TRAI Audit Wireless Report for Assam Circle

QE March- 2016

EAST ZONE

Prepared by:

IMRB | eTech

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Submitted to:

TRAI
Telecom Regulatory Authority of India

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

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 December 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated October 6, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

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

2.2   OBJECTIVES

The primary objective of the Audit module is to-

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

2.3 COVERAGE

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

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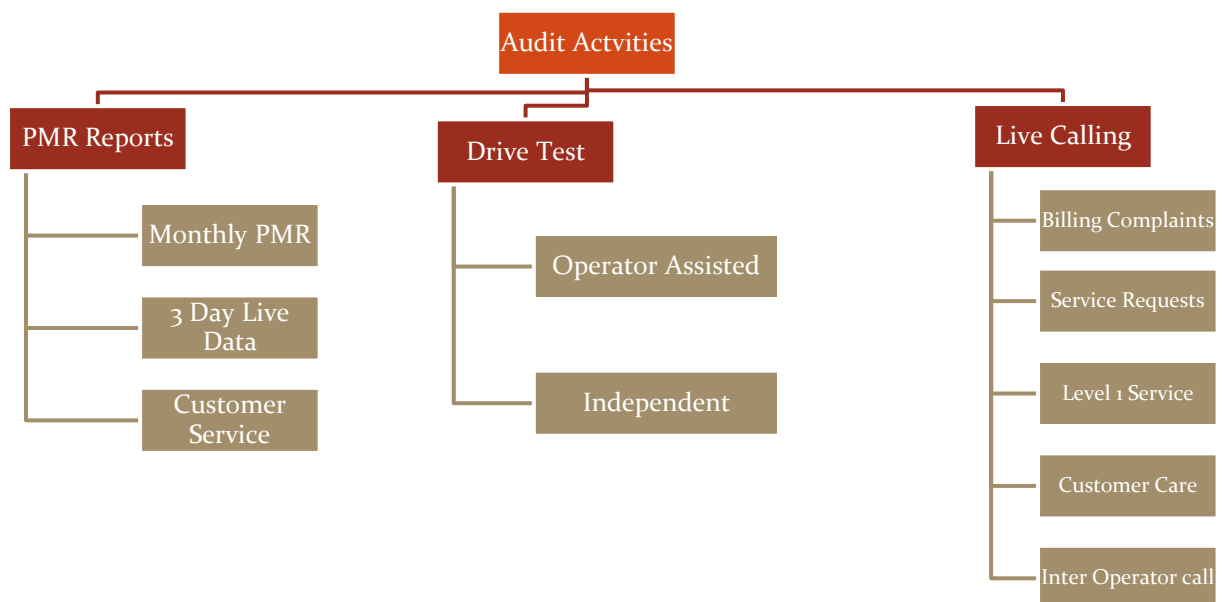
Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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, January 2016 audit data was collected in the month of February 2016.

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 March 2016 (JFM'16) was collected in the month of January 2016.

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

- ✍ Monthly PMR (Network Parameters & Wireless Data Services) – 2G & 3G
- ✍ 3 Day Live Measurement Data (Network Parameters & Wireless Data Services) – 2G & 3G
- ✍ Customer Service Data

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G 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 January, February and March 2016. 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 2G

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

Network Related

Network Parameters - 2G		
Parameter Category	**Parameter**	**Benchmark**
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 Chl. Congestion (%age)	**≤ 1%**
	TCH Congestion (%age)	**≤ 2%**
Connection Maintenance (Retainability)	**Call Drop Rate (%age)**	**≤ 2%**
	Worst affected cells having more than 3% TCH drop	**≤ 3%**
	%age of connection with good voice quality	**≥ 95%**
	Point of Interconnection (POI)	**≤ 0.5%**

2.4.1.4   MONTHLY PMR 3G

This involved calculation of the various 3G 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 January, February and March 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- Node Bs accumulated downtime
- Worst affected Node Bs due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- RRC Congestion
- Circuit Switched RAB Congestion
- Point of Interconnection

Connection Maintenance

- Circuit Switched Voice Drop rate
- Worst affected cells having more than 3% Circuit switched Voice drop rate

Voice Quality

- % Connections with good Circuit Switched 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.

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

Network Parameters - 3G		
Network Availability	**Node Bs downtime (not available for service)**	**≤ 2%**
	Worst affected Node Bs due to downtime	**≤ 2%**
Connection Establishment (Accessibility)	**Call Set-up Success Rate (within licensee's own network)**	**≥ 95%**
	RRC Congestion	**≤ 1%**
	Circuit Switched RAB Congestion	**≤ 2%**
Connection Maintenance (Retainability)	**Circuit Switched voice drop rate**	**≤ 2%**
	Worst affected cells having more than 3% Circuit switched voice drop rate	**≤ 3%**
	%age of connection with good circuit switched voice quality	**≥ 95%**
	Point of Interconnection (POI)	**0.5%**

2.4.1.6 MONTHLY PMR – WIRELESS DATA SERVICES (2G & 3G)

The PMR report for wireless data service (2G and 3G) is extracted at the operator premises and verified every month of the quarter. This includes three parameters-

- ➢ Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- ➢ PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- ➢ Drop Rate:- Drop Rate ≤ 5%

2.4.1.7 AUDIT PARAMETERS – WIRELESS DATA SERVICES (2G & 3G)

Wireless Data Service		
Service Activation	**Activation done within 4 hours**	**≥ 95%**
PDP Context activation success rate	**PDP Context activation success rate**	**≥ 95%**
Drop Rate	**Drop Rate**	**≤ 5%**

2.4.1.8   POINT OF DATA EXTRACTION

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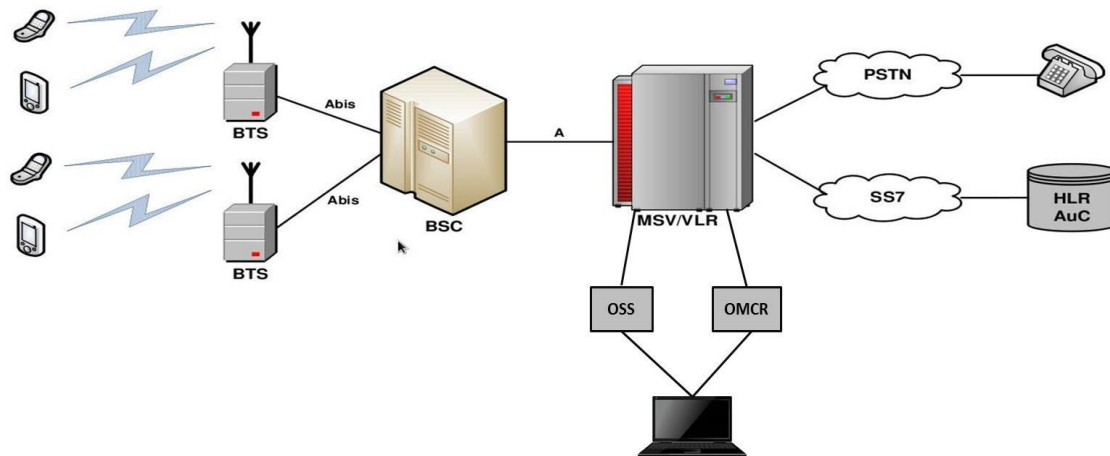
2.4.1.9   STEP BY STEP AUDIT PROCEDURE

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

Tender document and latest list of licensees as per TRAI are taken as a reference document for assimilating the presence of operators. The wireless operators are then contacted for the 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.

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

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% = $[(A_1 \times C_1) + (A_2 \times C_2) + ... + (A_n \times C_n)] / (A_1 + A_2 + ... + A_n)$ Where: A_1 = Number of attempts to establish SDCCH / TCH made on day 1
TCH Congestion	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	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
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

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

Parameter	Calculation Methodology
Node Bs Accumulated Downtime	Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100
Worst Affected Node Bs Due to Downtime	(Number of Node Bs having accumulated downtime greater than 24 hours in a month / Number of Node B in Licensed Service Area) * 100
Call Setup Success Rate	(RRC Established / Total RRC Attempts) * 100
RRC Congestion	RRC / RAB Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) + \ldots + (A_n \times C_n)] / (A_1 + A_2 + \ldots + A_n)$ Where: A_1 = Number of attempts to establish RRC/ RAB made on day 1
Circuit Switched RAB Congestion	C_1 = Average RRC/ RAB Congestion % on day 1 A_2 = Number of attempts to establish RRC/ RAB made on day 2 C_2 = Average RRC/ RAB Congestion % on day 2 A_n = Number of attempts to establish RRC/ RAB made on day n C_n = Average RRC/ RAB Congestion % on day n
POI Congestion	POI Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) + \ldots + (A_n \times C_n)] / (A_1 + A_2 + \ldots + A_n)$ 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
Circuit Switched Voice Drop Rate	No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released) x 100
Worst Affected Cells having more than 3% Circuit Switched Voice Drop Rate	Number of cells having CSV drop rate > 3% during CBBH in a month / Total number of cells in the licensed area) x 100
Connections with good Circuit switched voice quality	1- (Number of Faulty Transport Blocks In Uplink downlink After Selection Combining Speech / Total number of Transport Blocks In Uplink downlink After Selection Combining Speech)) x 100

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2.4.1.12 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.

The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

2.4.1.13 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 Aug 2015, the 90 day period data used to identify TCBH would be the data of Jun, Jul and Aug 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

2.4.1.14 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

2.4.1.15 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 March 2016 (JFM'16) was collected in the month of January 2016. 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.

2.4.1.16 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%

2.4.1.17 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 March 2016. 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 February 2016 was considered for live calling activity conducted in March 2016.

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 December, 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 300 test calls were made per service provider in the quarter.

In JFM'16, 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

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 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the performance of an operator 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 (No IDT conducted in this quarter)

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 – VOICE 2G & 3G

SSAs are selected according to the total no. of SSAs on that region and audited as per TRAI instructions; it depends on the total no. of drive on that circle. The drive tests were conducted for all operators in the circle, for both 2G and 3G voice services. As per TRAI instructions, the 2G drive was done in 2G only mode, while 3G drive test was conducted in dual mode (3G on priority).

As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

1. Normal SSA
2. Difficult SSA

During the drive test in normal SSA, the methodology adopted for the drive test is:

- 3 consecutive days were selected for drive test in selected SSA. SSAs were defined as per BSNL and SSA list was finalized by regional TRAI office.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 250kms in 3 days.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
  o With In city
  o Major Roads
  o Highways
  o Shopping complex/ Mall
  o Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 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. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

In drive test for difficult SSAs, the methodology adopted for the drive test is:-
- Drive test was conducted for 6 consecutive days in selected SSAs; SSAs are defined as per BSNL and SSA list was finalized by regional TRAI office.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 500kms in 6 days.

Rest of the activities for drive test in difficult SSAs are same as drive test for normal SSAs.

2.4.3.3 INDEPENDENT DRIVE TEST – 2G & 3G

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

- A minimum of 80 kilometers was traversed during the independent drive test in a SSA on each day. The SSAs were defined as per BSNL and SSA list was finalized by regional TRAI office.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
  - o With In city
  - o Major Roads
  - o Highways
  - o Shopping complex/ Mall
  - o Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 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. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING VOICE DRIVE TEST – 2G & 3G

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)

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- ✓ Total Rx Qual Samples– A
- ✓ Rx Qual 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

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

The data drive test is conducted at stationary places called hotspots in a SSA for all the days the voice drive test is conducted in the same SSA.

2.4.4.1 METHODOLOGY

The measurement setup is used to conduct test calls for measuring successful data transmission download and upload attempts, minimum download speed, average throughput and latency is given in figure given below.

The basic measurement set-up consists of a Test-Device and a Test-Server with specified software and hardware. Test calls are established between the Test-Device and Test-Server and measurements are made for the respective QoS parameters. These parameters are measured in a stationary mode. Service Activation/Provisioning, PDP Context Activation Success Rate and Drop rate are reported from the actual network counters/database.

- ✤ To assess the quality of the connection between an end user and an Internet Service Provider (ISP), ideally the Test-Server is placed as near as possible to the gateway providing the interconnection between access network and ISP network. The location of the test-server is as near as possible to the gateway providing the interconnection between access network and ISP network implies that the measurements will not reflect the influence in the QoS of the ISP network, between that gateway and the gateway interconnecting with the Internet.
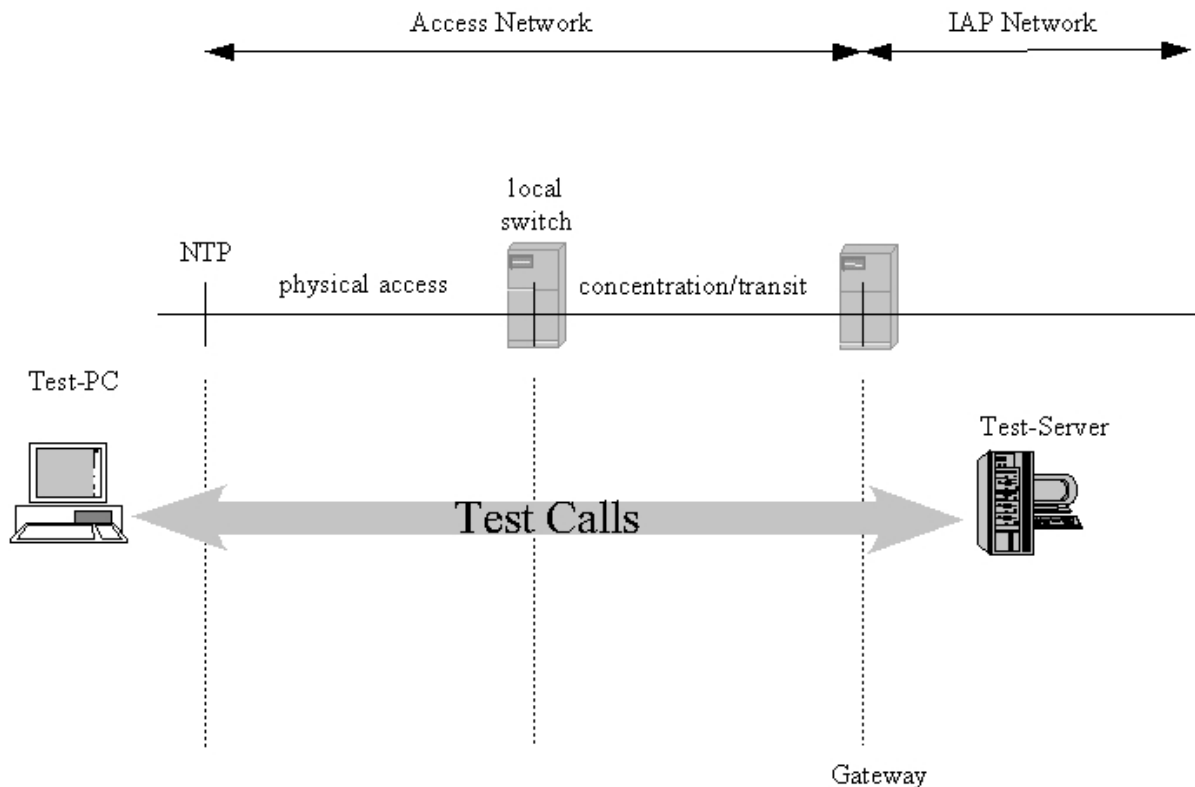
Figure for Measurement set-up

2.4.4.2 REQUIREMENTS FOR THE TEST-SERVER

For all tests, a dedicated test server is used as a well-defined reference. The test server may be located centrally for all the licensed service areas (LSA) or for a number of LSAs or in each LSA (not more than one in each LSA). Under no circumstances a commercial server (e.g. www.yahoo.com) is used, since the test conditions for such a server may change over time making later reproduction of the results impossible. The test server is identified by an IP address and not by its fully qualified Domain Name (FQDN) in order to avoid issues with Domain Name Server (DNS) lookup and including the DNS caching strategies of the used operating system into the measurement.

  ✤ The Transmission Control Protocol (TCP) settings of the server tested against, is also recorded. Since the number of host operating systems for internet servers is larger than on the client side, no detailed recommendation concerning the TCP settings of the server is given.

However, the TCP stack of the reference server should at least be capable of the following:
  o Maximum Segment Size between 1380 Bytes and 1460 Bytes.
  o TCP RX Window Size > 4096 Bytes
  o SACK (Selective Acknowledgement) enabled.
  o TCP Fast Retransmit.
  o TCP Fast Recovery enabled.
  o Delayed ACK enabled (200ms).

2.4.4.3 TEST FILES

The test file consist of incompressible data i.e. a data file that is already compressed, e.g. like a zip or jpg file. The test file has at least twice the size (in Kbit) of the theoretically maximum data transmission rate per second (in Kbit/s) of the Internet access under consideration.

2.4.4.4 REPRESENTATIVENESS OR NUMBER OF TEST CALLS

- ✎ The choice of adequate test calls, i.e. geographical locations of origin and destination of calls as well as traffic variations, is a crucial point with respect to the comparability and validation of the statistics are calculated for the measured parameters. For each parameter, it is ensured that the samples are aggregated over all classes of customers for fairness in reflecting the QoS actually perceived by the user and the statistics are preserved to substantiate the same.
- ✎ The necessary number of samples (test calls) are 1067 for each of the category "A" and "Metro" licensed service area (LSA), 600 for each of the category "B" LSA and 384 for each of the category "C" LSA for all the parameters.

2.4.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1 SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

The successful data download attempts is defined as the ratio of successful data downloads to the total number of data download attempts in a specified time period. A data transmission is successful if a test file is downloaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data downloads, divided by the sum total of all attempts to download a test file is provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data download is measured by downloading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission download attempts =

$$\frac{\text{Total Successful download attempts} \times 100}{\text{Total download attempts}}$$

2.4.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

The successful data upload attempts is defined as the ratio of successful data uploads to the total number of data upload attempts in a specified time period. A data upload is successful if a test file is uploaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data uploads, divided by the sum total of all attempts to upload a test file should be provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data upload is measured by uploading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission upload attempts = $\dfrac{\text{Total Successful upload attempts} \times 100}{\text{Total upload attempts}}$

2.4.4.5.3 MINIMUM DOWNLOAD SPEED

The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.

Measurement:

The minimum download speed is calculated from test calls made according to the measurement set-up. Test calls are to be made to weigh the results according to the patterns of real traffic. Minimum download speed is the average of the lower 10% of all such test calls.

Minimum download speed (average of lower 10% of all test calls) =
$$\frac{\text{Download speed } (A_1+A_2+A_3+A_4+A_5+A_6)}{6} \times 100$$
Note- A_1, A_2, A_3, A_4 A_5 & A_6 are download speeds at 6 hotspots

2.4.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

It is defined as the rate at which packets are transmitted in a network. In a mobile network the download speed varies depending on the number of users in a particular location. Even though a service provider may be advertising certain speed, the actual speed may vary as per the number of users in the network and there could be customer dissatisfaction on account of relatively slow speed. Hence, there is a need to prescribe an average throughput to protect the interest of consumers. The service providers need to constantly upgrade their network to meet average throughput benchmark.

- ✤ The throughput is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.
- ✤ The service provider will advertise the throughput being offered to its customers as per their category or plan and it should be meted out as per their commitment.

Measurement:

The average throughput for packet data should be calculated from all the test calls made according to the measurement setup.

Test calls are made to weigh the results according to the patterns of real traffic. Average throughput is calculated as the average of all such test calls.

Average Throughput for Packet data = Average of download attempts in Kbit/ average download time in secs

2.4.4.5.5   LATENCY

Latency is the amount of time taken by a packet to reach the receiving endpoint after being transmitted from the sending point. This time period is termed the "end-to-end delay" occurring along the transmission path. Latency generally refers to network conditions, such as congestion, that may affect the overall time required for transit.

Measurement:

Latency is measured with the test server for ping connected directly to the server on the same Intranet domain.

Latency (Percentage of successful pinged) = $\dfrac{\text{Total number of successful ping} \times 100}{\text{Total number of ping sent to the Test Server}}$

2.5   OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	3603794
Airtel	NDR
BSNL CDMA	7868
BSNL GSM	1109377
Idea	1061315
Reliance GSM	No Service
Vodafone	4108971
Name of Operator	Number of Subscriber as per VLR-3G
Aircel 3G	NDR
BSNL 3G	NDR
Reliance 3G	NDR

March'16 VLR data was considered for the number of subscribers.

Reliance GSM doesn't have service in Assam due to their license has been expired.

Airtel and Vodafone did not submit the data for 3G services

2.6   COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark   Best Performing Operator

3   EXECUTIVE SUMMARY-2G

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 FOR 2G

Reliance GSM doesn't have service in Assam as their license has been expired.

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	2.36%	14.79%	91.98%	1.68%	5.58%	1.62%	12.41%	91.61%
Airtel	0.21%	0.66%	95.95%	0.45%	1.15%	1.05%	1.08%	99.03%
BSNL CDMA	0.22%	26.34%	98.85%	NA	2.65%	1.60%	6.74%	NDR
BSNL GSM	1.95%	1.92%	98.19%	0.96%	1.81%	1.93%	2.98%	NDR
Idea	1.04%	0.82%	96.42%	0.75%	1.45%	0.40%	1.75%	95.77%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.64%	1.54%	98.88%	0.47%	1.12%	0.68%	2.74%	96.88%

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

NDR: data not received

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

BTSs Accumulated Downtime:

Aircel did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.21%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL CDMA failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel at 0.66%.

Call Set-up Success Rate (CSSR):

Aircel failed to meet the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 98.88%.

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.

SDCCH/ Paging Chl. Congestion:

Aircel and BSNL CDMA failed to meet the benchmark on SDCCH / Paging Channel Congestion. Airtel recorded the best SDCCH / Paging Channel Congestion at 0.45%.

TCH Congestion:

Aircel and BSNL CDMA failed to meet the benchmark for TCH congestion, while Vodafone performed the best on TCH congestion at 1.12%.

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:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.40%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL CDMA failed to meet the benchmark. Best performance was recorded for Airtel at 1.08%.

Voice Quality

Aircel failed to meet the benchmark. Best performance was recorded for Airtel at 99.03%.

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 - JANUARY FOR 2G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month January	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	2.14%	13.38%	92.33%	1.26%	5.35%	1.62%	13.66%	91.74%
Airtel	0.21%	0.69%	95.99%	0.40%	1.03%	1.02%	1.08%	99.06%
BSNL CDMA	0.22%	26.75%	98.96%	NA	2.61%	1.78%	7.42%	NDR
BSNL GSM	1.98%	1.87%	98.05%	0.99%	1.95%	1.98%	2.97%	NDR
Idea	0.98%	0.77%	97.87%	0.88%	1.91%	0.37%	1.70%	95.29%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.66%	1.49%	98.80%	0.43%	1.20%	0.77%	2.69%	96.61%

3.1.2 PMR DATA – FEBRUARY FOR 2G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month February	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	2.24%	13.77%	92.09%	1.41%	5.41%	1.62%	12.10%	91.62%
Airtel	0.18%	0.35%	95.92%	0.39%	1.07%	1.08%	1.09%	99.01%
BSNL CDMA	0.20%	25.10%	98.77%	NA	2.65%	1.72%	6.55%	NDR
BSNL GSM	1.86%	1.94%	98.18%	0.96%	1.82%	1.88%	2.99%	NDR
Idea	1.01%	0.88%	95.28%	0.67%	1.36%	0.40%	1.75%	96.03%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.50%	1.50%	98.74%	0.62%	1.26%	0.66%	2.94%	96.83%

3.1.3 PMR DATA - MARCH FOR 2G

Month								
	Network Availability		**Connection Establishment (Accessibility)**			**Connection Maintenance (Retainability)**		
Name of Service Provider Month March	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	2.69%	17.15%	91.53%	2.37%	5.98%	1.62%	11.51%	91.50%
Airtel	0.24%	0.93%	95.94%	0.57%	1.36%	1.03%	1.06%	99.01%
BSNL CDMA	0.25%	27.16%	98.82%	NA	2.69%	1.31%	6.26%	NDR
BSNL GSM	1.99%	1.94%	98.35%	0.94%	1.65%	1.94%	2.97%	NDR
Idea	1.14%	0.80%	96.11%	0.71%	1.09%	0.41%	1.79%	95.98%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.75%	1.63%	99.11%	0.36%	0.89%	0.60%	2.58%	97.20%

3.2   3 DAY DATA – CONSOLIDATED FOR 2G

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	2.49%	1.56%	95.89%	1.04%	2.81%	1.25%	10.61%	91.61%
Airtel	0.25%	0.00%	96.58%	0.20%	0.67%	0.89%	0.92%	99.19%
BSNL CDMA	0.25%	3.98%	98.75%	NA	2.86%	1.48%	6.66%	NDR
BSNL GSM	1.13%	0.67%	98.50%	2.96%	1.70%	2.38%	13.89%	NDR
Idea	1.16%	0.65%	98.23%	0.35%	0.42%	0.30%	1.46%	95.77%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.85%	0.27%	99.31%	0.62%	0.69%	0.68%	2.15%	96.88%

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

BTSs Accumulated Downtime:

Aircel did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel & BSNL CDMA at 0.25%.

Worst Affected BTSs Due to Downtime:

BSNL CDMA failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.31%.

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.

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SDCCH/ Paging Chl. Congestion:

Aircel and BSNL GSM failed to meet the benchmark for SDCCH / Paging Channel Congestion. Airtel recorded the best SDCCH / Paging Channel Congestion at 0.20%.

TCH Congestion:

Aircel and BSNL CDMA failed to meet the benchmark for TCH congestion, while Idea performed the best on TCH congestion at 0.42%.

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

Call Drop Rate:

BSNL GSM failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.30%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA & GSM failed to meet the benchmark. Best performance was recorded for Airtel at 0.92%.

Voice Quality

Aircel failed to meet the benchmark. Best performance was recorded for Airtel at 99.20%.

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 - JANUARY FOR 2G

Name of Service Provider 3 Day January	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	1.81%	1.02%	94.49%	1.60%	4.11%	1.44%	12.94%	92.97%
Airtel	0.21%	0.00%	96.62%	0.20%	0.64%	0.94%	0.91%	99.20%
BSNL CDMA	0.22%	4.12%	98.87%	NA	2.80%	1.76%	7.04%	NDR
BSNL GSM	1.74%	0.43%	97.30%	4.04%	2.29%	2.56%	3.51%	NDR
Idea	1.17%	0.66%	98.11%	0.32%	0.49%	0.26%	1.30%	96.70%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.92%	0.47%	99.31%	0.97%	0.69%	0.75%	2.94%	96.73%

3.2.2 3 DAY DATA – FEBRUARY FOR 2G

Name of Service Provider 3 Day February	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	2.85%	1.58%	96.45%	0.71%	2.20%	1.22%	10.03%	93.26%
Airtel	0.32%	0.00%	96.53%	0.16%	0.66%	0.88%	0.96%	99.21%
BSNL CDMA	0.21%	3.29%	98.68%	NA	3.55%	1.34%	6.40%	NDR
BSNL GSM	0.03%	1.22%	98.37%	0.36%	1.63%	1.58%	3.11%	NDR
Idea	1.26%	0.59%	98.16%	0.43%	0.42%	0.32%	1.57%	96.71%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.84%	0.15%	99.14%	0.61%	0.86%	0.73%	1.34%	97.22%

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3.2.3   3 DAY DATA - MARCH FOR 2G

	3 Day							
Name of Service Provider 3 Day March	**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	2.80%	2.06%	96.71%	0.82%	2.13%	1.13%	8.91%	93.00%
Airtel	0.22%	0.00%	96.58%	0.24%	0.70%	0.85%	0.89%	99.20%
BSNL CDMA	0.32%	4.53%	98.71%	NA	2.23%	1.31%	6.55%	NDR
BSNL GSM	1.63%	0.36%	99.83%	4.48%	1.17%	2.42%	17.56%	NDR
Idea	1.06%	0.70%	98.42%	0.29%	0.34%	0.32%	1.50%	96.72%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.80%	0.18%	99.48%	0.28%	0.52%	0.57%	2.17%	97.57%

3.3   PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel 3G	0.88%	4.75%	98.10%	0.12%	0.40%	0.71%	9.25%	99.03%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	0.33%	1.11%	98.73%	0.40%	0.02%	0.72%	1.74%	99.85%

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

Node Bs downtime:

All operators met the benchmark for Node Bs downtime.

Worst affected Node Bs due to downtime:

Aircel failed to meet the benchmark for Worst affected Node Bs due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 98.73%.

RRC Congestion:

All operators met the benchmark for RRC Congestion.

Circuit Switched RAB Congestion:

All operators met the TRAI benchmark for Circuit Switched RAB Congestion.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter Circuit Switched Voice Call Drop Rate.

Worst affected cells having more than 3% Circuit switched voice drop rate:

Aircel failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter Circuit Switch Voice Quality.

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.

3.3.1   PMR DATA - JANUARY FOR 3G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month January	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.47%	6.67%	97.25%	0.06%	1.18%	0.65%	9.16%	99.04%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.3.2   PMR DATA – FEBRUARY FOR 3G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month February	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.27%	7.22%	98.77%	0.15%	0.01%	0.70%	9.00%	99.03%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	0.49%	1.52%	97.67%	0.64%	0.01%	1.27%	1.98%	99.83%

3.3.3   PMR DATA - MARCH FOR 3G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month March	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.46%	0.98%	98.27%	0.14%	0.00%	0.75%	9.55%	99.03%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	1.93%	0.77%	99.79%	0.15%	0.02%	0.26%	1.51%	99.86%

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3.4   3 DAY DATA – CONSOLIDATED FOR 3G

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)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.61%	1.05%	96.55%	0.24%	0.00%	0.69%	7.09%	99.03%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	0.15%	1.11%	98.80%	0.36%	0.01%	0.89%	3.08%	99.84%

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

Node Bs downtime:
All operators met the benchmark for Node Bs downtime.

Worst affected Node Bs due to downtime:
All operators met the benchmark for worst affected Node Bs due to downtime.

Call Set-up Success Rate (CSSR):
All operators met the benchmark for CSSR.

RRC Congestion:
All operators met the benchmark for RRC Congestion.

Circuit Switched RAB Congestion:
All operators met the TRAI benchmark for Circuit Switched RAB Congestion.

Circuit Switched Voice Call Drop Rate:
All operators met the benchmark for the parameter Circuit Switched Voice Call Drop Rate.

Worst affected cells having more than 3% Circuit switched voice drop rate:
Aircel and Reliance failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate.

Circuit Switch Voice Quality:
All operators met the benchmark for the parameter Circuit Switch Voice Quality.

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.

3.4.1 3 DAY DATA - JANUARY FOR 3G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day January	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.15%	1.20%	98.72%	0.07%	0.00%	0.61%	8.63%	99.11%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.4.2 3 DAY DATA – FEBRUARY FOR 3G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day February	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.63%	1.25%	95.27%	0.18%	0.00%	0.71%	8.16%	87.88%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	0.05%	1.52%	97.83%	0.54%	0.01%	1.41%	3.26%	99.82%

3.4.3 3 DAY DATA - MARCH FOR 3G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day March	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.63%	0.76%	95.67%	0.47%	0.01%	0.75%	4.95%	92.64%
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	0.24%	0.77%	99.76%	0.18%	0.02%	0.29%	2.91%	99.86%

3.5 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 2G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	98.59%	99.60%	1.62%	NDR	99.93%	1.13%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR
BSNL CDMA	NDR	NDR	NDR	NDR	NDR	NDR
BSNL GSM	NDR	NDR	NDR	NDR	NDR	NDR
Idea	99.14%	99.20%	0.17%	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	99.76%	NDR	NDR	NDR	NDR	NDR

NDR: Data did not received from Operators

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

Activation done within 4 hours:

All operators met the benchmark for activation done within 4 hours for monthly, however for 3days data not received from operators.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate, however most of the operators not provided data for monthly as well as 3days live.

Drop Rate:

All operators met the benchmark for Drop Rate, however most of the operators not provided data for PMR as well as 3days live.

3.6   WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 3G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	NDR	99.36%	0.78%	NDR	NDR	NDR

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

NDR: Data were not submitted by any operators for 3G.

3.7 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	62.00%	62.00%	100.00%	100.00%	69.67%	67.00%
Airtel	69.00%	69.00%	100.00%	100.00%	80.00%	85.00%
BSNL CDMA	100.00%	100.00%	100.00%	91.43%	94.00%	100.00%
BSNL GSM	77.00%	79.00%	100.00%	85.71%	94.67%	84.00%
Idea	72.00%	72.00%	100.00%	100.00%	79.33%	61.00%
Reliance GSM	60.00%	60.00%	100.00%	100.00%	83.67%	64.00%
Vodafone	79.00%	79.00%	100.00%	94.68%	74.67%	88.00%

Resolution of billing complaints

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

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark of 95%, except Aircel.

Customer Care / Helpline Assessment (voice to voice)

BSNL CDMA & GSM and Vodafone failed to meet the benchmark for the parameter.

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered. 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.

Complaint/Request Attended to Satisfaction

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

3.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		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
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.04%	0.02%	100.00%	100.00%	100.00%	95.79%	95.49%
Airtel	0.05%	0.01%	100.00%	100.00%	100.00%	100.00%	94.23%
BSNL CDMA	0.03%	0.00%	100.00%	100.00%	100.00%	100.00%	97.79%
BSNL GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.32%	92.06%
Idea	0.29%	0.05%	100.00%	100.00%	100.00%	95.46%	99.79%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	99.07%	96.18%
Vodafone	0.14%	0.06%	100.00%	100.00%	100.00%	99.31%	100.00%

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed that 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, all operators met the benchmark of charging disputes. BSNL GSM and CDMA 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 6 weeks.

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. Airtel and BSNL CDMA recorded the best performance for the parameter.

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

Airtel and BSNL GSM failed to meet the TRAI specified benchmark of 95%. Vodafone recorded the best performance for the parameter.

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3.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment							
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Aircel	NA	84.00%	96.00%	95.00%	92.00%	95.00%	95.00%
Airtel	93.00%	NA	96.00%	94.00%	94.00%	96.00%	94.00%
BSNL CDMA	88.00%	83.00%	NA	93.00%	92.00%	96.00%	93.00%
BSNL GSM	94.00%	91.00%	95.00%	NA	94.00%	95.00%	93.00%
Idea	97.00%	96.00%	96.00%	95.00%	NA	95.00%	96.00%
Reliance GSM	88.00%	93.00%	96.00%	94.00%	94.00%	NA	91.00%
Vodafone	97.00%	89.00%	95.00%	96.00%	96.00%	95.00%	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 problems in connecting to other operators.

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3.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	2.41%	2.36%	14.77%	14.79%	91.98%	91.98%	1.68%	1.68%	5.58%	5.58%	1.62%	1.62%	12.42%	12.41%	91.62%	91.61%	0.00%	0.00%
Airtel	0.21%	0.21%	0.57%	0.66%	95.95%	95.95%	0.41%	0.45%	1.08%	1.15%	1.05%	1.05%	1.09%	1.08%	99.03%	99.03%	0.00%	0.00%
BSNL	1.99%	1.95%	1.92%	1.92%	97.70%	98.19%	0.96%	0.96%	1.81%	1.81%	1.93%	1.93%	2.98%	2.98%	96.18%	NA	0.00%	0.00%
Idea	1.06%	1.04%	0.82%	0.82%	96.42%	96.42%	0.75%	0.75%	1.45%	1.45%	0.40%	0.40%	1.75%	1.75%	95.77%	95.77%	0.00%	0.00%
Vodafone	0.65%	0.64%	1.54%	1.54%	98.88%	98.88%	0.47%	0.47%	1.12%	1.12%	0.68%	0.68%	2.74%	2.74%	96.88%	96.88%	0.00%	0.00%

3.11 PMR COMPARISON WITH IMRB AND OPERATORS DATA 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	1.83%	0.88%	11.49%	4.75%	98.10%	98.10%	0.12%	0.12%	0.00%	0.40%	0.70%	0.71%	9.25%	9.25%	99.03%	99.03%	0.00%	0.00%
Reliance	0.39%	0.33%	1.18%	1.11%	98.19%	98.73%	0.43%	0.40%	0.03%	0.02%	0.95%	0.72%	1.73%	1.74%	99.83%	99.85%	0.00%	0.00%

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PMR Consolidated (Network Parameters) for 2G

➢ Aircel did not meet the benchmark for BTS Accumulated downtime, CSSR, SDCCH congestion and Voice quality.
➢ Aircel and BSNL CDMA failed to meet the benchmark for worst affected BTSs due to downtime.
➢ Aircel and BSNL CDMA failed to meet the benchmark for TCH congestion and Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters) for 2G

➢ Aircel did not meet the benchmark for BTS Accumulated downtime and Voice Quality.
➢ BSNL CDMA failed to meet the benchmark for worst affected BTSs due to downtime.
➢ Aircel and BSNL GSM failed to meet the benchmark for SDCCH congestion.
➢ Aircel and BSNL CDMA failed to meet the benchmark for TCH congestion.
➢ BSNL GSM failed to meet the benchmark for call drop rate.
➢ Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

PMR Consolidated (Network Parameters) for 3G

➢ Aircel failed to meet the benchmark for worst affected Node Bs due to downtime and worst affected cells having more than 3% Circuit switched voice drop rate.

3 Day Live Measurement (Network Parameters) for 3G

➢ Aircel and BSNL failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate.

Live Calling

➢ Besides BSNL CDMA, none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.
➢ Vodafone, BSNL CDMA and BSNL GSM failed to meet the TRAI specified benchmark of Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.
➢ None of the operators met the TRAI benchmark for level 1 service with calls being answered. 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.

Metering and billing credibility

➢ For the billing disputes of post-paid subscribers, it was observed that Idea and Vodafone failed to meet the TRAI benchmark for the parameter.

Customer Care

➢ Airtel and BSNL GSM failed to meet the TRAI specified benchmark of Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Drive test (Voice) 2G

➢ In Tezpur SSA Aircel, Airtel, BSNL GSM and BSNL CDMA did not meet the benchmark for voice quality in outdoor locations; however Vodafone failed to meet the benchmark in indoor locations.
➢ In Tezpur SSA BSNL CDMA and Vodafone failed to meet the benchmark for CSSR parameters in outdoor locations.
➢ In Tezpur SSA BSNL CDMA failed to meet the benchmark for call drop rate in outdoor locations.
➢ In Dibrugarh SSA Airtel and BSNL CDMA failed to meet the benchmark for voice quality in outdoor locations; however BSNL GSM failed to meet the benchmark in indoor as well as outdoor locations.
➢ In Dibrugarh SSA BSNL GSM and BSNL CDMA failed to meet the benchmark for CSSR in outdoor as well as indoor locations.
➢ In Dibrugarh SSA BSNL CDMA and BSNL GSM failed to meet the benchmark for call drop rate in outdoor locations.
➢ In Bongaigaon SSA Aircel, Airtel, BSNL CDMA, BSNL GSM and Vodafone failed to meet the benchmark for voice quality in outdoor locations.
➢ In Bongaigaon SSA BSNL CDMA failed to meet the benchmark for CSSR in outdoor locations.
➢ In Bongaigaon SSA BSNL CDMA, BSNL GSM and Vodafone failed to meet the benchmark for call drop rate in outdoor locations.

Drive test (Voice) 3G

➢ In Tezpur SSA Airtel 3G and BSNL 3G failed to meet the benchmark for voice quality in outdoor locations, however Vodafone 3G failed in indoor as well as outdoor locations.
➢ In Tezpur SSA Vodafone 3G failed to meet the benchmark for call drop rate in outdoor locations.
➢ In Dibrugarh SSA BSNL 3G and Vodafone 3G failed to meet the benchmark for voice quality in indoor as well as outdoor locations.
➢ In Dibrugarh SSA Vodafone 3G failed to meet the benchmark for CSSR in outdoor locations.
➢ In Dibrugarh SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.
➢ In Bongaigaon SSA Airtel 3G failed to meet the benchmark for Voice quality in outdoor locations, however BSNL 3G and Vodafone 3G failed to meet the benchmark in indoor as well as outdoor locations.
➢ In Bongaigaon SSA Vodafone 3G failed to meet the benchmark for CSSR in outdoor locations.
➢ In Bongaigaon SSA Airtel 3G, BSNL 3G and Vodafone 3G failed to meet the benchmark for call drop rate in outdoor locations.

Data Drive test 2G & 3G

Note: - In Tezpur SSA BSNL CDMA and Aircel 3G did not submit the data drive reports.

Note: - In Dibrugarh SSA BSNL CDMA and BSNL 3G did not submit the data drive reports.

Note: In Bongaigaon SSA BSNL CDMA & GSM and BSNL 3G did not submit the data drive reports

5 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 2G

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

BTSs accumulated downtime - Consolidated

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	2.36%	2.49%
Airtel	0.21%	0.25%
BSNL CDMA	0.22%	0.25%
BSNL GSM	1.95%	1.13%
Idea	1.04%	1.16%
Reliance GSM	No Service	No Service
Vodafone	0.64%	0.85%
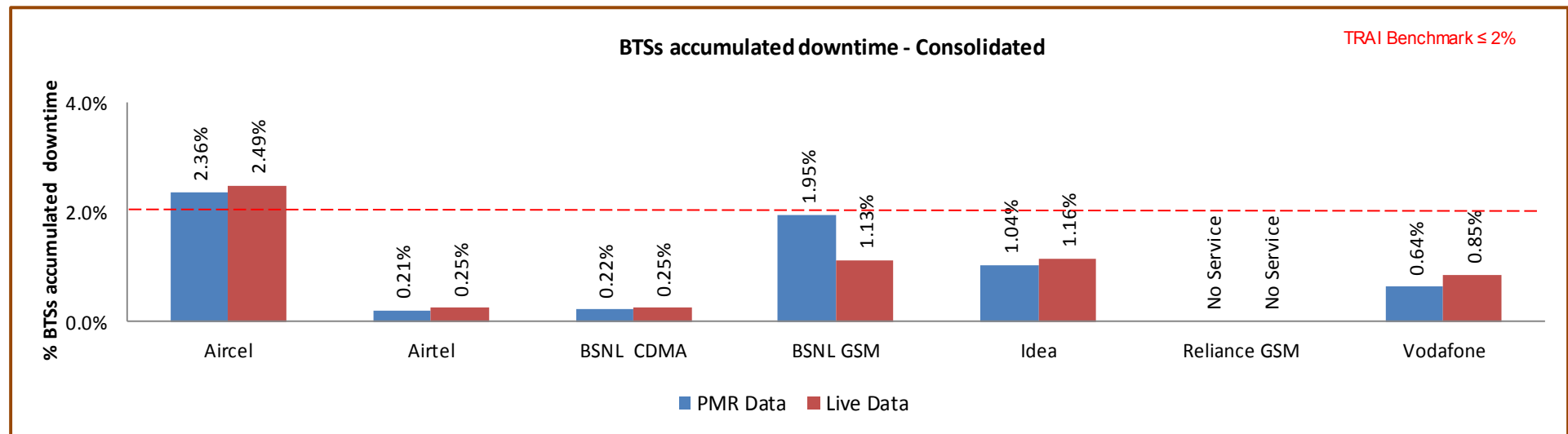
Data Source: Operations and Maintenance Center (OMC) of the operators

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

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5.1.2.1   KEY FINDINGS – MONTH 1

BTSs accumulated downtime - Month 1

TRAI Benchmark ≤ 2%
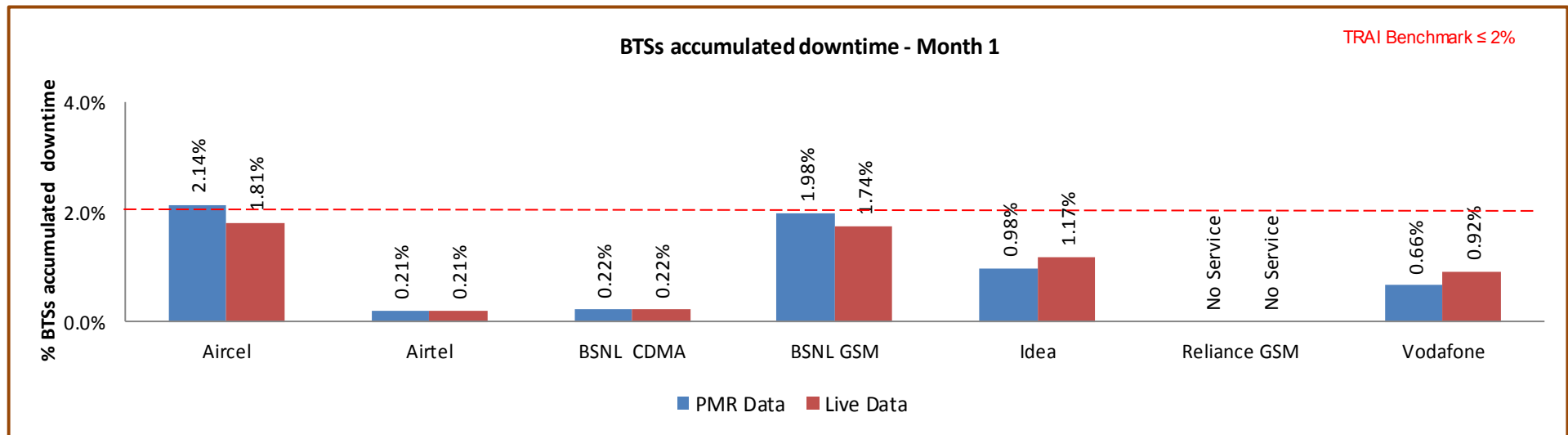
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2   KEY FINDINGS – MONTH 2

BTSs accumulated downtime - Month 2

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	2.24%	2.85%
Airtel	0.18%	0.32%
BSNL CDMA	0.20%	0.21%
BSNL GSM	1.86%	0.03%
Idea	1.01%	1.26%
Reliance GSM	No Service	No Service
Vodafone	0.50%	0.84%

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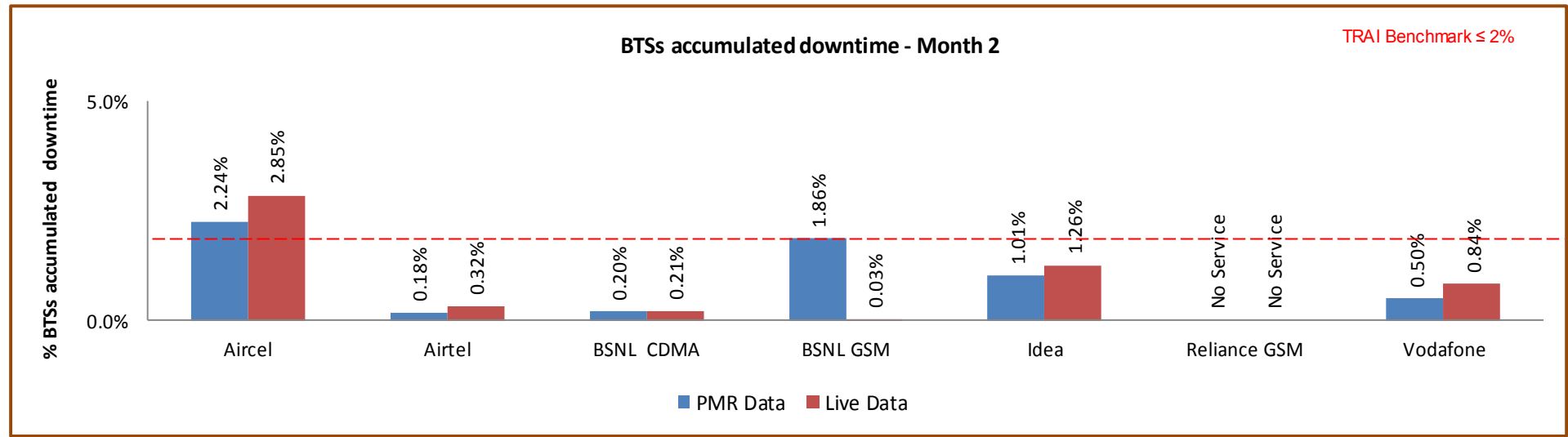
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.3 KEY FINDINGS – MONTH 3

BTSs accumulated downtime - Month 3

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	2.69%	2.80%
Airtel	0.24%	0.22%
BSNL CDMA	0.25%	0.32%
BSNL GSM	1.99%	1.63%
Idea	1.14%	1.06%
Reliance GSM	No Service	No Service
Vodafone	0.75%	0.80%
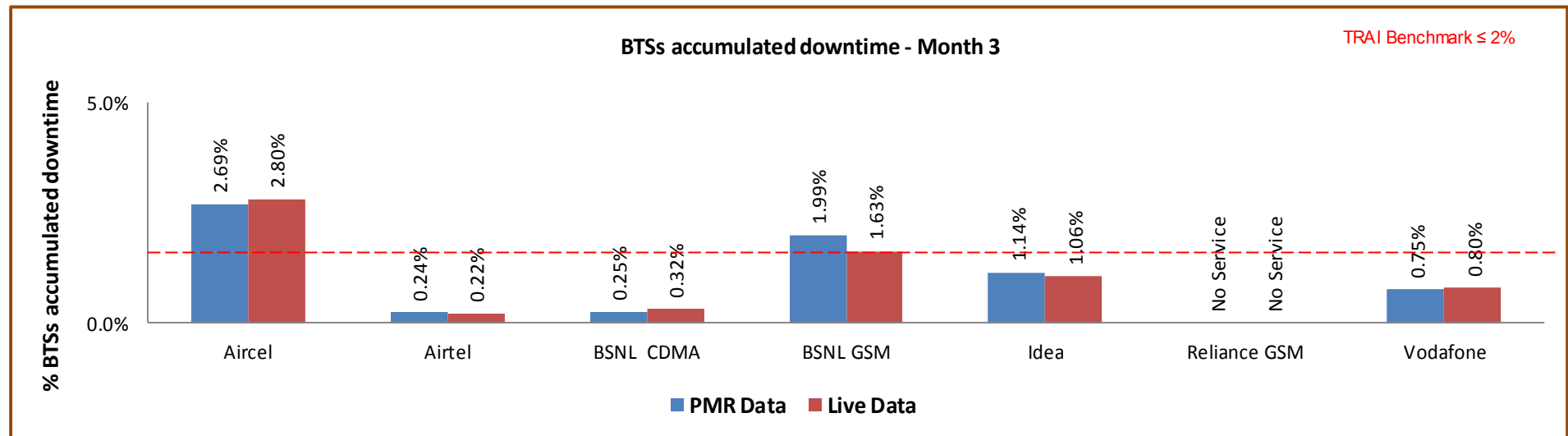
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2 WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1 PARAMETER DESCRIPTION

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

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

- **Computation Methodology** –

  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**

- **TRAI Benchmark** –

    a. Worst affected BTSs due to downtime ≤ 2%

- **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.

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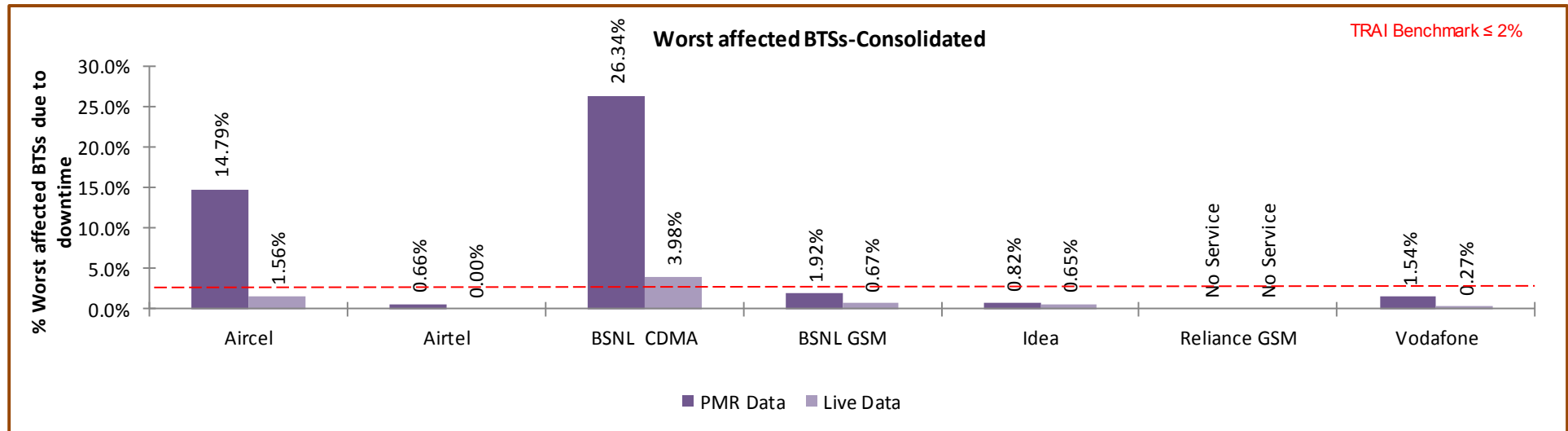
Data Source: Operations and Maintenance Center (OMC) of the operators

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
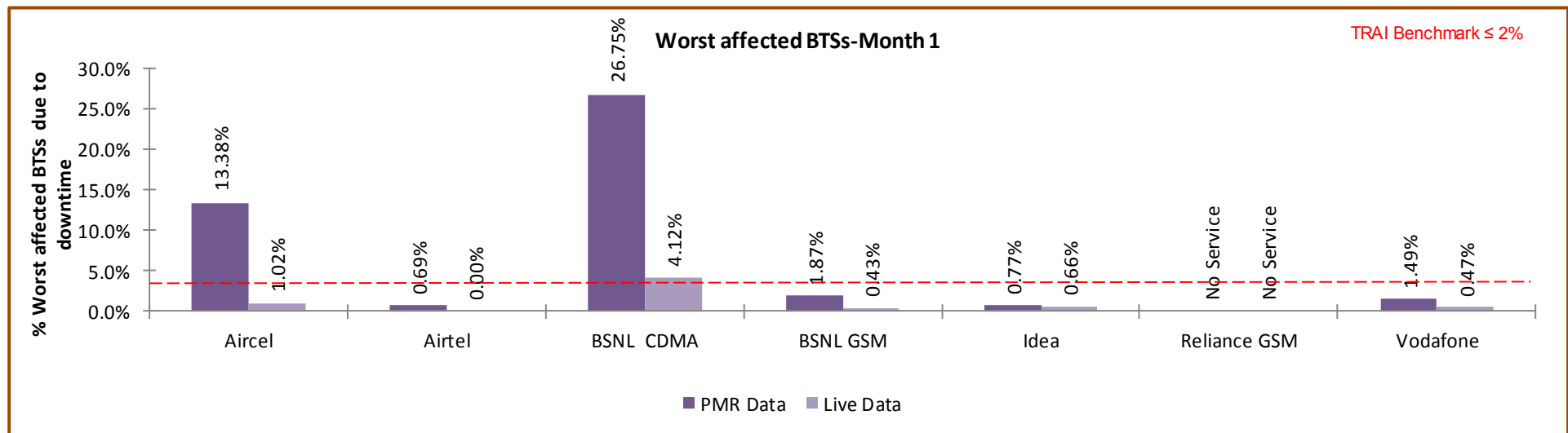
Worst affected BTSs-Month 1

TRAI Benchmark ≤ 2%

% Worst affected BTSs due to downtime

- Aircel: PMR Data 13.38%, Live Data 1.02%
- Airtel: PMR Data 0.69%, Live Data 0.00%
- BSNL CDMA: PMR Data 26.75%, Live Data 4.12%
- BSNL GSM: PMR Data 1.87%, Live Data 0.43%
- Idea: PMR Data 0.77%, Live Data 0.66%
- Reliance GSM: No Service, No Service
- Vodafone: PMR Data 1.49%, Live Data 0.47%

■ PMR Data ■ Live Data

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

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5.2.2.2   KEY FINDINGS – MONTH 2

Worst affected BTSs-Month 2

TRAI Benchmark ≤ 2%

Legend: ■ PMR Data ■ Live Data

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

5.2.2.3   KEY FINDINGS – MONTH 3

Worst affected BTSs-Month 3

TRAI Benchmark ≤ 2%

Chart: % Worst affected BTSs due to downtime

Operator	PMR Data	Live Data
Aircel	17.15%	2.06%
Airtel	0.93%	0.00%
BSNL CDMA	27.16%	4.53%
BSNL GSM	1.94%	0.36%
Idea	0.80%	0.70%
Reliance GSM	No Service	No Service
Vodafone	1.63%	0.18%

■ PMR Data   ■ Live Data

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

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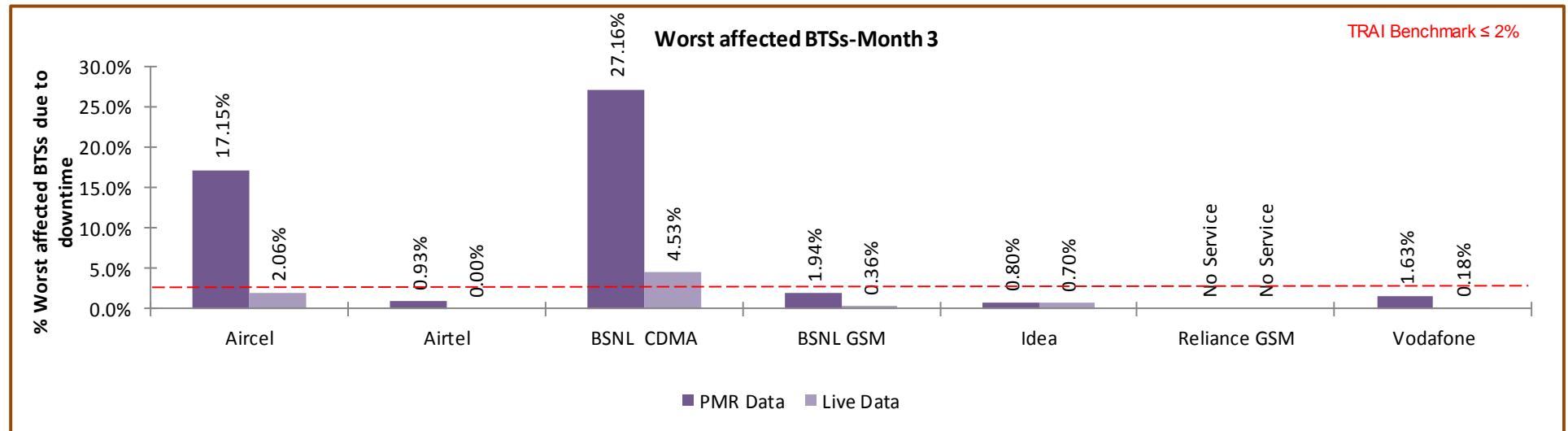
5.3   CALL SET UP SUCCESS RATE

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.

5.3.2 KEY FINDINGS - CONSOLIDATED

Call Set Up Success Rate-Consolidated

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	91.98%	95.89%	97.90%
Airtel	95.95%	96.58%	99.51%
BSNL CDMA	98.85%	98.75%	67.09%
BSNL GSM	98.19%	98.50%	96.85%
Idea	96.42%	98.23%	98.30%
Reliance GSM	No Service	No Service	NDR
Vodafone	98.88%	99.31%	96.60%

% CSSR — 100%, 80%, 60%, 40%, 20%, 0%

■ PMR Data ■ Live Data ■ Drive Test Data
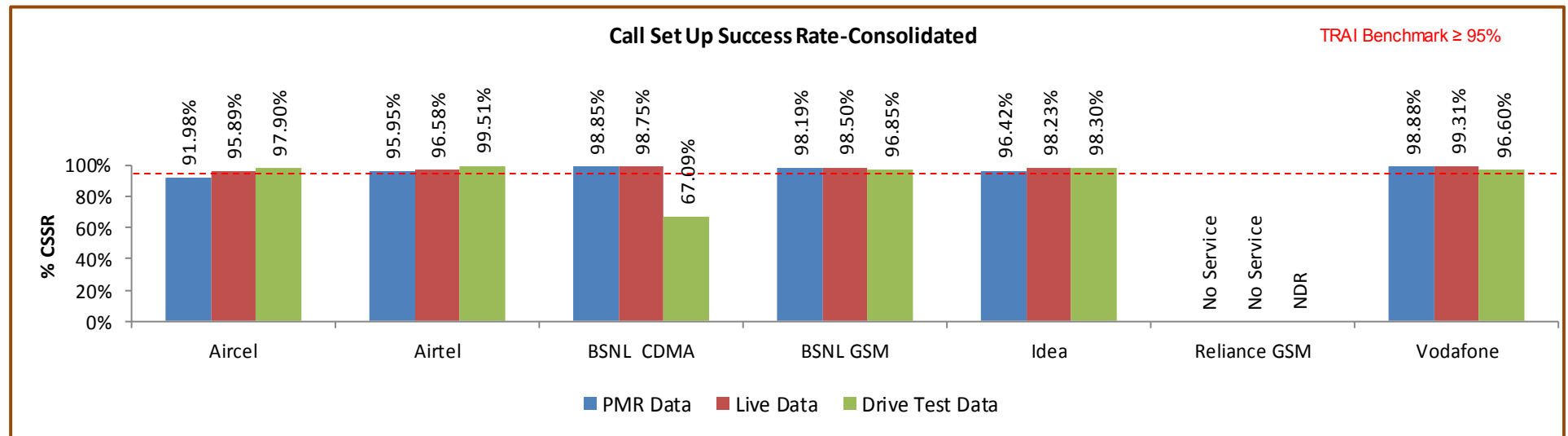
Data Source: Network Operations Center (NOC) of the operators

Aircel and Airtel failed to meet the TRAI benchmark as per audit/PMR data. During drive test BSNL CDMA failed to meet the benchmark.

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

Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%
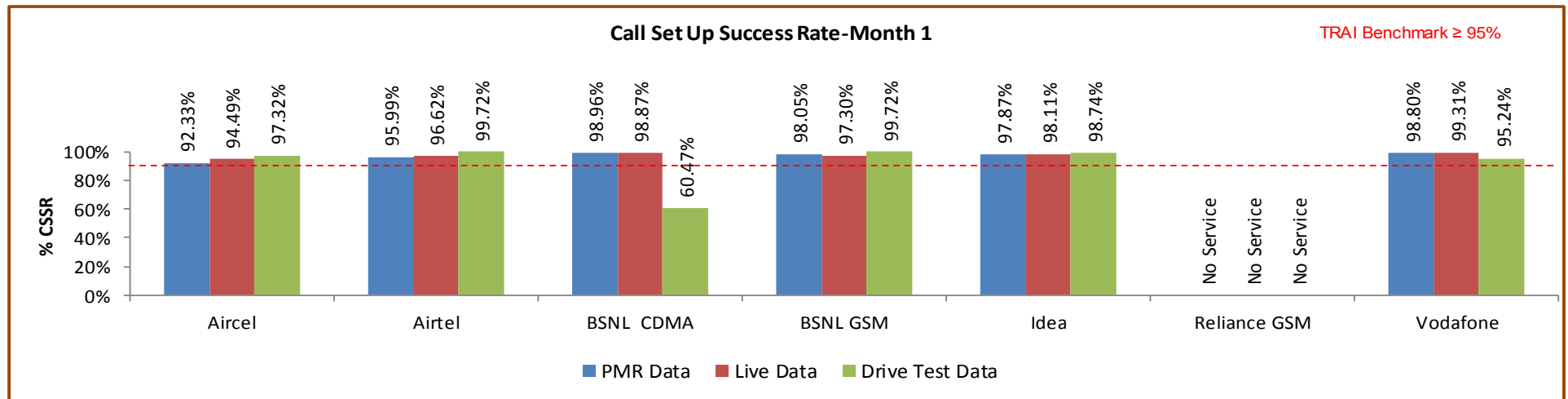
Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – MONTH 2

Call Set Up Success Rate-Month 2

TRAI Benchmark ≥ 95%

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

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5.3.2.3 KEY FINDINGS – MONTH 3

Call Set Up Success Rate-Month 3

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	91.53%	96.71%	98.15%
Airtel	95.94%	96.58%	99.14%
BSNL CDMA	98.82%	98.71%	93.20%
BSNL GSM	98.35%	99.83%	96.55%
Idea	96.11%	98.42%	97.37%
Reliance GSM	No Service	No Service	No Service
Vodafone	99.11%	99.48%	95.76%

Legend: ■ PMR Data ■ Live Data ■ Drive Test Data

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

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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 x C_1) + (A_2 x C_2) +.......+ (A_n x 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 x C_1) + (A_2 x C_2) +.......+ (A_n x 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

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

- Cn = Average POI Congestion % on day n

3. **Benchmark:**

   ↳ SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

4. **Audit Procedure –**

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

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

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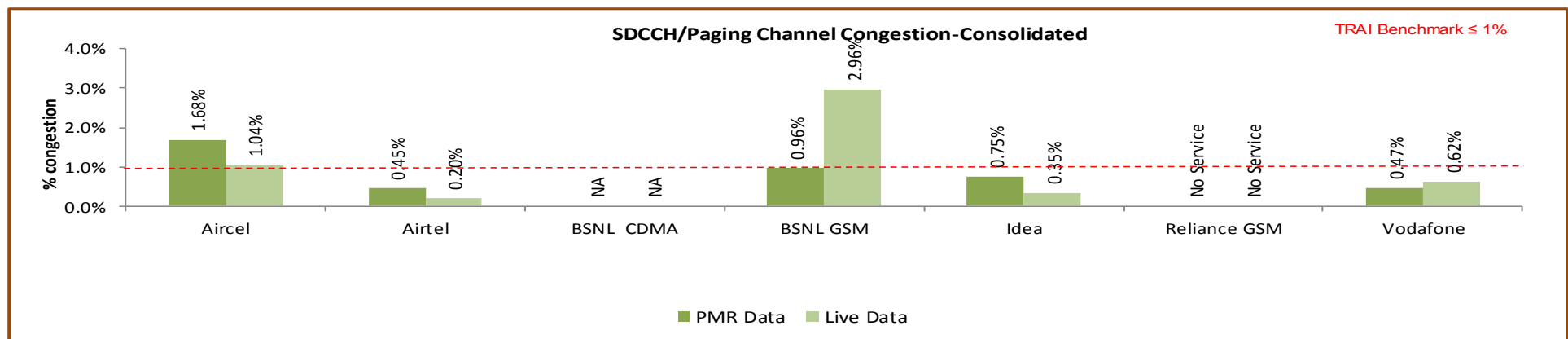
Data Source: Network Operations Center (NOC) of the operators

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

Significant difference was observed between PMR & live measurement data for Aircel, Airtel, Vodafone 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

SDCCH/Paging Channel Congestion-Month 1

TRAI Benchmark ≤ 1%

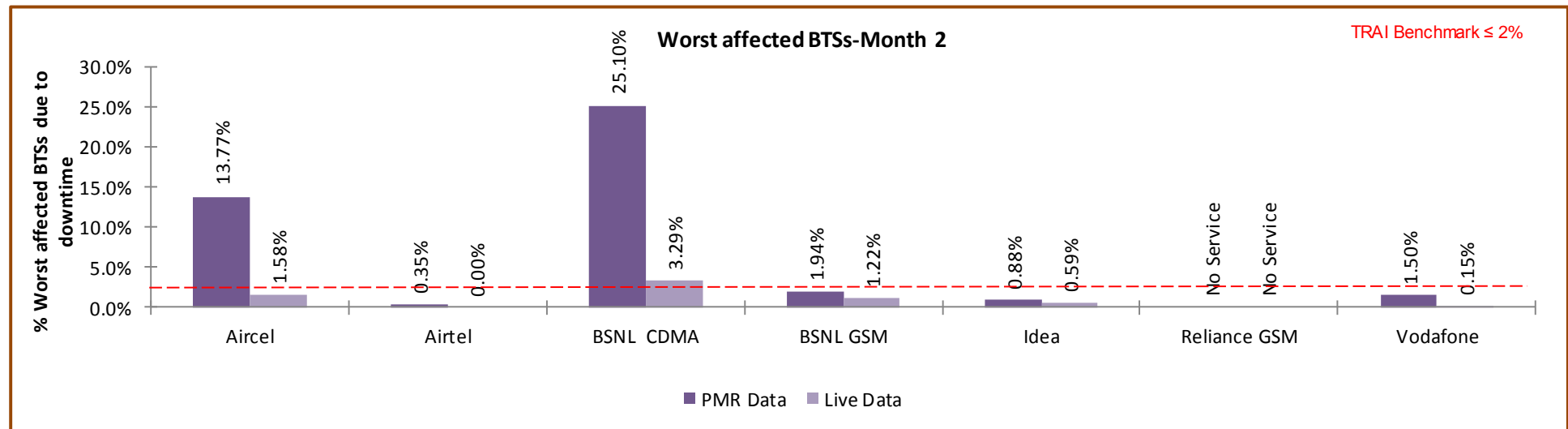| Operator	PMR Data	Live Data
Aircel	1.26%	1.60%
Airtel	0.40%	0.20%
BSNL CDMA	NA	NA
BSNL GSM	0.99%	4.04%
Idea	0.88%	0.32%
Reliance GSM	No Service	No Service
Vodafone	0.43%	0.97%

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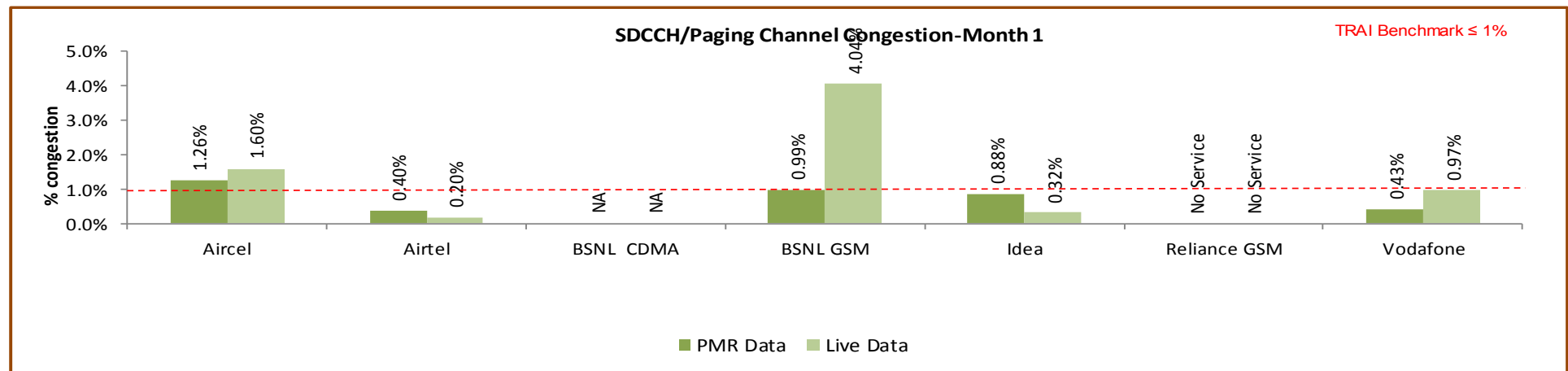
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2

SDCCH/Paging Channel Congestion-Month 2

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Aircel	1.41%	0.71%
Airtel	0.39%	0.16%
BSNL CDMA	NA	NA
BSNL GSM	0.96%	0.36%
Idea	0.67%	0.43%
Reliance GSM	No Service	No Service
Vodafone	0.62%	0.61%

■ PMR Data   ■ Live Data

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

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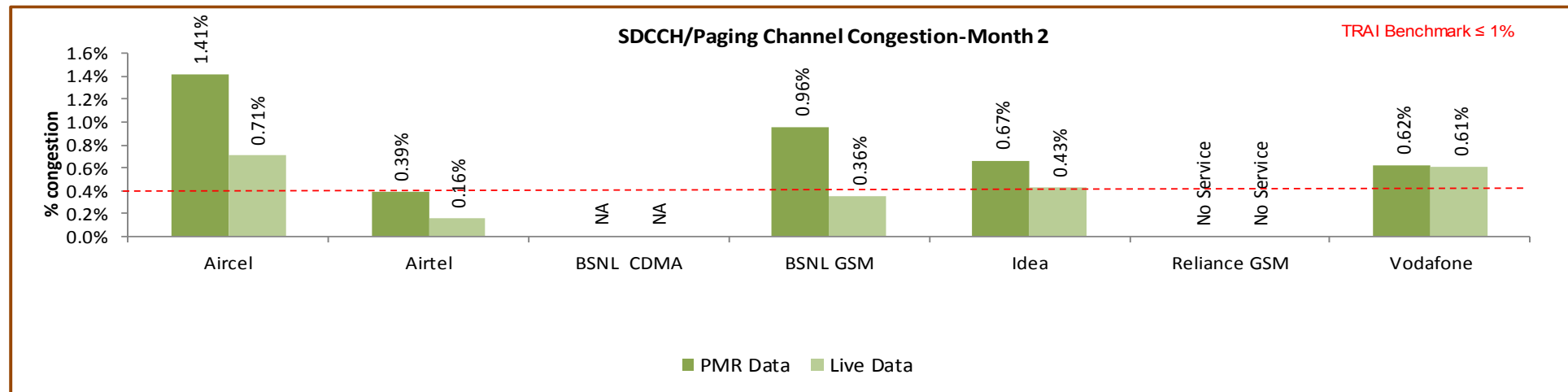
5.4.2.3 KEY FINDINGS – MONTH 3
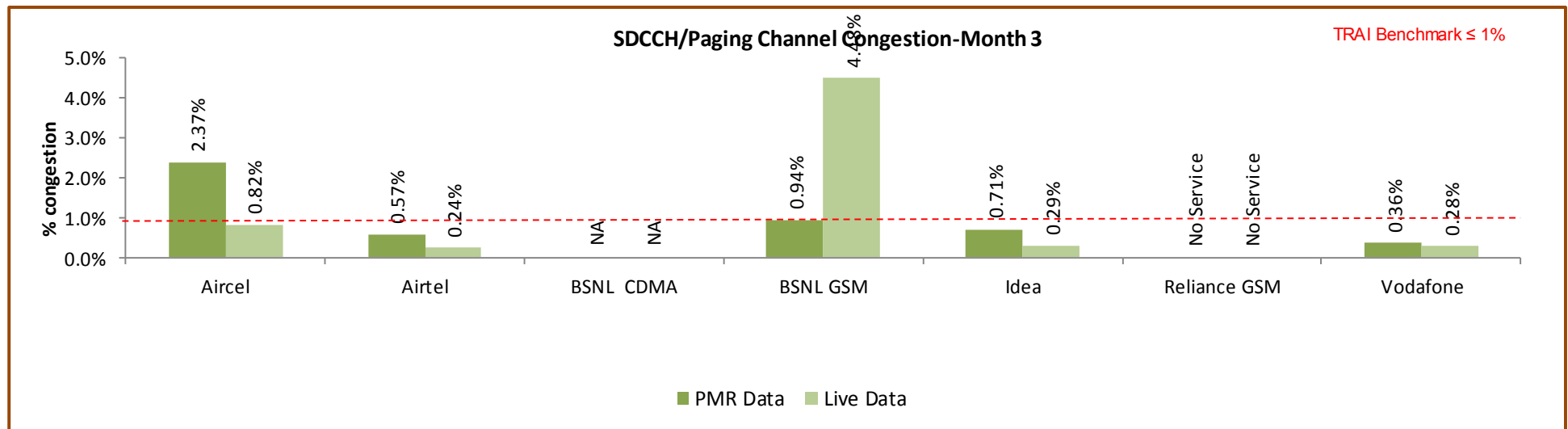
Data Source: Network Operations Center (NOC) of the operators

5.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)
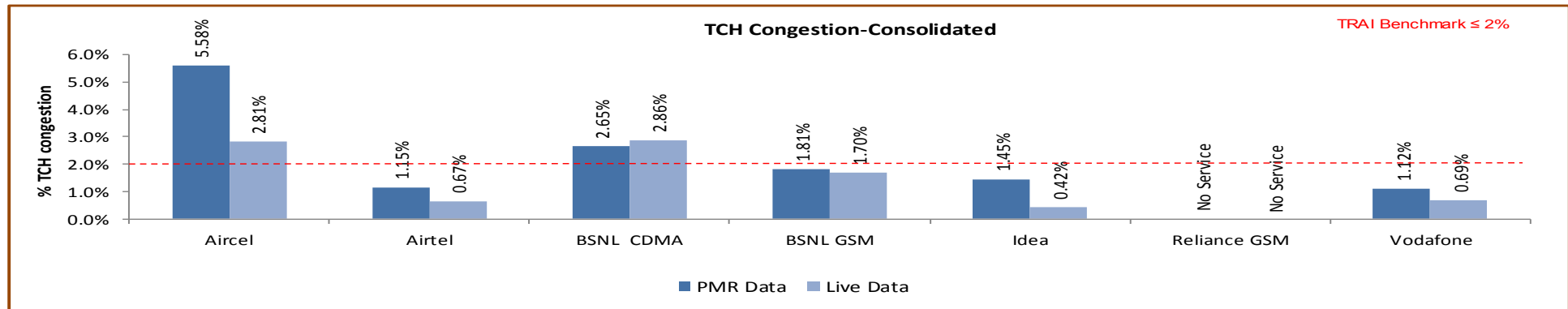
TCH Congestion-Consolidated

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	5.58%	2.81%
Airtel	1.15%	0.67%
BSNL CDMA	2.65%	2.86%
BSNL GSM	1.81%	1.70%
Idea	1.45%	0.42%
Reliance GSM	No Service	No Service
Vodafone	1.12%	0.69%

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

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

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

5.4.3.1 KEY FINDINGS – MONTH 1

TCH Congestion-Month 1

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	5.35%	4.11%
Airtel	1.03%	0.64%
BSNL CDMA	2.61%	2.80%
BSNL GSM	1.95%	2.29%
Idea	1.91%	0.49%
Reliance GSM	No Service	No Service
Vodafone	1.20%	0.69%

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

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5.4.3.2 KEY FINDINGS – MONTH 2

TCH Congestion-Month 2

TRAI Benchmark ≤ 2%

% TCH congestion

	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
PMR Data	5.41%	1.07%	2.65%	1.82%	1.36%	No Service	1.26%
Live Data	2.20%	0.66%	3.55%	1.63%	0.42%	No Service	0.86%

■ PMR Data ■ Live Data

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

5.4.3.3 KEY FINDINGS – MONTH 3

TCH Congestion-Month 3

TRAI Benchmark ≤ 2%

% TCH congestion

	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
PMR Data	5.98%	1.36%	2.69%	1.65%	1.09%	No Service	0.89%
Live Data	2.13%	0.70%	2.23%	1.17%	0.34%	No Service	0.52%

■ PMR Data ■ Live Data

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

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

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	45	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		283625	342183	0	75851	96191	No Service	20619381
Traffic served for all POIs (B)- in erlangs		187091	114406	0	64064	67458	No Service	17749966
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	45	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		282400	329809	0	75851	95396	No Service	4740736
Traffic served for all POIs (B)- in erlangs		183897	110346	0	49243	66667	No Service	3762526
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

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

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5.4.4.1   KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	31	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		93807	114807	0	25284	30678	No Service	16011629
Traffic served for all POIs (B)- in erlangs		59792	36253	0	20596	21571	No Service	14022896
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	31	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		93700	113193	0	25284	30226	No Service	1639862
Traffic served for all POIs (B)- in erlangs		58299	35356	0	5775	21158	No Service	1482678
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		94217	113071	0	25284	31611	No Service	2754584
Traffic served for all POIs (B)- in erlangs		63907	38891	0	21897	22936	No Service	2479126
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		94122	103592	0	25284	31527	No Service	1367460
Traffic served for all POIs (B)- in erlangs		62992	36315	0	21897	22714	No Service	1084748
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

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5.4.4.3   KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		95601	114305	0	25284	33903	No Service	1853168
Traffic served for all POIs (B)- in erlangs		63392	39261	0	21571	22952	No Service	1247944
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		94578	113024	0	25284	33642	No Service	1733414
Traffic served for all POIs (B)- in erlangs		62606	38675	0	21571	22794	No Service	1195100
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	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.

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5.5.2   KEY FINDINGS - CONSOLIDATED

Call Drop Rate-Consolidated

TRAI Benchmark ≤ 2%
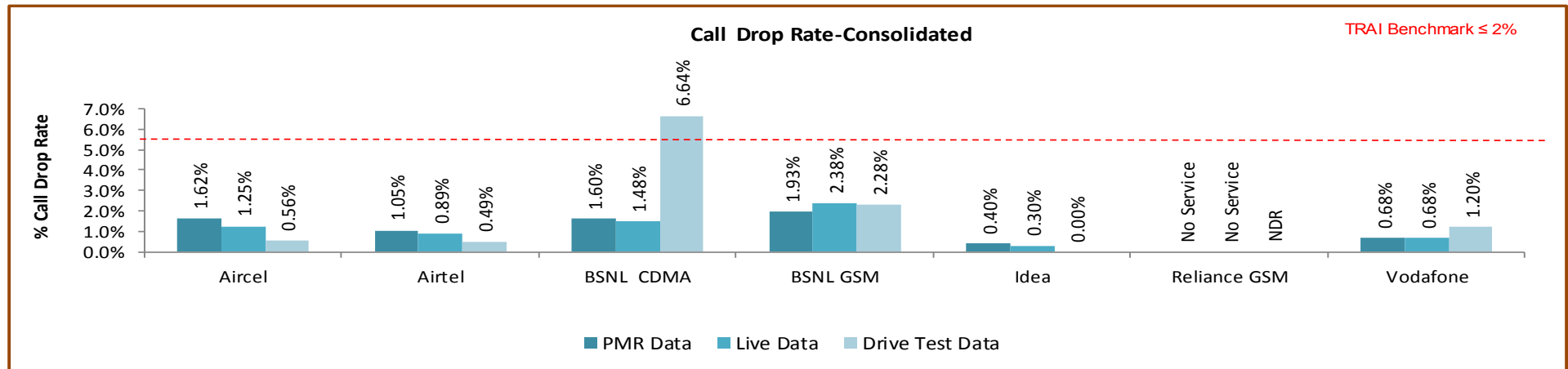
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for call drop rate during audit.

5.5.2.1   KEY FINDINGS – MONTH 1

Call Drop Rate-Month 1

TRAI Benchmark ≤ 2%
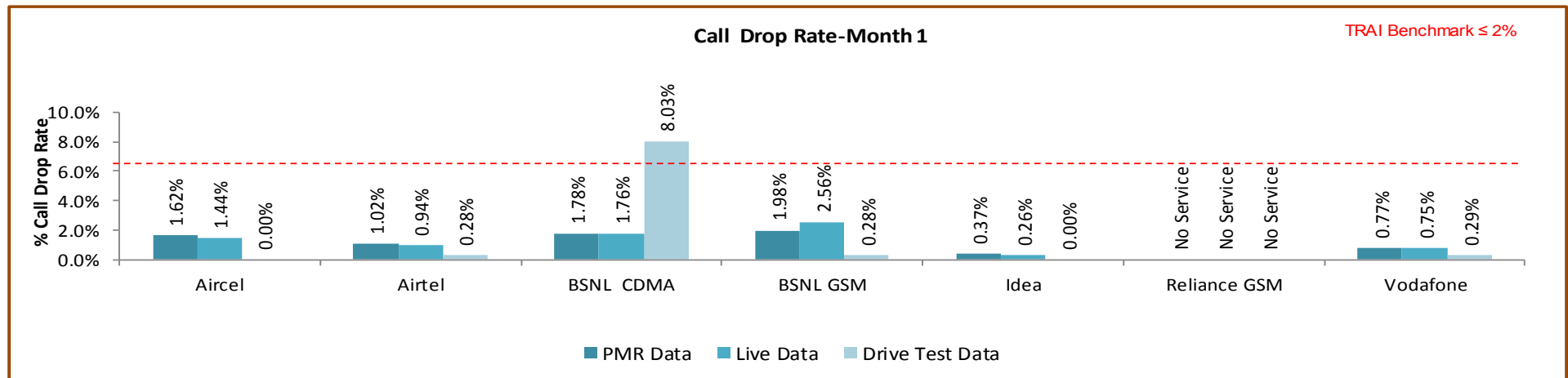
Data Source: Network Operations Center (NOC) of the operators

5.5.2.2 KEY FINDINGS – MONTH 2

Call Drop Rate-Month 2

TRAI Benchmark ≤ 2%
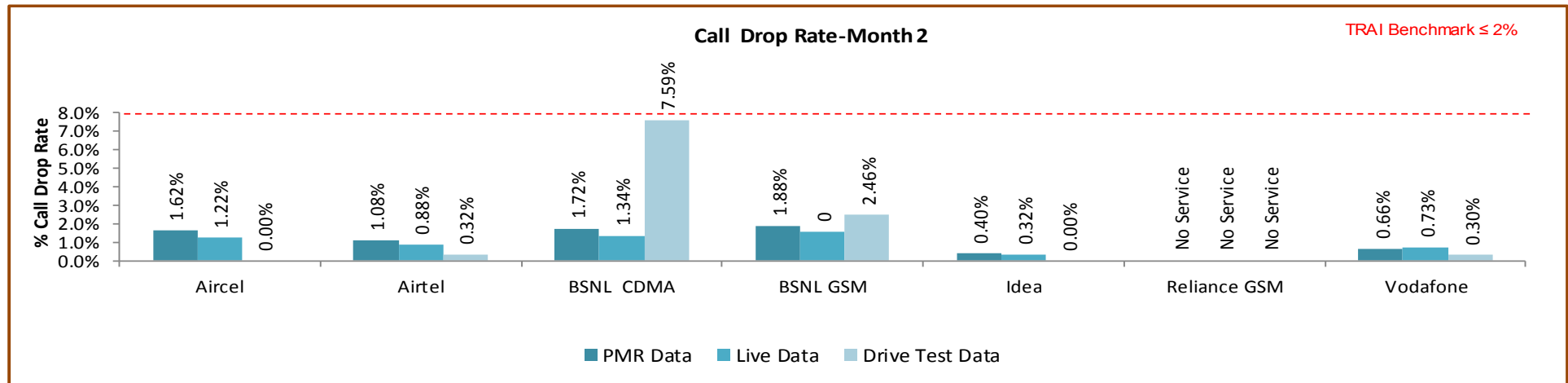
Data Source: Network Operations Center (NOC) of the operators

5.5.2.3 KEY FINDINGS – MONTH 3

Call Drop Rate-Month 3

TRAI Benchmark ≤ 2%
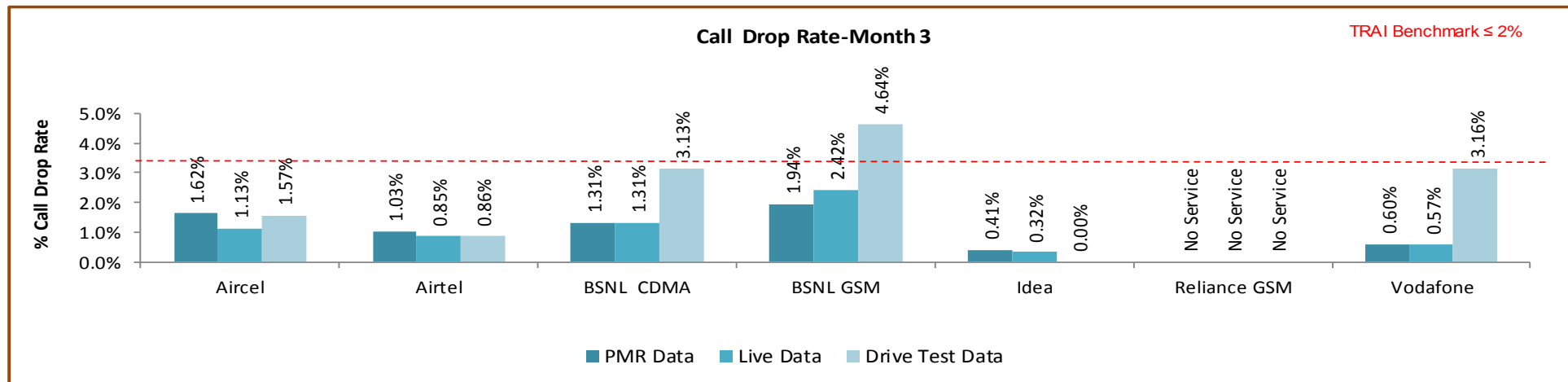
Data Source: Network Operations Center (NOC) of the operators

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.

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5.6.2 KEY FINDINGS - CONSOLIDATED

Cells having >3% TCH Drop -Consolidated
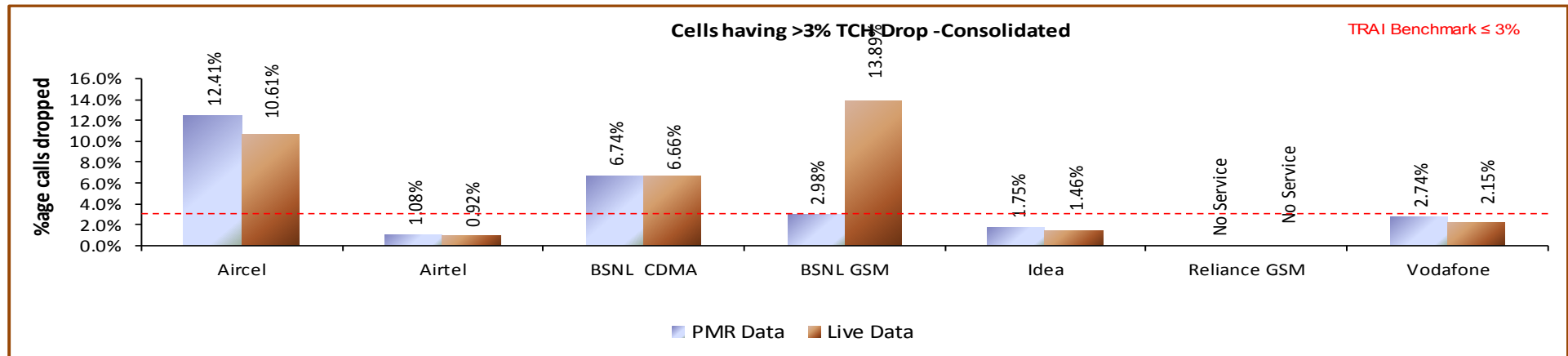
TRAI Benchmark ≤ 3%

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

Aircel BSNL CDMA failed to meet the TRAI benchmark.

5.6.2.1 KEY FINDINGS – MONTH 1

Cells having >3% TCH Drop-Month 1

TRAI Benchmark ≤ 3%
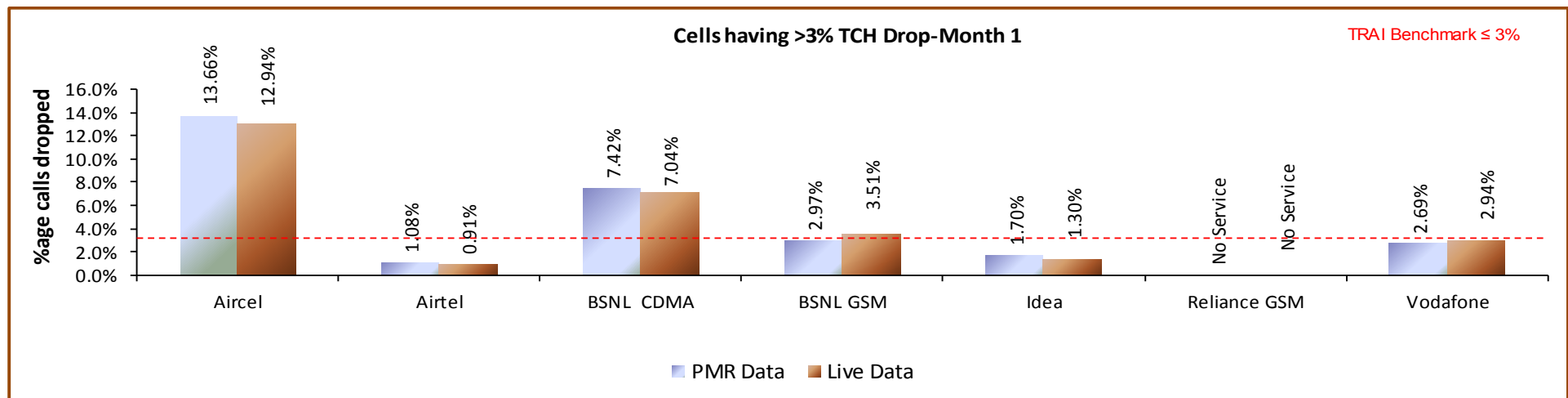
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2

Cells having >3% TCH Drop-Month 2

TRAI Benchmark ≤ 3%

%age calls dropped

Operator	PMR Data	Live Data
Aircel	12.10%	10.03%
Airtel	1.09%	0.96%
BSNL CDMA	6.55%	6.40%
BSNL GSM	2.99%	3.11%
Idea	1.75%	1.57%
Reliance GSM	No Service	No Service
Vodafone	2.94%	1.34%

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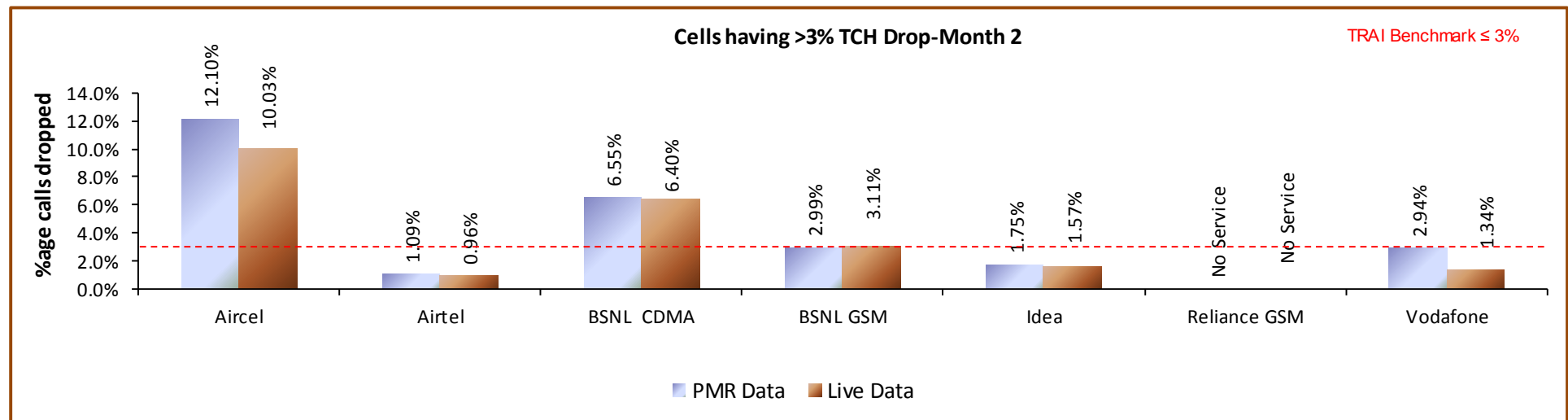
Data Source: Network Operations Center (NOC) of the operators

5.6.2.3 KEY FINDINGS – MONTH 3

Cells having >3% TCH Drop-Month 3

TRAI Benchmark ≤ 3%

%age calls dropped

Operator	PMR Data	Live Data
Aircel	11.51%	8.91%
Airtel	1.06%	0.89%
BSNL CDMA	6.26%	6.55%
BSNL GSM	2.97%	17.56%
Idea	1.79%	1.50%
Reliance GSM	No Service	No Service
Vodafone	2.58%	2.17%

■ PMR Data ■ Live Data

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

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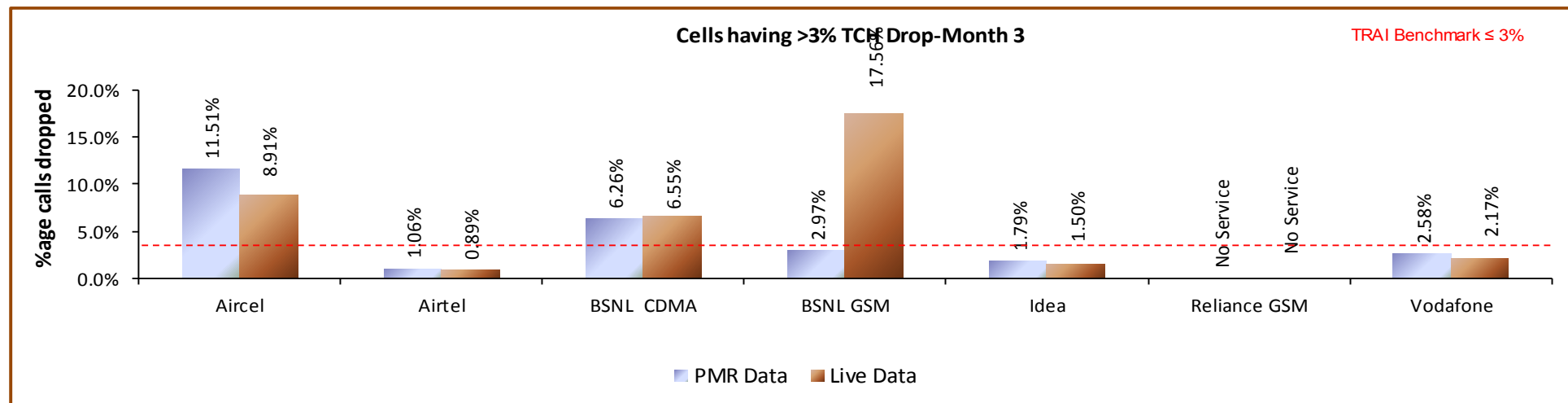
5.7 VOICE QUALITY

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

Voice Quality-Consolidated

TRAI Benchmark ≥ 95%

	PMR Data	Live Data	Drive Test Data
Aircel	91.61%	91.61%	95.58%
Airtel	99.03%	99.19%	94.23%
BSNL CDMA	NDR	NDR	NDR
BSNL GSM	NDR	NDR	92.82%
Idea	95.77%	95.77%	97.78%
Reliance GSM	No Service	No Service	NDR
Vodafone	96.88%	96.88%	94.44%
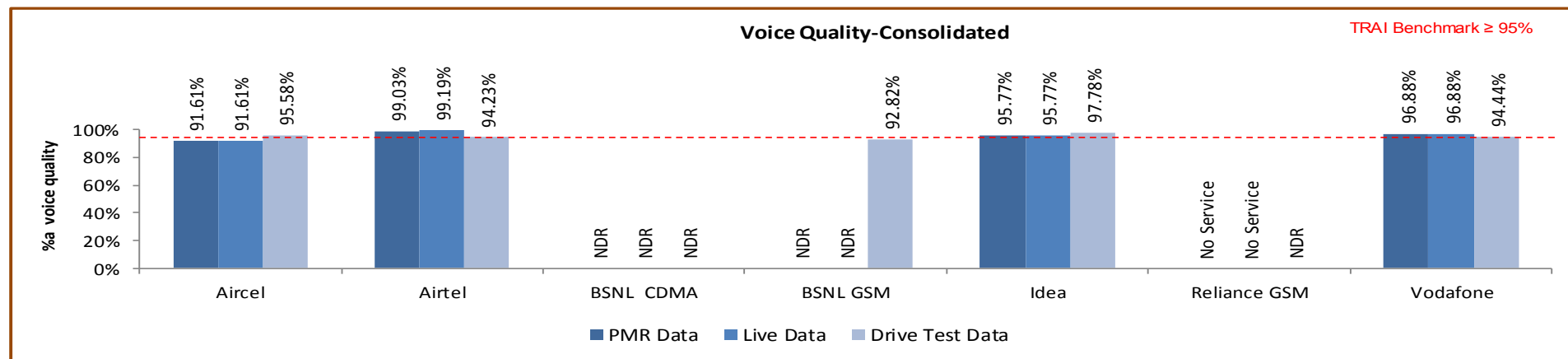
Data Source: Network Operations Center (NOC) of the operators

Aircel and BSNL CDMA were not able to meet the benchmark for Voice quality as per PMR data. During drive test Airtel BSNL GSM and Vodafone failed.

5.7.2.1   KEY FINDINGS – MONTH 1

Voice Quality-Month 1

TRAI Benchmark ≥ 95%

	PMR Data	Live Data	Drive Test Data
Aircel	91.74%	92.97%	94.96%
Airtel	99.06%	99.20%	94.46%
BSNL CDMA	NDR	NDR	NA
BSNL GSM	NDR	NDR	94.46%
Idea	95.29%	96.70%	97.34%
Reliance GSM	No Service	No Service	No Service
Vodafone	96.61%	96.73%	96.25%

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

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5.7.2.2 KEY FINDINGS – MONTH 2

Voice Quality-Month 2

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	91.62%	93.26%	97.22%
Airtel	99.01%	99.21%	94.42%
BSNL CDMA	NDR	NDR	NA
BSNL GSM	NDR	NDR	91.95%
Idea	96.03%	96.71%	98.07%
Reliance GSM	No Service	No Service	No Service
Vodafone	96.83%	97.22%	95.20%

%a voice quality

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

5.7.2.3 KEY FINDINGS – MONTH 3

Voice Quality-Month 3

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	91.50%	93.00%	95.10%
Airtel	99.01%	99.20%	93.83%
BSNL CDMA	NDR	NDR	NA
BSNL GSM	NDR	NDR	91.72%
Idea	95.98%	96.72%	97.97%
Reliance GSM	No Service	No Service	No Service
Vodafone	97.20%	97.57%	91.56%

%a voice quality

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

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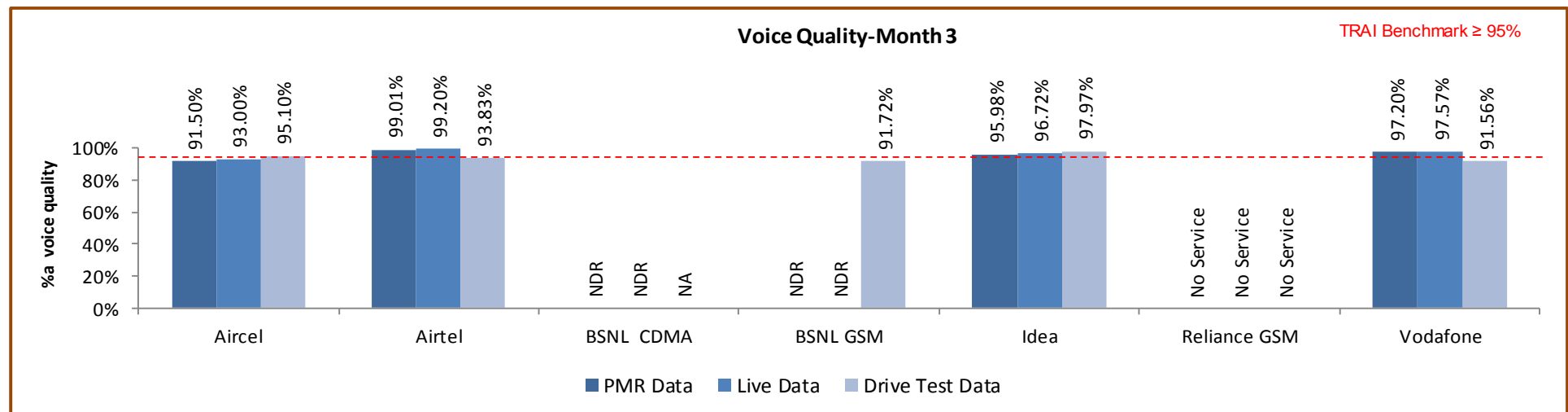
6 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

6.1 NODE BS DOWNTIME

6.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters

    1. Node Bs downtime (not available for service)

    2. Worst affected Node Bs due to downtime

- **Definition - Node Bs downtime (not available for service):** In the case of 3G networks, instead of BTS the nomenclature is Node B. The measurement methodology for the parameter Node B Accumulated downtime (not available for service) will be similar to the existing parameter for BTSs Accumulated downtime (not available for service).

- **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
- **Source of Data:** Network Operation Center (NOC) or a Central Server
- **Computation Methodology** –
  Node Bs downtime (not available for service) = **Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100**

    3. TRAI Benchmark –

    a. Node Bs 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 Node Bs in service area was 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 Node Bs downtime and worst affected Node Bs due to downtime.

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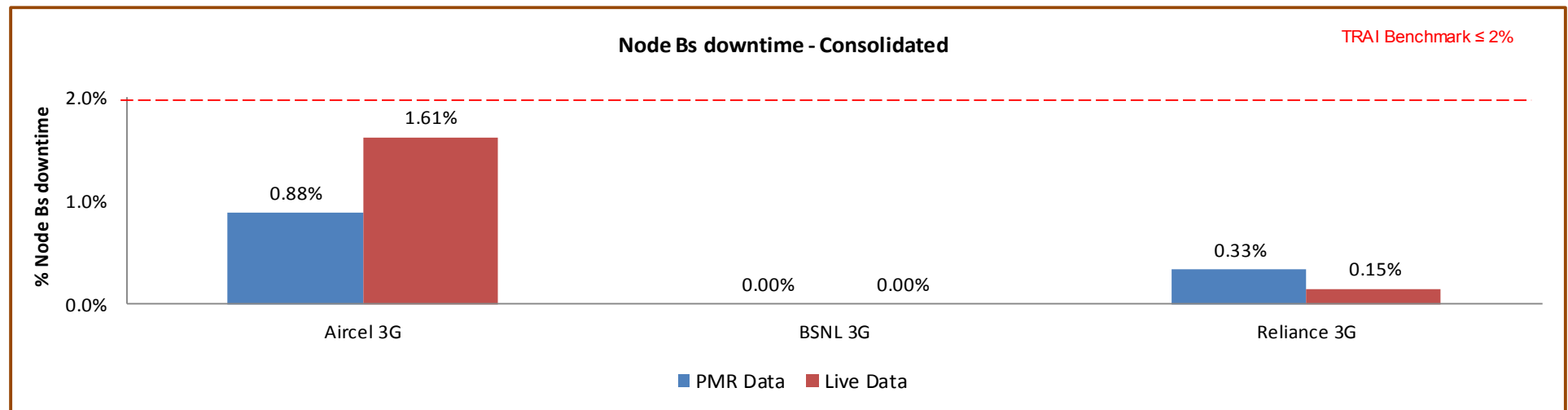
Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL failed to meet the benchmark.

6.1.2.1   KEY FINDINGS – MONTH 1

Node Bs downtime - Month 1

TRAI Benchmark ≤ 2%
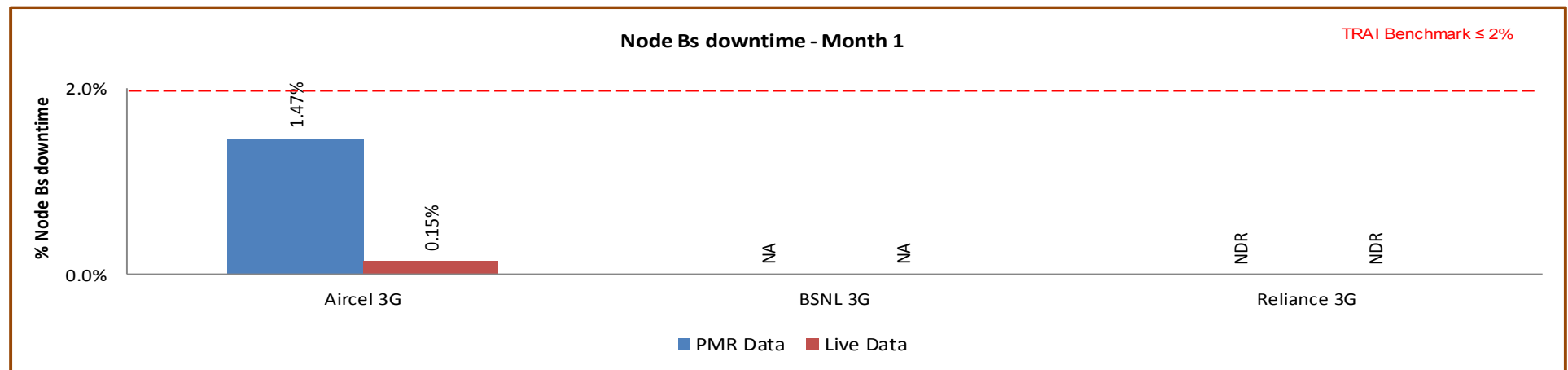
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2   KEY FINDINGS – MONTH 2

Node Bs downtime - Month 2

TRAI Benchmark ≤ 2%
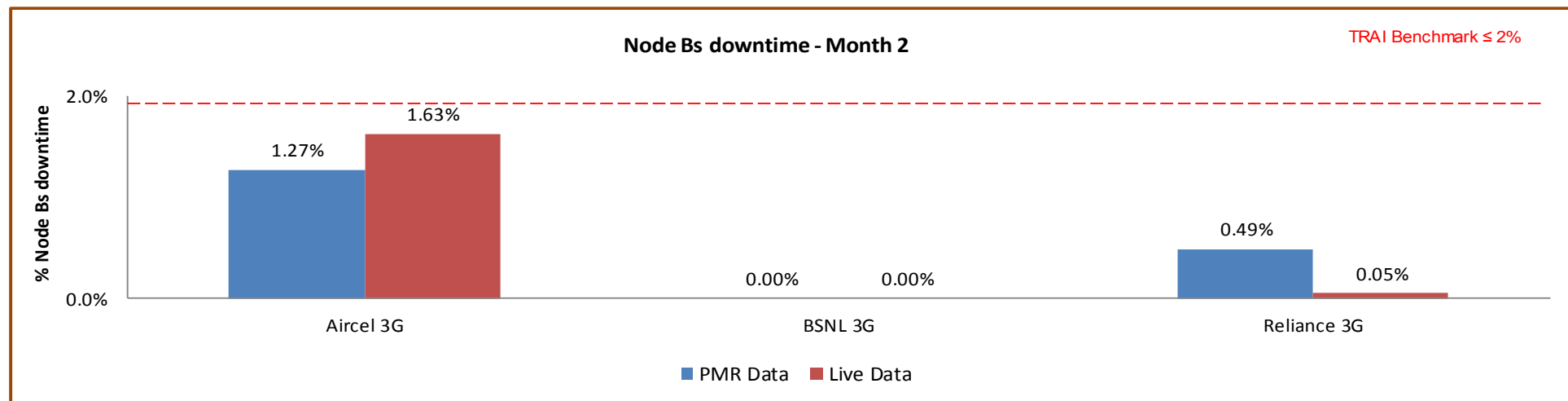
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.3   KEY FINDINGS – MONTH 3

Node Bs downtime - Month 3

TRAI Benchmark ≤ 2%
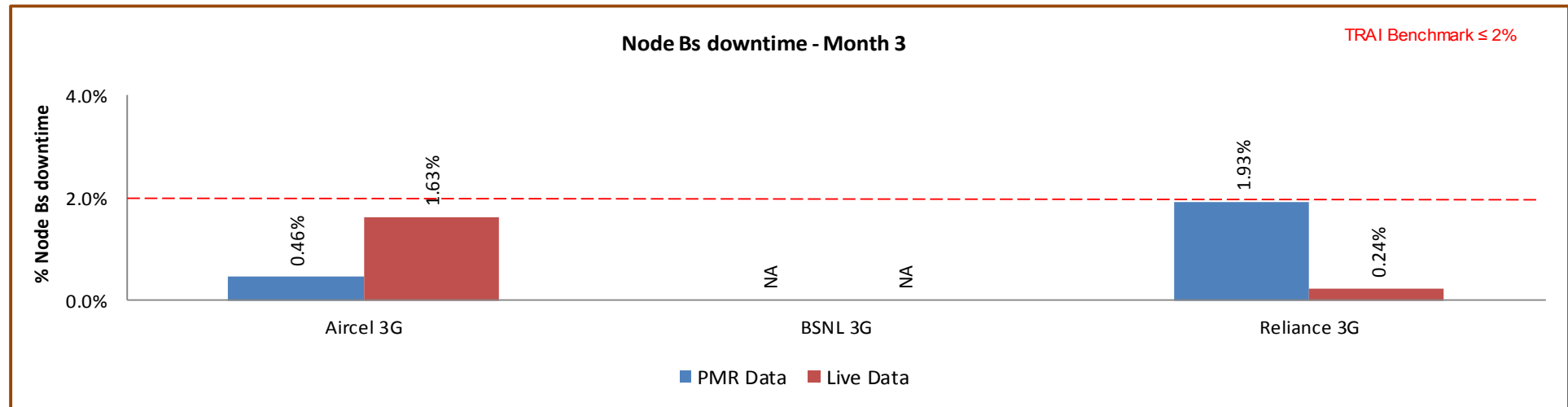
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

6.2.1 PARAMETER DESCRIPTION

- **Definition** – **Worst Affected Node Bs due to downtime** shall basically measure percentage of Node Bs 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 Node Bs due to downtime" the downtime of each Node B lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology** –

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

- **TRAI Benchmark** –

    b. Worst affected Node Bss due to downtime ≤ 2%

- **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 Node Bs 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.

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

6.2.2 KEY FINDINGS – CONSOLIDATED
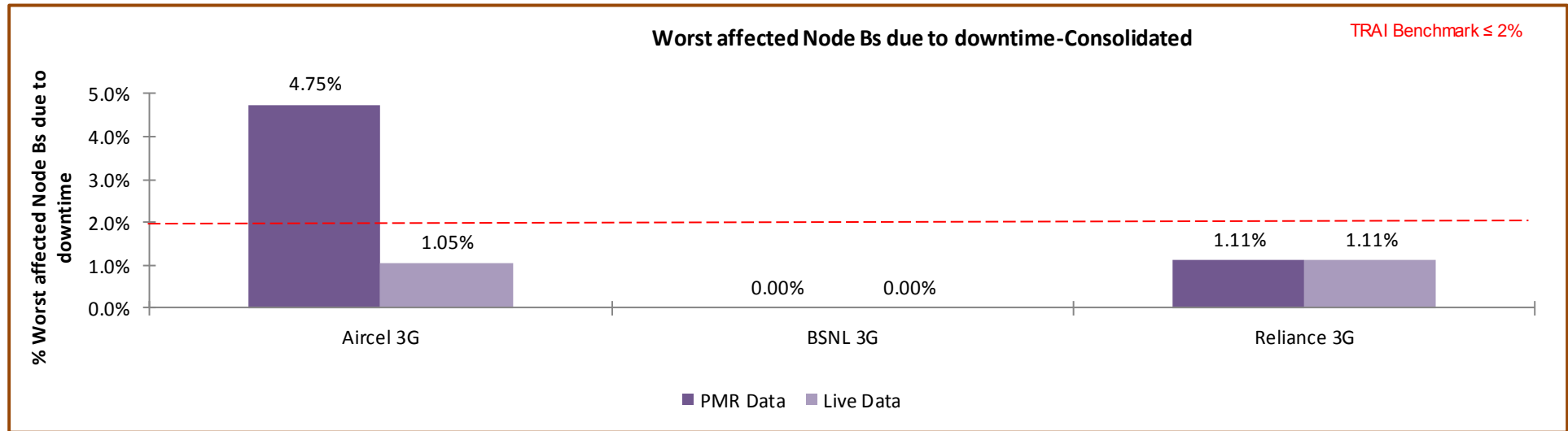
Worst affected Node Bs due to downtime-Consolidated

TRAI Benchmark ≤ 2%

- Aircel 3G: PMR Data 4.75%, Live Data 1.05%
- BSNL 3G: PMR Data 0.00%, Live Data 0.00%
- Reliance 3G: PMR Data 1.11%, Live Data 1.11%

Y-axis: % Worst affected Node Bs due to downtime

Legend: ■ PMR Data ■ Live Data

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

Aircel and BSNL did not meet the benchmark as per audit/PMR data.

Significant difference was observed between PMR & live measurement data for Aircel and BSNL. 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.

6.2.2.1 KEY FINDINGS – MONTH 1

Worst affected Node Bs due to downtime-Month 1

TRAI Benchmark ≤ 2%

Aircel 3G: PMR Data 6.67%, Live Data 1.20%
BSNL 3G: NA, NA
Reliance 3G: NDR, NDR

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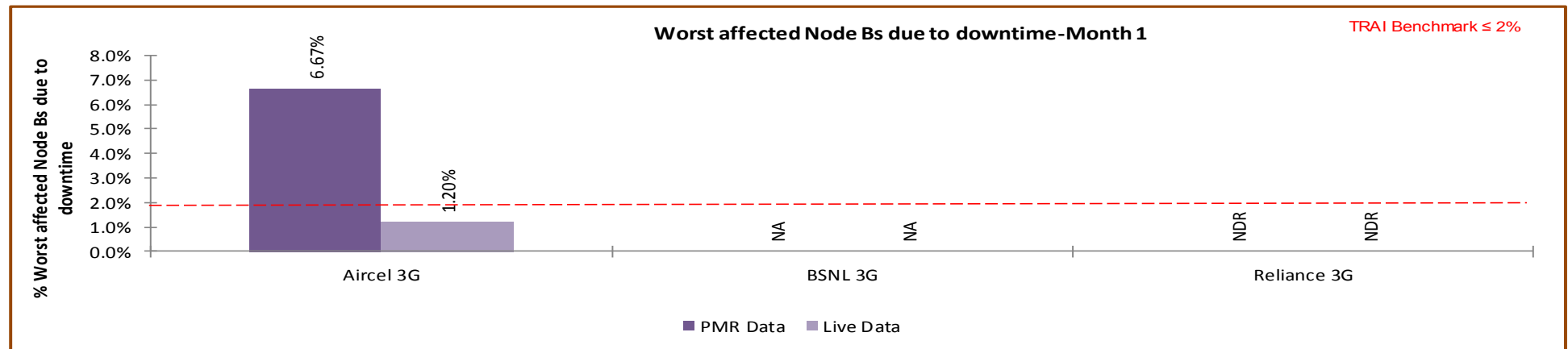
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2

Worst affected Node Bs due to downtime-Month 2

TRAI Benchmark ≤ 2%

Aircel 3G: PMR Data 7.22%, Live Data 1.25%
BSNL 3G: 0.00%, 0.00%
Reliance 3G: 1.52%, 1.52%

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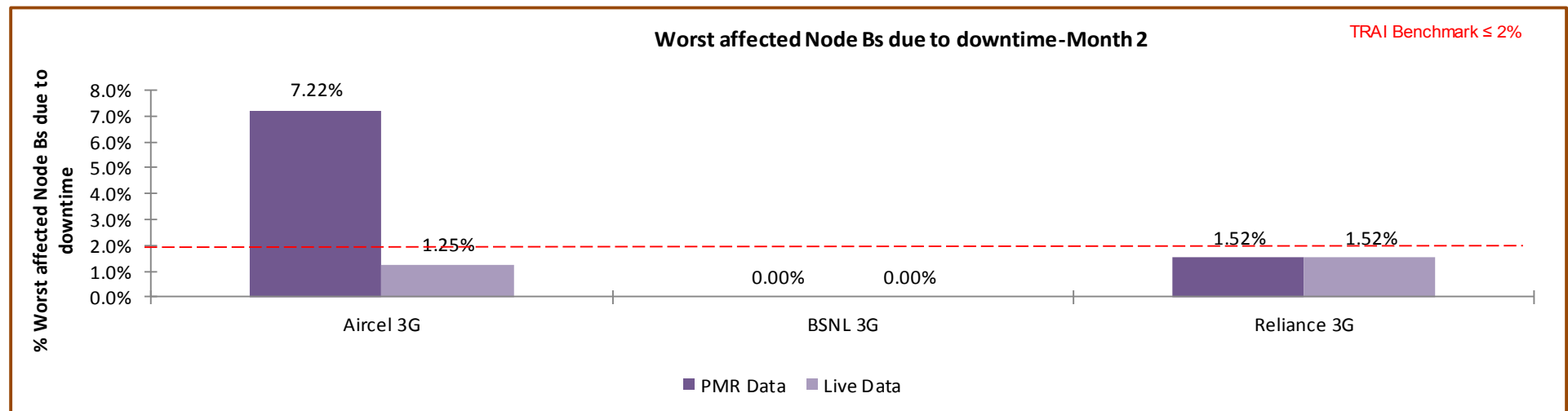
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.3 KEY FINDINGS – MONTH 3

Worst affected Node Bs due to downtime-Month 3

TRAI Benchmark ≤ 2%

Legend: ■ PMR Data ■ Live Data

Aircel 3G: 0.98% (PMR), 0.76% (Live)
BSNL 3G: NA, NA
Reliance 3G: 0.77% (PMR), 0.77% (Live)

Y-axis: % Worst affected Node Bs due to downtime (0.0% to 5.0%)

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

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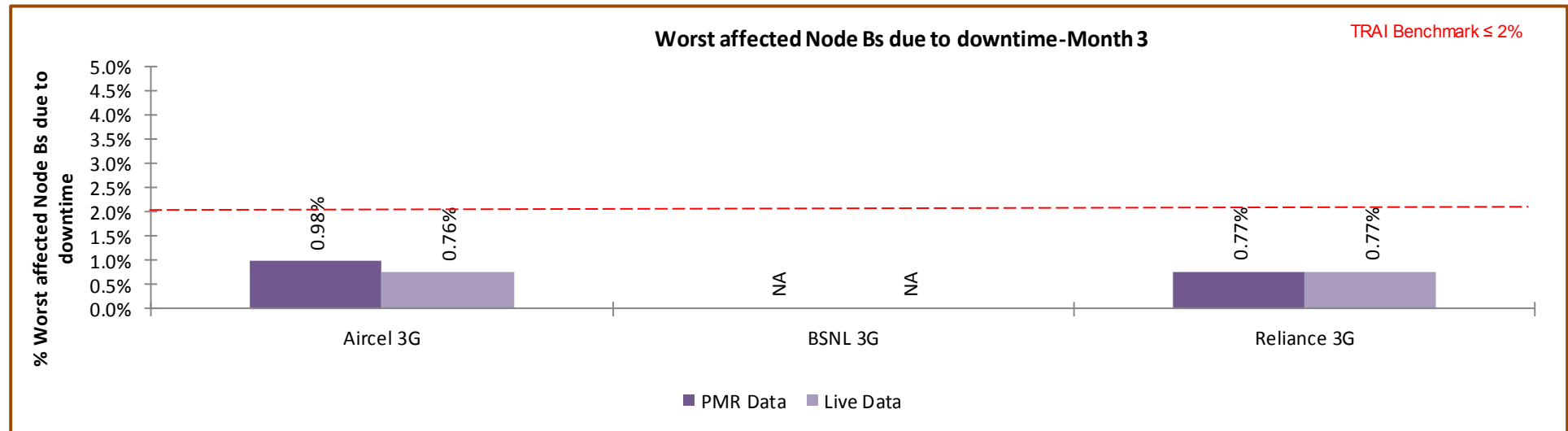
6.3   CALL SET UP SUCCESS RATE

6.3.1   PARAMETER DESCRIPTION

1. **Definition:** This parameter is same for 2G Networks as well as 3G Networks. However, the network elements involved in both the networks are different. Call Set-up Success Rate is defined as the ratio of Established Calls to Call Attempts. For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. However, any RAB abnormal release after RAB Assignment Response or Alerting/Connect message is to be considered as a dropped call.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computation Methodology-**
   (RRC Established / Total RRC Attempts) * 100

   RRC Established means the following events have happened in RRC setup:-

   ✤   RRC attempt is made

   ✤   The RRC established

   ✤   The RRC is routed to the outward path of the concerned MSC

5. **TRAI Benchmark ≥** 95%

6. **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 RAB congestion.

  ↳ The numerator and denominator values are derived from adding the counter values from the MSC.

6.3.2 KEY FINDINGS - CONSOLIDATED
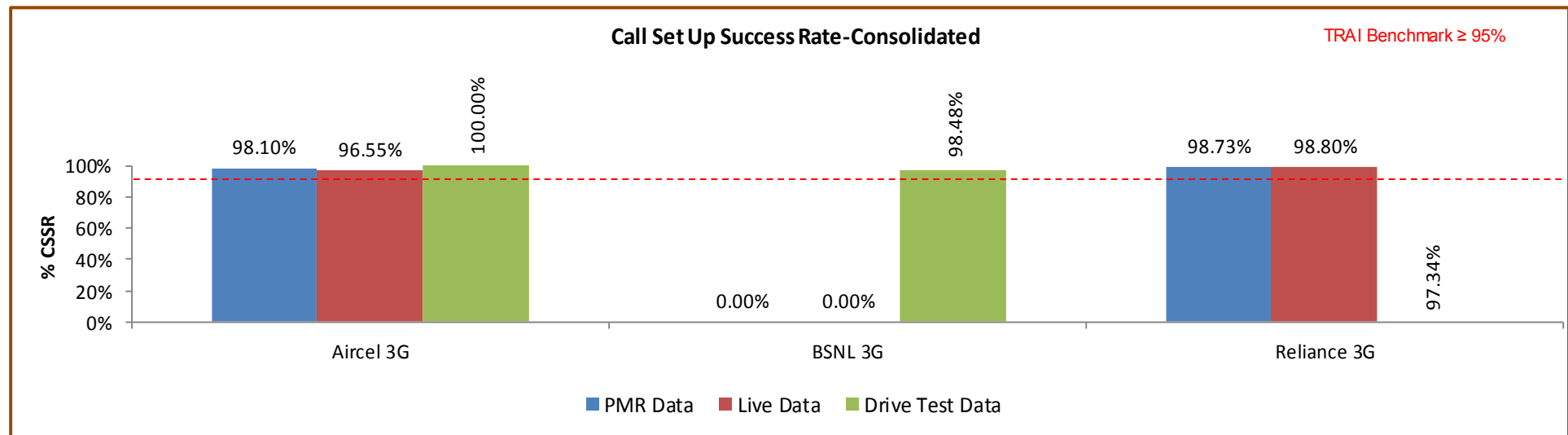
Call Set Up Success Rate-Consolidated

TRAI Benchmark ≥ 95%

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

All operators met the TRAI benchmark as per audit/PMR data.

6.3.2.1   KEY FINDINGS – MONTH 1

Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%

Aircel 3G: PMR Data 97.25%, Live Data 98.72%, Drive Test Data 100.00%

BSNL 3G: PMR Data NDR, Live Data NDR, Drive Test Data NA

Reliance 3G: PMR Data NDR, Live Data NDR, Drive Test Data 98.48%

Legend: ■ PMR Data   ■ Live Data   ■ Drive Test Data

Y-axis: % CSSR (0%, 20%, 40%, 60%, 80%, 100%)

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

6.3.2.2   KEY FINDINGS – MONTH 2

Call Set Up Success Rate-Month 2

TRAI Benchmark ≥ 95%

Aircel 3G: PMR Data 98.77%, Live Data 95.27%, Drive Test Data 100.00%

BSNL 3G: PMR Data NA, Live Data NA, Drive Test Data 96.32%

Reliance 3G: PMR Data 97.67%, Live Data 97.83%, Drive Test Data NA

Legend: ■ PMR Data   ■ Live Data   ■ Drive Test Data

Y-axis: % CSSR (0%, 20%, 40%, 60%, 80%, 100%)

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

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6.3.2.3   KEY FINDINGS – MONTH 3

Call Set Up Success Rate-Month 3

TRAI Benchmark ≥ 95%

Aircel 3G: 98.27% (PMR Data), 95.67% (Live Data), 100.00% (Drive Test Data)

BSNL 3G: NA (PMR Data), NA (Live Data), 98.48% (Drive Test Data)

Reliance 3G: 99.79% (PMR Data), 99.26% (Live Data), 96.39% (Drive Test Data)

% CSSR (Y-axis: 0%, 20%, 40%, 60%, 80%, 100%)

Legend: ■ PMR Data ■ Live Data ■ Drive Test Data

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

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6.4 NETWORK CHANNEL CONGESTION- RRC CONGESTION/ CIRCUIT SWITCHED RAB CONGESTION

6.4.1 PARAMETER DESCRIPTION

1. **Definition (RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition (Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.

   - RRC Level: Stand-alone dedicated control channel

   - RAB Level: Traffic Channel

   - POI Level: Point of Interconnect

4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**

   - **RRC / RAB 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 RRC/ RAB made on day 1

     - C_1 = Average RRC / RAB Congestion % on day 1

     - A_2 = Number of attempts to establish RRC / RAB made on day 2

     - C_2 = Average RRC / RAB Congestion % on day 2

     - A_n = Number of attempts to establish RRC / RAB made on day n

     - C_n = Average RRC / RAB Congestion % on day n

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- ✎ **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

7. **Benchmark:**

   - ✎ RRC Congestion: ≤ 1%, RAB Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

8. **Audit Procedure –**

   - ➲ Audit of the details of RRC and RAB 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 RRC

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6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)
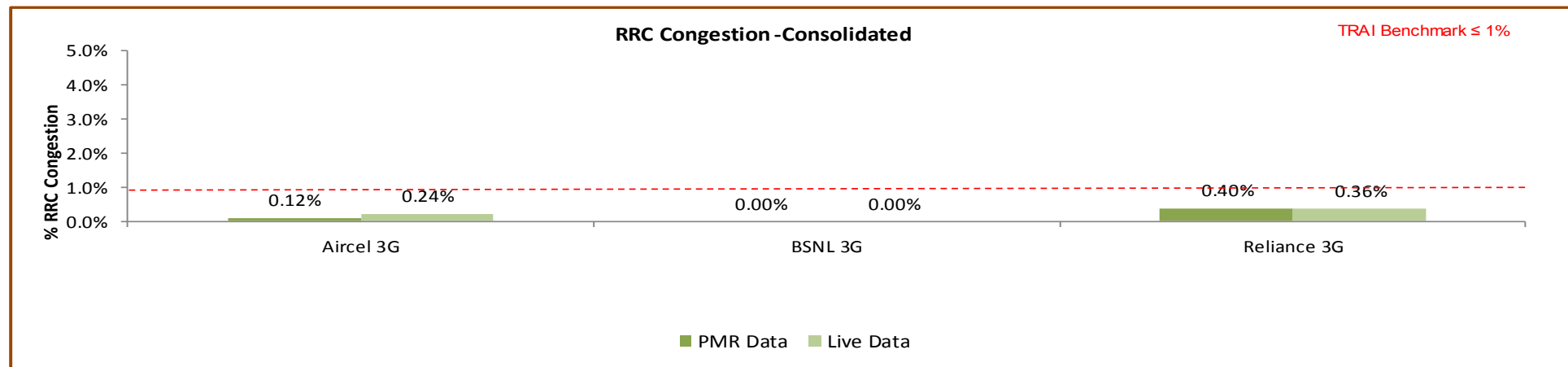
RRC Congestion - Consolidated

TRAI Benchmark ≤ 1%

	Aircel 3G	BSNL 3G	Reliance 3G
PMR Data	0.12%	0.00%	0.40%
Live Data	0.24%	0.00%	0.36%

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

BSNL failed to meet the benchmark.

6.4.2.1 KEY FINDINGS – MONTH 1
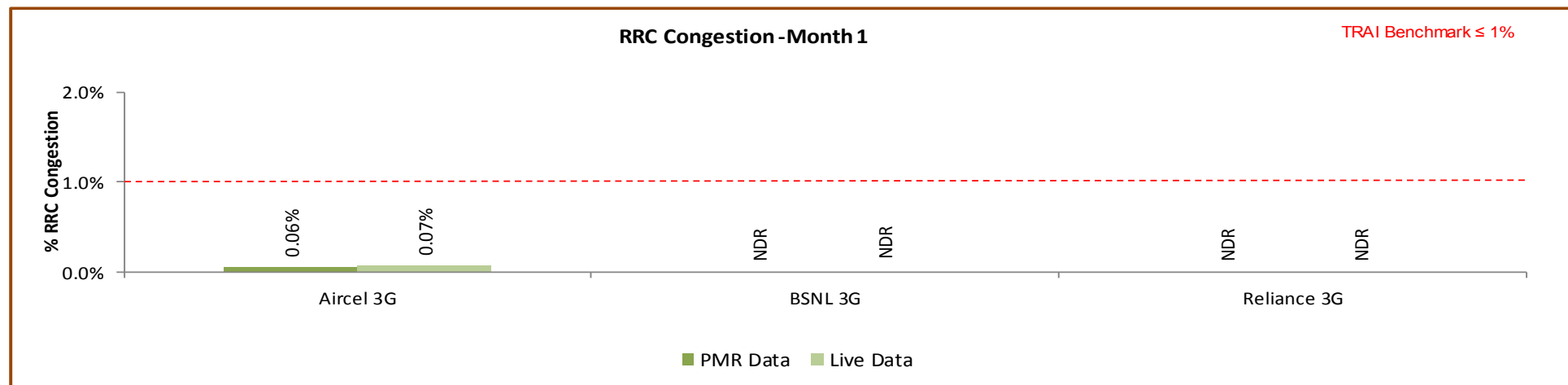
RRC Congestion - Month 1

TRAI Benchmark ≤ 1%

	Aircel 3G	BSNL 3G	Reliance 3G
PMR Data	0.06%	NDR	NDR
Live Data	0.07%	NDR	NDR

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

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6.4.2.2 KEY FINDINGS – MONTH 2

RRC Congestion -Month 2

TRAI Benchmark ≤ 1%

% RRC Congestion

	Aircel 3G	BSNL 3G	Reliance 3G
PMR Data	0.15%	0.00%	0.64%
Live Data	0.18%	0.00%	0.54%

■ PMR Data ■ Live Data

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

6.4.2.3 KEY FINDINGS – MONTH 3

RRC Congestion -Month 3

TRAI Benchmark ≤ 1%

% RRC Congestion

	Aircel 3G	BSNL 3G	Reliance 3G
PMR Data	0.14%	NA	0.15%
Live Data	0.47%	NA	0.18%

■ PMR Data ■ Live Data

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

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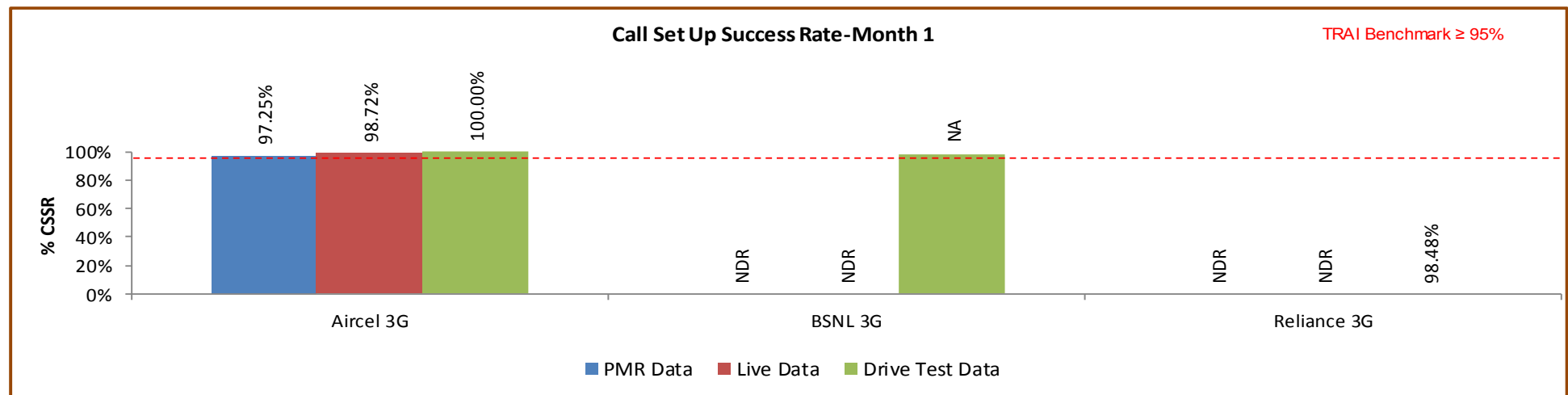(IS/ISO 9001-2008 Certified Organisation)
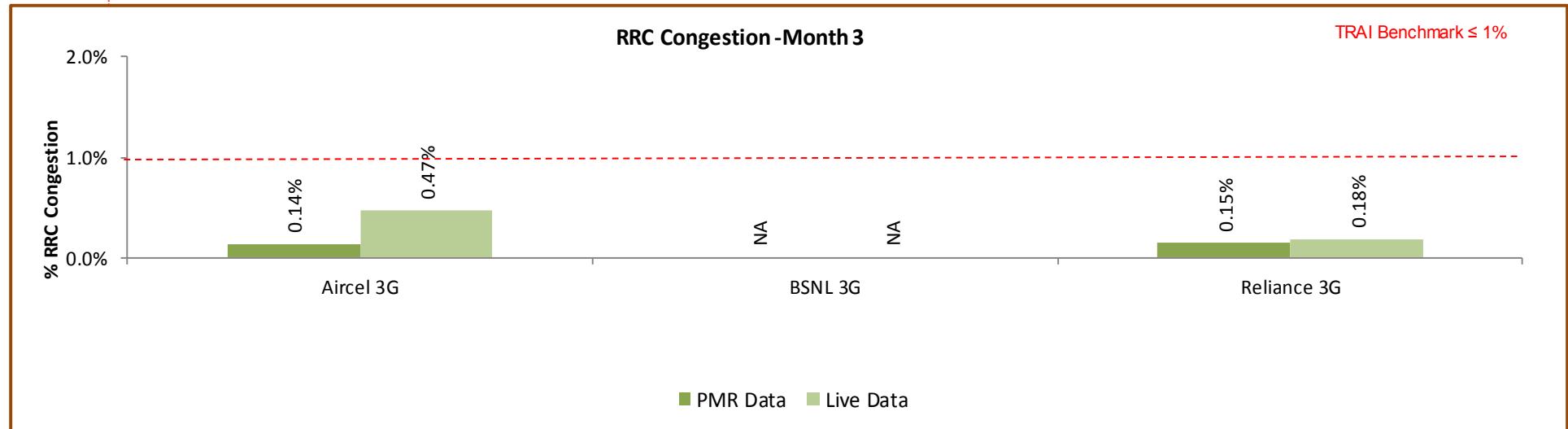
6.4.3   KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)
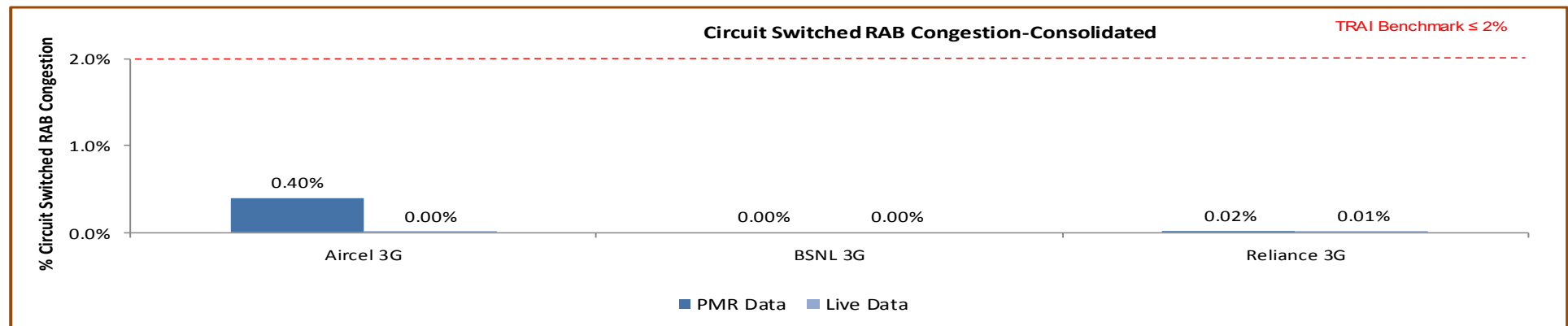
Data Source: Network Operations Center (NOC) of the operators

All operators met 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.

6.4.3.1   KEY FINDINGS – MONTH 1

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

6.4.3.2 KEY FINDINGS – MONTH 2

Circuit Switched RAB Congestion-Month 2

TRAI Benchmark ≤ 2%

- Aircel 3G: 0.01% (PMR Data), 0.00% (Live Data)
- BSNL 3G: NDR, NDR
- Reliance 3G: NDR, NDR

■ PMR Data   ■ Live Data

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

6.4.3.3 KEY FINDINGS – MONTH 3

Circuit Switched RAB Congestion-Month 3

TRAI Benchmark ≤ 2%

- Aircel 3G: 0.00% (PMR Data), 0.01% (Live Data)
- BSNL 3G: NA, NA
- Reliance 3G: 0.02% (PMR Data), 0.02% (Live Data)

■ PMR Data   ■ Live Data

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

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

Audit Results for POI Congestion- PMR data				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	19
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	44303
Traffic served for all POIs (B)- in erlangs		0	NDR	19766
POI congestion	≤ 0.5%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	19
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	44303
Traffic served for all POIs (B)- in erlangs		0	NDR	19766
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

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

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

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6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		0	NDR	NDR
Traffic served for all POIs (B)- in erlangs		0	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-January				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		0	NDR	NDR
Traffic served for all POIs (B)- in erlangs		0	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR

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

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6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	20
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	23641
Traffic served for all POIs (B)- in erlangs		0	NDR	9721
POI congestion	≤ 0.5%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	20
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	23641
Traffic served for all POIs (B)- in erlangs		0	NDR	9721
POI congestion	≤ 0.5%	0.00%	NDR	0

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	18
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	20662
Traffic served for all POIs (B)- in erlangs		0	NDR	10045
POI congestion	≤ 0.5%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	18
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	20662
Traffic served for all POIs (B)- in erlangs		0	NDR	10045
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

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

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6.5.1   PARAMETER DESCRIPTION

1. **Definition** - The Call Drop Rate measures the inability of Network to maintain a call and is defined as the ratio of abnormal speech disconnects with respect to all speech disconnects (both normal and abnormal). In 3G Networks, a normal disconnect is initiated from the Mobile Switching Centre (MSC) at completion of the call by a RAB Disconnect message. An abnormal RAB disconnect can be initiated by either UTRAN or CN and includes Radio Link Failures, Uplink (UL) or Downlink (DL) interference or any other reason.

   ↳ **Total No. of voice RAB abnormally released** = All calls ceasing unnaturally i.e. due to handover or due to radio loss

   ↳ **No. of voice RAB normally released** = All calls that have RAB allocation during busy hour

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released)x 100

Key Performance Indicator Term	Definition
#RAB Normal Release(CSV)	Number of voice RAB normally Released
#RAB Abnormal Release(CSV)	Number of voice RAB abnormally Released

5. **TRAI Benchmark** –

   ↳ Circuit switched voice drop rate ≤ 2%

6. **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.

6.5.2 KEY FINDINGS - CONSOLIDATED
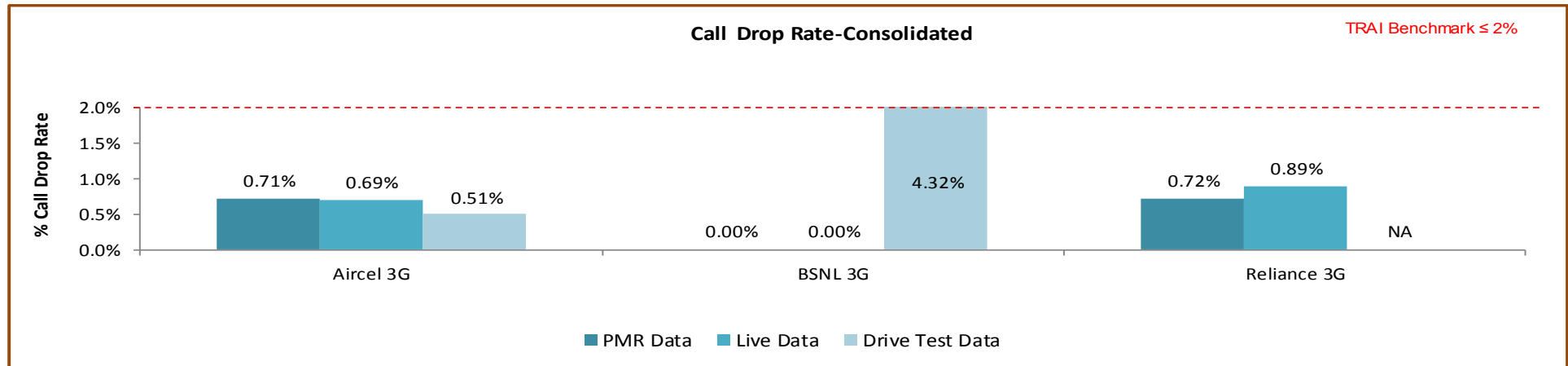
Call Drop Rate-Consolidated

TRAI Benchmark ≤ 2%

Aircel 3G: PMR Data 0.71%, Live Data 0.69%, Drive Test Data 0.51%
BSNL 3G: PMR Data 0.00%, Live Data 0.00%, Drive Test Data 4.32%
Reliance 3G: PMR Data 0.72%, Live Data 0.89%, Drive Test Data NA

Legend: PMR Data, Live Data, Drive Test Data

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

All operators met the benchmark for call drop rate during audit. During drive test BSNL failed to meet the benchmark.

6.5.2.1 KEY FINDINGS – MONTH 1
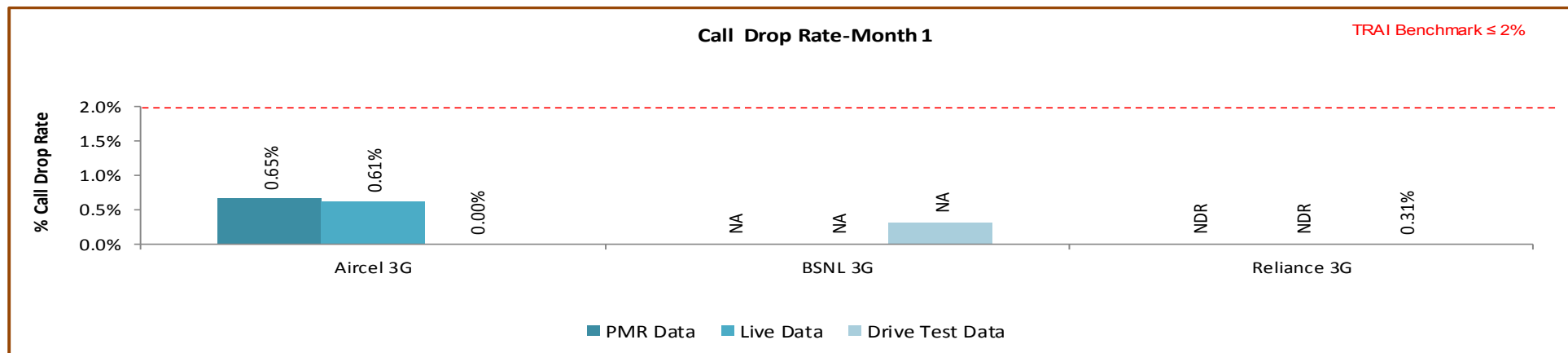
Call Drop Rate-Month 1

TRAI Benchmark ≤ 2%

Aircel 3G: PMR Data 0.65%, Live Data 0.61%, Drive Test Data 0.00%
BSNL 3G: PMR Data NA, Live Data NA, Drive Test Data NA
Reliance 3G: PMR Data NDR, Live Data NDR, Drive Test Data 0.31%

Legend: PMR Data, Live Data, Drive Test Data

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

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6.5.2.2   KEY FINDINGS – MONTH 2

Call Drop Rate-Month 2

TRAI Benchmark ≤ 2%
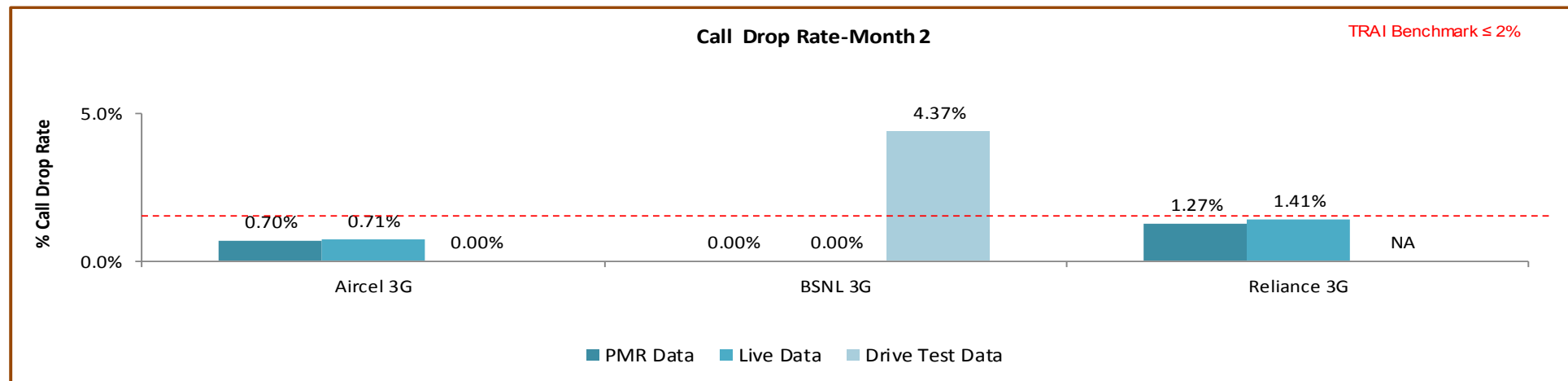
Data Source: Network Operations Center (NOC) of the operators

6.5.2.3   KEY FINDINGS – MONTH 3

Call Drop Rate-Month 3

TRAI Benchmark ≤ 2%
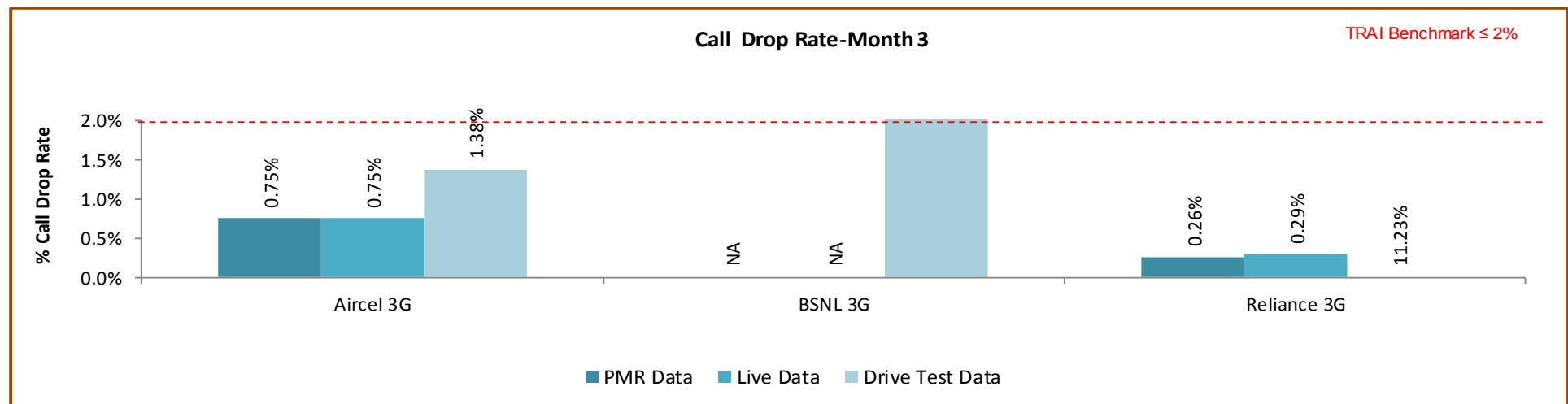
Data Source: Network Operations Center (NOC) of the operators

6.6 WORST AFFECTED CELLS HAVING MORE THAN 3% CIRCUIT SWITCHED VOICE DROP RATE

6.6.1 PARAMETER DESCRIPTION

1. **Definition- Cells having more than 3% circuit switch voice quality:** The existing parameter has been amended to cover 3G Networks to assess worst affected cells having more than 3% CSV Drop Rate.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (Number of cells having CSV drop rate > 3% during CBBH in a month / Total number of cells in the licensed area) x 100

5. **TRAI Benchmark** –

   ↳ Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **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.

6.6.2   KEY FINDINGS - CONSOLIDATED
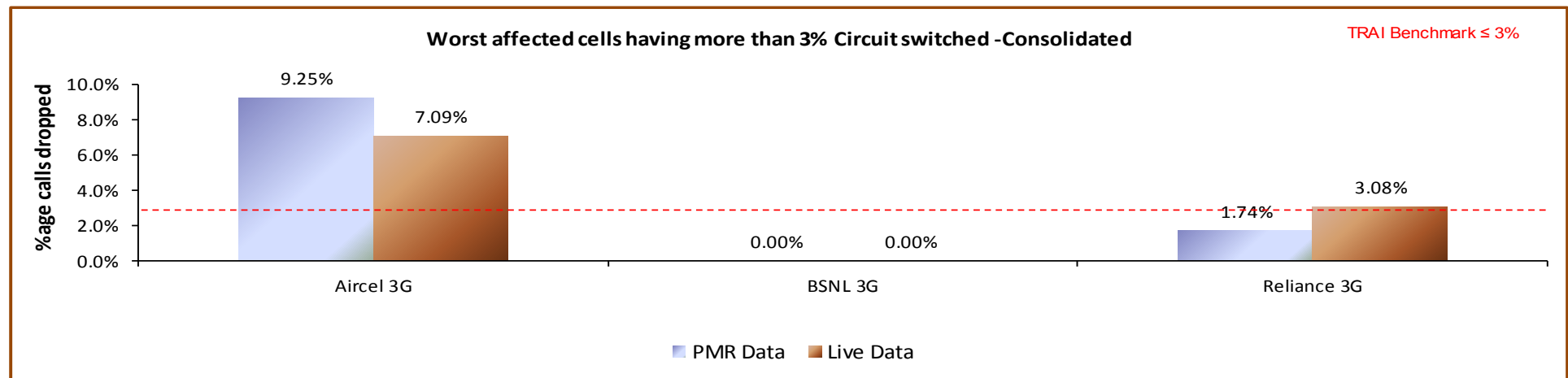
Worst affected cells having more than 3% Circuit switched -Consolidated

TRAI Benchmark ≤ 3%

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

Aircel and BSNL did not meet the benchmark during audit.

6.6.2.1   KEY FINDINGS – MONTH 1

Worst affected cells having more than 3% Circuit switched -Month 1

TRAI Benchmark ≤ 3%
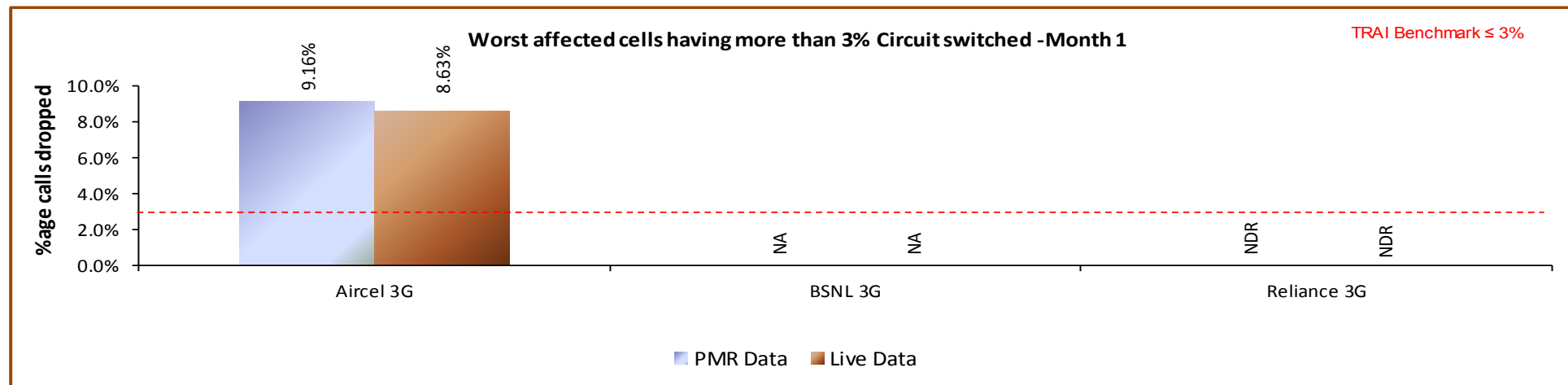
Data Source: Network Operations Center (NOC) of the operators

6.6.2.2   KEY FINDINGS – MONTH 2

Worst affected cells having more than 3% Circuit switched -Month 2

TRAI Benchmark ≤ 3%
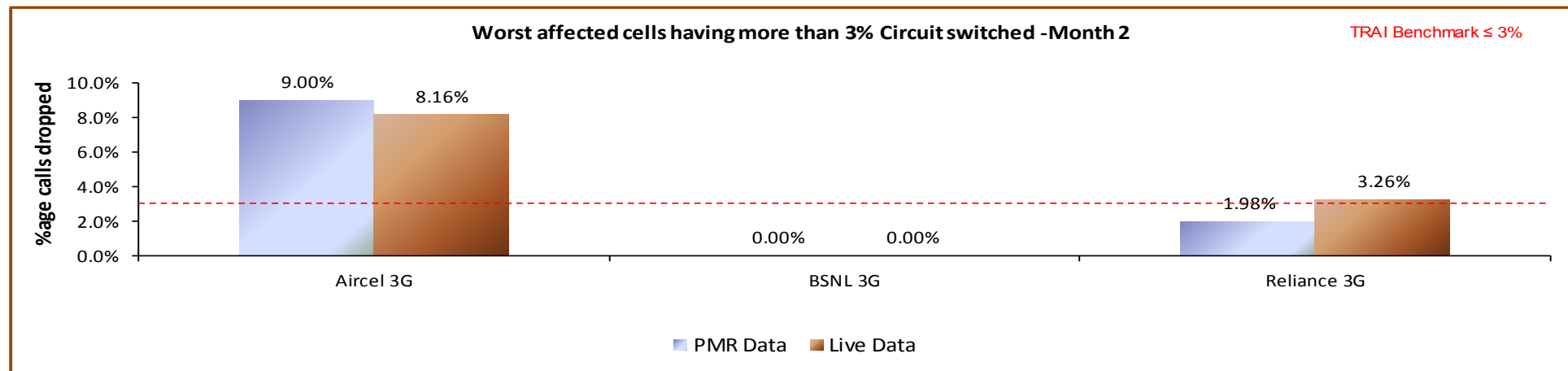
Data Source: Network Operations Center (NOC) of the operators

6.6.2.3   KEY FINDINGS – MONTH 3

Worst affected cells having more than 3% Circuit switched -Month 3

TRAI Benchmark ≤ 3%
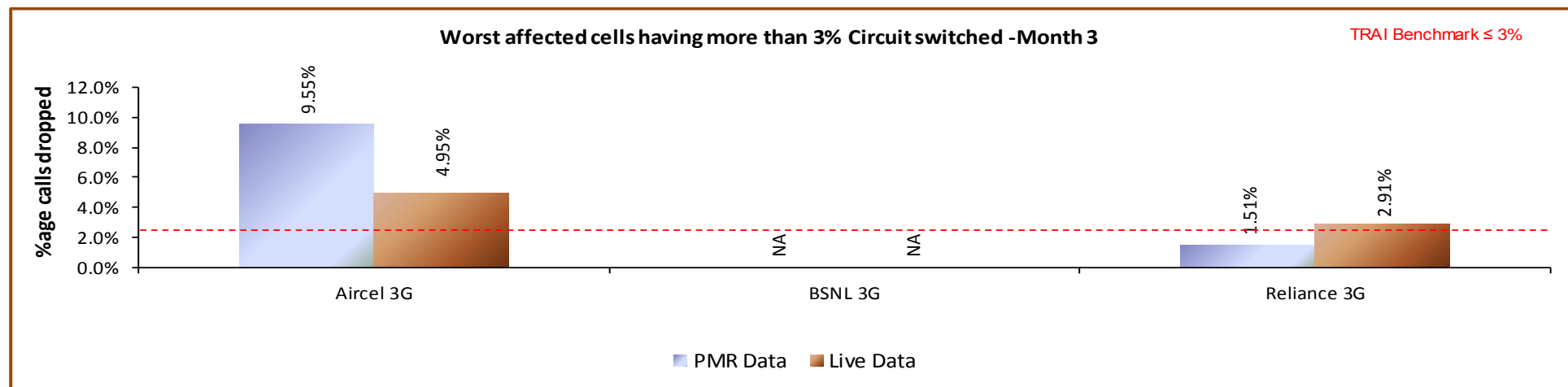
Data Source: Network Operations Center (NOC) of the operators

6.7 CIRCUIT SWITCH VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

5. **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 %

6. **Computational Methodology:**

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

7. **TRAI Benchmark:** ≥ 95%

8. **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.

6.7.2   KEY FINDINGS

Voice Quality-Consolidated

TRAI Benchmark ≥ 95%
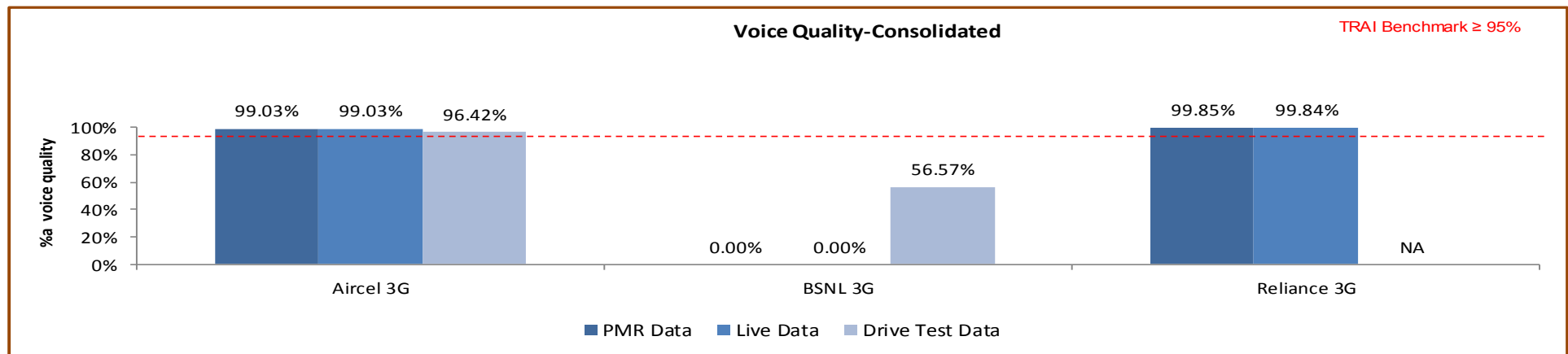
Data Source: Network Operations Center (NOC) of the operators

During drive test BSNL failed to meet the benchmark.

6.7.2.1   KEY FINDINGS – MONTH 1

Voice Quality-Month 1

TRAI Benchmark ≥ 95%

6.7.2.2   KEY FINDINGS – MONTH 2

Voice Quality-Month 2

TRAI Benchmark ≥ 95%

%a voice quality

- 99.03% — Aircel 3G (PMR Data)
- 87.88% — Aircel 3G (Live Data)
- NA — Aircel 3G (Drive Test Data)
- NA — BSNL 3G (PMR Data)
- NA — BSNL 3G (Live Data)
- 43.38% — BSNL 3G (Drive Test Data)
- 99.83% — Reliance 3G (PMR Data)
- 99.82% — Reliance 3G (Live Data)
- NA — Reliance 3G (Drive Test Data)

■ PMR Data   ■ Live Data   ■ Drive Test Data
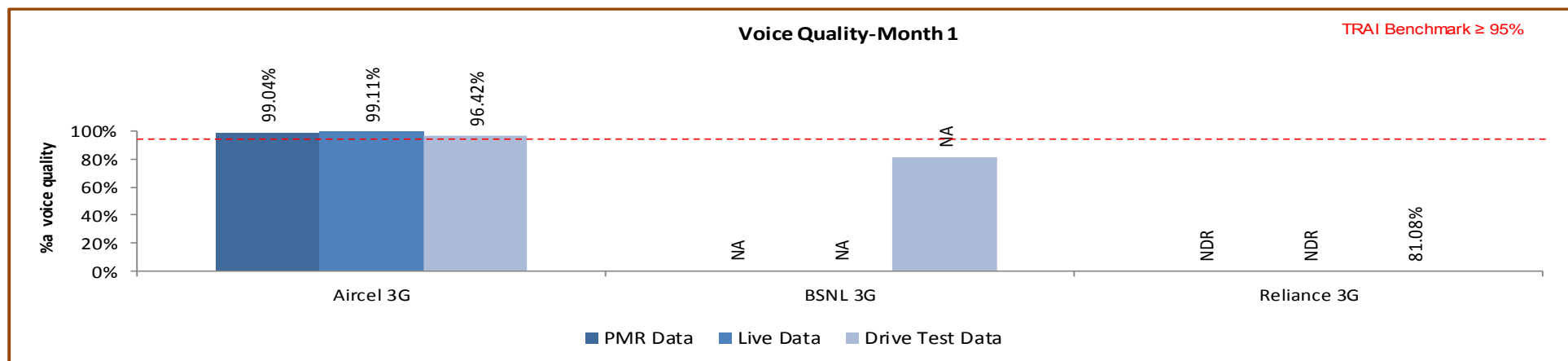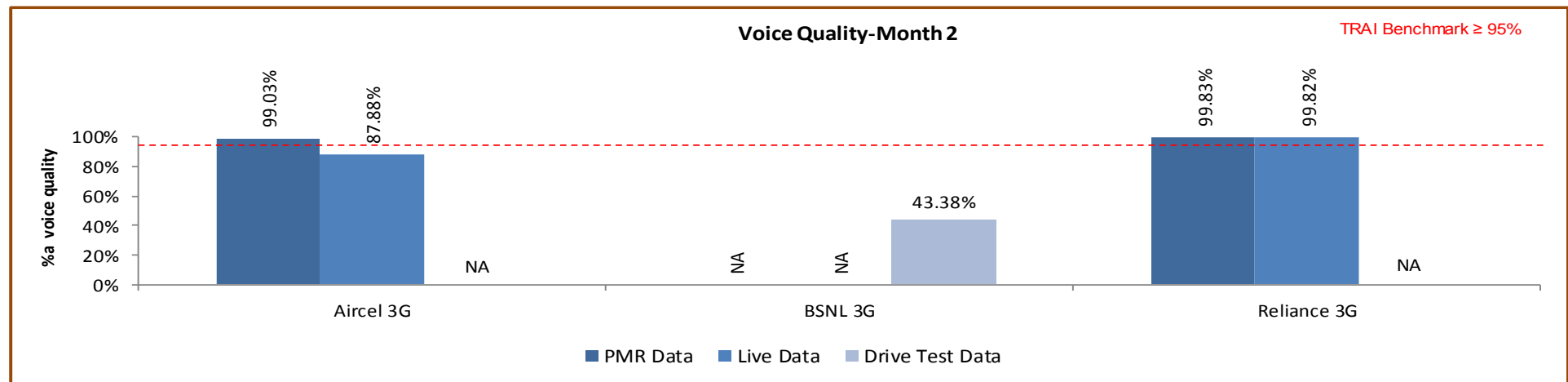
Data Source: Network Operations Center (NOC) of the operators

6.7.2.3   KEY FINDINGS – MONTH 3

Voice Quality-Month 3

TRAI Benchmark ≥ 95%

%a voice quality

- 99.03% — Aircel 3G (PMR Data)
- 92.64% — Aircel 3G (Live Data)
- NA — Aircel 3G (Drive Test Data)
- NA — BSNL 3G (PMR Data)
- NA — BSNL 3G (Live Data)
- NA — BSNL 3G (Drive Test Data)
- 99.86% — Reliance 3G (PMR Data)
- 99.86% — Reliance 3G (Live Data)
- 33.45% — Reliance 3G (Drive Test Data)

■ PMR Data   ■ Live Data   ■ Drive Test Data

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

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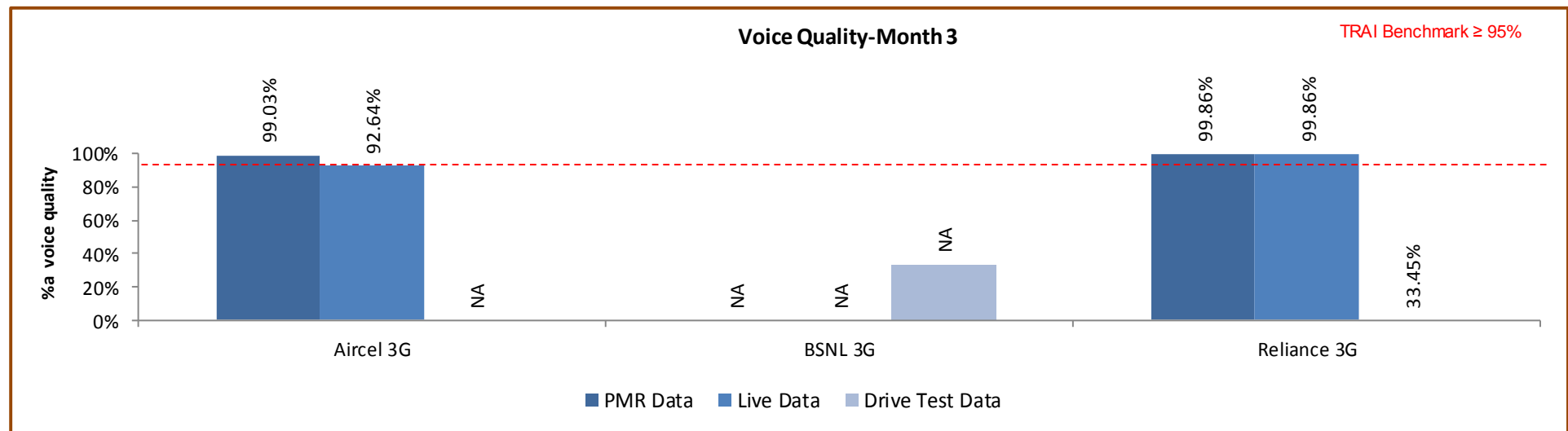
7 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (2G & 3G)

7.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

7.1.1 PARAMETER DESCRIPTION

This refers to the activation of services after activation of the SIM. This involves programming the various databases with the customer's information and any gateways to standard Internet chat or mail services or any data services. The service provider typically sends these settings to the subscriber's handset using SMS or WAP.

$$\textbf{\% activation done within 4 hours} = \frac{\text{Total Time Taken for Activation}}{\text{Total request time made}} \times 100$$

Benchmark: >=95%

7.1.2   KEY FINDINGS
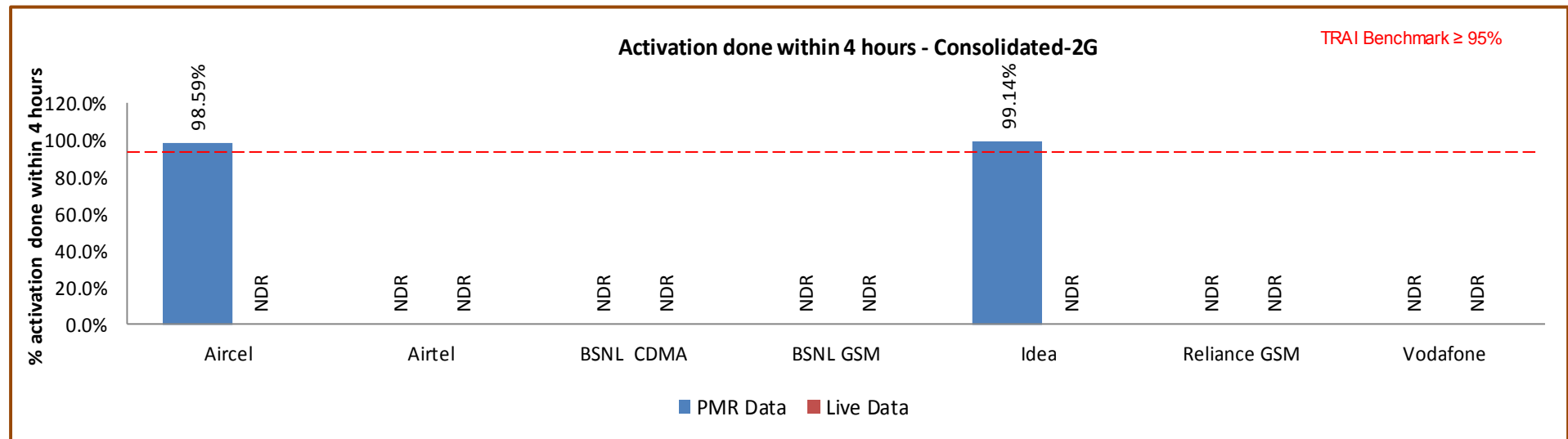
Aircel and Idea met the TRAI benchmark.
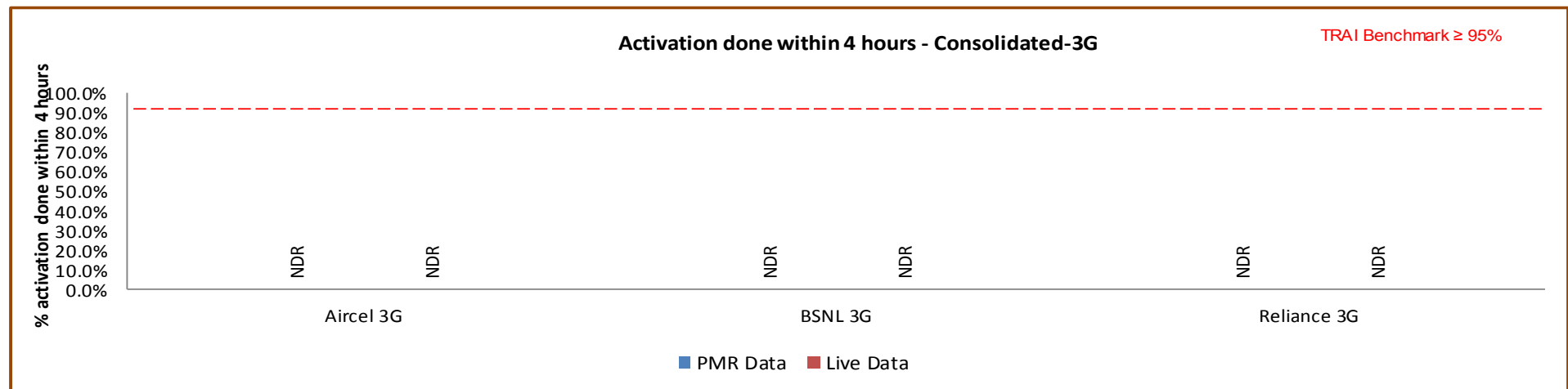
7.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G & 3G

7.2.1 PARAMETER DESCRIPTION

A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support Node (GGSN), and the requested QoS. A PDP context is handled by the MS, Serving GPRS Support Node (SGSN) and GGSN and is identified by a mobile's PDP address within these entities. Several PDP contexts can be activated at the same time within a given MS.

Measurement

This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

PDP Context Activation Success Rate (%) =

$$\frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

Benchmark: >=95%

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7.2.2 KEY FINDINGS

PDP Context activation success rate - Consolidated-2G

TRAI Benchmark ≥ 95%

All operators met the TRAI benchmark.

PDP Context activation success rate - Consolidated-3G
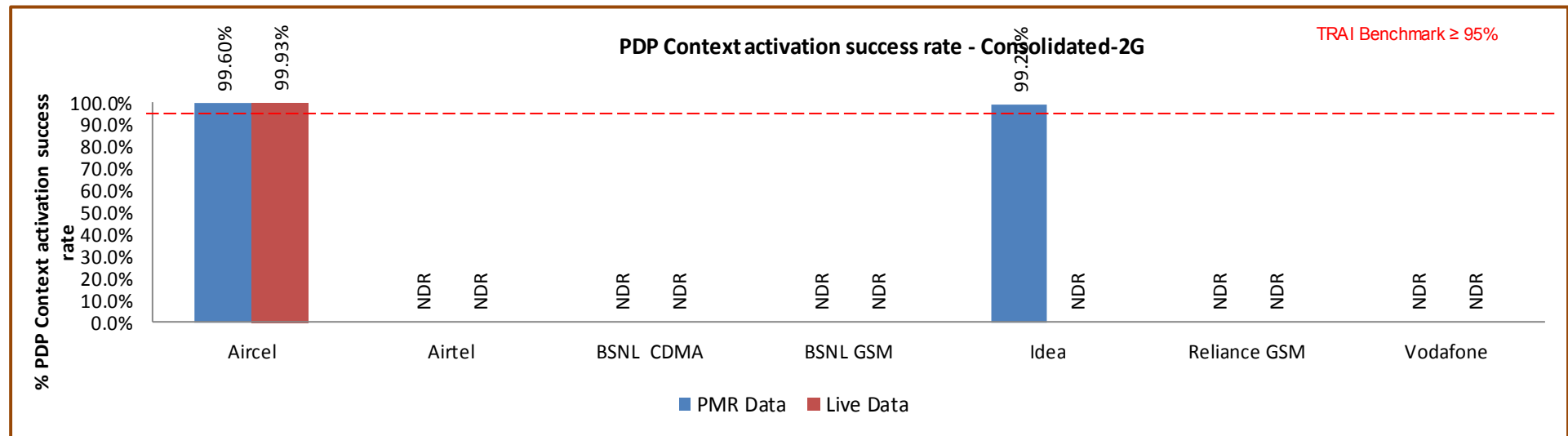
7.3   DROP RATE FOR 2G & 3G

7.3.1   PARAMETER DESCRIPTION

It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects (both normal and abnormal). An abnormal disconnect may happen because of Radio Link Failures, Uplink (UL) or Downlink (DL) interference, bad coverage, unsuccessful handovers or any other reason. The drop rate is to be measured for all generations of the technologies separately.

$$\textbf{Drop rate } = \frac{\text{No. of Dropped data Calls}}{\text{No. of Successful data calls}} \times 100$$

Benchmark: <=5%

7.3.2   KEY FINDINGS
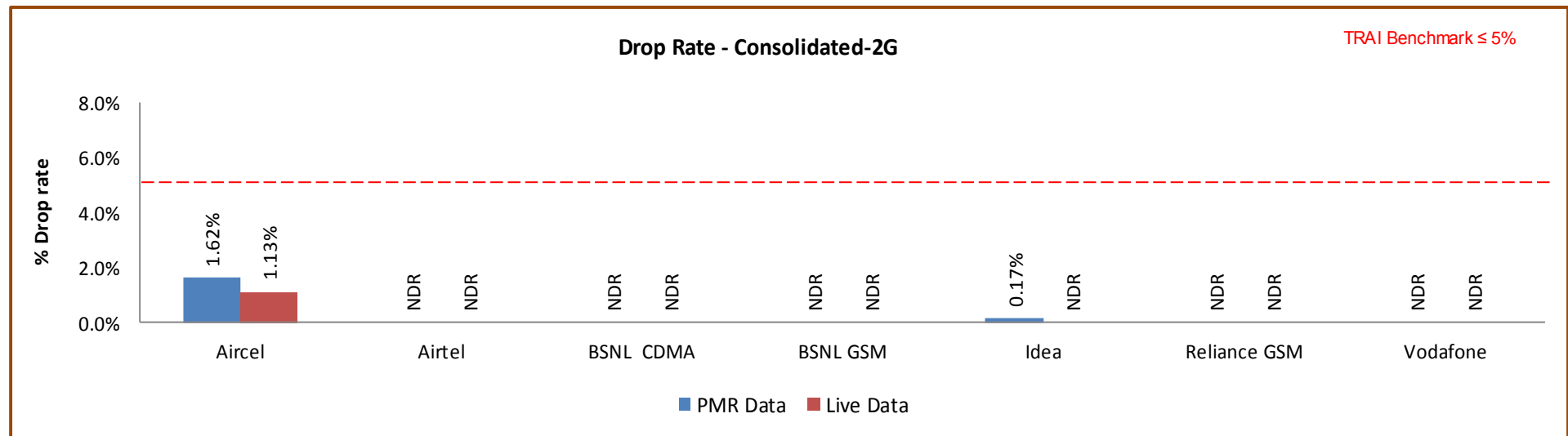
All operators met the TRAI benchmarks.
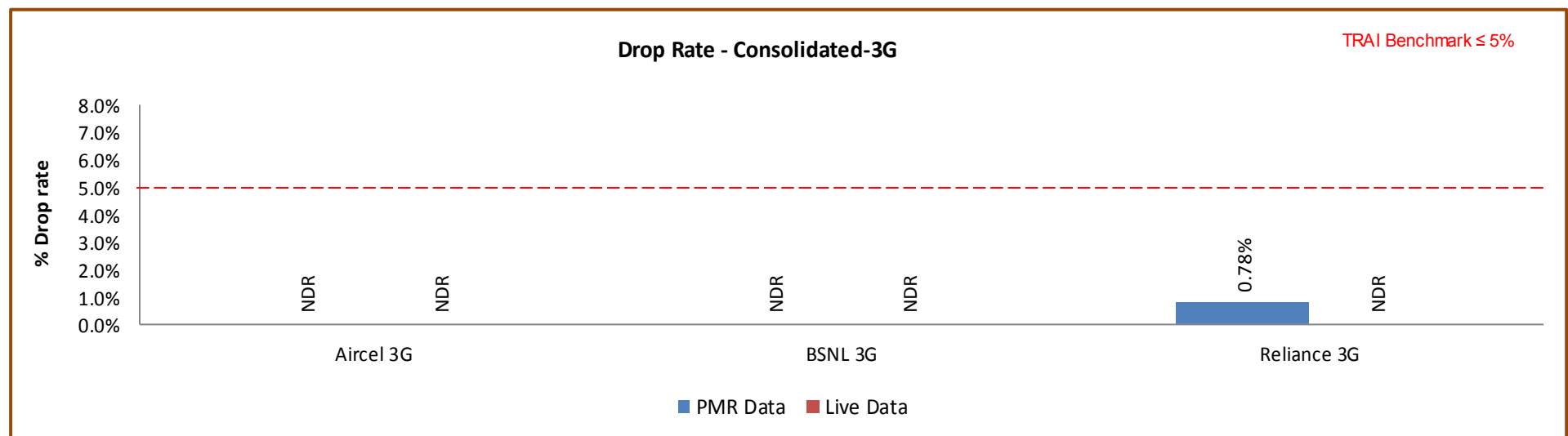
8   PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

8.1   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.

8.1.1   PARAMETER DESCRIPTION

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

- ✎ Payments made and not credited to the subscriber account
- ✎ Payment made on time but late payment charge levied wrongly
- ✎ Wrong roaming charges
- ✎ Double charges
- ✎ Charging for toll free services
- ✎ Local calls charged/billed as STD/ISD or vice versa
- ✎ Calls or messages made disputed
- ✎ Validity related complaints
- ✎ Credit agreed to be given in resolution of complaint, but not accounted in the bill
- ✎ Charging for services provided without consent
- ✎ Charging not as per tariff plans or top up vouchers/ special packs etc.
- ✎ Overcharging or undercharging

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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 February 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

8.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)

Metering and billing credibility - Postpaid

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
0.04%	0.05%	0.03%	0.00%	0.29%	0.09%	0.14%

Audit Results for Billing performance Postpaid-Consolidated
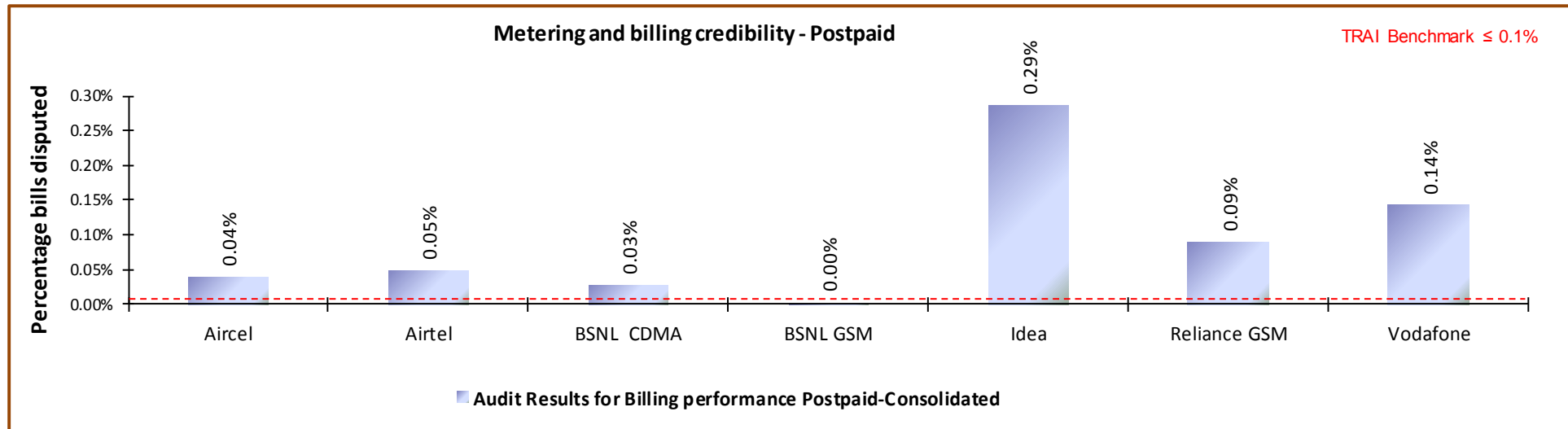
Data Source: Billing Center of the operators

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

Metering and billing credibility - Postpaid (Billing cycle wise)

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
January	0.01%	0.05%	0.03%	0.00%	0.24%	0.09%	0.18%
February	0.05%	0.05%	0.03%	0.00%	0.31%	0.09%	0.20%
March	0.05%	0.05%	0.02%	0.00%	0.31%	0.09%	0.04%

■ January ■ February ■ March

Data Source: Billing Center of the operators

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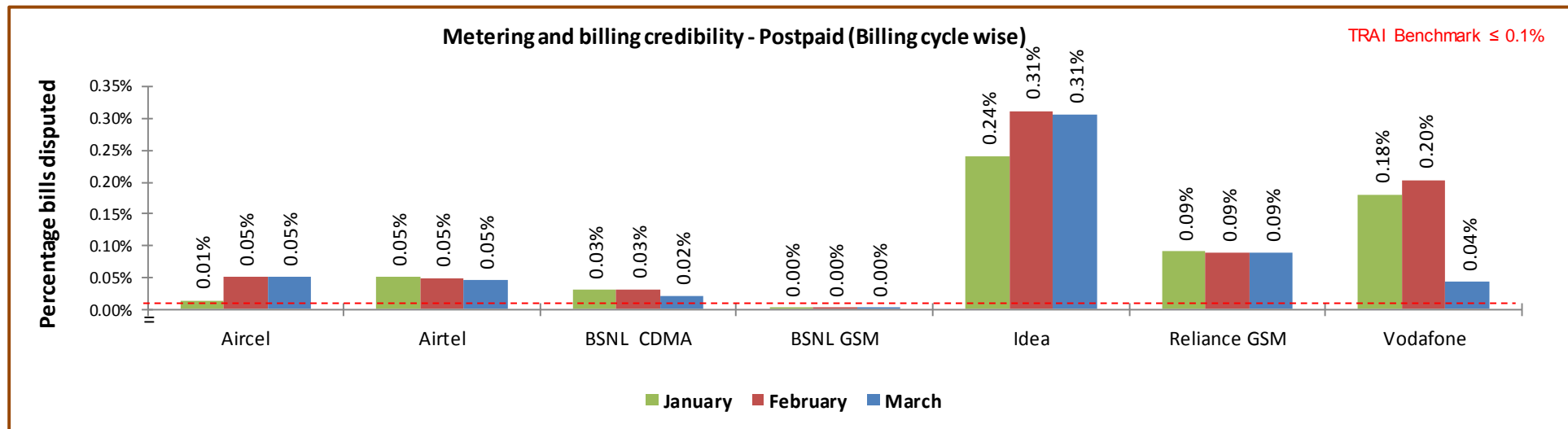
8.1.3   KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)
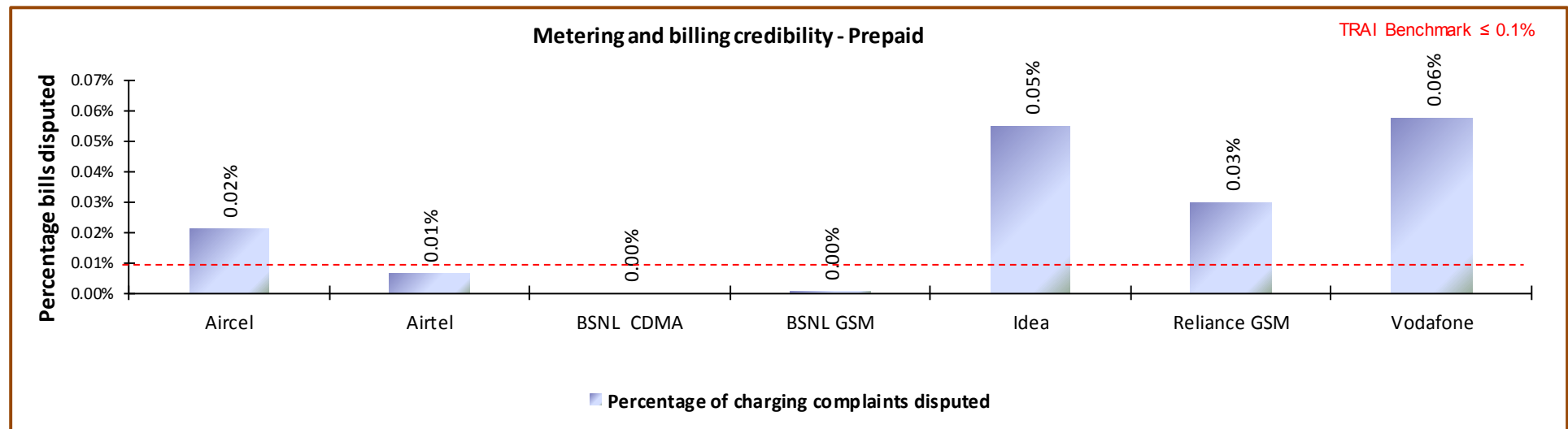
Data Source: Billing Center of the operators

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

8.2   RESOLUTION OF BILLING/ CHARGING COMPLAINTS

8.2.1   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 =

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

↬ **Billing complaints here shall include only dispute related issues (including those that February 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.

8.2.2 KEY FINDINGS - WITHIN 4 WEEKS

Resolution of billing complaints 4 Weeks

TRAI Benchmark =98%

Legend: ■ Percentage cases resolved in 4 weeks:Audit results   ■ Percentage cases resolved in 4 weeks:Live calling
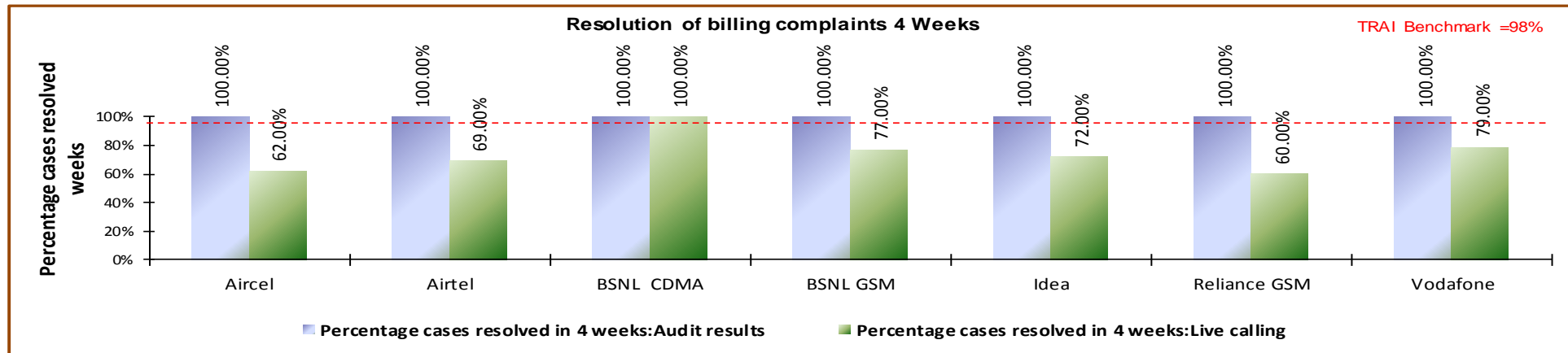
Data Source: Billing Center of the operators

8.2.3 KEY FINDINGS WITHIN 6 WEEKS
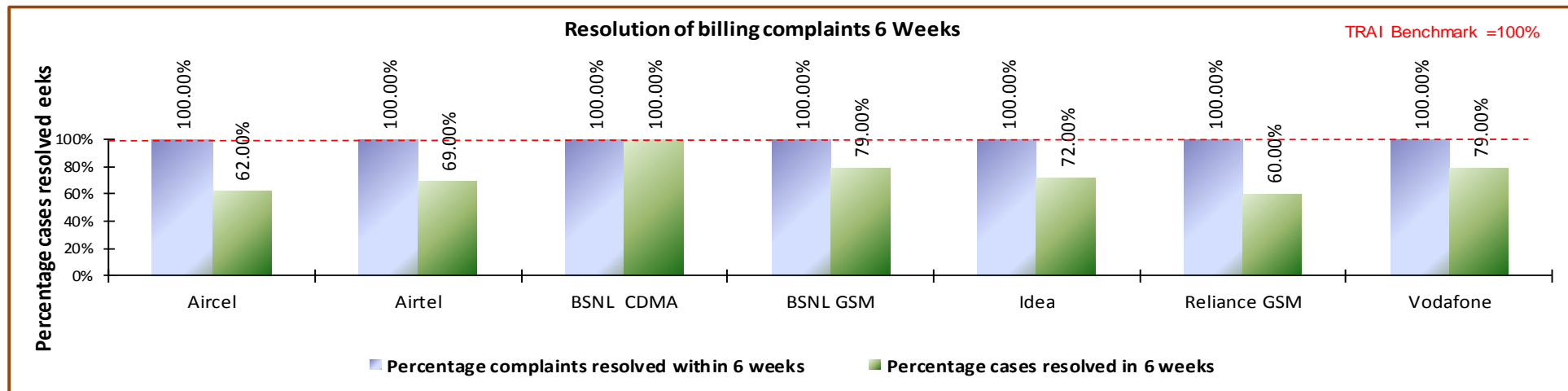
Resolution of billing complaints 6 Weeks

TRAI Benchmark =100%

Legend: ■ Percentage complaints resolved within 6 weeks   ■ Percentage cases resolved in 6 weeks

Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

8.3 PERIOD OF APPLYING CREDIT/WAVIER

8.3.1 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
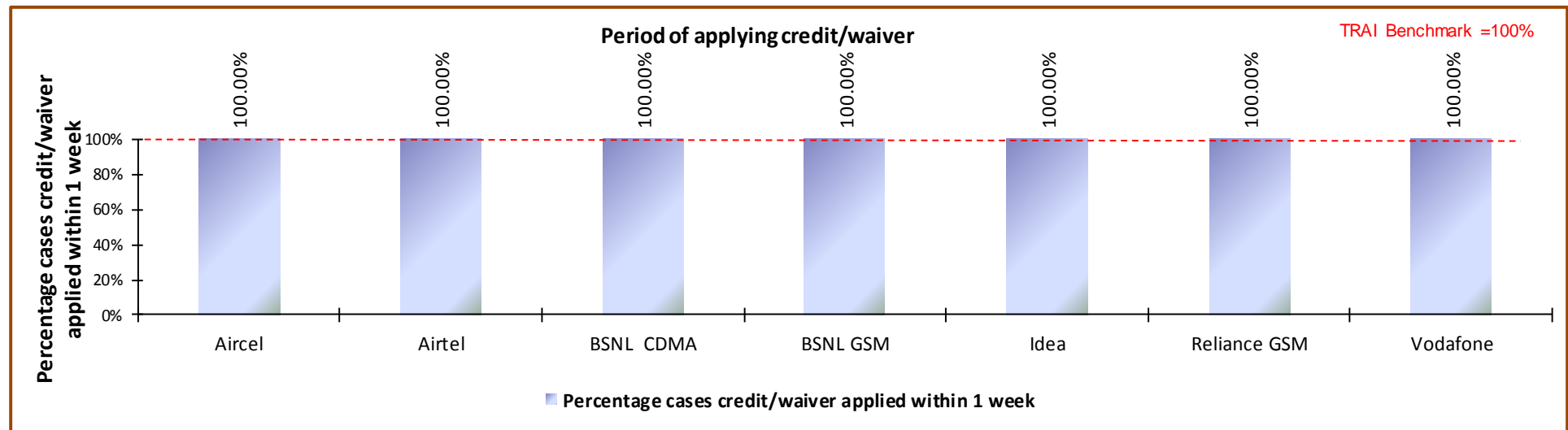
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8.3.2 KEY FINDINGS

Period of applying credit/waiver

TRAI Benchmark =100%

Percentage cases credit/waiver applied within 1 week

Aircel	100.00%
Airtel	100.00%
BSNL CDMA	100.00%
BSNL GSM	100.00%
Idea	100.00%
Reliance GSM	100.00%
Vodafone	100.00%

■ Percentage cases credit/waiver applied within 1 week

Data Source: Billing Center of the operators

All operators met the benchmark for this parameter.

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8.4 CALL CENTRE PERFORMANCE-IVR

8.4.1 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

8.4.2 KEY FINDINGS

Calls connected and answered

TRAI Benchmark ≥95%

Aircel: 95.79% / 100.00%
Airtel: 100.00% / 100.00%
BSNL CDMA: 100.00% / 100.00%
BSNL GSM: 97.32% / 100.00%
Idea: 95.46% / 100.00%
Reliance GSM: 99.07% / 100.00%
Vodafone: 99.31% / 100.00%

■ Percentage calls conncted and answered:Three month data   ■ Percentage calls connected and answered:Live calling
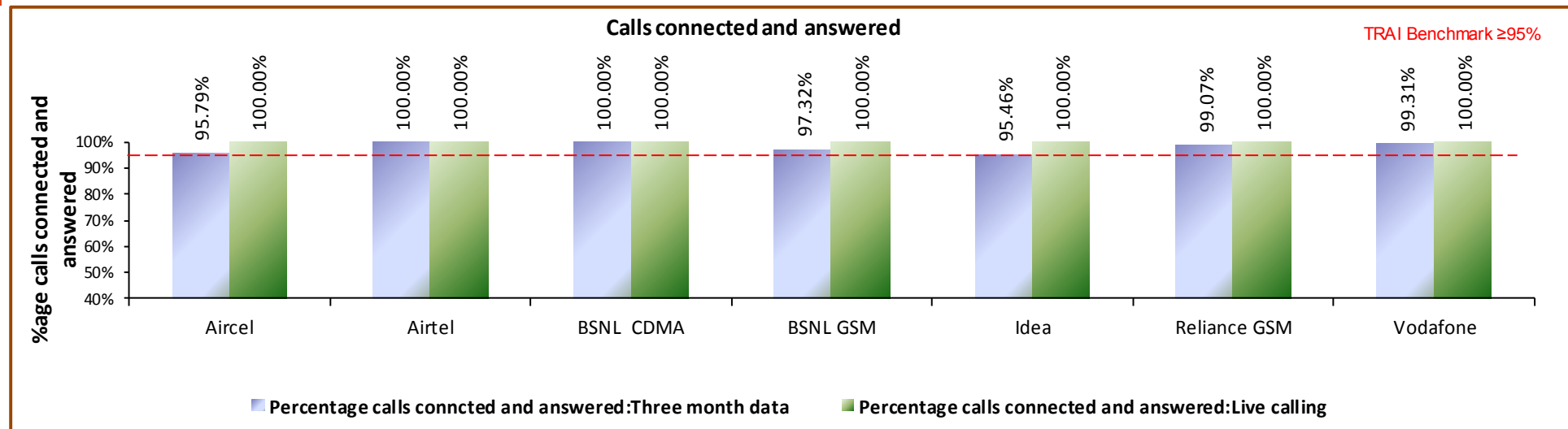
Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark except Aircel for PMR, however in live calling operators are much below than PMR.

8.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

8.5.1 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

8.5.2 KEY FINDINGS

Calls answered in 90 seconds (Voice to Voice)

TRAI Benchmark ≥ 95%

%age calls answered in 90 seconds

Operator	Percentage calls answered within 90 seconds (Avg of 3 months)	Live Calling Percentage calls getting connected and answered
Aircel	95.49%	100.00%
Airtel	94.23%	100.00%
BSNL CDMA	97.79%	91.43%
BSNL GSM	92.06%	85.71%
Idea	99.79%	100.00%
Reliance GSM	96.18%	100.00%
Vodafone	100.00%	94.68%

■ Percentage calls answered within 90 seconds (Avg of 3 months)   ■ Live Calling Percentage calls getting connected and answered

Data Source: Customer Service Center of the operators

Aircel and Reliance GSM were not able to meet the benchmark 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.

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Calls answered in 90 seconds (Voice to Voice)

TRAI Benchmark ≥ 95%

Operator	January	February	March
Aircel	95.58%	95.87%	95.06%
Airtel	96.12%	91.36%	95.03%
BSNL CDMA	98.18%	97.19%	98.24%
BSNL GSM	85.26%	95.24%	96.75%
Idea	99.80%	99.67%	99.91%
Reliance GSM	94.52%	96.78%	98.08%
Vodafone	100.00%	100.00%	100.00%
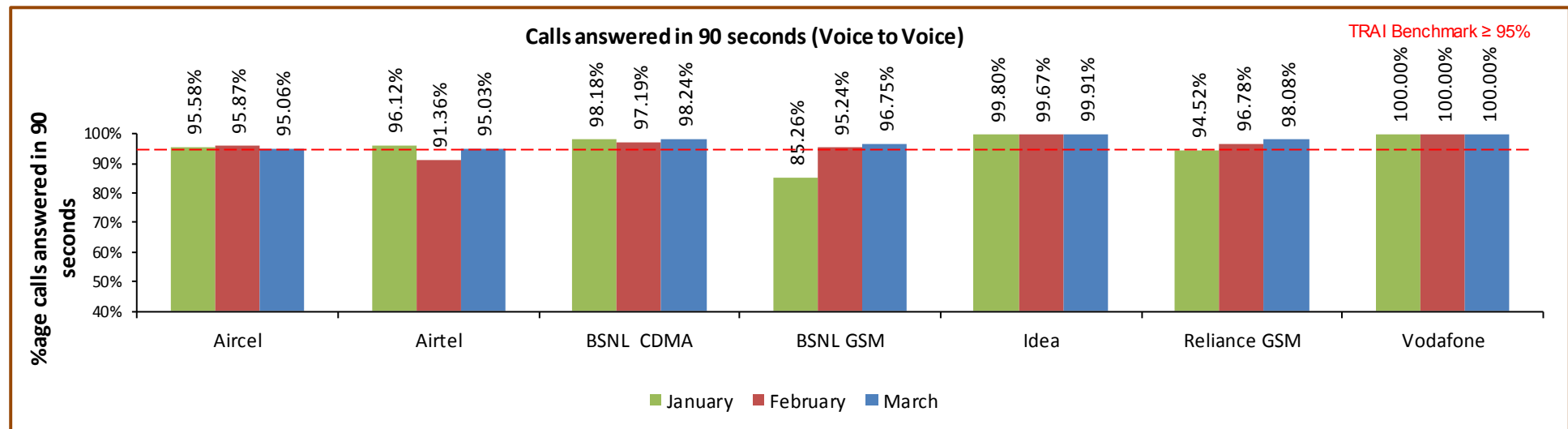
Data Source: Customer Service Center of the operators

8.6   TERMINATION/CLOSURE OF SERVICE

8.6.1   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

8.6.2 KEY FINDINGS
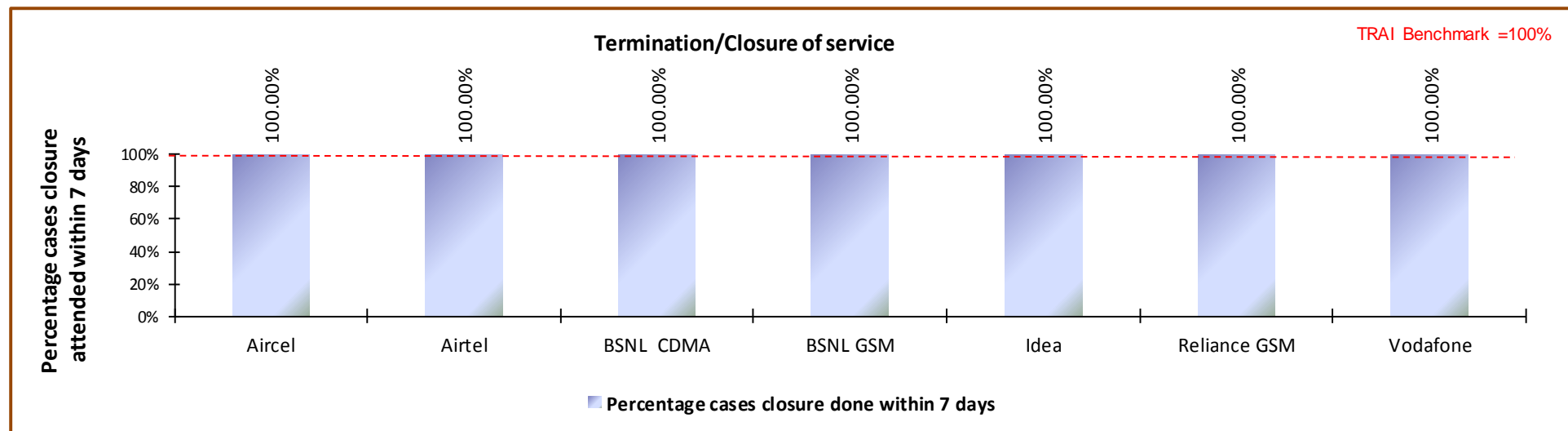
Termination/Closure of service

TRAI Benchmark =100%

Percentage cases closure attended within 7 days

100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00%

Aircel | Airtel | BSNL CDMA | BSNL GSM | Idea | Reliance GSM | Vodafone

■ **Percentage cases closure done within 7 days**

Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

8.7   REFUND OF DEPOSITS AFTER CLOSURE

8.7.1   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
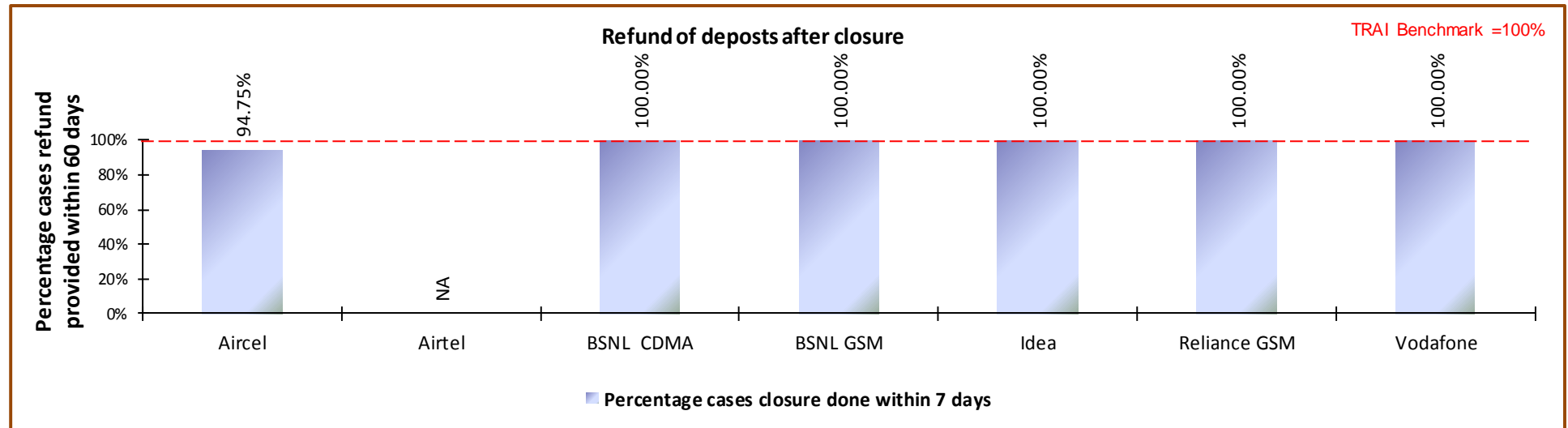
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8.7.2 KEY FINDINGS

Refund of deposts after closure

TRAI Benchmark =100%

Percentage cases refund provided within 60 days

Aircel	94.75%
Airtel	NA
BSNL CDMA	100.00%
BSNL GSM	100.00%
Idea	100.00%
Reliance GSM	100.00%
Vodafone	100.00%

■ **Percentage cases closure done within 7 days**

Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

9 DETAILED FINDINGS - DRIVE TEST DATA

9.1 OPERATOR ASSISTED DRIVE TEST - VOICE

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 in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days. The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. 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 regional teams. 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.

2G	3G
Aircel	Aircel
Airtel	Airtel
BSNL CDMA	BSNL WCDMA
BSNL GSM	Reliance WCDMA
Idea	
Reliance GSM	
Vodafone	

9.1.1 TEZPUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
January	TEZPUR	20/01/16	22/01/16	330

9.1.1.1 ROUTE DETAILS - TEZPUR SSA

Category	Type of location	January		
		TEZPUR		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	ROWTA	BISWANATH CHARIALI	BHIPURIA
	Highways	DHEKIAJULI	JINJA	TIPLING
	With in the City	THELAMARA	BEHALI	NORTH LAKHIMPUR
Indoor	Shopping complex	MISSION CHARALI	GOHPUR	DHUKUAKHANA
	Office complex	BALIPARA JAMUGURI BISWANATH CHARIALI;	NARAYANPUR BHIPURIA	

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We February 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.

9.1.1.2 ROUTE MAP - TEZPUR DAY 1
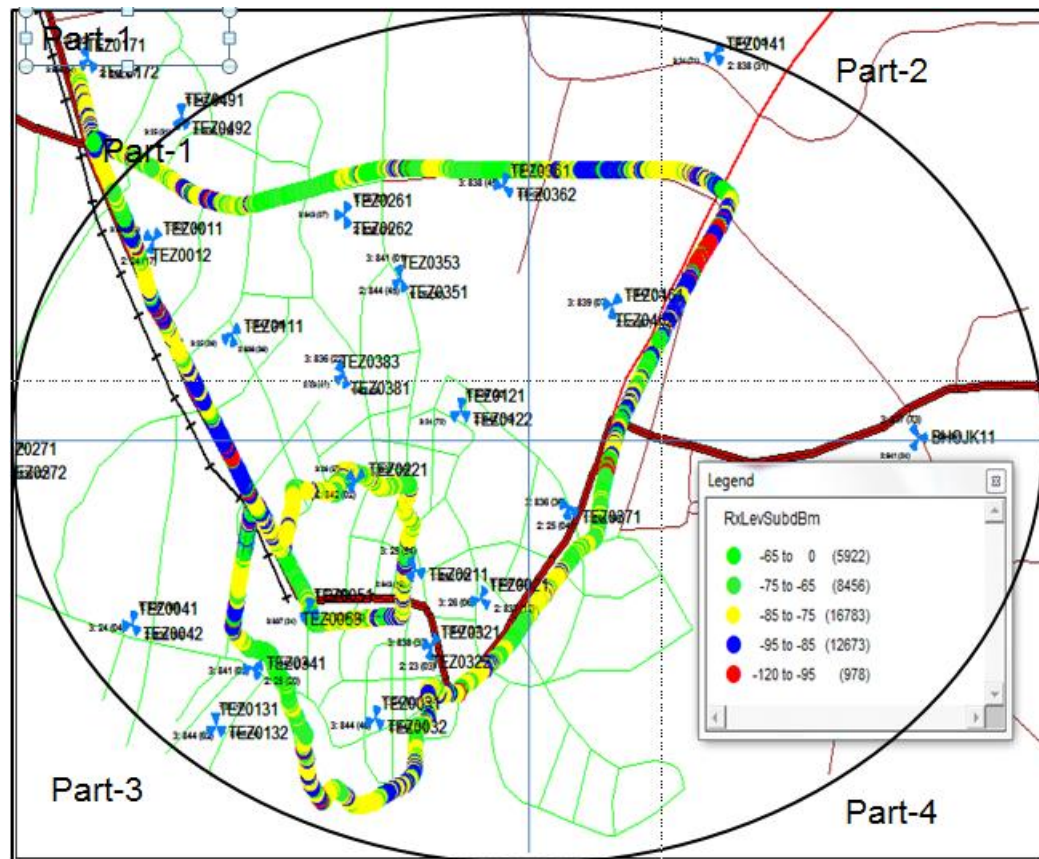
9.1.1.3 ROUTE MAP - TEZPUR DAY 2
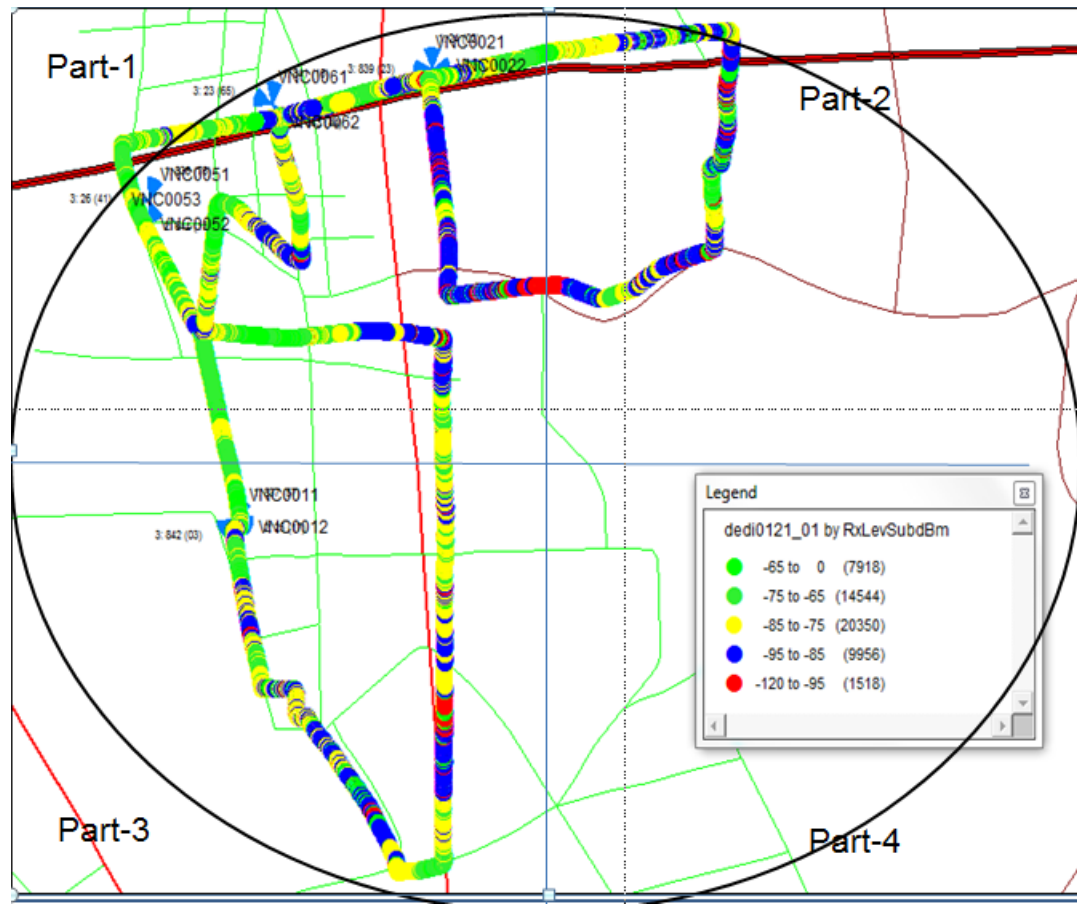
9.1.1.4   ROUTE MAP - TEZPUR DAY 3
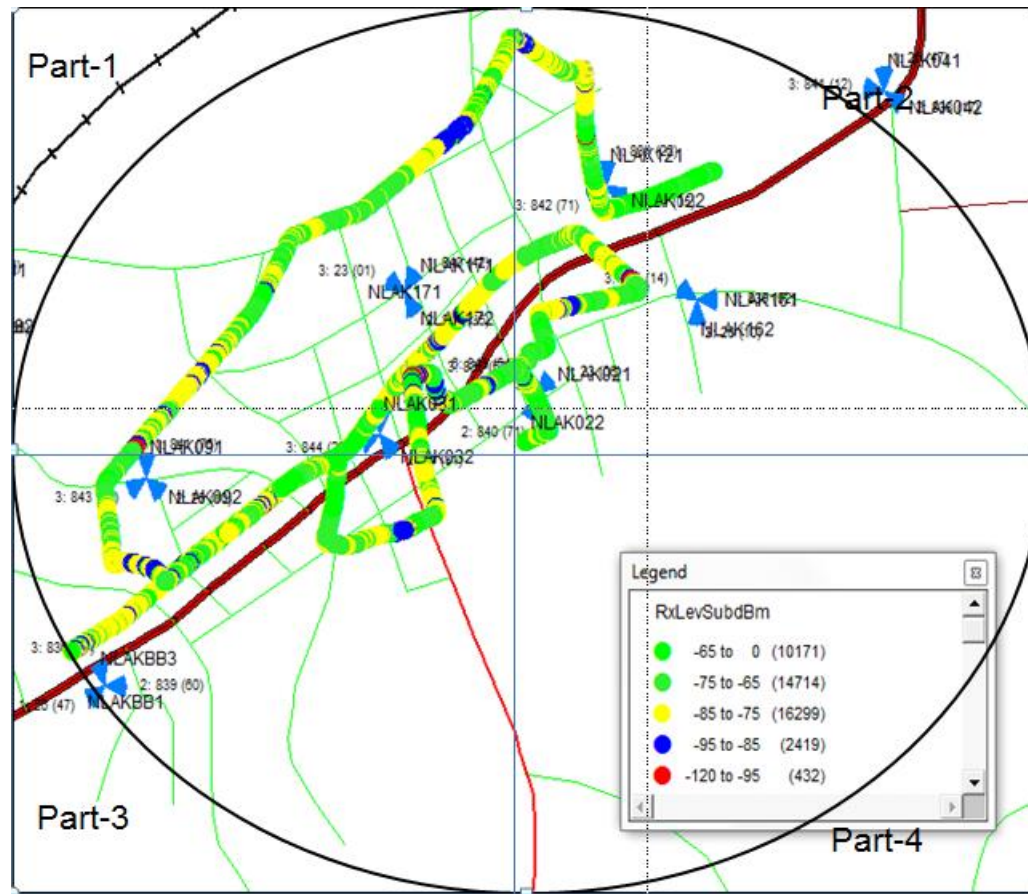
9.1.1.5   DRIVE TEST RESULTS - TEZPUR SSA-2G

TEZPUR	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		64.65%	49.19%	60.01%	34.94%	60.83%	13.43%	60.01%	34.94%	65.62%	37.65%	No Service		11.08%	37.64%
0 to -85 dBm		96.60%	84.00%	99.53%	66.74%	0.00%	30.86%	99.53%	66.74%	97.50%	69.50%			76.73%	75.59%
0 to -95 dBm		99.65%	97.81%	99.95%	91.89%	5.49%	55.97%	99.95%	91.89%	100.00%	92.70%			99.82%	96.26%
Voice quality	≥ 95%	96.82%	94.70%	99.46%	93.70%	99.95%	79.85%	99.46%	93.70%	99.01%	97.02%			94.84%	96.51%
CSSR	≥ 95%	100.00%	96.81%	100.00%	99.68%	100.00%	56.09%	100.00%	99.68%	NDR	98.74%			100.00%	94.35%
%age Blocked calls		0.00%	1.77%	0.00%	0.32%	0.00%	43.91%	0.00%	0.32%	NDR	1.26%			0.00%	4.32%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.32%	0.00%	9.62%	0.00%	0.32%	NDR	0.00%			0.00%	0.35%
Hands off success rate		100.00%	100.00%	100.00%	99.14%	100.00%	99.36%	100.00%	99.14%	NDR	100.00%			100.00%	99.69%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, Airtel, BSNL GSM and BSNL CDMA did not meet the benchmark in outdoor locations; however Vodafone failed to meet the benchmark in indoor locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.1.1   DRIVE TEST RESULTS - TEZPUR SSA-3G

TEZPUR	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		0.24%	29.61%	22.53%	12.58%	22.53%	12.58%	23.95%	33.79%
0 to -85 dBm		36.27%	57.23%	58.45%	42.86%	58.45%	42.86%	81.35%	57.27%
0 to -95 dBm		87.14%	89.63%	98.49%	64.75%	98.49%	64.75%	99.67%	77.10%
Voice quality	≥ 95%	98.43%	95.45%	97.26%	77.55%	97.26%	77.55%	93.14%	67.54%
CSSR	≥ 95%	100.00%	100.00%	100.00%	98.23%	100.00%	98.23%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	1.77%	0.00%	1.77%	1.18%	8.27%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.36%	0.00%	0.36%	0.00%	2.45%
Hands off success rate		NDR	NDR	100.00%	99.82%	100.00%	99.82%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Note: - Aircel did not share the data

Voice Quality

Airtel 3G and BSNL 3G failed to meet the benchmark for voice quality in outdoor locations, however Vodafone 3G failed in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

Vodafone 3G failed to meet the benchmark for call drop rate in outdoor locations.

9.1.1.1   DRIVE TEST RESULTS - TEZPUR SSA- DATA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	RCOM GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	100%	NDR	100%	100%		100%
Succesful Data Transmission upload speed attempts	>75%	100%	100%	NDR	100%	100%		100%
Minimum download speed		55	138	NDR	NDR	84	No Service	NDR
Average throughput for Packet Data		60	81	NDR	66	112		175
Latency	<250ms	NDR	100%	NDR	100	NDR		NDR

Note: BSNL CDMA did not submit the data.

All the parameters met the TRAI benchmark.

9.1.1.2   DRIVE TEST RESULTS - TEZPUR SSA- DATA-3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	NDR	100	100%		100%
Succesful Data Transmission upload speed attempts	>75%	NDR	100	100%		100%
Minimum download speed		NDR	136	NDR	No Service	NDR
Average throughput for Packet Data		NDR	576	235		1004
Latency	<250ms	NDR	100	100		NDR

Note: Aircel did not submit the data.

All the parameters met the TRAI benchmark.

9.1.2   DIBRUGARH SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
February	Dibrugargh	24/02/15	26/02/16	299

9.1.2.1   ROUTE DETAILS - DIBRUGARH SSA

Category	Type of location	February Dibrugargh		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Digboi to Margherita via pawoi Ledo to Mirichapori via Digboi,Tingrai Bazar,Hansara,Doomduma. Digboi Town	Dibrugarh to Digboi via Lahowal,Dikom,Chabua,Panitola,Tinsukia,Makum Rd,Tingrai Bazar. Tinsukia Town	Duliajan to Dibrugarh via Tipling Tiniali,Madhapur,Naharkatia,Tingkhong,Rajgarh,Pithaguti,Bamunbari,Moran,Kutuha, Dibrugarh University. Dibrugarh Town.
	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 February 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.

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9.1.2.2 ROUTE MAP - DIBRUGARH DAY 1

9.1.2.3   ROUTE MAP - DIBRUGARH DAY 2
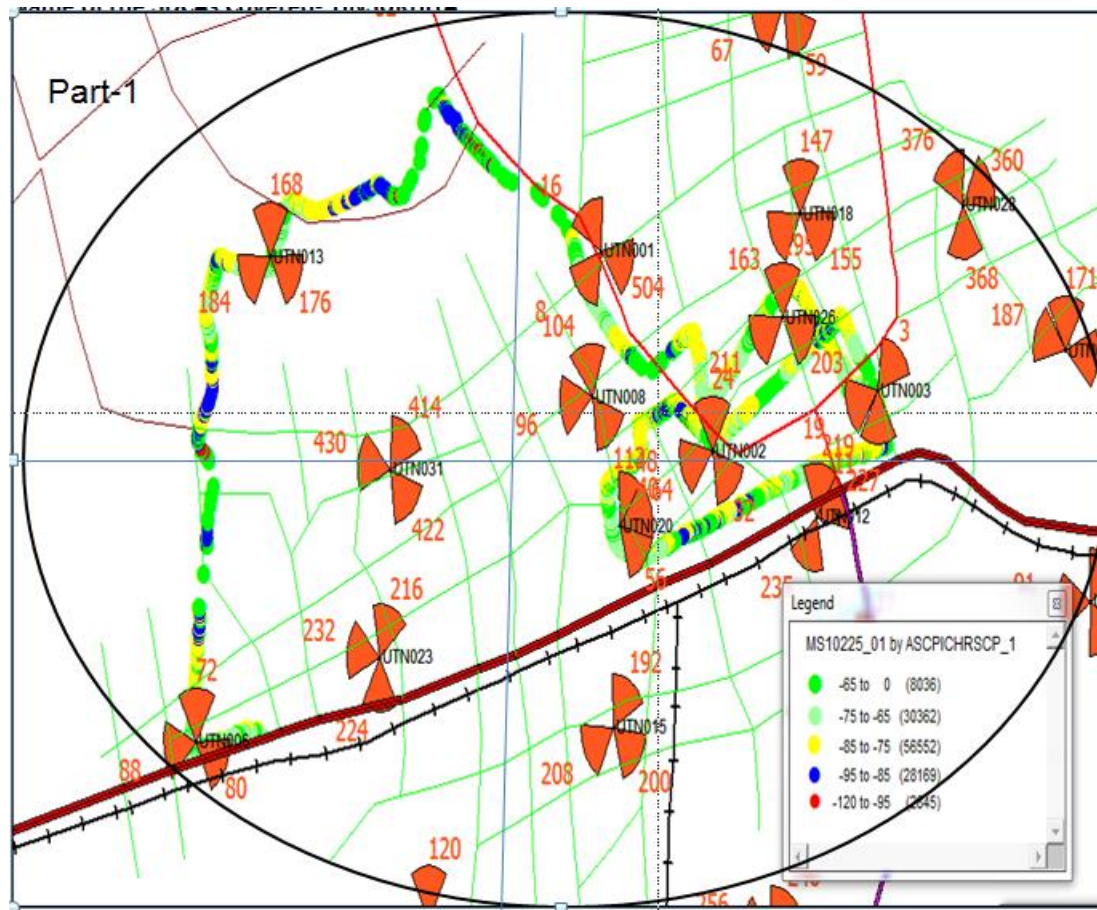
9.1.2.4   ROUTE MAP - DIBRUGARH DAY 3
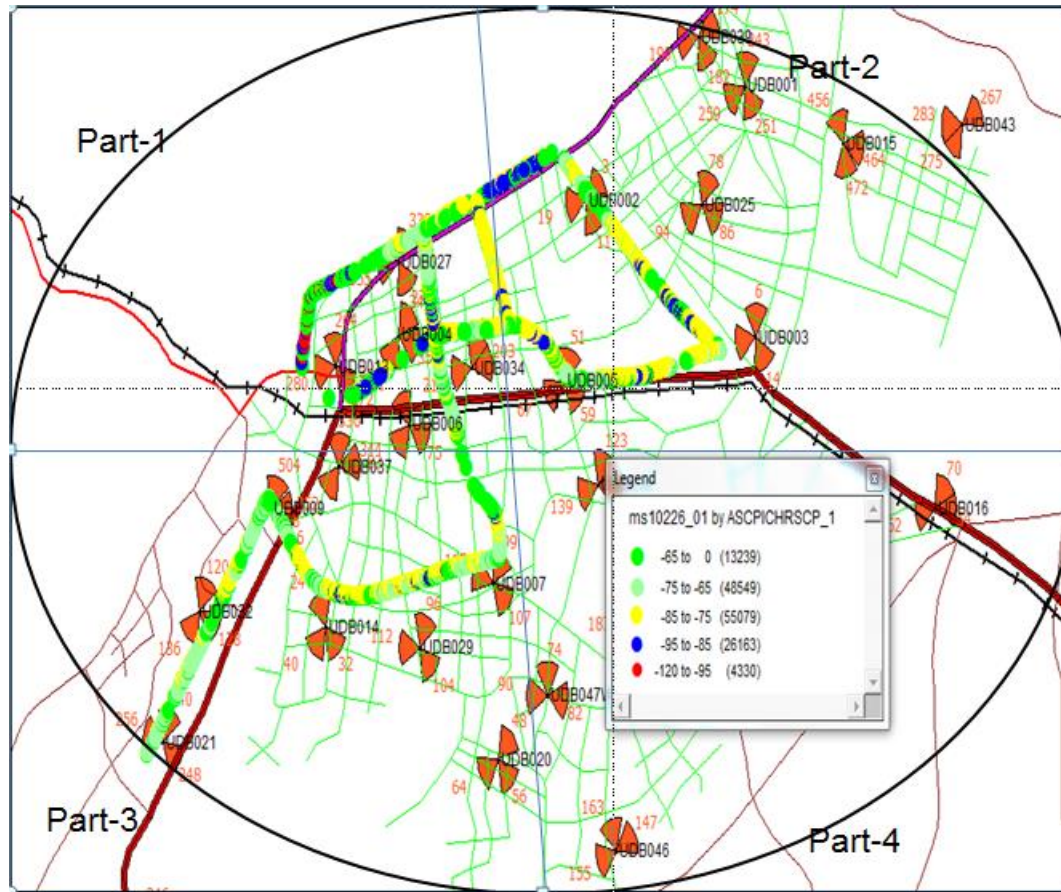
9.1.2.5 DRIVE TEST RESULTS - DIBRUGARH SSA-2G

Dibrugargh	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		21.71%	33.64%	86.25%	44.49%	59.28%	41.78%	79.07%	42.52%	64.65%	43.91%	No Service		81.62%	65.09%
0 to -85 dBm		74.97%	71.24%	99.40%	74.38%	90.84%	66.77%	99.18%	74.36%	95.49%	72.65%			99.77%	88.78%
0 to -95 dBm		99.58%	93.76%	99.96%	93.51%	90.84%	85.42%	99.90%	92.86%	99.80%	91.67%			99.99%	98.87%
Voice quality	≥ 95%	98.02%	96.90%	96.79%	93.99%	99.61%	93.55%	93.55%	91.59%	98.89%	97.91%			96.18%	95.04%
CSSR	≥ 95%	100.00%	97.99%	100.00%	99.62%	100.00%	60.50%	100.00%	92.64%	NDR	98.62%			100.00%	98.65%
%age Blocked calls		0.00%	2.01%	0.00%	0.38%	0.00%	16.38%	0.00%	6.98%	NDR	1.38%			0.00%	0.67%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.38%	0.00%	8.30%	0.00%	2.93%	NDR	0.00%			0.00%	0.34%
Hands off success rate		100.00%	100.00%	100.00%	99.60%	100.00%	99.92%	100.00%	100.00%	NDR	98.91%			100.00%	98.68%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Airtel and BSNL CDMA failed to meet the benchmark in outdoor locations; however BSNL GSM failed to meet the benchmark in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

BSNL GSM and BSNL CDMA failed to meet the benchmark for CSSR in outdoor as well as indoor locations.

Call Drop Rate

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

9.1.2.1   DRIVE TEST RESULTS - DIBRUGARH SSA-3G

Dibrugargh	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		0.42%	23.21%	91.06%	26.37%	42.00%	30.41%	68.31%	52.82%
0 to -85 dBm		64.38%	40.75%	99.97%	55.84%	90.12%	67.55%	100.00%	73.57%
0 to -95 dBm		70.07%	74.32%	100.00%	78.66%	100.00%	90.57%	100.00%	89.17%
Voice quality	≥ 95%	NDR	NDR	97.68%	95.36%	50.76%	40.91%	80.58%	82.71%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.20%	97.83%	95.83%	100.00%	79.48%
%age Blocked calls		0.00%	14.86%	0.00%	0.80%	2.17%	3.47%	0.00%	1.65%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	5.80%	0.00%	0.84%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Note: - Aircel did not share the data for voice quality

Voice Quality

BSNL 3G and Vodafone 3G failed to meet the benchmark in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

Vodafone 3G failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.

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9.1.2.1 DRIVE TEST RESULTS - DIBRUGARH SSA-DATA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	RCOM GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	100%	NDR	100%	100%	No Service	100%
Succesful Data Transmission upload speed attempts	>75%	100%	100%	NDR	100%	100%		100%
Minimum download speed		35	566	NDR	NDR	88		NDR
Average throughput for Packet Data		95	525	NDR	65	109		193
Latency	<250ms	100	100	NDR	100	NDR		NDR

Note: BSNL CDMA did not submit the data.

All the parameters met the TRAI benchmark.

9.1.2.2 DRIVE TEST RESULTS - DIBRUGARH SSA-DATA-3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	100	100	NDR	No Service	100%
Succesful Data Transmission upload speed attempts	>75%	100	100	NDR		100%
Minimum download speed		142	1133	NDR		NDR
Average throughput for Packet Data		723	1283	NDR		2399
Latency	<250ms	100	100	NDR		NDR

Note: BSNL 3G did not submit the data.

All the parameters met the TRAI benchmark.

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9.1.3   BONGAIGAON SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	BONGAIGAON	28/03/16	30/03/16	328

9.1.3.1   ROUTE DETAILS - BONGAIGAON SSA

Category	Type of location	March BONGAIGAON		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	DHUPDHARA, DARRANGGIRI DUDHNOI KRISHNAI AGIA GOALPARA ABHAYAPURI SALMARA	GOURIPUR PANBARI BHOGBARI MAHAMAYA BILASIPARA KOKRAJHAR DHOPGURI BONGAIGAON	BONGAIGAON RAKHALDUBI SIMLAGURI HOWLI PATSHALA BARAMA NALBARI
Outdoor	Highways			
Outdoor	With in the City			
Indoor	Shopping complex			
Indoor	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We February 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.

9.1.3.2   ROUTE MAP - BONGAIGAON DAY 1
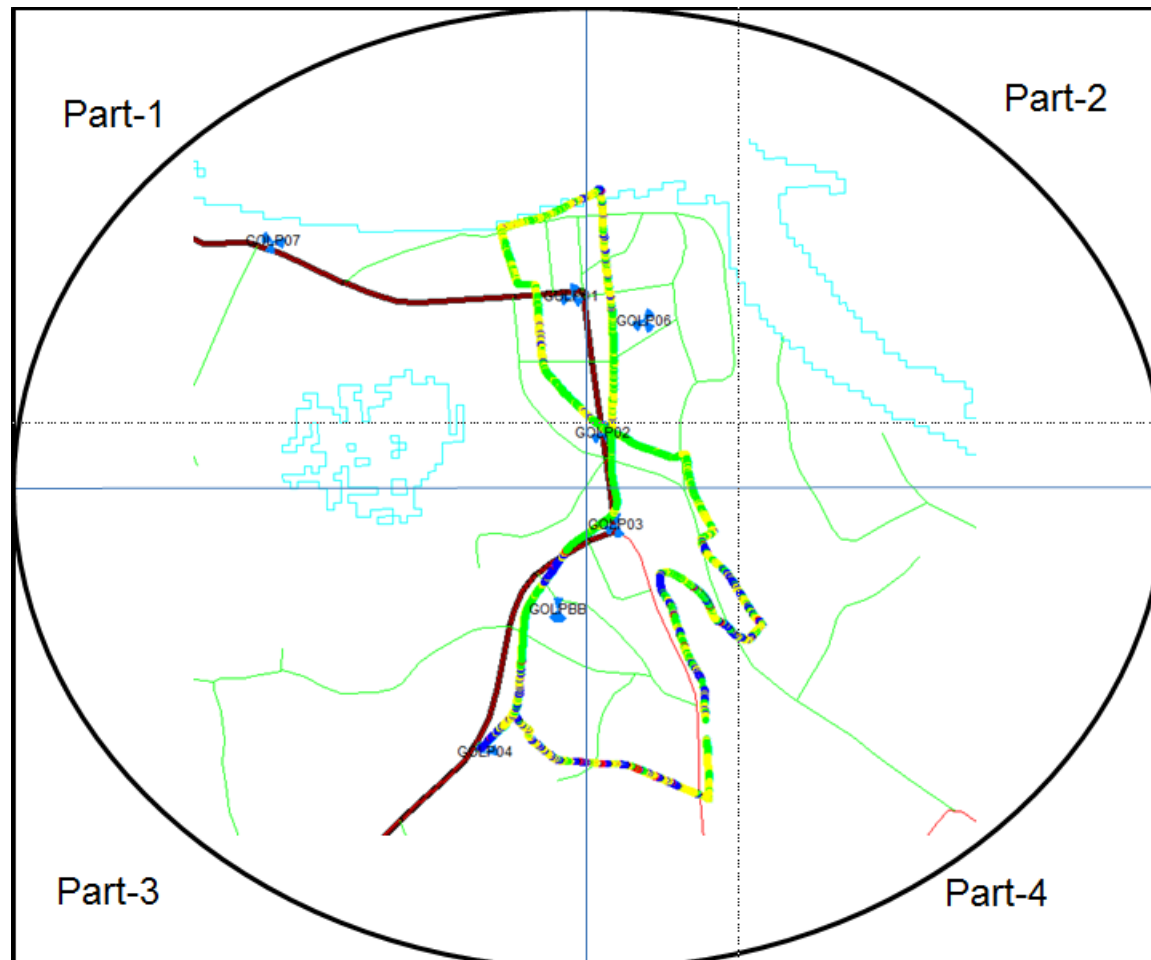
9.1.3.3   ROUTE MAP - BONGAIGAON DAY 2
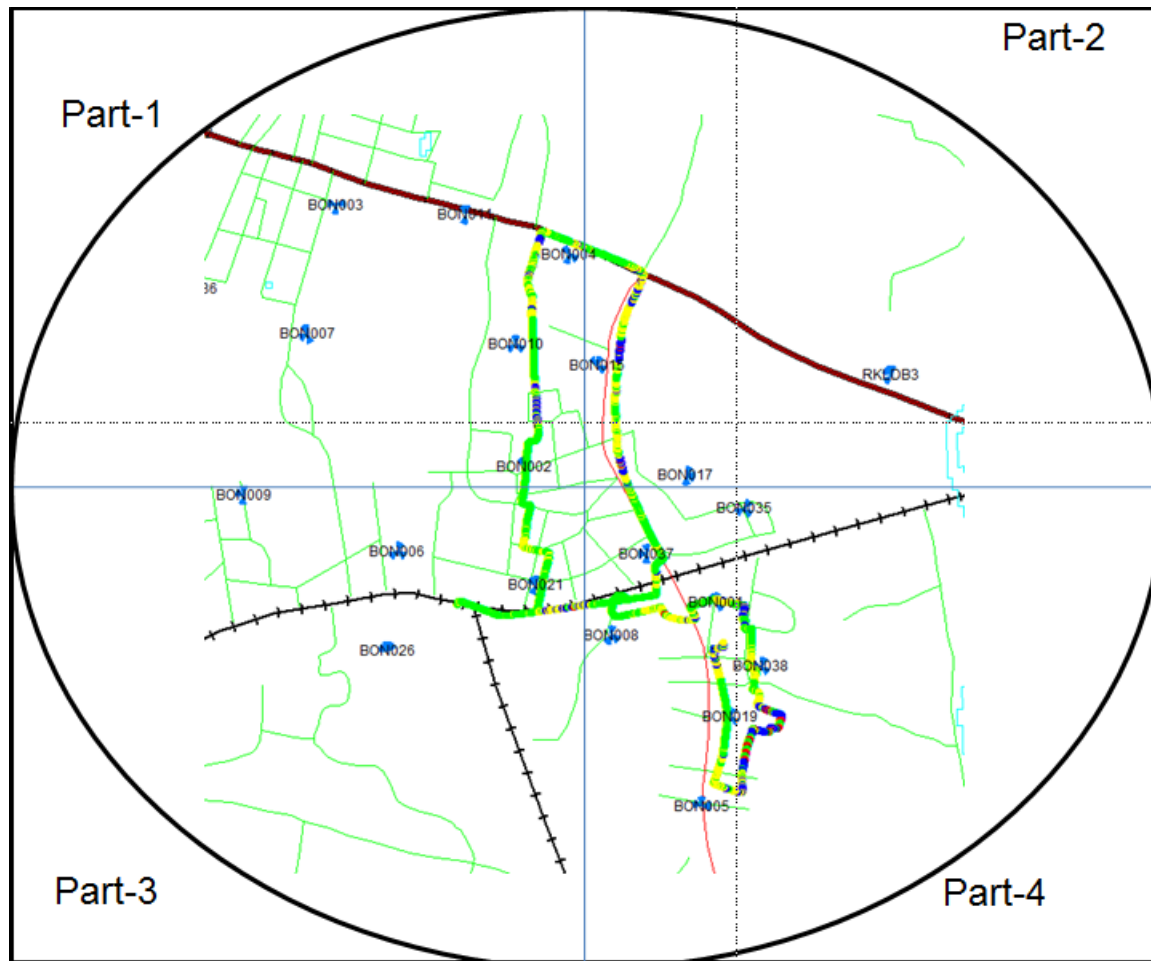
9.1.3.4 ROUTE MAP - BONGAIGAON DAY 3
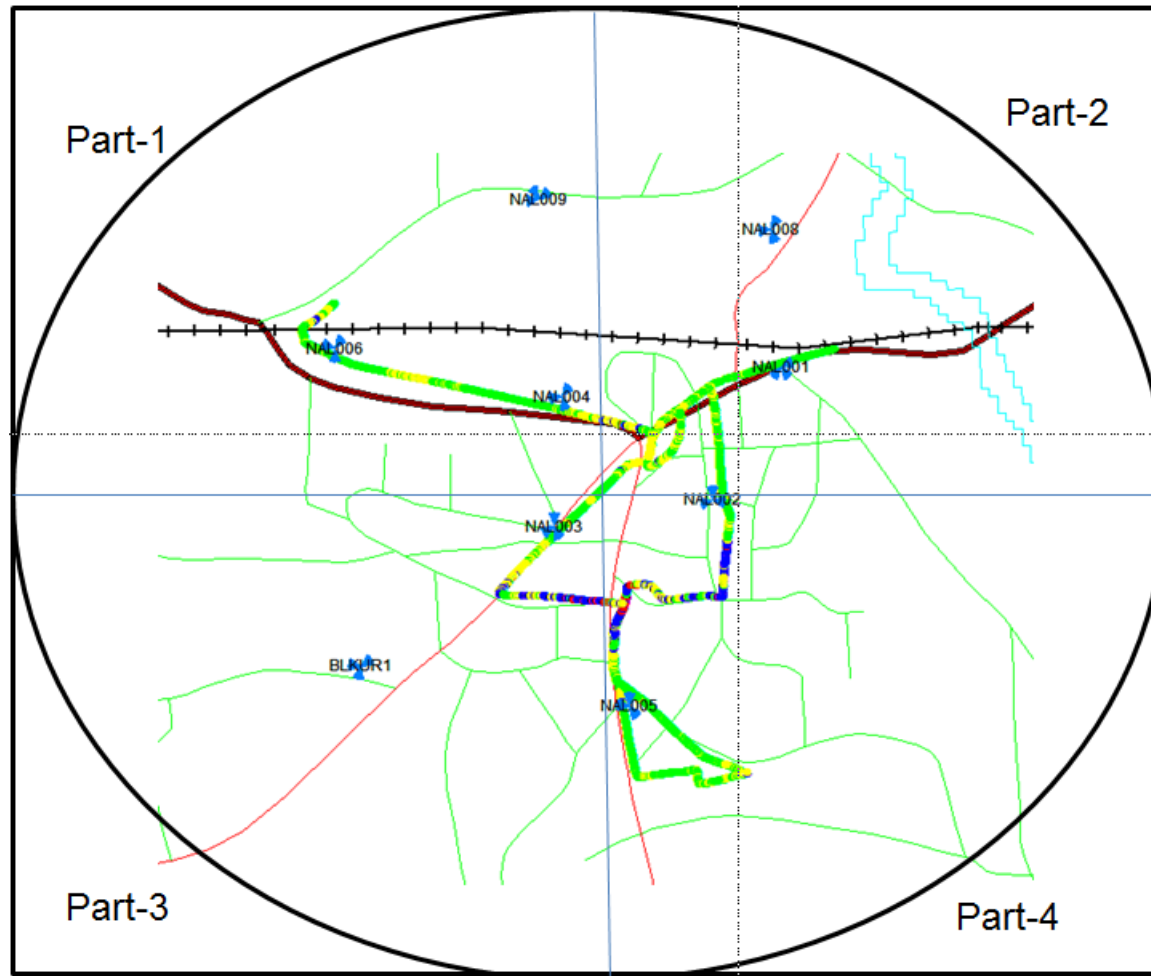
9.1.3.5   DRIVE TEST RESULTS - BONGAIGAON SSA-2G

Bongaigaon	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		78.97%	50.13%	83.23%	51.95%	60.83%	27.39%	34.60%	20.06%	54.35%	37.03%	No Service		28.95%	34.60%
0 to -85 dBm		98.07%	79.80%	91.47%	80.24%	0.00%	42.65%	78.78%	47.95%	94.18%	67.25%			89.27%	68.51%
0 to -95 dBm		98.60%	96.78%	99.45%	94.43%	5.49%	84.95%	99.74%	80.63%	99.89%	88.34%			99.65%	89.86%
Voice quality	≥ 95%	98.13%	94.59%	98.34%	93.23%	99.95%	77.84%	96.09%	90.99%	99.28%	97.70%			98.97%	90.27%
CSSR	≥ 95%	100.00%	97.85%	100.00%	99.01%	100.00%	91.35%	95.12%	96.79%	NDR	97.37%			100.00%	95.09%
%age Blocked calls		0.00%	2.15%	0.00%	0.98%	0.00%	14.29%	4.88%	3.21%	NDR	2.11%			0.00%	4.21%
Call drop rate	≤ 2%	0.00%	1.83%	0.00%	0.99%	0.00%	4.05%	0.00%	5.39%	NDR	0.00%			0.00%	3.69%
Hands off success rate		100.00%	96.61%	100.00%	99.50%	100.00%	99.55%	100.00%	90.46%	NDR	100.00%			100.00%	96.79%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, Airtel, BSNL CDMA, BSNL GSM and Vodafone failed to meet the benchmark for voice quality 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, BSNL GSM and Vodafone failed to meet the benchmark for call drop rate in outdoor locations.

9.1.3.6   DRIVE TEST RESULTS - BONGAIGAON SSA-3G

Bongaigaon	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		66.32%	35.37%	76.57%	33.60%	26.51%	13.34%	2.89%	29.87%
0 to -85 dBm		98.18%	79.12%	99.56%	57.14%	50.10%	23.71%	69.51%	59.59%
0 to -95 dBm		100.00%	95.93%	100.00%	79.88%	75.82%	41.29%	99.60%	79.05%
Voice quality	≥ 95%	NDR	NDR	97.63%	91.77%	71.17%	24.81%	92.15%	72.08%
CSSR	≥ 95%	100.00%	100.00%	100.00%	98.59%	97.56%	96.08%	100.00%	94.08%
%age Blocked calls		17.31%	0.00%	0.00%	1.41%	2.44%	3.92%	0.00%	3.33%
Call drop rate	≤ 2%	0.00%	2.15%	0.00%	0.35%	0.00%	14.29%	0.00%	5.19%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Airtel 3G failed to meet the benchmark for Voice quality in outdoor locations, however BSNL 3G and Vodafone 3G failed to meet the benchmark in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

Vodafone 3G failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

Airtel 3G, BSNL 3G and Vodafone 3G failed to meet the benchmark for call drop rate in outdoor locations.

9.1.3.7   DRIVE TEST RESULTS - BONGAIGAON SSA-DATA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	RCOM GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	100%	NDR	NDR	100%	No Service	100%
Succesful Data Transmission upload speed attempts	>75%	100%	100%	NDR	NDR	100%		100%
Minimum download speed		37	71	NDR	NDR	88		NDR
Average throughput for Packet Data		82	85	NDR	NDR	146		147
Latency	<250ms	100	100	NDR	NDR	100		NDR

Note: BSNL CDMA, BSNL GSM did not submit the data.

All the parameters met the TRAI benchmark.

9.1.3.8   DRIVE TEST RESULTS - BONGAIGAON SSA-DATA-3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	100	100	NDR	No Service	100%
Succesful Data Transmission upload speed attempts	>75%	100	100	NDR		100%
Minimum download speed		1624	1282	NDR		NDR
Average throughput for Packet Data		3585	1541	NDR		3088
Latency	<250ms	100	100	NDR		NDR

Note: BSNL 3G did not submit the data.

All the parameters met the TRAI benchmark.

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10 ANNEXURE – CONSOLIDATED-2G

10.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		8377	10462	729	4173	5149	No Service	9794
Sum of downtime of BTSs in a month (in hours)		147062	16422	1204	60428	39844	No Service	46310
BTSs accumulated downtime (not available for service)	≤ 2%	2.36%	0.21%	0.22%	1.95%	1.04%	No Service	0.64%
Number of BTSs having accumulated downtime >24 hours		1239	69	192	80	42	No Service	151
Worst affected BTSs due to downtime	≤ 2%	14.79%	0.66%	26.34%	1.92%	0.82%	No Service	1.54%
Live Measurement Results for Network Availability- 3 Day live data								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		8347	10395	729	4173	5087	No Service	9794
Sum of downtime of BTSs in a month (in hours)		14967	1864	130	3408	4251	No Service	6007
BTSs accumulated downtime (not available for service)	≤ 2%	2.49%	0.25%	0.25%	1.13%	1.16%	No Service	0.85%
Number of BTSs having accumulated downtime >24 hours		130	0	29	28	33	No Service	26
Worst affected BTSs due to downtime	≤ 2%	1.56%	0.00%	3.98%	0.67%	0.65%	No Service	0.27%

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

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10.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	91.98%	95.95%	98.85%	98.19%	96.42%	No Service	98.88%
SDCCH/Paging channel congestion	≤ 1%	1.68%	0.45%	NA	0.96%	0.75%	No Service	0.47%
TCH congestion	≤ 2%	5.58%	1.15%	2.65%	1.81%	1.45%	No Service	1.12%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.89%	96.58%	98.75%	98.50%	98.23%	No Service	99.31%
SDCCH/Paging channel congestion	≤ 1%	1.04%	0.20%	NA	2.96%	0.35%	No Service	0.62%
TCH congestion	≤ 2%	2.81%	0.67%	2.86%	1.70%	0.42%	No Service	0.69%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		905	1015	1948	952	647	0	1029
Total number of successful calls established		886	1010	1307	922	636	0	994
CSSR	≥ 95%	97.90%	99.51%	67.09%	96.85%	98.30%	NDR	96.60%
%age blocked calls		2.10%	0.49%	32.91%	3.15%	1.70%	NDR	3.40%

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

10.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		595411492	645142748	1073135	773129874	130169549	No Service	460266991
Total number of calls dropped		9634245	6743167	17148	14957141	515139	No Service	3110313
Call drop rate	≤ 2%	1.62%	1.05%	1.60%	1.93%	0.40%	No Service	0.68%
Total number of cells in the network		24866	31558	2061	12429	15447	No Service	29182
Total number of cells having more than 3% TCH		3086	341	139	370	270	No Service	798
Worst affected cells having more than 3% TCH	≤ 3%	12.41%	1.08%	6.74%	2.98%	1.75%	No Service	2.74%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		703797877	701151997	1293940	124861955	143370352	No Service	563624856
Total number of calls dropped		8831417	6216029	19104	2970348	434913	No Service	3838288
Call drop rate	≤ 2%	1.25%	0.89%	1.48%	2.38%	0.30%	No Service	0.68%
Total number of cells in the network		24812	31314	2061	31777	15261	No Service	29182
Total number of cells having more than 3% TCH		2633	289	137	4414	222	No Service	627
Worst affected cells having more than 3% TCH	≤ 3%	10.61%	0.92%	6.66%	13.89%	1.46%	No Service	2.15%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		886	1013	1295	922	636	0	999
Total number of calls dropped		5	5	86	21	0	0	12
Call drop rate	≤ 2%	0.56%	0.49%	6.64%	2.28%	0.00%	NDR	1.20%

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

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10.4   VOICE QUALITY

Audit Results for Voice quality -PMR Data								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		67465596853	68039853749	0	0	15756621980	No Service	69990137149
Total number of calls with good voice quality		61806129775	67376846657	0	0	15090104129	No Service	67806396807
%age calls with good voice quality	≥ 95%	91.61%	99.03%	NDR	NDR	95.77%	No Service	96.88%
Live measurement results for Voice quality-3 Day data								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
NDR		2811066536	25625746662	0	0	656525916	No Service	2916255715
Total number of calls with good voice quality		2575255407	25418208699	0	0	628754339	No Service	2825266534
%age calls with good voice quality	≥ 95%	91.61%	99.19%	NDR	NDR	95.77%	No Service	96.88%
Drive test results for Voice quality (Average of three drive tests) - DT data								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		1480172	1677877	0	1489429	1343556	0	1604321
Total number of calls with good voice quality		1414761	1580997	0	1382527	1313725	0	1515075
%age calls with good voice quality	≥ 95%	95.58%	94.23%	NDR	92.82%	97.78%	NDR	94.44%

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

10.5 POI CONGESTION

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	45	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		283625	342183	0	75851	96191	No Service	20619381
Traffic served for all POIs (B)- in erlangs		187091	114406	0	64064	67458	No Service	17749966
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	45	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		282400	329809	0	75851	95396	No Service	4740736
Traffic served for all POIs (B)- in erlangs		183897	110346	0	49243	66667	No Service	3762526
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

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10.6   ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang							
Traffic in Erlang	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Eqipped capacity of the network	185449.5511		33750	108000	38761	No Service	136093.8477
Total taffic handled in erlang during TCBH	127590.3776		172	44852	30577.97	No Service	107494.7517
Total no. of customers served (as per VLR)	3603794		7868	1109377	1061315	No Service	4108971

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

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11 ANNEXURE – CONSOLIDATED-3G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		2504	NDR	718
Sum of downtime (i.e. total outage time) of Node Bs		16355	NDR	1747
Node Bs downtime (not available for service)	≤ 2%	0.88%	NDR	0.33%
Number of Node Bs having accumulated downtime of >24 hours in a month		119	NDR	8
Worst affected Node Bs due to downtime	≤ 2%	4.75%	NDR	1.11%
Live Measurement Results for Network Availability- 3 Day live data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		2473	NDR	718
Sum of downtime (i.e. total outage time) of Node Bs		2865	NDR	80
Node Bs downtime (not available for service)	≤ 2%	1.61%	NDR	0.15%
Number of Node Bs having accumulated downtime of >24 hours in a month		26	NDR	8
Worst affected Node Bs due to downtime	≤ 2%	1.05%	NDR	1.11%

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

11.2   CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	98.10%	NDR	98.73%
RRC Congestion	≤ 1%	0.12%	NDR	0.40%
Circuit Switched RAB Congestion	≤ 2%	0.40%	NDR	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	96.55%	NDR	98.80%
RRC Congestion	≤ 1%	0.24%	NDR	0.36%
Circuit Switched RAB Congestion	≤ 2%	0.00%	NDR	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		392	714	0
Total number of RRC established (B)		392	695	0
Call setup success rate (B/A*100)	≥ 95%	100.00%	97.34%	NDR
%age blocked calls		0.00%	2.66%	NDR

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

11.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		14804064	NDR	4841617
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		104535	NDR	34976
Call drop rate (B/A*100)	≤ 2%	0.71%	NDR	0.72%
Total no. of cells in the licensed service area (B)		7214	NDR	1720
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		667	NDR	30
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	9.25%	NDR	1.74%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		19184841	NDR	573306
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		133151	NDR	5097
Call drop rate (B/A*100)	≤ 2%	0.69%	NDR	0.89%
Total no. of cells in the licensed service area (B)		7045	NDR	1720
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		500	NDR	53
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	7.09%	NDR	3.08%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data				
Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		389	694	0
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		2	30	0
Call drop rate (B/A*100)	≤ 2%	0.51%	4.32%	NDR

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

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1450940403123	NDR	39031072312
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1436867821245	NDR	38971315660
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	NDR	99.85%
Live measurement results for Voice quality-3 Day data				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		60455850130	NDR	4703749008
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		59869492552	NDR	4696090029
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	NDR	99.84%
Drive test results for Voice quality (Average of three drive tests) - DT data				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		614341	2769704	0
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		592368	1566864	0
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	96.42%	56.57%	NDR

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

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11.5   POI CONGESTION

Audit Results for POI Congestion- PMR data				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	19
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	44303
Traffic served for all POIs (B)- in erlangs		0	NDR	19766
POI congestion	≤ 0.5%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	19
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	44303
Traffic served for all POIs (B)- in erlangs		0	NDR	19766
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang				
Traffic in Erlang		Aircel 3G	BSNL 3G	Reliance 3G
Eqipped capacity of the network		NDR	NDR	NDR
Total taffic handled in erlang during TCBH		NDR	NDR	NDR
Total no. of customers served (as per VLR)		NDR	NDR	NDR

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12 ANNEXURE – CUSTOMER SERVICES

12.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated								
Billing Performance	Benchmark	Aircel	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		225307	237896	28828	614410	52769	331289	335764
Total number of bills disputed		88	116	8	17	151	296	472
Total number of valid billing complaints		7	24	8	17	1	296	231
Total complaints considered invalid		81	92	0	0	150	0	241
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.04%	0.05%	0.03%	0.00%	0.29%	0.09%	0.14%
January								
Total bills generated during the first billing cycle		74439	77461	9851	205408	17099	118083	107620
Total number of bills disputed in first billing cycle		11	39	3	6	41	107	194
Total number of valid billing complaints (billing cycle 1)		1	6	3	6	0	107	106
Total complaints considered invalid (billing cycle 1)		10	33	0	0	41	0	88
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.01%	0.05%	0.03%	0.00%	0.24%	0.09%	0.18%

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February							
Total bills generated during the second billing cycle		75037	79697	9547	203851	17340	109327	111831
Total number of bills disputed in second billing cycle		38	40	3	5	54	97	228
Total number of valid billing complaints (billing cycle 2)		5	9	3	5	0	97	95
Total complaints considered invalid (billing cycle 2)		33	31	0	0	54	0	133
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.05%	0.05%	0.03%	0.00%	0.31%	0.09%	0.20%
March							
Total bills generated during the third billing cycle		75831	80738	9430	205151	18330	103879	116313
Total number of bills disputed in third billing cycle		39	37	2	6	56	92	50
Total number of valid billing complaints (billing cycle 3)		1	9	2	6	1	92	30
Total complaints considered invalid (billing cycle 3)		38	28	0	0	55	0	20
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.05%	0.05%	0.02%	0.00%	0.31%	0.09%	0.04%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid								
Performance prepaid	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		26	34	0	16	325	991	1308
Total complaints considered invalid (sum of 3 months)		3113	1083	0	0	1535	96	735
Total number of charging complaints (sum of 3 months)		3139	1117	0	16	1860	1087	2043
Total no of customers served (Sum of 3 months)		14900952	17409548	165738	2987118	3383690	3646829	3552259
Percentage of charging complaints disputed	≤ 0.1%	0.02%	0.01%	0.00%	0.00%	0.05%	0.03%	0.06%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated								
Billing Performance	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of billing/charging complaints		6421	1233	8	33	3696	1479	2515
Total number of complaints resolved in favour of customer		3227	58	8	33	2011	1383	1539
Total complaints considered invalid		3194	1175	0	0	1685	96	976
Number of complaints resolved in 4 weeks		3227	58	8	33	2011	1383	1539
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		3227	58	8	33	2011	1383	1539
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver								
Total number of complaints where credit/waiver is required		33	58	8	33	399	1287	1398
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints								
Resolution of billing complaints	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made		100	100	1	100	100	100	100
Number of cases resolved in 4 weeks		62	69	1	77	72	60	79
Percentage cases resolved in 4 weeks	≥ 98%	62.00%	69.00%	100.00%	77.00%	72.00%	60.00%	79.00%
Number of cases resolved in 6 weeks		62	69	1	79	72	60	79
Percentage cases resolved in 6 weeks	100.00%	62.00%	69.00%	100.00%	79.00%	72.00%	60.00%	79.00%

Data Source: Billing Center of the operators

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12.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		15715386	1782760	5633	1404473	5187787	1101632	7290167
Number of calls getting connected and answered (electronically)		15054476	1782749	5633	1366875	4952417	1091383	7239779
Percentage calls getting connected and answered	≥ 95%	95.79%	100.00%	100.00%	97.32%	95.46%	99.07%	99.31%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received (3 months)		2532671	1760516	3345	676501	1181088	341045	3377455
Total Number of calls answered within 90 seconds (3 months)		2418492	1658998	3271	622772	1178640	328004	3377455
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	95.49%	94.23%	97.79%	92.06%	99.79%	96.18%	100.00%
January								
Total calls received (Month 1)		845289	596218	1481	249782	388879	143492	1214339
Total calls answered within 90 seconds (Month 1)		807936	573078	1454	212956	388083	135633	1214339
% calls answered within 90 seconds (Month 1)	≥ 95%	95.58%	96.12%	98.18%	85.26%	99.80%	94.52%	100.00%
February								
Total calls received (Month 2)		807570	559067	1354	201022	380177	106857	1051235
Total calls answered within 90 seconds (Month 2)		774194	510748	1316	191444	378908	103412	1051235
% calls answered within 90 seconds (Month 2)	≥ 95%	95.87%	91.36%	97.19%	95.24%	99.67%	96.78%	100.00%
March								
Total calls received (Month 3)		879812	605231	510	225697	412032	90696	1111881
Total calls answered within 90 seconds (Month 3)		836362	575172	501	218372	411649	88959	1111881
% calls answered within 90 seconds (Month 3)	≥ 95%	95.06%	95.03%	98.24%	96.75%	99.91%	98.08%	100.00%

Live calling results for customer care (IVR)								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received		12	31	70	14	55	20	94
Total Number of calls getting connected and answered		12	31	64	12	55	20	89
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	91.43%	85.71%	100.00%	100.00%	94.68%

12.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated								
Termination	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		1418	1509	216	650	240	977	923
Number of requests attended within 7 days		1418	1509	216	650	240	977	923
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

12.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated								
Refund	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		1390	0	118	405	330	7168	3073
Total number of cases where refund was made within 60 days		1317	0	118	405	330	7168	3073
Percentage cases in which refund was receive within 60 days	100.00%	94.75%	NA	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

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12.5   LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests							
Resolution of service requests	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	2	100	100	100	100
Number of cases resolved to satisfaction	67	85	2	84	61	64	88
Percentage cases resolved in four weeks	67.00%	85.00%	100.00%	84.00%	61.00%	64.00%	88.00%

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

12.6   LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services								
Level 1 services		Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total no. of calls made		300	300	300	300	300	300	300
Calls answered		209	240	282	284	238	251	224
% of calls connected	≥ 95%	69.67%	80.00%	94.00%	94.67%	79.33%	83.67%	74.67%

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

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12.7 LEVEL 1 SERVICE CALLS MADE

	Aircel				
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	18	12
101	Fire	✓	☐	17	13
102	Ambulance	✓	☐	18	12
104	Health Information Helpline	✓	☐	18	13
108	Emergency and Disaster Management Helpline	✓	☐	17	13
138	All India Helpine for Passangers	✓	☐	18	12
1412	Public Road Transport Utility Service	☐	✖		
181	Chief Minister Helpline	☐	✖		
182	Indian Railway Security Helpline	✓	☐	18	12
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	✓	☐	18	12
1071	Air Accident Helpline	☐	✖		
1072	Rail Accident Helpline	☐	✖		
1073	Road Accident Helpline	✓	☐	18	12
1077	Control Room for District Collector	☐	✖		
10120	Call Alart (Crime Branch)	☐	✖		

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
10121	Women Helpline	☐	✖		
10127	National AIDS Helpline to NACO	✓	☐	18	12
101212	Central Accident and Trauma Services (CATS)	☐	✖		
10580	Educationa & Vocational Guidance and Counselling	☐	✖		
105812	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	✓	☐	18	13
1514	National Career Service(NCS)	✓	☐	17	12
15100	Free Legal Service Helpline	✓	☐	17	13
155304	Municipal Corporations	☐	✖		
155214	Labour Helpline	✓	☐	18	12
11203	Sashastra Seema Bal (SSB)	✓	☐	17	12
112012	National Do Not Call Registry	✓	☐	18	12
11212	Complaint of Electricity	✓	☐	17	12
11216	Drinking Water Supply	☐	✖		
11250	Election Commission of India	☐	✖		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	19	15
101	Fire	✓	☐	19	15
102	Ambulance	✓	☐	18	15
104	Health Information Helpline	✓	☐	18	15
108	Emergency and Disaster Management Helpline	✓	☐	19	15

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138	All India Helpine for Passangers	✓	☐	19	15
1412	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	✓	☐	18	15
1071	Air Accident Helpline	☐	✖		
1072	Rail Accident Helpline	✓	☐	19	15
1073	Road Accident Helpline	☐	✖		
1077	Control Room for District Collector	✓	☐	18	15
10120	Call Alart (Crime Branch)	☐	✖		
10121	Women Helpline	☐	✖		
10127	National AIDS Helpline to NACO	✓	☐	19	15
101212	Central Accident and Trauma Services (CATS)	☐	✖		
10580	Educationa & Vocational Guidance and Counselling	☐	✖		
105812	Mother and Child Tracking (MCTH)	✓	☐	19	15
10740	Central Pollution Control Board	☐	✖		
10741	Pollution Control Board	✓	☐	19	15
1511	Police Related Service for all Metro Railway Project	☐	✖		

1512	Prevention of Crime in Railway	✓	☐	19	15
1514	National Career Service(NCS)	☐	✖		
15100	Free Legal Service Helpline	☐	✖		
155304	Municipal Corporations	☐	✖		
155214	Labour Helpline	✓	☐	19	15
11203	Sashastra Seema Bal (SSB)	✓	☐	19	15
112012	National Do Not Call Registry	✓	☐	19	15
11212	Complaint of Electricity	☐	✖		
11216	Drinking Water Supply	☐	✖		
11250	Election Commission of India	☐	✖		
BSNL CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	15
101	Fire	Y		16	15
102	Ambulance	Y		16	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	14
138	All India Helpine for Passangers	Y		16	15
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		16	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		

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1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		15	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	15
1073	Road Accident Helpline	Y		16	14
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		16	15
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		16	15
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		16	15
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		16	15
112012	National Do Not Call Registry	Y		16	15
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		15	15
BSNL GSM					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	16
101	Fire	Y		16	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	16
138	All India Helpine for Passangers	Y		16	16
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	15
182	Indian Railway Security Helpline	Y		17	16
1033	Road Accident Management Service	Y		16	15
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	16
1073	Road Accident Helpline	Y		17	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
101212	Central Accident and Trauma Services (CATS)	Y		17	16
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		17	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	16
112012	National Do Not Call Registry	Y		17	16
11212	Complaint of Electricity	Y		17	16
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	16
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	22	17
101	Fire	✓	☐	22	17
102	Ambulance	✓	☐	21	17
104	Health Information Helpline	✓	☐	22	17
108	Emergency and Disaster Management Helpline	✓	☐	21	17
138	All India Helpine for Passangers	✓	☐	21	17
1412	Public Road Transport Utility Service	☐	✗		

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No.	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	✓	☐	22	17
1071	Air Accident Helpline	☐	✗		
1072	Rail Accident Helpline	☐	✗		
1073	Road Accident Helpline	☐	✗		
1077	Control Room for District Collector	✓	☐	22	17
10120	Call Alart (Crime Branch)	☐	✗		
10121	Women Helpline	☐	✗		
10127	National AIDS Helpline to NACO	✓	☐	21	17
101212	Central Accident and Trauma Services (CATS)	☐	✗		
10580	Educationa & Vocational Guidance and Counselling	☐	✗		
105812	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	✓	☐	22	17
1514	National Career Service(NCS)	☐	✗		

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
15100	Free Legal Service Helpline	☐	✖		
155304	Municipal Corporations	☐	✖		
155214	Labour Helpline	☐	✖		
11203	Sashastra Seema Bal (SSB)	✓	☐	21	17
112012	National Do Not Call Registry	✓	☐	21	17
11212	Complaint of Electricity	✓	☐	21	17
11216	Drinking Water Supply	✓	☐	21	17
11250	Election Commission of India	☐	✖		
Reliance					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	16
101	Fire	Y		18	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline				
138	All India Helpine for Passangers	Y		18	16
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline				
182	Indian Railway Security Helpline	Y		19	15
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		

1070	Relief Commission for Natural Calamities	Y		18	16
1071	Air Accident Helpline	Y		19	16
1072	Rail Accident Helpline				
1073	Road Accident Helpline	Y		19	16
1077	Control Room for District Collector				
10120	Call Alart (Crime Branch)	Y		19	16
10121	Women Helpline	Y		19	16
10127	National AIDS Helpline to NACO	Y		19	15
101212	Central Accident and Trauma Services (CATS)				
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		19	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y	N	18	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		19	16
11212	Complaint of Electricity	Y		19	15
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		19	15
Vodafone					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	21	16
101	Fire	✓	☐	21	16
102	Ambulance	✓	☐	22	16
104	Health Information Helpline	✓	☐	21	16
108	Emergency and Disaster Management Helpline	✓	☐	22	16
138	All India Helpine for Passangers	✓	☐	21	16
1412	Public Road Transport Utility Service	☐	✘		
181	Chief Minister Helpline	☐	✘		
182	Indian Railway Security Helpline	✓	☐	22	16
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	✓	☐	22	16
1071	Air Accident Helpline	☐	✘		
1072	Rail Accident Helpline	☐	✘		
1073	Road Accident Helpline	☐	✘		
1077	Control Room for District Collector	✓	☐	22	16
10120	Call Alart (Crime Branch)	☐	✘		
10121	Women Helpline	☐	✘		
10127	National AIDS Helpline to NACO	✓	☐	22	16

Number	Service				
101212	Central Accident and Trauma Services (CATS)	☐	✘		
10580	Educationa & Vocational Guidance and Counselling	☐	✘		
105812	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	✓	☐	21	16
11203	Sashastra Seema Bal (SSB)	✓	☐	21	16
112012	National Do Not Call Registry	✓	☐	21	16
11212	Complaint of Electricity	✓	☐	21	16
11216	Drinking Water Supply	☐	✘		
11250	Election Commission of India	☐	✘		

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.

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

13 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

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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13.1.1 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.
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.

13.1.2 NSN (NOKIA SIEMENS NETWORKS)

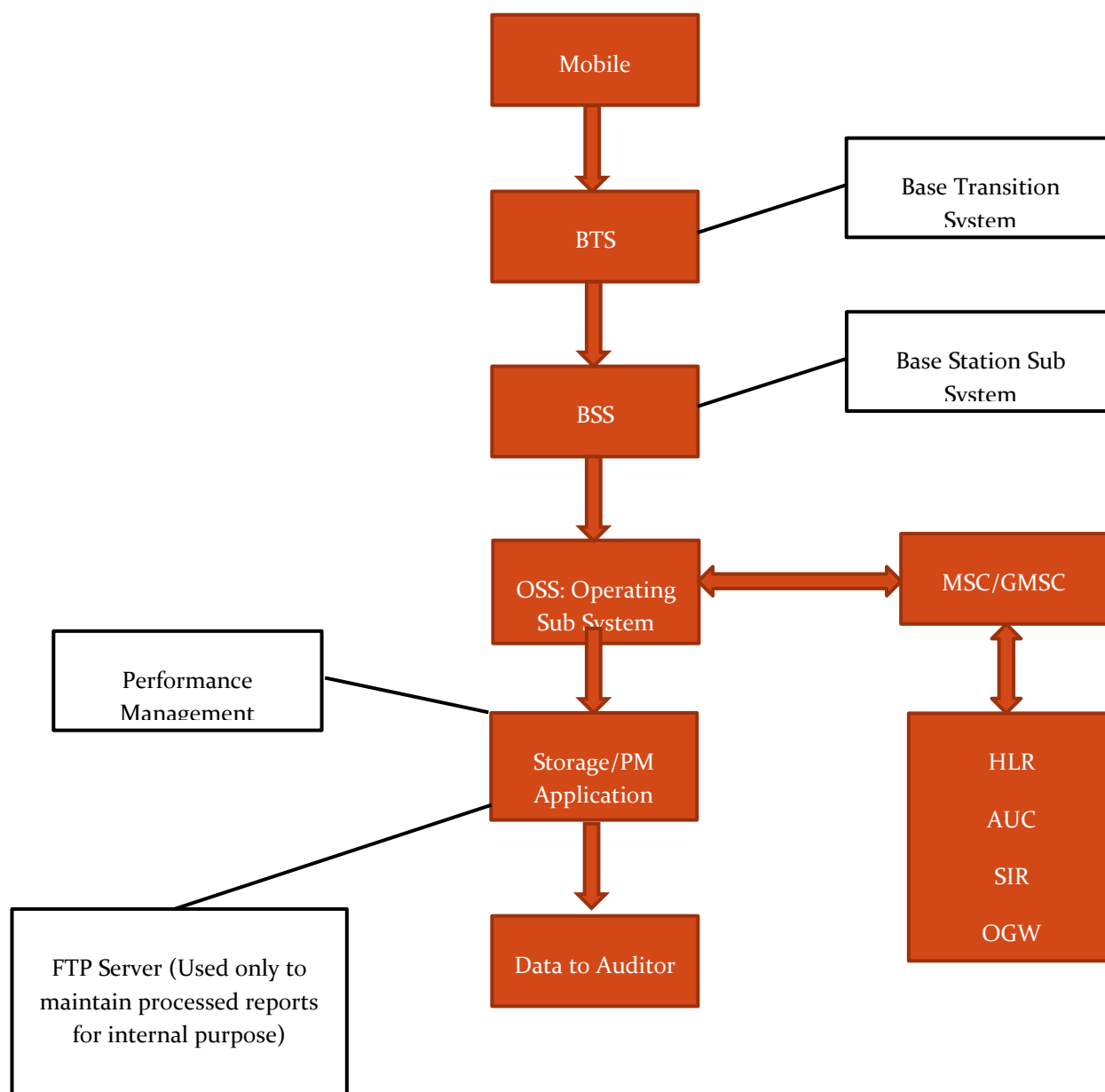NSN provides network support to Vodafone in the circle.

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)}
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)

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13.2 BLOCK SCHEMATIC DIAGRAMS

13.2.1 ERICSSON

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

Ericsson

13.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

NSN

```
                    ┌─────────────┐
                    │   Mobile    │
                    └─────────────┘
                           │
                    ┌─────────────┐      ┌──────────────────┐
                    │    BTS      │──────│ Base Transition  │
                    └─────────────┘      │ System           │
                           │             └──────────────────┘
                    ┌─────────────┐      ┌──────────────────┐
                    │    BSS      │──────│ Base Station Sub │
                    └─────────────┘      │ System           │
                           │             └──────────────────┘
```

OSS: Operating Sub System ⟷ MSC/GMSC

Performance Management

Storage/PM Application

HLR AUC SIR OGW

Data to Auditor

FTP Server (Used only to maintain processed reports for internal purpose)

Audit Results for Network Availability- PMR data-January							
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2743	3463	243	1391	1691	No Service	3215
Sum of downtime of BTSs in a month (in hours)		43643	5425	392	20530	12274	No Service	15749
BTSs accumulated downtime (not available for service)	≤ 2%	2.14%	0.21%	0.22%	1.98%	0.98%	No Service	0.66%
Number of BTSs having accumulated downtime >24 hours		367	24	65	26	13	No Service	48
Worst affected BTSs due to downtime	≤ 2%	13.38%	0.69%	26.75%	1.87%	0.77%	No Service	1.49%
Live Measurement Results for Network Availability- 3 Day live data-January							
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2743	3457	243	1391	1676	No Service	3215
Sum of downtime of BTSs in a month (in hours)		3569	516	38	1742	1414	No Service	2121
BTSs accumulated downtime (not available for service)	≤ 2%	1.81%	0.21%	0.22%	1.74%	1.17%	No Service	0.92%
Number of BTSs having accumulated downtime >24 hours		28	0	10	6	11	No Service	15
Worst affected BTSs due to downtime	≤ 2%	1.02%	0.00%	4.12%	0.43%	0.66%	No Service	0.47%

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CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-January								
CSSR	≥ 95%	92.33%	95.99%	98.96%	98.05%	97.87%	No Service	98.80%
SDCCH/Paging channel congestion	≤ 1%	1.26%	0.40%	NA	0.99%	0.88%	No Service	0.43%
TCH congestion	≤ 2%	5.35%	1.03%	2.61%	1.95%	1.91%	No Service	1.20%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-January								
CSSR	≥ 95%	94.49%	96.62%	98.87%	97.30%	98.11%	No Service	99.31%
SDCCH/Paging channel congestion	≤ 1%	1.60%	0.20%	NA	4.04%	0.32%	No Service	0.97%
TCH congestion	≤ 2%	4.11%	0.64%	2.80%	2.29%	0.49%	No Service	0.69%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January								
Total number of call attempts		336	358	721	358	239	No Service	357
Total number of successful calls established		327	357	436	357	236	No Service	340
CSSR	≥ 95%	97.32%	99.72%	60.47%	99.72%	98.74%	No Service	95.24%
%age blocked calls		2.68%	0.28%	39.53%	0.28%	1.26%	No Service	4.76%

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Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-January								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		195241237	213800120	369933	87489341	42672223	No Service	152702438
Total number of calls dropped		3159810	2189782	6575	1736162	158107	No Service	1180386
Call drop rate	≤ 2%	1.62%	1.02%	1.78%	1.98%	0.37%	No Service	0.77%
Total number of cells in the network		8169	10416	687	4143	5073	No Service	9600
Total number of cells having more than 3% TCH		1115	113	51	123	86	No Service	258
Worst affected cells having more than 3% TCH	≤ 3%	13.66%	1.08%	7.42%	2.97%	1.70%	No Service	2.69%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-January								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		221704365	224839677	445224	53487433	46404499	No Service	186280304
Total number of calls dropped		3183493	2105921	7855	1367228	121025	No Service	1391087
Call drop rate	≤ 2%	1.44%	0.94%	1.76%	2.56%	0.26%	No Service	0.75%
Total number of cells in the network		8164	10398	687	4037	5028	No Service	9600
Total number of cells having more than 3% TCH		1057	95	48	142	65	No Service	283
Worst affected cells having more than 3% TCH	≤ 3%	12.94%	0.91%	7.04%	3.51%	1.30%	No Service	2.94%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		327	357	436	357	236	No Service	345
Total number of calls dropped		0	1	35	1	0	No Service	1
Call drop rate	≤ 2%	0.00%	0.28%	8.03%	0.28%	0.00%	No Service	0.29%

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Audit Results for Voice quality -PMR Data-January								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		20847498058	21521619076	NDR	NDR	5194582474	No Service	24130571956
Total number of calls with good voice quality		19125152012	21319177259	NDR	NDR	4950135727	No Service	23313671339
%age calls with good voice quality	≥ 95%	91.74%	99.06%	NDR	NDR	95.29%	No Service	96.61%
Live measurement results for Voice quality-3 Day data-January								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		868645752	896734128	NDR	NDR	216440936	No Service	1005440498
Total number of calls with good voice quality		796881334	888299052	NDR	NDR	206255655	No Service	971402972
%age calls with good voice quality	≥ 95%	92.97%	99.20%	NDR	NDR	96.70%	No Service	96.73%
Drive test results for Voice quality (Average of three drive tests) - DT data-January								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		592618	554666	0	554666	477156	No Service	583005
Total number of calls with good voice quality		562759	523956	0	523956	464473	No Service	561130
%age calls with good voice quality	≥ 95%	94.96%	94.46%	NA	94.46%	97.34%	No Service	96.25%

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Audit Results for POI Congestion- PMR data-January							
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	31	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		93807	114807	0	25284	30678	No Service	16011629
Traffic served for all POIs (B)- in erlangs		59792	36253	0	20596	21571	No Service	14022896
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January							
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	31	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		93700	113193	0	25284	30226	No Service	1639862
Traffic served for all POIs (B)- in erlangs		58299	35356	0	5775	21158	No Service	1482678
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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Audit Results for Network Availability- PMR data-February								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2795	3469	243	1391	1711	No Service	3262
Sum of downtime of BTSs in a month (in hours)		46537	4625	364	19251	12796	No Service	12105
BTSs accumulated downtime (not available for service)	≤ 2%	2.24%	0.18%	0.20%	1.86%	1.01%	No Service	0.50%
Number of BTSs having accumulated downtime >24 hours		385	12	61	27	15	No Service	49
Worst affected BTSs due to downtime	≤ 2%	13.77%	0.35%	25.10%	1.94%	0.88%	No Service	1.50%
Live Measurement Results for Network Availability- 3 Day live data-February								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2785	3468	243	1391	1696	No Service	3262
Sum of downtime of BTSs in a month (in hours)		5712	796	37	32	1533	No Service	1978
BTSs accumulated downtime (not available for service)	≤ 2%	2.85%	0.32%	0.21%	0.03%	1.26%	No Service	0.84%
Number of BTSs having accumulated downtime >24 hours		44	0	8	17	10	No Service	5
Worst affected BTSs due to downtime	≤ 2%	1.58%	0.00%	3.29%	1.22%	0.59%	No Service	0.15%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-February								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	92.09%	95.92%	98.77%	98.18%	95.28%	No Service	98.74%
SDCCH/Paging channel congestion	≤ 1%	1.41%	0.39%	NA	0.96%	0.67%	No Service	0.62%
TCH congestion	≤ 2%	5.41%	1.07%	2.65%	1.82%	1.36%	No Service	1.26%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-February								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.45%	96.53%	98.68%	98.37%	98.16%	No Service	99.14%
SDCCH/Paging channel congestion	≤ 1%	0.71%	0.16%	NA	0.36%	0.43%	No Service	0.61%
TCH congestion	≤ 2%	2.20%	0.66%	3.55%	1.63%	0.42%	No Service	0.86%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		244	309	889	304	218	No Service	342
Total number of successful calls established		240	308	556	285	215	No Service	338
CSSR	≥ 95%	98.36%	99.68%	62.54%	93.75%	98.62%	No Service	98.83%
%age blocked calls		1.64%	0.32%	37.46%	6.25%	1.38%	No Service	1.17%

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

Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		186075265	205483251	336025	146099849	41608395	No Service	150038463
Total number of calls dropped		3013932	2220489	5772	2753890	167471	No Service	982794
Call drop rate	≤ 2%	1.62%	1.08%	1.72%	1.88%	0.40%	No Service	0.66%
Total number of cells in the network		8285	10530	687	4143	5133	No Service	9713
Total number of cells having more than 3% TCH		1003	115	45	124	90	No Service	285
Worst affected cells having more than 3% TCH	≤ 3%	12.10%	1.09%	6.55%	2.99%	1.75%	No Service	2.94%

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

Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		232357329	235582120	416181	14959645	46875245	No Service	187823969
Total number of calls dropped		2824003	2063996	5579	236591	151968	No Service	1365478
Call drop rate	≤ 2%	1.22%	0.88%	1.34%	0	0.32%	No Service	0.73%
Total number of cells in the network		8269	10402	687	4143	5088	No Service	9713
Total number of cells having more than 3% TCH		830	100	44	129	80	No Service	130
Worst affected cells having more than 3% TCH	≤ 3%	10.03%	0.96%	6.40%	3.11%	1.57%	No Service	1.34%

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

Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		240	309	540	285	215	No Service	338
Total number of calls dropped		0	1	41	7	0	No Service	1
Call drop rate	≤ 2%	0.00%	0.32%	7.59%	2.46%	0.00%	No Service	0.30%

Audit Results for Voice quality -PMR Data-February								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		22233392433	22638707045	NDR	NDR	5072487014	No Service	22615868422
Total number of calls with good voice quality		20369211839	22414459052	NDR	NDR	4871255377	No Service	21899414149
%age calls with good voice quality	≥ 95%	91.62%	99.01%	NDR	NDR	96.03%	No Service	96.83%
Live measurement results for Voice quality-3 Day data-February								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		926391351	943279460	NDR	NDR	211353626	No Service	942327851
Total number of calls with good voice quality		848717160	933935794	NDR	NDR	202968974	No Service	912475590
%age calls with good voice quality	≥ 95%	93.26%	99.21%	NDR	NDR	96.71%	No Service	97.22%
Drive test results for Voice quality (Average of three drive tests) - DT data-February								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		374427	524425	0	508152	442336	No Service	517675
Total number of calls with good voice quality		364036	495173	0	467266	433788	No Service	492827
%age calls with good voice quality	≥ 95%	97.22%	94.42%	NA	91.95%	98.07%	No Service	95.20%

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Audit Results for POI Congestion- PMR data-February							
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		94217	113071	0	25284	31611	No Service	2754584
Traffic served for all POIs (B)- in erlangs		63907	38891	0	21897	22936	No Service	2479126
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February							
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		94122	103592	0	25284	31527	No Service	1367460
Traffic served for all POIs (B)- in erlangs		62992	36315	0	21897	22714	No Service	1084748
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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Audit Results for Network Availability- PMR data-March								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2839	3530	243	1391	1747	No Service	3317
Sum of downtime of BTSs in a month (in hours)		56881	6372	448	20646	14774	No Service	18456
BTSs accumulated downtime (not available for service)	≤ 2%	2.69%	0.24%	0.25%	1.99%	1.14%	No Service	0.75%
Number of BTSs having accumulated downtime >24 hours		487	33	66	27	14	No Service	54
Worst affected BTSs due to downtime	≤ 2%	17.15%	0.93%	27.16%	1.94%	0.80%	No Service	1.63%
Live Measurement Results for Network Availability- 3 Day live data-March								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2819	3470	243	1391	1715	No Service	3317
Sum of downtime of BTSs in a month (in hours)		5685	552	56	1633	1304	No Service	1907
BTSs accumulated downtime (not available for service)	≤ 2%	2.80%	0.22%	0.32%	1.63%	1.06%	No Service	0.80%
Number of BTSs having accumulated downtime >24 hours		58	0	11	5	12	No Service	6
Worst affected BTSs due to downtime	≤ 2%	2.06%	0.00%	4.53%	0.36%	0.70%	No Service	0.18%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-March								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	91.53%	95.94%	98.82%	98.35%	96.11%	No Service	99.11%
SDCCH/Paging channel congestion	≤ 1%	2.37%	0.57%	NA	0.94%	0.71%	No Service	0.36%
TCH congestion	≤ 2%	5.98%	1.36%	2.69%	1.65%	1.09%	No Service	0.89%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-March								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.71%	96.58%	98.71%	99.83%	98.42%	No Service	99.48%
SDCCH/Paging channel congestion	≤ 1%	0.82%	0.24%	NA	4.48%	0.29%	No Service	0.28%
TCH congestion	≤ 2%	2.13%	0.70%	2.23%	1.17%	0.34%	No Service	0.52%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		325	348	338	290	190	No Service	330
Total number of successful calls established		319	345	315	280	185	No Service	316
CSSR	≥ 95%	98.15%	99.14%	93.20%	96.55%	97.37%	No Service	95.76%
%age blocked calls		1.85%	0.86%	6.80%	3.45%	2.63%	No Service	4.24%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-March								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		214094990	225859377	367177	539540684	45888931	No Service	157526090
Total number of calls dropped		3460503	2332896	4801	10467089	189561	No Service	947133
Call drop rate	≤ 2%	1.62%	1.03%	1.31%	1.94%	0.41%	No Service	0.60%
Total number of cells in the network		8413	10612	687	4143	5241	No Service	9869
Total number of cells having more than 3% TCH		968	113	43	123	94	No Service	255
Worst affected cells having more than 3% TCH	≤ 3%	11.51%	1.06%	6.26%	2.97%	1.79%	No Service	2.58%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-March								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		249736183	240730200	432535	56414876	50090608	No Service	189520583
Total number of calls dropped		2823921	2046112	5670	1366529	161920	No Service	1081723
Call drop rate	≤ 2%	1.13%	0.85%	1.31%	2.42%	0.32%	No Service	0.57%
Total number of cells in the network		8379	10514	687	23597	5145	No Service	9869
Total number of cells having more than 3% TCH		747	94	45	4143	77	No Service	214
Worst affected cells having more than 3% TCH	≤ 3%	8.91%	0.89%	6.55%	17.56%	1.50%	No Service	2.17%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		319	347	319	280	185	No Service	316
Total number of calls dropped		5	3	10	13	0	No Service	10
Call drop rate	≤ 2%	1.57%	0.86%	3.13%	4.64%	0.00%	No Service	3.16%

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Audit Results for Voice quality -PMR Data-March								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		24384706362	23879527628	NDR	NDR	5489552492	No Service	23243696771
Total number of calls with good voice quality		22311765924	23643210346	NDR	NDR	5268713025	No Service	22593311319
%age calls with good voice quality	≥ 95%	91.50%	99.01%	NDR	NDR	95.98%	No Service	97.20%
Live measurement results for Voice quality-3 Day data-March								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		1016029432	23785733074	NDR	NDR	228731354	No Service	968487365
Total number of calls with good voice quality		929656914	23595973853	NDR	NDR	219529709	No Service	941387972
%age calls with good voice quality	≥ 95%	93.00%	99.20%	NDR	NDR	96.72%	No Service	97.57%
Drive test results for Voice quality (Average of three drive tests) - DT data-March								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		513127	598786	0	426611	424064	No Service	503641
Total number of calls with good voice quality		487966	561868	0	391305	415464	No Service	461118
%age calls with good voice quality	≥ 95%	95.10%	93.83%	NA	91.72%	97.97%	No Service	91.56%

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Audit Results for POI Congestion- PMR data-March								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		95601	114305	0	25284	33903	No Service	1853168
Traffic served for all POIs (B)- in erlangs		63392	39261	0	21571	22952	No Service	1247944
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		52	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	15	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		94578	113024	0	25284	33642	No Service	1733414
Traffic served for all POIs (B)- in erlangs		62606	38675	0	21571	22794	No Service	1195100
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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Audit Results for Network Availability- PMR data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		750	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		8217	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	1.47%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		50	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	6.67%	NDR	NDR
Live Measurement Results for Network Availability- 3 Day live data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		750	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		844	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	0.15%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		9	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	1.20%	NDR	NDR

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Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	97.25%	NDR	NDR
RRC Congestion	≤ 1%	0.06%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	1.18%	NDR	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	98.72%	NDR	NDR
RRC Congestion	≤ 1%	0.07%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	0.00%	NDR	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		136	330	NA
Total number of RRC established (B)		136	325	NA
Call setup success rate (B/A*100)	≥ 95%	100.00%	98.48%	NA
%age blocked calls		0.00%	1.52%	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-January

	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		4271202	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		27636	NDR	NDR
Call drop rate (B/A*100)	≤ 2%	0.65%	NDR	NDR
Total no. of cells in the licensed service area (B)		2146	NDR	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		197	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	9.16%	NDR	NDR

Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-January

	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		5491952	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		33558	NDR	NDR
Call drop rate (B/A*100)	≤ 2%	0.61%	NDR	NDR
Total no. of cells in the licensed service area (B)		1977	NDR	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		171	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	8.63%	NDR	NDR

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

Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		136	324	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	1	NA
Call drop rate (B/A*100)	≤ 2%	0.00%	0.31%	NA

Audit Results for Voice quality -PMR Data-January				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		365104002815	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		361584675030	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.04%	NDR	NDR
Live measurement results for Voice quality-3 Day data-January				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		15212666784	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		15066028126	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.11%	NDR	NDR
Drive test results for Voice quality (Average of three drive tests) - DT data-January				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		614341	1209059	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		592368	980296	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	96.42%	81.08%	NA

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Audit Results for POI Congestion- PMR data-January				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		0	NDR	NDR
Traffic served for all POIs (B)- in erlangs		0	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-January				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		0	NDR	NDR
Traffic served for all POIs (B)- in erlangs		0	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR

18 ANNEXURE – FEBRUARY-3G

Audit Results for Network Availability- PMR data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		831	NDR	330
Sum of downtime (i.e. total outage time) of Node Bs		7836	NDR	1208
Node Bs downtime (not available for service)	≤ 2%	1.27%	NDR	0.49%
Number of Node Bs having accumulated downtime of >24 hours in a month		60	NDR	5
Worst affected Node Bs due to downtime	≤ 2%	7.22%	NDR	1.52%
Live Measurement Results for Network Availability- 3 Day live data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		803	NDR	330
Sum of downtime (i.e. total outage time) of Node Bs		943	NDR	12
Node Bs downtime (not available for service)	≤ 2%	1.63%	NDR	0.05%
Number of Node Bs having accumulated downtime of >24 hours in a month		10	NDR	5
Worst affected Node Bs due to downtime	≤ 2%	1.25%	NDR	1.52%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	98.77%	NDR	97.67%
RRC Congestion	≤ 1%	0.15%	NDR	0.64%
Circuit Switched RAB Congestion	≤ 2%	0.01%	NDR	0.01%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	95.27%	NDR	97.83%
RRC Congestion	≤ 1%	0.18%	NDR	0.54%
Circuit Switched RAB Congestion	≤ 2%	0.00%	NDR	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		111	190	NA
Total number of RRC established (B)		111	183	NA
Call setup success rate (B/A*100)	≥ 95%	100.00%	96.32%	NA
%age blocked calls		0.00%	3.68%	NA

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Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-February

	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		4717753	NDR	2220251
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		33152	NDR	28231
Call drop rate (B/A*100)	≤ 2%	0.70%	NDR	1.27%
Total no. of cells in the licensed service area (B)		2440	NDR	860
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		220	NDR	17
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	9.00%	NDR	1.98%

Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-February

	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		6422176	NDR	307331
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		45359	NDR	4322
Call drop rate (B/A*100)	≤ 2%	0.71%	NDR	1.41%
Total no. of cells in the licensed service area (B)		2440	NDR	860
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		199	NDR	28
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	8.16%	NDR	3.26%

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

Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		108	183	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	8	NA
Call drop rate (B/A*100)	≤ 2%	0.00%	4.37%	NA

Audit Results for Voice quality -PMR Data-February				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		479391713709	NDR	17346823333
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		474730892448	NDR	17316489714
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	NDR	99.83%
Live measurement results for Voice quality-3 Day data-February				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		19974654738	NDR	2602691119
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		19780453852	NDR	2597942903
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	87.88%	NDR	99.82%
Drive test results for Voice quality (Average of three drive tests) - DT data-February				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	649668	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	281803	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	43.38%	NA

Audit Results for POI Congestion- PMR data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	20
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	23641
Traffic served for all POIs (B)- in erlangs		0	NDR	9721
POI congestion	≤ 0.5%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	20
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	23641
Traffic served for all POIs (B)- in erlangs		0	NDR	9721
POI congestion	≤ 0.5%	0.00%	NDR	0

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19 ANNEXURE – MARCH-3G

Audit Results for Network Availability- PMR data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		923	NDR	388
Sum of downtime (i.e. total outage time) of Node Bs		303	NDR	539
Node Bs downtime (not available for service)	≤ 2%	0.46%	NDR	1.93%
Number of Node Bs having accumulated downtime of >24 hours in a month		9	NDR	3
Worst affected Node Bs due to downtime	≤ 2%	0.98%	NDR	0.77%
Live Measurement Results for Network Availability- 3 Day live data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		920	NDR	388
Sum of downtime (i.e. total outage time) of Node Bs		1078	NDR	68
Node Bs downtime (not available for service)	≤ 2%	1.63%	NDR	0.24%
Number of Node Bs having accumulated downtime of >24 hours in a month		7	NDR	3
Worst affected Node Bs due to downtime	≤ 2%	0.76%	NDR	0.77%

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Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	98.27%	NDR	99.79%
RRC Congestion	≤ 1%	0.14%	NDR	0.15%
Circuit Switched RAB Congestion	≤ 2%	0.00%	NDR	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	95.67%	NDR	99.76%
RRC Congestion	≤ 1%	0.47%	NDR	0.18%
Circuit Switched RAB Congestion	≤ 2%	0.01%	NDR	0.02%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		145	194	NA
Total number of RRC established (B)		145	187	NA
Call setup success rate (B/A*100)	≥ 95%	100.00%	96.39%	NA
%age blocked calls		0.00%	3.61%	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - PMR data-March

	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		5815109	NDR	2621366
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		43747	NDR	6745
Call drop rate (B/A*100)	≤ 2%	0.75%	NDR	0.26%
Total no. of cells in the licensed service area (B)		2628	NDR	860
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		251	NDR	13
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	9.55%	NDR	1.51%

Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-March

	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		7270713	NDR	265975
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		54234	NDR	775
Call drop rate (B/A*100)	≤ 2%	0.75%	NDR	0.29%
Total no. of cells in the licensed service area (B)		2628	NDR	860
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		130	NDR	25
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	4.95%	NDR	2.91%

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

Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		145	187	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		2	21	NA
Call drop rate (B/A*100)	≤ 2%	1.38%	11.23%	NA

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Audit Results for Voice quality -PMR Data-March				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		606444686599	NDR	21684248979
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		600552253767	NDR	21654825946
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	NDR	99.86%
Live measurement results for Voice quality-3 Day data-March				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		25268528608	NDR	2101057889
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		25023010574	NDR	2098147126
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	92.64%	NDR	99.86%
Drive test results for Voice quality (Average of three drive tests) - DT data-March				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	910977	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	304765	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	33.45%	NA

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Audit Results for POI Congestion- PMR data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	18
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	20662
Traffic served for all POIs (B)- in erlangs		0	NDR	10045
POI congestion	≤0.5%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		0	NDR	18
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		0	NDR	20662
Traffic served for all POIs (B)- in erlangs		0	NDR	10045
POI congestion	≤0.5%	0.00%	NDR	0.00%

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20 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. JFM'2016 – Refers to the quarter of January , February and March 2016
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

EAST ZONE

TRAI AUDIT BROADBAND REPORT – ASSAM - AUDIT OF JFM QUARTER, 2016

Prepared By -

Prepared For-

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1. INTRODUCTION

1.1   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 Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20thMarch, 2009, the "Standards of Quality of Service for Wireless Data Services Regulations, 2012 dated 4th December 2012, and the "Quality of Service of Broadband Service Regulations", 2006 (11 of 2006) dated 6th October, 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).

1.2   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).

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1.3   COVERAGE

The broadband audit was conducted in Assam circle (excluding Assam). For BSNL, a geographical spread among the SDCAs and POPs was maintained. For other operators, the audit was conducted for all SDCAs at overall level.

Image Source: BSNL web site

Operators audited during the audit period
- BSNL
- Pacenet
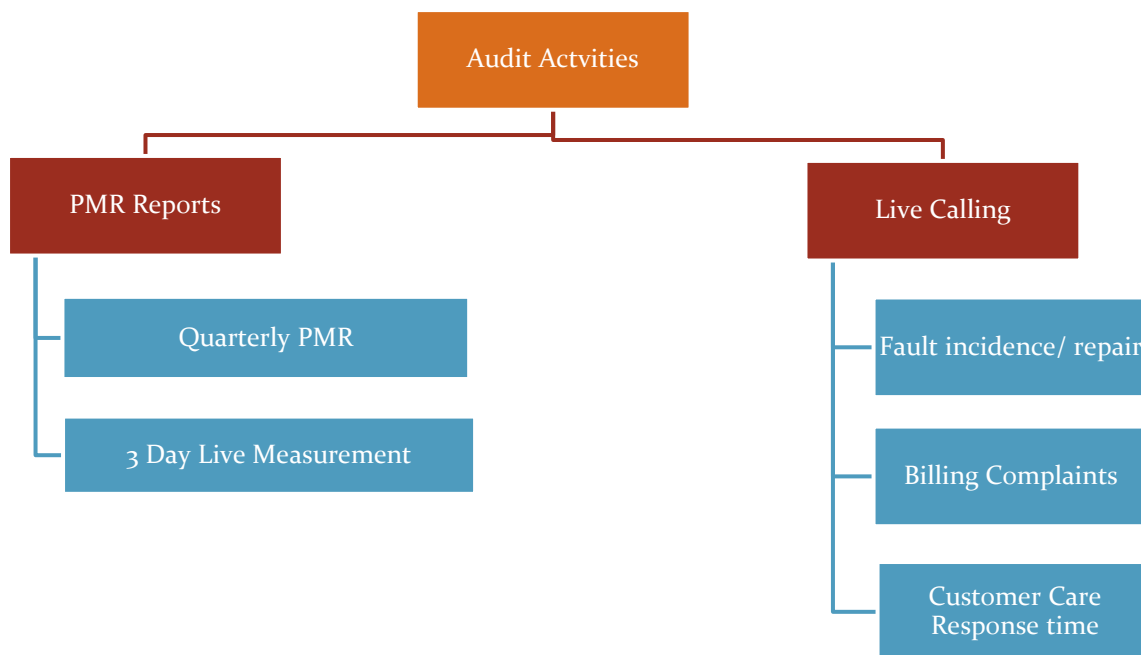- Siti cable

1.4   AUDIT PROCESS AND OPERATOR SELECTION

As per TRAI guidelines, the Broadband Audit for a circle is conducted once every year.

- The operators have been assimilated as per TRAI guidelines given in QoS tender document 2016 and latest list of licensees (with more than 10,000 subscriber in their LSAs) provided by TRAI.

- To conduct the audit, IMRB auditors contacted the broadband operators given in the list below to conduct the audit in Assam circle for the JFM 2016 quarter.

- The PMR was generated from the raw data pertaining to Jan, Feb and Mar 2016 (JFM'16), which was extracted by auditor from the operator's systems during the audit conducted in the month of April 2016.

- Live calling activity was carried out during the period of Mar 2016. The data considered for live calling was for the month prior to the live calling month. In this round of audit, Feb 2016 data

was considered for live calling for all operators whereas live measurement was carried out at the centralized operation centres of the operators, as per tender document.

- 3 day live measurement activity was carried out on working days during the month of Mar 2016. The data for the last three working days from the date of live measurement was extracted from operator's systems and audited by the auditors.

1.5   FRAMEWORK USED

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                        ┌──────────────────┐
                        │  Audit Actvities │
                        └──────────────────┘
              ┌──────────────────┴──────────────────┐
     ┌────────────────┐                    ┌────────────────┐
     │  PMR Reports   │                    │  Live Calling  │
     └────────────────┘                    └────────────────┘
         ├──┌──────────────────┐              ├──┌──────────────────────┐
         │  │   Quarterly PMR  │              │  │ Fault incidence/ repair│
         │  └──────────────────┘              │  └──────────────────────┘
         └──┌──────────────────┐              ├──┌──────────────────────┐
            │3 Day Live Measurement│          │  │  Billing Complaints   │
            └──────────────────┘              │  └──────────────────────┘
                                              └──┌──────────────────────┐
                                                 │   Customer Care       │
                                                 │   Response time       │
                                                 └──────────────────────┘
```

1.5.1   PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the Broadband services, which indicate the overall health of service for an operator.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in East Zone to conduct QoS audit of operators. The steps involved in the audit have been given below.

> 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/ Fault/ Billing /Customer Service).

> 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.
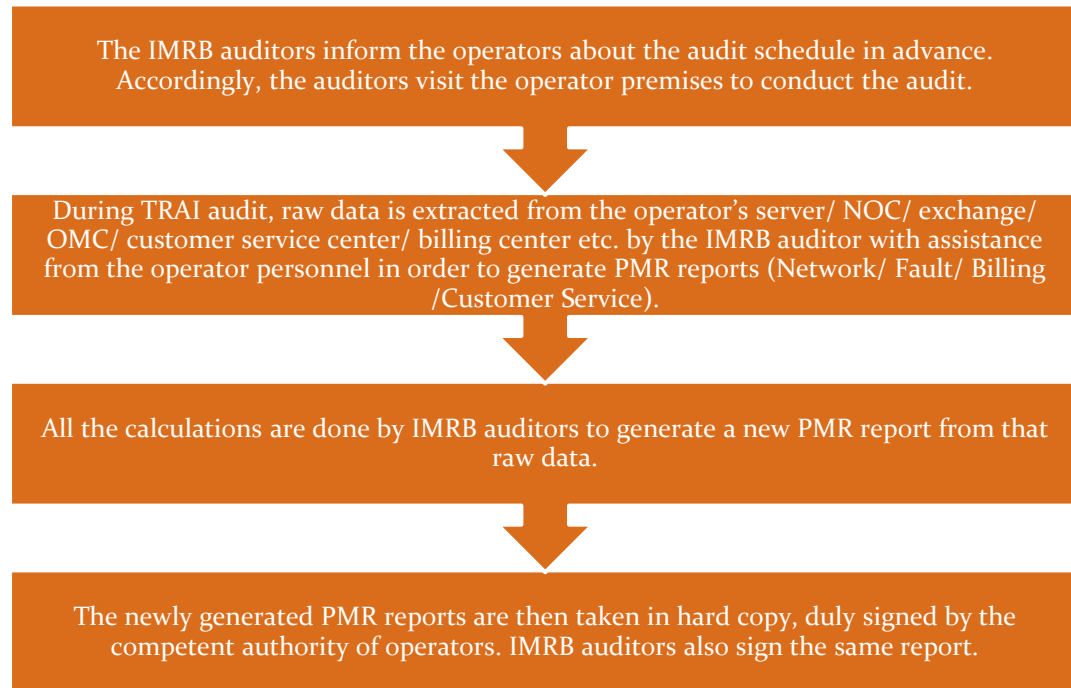
The raw data extracted is then used to generate PMR reports in the following formats.

- Quarterly PMR
- 3 Day Live Measurement Data

Let us understand these formats in detail.

This report has been prepared from the raw data extracted for the period of JFM'16 during April 2016.

1.5.1.1   QUARTERLY PMR REPORT – PARAMETERS REVIEWED

The main purpose of quarterly PMR report is to verify the following key QoS parameters on quarterly basis as per the methodology stated above in section 1.4.

- Service Provisioning
- Fault incidence/clearance related statistic
- Billing Performance (Metering and billing credibility)
- Resolution of billing complaints
- Response time to customer for assistance
- Bandwidth Utilization
- Broadband download speed

- Service Availability/ Uptime
- Network Latency/ Packet Loss

1.5.1.2   3 DAY LIVE MEASUREMENT - SIGNIFICANCE AND METHODOLOGY

The main purpose of 3 day live measurement is to evaluate the following parameters on intraday basis. The auditors visit the sample exchanges (in case of BSNL) and main exchanges (in case of other operators) to collect the 3 day live data for the following parameters.

- Bandwidth Utilization
- Broadband download speed
- Service Availability/ Uptime
- Network Latency/ Packet Loss

While the quarterly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the above given parameters. All the calculations are then done on the basis of that raw data of 3 days.

1.5.1.3   TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2006 (11 of 2006), 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 Mar 2016, the 90 day period data used to identify TCBH would be the data of, Jan, feb & Mar 2016

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 following TCBHs from the raw data collected from the operators for the quarter of JFM'16.

BSNL	Pacenet	Siti
18:00-19:00	20:00-21:00	19:00-20:00

The data for network parameters has been taken as per the TCBH identified by the auditor for the operators.

1.5.2 LIVE CALLING - SIGNIFICANCE AND METHODOLOGY

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

- Service Provisioning
- Fault incidence/clearance related statistic
- Resolution of billing complaints
- Response time to customer for assistance

The process of conducting live calling has been stated below.

The IMRB auditor visits the operator premises such as main exchanges/ OMC/ customer service center etc. to do live calling. The auditors take the raw data of service provisioning, fault repair, customer complaints (billing) from the the operator's system for the preceding month and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls 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 by calling the numbers using operator's wireline network

Let us now discuss the methodology of live calling for each parameter in detail.

1.5.2.1 SERVICE PROVISIONING

Live calling for service provisioning is done to verify the following.

- ✍ Number of connections provided in 15 days from customer request

Live Calling Process:

- ✍ Auditors request the operator to provide the database of all the subscribers who requested for a new connection in one month prior to IMRB auditor visit

- ✤ 100 Calls per service provider are made to customers or in case of BSNL, 10% or 30 per SDCA by randomly selecting from the database provided by operator
- ✤ Auditors check and record whether the connection was provided to customers within the timeframes as mentioned in the benchmark

Benchmark:

- ✤ New connections provided within 15 days: 100%

1.5.2.2   FAULT CLEARANCE

Live calling for fault clearance is done to verify the following.

- ✤ Fault repair by next working day
- ✤ Fault repair within 3 working days

Live Calling Process:

- ✤ Auditors request the operator to provide the database of all the subscribers who reported Faults in one month prior to IMRB auditor visit
- ✤ Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- ✤ Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Benchmarks:

- ✤ Fault repair by next working day: =>90%
- ✤ Fault repair within 3 working days: =>99%

1.5.2.3   RESOLUTION OF 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.

Benchmarks:

100% complaints resolved within 4 weeks.

1.5.2.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

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

- ✋ % age of calls answered by operator (voice to voice) within 60 seconds: In 60% of the cases or more
- ✋ % age of calls answered by operator (voice to voice) within 90 seconds: In 80% of the cases or more

The process for this parameter is stated below.

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

1.6 SAMPLING METHODOLOGY

- ▪ As per audit tender regulations, to conduct the Broadband audit for BSNL, auditors need to devise a sampling plan as given below
  - ○ A minimum sample of 10% Point of Presence (POP) of ISP should be spread across at least 10% of SDCA's in the telecom circle
  - ○ As per TRAI instructions, a DSLAM site was considered as a point of presence for the operator.
- ▪ The sampling plan was finalized as per TRAI guidelines. The POP details have been provided below in section 1.6.1 of the report,
- ▪ As per tender guidelines, no sampling activity was required in case of operators other than BSNL. Hence, the audit for operators other than BSNL has been conducted by taking the data for entire circle (all exchanges/ POPs combined).

Audit for BSNL has been conducted for the data pertaining to selected POPs in the sampling plan.

1.6.1 SAMPLING PLAN - BSNL

Total DSLAM sites (POPs) available in the circle: 491
As per sampling criteria, at least 10% POPs to be selected for audit should be: 25
However, to maintain a geographical spread and due to presence of multiple DSLAM sites at one exchange, the auditors have selected 50 sites.

Total SDCAs present in the circle: 83
As per sampling criteria, 10% SDCAs selected for audit: 10
A list of the SDCAs selected for audit has been given below.

BONGAIGAON TOWN
BARPETA TOWN
MAJULI
GUWAHATI
BIJAY NAGAR
SILCHAR
UDARBOND
TEZPUR
JORHAT
RANGAPARA

The DSLAM sites selected for the purpose of audit have been given below.

EXCH CDR code	Exch.Name (TOTAL=153)	MainExchange	SSA	Division	Sub-Division	SDCA	IP_Add DSLAM1
BNGABY	ABHAYAPURI	BONGAIGAON MBM	BGN	DE-BGN	SDE(EXTL/GRP) BGN	BGN.	10.228.200.6
BNGBPE	BARPETA TWN	BARPETA-MBM	BGN	DE-BARPETA	SDE(EXTL/GRP) BPTWN	BPT TWN	10.228.200.39
BNGBTM	BOITAMARI	BONGAIGAON MBM	BGN	DE-BGN	SDE(EXTL/GRP) BGN	BGN.	10.228.200.10
BNG	BONGAIGAON CDOT	BONGAIGAON OCB	BGN	DE-BGN	SDE(I / D)BGN	BGN.	
BNGBGN	BONGAIGAON OCB	BONGAIGAON MBM	BGN	DE-BGN	SDE(I / D)BGN	BGN.	10.228.200.2
BNGCPR	CHAPAR	DHUBRI MBM	BGN	DE-BGN	SDE(EXTL/GRP) BGN	BGN.	10.228.200.12
BNGDTL	DANGTOL	BONGAIGAON MBM	BGN	DE-BGN	SDE(EXTL/GRP) BGN	BGN.	10.228.200.160
BNGDHG	DHALIGAON	BONGAIGAON MBM	BGN	DE-BGN	SDE-DHALIGAON	BGN.	10.228.200.4
BNGJGP	JOGIGHOPA	BONGAIGAON MBM	BGN	DE-BGN	SDE(EXTL/GRP) BGN	BGN.	10.228.200.11
BNGKYC	KAYAKUCHI	BARPETA RD MBM	BGN	DE-BARPETA	SDE(EXTL/GRP) BPTWN	BPT TWN	10.228.200.162
BNGMDA	MONDIA	BARPETA RD MBM	BGN	DE-BARPETA	SDE(EXTL/GRP) BPTWN	BPT TWN	10.228.200.163
BNGSBG	S.BONGAIGAON	BONGAIGAON MBM	BGN	DE-BGN	SDE(EXTL/GRP) BGN	BGN.	10.228.200.13
BNGSRB	SARTHEBARI	BARPETA RD MBM	BGN	DE-BARPETA	SDE(EXTL/GRP) BPTWN	BPT TWN	10.228.200.164
BNGTHT	TARABARIHAT	BARPETA-MBM	BGN	DE-BARPETA	SDE(EXTL/GRP) BPTWN	BPT TWN	10.228.200.165
BNGBHE	VELLAH	BARPETA RD MBM	BGN	DE-BARPETA	SDE(EXTL/GRP) BPTWN	BPT TWN	10.228.200.161
JRTBHN	BAHANA	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-KENDUGURI	JRT.	10.236.24.172
JRTBNG	BONGAON	MARIANI MBM	JORHAT	AGM(EXT) JRT	SDE-MAJULI	MAJULI	10.236.24.62(closed)
JRTCBH	CHARAIBAHI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-LICHUBARI	JRT.	10.236.24.173
JRTCNM	CHINNAMARA	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-LICHUBARI	JRT.	10.240.148.97
JRTCNG	CHUNGI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-LICHUBARI	JRT.	10.236.24.176
JRTDRN	DERGAON	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-DERGAON	JRT.	10.236.16.9
JRTGMR	GARMUR	MARIANI MBM	JORHAT	AGM(EXT) JRT	SDE-MAJULI	MAJULI	10.236.24.63
JRTHGR	HATIGARH	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-KENDUGURI	JRT.	10.236.24.170
JRTJKB	JALUKANI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-TITABOR	JRT.	10.236.24.174
JRTJRM	JENGRAIMUKH	MARIANI MBM	JORHAT	AGM(EXT) JRT	SDE-MAJULI	MAJULI	10.236.24.65

JRTKKJ	KAKOJAN	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-KENDUGURI	JRT.	10.236.24.171
JRTKMB	KAMALABARI	MARIANI MBM	JORHAT	AGM(EXT) JRT	SDE-MAJULI	MAJULI	10.236.24.67
JRTKND	KENDUGURI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-KENDUGURI	JRT.	10.236.16.4
JRTLCB	LICHUBARI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-LICHUBARI	JRT.	10.236.16.17
JRTJRT	MALOWALI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-CENTRAL, JRT	JRT.	10.236.16.2
JRTEOB	MALOWALI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-CENTRAL, JRT	JRT.	
JRTMDG	MUDOIGAON	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-DERGAON	JRT.	10.236.24.189
JRTNDJ	NA-ALI DHEKIAJULI	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-TITABOR	JRT.	10.236.24.175
JRTNBR	NAYABAZAR	MARIANI MBM	JORHAT	AGM(EXT) JRT	SDE-MAJULI	MAJULI	10.236.24.68
JRTPLN	PHULONI	MARIANI MBM	JORHAT	AGM(EXT) JRT	SDE-MAJULI	MAJULI	10.236.24.69
JRTPLB	PULIBOR	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-CENTRAL, JRT	JRT.	10.236.16.3
JRTSKT	SHOKALATING	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-DERGAON	JRT.	10.236.24.178
JRTTOK	TEOK	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-KENDUGURI	JRT.	10.236.24.168
JRTTK	TILIKIUM	JORHAT OCB	JORHAT	AGM(EXT) JRT	SDE-DERGAON	JRT.	10.236.24.169
KMRADB	ADABARI	PANBAZAR OCB	KMR	DE I	SDO_ADABARI	GHY	10.228.194.117
KMRAMG	AMINGAON	PANBAZAR OCB	KMR	DE III	SDO_HAJO	GHY	10.228.208.25
KMRBMD	BAMUNDI	PANBAZAR OCB	KMR	DE III	SDO_RNG	GHY	10.228.208.15
KMRBST	BASISTHA	DISPUR OCB	KMR	DE II	SDO_DIS2	GHY	10.228.192.12
KMRBJN	BIJOYNAGAR	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNGR	10.228.200.114
KMRBJD	BIJULI BHAVAN	PANBAZAR OCB	KMR	DE III	SDO_CENTRAL	GHY	10.228.208.26
KMRBOK	BOKO	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNGR	10.228.200.118
KMRBRT	BORIHAT	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNGR	10.228.200.121
KMRBOR	BORJHAR	PANBAZAR OCB	KMR	DE III	SDO_BJN	GHY	10.228.208.8
KMRCHP	CHANDRAPUR	DISPUR OCB	KMR	DE IV	SDO_NMT	GHY	10.228.208.22
KMRCHY	CHAYGAON	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNGR	10.228.200.117
KMRCHR	CHRISTANBASTI	DISPUR OCB	KMR	DE II	SDO_ZRD	GHY	10.228.192.30
KMRDDR	DADARA	PANBAZAR OCB	KMR	DE III	SDO_BJN	GHY	10.228.208.12
KMRDAM	DAMDAMA	PANBAZAR OCB	KMR	DE III	SDO_RNG	GHY	10.228.208.14
KMRDSP	DISPUR	DISPUR OCB	KMR	DE II	SDO_DIS1	GHY	10.228.192.5
KMRBZF	FANCY BAZAR	PANBAZAR OCB	KMR	DE I	SDO_FANCYBAZAR	GHY	10.228.208.18
KMRGCK	GARCHUK	DISPUR OCB	KMR	DE II	SDO_DIS2	GHY	10.228.208.16
KMRHJO	HAJO	PANBAZAR OCB	KMR	DE III	SDO_HAJO	GHY	10.228.208.13
KMRHTG	HATIGARH	DISPUR OCB	KMR	DE II	SDO_ZRD	GHY	10.228.208.6
KMRHGB	HENGRABARI	DISPUR OCB	KMR	DE II	SDO_PNJ	GHY	10.228.192.9

KMRJ YR	JAYANAGAR	DISPUR OCB	KMR	DE II	SDO_DIS2	GHY	10.228.192.32
KMRJ BT	JORABAT	DISPUR OCB	KMR	DE II	SDO_PNJ	GHY	10.228.192.13
KMRK HP	KAHILIPARA	DISPUR OCB	KMR	DE II	SDO_DIS1	GHY	10.228.192.7
KMRK LP	KALAPAHAR	PANBAZAR OCB	KMR	DE IV	SDO_KLP	GHY	10.228.192.6
KMRK UM	KUMARPARA	PANBAZAR OCB	KMR	DE I	SDO_FANCYBAZAR	GHY	10.228.192.18
KMRM RZ	MIRZA	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNG R	10.228.200.115
KMRN GB	NAGARBERA	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNG R	10.228.200.120
KMRN GH	N-GUWAHATI	PANBAZAR OCB	KMR	DE III	SDO_HAJO	GHY	10.228.192.26
KMRN MT	NOONMATI (OCB)	PANBAZAR OCB	KMR	DE IV	SDO_NMT	GHY	10.228.208.4
KMRP NB	PANBAZAR	PANBAZAR OCB	KMR	DE I	SDO_CENTRAL	GHY	10.228.192.11
KMRP KT	PANIKHETI	PANBAZAR OCB	KMR	DE IV	SDO_NMT	GHY	10.228.208.23
KMRP NJ	PANJABARI	DISPUR OCB	KMR	DE II	SDO_PNJ	GHY	10.228.192.10
KMRR MP	RAMPUR	BIJOYNAGAR MBM	KMR	DE III	SDO_BJN	BJNG R	10.228.200.116
KMRR NI	RANI	PANBAZAR OCB	KMR	DE III	SDO_BJN	GHY	10.228.200.122
KMR	REHABARI	PANBAZAR OCB	KMR	DE I	SDO_CENTRAL	GHY	10.228.208.28
KMRS TG	SATGAON	PANBAZAR OCB	KMR	DE IV	SDO_NMT	GHY	10.228.208.7
KMRS AT	SATMILE	PANBAZAR OCB	KMR	DE I	SDO_ADABARI	GHY	10.228.208.9
KMRS LP	SILPUKURI	PANBAZAR OCB	KMR	DE IV	SDO_SLP	GHY	10.228.208.2
KMRS NG	SINGRA	BIJOYNAGAR MBM	KMR	DE III	SDO_BHT	BJNG R	10.228.200.119
KMRS NP	SONAPUR	DISPUR OCB	KMR	DE II	SDO_PNJ	GHY	10.228.192.22
KMRS LK	SULAKUCHI	PANBAZAR OCB	KMR	DE III	SDO_HAJO	GHY	10.228.208.11
KMRU LB	ULUBARI (OCB)	PANBAZAR OCB	KMR	DE IV	SDO_ULB	GHY	10.228.208.34
KMRZ OO	ZOO ROAD	DISPUR OCB	KMR	DE II	SDO_ZRD	GHY	10.228.208.5
SCHA MB	AMBICAPATTY	SILCHAR OCB	Silcha r	AGM-INT-SC	SDE-OCB-SC	SC.	10.236.32.2
SCHA CL	ARUNACHAL	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.32.14
SCHB PR	BAGPUR	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.19
SCHB TP	BANTARAPUR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.55
SCHB KD	BASKANDI	UDARBAND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.23
SCHB HR	BEHARABAZAR	UDARBAND MBM	Silcha r	AGM-KRM&HLK	SDE-GR-BDS	SC.	10.236.40.16
SCHB JP	BORJATRAPUR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.15
SCHB KA	BORKHOLA	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.26
SCHD AL	DALU	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.20
SCHD KN	DARGAKONA	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.32.13
SCHD WN	DEWAN	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.27

SCHD BZ	DHOLAIBAZAR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.10
SCHD BS	DWARBAND BASTI	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.9
SCHD WB	DWARBOND	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.12
SCHG GM	GANIRGRAM	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.30
SCHG RH	GUMRAH	SILCHAR OCB	Silcha r	AGM-KRM&HLK	SDE-GR-BDS	SC.	10.236.40.84
SCHH RN	HARINAGAR	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.60
SCHH TC	HATICHERRA	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.21
SCHH TN	HAWAITHANG	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.63
SCHJL P	JALALPUR	SILCHAR OCB	Silcha r	AGM-KRM&HLK	SDE-GR-BDS	SC.	10.236.40.85
SCHJT A	JARAILTALA	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.18
SCHJ GT	JIRIGHAT	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.14
SCHK LN	KALAIN	UDARBAND MBM	Silcha r	AGM-KRM&HLK	SDE-GR-BDS	SC.	10.236.32.20
SCHK PT	KAPTANPUR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.54
SCHK SP	KASHIPUR	UDARBAND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.25
SCHK KL	KATAKHAL	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.62
SCHK GR	KATIGORAH	SILCHAR OCB	Silcha r	AGM-KRM&HLK	SDE-GR-BDS	SC.	
SCHK BG	KUMBHIRGRAM	UDARBAND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	SC.	10.236.40.88
SCHL KH	LAKHIPUR	UDARBAND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.32.16
SCHM MK	MADHURAMUKH	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.22
SCHM EH	MEHERPUR	SILCHAR OCB	Silcha r	AGM-INT-SC	SDE-OCB-SC	SC.	10.236.32.6
SCHM TN	MOTINAGAR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.56
SCNS AH	N.S.AVENUE	SILCHAR OCB	Silcha r	AGM-INT-SC	SDE-OCB-SC	SC.	10.236.32.9
SCHN TZ	NATUNBAZAR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.8
SCHP LP	PAILAPOOL	UDARBAND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.29
SCHP GT	POLANGHAT	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.32
SCHR BZ	RAJABAZAR	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.28
SCHR JN	RAJNAGAR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.13
SCHR ON	RONGPUR	SILCHAR OCB	Silcha r	AGM-INT-SC	SDE-OCB-SC	SC.	10.236.32.19
SCHS CO	SADARGHAT	SILCHAR OCB	Silcha r	AGM-INT-SC	SDE-OCB-SC	SC.	10.236.32.4
SCHS LC	SALCHAPARA	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.31
SCHS GA	SALGANGA	UDARBAND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.24
SCHS BP	SIBPUR	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.57
SCHSI L	SILCORIE	SILCHAR OCB	Silcha r	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.11
SCHS GB	SINGERBOND	UDARBOND MBM	Silcha r	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.58

SCHS NB	SONABARIGHAT	SILCHAR OCB	Silchar	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.53
SCHS ON	SONAI ROAD	SILCHAR OCB	Silchar	AGM-INT-SC	SDE-OCB-SC	SC.	10.236.40.59
SCHS MK	SONAIMUKH	SILCHAR OCB	Silchar	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.52
SCHS KN	SRIKONA	SILCHAR OCB	Silchar	AGM-EXT-SC	SDOT-I-SC	SC.	10.236.40.17
SCHS BZ	SWADHIN BAZAR	SILCHAR OCB	Silchar	AGM-EXT-SC	SDET-II-SC	SC.	10.236.40.51
SCH	TARAPUR	SILCHAR OCB	Silchar	AGM-INT-SC	SDE-OCB-SC	SC.	
SCHU DB	UDARBAND	UDARBAND MBM	Silchar	AGM-EXT-SC	SDE-GR-UDB	UDRB ND	10.236.40.89
TZPBPA	BALIPARA	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	RNGP RA	10.236.0.17
TZPB HG	BIHAGURI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	TZ.	10.236.8.122
TZPB RS	BORSOLA	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(Dhekiajuli)	TZ.	10.236.0.23
TZPD KJ	DHEKIAJULI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(Dhekiajuli)	TZ.	10.236.0.7
TZPDL B	DOLABARI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(I), TEZPUR	TZ.	10.236.8.102
TZPG RM	GERUKAMUKH	LAKHIMPUR MBM	TZP	DE(Dhemaji)	sde (Gogamukh)	TZ.	10.236.8.22
TZPG MI	GOROIMARI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	TZ.	10.236.0.6
TZP	GOROIMARI IAF	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	TZ.	10.236.10.7
TZPTZ P	JOYMOTIPATHAR-TZP OCB	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(I), TEZPUR	TZ.	10.236.0.2
TZPK MH	KHANAMUKH	TEZPUR OCB	TZP	DE(Sonitpur)	SDEP(Jamuguri)	RNGP RA	10.236.0.18
TZPM SM	MISSAMARI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	RNGP RA	10.236.8.103
TZPM CL	MISSION CHARALI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	TZ.	10.236.0.5
TZPM NB	MONABAG	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(Dhekiajuli)	TZ.	10.236.0.20
TZPN PM	NAPAM	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	TZ.	10.236.8.101
TZPPB N	PARBATINAGAR	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(I), TEZPUR	TZ.	
TZPR PA	RANGAPARA	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	RNGP RA	10.236.0.10
TZPS GI	SINGRI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(Dhekiajuli)	TZ.	10.236.0.21
TZPSJ L	SIRAJULI	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(Dhekiajuli)	TZ.	10.236.0.22
TZPT MA	THELEMARA	TEZPUR OCB	TZP	DE(Sonitpur)	SDOP(II), TEZPUR	TZ.	10.236.8.104

Name of Operator	Customers
BSNL	8098
Pacenet	300
Siti	241

1.7   COLOUR CODE TO READ THE REPORT

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1.8   AUDIT METHODOLOGY

As per audit tender, following table explains the audit methodology for Broadband services. Here, a YES signifies that the mentioned parameter gets audited by the given audit method (PMR/ Live Measurement/ Live Calling).

	Parameters	Quarterly PMR Data	3 day live measurement	Live calling
1	**Service Provisioning/ Activation time**	YES		YES
2	**Fault Repair/ Restoration Time**	YES		YES
3	**Billing Performance**			
(i)	Billing Complaints per 100 Bills issued	YES		
(ii)	%age of billing complaints resolved in four weeks	YES		Yes
(iii)	Refund of deposits after closure within 60 days	YES		
4	**Response time to the customer for assistance(Voice to Voice)**			
(i)	*Within 60 seconds > 60%*	YES		YES
(ii)	*Within 90 seconds > 80%*	YES		YES
5	**Bandwidth Utilization/ Throughput:**			
	A) Bandwidth Utilization			
-	POP to ISP gateway Node [Intra – network] Links	YES	YES	
-	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for international connectivity	YES	YES	
	B) Broadband Connection Speed (Download)	YES	YES	
6	**Service Availability/Uptime**	YES	YES	
7	**Packet Loss**	YES	YES	
8	**Network Latency for wired broadband access)**			
(i)	*User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)*	YES	YES	
(ii)	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	
(iii)	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	

2. EXECUTIVE SUMMARY

2.1 PMR QUARTERLY DATA – JFM'2016

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

Parameters	Benchmarks	BSNL	Pacenet	Siti
Service provsioning uptime				
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%
Fault repair restoration time				
Percentage faults repaired by next working days	≥ 90%	94.20%	100.00%	97.56%
Percentage faults repaired within three working days	≥ 99%	100.00%	100.00%	97.56%
Billing performance				
Billing complaints per 100 bills issued	< 2%	0.04%	0.00%	0.00%
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	NA	NA	NA
Customer care/helpline assessment (Voice to Voice)				
Percentage calls answered within 60 seconds	≥ 60%	93.39%	87.50%	85.71%
Percentage calls answered within 90 seconds	≥ 80%	91.04%	100.00%	94.05%
Bandwidth utilisation/Throughput				
Intra network links (POP to ISP Node)		NDR	1	1
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		NDR	98	63
Percentage bandwidth utilised on upstream links	< 80%	NDR	69.39%	85.71%
Broadband download speed	≥ 80%	80.00%	100.00%	100.00%
Service availability/uptime	≥ 98%	98.56%	98.45%	98.87%
Packet loss	< 1%	NDR	0.00%	0.20%
Network Latency				
POP/ISP Node to NIXI	< 120 msec	NDR	9	70
ISP node to NAP port (Terrestrial)	< 350 msec	NDR	290	91

NA: Parameters not applicable for the operators.

NDR: No data received.

Audit of BSNL at its NOC for Bandwidth Utilization and Network Latency is yet to be conducted. Auditors have not received any cooperation from BSNL in helping the auditors to conduct the audit.

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Following are the parameter wise observations for the operators in Assam circle.

2.1.1   SERVICE PROVISIONING/ ACTIVATION TIME

As per audit, all operators met the benchmark for providing new connections within 15 days.

2.1.2   FAULT REPAIR/ RESTORATION

The benchmark of repairing 90% faults within the next day and 99% faults within next three days of receiving complaints was met by all operators.

2.1.3   BILLING PERFORMANCE

As per audit, all operators met the benchmark for metering and billing credibility. BSNL met the benchmark for resolution of billing complaints within 4 weeks

NA: Subscribers of Broadband Pacenet and Siti Cable did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators.

None of the operators had any billing dispute that required a refund.

2.1.4   RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit.

2.1.5   BANDWIDTH UTILIZATION AND THROUGHPUT

Siti cable failed to meet the benchmark for bandwidth utilized on upstream links during audit.

All operators met the benchmark for service availability time as per audit.

NDR: No data has been received for these parameters from BSNL.

2.1.6   NETWORK LATENCY

All operators met the benchmark for Network Latency parameters.

NDR: No data has been received for these parameters from BSNL.

2.2 LIVE MEASUREMENT

Parameters	Benchmarks	BSNL	Pacenet	Siti
Bandwidth utilisation/Throughput				
Intra network links (POP to ISP Node)		NDR	1	1
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		NDR	98	63
Percentage bandwidth utilised on upstream links	< 80%	NDR	69.39%	85.71%
Broadband download speed	≥ 80%	60.00%	76.25%	100.00%
Service availability/uptime	≥ 98%	100.00%	99.62%	99.28%
Packet loss	< 1%	NDR	0.00%	0.00%
Network Latency				
POP/ISP Node to NIXI	< 120 msec	NDR	9	70
ISP node to NAP port (Terrestrial)	< 350 msec	NDR	290	91

NDR: No data received. Audit of BSNL at its NOC for Bandwidth Utilization and Network Latency is yet to be conducted. In both cases, auditors have not received any cooperation from the operators in helping the auditors to conduct the audit.

2.2.1 BANDWIDTH UTILIZATION AND THROUGHPUT

Siti cable failed to meet the benchmark for bandwidth utilized on upstream links during live measurement.

BSNL and Pacenet failed to meet the benchmark for broadband download speed while Siti Cable met the benchmark of providing committed broadband download speed as per live measurement.

All operators met the benchmark for service availability time as per audit.

2.2.2 NETWORK LATENCY

During live measurement, Broadband Pacenet and Siti Cable met the benchmark for network latency parameters.

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2.3 LIVE CALLING

Parameters	Benchmarks	BSNL	Pacenet	Siti
Service provsioning uptime				
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%
Fault repair restoration time				
Percentage faults repaired by next working days	≥ 90%	70.18%	100.00%	100.00%
Percentage faults repaired within three working days	≥ 99%	94.74%	100.00%	100.00%
Billing performance				
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)				
Percentage calls answered within 60 seconds	≥ 60%	44.75%	64.71%	77.78%
Percentage calls answered within 90 seconds	≥ 80%	63.17%	100.00%	100.00%

NA: Parameters not applicable for the operators.

2.3.1 SERVICE PROVISIONING/ ACTIVATION TIMES

All operators met the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

2.3.2 FAULT REPAIR/ RESTORATION

All operators met the benchmark of repairing 90% faults within next working day as well repairing 99% faults within 3 days whereas BSNL failed to meet for 99% faults within 3 days.

2.3.3 BILLING PERFORMANCE

BSNL met the benchmark for %age of billing complaints resolved in 4 weeks.

NA: Live calling for Broadband Pacenet and Siti for 'resolution of billing complaints' has not been conducted due to very low/ zero base of billing complaints for the operators.

2.3.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

As per live calling, BSNL failed to meet both the benchmarks of customer care for %age call answered within 60 seconds and 90 seconds.

3. CRITICAL FINDINGS

Service Provisioning/ Activation Time

As per audit, all operators met the benchmark for providing new connections within 15 days.

Fault Repair/ Restoration

The benchmark of repairing 90% faults within the next day and 99% faults within next three days of receiving complaints was met by all operators. However during live calling BSNL failed to meet the benchmark for fault repaired within 3days.

Billing Performance

As per audit, all operators met the benchmark for metering and billing credibility. BSNL met the benchmark for resolution of billing complaints within 4 weeks

NA: Subscribers of Broadband Pacenet and Siti Cable did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators.

None of the operators had any billing dispute that required a refund.

Response time to customer for assistance

All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit. However during live calling BSNL failed to meet the benchmark of customer care for %age call answered within 60 seconds and 90 seconds.

Bandwidth Utilization and Throughput

Siti cable failed to meet the benchmark for bandwidth utilized on upstream links during live measurement.

BSNL and Pacenet failed to meet the benchmark for broadband download speed while Siti Cable met the benchmark of providing committed broadband download speed as per live measurement.

All operators met the benchmark for service availability time as per audit.

4. DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA AND LIVE MEASUREMENT/ CALLING DATA

4.1 SERVICE PROVISIONING/ ACTIVATION TIME

4.1.1 PARAMETER EXPLANATION

4.1.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:-

- ✎ Number of applications received at the service provider's level
- ✎ Number of connections provided within 15 days
- ✎ Number of connections provided after 15 days

Live Calling: -

- ✎ At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

4.1.1.2 COMPUTATIONAL METHODOLOGY

- ✎ Technically Non Feasible (TNF) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection were excluded from the calculation of this parameter.

- ✎ Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment were excluded from the calculation of this parameter.

*Percentage connections provided within X working days = No of connections provided within X working days/ Total number of connections registered during the period * 100*

4.1.1.3 BENCHMARK

100 % cases in =<15 working days.

4.1.2 DETAILED FINDINGS - SERVICE PROVISONING
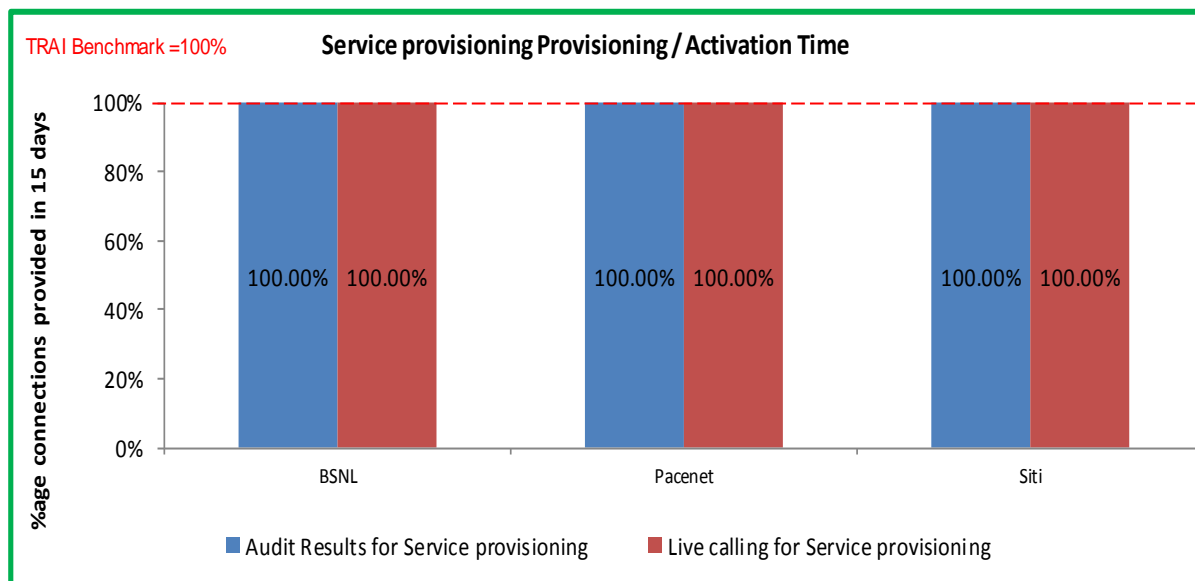
Data Source: OMC (Operations and Maintenance Center) of the operators

As per audit, all operators met the benchmark for providing new connections within 15 days.

4.2 FAULT REPAIR/ RESTORATION TIME

4.2.1 PARAMETER EXPLANATION

4.2.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to number of fault received and also number of faults cleared at the service provider's level in the following time frames:-

- ✤ Number of faults cleared within 24 hours
- ✤ Number of cleared in more than 1 day but less than 3 days
- ✤ Number of cleared in more than 3 days

Live calling: -

- ✤ Live calling is done to verify 'Fault repair by next working day', 'Fault repair within 3 working days' and 'Fault repair in more than 3 working days'
- ✤ Interviewers ensure that operator provided a list of all the subscribers who reported Faults in one month prior to IMRB staff visit
- ✤ Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- ✤ Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

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4.2.1.2 COMPUTATIONAL METHODOLOGY

- The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber

- Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours

Fault incidence = *(Total no of faults repaired in X working days /Total number of faults reported during the period)*100*

4.2.1.3 BENCHMARK

- By next working day: > 90% and within 3 working days: 99%.

4.2.2 DETAILED FINDINGS - FAULT REPAIR WITHIN NEXT WORKING DAY
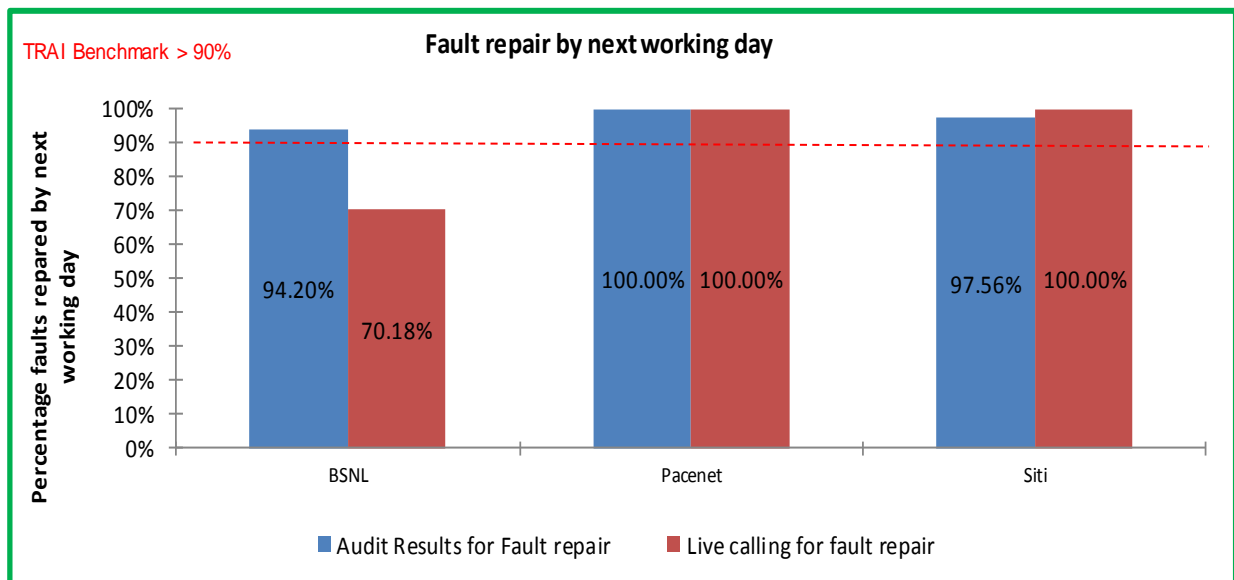
Data Source: OMC (Operations and Maintenance Center) of the operators

The benchmark of repairing 90% faults within the next day of receiving complaints was met by all operators as per audit. However, as per live calls made to subscribers, BSNL remained short of the benchmark for the parameter.

4.2.3 DETAILED FINDINGS - FAULT REPAIR WITHIN 3 WORKING DAYS
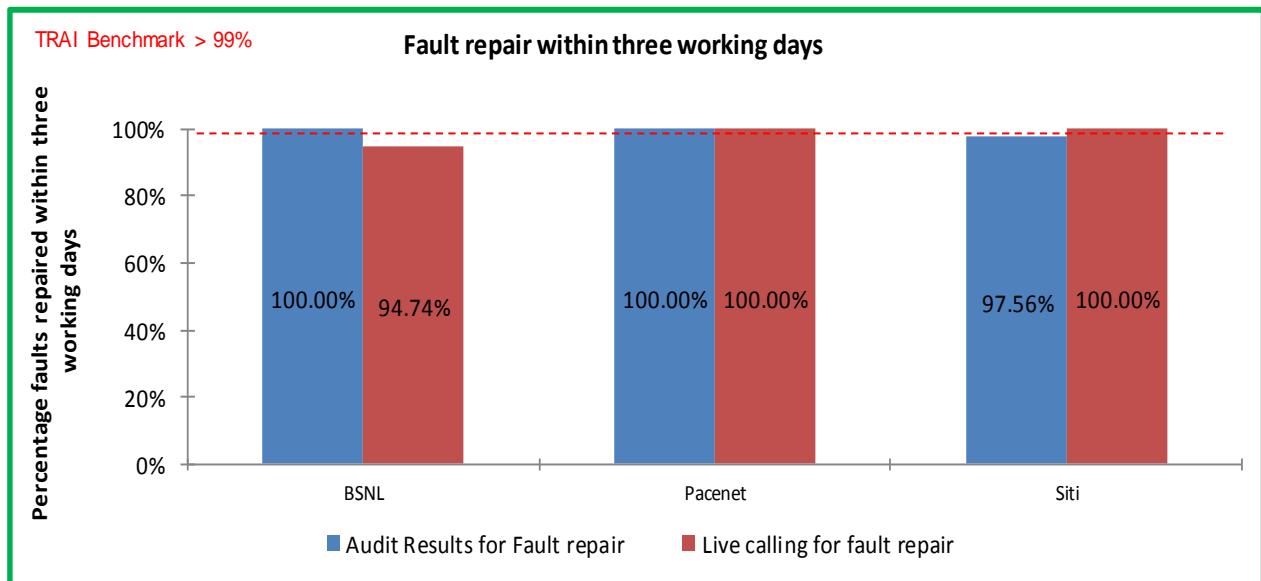
Fault repair within three working days

TRAI Benchmark > 99%

Percentage faults repaired within three working days

BSNL: 100.00% (Audit Results for Fault repair), 94.74% (Live calling for fault repair)
Pacenet: 100.00% (Audit Results for Fault repair), 100.00% (Live calling for fault repair)
Siti: 97.56% (Audit Results for Fault repair), 100.00% (Live calling for fault repair)

■ Audit Results for Fault repair   ■ Live calling for fault repair

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

All operators met the benchmark for repairing 99% faults within three working days as per audit data. However, as per live calls made to subscribers, BSNL remained short of the benchmark for the parameter.

4.3 METERING AND BILLING CREDIBILITY

4.3.1 PARAMETER EXPLANATION – BILLING COMPLAINTS

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

- ✤ Payments made and not credited to the subscriber account
- ✤ Payment made on time but late payment charge levied wrongly
- ✤ Double charges
- ✤ 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
- ✤ 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 a billing complaint for calculating the number of disputed bills.

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4.3.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to –

- Number of Billing complaints received at the service provider's level
- Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.
- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills
- Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.
- Billing complaints resolution database, with opening and closing date of complaint to identify the time taken to resolve a complaint

Live calling:

- 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. In case the sample data is too low to fulfill the target calls, auditors may call subscribers whose complaints got resolved in other months of the same audit period.
- 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.

Raw data for the parameter was extracted from central billing center of the operators.

4.3.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

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

$$\text{Billing complaints (\%)} = \frac{\text{total number of disputed bills X 100}}{\text{total number of bills issued during one billing cycle.}}$$

- ✋ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

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

TRAI Benchmark: <= 2%

4.3.1.3 METERING AND BILLING CREDIBILITY – AUDIT FINDINGS
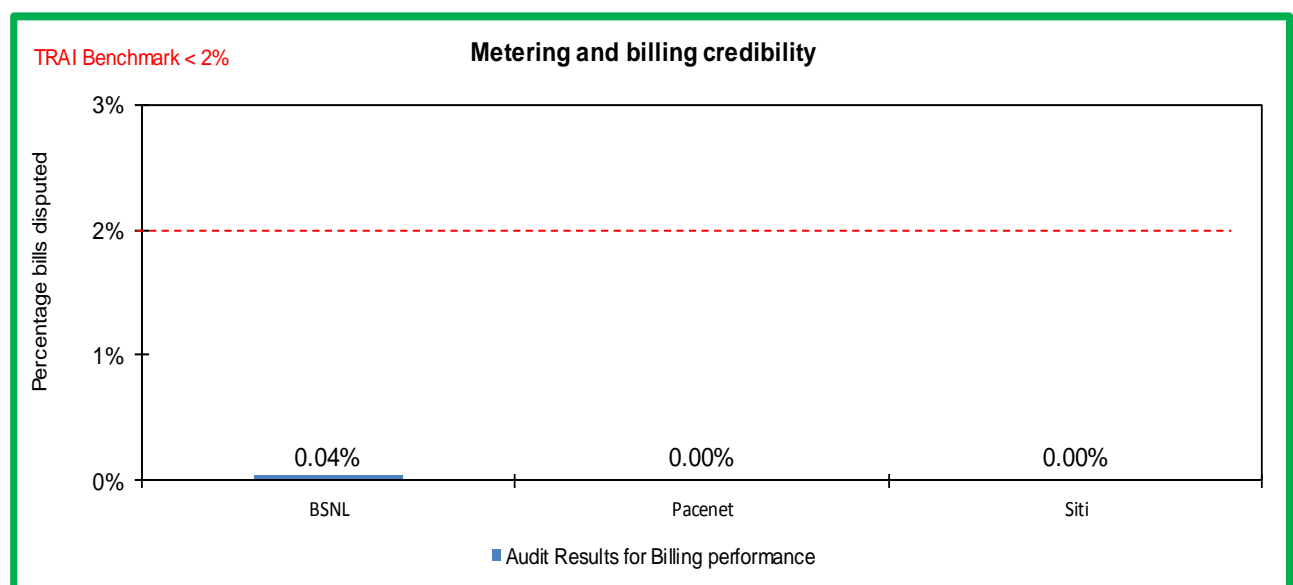
Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

NA: Siti Cable has prepaid broadband service in the circle. Hence the parameter is not applicable for the operator.

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4.3.1.4 COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

✎ Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) and TRAI guidelines (Received on Sep 08, 2014) 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 =

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

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

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

Benchmark: 100% complaints resolved within 4 weeks.

4.3.1.5 RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS
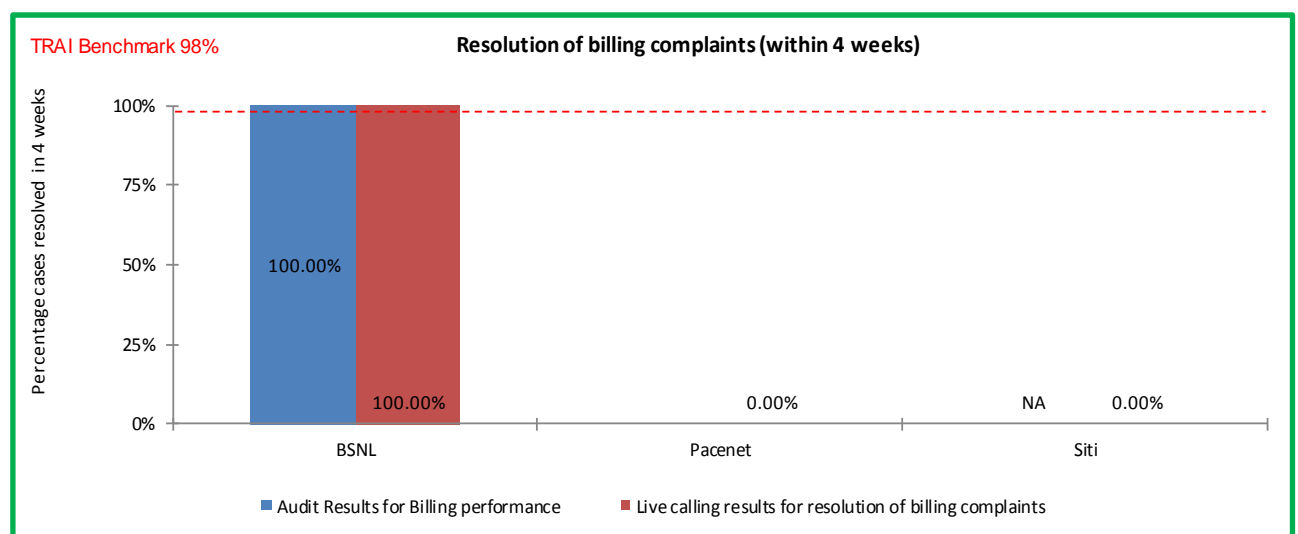
Data Source: Billing Center of the operators

BSNL met the benchmark for resolution of billing complaints within 4 week.

NA: Subscribers of Broadband Pacenet and Siti Cable did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators. Also, live calling for resolution of billing complaints for Pacenet and Siti have not been conducted due to low/ zero base billing complaints for the operators.

4.4   TIME TAKEN TO REFUND AFTER CLOSURE

4.4.1   PARAMETER EXPLANATION

4.4.1.1   AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to -

- ↳ Number of cases requiring refund of deposits
- ↳ Number of cases where refund was made within 60 days
- ↳ %age cases where refund was made within 60 days.

Data for the parameter was extracted from central billing center of the operators.

4.4.1.2   COMPUTATIONAL METHODOLOGY

- ↳ Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers

Time taken to refund = Date of refund – Date of closure

4.4.1.3   BENCHMARK

- ↳ 100% cases in less than 60 days

4.4.2   DETAILED FINDINGS - REFUND OF DEPOSITS
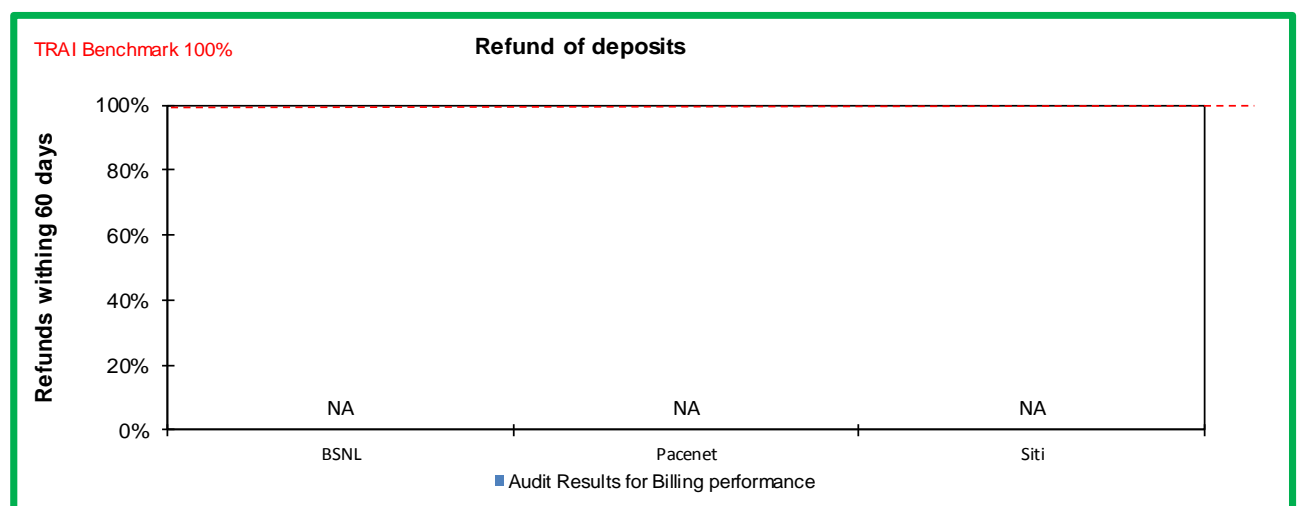
NA: BSNL, Broadband Pacenet and Siti cable had no cases where a refund was applicable.

4.5 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

4.5.1 PARAMETER EXPLANATION

4.5.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to

- Number of calls received by the operator
- Number and percentage calls answered within 60 seconds
- Number and percentage calls answered within 80 seconds

Live calling:

- Overall 100 number of live calls at different points of time were made in a licensed service area/circle for each service provider to assess the efficiency of the call center

Data for the parameter was extracted from central customer service center of the operators.

4.5.1.2 COMPUTATIONAL METHODOLOGY

%age of calls answered by operator (voice to voice) within n seconds = *(Number of calls where time taken for operator to respond* >= n sec / Total number of calls where an attempt to route to the operator was made) x 100)*.*

Time taken for operator to respond = Time when an operator responds to a call – Time when the relevant code to reach the operator is dialled

4.5.1.3 BENCHMARK

- Calls answered within 60 seconds > 60 %
- Calls answered within 90 seconds > 80%

4.5.2 DETAILED FINDINGS - CALL ANSWERED WITHIN 60 SECONDS
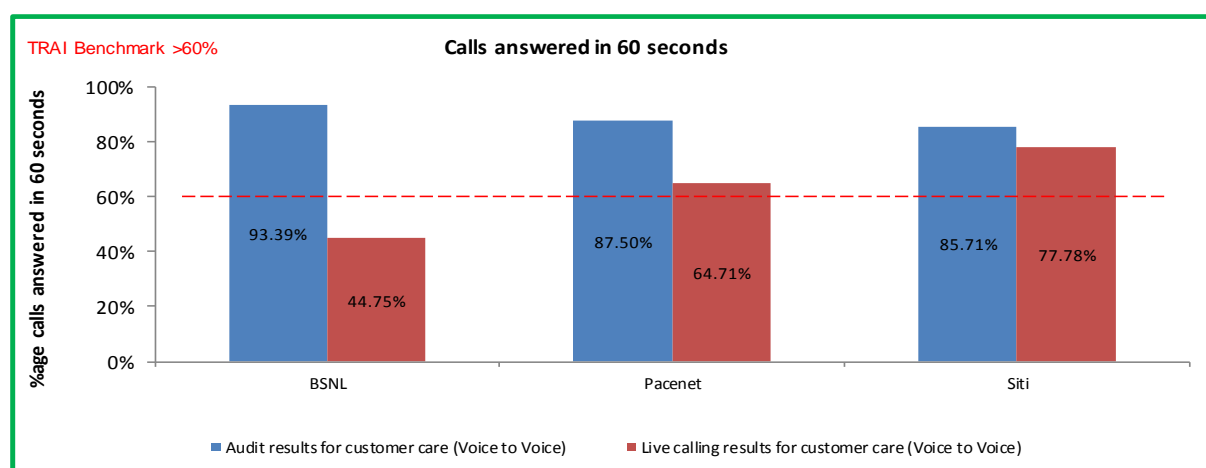
Data Source: Customer Service Center of the operators

During live calling BSNL failed to meet the benchmark.

4.5.3 DETAILED FINDINGS - CALL ANSWERED WITHIN 90 SECONDS
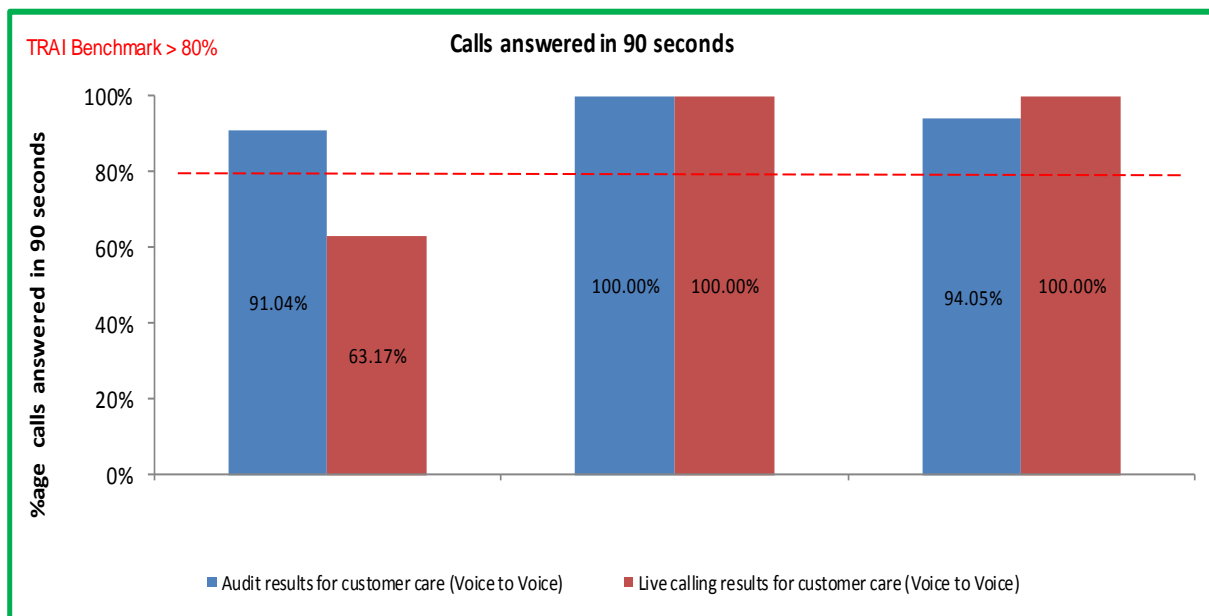
Data Source: Customer Service Center of the operators

All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit. However, during live calling performance of BSNL was observed to be below the benchmark.

4.6 BANDWIDTH UTILIZATION & DOWNLOAD SPEED

4.6.1 PARAMETER EXPLANATION – BANDWIDTH UTILIZATION

4.6.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

POP to ISP gateway Node [Intra – network] Links

- ✍ Auditors to verify and collect data pertaining to Total Bandwidth available and Total Bandwidth utilized during TCBH at some of the sample intra network links (POP to ISP Node) on each of the three days of live measurement separately
- ✍ Total Bandwidth available and Total bandwidth utilized during at the sample links TCBH for the complete month of audit
- ✍ Total number of intra network links having >90% bandwidth utilization during the month of Audit

ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity

- ✍ Total number of upstream links for International connectivity
- ✍ Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth utilized on all the upstream links during TCBH (POP to ISP Node) on each of the three days of live measurement separately

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✤ Total Bandwidth available and Total bandwidth utilized at all the international links during TCBH for the complete month of audit (Also obtain details separately for the days)

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

4.6.1.2 COMPUTATIONAL METHODOLOGY

Percentage Bandwidth available on the link = *Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100*

4.6.1.3 BENCHMARK

✤ < 80% link(s)/route bandwidth utilization during peak hours (TCBH).
✤ If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of bandwidth on immediate basis, but not later than one month is mandated.

4.6.2 DETAILED FINDINGS – BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Pacenet	Siti
Intra-network links (POP to ISP Node)				
Total number of intra network links		NDR	1	1
No of Intra network found to be above 90%				
Total number of upstream links		NDR	1	1
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		NDR	98	63
Total International Bandwidth utilised during peak hours		NDR	68	54
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	NDR	69.39%	85.71%
No of Intra network found to be above 90%		NDR	No	Yes

\>>

Live measurment results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Pacenet	Siti
Intra-network links (POP to ISP Node)				
Total number of intra network links		NDR	1	1
International Bandwidth				
Total number of upstream links		NDR	1	1
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		NDR	98	63
Total International Bandwidth utilised during peak hours		NDR	68	54
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	NDR	69.39%	85.71%
No of Intra network found to be above 90%		NDR	No	Yes

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

Siti cable failed to meet the benchmark for bandwidth utilization during audit and live measurement.

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NDR: No data received. Audit of BSNL at its NOC for Bandwidth Utilization is yet to be conducted. Auditors have contacted the NOC of BSNL, however, the operator is yet to provide an appointment to IMRB auditors to conduct audit at BSNL NOC.

4.6.3 PARAMETER EXPLANATION - BROADBAND DOWNLOAD SPEED

4.6.3.1 AUDIT PROCEDURE

Auditors collected and verified the following information from the operator's system.

- Total committed download speed to the all subscribers (In Mbps) (A)
- Total average download speed observed during TCBH (In Mbps)

Live Calling/ Measurement:

- Details of live customers were obtained from the service providers
- Overall 50 numbers of live calls at were made during peak hours (TCBH) in a licensed service area/circle for each service provider to assess the download speed available to subscribers. A download measurement software tool provided by the service providers was used for the same
- Details of total committed download speed and speed available to the users were recorded for each of the subscriber

4.6.3.2 COMPUTATIONAL METHODOLOGY

- The download speed for one customer is calculated by the download speed measurement software using the formula provided below:

Data Download Speed = Size of test file (data) in ISP server/ Transmission time required for error free transfer of the entire data

Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

4.6.3.3 BENCHMARK
Subscribed broadband connection speed to be met >= 80% from ISP Node to user

Data for the parameter was taken from "Download measurement software" installed in the server at ISP Node of the operators.

4.6.4 DETAILED FINDINGS – BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Pacenet	Siti
Total average committed download speed (In Mbps) (A)		5.0	1	1
Total average download speed observed during TCBH (In Mbps) (B)		4.0	1	1
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	80.00%	100.00%	100.00%

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Live measurement results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Pacenet	Siti
Total committed download speed to the sample subscribers (In Mbps) (A)		5	15.84	1
Total average download speed observed during TCBH (In Mbps) (B)		3	12.078	1
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	60.00%	76.25%	100.00%

Data Source: Download measurement software installed in the server at ISP Node of the operators

All operators met the benchmark of providing committed broadband download speed as per audit. However, BSNL and Pacenet failed to meet the benchmark during live measurement.

4.7 SERVICE AVAILABILITY/UPTIME

4.7.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

- ✋ Total operational hrs.
- ✋ Total downtime hrs.
- ✋ The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out/

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

4.7.1.2 COMPUTATIONAL METHODOLOGY

- ✋ Total downtime for all users, including the LAN switches, Routers, Servers, etc. at ISP Node and connectivity to upstream service provider are to be included
- ✋ Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime

Service availability/Uptime = (Total operational hours – Total Downtime hrs)*100 / Total operational hours

4.7.1.3 BENCHMARK

- ✋ 98% with effect from quarter ending September 2007 and onwards

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4.7.2 DETAILED FINDINGS - SERVICE AVAILABILITY
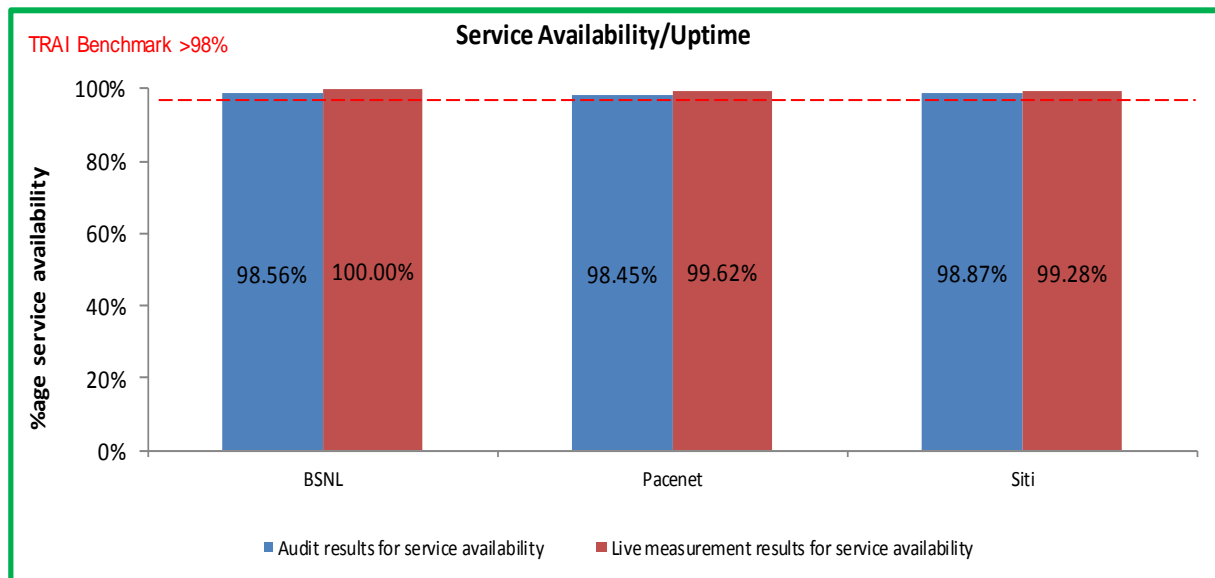
Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for service availability time as per audit.

4.8 NETWORK LATENCY & PACKET LOSS

4.8.1 PARAMETER EXPLANATION - NETWORK LATENCY

Network Latency: Network Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/ Customer Premises Equipment (CPE).

4.8.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to:

- Records maintained for ping tests conducted during the period
- Smoked ping test (wherever available) results for the period
- Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)
- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

4.8.1.2 COMPUTATIONAL METHODOLOGY

- Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for 1000 pings of 64 bytes each (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)

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↳ Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI

↳ Minimum sample reference points for each service area shall be three in number or multiple reference points if required

Hence the formula for network latency would be Network latency for X days= *Total round trip time for all the ping packets transmitted in X days /No of days during the period*

4.8.1.3   BENCHMARK

↳ < 120 msec from user reference point at POP/ISP Node to International Gateway

↳ < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)

↳ < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)

4.8.2   PARAMETER EXPLANATION – PACKET LOSS

Packet Loss: Packet loss is the percentage of packets lost to the total packets transmitted between two designated CPE/ Router Ports.

4.8.2.1   AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

↳ Records maintained for ping tests conducted during the period

↳ Smoked ping test (wherever available) results for the period

↳ Results of live ping tests conducted during three day live measurement and month of Audit (During TCBH)

↳ Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

4.8.2.2   COMPUTATIONAL METHODOLOGY

↳ Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipment's/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad

↳ The packet loss is measured by computing the percent packet loss of 1000 pings of 64 byte packet each.

↳ Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI

↳ Minimum sample reference points for each service area were three in number or multiple reference points if required

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Hence Packet loss is computed by the formula: *(Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100*

4.8.2.3   BENCHMARK

- Packets Loss <1 %

4.8.3   DETAILED FINDINGS - NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Pacenet	Siti
Packet Loss (Percentage)	< 1%	NDR	0.00%	0.20%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	NDR	9	70
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	NDR	290	91
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NDR	NA	NA

>>

Live measurement results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Pacenet	Siti
Packet Loss (Percentage)	< 1%	NDR	0.00%	0.00%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	NDR	9	70
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	NDR	290	91
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NDR	NA	NA

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

Broadband Pacenet and Siti cable met the benchmark for network latency related parameters.

NDR: No data received. Audit of BSNL at its NOC for Network Latency is yet to be conducted. Auditors have contacted the NOC of BSNL, however, the operator is yet to provide an appointment to IMRB auditors to conduct audit at BSNL NOC.

5. ANNEXURE – JFM'2016

5.1 SERVICE PROVISIONING

Audit Results for Service provisioning				
	Benchmark	BSNL	Pacenet	Siti
Total connections registered during the period		2547	22	25
Number of connections provided within 15 days		2547	22	25
Percentage of connections provided within 15 days	100%	100.00%	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		2547	22	25
percentage of connections provided after 15 days of registration of demand	100%	100.00%	100.00%	100.00%
Number of customers to whom credit is given for delayed connections		2547	22	25
Percentage of customers to whom credit is given for delayed connections	100%	100.00%	100.00%	100.00%
Live calling for Service provisioning				
	Benchmark	BSNL	Pacenet	Siti
Total connections registered during the period		250	11	9
Number of connections provided within 15 days		250	11	9
Percentage of connections provided within 15 days	100%	100.00%	100.00%	100.00%

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

Note: Live calls less than target for Siti cable due to low base of service provisioning repair requests.

5.2 FAULT REPAIR/ RESTORATION

Audit Results for Fault repair				
Fault repair	Benchmark	BSNL	Pacenet	Siti
Total No. of faults registered during the period		10342	7	41
No. of faults repaired by next working day during the period		9742	7	40
Percentage of faults repaired by next working day during the period	≥ 90%	94.20%	100.00%	97.56%
No. of faults repaired within 3 days during the period		10342	7	40
Percentage of faults repaired within 3 days during the period	≥ 99%	100.00%	100.00%	97.56%
No. of cases with faults pending for >3 days				
>>				
Rent rebate	Benchmark	BSNL	Pacenet	Siti
Percentage of cases where rent rebate for >3 days was given	100%	NA	NA	NA
>>				
Live calling for fault repair				
Fault repair	Benchmark	BSNL	Pacenet	Siti
Total Number of calls made to subscribers		399	3	11
Number of cases where faults were repaired by next working day		280	3	11
Percentage cases where faults were repaired by next working day	≥ 90%	70.18%	100.00%	100.00%
Number of cases where faults were repaired within 3 days		378	4	8
Percentage cases where faults were repaired within 3 days	≥ 99%	94.74%	100.00%	100.00%

Data Source: Operations and Maintenance Center (OMC) of the operators and live calls conducted by the auditors from operator's network

Note: Live calls less than target for Broadband Pacenet and Siti Cable due to low base of fault repair requests.

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5.3 BILLING PERFORMANCE – METERING AND BILLING CREDIBILITY

Audit Results for Billing performance				
Billing Performance	Benchmark	BSNL	Pacenet	Siti
Billing diputes				
Total bills generated during the period		77325	860	NA
Total number of bills disputed		33	0	0
Percentage bills disputed (Avg of 3 billing cycles)	≤ 2%	0.04%	0.00%	0.00%
Total bills generated during the first billing cycle		28433	NA	NA
Total number of bills disputed in first billing cycle		8	NA	NA
Percentage bills disputed (first billing cycle)	≤ 2%	0.03%	NA	NA
Total bills generated during the second billing cycle		28435	NA	NA
Total number of bills disputed in second billing cycle		15	NA	NA
Percentage bills disputed (second billing cycle)	≤ 2%	0.05%	NA	NA
Total bills generated during the third billing cycle		20457	NA	NA
Total number of bills disputed in third billing cycle		10	NA	NA
Percentage bills disputed (third billing cycle)	≤ 2%	0.05%	NA	NA
Resolution of billing complaints				
Total number of complaints		33	NA	NA
Total complaints resolved in 4 weeks from date of receipt		33	NA	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	NA	NA
Refund of deposits				
Total number of cases requiring refund		NA	NA	NA
Total number of cases where credit/waiver was made within 60 days		NA	NA	NA
Percentage cases in which credit/waiver was received within 60 days	100%	NA	NA	NA

Data Source: Billing Center of the operators

NA: Subscribers of Broadband Pacenet and Siti Cable did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators.

Live calling results for resolution of billing complaints				
Resolution of billing complaints	Benchmark	BSNL	Pacenet	Siti
Total Number of calls made		25	NA	NA
Number of cases resolved in 4 weeks		25	NA	NA
Percentage cases resolved in 4 weeks	100%	100.00%	NA	NA

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

NA: Live calling for Pacenet and Siti for 'resolution of billing complaints' has not been conducted due to low/ zero base of billing complaints for the operators.

5.4 RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE

Calls Answered within 60 seconds				
Customer Care Assessment	Benchmark	BSNL	Pacenet	Siti
Total Number of calls received		16574	8	84
Total Number of calls answered within 60 seconds		15478	7	72
Percentage calls answered within 60 seconds	≥ 60%	93.39%	87.50%	85.71%

Calls Answered within 90 seconds				
Total Number of calls received		16574	8	84
Total Number of calls answered within 90 seconds		15089	8	79
Percentage calls answered within 90 seconds	≥ 80%	91.04%	100.00%	94.05%

Data Source: Customer Service Center of the operators

Live calling results for customer care (Voice to Voice)				
Customer Care Assessment	Benchmark	BSNL	Pacenet	Siti
Total Number of calls received		467	17	9
Total Number of calls answered within 60 seconds		209	11	7
Percentage calls answered within 60 seconds	≥ 60%	44.75%	64.71%	77.78%
Total Number of calls answered within 90 seconds		295	17	9
Percentage calls answered within 90 seconds	≥ 80%	63.17%	100.00%	100.00%

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

5.5 BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Pacenet	Siti
Intra-network links (POP to ISP Node)				
Total number of intra network links		NDR	1	1
No of Intra network found to be above 90%				
Total number of upstream links		NDR	1	1
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		NDR	98	63
Total International Bandwidth utilised during peak hours		NDR	68	54
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	NDR	69.39%	85.71%
No of Intra network found to be above 90%		NDR	No	Yes
Live measurment results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Pacenet	Siti
Intra-network links (POP to ISP Node)				
Total number of intra network links		NDR	1	1
International Bandwidth				
Total number of upstream links		NDR	1	1
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		NDR	98	63
Total International Bandwidth utilised during peak hours		NDR	68	54
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	NDR	69.39%	85.71%
No of Intra network found to be above 90%		NDR	No	Yes

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

NDR: No data received. Audit of BSNL at its NOC for Bandwidth Utilization and Network Latency is yet to be conducted. Auditors have not received any cooperation from the operator in helping the auditors to conduct the audit.

5.6 BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Pacenet	Siti
Total average committed download speed (In Mbps) (A)		5.0	1	1
Total average download speed observed during TCBH (In Mbps) (B)		4.0	1	1
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	80.00%	100.00%	100.00%

>>

Live measurement results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Pacenet	Siti
Total committed download speed to the sample subscribers (In Mbps) (A)		5	15.84	1
Total average download speed observed during TCBH (In Mbps) (B)		3	12.078	1
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	60.00%	76.25%	100.00%

Data Source: Download measurement software installed in the server at ISP Node of the operators

5.7 SERVICE AVAILABILITY/ UPTIME

Audit results for service availability				
Service Availability	Benchmark	BSNL	Pacenet	Siti
Total Operational Hours		1348	2184	2547
Total Downtime		3	3	2
Total time when the service was available		1450	2181	2781
Service Availability Uptime in Percentage	≥ 98%	98.56%	98.45%	98.87%

>>

Live measurement results for service availability				
Service Availability	Benchmark	BSNL	Pacenet	Siti
Total Operational Hours		87	2184	1908
Total Downtime		0	3	4
Total time when the service was available		87	2181	1968.0
Service Availability Uptime in Percentage	≥ 98%	100.00%	99.62%	99.28%

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

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5.8 NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Pacenet	Siti
Packet Loss (Percentage)	< 1%	NDR	0.00%	0.20%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	NDR	9	70
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	NDR	290	91
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NDR	NA	NA

>>

Live measurement results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Pacenet	Siti
Packet Loss (Percentage)	< 1%	NDR	0.00%	0.00%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	NDR	9	70
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	NDR	290	91
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NDR	NA	NA

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

NDR: No data received. Audit of BSNL at its NOC for Bandwidth Utilization and Network Latency is yet to be conducted. Auditors have not received any cooperation from the operator in helping the auditors to conduct the audit.

5.9 TOTAL CAPACITY AND SUBSCRIBERS

Capacity and Subscribers				
		BSNL	Pacenet	Siti
Capacity		15,897	600	563
Total No of customers served (Mar 2016)		8098	300	241

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

EAST ZONE

TRAI AUDIT WIRELINE REPORT – ASSAM CIRCLE - AUDIT OF JFM QUARTER, 2016

Prepared By -

Prepared For-

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

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1   INTRODUCTION

1.1   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 Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20thMarch, 2009, the "Standards of Quality of Service for Wireless Data Services Regulations, 2012 dated 4th March 2012, and the "Quality of Service of Broadband Service Regulations", 2006 (11 of 2006) dated 6th January, 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).

1.2   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).

1.3 COVERAGE

The wireline audit was conducted in Assam circle (excluding Assam). For BSNL, geographical spread among SDCAs and exchanges was maintained. For other operators (Vodafone), the audit was conducted for all exchanges at overall level.


Image Source: BSNL web site

1.4 AUDIT PROCESS

As per TRAI guidelines, the Wireline Audit for a circle is conducted for one quarter once every year.

- The operators have been assimilated as per TRAI guidelines given in QoS tender document 2015 and latest list of licensees provided by TRAI.
- IMRB auditors contacted the following wireline operators to conduct the audit in Assam for the JFM 2016 quarter.
  - o BSNL
  - o Vodafone

- The PMR was generated from the raw data pertaining to Jan, Feb and Mar 2016 (JFM'16), which was collected from the operator during the audit conducted in the month of April 2016.
- Live calling and 3 day live measurement activity was carried out during the month of Mar 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. For example, data of Feb 2016 was considered for live calling activity conducted in Mar 2016.

1.5 FRAMEWORK USED
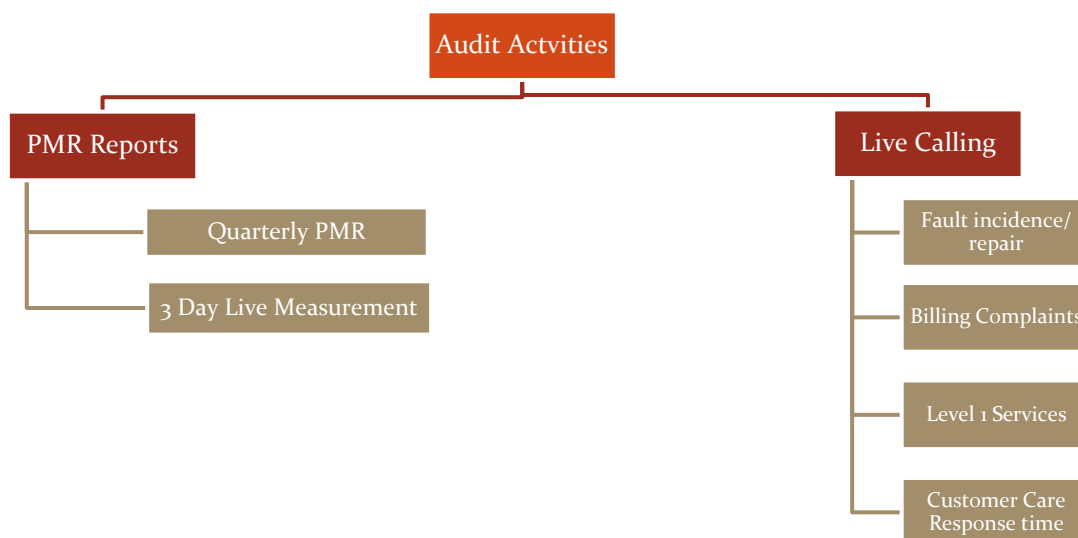
1.5.1 PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the Basic (Wireline) telephone services, which indicate the overall health of service for an operator. The operators submit these PMR reports to TRAI time to time as per instructions from TRAI.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in East Zone to conduct QoS audit of operators. The steps involved in the audit have been given below.

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/ Fault/ Billing /Customer Service).

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 raw data extracted is then used to generate PMR reports in the following formats.

- ✋ Quarterly PMR
- ✋ 3 Day Live Measurement Data

Let us understand these formats in detail.

1.5.1.1   QUARTERLY PMR REPORT – PARAMETERS REVIEWED

The main purpose of quarterly PMR report is to verify the following key QoS parameters on quarterly basis as per the methodology stated above in section 1.4

- Fault incidence/clearance related statistic
- Mean Time to Repair (MTTR)
- POI (Point of Interconnection) Congestion
- Metering and billing credibility
- Resolution of billing complaints
- Customer care promptness
- Time taken to refund of deposits after closure

1.5.1.2   3 DAY LIVE MEASUREMENT – METHODOLOGY AND PARAMETERS REVIEWED

The main purpose of 3 day live measurement is to evaluate the following parameters on intraday basis. The auditors visit the sample exchanges (in case of BSNL) and main exchanges (in case of other operators) to collect the 3 day live data for the following parameters

- POI (Point of Interconnection) Congestion

While the quarterly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the above given parameters. All the calculations are then done on the basis of that raw data of 3 days.

1.5.1.3   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 March 2016, the 90 day period data used to identify TCBH would be the data of January, February & March 2016.

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 JFM'16 was the time period as given below.

1.5.2 LIVE CALLING - SIGNIFICANCE AND METHODOLOGY

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

- Fault clearance
- Resolution of billing complaints
- Response time to the customer for assistance
- Level 1 services

The process of conducting live calling has been stated below.

The IMRB auditor visits the operator premises such as main exchanges/ OMC/ customer service center etc. to do live calling. The operators provide the raw data of customer complaints (billing) from the preceding month and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls 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 and level 1 services by calling the numbers using operator's wireline network

Let us now discuss the methodology of live calling for each parameter in detail.

1.5.2.1 FAULT CLEARANCE

Live calling for fault clearance is done to verify the following.

- Fault repair by next working day - for both Urban and Rural Exchanges
- Fault repair within 5 working days – Urban Exchanges
- Fault repair within 7 working days – Rural Exchanges

- Auditors request the operator to provide the database of all the subscribers who reported Faults in one month prior to IMRB auditor visit
- Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Benchmark:

- Fault repair by next working day (Urban Exchanges): =>85%
- Fault repair by next working day (Rural Exchanges): =>75%
- Fault repair within 5 working days (Urban Exchanges): =100%
- Fault repair within 7 working days (Rural Exchanges): =100%

1.5.2.2 RESOLUTION OF BILLING COMPLAINTS

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

- Auditors collected the data from operators system 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.

Benchmark:

98% complaints resolved within 4 weeks, 100% complaints resolved within 6 weeks

1.5.2.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

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

The process for this parameter is stated below.

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

1.5.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services. Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator network to test the accessibility and efficiency of Level 1 services on an operator's network.

A minimum of 300 test calls were made per service provider in the quarter. In case of BSNL, calls were equally distributed among SDCAs (Short Distance Charging Area) visited for the purpose of live calling.

In JFM'16, IMRB has conducted the live calling to the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

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

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1.5.3 AUDIT METHODOLOGY

As per audit tender, following table explains the audit methodology for Basic (Wireline) services. Here, a YES signifies that the mentioned parameter gets audited by the given audit method (PMR/ Live Measurement/ Live Calling).

Sl. No.	Parameters	PMR	Live measurement	Live calling
1	Fault incidence/clearance related statistic	YES		
1.1	- Total number of faults registered per month	YES		
1.2	- Fault repair by next working day (Urban and Rural)	YES		YES
1.3.1	- Fault repair within 5 working days (Urban)	YES		YES
1.3.2	- Fault repair within 7 working days (Rural)	YES		YES
1.4	Mean Time to Repair (MTTR)	YES		
4	POI Congestion	YES	YES	
5	Metering and billing credibility – postpaid	YES		YES
5.1	Metering and billing credibility – prepaid	YES		YES
6	Customer service promptness	YES		
6.1	Processing closure request	YES		
7	Response time to customer	YES		
7.1	While call is getting connected and answered	YES		YES
7.2	While call is answered by operator (voice to voice)	YES		YES
8	Level 1 Services			YES
9	Time taken to refund of deposits after closure	YES		

The audit methodology for each parameter has been explained along with the findings of same.

1.5.4 MEASUREMENT METHODOLOGY

As per audit tender, following table explains the measurement methodology in terms of time period consideration for various parameters involved in audit of Basic (Wireline) services.

Sl. No.	Parameters	Averaged over a period
1	Fault incidence	One Quarter
1.1	Total number of faults registered per month	One Quarter
1.2	Fault repair by next working day (Urban and Rural)	One Quarter
1.3.1	Fault repair within 5 working days (Urban)	One Quarter
1.3.2	Fault repair within 7 working days (Rural)	One Quarter
1.4	Mean Time to Repair (MTTR)	One Quarter
4	POI Congestion	One Month
5	Metering and billing credibility – postpaid	One Billing Cycle
5.1	Metering and billing credibility – prepaid	One Quarter
6	Customer care promptness	One Quarter
6.1	Processing closure request	One Quarter
7	Response time to customer	One Quarter
7.1	While call is getting connected and answered	One Quarter
7.2	While call is answered by operator (voice to voice) within 90 seconds	One Quarter
8	Time taken to refund of deposits after closure	One Quarter

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1.6 SAMPLING METHODOLOGY

- For BSNL, sampling include all exchanges, including rural and urban exchanges, in 10% of SDCAs in the licensed service area or 10 SDCAs, whichever is more for the purpose of audit, live calling and live measurement.
- For Vodafone audit was conducted in centralized exchange.
- The sampling plan for BSNL was finalized as per TRAI guidelines. The details of exchange list are given below

Audit for BSNL has been conducted on the basis of data pertaining to sample SDCAs and exchanges.

1.6.1.1 SDCA SELECTED AS PER SAMPLING PLAN – BSNL

SDCA COVERED
BONGAIGAON TOWN (WEST)
BARPETA TOWN (WEST)
JORHAT (EAST)
MAJULI (EAST)
GUWAHATI (CENTRAL)
BIJAY NAGAR (CENTRAL)
SILCHAR (SOUTH)
UDARBOND (SOUTH)
TEZPUR (NORTH)
RONGAPARA (NORTH)

Name of Operator
BSNL
Vodafone

1.7 COLOUR CODE TO READ THE REPORT

Not Meeting the benchmark

2   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.

2.1   PMR (PERFORMANCE MONITORING REPORT) DATA – JFM'15

Parameters	Benchmarks	BSNL	Vodafone
Faults incidences (No. of faults/100 Subs./month) - averaged for the quarter	≤7	3.90	2.50
% of faults repaired by next working day	≥ 85% (Urban)	86.95%	93.33%
% of faults repaired within 5 days	100% (Urban)	100.00%	98.89%
Percentage of faults repaired by next working day during the quarter	≥ 75% (Rural)	82.97%	NA
Percentage of faults repaired within 7 days during the quarter	100% (Rural)	100.00%	NA
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	NA	NA
Mean Time to Repair (MTTR)	≤ 10 Hrs	3.88	2.70
No. of POIs with congestion > 0.5%	≤ 0.5%	0.00%	NA
Metering and billing credibility - Number of bills disputed during the quarter	≤ 0.1%	0.07%	0.00%
Resolution of billing complaints within 4 weeks	≥ 98%	90.74%	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	99.63%	NA
Period of applying credit / waiver	≤ 1 week	NA	NA
Closure within 7 days	100%	100.00%	NA
Refund of deposits within 60 days of closure of service	100%	80.95%	NA

Response time to customer for assistance	Benchmarks	BSNL	Vodafone
% age calls getting connected and answered	≥ 95%	96.77%	99.60%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%	76.90%	100.00%

2.1.1   FAULT INCIDENCE / CLEARANCE STATISTICS

All the operators met the benchmark for fault incidence.

All the operators met the benchmark of fault repair within next day in urban areas, however Vodafone failed to meet the benchmark of fault repair within 5days and BSNL also met the benchmark for fault repair within 7 days in rural areas.

All the operators met the benchmark for the Mean time to repair (MTTR).

Rent rebate not applicable for BSNL and Vodafone as all faults were repaired within stipulated time.

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2.1.2 POI (POINT OF INTERCONNECTION) CONGESTION

BSNL met the benchmark by reporting 0% POIs with congestion.

NA: In case of POI for Vodafone, there is no direct POI from Wireline MSC. All Calls are getting routed via Inter MSC TGs with GSM MSCs. So, Total number of working POI is not present in the wireline system of Vodafone. The operator system is not equipped to provide the POI data separately for wireline.

2.1.3 METERING AND BILLING CREDIBILITY

All the operators met the benchmark for metering and billing credibility.

2.1.4 RESOLUTION OF BILLING COMPLAINTS

BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks and for resolution of billing complaints within 6 weeks.

NA: Parameter not applicable for Vodafone as no billing complaints were logged in the audit period.

2.1.5 PERIOD OF APPLYING CREDIT/ WAIVER

NA: BSNL and Vodafone had no cases where credit/ waiver were required during the audit period.

2.1.6 CLOSURE WITHIN 7 DAYS

BSNL met the benchmark for the parameter..

2.1.7 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

BSNL & Vodafone met the TRAI benchmark in terms of number of IVR calls being connected and answered.

The benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds was not met by BSNL while Vodafone was able to meet the benchmark for the parameter.

2.1.8 REFUND OF DEPOSIT WITHIN 60 DAYS FROM CLOSURE

BSNL did not meet the benchmark for the parameter.

NA: Vodafone did not have any closure request during the audit period.

2.2 3 DAY LIVE MEASUREMENT

Parameters	Benchmarks	BSNL	Vodafone
POI Congestion	≤ 0.5%	0.00%	NA

2.2.1 POI (POINT OF INTERCONNECTION) CONGESTION

BSNL met the benchmark by reporting o% POIs with congestion.

NA: In case of POI for Vodafone, there is no direct POI from Wireline MSC. All Calls are getting routed via Inter MSC TGs with GSM MSCs. So, Total number of working POI is not present in the wireline system of Vodafone. The operator system is not equipped to provide the POI data separately for wireline.

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2.3 LIVE CALLING

Parameters	Benchmarks	BSNL	Vodafone
Fault Repair/ Clearance			
% of faults repaired by next working day	≥ 85% (Urban)	76.33%	100.00%
Percentage cases where faults were repaired by next working day	≥ 75% (Rural)	81.82%	NA
% of faults repaired within 5 days	100% (Urban)	89.00%	100.00%
Percentage cases where faults were repaired within 7 days	100% (Rural)	89.09%	NA
Resolution of billing complaints			
Resolution of billing complaints within 4 weeks	≥ 98%	87.00%	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	95.00%	NA
Response time to customer for assistance			
% age calls getting connected and answered	≥ 95%	100.00%	100.00%
% age call answered by operator in 90 seconds	≥ 95%	80.00%	98.00%
Level 1 Services			
% age calls made to Level 1 services getting answered	≥ 90%	72.67%	91.00%

2.3.1 FAULTS REPAIR/ CLEARANCE

BSNL failed to meet the benchmark of fault repair within next day in urban areas. BSNL also did not meet the benchmark of fault repair within 5 days in urban areas and fault repair within 7 days in rural areas. Vodafone met the benchmark of fault repair within next day and within 5 days in urban areas.

NA: Vodafone does not have presence in rural areas. Resolution of billing complaints

2.3.2 RESOLUTIONOF BILLING COMPLAINTS

During live calling, it was observed that BSNL failed to meet the benchmark of resolving complaints within 4 weeks as well as within 6 weeks. Live calling for Vodafone was not conducted as there were no complaints reported for the operator in the audit period.

2.3.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

During live calling, it was observed that BSNL failed to meet the benchmark of %age calls answered by operators in 90 seconds.

2.3.4 LEVEL 1 SERVICES

BSNL failed to meet the benchmark for Level 1 services. The details of live calling have been provided in the annexure.

3   CRITICAL FINDINGS - JFM'15

Fault Incidence/ Clearance Statistic/ POI

- Vodafone failed to meet the benchmark of fault repair within 5days.
- Rent rebate not applicable for BSNL and Vodafone as all faults were repaired within stipulated time.
- BSNL met the benchmark by reporting 0% POIs with congestion.
  - o NA: In case of POI for Vodafone, there is no direct POI from Wireline MSC. All Calls are getting routed via Inter MSC TGs with GSM MSCs. So, Total number of working POI is not present in the wireline system of Vodafone. The operator system is not equipped to provide the POI data separately for wireline.

Resolution of Billing Complaints

- BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks and for resolution of billing complaints within 6 weeks.

     NA: Parameter not applicable for Vodafone as no billing complaints were logged in the audit period.

Response time for customer assistance

- The benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds was not met by BSNL.

Refund of deposit within 60 days from closure

- BSNL did not meet the benchmark for the parameter.

     NA: Vodafone did not have any closure request during the audit period.

Live Calling

- BSNL failed to meet the benchmark of fault repair within next day in urban areas. BSNL also did not meet the benchmark of fault repair within 5 days in urban areas and fault repair within 7 days in rural areas. Vodafone met the benchmark of fault repair within next day and within 5 days in urban areas.

     NA: Vodafone does not have presence in rural areas. Resolution of billing complaints

- During live calling, it was observed that BSNL failed to meet the benchmark of resolving complaints within 4 weeks as well as within 6 weeks. Live calling for Vodafone was not conducted as there were no complaints reported for the operator in the audit period.
- During live calling, it was observed that BSNL failed to meet the benchmark of %age calls answered by operators in 90 seconds.
- BSNL failed to meet the benchmark for Level 1 services. The details of live calling have been provided in the annexure.

4 PARAMETER EXPLANATION AND DETAILED FINDINGS - COMPARISON BETWEEN PMR AND LIVE CALLING/ MEASUREMENT DATA

4.1 FAULT INCIDENCE/ CLEARANCE RELATED SERVICES

4.1.1 PARAMETER EXPLANATION

4.1.1.1 DEFINITION

Fault Incidence: This parameter quantifies the number of faults registered per 100 subscribers/ per month for a wireline service provider in a quarter.

Fault Clearance/Repair: This parameter quantifies the number of faults repaired within a stipulated period of time (within a day, within 5 days – urban, within 7 days – rural) in the quarter

Mean Time to Repair (MTTR): It is the average of total time taken to repair for all faults reported in a quarter

4.1.1.2 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to number of fault received and also number of faults cleared at the service provider's level in the following time frames:-

- ♨ Number of faults cleared within 24 hours (Urban & Rural)
- ♨ Number of cleared in more than 1 day but less than 5 days (Urban)
- ♨ Number of cleared in more than 5 days but less than 7 days (Urban)
- ♨ Number of cleared in more than 1 day but less than 7 days (Rural)
- ♨ Number of cleared in more than 7 days but less than 15 days (Urban & Rural)
- ♨ Number of cleared in more than 15 days (Urban & Rural)

The mean time to repair (in hours) is also calculated by averaging the total time of repair for each customer.

Live calling: -

- ♨ Live calling was done to verify the following
    - o Fault repair by next working day - for both Urban and Rural Exchanges
    - o Fault repair within 5 working days – Urban Exchanges
    - o Fault repair within 7 working days – Rural Exchanges
- ♨ Auditors ensured that the operator provided a list of all the subscribers who reported Faults in one month prior to IMRB auditor visit

Ջ Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.

Ջ Auditors checked and recorded whether the fault was corrected within the timeframes as mentioned in the benchmark

4.1.1.3   COMPUTATIONAL METHODOLOGY

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed for calculating fault related parameters.

Fault Incidence:

Fault incidences – No. of faults/100 subscriber/month =

$$\text{Fault incidences} = \frac{\text{Total number of faults in the Quarter (3 months)}}{\text{Total No. of DELs at the end of the Quarter}} \times \frac{100}{3}$$

Here, DEL or Direct Exchange Line would be the subscribers of wireline services.
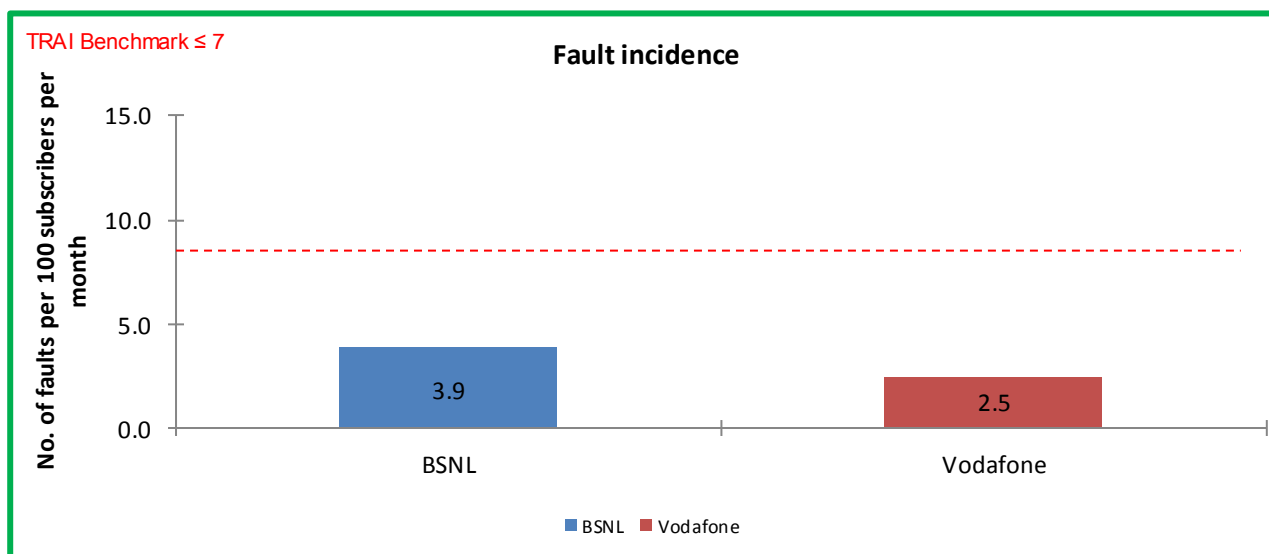
MTTR (Mean Time to Repair):

$$\text{Mean Time to Repair} = \frac{\text{sum of duration of each repair time in hours for all the fault incidences in a Quarter (3 months)}}{\text{Total number of fault incidences in a Quarter (3 months)}}$$

4.1.1.4   BENCHMARK

Ջ Total number of faults registered per month: <=5 complaints per 100 subscribers

Ջ Fault repair:

- o   Fault repair by next working day (Urban Exchanges): =<85%
- o   Fault repair by next working day (Rural Exchanges): =<75%
- o   Fault repair within 5 working days (Urban Exchanges): =100%
- o   Fault repair within 7 working days (Rural Exchanges): =100%
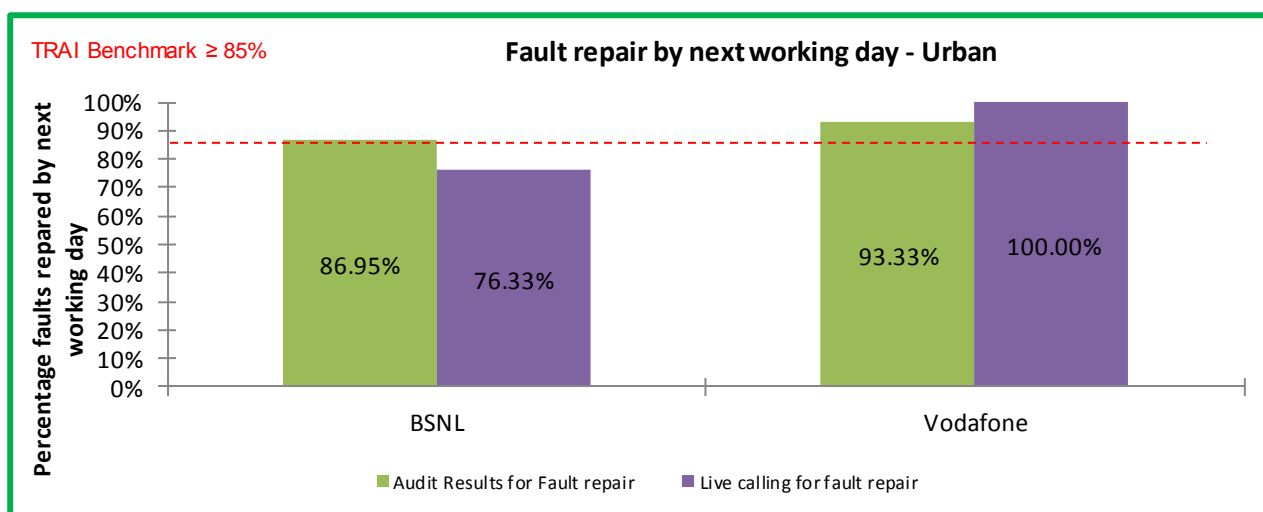
Ջ Mean Time to Repair: 8 hours

4.1.2 DETAILED FINDINGS - FAULT INCIDENCE

Fault incidence

TRAI Benchmark ≤ 7

Y-axis: No. of faults per 100 subscribers per month (0.0, 5.0, 10.0, 15.0)

- BSNL: 3.9
- Vodafone: 2.5

Legend: ■ BSNL ■ Vodafone

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

BSNL and Vodafone met the benchmark for fault incidence.

4.1.3 DETAILED FINDINGS - FAULT REPAIR BY NEXT DAY (URBAN)

Fault repair by next working day - Urban

TRAI Benchmark ≥ 85%

Y-axis: Percentage faults repared by next working day (0% to 100%)

- BSNL: Audit Results for Fault repair 86.95%, Live calling for fault repair 76.33%
- Vodafone: Audit Results for Fault repair 93.33%, Live calling for fault repair 100.00%

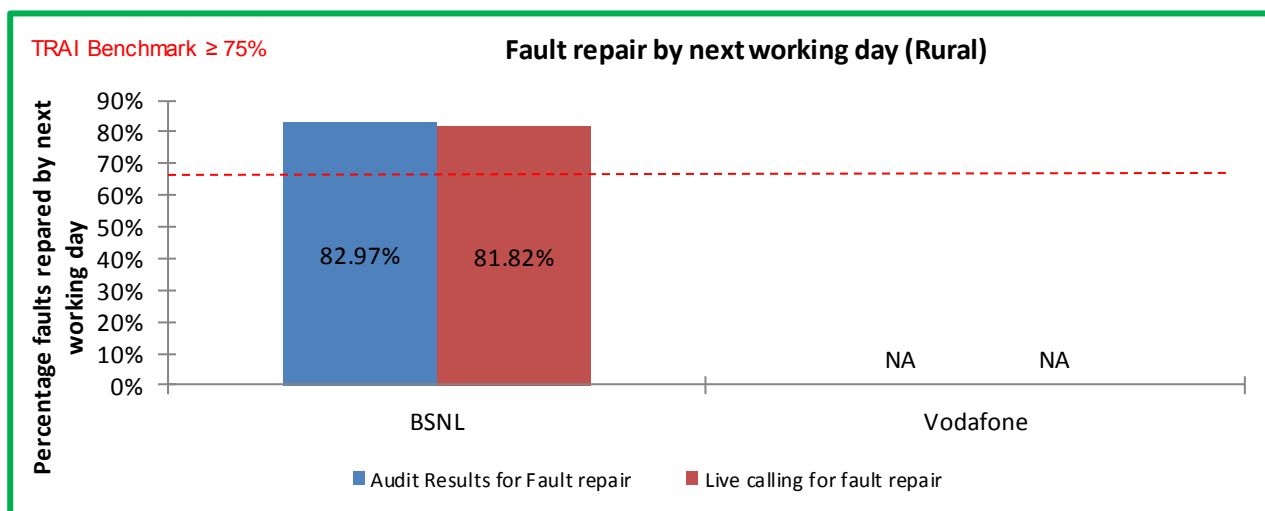Legend: ■ Audit Results for Fault repair ■ Live calling for fault repair

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

BSNL & Vodafone met the benchmark of fault repair within next day in urban areas as per audit.

However, during live calling, performance of BSNL was below the benchmark level.

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4.1.1 DETAILED FINDINGS - FAULT REPAIR BY NEXT DAY (RURAL)

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

BSNL met the benchmark of fault repair within next day in rural areas

NA: Vodafone does not have network presence in rural and hilly areas.

4.1.2 FINDINGS - FAULT REPAIR WITHIN FIVE WORKING DAYS (URBAN)

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

Vodafone failed to meet the benchmark of fault repair within 5 day in urban areas as per audit.

However, during live calling, performance of BSNL was below the benchmark level.

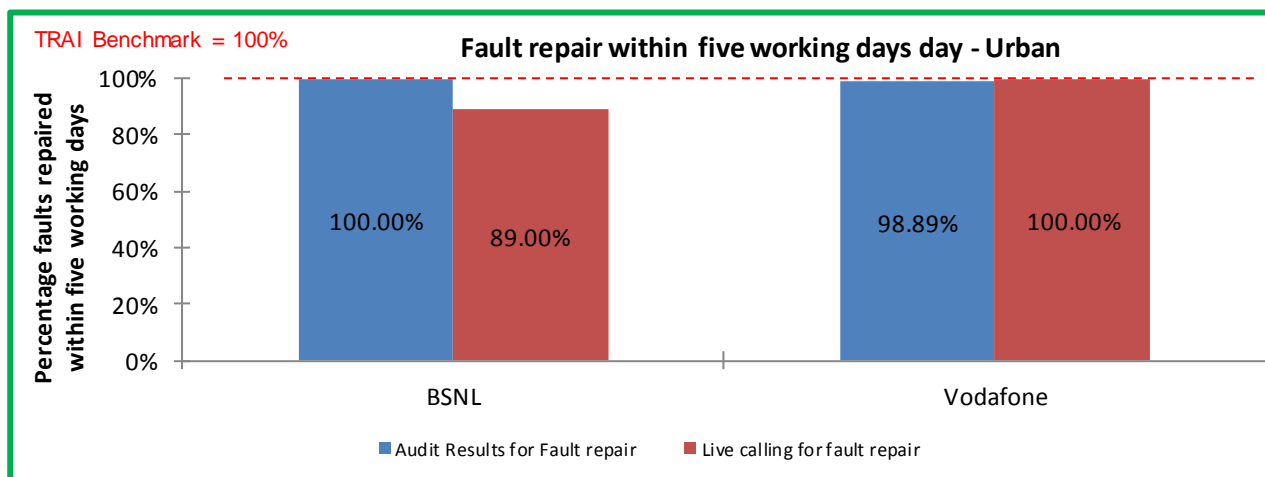## 4.1.1 FINDINGS - FAULT REPAIR WITHIN SEVEN WORKING DAYS (RURAL)
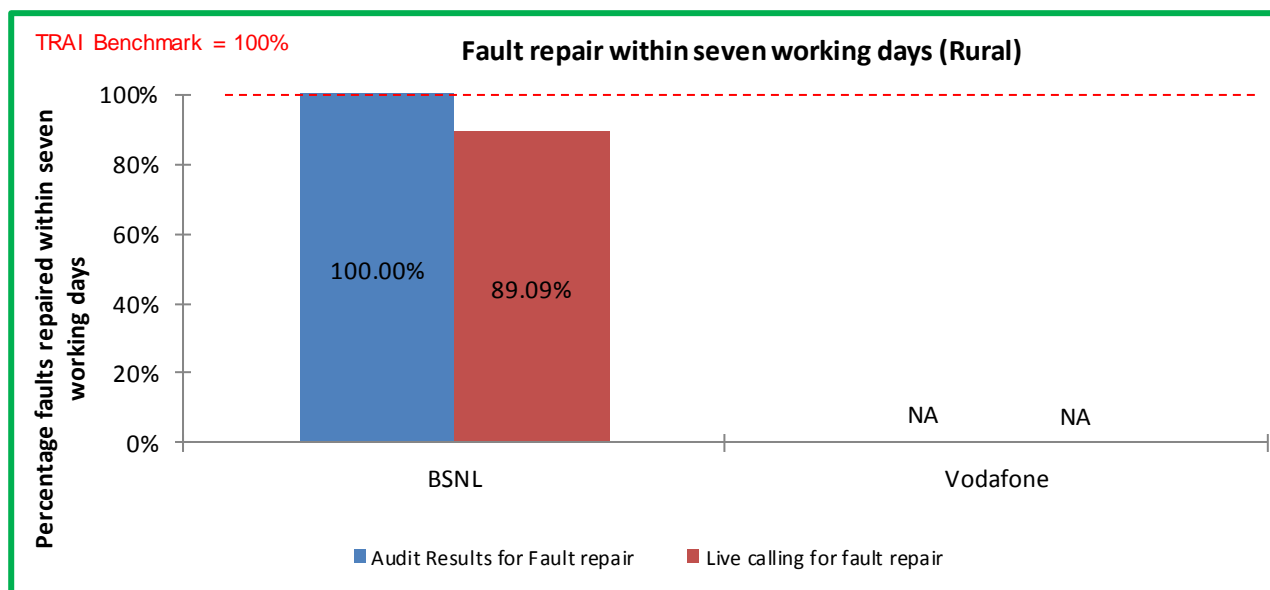
Data Source: Operations and Maintenance Center (OMC) of the operators

During live calling BSNL failed to meet the benchmark of fault repair within 7days in rural areas.

NA: Vodafone does not have network presence in rural and hilly areas.
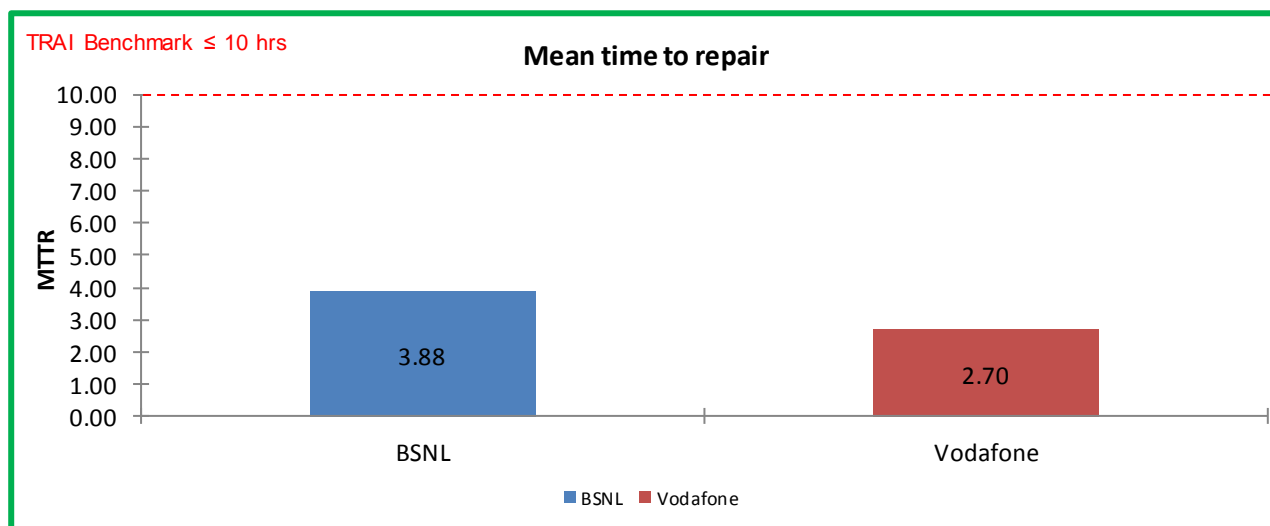
4.1.2 DETAILED FINDINGS - MEAN TIME TO REPAIR

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

BSNL and Vodafone met the benchmark for the parameter.

4.2 METERING AND BILLING CREDIBILITY

4.2.1 PARAMETER EXPLANATION

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

- Payments made and not credited to the subscriber account

- Payment made on time but late payment charge levied wrongly

- Double charges

- Charging for toll free services

- Local calls charged/billed as STD/ISD or vice versa

- Calls made disputed

- 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

- 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 a valid billing complaint for calculating the number of disputed bills.

4.2.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to –

- Number of Billing complaints received at the service provider's level
- Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.
- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills
- Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.
- Billing complaints resolution database, with opening and closing date of complaint to identify the time taken to resolve a complaint

Live calling:

ᕲ 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

ᕲ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

ᕲ 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.

Benchmarks:

ᕲ 98% complaints resolved within 4 weeks, 100% complaints resolved within 6 weeks

4.2.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

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

$$\text{Billing complaints (\%)} = \frac{\text{total number of disputed bills} \times 100}{\text{total number of bills issued during one billing cycle.}}$$

ᕲ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

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

TRAI Benchmark: <= 0.1%

4.2.1.3 METERING AND BILLING CREDIBILITY – AUDIT FINDINGS
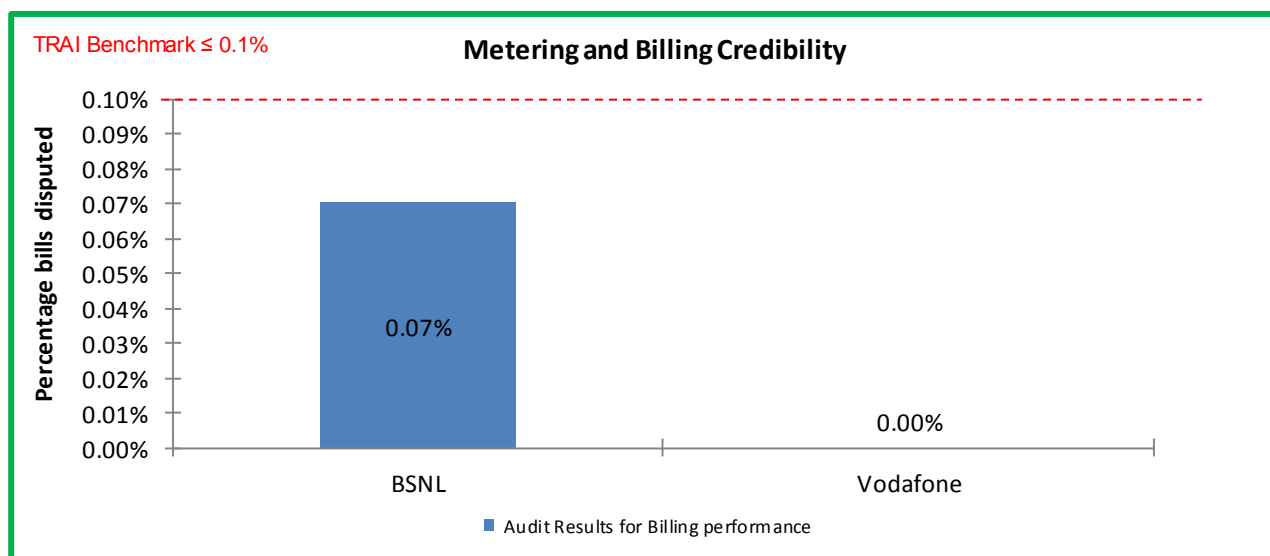
Metering and Billing Credibility

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

- 0.10% benchmark line
- BSNL: 0.07%
- Vodafone: 0.00%

■ Audit Results for Billing performance

Data Source: Billing Center of the operators

BSNL and Vodafone met the benchmark for the parameter.

4.2.1.4 COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

✍ **Calculation of Percentage resolution of billing complaints**

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) and TRAI guidelines (Received on Sep 08, 2016) 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 =

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

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

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

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

4.2.1.5   RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS
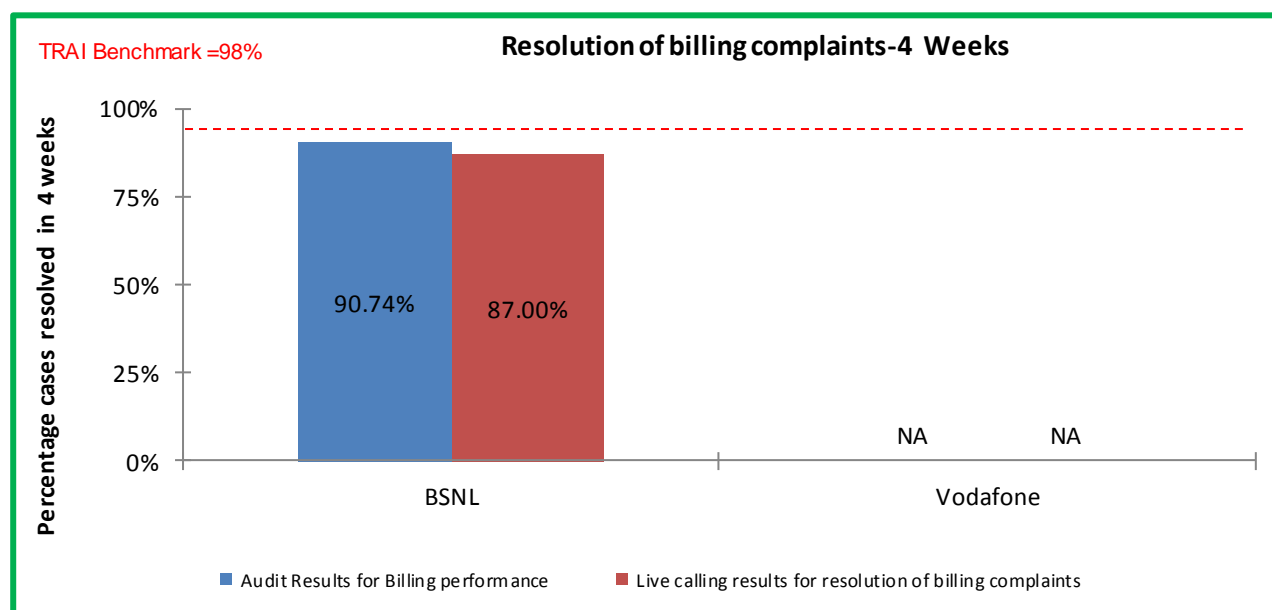
BSNL failed to meet the benchmark for the parameter as per audit data as well as live calling.
Not Applicable: Zero complaints

Resolution of billing complaints-6 weeks

TRAI Benchmark =100%

- Audit Results for Billing performance
- Live calling results for resolution of billing complaints

BSNL: 90.74%, 87.00%
Vodafone: NA, NA
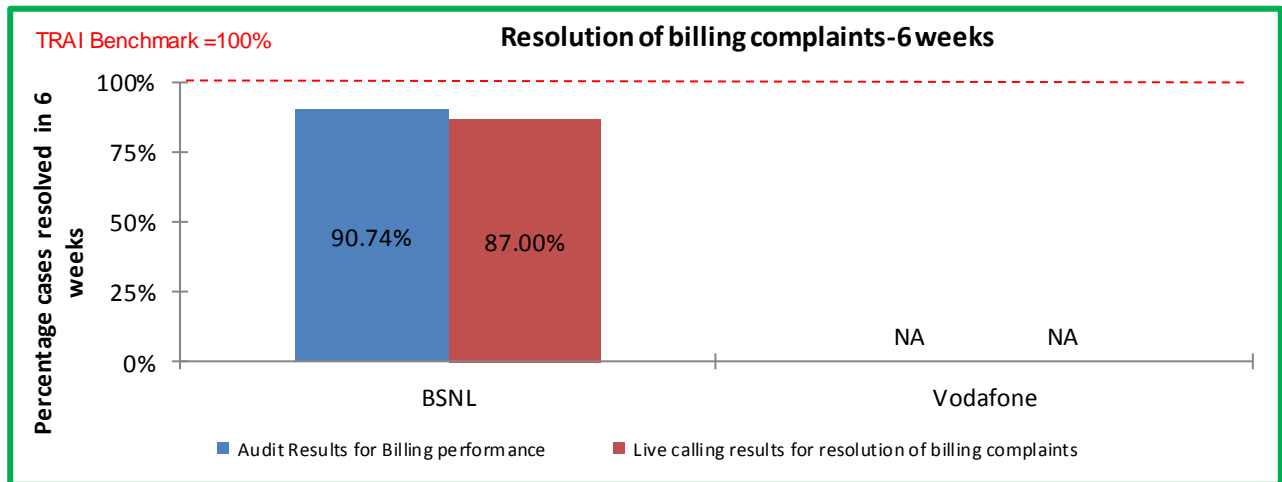
BSNL failed to meet the benchmark for the parameter resolving complaints within 6 weeks as per audit data as well as during live calling.

Live calling for Vodafone was not conducted as there were no complaints reported for the operator in the audit period.

4.2.1.6 COMPUTATION METHODOLOFY - PERIOD OF APPLYING CREDIT WAIVER

This parameter measures whether all refunds in the form of credit/ waiver/ adjustment are made within 7 days from the date of resolution of complaint.

- ⮑ 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:-
    - ‣ Dates of applying credit waiver to all the eligible cases.
    - ‣ Dates of lodging the request for applying credit waiver for all eligible cases

4.3 RESPONSE TIME TO CUSTOMER

4.3.1 PARAMETER EXPLANATION

Following two sub-parameters are covered for this parameter:

- ✤ Accessibility of Call Centre: The percentage of calls getting connected and answered by the call center. Not more than 5% calls shall encounter busy signal, no reply or any other failure in getting connected to the IVR.
- ✤ % age of calls answered by operators (voice to voice) within stipulated time: Not more than 5% calls shall encounter busy signal, no reply or any other failure in getting connected to the call center executive.

4.3.1.1 AUDIT PROCEDURE

- ✤ IMRB auditors collect the data for time taken to connect a customer's call both to the IVR as well as to a customer care executive.
- ✤ All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

Live calling:

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

4.3.1.2 COMPUTATIONAL METHODOLOGY

- ✤ **Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100**

4.3.1.3 BENCHMARK

- ✤ % age of calls getting connected and answered: In 95% of the cases or more.
- ✤ % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

4.3.2 CALLS GETTING CONNECTED AND ANSWERED
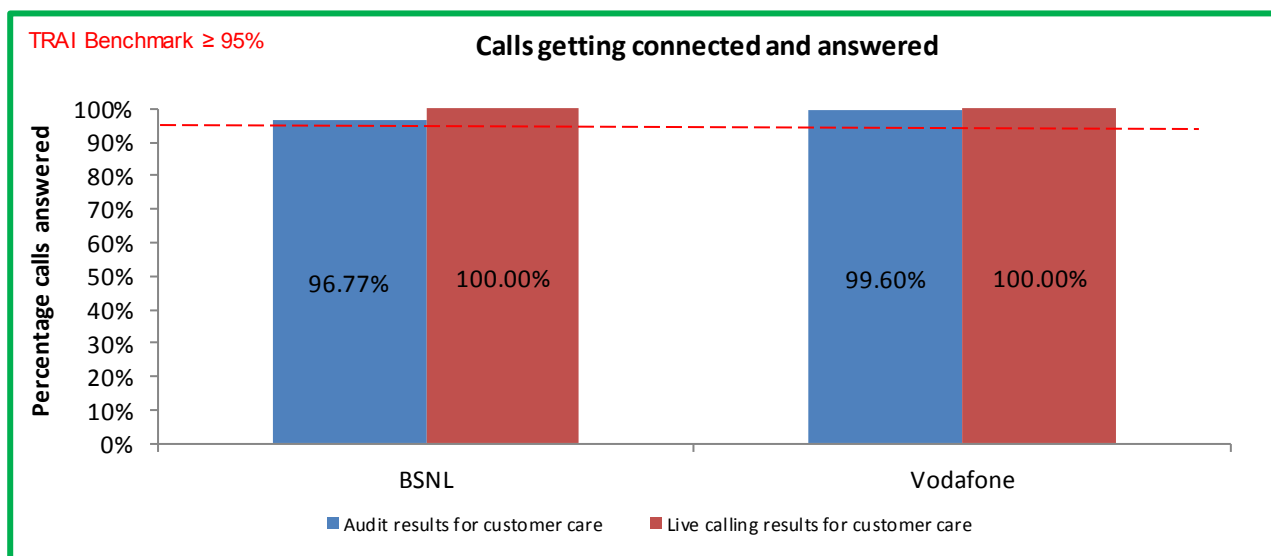
Data Source: Customer Service Center of the operators

BSNL and Vodafone met the TRAI benchmark in terms of number of IVR calls being connected and answered.

4.3.3 CALL ANSWERED BY OPERATOR WITHIN 90 SECONDS
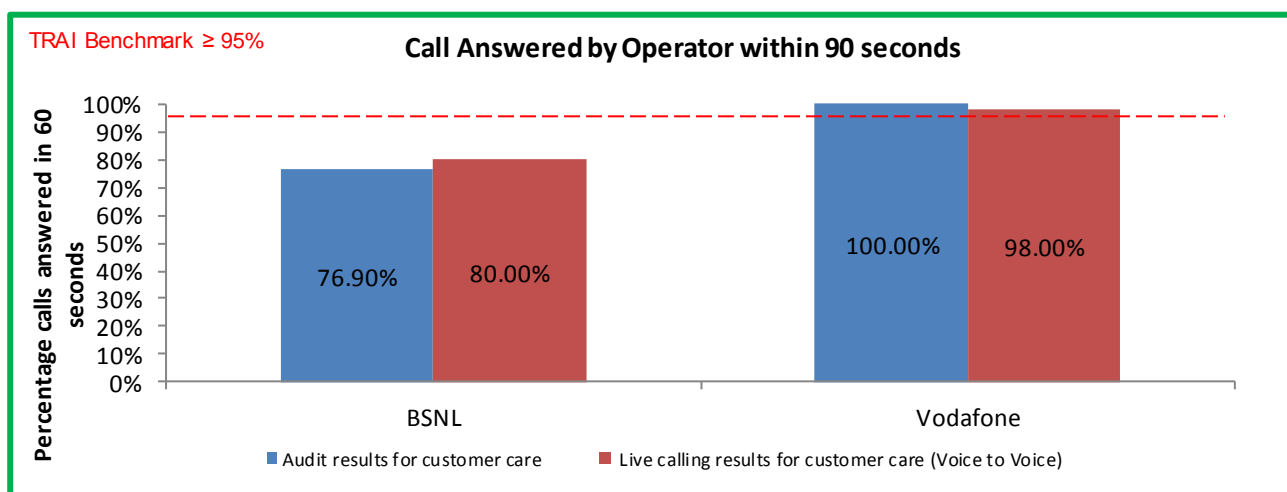
Data Source: Customer Service Center of the operators

The benchmark of getting 95% of voice to voice calls answered within stipulated time of 90 seconds was not met by BSNL during audit as well as live calling.

Vodafone met the benchmark for the parameter during audit as well as during live calling.

4.4 CUSTOMER CARE PROMPTNESS

4.4.1 PARAMETER EXPLANATION

4.4.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to -

Processing of closure request (Following key points were taken care of while verifying the data)

- ✤ The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange.
- ✤ DNP (due to Non – payment) cases are excluded.
- ✤ All holidays are excluded for calculating 7 days.
- ✤ Closure requests attended in the previous months are excluded
- ✤ The period for closure starts from the time of submission of application by the subscriber.

4.4.1.2 BENCHMARK

- ✤ Processing of closure request: Less than 7 days

4.4.2 FINDINGS - CLOSURE REQUEST ATTENDED IN 7 DAYS
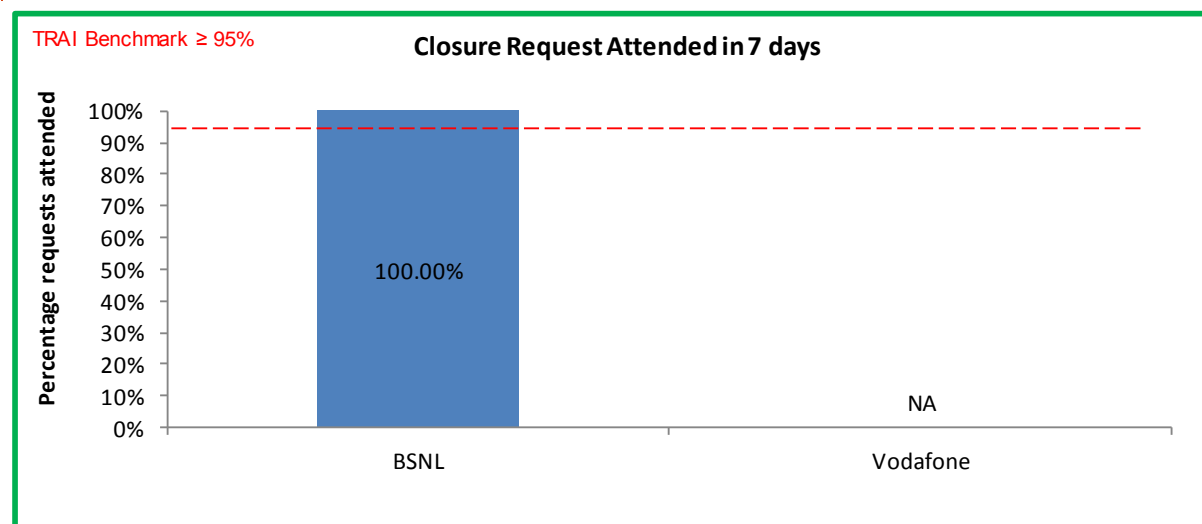
Data Source: Customer Service Center of the operators

BSNL met the benchmark for the parameter.

NA: The parameter is not applicable for Vodafone as there were no closure requests made during the audit period.

4.5 TIME TAKEN TO REFUND DEPOSIT AFTER CLOSURE

4.5.1 PARAMETER EXPLANATION

4.5.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to -

- ✋ Cases requiring refund of deposits after closure are to be included.
- ✋ Time taken starts from the date on which the closure is made by the service provider and ends at the date on which refund is received by the customer

4.5.1.2 COMPUTATIONAL METHODOLOGY

- ✋ **Percentage of cases where refund has been made within stipulated time = (Total no. of cases where refund was made within stipulated time/ Total no. of cases requiring refunds)*100**

4.5.1.3 BENCHMARK

- ✋ Time taken to refund = 100% within 60 days

4.5.2 FINDINGS - REFUND OF DEPOSIT AFTER CLOSURE WITHIN 60 DAYS
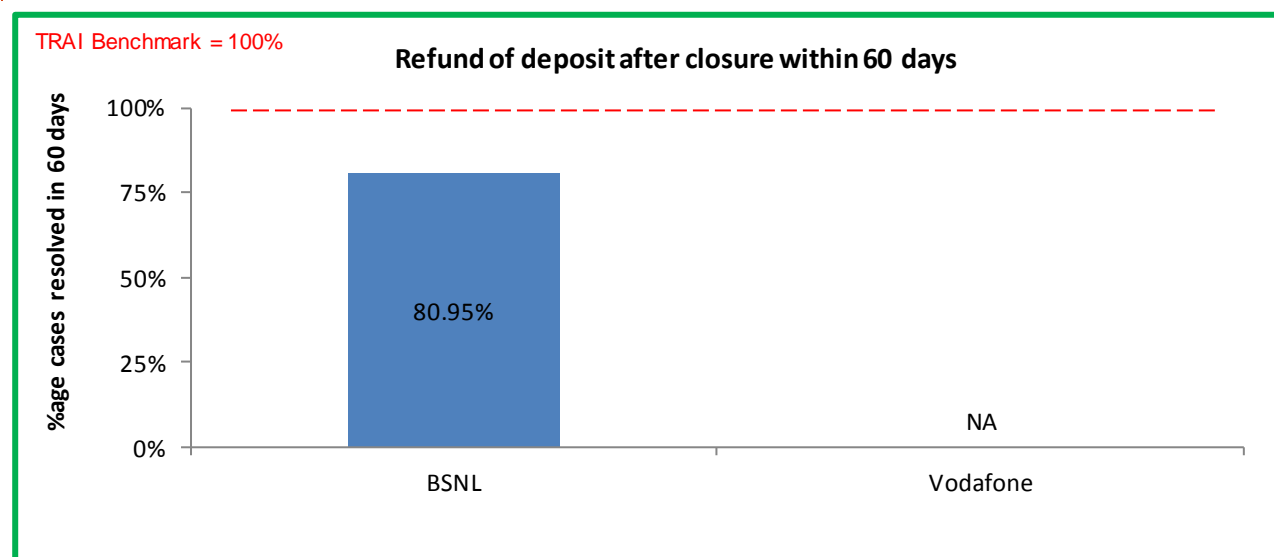
Data Source: Customer Service Center of the operators

BSNL failed to meet the benchmark for the parameter.

NA: Vodafone did not have any closure request during the audit period.

5 ANNEXURE – JFM'15

5.1 FAULT INCIDENCE / CLEARANCE STATISTIC

Audit Results for Fault repair			
Fault incidences	Benchmark	BSNL	Vodafone
Faults incidences (Urban)	≤ 7	3.9	2.5
Fault repair (Urban areas)	Benchmark	BSNL	Vodafone
Total No. of faults registered during the quarter		14452	90
No. of faults repaired by next working day during the quarter		12566	84
Percentage of faults repaired by next working day during the quarter	≥ 85%	86.95%	93.33%
No. of faults repaired within 5 days during the quarter		14452	89
Percentage of faults repaired within 5 days during the quarter	100%	100.00%	98.89%

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

Live calling for fault repair			
Urban area	Benchmark	BSNL	Vodafone
Total Number of calls made		300.00	40.00
Number of cases where faults were repaired by next working day		229.00	40.00
Percentage cases where faults were repaired by next working day	≥ 85%	76.33%	100.00%
Number of cases where faults were repaired within 5 days		267.00	40.00
Percentage cases where faults were repaired within 5 days	100%	89.00%	100.00%
Fault Repair (Rural & Hilly areas)	Benchmark	BSNL	Vodafone
Total Number of calls made		55.00	NA
Number of cases where fauls were repaired by next working day		45.00	NA
Percentage cases where faults were repaired by next working day	≥ 75%	81.82%	NA
Number of cases where faults were repaired within 7 days		49.00	NA
Percentage cases where faults were repaired within 7 days	100%	89.09%	NA

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

NA: Vodafone does not have network presence in rural and hilly areas.

5.2 POI CONGESTION

Audit Results for POI Congestion - Consolidated			
POI congestion	Benchmark	BSNL	Vodafone
Total capacity of all POIs (Average of 3 months)		28062	NA
Served traffic for all POI's (Average of 3 months)		18462	NA
Traffic failed on all POI's (Average of 3 months)	≤ 0.5%	0.00%	NA

POI congestion	Benchmark	BSNL	Vodafone
No. of POIs not meeting benchmark (Avg. of 3 months)		0	NA
Total number of working POIs (Avg. of 3 months)		15	NA

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

Live measurement results for POI congestion			
POI congestion	Benchmark	BSNL	Vodafone
Total capacity of all POIs		28062	NA
Served traffic for all POI's		18462	NA
Traffic failed on all POI's	≤ 0.5%	0.00%	NA

POI congestion	Benchmark	BSNL	Vodafone
No. of POIs not meeting benchmark		0	NA
Total number of working POIs		15	NA

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

NA: In case of POI for Vodafone, there is no direct POI from Wireline MSC. All Calls are getting routed via Inter MSC TGs with GSM MSCs. So, Total number of working POI is not present in the wireline system of Vodafone. The operator system is not equipped to provide the POI data separately for wireline.

5.3 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance			
Billing Performance	Benchmark	BSNL	Vodafone
Billing diputes			
Total bills generated during the quarter		378456	40
Total number of bills disputed		267	0
Percentage bills disputed (Average of 3 billing cycles)	≤ 0.1%	0.07%	0.00%
Resolution of billing complaints			
Total number of billing/charging complaints		270	NA
Total complaints resolved in 4 weeks from date of receipt		245	NA
Percentage complaints resolved within 4 weeks of date of receipt	≥ 98%	90.74%	NA
Total complaints resolved in 6 weeks from date of receipt		269	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	99.63%	NA

Data Source: Billing Center of the operators

NA: Resolution of complaints parameter not applicable for Vodafone as no billing complaints were logged in the audit period for the operator.

Period of applying credit / waiver			
No. of complaints resolved in favour of the customer during the quarter		NA	NA
No. of complaints disposed on account of not considered as valid complaints		NA	NA
Percentage cases in which credit/waiver was received within 1 week	100%	NA	NA
Number of cases resolved in 6 weeks		NA	NA
Percentage cases resolved in 6 weeks	100%	NA	NA

Data Source: Billing Center of the operators

NA: BSNL & Vodafone had no cases where credit/ waiver were required during the audit period.

Live calling results for resolution of billing complaints			
Resolution of billing complaints	Benchmark	BSNL	Vodafone
Total Number of calls made		100.00	NA
Number of cases resolved in 4 weeks		87.00	NA
Percentage cases resolved in 4 weeks	≥ 98%	87.00%	NA
Total complaints resolved in 6 weeks from date of receipt		95.00	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	95.00%	NA

Live calling for Vodafone was not conducted as there were no complaints reported for the operator in the audit period.

5.4 RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE

Audit results for customer care			
Customer Care Assessment	Benchmark	BSNL	Vodafone
Total no. of call attempts to call centre / customer care nos.		14322	27970
No. of calls connected and answered successfully to call centre / customer care nos.		13859	27857
Percentage of calls getting connected and answered electronically	≥ 95%	96.77%	99.60%
Audit results for customer care (voice to voice)			
Total no. of call attempts to call centre / customer care (voice to voice)		11435	27857
No. of calls connected and answered successfully to call centre / customer care nos.		8793	27857
Percentage of calls answered by the operators (voice to voice) within 90 seconds (Avg of 3 months)	≥ 95%	76.90%	100.00%

Data Source: Customer Service Center of the operators

Audit Results for Closure Requests			
Closure Requests	Benchmark	BSNL	Vodafone
Total no. of requests received for Closures		7746	NA
Total no. of requests for closures attended within 7 days		7746	NA
Percentage of requests for closures attended within 7 days	100%	100.00%	NA
Total no. of requests for closures not attended or attended beyond 7 days		0.00	NA

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

5.5 CUSTOMER CARE - PROMPTNESS IN ATTENDING CUSTOMER REQUEST

Audit Results for Closure Requests			
Closure Requests	Benchmark	BSNL	Vodafone
Total no. of requests received for Closures		7746	NA
Total no. of requests for closures attended within 7 days		7746	NA
Percentage of requests for closures attended within 7 days	100%	100.00%	NA
Total no. of requests for closures not attended or attended beyond 7 days		0.00	NA

Data Source: Customer Service Center of the operators

NA: Vodafone did not have any closure request during the audit period.

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5.6 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits			
Refund	Benchmark	BSNL	Vodafone
Total number of cases requiring refund of deposits		210.00	NA
Total number of cases where refund was made within 60 days		170.00	NA
Percentage cases in which refund was receive within 60 days	100%	80.95%	NA

Data Source: Billing Center of the operators

NA: Vodafone did not have any closure request during the audit period.

5.7 LIVE CALLING FOR LEVEL 1 SERVICES

Live calling for level 1 services			
Level 1 services	Benchmark	BSNL	Vodafone
Total no. of calls made		300.00	300.00
Calls answered		218.00	273.00
Percentage of Calls answered	≥ 90%	72.67%	91.00%

Data Source: Live calling conducted by auditors from operator's network

Level 1 Calls made SDCA wise for BSNL

SDCA	Calls Made	Calls Connected
BONGAIGAON TOWN (WEST)	30	19
BARPETA TOWN (WEST)	30	20
JORHAT (EAST)	30	25
MAJULI (EAST)	30	21
GUWAHATI (CENTRAL)	30	25
BIJAY NAGAR (CENTRAL)	30	20
SILCHAR (SOUTH)	30	23
UDARBOND (SOUTH)	30	20
TEZPUR (NORTH)	30	24
RONGAPARA (NORTH)	30	21

BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	18
101	Fire	Y		20	17
102	Ambulance	Y		20	18
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers	Y		20	14
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	13
182	Indian Railway Security Helpline	Y		20	14

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		20	15
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		20	12
1070	Relief Commission for Natural Calamities	Y		20	13
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)		N		
10121	Women Helpline	Y		20	15
10127	National AIDS Helpline to NACO	Y		20	13
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		20	15
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		20	14
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		20	15
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		20	12
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	17
101	Fire	Y		18	17
102	Ambulance	Y		17	17
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers		N		
1412	Public Road Transport Utility Service	Y		17	15
181	Chief Minister Helpline	Y		17	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	16
1037	Public Grievance Cell DoT Hq as 'Telecom	Y		18	16

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	Consumer Grievance Redressal Helpline'				
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		18	15
1064	Anti Corruption Helpline	Y		18	16
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		18	16
1072	Rail Accident Helpline	Y		17	15
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)		N		
10121	Women Helpline	Y		18	18
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling	Y		18	17
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	17
1514	National Career Service(NCS)	Y		17	15
15100	Free Legal Service Helpline	Y		18	15
155304	Municipal Corporations	Y		18	16
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

5.8 EXCHANGE CAPACITY AND SUBSCRIBERS – SAMPLE EXCHANGES

Exchange capacity and Subscribers			
Exchange Capacity & Subscribers		BSNL	Vodafone
Equipped Capacity of the exchange (in erlangs)		568966	NA
Total number of customers served		165359	4789

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

5.9 EXCHANGES SELECTED AS PER SAMPLING PLAN – BSNL

District	BLOCK H/Q	TEHSIL H/Q	SSA	SDCA	AREA
BONGAIGAON	Tapatari	Srijangram	BGN	BGN.	U
BARPETA	Barpeta	Barpeta	BGN	BPT TWN	U
BONGAIGAON	Botiamari	Boitamari	BGN	BGN.	R
BONGAIGAON	Municipalty area	Bongaigaon	BGN	BGN.	U
BONGAIGAON	Municipalty area	Bongaigaon	BGN	BGN.	U
DHUBRI	Chapar	Chapar	BGN	BGN.	R
BONGAIGAON	Dangtol	Bongaigaon	BGN	BGN.	R/T
CHIRANG	Sidli	Sidli Pt-II	BGN	BGN.	U/T
BONGAIGAON	Botiamari	Boitamari	BGN	BGN.	U
BARPETA	Bhabanipur	Sarupeta	BGN	BPT TWN	R
BARPETA	Mondia	Barpeta	BGN	BPT TWN	R
BONGAIGAON	Municipalty area	Bongaigaon	BGN	BGN.	U
BARPETA	Sarukhetri	Barpeta	BGN	BPT TWN	U
BARPETA	Gumaphulbari	Chenga	BGN	BPT TWN	R
BARPETA	Barpeta	Barpeta	BGN	BPT TWN	R
JORHAT	JRT (Central)	JRT (East)	JORHAT	JRT.	R
JORHAT	Majuli	Majuli (Garmur)	JORHAT	MAJULI	R
JORHAT	Bagchung	Titabor	JORHAT	JRT.	R
JORHAT	Bagchung	JRT (East)	JORHAT	JRT.	U
JORHAT	Titabor	Titabor	JORHAT	JRT.	R
GOLAGHAT	JTR (West)	JRT (West)	JORHAT	JRT.	U
JORHAT	Majuli	Majuli (Garmur)	JORHAT	MAJULI	R
JORHAT	JRT (Central)	JRT (East)	JORHAT	JRT.	R
JORHAT	Bagchung	JRT (East)	JORHAT	JRT.	R
JORHAT	Ujanimajuli	Majuli	JORHAT	MAJULI	R/T
JORHAT	Kaliapani	Teok	JORHAT	JRT.	R
JORHAT	Majuli	Majuli (Garmur)	JORHAT	MAJULI	R
JORHAT	JRT (Central)	JRT (East)	JORHAT	JRT.	U
JORHAT	Bagchung	JRT (East)	JORHAT	JRT.	U
JORHAT	JRT (Central)	JRT (East)	JORHAT	JRT.	U
JORHAT	JRT (Central)	JRT (East)	JORHAT	JRT.	U
GOLAGHAT	N.Blk Dergaon	Dergaon R/Circle	JORHAT	JRT.	R
JORHAT	Bagchung	JRT (East)	JORHAT	JRT.	R
JORHAT	Ujani Majuli	Majuli	JORHAT	MAJULI	R/T
JORHAT	Ujanimajuli	Majuli	JORHAT	MAJULI	R
JORHAT	Jorhat Bagchung	JRT (West)	JORHAT	JRT.	U
JORHAT	Gaurisagar	Sibsagar	JORHAT	JRT.	R
JORHAT	Kaliapani	Teok	JORHAT	JRT.	R
JORHAT	Bagehing	JRT (West)	JORHAT	JRT.	R
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-R		North Guwahati	KMR	GHY	R
KAMRUP-R	Soalkuchi	Hajo	KMR	GHY	R

KAMRUP		Dispur	KMR	GHY	U
KAMRUP-R	Boko	Boko	KMR	BJNGR	R
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP	Boko	Boko	KMR	BJNGR	R/T
KAMRUP-R	Boko	Boko	KMR	BJNGR	R
KAMRUP		Azara	KMR	GHY	U
KAMRUP	Chandrapur	Chandrapur	KMR	GHY	R/T
KAMRUP-R	Chaygaon	Chaygaon	KMR	BJNGR	R/T
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-R	Soalkuchi	Hajo	KMR	GHY	R
KAMRUP-R	Soalkuchi	Hajo	KMR	GHY	R
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-R	Hajo	Hajo	KMR	GHY	R
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U	Dimoria	Dispur	KMR	GHY	R/T
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-R	Boko	Boko	KMR	BJNGR	R
KAMRUP-R	Rampur	Nagarbera	KMR	BJNGR	R
KAMRUP-R		North Guwahati	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-U	Chandrapur	Chandrapur	KMR	GHY	R
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-R	Rampur	Nagarbera	KMR	BJNGR	R
KAMRUP-R	Rani	Boko	KMR	GHY	R
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-U		Dispur	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-R	Boko	Boko	KMR	BJNGR	R
KAMRUP-U	Dimoria	Sonapur	KMR	GHY	R/T
KAMRUP-R	Soalkuchi	Hajo	KMR	GHY	U
KAMRUP-U		Guwahati Sadar	KMR	GHY	U
KAMRUP-U		Dispur	KMR	GHY	U
CHACHAR	Silchar	Silchar	Silchar	SC.	U
CHACHAR	Borkhola	Borkhola	Silchar	SC.	R
CHACHAR	Baskandi	Lakhipur	Silchar	UDRBND	R
CHACHAR	Sonai	Sonai	Silchar	SC.	R
CHACHAR	Baskandi	Lakhipur	Silchar	UDRBND	R
CHACHAR	Kalain	Kathigora	Silchar	SC.	R
CHACHAR	Salchapra	Borkhola	Silchar	SC.	R
CHACHAR	Borkhola	Borkhola	Silchar	SC.	R
CHACHAR	Borkhola	Borkhola	Silchar	UDRBND	R
CHACHAR	Barjalenga	Silchar	Silchar	SC.	R
CHACHAR	Rajabazar	Lakhipur	Silchar	UDRBND	R
CHACHAR	Narsingpur	Sonai	Silchar	SC.	R
CHACHAR	Barjalenga	Silchar	Silchar	SC.	R
CHACHAR	Barjalenga	Silchar	Silchar	SC.	R
CHACHAR	Kathigora	Kathigora	Silchar	SC.	R
CHACHAR	Kalain	Kathigora	Silchar	SC.	R
CHACHAR	Rajabazar	Lakhipur	Silchar	UDRBND	R

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CHACHAR	Borkhola	Borkhola	Silchar	UDRBND	R
CHACHAR	Narashingpur	Sonai	Silchar	SC.	R
CHACHAR	Kalain	Kathigora	Silchar	SC.	R
CHACHAR	Borkhola	Borkhola	Silchar	SC.	R
CHACHAR	Lakhipur	Lakhipur	Silchar	UDRBND	R
CHACHAR	Kalain	Kathigora	Silchar	SC.	R
CHACHAR	Binakandi	Lakhipur	Silchar	SC.	R
CHACHAR	Udarband	Udarbond	Silchar	UDRBND	R
CHACHAR	Narashingpur	Sonai	Silchar	SC.	R
CHACHAR	Katigora	Katigora	Silchar	SC.	R
CHACHAR	Udarband	Udarband	Silchar	SC.	R
CHACHAR	Lakhipur	Lakhipur	Silchar	UDRBND	U
CHACHAR	Borkhola	Borkhola	Silchar	UDRBND	R
CHACHAR	Sonai	Sonai	Silchar	SC.	U
CHACHAR	Polonghat	Sonai	Silchar	SC.	R
CHACHAR	Silchar	Silchar	Silchar	SC.	U
CHACHAR	Narsingpur	Sonai	Silchar	SC.	R
CHACHAR	Lakhipur	Lakhipur	Silchar	UDRBND	R
CHACHAR	Polonghat	Sonai	Silchar	SC.	R
CHACHAR	Rajabazar	Lakhipur	Silchar	UDRBND	R
CHACHAR	Salchapra	Borkhola	Silchar	SC.	R
CHACHAR	Silchar	Silchar	Silchar	SC.	U
CHACHAR	Silchar	Silchar	Silchar	SC.	U
CHACHAR	Salchapra	Borkhola	Silchar	SC.	R
CHACHAR	Udarband	Udarbond	Silchar	UDRBND	R
CHACHAR	Binakandi	Lakhipur	Silchar	SC.	R
CHACHAR	Barjalenga	Silchar	Silchar	SC.	R
CHACHAR	Binakandi	Lakhipur	Silchar	UDRBND	R
CHACHAR	Sonai	Sonai	Silchar	SC.	R
CHACHAR	Borkhola	Borkhola	Silchar	SC.	U
CHACHAR	Sonai	Sonai	Silchar	SC.	R
CHACHAR	Salchapra	Silchar	Silchar	SC.	R
CHACHAR	Sonai	Sonai	Silchar	SC.	R
CHACHAR			Silchar	SC.	U
CHACHAR	Udarband	Udarbond	Silchar	UDRBND	U
SONITPUR	Balipara	Chariduar	TZP	RNGPRA	R
SONITPUR	Bihaguri	Tezpur	TZP	TZ.	R
SONITPUR	Borsola	Dhekiajuli	TZP	TZ.	R/T
SONITPUR	Dhekiajuli	Dhekiajuli	TZP	TZ.	U
SONITPUR	Gabharu	Tezpur	TZP	TZ.	U
DHEMAJI	Bordoloni	Gogamukh	TZP	TZ.	R
SONITPUR	Balipara	Tezpur	TZP	TZ.	U
SONITPUR	Balipara	Chariduar	TZP	TZ.	U
SONITPUR	Gabharu	Tezpur	TZP	TZ.	U
SONITPUR	Balipara	Chariduar	TZP	RNGPRA	R
SONITPUR	Dhekiajuli	Dhekiajuli	TZP	RNGPRA	R
SONITPUR	Gabharu	Tezpur	TZP	TZ.	U
SONITPUR	Dhekiajuli	Dhekiajuli	TZP	TZ.	R
SONITPUR	Balipara	Chariduar	TZP	TZ.	U
SONITPUR	Gabharu	Tezpur	TZP	TZ.	U
SONITPUR	Balipara	Chariduar	TZP	RNGPRA	U
SONITPUR	Borsola	Dhekiajuli	TZP	TZ.	R
SONITPUR	Borsola	Dhekiajuli	TZP	TZ.	R
SONITPUR	Gabharu	Thelamara	TZP	TZ.	R/T

5.10 ABBREVIATIONS

The following terms/abbreviations have been commonly 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. JFM'15 – Refers to the quarter of January, February and March 2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. NOC – Network Operation Center
6. OMC – Operations and Maintenance Center
7. SDCA – Short Distance Charging Area
8. PMR – Performance Monitoring Reports
9. MTTR - Mean Time to Repair faults
10. TCBH – Time Consistent Busy Hour
11. NA – Not Applicable
12. NC – Non Compliance
13. POI – Point of Interconnection
14. IVR – Interactive Voice Response
15. DEL – Direct Exchange Line
16. STD – Standard Trunk Dialing
17. ISD – International Subscriber Dialing

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