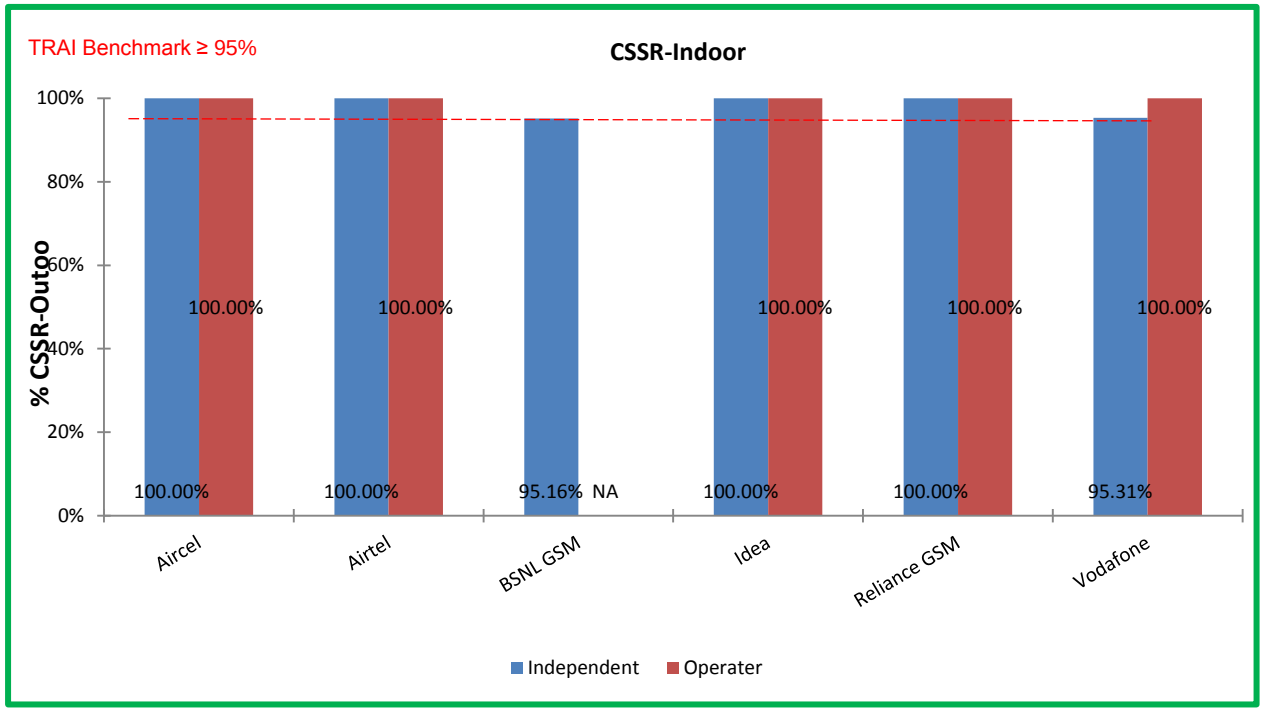
Outdoor Locations



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.

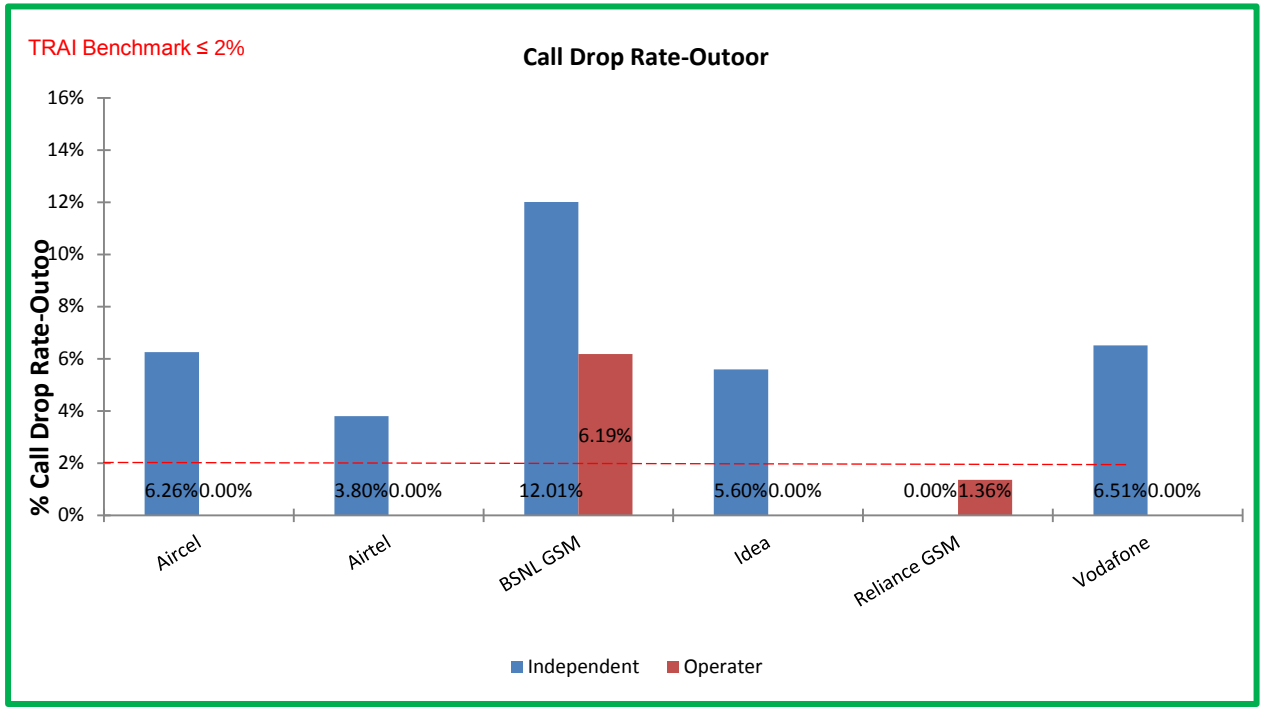
Indoor Locations



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

6.3.1.2.3 CALL DROP RATE

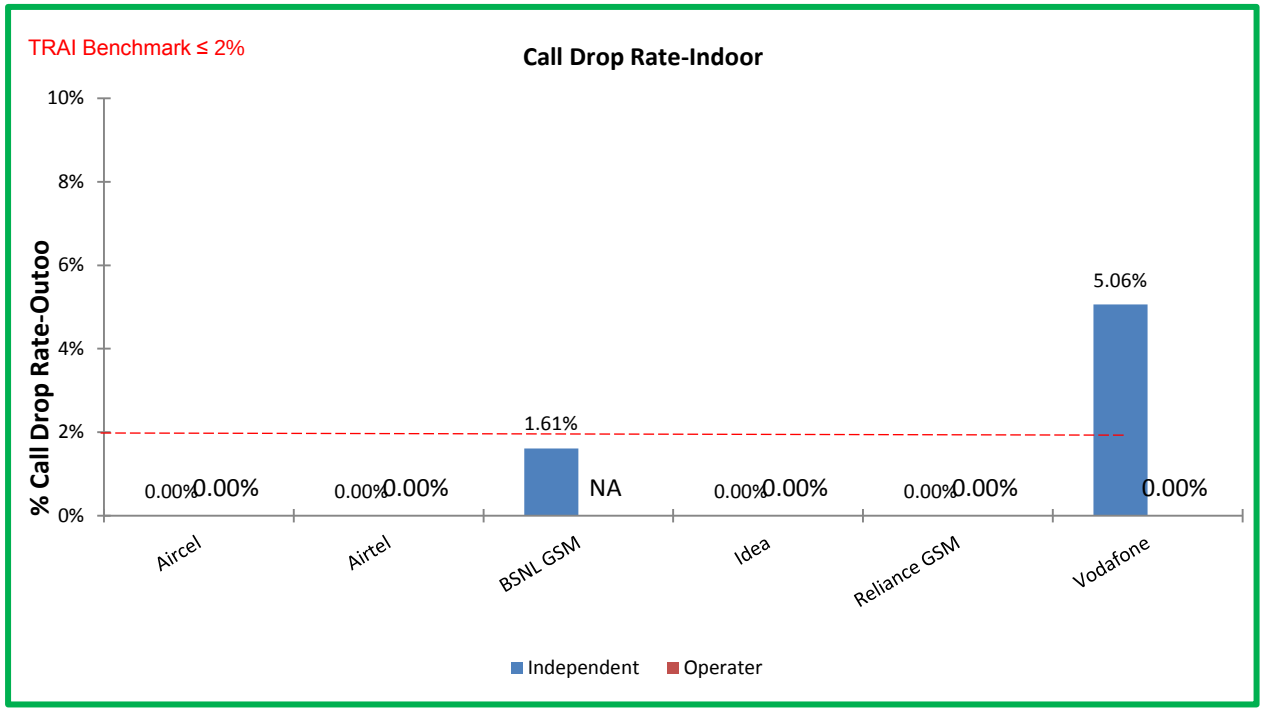
Outdoor Locations



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

Excluding Reliance GSM, all operators failed to meet the benchmark during independent drive test while all operators met the benchmark during operator assisted drive test in outdoor locations.

Indoor Locations



In indoor locations, Vodafone missed the benchmark during independent drive test but met the benchmark during operator assisted drive test. All operators met the benchmark during operator assisted drive test.

6.3.2 MEGHALAYA SSA/ SHILLONG

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

The operator assisted drive test happened in entire Meghalaya SSA for three days from 20 to 22 Aug 2014. However, the independent drive test was conducted with a focus on Shillong city area along with adjoining areas on 01 and 02 Sep 2014.

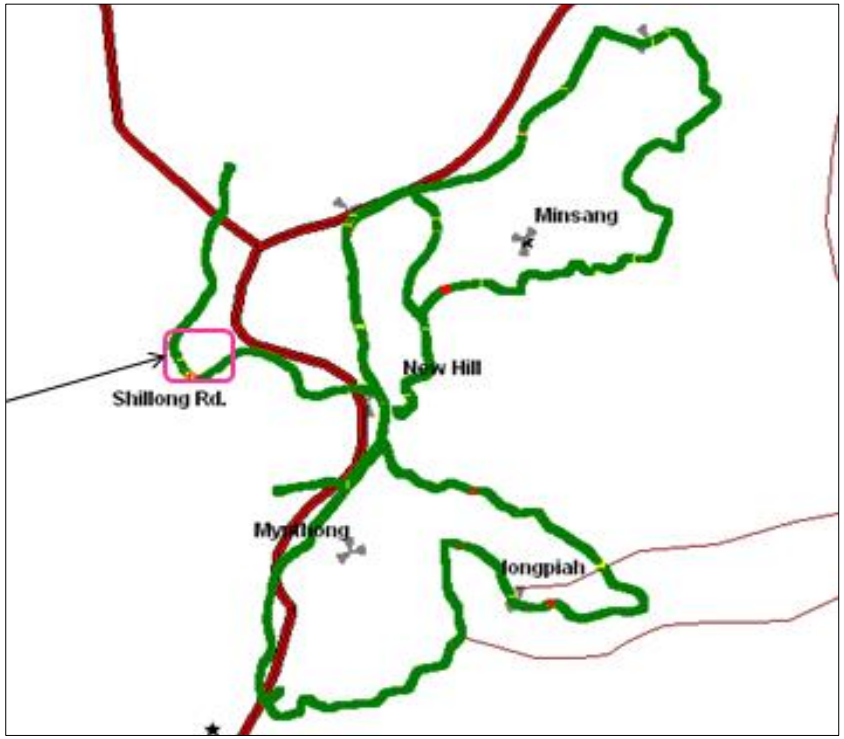
The results of the comparison between the two will be indicative and parameters for the two drive tests may not comply with each other due to following reasons.

- 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

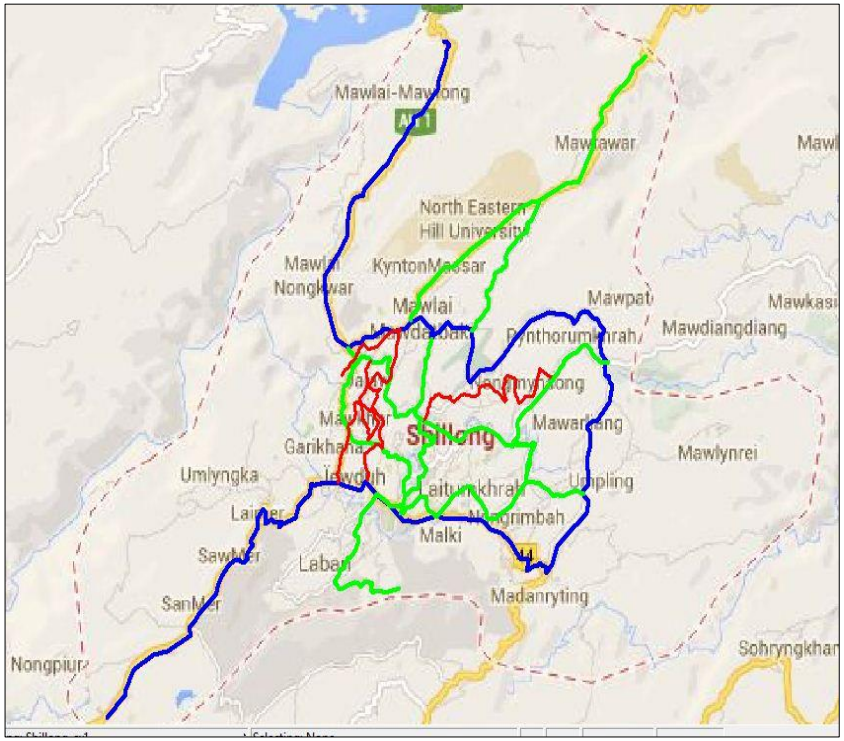
Let us now look at the comparison between the two drive tests.

6.3.2.1 ROUTE DETAILS

Operator Assisted Drive Test



Independent Drive Test



Route Details – Independent Drive Test – Shillong SSA

Shillong	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Shillong Heliport-Vidya Bajoria Park-St. Peter's College-Sawlad Bus Stop-Lapalang Bus Stop-Itshyrwat-Mawroh Presbyterian Church-Greater Mawlai College-Mawiong MLP Bus Stop	Umkdait Bus Stop-BK Bajoria School/College-Golf Link Bus Stand-Sports Centre.Rilbong Point Bus Stop-Garikhana Mosque-Mawkhar Presbyterian Church-Anjali	Greater Mawlai College-GS Rd-Police Bazar-Martin Luther Christian University-Vidya Bajoria Park-Laban.Martin Luther Christian University-CMJ University-Umkdait Bus Stop-Itshyrwat	Doordarshan Kendra	Police Bazar

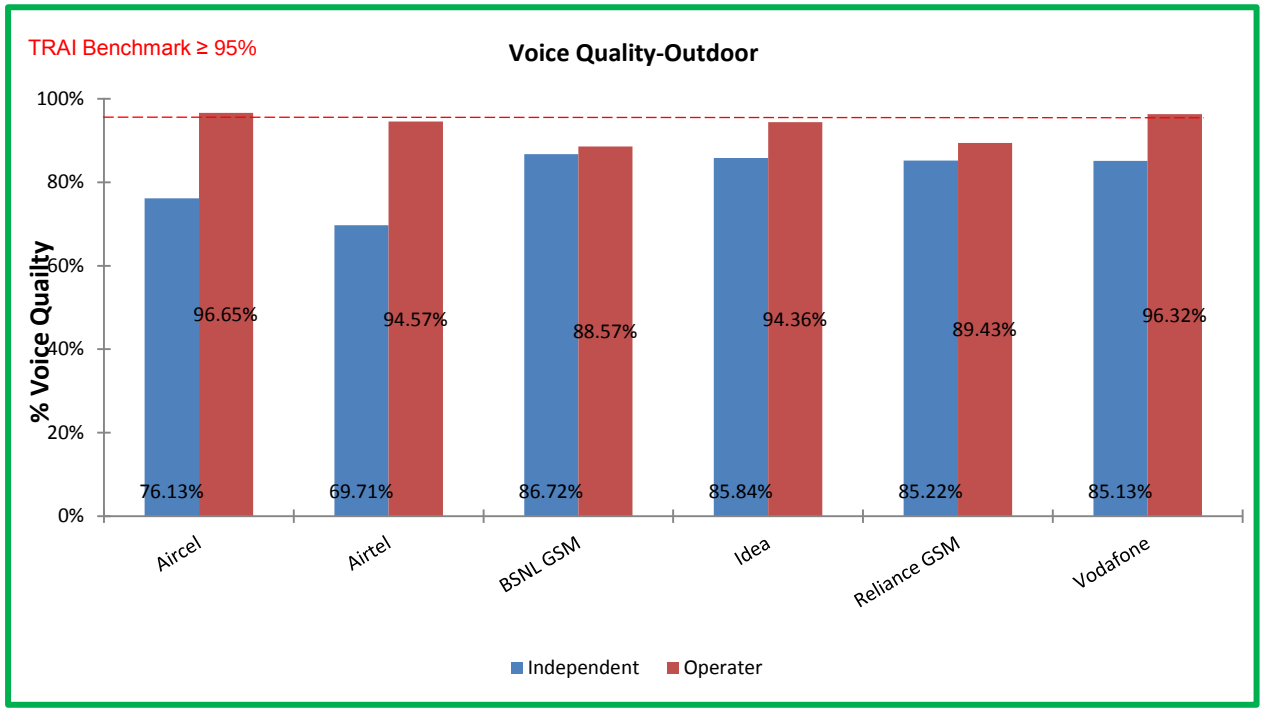
Route Details – Operator Assisted Drive Test – Meghalaya SSA

Category	Type of location	North East-August		
		Meghalaya		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	Cherrapungji to	NA
	Highways	Barapani	Cherrapunji	Umulong
	With in the City	Bishnupur	Cherrapunji town	Jowai Town
Indoor	Shopping complex	Padmini Complex(Sonepur), Goel Super Bazar (Titlagarh)	NA	NA
	Office complex	BSNL Telephone Exchange (Sonepur), Bishnupur, BSNL telephone Exchange(Kantabanji)	Cherrapunji town	Jowai Town

6.3.2.2 COMPARISON CHARTS AND ANALYSIS

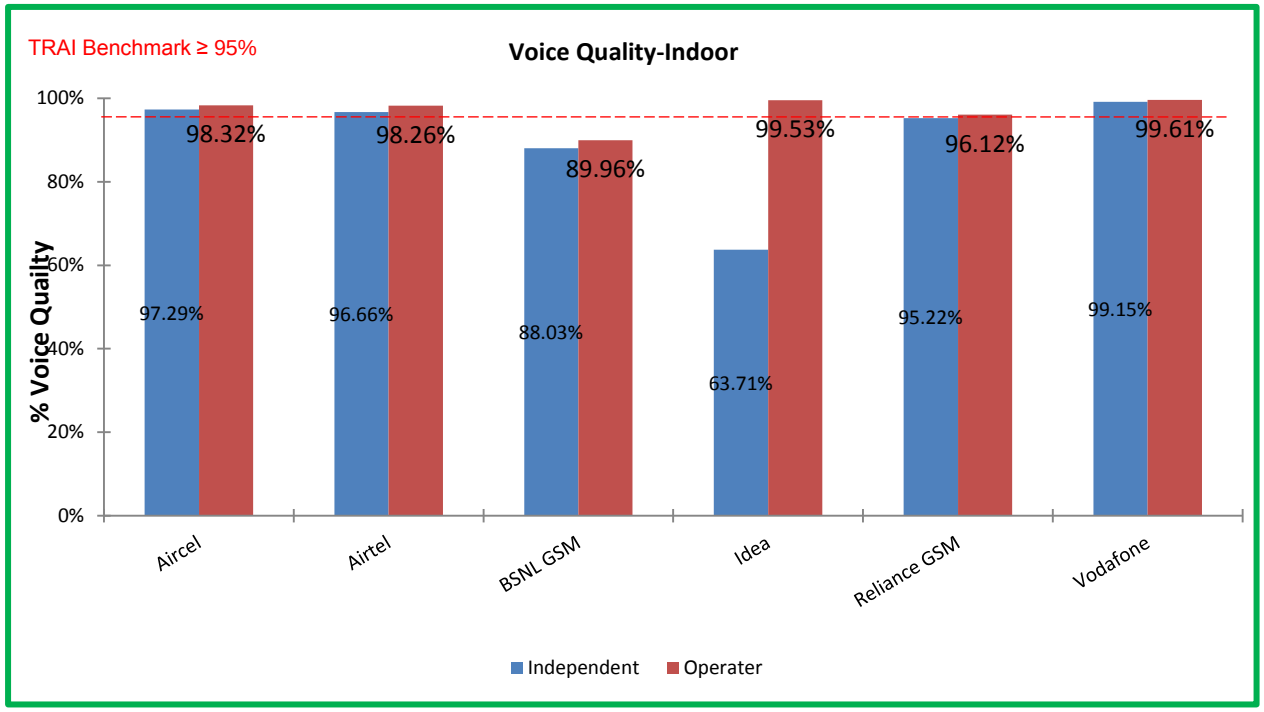
6.3.2.2.1 VOICE QUALITY

Outdoor Locations



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

Indoor Locations

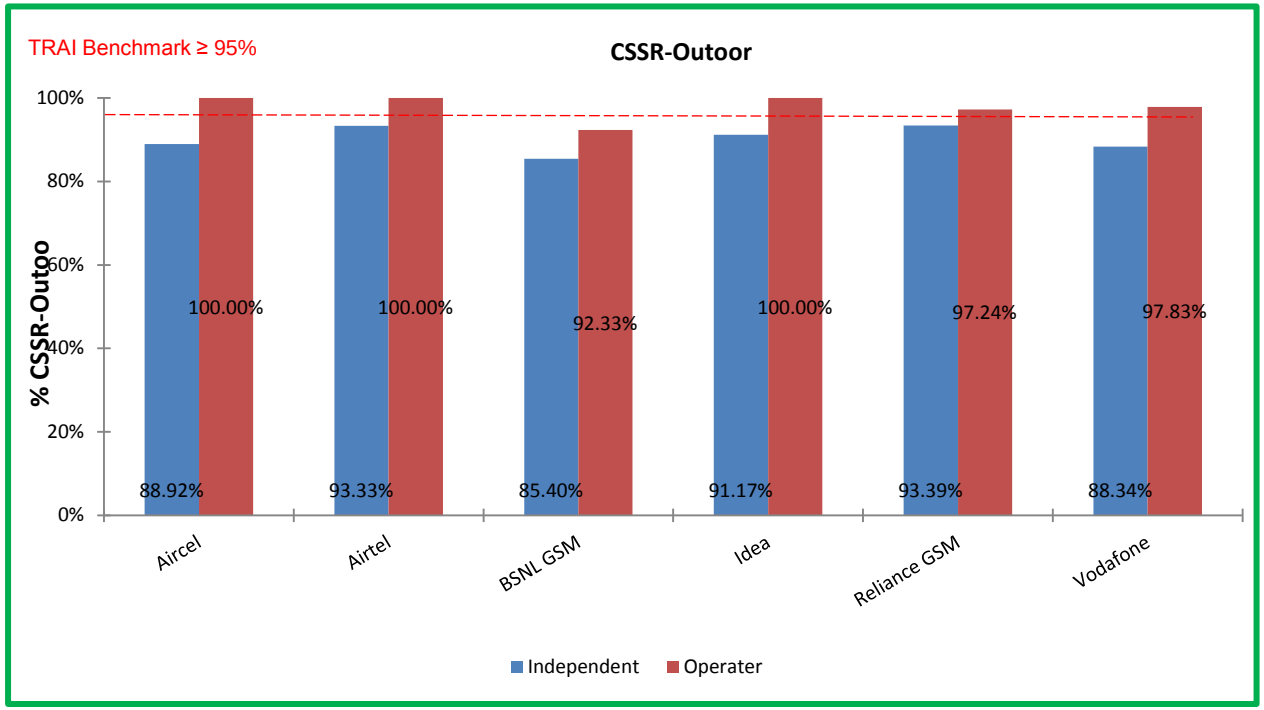


In indoor locations, BSNL GSM failed to meet the benchmark in both the drive tests.

Idea missed the benchmark during independent drive test but met the benchmark during operator assisted drive test. Aircel, Airtel, Reliance GSM and Vodafone met the benchmark in both the tests.

6.3.2.2.2 CALL SETUP SUCCESS RATE

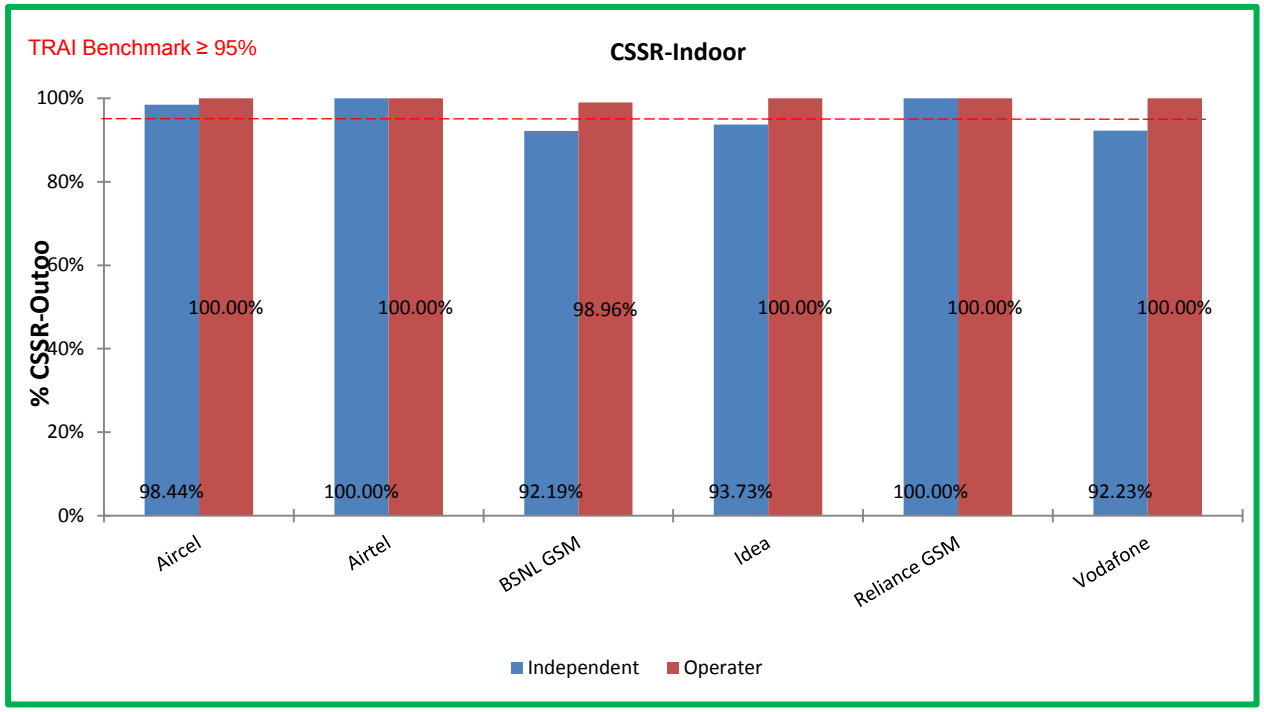
Outdoor Locations



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

Excluding BSNL GSM, all operators met the benchmark during operator assisted drive test.

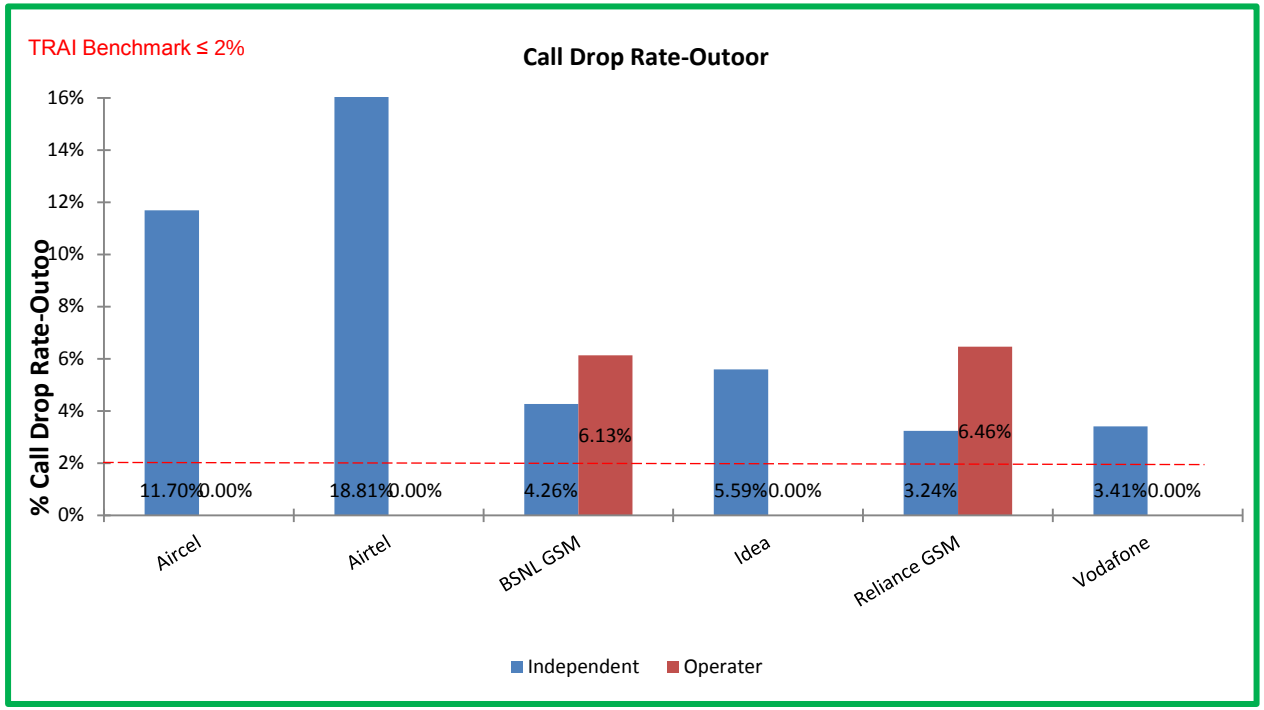
Indoor Locations



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

6.3.2.2.3 CALL DROP RATE

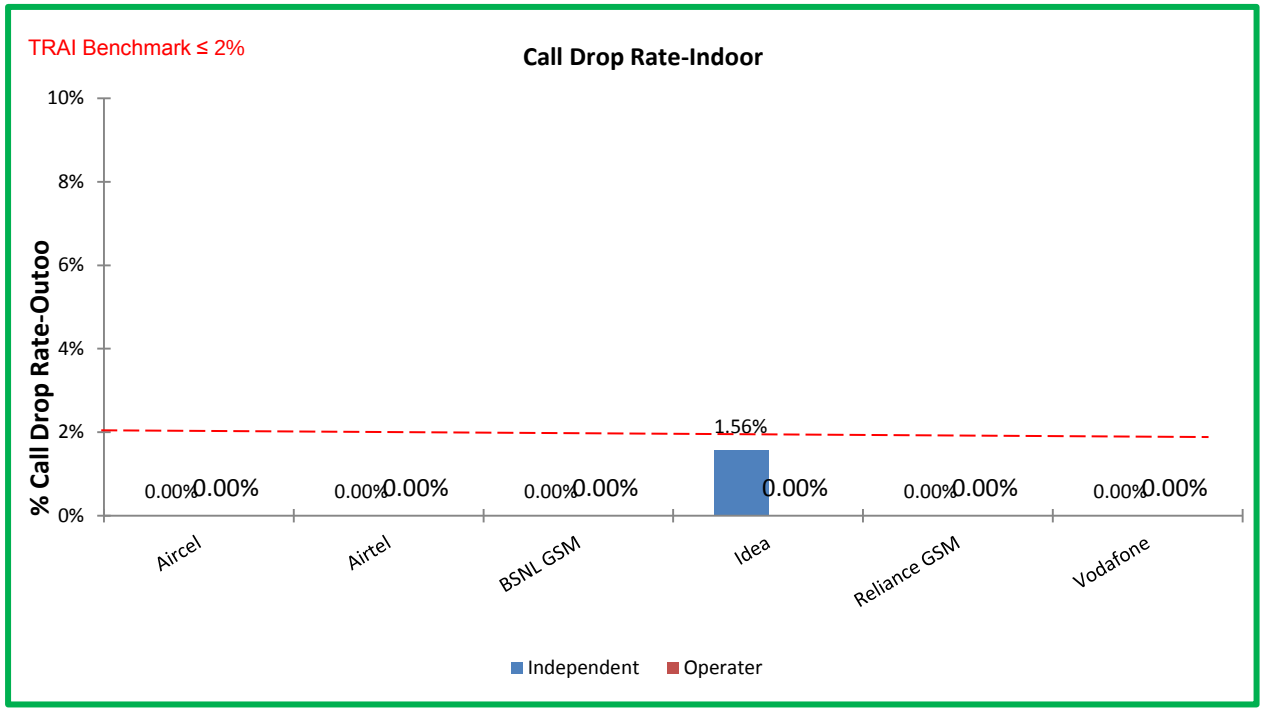
Outdoor Locations



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

Aircel, Airtel, Idea and Vodafone missed the benchmark during independent drive test but met the benchmark during operator assisted drive test.

Indoor Locations



All operators met the benchmark in both the drive tests.

7 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Aircel failed to meet the benchmark for all network parameters, except CSSR. BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM also failed to meet the benchmark for majority network parameters.

3 Day Live Measurement (Network Parameters)

Aircel failed to meet the benchmark for all network parameters, except CSSR. BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM also 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 Airtel and Idea met the benchmark.

Billing and Customer Care

Vodafone failed to meet the benchmark of billing complaints for postpaid subscribers. BSNL NE 2 GSM did not meet the benchmark of resolving billing complaints within 4 weeks.

BSNL NE 1 GSM and BSNL NE 2 GSM did not meet the benchmark of 95% of its IVR call being attended within 60 seconds and voice to voice within 90 seconds (new benchmark value).

Inter-Operator Call Assessment

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

Drive Test (Operator Assisted)

During all the drive tests, it was observed that Airtel is the key concern operator in terms of Voice Quality in outdoor areas. Aircel, BSNL CDMA, Idea and Reliance GSM also missed benchmark for the key parameters during the drive tests.

Drive Test (Independent)

During all the drive tests, it was observed that Voice Quality has remained below benchmark for most of the operators. CSSR and Call drop rate also remain a concern for majority of the service providers.

8 ANNEXURE - CONSOLIDATED

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability

	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1718	1937	135	243	635	478	739	623	1457
Sum of downtime of BTSs in a month (in hours)		163597	4761	11029	17213	9117	34371	6874	1556	17708
BTSs accumulated downtime (not available for service)	≤ 2%	12.80%	0.33%	10.65%	9.52%	1.93%	9.67%	1.25%	0.33%	1.63%
Number of BTSs having accumulated downtime >24 hours		1084	27	27	40	12	180	8	8	27
Worst affected BTSs due to downtime	≤ 2%	63.11%	1.39%	19.46%	16.60%	1.84%	37.67%	1.08%	1.34%	1.87%

Live Measurement- BTSs accumulated downtime

	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1718	1927	135	243	635	478	739	623	1457
Sum of downtime of BTSs in a month (in hours)		15760	410	1008	1689	878	1731	623	119	1795
(not available for service)	≤ 2%	8.69%	0.21%	8.32%	7.30%	1.34%	3.66%	0.90%	0.19%	1.15%
Number of BTSs having accumulated downtime >24 hours		154	0	10	26	12	107	5	6	5
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	8.96%	0.00%	6.80%	10.70%	1.84%	22.39%	0.63%	0.94%	0.37%

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.42%	97.47%	97.18%	88.22%	97.39%	84.02%	97.61%	98.57%	99.21%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	3.44%	0.54%	No Data	0.08%	0.94%	0.53%	0.35%	0.02%	0.21%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.64%	0.50%	No Data	0.17%	1.85%	0.86%	1.45%	0.26%	0.79%

Live measurement results for CSSR, SDCCH and TCH congestion										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.95%	97.68%	97.09%	88.09%	96.91%	82.61%	99.16%	98.77%	99.49%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	4.20%	0.50%	No Data	0.04%	0.88%	0.48%	0.39%	0.02%	0.26%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.13%	0.47%	No Data	0.42%	1.81%	0.83%	0.45%	0.24%	0.51%

Drive test results for CSSR (Average of three drive tests) and blocked calls										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		428	416	No Data	No Data	452	505	310	455	429
Total number of successful calls established		427	416	No Data	No Data	426	334	310	422	420
CSSR	≥ 95%	99.75%	100.00%	No Data	No Data	94.25%	66.14%	100.00%	94.05%	98.11%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.25%	0.00%	No Data	No Data	5.75%	33.86%	0.00%	5.95%	1.89%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		57032254	93763806	249891	1480046	81560463	146229863	9670095	18080195	1034719
Total number of calls dropped		1522549	1021113	4158	17718	978124	8194485	146328	121008	8215
Call drop rate	≤ 2%	2.67%	1.09%	1.69%	1.20%	1.20%	5.70%	1.51%	0.67%	0.79%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5056	5772	No Data	509	1865	1362	2218	1868	4464
Total number of cells having more than 3% TCH		1412	59	No Data	19	55	340	52	1	111
Worst affected cells having more than 3% TCH	≤ 3%	27.92%	1.03%	No Data	3.80%	2.95%	24.97%	2.36%	0.07%	2.49%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		5292379	8932860	25121	172833	8417527	21070560	13024789	8710116	594790
Total number of calls dropped		142353	97785	426	1585	145208	1203926	167232	52068	4260
Call drop rate	≤ 2%	2.69%	1.10%	1.71%	0.92%	1.72%	5.72%	1.28%	0.64%	0.72%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5033	5741	No Data	509	1865	1362	2218	1865	4461
Total number of cells having more than 3% TCH		1401	58	No Data	20	54	239	55	2	110
Worst affected cells having more than 3% TCH	≤ 3%	27.84%	1.01%	No Data	3.87%	2.91%	17.57%	2.46%	0.09%	2.47%

Drive test results for Call drop rate (Average of three drive tests)										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		427	416	No Data	No Data	426	333	310	422	420
Total number of calls dropped		0	0	No Data	No Data	20	25	0	21	3
Call drop rate	≤ 2%	0.00%	0.00%	No Data	No Data	4.69%	7.51%	0.00%	4.24%	0.54%

8.4 VOICE QUALITY

Audit Results for Voice quality

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		8447513229	12900272324	No Data	70	100	146229863	1767421299	3700407719	178447526
Total number of calls with good voice quality		7813815932	12745831538	No Data	70	97	124717803	1684900849	3637699291	174545286
%age calls with good voice quality	≥ 95%	92.50%	98.80%	No Data	100.00%	97.33%	86.37%	95.33%	98.31%	97.82%

Live measurement results for Voice quality

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		806243368	1256303972	No Data	70	210	21070560	2849214263	1622867977	91047613
Total number of calls with good voice quality		746829457	1241445523	No Data	70	205	18039423	2717346068	1593299198	89192779
%age calls with good voice quality	≥ 95%	92.63%	98.82%	No Data	100.00%	97.62%	85.68%	95.48%	98.28%	97.96%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		761042	696505	No Data	No Data	782479	485566	512467	114898	859384
Total number of calls with good voice quality		725341	656121	No Data	No Data	699262	480861	494789	108051	831761
%age calls with good voice quality	≥ 95%	95.26%	94.30%	No Data	No Data	89.36%	99.03%	96.60%	93.10%	96.87%

8.5 POI CONGESTION

Audit Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	No Data	No Data	40	No Data	27	14	31
No. of POIs not meeting benchmark		0	0	No Data	No Data	0	No Data	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50240	No Data	No Data	28840	No Data	13152	8696	27735600
Traffic served for all POIs (B)- in erlangs		23755	19908	No Data	No Data	15082	No Data	8110	4643	5766048
POI congestion	≤ 0.5%	0.00%	0.00%	No Data	No Data	0.32%	No Data	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	No Data	No Data	40	No Data	27	14	31
No. of POIs not meeting benchmark		0	0	No Data	No Data	0	No Data	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50227	No Data	No Data	28840	No Data	13226	8528	916889
Traffic served for all POIs (B)- in erlangs		22280	19931	No Data	No Data	15057	No Data	8072	4288	187101
POI congestion	≤ 0.5%	0.00%	0.00%	No Data	No Data	0.32%	No Data	0.00%	0.00%	0.00%

8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

July									
Voice quality	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	754872	595082	NA	No Data	NA	485566	505906	123883	590381
August									
Voice quality	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	808292	704146	No Data	NA	782479	NA	579401	37919	856363
September									
Voice quality	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	719963	790288	No Data	NA	No Data	NA	452094	182892	1131409

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

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance										
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Billing disputes - Postpaid										
Total bills generated during the period		49423	70646	12652	4926	72056	127938	2884	26917	65009
Total number of bills disputed		61	31	10	0	22	11	0	22	185
Percentage bills disputed	≤ 0.1%	0.12%	0.04%	0.08%	0.00%	0.03%	0.01%	0.00%	0.08%	0.28%
Billing disputes - Prepaid										
Number of complaints related to charging, credit & validity		179	1988	10	0	159	13	70	643	1516
Total number of prepaid customers in that period		2421712	6255325	45295	94423	554462	726780	738229	1663959	3585651
Percentage of complaints	≤ 0.1%	0.01%	0.03%	0.02%	0.00%	0.03%	0.00%	0.01%	0.04%	0.04%
Resolution of billing complaints										
Total number of billing/charging complaints		804	2019	20	0	181	24	70	665	1701
Total complaints considered invalid		644	1700	6	0	20	0	10	425	260
Number of complaints resolved in 4 weeks		804	2019	20	0	181	20	70	665	1701
Percentage complaints resolved within 4 weeks	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	89.00%	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%	100.00%	100.00%

Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		160	319	14	0	161	24	60	240	1441
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%	100.00%	100.00%

Live calling results for resolution of billing complaints										
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made		100	100	No Raw Data	No Raw Data	48	100	72	100	100
Number of cases resolved in 4 weeks		66	72	No Raw Data	No Raw Data	35	72	27	72	85
Percentage cases resolved in four weeks	100.00%	66.00%	72.00%	No Raw Data	No Raw Data	72.92%	72.00%	37.50%	72.00%	85.00%

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		5751798	No Data	No Data	No Data	306791	150773	1124192	1548193	1610792
Number of calls getting connected and answered (electronically)		5581898	No Data	No Data	No Data	128599	76802	1122761	1524923	1610435
Percentage calls getting connected and answered	≥ 95%	97.05%	No Data	No Data	No Data	41.92%	50.94%	99.87%	98.50%	99.98%
Total number of call attempts to callecenter during TCBH		599036	827978	No Data	No Data	No Data	No Data	89746	1548193	No Data
No. of calls connected and answered successfully during TCBH		581335	827676	No Data	No Data	No Data	No Data	89592	1524923	No Data
Number of calls getting transferred to the operator (voice to voice)		NA	NA	NA	NA	NA	NA	NA	NA	454998
Number of calls answered by operator (voice to voice) within 60 seconds		NA	NA	NA	NA	NA	NA	NA	NA	432334
Percentage calls answered within 60 seconds (V2V)	≥ 90%	NA	NA	NA	NA	NA	NA	NA	NA	95.02%
Number of calls getting transferred to the operator (voice to voice)		837515	1243839	3495	No Data	114736	76802	265930	438771	NA
Number of calls answered by operator (voice to voice) within 90 seconds		764459	1220260	3171	No Data	87258	54783	262683	427918	NA
Percentage calls answered within 90 seconds (V2V)	≥ 95%	91.28%	98.10%	90.73%	No Data	76.05%	71.33%	98.78%	97.53%	NA

Live calling results for customer care (IVR)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	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%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		85	95	65	60	66	67	93	80	89
Percentage calls getting connected and answered	≥ 95%	85.00%	95.00%	65.00%	60.00%	66.00%	67.00%	93.00%	80.00%	89.00%

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service										
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		49	457	No Data	No Data	115	21	67	75	1935
Number of requests attended within 7 days		49	457	No Data	No Data	115	21	67	75	1935
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	No Data	No Data	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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		63	258	No Data	No Data	121	0	14	102	364
Total number of cases where refund was made within 60 days		61	258	No Data	No Data	121	0	14	102	364
Percentage cases in which refund was receive within 60 days	100.00%	96.83%	100.00%	No Data	No Data	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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network	98025	898681	27293	16875	72000	52000	20212	40000	39567
Total taffic handled in erlang during TCBH	49465	77574	105	1068	36156	11798	10426	16406	25420
Total no. of customers served (as per VLR)	1750927	3074744	6409	29950	375964	555344	339176	635561	1044892

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	No Raw Data	No Raw Data	62	50	100	100	100
Number of cases resolved to satisfaction	69	88	No Raw Data	No Raw Data	40	35	82	59	81
Percentage cases resolved in four weeks	69.00%	88.00%	No Raw Data	No Raw Data	64.52%	70.00%	82.00%	59.00%	81.00%

8.13 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services										
Level 1 services	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		103	66	110	31	110	110	103	66	57
% of calls connected in 60 seconds	≥ 95%	68.67%	44.00%	73.33%	20.67%	73.33%	73.33%	68.67%	44.00%	38.00%

8.14 LEVEL 1 SERVICES CALLS MADE

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

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

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

BSNL CDMA 2			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	0	10
103	10	0	10
104	10	0	10
1056/108	10	0	10
1070	17	0	17
1071	23	0	23
1072	8	0	8
1073	4	0	4
1091	7	0	7
1095	9	0	9
1096	11	0	11
1098	11	11	0

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

BSNL GSM 2			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	10	0
103	10	0	10
104	10	0	10
1056/108	10	10	0
1070	17	17	0
1071	23	23	0
1072	8	8	0
1073	4	4	0
1091	7	7	0
1095	9	0	9
1096	11	0	11
1098	11	11	0

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

8.15 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	***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)])
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	***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)])
3	TCH congestion= (TCH Failures /TCH Attempts)%	***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)])

4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	***The total no of dropped calls=*** **([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])/*Total no of calls successfully established (where traffic channel is allotted) =* ([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)])**
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 =*** **((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)) /*Total voice samples=* ((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))**

8.15.1 ERICSSON

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

Sl 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)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(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)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(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)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

9 ANNEXURE – JULY

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1714	1932	146	243	630	474	739	658	1434
Sum of downtime of BTSs in a month (in hours)		177102	4741	20887	17136	9047	38366	8096	1849	17120
BTSs accumulated downtime (not available for service)	≤ 2%	13.89%	0.33%	19.23%	9.48%	1.93%	10.88%	1.47%	0.38%	1.60%
Number of		1118	27	49	44	12	187	11	8	26

BTSs having accumulated downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	65.23%	1.40%	33.56%	18.11%	1.90%	39.45%	1.49%	1.22%	1.81%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1714	1926	146	243	630	474	739	658	1434
Sum of downtime of BTSs in a month (in hours)		15894	467	1961	1598	865	1865	769	188	1610
BTSs accumulated downtime (not available for service)	≤ 2%	12.88%	0.34%	18.65%	9.13%	1.91%	5.46%	1.45%	0.40%	1.56%
Number of		230	0	23	27	12	110	5	0	10

BTSs having accumulated downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	13.42%	0.00%	15.75%	11.11%	1.90%	23.21%	0.68%	0.00%	0.70%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.06%	97.52%	97.53%	86.71%	97.18%	81.00%	97.86%	98.65%	98.99%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	3.78%	0.47%	0.00%	0.13%	0.96%	0.49%	0.43%	0.03%	0.26%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.94%	0.50%	No Data	0.19%	1.87%	0.85%	1.37%	0.34%	1.01%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.21%	97.62%	96.83%	88.53%	96.90%	83.23%	99.22%	98.73%	99.55%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	4.31%	0.55%	0.00%	0.04%	0.89%	0.52%	0.30%	0.03%	0.23%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.83%	0.45%	No Data	0.10%	1.83%	0.82%	0.36%	0.30%	0.45%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		411	370	NA	No Data	NA	505	315	318	363
Total number of successful calls established		409	370	NA	No Data	NA	334	315	315	363
CSSR	≥ 95%	99.51%	100.00%	NA	No Data	NA	66.14%	100.00%	99.06%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.49%	0.00%	NA	No Data	NA	33.86%	0.00%	0.94%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		60096587	99632740	290869	1428385	80982395	205089898	9391067	17820481	1061783
Total number of calls dropped		1623570	1030622	4105	18042	1366980	11372018	141016	119280	8181
Call drop rate	≤ 2%	2.70%	1.03%	1.41%	1.26%	1.69%	5.54%	1.50%	0.67%	0.77%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the		5062	5756	No Data	509	1849	1364	2218	1974	4399

network										
Total number of cells having more than 3% TCH		1461	55	427	17	54	301	58	2	109
Worst affected cells having more than 3% TCH	≤ 3%	28.86%	0.96%	No Data	3.34%	2.92%	22.07%	2.61%	0.10%	2.48%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		5578400	9596882	24045	177080	8352293	20405294	12317593	1929521	588879
Total number of calls dropped		150479	98592	418	1786	140197	1230254	163981	13021	4273
Call drop rate	≤ 2%	2.70%	1.03%	1.74%	1.01%	1.68%	6.03%	1.33%	0.67%	0.73%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total		5020	5738	No Data	509	1849	1364	2218	1964	4397

number of cells in the network										
Total number of cells having more than 3% TCH		1472	47	427	18	54	224	65	3	110
Worst affected cells having more than 3% TCH	≤ 3%	29.32%	0.82%	No Data	3.54%	2.92%	16.42%	2.93%	0.15%	2.50%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		409	370	NA	No Data	NA	333	315	315	363
Total number of calls dropped		0	0	NA	No Data	NA	25	0	3	0
Call drop rate	≤ 2%	0.00%	0.00%	NA	No Data	NA	7.51%	0.00%	0.95%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		8527753812	13085075275	No Data	70	100	205089898	1813107637	3661122272	178263773
Total number of calls with good voice quality		7881142114	12928218797	No Data	70	97	169383747	1724859557	3601238086	174299685
%age calls with good voice quality	≥ 95%	92.42%	98.80%	No Data	100.00%	97.00%	82.59%	95.13%	98.36%	97.78%

Live measurement results for Voice quality-3 Day data										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		799148000	1270573754	No Data	70	210	20405294	5244330576	318527689	90894392
Total number of calls with good voice quality		739584696	1255349836	No Data	70	206	17362865	4993798533	313692166	88992503
%age calls	≥ 95%	92.55%	98.80%	No Data	100.00%	98.10%	85.09%	95.22%	98.48%	97.91%

with good voice quality										

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		754872	595082	NA	No Data	NA	485566	505906	123883	590381
Total number of calls with good voice quality		714575	565131	NA	No Data	NA	480861	495614	115339	573514
%age calls with good voice quality	≥ 95%	94.66%	94.97%	NA	No Data	NA	99.03%	97.97%	93.10%	97.14%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31

No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50361	0	0	29075	0	13099	8690	28401497
Traffic served for all POIs (B)- in erlangs		24163	19418	0	0	15190	0	7722	4751	5801418
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50277	0	0	29075	0	13130	8194	916177

Traffic served for all POIs (B)- in erlangs		21074	19980	0	0	15408	0	7710	3714	186041
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – AUGUST

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1716	1936	129	243	636	480	739	605	1460
Sum of downtime of BTSs in a month (in hours)		158688	4674	6463	17128	8976	35208	7197	1552	17384
BTSs accumulated downtime (not available for service)	≤ 2%	12.43%	0.32%	6.73%	9.47%	1.90%	9.86%	1.31%	0.34%	1.60%
Number of BTSs having accumulated downtime >24 hours		1057	26	15	40	11	183	6	10	28
Worst affected BTSs due to	≤ 2%	61.60%	1.34%	11.63%	16.46%	1.73%	38.13%	0.81%	1.65%	1.92%

downtime										

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1716	1923	129	243	636	480	739	605	1460
Sum of downtime of BTSs in a month (in hours)		14697	362	535	2100	878	1760	617	60	1795
BTSs accumulated downtime (not available for service)	≤ 2%	11.90%	0.26%	5.76%	12.00%	1.92%	5.09%	1.16%	0.14%	1.71%
Number of BTSs having accumulated downtime >24 hours		217	0	3	31	11	106	4	10	3
Worst affected BTSs due to	≤ 2%	12.65%	0.00%	2.33%	12.76%	1.73%	22.08%	0.54%	1.65%	0.21%

downtime										

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.27%	97.47%	96.98%	89.76%	97.32%	82.07%	97.11%	98.51%	99.26%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	3.31%	0.49%	No Data	0.06%	0.91%	0.48%	0.34%	0.02%	0.21%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.80%	0.53%	No Data	0.16%	1.86%	0.83%	1.33%	0.31%	0.74%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.85%	97.66%	97.65%	94.35%	96.58%	82.10%	99.11%	98.82%	99.49%

SDCCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1	BSNL NE 2	BSNL NE 1	BSNL NE 2	Idea	Reliance	Vodafone

congestion				CDMA	CDMA	GSM	GSM		GSM	
SDCCH/Paging channel congestion	≤ 1%	2.86%	0.52%	No Data	0.03%	0.86%	0.45%	0.39%	0.02%	0.31%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.14%	0.50%	No Data	0.90%	1.76%	0.84%	0.55%	0.14%	0.51%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		466	448	No Data	NA	452	NA	331	448	412
Total number of successful calls established		466	448	No Data	NA	426	NA	331	435	404
CSSR	≥ 95%	100.00%	100.00%	No Data	NA	94.25%	NA	100.00%	97.10%	98.06%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.00%	0.00%	No Data	NA	5.75%	NA	0.00%	2.90%	1.94%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		58047272	93876224	246941	1539665	81442286	215647022	9915374	18665065	1038983
Total number of calls dropped		1545732	1073030	4394	17733	1417096	12146384	148295	124760	8700
Call drop rate	≤ 2%	2.66%	1.14%	1.78%	1.15%	1.74%	5.63%	1.50%	0.67%	0.84%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5055	5767	No Data	509	1867	1366	2218	1815	4477
Total number of cells having more than		1411	67	427	20	55	350	53	2	111

3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	27.91%	1.16%	No Data	3.93%	2.95%	25.62%	2.39%	0.11%	2.48%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		5477878	9025557	28766	173493	8408997	22596811	13132828	22536181	595025
Total number of calls dropped		146633	107360	454	1440	147339	1258348	153302	132418	4462
Call drop rate	≤ 2%	2.68%	1.19%	1.58%	0.83%	1.75%	5.57%	1.17%	0.59%	0.75%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5066	5729	No Data	509	1867	1366	2218	1815	4471
Total		1433	67	427	20	54	245	49	2	108

number of cells having more than 3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	28.29%	1.17%	No Data	3.93%	2.89%	17.94%	2.21%	0.11%	2.42%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		466	448	No Data	NA	426	NA	331	435	404
Total number of calls dropped		0	0	No Data	NA	20	NA	0	9	0
Call drop rate	≤ 2%	0.00%	0.00%	No Data	NA	4.69%	NA	0.00%	2.07%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1	BSNL NE 2	BSNL NE 1	BSNL NE 2	Idea	Reliance	Vodafone

				CDMA	CDMA	GSM	GSM		GSM	
Total number of sample calls		8610637547	1300633125 7	No Data	70	100	215647022	1721733081	3698928995	178982449
Total number of calls with good voice quality		7964918894	1284791139 6	No Data	70	98	188798968	1642735665	3635594922	175023591
%age calls with good voice quality	≥ 95%	92.50%	98.78%	No Data	100.00%	98.00%	87.55%	95.41%	98.29%	97.79%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		833053508	1271667743	No Data	70	210	22596811	1625652455	4183319353	91307637
Total number of calls with good voice quality		771959303	1256178650	No Data	70	205	18979062	1555617480	4106023334	89428460
%age calls with good voice quality	≥ 95%	92.67%	98.78%	No Data	100.00%	97.62%	83.99%	95.69%	98.15%	97.94%

Drive test results for Voice quality (Average of three drive tests) - DT data										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		808292	704146	No Data	NA	782479	NA	579401	37919	856363
Total number of calls with good voice quality		782909	670068	No Data	NA	699262	NA	552737	34456	831502
%age calls with good voice quality	≥ 95%	96.86%	95.16%	No Data	NA	89.36%	NA	95.40%	90.87%	97.10%

5. POI Congestion

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0

Total Capacity of all POIs (A) - in erlangs		40129	50255	0	0	29075	0	13139	8708	28401497
Traffic served for all POIs (B)- in erlangs		22940	20078	0	0	15082	0	8177	4675	5814855
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	42	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50263	0	0	29075	0	13156	8708	916177
Traffic served for all POIs (B)- in		21602	20091	0	0	15486	0	8346	4736	188317

erlangs										
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE - SEPTEMBER

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data										
	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1723	1944	129	243	640	480	739	605	1478
Sum of downtime of BTSs in a month (in hours)		155001	4869	5736	17376	9327	29538	5329	1267	18619
BTSs accumulated downtime (not available for service)	≤ 2%	12.09%	0.34%	5.98%	9.61%	1.96%	8.27%	0.97%	0.28%	1.69%
Number of BTSs having accumulated downtime >24 hours		1077	28	17	37	12	170	7	7	28
Worst affected BTSs due to downtime	≤ 2%	62.51%	1.44%	13.18%	15.23%	1.88%	35.42%	0.95%	1.16%	1.89%

Live Measurement Results for Network Availability- 3 Day live data										
	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1723	1933	129	243	640	480	739	605	1478
Sum of downtime of BTSs in a month (in hours)		16689	400	527	1368	890	1568	483	109	1980
BTSs accumulated downtime (not available for service)	≤ 2%	1.30%	0.03%	0.55%	0.76%	0.19%	0.44%	0.09%	0.02%	0.18%
Number of BTSs having accumulated downtime >24 hours		14	0	3	20	12	105	5	7	3
Worst affected BTSs due to downtime	≤ 2%	0.80%	0.00%	2.33%	8.23%	1.88%	21.88%	0.68%	1.16%	0.20%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.94%	97.43%	97.04%	88.20%	97.68%	89.00%	97.85%	98.54%	99.39%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	3.23%	0.67%	No Data	0.06%	0.96%	0.63%	0.29%	0.02%	0.17%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.18%	0.47%	No Data	0.17%	1.81%	0.91%	1.64%	0.13%	0.61%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.80%	97.75%	96.78%	81.40%	97.24%	82.50%	99.14%	98.76%	99.44%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
SDCCH/Pagin	≤ 1%	5.42%	0.44%	No Data	0.05%	0.89%	0.48%	0.47%	0.02%	0.25%

g channel congestion										

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.42%	0.45%	No Data	0.26%	1.84%	0.82%	0.45%	0.29%	0.56%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		408	430	No Data	NA	No Data	NA	285	599	511
Total number of successful calls established		407	430	No Data	NA	No Data	NA	285	515	492
CSSR	≥ 95%	99.75%	100.00%	No Data	NA	No Data	NA	100.00%	85.98%	96.28%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.25%	0.00%	No Data	NA	No Data	NA	0.00%	14.02%	3.72%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		52952903	87782455	211864	1472088	82256707	17952669	9703845	17755040	1003391
Total number of calls dropped		1398345	959687	3976	17380	150297	1065052	149673	118985	7765
Call drop rate	≤ 2%	2.64%	1.09%	1.88%	1.18%	0.18%	5.93%	1.54%	0.67%	0.77%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5052	5792	No Data	509	1879	1356	2218	1815	4515
Total number of cells having more than 3% TCH		1364	56	No Data	21	56	369	46	0	113

Worst affected cells having more than 3% TCH	≤ 3%	27.00%	0.97%	No Data	4.13%	2.98%	27.21%	2.07%	0.00%	2.50%

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 NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		4820860	8176140	22551	167927	8491291	20209574	13623945	1664645	600468
Total number of calls dropped		129947	87402	406	1529	148089	1123176	184412	10764	4045
Call drop rate	≤ 2%	2.70%	1.07%	1.80%	0.91%	1.74%	5.56%	1.35%	0.65%	0.67%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5012	5757	No Data	509	1879	1356	2218	1815	4515
Total number of		1299	60	No Data	21	55	249	50	0	113

cells having more than 3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	25.92%	1.04%	No Data	4.13%	2.93%	18.36%	2.25%	0.00%	2.50%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		407	430	No Data	NA	No Data	NA	285	515	492
Total number of calls dropped		0	0	No Data	NA	No Data	NA	0	50	8
Call drop rate	≤ 2%	0.00%	0.00%	No Data	NA	No Data	NA	0.00%	9.71%	1.63%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone

Total number of sample calls		8204148329	12609410439	No Data	70	100	17952669	1767423179	3741171889	178096357
Total number of calls with good voice quality		7595386787	12461364422	No Data	70	97	15970694	1687107324	3676264866	174312581
%age calls with good voice quality	≥ 95%	92.58%	98.83%	No Data	100.00%	97.00%	88.96%	95.46%	98.27%	97.88%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		786528596	1226670418	No Data	70	210	20209574	1677659758	366756888	90940811
Total number of calls with good voice quality		728944373	1212808082	No Data	70	204	17776341	1602622192	360182094	89157373
%age calls with good voice quality	≥ 95%	92.68%	98.87%	No Data	100.00%	97.14%	87.96%	95.53%	98.21%	98.04%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		719963	790288	No Data	NA	No Data	NA	452094	182892	1131409
Total number of calls with good voice quality		678539	733164	No Data	NA	No Data	NA	436015	174357	1090267
%age calls with good voice quality	≥ 95%	94.25%	92.77%	No Data	NA	No Data	NA	96.44%	95.33%	96.36%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	35	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of		40129	50104	0	0	28369	0	13217	8691	26403806

all POIs (A) - in erlangs										
Traffic served for all POIs (B)- in erlangs		24163	20228	0	0	14973	0	8430	4503	5681871
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		36	15	0	0	35	0	27	14	31
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40129	50140	0	0	28369	0	13393	8681	918311
Traffic served for all POIs (B)- in erlangs		24163	19722	0	0	14276	0	8161	4414	186944
POI	≤ 0.5%	0.00%	0.00%	0.00%	100.00%	0.50%	0.00%	0.00%	0.00%	0.00%

congestion										

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. SDCCH – 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

27.

SCO 47, 5th Floor, Old Judicial Complex, Sector 15
Part 1, Gurgaon, Haryana – 122001

✆+91 (124) 4217300

www.imrbint.com