TRAI Audit Wireless Report for West Bengal Circle

EAST ZONE

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Submitted to:

TRAI
Telecom Regulatory Authority of India

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated 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

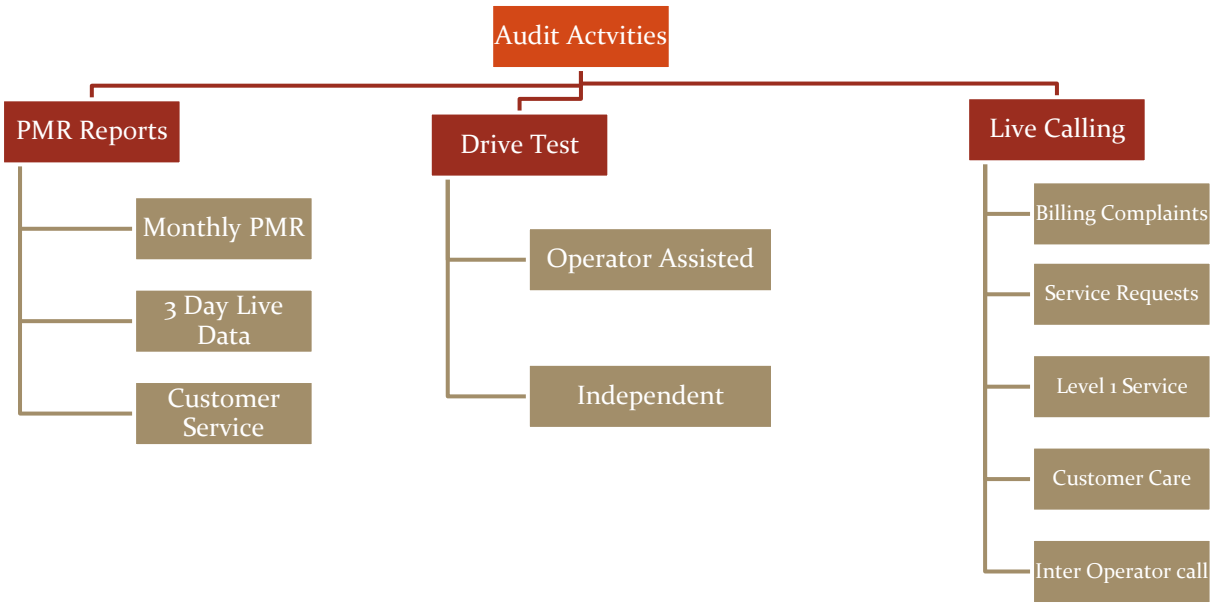
The primary objective of the Audit module is to-

- 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 West Bengal circle.

2.3 COVERAGE

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

2.4 FRAMEWORK USED

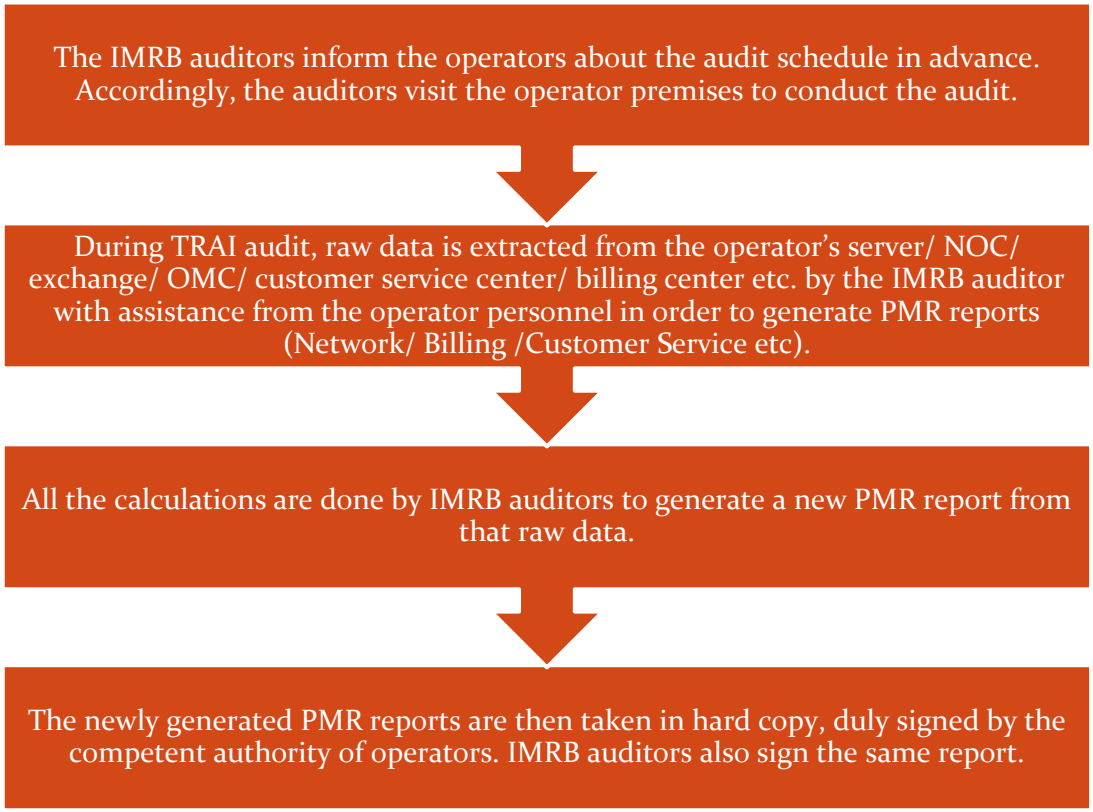


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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 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, October 2015 audit data was collected in the month of November 2015.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending December 2015 (OND'15) 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 October, November and December 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 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 October, November and December 2015. 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% 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-

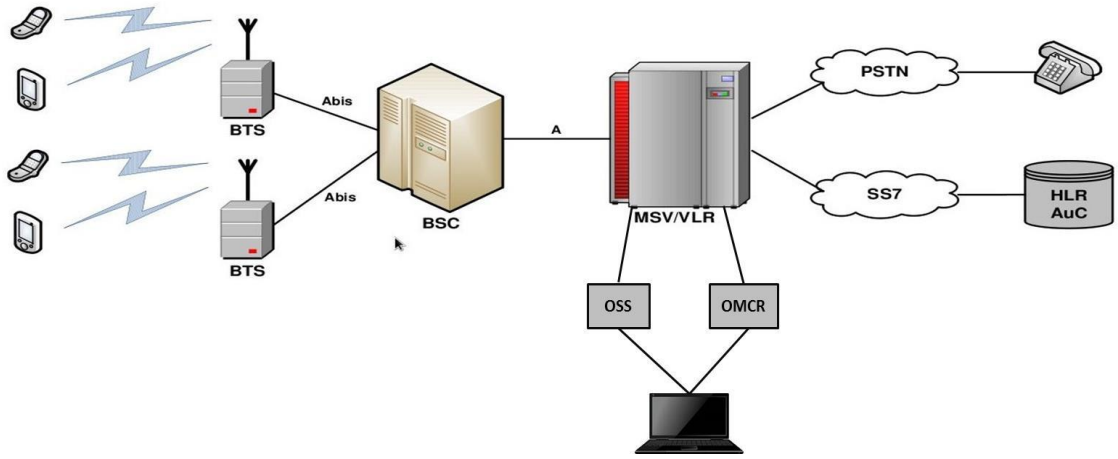
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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%

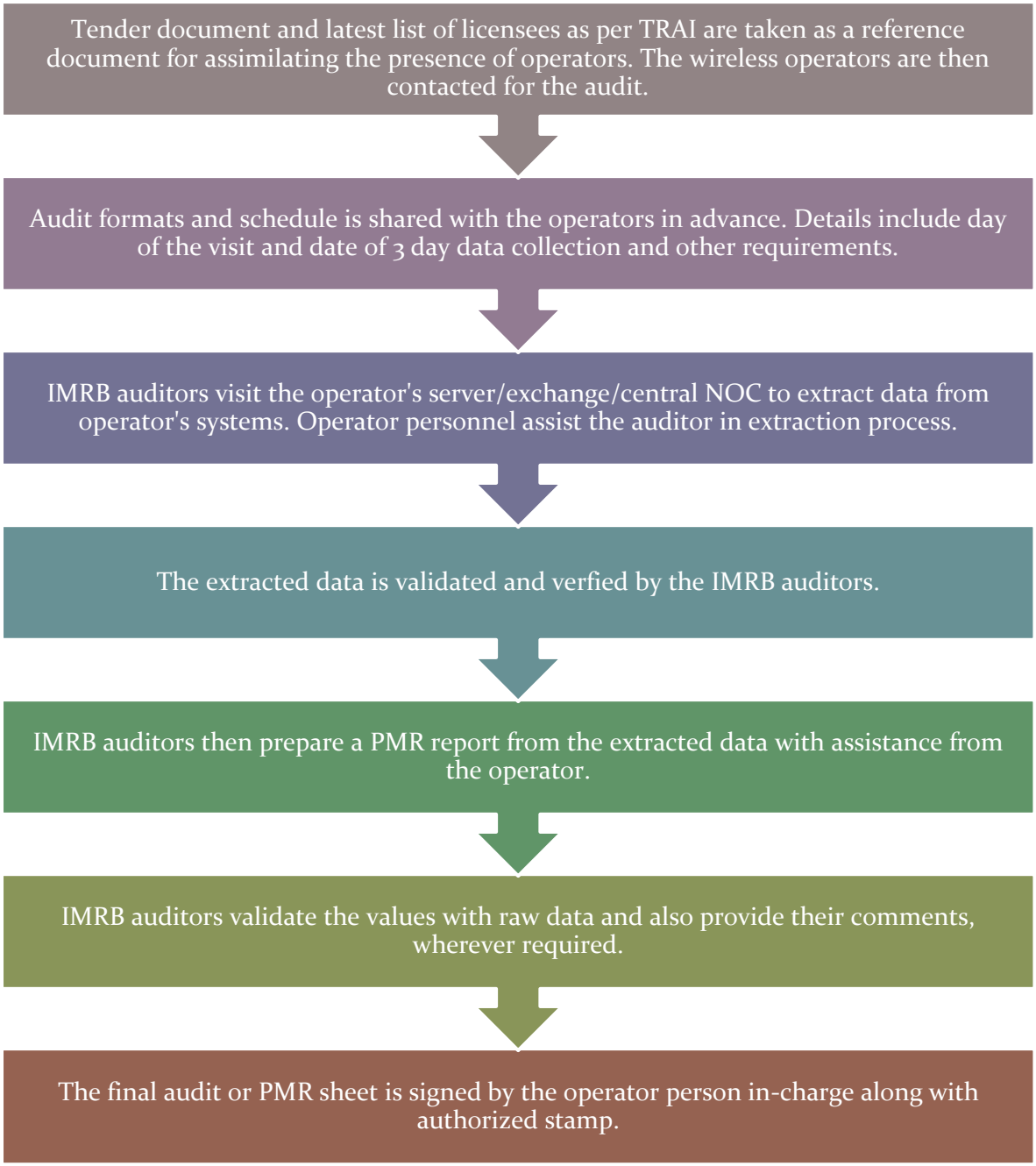
2.4.1.8 POINT OF DATA EXTRACTION

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.



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% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

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

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.

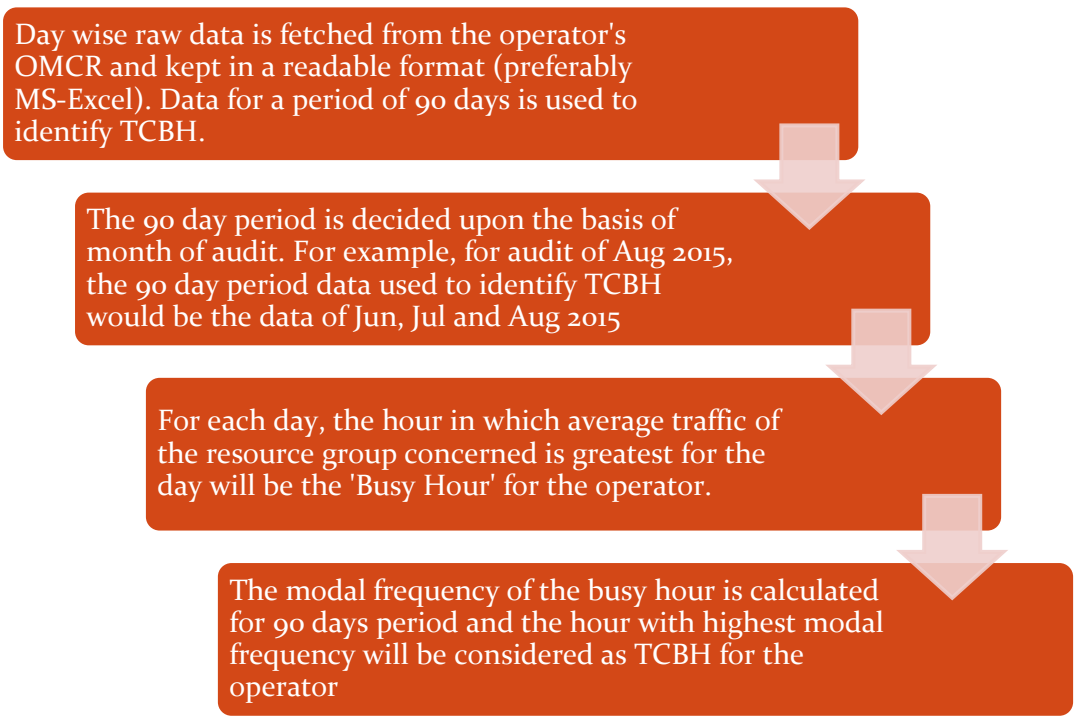
Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar 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.

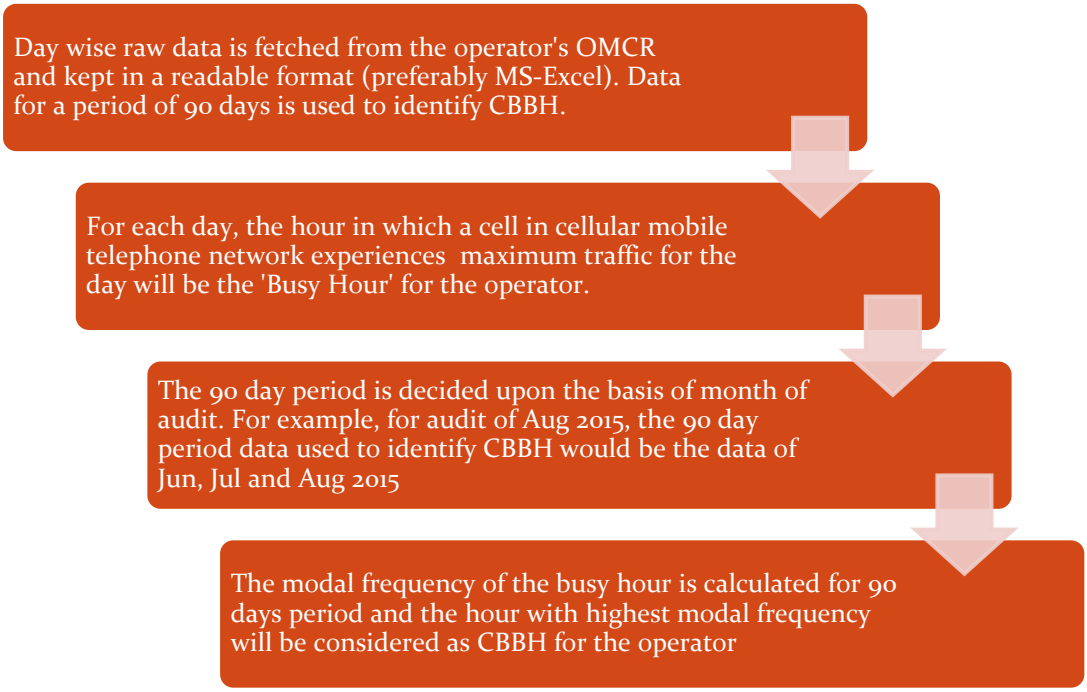
Step by step procedure to identify TCBH for an operator:



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:



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 December 2015 (OND'15) 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%

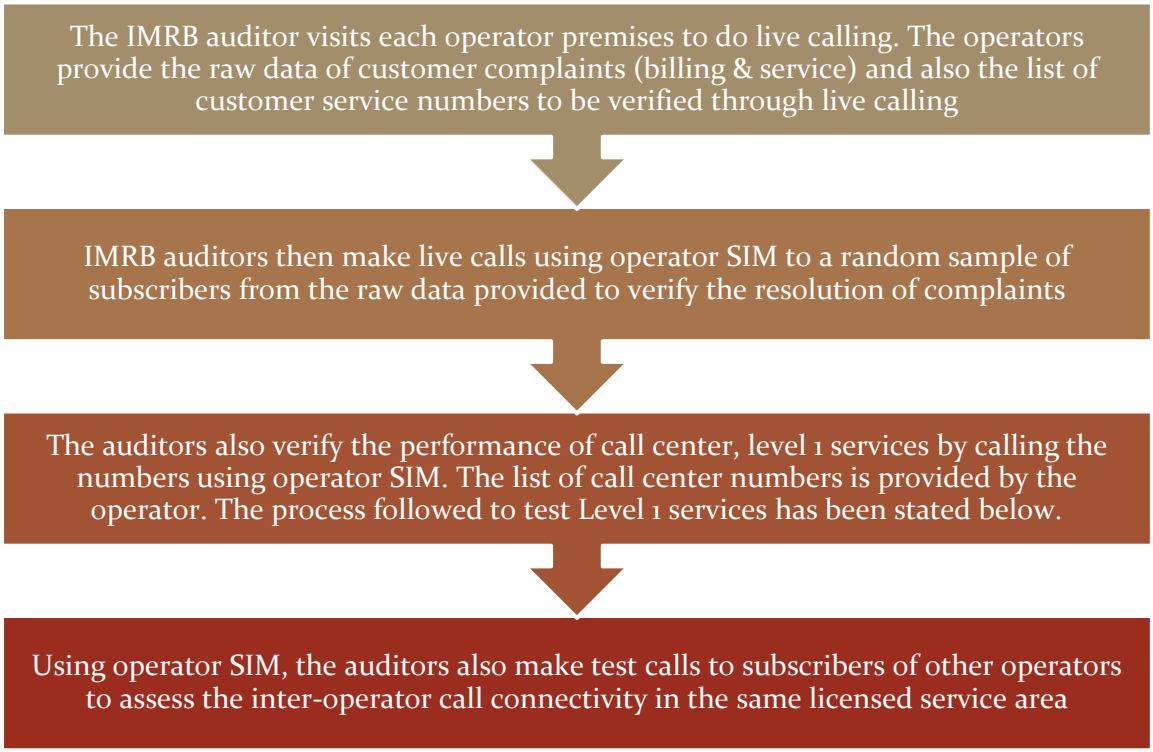
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

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.



Live calling activity was carried out during the period of December 2015. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of November 2015 was considered for live calling activity conducted in December 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th 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 OND'15, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

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

2.4.2.5 CUSTOMER CARE

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

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

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

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 in each quarter, at least 1 SSA in each month it may be more 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-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 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-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 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)
  - ✓ Total RxQual Samples– A
  - ✓ RxQual samples with 0-5 value – B
  - ✓ %age samples with good voice quality = B/A x 100
- Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]
- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 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.

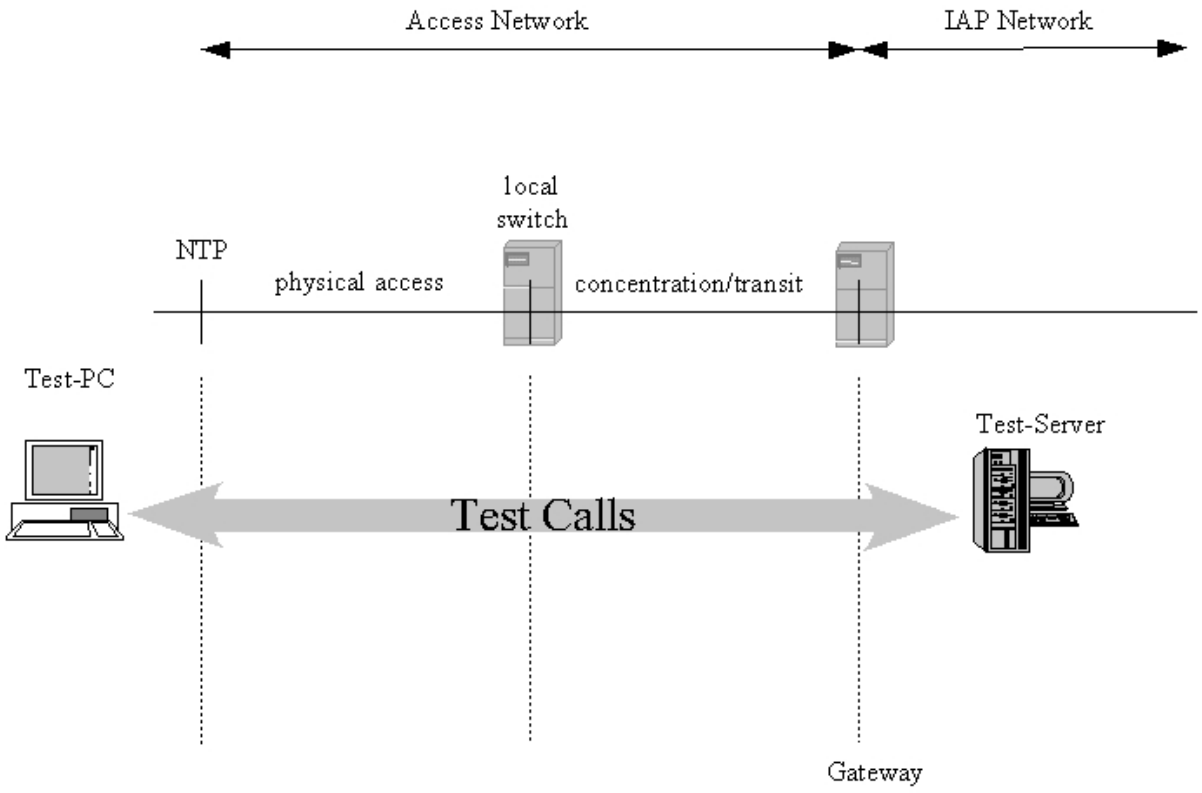


Figure for Measurement set-up

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:

- Maximum Segment Size between 1380 Bytes and 1460 Bytes.
- TCP RX Window Size > 4096 Bytes
- SACK (Selective Acknowledgement) enabled.
- TCP Fast Retransmit.
- TCP Fast Recovery enabled.
- 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

Data Drive Test		
	Parameter	**Benchmarks**
Download Attempts		
	Successful data transmission download attempts	>80%
Upload Attempts		
	Successful data transmission upload attempts	>75%
Download Speed		
	Minimum download speed	To be measured for each plan by the service provider and reported to TRAI
Throughtput Packet		
	Average Throughput for Packet data	>75% of the Subscribed speed.
Latency		
	Latency	Data <250ms

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 =

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

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 = $\frac{\text{Total Successful upload attempts}}{\text{Total upload attempts}} \times 100$

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) =

$$\frac{\text{Download speed (A1+A2+A3+A4+A5+A6)}}{6} \times 100$$

Note- A1, A2, A3, A4 A5 & A6 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) =

$$\frac{\text{Total number of successful ping}}{\text{Total number of ping sent to the Test Server}} \times 100$$

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	3311543
Airtel	13646712
BSNL	1209959
Idea	5534064
MTS	959570
Reliance CDMA	770757
Reliance GSM	Service Closed
TATA CDMA	2647
TATA GSM	236922
Vodafone	16938976
Name of Operator	**Number of Subscriber as per VLR-3G**
Aircel	152980
Airtel	NDR
BSNL	50114
Vodafone	730026

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY-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 West Bengal circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

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	0.88%	4.50%	97.41%	0.47%	0.95%	1.17%	12.00%	96.62%
Airtel	0.08%	0.18%	96.29%	0.43%	1.26%	1.27%	2.64%	95.72%
BSNL	3.41%	21.16%	98.28%	2.19%	1.33%	0.85%	23.10%	95.07%
Idea	0.04%	0.19%	98.34%	0.05%	0.16%	0.47%	0.51%	96.93%
MTS	0.12%	0.00%	99.64%	NA	0.08%	0.67%	2.13%	99.84%
Reliance CDMA	0.12%	0.37%	98.09%	NA	0.53%	0.13%	0.96%	98.93%
Reliance GSM	7.36%	0.30%	96.65%	0.52%	0.59%	0.00%	0.73%	97.89%
TATA CDMA	0.02%	0.00%	99.42%	NA	0.00%	0.26%	1.45%	98.13%
TATA GSM	0.03%	0.00%	98.75%	0.03%	0.10%	0.53%	2.85%	97.80%
Vodafone	0.05%	0.11%	99.30%	0.49%	0.70%	0.74%	2.42%	95.87%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

Reliance GSM data reported only for October 2015 & November 2015 and also Reliance GSM service is closed in west Bengal circle.

Following are the parameter wise observations for wireless operators for West Bengal circle:

BTSs Accumulated Downtime:

Reliance GSM and BSNL did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for TATA CDMA at 0.02%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for MTS and TATA CDMA & GSM at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.64%.

SDCCH/ Paging Chl. Congestion:

BSNL failed to meet the benchmark on SDCCH / Paging Channel Congestion, in which best performance was TATA GSM with 0.03%.

TCH Congestion:

All operators met the benchmark for TCH congestion, in which best performance was TATA CDMA with 0.00%.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM at 0.62%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL failed to meet the benchmark. Best performance was recorded for Idea at 0.51%.

Voice Quality

All operators meet the benchmark. Best performance was recorded for MTS at 99.83%.

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

3.1.1 PMR DATA - OCTOBER FOR 2G

Name of Service Provider Month October	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	1.06%	5.68%	97.46%	0.45%	0.95%	1.26%	12.85%	96.45%
Airtel	0.07%	0.12%	95.90%	0.38%	1.16%	1.29%	2.60%	95.71%
BSNL	2.60%	18.15%	97.86%	2.56%	1.72%	0.85%	24.27%	95.06%
Idea	0.05%	0.27%	99.22%	0.05%	0.11%	0.44%	0.67%	96.89%
MTS	0.15%	0.00%	99.38%	0.00%	0.11%	0.72%	2.37%	99.82%
Reliance CDMA	0.12%	0.37%	98.09%	0.00%	0.53%	0.13%	0.99%	98.92%
Reliance GSM	4.74%	0.44%	96.62%	0.03%	0.40%	0.13%	0.69%	97.88%
TATA CDMA	0.01%	0.00%	99.37%	0.00%	0.00%	0.31%	1.32%	98.12%
TATA GSM	0.04%	0.00%	98.91%	0.06%	0.23%	0.53%	3.01%	97.69%
Vodafone	0.06%	0.31%	99.67%	0.11%	0.33%	0.79%	2.47%	97.00%

3.1.2 PMR DATA – NOVEMBER FOR 2G

Name of Service Provider Month November	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	0.81%	3.69%	97.42%	0.37%	0.87%	1.20%	11.92%	96.54%
Airtel	0.09%	0.26%	96.47%	0.39%	1.17%	1.30%	2.67%	95.72%
BSNL	1.75%	11.01%	98.58%	2.20%	1.05%	0.88%	23.02%	95.07%
Idea	0.02%	0.09%	99.07%	0.05%	0.16%	0.51%	0.50%	96.67%
MTS	0.12%	0.00%	99.77%	NA	0.06%	0.67%	2.13%	99.88%
Reliance CDMA	0.12%	0.37%	98.09%	NA	0.53%	0.13%	0.92%	98.92%
Reliance GSM	10.33%	0.16%	96.69%	1.00%	0.77%	0.00%	0.76%	97.91%
TATA CDMA	0.03%	0.00%	99.44%	NA	0.00%	0.22%	1.58%	98.15%
TATA GSM	0.03%	0.00%	98.17%	0.01%	0.05%	0.50%	2.61%	97.82%
Vodafone	0.04%	0.00%	99.38%	0.47%	0.62%	0.78%	2.73%	95.29%

3.1.3 PMR DATA - DECEMBER FOR 2G

Name of Service Provider Month December	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	0.81%	4.15%	97.37%	0.58%	1.04%	1.06%	11.26%	96.87%
Airtel	0.07%	0.15%	96.51%	0.52%	1.45%	1.24%	2.65%	95.74%
BSNL	5.94%	34.33%	98.40%	1.82%	1.22%	0.84%	22.04%	95.09%
Idea	0.05%	0.20%	96.73%	0.05%	0.20%	0.46%	0.37%	97.22%
MTS	0.11%	0.00%	99.78%	0.00%	0.08%	0.60%	1.89%	99.83%
Reliance CDMA	0.12%	0.37%	98.09%	0.00%	0.53%	0.13%	0.96%	98.95%
Reliance GSM	Service closed	Service closed	Service closed	Service closed	Service closed	Service closed	Service closed	Service closed
TATA CDMA	0.00%	0.00%	99.45%	0.00%	0.01%	0.23%	1.45%	98.10%
TATA GSM	0.02%	0.00%	99.16%	0.01%	0.03%	0.54%	2.92%	97.87%
Vodafone	0.05%	0.15%	98.85%	0.89%	1.15%	0.70%	2.10%	96.18%

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	0.90%	0.51%	98.06%	0.42%	0.42%	1.02%	11.46%	97.15%
Airtel	0.07%	0.00%	95.59%	0.44%	0.71%	1.25%	2.75%	95.66%
BSNL	2.04%	1.72%	98.04%	2.18%	1.55%	0.88%	19.45%	95.13%
Idea	0.05%	0.04%	98.20%	0.02%	0.06%	0.34%	0.08%	97.67%
MTS	0.17%	0.00%	99.81%	NA	0.05%	0.49%	0.09%	99.46%
Reliance CDMA	0.07%	0.00%	97.03%	NA	1.17%	0.24%	0.53%	99.21%
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.00%	0.00%	99.37%	NA	0.00%	0.24%	1.53%	98.11%
TATA GSM	0.00%	0.00%	99.31%	0.00%	0.02%	0.51%	2.93%	98.02%
Vodafone	0.05%	0.01%	99.70%	0.33%	0.33%	0.57%	2.29%	97.07%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

Reliance CDMA and Reliance GSM had there sever issue so we could not able to conducted the audit for all the 3 months same is intimated to TRAI by the operator.

Reliance GSM service is closed in West Bengal circle.

BTSs Accumulated Downtime:

BSNL did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for TATA GSM & CDMA at 0.00%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel, MTS, Reliance GSM & CDMA and TATA GSM & CDMA at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.81%.

SDCCH/ Paging Chl. Congestion:

BSNL did not meet the benchmark for SDCCH / Paging Channel Congestion, while MTS, Reliance CDMA and TATA CDMA recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All operators met the benchmark for TCH congestion, while TATA CDMA performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDMA and TATA CDMA at 0.24%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL failed to meet the benchmark. Best performance was recorded for Idea at 0.08%.

Voice Quality

All operators met the benchmark. Best performance was recorded for MTS at 99.52%.

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 - OCTOBER FOR 2G

Name of Service Provider 3 Day October	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	0.91%	0.56%	98.07%	0.28%	0.42%	1.08%	11.59%	96.99%
Airtel	0.08%	0.00%	95.95%	0.38%	0.38%	1.32%	2.78%	95.65%
BSNL	1.48%	1.45%	97.46%	2.62%	2.17%	0.85%	19.68%	95.23%
Idea	0.04%	0.02%	99.52%	0.02%	0.05%	0.35%	0.09%	97.46%
MTS	0.13%	0.00%	99.86%	0.00%	0.01%	0.52%	0.09%	99.53%
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.00%	0.00%	99.28%	0.00%	0.00%	0.23%	2.63%	98.16%
TATA GSM	0.01%	0.00%	99.29%	0.00%	0.04%	0.51%	3.27%	97.96%
Vodafone	0.07%	0.08%	99.76%	0.03%	0.24%	0.73%	2.78%	97.36%

3.2.2 3 DAY DATA – NOVEMBER FOR 2G

Name of Service Provider 3 Day November	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	0.86%	0.43%	97.92%	0.20%	0.44%	1.02%	11.16%	97.05%
Airtel	0.07%	0.00%	95.44%	0.35%	0.40%	1.21%	2.75%	95.64%
BSNL	2.11%	1.77%	98.29%	3.02%	1.45%	0.97%	20.29%	95.11%
Idea	0.04%	0.04%	99.62%	0.02%	0.08%	0.31%	0.07%	97.63%
MTS	0.20%	0.00%	99.75%	NA	0.08%	0.52%	0.10%	99.36%
Reliance CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.00%	0.00%	99.30%	NA	0.00%	0.25%	1.92%	98.09%
TATA GSM	0.00%	0.00%	99.33%	0.01%	0.02%	0.49%	2.91%	98.04%
Vodafone	0.03%	0.00%	99.89%	0.31%	0.21%	0.59%	2.80%	96.51%

3.2.3 3 DAY DATA - DECEMBER FOR 2G

Name of Service Provider 3 Day December	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	0.94%	0.53%	98.19%	0.77%	0.41%	0.95%	11.62%	97.45%
Airtel	0.06%	0.00%	95.38%	0.58%	1.36%	1.23%	2.73%	95.70%
BSNL	2.52%	1.94%	98.36%	0.90%	1.03%	0.83%	18.38%	95.04%
Idea	0.06%	0.04%	95.46%	0.03%	0.05%	0.36%	0.08%	97.91%
MTS	0.18%	0.00%	99.84%	0.00%	0.05%	0.42%	0.08%	99.50%
Reliance CDMA	0.07%	0.00%	97.03%	0.00%	1.17%	0.24%	0.53%	99.21%
Reliance GSM	Service closed	Service closed	Service closed	Service closed	Service closed	Service closed	Service closed	Service closed
TATA CDMA	0.00%	0.00%	99.51%	0.00%	0.00%	0.22%	0.04%	98.09%
TATA GSM	0.00%	0.00%	99.33%	0.01%	0.00%	0.53%	2.60%	98.07%
Vodafone	0.05%	0.00%	99.45%	0.65%	0.55%	0.51%	1.63%	97.50%

3.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

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	0.63%	2.85%	98.58%	0.23%	0.39%	0.31%	3.83%	99.46%
BSNL	3.53%	20.35%	95.50%	0.60%	1.27%	1.65%	14.56%	NDR
Vodafone	0.04%	0.06%	99.79%	0.05%	0.09%	0.38%	2.29%	98.96%

Following are the parameter wise observations for wireless operators for West Bengal circle:

Node Bs downtime:

BSNL did not meet the benchmark. Minimum Node Bs downtime was recorded for Vodafone at 0.04%.

Worst affected Node Bs due to downtime:

Aircel and BSNL failed to meet the benchmark. Minimum worst affected Node Bs due to downtime was recorded for Vodafone at 0.06%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.79%.

RRC Congestion:

All operators met the benchmark for RRC congestion. The maximum RRC congestion was observed for Vodafone with 0.05%.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB congestion. The maximum Circuit Switched RAB congestion was observed for Vodafone with 0.09%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Aircel at 0.31%.

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

Aircel and BSNL failed to meet the benchmark. Best performance was recorded for Vodafone at 2.29%.

Circuit Switch Voice Quality:

All operators met the benchmark. Best performance was recorded for Aircel at 99.46%.

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 - OCTOBER FOR 3G

Name of Service Provider Month October	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 voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.87%	4.29%	99.25%	0.17%	0.13%	0.27%	3.47%	98.90%
BSNL	2.49%	12.72%	94.33%	1.13%	0.37%	1.80%	12.51%	NDR
Vodafone	0.04%	0.15%	99.99%	0.01%	0.15%	0.32%	2.14%	99.01%

3.3.2 PMR DATA – NOVEMBER FOR 3G

Name of Service Provider Month November	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 voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.37%	1.71%	98.70%	0.24%	0.21%	0.23%	3.05%	98.91%
BSNL	1.41%	7.63%	96.25%	0.33%	0.50%	1.51%	15.74%	NDR
Vodafone	0.04%	0.00%	99.67%	0.07%	0.06%	0.46%	2.42%	98.94%

3.3.3 PMR DATA - DECEMBER FOR 3G

Name of Service Provider Month December	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	0.65%	2.61%	97.79%	0.28%	0.82%	0.39%	4.87%	99.98%
BSNL	6.74%	40.70%	95.92%	0.35%	2.93%	1.60%	15.42%	NDR
Vodafone	0.03%	0.04%	99.72%	0.07%	0.05%	0.38%	2.30%	98.95%

3.4 3 DAYS 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	0.52%	0.19%	98.77%	0.27%	0.35%	0.35%	4.42%	49.55%
BSNL	2.94%	2.97%	95.64%	0.41%	1.50%	1.63%	10.70%	NDR
Vodafone	0.06%	0.03%	99.83%	0.02%	0.01%	0.09%	1.67%	98.87%

Node Bs downtime:

BSNL did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Vodafone at 0.06%.

Worst affected Node Bs due to downtime:

BSNL failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Vodafone at 0.03%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.83%.

RRC Congestion:

All operators met the benchmark for RRC congestion. The maximum RRC congestion was observed for Vodafone with 0.02%.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB congestion. The maximum Circuit Switched RAB congestion was observed for Vodafone with 0.01%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Vodafone at 0.09%.

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

Aircel and BSNL failed to meet the benchmark. Best performance was recorded for Vodafone at 1.67%.

Circuit Switch Voice Quality:

All operators met the benchmark. Best performance was recorded for Aircel at 99.44%.

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 - OCTOBER FOR 3G

Name of Service Provider 3 Day October	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 voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.35%	0.00%	98.99%	0.25%	0.21%	0.31%	3.13%	98.89%
BSNL	3.76%	5.25%	96.00%	0.40%	0.43%	1.73%	12.19%	NDR
Vodafone	0.08%	0.08%	100.00%	0.00%	0.00%	0.04%	0.09%	98.84%

3.4.2 3 DAY DATA – NOVEMBER FOR 3G

Name of Service Provider 3 Day November	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 voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.27%	0.19%	99.15%	0.33%	0.21%	0.24%	3.71%	98.93%
BSNL	2.41%	1.91%	95.35%	0.45%	0.60%	1.54%	6.09%	NDR
Vodafone	0.04%	0.00%	99.73%	0.04%	0.01%	0.44%	2.38%	98.94%

3.4.3 3 DAY DATA - DECEMBER FOR 3G

Name of Service Provider 3 Day December	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 voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.88%	0.35%	98.18%	0.24%	0.62%	0.42%	6.22%	99.98%
BSNL	2.65%	1.75%	95.57%	0.39%	3.46%	1.60%	13.83%	NDR
Vodafone	0.05%	0.00%	99.77%	0.03%	0.03%	0.37%	2.47%	98.89%

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	99.98%	98.92%	1.47%	54.94%	99.83%	1.29%
Airtel	NA	NA	NA	NA	NA	NA
BSNL	NA	48.27%	NA	NA	53.77%	NA
Idea	NA	98.33%	1.02%	100.00%	98.42%	1.11%
MTS	99.80%	99.56%	0.55%	99.85%	99.40%	0.60%
Reliance CDMA	NA	NA	NA	NA	NA	NA
Reliance GSM	NA	NA	NA	NA	NA	NA
TATA CDMA	NA	NA	1.17%	NA	NA	0.83%
TATA GSM	100.00%	99.99%	0.58%	100.00%	99.97%	0.57%
Vodafone	99.64%	99.84%	4.31%	99.24%	98.83%	4.74%

Following are the parameter wise observations for wireless operators for West Bengal circle:

Activation done within 4 hours:

All operators met the benchmark in PMR, however in 3days live Aircel failed to meet the benchmark. Best performance was recorded for TATA GSM in PMR & 3days live at 100.00%.

PDP Context activation success rate:

BSNL failed to meet the benchmark in PMR as well as 3days live. Best performance was recorded for TATA GSM in PMR & 3days live at 99.99% & 99.97%.

Drop Rate:

All operators met the benchmark in PMR and in 3days live. Best performance was recorded for MTS for PMR ato.55% & TATA GSM for 3days live at 0.57%.

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	99.97%	98.76%	0.80%	99.94%	99.81%	0.93%
BSNL	NA	42.91%	NA	NA	45.66%	NA
Vodafone	99.44%	95.32%	0.77%	98.13%	96.23%	0.81%

Following are the parameter wise observations for wireless operators for West Bengal circle:

Activation done within 4 hours:

All operators met the benchmark in PMR as well as 3days live. Best performance was recorded for Aircel in PMR & 3days live at 99.97% & 99.94%.

PDP Context activation success rate:

BSNL failed to meet the benchmark in PMR as well as 3days live. Best performance was recorded for Aircel in PMR & 3days live at 98.76% & 99.81%.

Drop Rate:

All operators met the benchmark in PMR and in 3days live. Best performance was recorded for Vodafone in PMR as well as 3days live at 0.77% & 0.81%.

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

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	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	98.00%	100.00%	100.00%	100.00%	43.67%	100.00%
Airtel	96.00%	100.00%	100.00%	97.00%	84.33%	97.00%
BSNL	98.00%	100.00%	100.00%	100.00%	91.00%	97.00%
Idea	98.00%	100.00%	100.00%	100.00%	82.33%	95.00%
MTS	96.00%	100.00%	100.00%	100.00%	100.00%	98.00%
Reliance CDMA	97.00%	100.00%	100.00%	100.00%	89.00%	96.00%
Reliance GSM	95.00%	100.00%	100.00%	88.00%	86.33%	95.00%
TATA CDMA	NA	NA	100.00%	100.00%	87.67%	87.50%
TATA GSM	100.00%	100.00%	100.00%	100.00%	83.67%	95.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	86.00%	100.00%

Resolution of billing complaints

As per the consumers (live calling exercise) Airtel, MTS and Reliance CDMA & GSM failed to meet the benchmark of resolving 98% complaints within 4 weeks, however 100% complaints resolved within 6 weeks.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Aircel and Vodafone recorded the best performance at 82%.

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 except MTS. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

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

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark of 95% with most of the operators recording 100% for the parameter.

Customer Care / Helpline Assessment (voice to voice)

Reliance GSM failed to meet the benchmark for the parameter.

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	0.00%	0.03%	100.00%	100.00%	100.00%	98.11%	96.64%
Airtel	0.04%	0.01%	100.00%	100.00%	100.00%	98.53%	88.19%
BSNL	0.00%	0.05%	99.10%	100.00%	100.00%	96.87%	95.21%
Idea	0.35%	0.06%	100.00%	100.00%	100.00%	96.50%	97.15%
MTS	0.09%	0.02%	100.00%	100.00%	100.00%	99.12%	98.21%
Reliance CDMA	0.09%	0.02%	100.00%	100.00%	100.00%	97.58%	75.02%
Reliance GSM	0.08%	0.03%	100.00%	100.00%	100.00%	97.41%	71.54%
TATA CDMA	NA	0.00%	NA	NA	100.00%	99.12%	99.41%
TATA GSM	NA	0.00%	NA	NA	100.00%	96.41%	98.81%
Vodafone	0.10%	0.08%	100.00%	100.00%	100.00%	100.00%	95.55%

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of postpaid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter. BSNL & Aircel 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. TATA 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. BSNL remained slightly below the benchmark for resolving 100% complaints within 4 weeks.

All operators met the TRAI benchmark of resolution of billing complaints within 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. Vodafone recorded the best performance for the parameter.

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

Airtel and Reliance GSM & CDMA failed to meet the TRAI specified benchmark of 95%. TATA CDMA recorded the best performance for the parameter.

3.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Aircel	NA	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	99.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	100.00%	99.00%	100.00%	100.00%	100.00%
MTS	100.00%	98.00%	100.00%	100.00%	NA	100.00%	97.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.00%	NA	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	NA	100.00%
Vodafone	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	NA

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

In the inter-operator call assessment, most of the operators faced any problems in connecting to other operators.

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Reliance GSM and BSNL did not meet the benchmark BTS Accumulated downtime.
- Aircel and BSNL failed to meet the benchmark worst affected BTSs due to downtime.
- BSNL failed to meet the benchmark on SDCCH / Paging Channel Congestion
- Aircel and BSNL failed to meet the benchmark Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters) for 2G

- BSNL did not meet the benchmark BTS Accumulated downtime.
- BSNL did not meet the benchmark for SDCCH / Paging Channel Congestion.
- Aircel and BSNL failed to meet the benchmark Worst Affected Cells Having More than 3% TCH Drop.

PMR Consolidated (Network Parameters) for 3G

- BSNL did not meet the benchmark Node Bs downtime.
- Aircel and BSNL failed to meet the benchmark worst affected Node Bs due to downtime.
- Aircel and BSNL failed to meet the benchmark worst affected cells having more than 3% Circuit switched voice drop rate.

3 Day Live Measurement (Network Parameters) for 3G

- BSNL did not meet the benchmark BTS Accumulated downtime.
- BSNL failed to meet the benchmark worst affected BTSs due to downtime.
- Aircel and BSNL failed to meet the benchmark worst affected cells having more than 3% Circuit switched voice drop rate.

Wireless Data Services 2G

- All operators met the benchmark in monthly, however in live Aircel failed to meet the benchmark for Activation done within 4 hours
- BSNL failed to meet the benchmark in PMR as well as live for PDP Context activation success rate

Wireless Data Services 3G:

- BSNL failed to meet the benchmark in monthly as well as live for PDP Context activation success rate

Live Calling

- As per the consumers (live calling exercise) Airtel, MTS and Reliance CDMA & GSM failed to meet the benchmark of resolving 98% complaints within 4 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except MTS.
- Reliance GSM failed to meet the benchmark for the parameter Customer Care / Helpline Assessment (voice to voice).

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter.
- Airtel and Reliance GSM & CDMA 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 (Operator Assisted) for 2G

- BSNL, Reliance CDMA and Aircel consistently failed to meet the benchmark of various parameters being tested during the drive tests in Asansol SSA, Suri SSA and Malda SSA.

Drive Test (Operator Assisted) for 3G

- BSNL consistently failed to meet the benchmark of various parameters being tested during the drive tests in Asansol SSA, Suri SSA and Malda SSA.

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

PMR: -Reliance GSM data reported only for October 2015 & November 2015 and also Reliance GSM service is closed in west Bengal circle.

3 Day Live: - Reliance CDMA had there sever issue so we could not able to conduct the audit for October 2015 and November 2015 months same is intimated to TRAI by the operator.

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 PARAMETER DESCRIPTION

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

1. BTSs Accumulated downtime (not available for service)
2. Worst affected BTSs due to downtime

1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.

2. **Computation Methodology –**
BTS accumulated downtime (not available for service) = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100

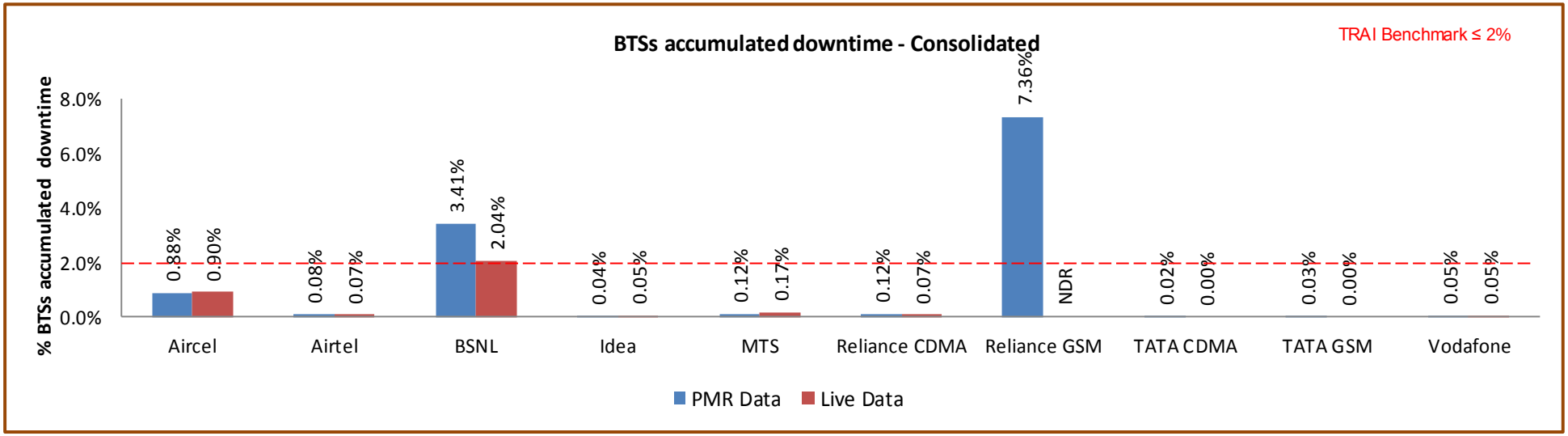
3. **TRAI Benchmark –**

   a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

- The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
- All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.
- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
- When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

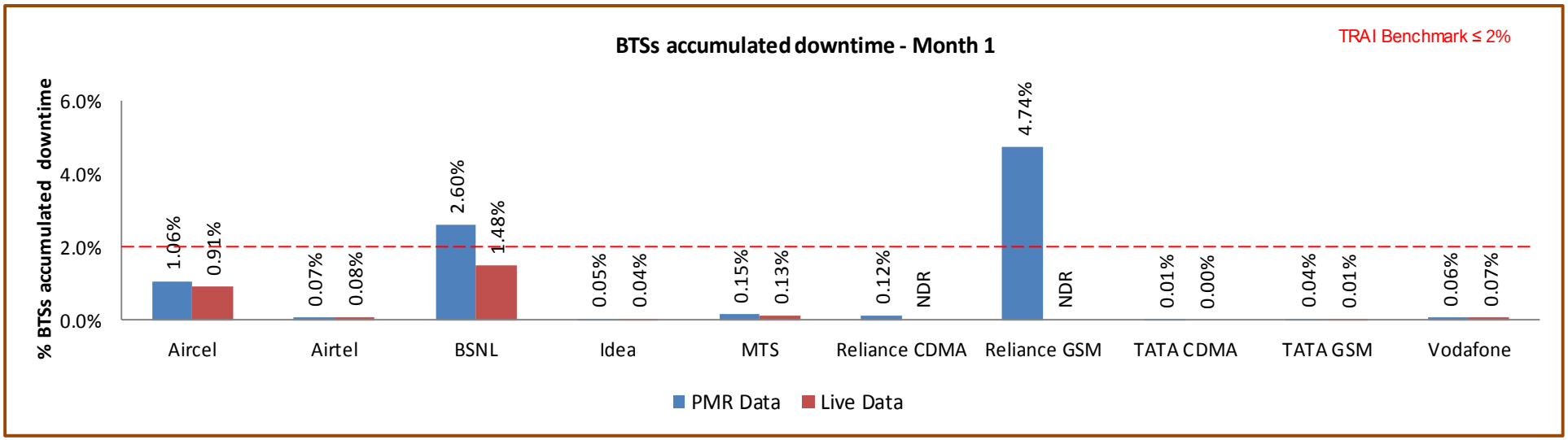
5.1.2 KEY FINDINGS - CONSOLIDATED



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

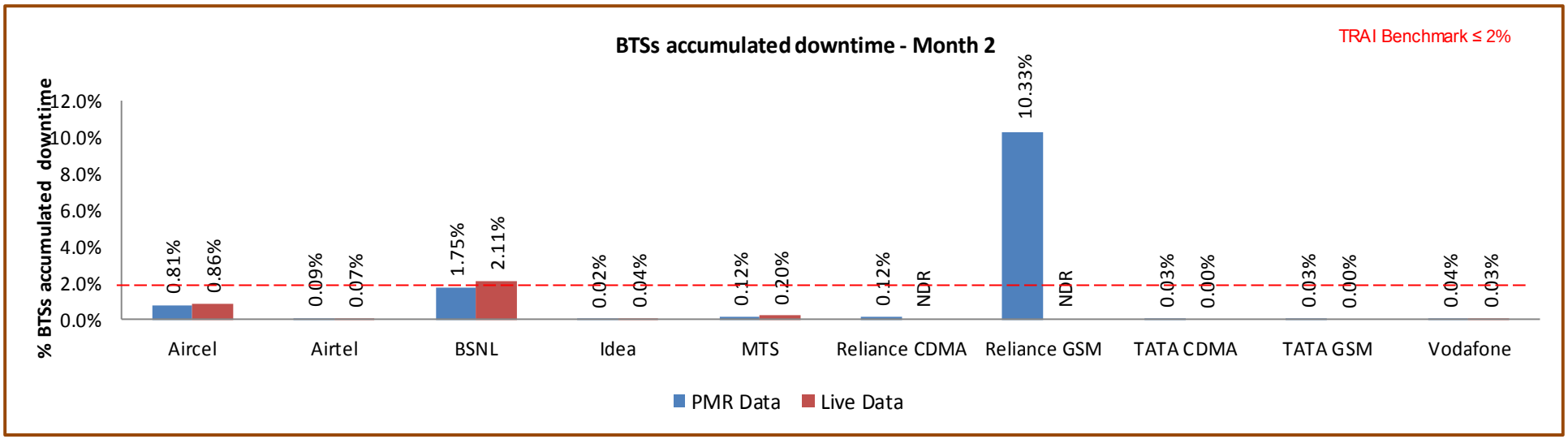
Reliance GSM & BSNL did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data and also BSNL failed in 3Days live.

5.1.2.1 KEY FINDINGS – MONTH 1



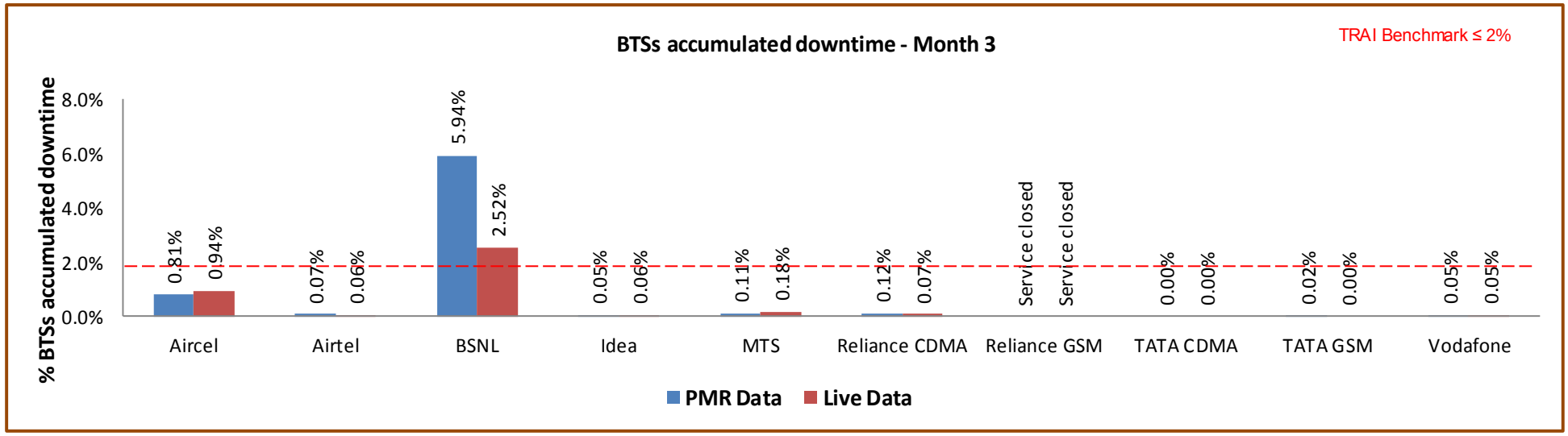
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – MONTH 2



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

5.1.2.3 KEY FINDINGS – MONTH 3



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

5.2 WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1 PARAMETER DESCRIPTION

- **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.

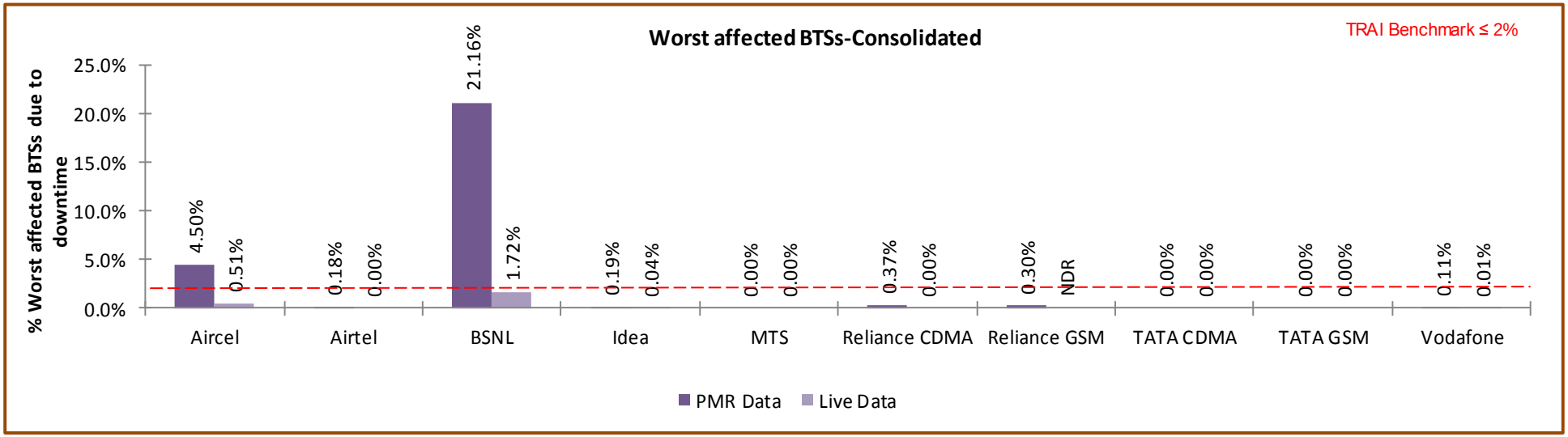
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

5.2.2 KEY FINDINGS – CONSOLIDATED



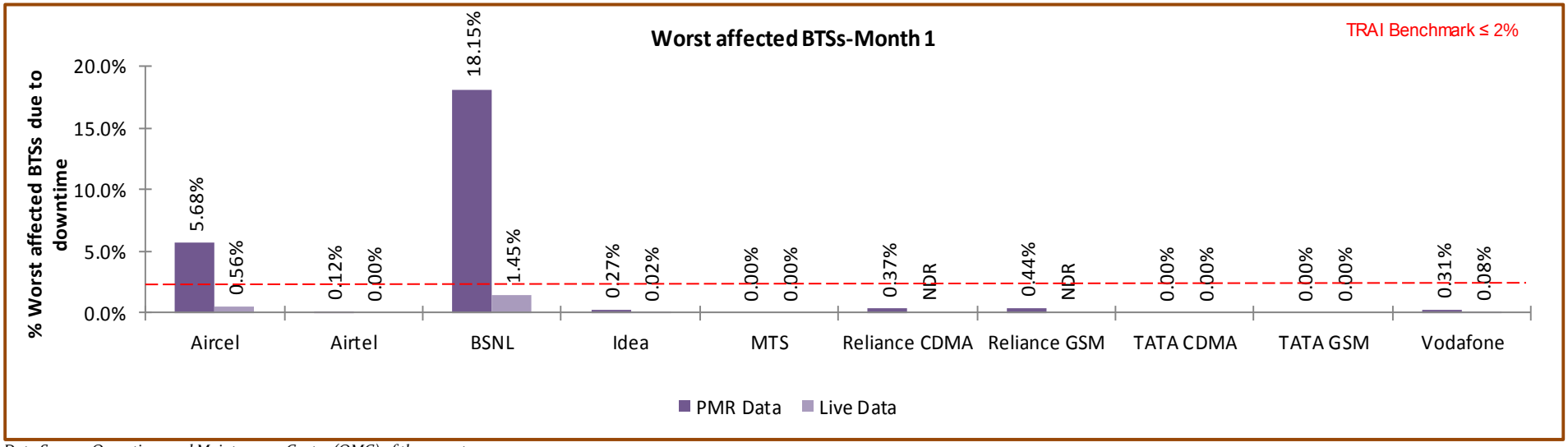
Data Source: Operations and Maintenance Center (OMC) of the operators

Note: Reliance 3days is not available (NA) due to server issue.

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

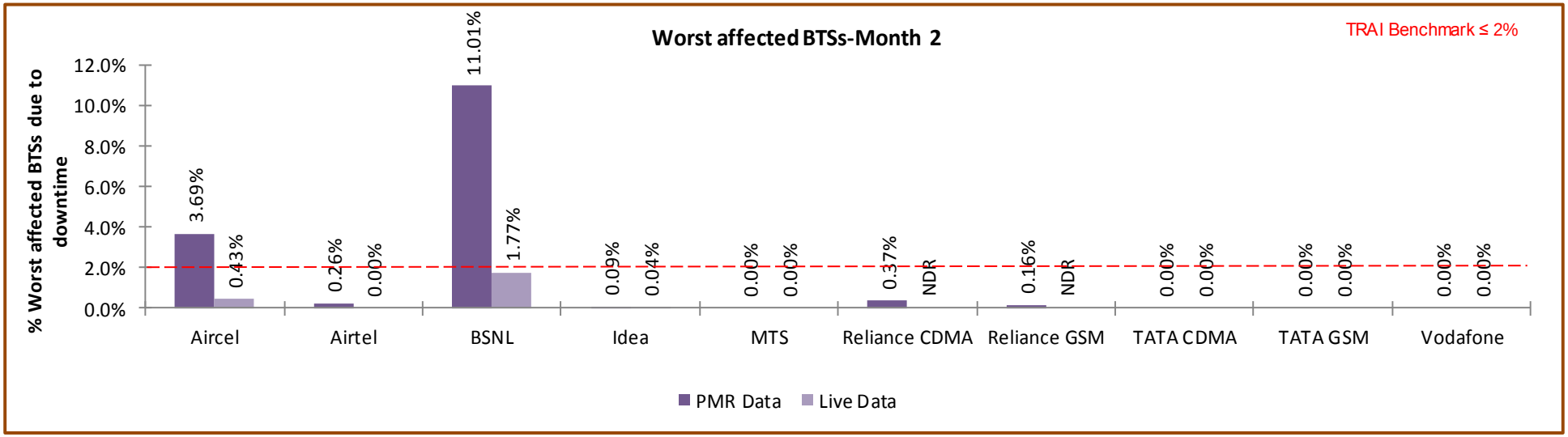
Significant difference was observed between PMR & live measurement data for Aircel and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



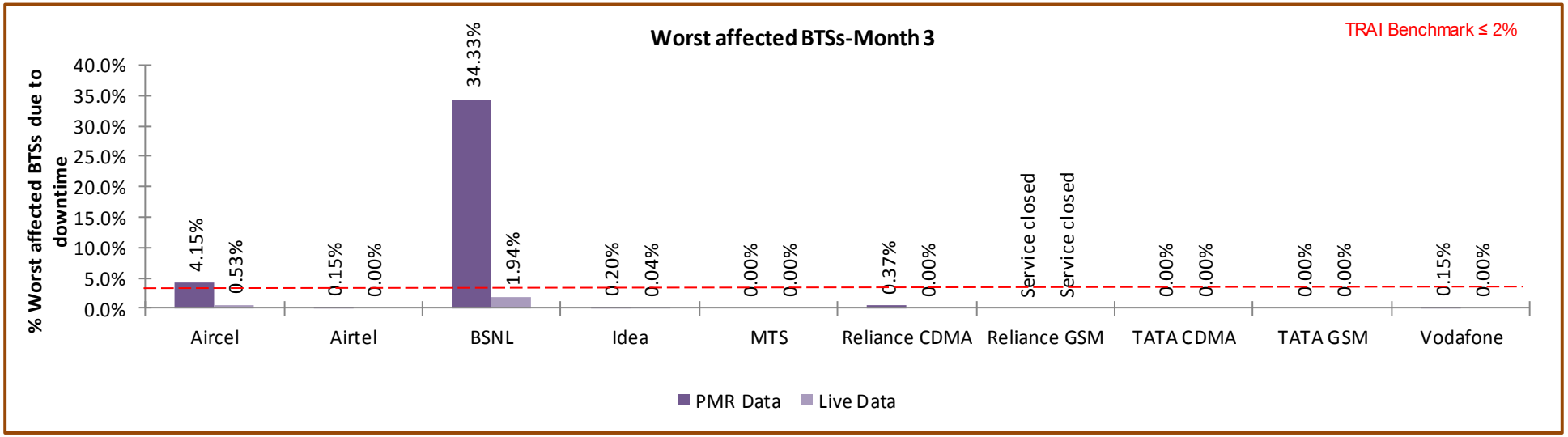
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.2 KEY FINDINGS – MONTH 2



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

5.2.2.3 KEY FINDINGS – MONTH 3



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

5.3 CALL SET UP SUCCESS RATE

5.3.1 PARAMETER DESCRIPTION

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

   (Calls Established / Total Call Attempts) * 100

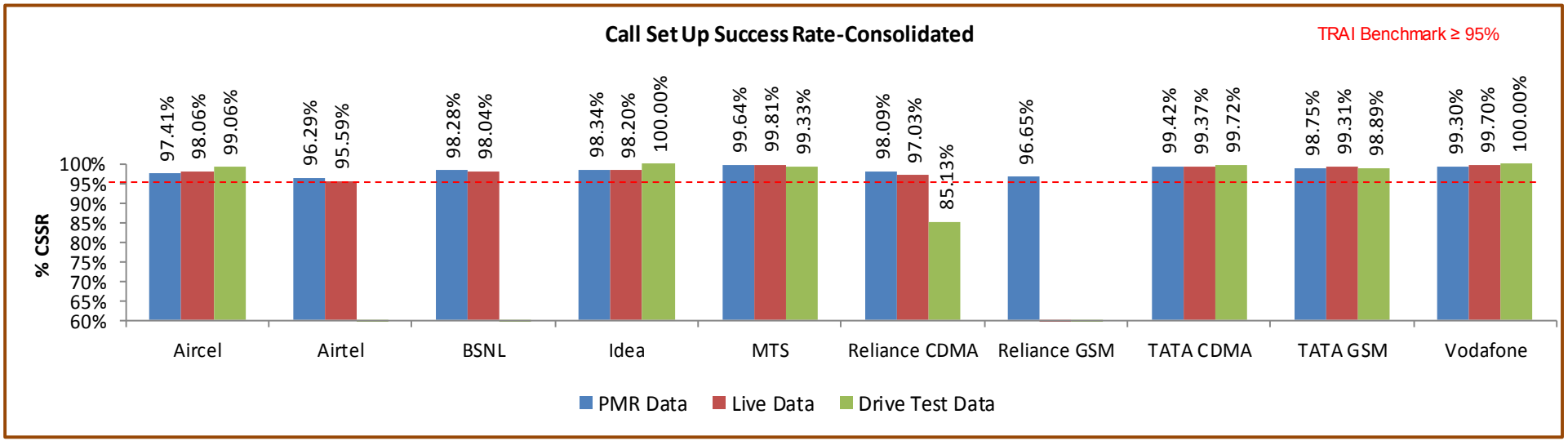
   Call Established means the following events have happened in call setup:-

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

3. **TRAI Benchmark ≥** 95%
4. **Audit Procedure –**

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

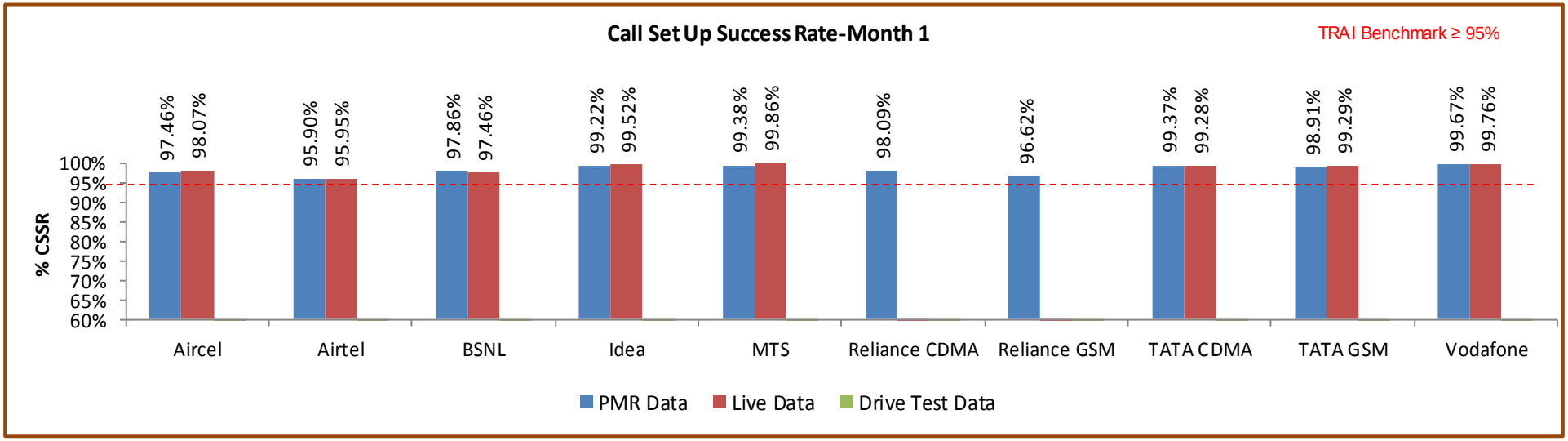
5.3.2 KEY FINDINGS - CONSOLIDATED



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

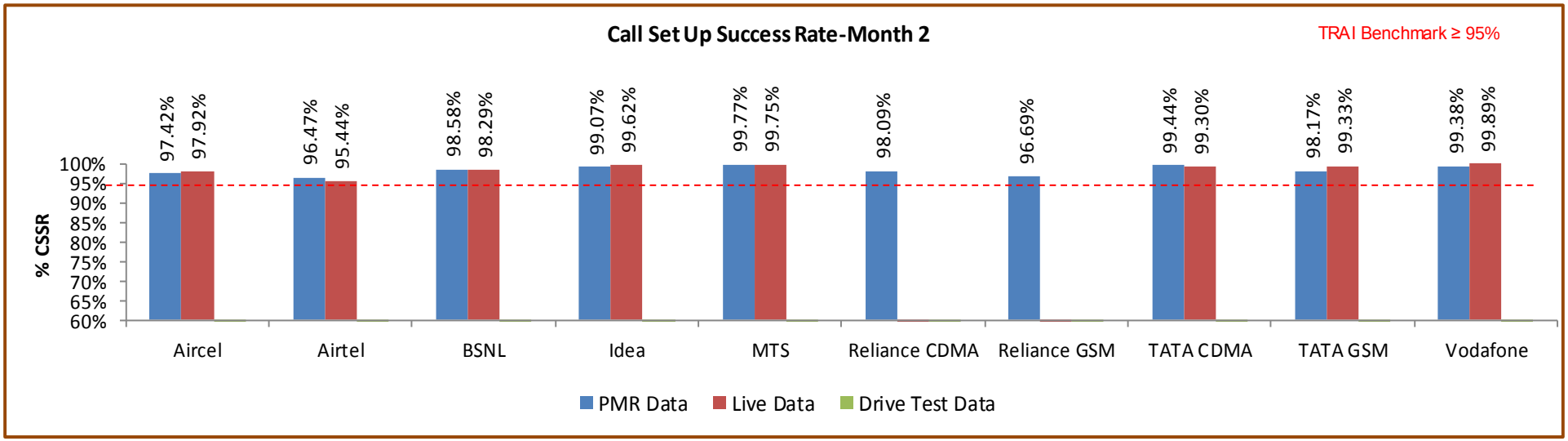
All operators met the TRAI benchmark as per audit/PMR data.

5.3.2.1 KEY FINDINGS – MONTH 1



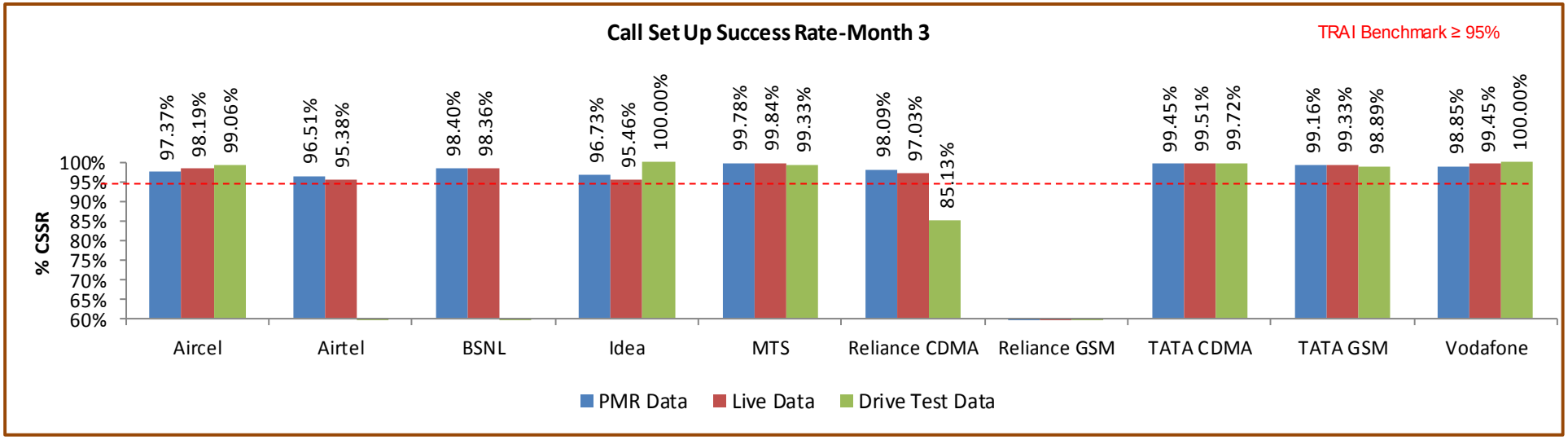
Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – MONTH 2



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

5.3.2.3 KEY FINDINGS – MONTH 3



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

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

5.4.1 PARAMETER DESCRIPTION

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

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

2. **Computational Methodology:**

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

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

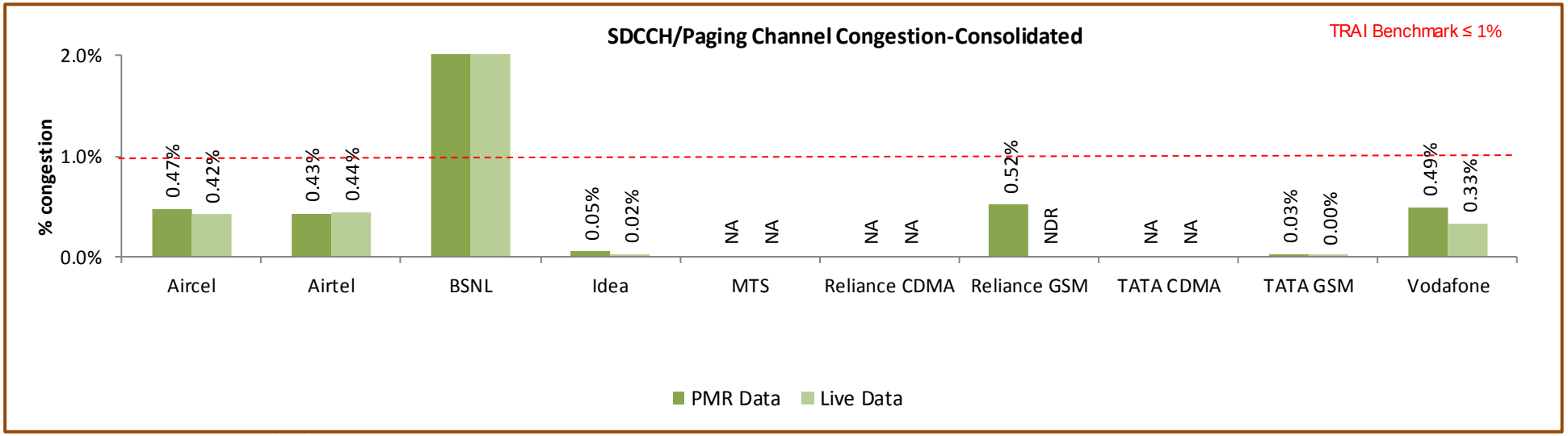
3. Benchmark:

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

4. Audit Procedure –

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

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



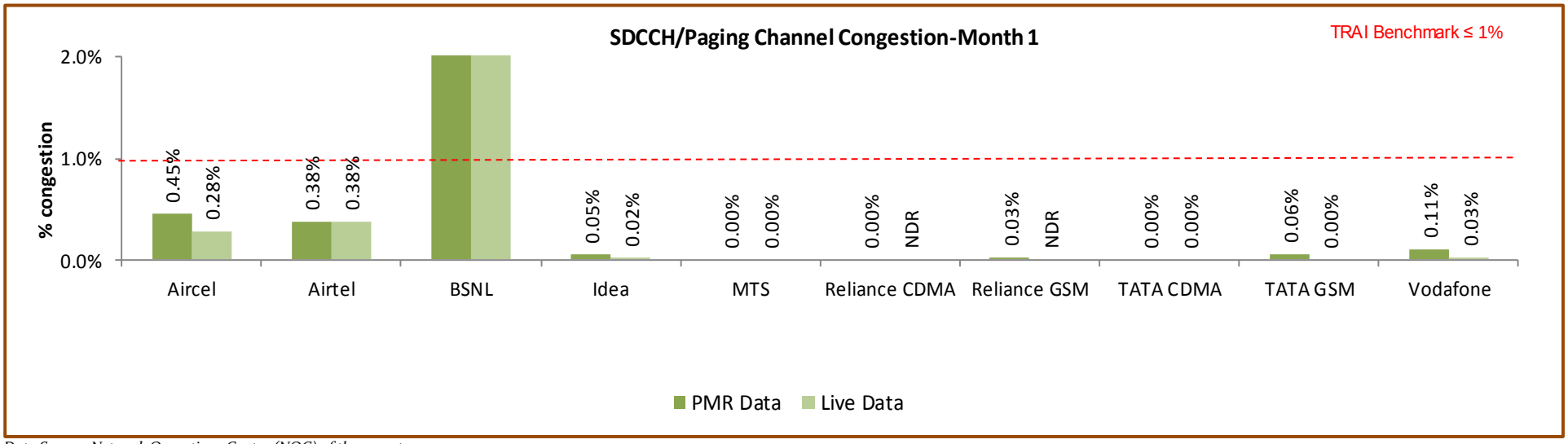
Data Source: Network Operations Center (NOC) of the operators

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

Significant difference was observed between PMR & live measurement data for BSNL, Reliance GSM and Vodafone. 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.

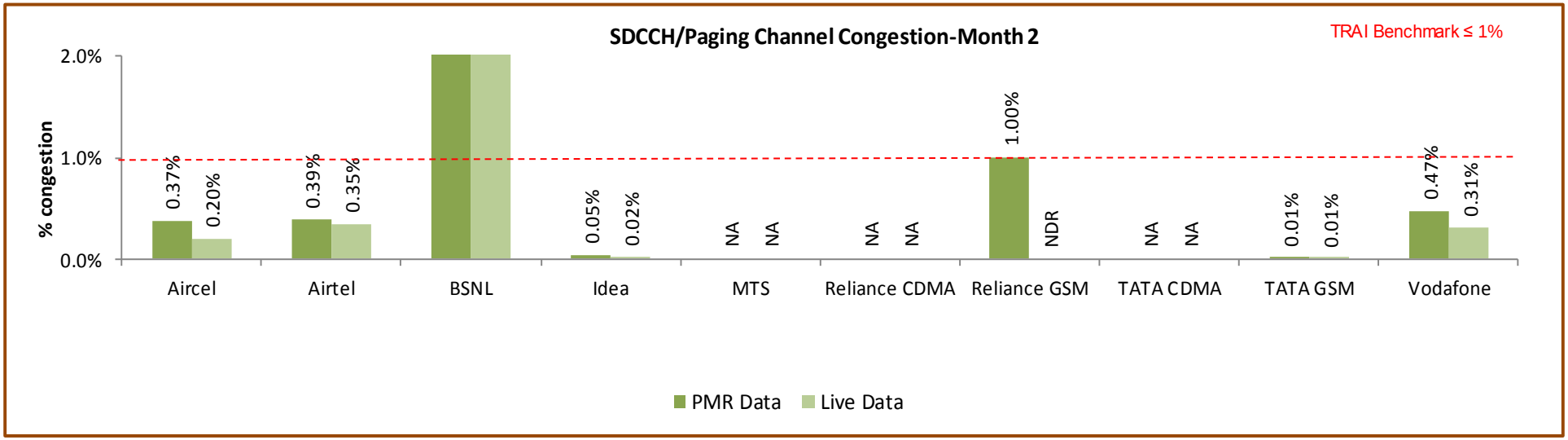
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

5.4.2.1 KEY FINDINGS – MONTH 1



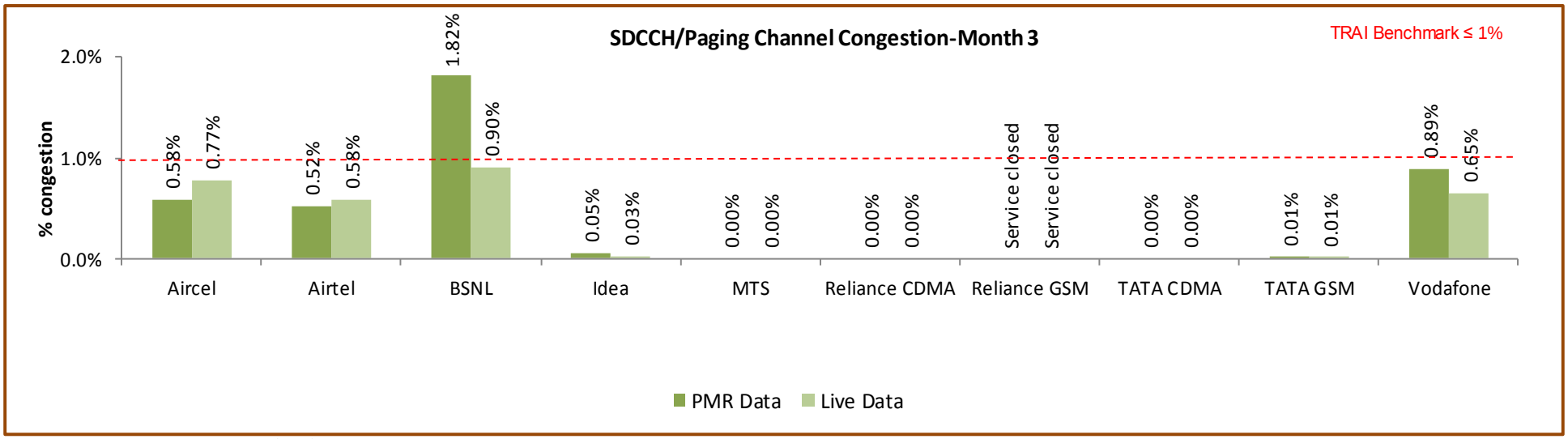
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



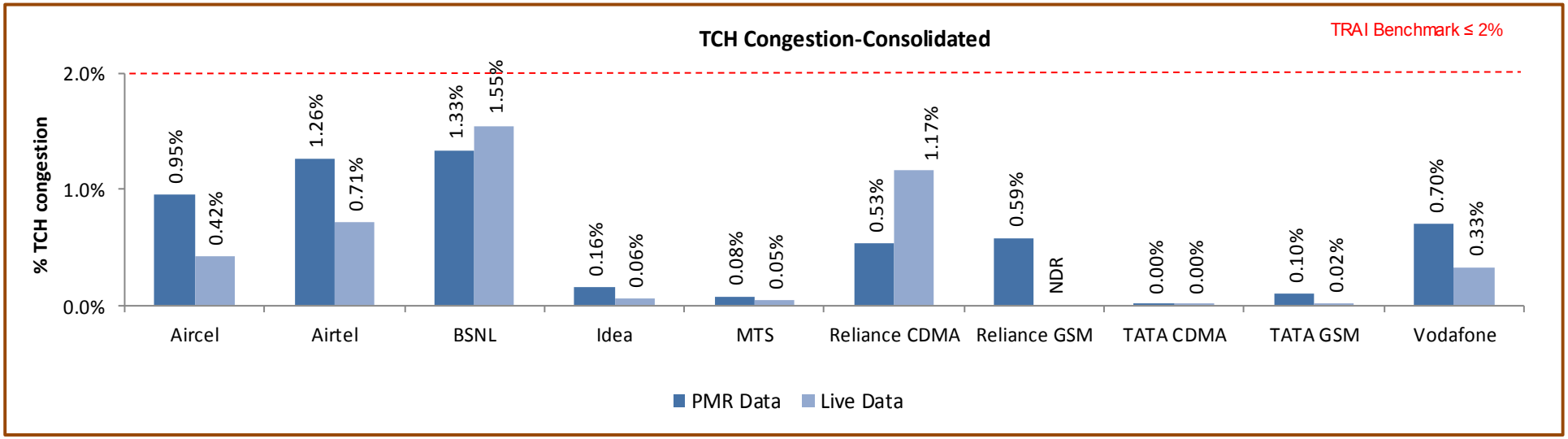
Data Source: Network Operations Center (NOC) of the operators

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)

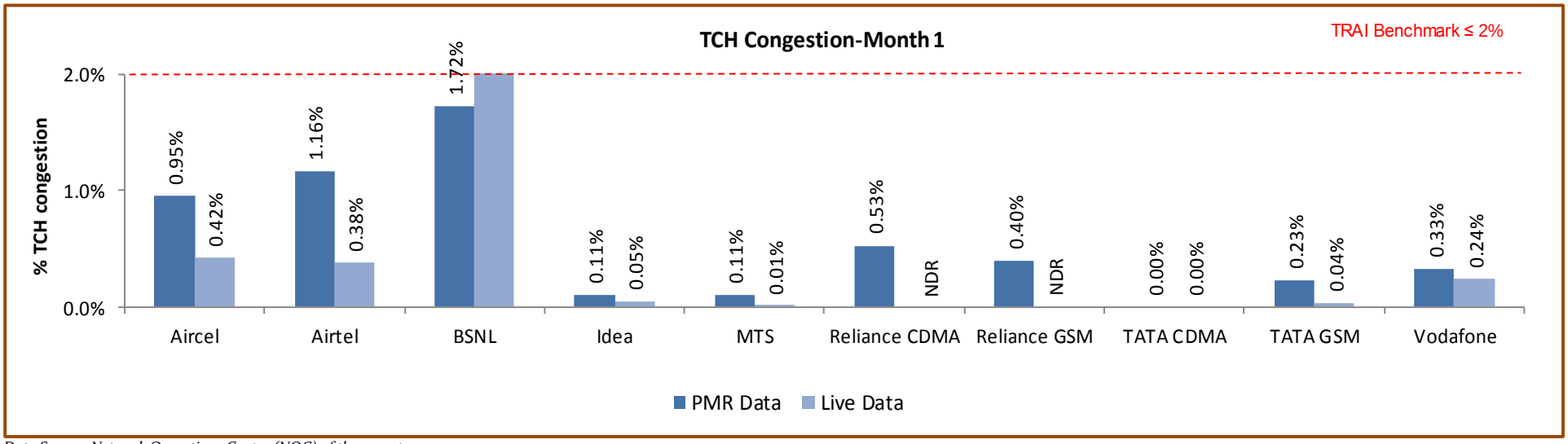


Data Source: Network Operations Center (NOC) of the operators

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

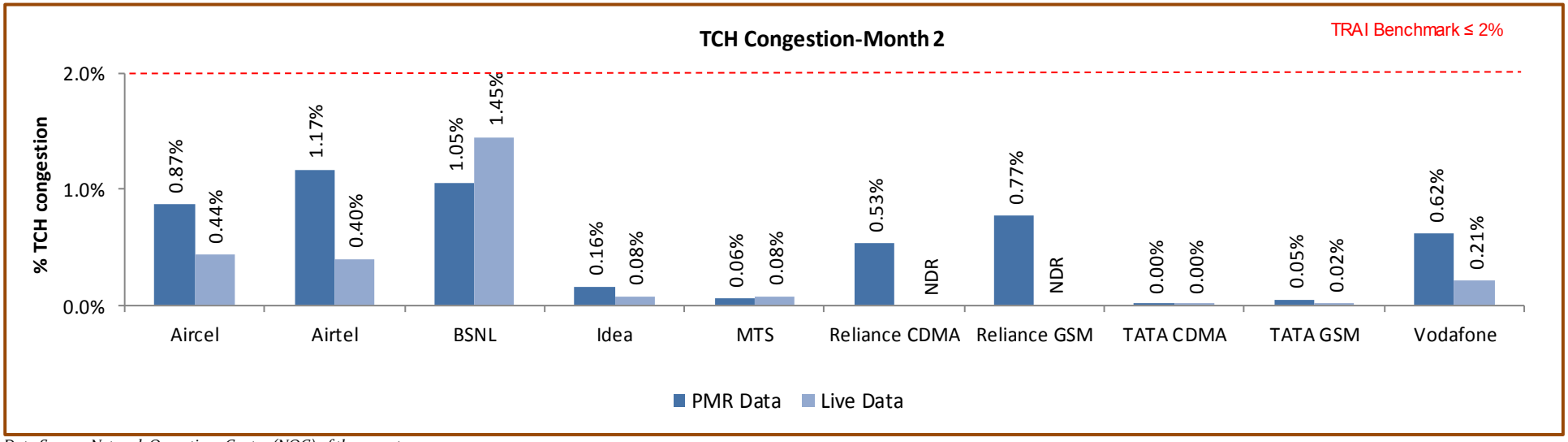
Significant difference was observed between PMR & live measurement data for Aircel, Airtel, BSNL, Reliance GSM and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.4.3.1 KEY FINDINGS – MONTH 1



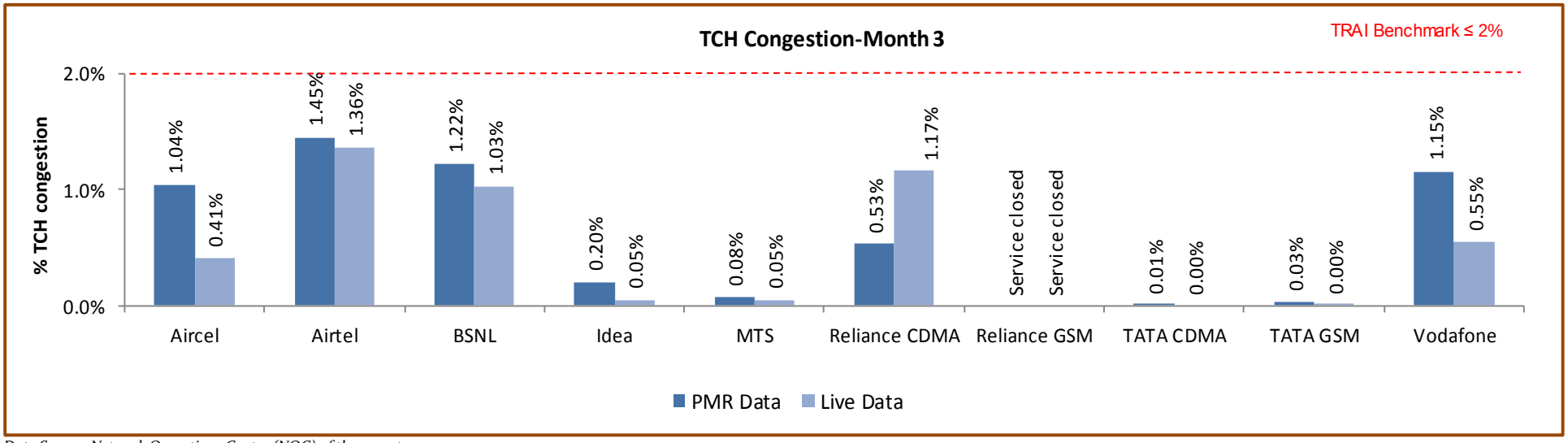
Data Source: Network Operations Center (NOC) of the operators

5.4.3.2 KEY FINDINGS – MONTH 2



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

5.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		66	40	77	118	40	21	48	48	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		241999	464918	536231	348866	170316	19924	76345	35111	18691	908766
Traffic served for all POIs (B)- in erlangs		91900	271695	89005	209330	60425	6352	33884	3619	2737	465610
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	21	NDR	48	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		243234	1387795	546921	349567	170423	7366	NDR	35111	18627	906515
Traffic served for all POIs (B)- in erlangs		47368	725700	92083	206379	60219	861	NDR	1889	1248	266032
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%

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

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

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		66	40	77	118	40	21	48	48	20	45
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79858	154814	176124	115471	56325	7351	37316	11697	6272	187112
Traffic served for all POIs (B)- in erlangs		30436	84549	28924	68260	20065	2588	17615	1240	929	86901
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	NDR	NDR	48	20	45
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	465488	181657	116124	56382	NDR	NDR	11697	6242	186549
Traffic served for all POIs (B)- in erlangs		15514	232135	30171	68775	19913	NDR	NDR	638	428	53133
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	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-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		66	40	77	118	40	21	48	48	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81058	155191	180337	116570	56322	7351	39029	11698	6192	361512
Traffic served for all POIs (B)- in erlangs		30120	93788	28327	70029	19920	2476	16269	1192	922	185743
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	NDR	NDR	48	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	462492	181657	116444	56322	NDR	NDR	11697	6192	359672
Traffic served for all POIs (B)- in erlangs		15898	246532	31479	69969	20324	NDR	NDR	650	424	130554
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	22	Service closed	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	Service closed	0	0	0
Total Capacity of all POIs (A) - in erlangs		81083	154913	179769	116825	57670	5222	Service closed	11717	6226	360143
Traffic served for all POIs (B)- in erlangs		31345	93358	31754	71041	20440	1288	Service closed	1187	887	192966
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Service closed	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	21	Service closed	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	Service closed	0	0	0
Total Capacity of all POIs (A) - in erlangs		81076	459815	183607	116999	57719	7366	Service closed	11717	6192	360294
Traffic served for all POIs (B)- in erlangs		15956	247033	30433	67635	19983	861	Service closed	601	396	82346
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Service closed	0.00%	0.00%	0.00%

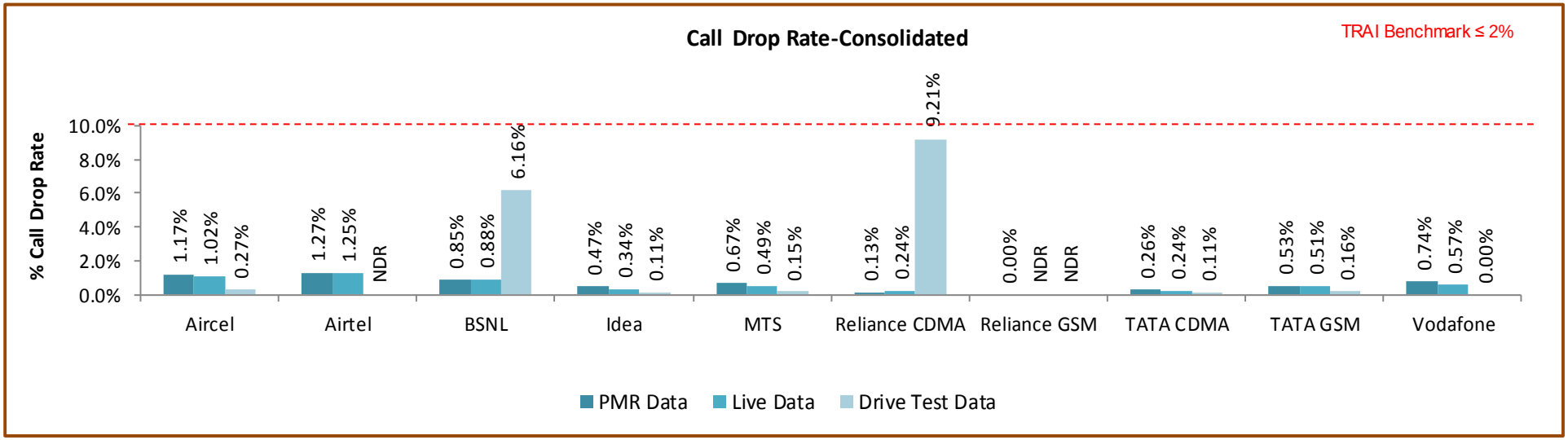
Data Source: Network Operations Center (NOC) of the operators

5.5 CALL DROP RATE

5.5.1 PARAMETER DESCRIPTION

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

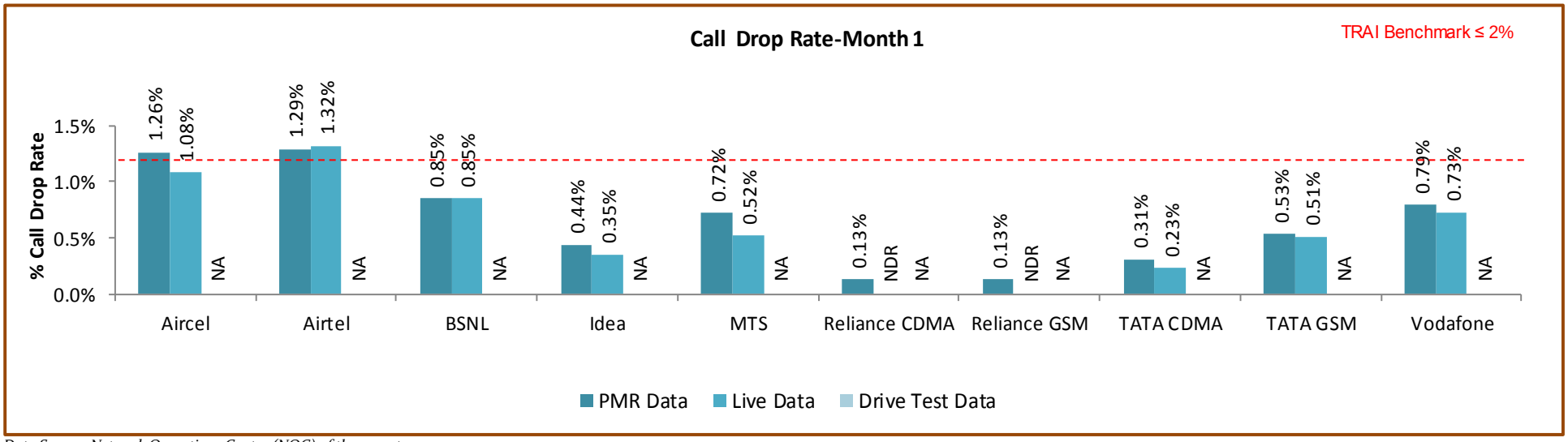
5.5.2 KEY FINDINGS - CONSOLIDATED



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

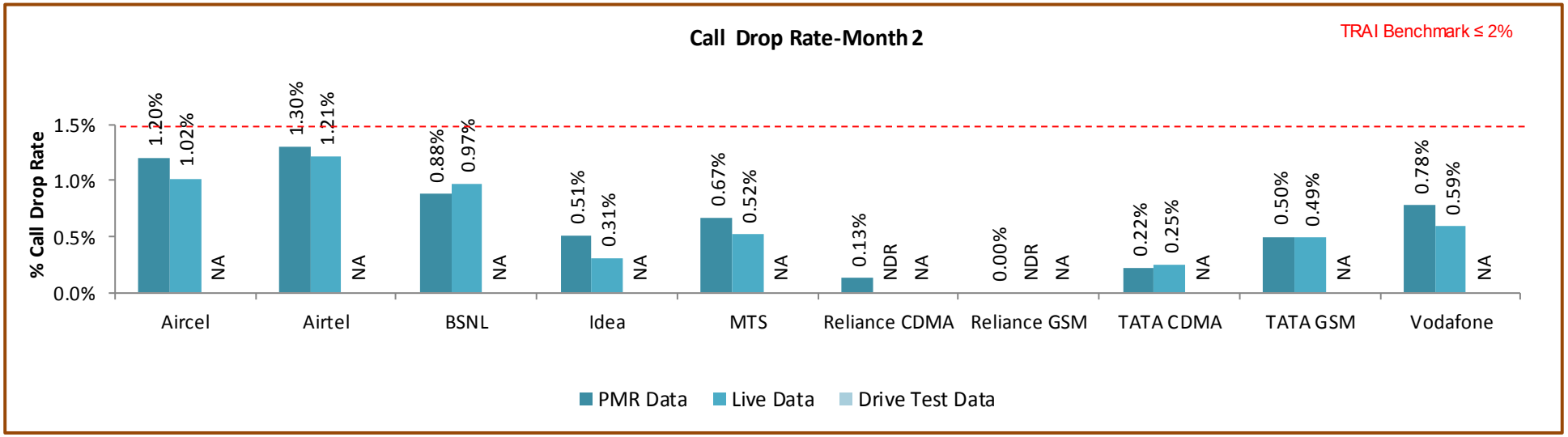
All operators met the benchmark for call drop rate during audit. The call drop rate during drive test was observed to be higher than audit for Aircel, BSNL, Reliance CDMA, Vodafone and MTS.

5.5.2.1 KEY FINDINGS – MONTH 1



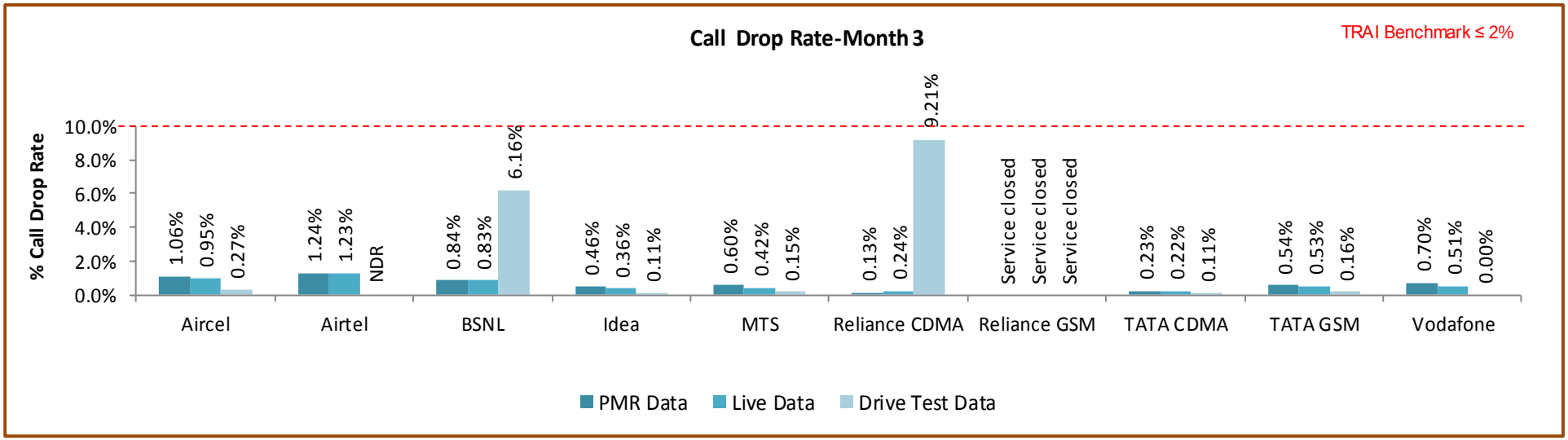
Data Source: Network Operations Center (NOC) of the operators

5.5.2.2 KEY FINDINGS – MONTH 2



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

5.5.2.3 KEY FINDINGS – MONTH 3



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

5.6 CELLS HAVING GREATER THAN 3% TCH DROP

5.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.

2. **Computational Methodology: (Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**

3. **TRAI Benchmark –**

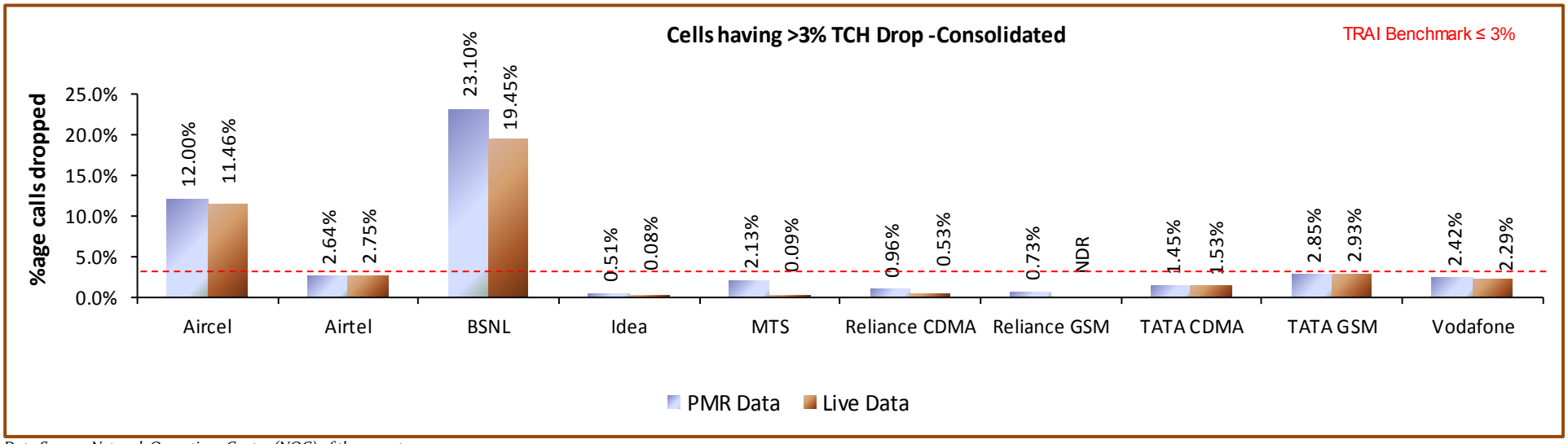
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

4. **Audit Procedure –**

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

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

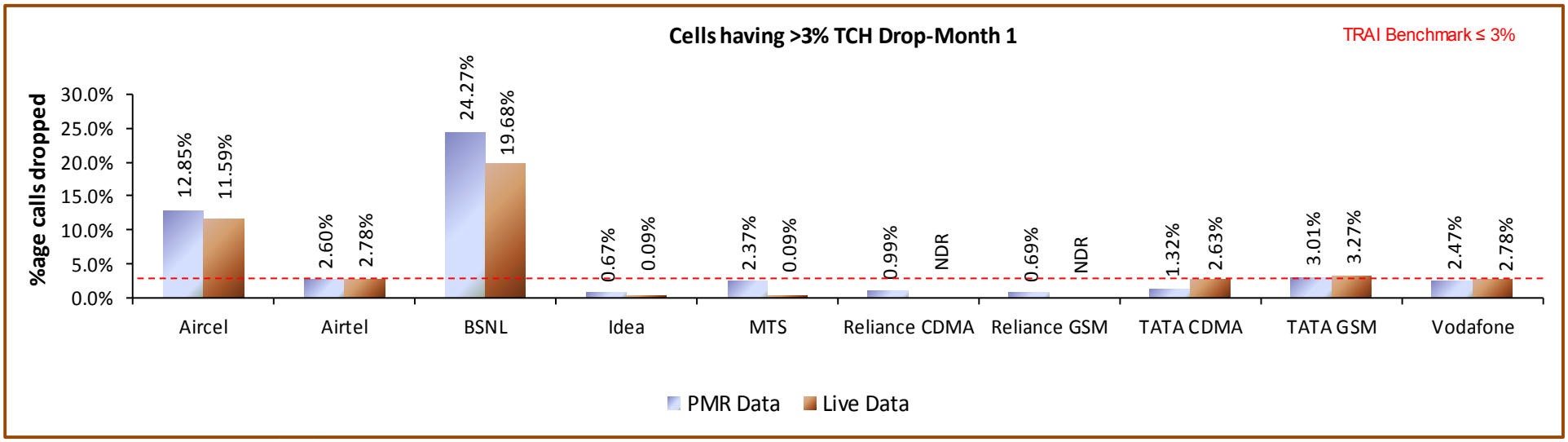
5.6.2 KEY FINDINGS - CONSOLIDATED



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

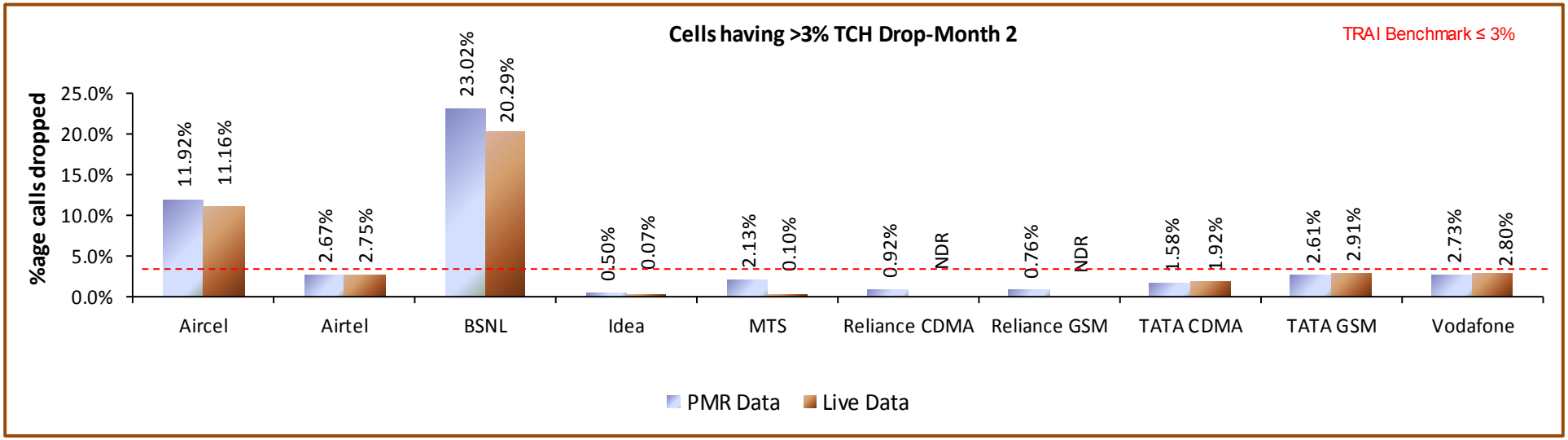
Aircel and BSNL failed to meet the benchmark for cells having >3% TCH drop rate. The TCH drop rate during audit was observed to be higher than live for Aircel and BSNL

5.6.2.1 KEY FINDINGS – MONTH 1



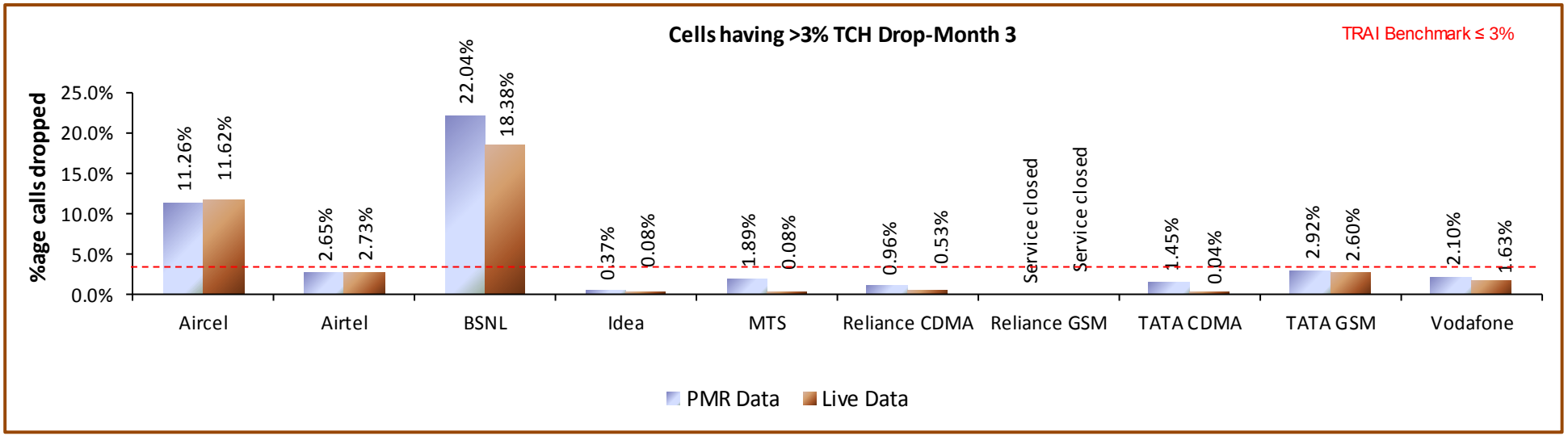
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2



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

5.6.2.3 KEY FINDINGS – MONTH 3



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

5.7 VOICE QUALITY

5.7.1 PARAMETER DESCRIPTION

1. **Definition:**

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

2. **Computational Methodology:**

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

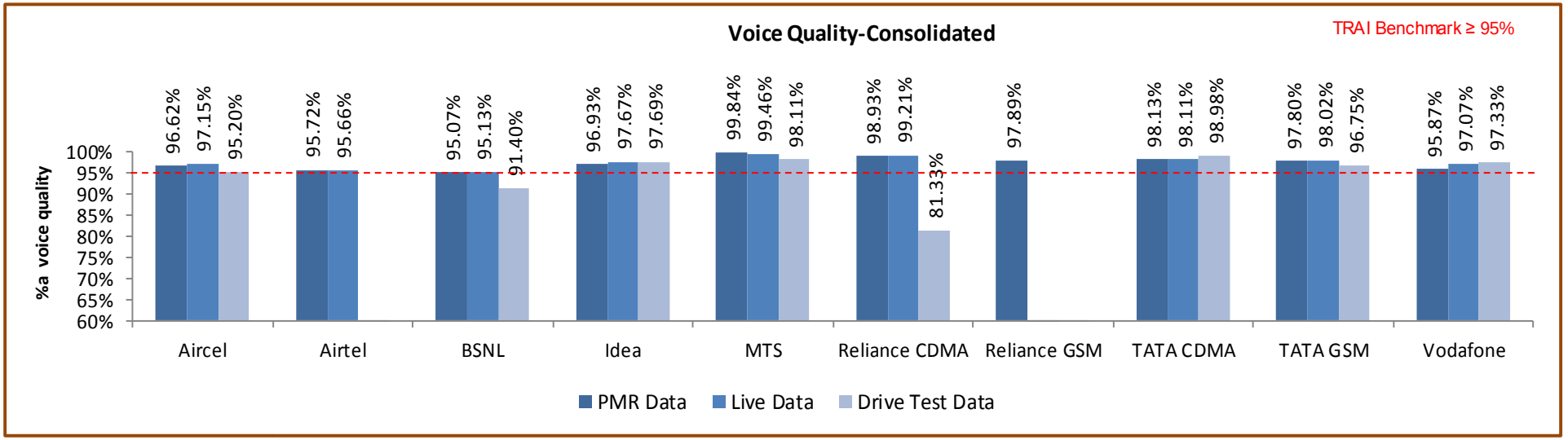
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

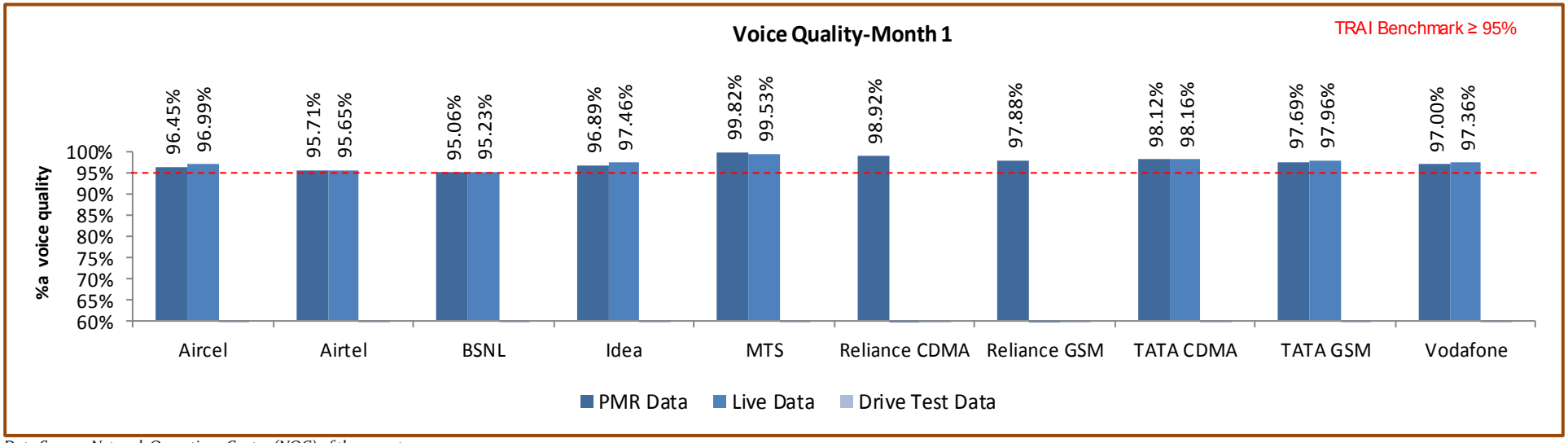
5.7.2 KEY FINDINGS



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

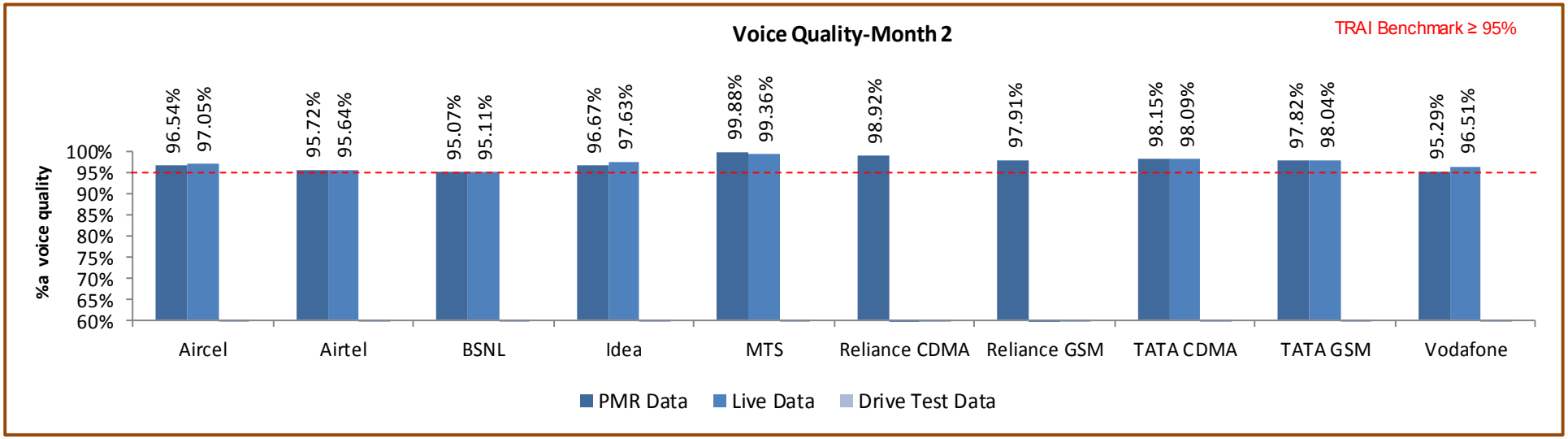
All operators met the benchmark for Voice quality as per PMR data. Due to server issue Reliance data not audited and it is informed to TRAI. In drive test BSNL, Reliance CDMA failed to meet the benchmark for Voice quality.

5.7.2.1 KEY FINDINGS – MONTH 1



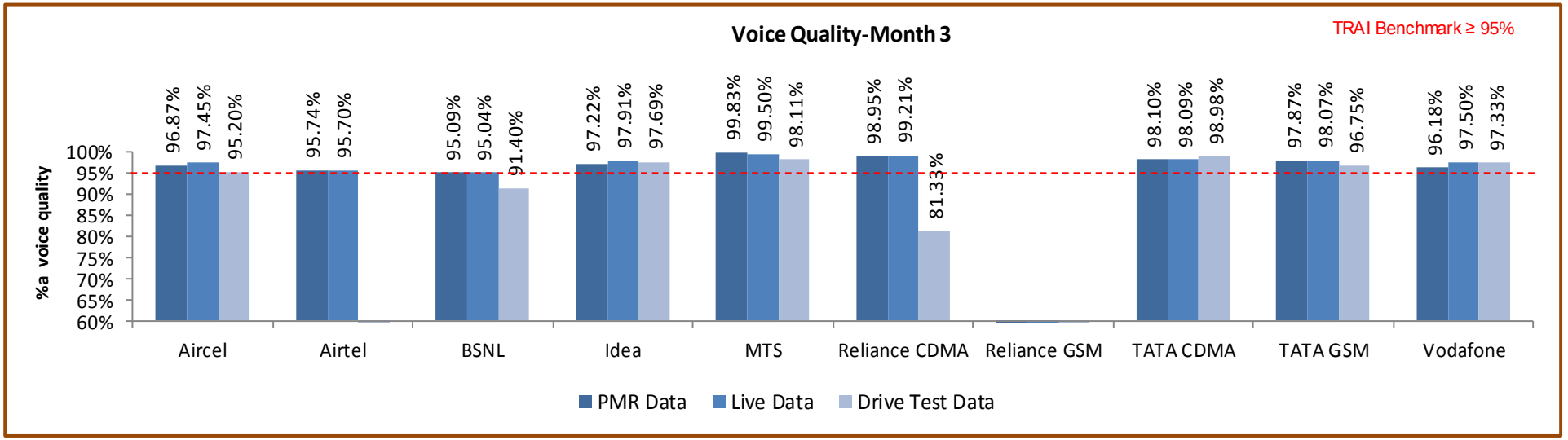
Data Source: Network Operations Center (NOC) of the operators

5.7.2.2 KEY FINDINGS – MONTH 2



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

5.7.2.3 KEY FINDINGS – MONTH 3



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

6 PARAMETER DESCRIPTION & 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 –

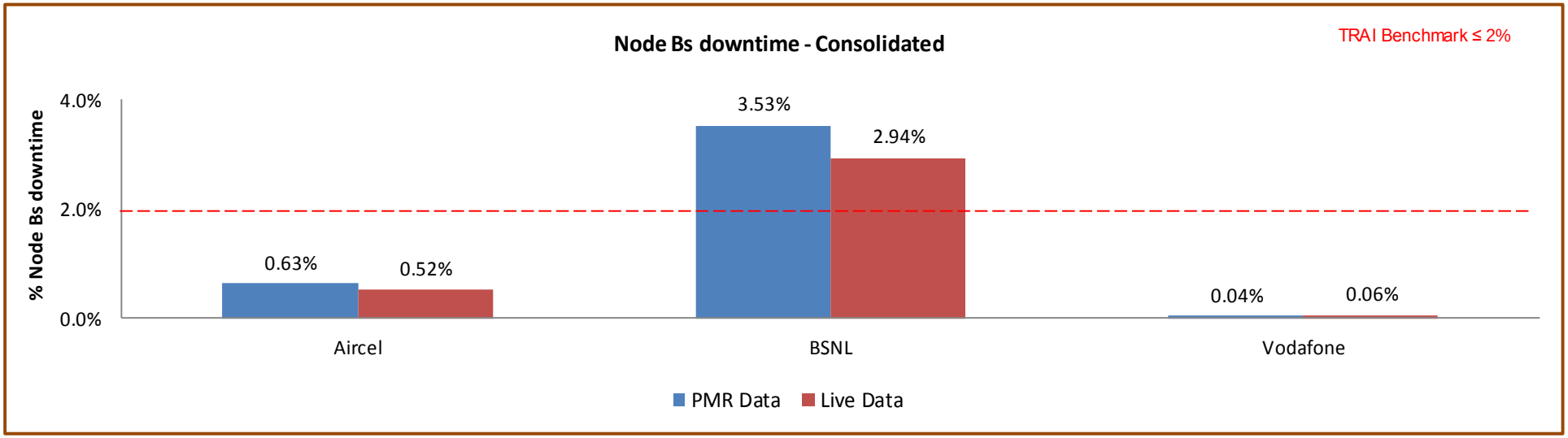
a. Node Bs downtime (not available for service) ≤ 2%

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.

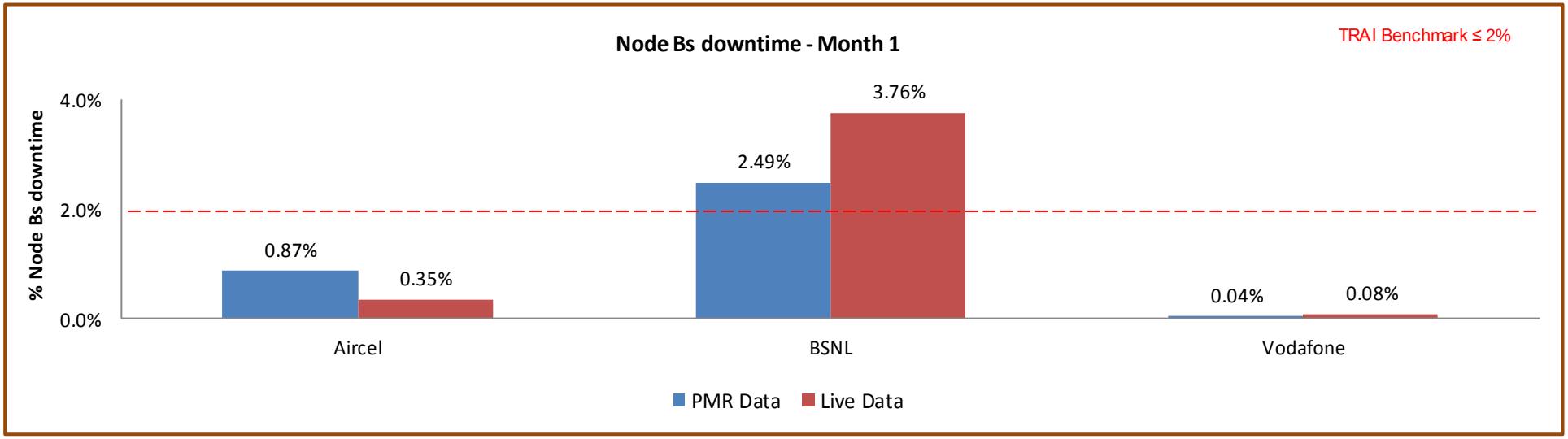
6.1.2 KEY FINDINGS - CONSOLIDATED



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

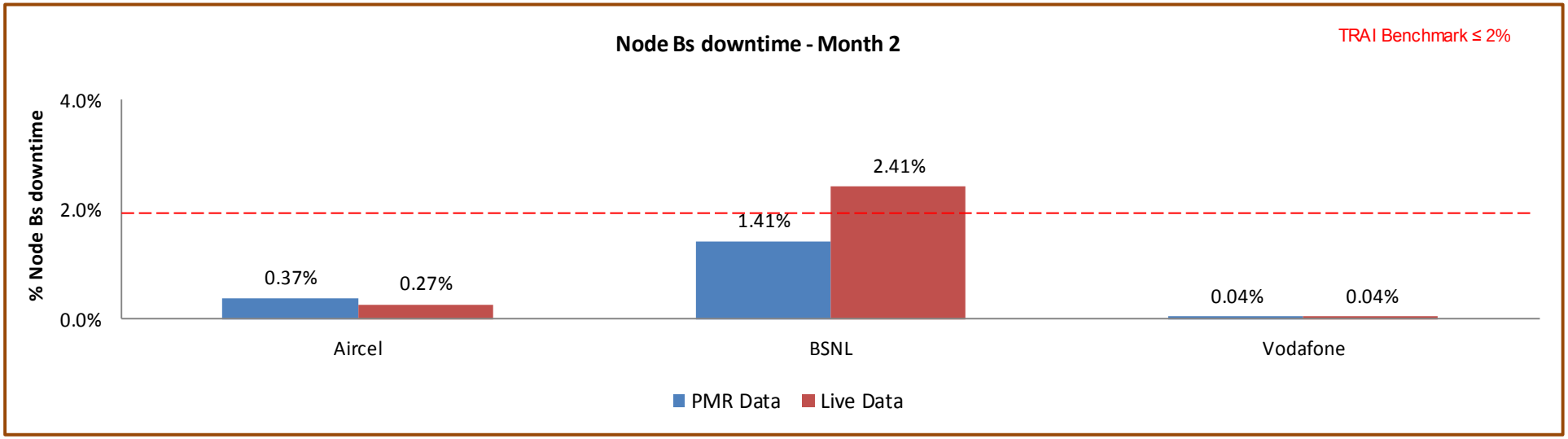
BSNL failed to meet the benchmark in PMR as well as 3days live.

6.1.2.1 KEY FINDINGS – MONTH 1



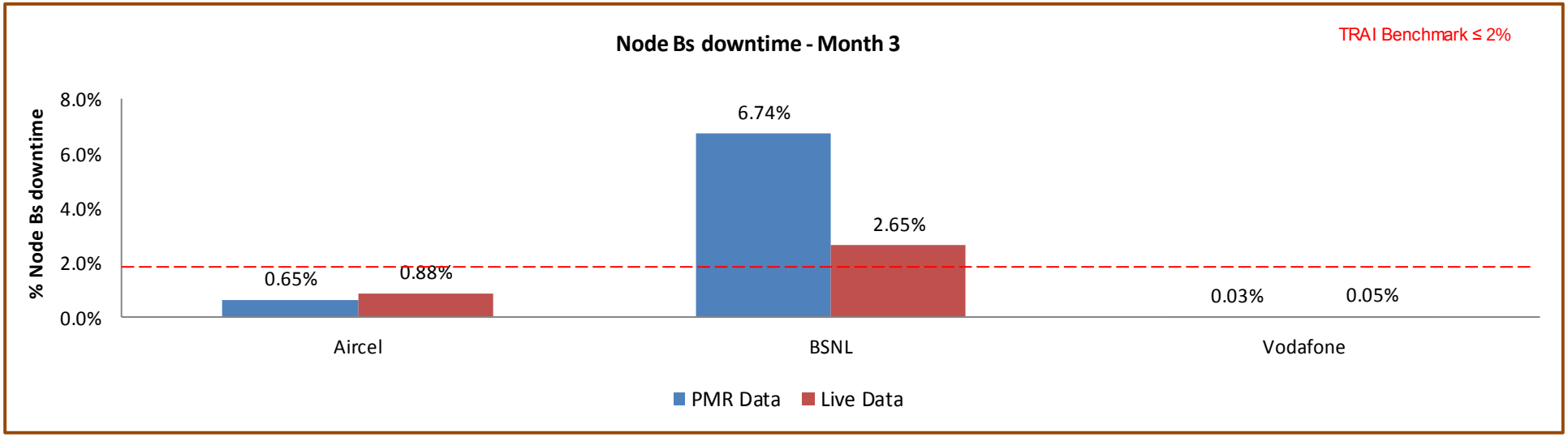
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



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

6.1.2.3 KEY FINDINGS – MONTH 3



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.

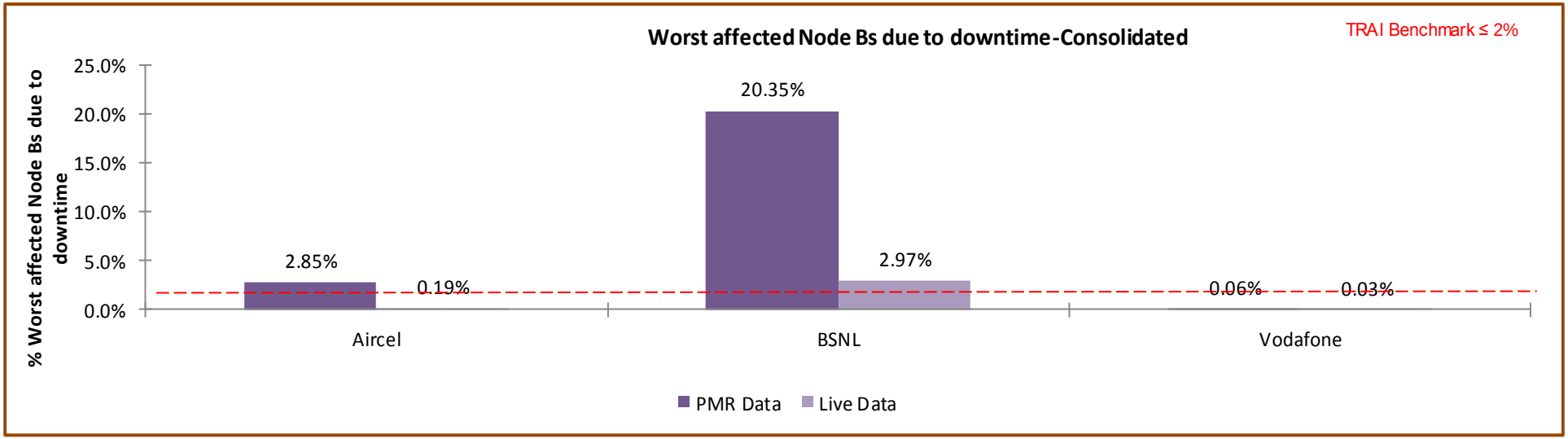
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

  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

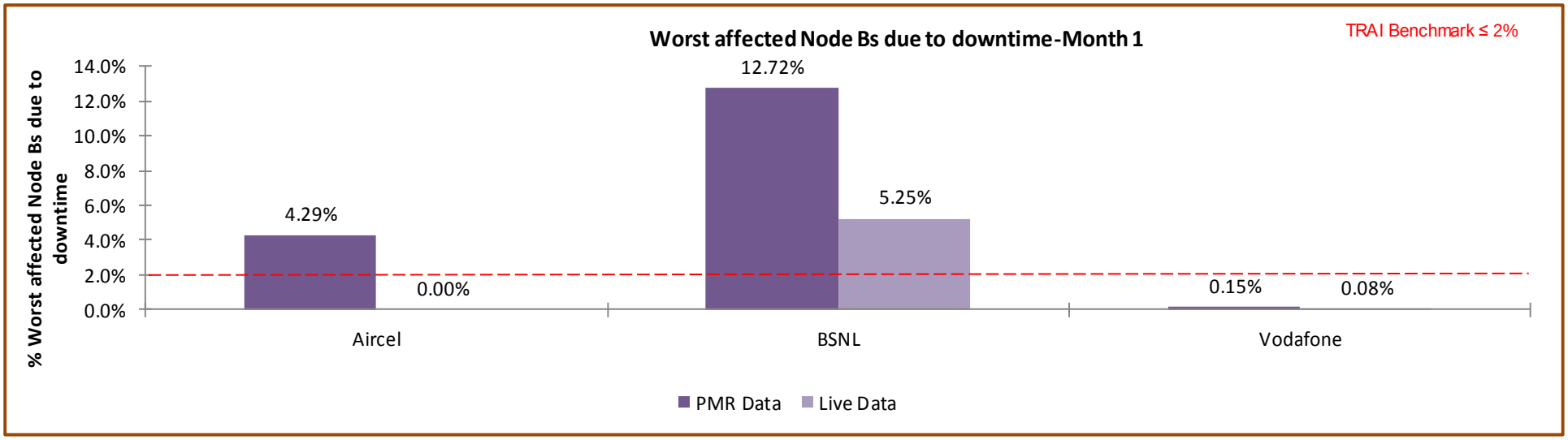


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel &BSNL did not meet the benchmark for worst affected Node Bs due to downtime as per audit/PMR data.

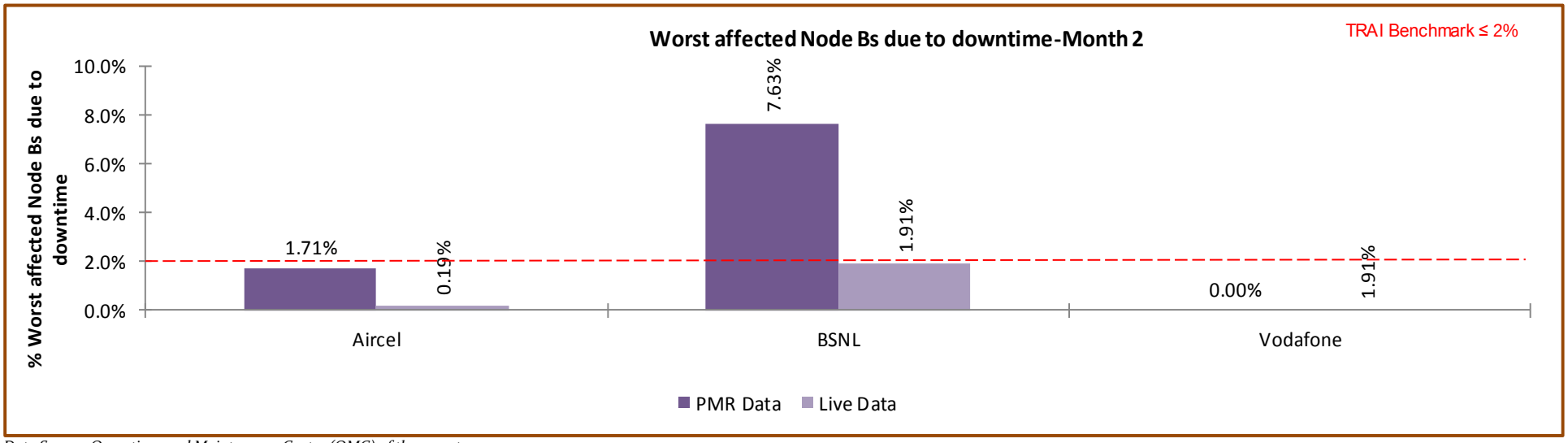
Significant difference was observed between PMR & live measurement data for Aircel and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



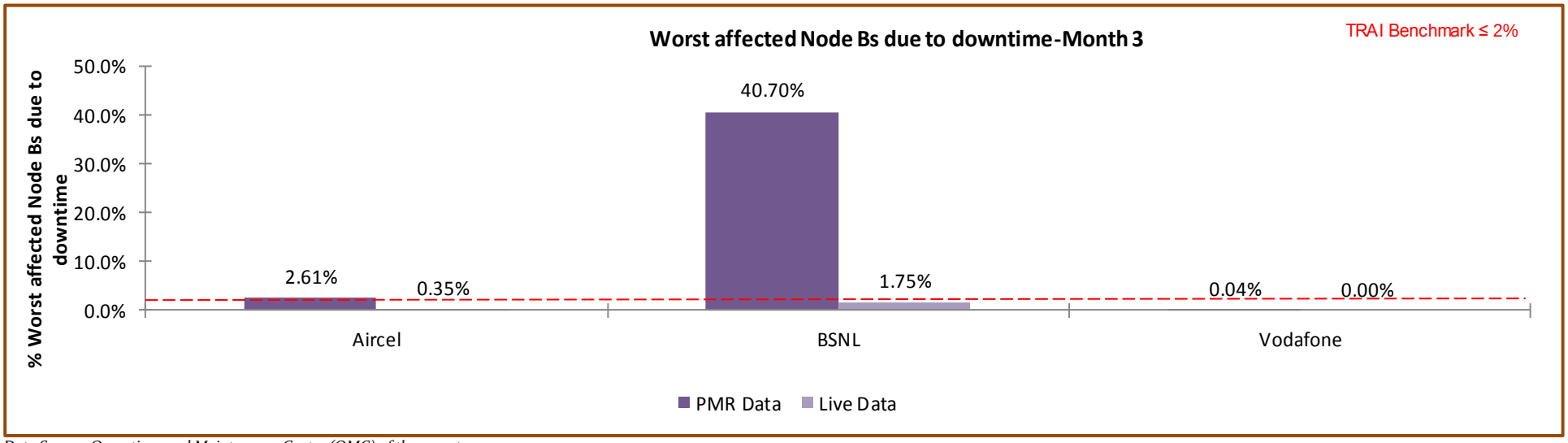
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



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

6.2.2.3 KEY FINDINGS – MONTH 3



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

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:-

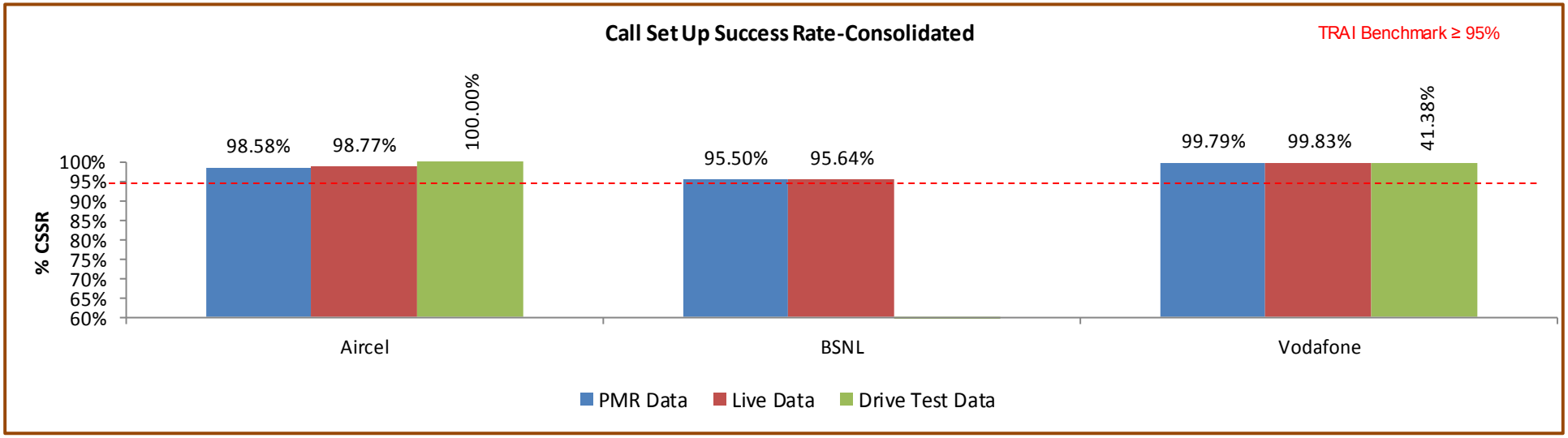
   - RRC attempt is made
   - The RRC established
   - The RRC is routed to the outward path of the concerned MSC

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.

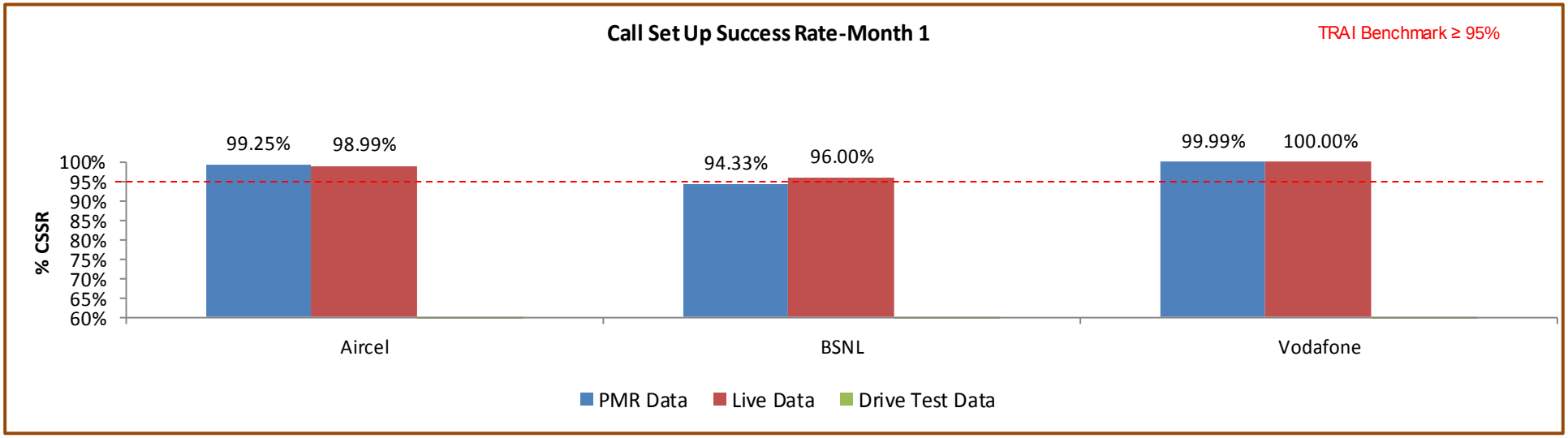
6.3.2 KEY FINDINGS - CONSOLIDATED



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

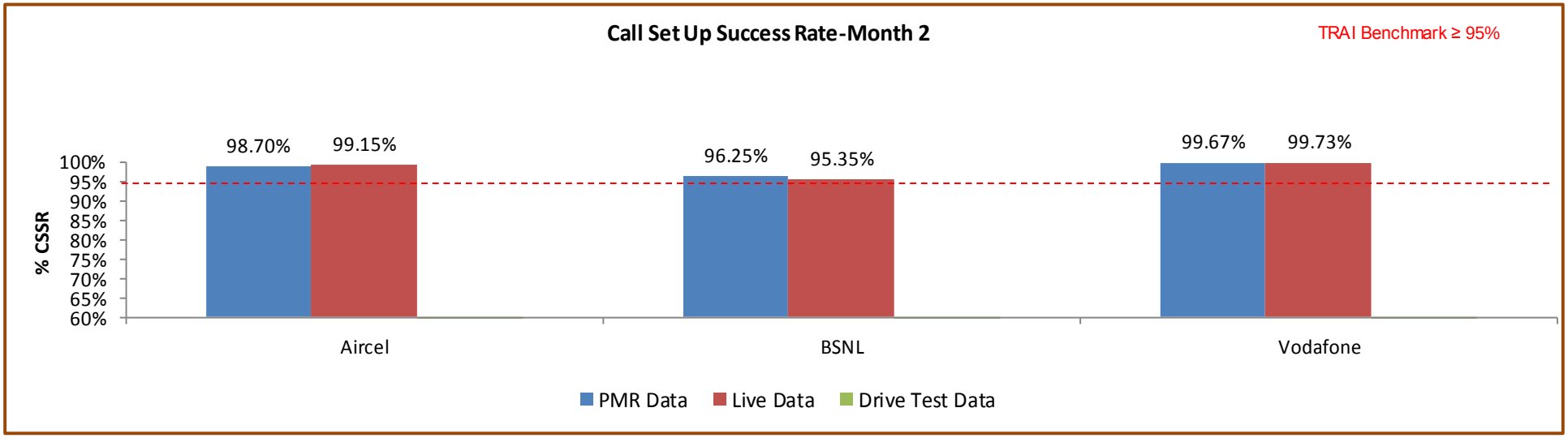
All operators met the TRAI benchmark as per audit/PMR data.

6.3.2.1 KEY FINDINGS – MONTH 1



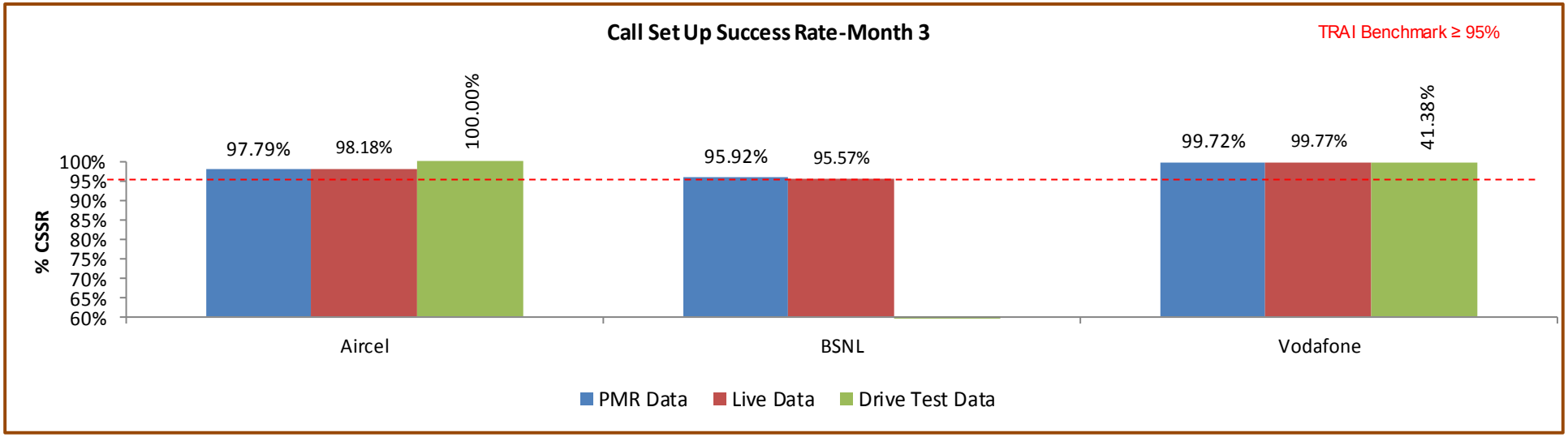
Data Source: Network Operations Center (NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2



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

6.3.2.3 KEY FINDINGS – MONTH 3



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

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% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
        - Where:-A1 = Number of attempts to establish RRC/ RAB made on day 1
        - C1 = Average RRC / RAB Congestion % on day 1
        - A2 = Number of attempts to establish RRC / RAB made on day 2
        - C2 = Average RRC / RAB Congestion % on day 2
        - An = Number of attempts to establish RRC / RAB made on day n
        - Cn = Average RRC / RAB Congestion % on day n

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

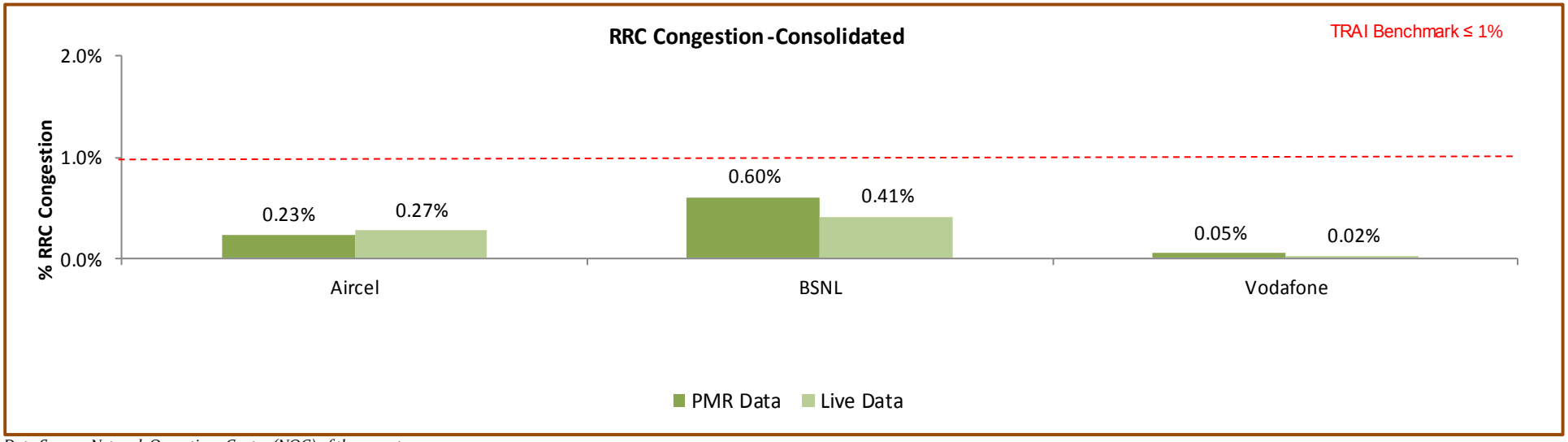
7. Benchmark:

- 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

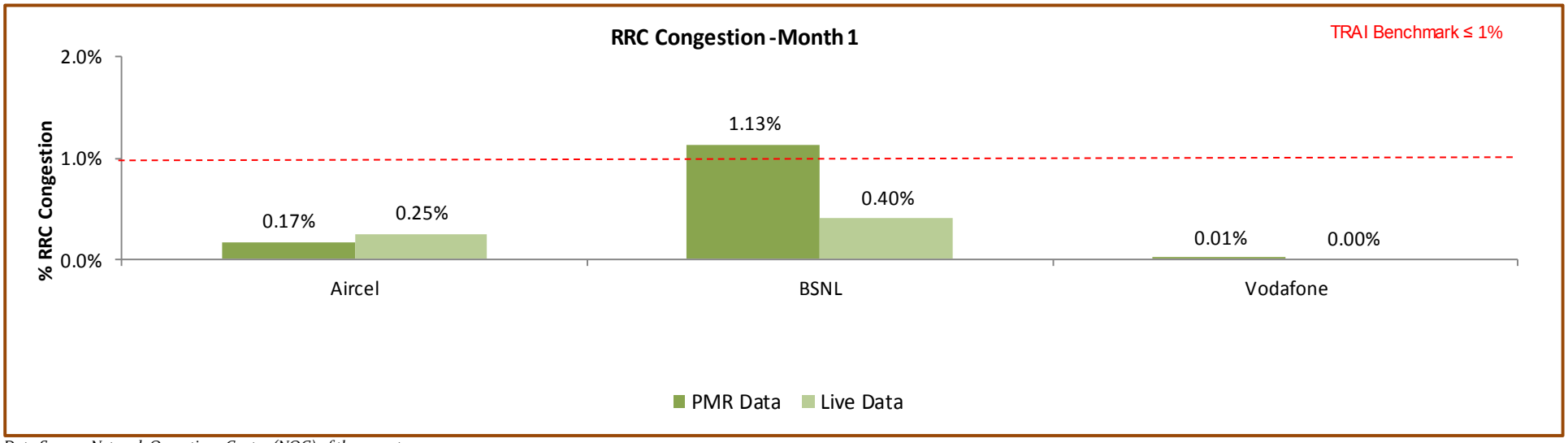
6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

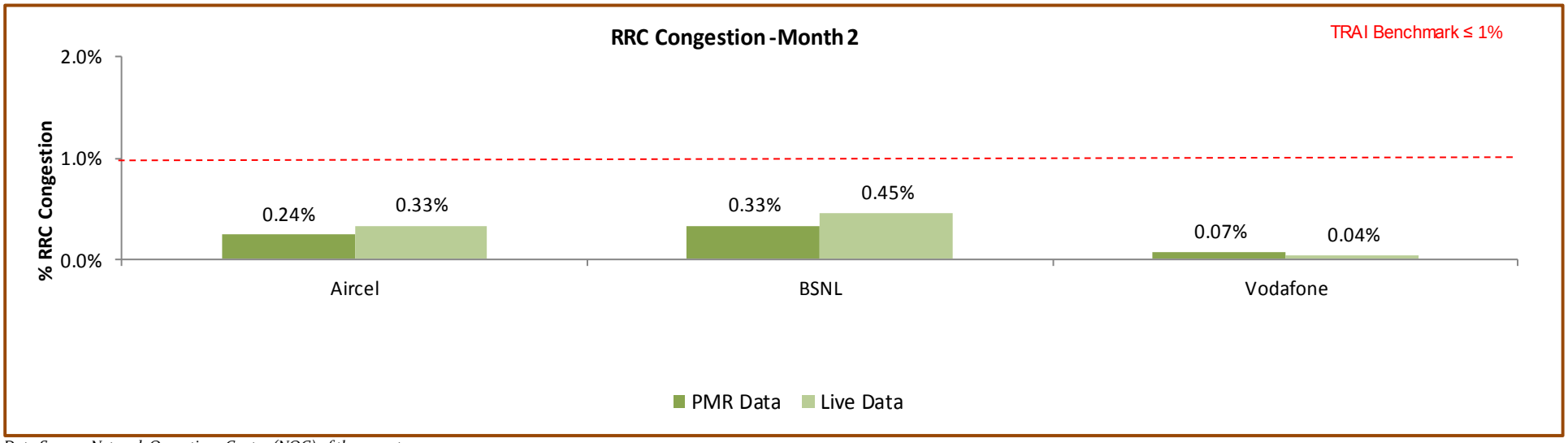
All operators met the benchmark for RRC congestion.

6.4.2.1 KEY FINDINGS – MONTH 1



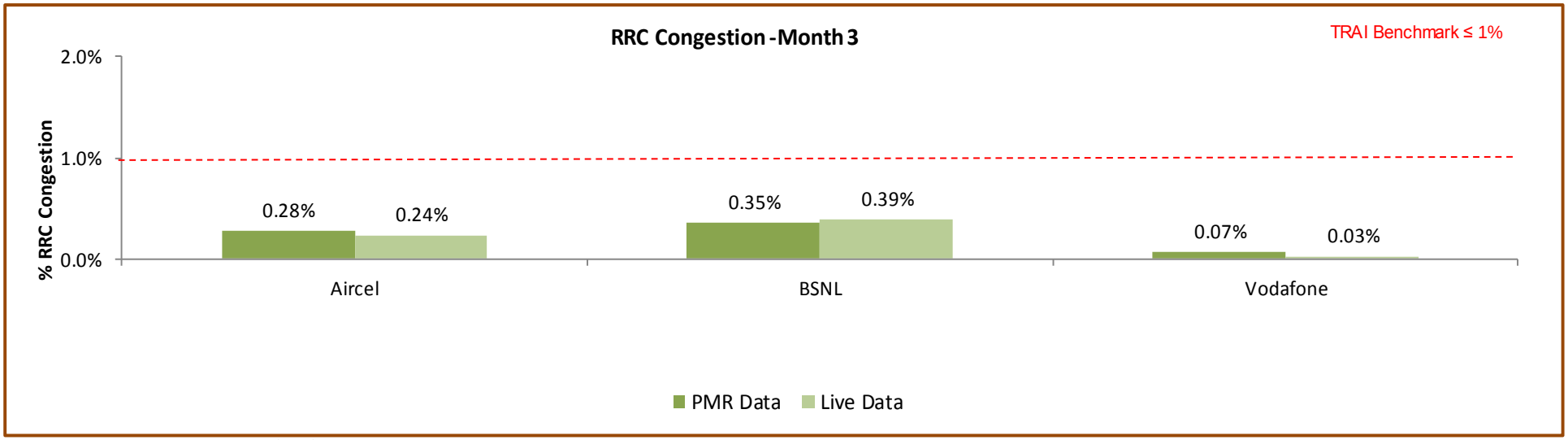
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



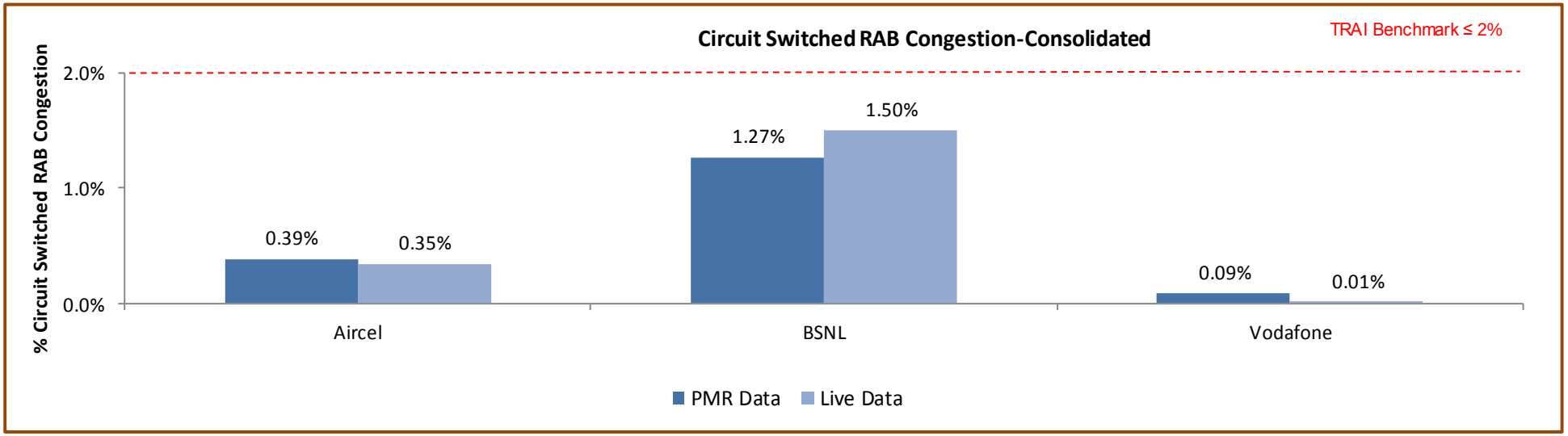
Data Source: Network Operations Center (NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



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

6.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

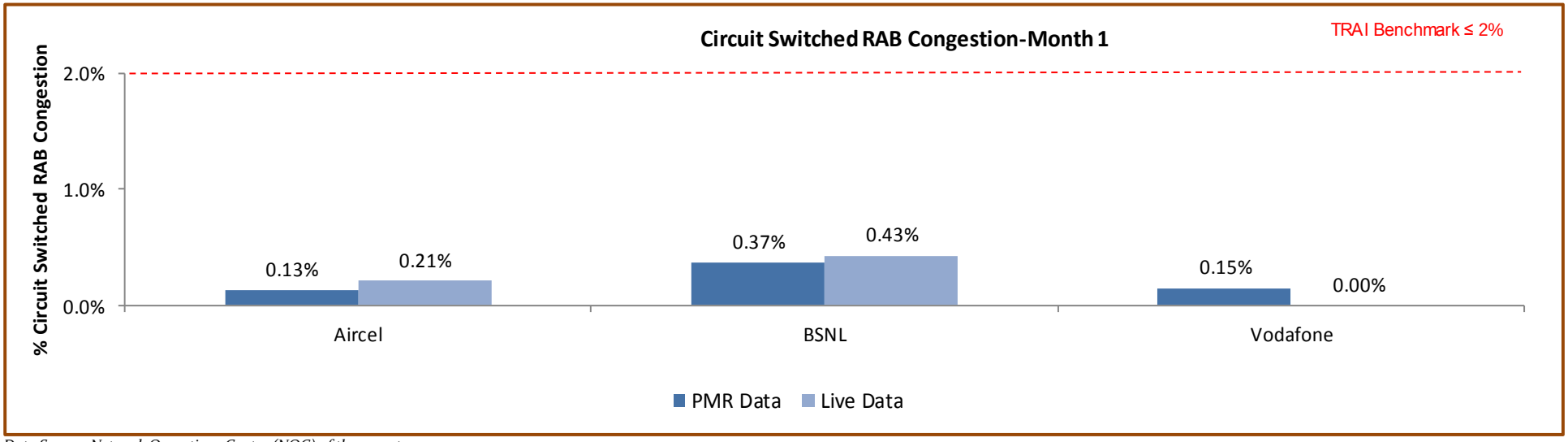


Data Source: Network Operations Center (NOC) of the operators

All operators meet the benchmark as per audit/PMR report.

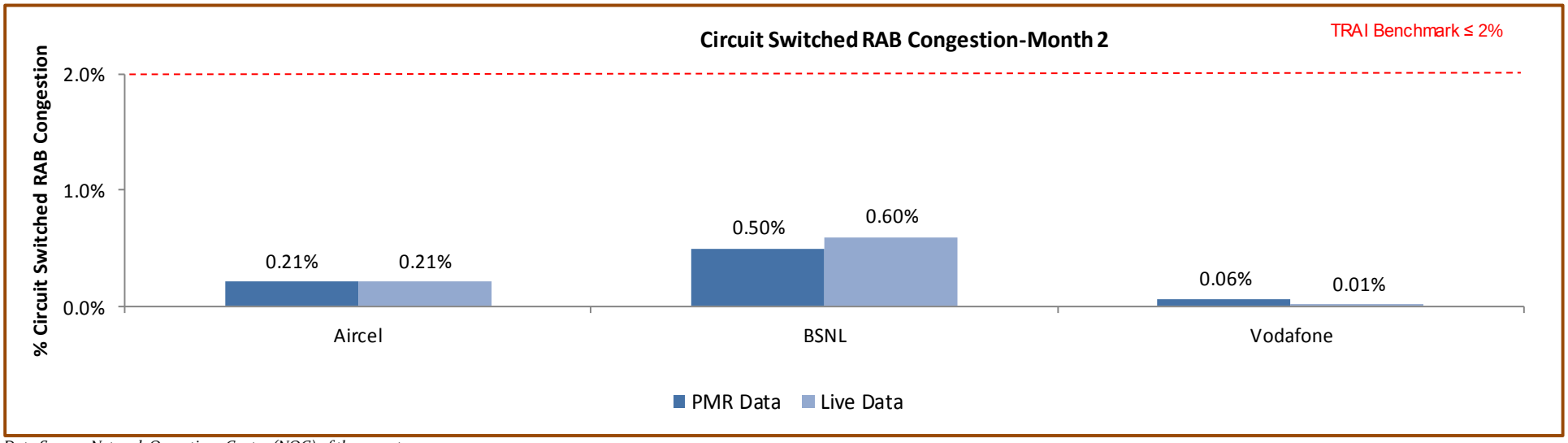
Significant difference was observed between PMR & live measurement data for BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



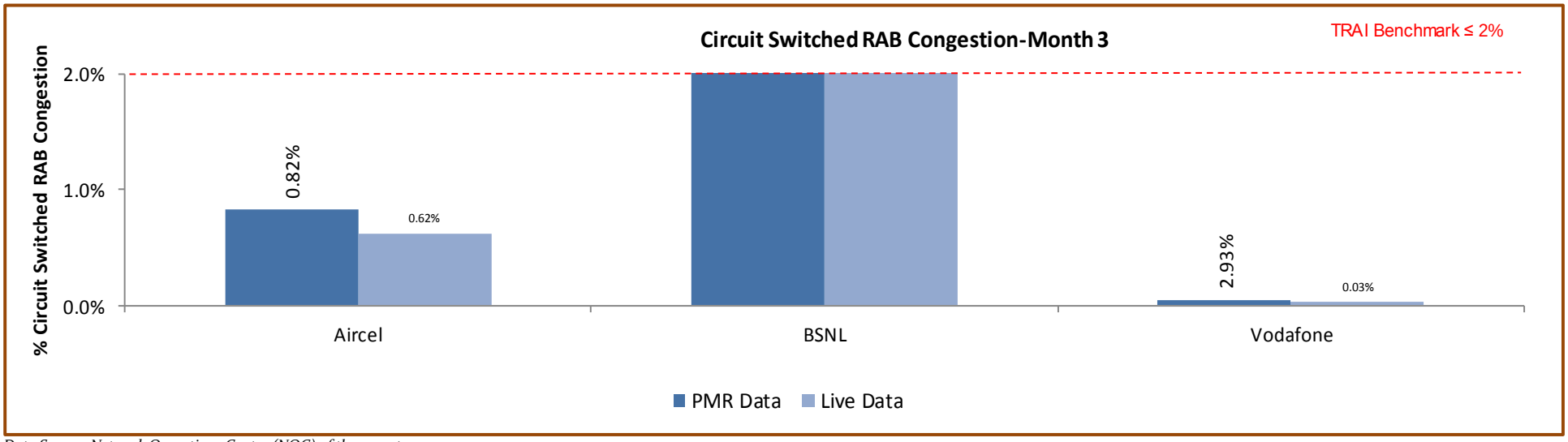
Data Source: Network Operations Center (NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2



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

6.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		66	77	48
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		241999	536231	908766
Traffic served for all POIs (B)- in erlangs		91900	89005	465610
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	48
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		243234	546921	906515
Traffic served for all POIs (B)- in erlangs		47477	92083	266033
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		66	77	45
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		79858	176124	187112
Traffic served for all POIs (B)- in erlangs		30436	28924	86901
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	45
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	181657	186549
Traffic served for all POIs (B)- in erlangs		15622	30171	53133
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		66	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81058	180337	361512
Traffic served for all POIs (B)- in erlangs		30120	28327	185743
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	181657	359672
Traffic served for all POIs (B)- in erlangs		15898	31479	130554
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81083	179769	360143
Traffic served for all POIs (B)- in erlangs		31345	31754	192966
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81076	183607	360294
Traffic served for all POIs (B)- in erlangs		15956	30433	82346
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

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

6.5 CIRCUIT SWITCHED VOICE DROP RATE

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

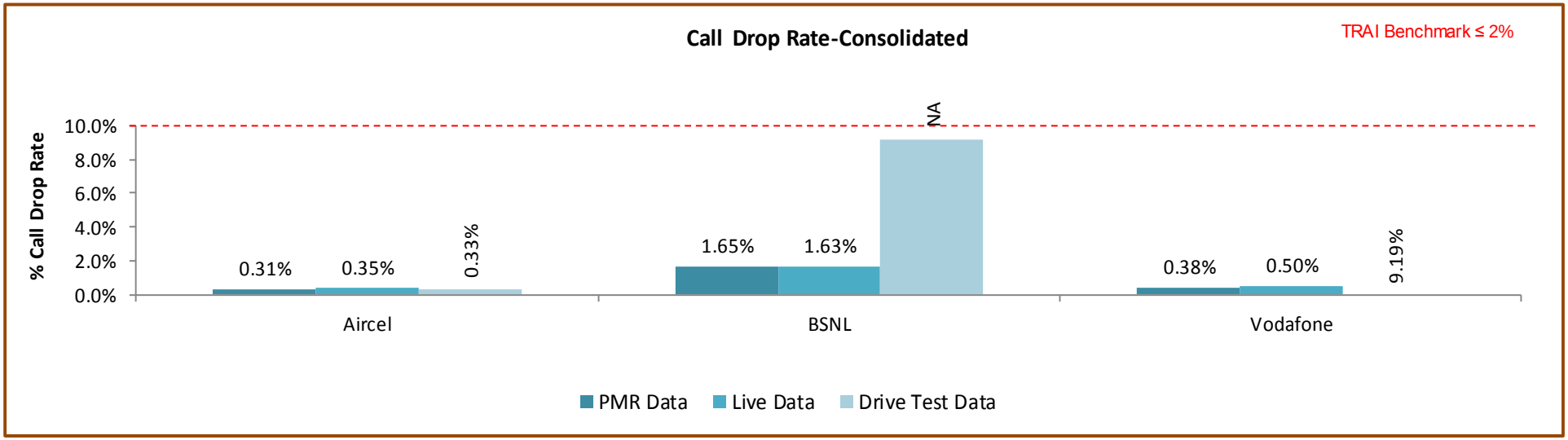
5. **TRAI Benchmark –**

   - 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.

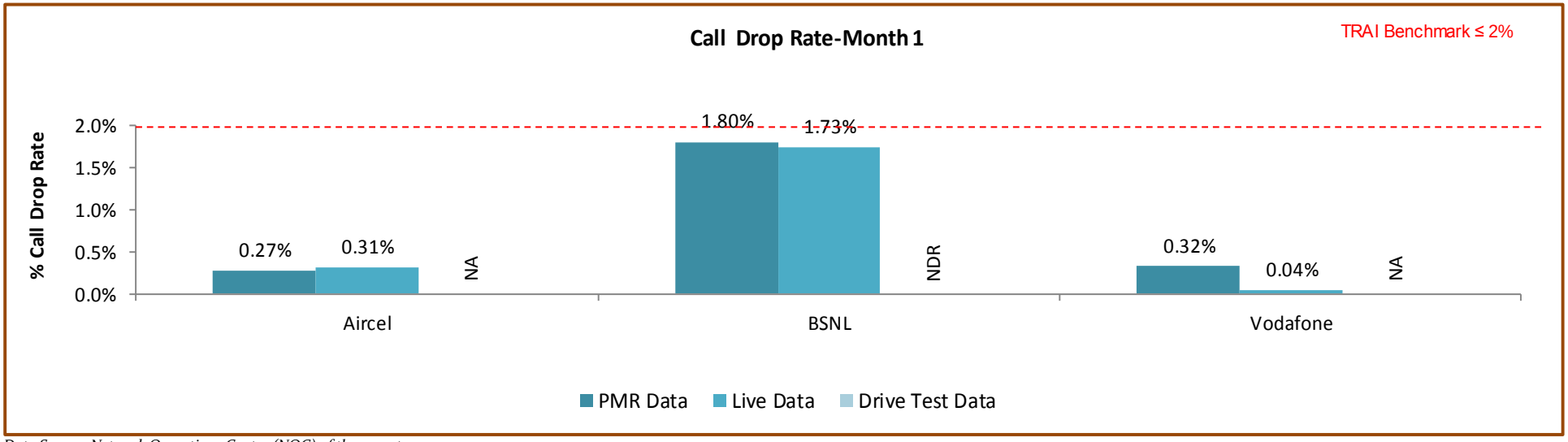
6.5.2 KEY FINDINGS - CONSOLIDATED



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

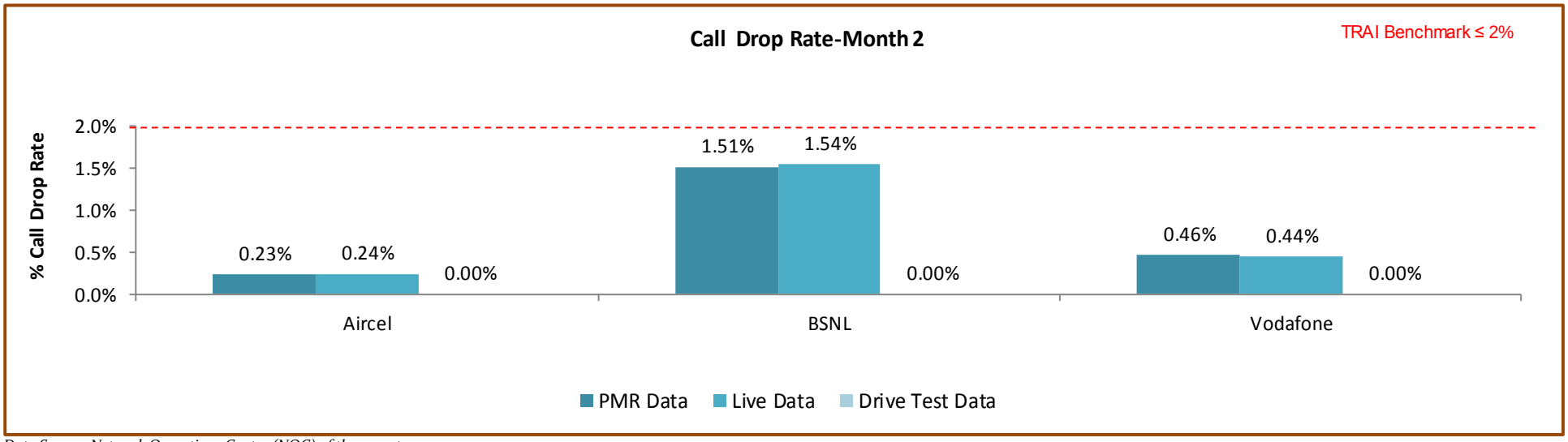
All operators met the benchmark for circuit switched voice drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



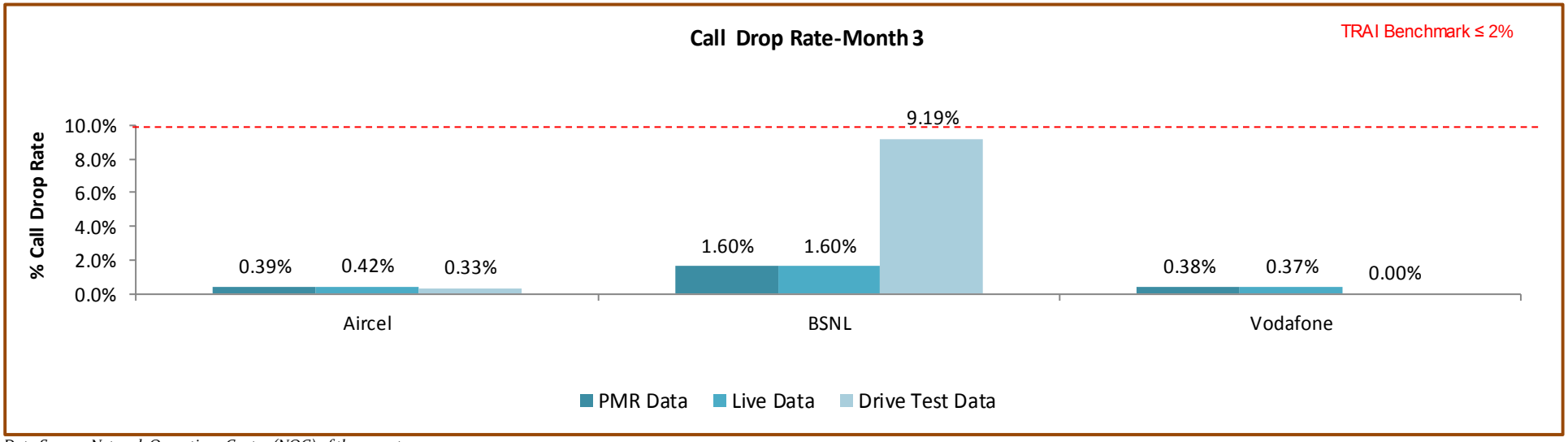
Data Source: Network Operations Center (NOC) of the operators

6.5.2.2 KEY FINDINGS – MONTH 2



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

6.5.2.3 KEY FINDINGS – MONTH 3



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** –

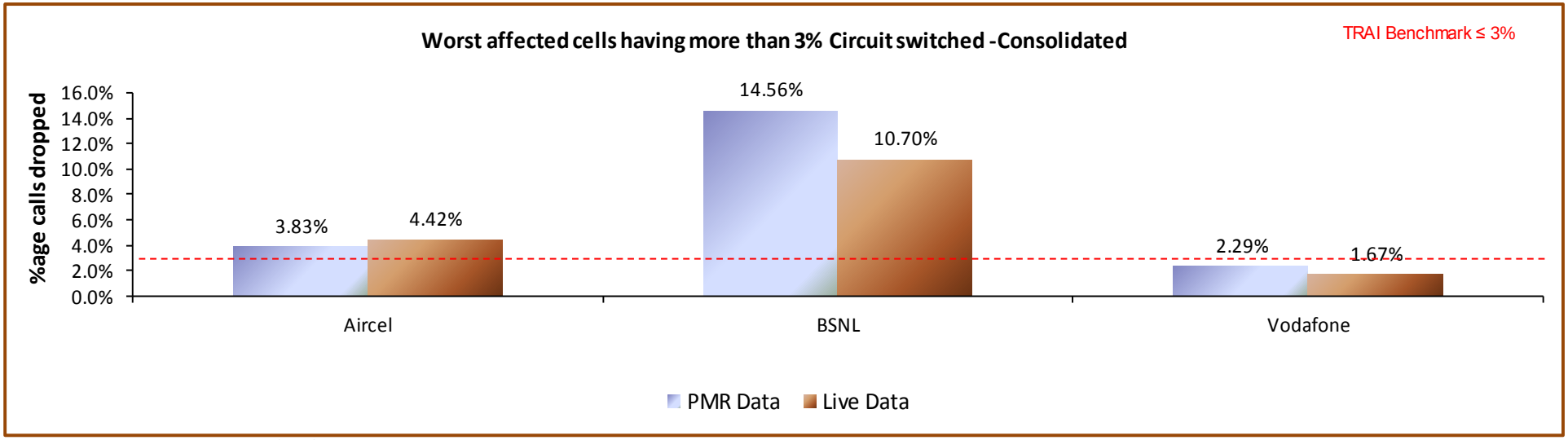
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

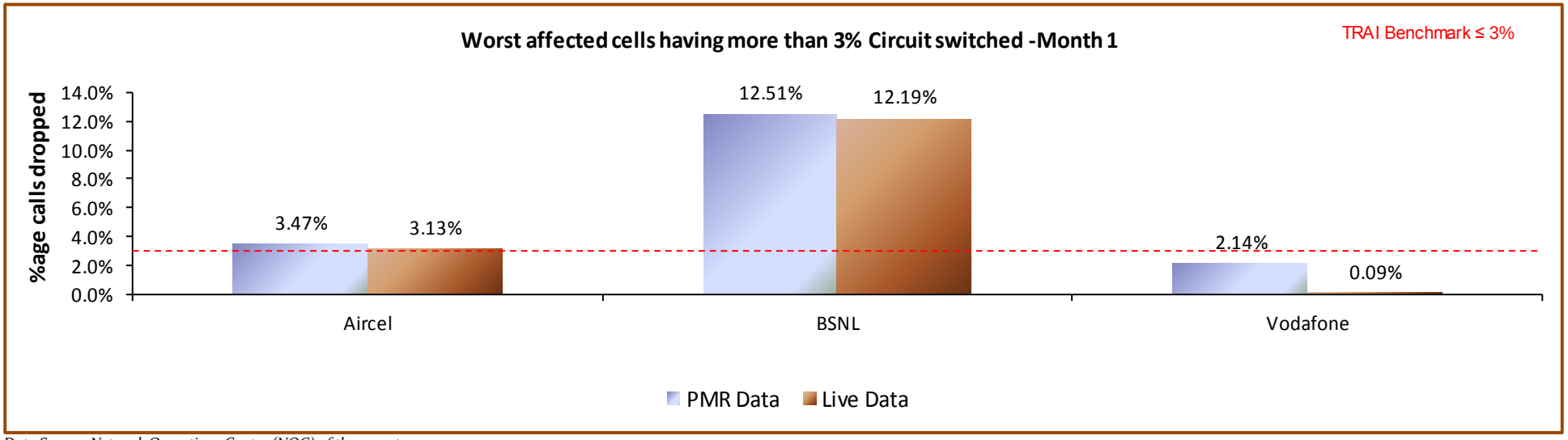
6.6.2 KEY FINDINGS - CONSOLIDATED



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

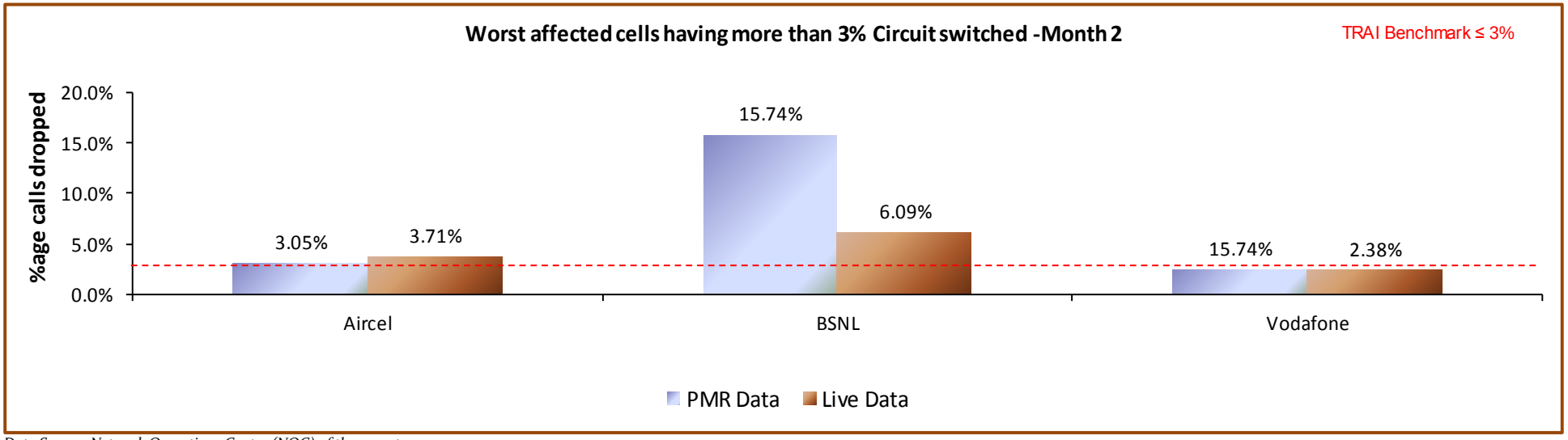
Aircel and BSNL did not meet the benchmark during audit.

6.6.2.1 KEY FINDINGS – MONTH 1



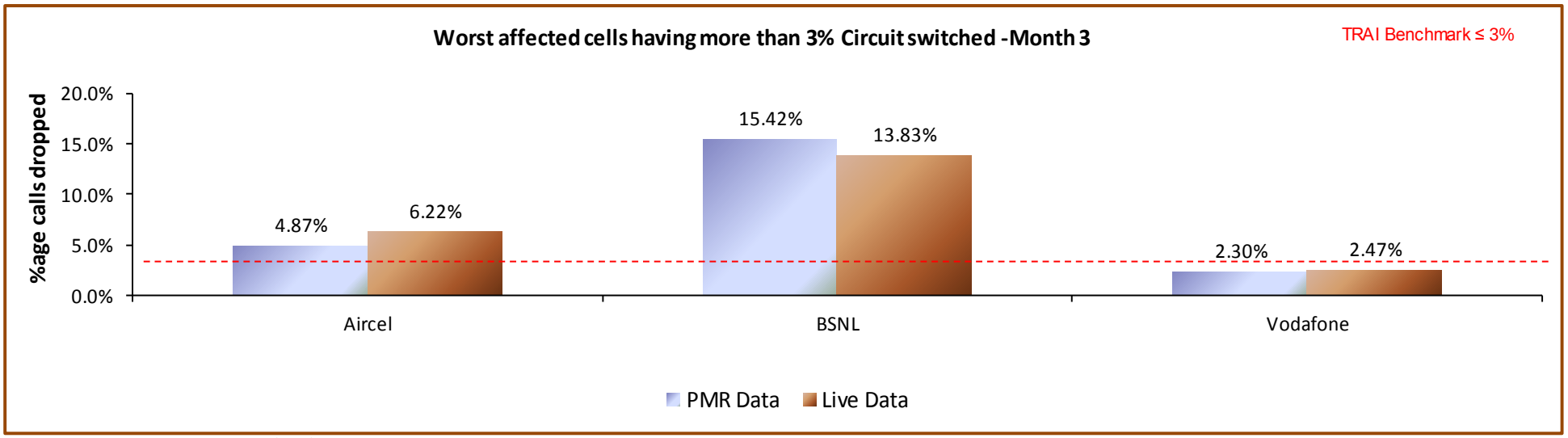
Data Source: Network Operations Center (NOC) of the operators

6.6.2.2 KEY FINDINGS – MONTH 2



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

6.6.2.3 KEY FINDINGS – MONTH 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**

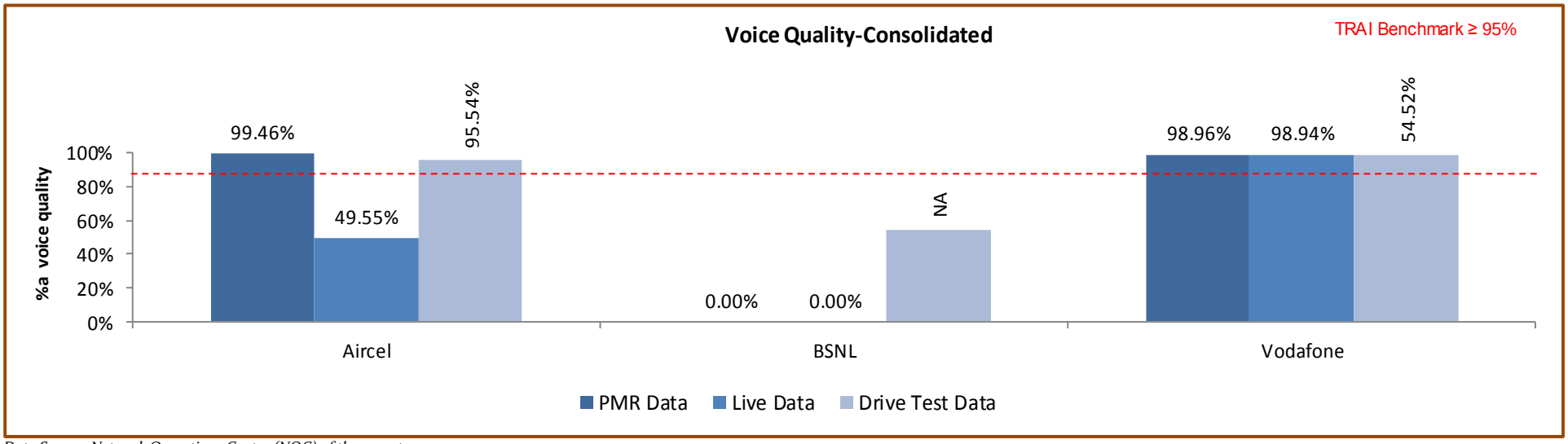
7. **TRAI Benchmark:** ≥ 95%

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.

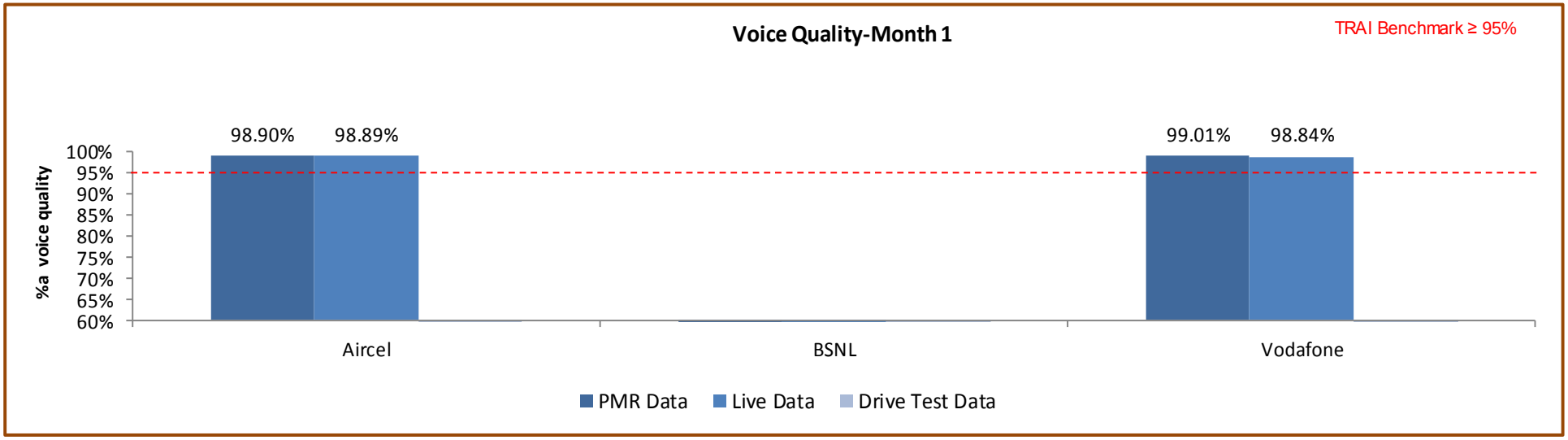
6.7.2 KEY FINDINGS



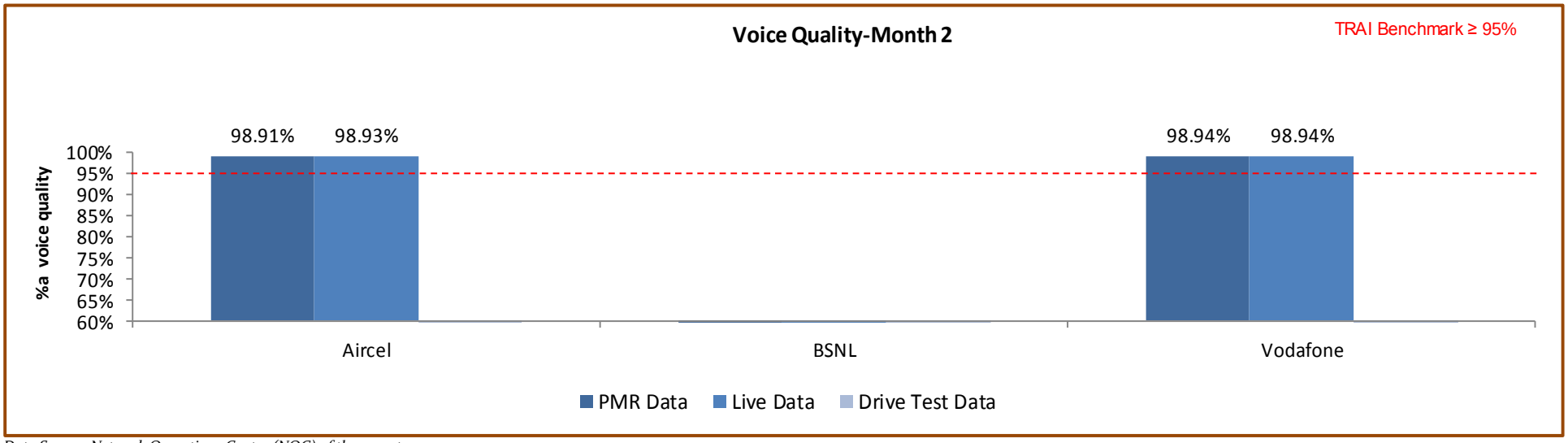
Data Source: Network Operations Center (NOC) of the operators

All operators met the bench for circuit switch voice quality

6.7.2.1 KEY FINDINGS – MONTH 1

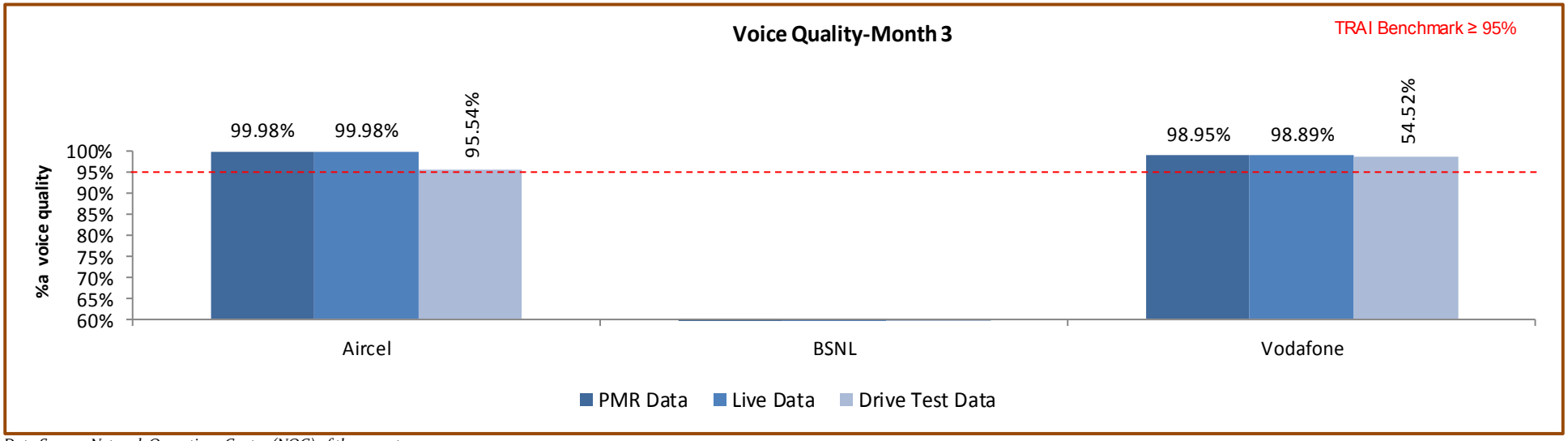


6.7.2.2 KEY FINDINGS – MONTH 2



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

6.7.2.3 KEY FINDINGS – MONTH 3



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

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

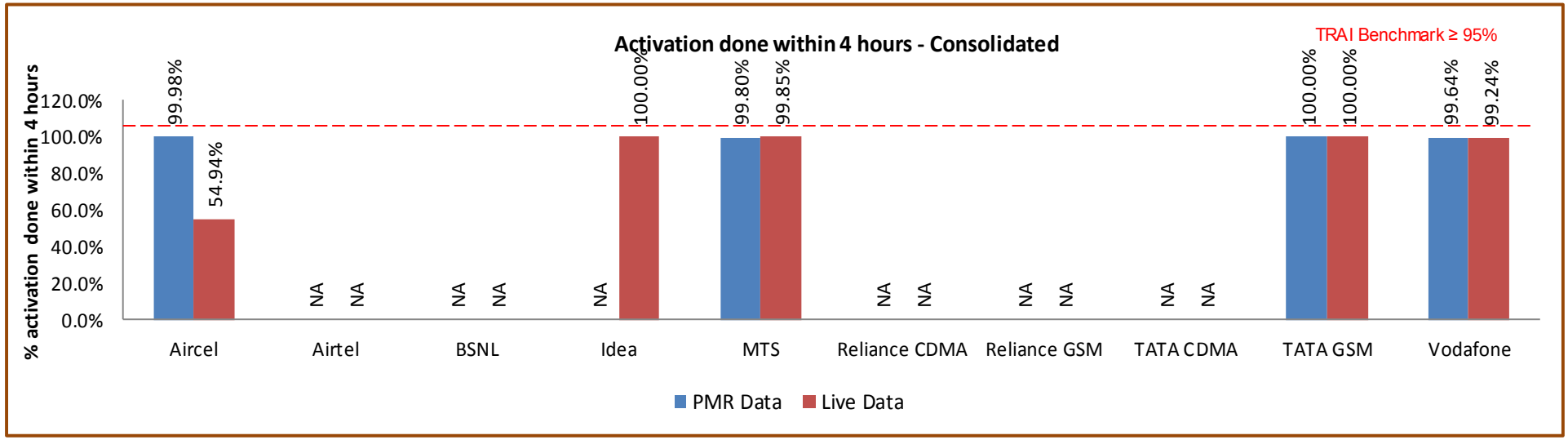
7.1 SERVICE ACTIVATION /PROVISIONING FOR 2G PMR & 3DAYS LIVE

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.

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

7.1.2 KEY FINDINGS



All operators met the benchmark except Aircel for 3days live.

7.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G PMR & 3DAYS LIVE

7.2.1 PARAMETER DESCRIPTION

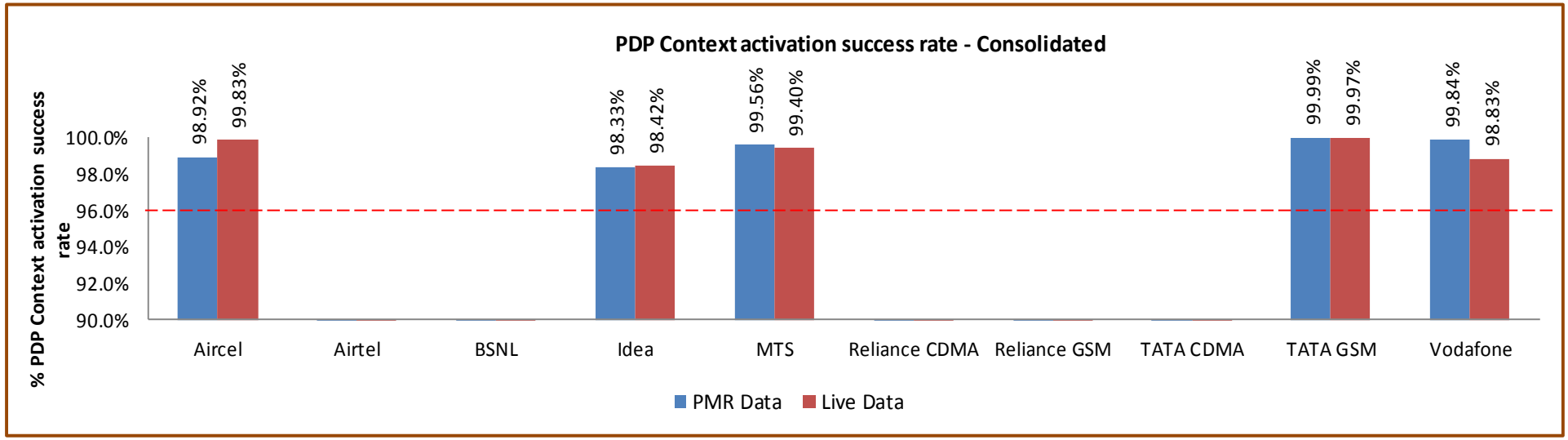
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support 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.

$$\textbf{PDP Context Activation Success Rate (\%)} = \frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

7.2.2 KEY FINDINGS



All operators met the benchmark for PDP context activation success rate.

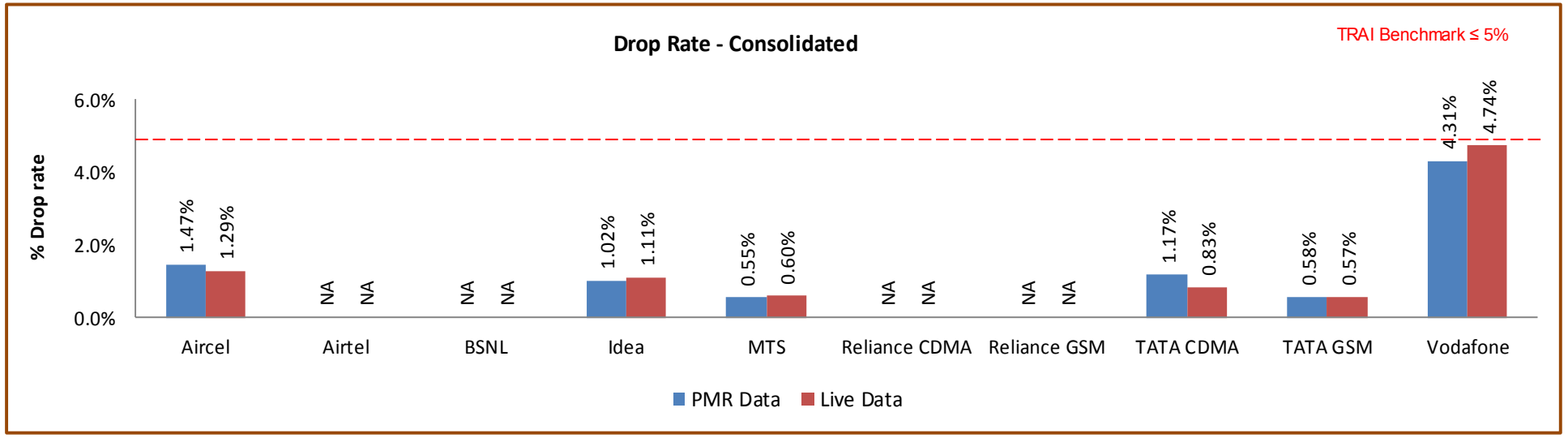
7.3 DROP RATE FOR 2G PMR & 3DAYS LIVE

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.

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

7.3.2 KEY FINDINGS



All operators met the benchmark for drop rat. Best performance was for TATA GSM.

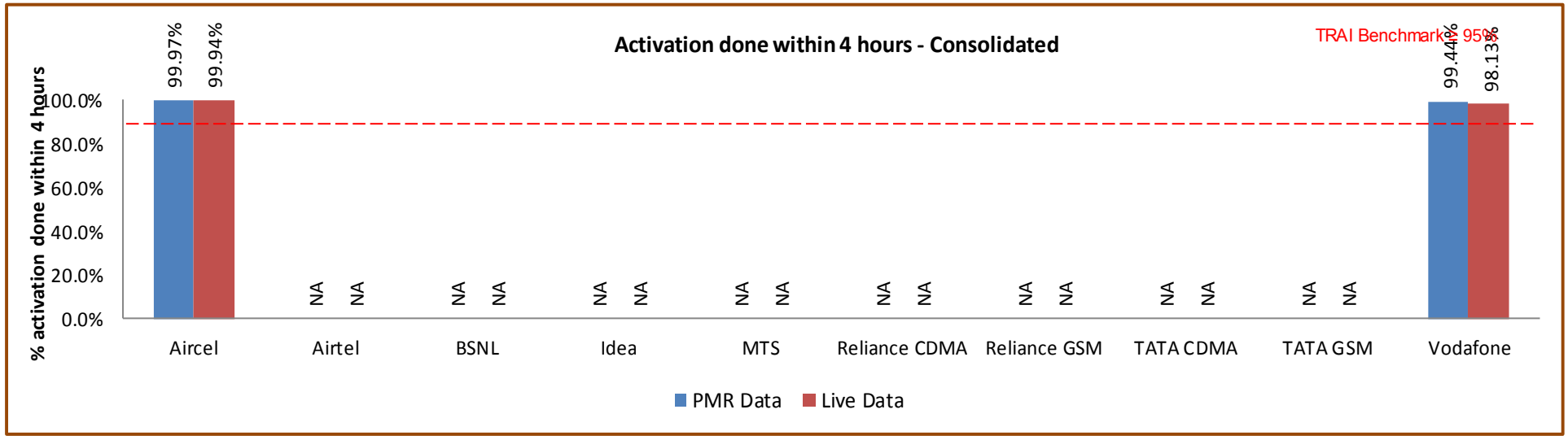
7.4 SERVICE ACTIVATION /PROVISIONING FOR 3G PMR & 3DAYS LIVE

7.4.1 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.

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

7.4.2 KEY FINDINGS



All operators met the benchmark for Activation done within 4 hours.

7.5 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 3G PMR & 3DAYS LIVE

7.5.1 PARAMETER DESCRIPTION

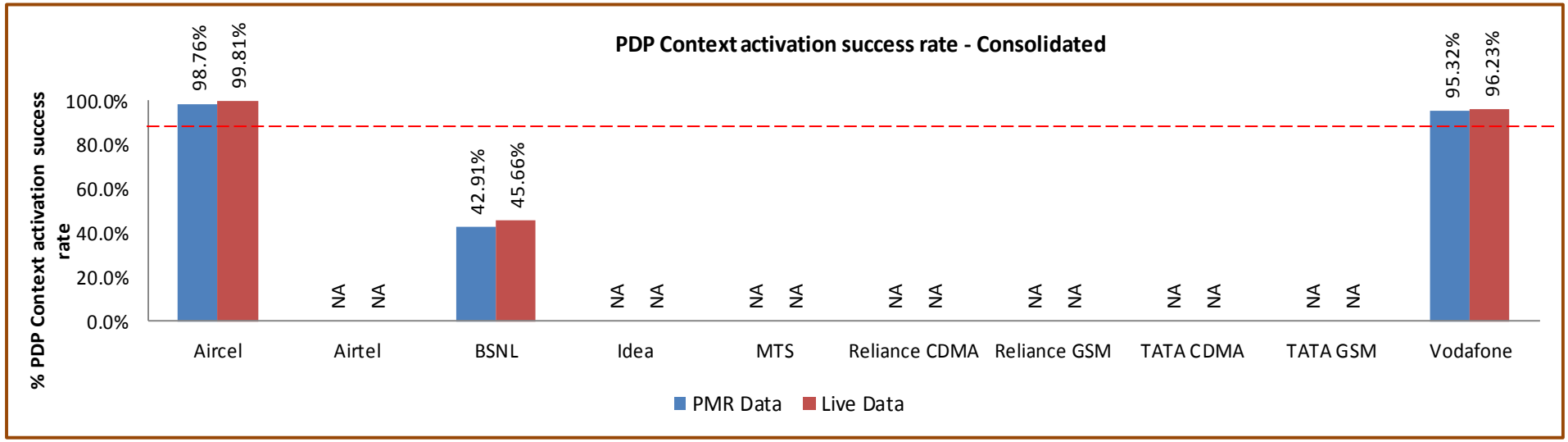
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support 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.

$$\textbf{PDP Context Activation Success Rate (\%)} = \frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

7.5.2 KEY FINDINGS



All operators met the benchmark for PDP context activation success rate except BSNL.

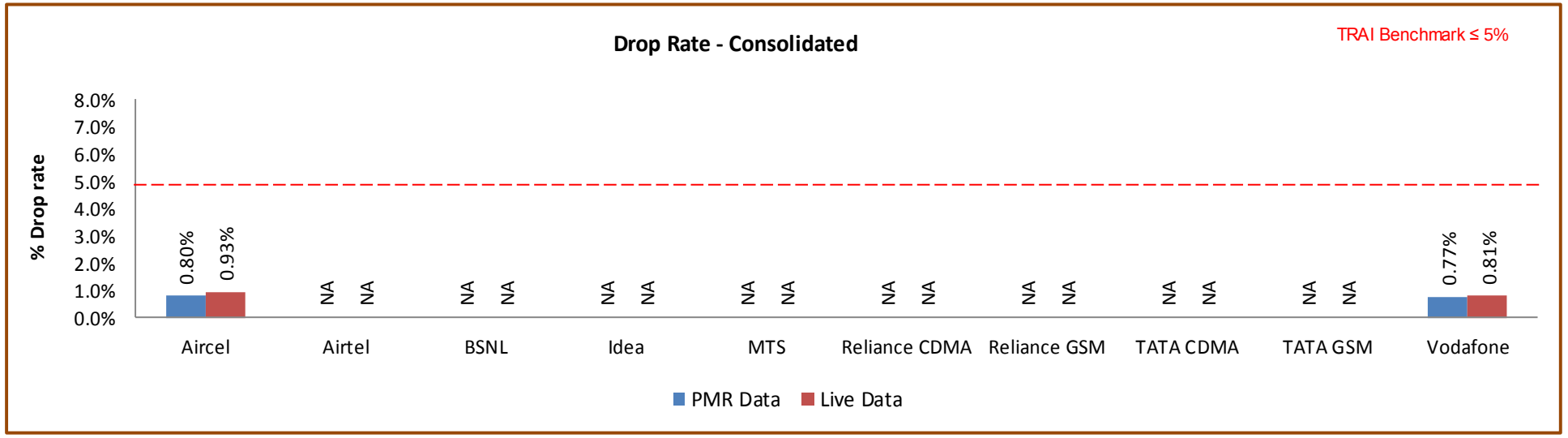
7.6 DROP RATE FOR 3G PMR & 3DAYS LIVE

7.6.1 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.

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

7.6.2 KEY FINDINGS



All operators met the benchmark for drop rate.

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

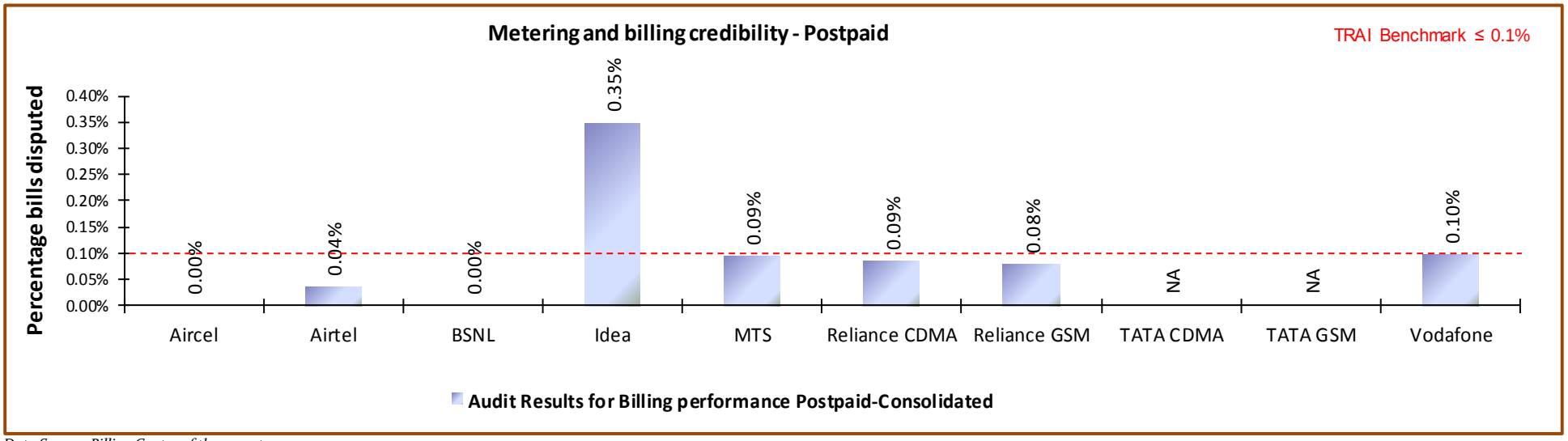
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

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

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

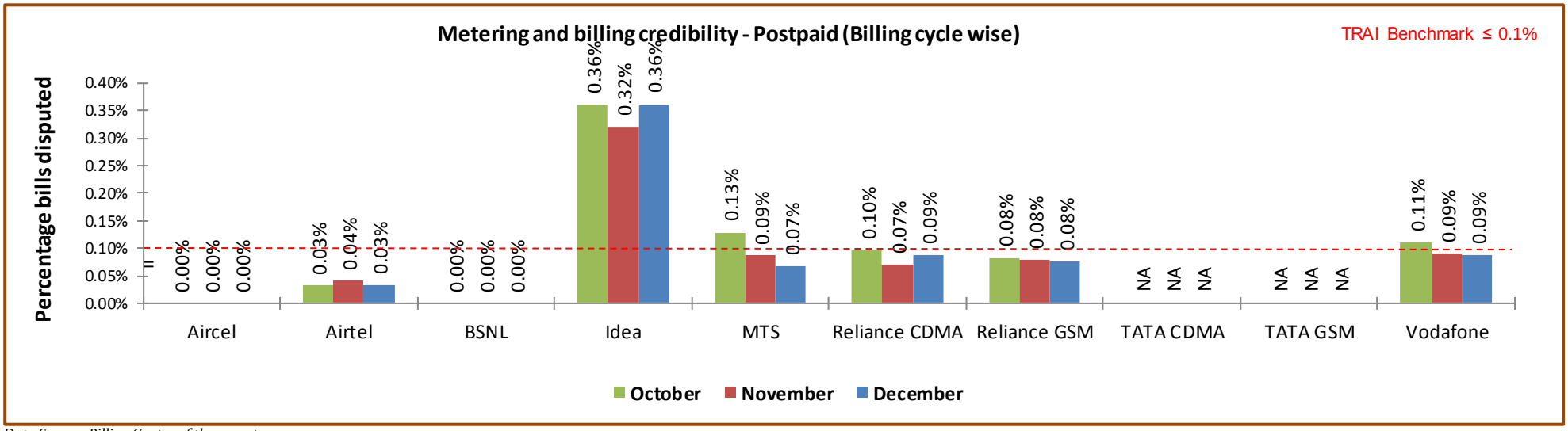
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
  - **Billing complaints here shall include only dispute related issues (including those that November 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)



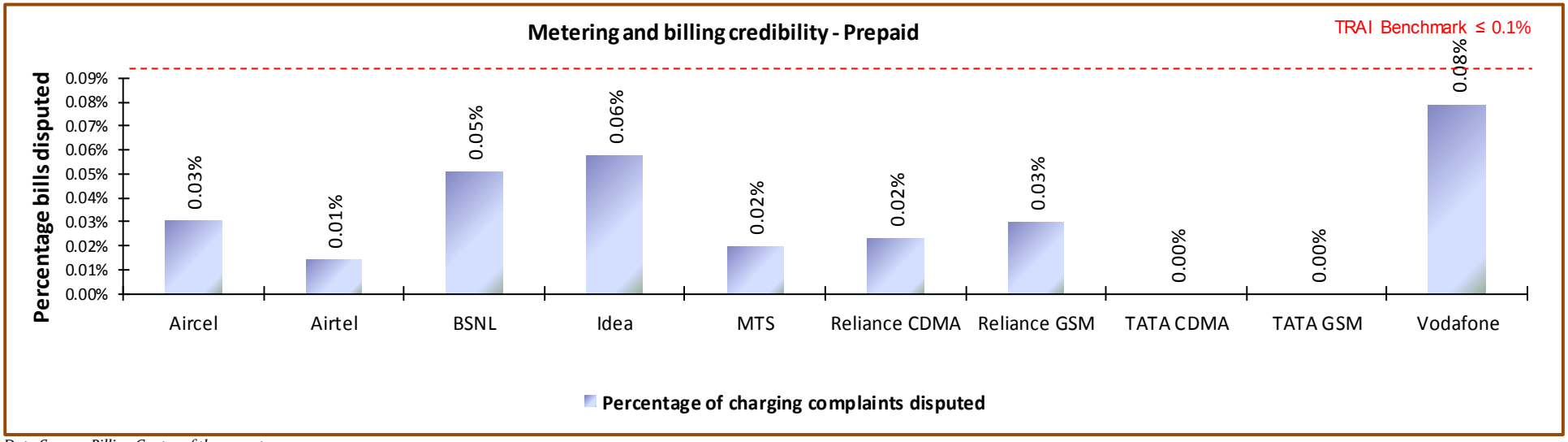
Data Source: Billing Center of the operators

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



Data Source: Billing Center of the operators

8.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

All operators met 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:

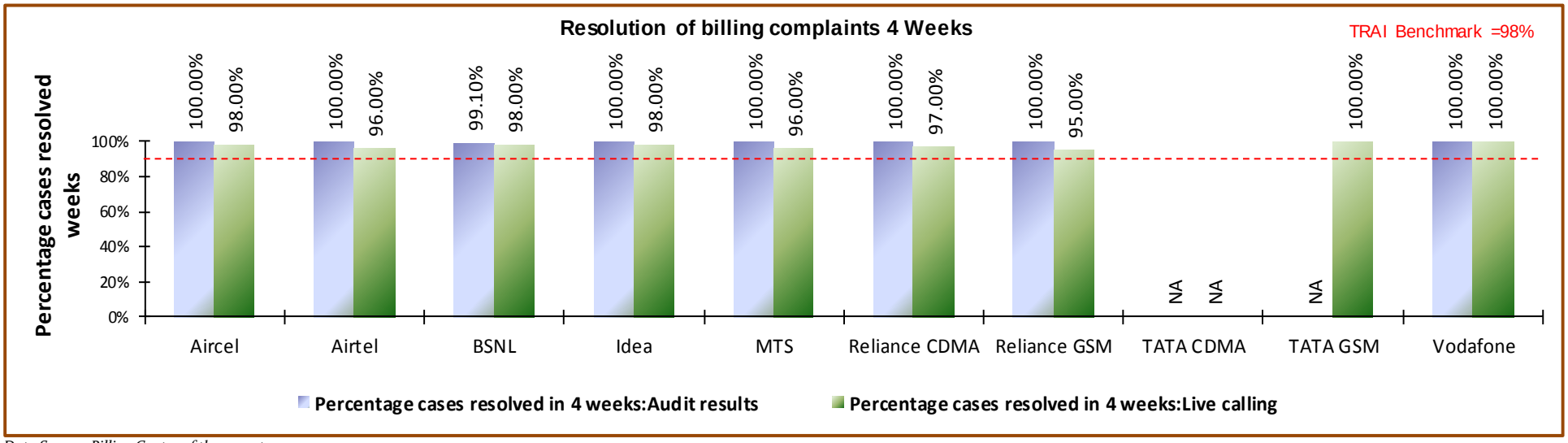
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

- **Billing complaints here shall include only dispute related issues (including those that November 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.

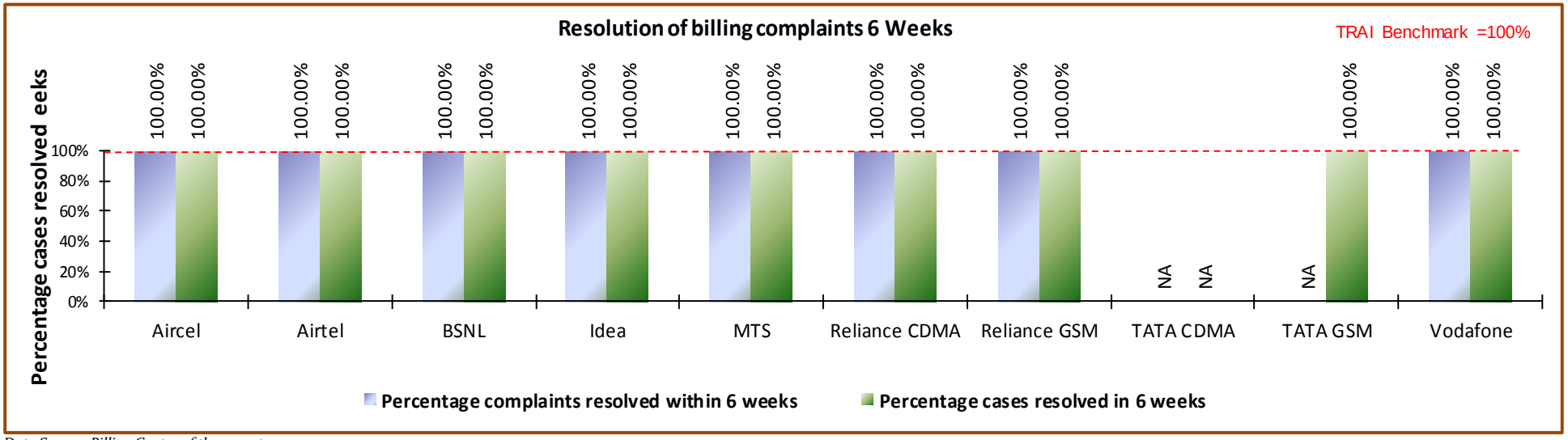
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

8.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

8.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

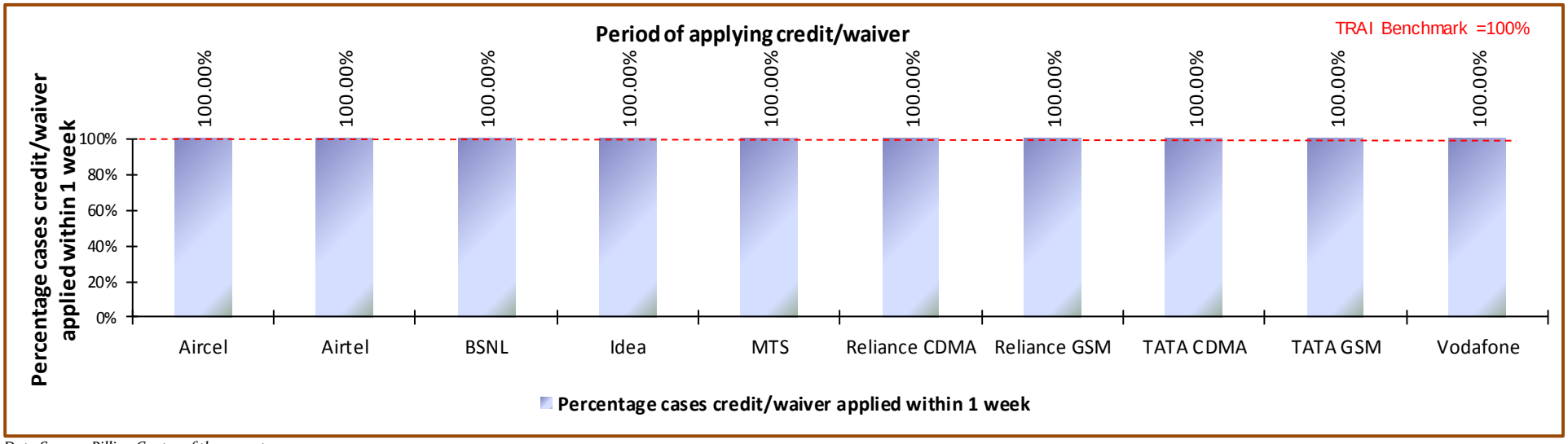
All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks.

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

8.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

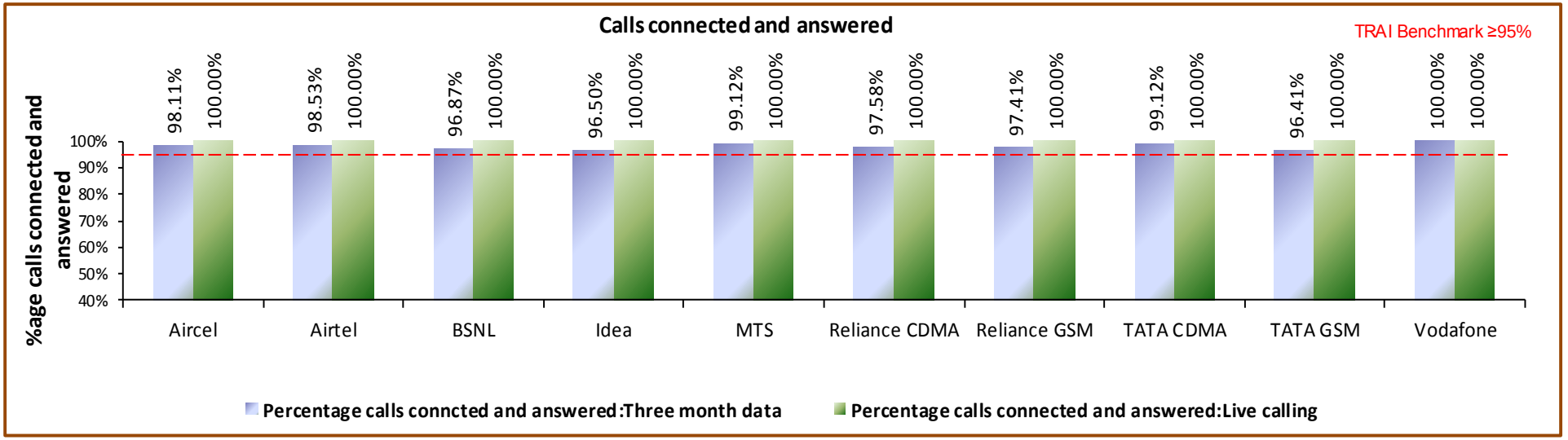
All operators met the benchmark for this parameter.

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



Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

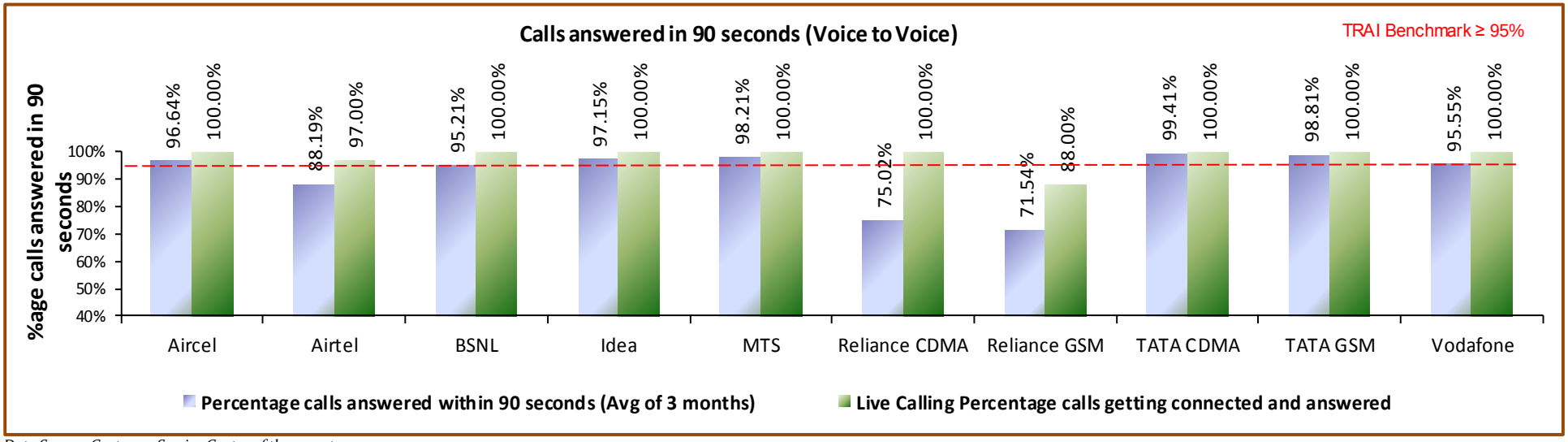
8.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

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

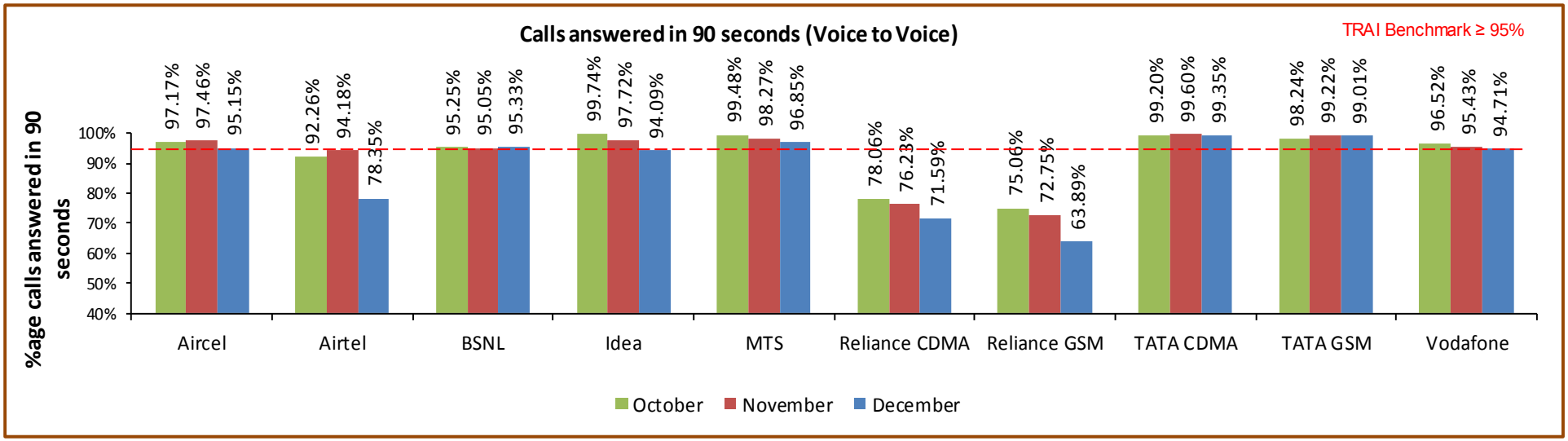
Benchmark: 95% calls to be answered within 90 seconds

8.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Airtel and Reliance CDMA & GSM were not able to meet the benchmark as per audit.



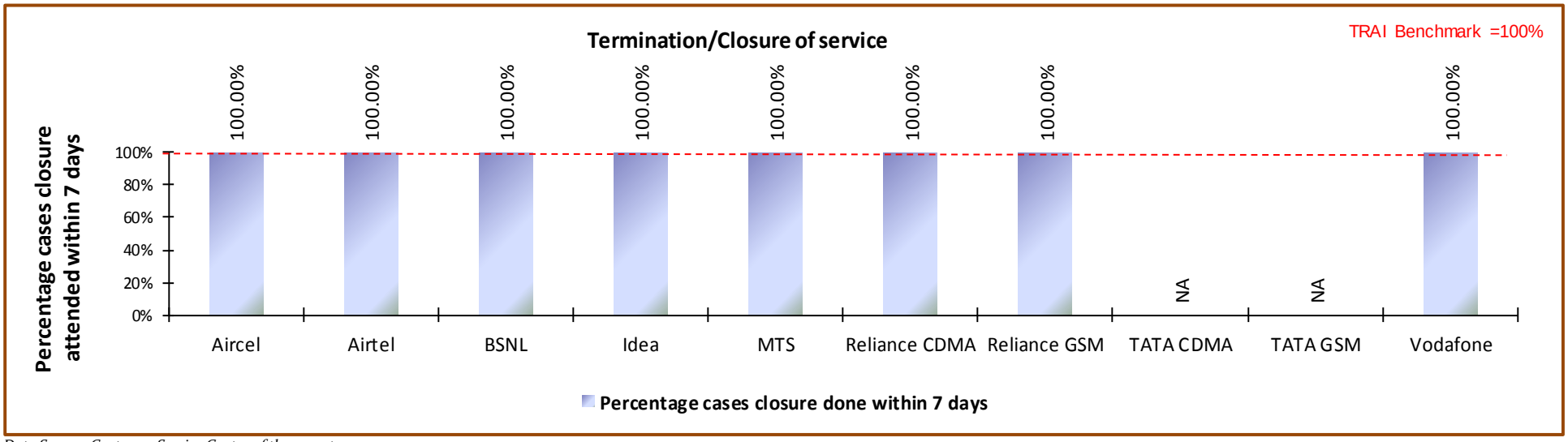
Data Source: Customer Service Center of the operators

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



Data Source: Customer Service Center of the operators

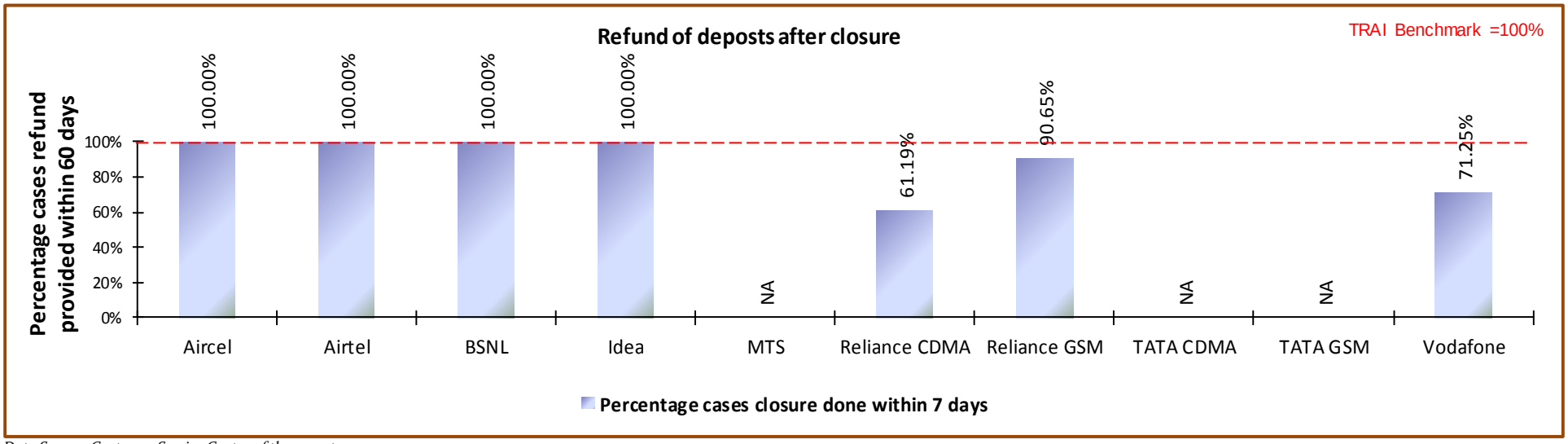
All operators met the TRAI benchmark for the parameter.

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

8.7.2 KEY FINDINGS



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 West Bengal 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 West Bengal circle are given below.

9.1.1 Asansol SSA

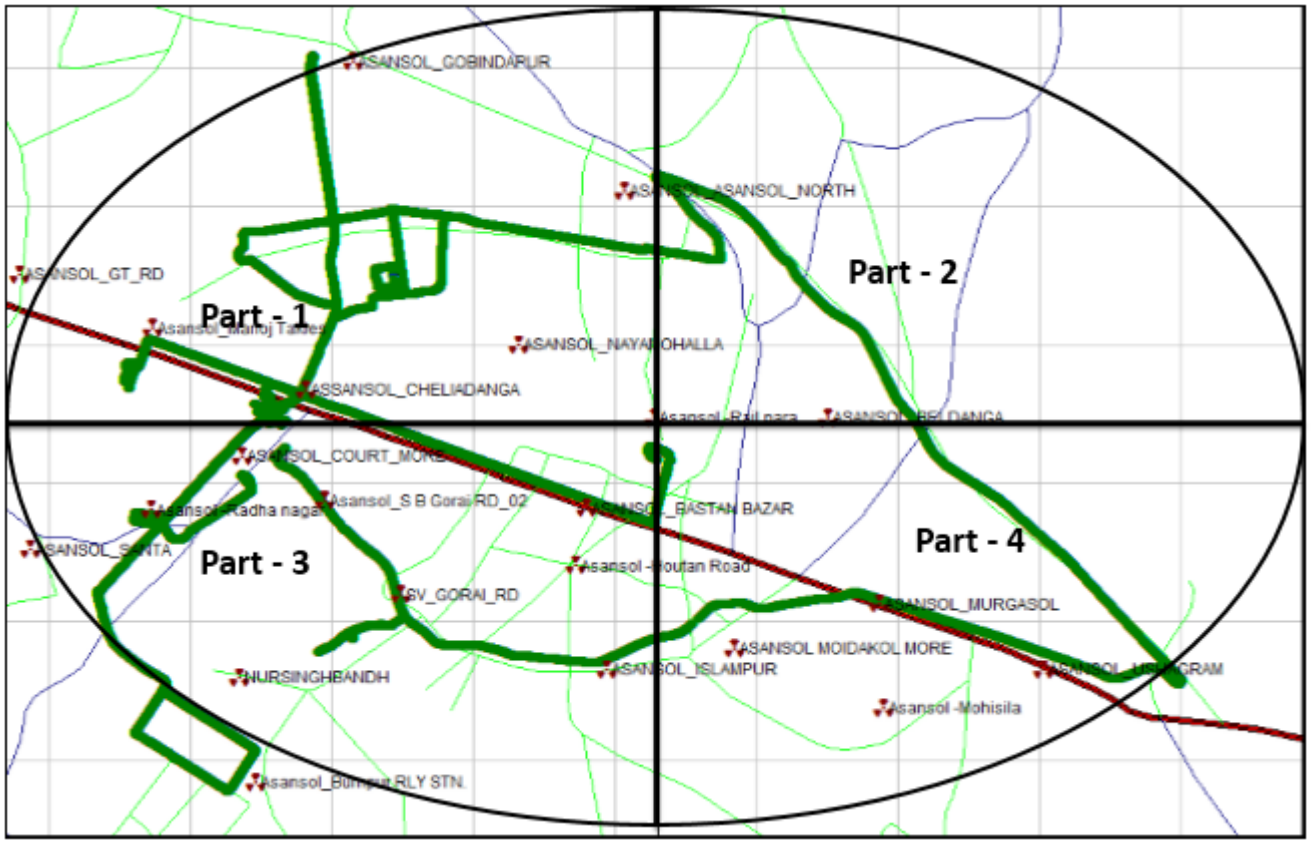
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	ASANSOL	14-12-1015	16-12-2015	330

9.1.1.1 Route Details - Asansol SSA

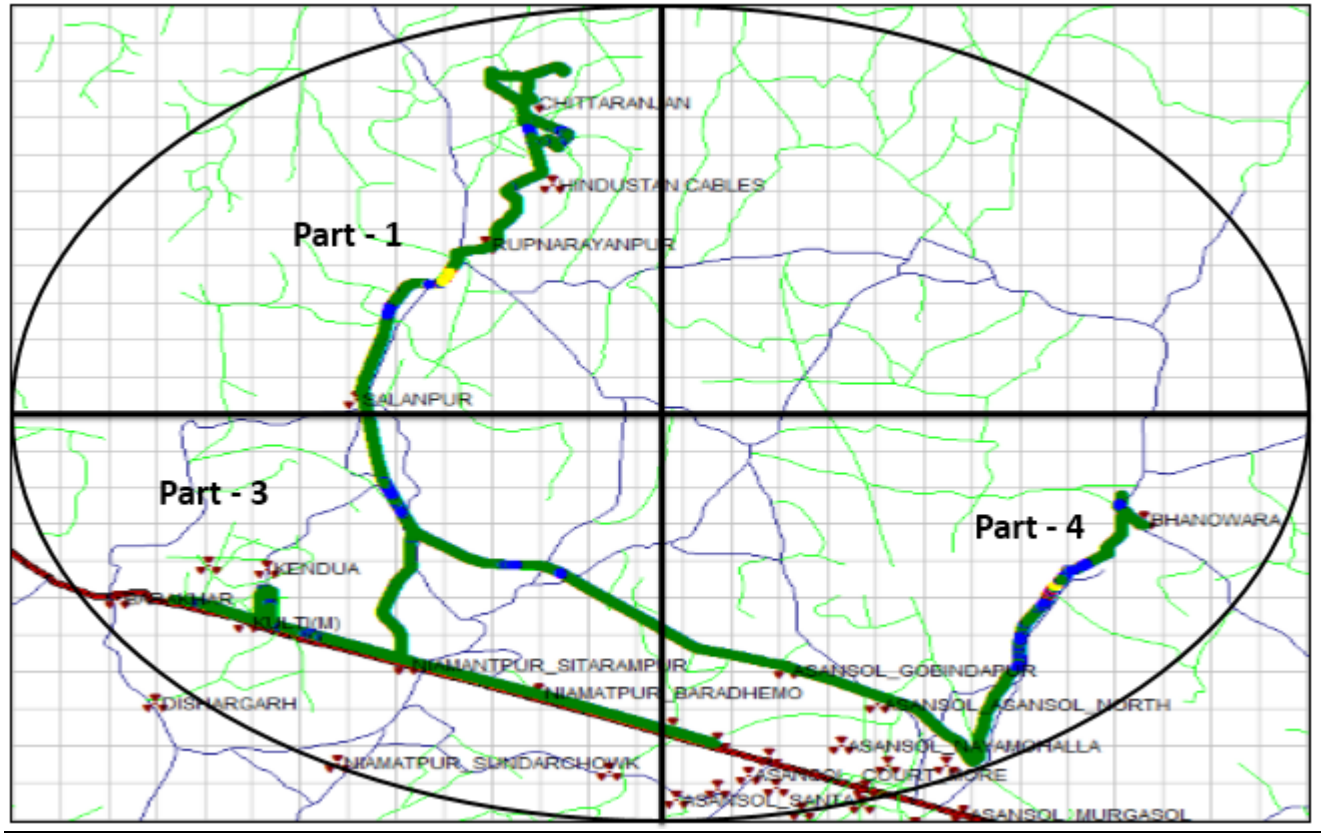
Category	Type of location	December		
		ASANSOL		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Asansol stn , Manoj cinema , Apcar Garden Sitla , Suryasen Park Bigbazaar , G.T.Road , Purana station Court more , Radhanagar,Purunina Talab , Drubdanga	Asansol stn , Manoj cinema , Apcar Garden Sitla , Suryasen Park Bigbazaar , G.T.Road , Purana station Court more , Radhanagar,Purunina Talab , Drubdanga	Ushagram Boys High School,Airtel Office,Hirapur Pandbeswar,Phulbagan Raniganj,Andal,Durgapur,Durgapur city center Mangalpur,KM Hospital Raniganj
	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 November 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.

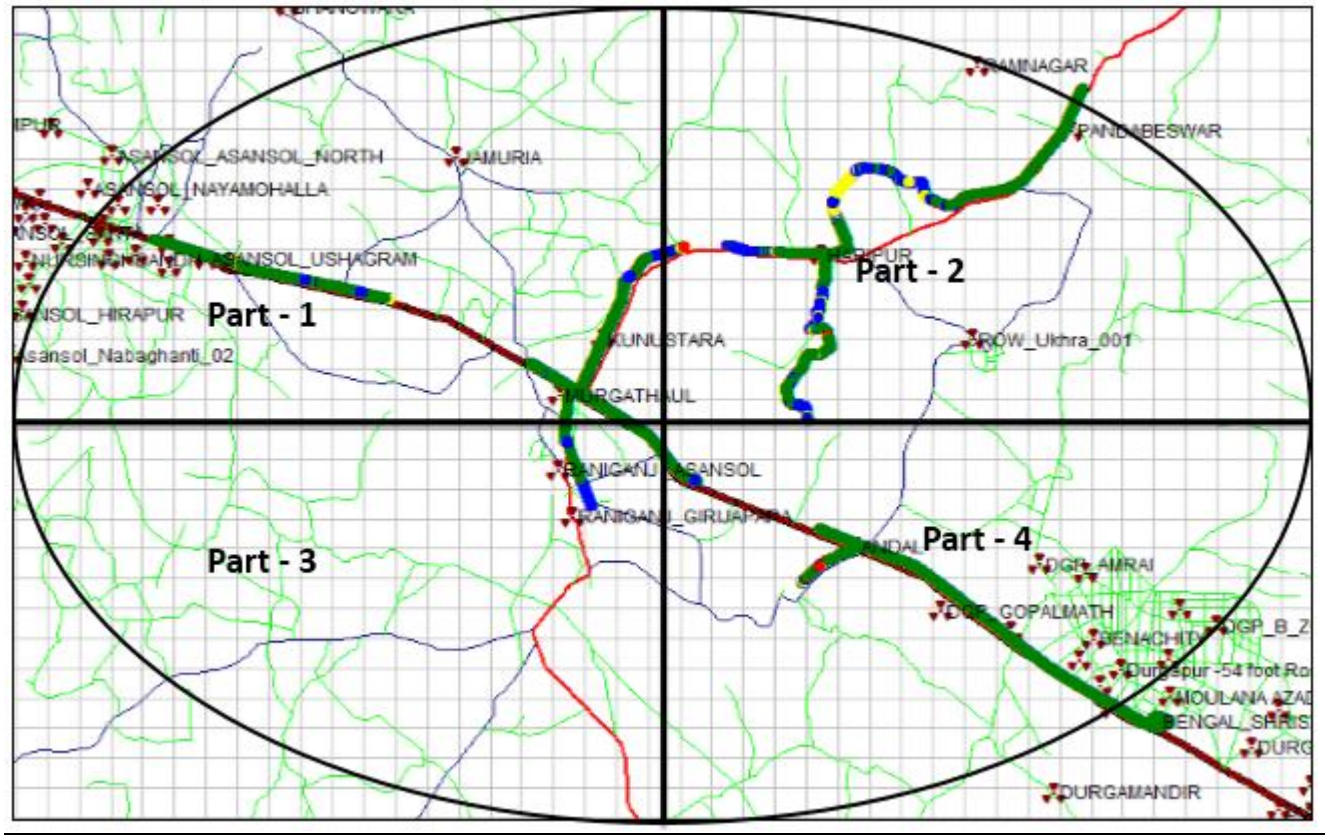
9.1.1.2 Route Map - Asansol DAY 1



9.1.1.3 Route Map - Asansol DAY 2



9.1.1.4 Route Map - Asansol DAY 3



9.1.1.5 Drive Test Results - Asansol SSA-2G

	B'mark	Aircel		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		82.26%	84.20%	NDR		84.59%	48.46%	69.89%	88.34%	71.33%	73.82%	25.62%	22.37%	No Service		89.76%	95.33%	14.66%	33.68%	75.95%	57.21%
0 to -85 dBm		99.19%	97.47%			15.16%	37.20%	93.15%	98.31%	95.91%	94.25%	36.97%	33.07%			99.68%	99.11%	94.41%	88.80%	97.67%	94.10%
0 to -95 dBm		99.86%	99.60%			0.24%	14.32%	99.78%	99.78%	99.99%	99.97%	37.39%	44.02%			100.00%	99.73%	99.51%	99.05%	99.31%	99.81%
Voice quality	≥ 95%	96.02%	94.99%			93.73%	88.79%	99.03%	97.63%	99.38%	96.85%	82.56%	81.22%			99.95%	98.70%	97.23%	96.83%	97.09%	96.80%
CSSR	≥ 95%	99.22%	98.93%			49.02%	52.97%	100.00%	100.00%	100.00%	100.00%	93.33%	93.04%			100.00%	99.05%	98.26%	98.58%	100.00%	100.00%
%age Blocked calls		1.07%	1.07%			47.03%	50.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			0.00%	0.95%	1.74%	1.42%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.33%			4.18%	9.54%	0.00%	0.21%	0.00%	0.20%	0.00%	0.60%			0.00%	0.19%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		99.04%	98.19%			100.00%	100.00%	100.00%	98.82%	100.00%	99.99%	100.00%	100.00%			100.00%	100.00%	100.00%	97.26%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

Reliance CDMA and BSNL failed to meet the benchmark for CSSR in outdoor & indoor locations.

Call Drop Rate

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

9.1.1.1 Drive Test Results - Asansol SSA-3G

	B'mark	Aircel		Airtel		BSNL		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		NDR		16.92%	33.63%	43.58%	61.36%
0 to -85 dBm						8.69%	23.60%	84.61%	85.37%
0 to -95 dBm						71.05%	19.46%	99.44%	97.79%
Voice quality	≥ 95%					54.56%	60.53%	99.07%	98.19%
CSSR	≥ 95%					50.20%	44.07%	100.00%	99.76%
%age Blocked calls						49.80%	55.93%	0.00%	0.24%
Call drop rate	≤ 2%					0.86%	7.16%	0.00%	0.00%
Hands off success rate						100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL failed to meet the benchmark in outdoor as well as indoor locations.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmark in outdoor as well as indoor locations.

Call Drop Rate

BSNL failed to meet the benchmark in outdoor as locations.

9.1.1.1 Drive Test Results - Asansol SSA-DATA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	Not Received	95	100%	NDR	Not Participated		100%	100%	100%
Succesful Data Transmission upload speed attempts	>75%	100%		92	100%	NDR			100%	100%	100%
Minimum download speed		58		60	372	89			31	72	82
Average throughput for Packet Data		105		275	189	1743			55	108	125
Latency	<250ms	NDR		100	100	100			NDR	100	100

All the operators met the benchmark

9.1.1.2 Drive Test Results - Asansol SSA-DATA 3G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	Not Received	95	100%
Succesful Data Transmission upload speed attempts	>75%	NDR		92	100%
Minimum download speed		NDR		408	1514
Average throughput for Packet Data		NDR		541	2834
Latency	<250ms	NDR		100	NDR

All the operators met the benchmark

9.1.2 Suri SSA

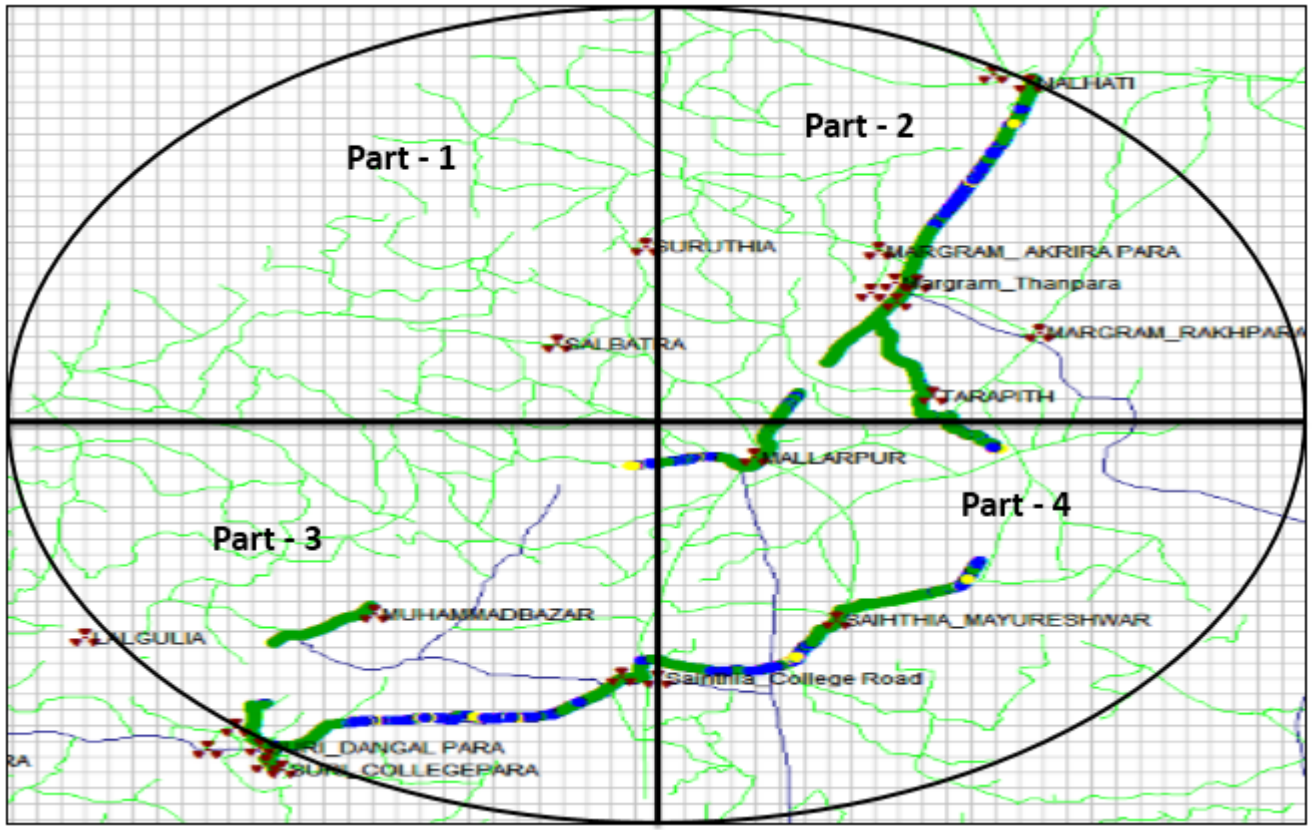
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Suri	17-12-1015	19-12-2015	325

9.1.2.1 Route Details - Suri SSA

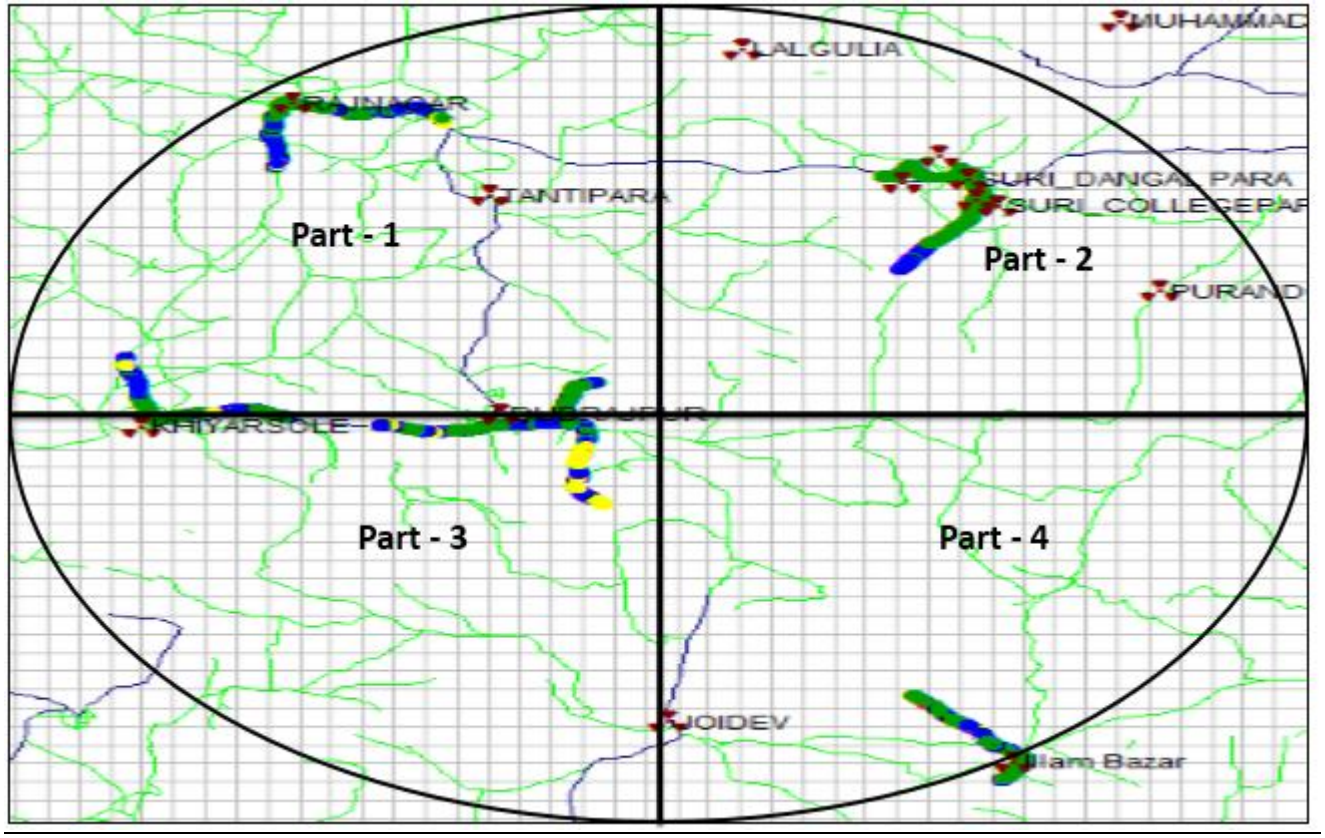
Category	Type of location	December		
		Suri		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Rampurhat,Nalhati,Tarapith, Mallarpur Mayureshwar Suri bus stand,saithia,lambadarpur	DubrajpurSuri police line ground,Bakreshwar,Manpur Illambazar Hetampur	Suri,Snkara Ahamadpur town,Labpur,Saurangaria Nanur,Durgapur Bolpur
	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 November 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.

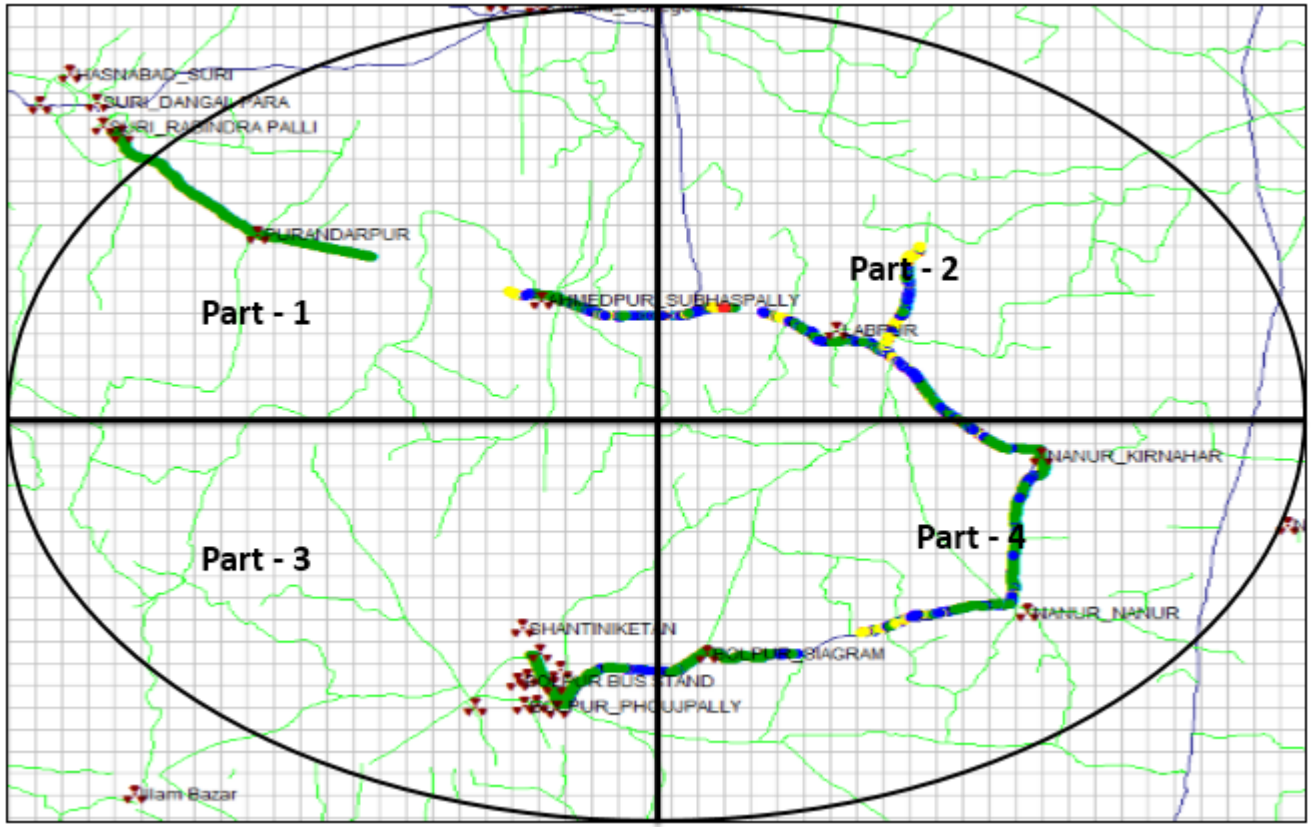
9.1.2.2 Route Map - Suri DAY 1



9.1.2.3 Route Map - Suri DAY 2



9.1.2.4 Route Map - Suri DAY 3



9.1.2.5 Drive Test Results - Suri SSA

	B'mark	Aircel		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		82.26%	84.20%			39.42%	36.80%	78.21%	52.48%	71.33%	73.82%	25.62%	22.37%			80.98%	85.44%	1.97%	34.10%	52.53%	61.44%
0 to -85 dBm		99.19%	97.47%			22.71%	30.17%	98.77%	84.34%	95.91%	94.25%	36.97%	33.07%			93.43%	97.06%	63.27%	74.93%	95.84%	91.02%
0 to -95 dBm		99.86%	99.60%			26.85%	22.68%	99.98%	96.76%	99.99%	99.97%	37.39%	44.02%			100.00%	99.95%	98.68%	97.40%	99.89%	99.17%
Voice quality	≥ 95%	96.02%	94.99%	NDR		91.83%	93.39%	99.73%	97.51%	99.38%	96.85%	80.22%	82.56%	No Service		99.80%	98.16%	97.03%	96.03%	98.00%	96.05%
CSSR	≥ 95%	99.22%	98.93%			92.87%	62.47%	100.00%	100.00%	100.00%	100.00%	91.56%	93.33%			100.00%	100.00%	98.86%	99.65%	100.00%	100.00%
%age Blocked calls		1.07%	1.07%			7.13%	37.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			0.00%	0.00%	1.14%	0.35%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.33%			0.00%	1.07%	0.00%	0.20%	0.00%	0.20%	0.00%	0.60%			0.00%	0.21%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		99.04%	98.19%			100.00%	100.00%	100.00%	99.81%	100.00%	99.99%	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

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

Call Set Success Rate (CSSR)

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

%age Block calls

BSNL and Reliance CDMA failed to meet the benchmark in outdoor as well as indoor locations

9.1.2.1 Drive Test Results - Suri SSA 3G

	B'mark	Aircel		Airtel		BSNL		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		NDR		39.66%	18.87%	65.21%	49.84%
0 to -85 dBm						9.76%	21.85%	78.27%	80.22%
0 to -95 dBm						34.42%	37.07%	94.33%	95.70%
Voice quality	≥ 95%					28.43%	65.14%	99.85%	99.14%
CSSR	≥ 95%					97.06%	89.62%	100.00%	99.23%
%age Blocked calls						2.94%	10.38%	0.00%	0.77%
Call drop rate	≤ 2%					0.00%	9.47%	0.00%	0.00%
Hands off success rate						0.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL failed to meet the benchmark in outdoor as well as indoor locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.2.1 Drive Test Results - Suri SSA DATA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	Not Received	98	100%	NDR	Not Participated		100%	100%	100%
Succesful Data Transmission upload speed attempts	>75%	100%		96	100%	NDR			100%	100%	100%
Minimum download speed		75		56	145	869			32	68	95
Average throughput for Packet Data		122		116	85	1244			59	121	145
Latency	<250ms	NDR		100	100	100			NDR	NDR	NDR

All the operators met the benchmark

9.1.2.2 Drive Test Results - Suri SSA DATA 3G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	Not Received	98	100%
Succesful Data Transmission upload speed attempts	>75%	NDR		96	100%
Minimum download speed		NDR		315	2522
Average throughput for Packet Data		NDR		326	3477
Latency	<250ms	NDR		100	NDR

All the operators met the benchmark

9.1.3 Malda SSA

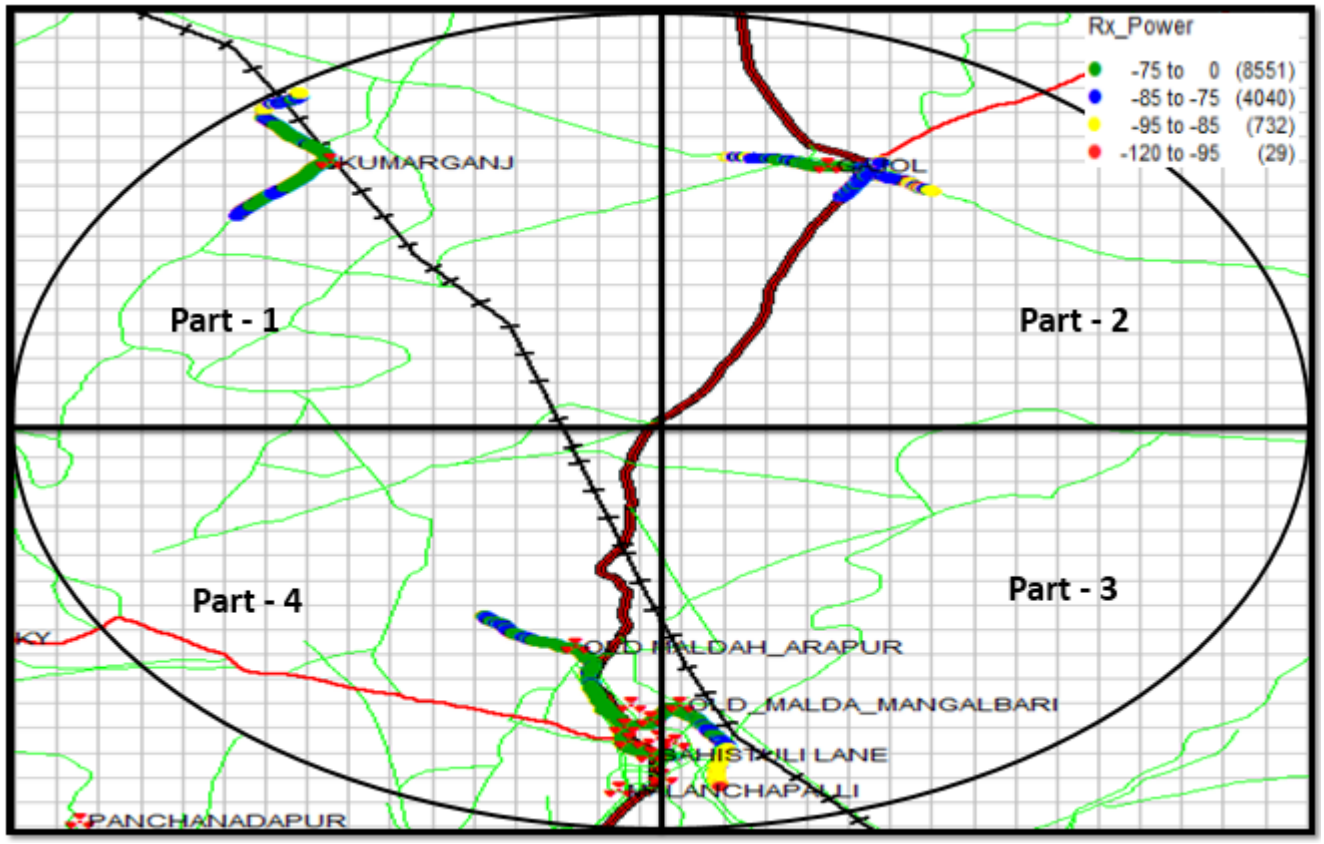
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Malda	28-12-1015	30-12-2015	740

9.1.3.1 Route Details - Malda SSA

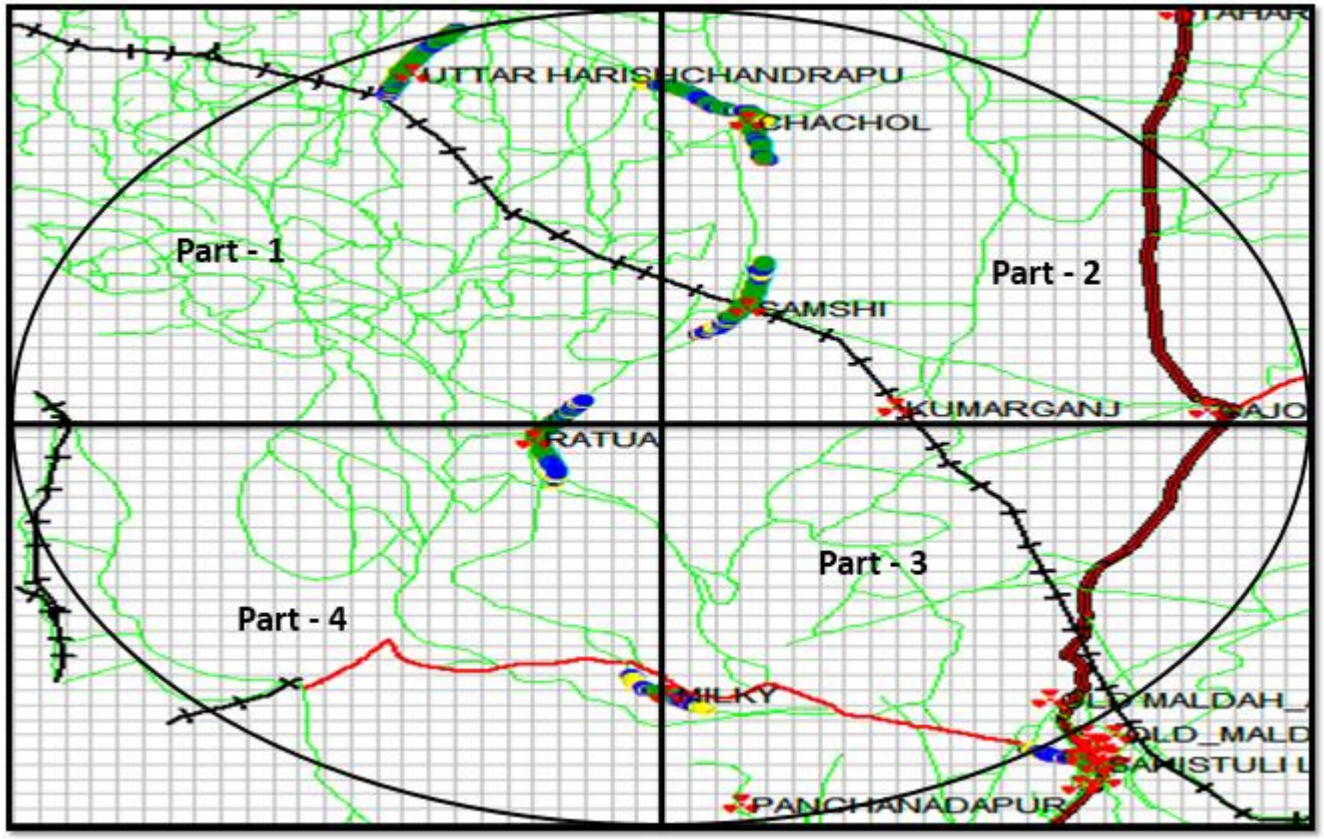
Category	Type of location	December		
		Malda		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	kumarganj-pukuria-pirganj-kotwali gajol-alal-laskarpur pakua-bamangola-gajol-alal-laskarpur,BSNL Exchange Malda stn-420more-mangalbari-bulbulchandi-pakua-bamangola	harischandarpur samsi-maltipur-chachal-tulsihata-Bsnl exchange-rathbari-amriti-milky mathurapur-baharal-ratua	Bsnl exchange-B.G. road- goud road kaliachak-baliadanga-sujapur sustani more-goud malda-mohodipur-pakakot-sahabajpur
	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 November 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.

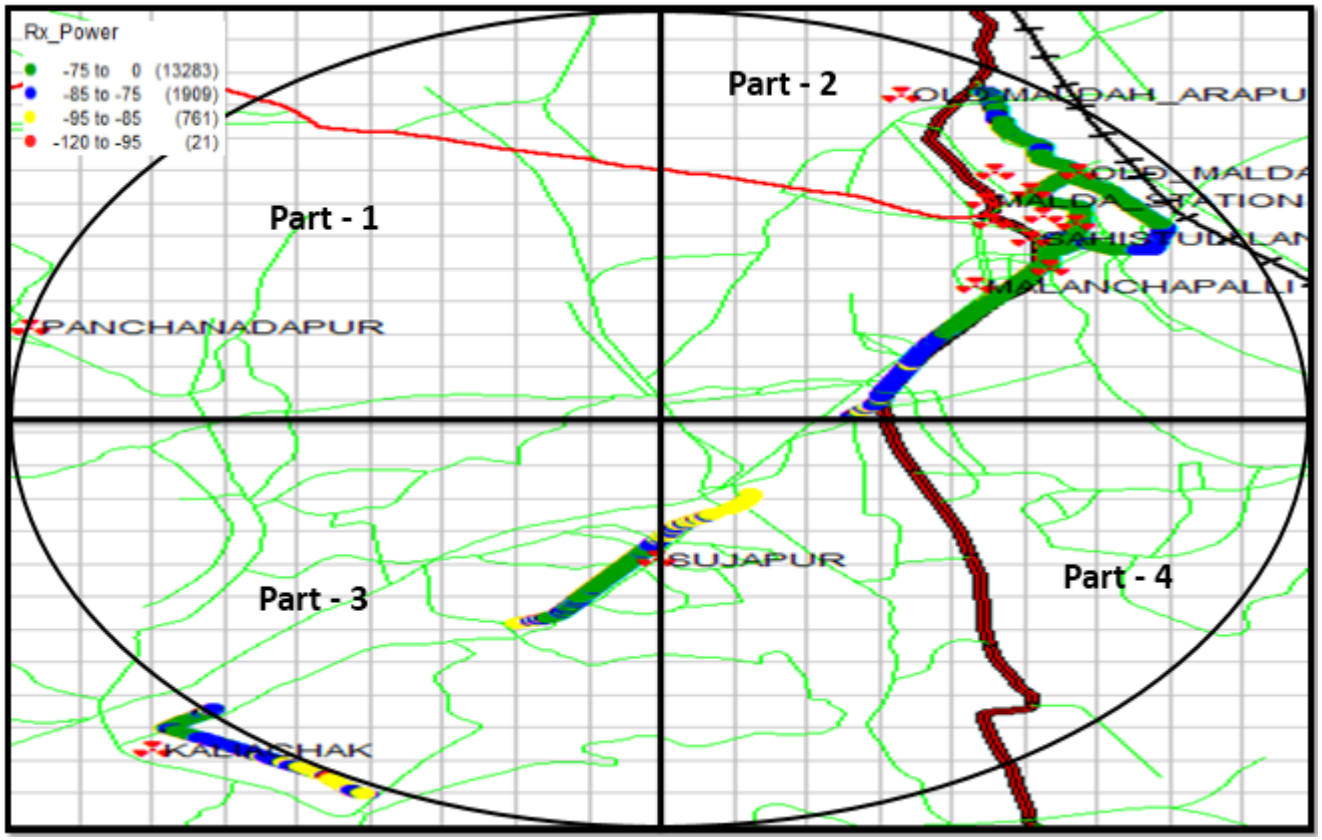
9.1.3.2 Route Map - Malda DAY 1



9.1.3.3 Route Map - Malda DAY 2



9.1.3.4 Route Map - Malda DAY 3



9.1.3.5 Drive Test Results - Malda SSA

	B'mark	Aircel		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		51.13%	65.19%	NDR		54.85%	42.17%	52.51%	63.47%	67.89%	53.43%	25.62%	22.37%	Service Closed		63.77%	74.69%	38.21%	55.77%	93.56%	79.58%
0 to -85 dBm		95.72%	95.54%			42.20%	37.81%	88.15%	86.65%	92.07%	72.17%	36.97%	33.07%			98.76%	94.38%	89.82%	94.12%	100.00%	99.03%
0 to -95 dBm		99.96%	99.79%			3.04%	20.02%	99.83%	97.74%	99.87%	90.65%	37.39%	44.02%			99.99%	99.85%	99.38%	99.70%	100.00%	99.89%
Voice quality	≥ 95%	96.11%	94.44%			97.87%	88.12%	99.94%	98.01%	99.38%	97.85%	80.22%	82.56%			99.38%	97.71%	97.16%	98.92%	99.13%	98.37%
CSSR	≥ 95%	98.53%	99.58%			64.62%	52.84%	100.00%	100.00%	100.00%	96.20%	91.56%	93.33%			100.00%	100.00%	98.55%	100.00%	100.00%	100.00%
%age Blocked calls		1.47%	0.42%			35.38%	47.16%	0.00%	0.00%	0.00%	3.80%	0.00%	0.00%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.42%			2.38%	9.69%	0.00%	0.00%	0.00%	0.18%	0.00%	0.60%			0.00%	0.00%	0.00%	0.72%	0.00%	0.00%
Hands off success rate		100.00%	97.28%			100.00%	100.00%	100.00%	99.29%	100.00%	99.98%	100.00%	100.00%			100.00%	100.00%	100.00%	97.95%	100.00%	98.94%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL, Aircel and Reliance CDMA failed to meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.3.1 Drive Test Results - Malda SSA

	B'mark	Aircel		Airtel		BSNL		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		58.51%	71.08%	NDR		39.57%	36.30%	73.64%	52.53%
0 to -85 dBm		98.88%	88.35%			16.69%	43.42%	94.81%	77.07%
0 to -95 dBm		100.00%	96.94%			27.53%	10.65%	99.97%	94.20%
Voice quality	≥ 95%	99.80%	96.59%			32.56%	48.13%	99.94%	98.46%
CSSR	≥ 95%	100.00%	100.00%			50.00%	27.68%	100.00%	100.00%
%age Blocked calls		0.00%	1.09%			50.00%	72.32%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.55%			3.85%	18.63%	0.00%	0.00%
Hands off success rate		100.00%	100.00%			100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL failed to meet the benchmark in outdoor as well as indoor locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.3.1 Drive Test Results - Malda SSA DATA DT-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	Not Received	98	100%	NDR	Not Participated		100%	100%	100%
Succesful Data Transmission upload speed attempts	>75%	100%		97	100%	NDR			100%	99%	100%
Minimum download speed		100		69	120	741			62	89	61
Average throughput for Packet Data		129		131	174	1388			76	133	127
Latency	<250ms	NDR		100	100	100			100	100	100

All the operators met the benchmark

9.1.3.2 Drive Test Results - Malda SSA DATA DT-3G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	Not Received	98	100%
Succesful Data Transmission upload speed attempts	>75%	NDR		97	100%
Minimum download speed		NDR		421	1579
Average throughput for Packet Data		NDR		3111	2570
Latency	<250ms	NDR		100	100

All the operators met the benchmark

10 ANNEXURE – CONSOLIDATED-2G

PMR: -Reliance GSM data reported only for October 2015 & November 2015 and also Reliance GSM service is closed in west Bengal circle.

3 Day Live: - Reliance CDMA had there sever issue so we could not able to conduct the audit for all the 3 months same is intimated to TRAI by the operator.

10.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		9036	19421	7437	13490	2748	2424	4966	78	765	17418
Sum of downtime of BTSs in a month (in hours)		59338	11134	188877	3948	2549	2082	272096	9	177	5925
BTSs accumulated downtime (not available for service)	≤ 2%	0.88%	0.08%	3.41%	0.04%	0.12%	0.12%	7.36%	0.02%	0.03%	0.05%
Number of BTSs having accumulated downtime >24 hours		407	35	1574	25	0	9	15	0	0	19
Worst affected BTSs due to downtime	≤ 2%	4.50%	0.18%	21.16%	0.19%	0.00%	0.37%	0.30%	0.00%	0.00%	0.11%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		9036	19349	7437	13443	2750	456	NDR	78	765	17367
Sum of downtime of BTSs in a month (in hours)		5865	960	10904	447	336	24	NDR	0	1	573
BTSs accumulated downtime (not available for service)	≤ 2%	0.90%	0.07%	2.04%	0.05%	0.17%	0.07%	NDR	0.00%	0.00%	0.05%
Number of BTSs having accumulated downtime >24 hours		46	0	128	5	0	0	NDR	0	0	2
Worst affected BTSs due to downtime	≤ 2%	0.51%	0.00%	1.72%	0.04%	0.00%	0.00%	NDR	0.00%	0.00%	0.01%

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

10.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.41%	96.29%	98.28%	98.34%	99.64%	98.09%	96.65%	99.42%	98.75%	99.30%
SDCCH/Paging channel congestion	≤ 1%	0.47%	0.43%	2.19%	0.05%	NA	NA	0.52%	NA	0.03%	0.49%
TCH congestion	≤ 2%	0.95%	1.26%	1.33%	0.16%	0.08%	0.53%	0.59%	0.00%	0.10%	0.70%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.06%	95.59%	98.04%	98.20%	99.81%	97.03%	NDR	99.37%	99.31%	99.70%
SDCCH/Paging channel congestion	≤ 1%	0.42%	0.44%	2.18%	0.02%	NA	NA	NDR	NA	0.00%	0.33%
TCH congestion	≤ 2%	0.42%	0.71%	1.55%	0.06%	0.05%	1.17%	NDR	0.00%	0.02%	0.33%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		2985	NDR	3364	1814	3302	4257	NDR	1759	1260	1605
Total number of successful calls established		2957	NDR	1785	1814	3280	3624	NDR	1754	1246	1605
CSSR	≥ 95%	99.06%	NDR	53.06%	100.00%	99.33%	85.13%	NDR	99.72%	98.89%	100.00%
%age blocked calls		0.94%	NDR	46.94%	0.00%	0.67%	14.87%	NDR	0.28%	1.11%	0.00%

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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		301195110	959038542	169628376	505179387	98356578	38857131	727128092116996	309038	17848815	1036907426
Total number of calls dropped		3536700	12183735	1450036	2350474	655541	49233	212038	796	93827	7682847
Call drop rate	≤ 2%	1.17%	1.27%	0.85%	0.47%	0.67%	0.13%	0.00%	0.26%	0.53%	0.74%
Total number of cells in the network		27037	61718	21555	40641	10149	2424	15856	228	2298	51237
Total number of cells having more than 3% TCH		3246	1628	4979	208	216	23	115	3	65	1241
Worst affected cells having more than 3% TCH	≤ 3%	12.00%	2.64%	23.10%	0.51%	2.13%	0.96%	0.73%	1.45%	2.85%	2.42%
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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		28854474	142980105	16933954	48874891	9381159	1484675	NDR	30410	1878913	134080840
Total number of calls dropped		319992	1788801	149489	16021243	62551	2239	NDR	73	40008	43082215
Call drop rate	≤ 2%	1.02%	1.25%	0.88%	0.34%	0.49%	0.24%	NDR	0.24%	0.51%	0.57%
Total number of cells in the network		26941	184342	21555	40500	10154	1368	NDR	228	2301	51116
Total number of cells having more than 3% TCH		3086	5077	4192	33	9	7	NDR	3	67	1168
Worst affected cells having more than 3% TCH	≤ 3%	11.46%	2.75%	19.45%	0.08%	0.09%	0.53%	NDR	1.53%	2.93%	2.29%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		2957	NDR	1785	1814	3258	3624	NDR	1754	1248	1605
Total number of calls dropped		8	NDR	110	2	5	334	NDR	2	2	0
Call drop rate	≤ 2%	0.27%	NDR	6.16%	0.11%	0.15%	9.21%	NDR	0.11%	0.16%	0.00%

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

10.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		50815146317	345532906543	21165	77444505890	311288	NA	26122307522	1021879651	3121453319	187567684242
Total number of calls with good voice quality		49099237572	330749282776	20122	75070695839	310797	NA	25572273672	1002727485	3052640004	179812897031
%age calls with good voice quality	≥ 95%	96.62%	95.72%	95.07%	96.93%	99.84%	98.93%	97.89%	98.13%	97.80%	95.87%
Live measurement results for Voice quality-3 Day data											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		5058757923	33562607059	2011	7602836780	30455	NA	NDR	422790175	1455495082	24813541572
Total number of calls with good voice quality		4893505769	32106146875	1913	7372391064	30407	NA	NDR	414762018	1426436134	23749966284
%age calls with good voice quality	≥ 95%	97.15%	95.66%	95.13%	97.67%	99.46%	99.21%	NDR	98.11%	98.02%	97.07%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		3911865	NDR	2585325	1998136	243389	99967	NDR	NA	2023114	959390
Total number of calls with good voice quality		3724019	NDR	2362882	1952056	121844	81299	NDR	NA	1957293	933816
%age calls with good voice quality	≥ 95%	95.20%	NDR	91.40%	97.69%	98.11%	81.33%	NDR	98.98%	96.75%	97.33%

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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		66	40	77	118	40	21	48	48	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		241999	464918	536231	348866	170316	19924	76345	35111	18691	908766
Traffic served for all POIs (B)- in erlangs		91900	271695	89005	209330	60425	6352	33884	3619	2737	465610
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	21	NDR	48	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		243234	1387795	546921	349567	170423	7366	NDR	35111	18627	906515
Traffic served for all POIs (B)- in erlangs		47368	725700	92083	206379	60219	861	NDR	1889	1248	266032
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%

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

10.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Eqipped capacity of the network	146367.6878	341465.79	236000	163061.7281	109200	118000	NDR	5617	13915	394739
Total taffic handled in erlang during TCBH	85103.06407	330477.67	45254.83	150343.78	29847.86	25348.55	NDR	98.9434	4133.1394	446656.1353
Total no. of customers served (as per VLR)	3311543	13646712	1209959	5534064	959570	770757	NDR	2647	236922	16938976

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

11 ANNEXURE – CONSOLIDATED-3G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		1612	1887	7827
Sum of downtime (i.e. total outage time) of Node Bs		7500	49522	2101
Node Bs downtime (not available for service)	≤ 2%	0.63%	3.53%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		46	384	5
Worst affected Node Bs due to downtime	≤ 2%	2.85%	20.35%	0.06%
Live Measurement Results for Network Availability- 3 Day live data				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		1600	1887	7732
Sum of downtime (i.e. total outage time) of Node Bs		594	3998	308
Node Bs downtime (not available for service)	≤ 2%	0.52%	2.94%	0.06%
Number of Node Bs having accumulated downtime of >24 hours in a month		3	56	2
Worst affected Node Bs due to downtime	≤ 2%	0.19%	2.97%	0.03%

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	BSNL	Vodafone
CSSR	≥ 95%	98.58%	95.50%	99.79%
RRC Congestion	≤ 1%	0.23%	0.60%	0.05%
Circuit Switched RAB Congestion	≤ 2%	0.39%	1.27%	0.09%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	98.77%	95.64%	99.83%
RRC Congestion	≤ 1%	0.27%	0.41%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.35%	1.50%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data				
CSSR	Benchmark	Aircel	BSNL	Vodafone
Total number of RRC attempts (A)		1464	2414	1381
Total number of RRC established (B)		1464	999	1377
Call setup success rate (B/A*100)	≥ 95%	100.00%	41.38%	99.71%
%age blocked calls		0.00%	58.62%	0.29%

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	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		9092987	3646329	78063133
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		27933	60016	294075
Call drop rate (B/A*100)	≤ 2%	0.31%	1.65%	0.38%
Total no. of cells in the licensed service area (B)		4716	5661	23482
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		181	824	538
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	3.83%	14.56%	2.29%
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	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		994134	370737	36187124
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		3466	6031	181163
Call drop rate (B/A*100)	≤ 2%	0.35%	1.63%	0.50%
Total no. of cells in the licensed service area (B)		4722	5661	23358
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		209	606	390
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	4.42%	10.70%	1.67%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data				
Call drop rate	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		1508	990	1377
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		5	91	0
Call drop rate (B/A*100)	≤ 2%	0.33%	9.19%	0.00%

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**	**BSNL**	**Vodafone**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		46290955241	NDR	165878496120
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		46042039365	NDR	164159808897
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.46%	NDR	98.96%
Live measurement results for Voice quality-3 Day data				
Voice quality	**Benchmark**	**Aircel**	**BSNL**	**Vodafone**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5191927536	NDR	14591955194
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2572362868	NDR	14436592777
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	49.55%	NDR	98.94%
Drive test results for Voice quality (Average of three drive tests) - DT data				
Voice quality	**Benchmark**	**Aircel**	**BSNL**	**Vodafone**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2402924	3901845	3027912
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2295710	2127099	2991648
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	95.54%	54.52%	98.80%

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

11.5 POI CONGESTION

Audit Results for POI Congestion- PMR data				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		66	77	48
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		241999	536231	908766
Traffic served for all POIs (B)- in erlangs		91900	89005	465610
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	48
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		243234	546921	906515
Traffic served for all POIs (B)- in erlangs		47477	92083	266033
POI congestion	≤ 0.5%	0.00%	0.00%	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	BSNL	Vodafone
Eqipped capacity of the network		0	150138	-
Total taffic handled in erlang during TCBH		2231.507936	35790.64	14157.84023
Total no. of customers served (as per VLR)		152980	50114	730026

12 ANNEXURE – CUSTOMER SERVICES

12.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		737	182503	101163	18108	39064	21165	56602	0	0	924142
Total number of bills disputed		0	64	0	63	36	18	45	0	0	892
Total number of valid billing complaints		0	13	0	8	16	18	45	0	0	577
Total complaints considered invalid		0	51	0	55	20	0	0	0	0	315
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.04%	0.00%	0.35%	0.09%	0.09%	0.08%	NA	NA	0.10%
October											
Total bills generated during the first billing cycle		263	62744	33839	5546	11593	7236	19262	0	0	296155
Total number of bills disputed in first billing cycle		0	20	0	20	15	7	16	0	0	330
Total number of valid billing complaints (billing cycle 1)		0	6	0	4	6	7	16	0	0	227
Total complaints considered invalid (billing cycle 1)		0	14	0	16	9	0	0	0	0	103
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.03%	0.00%	0.36%	0.13%	0.10%	0.08%	NA	NA	0.11%

November											
Total bills generated during the second billing cycle		216	59551	33755	5936	12618	7099	18902	0	0	307606
Total number of bills disputed in second billing cycle		0	24	0	19	11	5	15	0	0	279
Total number of valid billing complaints (billing cycle 2)		0	3	0	1	5	5	15	0	0	186
Total complaints considered invalid (billing cycle 2)		0	21	0	18	6	0	0	0	0	93
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.04%	0.00%	0.32%	0.09%	0.07%	0.08%	NA	NA	0.09%
December											
Total bills generated during the third billing cycle		258	60208	33569	6626	14853	6830	18438	0	0	320381
Total number of bills disputed in third billing cycle		0	20	0	24	10	6	14	0	0	283
Total number of valid billing complaints (billing cycle 3)		0	4	0	3	5	6	14	0	0	164
Total complaints considered invalid (billing cycle 3)		0	16	0	21	5	0	0	0	0	119
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.03%	0.00%	0.36%	0.07%	0.09%	0.08%	NA	NA	0.09%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		1	509	1669	994	189	297	4320	0	0	5984
Total complaints considered invalid (sum of 3 months)		4702	5237	212	7687	123	280	0	0	0	6988
Total number of charging complaints (sum of 3 months)		4703	5746	1881	8681	312	577	4320	0	0	12972
Total no of customers served (Sum of 3 months)		15452188	40465308	3674934	15030379	1565318	2468105	14414756	197318	1920353	16420563
Percentage of charging complaints disputed	≤ 0.1%	0.03%	0.01%	0.05%	0.06%	0.02%	0.02%	0.03%	0.00%	0.00%	0.08%

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of billing/charging complaints		4703	5810	3550	16486	553	875	4365	0	0	13864
Total number of complaints resolved in favour of customer		1	522	1881	8744	348	595	4365	0	0	6561
Total complaints considered invalid		4702	5288	1669	7742	205	280	0	0	0	7303
Number of complaints resolved in 4 weeks		1	522	1864	8744	348	595	4365	0	0	6561
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	99.10%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%
Number of complaints resolved in 6 weeks		1	522	1881	8744	348	595	4365	0	0	6561
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		1	522	591	1002	205	315	4365	0	0	1527
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%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made		100	100	100	100	100	100	100	0	5	100
Number of cases resolved in 4 weeks		98	96	98	98	96	97	95	0	5	100
Percentage cases resolved in 4 weeks	≥ 98%	98.00%	96.00%	98.00%	98.00%	96.00%	97.00%	95.00%	NA	100.00%	100.00%
Number of cases resolved in 6 weeks		100	100	100	100	100	100	100	0	5	100
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%

12.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		13537989	3757777	1954023	17016147	3506595	533989	6130837	5942	82366	28216586
Number of calls getting connected and answered (electronically)		13282544	3702627	1892935	16421252	3475799	521043	5972285	5890	79405	28216586
Percentage calls getting connected and answered	≥ 95%	98.11%	98.53%	96.87%	96.50%	99.12%	97.58%	97.41%	99.12%	96.41%	100.00%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received (3 months)		2873591	6580638	537085	5060349	1050990	352988	1990311	4929	101837	10253518
Total Number of calls answered within 90 seconds (3 months)		2776999	5803207	511380	4916337	1032225	264823	1423794	4900	100622	9796807
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	96.64%	88.19%	95.21%	97.15%	98.21%	75.02%	71.54%	99.41%	98.81%	95.55%
October											
Total calls received (Month 1)		1050893	2242443	151193	1681176	360730	97056	744091	1371	35773	3416443
Total calls answered within 90 seconds (Month 1)		1021154	2068901	144008	1676868	358865	75760	558531	1360	35144	3297547
% calls answered within 90 seconds (Month 1)	≥ 95%	97.17%	92.26%	95.25%	99.74%	99.48%	78.06%	75.06%	99.20%	98.24%	96.52%
November											
Total calls received (Month 2)		932441	2118858	177433	1649929	340996	125793	779393	2017	32897	3316428
Total calls answered within 90 seconds (Month 2)		908734	1995558	168653	1612340	335108	95897	567005	2009	32639	3164930
% calls answered within 90 seconds (Month 2)	≥ 95%	97.46%	94.18%	95.05%	97.72%	98.27%	76.23%	72.75%	99.60%	99.22%	95.43%

December											
Total calls received (Month 3)		890257	2219337	208459	1729244	349264	130139	466827	1541	33167	3520647
Total calls answered within 90 seconds (Month 3)		847111	1738748	198719	1627129	338252	93166	298258	1531	32839	3334330
% calls answered within 90 seconds (Month 3)	≥ 95%	95.15%	78.35%	95.33%	94.09%	96.85%	71.59%	63.89%	99.35%	99.01%	94.71%
Live calling results for customer care (IVR)											
Customer Care Assessment	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	97	100	100	100	100	88	100	100	100
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	97.00%	100.00%	100.00%	100.00%	100.00%	88.00%	100.00%	100.00%	100.00%

12.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		7	462	1083	307	436	98	133	0	0	5379
Number of requests attended within 7 days		7	462	1083	307	436	98	133	0	0	5379
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%	NA	NA	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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		1	92	352	183	NA	201	599	0	0	5864
Total number of cases where refund was made within 60 days		1	92	352	183	NA	123	543	0	0	4178
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	NA	61.19%	90.65%	NA	NA	71.25%

Data Source: Billing Center of the operators

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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made	100	100	100	100	100	100	100	8	100	100
Number of cases resolved to satisfaction	100	97	97	95	98	96	95	7	95	100
Percentage cases resolved in four weeks	100.00%	97.00%	97.00%	95.00%	98.00%	96.00%	95.00%	87.50%	95.00%	100.00%

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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300
Calls answered		131	253	273	247	300	267	259	263	251	258
% of calls connected	≥ 95%	43.67%	84.33%	91.00%	82.33%	100.00%	89.00%	86.33%	87.67%	83.67%	86.00%

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

12.7 LEVEL 1 SERVICE CALLS MADE

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

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	8
101	Fire	Y		17	7
102	Ambulance	Y		18	7
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	8
138	All India Helpine for Passangers	Y		17	7
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	8
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	7
1071	Air Accident Helpline	Y		17	8
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		17	7
1077	Control Room for District Collector	Y		18	8
10120	Call Alart (Crime Branch)	Y		17	8
10121	Women Helpline		N		

10127	National AIDS Helpline to NACO	Y		18	8
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		17	8
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	8
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	8
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	8
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	8
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	16
101	Fire	Y		19	16
102	Ambulance	Y		18	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		19	16
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		

182	Indian Railway Security Helpline		N		
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	15
1072	Rail Accident Helpline	Y		19	15
1073	Road Accident Helpline	Y		19	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		19	16
10121	Women Helpline	Y		18	16
10127	National AIDS Helpline to NACO	Y		19	16
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		18	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	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		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		19	16
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		14	13
101	Fire	Y		14	13
102	Ambulance				
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	Y		14	13
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		14	13
182	Indian Railway Security Helpline	Y		13	13
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services				
106X	State of the Art Hospitals	Y		14	13
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		13	13
1070	Relief Commission for Natural Calamities	Y		14	13
1071	Air Accident Helpline	Y		14	13
1072	Rail Accident Helpline	Y		13	13
1073	Road Accident Helpline	Y		14	13
1077	Control Room for District Collector	Y		13	13

10120	Call Alart (Crime Branch)	Y		14	13
10121	Women Helpline	Y		14	13
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		14	13
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		13	13
10741	Pollution Control Board	Y		14	13
1511	Police Related Service for all Metro Railway Project	Y	N	13	
1512	Prevention of Crime in Railway	Y		13	13
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		13	13
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)				
112012	National Do Not Call Registry	Y		14	13
11212	Complaint of Electricity	Y		14	13
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Idea

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	23
101	Fire	Y		28	22
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		28	23
138	All India Helpine for Passangers		N		

1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		27	22
182	Indian Railway Security Helpline		N		
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		27	23
1071	Air Accident Helpline	Y		28	22
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	23
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	22
10127	National AIDS Helpline to NACO		N		
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		27	23
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	22
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		

155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		27	22
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
MTS					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	17
101	Fire	Y		17	17
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	17
138	All India Helpine for Passangers	Y		17	17
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	17
182	Indian Railway Security Helpline	Y		17	17
1033	Road Accident Management Service	Y		17	17
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		17	17
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	16

1073	Road Accident Helpline	Y		16	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	17
10121	Women Helpline	Y		16	16
10127	National AIDS Helpline to NACO	Y		16	16
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		17	17
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	17
112012	National Do Not Call Registry	Y		16	16
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	17

Reliance CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	25
101	Fire	Y		28	24
102	Ambulance		N		
104	Health Information Helpline		N		

108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		28	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		27	25
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		27	24
1071	Air Accident Helpline	Y		28	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	24
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	25
10127	National AIDS Helpline to NACO		N		
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		27	24
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway	Y		27	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		27	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	19
101	Fire	Y		21	19
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	18
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	18
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		21	18
1071	Air Accident Helpline	Y		22	18
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline				
1077	Control Room for District Collector	Y		21	18
10120	Call Alart (Crime Branch)	Y		21	18
10121	Women Helpline	Y		21	19
10127	National AIDS Helpline to NACO	Y		22	19
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				
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	18
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		21	19
11212	Complaint of Electricity	Y		21	19
11216	Drinking Water Supply	Y		22	19
11250	Election Commission of India		N		
TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	24

101	Fire	Y		28	24
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		28	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		27	23
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		27	24
1071	Air Accident Helpline	Y		28	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	24
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	24
10127	National AIDS Helpline to NACO		N		
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		27	24

10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		27	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	18
101	Fire	Y		21	18
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	17
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	18
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		21	17
1071	Air Accident Helpline	Y		22	17
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		21	18
10120	Call Alart (Crime Branch)	Y		21	18
10121	Women Helpline	Y		21	19
10127	National AIDS Helpline to NACO	Y		22	19
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		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	18
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		21	18
11212	Complaint of Electricity	Y		21	18
11216	Drinking Water Supply	Y		22	18
11250	Election Commission of India		N		
Vodafone					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		24	20
101	Fire	Y		23	20
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		23	20
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		23	19
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		23	20
1071	Air Accident Helpline	Y		23	20
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		23	19
10120	Call Alart (Crime Branch)	Y		23	20
10121	Women Helpline	Y		23	20
10127	National AIDS Helpline to NACO	Y		23	20
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				
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway				
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		23	20
11212	Complaint of Electricity	Y		23	20
11216	Drinking Water Supply	Y		23	20
11250	Election Commission of India		N		

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

12.8 COUNTER DETAILS

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

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

12.8.1 ERICSSON

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

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

Ericsson Counters

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

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

12.8.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel in the circle.

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

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

12.8.3 HUAWEI

Huawei provides network support to Idea and MTS in the circle.

HUAWEI CDMA		
SR .NO	KPI	HUAWEI FORMULA
1	CALL SETUP SUCCES (NUM)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups] ([1157628567] + [1157628587] + [1157628568] + [1157628588])
2	CALL SETUP SUCCES (DEN)	[CS IS-95 Orig Attempts + CS IS-2000 Orig Attempts + CS IS-95 Term Attempts + CS IS-2000 Term Attempts] ([1157628553] + [1157628573] + [1157628554] + [1157628574])
3	CALL SETUP SUCCESS RATE (%)	CALL SETUP SUCCES (NUM) / CALL SETUP SUCCES (DEN) * 100\

4	CALL DROP RATE (NUM)	[CS IS-95 Call Drops (Too many Erasure frames) + CS IS-2000 Call Drops (Too many Erasure frames) + CS IS-95 Call Drops (No reverse frame received) + CS IS-2000 Call Drops (No reverse frame received) + CS IS-95 Call Drops (Abis interface abnormal) + CS IS-2000 Call Drops (Abis interface abnormal) + CS IS-95 Call Drops (A2 interface abnormal) + CS IS-2000 Call Drops (A2 interface abnormal) + CS IS-95 Call Drops (HHO fail) + CS IS-2000 Call Drops (HHO fail) + CS IS-95 Call Drops (Other causes) + CS IS-2000 Call Drops (Other causes)] ([1157628608] + [1157628614] + [1157628609] + [1157628615] + [1157628610] + [1157628616] + [1157628611] + [1157628617] + [1157628612] + [1157628618] + [1157628613] + [1157628619])
5	CALL DROP RATE(DEN)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups + CS IS-95 Successful Incoming Hard HOs + CS IS-2000 Successful Incoming Hard HOs] [1157628619]) x 100/([1157628567] + [1157628587] + [1157628568] + [1157628588] + [1157628569] + [1157628589])]
6	Call DROP Rate	CALL DROP RATE (NUM) / CALL DROP RATE(DEN) * 100\
7	RF BLOCK RATE (NUM)	{[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]) - (Successful TCH Assignments-CS Orig-IS95[Times] + Successful TCH Assignments-CS Orig-IS2000[Times] + Successful TCH Assignments-CS Term-IS95[Times] + Successful TCH Assignments-CS Term-IS2000[Times])] {[(1157628621 + 1157628628 + 1157628635+ 1157628642)
8	RF BLOCK RATE (DEN)	[((TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]))]} [(1157628621 + 1157628628 + 1157628635+ 1157628642)]}
9	RF BLOCK RATE	RF BLOCK RATE (NUM) / RF BLOCK RATE (DEN) *100
10	Call Quality (RFER)	CS Reverse Link Average FER of Carrier[%]

12.8.4 ZTE

ZTE provides network support to Tata CDMA and Tata GSM in the circle.

1. Connection Establishment (Accessibility)

A. CALL SETUP SUCCESS RATE:

KPI is calculated as Average over the month at TCBH

**((1-C900060053/(C900060003+C900060010+C900060038))*(1-
((C900060005+C900060011+C900060039)/(C900060003+C900060010+C900060038)))*(1-
(C900060020+C900060031+C900060043+C900060047)/(C900060019+C900060030+C900060042+C900060046
))*(1-
(C900060018+C900060029+C900060037+C900060135+C900060200+C900060211)/(C900060017+C900060028
+C900060036+C900060018+C900060029+C900060037+C900060235+C900060199+C900060210+C900060135
+C900060200+C900060211)))*100**

Where,

C900060053	Number of SDCCH drops
C900060003	Number of SDCCH seizure attempts for assignment
C900060010	Number of signaling TCH/F seizure attempts for assignment
C900060038	Number of signaling TCH/H seizure attempts for assignment
C900060005	Number of SDCCH seizure failure for assignment
C900060011	Number of signaling TCH/F seizure failure for assignment
C900060039	Number of signaling TCH/H seizure failure for assignment
C900060020	Number of voice TCH/F seizure failure for assignment
C900060031	Number of data TCH/F seizure failure for assignment
C900060043	Number of voice TCH/H seizure failure for assignment
C900060047	Number of data TCH/H seizure failure for assignment
C900060019	Number of voice TCH/F seizure attempts for assignment
C900060030	Number of data TCH/F seizure attempts for assignment
C900060042	Number of voice TCH/H seizure attempts for assignment
C900060046	Number of data TCH/H seizure attempts for assignment
C900060018	Number of signaling TCH/F assignment failure for assignment
C900060029	Number of voice TCH/F assignment failure for assignment

C900060037	Number of data TCH/F assignment failure
C900060135	Number of signaling TCH/H assignment failure
C900060200	Number of Voice TCH/H assignment failure
C900060211	Number of data TCH/H assignment failure
C900060017	Number of signaling TCH/F assignment success for assignment
C900060028	Number of voice TCH/F assignment success
C900060036	Number of data TCH/F assignment success
C900060235	Number of signaling TCH/H assignment success
C900060199	Number of Voice TCH/H assignment success
C900060210	Number of data TCH/H assignment success

B. SDCCH BLOCKING:

KPI is calculated as Average over the month at TCBH

(C900060005+C900060011+C900060039)/(C900060003+C900060010+C900060038)

Where,

C900060005	Number of SDCCH seizure failure for assignment
C900060011	Number of signaling TCH/F seizure failure for assignment
C900060039	Number of signaling TCH/H seizure failure for assignment
C900060003	Number of SDCCH seizure attempts for assignment
C900060010	Number of signaling TCH/F seizure attempts for assignment
C900060038	Number of signaling TCH/H seizure attempts for assignment

C. TCH BLOCKING:

KPI is calculated as Average over the month at TCBH

(C900060020+C900060031+C900060043+C900060047)/(C900060019+C900060030+C900060042+C900060046)

Where,

C900060020	Number of voice TCH/F seizure failure for assignment
C900060031	Number of data TCH/F seizure failure for assignment
C900060043	Number of voice TCH/H seizure failure for assignment
C900060047	Number of data TCH/H seizure failure for assignment
C900060019	Number of voice TCH/F seizure attempts for assignment

C900060030	Number of data TCH/F seizure attempts for assignment
C900060042	Number of voice TCH/H seizure attempts for assignment
C900060046	Number of data TCH/H seizure attempts for assignment

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

(C900060054+C900060055)/(C900060028+C900060036+C900060199+C900060210+C900060098+C900060102 -(C900060094+C900060095))

Where,

C900060054	Number of TCH/F drops
C900060055	Number of TCH/H drops
C900060028	Number of voice TCH/F assignment success
C900060036	Number of data TCH/F assignment success
C900060199	Number of Voice TCH/H assignment success
C900060210	Number of data TCH/H assignment success
C900060098	Number of BSC-controlled inter-cell incoming handover success
C900060102	Number of MSC-controlled incoming handover success
C900060094	Number of BSC-controlled inter-cell outgoing handover success
C900060095	Number of MSC-controlled outgoing handover

C900060030	Number of data TCH/F seizure attempts for assignment
C900060042	Number of voice TCH/H seizure attempts for assignment
C900060046	Number of data TCH/H seizure attempts for assignment

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

(C900060054+C900060055)/(C900060028+C900060036+C900060199+C900060210+C900060098+C900060102 -(C900060094+C900060095))

Where,

C900060054	Number of TCH/F drops
C900060055	Number of TCH/H drops
C900060028	Number of voice TCH/F assignment success
C900060036	Number of data TCH/F assignment success
C900060199	Number of Voice TCH/H assignment success
C900060210	Number of data TCH/H assignment success
C900060098	Number of BSC-controlled inter-cell incoming handover success
C900060102	Number of MSC-controlled incoming handover success
C900060094	Number of BSC-controlled inter-cell outgoing handover success
C900060095	Number of MSC-controlled outgoing handover

B. Total No. of cells exceeding 3% TCH drop (call drop):

Total no of cells with TCH drop>3%

C. Total No. of cells in the Network:

Active cell from last day of the month.

D. Worst affected cells having more than 3% TCH drop (call drop) rate:

(Total no. of cells with TCH drop>3%/Total no. of cells of on air sites)*100

E. %age of Connection with Good Voice Quality:

KPI is calculated as Average over the month at TCBH

(C900060074+C900060075+C900060076+C900060077+C900060078+C900060079)/(C900060074+C900060075+C900060076+C900060077+C900060078+C900060079+C900060080+C900060081)*100

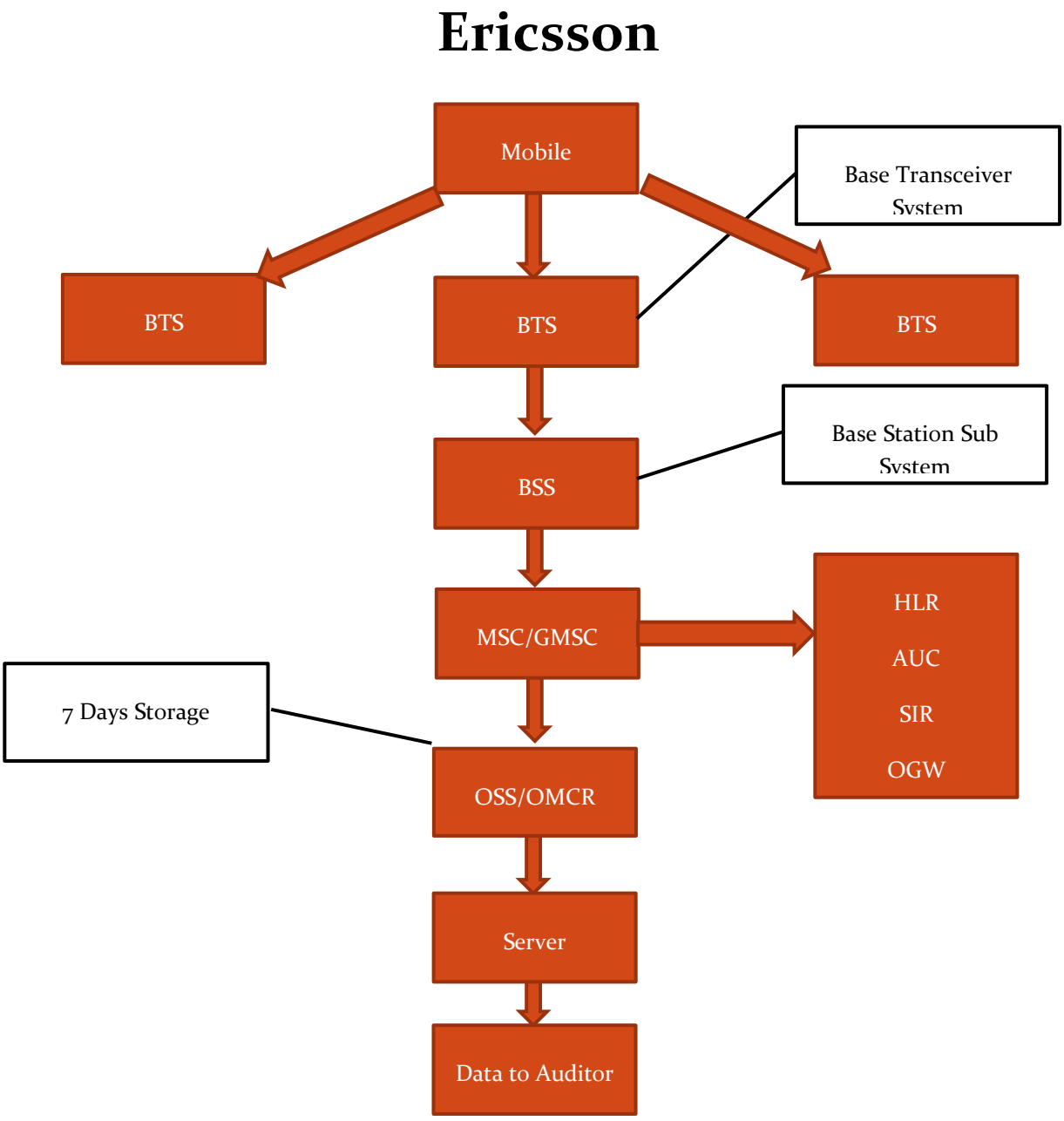
Where,

C900060074	Number of samples with DL RQ = 0
C900060075	Number of samples with DL RQ = 1
C900060076	Number of samples with DL RQ = 2
C900060077	Number of samples with DL RQ = 3
C900060078	Number of samples with DL RQ = 4
C900060079	Number of samples with DL RQ = 5
C900060079	Number of samples with DL RQ = 5
C900060080	Number of samples with DL RQ = 6
C900060081	Number of samples with DL RQ = 7

12.9 BLOCK SCHEMATIC DIAGRAMS

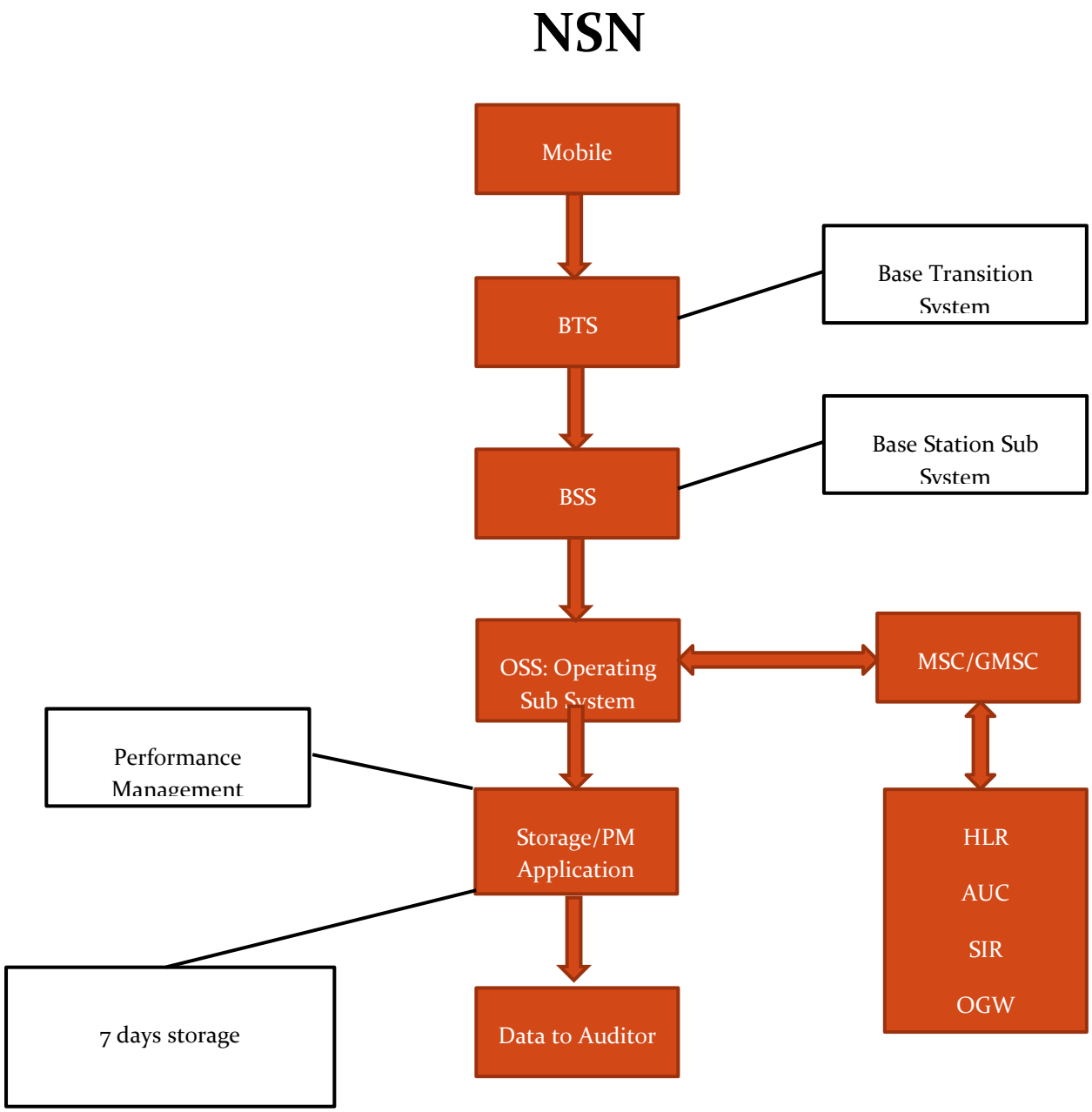
12.9.1 ERICSSON

Ericsson provides network support to Aircel, Uninor, BSNL, Reliance CDMA and Reliance GSM in the circle.



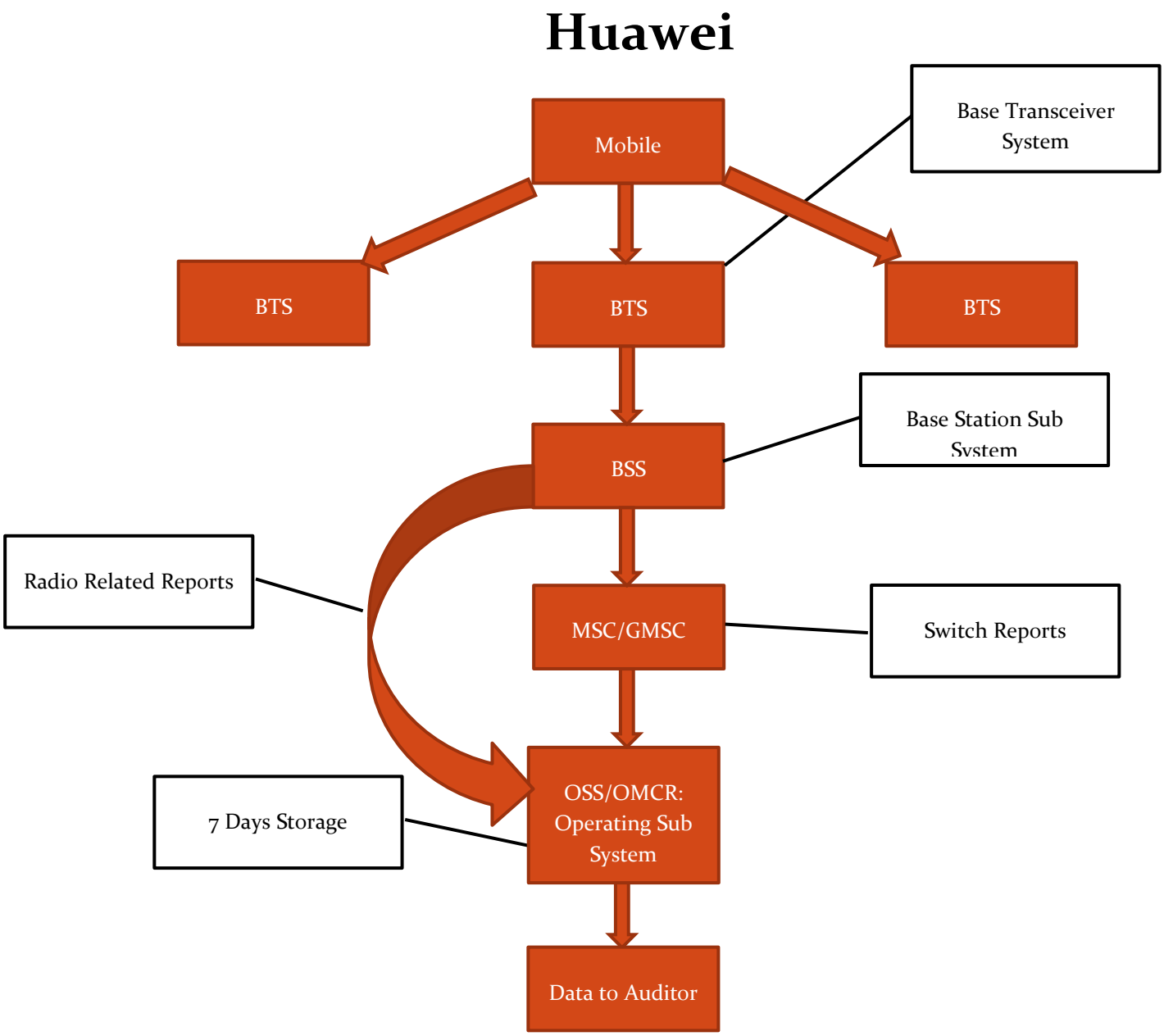
12.9.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel, Vodafone and Idea in the circle.



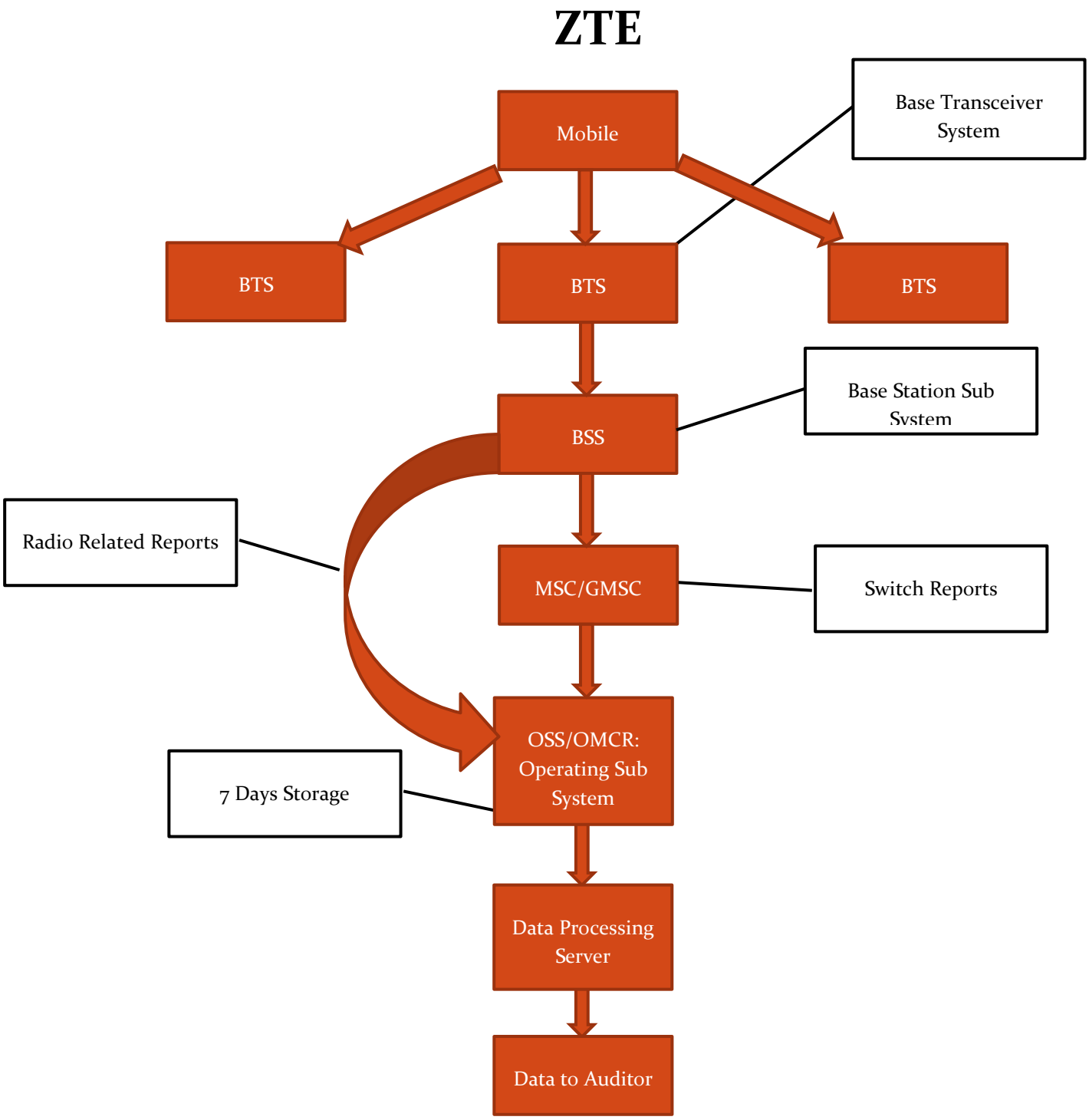
12.9.3 HUAWEI

Huawei provides network support to Uninor in the circle.



12.9.4 ZTE

ZTE provides network support to BSNL, Tata GSM and Tata CDMA in the circle.



13 ANNEXURE – OCTOBER -2G

PMR: -Reliance GSM data reported only for October 2015 & November 2015 and also Reliance GSM service is closed in west Bengal circle.

3 Day Live: - Reliance CDMA had there sever issue so we could not able to conduct the audit for October 2015 and November 2015 months same is intimated to TRAI by the operator.

Audit Results for Network Availability- PMR data-October											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		3012	6403	2479	4485	916	808	2483	26	255	2618
Sum of downtime of BTSs in a month (in hours)		23725	3391	47998	1709	1016	694	87487	2	77	1072
BTSs accumulated downtime (not available for service)	≤ 2%	1.06%	0.07%	2.60%	0.05%	0.15%	0.12%	4.74%	0.01%	0.04%	0.06%
Number of BTSs having accumulated downtime >24 hours		171	8	450	12	0	3	11	0	0	8
Worst affected BTSs due to downtime	≤ 2%	5.68%	0.12%	18.15%	0.27%	0.00%	0.37%	0.44%	0.00%	0.00%	0.31%
Live Measurement Results for Network Availability- 3 Day live data-October											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		3012	6405	2479	4469	918	NDR	NDR	26	255	2588
Sum of downtime of BTSs in a month (in hours)		1981	375	2646	121	84	NDR	NDR	0	1	122
BTSs accumulated downtime (not available for service)	≤ 2%	0.91%	0.08%	1.48%	0.04%	0.13%	NDR	NDR	0.00%	0.01%	0.07%
Number of BTSs having accumulated downtime >24 hours		17	0	36	1	0	NDR	NDR	0	0	2
Worst affected BTSs due to downtime	≤ 2%	0.56%	0.00%	1.45%	0.02%	0.00%	NDR	NDR	0.00%	0.00%	0.08%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-October											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.46%	95.90%	97.86%	99.22%	99.38%	98.09%	96.62%	99.37%	98.91%	99.67%
SDCCH/Paging channel congestion	≤ 1%	0.45%	0.38%	2.56%	0.05%	0.00%	0.00%	0.03%	0.00%	0.06%	0.11%
TCH congestion	≤ 2%	0.95%	1.16%	1.72%	0.11%	0.11%	0.53%	0.40%	0.00%	0.23%	0.33%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.07%	95.95%	97.46%	99.52%	99.86%	NDR	NDR	99.28%	99.29%	99.76%
SDCCH/Paging channel congestion	≤ 1%	0.28%	0.38%	2.62%	0.02%	0.00%	NDR	NDR	0.00%	0.00%	0.03%
TCH congestion	≤ 2%	0.42%	0.38%	2.17%	0.05%	0.01%	NDR	NDR	0.00%	0.04%	0.24%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-October											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		102508300	500310001	58727836	167348982	34617278	12952377	83934296	111146	5731613	107711355
Total number of calls dropped		1295049	6452052	499236	728748	250032	16411	109573	346	30425	855109
Call drop rate	≤ 2%	1.26%	1.29%	0.85%	0.44%	0.72%	0.13%	0.13%	0.31%	0.53%	0.79%
Total number of cells in the network		8955	20358	7063	13511	3382	808	7928	76	765	6721
Total number of cells having more than 3% TCH		1151	529	1714	90	80	8	55	1	23	166
Worst affected cells having more than 3% TCH	≤ 3%	12.85%	2.60%	24.27%	0.67%	2.37%	0.99%	0.69%	1.32%	3.01%	2.47%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-October											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		10000538	47954800	6048559	15990034	3184841	NDR	NDR	10591	601826	43709557
Total number of calls dropped		113620	633232	51268	15882230	21883	NDR	NDR	32	3192	42468285
Call drop rate	≤ 2%	1.08%	1.32%	0.85%	0.35%	0.52%	NDR	NDR	0.23%	0.51%	0.73%
Total number of cells in the network		8955	61007	7063	13464	3388	NDR	NDR	76	765	6651
Total number of cells having more than 3% TCH		1038	1698	1390	12	3	NDR	NDR	2	25	185
Worst affected cells having more than 3% TCH	≤ 3%	11.59%	2.78%	19.68%	0.09%	0.09%	NDR	NDR	2.63%	3.27%	2.78%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-October											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		17274605153	125329261384	7024	24612223365	104929	NA	13310148438	258863574	966418239	15650971458
Total number of calls with good voice quality		16661789034	119948202862	6677	23846734355	104745	NA	13027885326	254002354	944058268	15180746205
%age calls with good voice quality	≥ 95%	96.45%	95.71%	95.06%	96.89%	99.82%	98.92%	97.88%	98.12%	97.69%	97.00%
Live measurement results for Voice quality-3 Day data-October											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1683826596	11991946098	671	2493301707	10158	NDR	NDR	26413119	106638593	7783425110
Total number of calls with good voice quality		1624690101	11470299801	639	2412281646	10145	NDR	NDR	25943469	104271657	7406500346
%age calls with good voice quality	≥ 95%	96.99%	95.65%	95.23%	97.46%	99.53%	NDR	NDR	98.16%	97.96%	97.36%
Drive test results for Voice quality (Average of three drive tests) - DT data-October											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		66	40	77	118	40	21	48	48	20	45
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79858	154814	176124	115471	56325	7351	37316	11697	6272	187112
Traffic served for all POIs (B)- in erlangs		30436	84549	28924	68260	20065	2588	17615	1240	929	86901
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	NDR	NDR	48	20	45
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	465488	181657	116124	56382	NDR	NDR	11697	6242	186549
Traffic served for all POIs (B)- in erlangs		15514	232135	30171	68775	19913	NDR	NDR	638	428	53133
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

14 ANNEXURE – NOVEMBER-2G

PMR: -Reliance GSM data reported only for October 2015 & November 2015 and also Reliance GSM service is closed in west Bengal circle.

3 Day Live: - Reliance CDMA had there sever issue so we could not able to conduct the audit for October 2015 and November 2015 months same is intimated to TRAI by the operator.

Audit Results for Network Availability- PMR data-November											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		3012	6477	2479	4490	916	808	2483	26	255	7400
Sum of downtime of BTSs in a month (in hours)		17539	4342	31273	570	765	694	184609	6	53	1985
BTSs accumulated downtime (not available for service)	≤ 2%	0.81%	0.09%	1.75%	0.02%	0.12%	0.12%	10.33%	0.03%	0.03%	0.04%
Number of BTSs having accumulated downtime >24 hours		111	17	273	4	0	3	4	0	0	0
Worst affected BTSs due to downtime	≤ 2%	3.69%	0.26%	11.01%	0.09%	0.00%	0.37%	0.16%	0.00%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-November											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		3012	6425	2479	4485	916	NDR	NDR	26	255	7379
Sum of downtime of BTSs in a month (in hours)		1856	302	3758	130	130	NDR	NDR	0	0	167
BTSs accumulated downtime (not available for service)	≤ 2%	0.86%	0.07%	2.11%	0.04%	0.20%	NDR	NDR	0.00%	0.00%	0.03%
Number of BTSs having accumulated downtime >24 hours		13	0	44	2	0	NDR	NDR	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.43%	0.00%	1.77%	0.04%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.42%	96.47%	98.58%	99.07%	99.77%	98.09%	96.69%	99.44%	98.17%	99.38%
SDCCH/Paging channel congestion	≤ 1%	0.37%	0.39%	2.20%	0.05%	NA	NA	1.00%	NA	0.01%	0.47%
TCH congestion	≤ 2%	0.87%	1.17%	1.05%	0.16%	0.06%	0.53%	0.77%	0.00%	0.05%	0.62%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.92%	95.44%	98.29%	99.62%	99.75%	NDR	NDR	99.30%	99.33%	99.89%
SDCCH/Paging channel congestion	≤ 1%	0.20%	0.35%	3.02%	0.02%	NA	NA	NDR	NA	0.01%	0.31%
TCH congestion	≤ 2%	0.44%	0.40%	1.45%	0.08%	0.08%	NDR	NDR	0.00%	0.02%	0.21%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-November											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		98576356	472435289	53963847	165440333	31776719	12952377	727128008182700	102327	5966245	443003210
Total number of calls dropped		1180265	6162066	474174	836184	213934	16411	102465	227	30111	3445073
Call drop rate	≤ 2%	1.20%	1.30%	0.88%	0.51%	0.67%	0.13%	0.00%	0.22%	0.50%	0.78%
Total number of cells in the network		8955	20583	7246	13527	3383	808	7928	76	765	22251
Total number of cells having more than 3% TCH		1067	549	1668	67	72	7	60	1	20	608
Worst affected cells having more than 3% TCH	≤ 3%	11.92%	2.67%	23.02%	0.50%	2.13%	0.92%	0.76%	1.58%	2.61%	2.73%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-November											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		9189756	48784740	5817766	16236781	3226017	NDR	NDR	9913	684113	42594602
Total number of calls dropped		107151	588751	56383	63271	23133	NDR	NDR	21	33477	327284
Call drop rate	≤ 2%	1.02%	1.21%	0.97%	0.31%	0.52%	NDR	NDR	0.25%	0.49%	0.59%
Total number of cells in the network		8961	61210	7246	13511	3382	NDR	NDR	76	768	22200
Total number of cells having more than 3% TCH		1000	1685	1470	9	4	NDR	NDR	1	22	621
Worst affected cells having more than 3% TCH	≤ 3%	11.16%	2.75%	20.29%	0.07%	0.10%	NDR	NDR	1.92%	2.91%	2.80%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-November											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		16439747213	112939239238	7059	25303953672	101472	0	12812159084	361313657	1048863490	80232509572
Total number of calls with good voice quality		15871150011	108108262641	6711	24461245225	101348	0	12544388346	354636665	1026009084	76453495463
%age calls with good voice quality	≥ 95%	96.54%	95.72%	95.07%	96.67%	99.88%	98.92%	97.91%	98.15%	97.82%	95.29%
Live measurement results for Voice quality-3 Day data-November											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1726928241	11587925875	654	2541189603	10146	NDR	NDR	357248969	1241631862	8005392784
Total number of calls with good voice quality		1670142120	11082842454	622	2463362139	10128	NDR	NDR	350429306	1217283881	7633853846
%age calls with good voice quality	≥ 95%	97.05%	95.64%	95.11%	97.63%	99.36%	NDR	NDR	98.09%	98.04%	96.51%
Drive test results for Voice quality (Average of three drive tests) - DT data-November											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		66	40	77	118	40	21	48	48	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81058	155191	180337	116570	56322	7351	39029	11698	6192	361512
Traffic served for all POIs (B)- in erlangs		30120	93788	28327	70029	19920	2476	16269	1192	922	185743
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	NDR	NDR	48	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	462492	181657	116444	56322	NDR	NDR	11697	6192	359672
Traffic served for all POIs (B)- in erlangs		15898	246532	31479	69969	20324	NDR	NDR	650	424	130554
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

15 ANNEXURE – DECEMBER-2G

PMR: -Reliance GSM data reported only for October 2015 & November 2015 and also Reliance GSM service is closed in west Bengal circle.

3 Day Live: - Reliance CDMA had there sever issue so we could not able to conduct the audit for October 2015 and November 2015 months same is intimated to TRAI by the operator.

Audit Results for Network Availability- PMR data-December											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		3012	6541	2479	4515	916	808	Service closed	26	255	7400
Sum of downtime of BTSs in a month (in hours)		18074	3401	109606	1668	768	694	Service closed	0	47	2868
BTSs accumulated downtime (not available for service)	≤ 2%	0.81%	0.07%	5.94%	0.05%	0.11%	0.12%	Service closed	0.00%	0.02%	0.05%
Number of BTSs having accumulated downtime >24 hours		125	10	851	9	0	3	Service closed	0	0	11
Worst affected BTSs due to downtime	≤ 2%	4.15%	0.15%	34.33%	0.20%	0.00%	0.37%	Service closed	0.00%	0.00%	0.15%
Live Measurement Results for Network Availability- 3 Day live data-December											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		3012	6519	2479	4489	916	456	Service closed	26	255	7400
Sum of downtime of BTSs in a month (in hours)		2028	283	4499	196	122	24	Service closed	0	0	284
BTSs accumulated downtime (not available for service)	≤ 2%	0.94%	0.06%	2.52%	0.06%	0.18%	0.07%	Service closed	0.00%	0.00%	0.05%
Number of BTSs having accumulated downtime >24 hours		16	0	48	2	0	0	Service closed	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.53%	0.00%	1.94%	0.04%	0.00%	0.00%	Service closed	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.37%	96.51%	98.40%	96.73%	99.78%	98.09%	Service closed	99.45%	99.16%	98.85%
SDCCH/Paging channel congestion	≤ 1%	0.58%	0.52%	1.82%	0.05%	0.00%	0.00%	Service closed	0.00%	0.01%	0.89%
TCH congestion	≤ 2%	1.04%	1.45%	1.22%	0.20%	0.08%	0.53%	Service closed	0.01%	0.03%	1.15%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.19%	95.38%	98.36%	95.46%	99.84%	97.03%	Service closed	99.51%	99.33%	99.45%
SDCCH/Paging channel congestion	≤ 1%	0.77%	0.58%	0.90%	0.03%	0.00%	0.00%	Service closed	0.00%	0.01%	0.65%
TCH congestion	≤ 2%	0.41%	1.36%	1.03%	0.05%	0.05%	1.17%	Service closed	0.00%	0.00%	0.55%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		2985	NDR	3364	1814	3302	4257	Service closed	1759	1260	1605
Total number of successful calls established		2957	NDR	1785	1814	3280	3624	Service closed	1754	1246	1605
CSSR	≥ 95%	99.06%	NDR	53.06%	100.00%	99.33%	85.13%	Service closed	99.72%	98.89%	100.00%
%age blocked calls		0.94%	NDR	46.94%	0.00%	0.67%	14.87%	Service closed	0.28%	1.11%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-December											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		100110454	486603253	56936693	172390072	31962581	12952377	Service closed	95565	6150957	486192861
Total number of calls dropped		1061386	6021669	476626	785542	191575	16411	Service closed	223	33291	3382665
Call drop rate	≤ 2%	1.06%	1.24%	0.84%	0.46%	0.60%	0.13%	Service closed	0.23%	0.54%	0.70%
Total number of cells in the network		9127	20777	7246	13603	3384	808	Service closed	76	768	22265
Total number of cells having more than 3% TCH		1027	550	1597	51	64	8	Service closed	1	22	467
Worst affected cells having more than 3% TCH	≤ 3%	11.26%	2.65%	22.04%	0.37%	1.89%	0.96%	Service closed	1.45%	2.92%	2.10%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-December											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		9664180	46240565	5067629	16648076	2970301	1484675	Service closed	9906	592974	47776681
Total number of calls dropped		99221	566818	41838	75742	17535	2239	Service closed	20	3339	286646
Call drop rate	≤ 2%	0.95%	1.23%	0.83%	0.36%	0.42%	0.24%	Service closed	0.22%	0.53%	0.51%
Total number of cells in the network		9025	62125	7246	13525	3384	1368	Service closed	76	768	22265
Total number of cells having more than 3% TCH		1048	1694	1332	11	3	7	Service closed	0	20	363
Worst affected cells having more than 3% TCH	≤ 3%	11.62%	2.73%	18.38%	0.08%	0.08%	0.53%	Service closed	0.04%	2.60%	1.63%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		2957	0	1785	1814	3258	3624	Service closed	1754	1248	1605
Total number of calls dropped		8	0	110	2	5	334	Service closed	2	2	0
Call drop rate	≤ 2%	0.27%	NDR	6.16%	0.11%	0.15%	9.21%	Service closed	0.11%	0.16%	0.00%

Audit Results for Voice quality -PMR Data-December											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		17100793951	107264405921	7082	27528328853	104887	NA	Service closed	401702420	1106171590	91684203212
Total number of calls with good voice quality		16566298527	102692817273	6734	26762716259	104704	NA	Service closed	394088466	1082572652	88178655363
%age calls with good voice quality	≥ 95%	96.87%	95.74%	95.09%	97.22%	99.83%	98.95%	Service closed	98.10%	97.87%	96.18%
Live measurement results for Voice quality-3 Day data-December											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1648003086	9982735086	686	2568345470	10151	NA	Service closed	39128087	107224627	9024723678
Total number of calls with good voice quality		1598673548	9553004620	652	2496747279	10134	NA	Service closed	38389243	104880596	8709612092
%age calls with good voice quality	≥ 95%	97.45%	95.70%	95.04%	97.91%	99.50%	99.21%	Service closed	98.09%	98.07%	97.50%
Drive test results for Voice quality (Average of three drive tests) - DT data-December											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		3911865	NDR	2585325	1998136	243389	99967	Service closed	0	2023114	959390
Total number of calls with good voice quality		3724019	NDR	2362882	1952056	121844	81299	Service closed	0	1957293	933816
%age calls with good voice quality	≥ 95%	95.20%	NDR	91.40%	97.69%	98.11%	81.33%	Service closed	98.98%	96.75%	97.33%

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	22	Service closed	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	Service closed	0	0	0
Total Capacity of all POIs (A) - in erlangs		81083	154913	179769	116825	57670	5222	Service closed	11717	6226	360143
Traffic served for all POIs (B)- in erlangs		31345	93358	31754	71041	20440	1288	Service closed	1187	887	192966
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Service closed	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		67	40	77	118	40	21	Service closed	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	Service closed	0	0	0
Total Capacity of all POIs (A) - in erlangs		81076	459815	183607	116999	57719	7366	Service closed	11717	6192	360294
Traffic served for all POIs (B)- in erlangs		15956	247033	30433	67635	19983	861	Service closed	601	396	82346
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Service closed	0.00%	0.00%	0.00%

16 ANNEXURE – OCTOBER -3G

Audit Results for Network Availability- PMR data-October				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		513	629	2598
Sum of downtime (i.e. total outage time) of Node Bs		3325	11630	794
Node Bs downtime (not available for service)	≤ 2%	0.87%	2.49%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		22	80	4
Worst affected Node Bs due to downtime	≤ 2%	4.29%	12.72%	0.15%
Live Measurement Results for Network Availability- 3 Day live data-October				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		513	629	2593
Sum of downtime (i.e. total outage time) of Node Bs		128	1705	153
Node Bs downtime (not available for service)	≤ 2%	0.35%	3.76%	0.08%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	33	2
Worst affected Node Bs due to downtime	≤ 2%	0.00%	5.25%	0.08%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-October				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	99.25%	94.33%	99.99%
RRC Congestion	≤ 1%	0.17%	1.13%	0.01%
Circuit Switched RAB Congestion	≤ 2%	0.13%	0.37%	0.15%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-October				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	98.99%	96.00%	100.00%
RRC Congestion	≤ 1%	0.25%	0.40%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.21%	0.43%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October				
CSSR	Benchmark	Aircel	BSNL	Vodafone
Total number of RRC attempts (A)		NA	NA	NA
Total number of RRC established (B)		NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA
%age blocked calls		NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - PMR data-October				
	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		2122059	1277691	35355006
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		5643	23055	114725
Call drop rate (B/A*100)	≤ 2%	0.27%	1.80%	0.32%
Total no. of cells in the licensed service area (B)		1499	1887	7573
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		52	236	162
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	3.47%	12.51%	2.14%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-October				
	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		273851	128702	31947950
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		999	2231	162543
Call drop rate (B/A*100)	≤ 2%	0.31%	1.73%	0.04%
Total no. of cells in the licensed service area (B)		1502	1887	7573
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		47	230	7
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	3.13%	12.19%	0.09%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October				
Call drop rate	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA

Audit Results for Voice quality -PMR Data-October				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		10166921818	NDR	45820613855
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		10055491844	NDR	45365610808
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.90%	NDR	99.01%
Live measurement results for Voice quality-3 Day data-October				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1283548708	NDR	3603800885
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1269295373	NDR	3563922100
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.89%	NDR	98.84%
Drive test results for Voice quality (Average of three drive tests) - DT data-October				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA

Audit Results for POI Congestion- PMR data-October				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		66	77	45
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		79858	176124	187112
Traffic served for all POIs (B)- in erlangs		30436	28924	86901
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	45
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	181657	186549
Traffic served for all POIs (B)- in erlangs		15622	30171	53133
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

17 ANNEXURE – NOVEMBER-3G

Audit Results for Network Availability- PMR data-November				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		525	629	2590
Sum of downtime (i.e. total outage time) of Node Bs		1412	6364	757
Node Bs downtime (not available for service)	≤ 2%	0.37%	1.41%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		9	48	0
Worst affected Node Bs due to downtime	≤ 2%	1.71%	7.63%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-November				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		513	629	2500
Sum of downtime (i.e. total outage time) of Node Bs		101	1093	65
Node Bs downtime (not available for service)	≤ 2%	0.27%	2.41%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		1	12	0
Worst affected Node Bs due to downtime	≤ 2%	0.19%	1.91%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-November				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	98.70%	96.25%	99.67%
RRC Congestion	≤ 1%	0.24%	0.33%	0.07%
Circuit Switched RAB Congestion	≤ 2%	0.21%	0.50%	0.06%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-November				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	99.15%	95.35%	99.73%
RRC Congestion	≤ 1%	0.33%	0.45%	0.04%
Circuit Switched RAB Congestion	≤ 2%	0.21%	0.60%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November				
CSSR	Benchmark	Aircel	BSNL	Vodafone
Total number of RRC attempts (A)		NA	NA	NA
Total number of RRC established (B)		NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA
%age blocked calls		NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - PMR data-November				
	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		3063734	1140801	20060709
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		7143	17269	92486
Call drop rate (B/A*100)	≤ 2%	0.23%	1.51%	0.46%
Total no. of cells in the licensed service area (B)		1541	1887	7877
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		47	297	191
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	3.05%	15.74%	2.42%

Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-November				
	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		311803	124895	1987423
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		629	1921	9873
Call drop rate (B/A*100)	≤ 2%	0.24%	1.54%	0.44%
Total no. of cells in the licensed service area (B)		1536	1887	7778
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		57	115	185
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	3.71%	6.09%	2.38%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November				
Call drop rate	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA

Audit Results for Voice quality -PMR Data-November				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12141865132	NDR	55569468874
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12009175664	NDR	54981377714
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.91%	NDR	98.94%
Live measurement results for Voice quality-3 Day data-November				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1274501385	NDR	4515056998
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1259929190	NDR	4466933929
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.93%	NDR	98.94%
Drive test results for Voice quality (Average of three drive tests) - DT data-November				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA

Audit Results for POI Congestion- PMR data-November				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		66	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81058	180337	361512
Traffic served for all POIs (B)- in erlangs		30120	28327	185743
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81079	181657	359672
Traffic served for all POIs (B)- in erlangs		15898	31479	130554
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

18 ANNEXURE – DECEMBER-3G

Audit Results for Network Availability- PMR data-December				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		574	629	2639
Sum of downtime (i.e. total outage time) of Node Bs		2763	31528	550
Node Bs downtime (not available for service)	≤ 2%	0.65%	6.74%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		15	256	1
Worst affected Node Bs due to downtime	≤ 2%	2.61%	40.70%	0.04%
Live Measurement Results for Network Availability- 3 Day live data-December				
	Benchmark	Aircel	BSNL	Vodafone
(Number of Node Bs in the network in the licensed service area		574	629	2639
Sum of downtime (i.e. total outage time) of Node Bs		365	1200	90
Node Bs downtime (not available for service)	≤ 2%	0.88%	2.65%	0.05%
Number of Node Bs having accumulated downtime of >24 hours in a month		2	11	0
Worst affected Node Bs due to downtime	≤ 2%	0.35%	1.75%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-December				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	97.79%	95.92%	99.72%
RRC Congestion	≤ 1%	0.28%	0.35%	0.07%
Circuit Switched RAB Congestion	≤ 2%	0.82%	2.93%	0.05%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-December				
	Benchmark	Aircel	BSNL	Vodafone
CSSR	≥ 95%	98.18%	95.57%	99.77%
RRC Congestion	≤ 1%	0.24%	0.39%	0.03%
Circuit Switched RAB Congestion	≤ 2%	0.62%	3.46%	0.03%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December				
CSSR	Benchmark	Aircel	BSNL	Vodafone
Total number of RRC attempts (A)		1464	2414	1381
Total number of RRC established (B)		1464	999	1377
Call setup success rate (B/A*100)	≥ 95%	100.00%	41.38%	99.71%
%age blocked calls		0.00%	58.62%	0.29%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - PMR data-December				
	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		3907194	1227837	22647418
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		15147	19692	86864
Call drop rate (B/A*100)	≤ 2%	0.39%	1.60%	0.38%
Total no. of cells in the licensed service area (B)		1676	1887	8032
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		82	291	185
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	4.87%	15.42%	2.30%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-December				
	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		408480	117140	2251751
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		1838	1879	8747
Call drop rate (B/A*100)	≤ 2%	0.42%	1.60%	0.37%
Total no. of cells in the licensed service area (B)		1684	1887	8007
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		105	261	198
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	6.22%	13.83%	2.47%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December				
Call drop rate	Benchmark	Aircel	BSNL	Vodafone
Total calls successfully established (A) (Number of voice RAB normally released)		1508	990	1377
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		5	91	0
Call drop rate (B/A*100)	≤ 2%	0.33%	9.19%	0.00%

Audit Results for Voice quality -PMR Data-December				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		23982168291	NDR	64488413391
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		23977371857	NDR	63812820375
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.98%	NDR	98.95%
Live measurement results for Voice quality-3 Day data-December				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2633877443	NDR	6473097311
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		43138305	NDR	6405736748
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.98%	NDR	98.89%
Drive test results for Voice quality (Average of three drive tests) - DT data-December				
Voice quality	Benchmark	Aircel	BSNL	Vodafone
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2402924	3901845	3027912
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2295710	2127099	2991648
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	95.54%	54.52%	98.80%

Audit Results for POI Congestion- PMR data-December				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81083	179769	360143
Traffic served for all POIs (B)- in erlangs		31345	31754	192966
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December				
POI congestion	Benchmark	Aircel	BSNL	Vodafone
Total number of working POIs		67	77	49
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		81076	183607	360294
Traffic served for all POIs (B)- in erlangs		15956	30433	82346
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

19 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. OND'15 – Refers to the quarter of October , November and December 2015
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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