EAST ZONE

TRAI AUDIT WIRELESS REPORT-ASSAM CIRCLE - JAS QUARTER, 2015

Prepared By -

Prepared For-

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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2   INTRODUCTION

2.1   ABOUT TRAI

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

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

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

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

2.2   OBJECTIVES

The primary objective of the Audit module is to

- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in Assam Circle.

2.3   COVERAGE

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

Image Source: BSNL website

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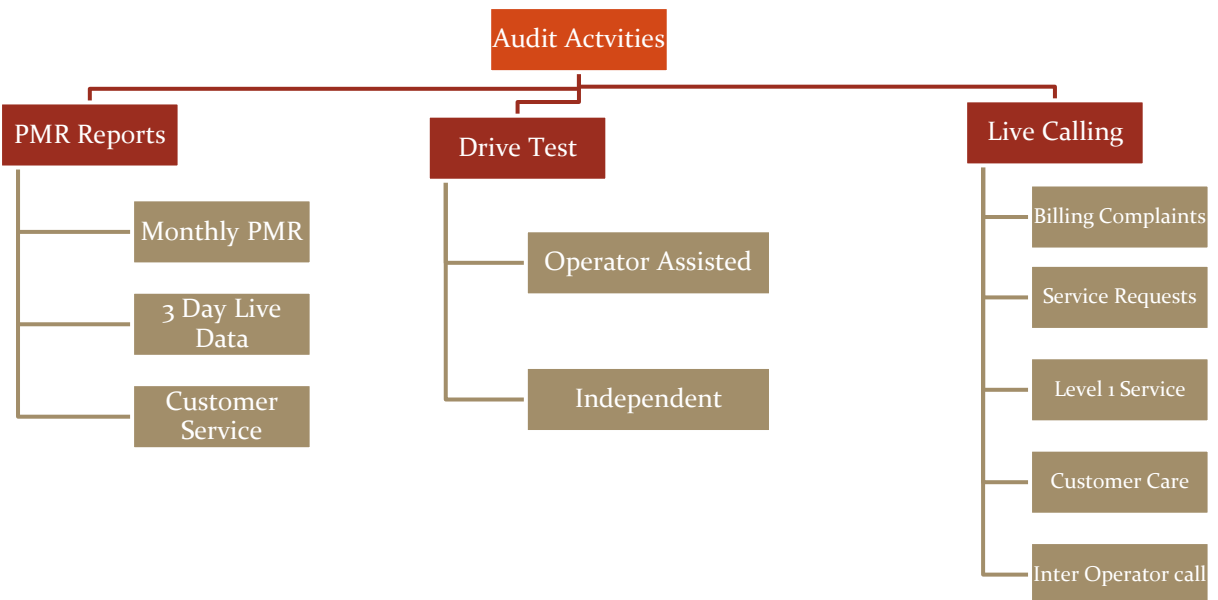
Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1   PMR REPORTS

2.4.1.1   SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated 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 IMRB auditors inform the operators about the audit schedule in advance. Accordingly, the auditors visit the operator premises to conduct the audit.

During TRAI audit, raw data is extracted from the operator's server/ NOC/ exchange/ OMC/ customer service center/ billing center etc. by the IMRB auditor with assistance from the operator personnel in order to generate PMR reports (Network/ Billing /Customer Service etc).

All the calculations are done by IMRB auditors to generate a new PMR report from that raw data.

The newly generated PMR reports are then taken in hard copy, duly signed by the competent authority of operators. IMRB auditors also sign the same report.

The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, August 2015 audit data was collected in the month of September 2015.

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 2015 (JAS'15) was collected in the month of October 2015.

The raw data extracted from operator's systems is used 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.

2.4.1.2 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of July, August and September 2015. 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 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3   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%

2.4.1.4   POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR & OSS on the operator network.
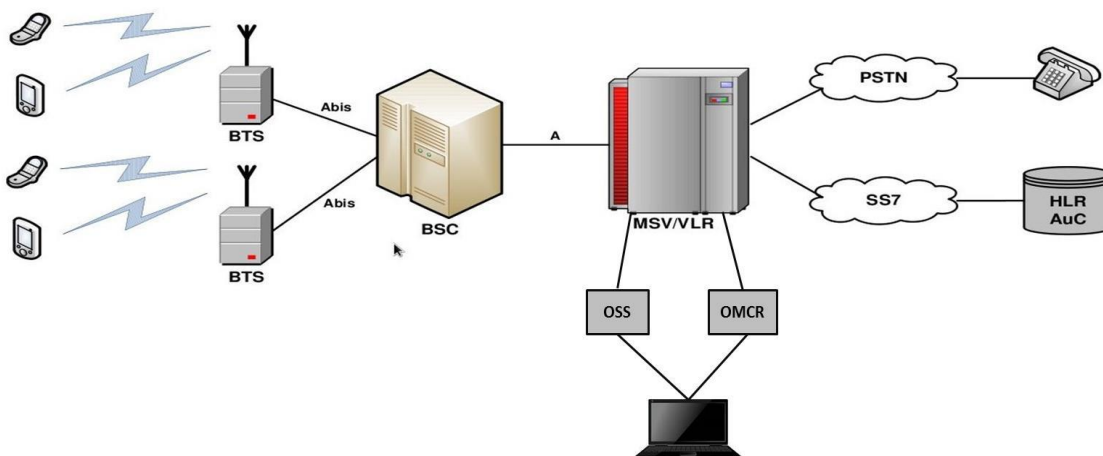
2.4.1.5   STEP BY STEP AUDIT PROCEDURE

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

Tender document and latest list of licencees as per TRAI is taken as a reference document for assimilating the presence of operators. All the wireless operators are then informed about the schedule of audit.

Audit formats and schedule is shared with the operators in advance. Details include day of the visit and date of 3 day data collection and other requirements.

IMRB auditors visit the operator's server/exchange/central NOC to extract data from operator's systems. Operator personnel assist the auditor in extraction process.

The extracted data is validated and verfied by the IMRB auditors.

IMRB auditors then prepare a PMR report from the extracted data with assistance from the operator.

IMRB auditors validate the values with raw data and also provide their comments, wherever required.

The final audit or PMR sheet is signed by the operator person in-charge along with authorized stamp.

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.

2.4.1.6 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
TCH Congestion	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	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

2.4.1.7 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.

2.4.1.8 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.

Step by step procedure to identify TCBH for an operator:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify TCBH.

The 90 day period is decided upon the basis of month of audit. For example, for audit of August 2015, the 90 day period data used to identify TCBH would be the data of June, July & August 2015

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

During audit, the auditors identified from the raw data that the TCBH for the operators in JAS'15 was the time period as given below.

Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
19:00-20:00	19:00-20:00	19:00-20:00	18:00-19:00	19:00-20:00	19:00-20:00	19:00-20:00

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2.4.1.9   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.

Step by step procedure to identify CBBH for an operator:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify CBBH.

For each day, the hour in which a cell in cellular mobile telephone network experiences maximum traffic for the day will be the 'Busy Hour' for the operator.

The 90 day period is decided upon the basis of month of audit. For example, for audit of Aug 2015, the 90 day period data used to identify CBBH would be the data of Jun, Jul and Aug 2015

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as CBBH for the operator

2.4.1.10 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 September 2015 (JAS'15) was collected in the month of October 2015. 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 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.11 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	98%
Resolution of billing/ charging complaints within 6 weeks	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 90 seconds	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.12 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Metering and billing credibility – 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 centre performance (Voice to Voice)	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 90 seconds
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

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2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers. 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 September 2015. 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 August 2015 was considered for live calling activity conducted in September 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 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 September, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

Resolution of billing/ charging complaints - 98% within 4 weeks, 100% within 6 weeks

2.4.2.3   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.

2.4.2.4   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.

In JAS'15, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1   PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.

- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Code	Description
100	Police
101	Fire
102	Ambulance
104	Health Information Helpline
108	Emergency and Disaster Management Helpline
138	All India Helpine for Passangers
149	Public Road Transport Utility Service
181	Chief Minister Helpline
182	Indian Railway Security Helpline
1033	Road Accident Management Service
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'
1056	Emergency Medical Services
106X	State of the Art Hospitals
1063	Public Grievance Cell DoT Hq
1064	Anti Corruption Helpline
1070	Relief Commission for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Helpline
1077	Control Room for District Collector
1090	Call Alart (Crime Branch)
1091	Women Helpline
1097	National AIDS Helpline to NACO
1099	Central Accident and Trauma Services (CATS)
10580	Educationa & Vocational Guidance and Counselling
10589	Mother and Child Tracking (MCTH)
10740	Central Pollution Control Board
10741	Pollution Control Board
1511	Police Related Service for all Metro Railway Project
1512	Prevention of Crime in Railway
1514	National Career Service(NCS)
15100	Free Legal Service Helpline
155304	Municipal Corporations
155214	Labour Helpline
1903	Sashastra Seema Bal (SSB)
1909	National Do Not Call Registry
1912	Complaint of Electricity
1916	Drinking Water Supply
1950	Election Commission of India

2.4.2.5 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 by operator's IVR.
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

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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 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 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.

2.4.2.6 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.

2.4.3 DRIVE TEST

2.4.3.1 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.

2.4.3.2 OPERATOR ASSISTED DRIVE TEST

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

- ✤ 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- ✤ On an average, a minimum of 100 kilometers were covered each day

- ꙮ 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.
- ꙮ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ꙮ 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).
- ꙮ The route was classified as-
    - o With In city
    - o Major Roads
    - o Highways
    - o Shopping complex/ Mall
    - o Office Complex/ Government Building
- ꙮ 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.
- ꙮ The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- ꙮ The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- ꙮ The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- ꙮ The speed of the vehicle was kept at around 30 km/hr.
- ꙮ The holding period of each test call was 120 seconds.
- ꙮ A test call was generated 10 seconds after the previous test call is completed.
- ꙮ Height of the antenna was kept uniform in case of all service providers.

2.4.3.3 INDEPENDENT DRIVE TEST

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

- ꙮ 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.
- ꙮ 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.
- ꙮ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ꙮ 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).
- ꙮ The route was classified as-
    - o With In city
    - o Major Roads
    - o Highways
    - o Shopping complex/ Mall
    - o Office Complex/ Government Building
- ꙮ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For

indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.

↳ The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.

↳ The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.

↳ The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.

↳ The speed of the vehicle was kept at around 30 km/hr.

↳ The holding period of each test call was 120 seconds.

↳ A test call was generated 10 seconds after the previous test call is completed.

↳ Height of the antenna was kept uniform in case of all service providers.

2.4.3.4   PARAMETERS EVALUATED DURING DRIVE TEST

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

↳ Coverage-Signal strength (GSM)
   ✓ Total calls made (A)
   ✓ Number of calls with signal strength between 0 to -75 dBm
   ✓ Number of calls with signal strength between 0 to -85 dBm
   ✓ Number of calls with signal strength between 0 to -95 dBm

↳ Coverage-Signal strength (CDMA)
   ✓ Total 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

2.5 OPERATORS COVERED

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	3780633
Airtel	4944506
BSNL CDMA	28142
BSNL GSM	1021251
Idea	919889
Reliance GSM	1740264
Vodafone	2978280

September'15 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3   EXECUTIVE SUMMARY

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

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)	4.41%	26.50%	93.13%	1.12%	5.01%	1.71%	14.06%	91.30%
Airtel	0.36%	1.70%	96.27%	0.36%	0.95%	1.31%	1.60%	98.08%
BSNL CDMA	16.63%	28.26%	97.42%	NA	NDR	2.26%	10.10%	93.02%
BSNL GSM	1.93%	1.82%	97.87%	0.46%	0.83%	1.99%	2.87%	95.23%
Idea	1.18%	1.08%	96.96%	0.67%	1.09%	0.46%	1.79%	95.50%
Reliance GSM	0.32%	1.16%	98.53%	0.02%	0.07%	0.63%	0.15%	98.32%
Vodafone	0.66%	1.91%	99.59%	0.13%	0.41%	0.67%	2.89%	97.95%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

NDR: Data for TCH congestion of BSNL CDMA could not get audited due a technical problem with the operator's server.

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

BTSs Accumulated Downtime:

Aircel and BSNL CDMA did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Reliance GSM at 0.32%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL CDMA failed to meet the benchmark for the parameter. Minimum worst affected BTSs due to downtime was recorded for Idea at 1.08%.

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Call Set-up Success Rate (CSSR):

Aircel failed to meet the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.59%.

Excluding Airtel, all other operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section. Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

Network Congestion parameters:

Aircel failed to meet the benchmark for SDCCH / Paging Channel Congestion and TCH congestion.

Reliance GSM recorded the best SDCCH / Paging Channel Congestion at 0.02% and TCH congestion at 0.07%.

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

Call Drop Rate:

BSNL CDMA failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.46%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.15%.

Voice Quality

Aircel and BSNL CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM at 98.32%.

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

Below are the month wise summary tables for each network parameter basis PMR data.

3.1.1 PMR DATA - JULY

Name of Service Provider Month July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.13%	25.53%	92.67%	1.48%	5.59%	1.71%	14.30%	91.06%
Airtel	0.35%	1.57%	96.28%	0.46%	0.97%	1.10%	1.37%	98.20%
BSNL CDMA	16.82%	27.98%	95.73%	NA	NDR	2.33%	10.47%	92.70%
BSNL GSM	1.88%	1.60%	98.61%	0.48%	0.60%	1.98%	2.66%	91.26%
Idea	1.13%	0.89%	97.25%	0.56%	1.04%	0.48%	1.58%	95.34%
Reliance GSM	0.18%	0.52%	98.50%	0.02%	0.08%	0.63%	0.19%	98.41%
Vodafone	0.56%	1.93%	99.64%	0.11%	0.36%	0.62%	2.72%	98.00%

NDR: Data for TCH congestion of BSNL could not get audited due a technical problem with their server.

3.1.2 PMR DATA – AUGUST

Name of Service Provider Month August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.30%	26.46%	93.89%	0.90%	4.29%	1.66%	13.39%	91.49%
Airtel	0.35%	1.67%	96.26%	0.30%	1.01%	1.25%	1.53%	98.28%
BSNL CDMA	16.88%	28.81%	98.20%	NA	NDR	2.34%	10.54%	91.76%
BSNL GSM	1.98%	1.89%	98.58%	0.39%	0.57%	2.00%	2.99%	96.12%
Idea	1.20%	0.99%	97.25%	0.47%	1.10%	0.35%	1.66%	95.51%
Reliance GSM	0.42%	1.68%	98.54%	0.02%	0.07%	0.63%	0.15%	98.24%
Vodafone	0.71%	1.92%	99.56%	0.13%	0.44%	0.69%	2.96%	97.92%

3.1.3   PMR DATA - SEPTEMBER

Name of Service Provider Month September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.79%	27.51%	92.82%	0.97%	5.16%	1.76%	14.48%	91.36%
Airtel	0.38%	1.85%	96.28%	0.31%	0.88%	1.57%	1.91%	97.77%
BSNL CDMA	16.18%	27.98%	98.32%	NA	NDR	2.11%	9.29%	94.60%
BSNL GSM	1.92%	1.96%	96.43%	0.50%	1.31%	2.00%	2.96%	98.32%
Idea	1.20%	1.35%	96.39%	0.97%	1.13%	0.56%	2.13%	95.65%
Reliance GSM	0.36%	1.29%	98.56%	0.02%	0.07%	0.63%	0.11%	98.31%
Vodafone	0.71%	1.88%	99.57%	0.14%	0.43%	0.69%	2.98%	97.94%

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3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

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)	4.38%	3.24%	96.95%	1.61%	2.39%	1.41%	13.94%	92.74%
Airtel	0.35%	0.00%	96.25%	0.31%	0.90%	1.29%	1.58%	98.06%
BSNL CDMA	18.61%	4.66%	95.88%	NA	NDR	2.44%	6.42%	93.02%
BSNL GSM	2.01%	0.36%	96.22%	0.30%	0.63%	2.54%	2.72%	95.23%
Idea	1.49%	1.06%	98.67%	0.24%	0.40%	0.71%	1.55%	95.92%
Reliance GSM	3.94%	1.49%	98.54%	0.02%	0.06%	0.61%	0.13%	98.24%
Vodafone	0.51%	0.13%	99.78%	0.13%	0.22%	0.71%	2.95%	98.18%

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

NDR: Data for TCH congestion of BSNL CDMA could not get audited due a technical problem with the operator's server.

BTSs Accumulated Downtime:

Aircel, BSNL CDMA, BSNL GSM and Reliance GSM failed to meet the TRAI specified benchmark. Minimum BTS accumulated downtime was recorded for Airtel at 0.35%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL CDMA failed to meet the TRAI specified benchmark for the parameter. Airtel was the best performer with 0.00% worst affected BTSs due to downtime.

Call Set-up Success Rate (CSSR):

During live measurement, all operators met the benchmark of CSSR. Maximum CSSR was observed for Vodafone with 99.78%.

Excluding Airtel, all other operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section. Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

Network Congestion parameters:

Aircel failed to meet the benchmark for SDCCH / Paging Channel Congestion and TCH congestion.

Reliance GSM recorded the best SDCCH / Paging Channel Congestion as well as TCH congestion.

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

Call Drop Rate:

BSNL CDMA and BSNL GSM failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM at 0.61%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.13%.

Voice Quality

Aircel and BSNL CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM at 98.24%.

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

Below are the month wise summary tables for each network parameter basis 3 day live data.

3.2.1 3 DAY DATA - JULY

Name of Service Provider 3 Day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.70%	3.49%	96.78%	1.47%	2.21%	1.50%	14.63%	92.48%
Airtel	0.44%	0.00%	96.25%	0.44%	0.98%	1.12%	1.63%	98.16%
BSNL CDMA	17.30%	3.70%	91.20%	NA	NDR	2.50%	7.86%	92.70%
BSNL GSM	2.06%	0.36%	98.73%	0.20%	0.41%	2.84%	2.44%	91.26%
Idea	1.43%	0.92%	98.58%	0.26%	0.40%	1.40%	1.25%	95.88%
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	0.61%	0.16%	99.82%	0.14%	0.18%	0.89%	2.96%	98.23%

NDR: Data for TCH congestion of BSNL could not get audited due a technical problem with their server.

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

3.2.2 3 DAY DATA – AUGUST

Name of Service Provider 3 day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.06%	2.97%	97.19%	1.38%	2.81%	1.43%	13.46%	92.81%
Airtel	0.21%	0.00%	96.25%	0.27%	0.94%	1.18%	1.21%	98.25%
BSNL CDMA	22.02%	6.17%	98.04%	NA	NDR	2.93%	6.31%	91.76%
BSNL GSM	2.07%	0.36%	98.89%	0.19%	0.30%	2.61%	2.44%	96.12%
Idea	1.49%	0.96%	98.61%	0.34%	0.45%	0.33%	1.53%	95.94%
Reliance GSM	4.30%	1.68%	98.50%	0.01%	0.06%	0.61%	0.15%	98.23%
Vodafone	0.46%	0.16%	99.78%	0.10%	0.22%	0.59%	2.93%	98.03%

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3.2.3   3 DAY DATA - SEPTEMBER

Name of Service Provider 3 Day September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	4.37%	3.27%	96.88%	1.98%	2.16%	1.30%	13.72%	92.92%
Airtel	0.39%	0.00%	96.25%	0.23%	0.79%	1.58%	1.89%	97.77%
BSNL CDMA	16.52%	4.12%	98.41%	NA	NDR	1.89%	5.09%	94.60%
BSNL GSM	1.89%	0.36%	91.03%	0.50%	1.17%	2.17%	3.27%	98.32%
Idea	1.54%	1.30%	98.83%	0.12%	0.35%	0.39%	1.86%	95.93%
Reliance GSM	3.58%	1.29%	98.57%	0.02%	0.07%	0.61%	0.11%	98.24%
Vodafone	0.46%	0.06%	99.73%	0.16%	0.27%	0.65%	2.96%	98.28%

3.3   LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Resolution of billing complaints		Service Requests	Level 1 Service	Customer Care	
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Complaint /Request attended to Satisfaction	Call answered	Accessibility of call centre/ customer care	Percentage of calls answered by the operators within 90 seconds
Benchmark	98.00%	100.00%		≥ 95%	≥ 95%	≥ 95%
Aircel(DWL)	59.00%	66.00%	87.00%	83.33%	100.00%	100.00%
Airtel	76.67%	76.67%	86.00%	92.00%	96.00%	88.00%
BSNL CDMA	NA	NA	NA	86.00%	87.00%	95.00%
BSNL GSM	75.00%	80.00%	72.00%	90.67%	100.00%	90.00%
Idea	67.00%	79.00%	72.00%	94.00%	100.00%	98.00%
Reliance GSM	82.00%	88.00%	74.00%	84.00%	89.00%	87.00%
Vodafone	83.00%	93.00%	89.00%	92.00%	88.00%	54.00%

NA: Data to conduct live calling for resolution of complaints and service requests was not available at the central billing center of BSNL CDMA. Hence, live calling for these parameters has not been conducted for the operator.

Resolution of billing complaints

As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Vodafone recorded the best performance at 89%.

Level 1 Services

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

It was also observed that a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

Accessibility of Call Center/Customer Care-IVR

For the IVR aspect, BSNL CDMA, Reliance GSM and Vodafone failed to meet the TRAI benchmark of 95% for the parameter.

Customer Care / Helpline Assessment (voice to voice)

Airtel, BSNL GSM, Reliance GSM and Vodafone failed to meet the benchmark for the parameter.

3.4 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Resolution of 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 IVR	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.13%	0.50%	100.00%	100.00%	100.00%	96.69%	88.92%
Airtel	0.04%	0.00%	100.00%	100.00%	100.00%	98.78%	97.54%
BSNL CDMA	0.04%	0.00%	100.00%	100.00%	100.00%	100.00%	97.85%
BSNL GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.66%	97.89%
Idea	0.39%	0.05%	100.00%	100.00%	100.00%	98.07%	99.82%
Reliance GSM	0.09%	0.01%	100.00%	100.00%	100.00%	98.98%	97.28%
Vodafone	0.19%	0.07%	100.00%	100.00%	100.00%	99.99%	100.00%

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of postpaid subscribers, it was observed that Aircel, Idea and Vodafone failed to meet the TRAI benchmark for the parameter. BSNL GSM had the best performance with 0.00% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Aircel failed to meet the benchmark of charging disputes. Airtel, BSNL CDMA and BSNL GSM performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 100% complaints within 6 weeks.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. Further details can be found in annexure (section 8.7).

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

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

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark of 95% IVR call being attended. BSNL recorded the best performance for the parameter.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Aircel failed to meet the TRAI specified benchmark of 95%. Vodafone recorded the best performance for the parameter with 100% calls getting answered by the operator.

3.5   INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment							
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Aircel(DWL)	NA	92.00%	92.00%	95.00%	91.00%	93.00%	95.00%
Airtel	95.00%	NA	95.00%	95.00%	93.00%	93.00%	94.00%
BSNL CDMA	94.00%	96.00%	NA	94.00%	95.00%	96.00%	92.00%
BSNL GSM	93.00%	93.00%	94.00%	NA	91.00%	95.00%	94.00%
Idea	93.00%	98.00%	95.00%	92.00%	NA	96.00%	97.00%
Reliance GSM	95.00%	92.00%	92.00%	93.00%	91.00%	NA	92.00%
Vodafone	97.00%	98.00%	96.00%	92.00%	90.00%	96.00%	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, most of the operators faced any problems in connecting to other operators.

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4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

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

To calculate CSSR, Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

3 Day Live Measurement (Network Parameters)

Aircel and BSNL CDMA failed to meet the benchmark for majority network parameters. BSNL GSM failed to meet benchmark for BTS accumulated downtime and call drop rate.

For Worst affected BTS due to downtime, significant difference was observed between PMR & live measurement data for Aircel and BSNL CDMA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

Live Calling

None of the operators met the benchmark for complaints resolved within 4 weeks, complaints resolved within 6 weeks and Level 1 services.

BSNL CDMA, Reliance GSM and Vodafone failed to meet the TRAI benchmark for accessibility of call center (IVR). Airtel, BSNL GSM, Reliance GSM and Vodafone failed to meet the benchmark for accessibility of call center (voice to voice).

As per live calling conducted for 'level 1' services, a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

Metering and billing credibility

Aircel, Idea and Vodafone failed to meet the benchmark of metering and billing credibility for postpaid while Aircel failed to meet the benchmark of metering and billing credibility for prepaid.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Customer Care

Aircel failed to meet the TRAI specified benchmark of answering 95% (voice to voice) calls within 90 seconds.

Drive Test (Operator Assisted)

BSNL CDMA and BSNL GSM consistently failed to meet the benchmark of various parameters being tested during the drive tests.

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

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 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.

5.1.2 KEY FINDINGS - CONSOLIDATED
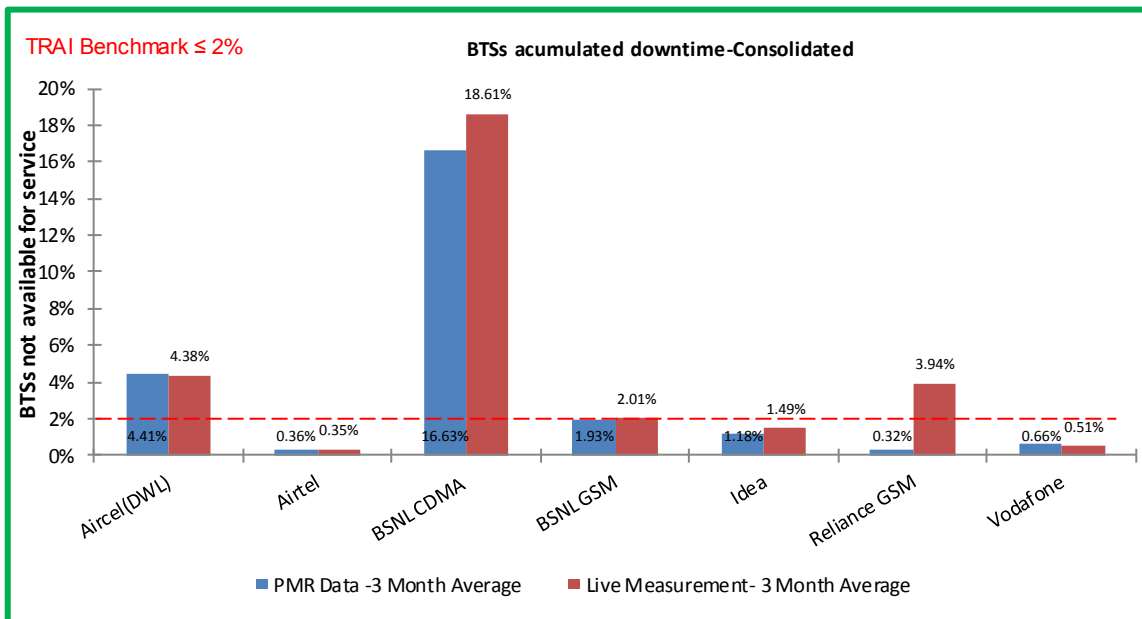
Data Source: Operations and Maintenance Center (OMC) of the operators

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

5.1.2.1 KEY FINDINGS – MONTH 1
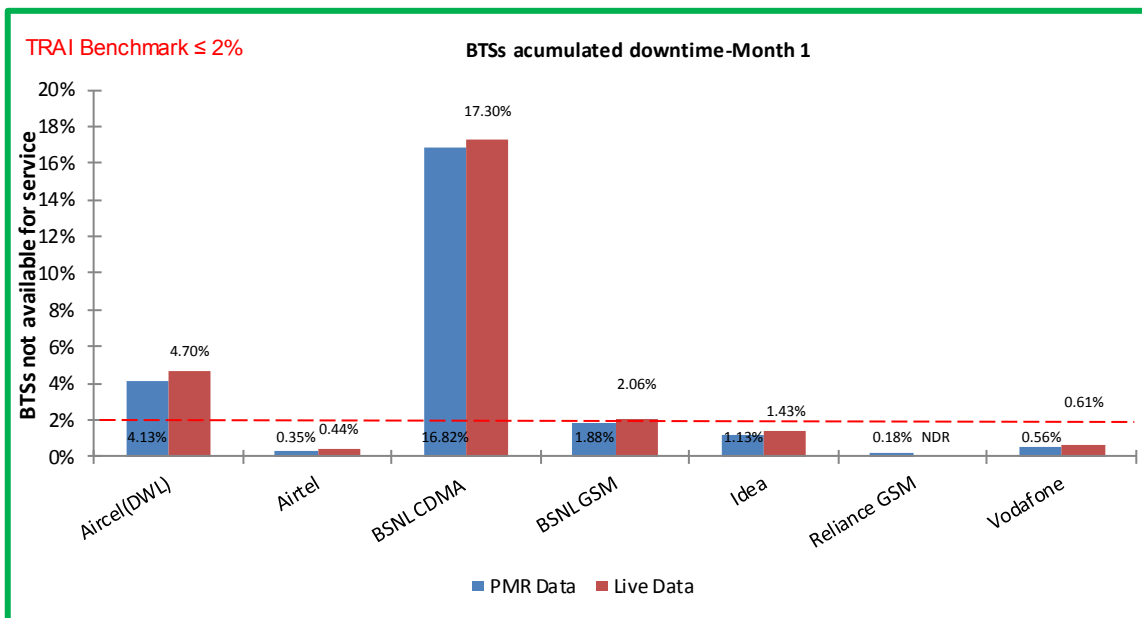
Data Source: Operations and Maintenance Center (OMC) of the operators

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.1.2.2 KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 2%

BTSs acumulated downtime-Month 2
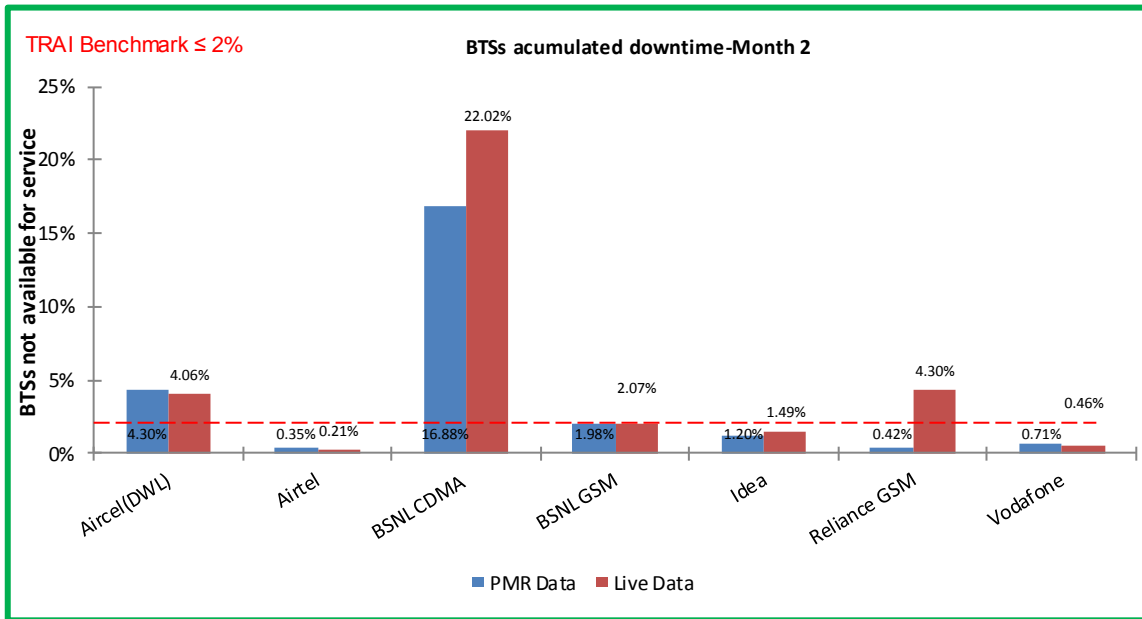
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.3 KEY FINDINGS – MONTH 3

TRAI Benchmark ≤ 2%

BTSs acumulated downtime-Month 3
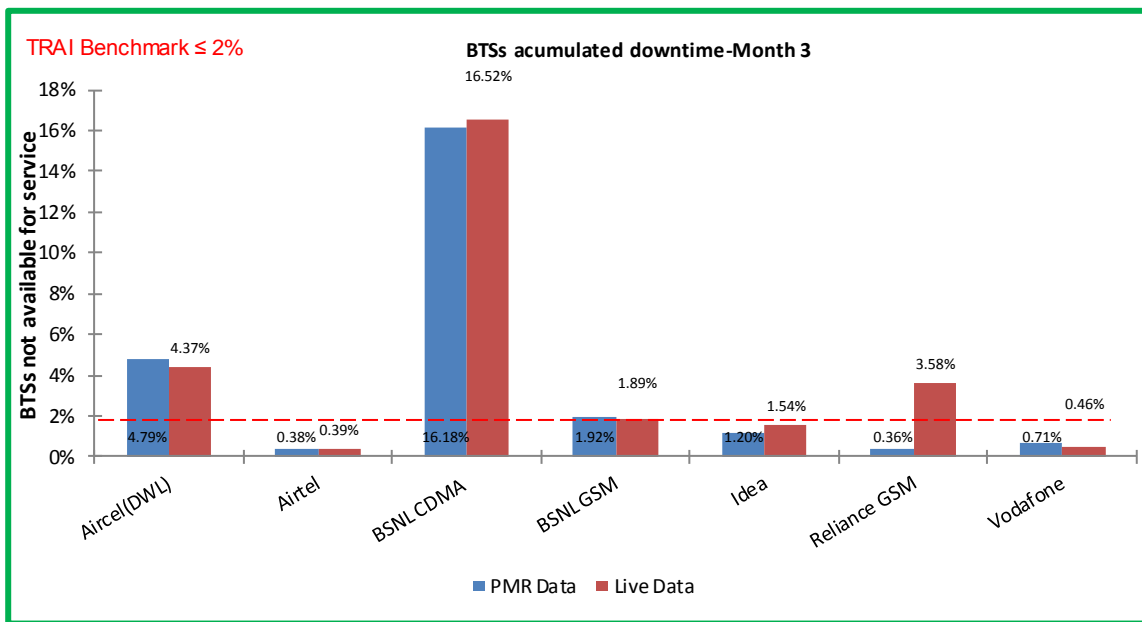
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2   WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1   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.

5.2.2   KEY FINDINGS – CONSOLIDATED
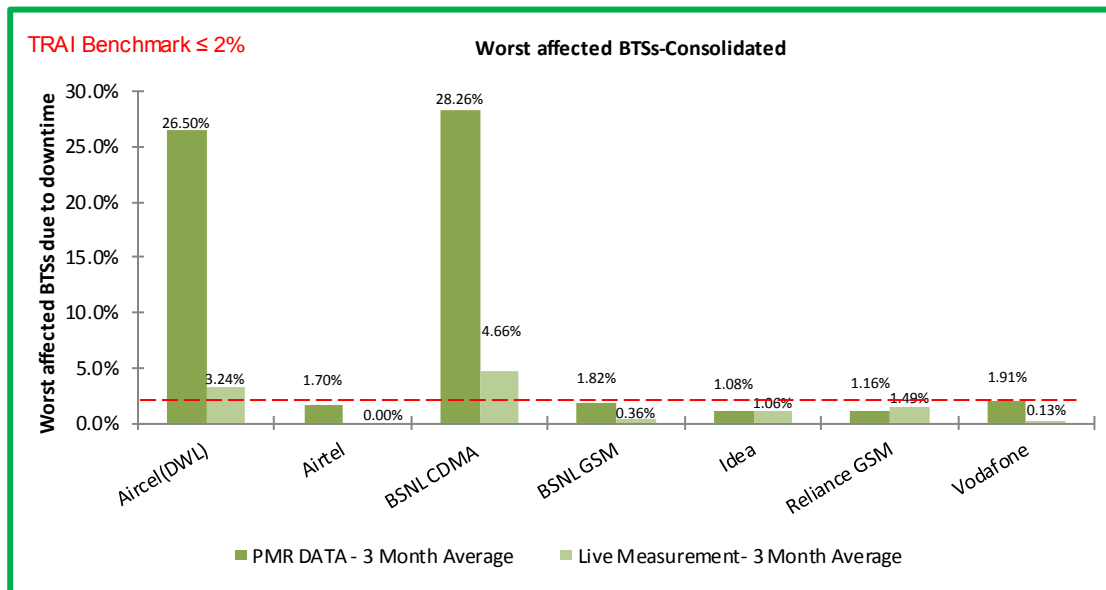
Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL CDMA did not meet the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

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

5.2.2.1   KEY FINDINGS – MONTH 1
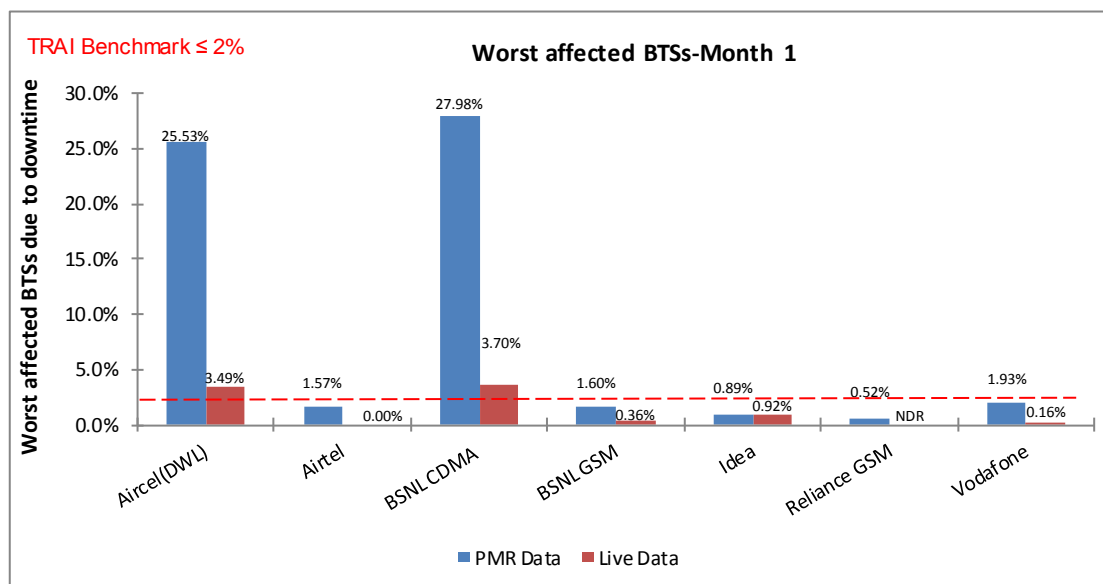
Data Source: Operations and Maintenance Center (OMC) of the operators

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.2.2.2 KEY FINDINGS – MONTH 2
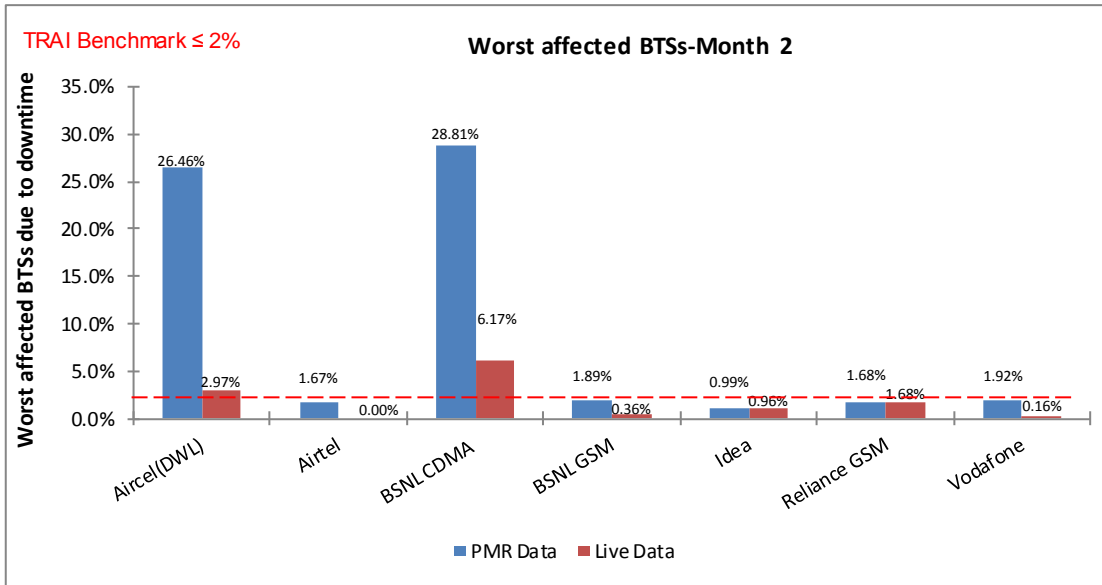
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.3 KEY FINDINGS – MONTH 3
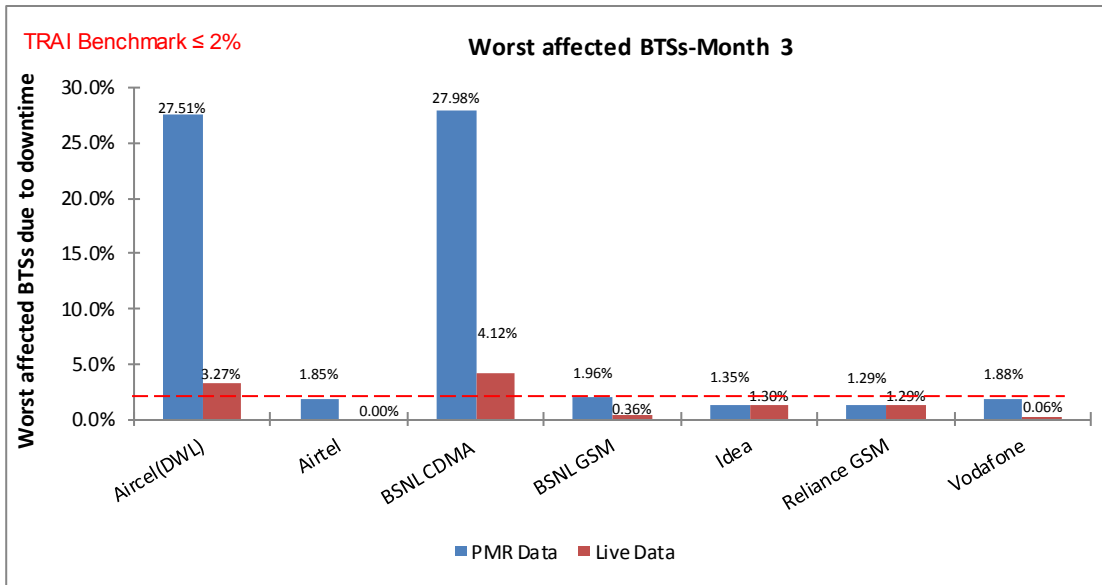
Data Source: Operations and Maintenance Center (OMC) of the operators

5.3 CALL SET UP SUCCESS RATE

5.3.1 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.
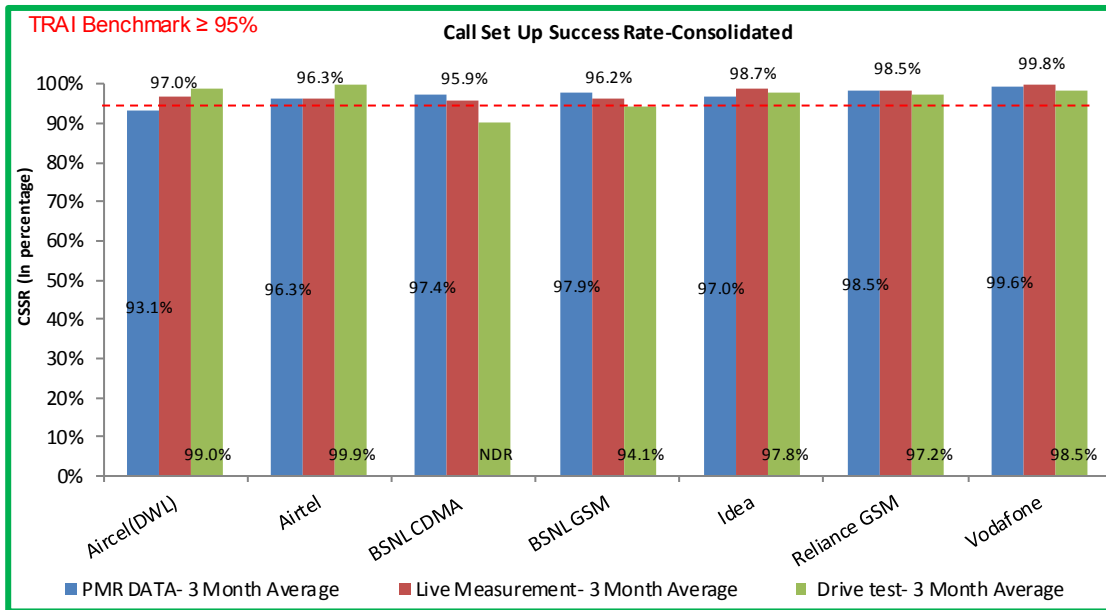
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5.3.2   KEY FINDINGS - CONSOLIDATED

TRAI Benchmark ≥ 95%   **Call Set Up Success Rate-Consolidated**

Legend: PMR DATA- 3 Month Average | Live Measurement- 3 Month Average | Drive test- 3 Month Average

Data Source: Network Operations Center (NOC) of the operators

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

To calculate CSSR, Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

5.3.2.1   KEY FINDINGS – MONTH 1
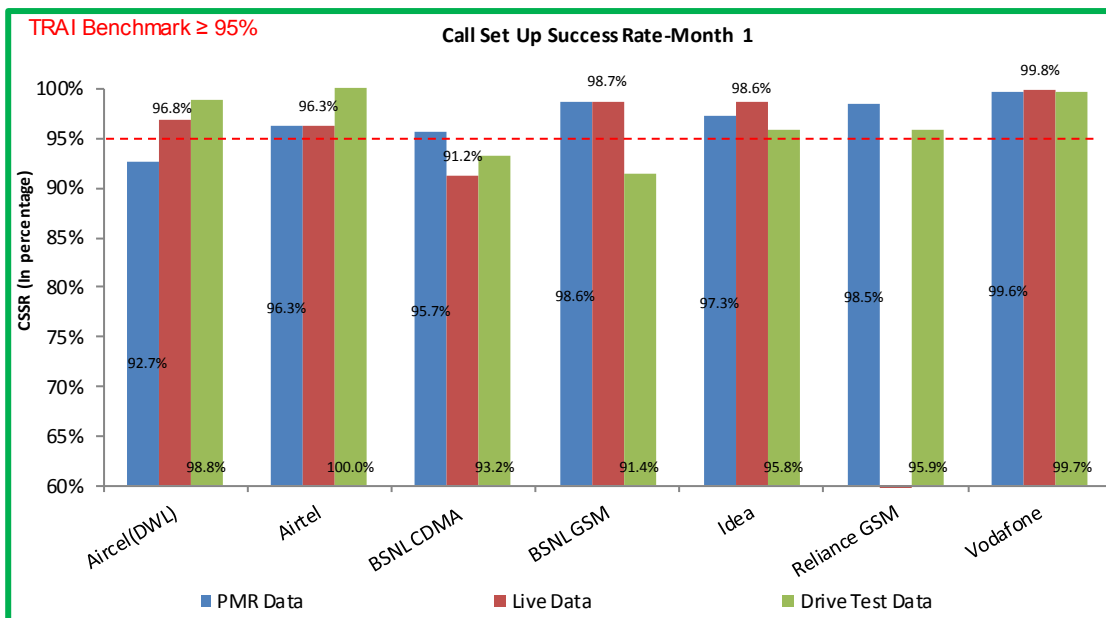
TRAI Benchmark ≥ 95%   **Call Set Up Success Rate-Month 1**

Legend: PMR Data | Live Data | Drive Test Data

*Data Source: Network Operations Center (NOC) of the operators*

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.3.2.2 KEY FINDINGS – MONTH 2
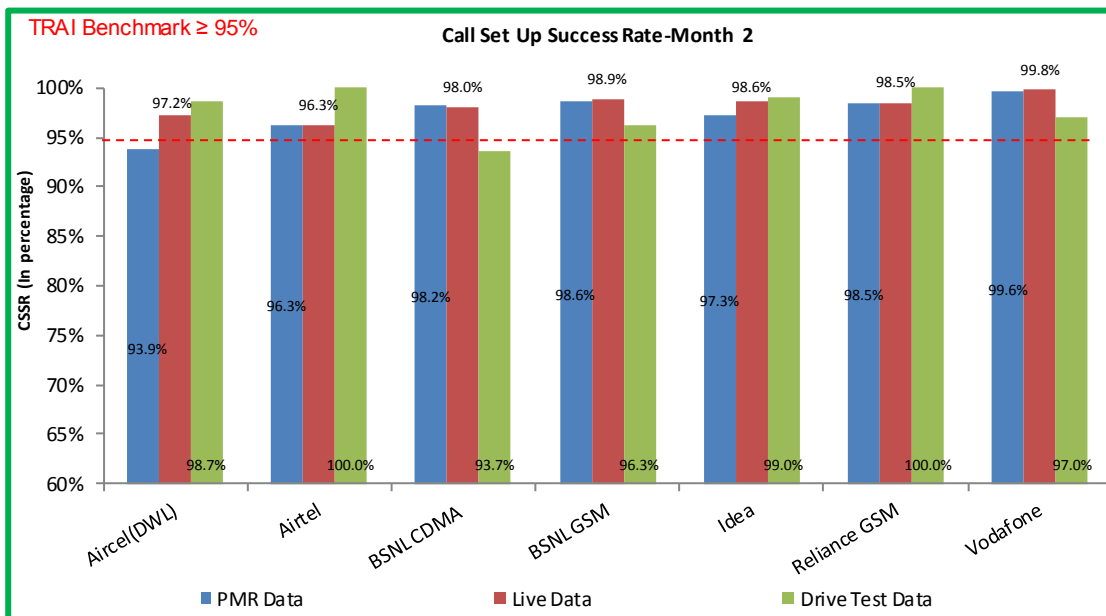
Data Source: Network Operations Center (NOC) of the operators

5.3.2.3 KEY FINDINGS – MONTH 3
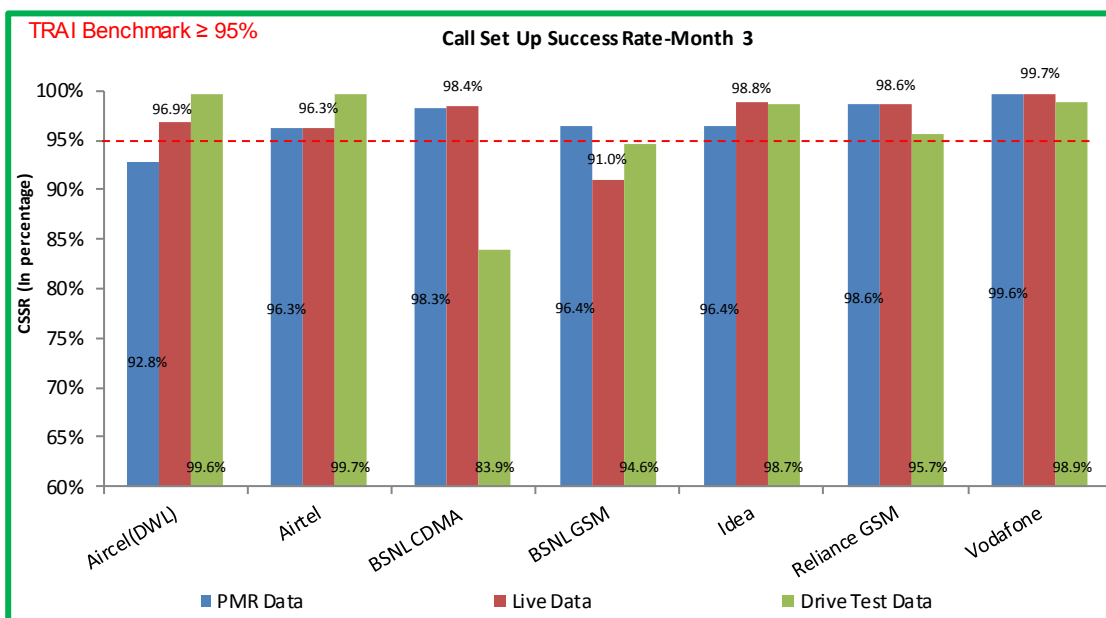
Data Source: Network Operations Center (NOC) of the operators

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

5.4.1 PARAMETER DESCRIPTION

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

   - SDCCH Level: Stand-alone dedicated control channel

   - TCH Level: Traffic Channel

   - POI Level: Point of Interconnect

2. **Computational Methodology:**

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

     - Where:-A_1 = Number of attempts to establish SDCCH / TCH made on day 1

     - C_1 = Average SDCCH / TCH Congestion % on day 1

     - A_2 = Number of attempts to establish SDCCH / TCH made on day 2

     - C_2 = Average SDCCH / TCH Congestion % on day 2

     - A_n = Number of attempts to establish SDCCH / TCH made on day n

     - C_n = Average SDCCH / TCH Congestion % on day n

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

     - Where:-A_1 = POI traffic offered on all POIs (no. of calls) on day 1

     - C_1 = Average POI Congestion % on day 1

     - A_2 = POI traffic offered on all POIs (no. of calls) on day 2

     - C_2 = Average POI Congestion % on day 2

     - A_n = POI traffic offered on all POIs (no. of calls) on day n

     - C_n = Average POI Congestion % on day n

3. **Benchmark:**

   - SDCCH Congestion: ≤ 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

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5.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)
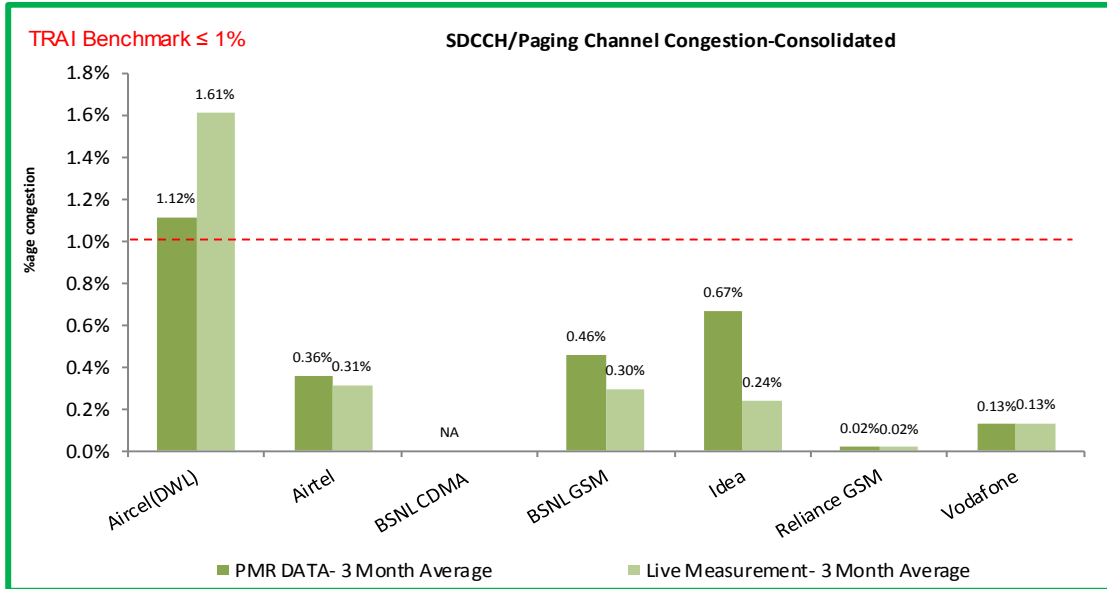
Data Source: Network Operations Center (NOC) of the operators

Aircel failed to meet the benchmark as per PMR/audit Data.

Significant difference was observed between PMR & live measurement data for Aircel and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for 3 days.

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

5.4.2.1 KEY FINDINGS – MONTH 1
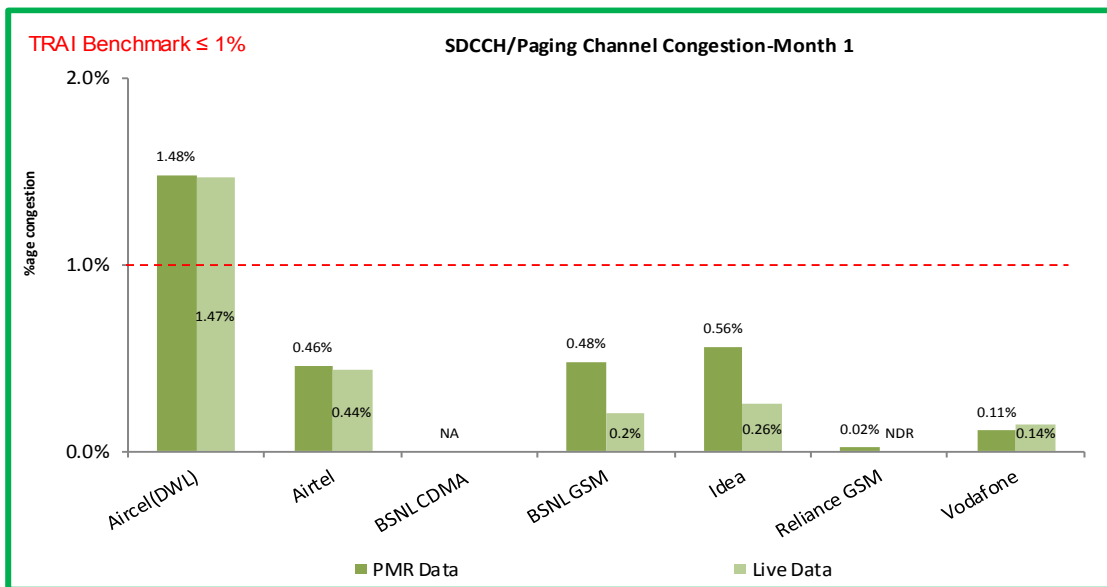
*Data Source: Network Operations Center (NOC) of the operators*

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.2.2 KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 1%   **SDCCH/Paging Channel Congestion-Month 2**
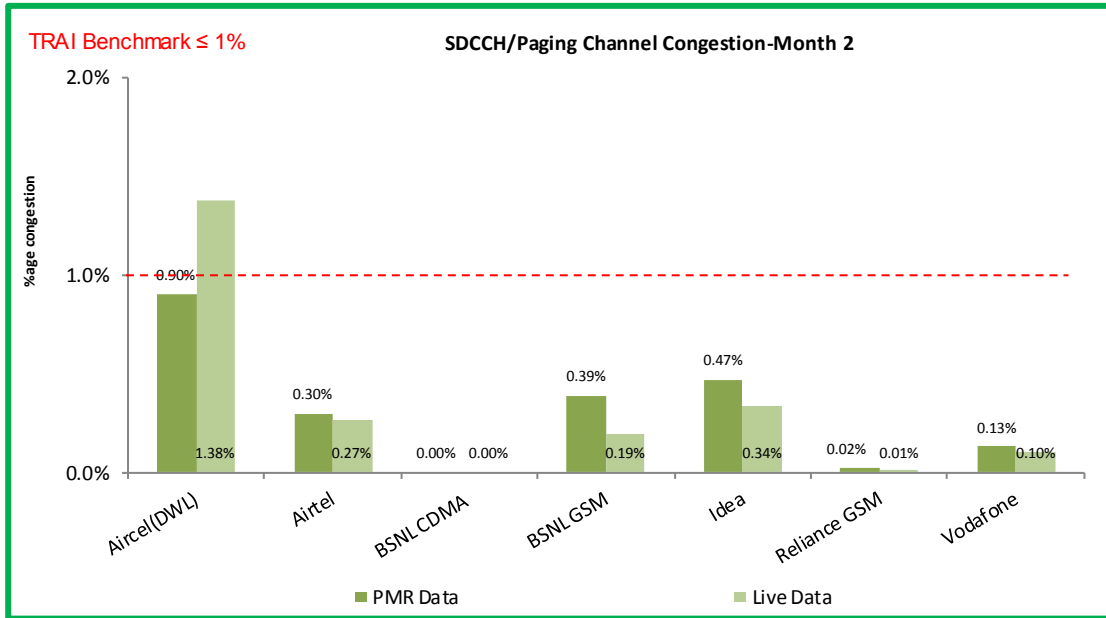
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MONTH 3

TRAI Benchmark ≤ 1%   **SDCCH/Paging Channel Congestion-Month 3**
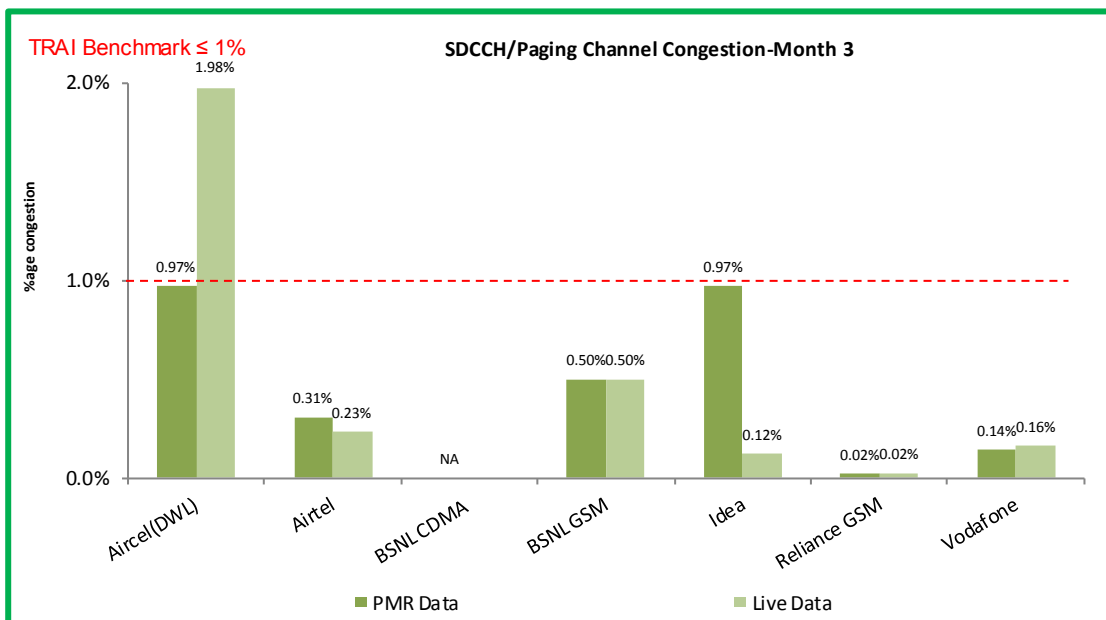
Data Source: Network Operations Center (NOC) of the operators

5.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)
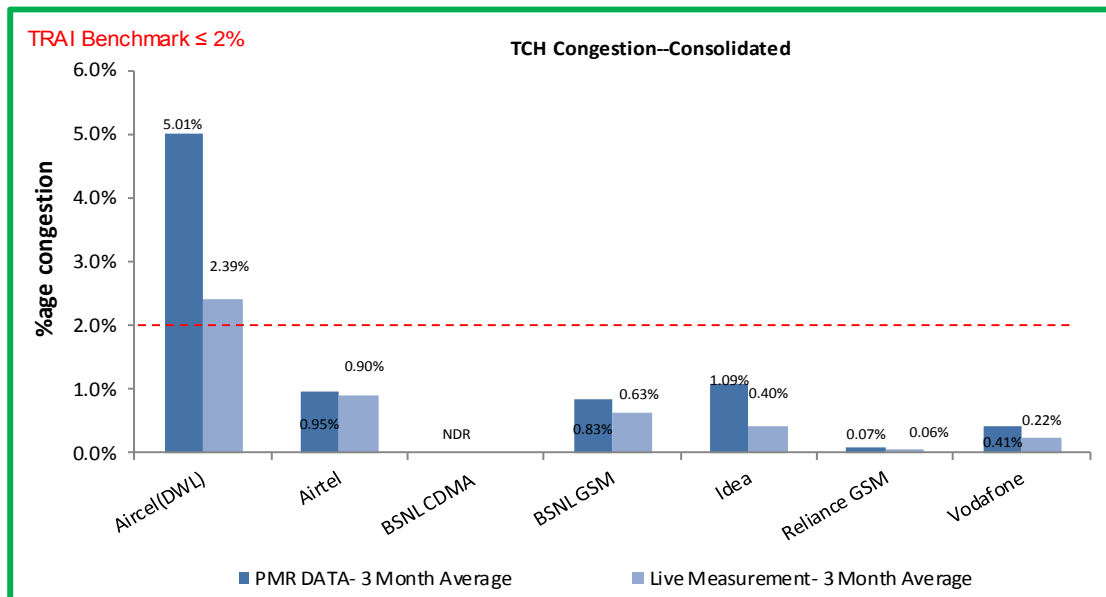
Data Source: Network Operations Center (NOC) of the operators

Aircel failed to meet the benchmark as per audit/PMR report.

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

NDR: Data for TCH congestion of BSNL CDMA could not get audited due a technical problem with the operator's server.

5.4.3.1 KEY FINDINGS – MONTH 1
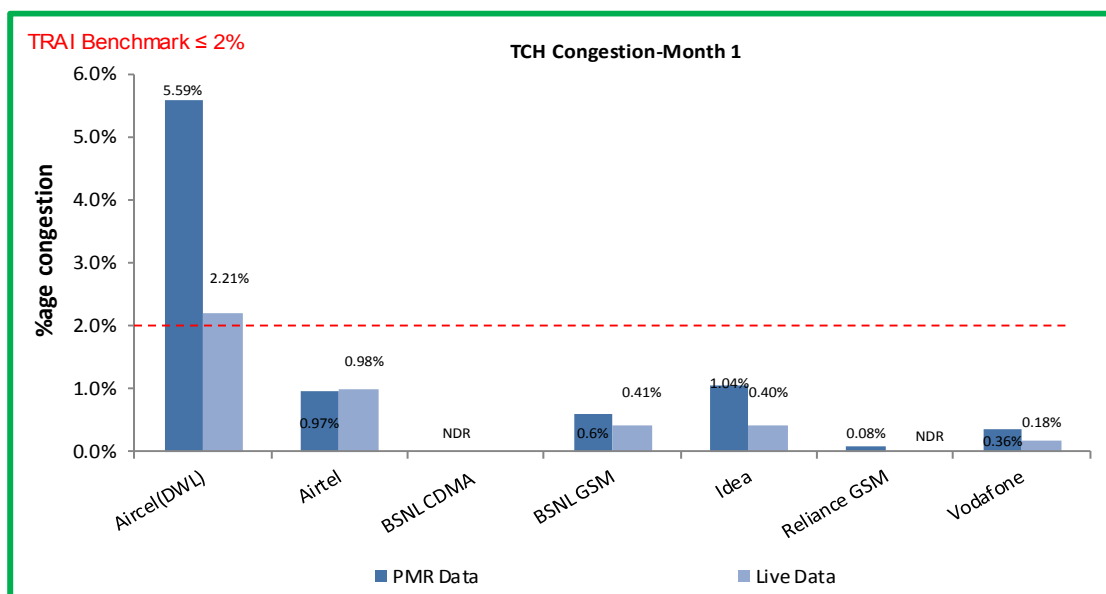
Data Source: Network Operations Center (NOC) of the operators

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.3.2 KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 2%

TCH Congestion-Month 2

Data Source: Network Operations Center (NOC) of the operators

5.4.3.3 KEY FINDINGS – MONTH 3

TRAI Benchmark ≤ 2%

TCH Congestion-Month 3

Data Source: Network Operations Center (NOC) of the operators

5.4.4   KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		89128	112943	NA	23853	33669	27715	16094361
Traffic served for all POIs (B)- in erlangs		59677	34888	NA	20258	18319	17168	14234738
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		89017	112263	NA	23853	33274	29203	3300832
Traffic served for all POIs (B)- in erlangs		59796	35072	NA	17253	19053	18211	1444663
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

NA: Auditors were not able to get the POI data from BSNL CDMA as operator uses the POI of BSNL GSM for its connectivity to other operators. As per the operator, their systems were not equipped to provide the POI data specifically for BSNL CDMA.

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5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-July								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		88098	112716	NA	21047	40451	24738	16091678
Traffic served for all POIs (B)- in erlangs		59497	35960	NA	19692	17735	15081	14512491
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-July								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	NDR	31
No. of POIs not meeting benchmark		0	0	NA	0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		88098	112688	NA	21047	40451	NDR	6655532
Traffic served for all POIs (B)- in erlangs		59963	35454	NA	17561	19925	NDR	1471048
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	NDR	0.00%

Data Source: Network Operations Center (NOC) of the operators

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.4.2   KEY FINDINGS – MONTH 2

| Audit Results for POI Congestion- PMR data-August								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		88460	112942	NA	25256	30581	29934	16091876
Traffic served for all POIs (B)- in erlangs		59703	35380	NA	21741	18482	18551	13683796
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-August								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		88127	113039	NA	25256	29394	29934	1623097
Traffic served for all POIs (B)- in erlangs		59703	36239	NA	16390	18524	18551	1424099
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

5.4.4.3   KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-September								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	22	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		90826	113172	NA	25256	29976	28473	16099530
Traffic served for all POIs (B)- in erlangs		59832	33324	NA	19341	18738	17870	14507926
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-September								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	22	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		90826	111063	NA	25256	29976	28473	1623867
Traffic served for all POIs (B)- in erlangs		59721	33524	NA	17809	18709	17870	1438841
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

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5.5   CALL DROP RATE

5.5.1   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.

5.5.2   KEY FINDINGS - CONSOLIDATED
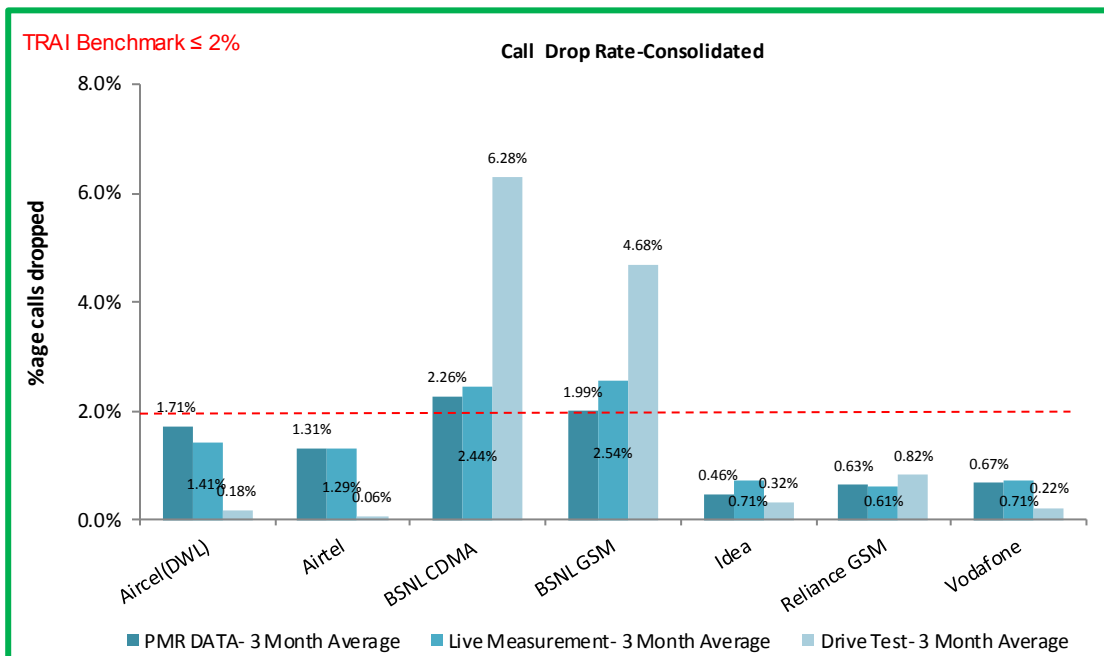
Data Source: Network Operations Center (NOC) of the operators

BSNL CDMA and BSNL GSM failed to meet the benchmark for call drop rate during audit. The call drop rate during drive test was observed to be higher than audit for BSNL CDMA and BSNL GSM.
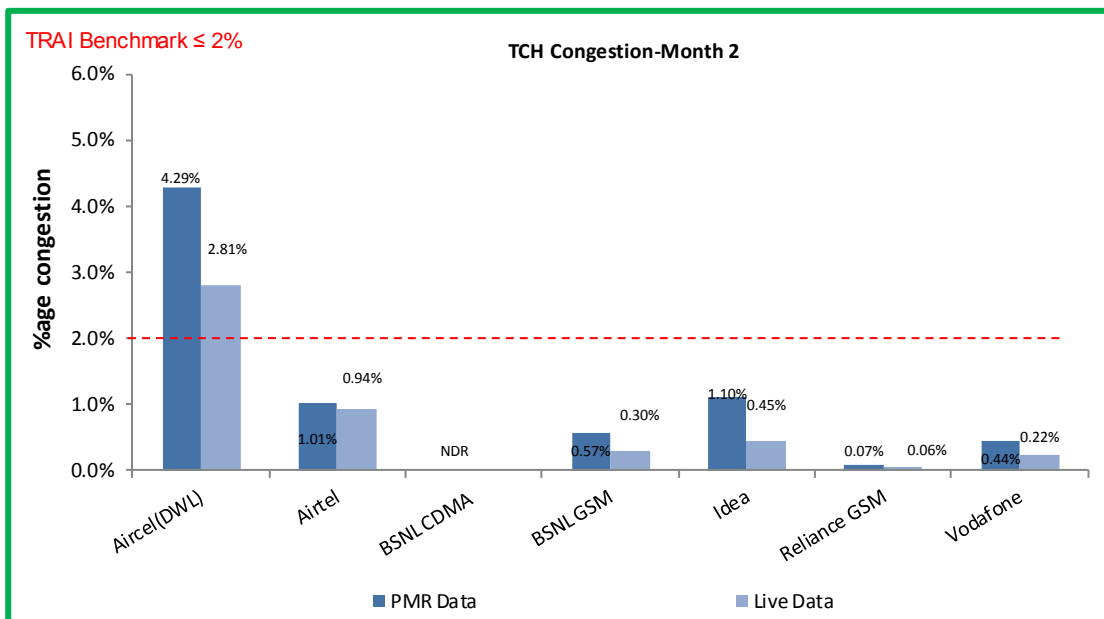
5.5.2.1 KEY FINDINGS – MONTH 1

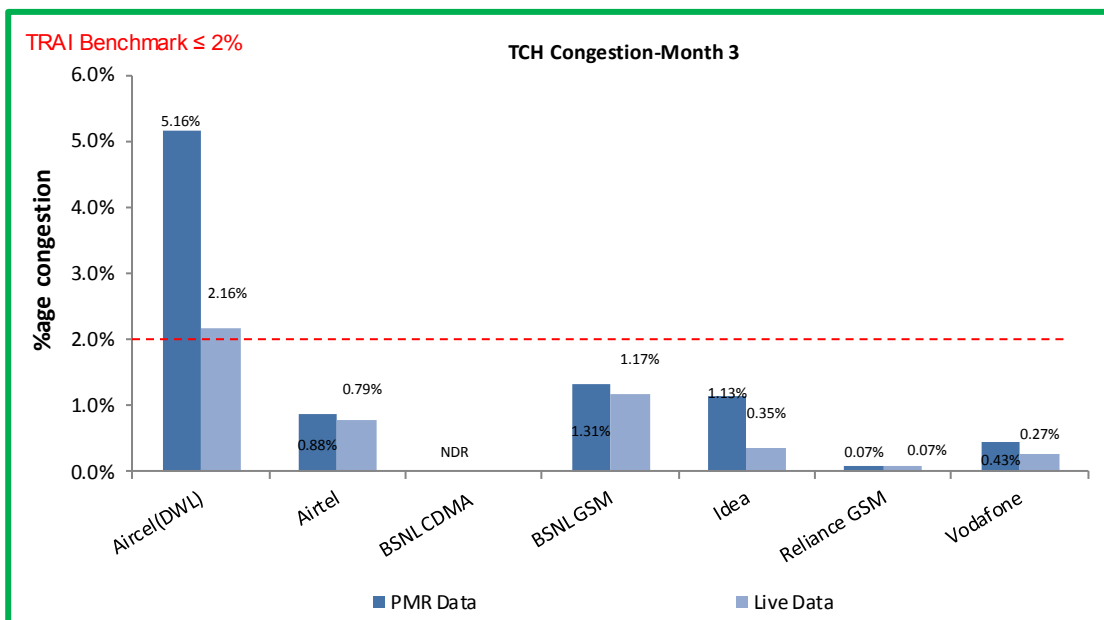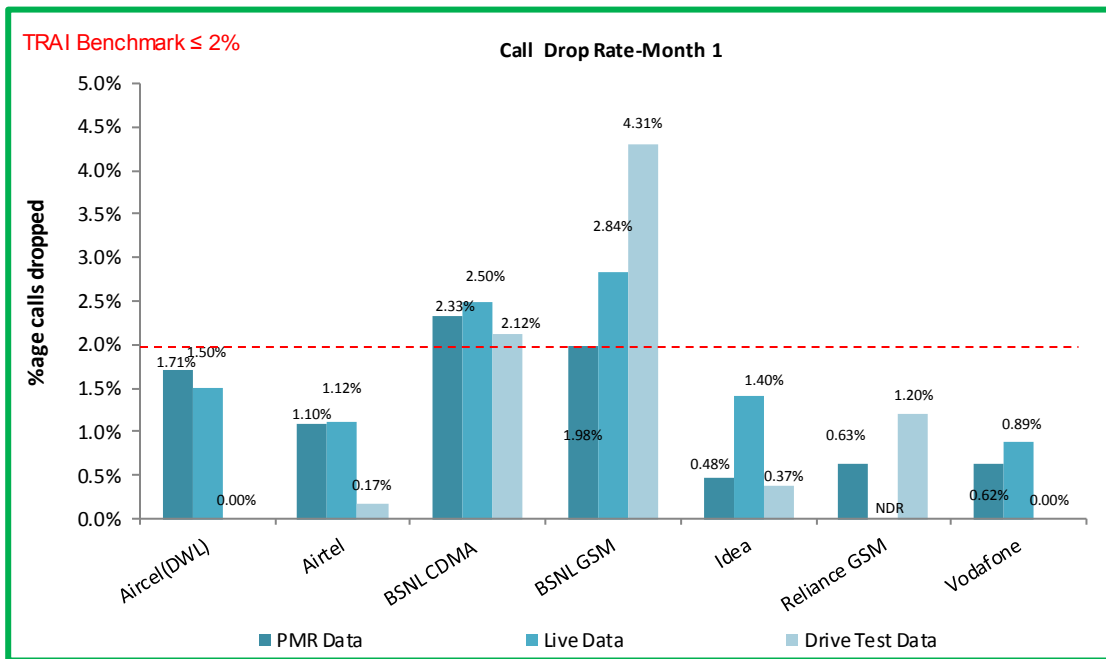*Data Source: Network Operations Center (NOC) of the operators*

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.5.2.2 KEY FINDINGS – MONTH 2
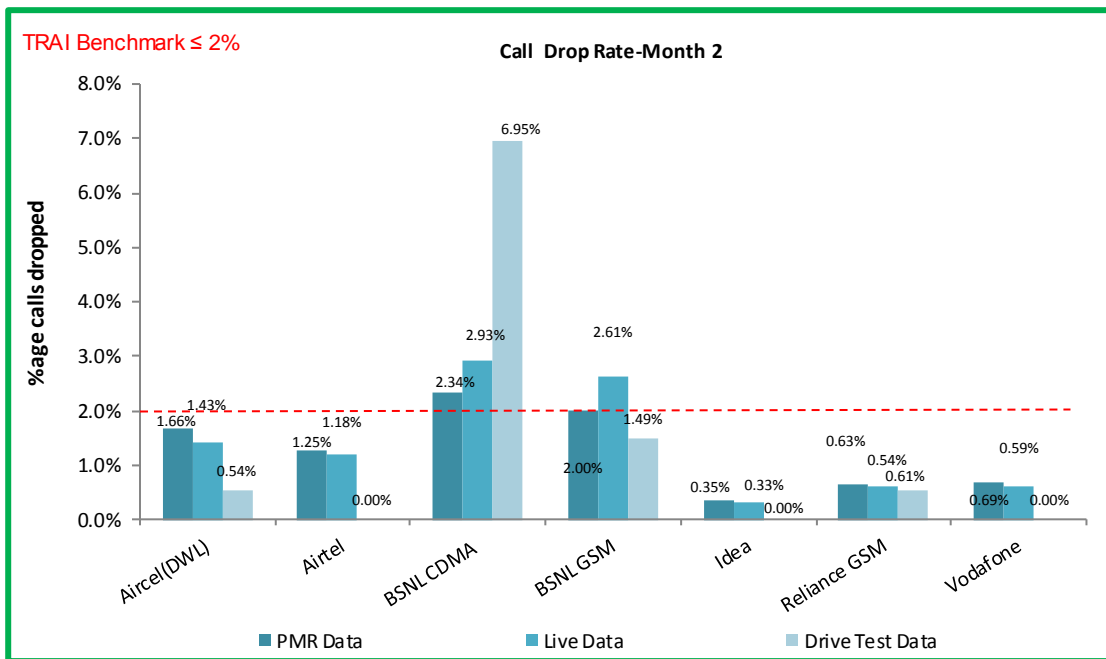
Data Source: Network Operations Center (NOC) of the operators

5.5.2.3 KEY FINDINGS – MONTH 3
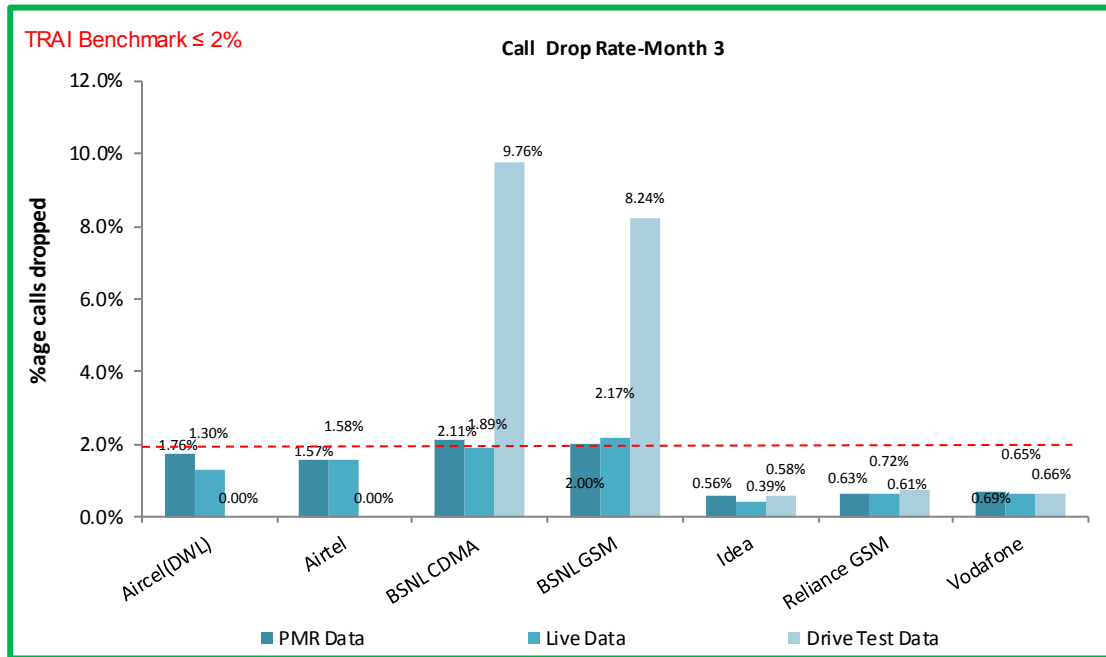
Data Source: Network Operations Center (NOC) of the operators

5.6 CELLS HAVING GREATER THAN 3% TCH DROP

5.6.1 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.

5.6.2 KEY FINDINGS - CONSOLIDATED
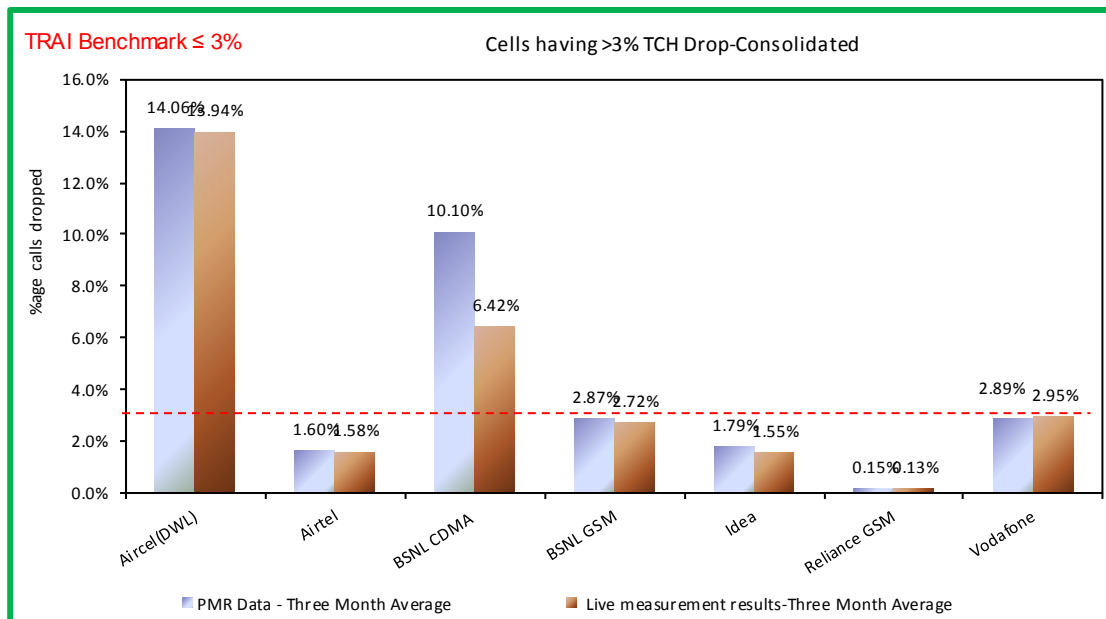
Data Source: Network Operations Center (NOC) of the operators

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

5.6.2.1 KEY FINDINGS – MONTH 1
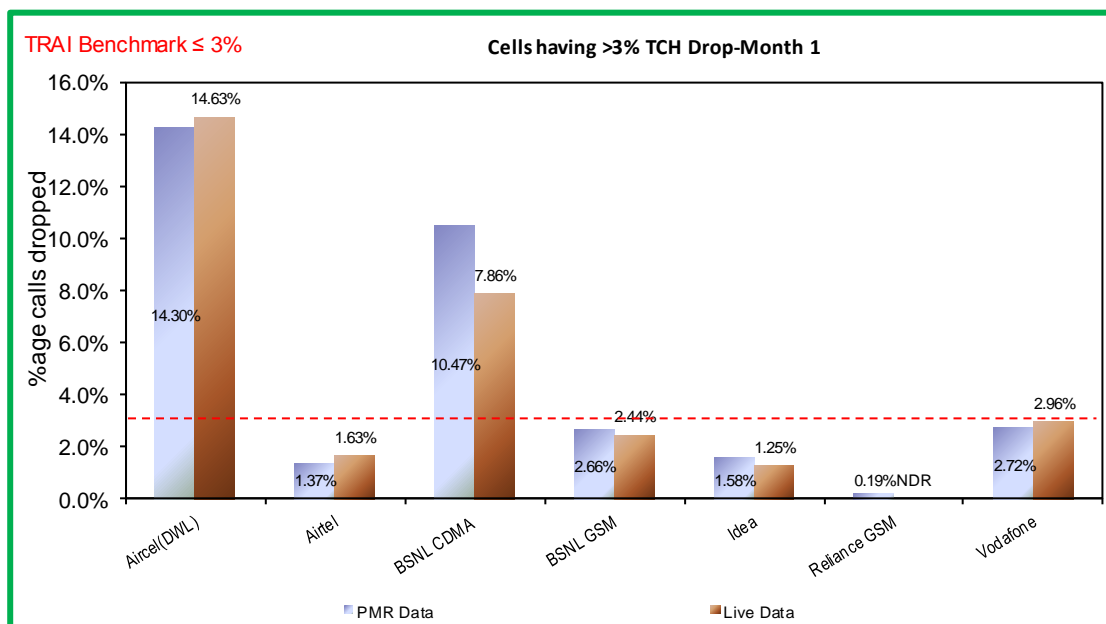
Data Source: Network Operations Center (NOC) of the operators

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.6.2.2   KEY FINDINGS – MONTH 2
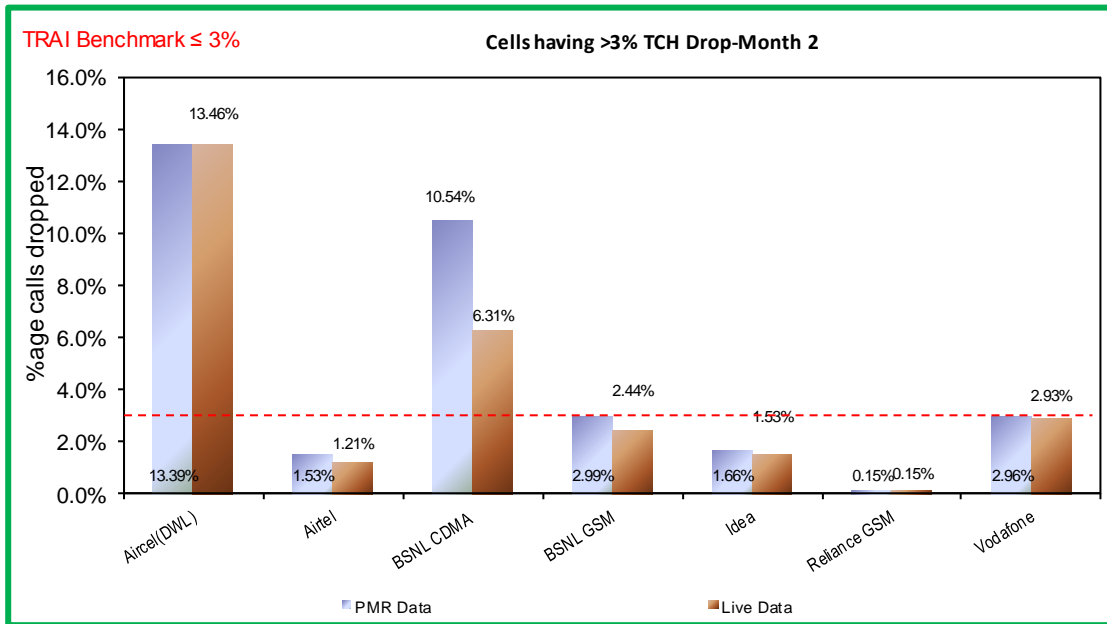
Data Source: Network Operations Center (NOC) of the operators

5.6.2.3   KEY FINDINGS – MONTH 3
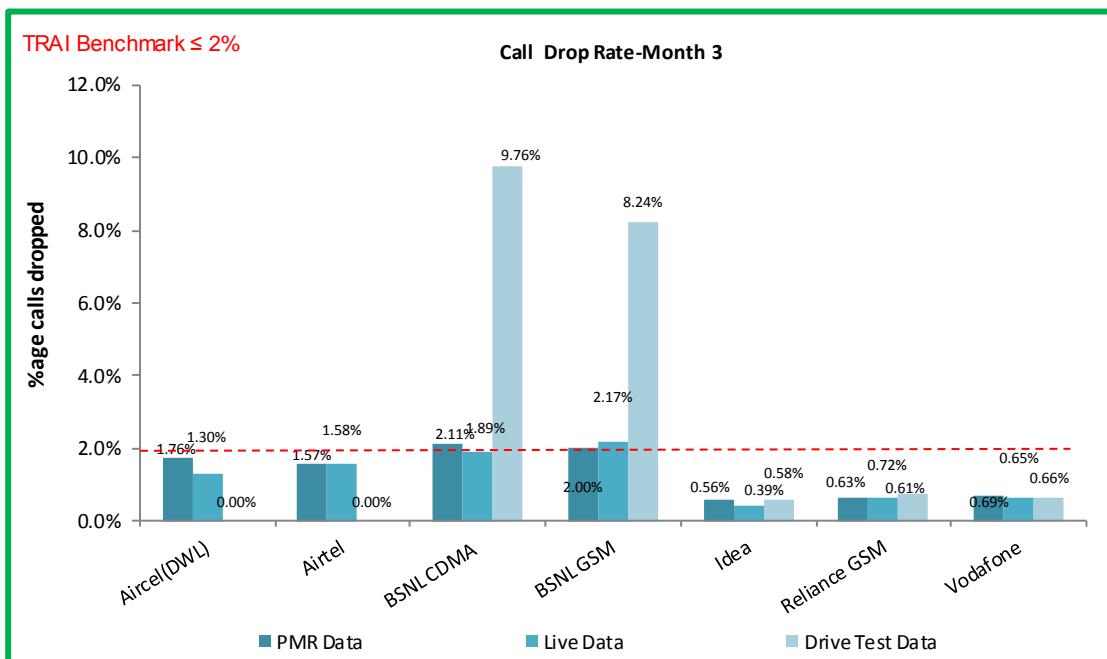
Data Source: Network Operations Center (NOC) of the operators

5.7   VOICE QUALITY

5.7.1   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.

5.7.2   KEY FINDINGS
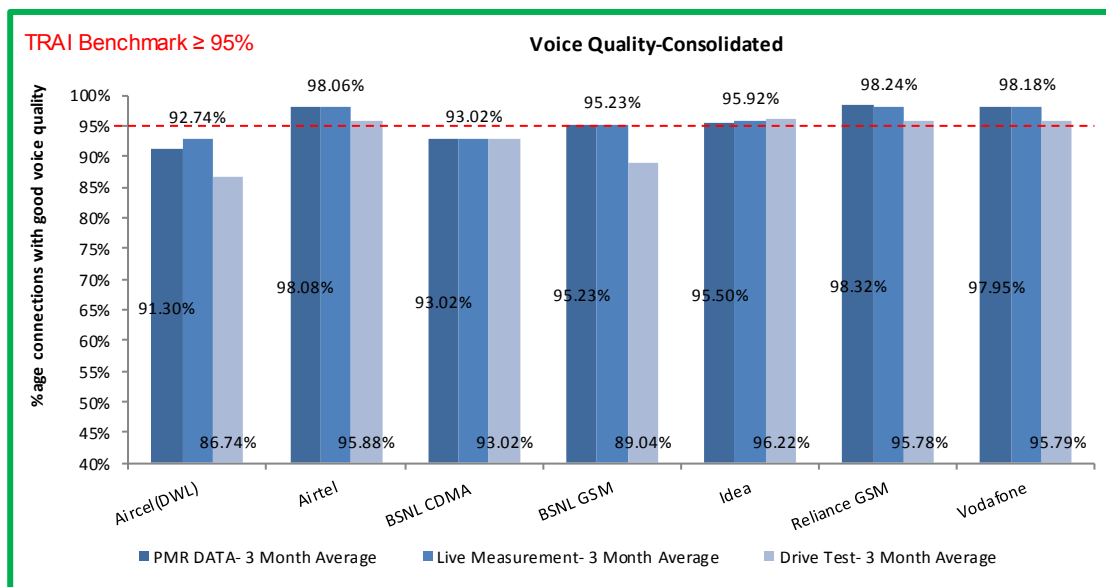
Data Source: Network Operations Center (NOC) of the operators

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

5.7.2.1 KEY FINDINGS – MONTH 1
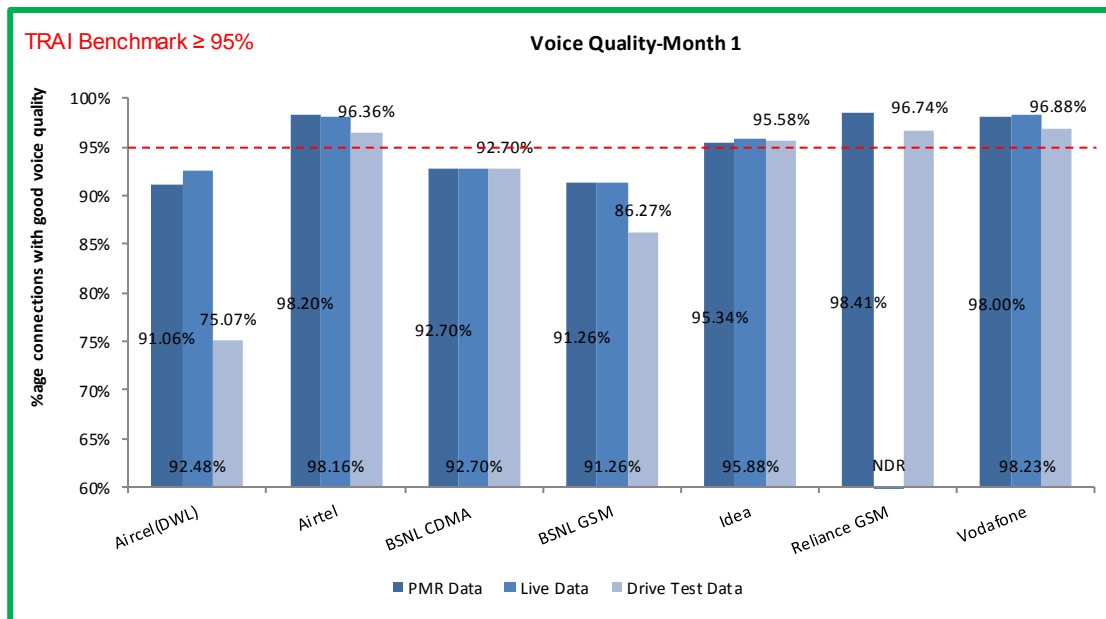
TRAI Benchmark ≥ 95% Voice Quality-Month 1

Data Source: Network Operations Center (NOC) of the operators

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.7.2.2 KEY FINDINGS – MONTH 2

TRAI Benchmark ≥ 95% Voice Quality-Month 2
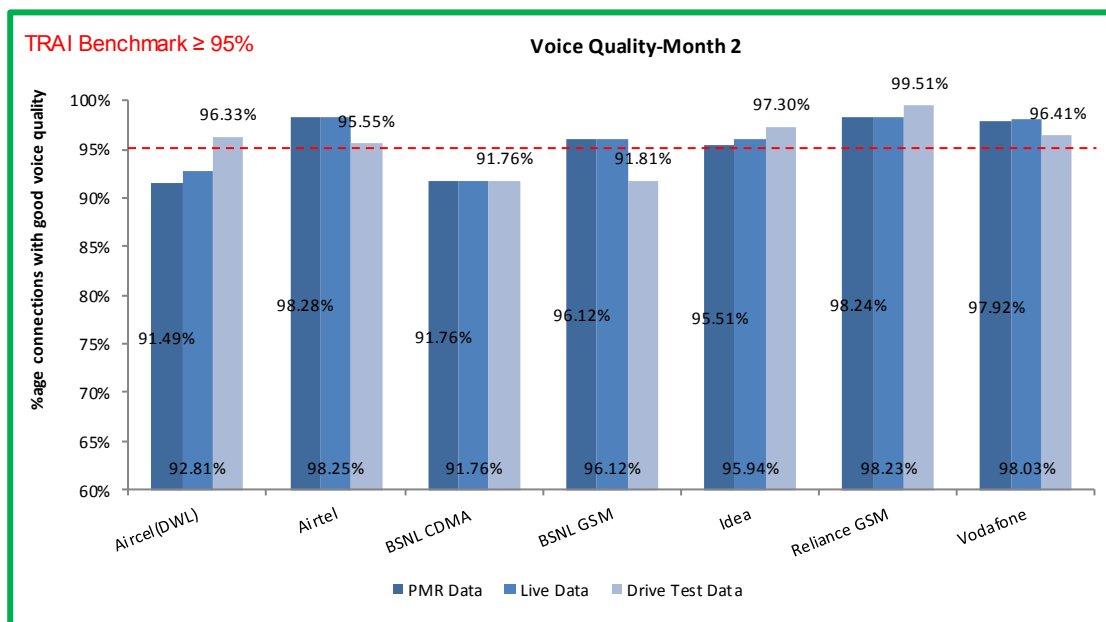
Data Source: Network Operations Center (NOC) of the operators

5.7.2.3   KEY FINDINGS – MONTH 3
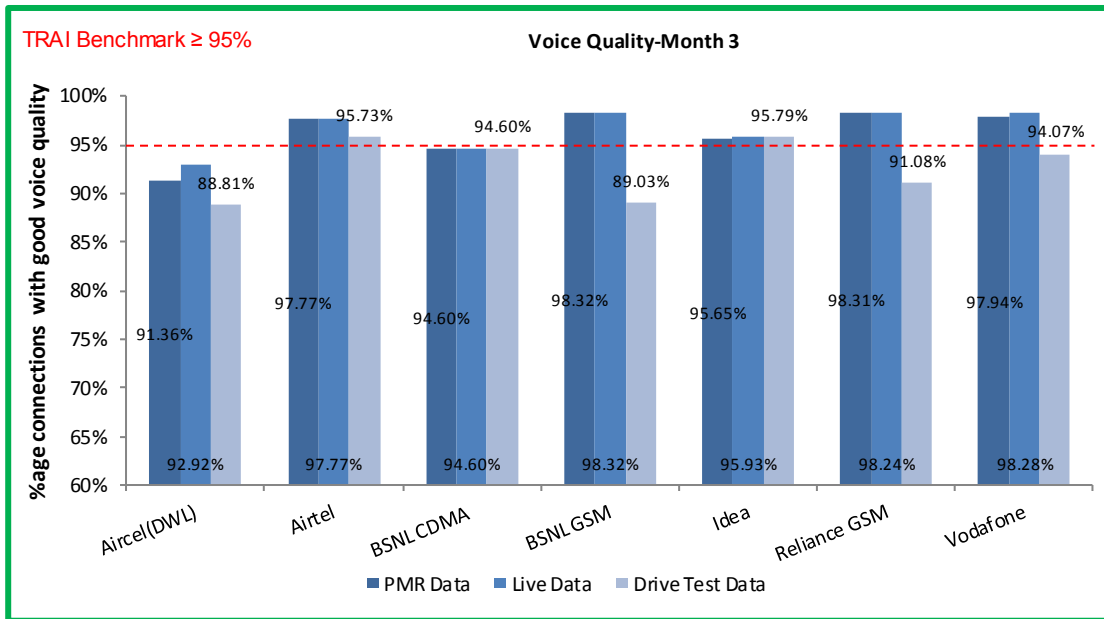
Data Source: Network Operations Center (NOC) of the operators

6   PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

6.1   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.

6.1.1   PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th September, 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 August 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

6.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)
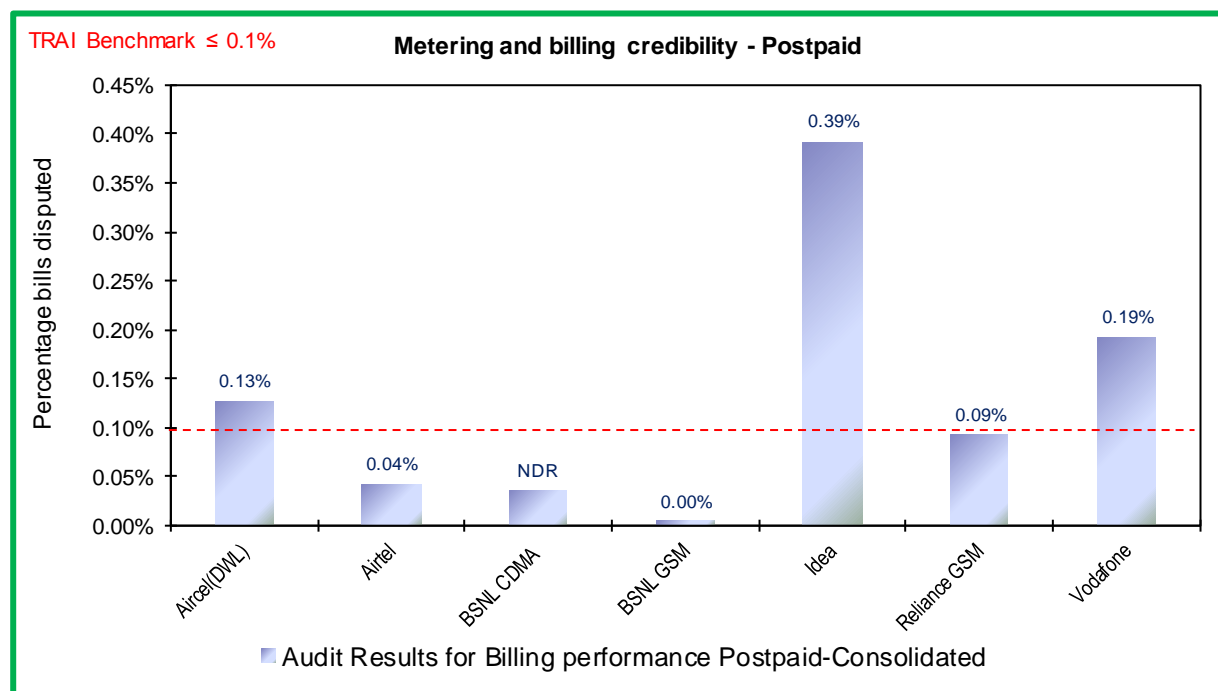
Data Source: Billing Center of the operators

Aircel, Idea and Vodafone failed to meet the benchmark of 0.1% postpaid metering and billing credibility.

TRAI Benchmark ≤ 0.1%

Metering and billing credibility - Postpaid (Billing cycle wise)
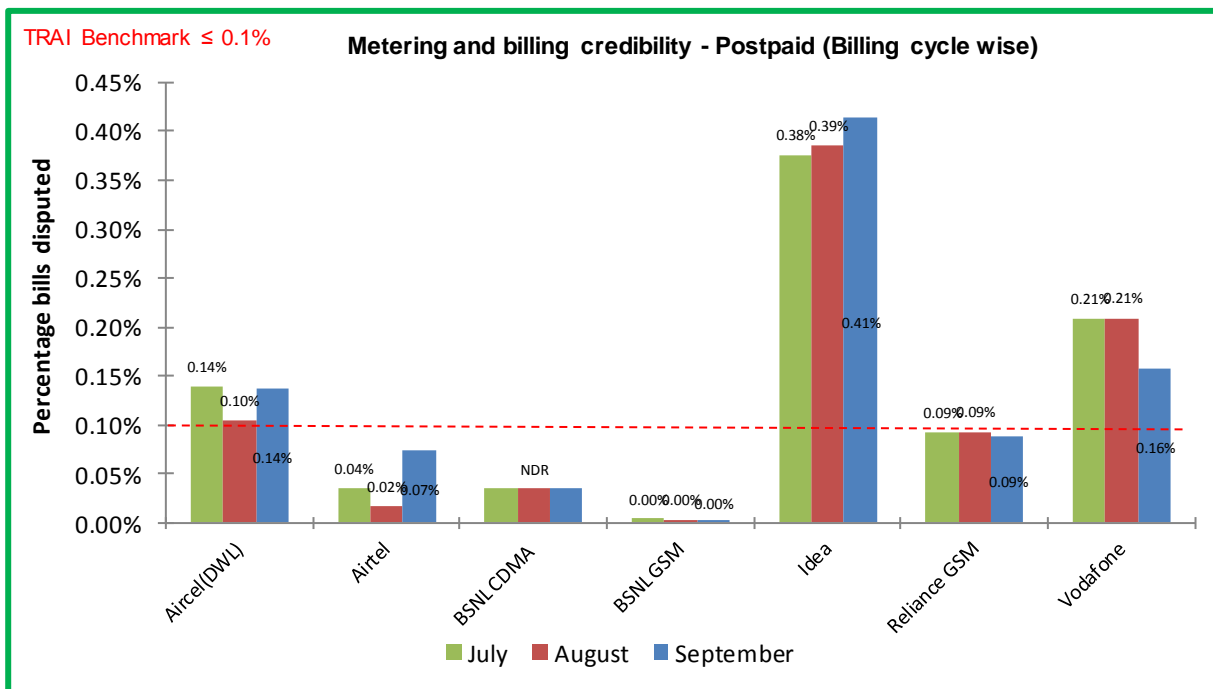
Data Source: Billing Center of the operators

6.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)

TRAI Benchmark ≤ 0.1%

Metering and billing credibility - Prepaid
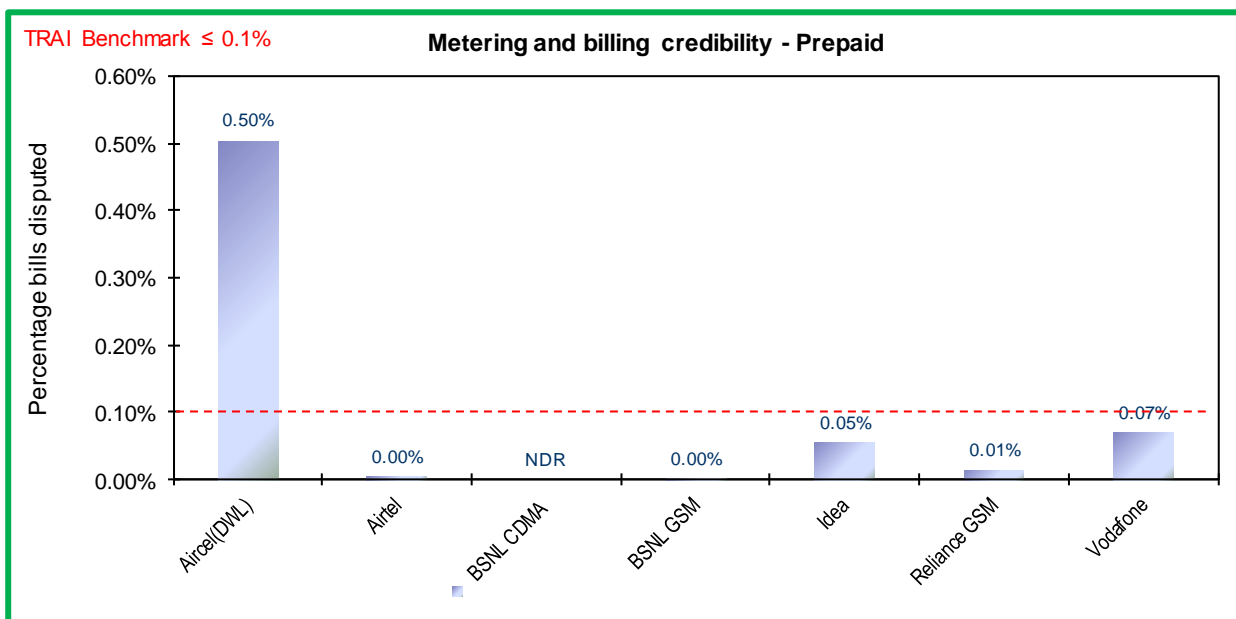
Data Source: Billing Center of the operators

Aircel failed to meet the benchmark for metering and billing credibility of prepaid subscribers.

NDR: Data to conduct audit for metering and billing was not available at the central billing center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

6.2   RESOLUTION OF BILLING/ CHARGING COMPLAINTS

6.2.1   PARAMETER DESCRIPTION

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.

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

&#x21 AB;   **Billing complaints here shall include only dispute related issues (including those that August 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.

↫   The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.

⮰   *** 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.

Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

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6.2.2 KEY FINDINGS - WITHIN 4 WEEKS
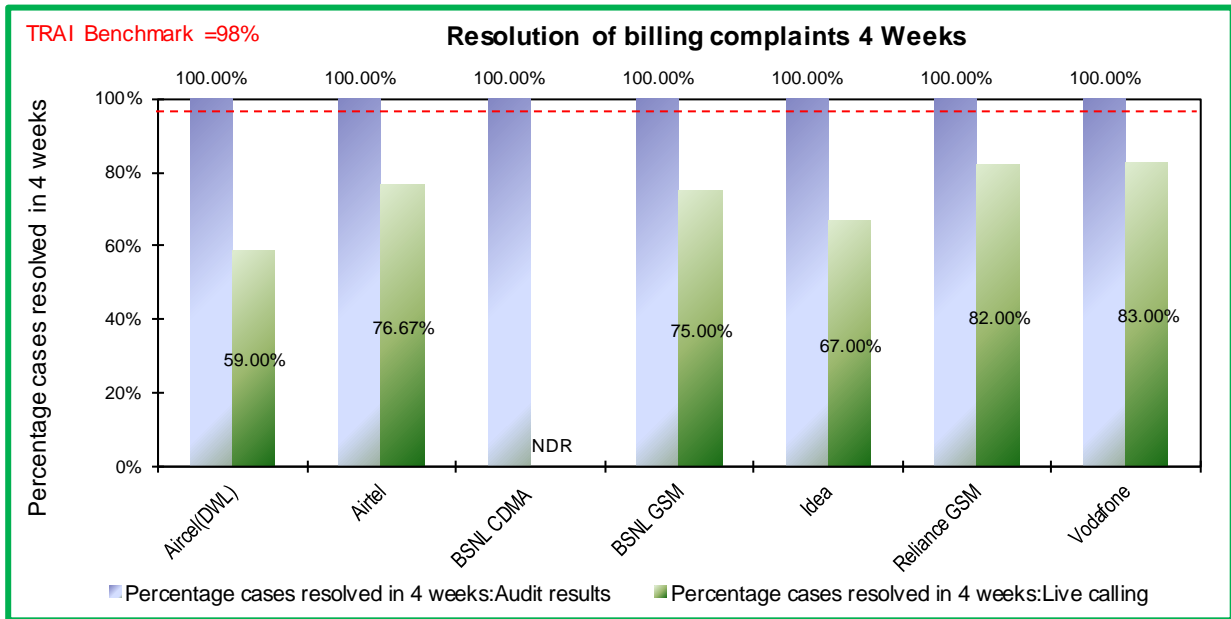
Data Source: Billing Center of the operators

6.2.3 KEY FINDINGS WITHIN 6 WEEKS
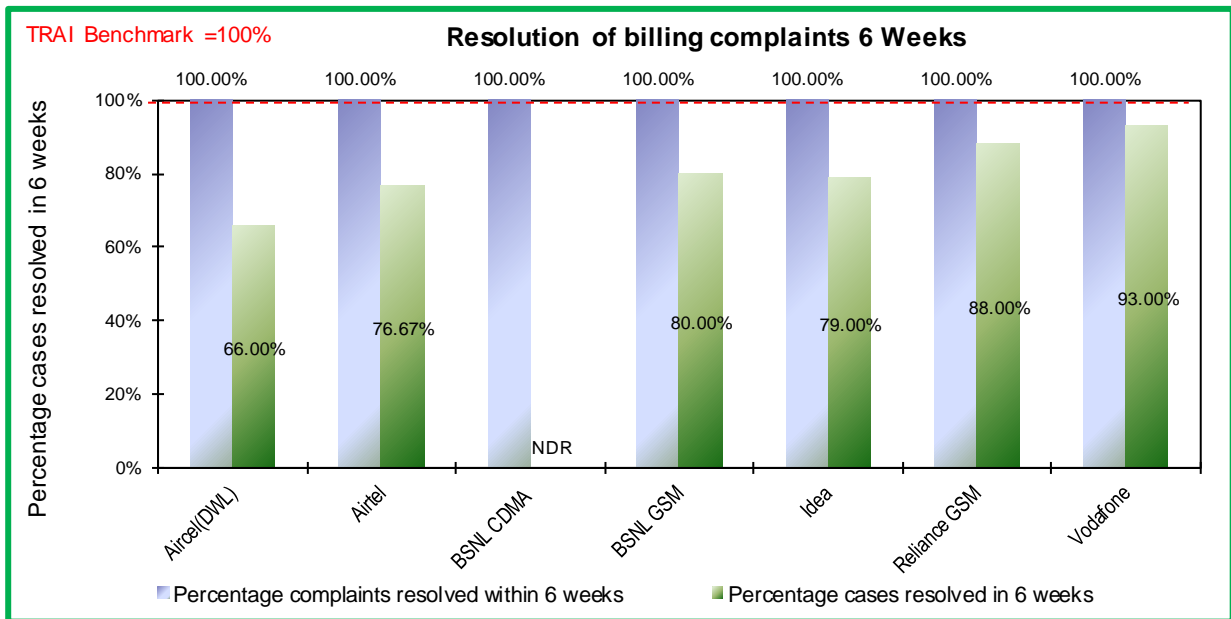
Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks as well as within 6 weeks.

However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. Further details can be found in annexure (section 8.7).

NDR: Data to conduct audit for resolution of billing complaints was not available at the central billing center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

6.3 PERIOD OF APPLYING CREDIT/WAVIER

6.3.1 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

6.3.2 KEY FINDINGS
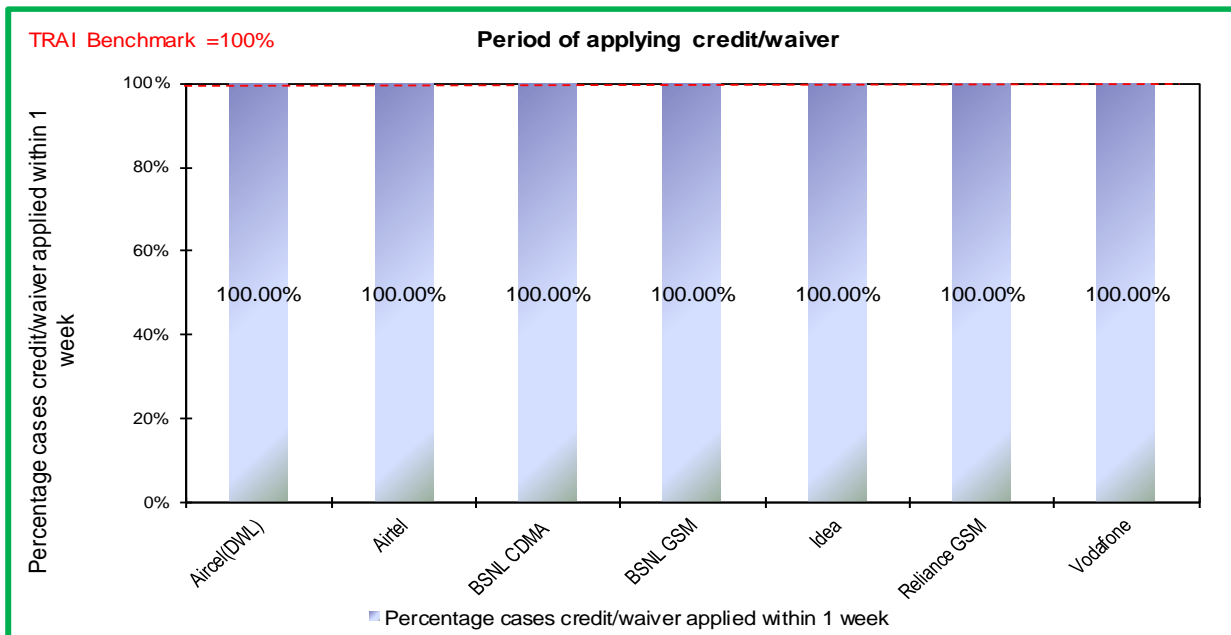
Data Source: Billing Center of the operators

All operators met the benchmark for this parameter.

6.4   CALL CENTRE PERFORMANCE-IVR

6.4.1   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

6.4.2   KEY FINDINGS
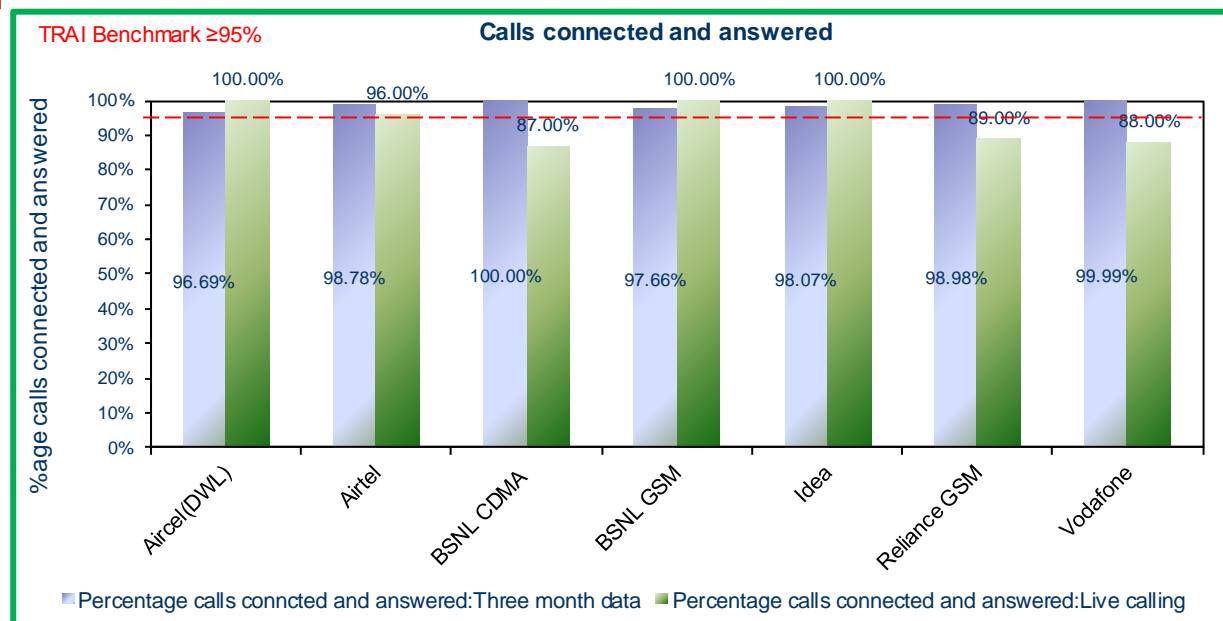
Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

However, during live calling it was observed that BSNL CDMA, Reliance GSM and Vodafone remained below the benchmark level of 95% for the parameter.

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6.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

6.5.1 PARAMETER DESCRIPTION

- ➲ Computational Methodology:

  - ↳ Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100

- ➲ Audit Procedure:

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

    - ‣ Total calls connected and answered by operator within 90 seconds

    - ‣ Total calls attempted to connect to the operator

  - ↳ Also live calling was done to test the calls answered within 90 seconds by the operator

Benchmark: 95% calls to be answered within 90 seconds

6.5.2 KEY FINDINGS
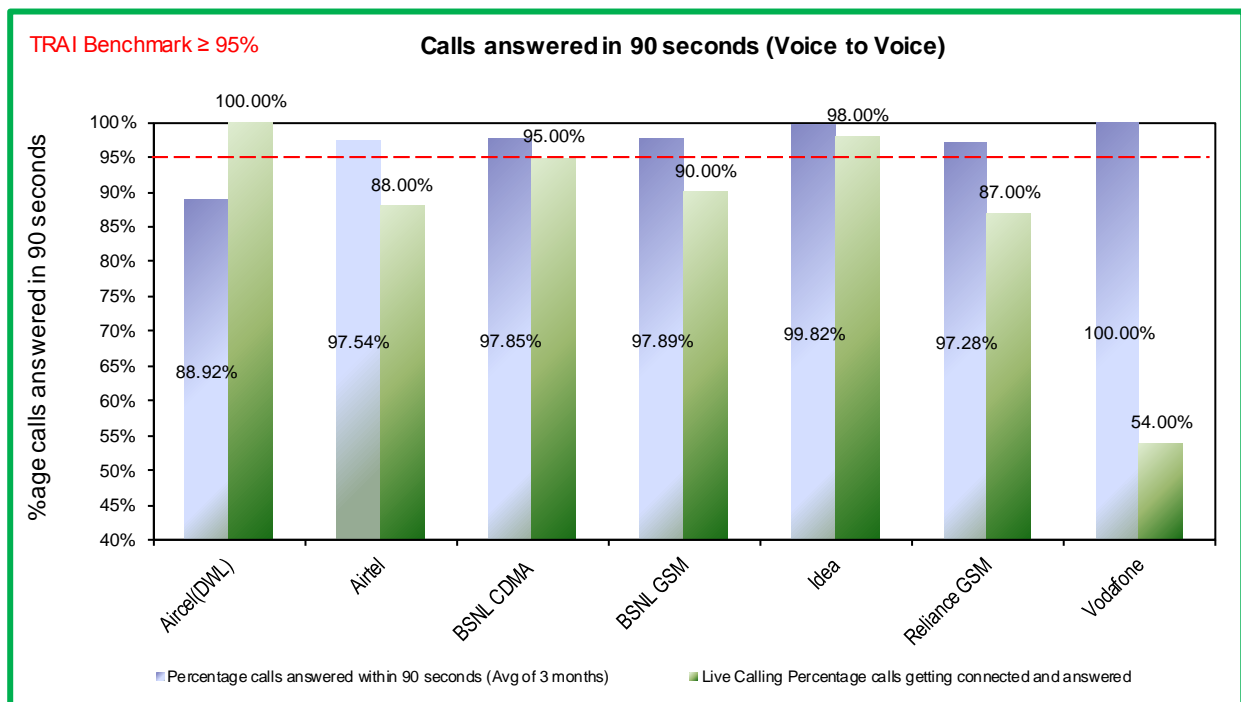
Data Source: Customer Service Center of the operators

Aircel failed to meet the benchmark for the parameter as per audit.

However, as per live calling done to customers, the performance of Airtel, BSNL GSM, Reliance GSM and Vodafone was far inferior to the PMR data.

Data Source: Customer Service Center of the operators
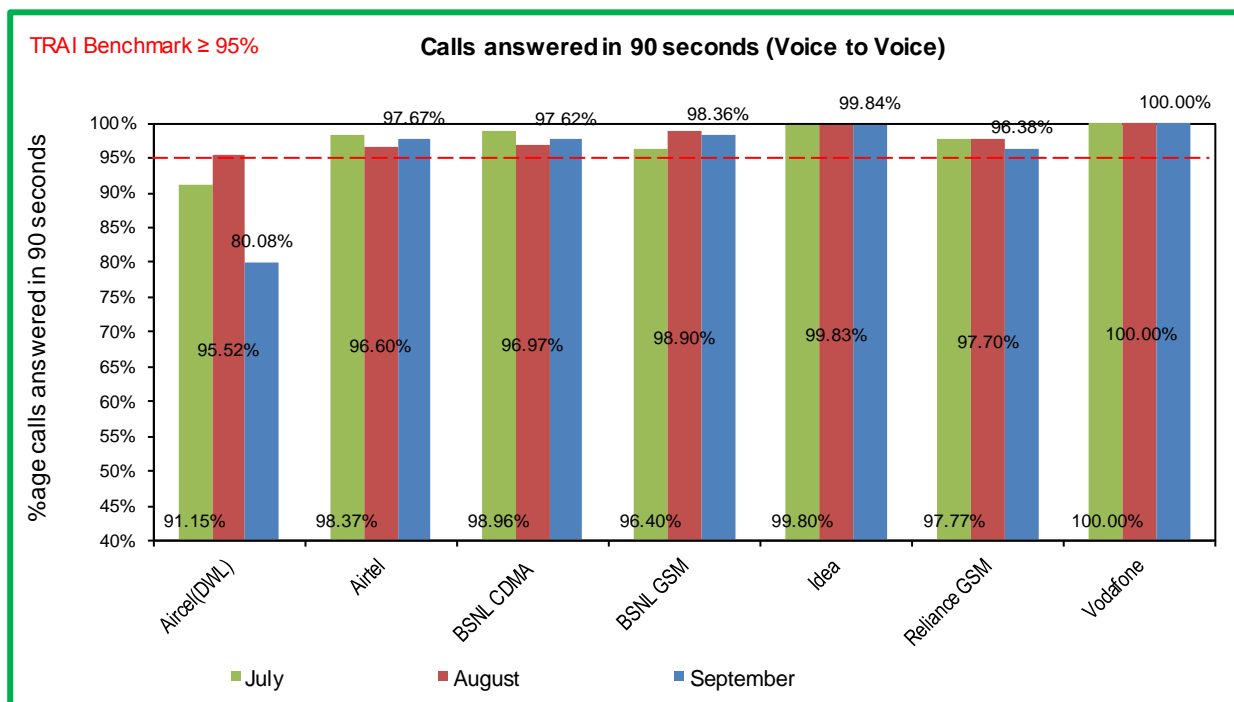
6.6   TERMINATION/CLOSURE OF SERVICE

6.6.1   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

6.6.2 KEY FINDINGS
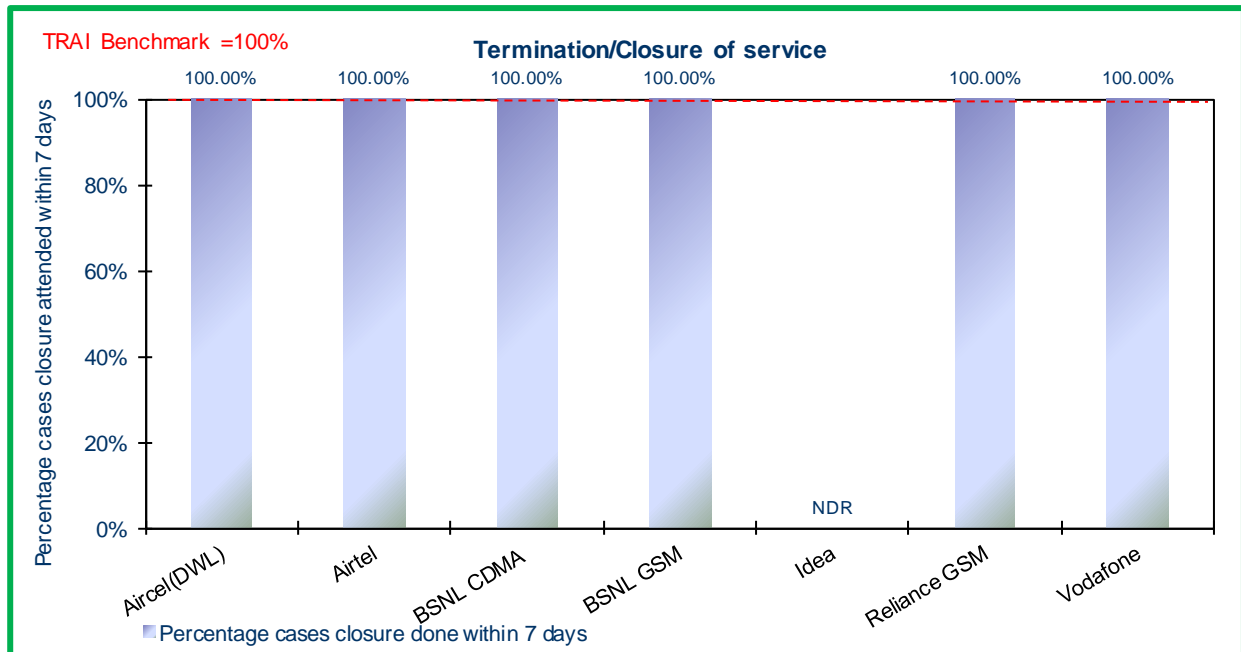
Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

NDR: For Idea, auditors were not able to take data for termination/ closure due to a server issue at the operator's end. Hence, audit for the parameter has not been conducted for the operator.

6.7   REFUND OF DEPOSITS AFTER CLOSURE

6.7.1   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

6.7.2 KEY FINDINGS

Data Source: Customer Service Center of the operators
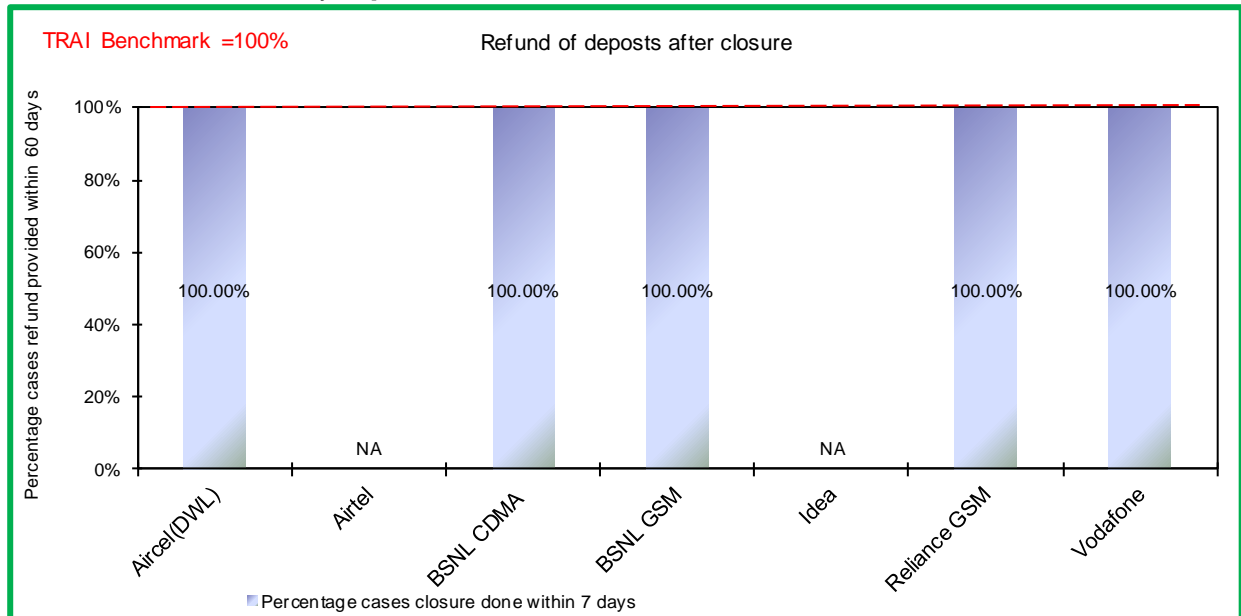
All operators met the TRAI benchmark for the parameter.

NA: In case of Airtel, there were no cases that required a refund after termination during the quarter. Hence, the audit for the parameter has not been conducted for the operator.

NDR: For Idea, auditors were not able to take data for termination/ closure due to a server issue at the operator's end. Hence, audit for the parameter has not been conducted for the operator.

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7   DETAILED FINDINGS - DRIVE TEST DATA

7.1   OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the Assam circle. As per the new directive given by TRAI headquarters, drive test for the month of July, August and September 2015 were conducted at a SSA level. Drive test was conducted for three days in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI advisors. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

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

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

7.1.1   July - Jorhat SSA

Month	Name of SSA Covered	Date of Drive Test
July	JORHAT	20th to 22nd July 2015

7.1.1.1   Route Details - Jorhat SSA

Category	Type of location	Assam-July		
		JORHAT		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Furkating to Sonari Via Titabor, Nazira àRoad Drive(High Way).(132 km) and NAZIRA Town Drive	Sonari to Moranhat à (Major road) via BHOJO and Moranhat to Teok via SIBSAGARà Road Drive (High Way) .(29KM +77KM=106 km) and SIBSAGAR Town Drive	Teok to Furkating via JORHAT, GOLAGHATà Road Drive (High Way) .(77km) and JORHAT and GOLAGHAT Town Drive.
	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 August 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.

7.1.1.2   Kilometers Travelled- Jorhat SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Jorhat	132	106	77	315

7.1.1.3 Route Map - Jorhat DAY 1
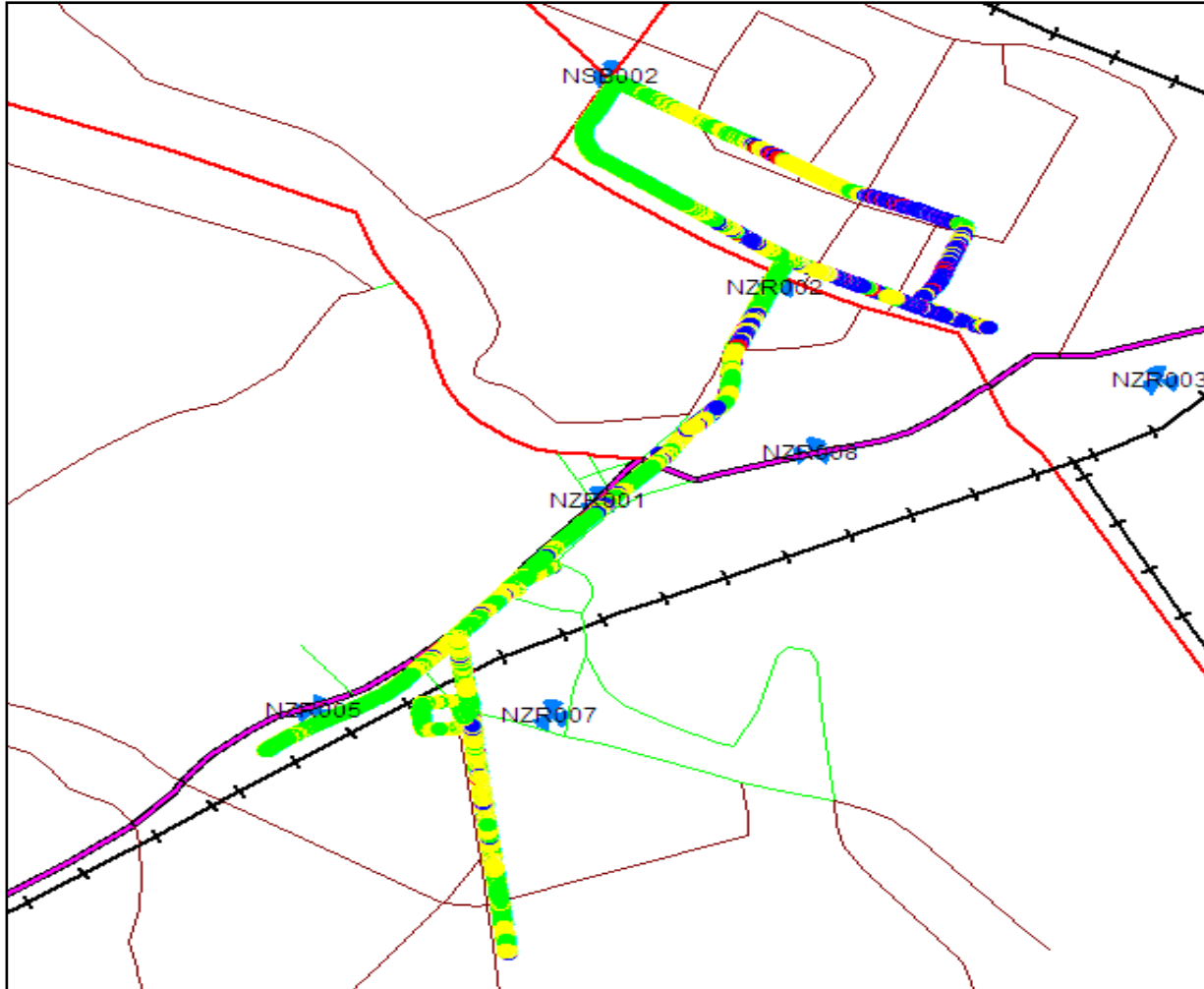
Route Detail: -
NAZIRA TOWN
TEMPLE;
MAIN MARKET
SBI BANK
RELLWAY STATION
DIMAKUCHI;
DIPILA;
ASTC BUS STAND

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7.1.1.4 Route Map - Jorhat DAY 2
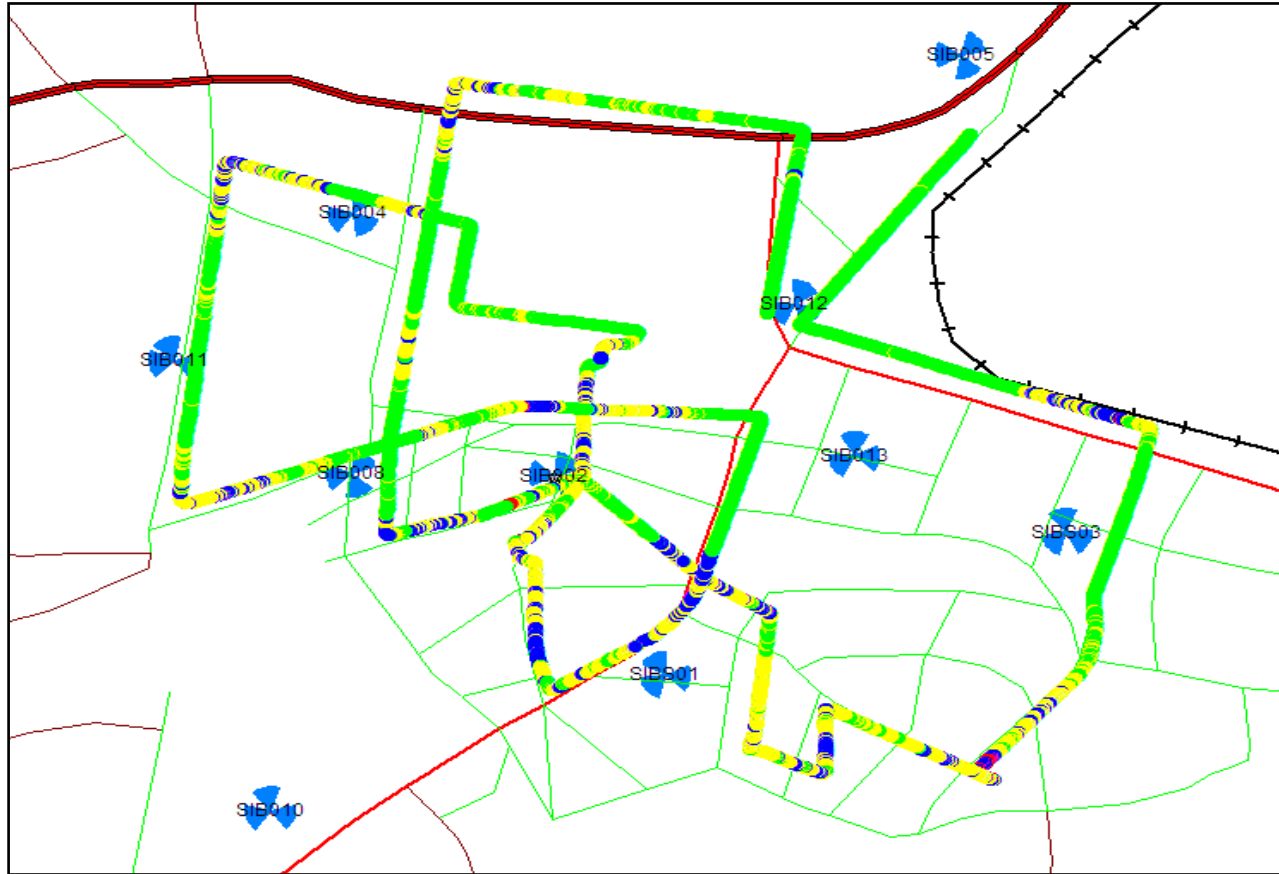
Route Detail: -
SIBSAGAR TOWN;
KHARUPETIA;
ORANG;
BUS STAND;
MAIN MARKET;

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7.1.1.5 Route Map - Jorhat DAY 3
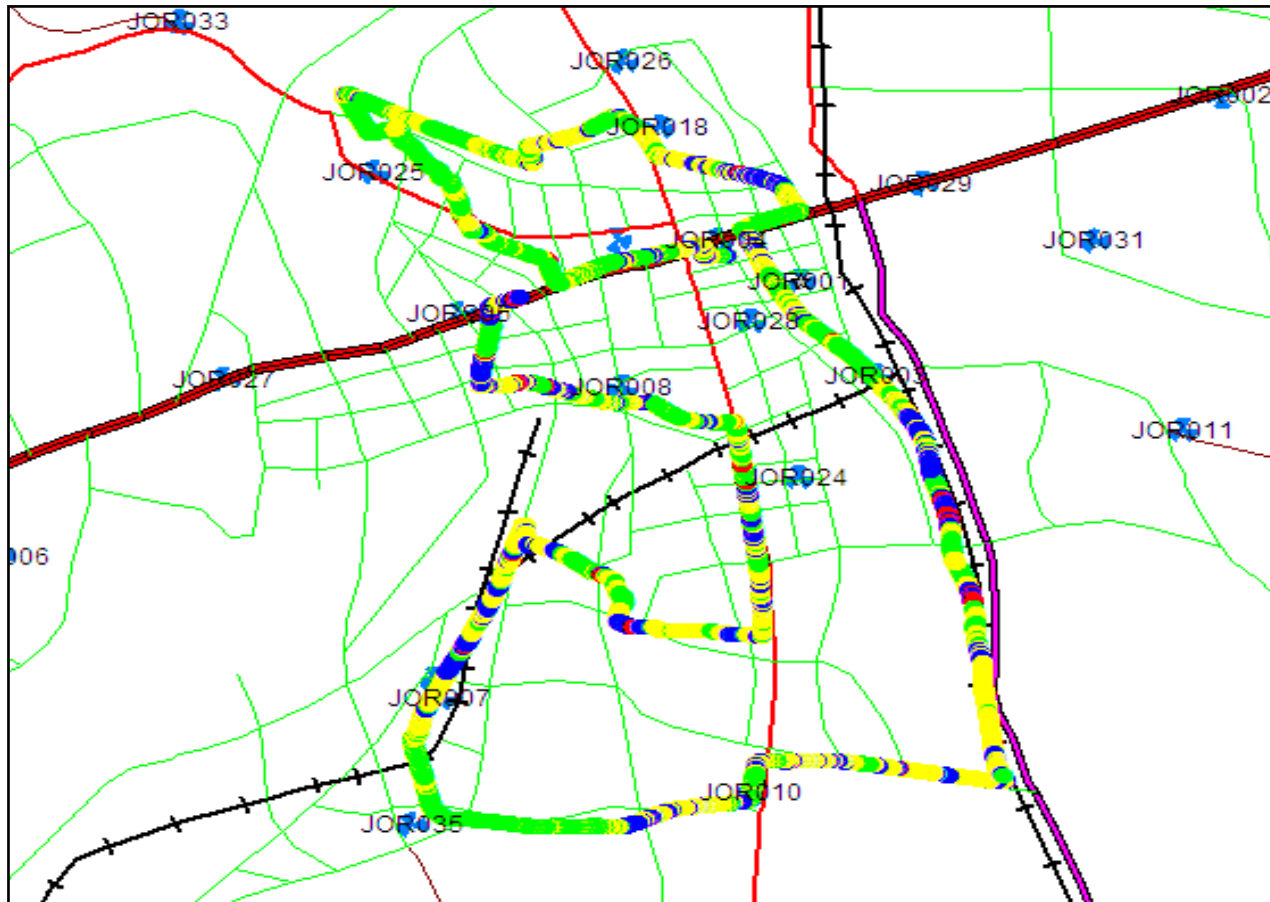
Route Detail: -

JORHAT TOWN;
MAIN MARKET;
SBI BANK;
BUSSTAND;

7.1.1.6   Drive Test Results - Jorhat SSA

Parameter's	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		68.39%	42.05%	77.85%	50.12%	99.67%	63.05%	29.96%	27.30%	87.48%	58.68%	65.79%	26.23%	52.33%	50.58%
0 to -85 dBm		97.96%	74.83%	95.21%	83.62%	100.00%	91.80%	94.03%	62.19%	99.79%	79.91%	98.55%	66.47%	93.11%	85.62%
0 to -95 dBm		99.94%	96.48%	99.72%	96.91%	100.00%	100.05%	100.00%	87.50%	99.94%	94.20%	99.99%	91.83%	99.92%	97.07%
Voice quality	≥ 95%	98.78%	76.47%	98.82%	95.78%	98.22%	93.73%	91.53%	85.82%	99.37%	95.87%	99.57%	96.01%	98.77%	96.47%
CSSR	≥ 95%	100.00%	98.67%	100.00%	100.00%	99.36%	96.31%	98.89%	92.78%	100.00%	97.20%	100.00%	95.89%	100.00%	99.42%
%age Blocked calls		0.00%	1.24%	0.00%	0.00%	0.00%	1.26%	1.11%	7.22%	0.00%	2.80%	0.00%	3.08%	0.00%	0.58%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.08%	0.65%	1.90%	0.00%	3.91%	0.00%	0.48%	0.00%	1.39%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.45%	100.00%	99.83%	100.00%	96.17%	100.00%	98.11%	NA	90.62%	100.00%	99.31%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL GSM failed to meet the benchmark in outdoor as well as indoor locations. Aircel and BSNL CDMA did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

BSNL GSM failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

BSNL GSM failed to meet the benchmark for call drop rate in outdoor locations.

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7.1.2 August – Dibrugarh SSA

Month	Name of SSA Covered	Date of Drive Test
August	DIBRUGARH	18th to 20th August 2015

7.1.2.1 Route Details – Dibrugarh SSA

Category	Type of location	Assam-August		
		DIBRUGARH		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Dibrugarh to Namrup Via Moranhat, Cheleng ⬜Road Drive(High Way).(104km) and DIBRUGARH Town Drive.	Doomdooma via Digboi , Bordumsa and Mahadevpur ⬜Road Drive (Major road) (127 km) and NAMRUP Town Drive	Doomdooma to Dibrugarh via Tinsukia, Duliajan Drive ⬜Road Drive (High Way and Major Rd) (94km) and TINSUKIA Town Drive.
	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 August 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.

7.1.2.2 Kilometers Travelled– Dibrugarh SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Dibrugarh	104	127	94	325

7.1.2.3 Route Map Dibrugarh Day 1
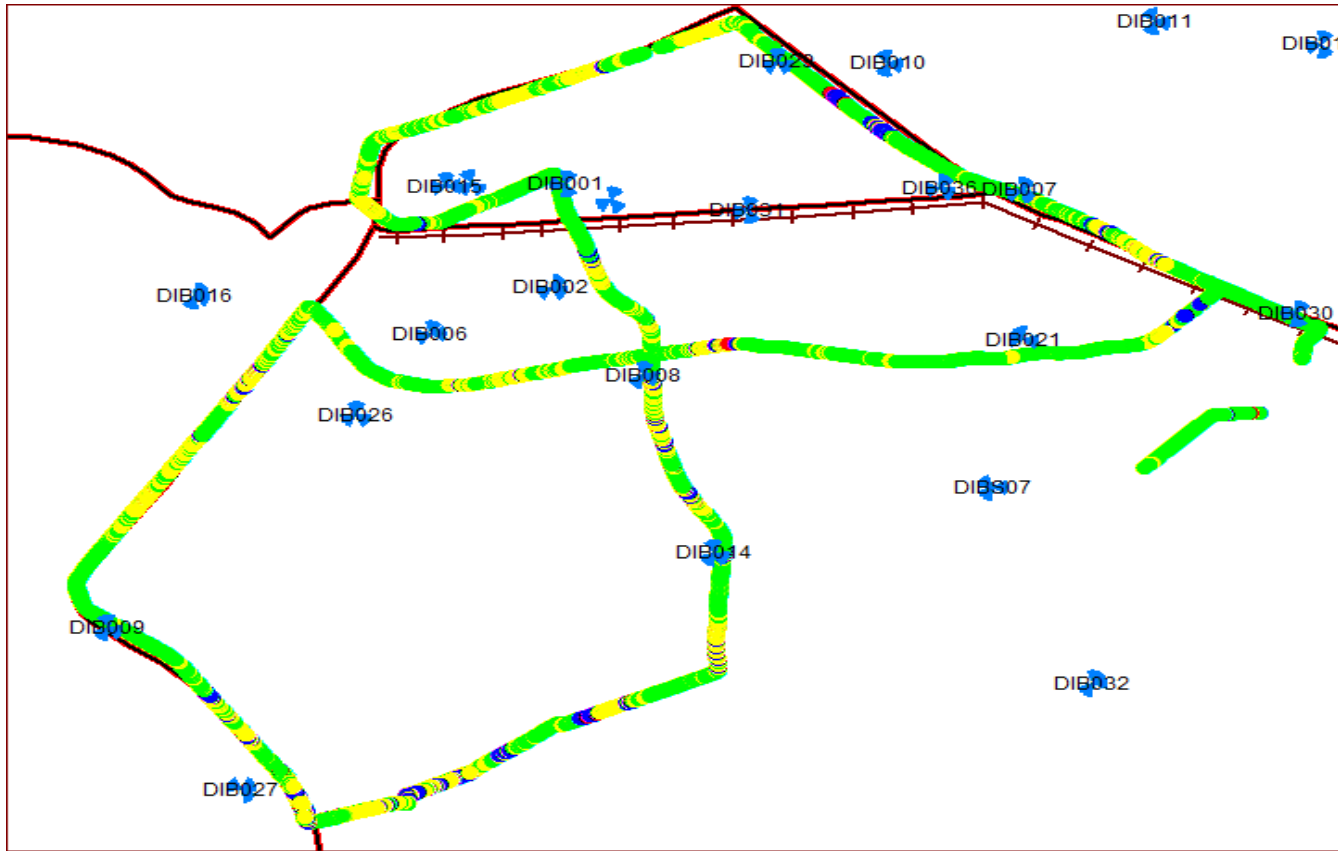
Route Detail: -
PHOOL BAGAAN,
CHAUNKIDINGNI,
MILAN NAGAR,
POLICE CHOWK,
AMOLAPATTY,
MEDICAL
COLLEGE
PALTAN BAZAAR,
MALWADIPATTY

7.1.2.4   Route Map Dibrugarh Day 2

Route Detail: -

**NAMRUP COLLEGE
MODEL
HIGHSCHOOL
BVFCL ROAD
HOSPITAL ROAD
BUS STAND**

7.1.2.5   Route Map Dibrugarh Day 3
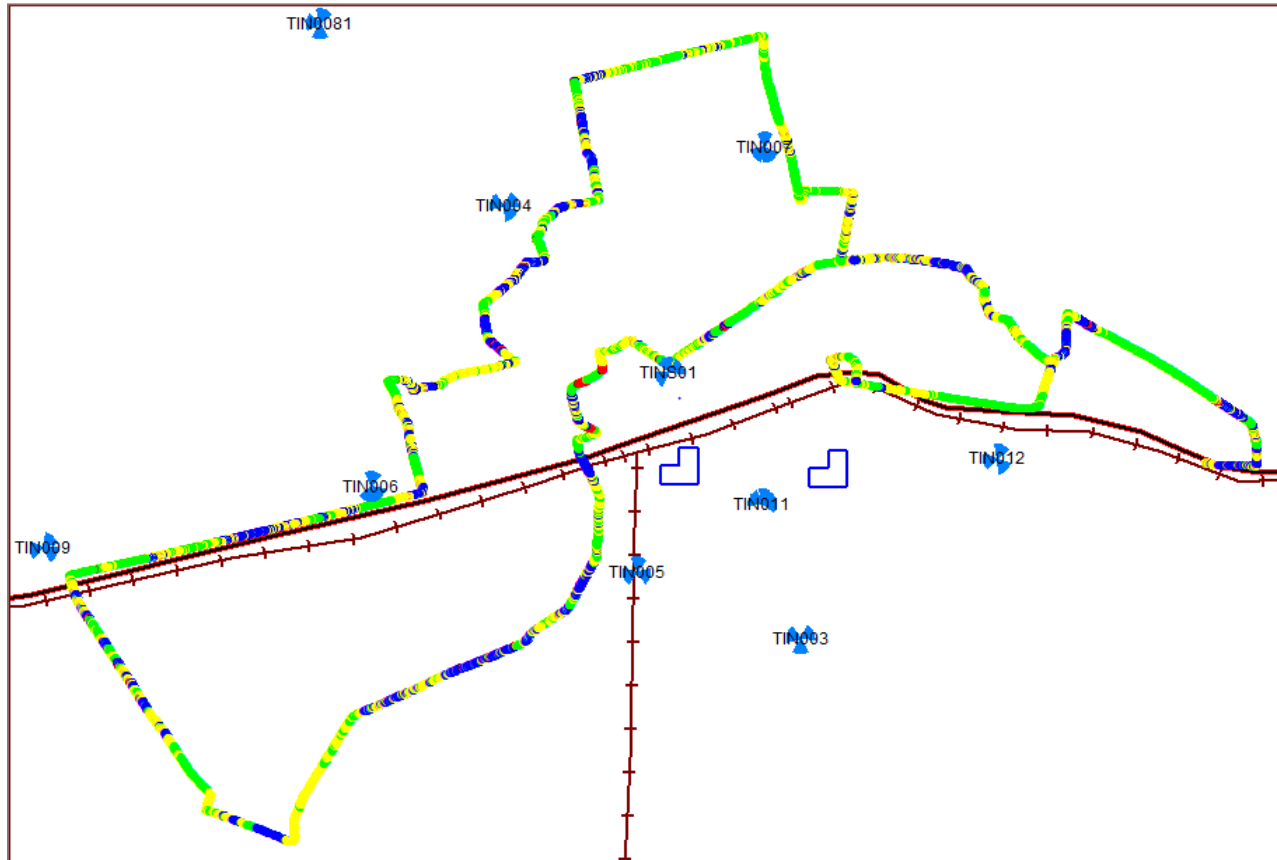
Route Detail: -

TINSUKIYA
MALL ROAD
MARUTI HOTEL
POLICE CHOWK
CENTRAL MARKET
RAILWAY STATION

7.1.2.6   Drive Test Results – Dibrugarh SSA

Parameter's	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		88.37%	47.42%	78.87%	54.93%	32.65%	36.66%	32.95%	32.85%	58.55%	37.85%	86.63%	52.55%	57.01%	39.00%
0 to -85 dBm		99.48%	82.47%	98.82%	81.95%	74.41%	71.96%	83.22%	70.08%	98.71%	69.46%	99.59%	79.23%	94.72%	76.55%
0 to -95 dBm		99.95%	98.11%	99.90%	96.91%	76.86%	90.03%	99.85%	92.49%	99.87%	91.02%	100.00%	93.18%	99.97%	96.85%
Voice quality	≥ 95%	98.80%	95.89%	99.27%	94.74%	97.47%	92.63%	92.74%	91.82%	99.35%	96.72%	99.88%	99.37%	98.42%	96.18%
CSSR	≥ 95%	100.00%	98.63%	100.00%	100.00%	98.04%	92.86%	100.00%	96.86%	100.00%	98.72%	100.00%	100.00%	100.00%	97.33%
%age Blocked calls		0.00%	0.86%	0.00%	0.00%	0.00%	0.00%	0.00%	2.48%	0.00%	1.28%	0.00%	0.00%	0.00%	1.27%
Call drop rate	≤ 2%	0.00%	0.51%	0.00%	0.00%	8.33%	4.79%	1.67%	1.21%	0.00%	0.00%	0.00%	0.75%	0.00%	0.00%
Hands off success rate		100.00%	99.67%	100.00%	99.01%	98.61%	99.15%	93.33%	97.50%	100.00%	99.59%	NA	99.43%	100.00%	99.11%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL GSM failed to meet the benchmark in outdoor as well as indoor locations. Airtel and BSNL CDMA did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

BSNL CDMA failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

BSNL CDMA failed to meet the benchmark for call drop rate in indoor as well as outdoor locations.

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7.1.3   September - Kamrup SSA

Month	Name of SSA Covered	Date of Drive Test
September	KAMRUP	22nd to 24th Sep' 2015

7.1.3.1   Route Details - Kamrup SSA

Category	Type of location	Assam-October KAMRUP		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1. Guwahati rly Stn. to Gerua – Via Baihata chariali, Rangia NH Way/St Way (84 KM) Gerua to Goreswar- Major Road (20 KM) Total- (84 + 20) = 104 KM	1. Goreswar to Dumunichowki - - Major Road (30 KM) Dumunichowki to guwahati Rly Stn. – via bezera, Mandakata, Suktaguri No-2 , kurua Major Rd Drive (48 KM) Total- (30 + 49) = 79 KM Guwahati (Part -1) - City Drive(within the city and office Complex).	1. Teliaguri Gaon Hahim - via Khanapara NH Way Drive(109 KM) Total- 79 KM 2. Guwahati (Part -2) - City Drive(within the city and office Complex).
	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 August 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.

7.1.3.2   Kilometers Travelled- Kamrup SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Kamrup	104	79	79	262

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7.1.3.3   Route Map - Kamrup Day 1
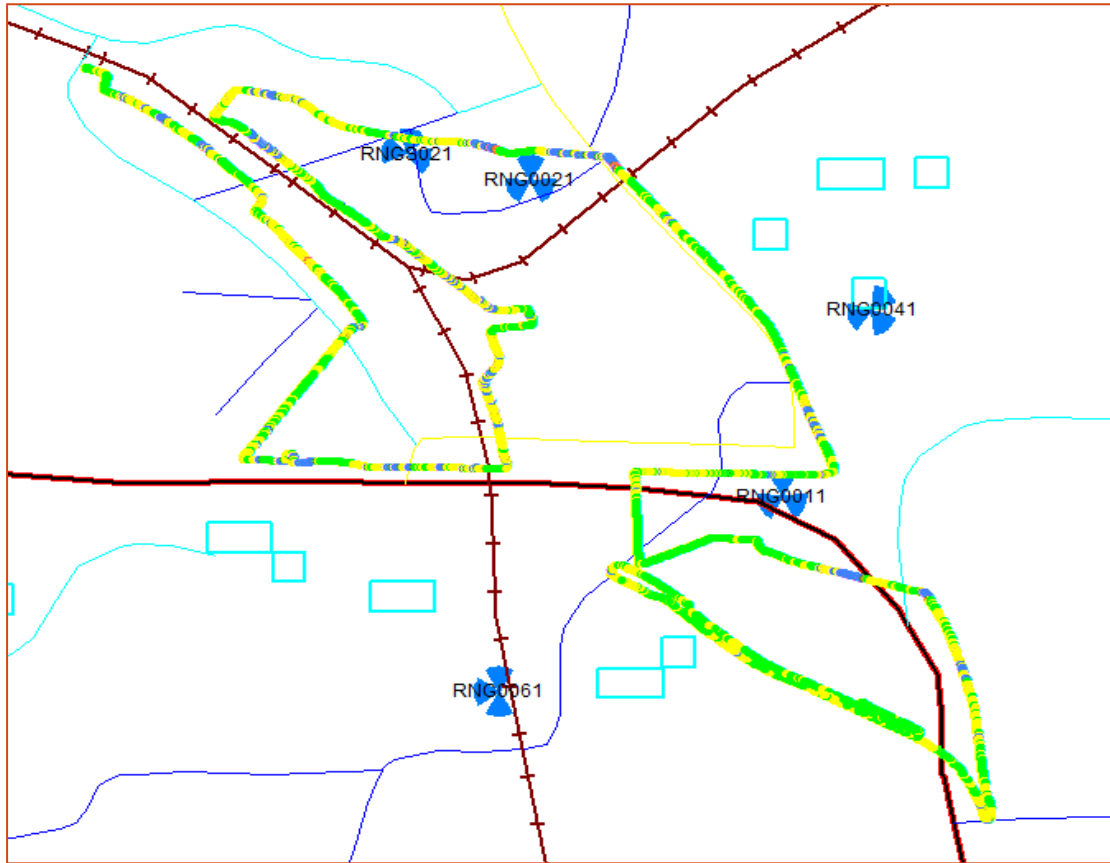
Route Detail: -
POLICE
SATATION
RAILWAY
STATION
RANGIA
MARKET
HIGH SCHOOL

7.1.3.4 Route Map - Kamrup Day 2
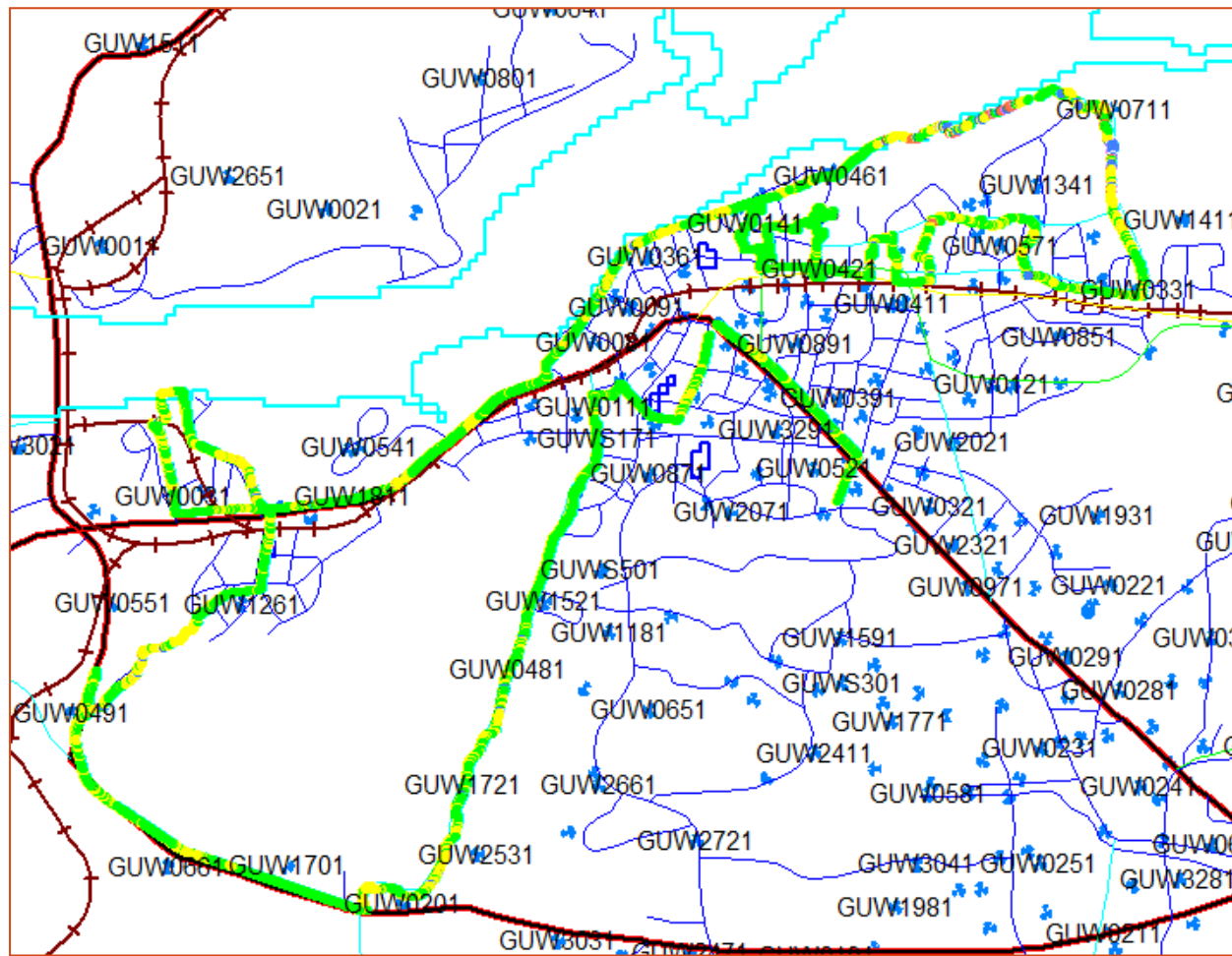
Route Detail: -
JALUKBARI
PANBAZAR
FANCY BAZAR
UZANBAZAR
CHANDMARI
SILPUKRI

7.1.3.5   Route Map - Kamrup Day 3
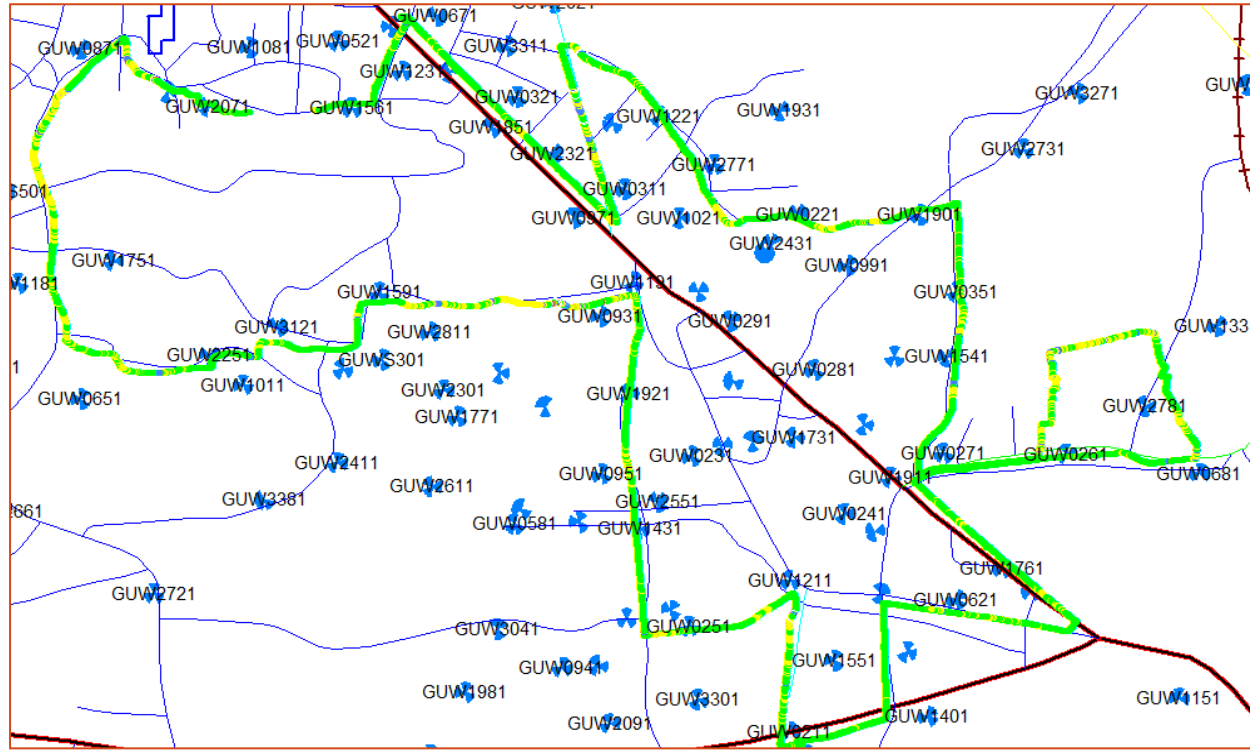
Route Detail: -
Bus Stand
Zoo Road
Pan Bazar
Six Mile
Ganeshguri
Panzabari
Police Station
Afsara Mall

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7.1.3.6   Drive Test Results - Kamrup SSA

Parameter's	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		77.69%	64.71%	100.00%	26.89%	100.00%	26.89%	41.30%	31.04%	37.23%	37.60%	76.16%	71.41%	62.27%	48.54%
0 to -85 dBm		99.70%	91.74%	100.00%	54.88%	100.00%	54.88%	66.30%	61.10%	97.35%	64.63%	98.45%	92.26%	98.59%	83.27%
0 to -95 dBm		66.61%	98.92%	100.00%	89.87%	100.00%	89.87%	98.40%	84.96%	99.93%	88.71%	100.00%	98.81%	99.95%	96.31%
Voice quality	≥ 95%	97.65%	87.98%	98.59%	95.35%	99.89%	93.88%	97.39%	88.83%	99.04%	95.60%	97.49%	90.14%	97.31%	93.67%
CSSR	≥ 95%	100.00%	99.65%	100.00%	99.59%	99.07%	85.94%	100.00%	94.83%	100.00%	98.50%	100.00%	94.82%	100.00%	98.97%
%age Blocked calls		0.00%	0.35%	0.00%	0.41%	0.93%	14.06%	0.00%	5.17%	0.00%	1.50%	0.00%	5.18%	0.00%	1.03%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.65%	8.79%	0.00%	7.88%	0.00%	0.54%	0.00%	0.75%	0.00%	0.62%
Hands off success rate		100.00%	100.00%	100.00%	99.34%	99.48%	99.08%	NA	89.54%	100.00%	98.73%	100.00%	100.00%	100.00%	97.53%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, BSNL CDMA, BSNL GSM, Reliance GSM and Vodafone did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

BSNL CDMA, BSNL GSM, Reliance GSM failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

BSNL CDMA and BSNL GSM failed to meet the benchmark for call drop rate in outdoor locations.

8   ANNEXURE – CONSOLIDATED

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

8.1   NETWORK AVAILABILITY

Audit Results for Network Availability								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		8076	10250	729	4125	4800	4644	9534
Sum of downtime of BTSs in a month (in hours)		261613	27138	89228	58605	41535	10830	46175
BTSs accumulated downtime (not available for service)	≤ 2%	4.41%	0.36%	16.63%	1.93%	1.18%	0.32%	0.66%
Number of BTSs having accumulated downtime >24 hours		2140	174	206	75	52	54	182
Worst affected BTSs due to downtime	≤ 2%	26.50%	1.70%	28.26%	1.82%	1.08%	1.16%	1.91%

Live Measurement- BTSs accumulated downtime								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		8076	10184	729	4125	4700	3096	9534
Sum of downtime of BTSs in a month (in hours)		25449	2519	9769	5964	5035	8779	3497
BTSs accumulated downtime (not available for service)	≤ 2%	4.38%	0.35%	18.61%	2.01%	1.49%	3.94%	0.51%
Number of BTSs having accumulated downtime >24 hours		262	0	34	15	50	46	12
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	3.24%	0.00%	4.66%	0.36%	1.06%	1.49%	0.13%

Data Source: Operations and Maintenance Center (OMC) of the operators

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8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	93.13%	96.27%	97.42%	97.87%	96.96%	98.53%	99.59%
SDCCH/Paging channel congestion	≤ 1%	1.12%	0.36%	NA	0.46%	0.67%	0.02%	0.13%
TCH congestion	≤ 2%	5.01%	0.95%	NDR	0.83%	1.09%	0.07%	0.41%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.95%	96.25%	95.88%	96.22%	98.67%	98.54%	99.78%
SDCCH/Paging channel congestion	≤ 1%	1.61%	0.31%	NA	0.30%	0.24%	0.02%	0.13%
TCH congestion	≤ 2%	2.39%	0.90%	NDR	0.63%	0.40%	0.06%	0.22%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		1515	1643	2368	1816	1485	1382	1638
Total number of successful calls established		1501	1641	2125	1705	1450	1339	1616
CSSR	≥ 95%	99.03%	99.89%	90.24%	94.09%	97.81%	97.17%	98.51%
%age blocked calls		0.97%	0.11%	9.76%	5.91%	2.19%	2.83%	1.49%

Data Source: Network Operations Center (NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

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8.3   CONNECTION MAINTENANCE (RETAINABILITY)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		567470452	560250873	1188471	1090928533	97053486	123385525	11598627
Total number of calls dropped		9695833	7270490	26876	21748251	449695	776151	77440
Call drop rate	≤ 2%	1.71%	1.31%	2.26%	1.99%	0.46%	0.63%	0.67%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		24048	30783	2061	11943	14400	14214	28736
Total number of cells having more than 3% TCH		3380	494	208	343	258	21	830
Worst affected cells having more than 3% TCH	≤ 3%	14.06%	1.60%	10.10%	2.87%	1.79%	0.15%	2.89%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		601997675	56013863	110126	106113140	111786407	10618806	6158379
Total number of calls dropped		8495381	722307	2691	2678791	784263	64673	43834
Call drop rate	≤ 2%	1.41%	1.29%	2.44%	2.54%	0.71%	0.61%	0.71%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		24057	30733	2061	11943	14100	9476	28736
Total number of cells having more than 3% TCH		3352	485	132	324	219	12	848
Worst affected cells having more than 3% TCH	≤ 3%	13.94%	1.58%	6.42%	2.72%	1.55%	0.13%	2.95%

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Drive test results for Call drop rate (Average of three drive tests)								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		1524	1641	2125	1705	1450	1339	1625
Total number of calls dropped		2	1	128	85	5	11	4
Call drop rate	≤ 2%	0.18%	0.06%	6.28%	4.68%	0.32%	0.82%	0.22%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

8.4   VOICE QUALITY

Audit Results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		59393397899	231580971352	240513	102797	12672025230	19113421261	2058805946
Total number of calls with good voice quality		54230052981	226606008468	223274	96367	12102275243	18785724818	2016624915
%age calls with good voice quality	≥ 95%	91.30%	98.08%	93.02%	95.23%	95.50%	98.32%	97.95%

Live measurement results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		58834694251	23591491758	240513	102797	12263946718	1676260569	989663657
Total number of calls with good voice quality		54563644381	23083610630	223274	96367	11763107160	1646731620	971642288
%age calls with good voice quality	≥ 95%	92.74%	98.06%	93.02%	95.23%	95.92%	98.24%	98.18%

Drive test results for Voice quality (Average of three drive tests)								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		2138283	2484065	240513	1520806	2364463	1251771	2595262
Total number of calls with good voice quality		1853139	2382013	223274	1352165	2272280	1165313	2485453
%age calls with good voice quality	≥ 95%	86.74%	95.88%	93.02%	89.04%	96.22%	95.78%	95.79%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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8.5 POI CONGESTION

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		89128	112943	NA	23853	33669	27715	16094361
Traffic served for all POIs (B)- in erlangs		59677	34888	NA	20258	18319	17168	14234738
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		89017	112263	NA	23853	33274	29203	3300832
Traffic served for all POIs (B)- in erlangs		59796	35072	NA	17253	19053	18211	1444663
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

NA: Auditors were not able to get the POI data from BSNL CDMA as operator uses the POI of BSNL GSM for its connectivity to other operators. As per the operator, their systems were not equipped to provide the POI data specifically for BSNL CDMA.

8.6   TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

July							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	679557	845385	94908	761342	898914	101655	976854
August							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	632054	719551	86226	690076	612069	230889	710193
September							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	826672	919129	59379	69388	853480	919227	908215

Data Source: Drive test reports submitted by operators to auditors

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated								
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)								
Metering and billing credibility - Postpaid								
Total bills generated during the period		223552	222460	34213	627559	44136	366201	259388
Total number of bills disputed		284	94	12	25	173	336	497
Total number of valid billing complaints		22	12	12	25	2	336	237
Total complaints considered invalid		262	82	0	0	171	0	260
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.13%	0.04%	0.04%	0.00%	0.39%	0.09%	0.19%
July								
Total bills generated during the first billing cycle		74116	73524	11608	209370	13847	121741	85862
Total number of bills disputed in first billing cycle		103	26	4	9	52	113	179
Total number of valid billing complaints (billing cycle 1)		8	6	4	9	0	113	79
Total complaints considered invalid (billing cycle 1)		95	20			0	52	0	100
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.14%	0.04%	0.03%	0.00%	0.38%	0.09%	0.21%

Data Source: Billing Center of the operators

August							
Total bills generated during the second billing cycle		74622	74037	11568	209656	15053	122199	86419
Total number of bills disputed in second billing cycle		78	13	4	8	58	114	181
Total number of valid billing complaints (billing cycle 2)		5	3	4	8	0	114	83
Total complaints considered invalid (billing cycle 2)		73	10		0	58	0	98
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.10%	0.02%	0.03%	0.00%	0.39%	0.09%	0.21%
September							
Total bills generated during the third billing cycle		74814	74899	11037	208533	15236	122261	87107
Total number of bills disputed in third billing cycle		103	55	4	8	63	109	137
Total number of valid billing complaints (billing cycle 3)		9	3	4	8	2	109	75
Total complaints considered invalid (billing cycle 3)		94	52		0	61	0	62
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.14%	0.07%	0.04%	0.00%	0.41%	0.09%	0.16%

Data Source: Billing Center of the operators

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Metering and billing credibility - Prepaid

Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		5539	33	0	25	215	778	954
Total complaints considered invalid (sum of 3 months)		63642	683	0	1	1288	239	1259
Total number of charging complaints (sum of 3 months)		69181	716	0	26	1503	1017	2213
Total no of customers served (Sum of 3 months)		13732247	16017126	164846	2758630	2761149	6817621	3186357
Percentage of charging complaints disputed	≤ 0.1%	0.50%	0.00%	0.00%	0.00%	0.05%	0.01%	0.07%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated

Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of billing/charging complaints		69465	810	0	21	1459	1592	2710
Total number of complaints resolved in favour of customer		5561	45	0	21	217	1353	1178
Total complaints considered invalid		63904	765	0	0	1242	239	1532
Number of complaints resolved in 4 weeks		5561	45	0	21	217	1353	1178
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		5561	45	0	21	217	1353	1178
Percentage complaints resolved within 6 weeks	100%	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		5561	45	0	20	230	1114	868
Percentage cases in which credit/waiver was received within 1	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints								
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made		100	30	NA	100	100	100	100
Number of cases resolved in 4 weeks		59	23	NA	75	67	82	83
Percentage cases resolved in 4 weeks	≥ 98%	59.00%	76.67%	NA	75.00%	67.00%	82.00%	83.00%
Number of cases resolved in 6 weeks		66	23	NA	80	79	88	93
Percentage cases resolved in 6 weeks	100.00%	66.00%	76.67%	NA	80.00%	79.00%	88.00%	93.00%

Data Source: Billing Center of the operators

NA: Data to conduct live calling for metering and billing was not available at the central billing center of BSNL CDMA. Hence, live calling for the parameter has not been conducted for the operator.

The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.

8.8   CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		17128954	2093904	9402	1133550	4209360	4492296	8480278
Number of calls getting connected and answered (electronically)		16562800	2068371	9402	1107058	4128100	4446584	8479489
Percentage calls getting connected and answered	≥ 95%	96.69%	98.78%	100.00%	97.66%	98.07%	98.98%	99.99%

Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received (3 months)		2590411	1959874	5234	656270	972610	1826876	3003390
Total Number of calls answered within 90 seconds (3 months)		2308371	1911877	5126	642058	970894	1776937	3003390
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	88.92%	97.54%	97.85%	97.89%	99.82%	97.28%	100.00%
July								
Total calls received (Month 1)		878035	689394	1925	238543	324503	562361	1005081
Total calls answered within 90 seconds (Month 1)		800365	678171	1905	229955	323861	549829	1005081
% calls answered within 90 seconds (Month 1)	≥ 95%	91.15%	98.37%	98.96%	96.40%	99.80%	97.77%	100.00%
August								
Total calls received (Month 2)		885582	665833	1421	226270	327039	632955	1015751
Total calls answered within 90 seconds (Month 2)		845908	643167	1378	223781	326493	618409	1015751
% calls answered within 90 seconds (Month 2)	≥ 95%	95.52%	96.60%	96.97%	98.90%	99.83%	97.70%	100.00%
September								
Total calls received (Month 3)		826794	604647	1888	191457	321068	631560	982558
Total calls answered within 90 seconds (Month 3)		662098	590539	1843	188322	320540	608699	982558
% calls answered within 90 seconds (Month 3)	≥ 95%	80.08%	97.67%	97.62%	98.36%	99.84%	96.38%	100.00%

Data Source: Customer Service Center of the operators

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Live calling results for customer care (IVR)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	96	87	100	100	89	88
Percentage calls getting connected and answered	≥ 95%	100.00%	96.00%	87.00%	100.00%	100.00%	89.00%	88.00%

Live calling results for customer care (Voice to Voice)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls attempts		100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	88	95	90	98	87	54
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	88.00%	95.00%	90.00%	98.00%	87.00%	54.00%

Data Source: Live calls made by auditors from operator's network

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated								
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		1157	1122	222	846	NDR	892	842
Number of requests attended within 7 days		1157	1122	222	846	NDR	892	842
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	NDR	100.00%	100.00%

Data Source: Customer Service Center of the operators

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated								
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		994	NA	200	436	NDR	1296	2644
Total number of cases where refund was made within 60 days		994	NA	200	436	NDR	1296	2644
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	NA	100.00%	100.00%	NDR	100.00%	100.00%

Data Source: Billing Center of the operators

NA: For Airtel, there were no cases that required a refund after termination during the quarter. Hence, the audit for the parameter has not been conducted.

NDR: For Idea, auditors were not able to take data for termination/ closure due to a server issue at the operator's end. Hence, audit for the parameter has not been conducted for the operator.

8.11   ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang

Traffic in Erlang	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network	181589	153998	33750	108000	37947	132000	111124
Total taffic handled in erlang during TCBH	123524	124749	525	20258	27070	53380	95158
Total no. of customers served (as per VLR)	3780633	4944506	28142	1021251	919889	1740264	2978280

Data Source: Network Operations Center (NOC) of the operators

8.12   LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests

Resolution of service requests	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	NA	100	100	100	100
Number of cases resolved to satisfaction	87	86	NA	72	72	74	89
Percentage cases resolved in four weeks	87.00%	86.00%	NA	72.00%	72.00%	74.00%	89.00%

Data Source: Live calls made by auditors from operator's network

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NDR: Data to conduct live calling for customer care was not available at the customer service center of BSNL CDMA. Hence, live calling for the parameter has not been conducted for the operator.

8.13   LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services								
Level 1 services		Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150
Calls answered		125	138	129	136	141	126	138
% of calls connected	≥ 95%	83.33%	92.00%	86.00%	90.67%	94.00%	84.00%	92.00%

Data Source: Live calls made by auditors from operator's network

8.14 LEVEL 1 SERVICE CALLS MADE

All the numbers given in mandatory list in Section 2.4.2.4.1 were tested. The following table provides the numbers that are activated for each operator. A tick (✔) for an operator signifies that the number was active for the operator.

Live calls were made to the active numbers to test the calls answered. The details of the same have been given below for each operator.

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✔		10	8
101	Fire	✔		10	8
102	Ambulance	✔		10	8
104	Health Information Helpline	✔		10	8
108	Emergency and Disaster Management Helpline	✔		10	8
138	All India Helpine for Passangers	✔		10	8
149	Public Road Transport Utility Service		✖		
181	Chief Minister Helpline		✖		
182	Indian Railway Security Helpline	✔		8	8
1033	Road Accident Management Service		✖		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✖		
1056	Emergency Medical Services		✖		
106X	State of the Art Hospitals		✖		
1063	Public Grievance Cell DoT Hq		✖		
1064	Anti Corruption Helpline		✖		
1070	Relief Commission for Natural Calamities	✔		10	8
1071	Air Accident Helpline		✖		
1072	Rail Accident Helpline		✖		
1073	Road Accident Helpline	✔		9	8
1077	Control Room for District Collector		✖		
1090	Call Alart (Crime Branch)		✖		
1091	Women Helpline		✖		
1097	National AIDS Helpline to NACO	✔		10	8
1099	Central Accident and Trauma Services (CATS)		✖		
10580	Educationa & Vocational Guidance and Counselling		✖		
10589	Mother and Child Tracking (MCTH)		✖		
10740	Central Pollution Control Board		✖		
10741	Pollution Control Board		✖		
1511	Police Related Service for all Metro Railway Project		✖		
1512	Prevention of Crime in Railway	✔		10	8
1514	National Career Service(NCS)				
15100	Free Legal Service Helpline	✔		8	8
155304	Municipal Corporations		✖		
155214	Labour Helpline	✔		9	8

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
1903	Sashastra Seema Bal (SSB)	✓		9	7
1909	National Do Not Call Registry	✓		8	7
1912	Complaint of Electricity	✓		9	7
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		

Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		11	11
101	Fire	✓		11	10
102	Ambulance	✓		11	10
104	Health Information Helpline	✓		11	11
108	Emergency and Disaster Management Helpline	✓		11	10
138	All India Helpine for Passangers	✓		11	10
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline		✗		
1033	Road Accident Management Service		✗		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✗		
1056	Emergency Medical Services		✗		
106X	State of the Art Hospitals		✗		
1063	Public Grievance Cell DoT Hq		✗		
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		11	9
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline	✓		11	10
1073	Road Accident Helpline		✗		
1077	Control Room for District Collector	✓		11	9
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline		✗		
1097	National AIDS Helpline to NACO	✓		11	10
1099	Central Accident and Trauma Services (CATS)		✗		
10580	Educationa & Vocational Guidance and Counselling		✗		
10589	Mother and Child Tracking (MCTH)	✓			
10740	Central Pollution Control Board		✗		
10741	Pollution Control Board	✓			
1511	Police Related Service for all Metro Railway Project		✗		
1512	Prevention of Crime in Railway	✓		10	9
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline		✗		
155304	Municipal Corporations		✗		
155214	Labour Helpline	✓		10	10
1903	Sashastra Seema Bal (SSB)	✓		10	9
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity		✗		

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		
BSNL CDMA					
100	Police	✓		17	15
101	Fire	✓			
102	Ambulance		✗		
104	Health Information Helpline		✗	17	15
108	Emergency and Disaster Management Helpline	✓		17	16
138	All India Helpine for Passangers		✗		
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline		✗	17	14
1033	Road Accident Management Service		✗		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✗		
1056	Emergency Medical Services		✗		
106X	State of the Art Hospitals		✗		
1063	Public Grievance Cell DoT Hq		✗		
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		17	15
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline	✓		16	14
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline		✗		
1097	National AIDS Helpline to NACO	✓		17	14
1099	Central Accident and Trauma Services (CATS)		✗		
10580	Educationa & Vocational Guidance and Counselling		✗		
10589	Mother and Child Tracking (MCTH)		✗		
10740	Central Pollution Control Board		✗		
10741	Pollution Control Board		✗		
1511	Police Related Service for all Metro Railway Project		✗		
1512	Prevention of Crime in Railway		✗		
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline		✗		
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		16	13
1909	National Do Not Call Registry	✓		16	13
1912	Complaint of Electricity		✗		
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		
BSNL GSM					

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	8
101	Fire	✓		10	9
102	Ambulance	✓		10	9
104	Health Information Helpline	✓		10	8
108	Emergency and Disaster Management Helpline	✓		10	10
138	All India Helpline for Passangers	✓		10	10
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline	✓		10	10
1033	Road Accident Management Service		✗		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✗		
1056	Emergency Medical Services		✗		
106X	State of the Art Hospitals		✗		
1063	Public Grievance Cell DoT Hq		✗		
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		10	10
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline		✗		
1077	Control Room for District Collector	✓		10	10
1090	Call Alart (Crime Branch)	✓		10	10
1091	Women Helpline		✗		
1097	National AIDS Helpline to NACO	✓		10	9
1099	Central Accident and Trauma Services (CATS)		✗		
10580	Educationa & Vocational Guidance and Counselling		✗		
10589	Mother and Child Tracking (MCTH)		✗		
10740	Central Pollution Control Board		✗		
10741	Pollution Control Board		✗		
1511	Police Related Service for all Metro Railway Project		✗		
1512	Prevention of Crime in Railway		✗		
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✓		10	9
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		10	8
1909	National Do Not Call Registry	✓		10	8
1912	Complaint of Electricity	✓		10	8
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		11	10

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
101	Fire	✔		11	10
102	Ambulance	✔		10	10
104	Health Information Helpline	✔		11	11
108	Emergency and Disaster Management Helpline	✔		11	10
138	All India Helpine for Passangers	✔		10	10
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline		✗		
1033	Road Accident Management Service		✗		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✗		
1056	Emergency Medical Services		✗		
106X	State of the Art Hospitals		✗		
1063	Public Grievance Cell DoT Hq		✗		
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✔		11	11
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline		✗		
1077	Control Room for District Collector	✔		10	10
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline		✗		
1097	National AIDS Helpline to NACO	✔		11	10
1099	Central Accident and Trauma Services (CATS)		✗		
10580	Educationa & Vocational Guidance and Counselling		✗		
10589	Mother and Child Tracking (MCTH)		✗		
10740	Central Pollution Control Board		✗		
10741	Pollution Control Board		✗		
1511	Police Related Service for all Metro Railway Project		✗		
1512	Prevention of Crime in Railway	✔		11	10
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✔		11	10
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✔		10	10
1909	National Do Not Call Registry	✔		11	10
1912	Complaint of Electricity	✔		11	9
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✔		10	10
101	Fire	✔		11	8
102	Ambulance	✔		10	8
104	Health Information Helpline	✔		11	9

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
108	Emergency and Disaster Management Helpline	✓		11	10
138	All India Helpine for Passangers	✓		11	9
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline		✗		
1033	Road Accident Management Service		✗		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✗		
1056	Emergency Medical Services		✗		
106X	State of the Art Hospitals		✗		
1063	Public Grievance Cell DoT Hq		✗		
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		10	8
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline		✗		
1077	Control Room for District Collector	✓		11	9
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline		✗		
1097	National AIDS Helpline to NACO	✓		11	9
1099	Central Accident and Trauma Services (CATS)		✗		
10580	Educationa & Vocational Guidance and Counselling		✗		
10589	Mother and Child Tracking (MCTH)		✗		
10740	Central Pollution Control Board		✗		
10741	Pollution Control Board		✗		
1511	Police Related Service for all Metro Railway Project		✗		
1512	Prevention of Crime in Railway	✓		11	10
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline		✗		
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		11	9
1909	National Do Not Call Registry	✓		10	9
1912	Complaint of Electricity	✓		11	9
1916	Drinking Water Supply	✓		11	9
1950	Election Commission of India		✗		

Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		11	11
101	Fire	✓		11	11
102	Ambulance	✓		11	10
104	Health Information Helpline	✓		11	10
108	Emergency and Disaster Management Helpline	✓		11	10
138	All India Helpine for Passangers	✓		10	11
149	Public Road Transport Utility Service		✗		

181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline	✓		11	10
1033	Road Accident Management Service		✗		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		✗		
1056	Emergency Medical Services		✗		
106X	State of the Art Hospitals		✗		
1063	Public Grievance Cell DoT Hq		✗		
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		11	11
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline		✗		
1077	Control Room for District Collector	✓		11	9
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline		✗		
1097	National AIDS Helpline to NACO	✓		11	9
1099	Central Accident and Trauma Services (CATS)		✗		
10580	Educationa & Vocational Guidance and Counselling		✗		
10589	Mother and Child Tracking (MCTH)		✗		
10740	Central Pollution Control Board		✗		
10741	Pollution Control Board		✗		
1511	Police Related Service for all Metro Railway Project		✗		
1512	Prevention of Crime in Railway		✗		
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		✗		
155214	Labour Helpline	✓		10	10
1903	Sashastra Seema Bal (SSB)	✓		11	9
1909	National Do Not Call Registry	✓		10	9
1912	Complaint of Electricity	✓		10	8
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		

Data Source: Live calls made by auditors from operator's network

8.14.1 SDCA WISE LEVEL 1 SERVICE CALLS MADE FOR MANDATORY SERVICES

Barpeta						
Operator Name	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	2	2	2	2	2	2
Airtel	3	2	3	2	3	2
BSNL CDMA	4	3	4	3	4	3
BSNL GSM	3	2	3	2	3	2
Idea	3	2	3	2	2	2
Reliance GSM	3	3	3	2	3	2
Vodafone	2	2	2	2	2	2

Bongaigaon						
Operator Name	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	3	2	3	2	3	2
Airtel	3	3	3	3	3	3
BSNL CDMA	4	4	4	4	4	4
BSNL GSM	3	2	3	3	3	3
Idea	3	2	3	2	2	2
Reliance GSM	2	2	3	2	2	2
Vodafone	3	3	3	3	3	2

Dibrugarh						
Operator Name	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	3	2	3	2	3	2
Airtel	2	3	2	2	2	2
BSNL CDMA	4	4	3	3	3	2
BSNL GSM	2	2	2	2	2	2
Idea	3	3	3	3	3	3
Reliance GSM	2	2	2	2	3	2
Vodafone	3	3	3	3	3	3

Golaghat						
Operator Name	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	2	2	2	2	2	2
Airtel	3	3	3	3	3	3
BSNL CDMA	5	4	3	2	3	3
BSNL GSM	2	2	2	2	2	2
Idea	2	2	2	2	3	3
Reliance GSM	3	3	3	2	2	2
Vodafone	3	3	3	3	3	3

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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

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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))

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8.15.1 ERICSSON

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

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

Ericsson Counters

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

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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 Vodafone 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)}

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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)

8.16   BLOCK SCHEMATIC DIAGRAMS

8.16.1 ERICSSON

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

Ericsson
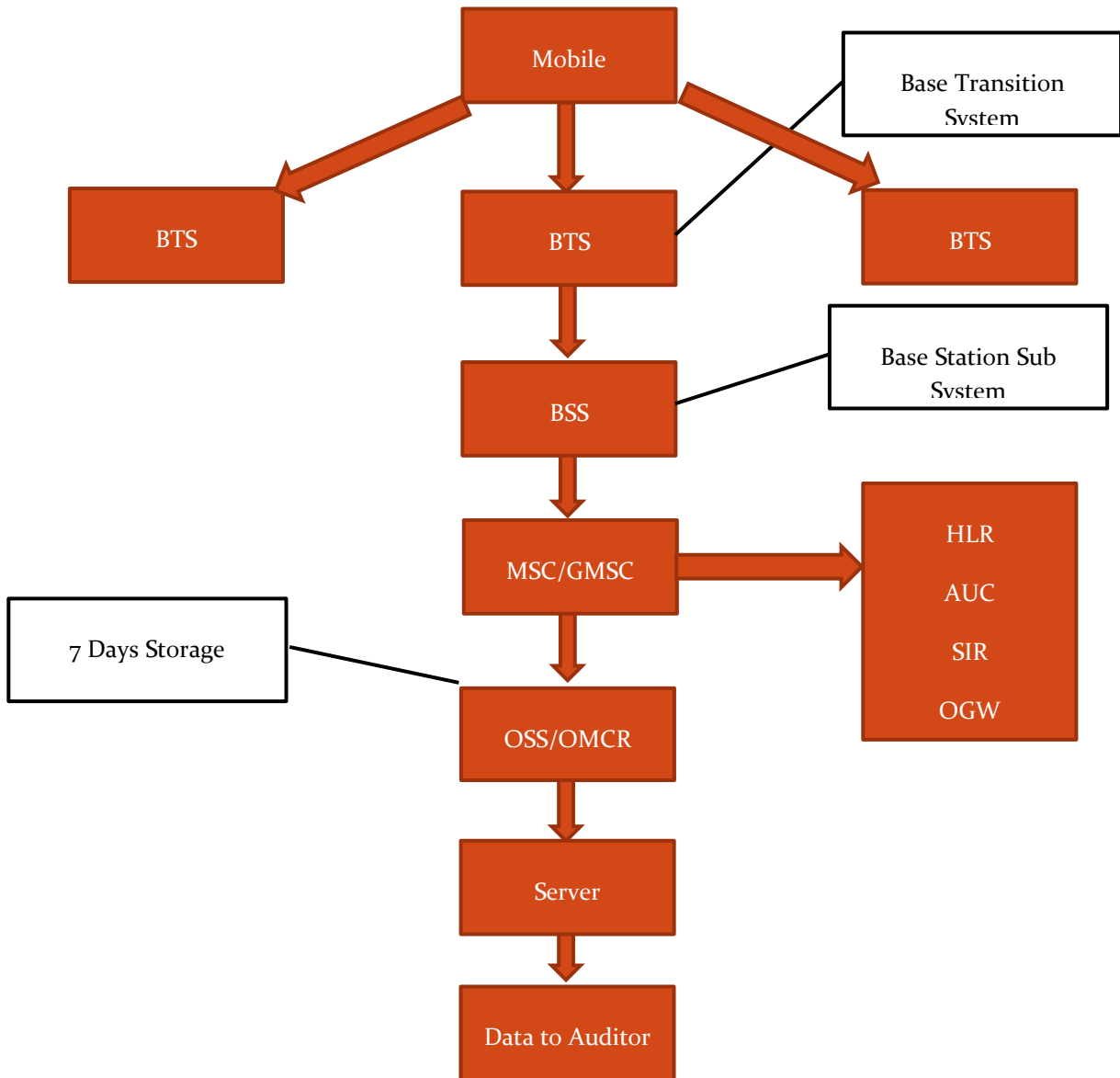
8.16.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

NSN

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                    │      BSS        │──────────│  Base Station Sub    │
                    └─────────────────┘          │      System          │
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    │                  │ │ OSS: Operating  │◄────►│     MSC/GMSC         │
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                                  ▼                          ▼
                         ┌─────────────────┐      ┌──────────────────────┐
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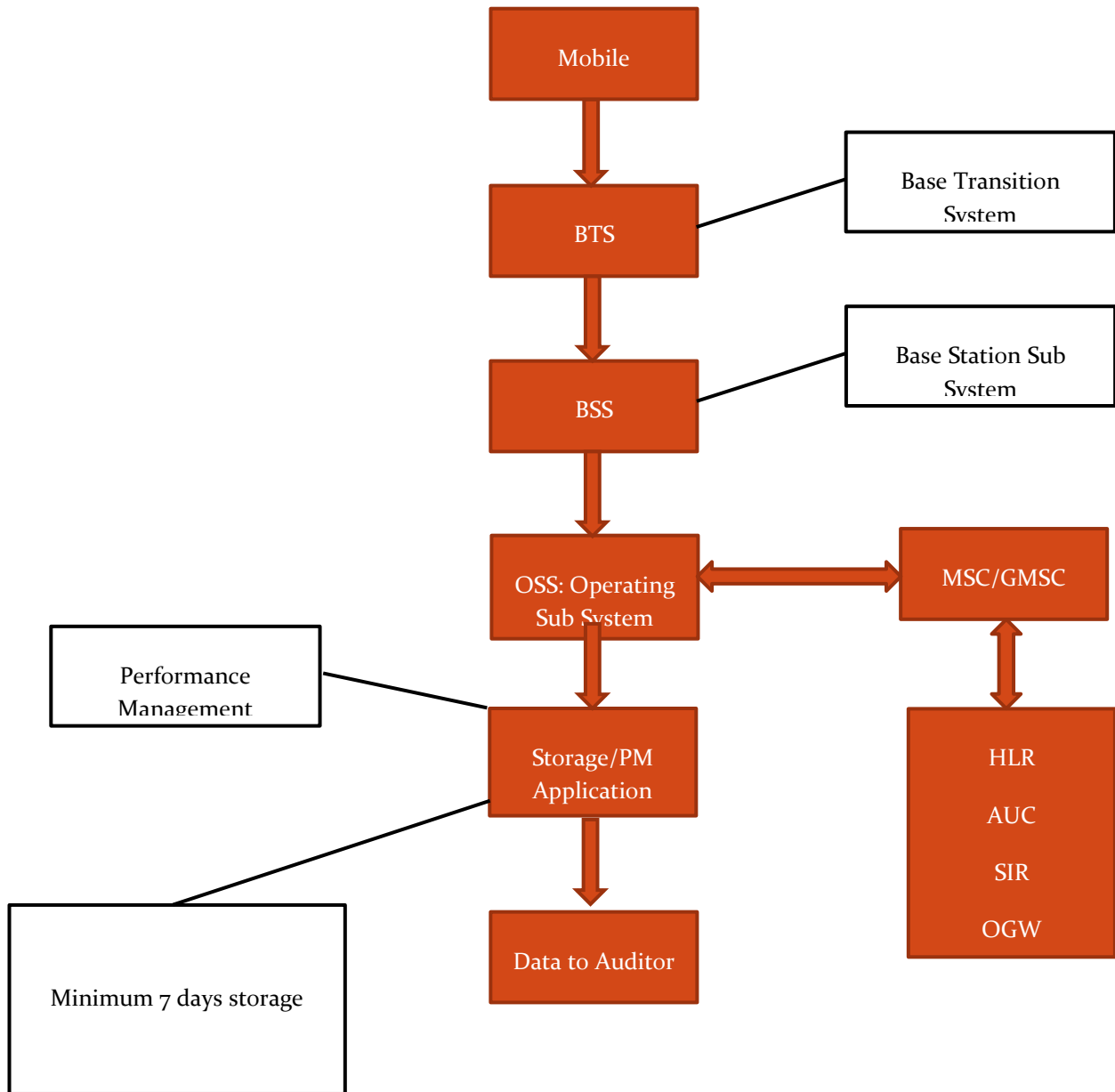
9   ANNEXURE – JULY

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

Audit Results for Network Availability- PMR data-July								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2691	3379	243	1375	1565	1548	3167
Sum of downtime of BTSs in a month (in hours)		82710	8877	30407	19251	13119	2051	13115
BTSs accumulated downtime (not available for service)	≤ 2%	4.13%	0.35%	16.82%	1.88%	1.13%	0.18%	0.56%
Number of BTSs having accumulated downtime >24 hours		687	53	68	22	14	8	61
Worst affected BTSs due to downtime	≤ 2%	25.53%	1.57%	27.98%	1.60%	0.89%	0.52%	1.93%
Live Measurement Results for Network Availability- 3 Day live data-July								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2691	3358	243	1375	1525	NDR	3167
Sum of downtime of BTSs in a month (in hours)		9108	1059	3027	2044	1574	NDR	1397
BTSs accumulated downtime (not available for service)	≤ 2%	4.70%	0.44%	17.30%	2.06%	1.43%	NDR	0.61%
Number of BTSs having accumulated downtime >24 hours		94	0	9	5	14	NDR	5
Worst affected BTSs due to downtime	≤ 2%	3.49%	0.00%	3.70%	0.36%	0.92%	NDR	0.16%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	92.67%	96.28%	95.73%	98.61%	97.25%	98.50%	99.64%
SDCCH/Paging channel congestion	≤ 1%	1.48%	0.46%	NA	0.48%	0.56%	0.02%	0.11%
TCH congestion	≤ 2%	5.59%	0.97%	NDR	0.6%	1.04%	0.08%	0.36%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.78%	96.25%	91.20%	98.73%	98.58%	NDR	99.82%
SDCCH/Paging channel congestion	≤ 1%	1.47%	0.44%	NA	0.2%	0.26%	NDR	0.14%
TCH congestion	≤ 2%	2.21%	0.98%	NDR	0.41%	0.40%	NDR	0.18%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		579	581	911	660	570	434	587
Total number of successful calls established		572	581	849	603	546	416	585
CSSR	≥ 95%	98.79%	100.00%	93.19%	91.36%	95.79%	95.85%	99.66%
%age blocked calls		1.21%	0.00%	6.81%	8.64%	4.21%	4.15%	0.34%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-July								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		195427184	210118380	327505	351598281	31912396	14834040	3957078
Total number of calls dropped		3338984	2311870	7645	6961646	151619	94154	24694
Call drop rate	≤ 2%	1.71%	1.10%	2.33%	1.98%	0.48%	0.63%	0.62%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		8015	10133	687	3981	4695	4738	9548
Total number of cells having more than 3% TCH		1146	139	72	106	74	9	260
Worst affected cells having more than 3% TCH	≤ 3%	14.30%	1.37%	10.47%	2.66%	1.58%	0.19%	2.72%

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Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-July								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		201162205	20649276	21898	33930486	36705909	NDR	2108163
Total number of calls dropped		3022955	231884	547	963626	514054	NDR	18694
Call drop rate	≤ 2%	1.50%	1.12%	2.50%	2.84%	1.40%	NDR	0.89%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		8011	10101	687	3981	4575	NDR	9548
Total number of cells having more than 3% TCH		1172	165	54	97	57	NDR	283
Worst affected cells having more than 3% TCH	≤ 3%	14.63%	1.63%	7.86%	2.44%	1.25%	NDR	2.96%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-July								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		572	581	849	603	546	416	585
Total number of calls dropped		0	1	18	26	2	5	0
Call drop rate	≤ 2%	0.00%	0.17%	2.12%	4.31%	0.37%	1.20%	0.00%

Audit Results for Voice quality -PMR Data-July

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		19655742153	20382003861	94908	51974	4159453760	2209934390	692079480
Total number of calls with good voice quality		17899487168	20015955437	87978	47433	3965744808	2174825889	678216157
%age calls with good voice quality	≥ 95%	91.06%	98.20%	92.70%	91.26%	95.34%	98.41%	98.00%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		19211105414	2012281754	94908	51974	3916182213	NDR	328274729
Total number of calls with good voice quality		17766725408	1975329349	87978	47433	3754904887	NDR	322464970
%age calls with good voice quality	≥ 95%	92.48%	98.16%	92.70%	91.26%	95.88%	NDR	98.23%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		679557	845385	94908	761342	898914	101655	976854
Total number of calls with good voice quality		510150	814579	87978	656809	859178	98344	946415
%age calls with good voice quality	≥ 95%	75.07%	96.36%	92.70%	86.27%	95.58%	96.74%	96.88%

Audit Results for POI Congestion- PMR data-July							
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		88098	112716	NA	21047	40451	24738	16091678
Traffic served for all POIs (B)- in erlangs		59497	35960	NA	19692	17735	15081	14512491
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-July							
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	NDR	31
No. of POIs not meeting benchmark		0	0	NA	0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		88098	112688	NA	21047	40451	NDR	6655532
Traffic served for all POIs (B)- in erlangs		59963	35454	NA	17561	19925	NDR	1471048
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	NDR	0.00%

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10 ANNEXURE – AUGUST

Audit Results for Network Availability- PMR data-August								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2691	3419	243	1375	1610	1548	3182
Sum of downtime of BTSs in a month (in hours)		86068	8810	30512	20306	14328	4790	16845
BTSs accumulated downtime (not available for service)	≤ 2%	4.30%	0.35%	16.88%	1.98%	1.20%	0.42%	0.71%
Number of BTSs having accumulated downtime >24 hours		712	57	70	26	16	26	61
Worst affected BTSs due to downtime	≤ 2%	26.46%	1.67%	28.81%	1.89%	0.99%	1.68%	1.92%
Live Measurement Results for Network Availability- 3 Day live data-August								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2691	3385	243	1375	1565	1548	3182
Sum of downtime of BTSs in a month (in hours)		7865	505	3852	2049	1679	4790	1055
BTSs accumulated downtime (not available for service)	≤ 2%	4.06%	0.21%	22.02%	2.07%	1.49%	4.30%	0.46%
Number of BTSs having accumulated downtime >24 hours		80	0	15	5	15	26	5
Worst affected BTSs due to downtime	≤ 2%	2.97%	0.00%	6.17%	0.36%	0.96%	1.68%	0.16%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	93.89%	96.26%	98.20%	98.58%	97.25%	98.54%	99.56%
SDCCH/Paging channel congestion	≤ 1%	0.90%	0.30%	NA	0.39%	0.47%	0.02%	0.13%
TCH congestion	≤ 2%	4.29%	1.01%	NDR	0.57%	1.10%	0.07%	0.44%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.19%	96.25%	98.04%	98.89%	98.61%	98.50%	99.78%
SDCCH/Paging channel congestion	≤ 1%	1.38%	0.27%	NA	0.19%	0.34%	0.01%	0.10%
TCH congestion	≤ 2%	2.81%	0.94%	NDR	0.30%	0.45%	0.06%	0.22%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		374	433	553	489	391	371	436
Total number of successful calls established		369	433	518	471	387	371	423
CSSR	≥ 95%	98.66%	100.00%	93.67%	96.32%	98.98%	100.00%	97.02%
%age blocked calls		1.34%	0.00%	6.33%	3.68%	1.02%	0.00%	2.98%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		187409790	167639499	462146	346681348	31630178	59636417	3820342
Total number of calls dropped		3103584	2095626	10819	6933627	109377	374638	26363
Call drop rate	≤ 2%	1.66%	1.25%	2.34%	2.00%	0.35%	0.63%	0.69%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		8008	10323	687	3981	4830	4738	9597
Total number of cells having more than 3% TCH		1072	158	72	119	80	7	284
Worst affected cells having more than 3% TCH	≤ 3%	13.39%	1.53%	10.54%	2.99%	1.66%	0.15%	2.96%

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Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-August								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		195572025	17256788	45785	33818617	37982670	5730961	2012737
Total number of calls dropped		2795066	203971	1342	882666	123847	34781	11838
Call drop rate	≤ 2%	1.43%	1.18%	2.93%	2.61%	0.33%	0.61%	0.59%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		8026	10283	687	3981	4695	4738	9597
Total number of cells having more than 3% TCH		1080	124	43	97	72	7	281
Worst affected cells having more than 3% TCH	≤ 3%	13.46%	1.21%	6.31%	2.44%	1.53%	0.15%	2.93%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-August								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		373	433	518	471	387	371	432
Total number of calls dropped		2	0	36	7	0	2	0
Call drop rate	≤ 2%	0.54%	0.00%	6.95%	1.49%	0.00%	0.54%	0.00%

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Audit Results for Voice quality -PMR Data-August

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		20096753784	20605020078	86226	47006	4292999491	9014607410	694279603
Total number of calls with good voice quality		18386023300	20250865034	79121	45181	4100326398	8855603691	679845755
%age calls with good voice quality	≥ 95%	91.49%	98.28%	91.76%	96.12%	95.51%	98.24%	97.92%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		19412301454	2110538078	86226	47006	4094885747	862270387	328797123
Total number of calls with good voice quality		18016604533	2073609183	79121	45181	3928482254	847035363	322317905
%age calls with good voice quality	≥ 95%	92.81%	98.25%	91.76%	96.12%	95.94%	98.23%	98.03%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		632054	719551	86226	690076	612069	230889	710193
Total number of calls with good voice quality		608847	687548	79121	633579	595565	229752	684710
%age calls with good voice quality	≥ 95%	96.33%	95.55%	91.76%	91.81%	97.30%	99.51%	96.41%

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Audit Results for POI Congestion- PMR data-August								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		88460	112942	NA	25256	30581	29934	16091876
Traffic served for all POIs (B)- in erlangs		59703	35380	NA	21741	18482	18551	13683796
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-August								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	23	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		88127	113039	NA	25256	29394	29934	1623097
Traffic served for all POIs (B)- in erlangs		59703	36239	NA	16390	18524	18551	1424099
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE – SEPTEMBER

Audit Results for Network Availability- PMR data-September								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2694	3452	243	1375	1625	1548	3185
Sum of downtime of BTSs in a month (in hours)		92836	9451	28309	19049	14088	3989	16215
BTSs accumulated downtime (not available for service)	≤ 2%	4.79%	0.38%	16.18%	1.92%	1.20%	0.36%	0.71%
Number of BTSs having accumulated downtime >24 hours		741	64	68	27	22	20	60
Worst affected BTSs due to downtime	≤ 2%	27.51%	1.85%	27.98%	1.96%	1.35%	1.29%	1.88%

Live Measurement Results for Network Availability- 3 Day live data-September								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2694	3441	243	1375	1610	1548	3185
Sum of downtime of BTSs in a month (in hours)		8476	955	2890	1871	1782	3989	1045
BTSs accumulated downtime (not available for service)	≤ 2%	4.37%	0.39%	16.52%	1.89%	1.54%	3.58%	0.46%
Number of BTSs having accumulated downtime >24 hours		88	0	10	5	21	20	2
Worst affected BTSs due to downtime	≤ 2%	3.27%	0.00%	4.12%	0.36%	1.30%	1.29%	0.06%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	92.82%	96.28%	98.32%	96.43%	96.39%	98.56%	99.57%
SDCCH/Paging channel congestion	≤ 1%	0.97%	0.31%	NA	0.50%	0.97%	0.02%	0.14%
TCH congestion	≤ 2%	5.16%	0.88%	NDR	1.31%	1.13%	0.07%	0.43%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.88%	96.25%	98.41%	91.03%	98.83%	98.57%	99.73%
SDCCH/Paging channel congestion	≤ 1%	1.98%	0.23%	NA	0.50%	0.12%	0.02%	0.16%
TCH congestion	≤ 2%	2.16%	0.79%	NDR	1.17%	0.35%	0.07%	0.27%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		562	629	904	667	524	577	615
Total number of successful calls established		560	627	758	631	517	552	608
CSSR	≥ 95%	99.64%	99.68%	83.85%	94.60%	98.66%	95.67%	98.86%
%age blocked calls		0.36%	0.32%	16.15%	5.40%	1.34%	4.33%	1.14%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		184633478	182492994	398820	392648904	33510912	48915068	3821207
Total number of calls dropped		3253265	2862994	8412	7852978	188699	307359	26383
Call drop rate	≤ 2%	1.76%	1.57%	2.11%	2.00%	0.56%	0.63%	0.69%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		8025	10327	687	3981	4875	4738	9591
Total number of cells having more than 3% TCH		1162	197	64	118	104	5	286
Worst affected cells having more than 3% TCH	≤ 3%	14.48%	1.91%	9.29%	2.96%	2.13%	0.11%	2.98%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		205263445	18107799	42443	38364037	37097828	4887845	2037479
Total number of calls dropped		2677360	286452	802	832499	146362	29892	13302
Call drop rate	≤ 2%	1.30%	1.58%	1.89%	2.17%	0.39%	0.61%	0.65%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		8020	10349	687	3981	4830	4738	9591
Total number of cells having more than 3% TCH		1100	196	35	130	90	5	284
Worst affected cells having more than 3% TCH	≤ 3%	13.72%	1.89%	5.09%	3.27%	1.86%	0.11%	2.96%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		579	627	758	631	517	552	608
Total number of calls dropped		0	0	74	52	3	4	4
Call drop rate	≤ 2%	0.00%	0.00%	9.76%	8.24%	0.58%	0.72%	0.66%

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Audit Results for Voice quality -PMR Data-September

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		19640901962	190593947413	59379	3817	4219571979	7888879461	672446863
Total number of calls with good voice quality		17944542513	186339187997	56175	3753	4036204037	7755295238	658563003
%age calls with good voice quality	≥ 95%	91.36%	97.77%	94.60%	98.32%	95.65%	98.31%	97.94%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		20211287383	19468671926	59379	3817	4252878758	813990182	332591805
Total number of calls with good voice quality		18780314440	19034672098	56175	3753	4079720019	799696257	326859413
%age calls with good voice quality	≥ 95%	92.92%	97.77%	94.60%	98.32%	95.93%	98.24%	98.28%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		826672	919129	59379	69388	853480	919227	908215
Total number of calls with good voice quality		734142	879886	56175	61777	817537	837217	854328
%age calls with good voice quality	≥ 95%	88.81%	95.73%	94.60%	89.03%	95.79%	91.08%	94.07%

Audit Results for POI Congestion- PMR data-September

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	22	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		90826	113172	NA	25256	29976	28473	16099530
Traffic served for all POIs (B)- in erlangs		59832	33324	NA	19341	18738	17870	14507926
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

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

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	NA	19	30	22	31
No. of POIs not meeting benchmark		0	0	NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		90826	111063	NA	25256	29976	28473	1623867
Traffic served for all POIs (B)- in erlangs		59721	33524	NA	17809	18709	17870	1438841
POI congestion	≤ 0.5%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%

12 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JAS'15 – Refers to the quarter of July , August and September 2015
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