TRAI Audit Wireless Report for Bihar & Jharkhand Circle

QE December 2015

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-

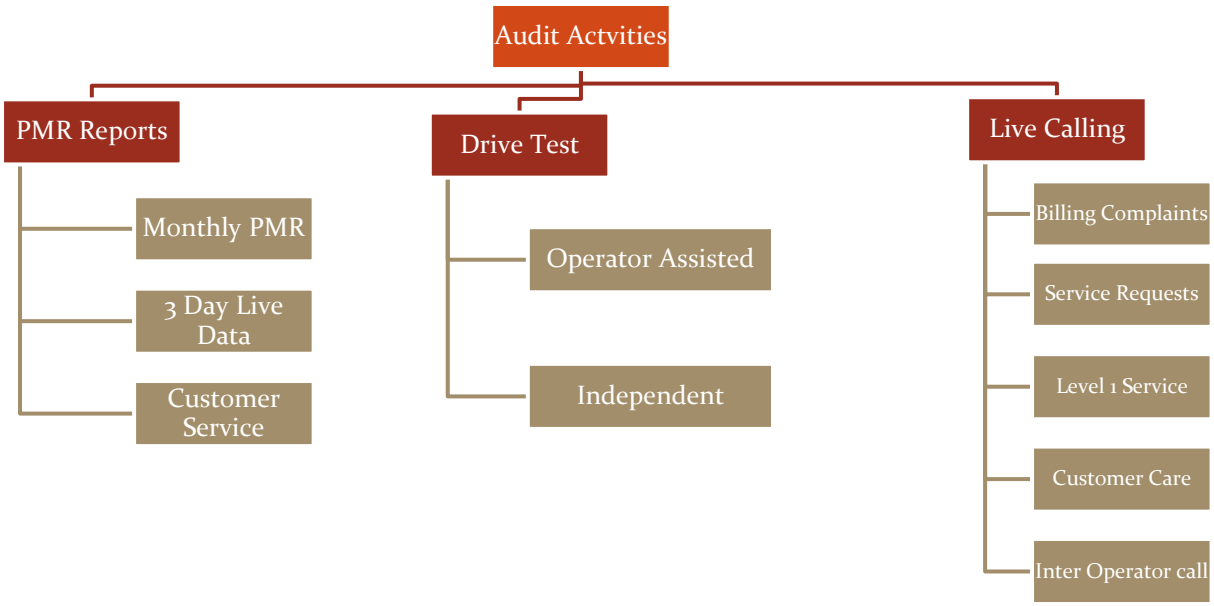
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

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

Image Source: BSNL website

2.4 FRAMEWORK USED

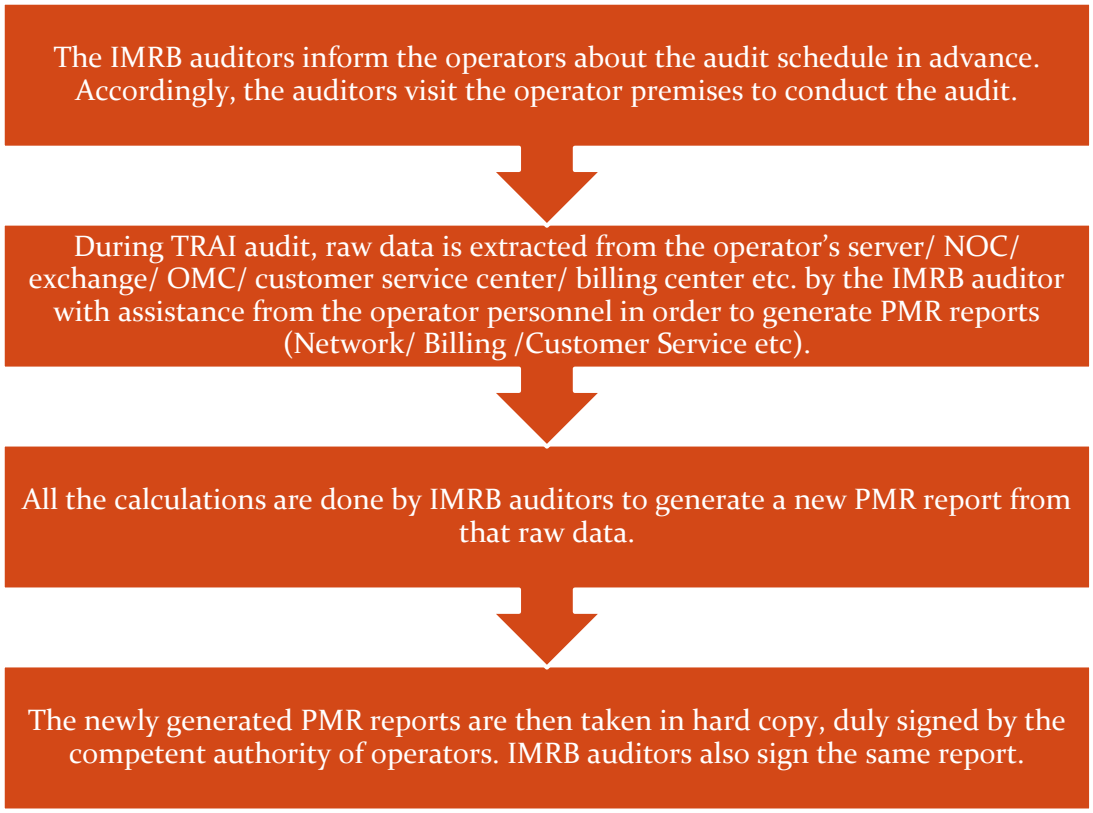


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.



The 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-

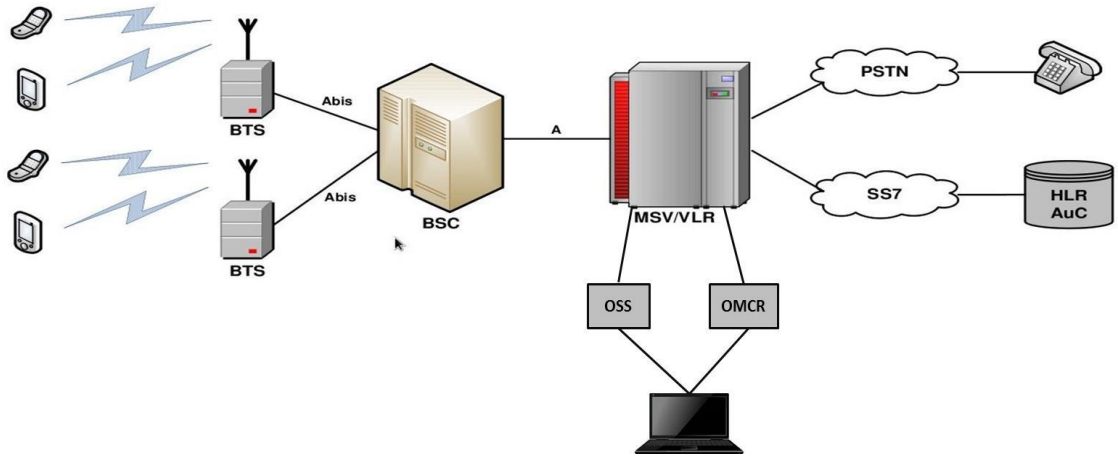
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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%

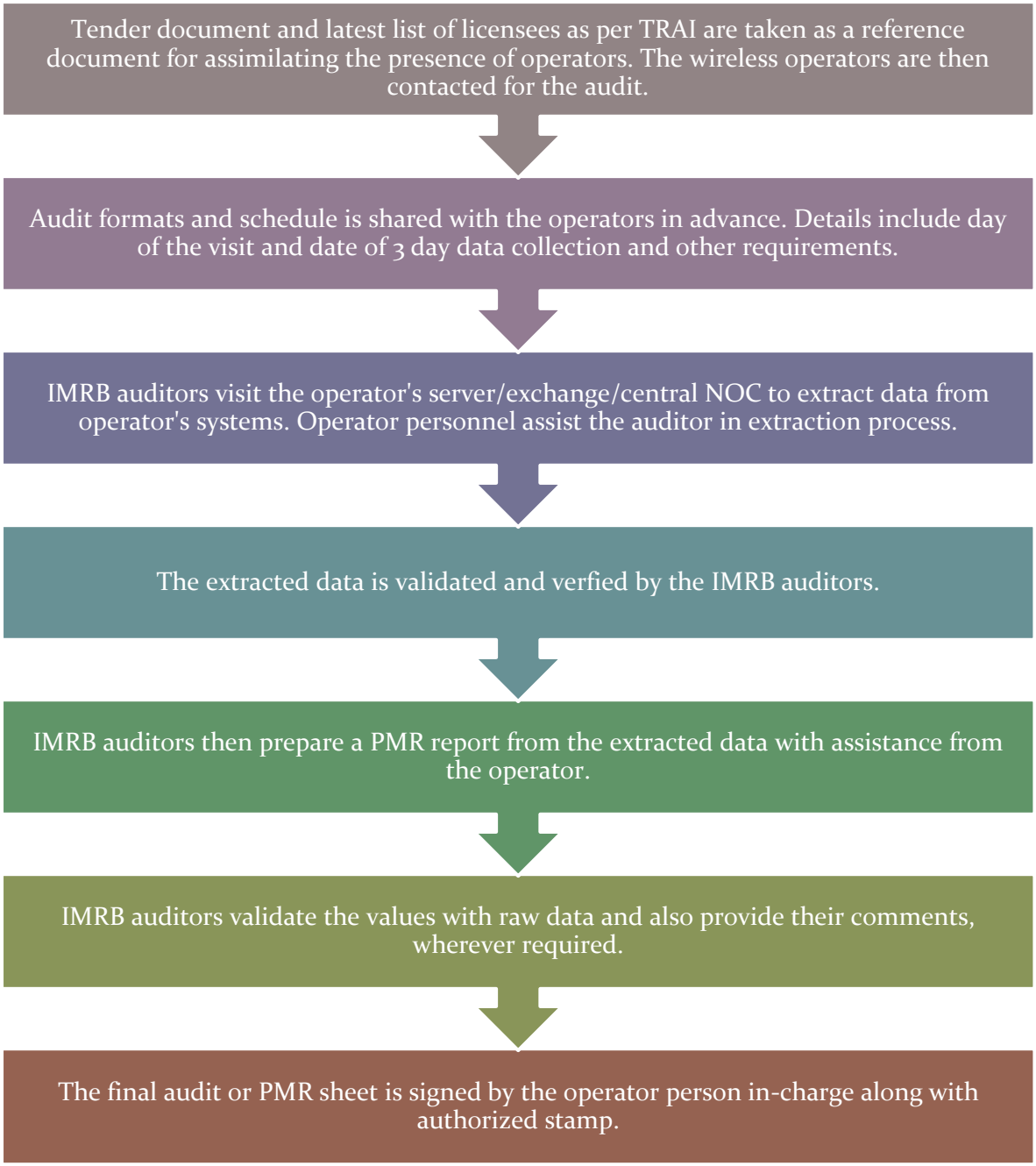
2.4.1.8 POINT OF DATA EXTRACTION

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.

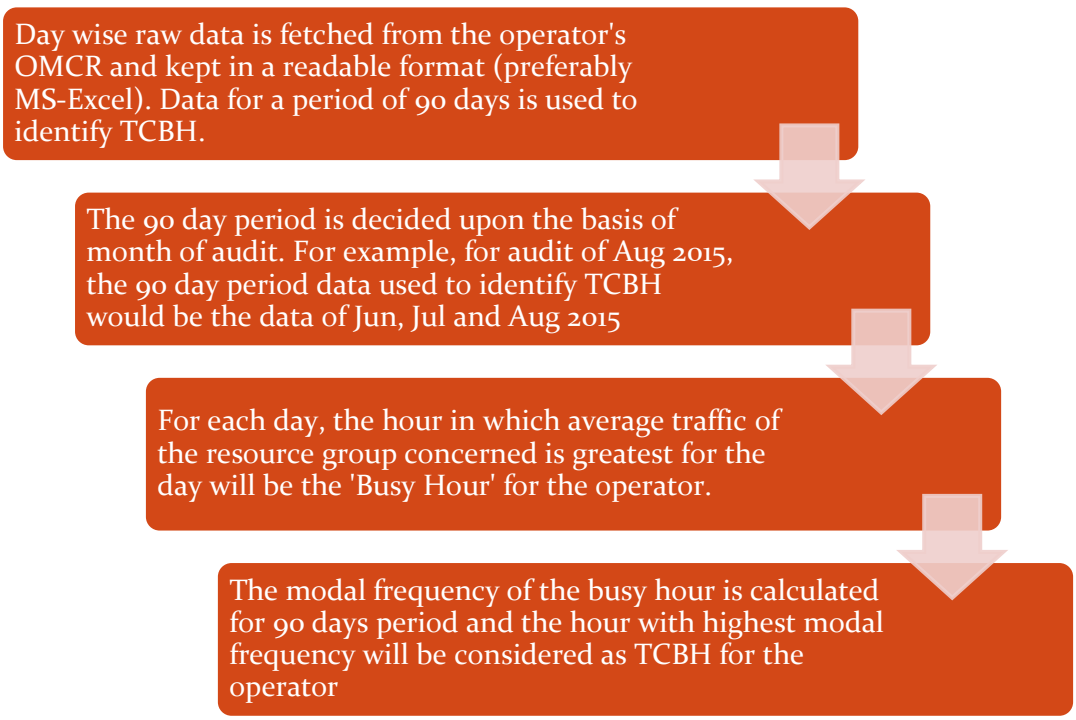
Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar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

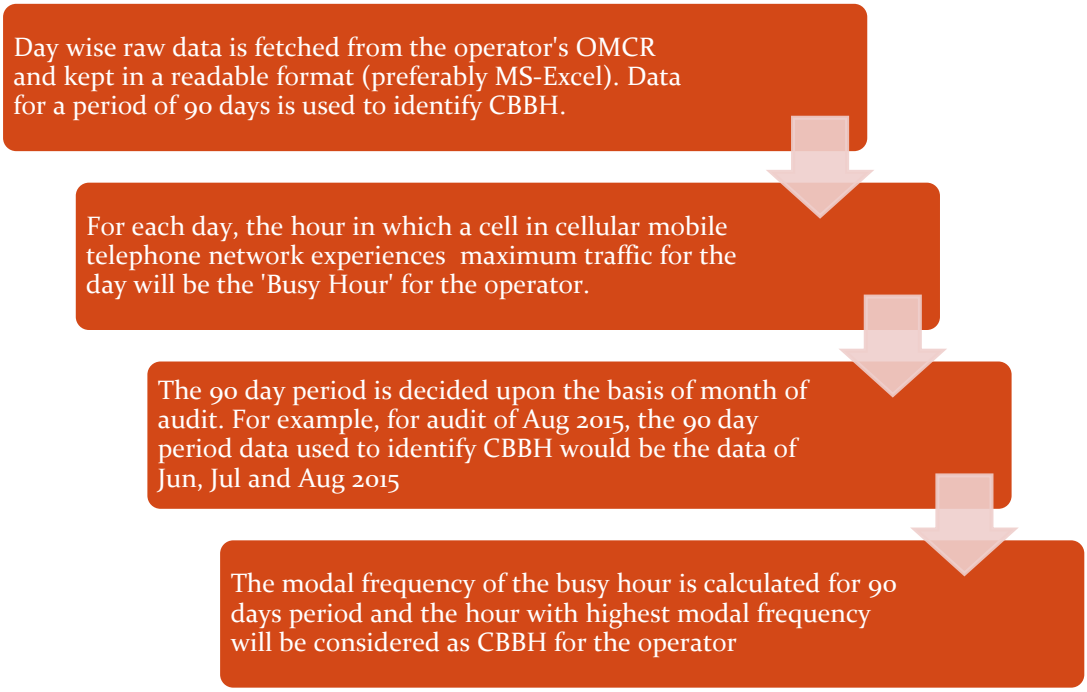
Step by step procedure to identify TCBH for an operator:



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%

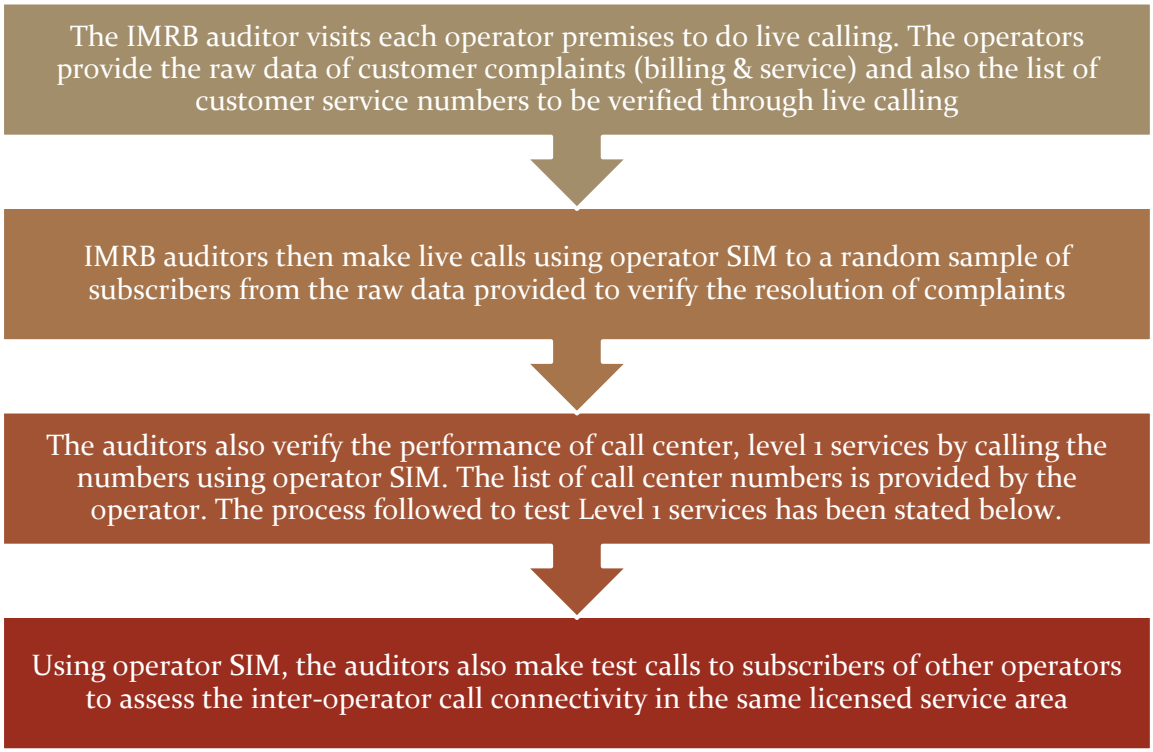
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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.

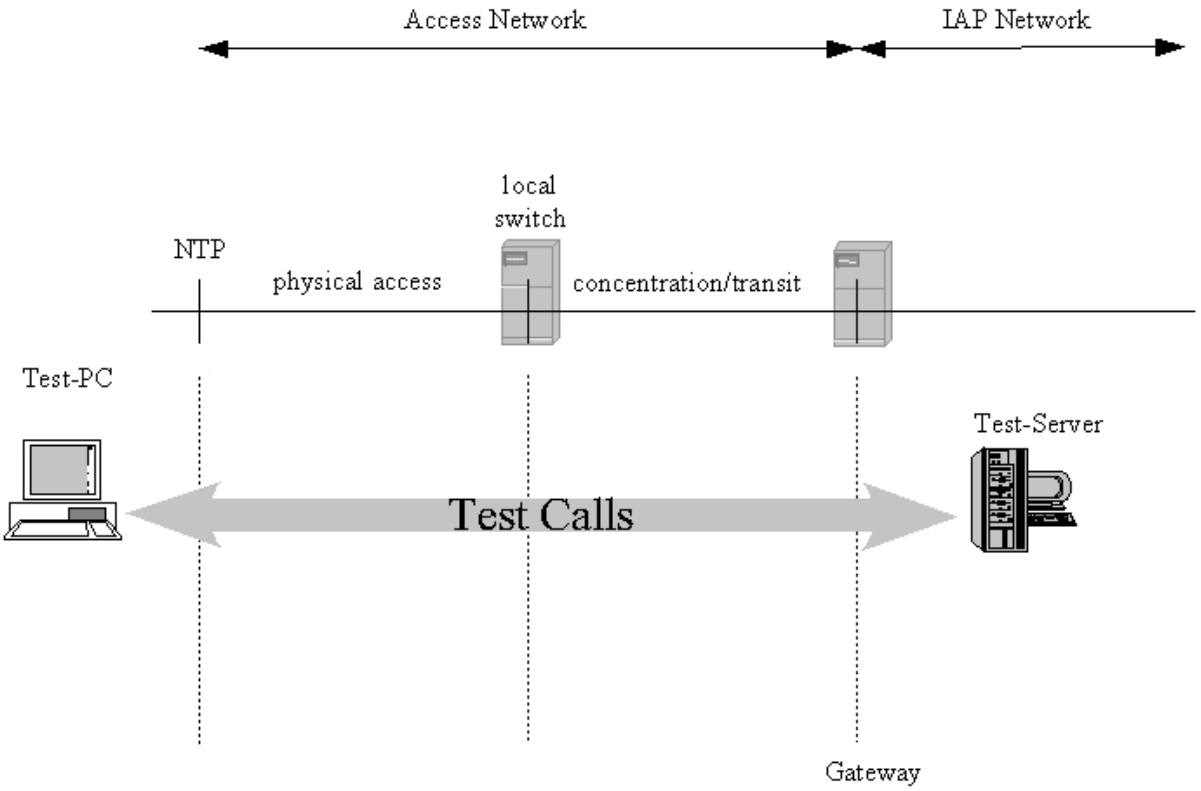


Figure for Measurement set-up

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

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(DWL)	5146028
Airtel	NDR
BSNL Bihar/Jharkand	1422885
Idea	10899788
Reliance CDMA	NDR
Reliance GSM	NDR
TATA CDMA	167927
TATA GSM	951364
Telenor	5873824
Vodafone	10312878
Name of Operator	**Number of Subscriber as per VLR-3G**
Aircel(DWL)	202148
Airtel	NDR
BSNL Bihar/Jharkand	NDR

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

3 Day Live: - Reliance CDMA and Reliance GSM did not submit the Data for all the 3 months due to server issue

Airtel did not submit the data for 3G services.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY-2G

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the Bihar & Jharkhand 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(DWL)	2.09%	11.04%	87.72%	0.92%	12.54%	1.70%	12.03%	95.26%
Airtel	0.06%	0.17%	95.64%	0.79%	1.18%	1.60%	2.21%	95.74%
BSNL Bihar/Jharkand	2.66%	12.61%	89.69%	2.97%	7.27%	14.97%	7.03%	96.43%
Idea	0.56%	1.75%	95.87%	0.92%	1.90%	1.07%	2.69%	96.01%
Reliance CDMA	0.14%	0.62%	97.02%	NA	0.81%	0.15%	0.29%	98.71%
Reliance GSM	0.06%	0.10%	98.41%	0.20%	0.50%	0.28%	0.66%	98.93%
TATA CDMA	4.22%	0.00%	97.89%	NA	0.41%	0.36%	1.67%	98.25%
TATA GSM	0.20%	0.31%	98.33%	0.19%	0.34%	0.49%	2.46%	97.53%
Telenor	0.21%	0.36%	92.77%	2.10%	5.79%	0.52%	1.24%	94.68%
Vodafone	27.46%	1.93%	99.15%	0.52%	0.85%	0.86%	2.84%	97.56%

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

Following are the parameter wise observations for wireless operators for Bihar & Jharkhand circle:

BTSs Accumulated Downtime:

Aircel, TATA CDMA, Vodafone and BSNL did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel and Reliance GSM at 0.06%.

Worst Affected BTSs Due to Downtime:

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

Call Set-up Success Rate (CSSR):

Aircel, BSNL and Telenor failed to meet the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.15%.

SDCCH/ Paging Chl. Congestion:

BSNL and Telenor failed to meet the benchmark on SDCCH / Paging Channel Congestion. TATA GSM recorded the best SDCCH / Paging Channel Congestion

TCH Congestion:

Aircel, BSNL and Telenor failed to meet the benchmark for TCH congestion, while TATA GSM performed the best on TCH congestion.

Call Drop Rate:

BSNL failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDM at 0.15%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL failed to meet the benchmark. Best performance was recorded for Reliance CDMA at 0.29%.

Voice Quality

Telenor failed to meet the benchmark. Best performance was recorded for Airtel at 98.93%.

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

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

3.1.1 PMR DATA - OCTOBER FOR 2G

October PMR								
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(DWL)	2.62%	13.45%	88.18%	0.82%	11.35%	1.84%	12.58%	95.31%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	3.63%	22.76%	87.81%	0.38%	1.24%	63.33%	8.39%	NDR
Idea	0.57%	1.57%	95.53%	0.96%	1.95%	1.07%	2.66%	95.79%
Reliance CDMA	0.13%	0.40%	96.96%	NA	0.82%	0.17%	0.32%	98.71%
Reliance GSM	0.04%	0.03%	98.44%	0.20%	0.49%	0.28%	0.67%	98.95%
TATA CDMA	12.33%	0.00%	97.49%	NA	0.75%	0.61%	NDR	98.25%
TATA GSM	0.34%	0.73%	98.16%	0.29%	0.61%	0.58%	2.58%	98.16%
Telenor	0.24%	0.68%	92.81%	1.15%	5.84%	0.51%	1.48%	94.64%
Vodafone	28.71%	1.98%	99.03%	0.44%	0.97%	0.90%	2.83%	97.48%

3.1.2 PMR DATA – NOVEMBER FOR 2G

November PMR								
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(DWL)	1.91%	10.06%	87.40%	1.11%	14.16%	1.64%	11.45%	95.24%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	3.15%	15.49%	91.08%	5.66%	19.09%	1.44%	8.79%	96.43%
Idea	0.50%	1.78%	95.31%	0.93%	1.95%	1.14%	2.82%	95.92%
Reliance CDMA	0.06%	0.26%	97.25%	NA	0.77%	0.15%	0.30%	98.71%
Reliance GSM	0.04%	0.10%	98.44%	0.20%	0.43%	0.29%	1.05%	98.95%
TATA CDMA	0.12%	0.00%	98.18%	NA	0.16%	0.25%	2.20%	98.25%
TATA GSM	0.11%	0.10%	98.61%	0.10%	0.13%	0.45%	NA	97.56%
Telenor	0.22%	0.36%	93.29%	0.88%	5.05%	0.50%	1.05%	94.62%
Vodafone	30.40%	1.92%	99.18%	0.59%	0.82%	0.84%	2.91%	97.50%

3.1.3 PMR DATA - DECEMBER FOR 2G

December PMR								
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(DWL)	1.83%	9.72%	87.57%	0.85%	12.11%	1.65%	12.04%	95.23%
Airtel	0.06%	0.17%	95.64%	0.79%	1.18%	1.60%	2.21%	95.74%
BSNL Bihar/Jharkand	1.47%	1.56%	90.19%	2.87%	1.47%	2.47%	3.94%	NDR
Idea	0.63%	1.91%	96.77%	0.86%	1.79%	1.01%	2.59%	96.33%
Reliance CDMA	0.22%	1.19%	96.83%	0.00%	0.85%	0.13%	0.24%	98.71%
Reliance GSM	0.09%	0.16%	98.34%	0.19%	0.58%	0.26%	0.27%	98.80%
TATA CDMA	0.18%	0.00%	97.99%	NA	0.33%	0.35%	1.09%	98.25%
TATA GSM	0.14%	0.10%	98.22%	0.18%	0.29%	0.47%	2.35%	97.51%
Telenor	0.17%	0.06%	92.22%	4.27%	6.47%	0.56%	1.20%	94.77%
Vodafone	24.24%	1.90%	99.23%	0.52%	0.77%	0.84%	2.79%	97.68%

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(DWL)	2.05%	0.00%	88.31%	0.92%	10.88%	1.68%	11.76%	95.34%
Airtel	0.05%	0.00%	95.65%	0.79%	1.15%	1.59%	2.23%	95.70%
BSNL Bihar/Jharkand	4.74%	1.74%	89.93%	3.25%	6.85%	68.42%	9.38%	96.11%
Idea	0.63%	0.05%	96.50%	0.94%	1.88%	1.09%	2.61%	96.17%
Reliance CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.26%	0.00%	96.62%	NA	0.20%	1.06%	4.12%	98.25%
TATA GSM	0.22%	0.00%	98.78%	0.08%	0.12%	0.49%	2.51%	97.68%
Telenor	0.24%	0.00%	94.83%	0.84%	3.94%	0.48%	1.08%	94.71%
Vodafone	25.62%	0.00%	99.52%	0.52%	0.48%	0.80%	2.86%	97.95%

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

3 Day Live: - Reliance CDMA and Reliance GSM did not submit the Data for all the 3 months due to server issue

BTSs Accumulated Downtime:

Aircel, Vodafone and BSNL did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.05%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark worst affected BTSs due to downtime.

Call Set-up Success Rate (CSSR):

Aircel, BSNL and Telenor failed to meet the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.52%.

SDCCH/ Paging Chl. Congestion:

BSNL failed to meet the benchmark on SDCCH / Paging Channel Congestion. TATA GSM recorded the best SDCCH / Paging Channel Congestion

TCH Congestion:

Aircel, BSNL and Telenor failed to meet the benchmark for TCH congestion, while TATA GSM performed the best on TCH congestion.

Call Drop Rate:

BSNL failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Telenor at 0.14%.

Worst Affected Cells Having More than 3% TCH Drop:

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

Voice Quality

All operators met the benchmark. Best performance was recorded for Airtel at 98.25%.

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

October 3 Day								
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(DWL)	2.61%	0.00%	90.99%	0.45%	8.66%	1.56%	10.66%	95.67%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	8.15%	2.63%	89.23%	0.00%	0.00%	8.05%	5.00%	NDR
Idea	0.65%	0.04%	96.28%	0.92%	1.91%	1.10%	2.63%	96.32%
Reliance CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.28%	0.00%	94.41%	NA	0.11%	0.44%	3.39%	98.25%
TATA GSM	0.34%	0.00%	98.83%	NA	0.12%	0.49%	2.59%	97.74%
Telenor	0.24%	0.00%	97.02%	0.71%	2.08%	0.42%	1.17%	95.42%
Vodafone	29.62%	0.00%	99.57%	0.43%	0.43%	0.77%	2.87%	98.02%

3.2.2 3 DAY DATA – NOVEMBER FOR 2G

November 3 Day								
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(DWL)	1.67%	0.00%	86.74%	1.36%	11.42%	1.81%	11.75%	95.34%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	5.63%	2.43%	89.60%	6.40%	19.72%	1.57%	5.92%	96.11%
Idea	0.61%	0.01%	96.15%	0.95%	1.92%	1.09%	2.59%	96.03%
Reliance CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	48.19%	0.00%	98.21%	NA	0.11%	0.18%	2.04%	98.25%
TATA GSM	0.14%	0.00%	98.89%	0.05%	0.12%	0.44%	2.59%	97.83%
Telenor	0.34%	0.00%	96.80%	0.48%	2.26%	0.39%	1.08%	95.23%
Vodafone	23.83%	0.00%	99.57%	0.48%	0.43%	0.72%	2.91%	97.98%

3.2.3 3 DAY DATA - DECEMBER FOR 2G

December PMR								
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(DWL)	1.83%	9.72%	87.57%	0.85%	12.11%	1.65%	12.04%	95.23%
Airtel	0.06%	0.17%	95.64%	0.79%	1.18%	1.60%	2.21%	95.74%
BSNL Bihar/Jharkand	1.47%	1.56%	90.19%	2.87%	1.47%	2.47%	3.94%	NDR
Idea	0.63%	1.91%	96.77%	0.86%	1.79%	1.01%	2.59%	96.33%
Reliance CDMA	0.22%	1.19%	96.83%	0.00%	0.85%	0.13%	0.24%	98.71%
Reliance GSM	0.09%	0.16%	98.34%	0.19%	0.58%	0.26%	0.27%	98.80%
TATA CDMA	0.18%	0.00%	97.99%	NA	0.33%	0.35%	1.09%	98.25%
TATA GSM	0.14%	0.10%	98.22%	0.18%	0.29%	0.47%	2.35%	97.51%
Telenor	0.17%	0.06%	92.22%	4.27%	6.47%	0.56%	1.20%	94.77%
Vodafone	24.24%	1.90%	99.23%	0.52%	0.77%	0.84%	2.79%	97.68%

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	Circuit Switched voice 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(DWL)	2.15%	11.55%	93.35%	0.97%	0.26%	1.17%	11.74%	99.07%
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

NDR: - No data received

Following are the parameter wise observations for wireless operators for Bihar & Jharkhand circle:

Node Bs downtime:
Aircel did not meet the benchmark for Node Bs downtime.

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

Call Set-up Success Rate (CSSR):
Aircel failed to meet the benchmark for CSSR.

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

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

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

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

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

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

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

3.3.1 PMR DATA - OCTOBER FOR 3G

October PMR 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	Circuit switched voice 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(DWL)	2.53%	13.61%	98.78%	0.63%	0.07%	1.22%	12.09%	99.07%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.3.2 PMR DATA – NOVEMBER FOR 3G

November PMR 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	Circuit switched voice 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(DWL)	2.18%	12.48%	97.16%	0.65%	0.12%	1.24%	12.56%	99.26%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.3.3 PMR DATA - DECEMBER FOR 3G

December PMR 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	Circuit switched voice 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(DWL)	1.80%	8.93%	84.12%	1.65%	0.59%	1.10%	10.74%	98.81%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.4 3 DAY DATA – CONSOLIDATED FOR 3G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Circuit Switched voice 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(DWL)	2.52%	0.00%	94.40%	0.85%	0.38%	1.15%	11.83%	99.03%
BSNL Bihar/Jharkand	0.91%	1.88%	91.08%	3.45%	0.83%	1.81%	10.48%	95.00%

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

Node Bs downtime:

Aircel did not meet the benchmark for Node Bs downtime.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

Aircel and BSNL failed to meet the benchmark for CSSR.

RRC Congestion:

BSNL failed to meet the TRAI benchmark for RRC Congestion.

Circuit Switched RAB Congestion:

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

Circuit Switched Voice Call Drop Rate:

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

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

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

Circuit Switch Voice Quality:

All operators met the benchmark for Circuit Switch Voice Quality.

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

October 3 Day 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	Circuit switched voice 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(DWL)	3.04%	0.00%	98.66%	0.48%	0.08%	1.27%	11.80%	99.02%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.4.2 3 DAY DATA – NOVEMBER FOR 3G

November 3 Day 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	Circuit switched voice 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(DWL)	2.36%	0.00%	97.99%	1.02%	0.28%	1.33%	13.74%	99.36%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	0.91%	1.88%	91.08%	3.45%	0.83%	1.81%	10.48%	95.00%

3.4.3 3 DAY DATA - DECEMBER FOR 3G

December 3 Day 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	Circuit switched voice 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(DWL)	2.24%	0.00%	86.55%	1.05%	0.77%	0.95%	9.95%	99.82%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

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(DWL)	99.98%	95.82%	0.88%	100.00%	99.19%	0.87%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR
Idea	100.00%	98.72%	1.17%	100.00%	97.87%	1.31%
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	NDR	NDR	NDR	NDR	NDR	NDR
TATA GSM	100.00%	100.00%	1.73%	100.00%	99.94%	1.58%
Telenor	100.00%	99.72%	4.17%	100.00%	99.64%	4.38%
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR

Following are the parameter wise observations for wireless operators for Bihar & Jharkhand circle:

Activation done within 4 hours:

All operators met the benchmark for Activation done within 4 hours in monthly as well as live.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate in monthly as well as live.

Drop Rate:

All operators met the benchmark for Drop Rate in monthly as well as live.

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

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel(DWL)	99.98%	98.37%	0.72%	100.00%	98.35%	0.84%
BSNL Bihar/Jharkand	NDR	NDR	NDR	NDR	NDR	NDR

Following are the parameter wise observations for wireless operators for Bihar & Jharkhand circle:

Activation done within 4 hours:

All operators met the benchmark for Activation done within 4 hours in monthly as well as live.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate in monthly as well as live.

Drop Rate:

All operators met the benchmark for Drop Rate in monthly as well as live

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(DWL)	95.00%	95.00%	100.00%	100.00%	97.33%	94.00%
Airtel	89.00%	89.00%	100.00%	100.00%	98.33%	93.00%
BSNL Bihar/Jharkand	67.00%	67.00%	100.00%	75.00%	81.83%	65.00%
Idea	52.00%	52.00%	100.00%	100.00%	72.33%	67.00%
Reliance CDMA	52.00%	55.00%	100.00%	100.00%	95.33%	90.00%
Reliance GSM	43.00%	43.00%	100.00%	100.00%	91.33%	85.00%
TATA CDMA	90.32%	90.32%	100.00%	100.00%	97.33%	NA
TATA GSM	89.00%	89.00%	100.00%	100.00%	92.33%	NA
Telenor	100.00%	100.00%	100.00%	84.00%	92.00%	NA
Vodafone	96.00%	96.00%	100.00%	96.00%	89.67%	100.00%

Resolution of billing complaints

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

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Vodafone recorded the best performance at 100%.

Level 1 Service

As per the live calling results, BSNL, Idea, Reliance GSM, TATA GSM, Telenor and Vodafone failed to meet the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

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)

BSNL and Telenor 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(DWL)	0.00%	0.24%	100.00%	100.00%	100.00%	96.05%	99.21%
Airtel	0.09%	0.01%	100.00%	100.00%	100.00%	99.43%	95.26%
BSNL Bihar/Jharkand	0.09%	0.00%	100.00%	100.00%	100.00%	99.22%	95.40%
Idea	0.12%	0.02%	100.00%	100.00%	100.00%	93.36%	99.94%
Reliance CDMA	0.09%	0.03%	100.00%	100.00%	100.00%	98.41%	94.37%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	98.18%	74.35%
TATA CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	95.10%	97.26%
TATA GSM	0.01%	0.00%	100.00%	100.00%	100.00%	97.12%	99.53%
Telenor	NA	0.00%	100.00%	100.00%	100.00%	99.68%	97.18%
Vodafone	0.02%	0.07%	100.00%	100.00%	100.00%	100.00%	95.79%

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed that Idea and Idea failed to meet the TRAI benchmark for the parameter. Aircel and TATA CDMA had the best performance with 0.00% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

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

Resolution of billing complaints

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

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

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

Customer Care Percentage of calls answered by the IVR

Idea failed to meet 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

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

3.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Aircel(DWL)	NA	95.00%	86.00%	96.00%	98.00%	96.00%	95.00%	95.00%	96.00%	98.00%
Airtel	99.00%	NA	87.00%	100.00%	89.00%	97.00%	97.00%	94.00%	95.00%	96.00%
BSNL Bihar/Jharkand	100.00%	98.00%	NA	95.00%	94.00%	100.00%	99.00%	98.00%	95.00%	96.00%
Idea	100.00%	93.00%	87.00%	NA	94.00%	94.00%	98.00%	95.00%	98.00%	98.00%
Reliance CDMA	98.00%	91.00%	85.00%	91.00%	NA	90.00%	96.00%	95.00%	96.00%	97.00%
Reliance GSM	94.00%	95.00%	87.00%	100.00%	93.00%	NA	95.00%	96.00%	98.00%	97.00%
TATA CDMA	96.00%	98.00%	89.00%	96.00%	94.00%	95.00%	NA	97.00%	99.00%	99.00%
TATA GSM	95.00%	100.00%	91.00%	95.00%	99.00%	99.00%	96.00%	NA	94.00%	100.00%
Telenor	100.00%	92.00%	83.00%	100.00%	95.00%	89.00%	96.00%	93.00%	NA	97.00%
Vodafone	95.00%	93.00%	85.00%	100.00%	95.00%	95.00%	97.00%	97.00%	97.00%	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

- Aircel, TATA CDMA, Vodafone and BSNL did not meet the benchmark for BTS Accumulated downtime.
- Aircel and BSNL failed to meet the benchmark for worst affected BTSs due to downtime.
- Aircel, BSNL and Telenor failed to meet the benchmark for Call Set-up Success Rate (CSSR).
- BSNL and Telenor failed to meet the benchmark on SDCCH / Paging Channel Congestion.
- Aircel, BSNL and Telenor failed to meet the benchmark for TCH congestion
- BSNL failed to meet the benchmark for the parameter Call Drop Rate.
- Aircel and BSNL failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.
- Telenor failed to meet the benchmark for Voice Quality.

3 Day Live Measurement (Network Parameters) for 2G

- Aircel, Vodafone and BSNL did not meet the benchmark for BTS Accumulated downtime.
- Aircel, BSNL and Telenor failed to meet the benchmark for Call Set-up Success Rate (CSSR).
- BSNL failed to meet the benchmark on SDCCH / Paging Channel Congestion.
- Aircel, BSNL and Telenor failed to meet the benchmark for TCH congestion.
- BSNL failed to meet the benchmark for the parameter for Call Drop Rate.
- Aircel, TATA CDMA and BSNL failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

PMR Consolidated (Network Parameters) for 3G

- Aircel did not meet the benchmark for Node Bs downtime.
- Aircel failed to meet the benchmark for worst affected Node Bs due to downtime.
- Aircel failed to meet the benchmark for Call Set-up Success Rate (CSSR).
- Aircel failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate

3 Day Live Measurement (Network Parameters) for 3G

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

Wireless Data Services for 2G & 3G

- All operators met the benchmark for Activation done within 4 hours, PDP Context activation success rate and Drop Rate in monthly as well as live for 2G as well as 3G.

Live Calling

- As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks except Telenor.
- As per the live calling results, BSNL, Idea, Reliance GSM, TATA GSM, Telenor and Vodafone failed to meet the TRAI benchmark for level 1 service with calls being answered.
- BSNL and Telenor 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 and Idea failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers, Aircel failed to meet the benchmark of charging disputes
- Idea failed to meet the benchmark for Customer Care Percentage of calls answered by the IVR.
- Reliance GSM & CDMA failed to meet the TRAI specified benchmark for Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

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

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 PARAMETER DESCRIPTION

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

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

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

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

3. **TRAI Benchmark –**

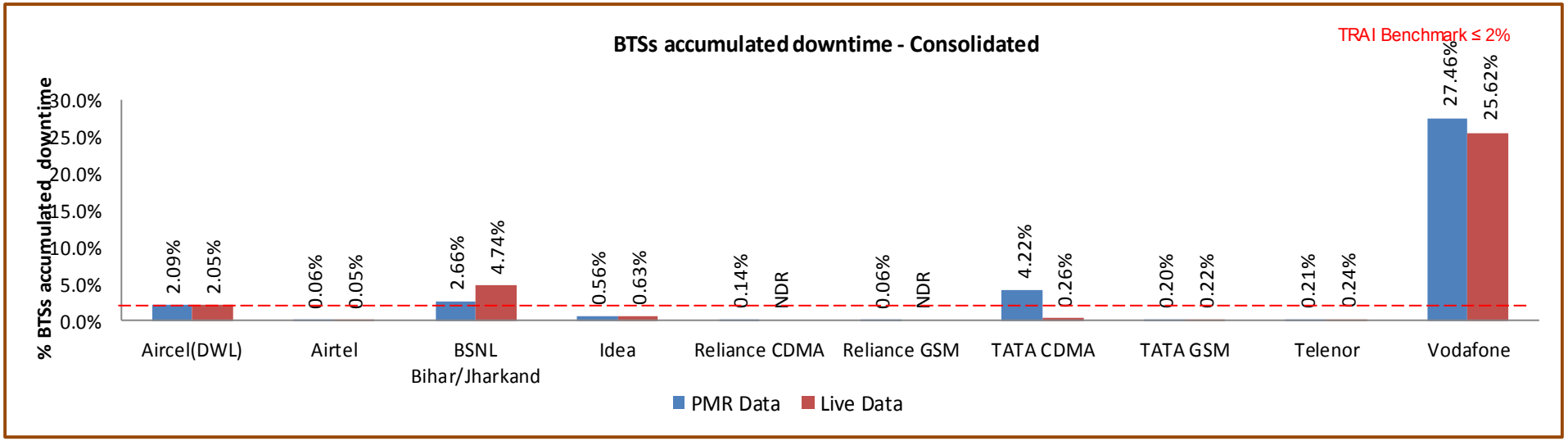
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

    - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
    - All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
- When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

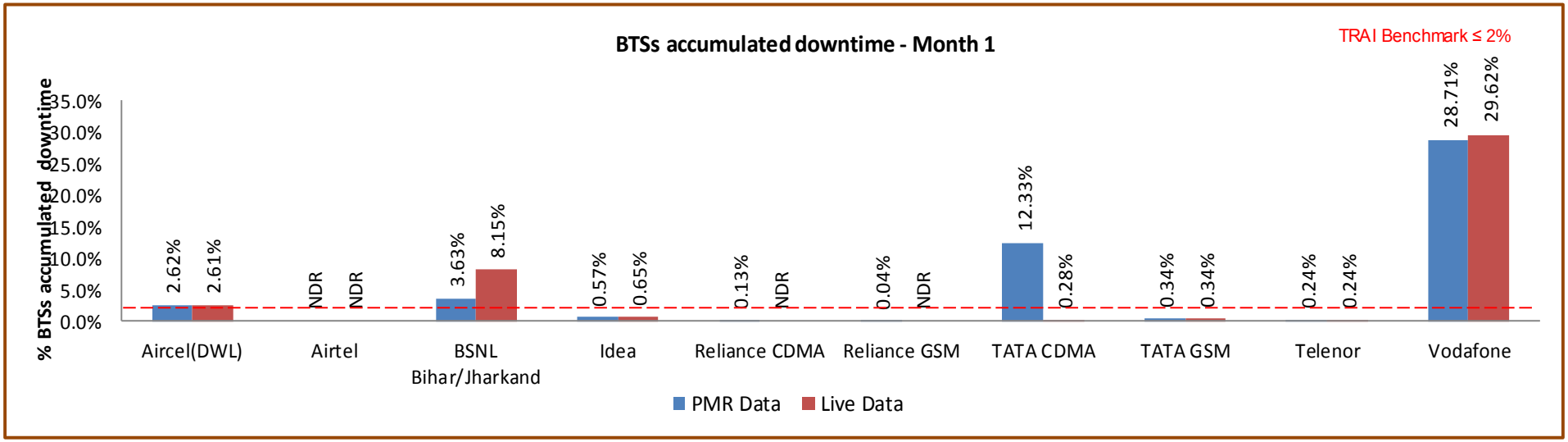
5.1.2 KEY FINDINGS - CONSOLIDATED



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

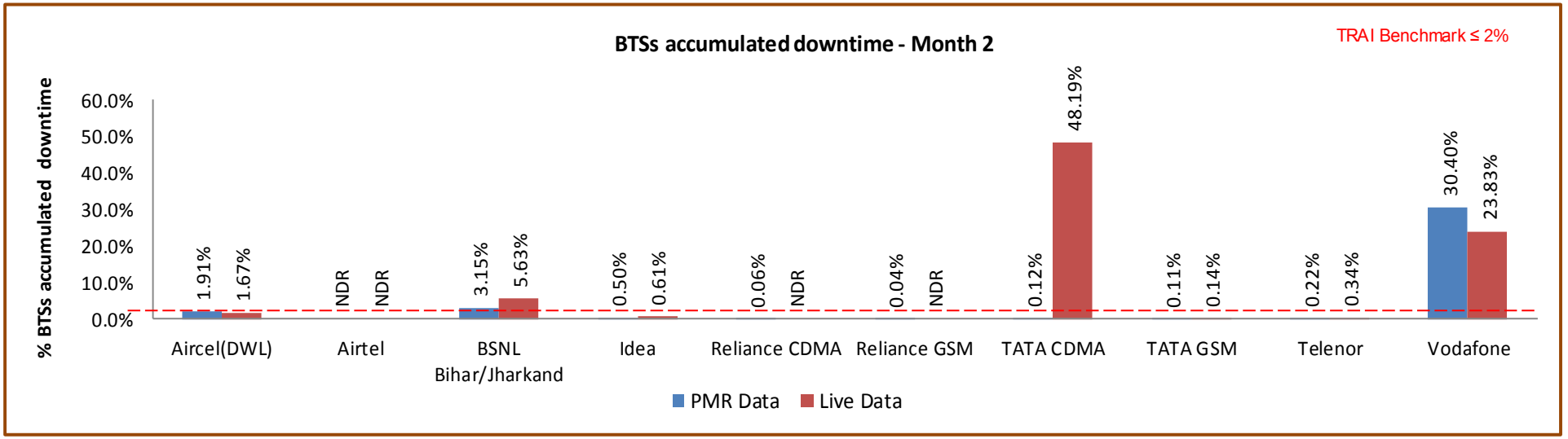
Aircel and BSNL, TATA CDMA and Vodafone did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

5.1.2.1 KEY FINDINGS – MONTH 1



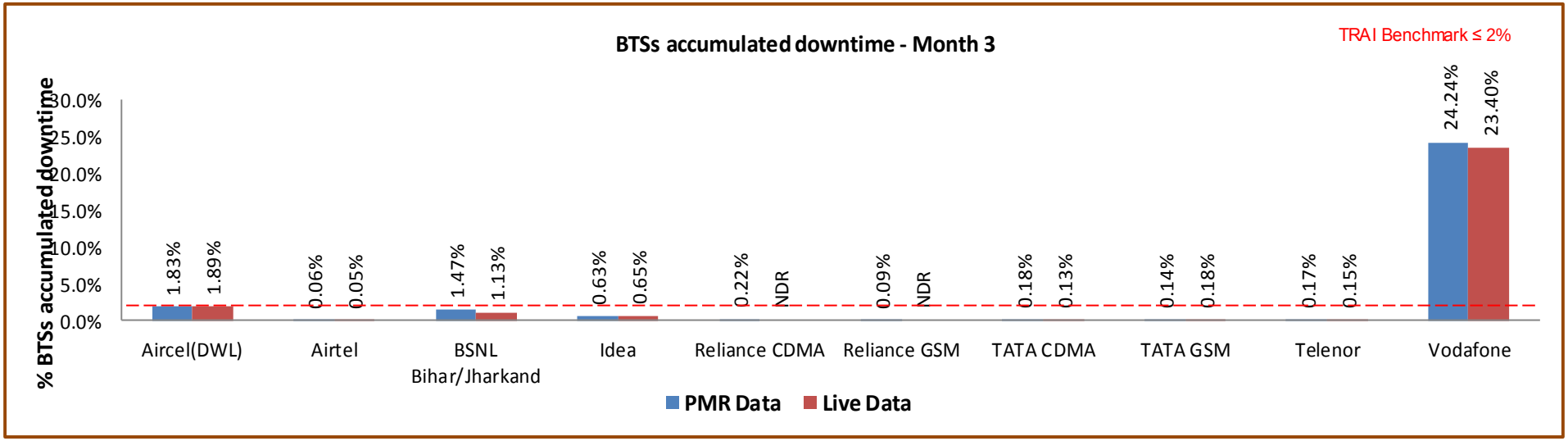
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

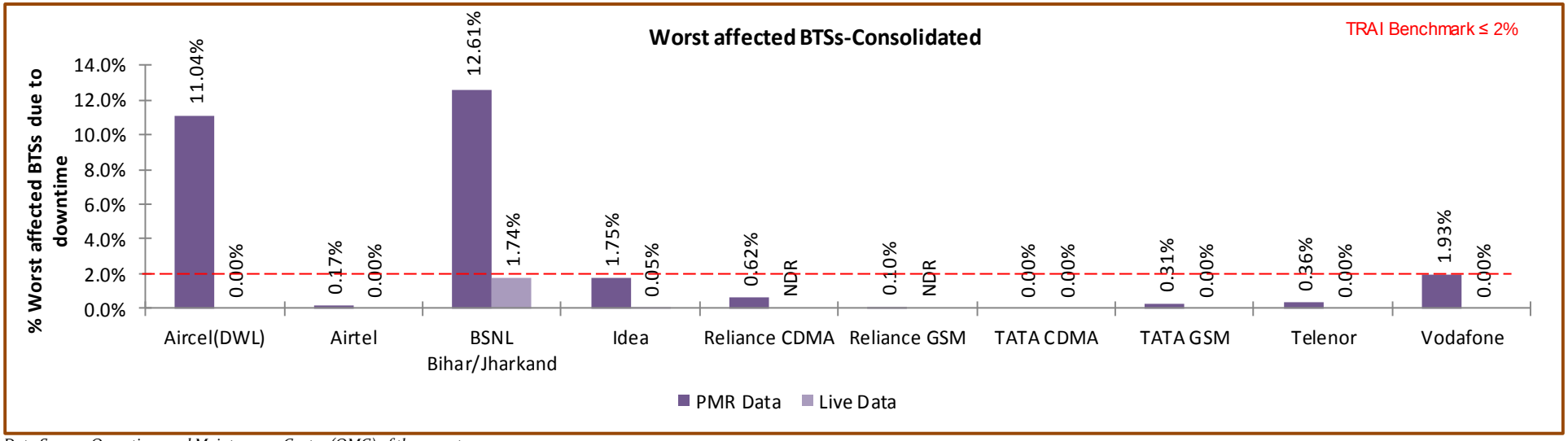
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

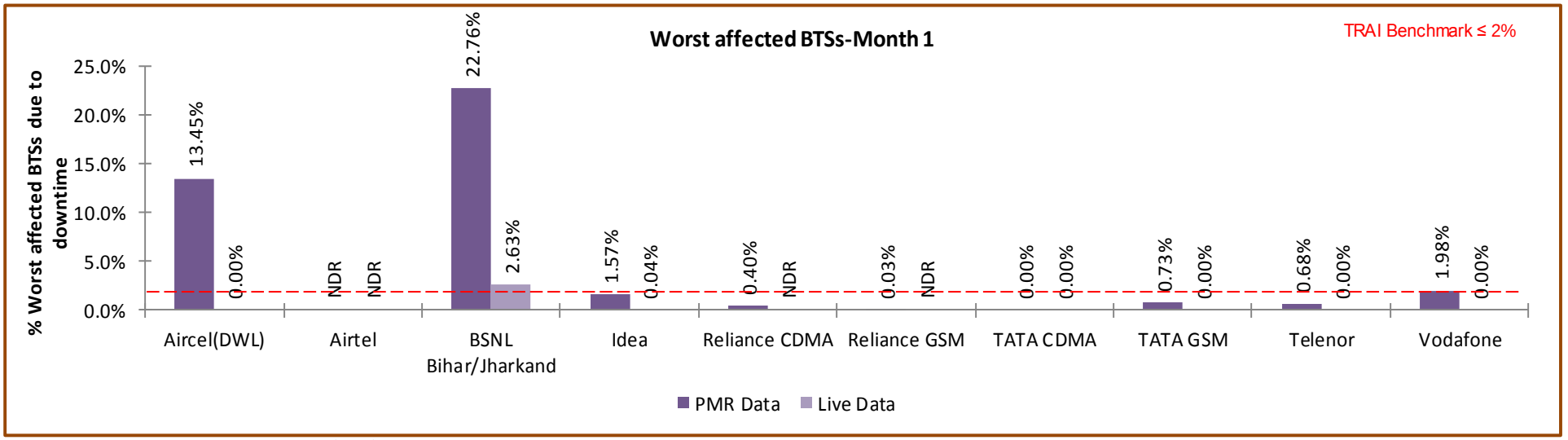


Data Source: Operations and Maintenance Center (OMC) of the operators

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

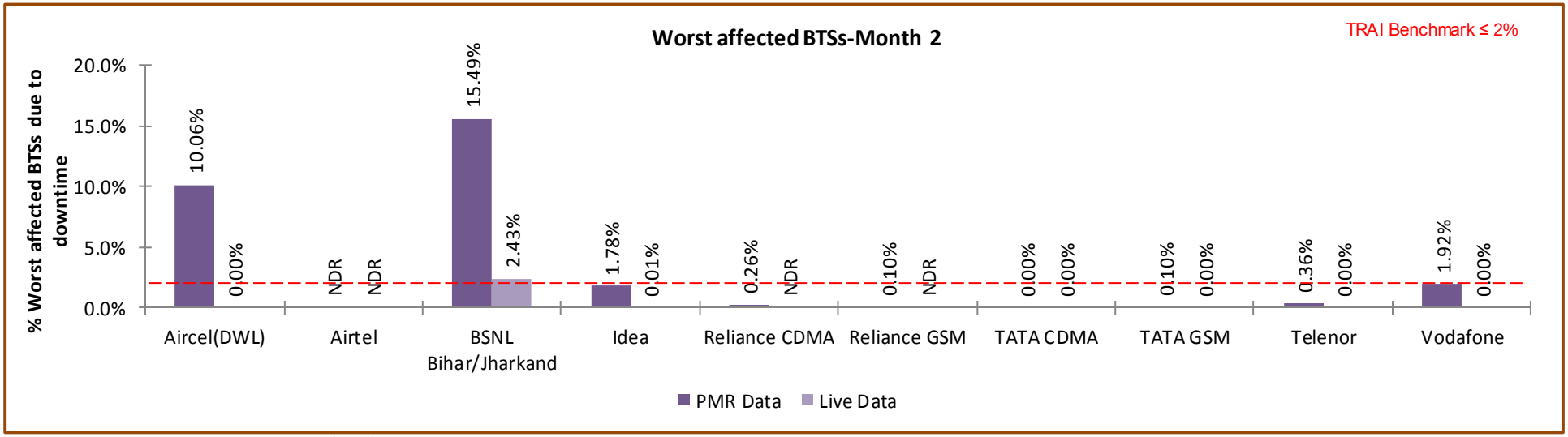
Significant difference was observed between PMR & live measurement data for Aircel, Vodafone, Idea and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



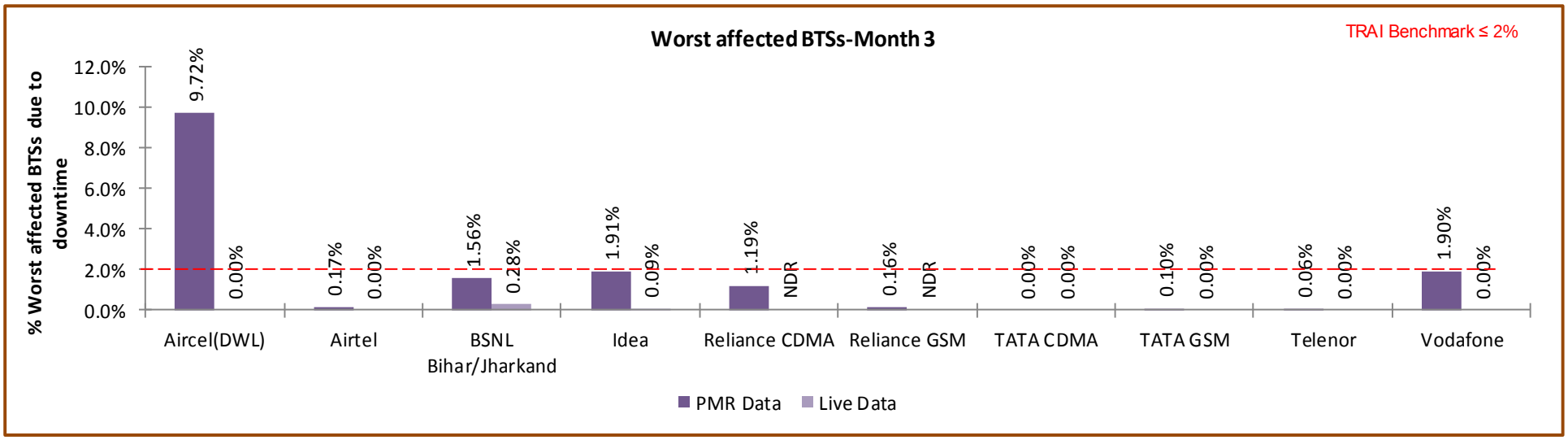
Data Source: Operations and Maintenance Center (OMC) of the operators

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

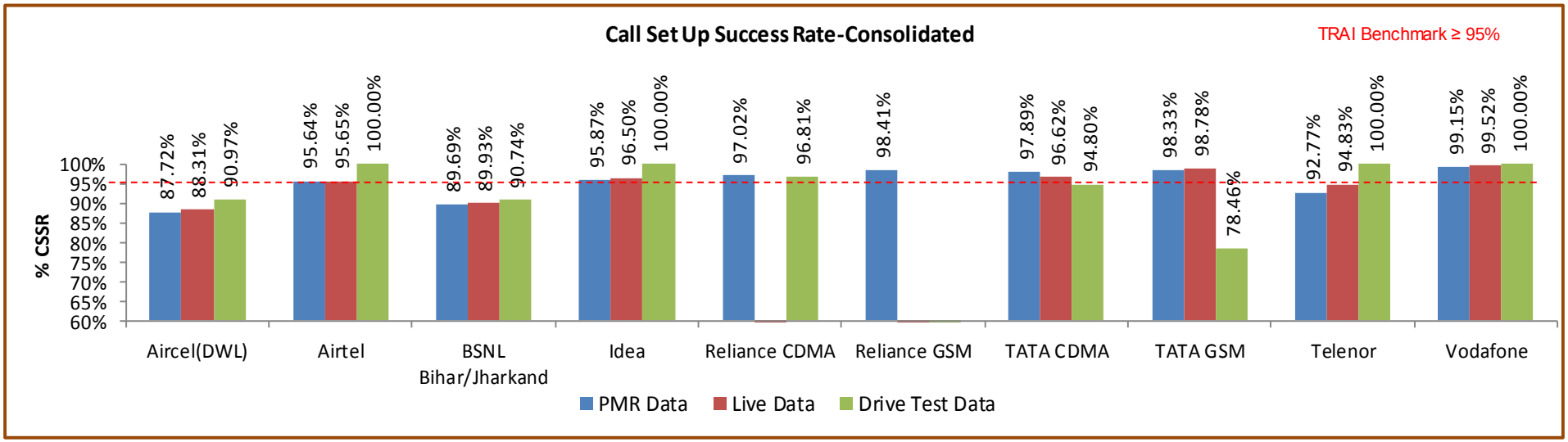
   Call Established means the following events have happened in call setup:-

   - 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.

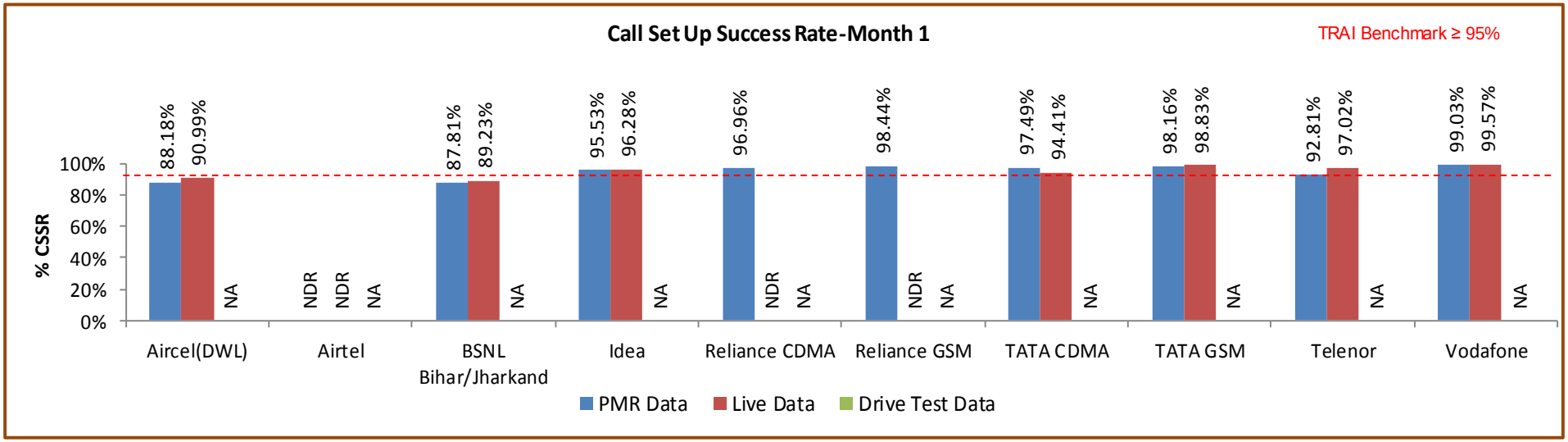
5.3.2 KEY FINDINGS - CONSOLIDATED



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

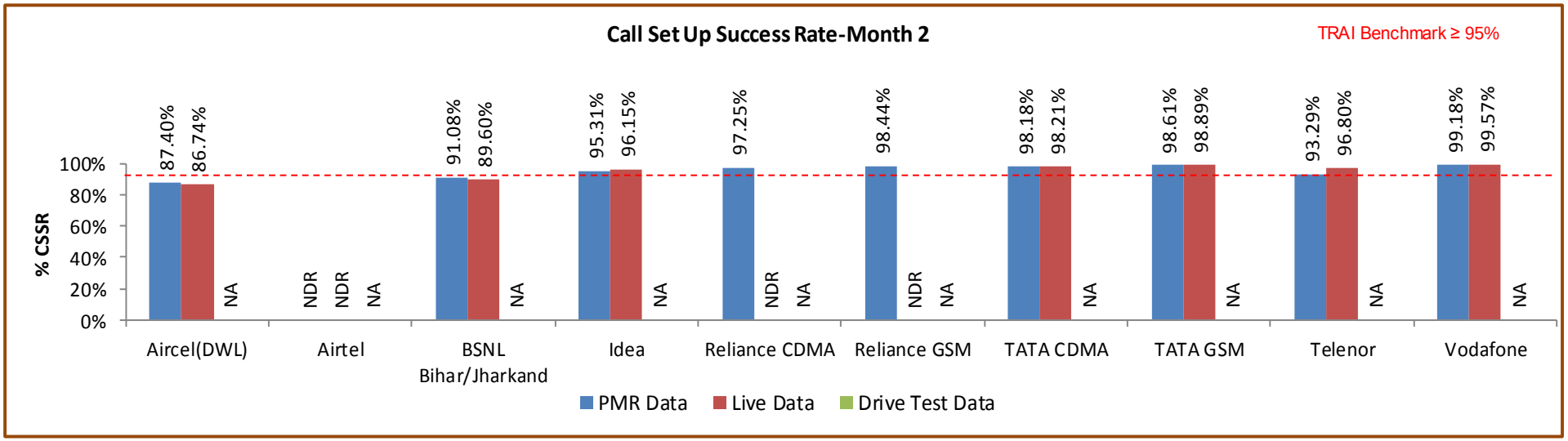
Aircel, BSNL and Telenor failed to meet the TRAI benchmark as per audit/PMR data.

5.3.2.1 KEY FINDINGS – MONTH 1



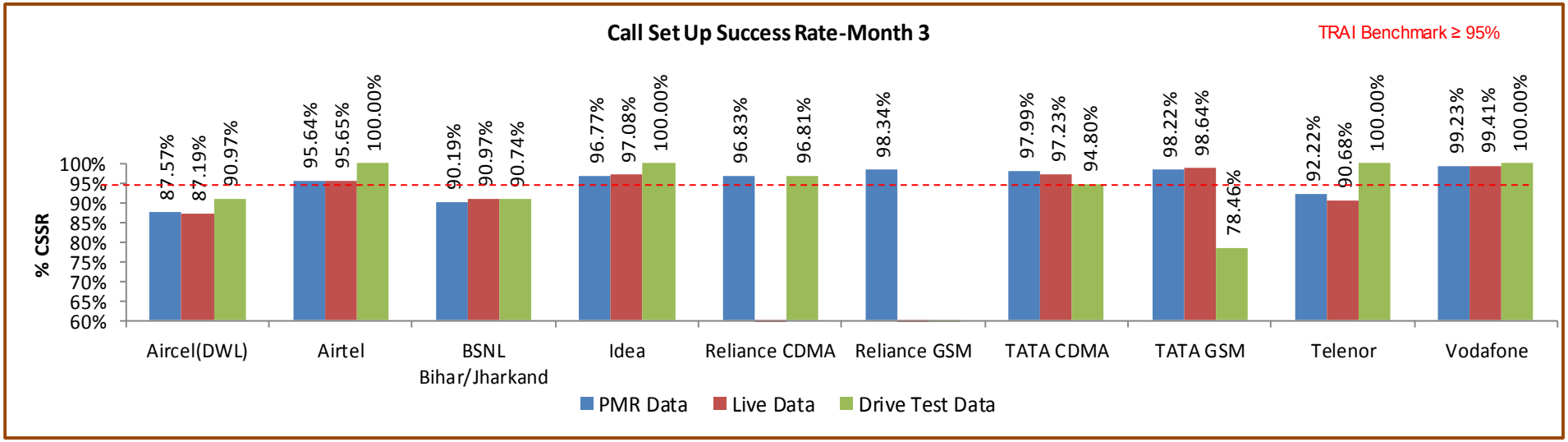
Data Source: Network Operations Center (NOC) of the operators

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

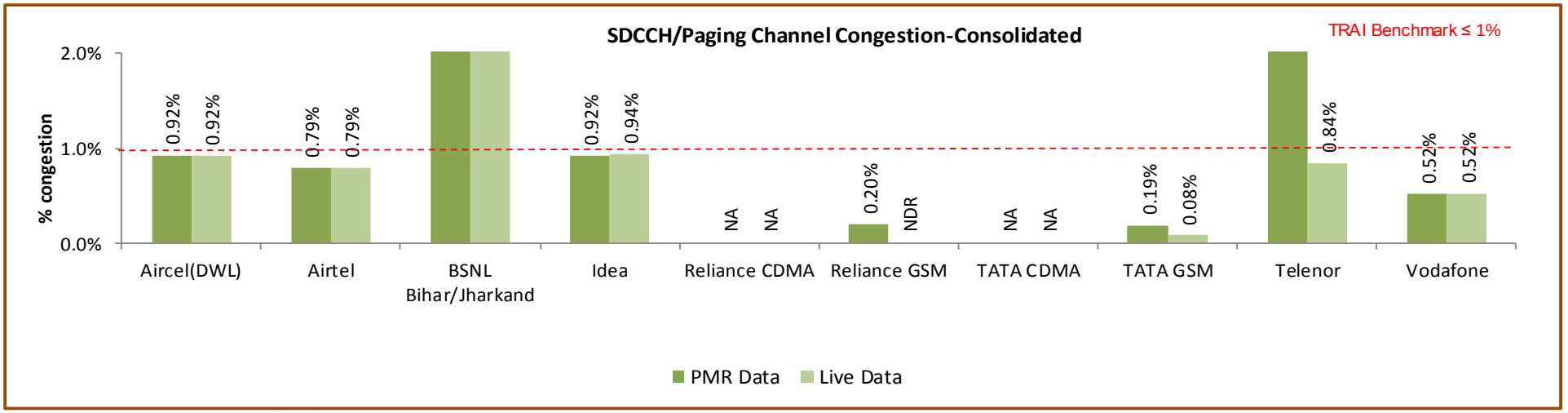
3. Benchmark:

- 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

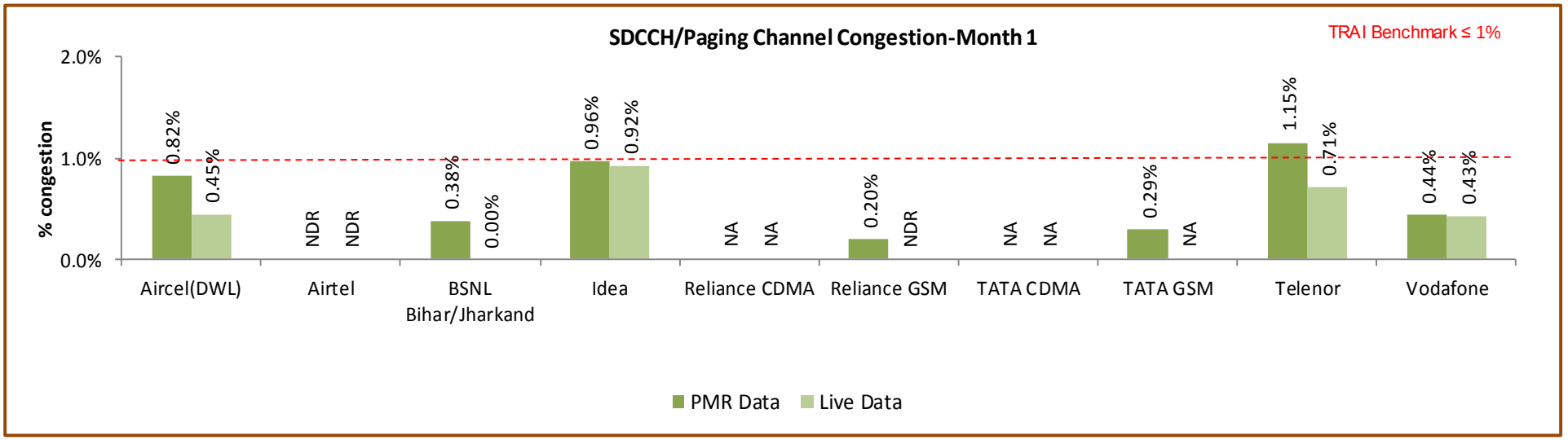
5.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



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

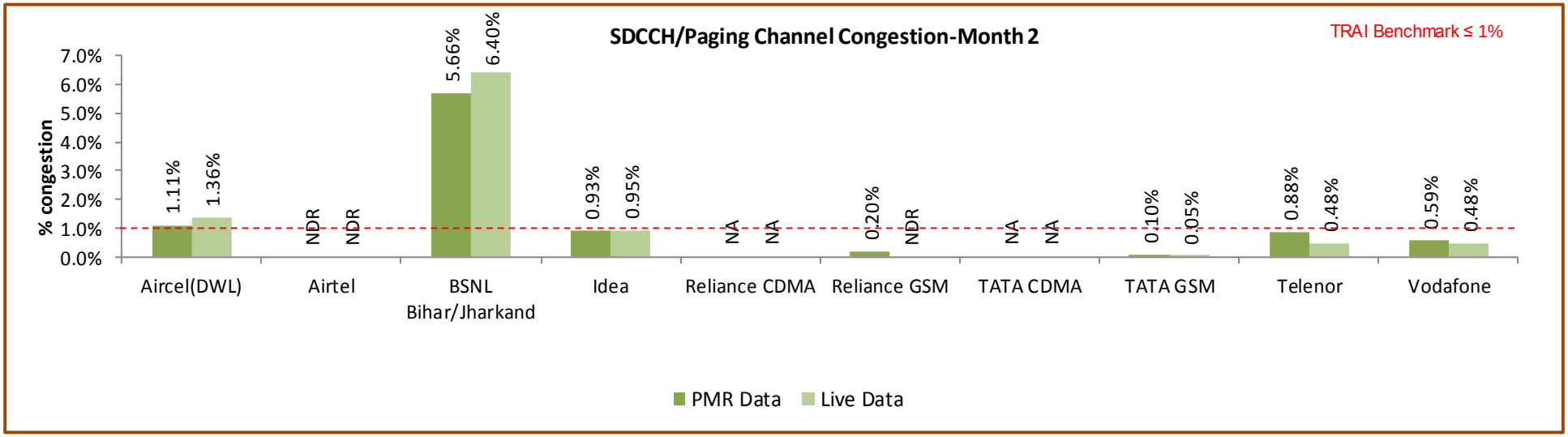
BSNL and Telenor failed to meet the benchmark as per PMR/audit Data.
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

5.4.2.1 KEY FINDINGS – MONTH 1



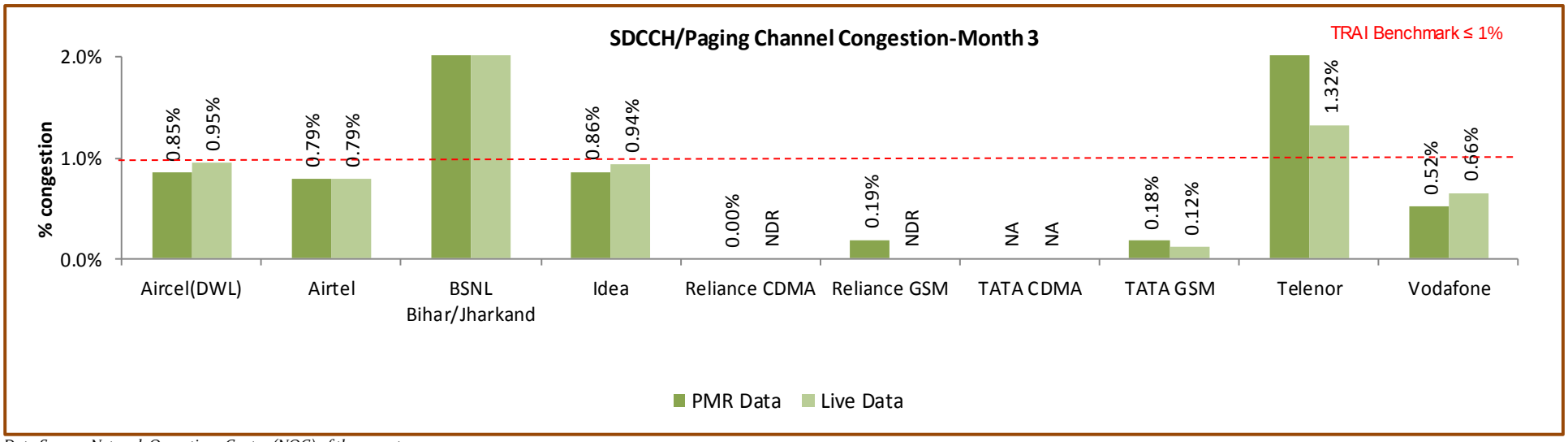
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



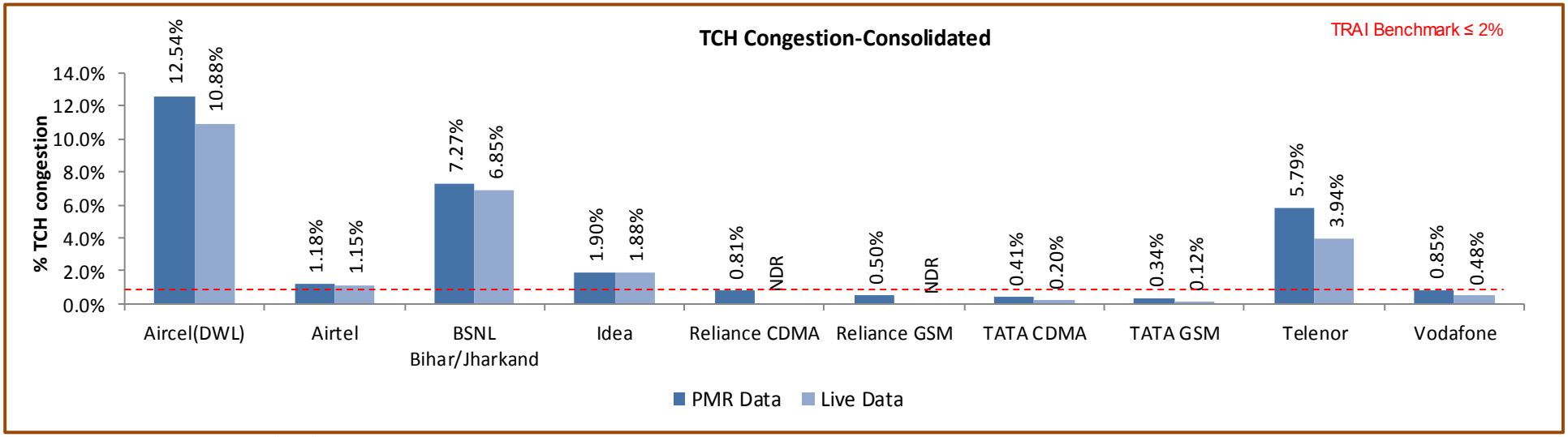
Data Source: Network Operations Center (NOC) of the operators

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)

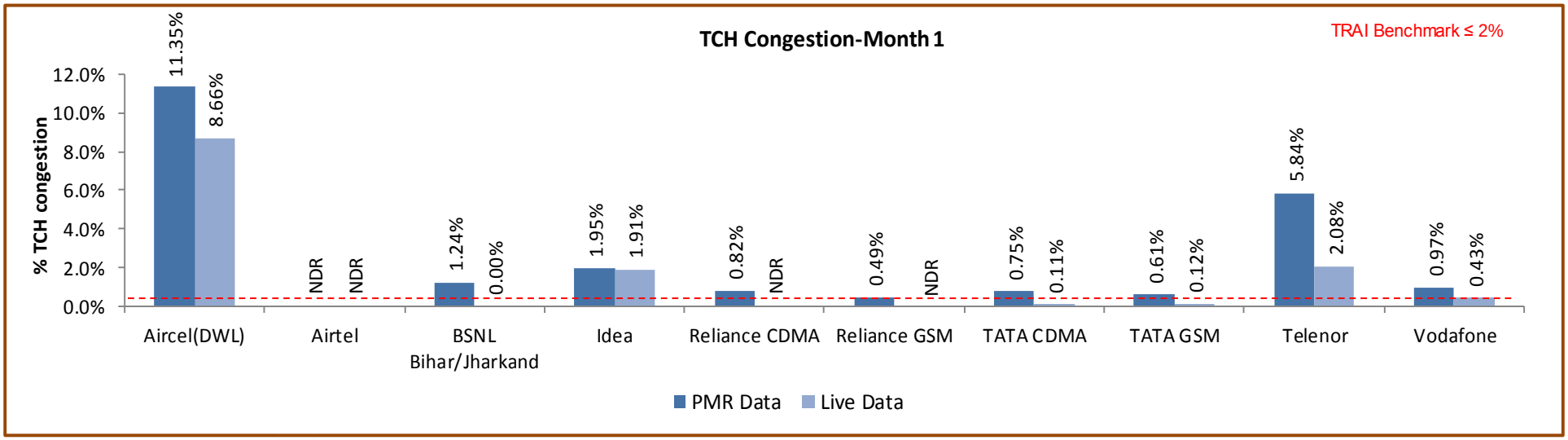


Data Source: Network Operations Center (NOC) of the operators

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

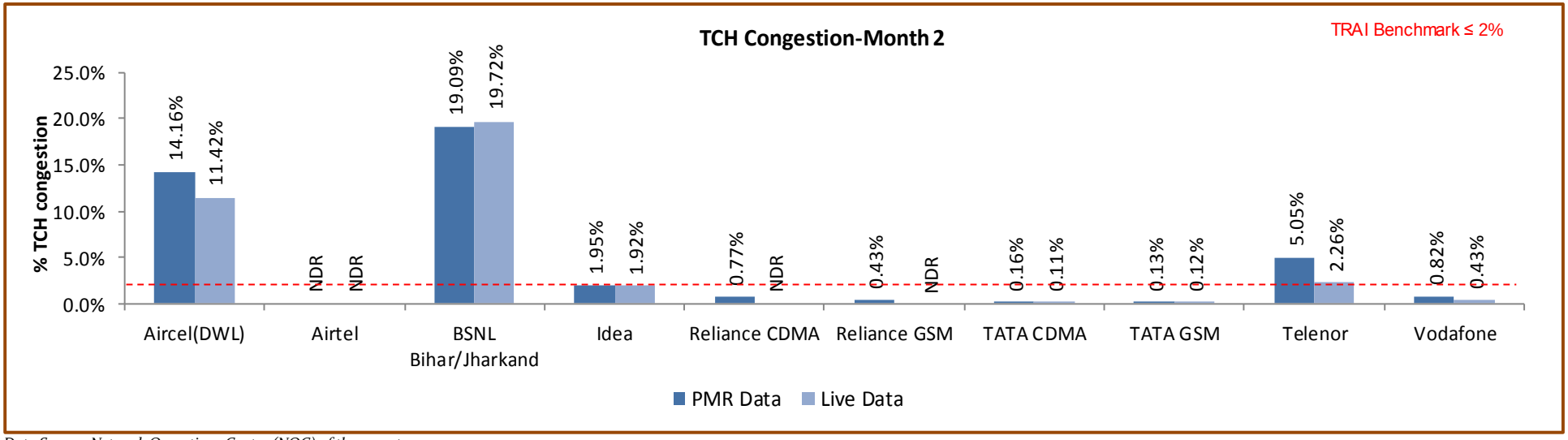
Significant difference was observed between PMR & live measurement data for Aircel, BSNL and Telenor. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.4.3.1 KEY FINDINGS – MONTH 1



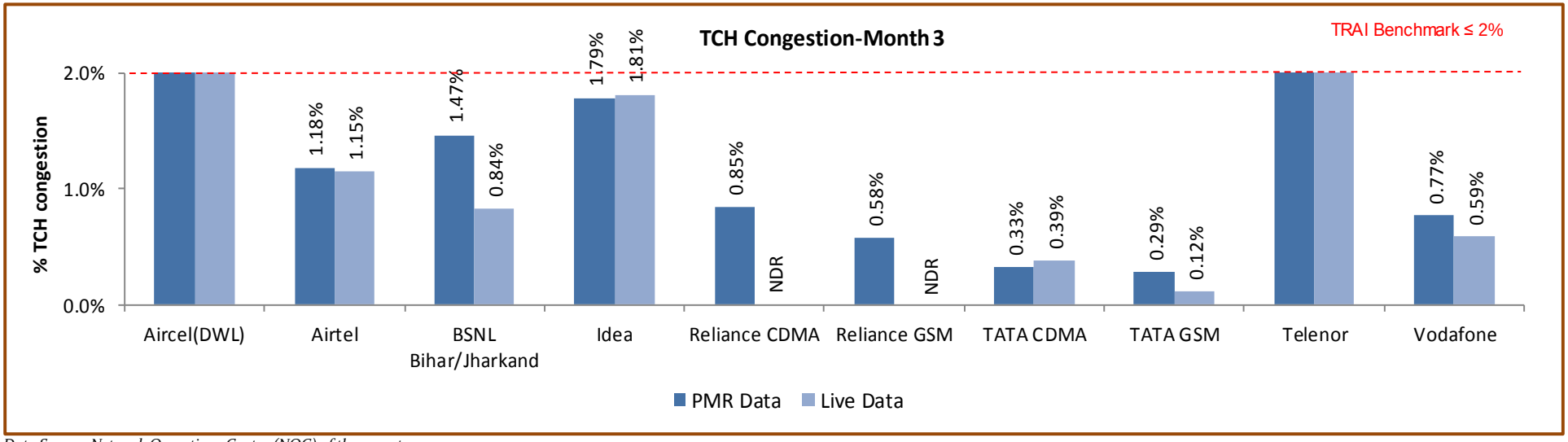
Data Source: Network Operations Center (NOC) of the operators

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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		144	841	54	249	357	456	459	60	196	174
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		388902	719424	146854	859529	194181	246738	5299562	512690	151380	2093704
Traffic served for all POIs (B)- in erlangs		223567	400501	29830	524280	115063	49239	574998	72329	103109	919875
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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		144	841	54	249	NDR	NDR	459	60	195	174
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		390128	2159405	146854	859529	NDR	NDR	220632	31492	225810	2113437
Traffic served for all POIs (B)- in erlangs		104302	1297120	14211	540686	NDR	NDR	24179	3930	157640	436463
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

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

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

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	NDR	11	83	112	183	153	20	65	58
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		129008	NDR	43772	285574	58753	102469	1779371	249858	74692	1582849
Traffic served for all POIs (B)- in erlangs		76170	NDR	15619	161692	32552	19633	209326	35443	52000	628467
POI congestion	≤ 0.5%	0.00%	NDR	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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	NDR	11	83	NDR	NDR	153	20	65	58
No. of POIs not meeting benchmark		0	NDR	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		130270	NDR	43772	285574	NDR	NDR	74087	10506	75328	1601693
Traffic served for all POIs (B)- in erlangs		32915	NDR	0	172835	NDR	NDR	8348	1438	50684	303251
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	NDR	NDR	0.00%	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(DWL)	Airtel	BSNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	NDR	32	83	125	136	153	20	65	58
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		130369	NDR	59310	286714	70662	72062	1779372	252327	1159	254807
Traffic served for all POIs (B)- in erlangs		71750	NDR	14211	181164	41393	17090	179373	34125	772	145796
POI congestion	≤ 0.5%	0.00%	NDR	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(DWL)	Airtel	BSNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	NDR	32	83	NDR	NDR	153	20	65	58
No. of POIs not meeting benchmark		0	NDR	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		130394	NDR	59310	286714	NDR	NDR	74011	10556	75196	255847
Traffic served for all POIs (B)- in erlangs		35259	NDR	14211	182675	NDR	NDR	7900	1463	53299	67578
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	841	11	83	120	137	153	20	66	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		129524	719424	43772	287241	64765	72207	1740819	10505	75529	256048
Traffic served for all POIs (B)- in erlangs		75647	400501	0	181424	41118	12516	186299	2761	50336	145611
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-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	841	11	83	NDR	NDR	153	20	65	58
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		129464	2159405	43772	287241	NDR	NDR	72534	10430	75286	255897
Traffic served for all POIs (B)- in erlangs		36129	1297120	0	185176	NDR	NDR	7931	1029	53657	65635
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

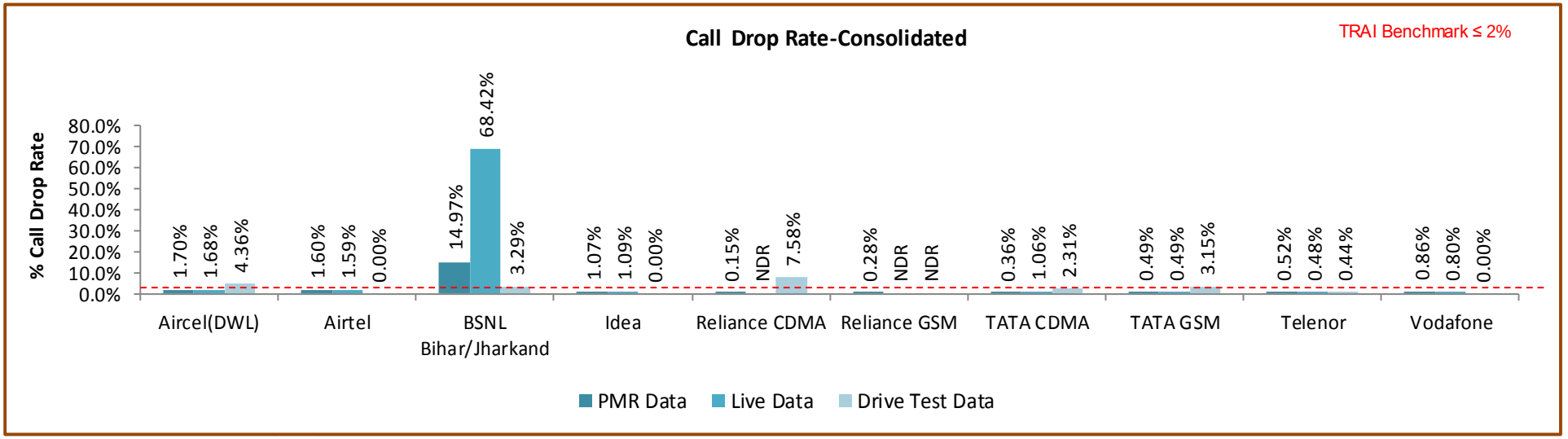
Data Source: Network Operations Center (NOC) of the operators

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.

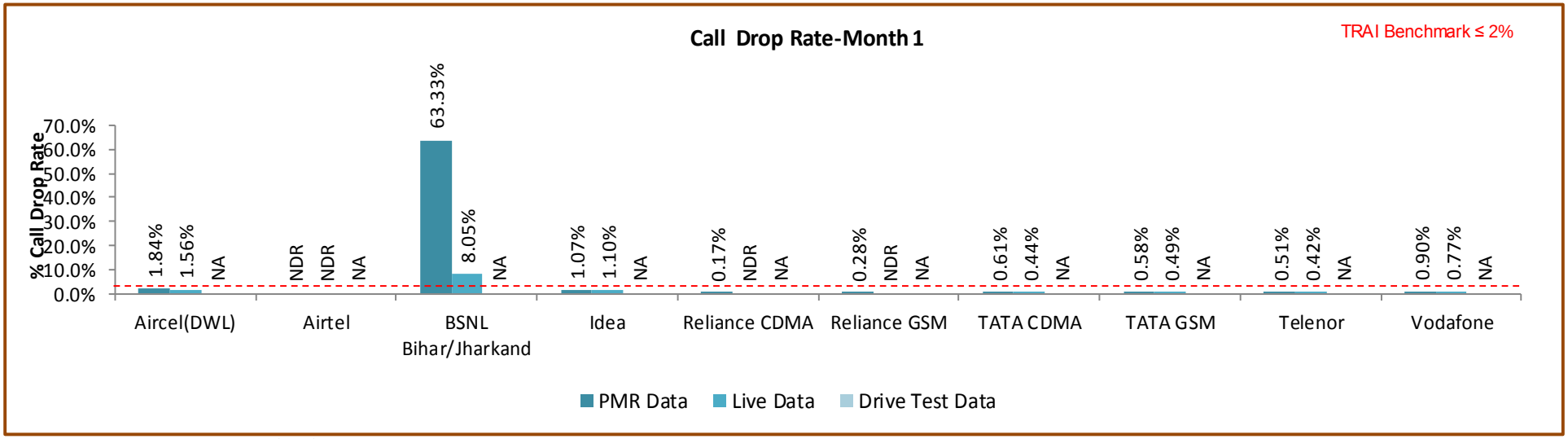
5.5.2 KEY FINDINGS - CONSOLIDATED



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

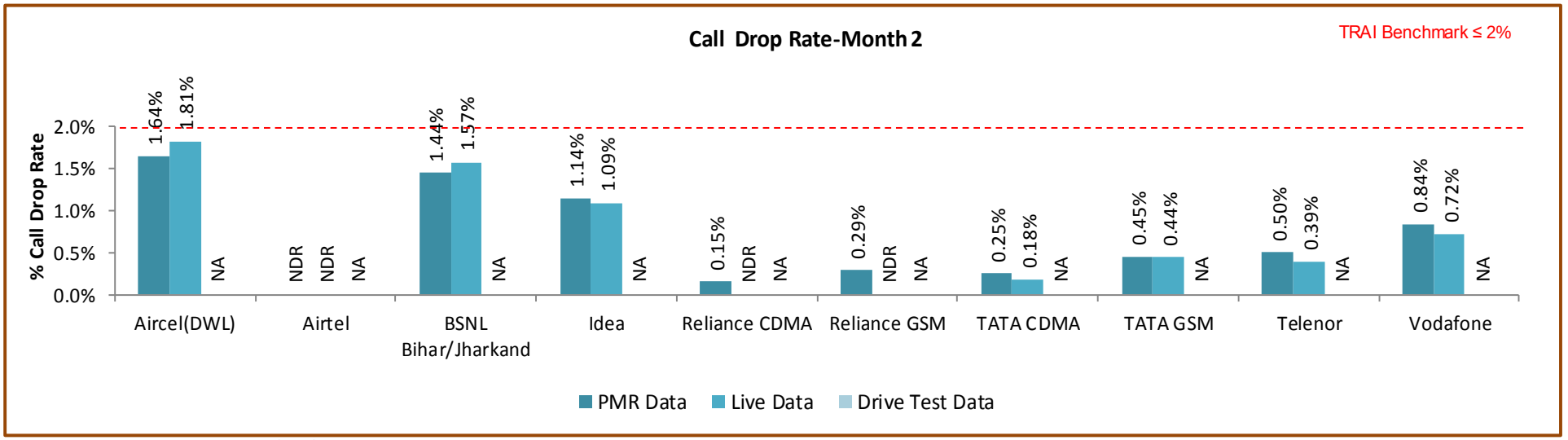
BSNL failed to meet the benchmark for call drop rate during audit.

5.5.2.1 KEY FINDINGS – MONTH 1



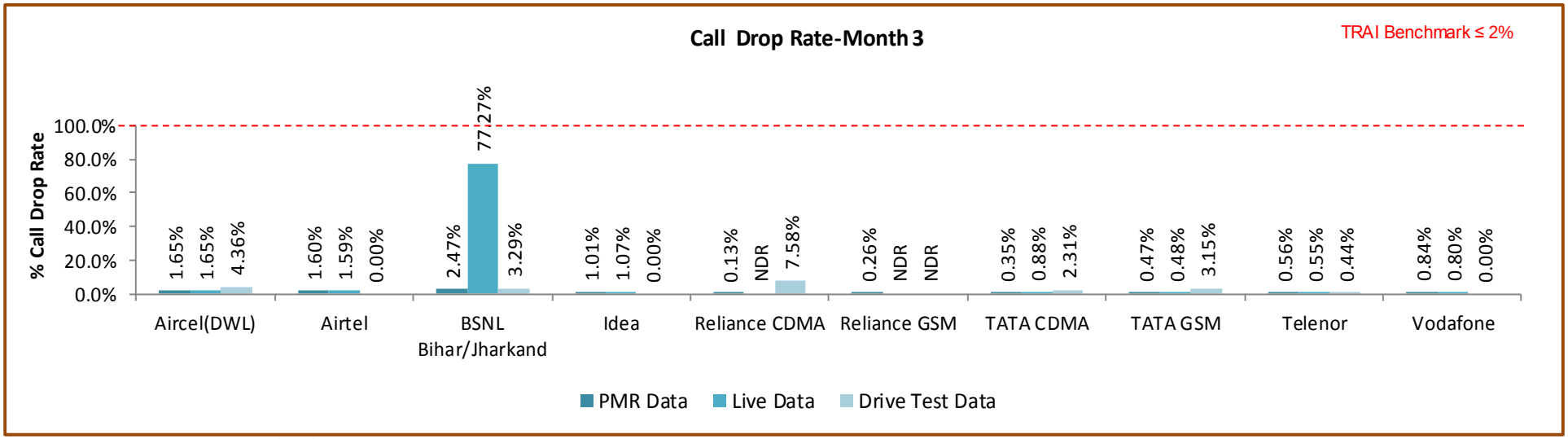
Data Source: Network Operations Center (NOC) of the operators

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 –**

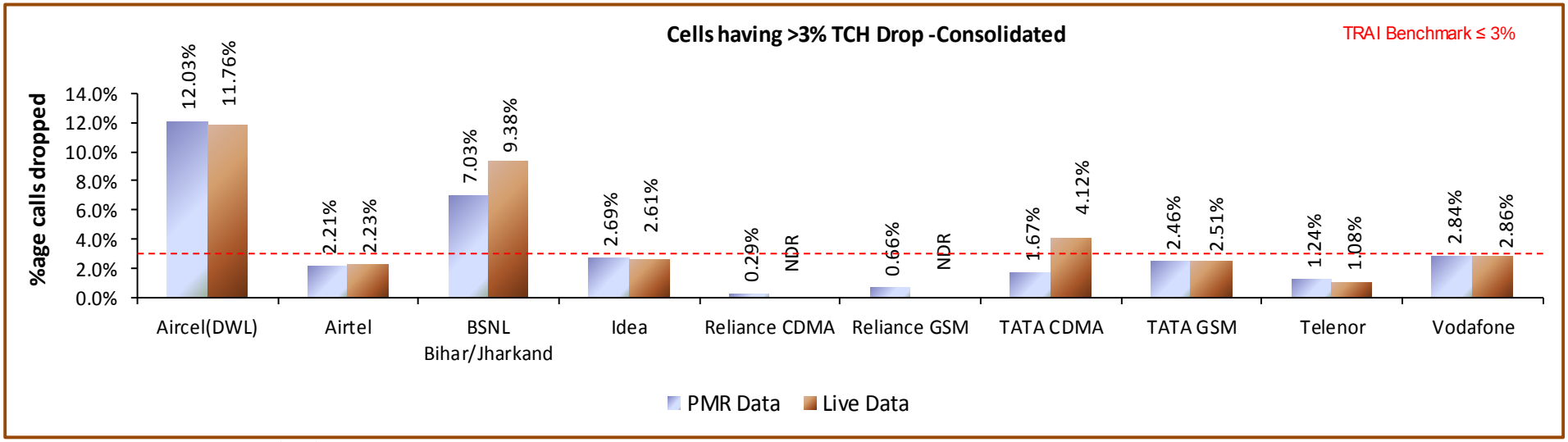
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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.

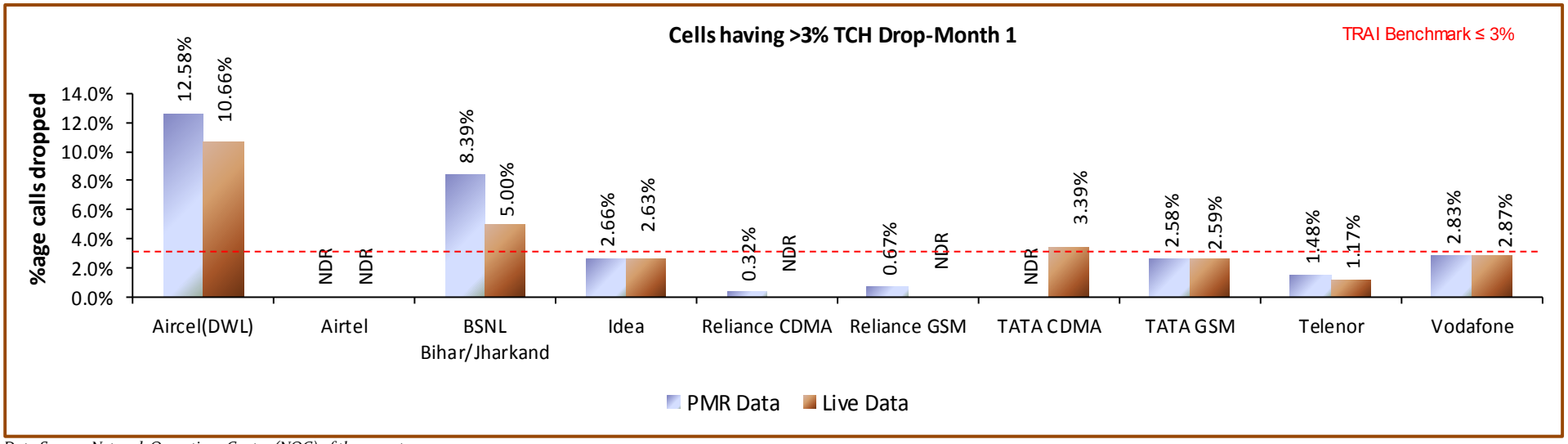
5.6.2 KEY FINDINGS - CONSOLIDATED



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

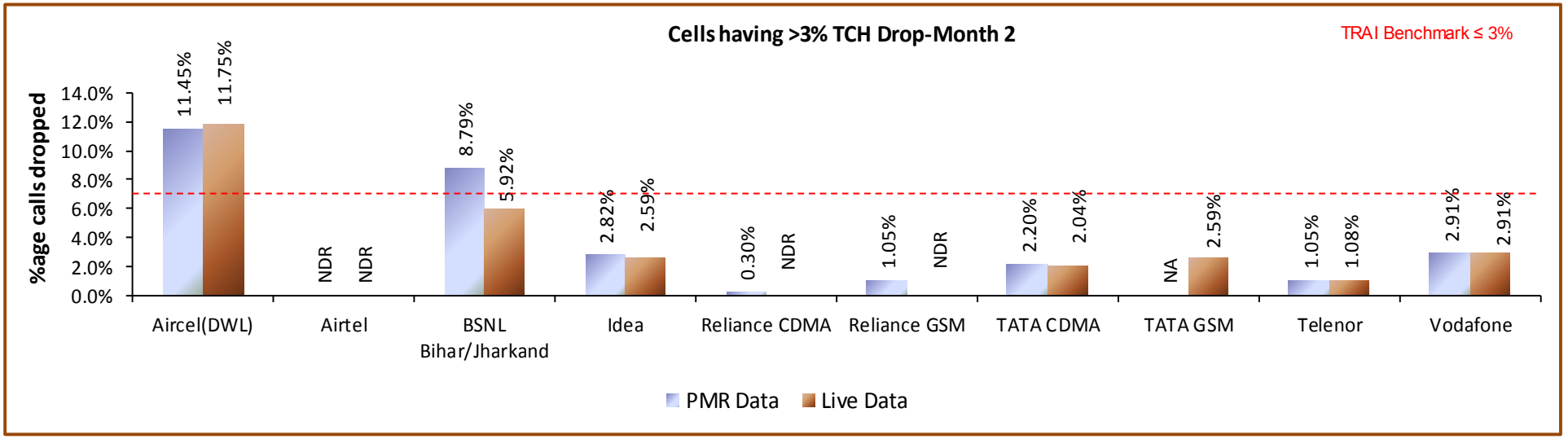
Aircel, BSNL and TATA CDMA failed to meet the benchmark for Audit PMR.

5.6.2.1 KEY FINDINGS – MONTH 1



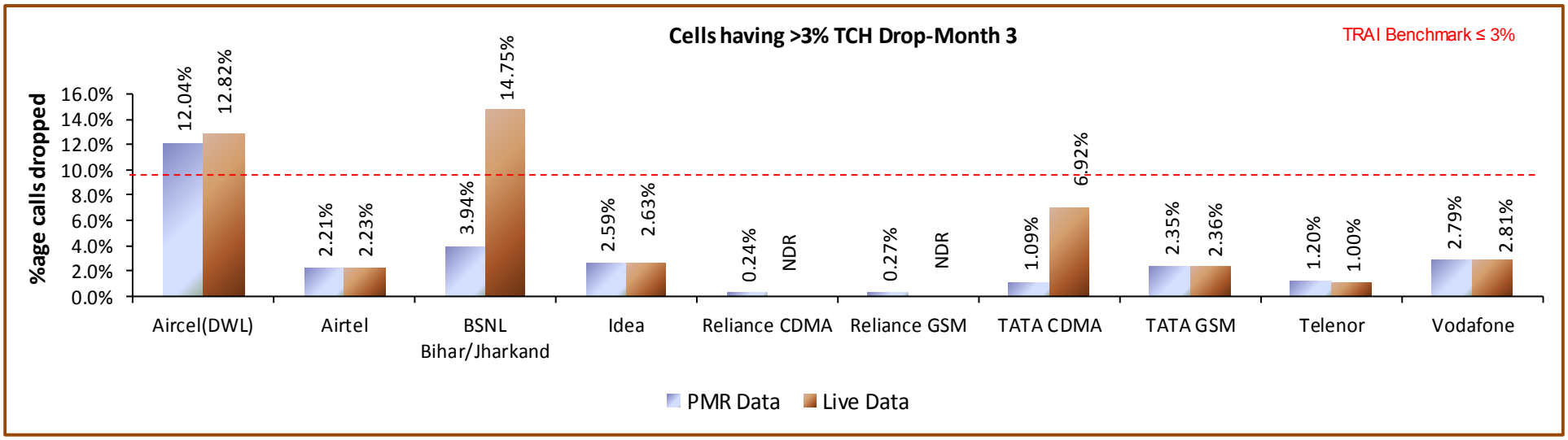
Data Source: Network Operations Center (NOC) of the operators

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**

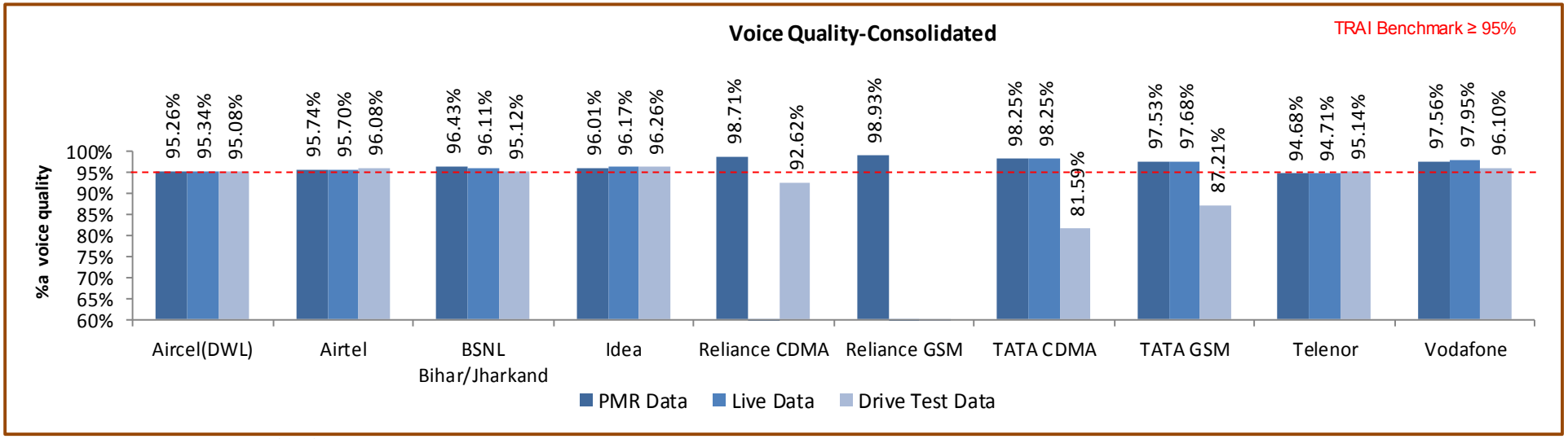
3. **TRAI Benchmark:** ≥ 95%

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.

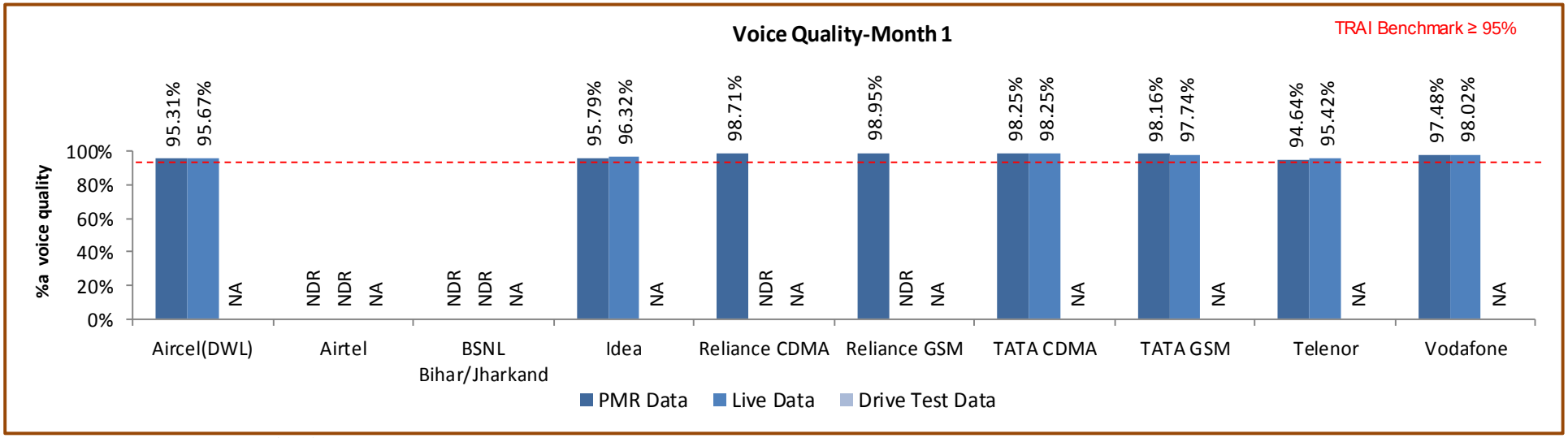
5.7.2 KEY FINDINGS



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

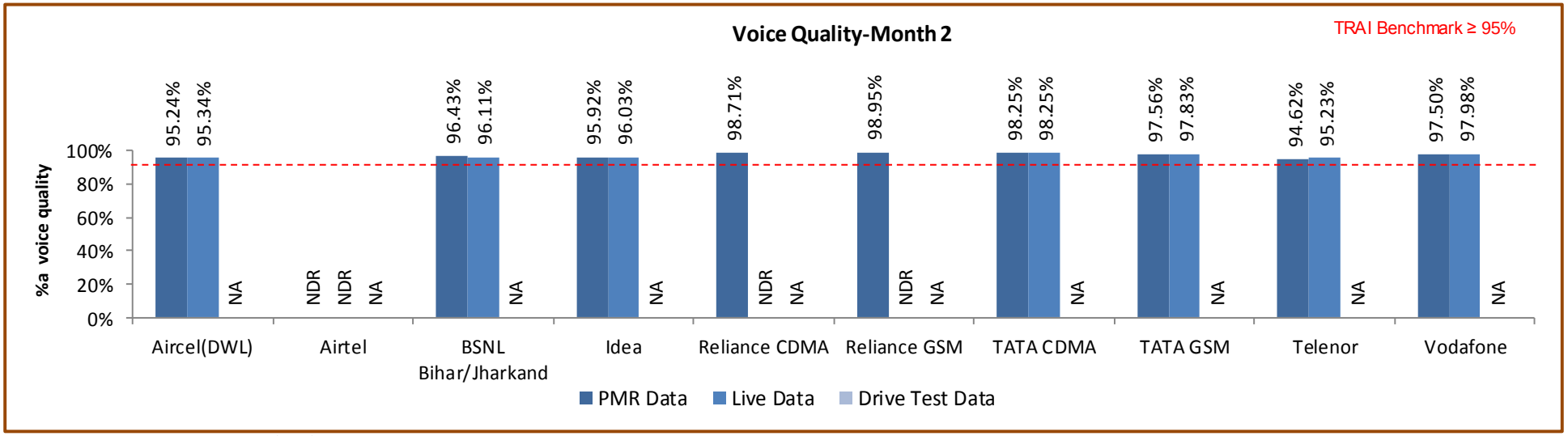
Telenor were not able to meet the benchmark for Voice quality as per PMR data.

5.7.2.1 KEY FINDINGS – MONTH 1



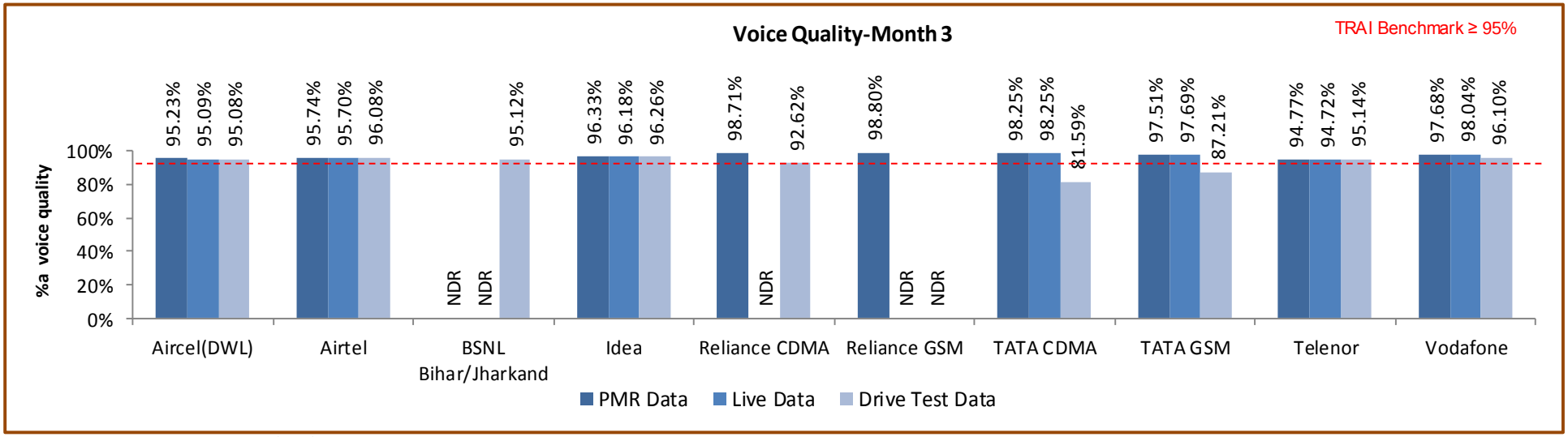
Data Source: Network Operations Center (NOC) of the operators

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 –

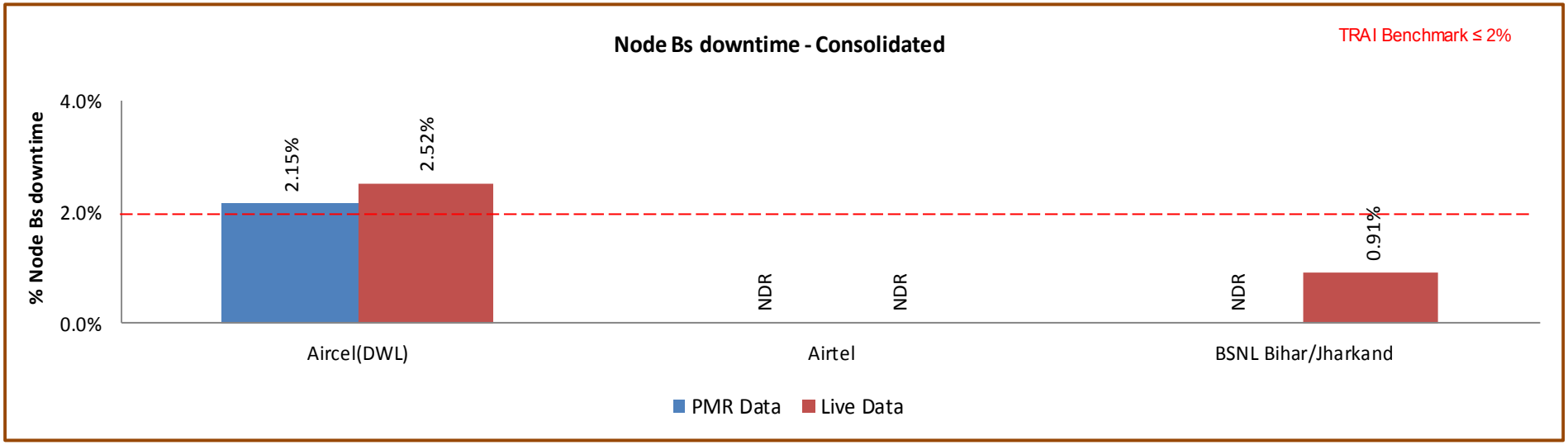
a. Node Bs downtime (not available for service) ≤ 2%

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.

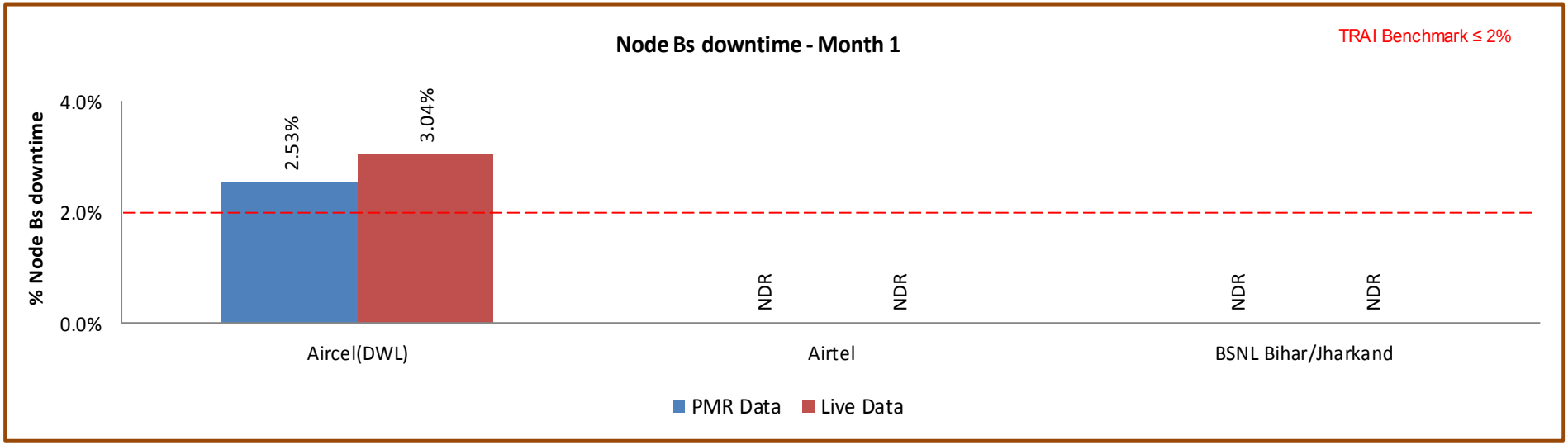
6.1.2 KEY FINDINGS - CONSOLIDATED



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

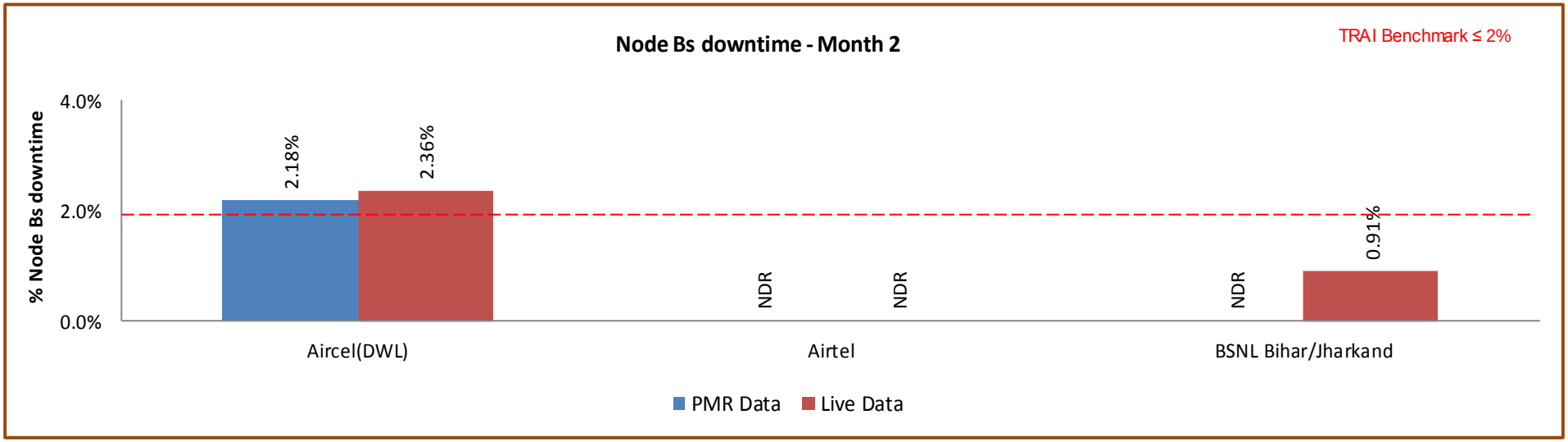
Aircel failed to meet the benchmark for Node B downtime.

6.1.2.1 KEY FINDINGS – MONTH 1



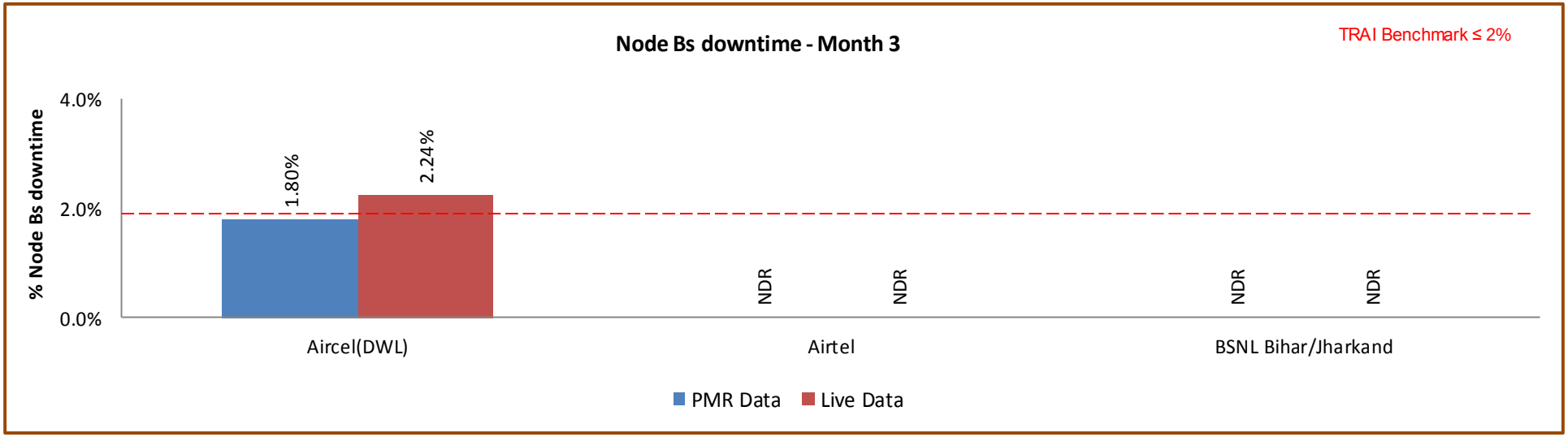
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

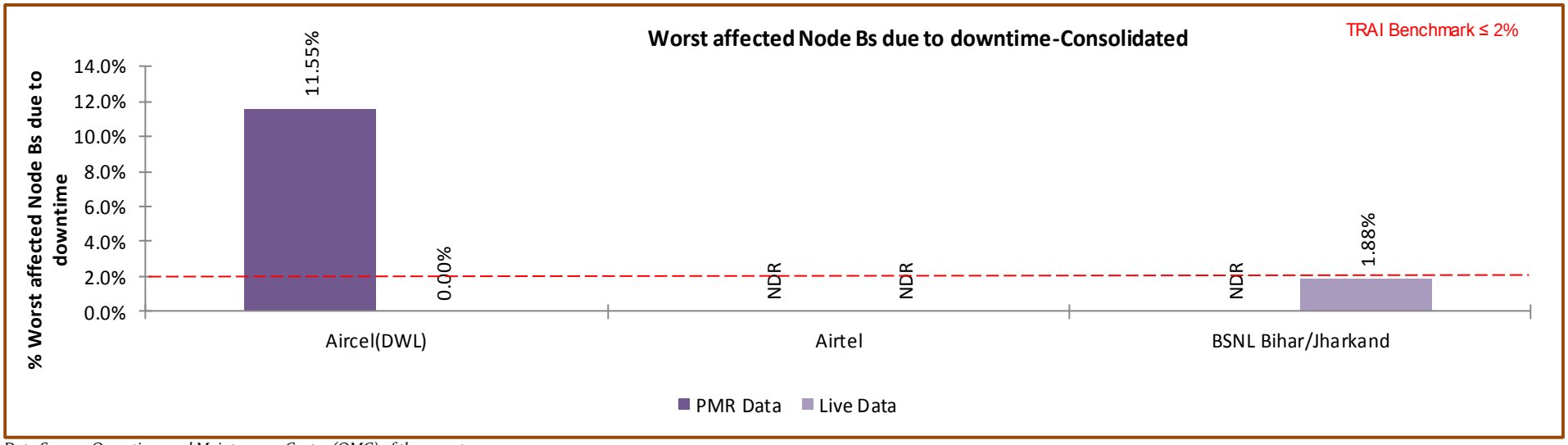
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

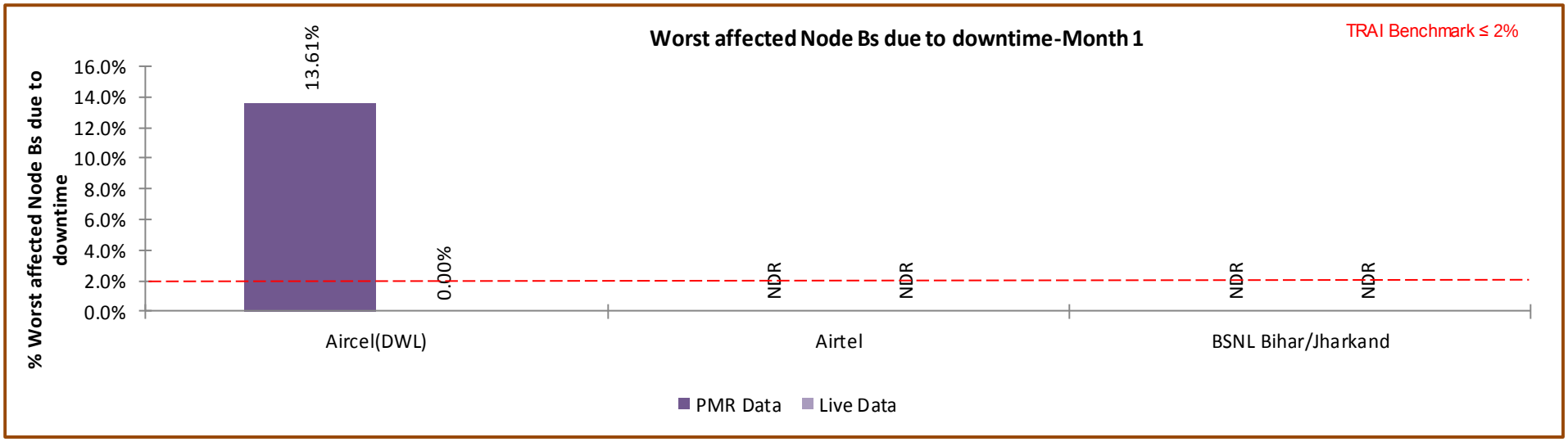


Data Source: Operations and Maintenance Center (OMC) of the operators

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

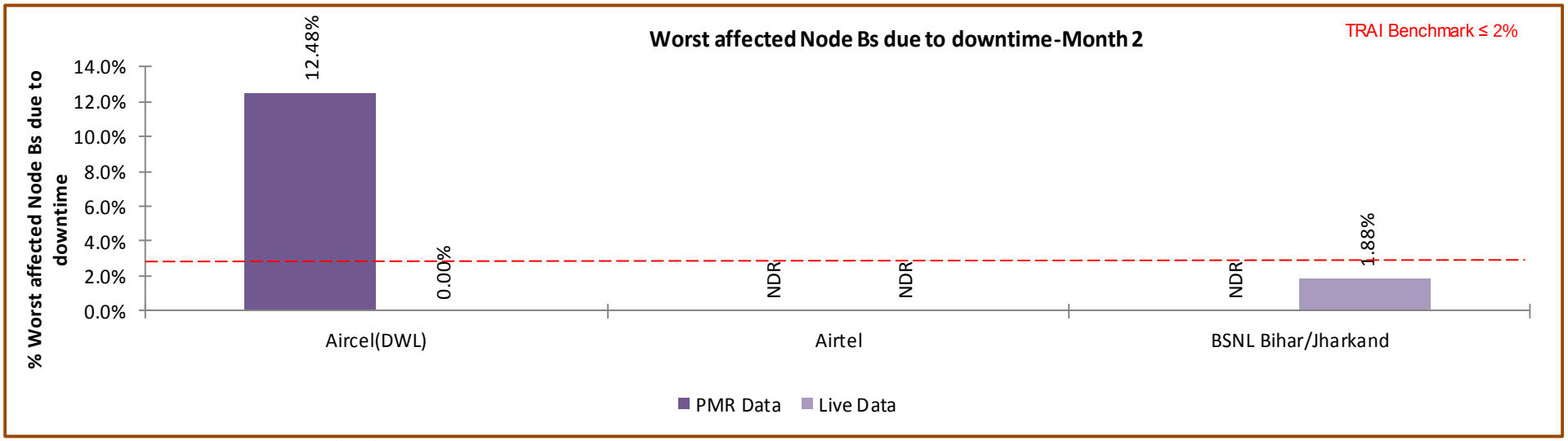
Significant difference was observed between PMR & live measurement data for Aircel and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



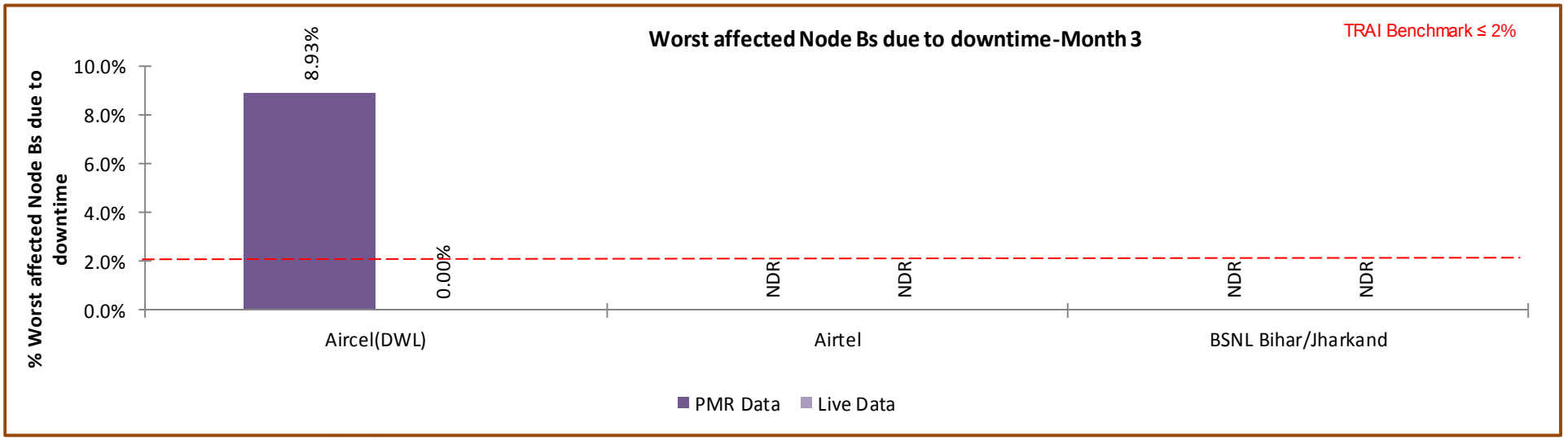
Data Source: Operations and Maintenance Center (OMC) of the operators

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

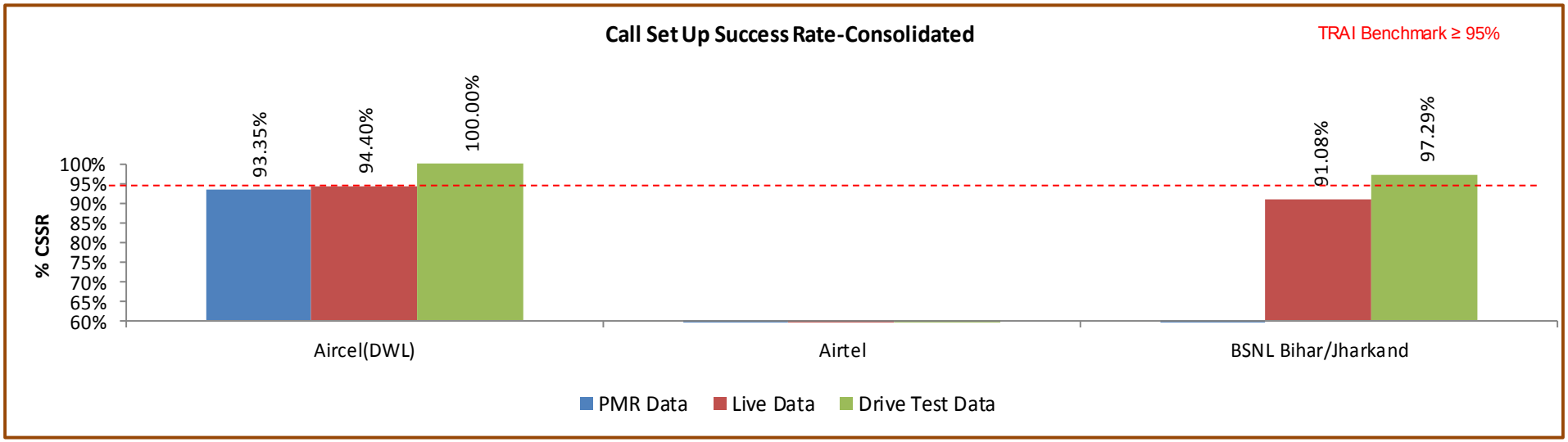
5. **TRAI Benchmark ≥** 95%

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.

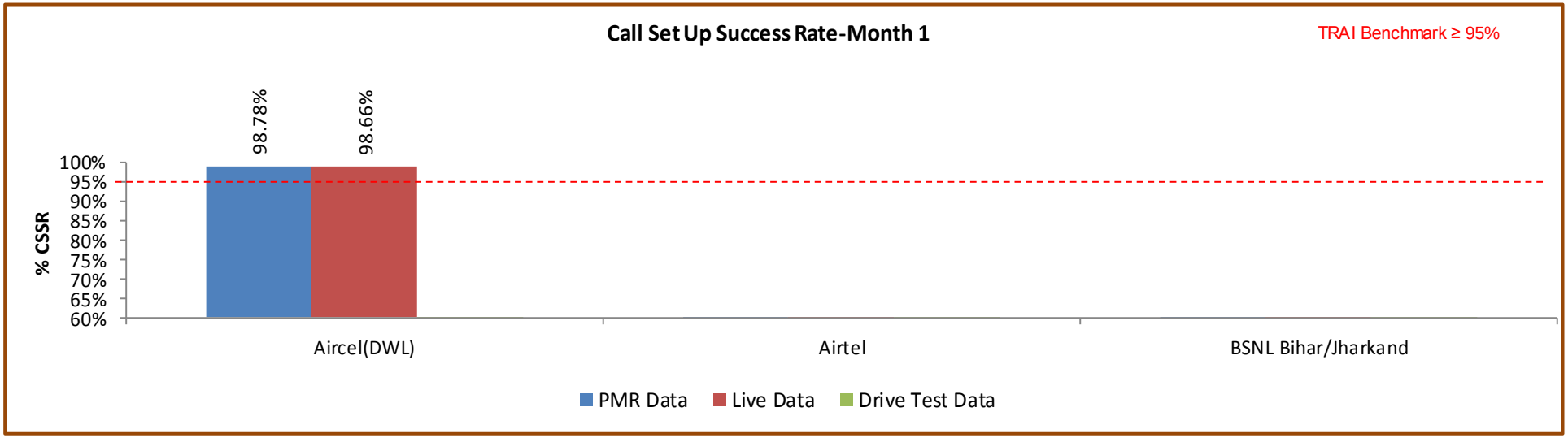
6.3.2 KEY FINDINGS - CONSOLIDATED



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

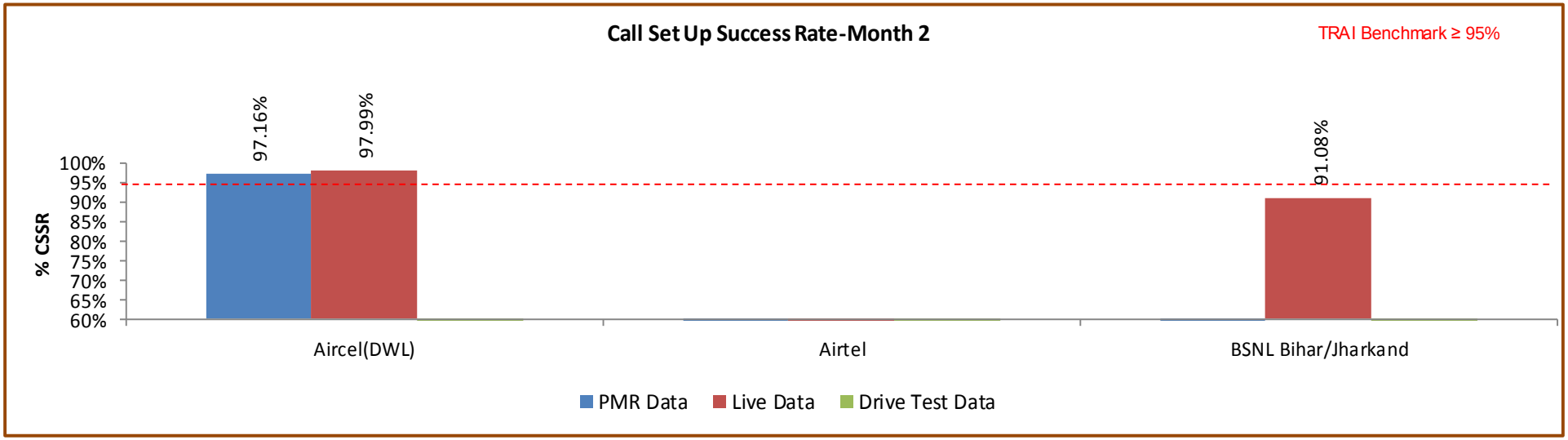
Aircel failed to meet the TRAI benchmark as per audit/PMR data.

6.3.2.1 KEY FINDINGS – MONTH 1



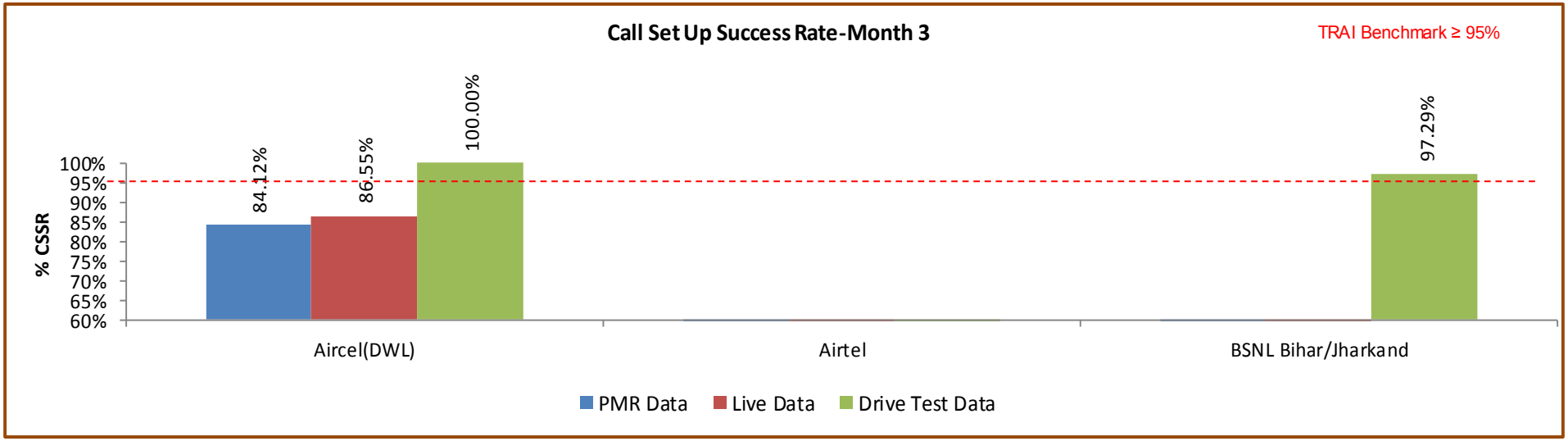
Data Source: Network Operations Center (NOC) of the operators

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

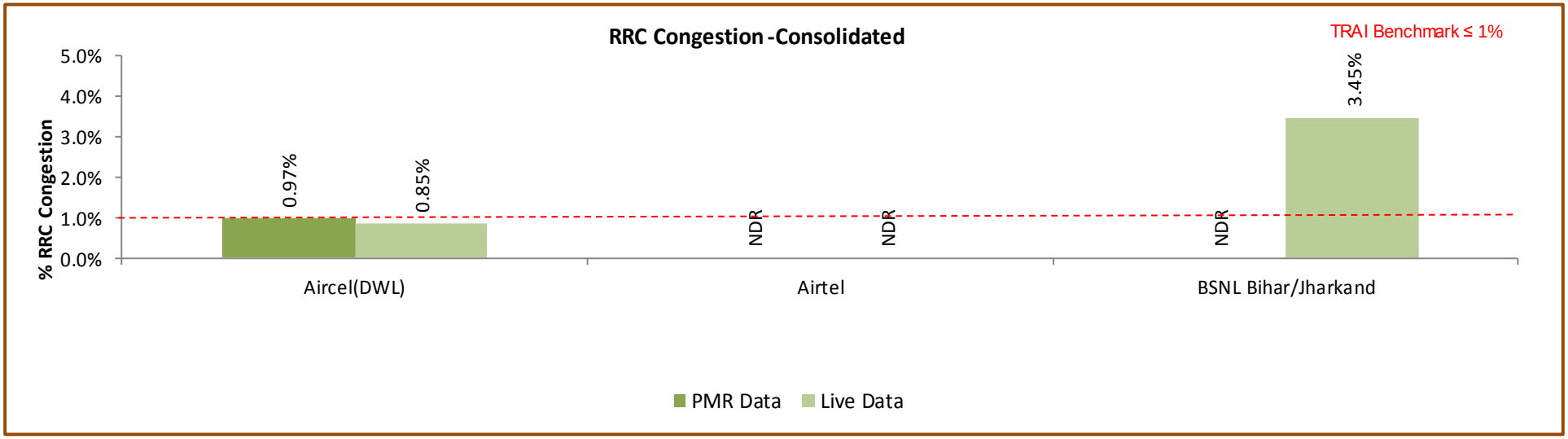
7. Benchmark:

- 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

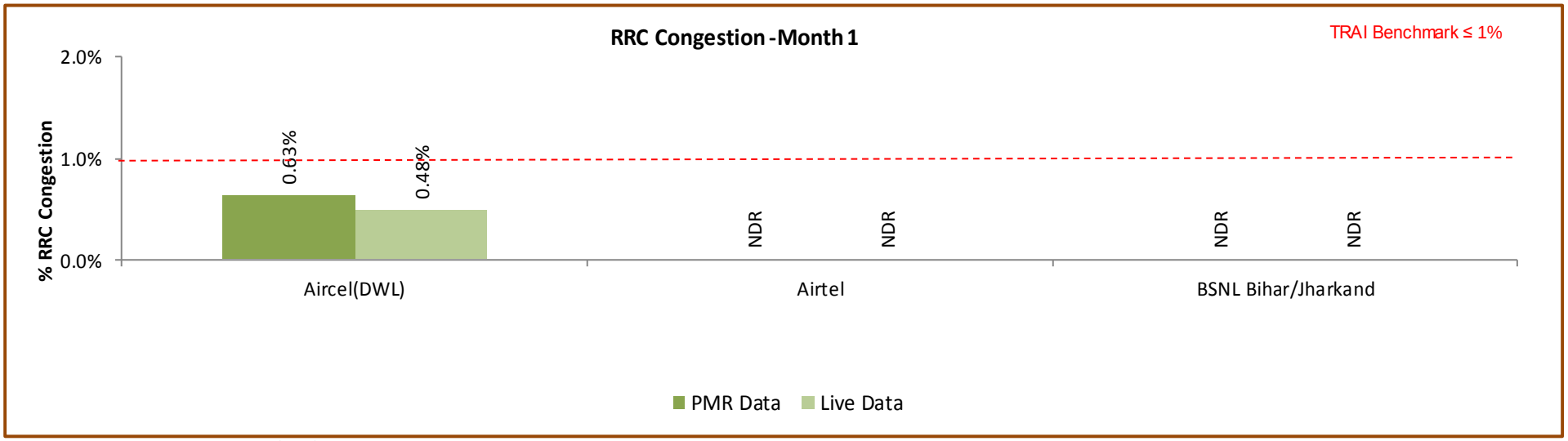
6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

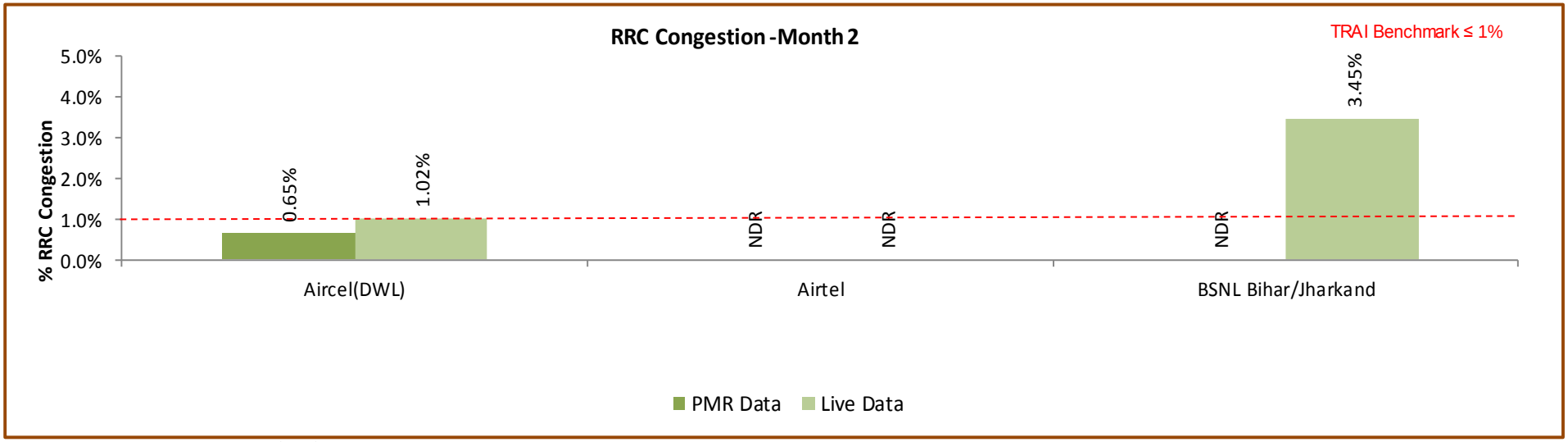
All operators met the TRAI benchmark for RRC congestion.

6.4.2.1 KEY FINDINGS – MONTH 1



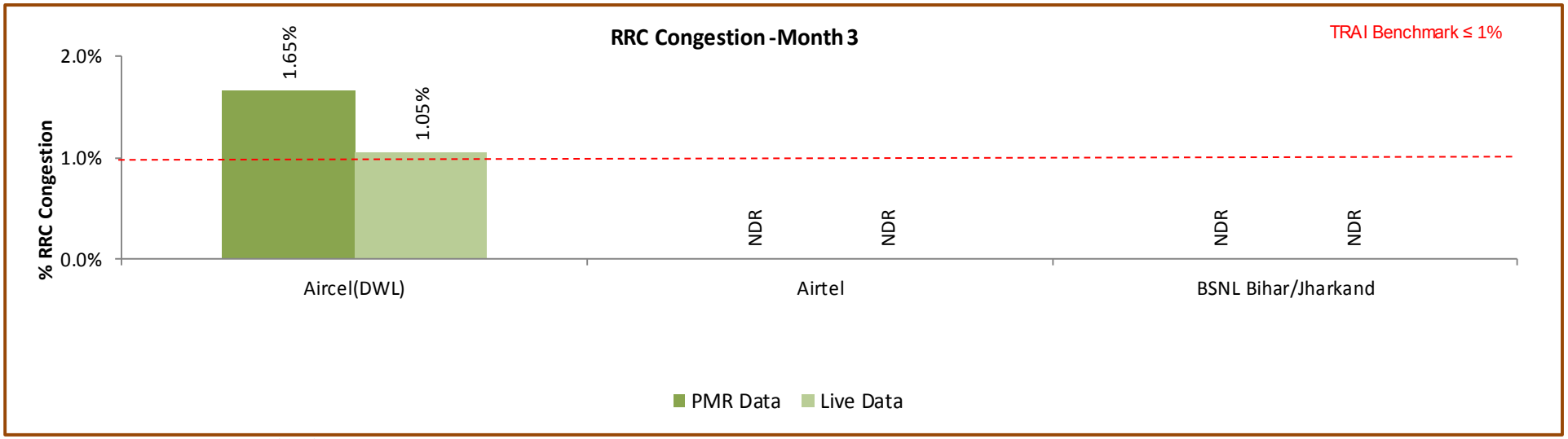
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



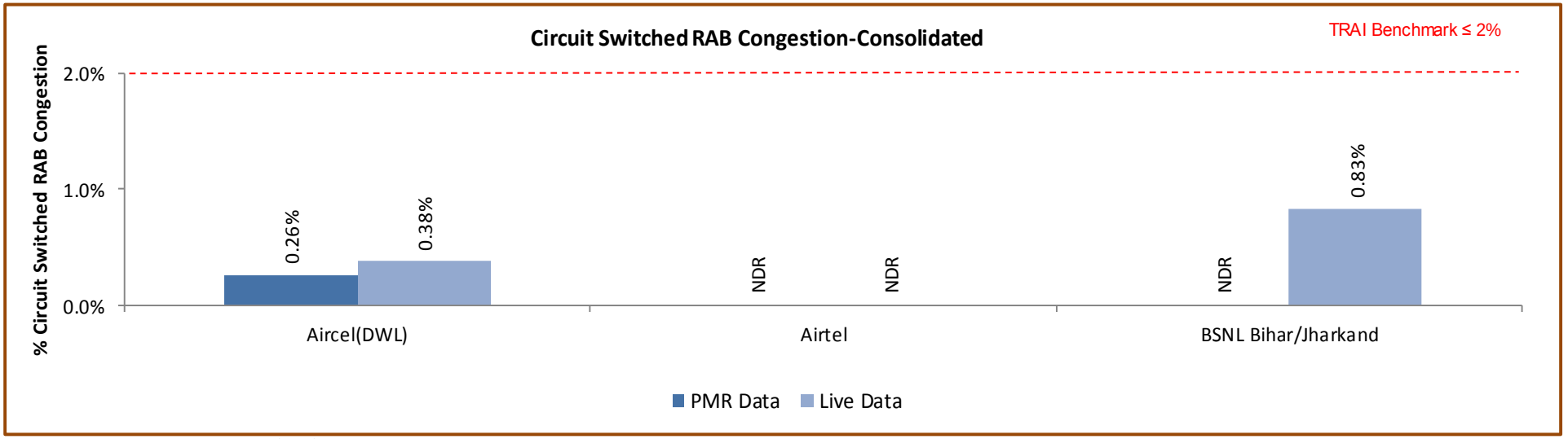
Data Source: Network Operations Center (NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



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

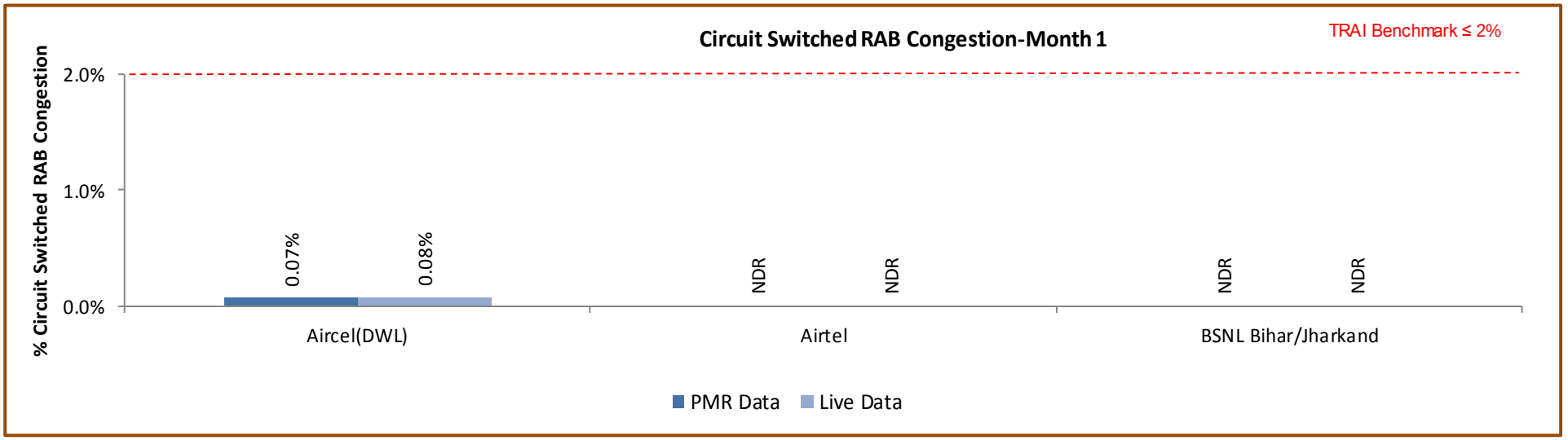
6.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)



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

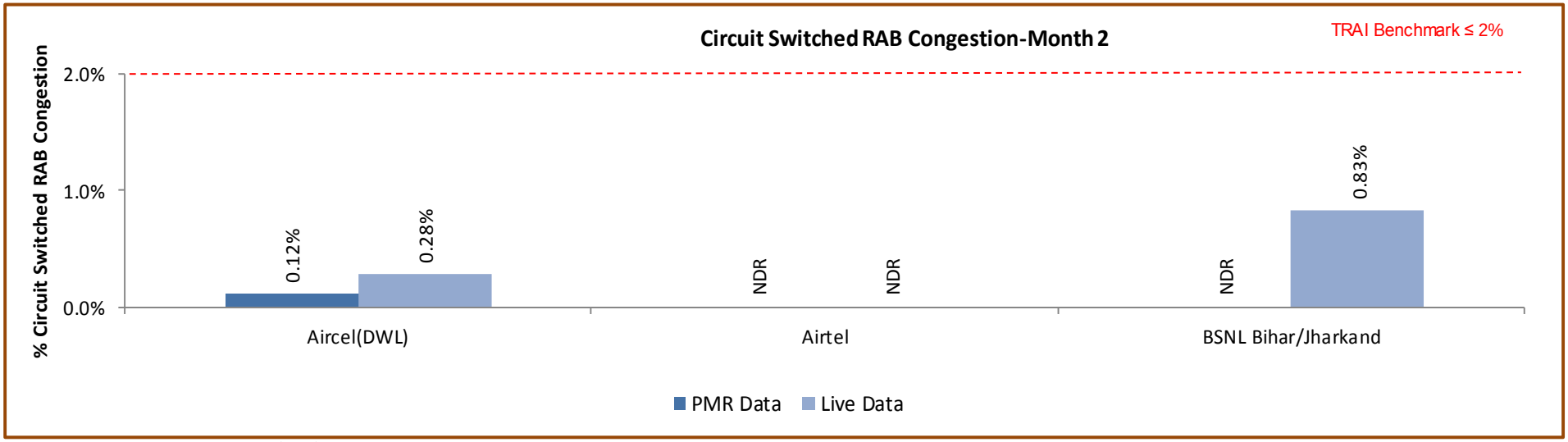
All operators met the benchmark as per audit/PMR report.

6.4.3.1 KEY FINDINGS – MONTH 1



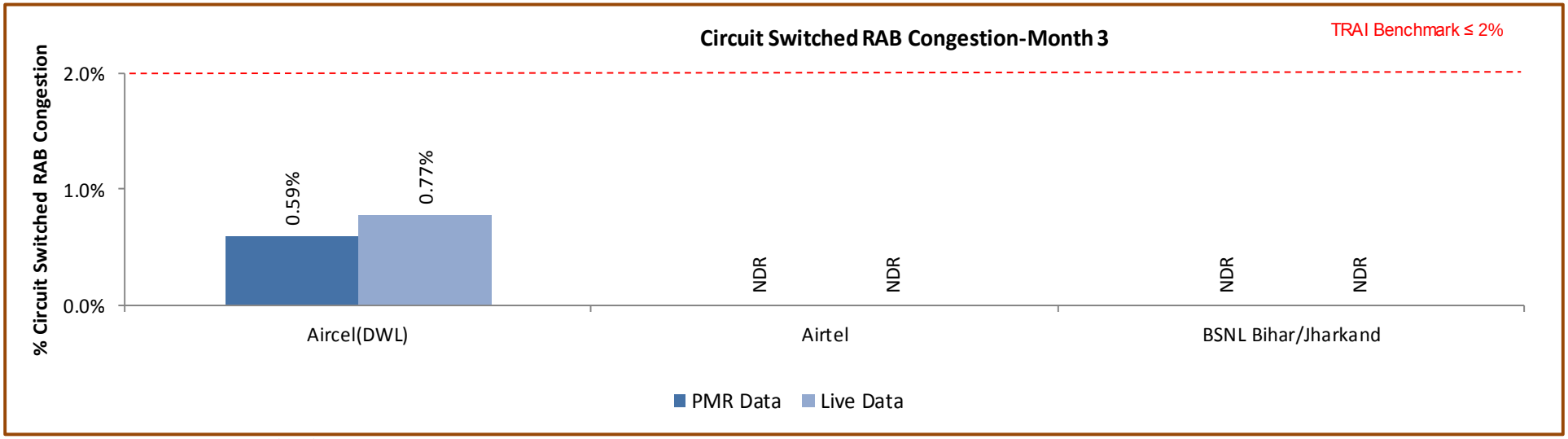
Data Source: Network Operations Center (NOC) of the operators

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(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		144	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		388902	NDR	NDR
Traffic served for all POIs (B)- in erlangs		223567	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		144	NDR	21
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		390128	NDR	15538
Traffic served for all POIs (B)- in erlangs		104302	NDR	0
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October				
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		129008	NDR	NDR
Traffic served for all POIs (B)- in erlangs		76170	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-October				
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		130270	NDR	NDR
Traffic served for all POIs (B)- in erlangs		32915	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR

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(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		130369	NDR	NDR
Traffic served for all POIs (B)- in erlangs		71750	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-November				
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		48	NDR	21
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		130394	NDR	15538
Traffic served for all POIs (B)- in erlangs		35259	NDR	0
POI congestion	≤ 0.5%	0.00%	NDR	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(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		129524	NDR	NDR
Traffic served for all POIs (B)- in erlangs		75647	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-December				
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		129464	NDR	NDR
Traffic served for all POIs (B)- in erlangs		36129	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR

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

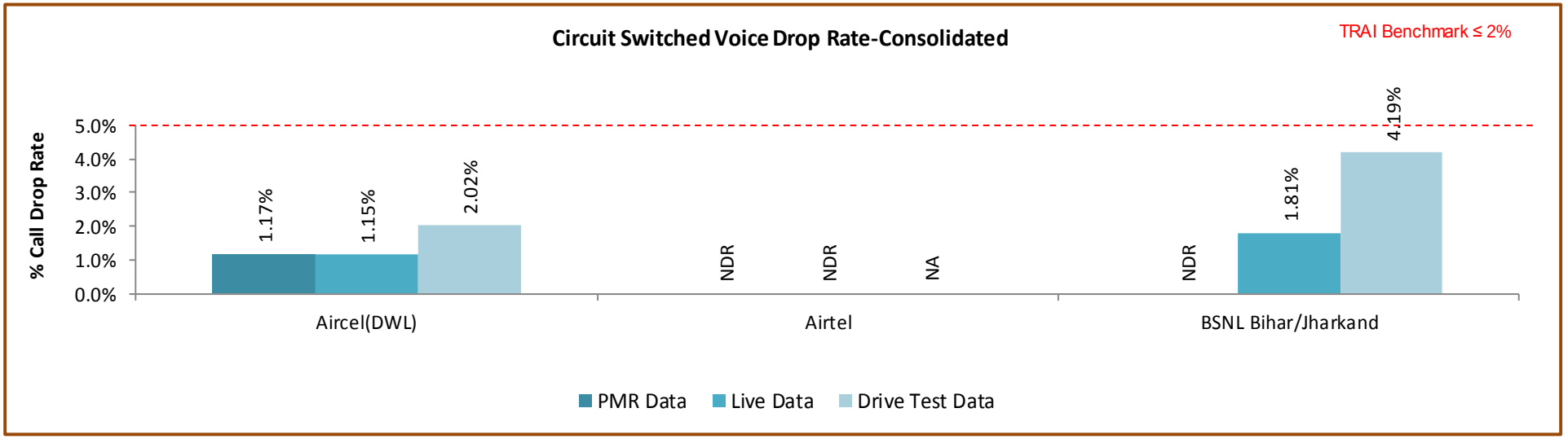
5. **TRAI Benchmark –**

   - 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.

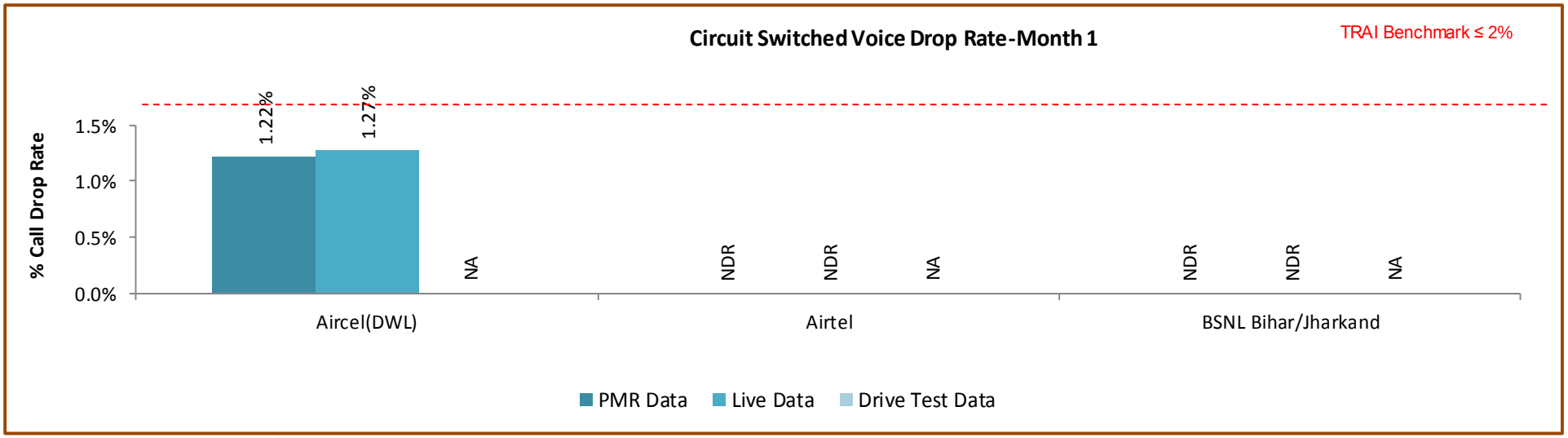
6.5.2 KEY FINDINGS - CONSOLIDATED



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

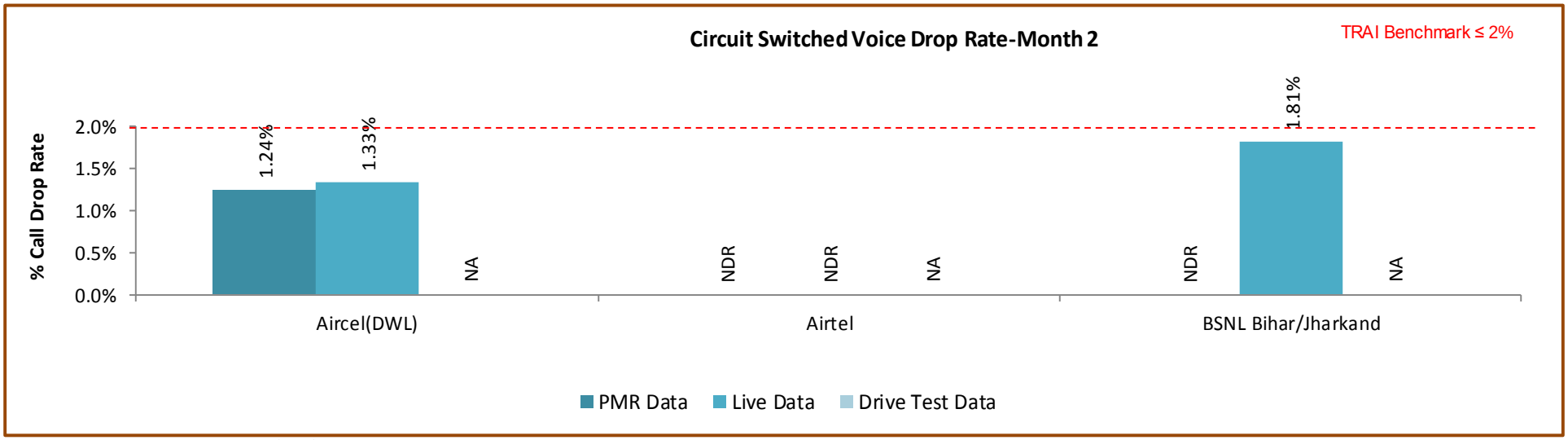
All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



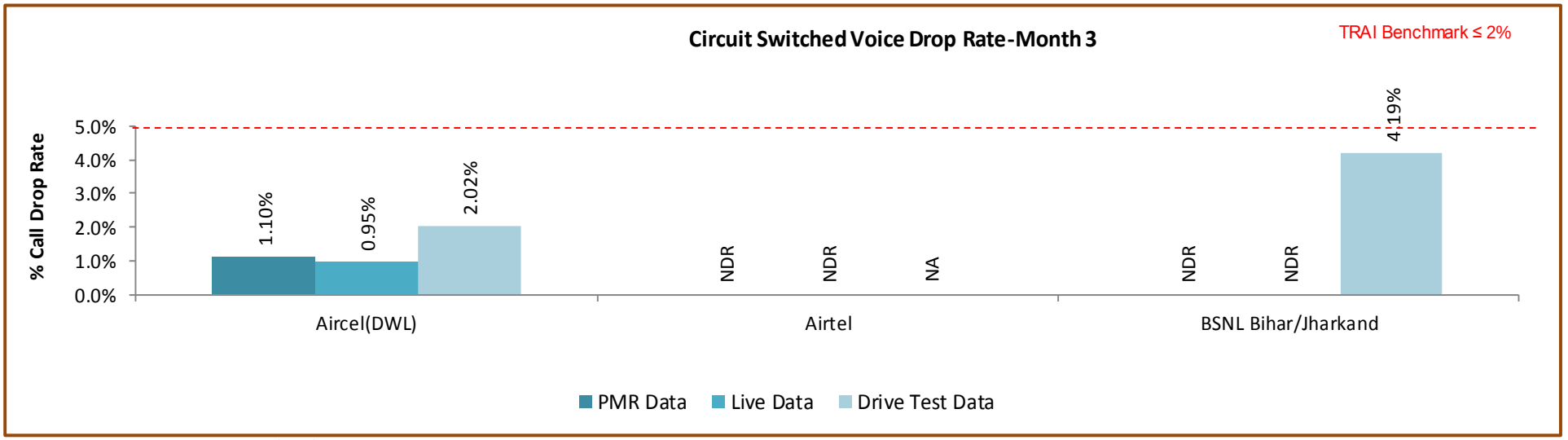
Data Source: Network Operations Center (NOC) of the operators

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** –

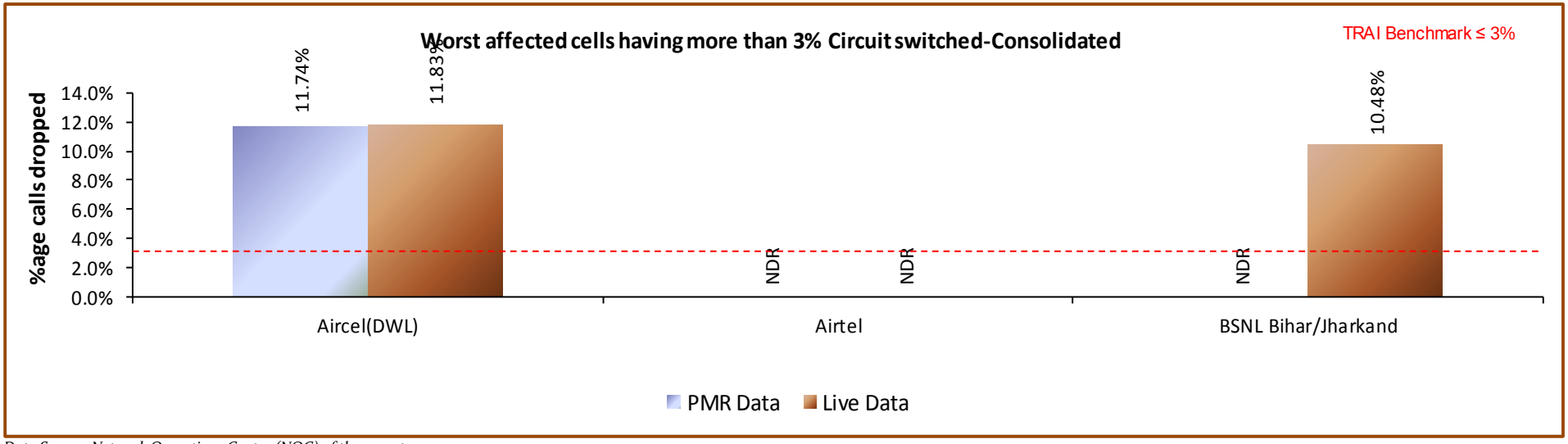
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

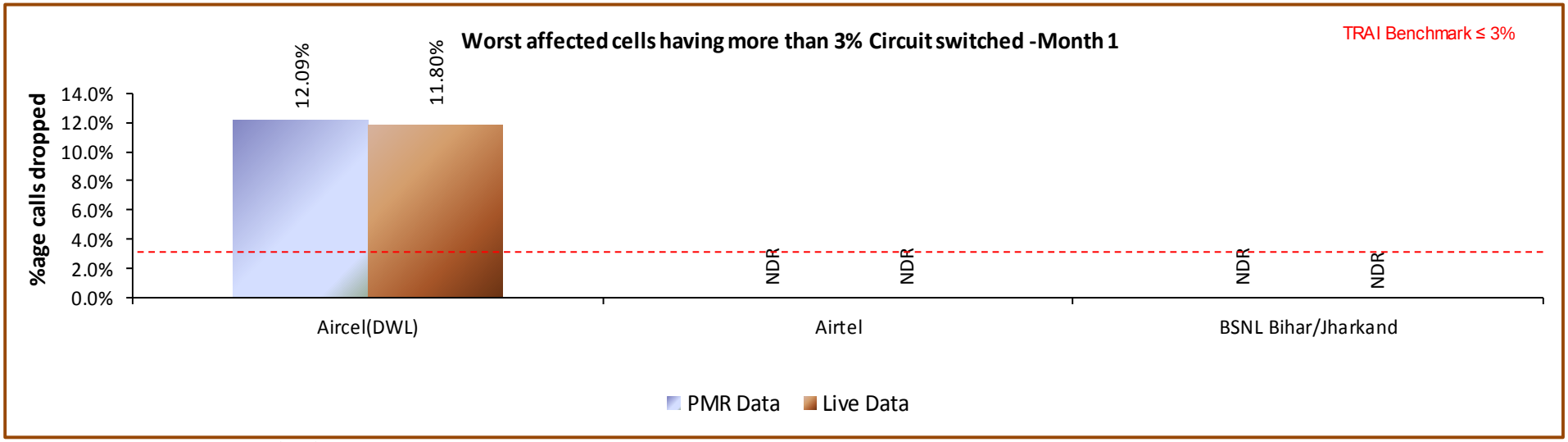
6.6.2 KEY FINDINGS - CONSOLIDATED



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

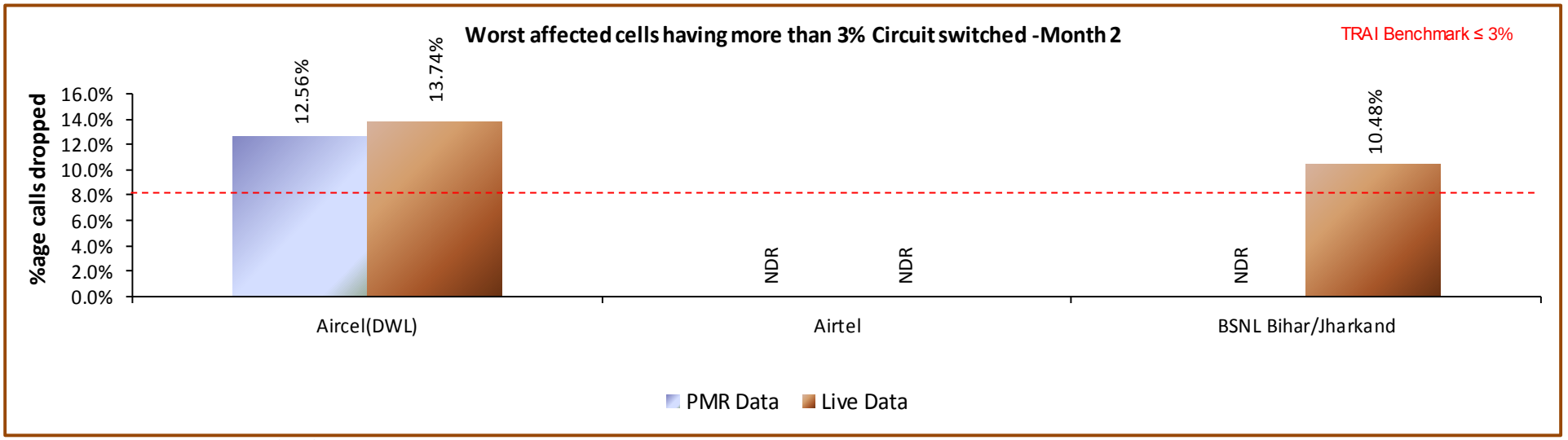
Aircel did not meet the benchmark during audit.

6.6.2.1 KEY FINDINGS – MONTH 1



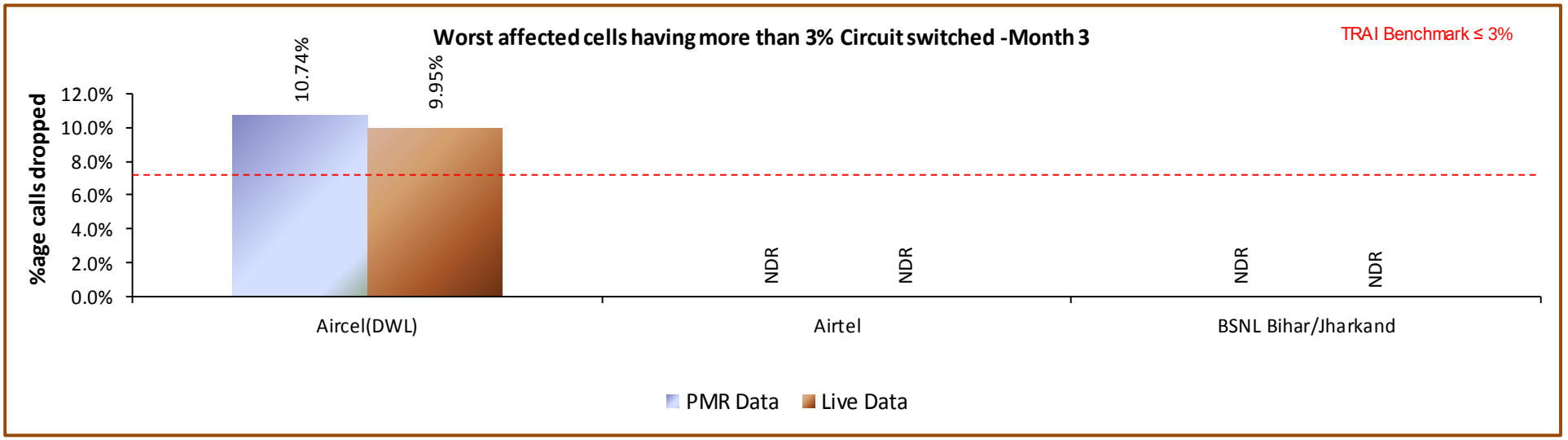
Data Source: Network Operations Center (NOC) of the operators

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**

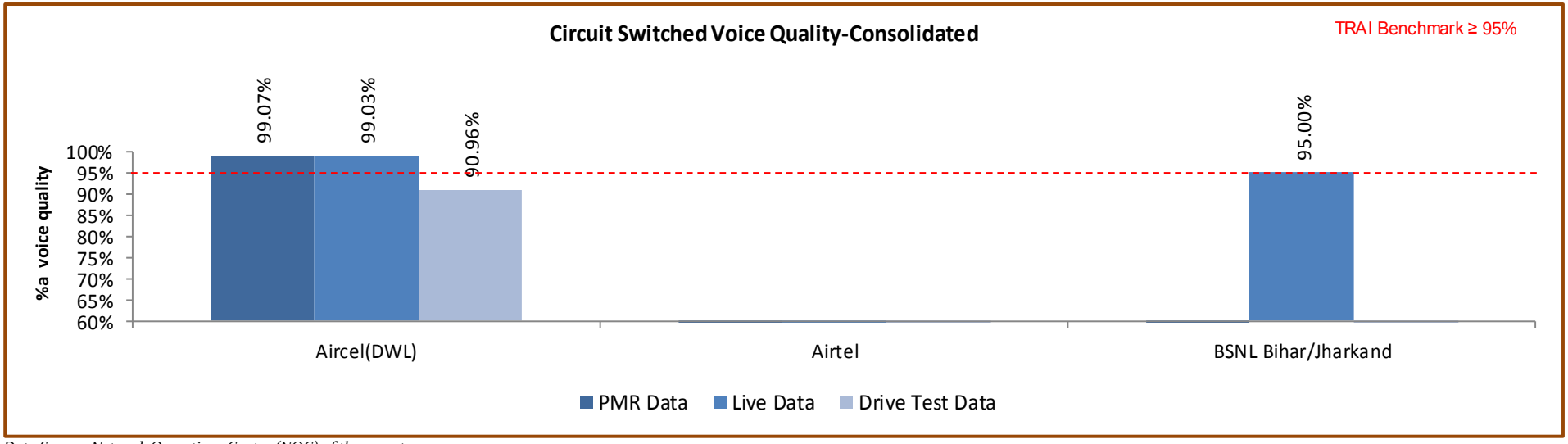
7. **TRAI Benchmark:** ≥ 95%

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.

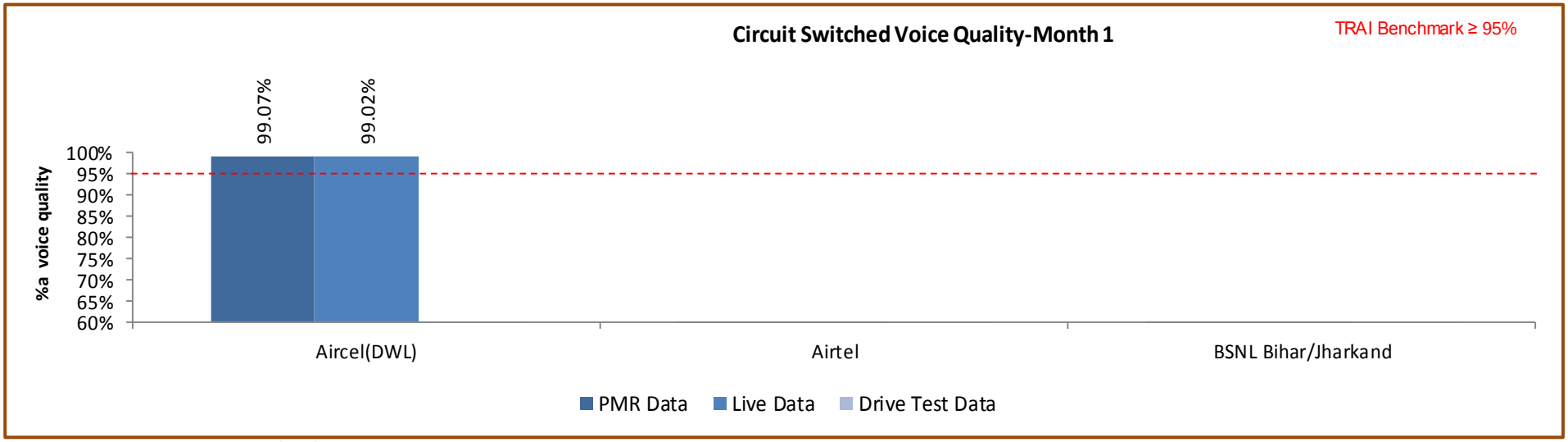
6.7.2 KEY FINDINGS



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

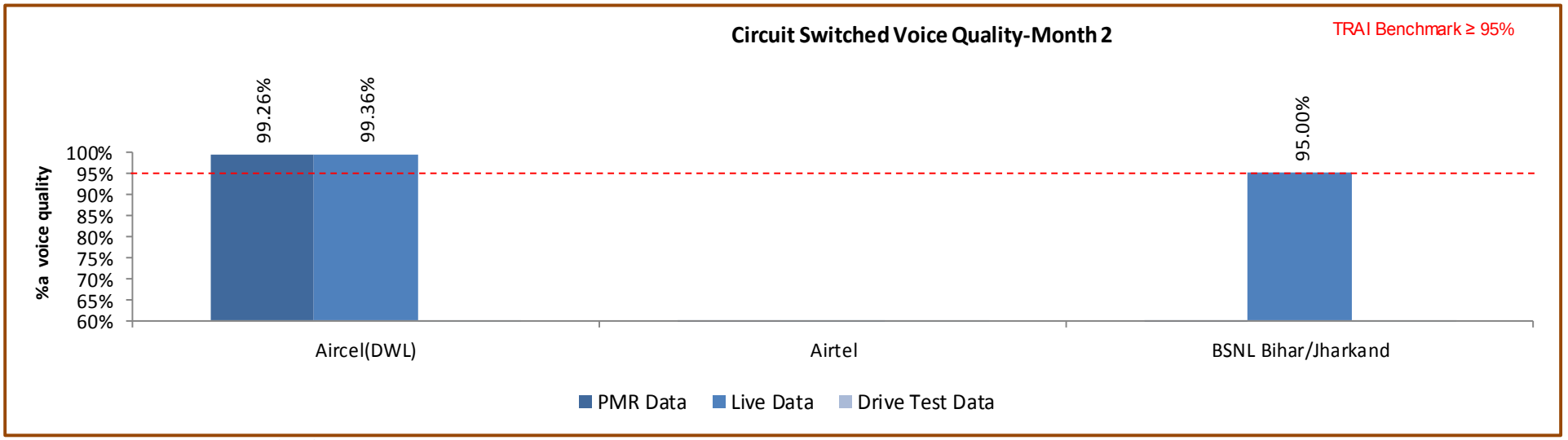
All operators met the TRAI benchmark at the time of audit.

6.7.2.1 KEY FINDINGS – MONTH 1



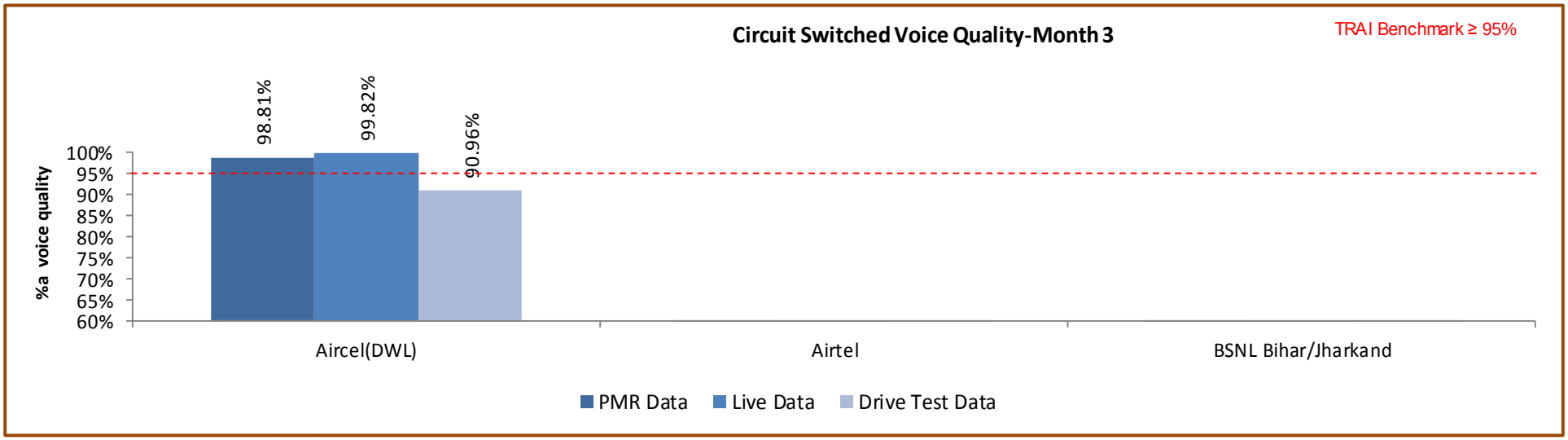
Data Source: Network Operations Center (NOC) of the operators

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 & 3G

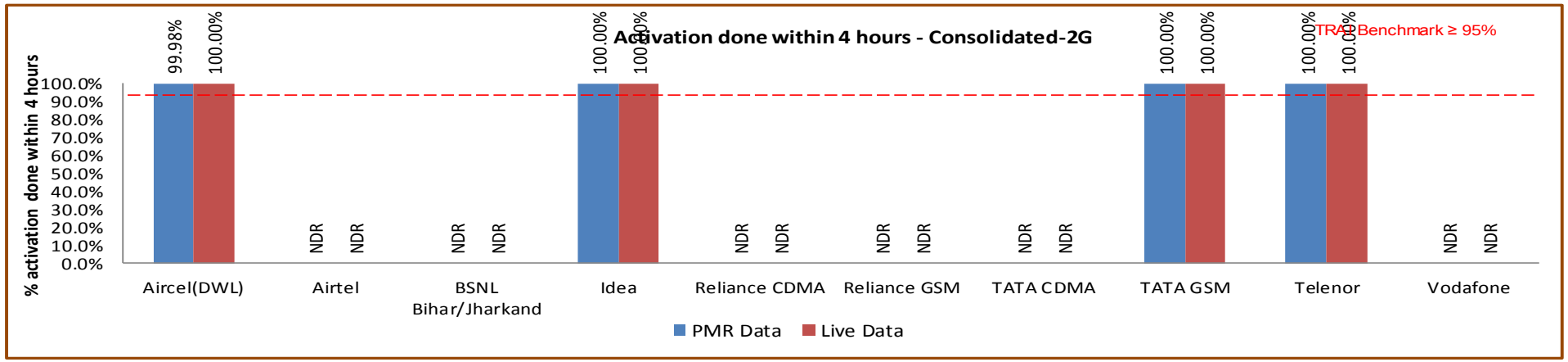
7.1.1 PARAMETER DESCRIPTION

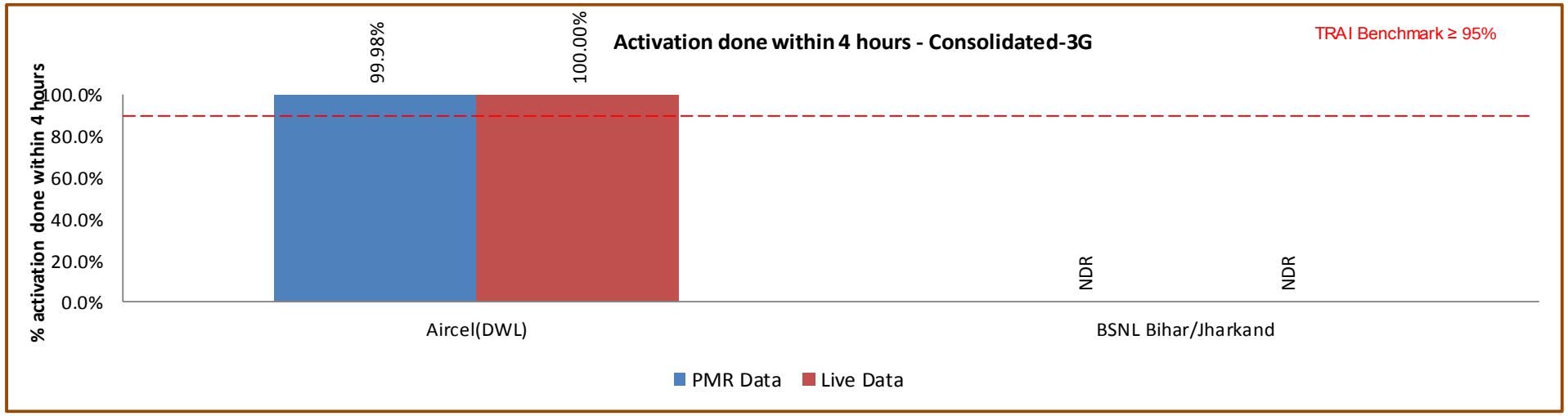
This refers to the activation of services after activation of the SIM. This involves programming the various databases with the customer's information and any gateways to standard Internet chat or mail services or any data services. The service provider typically sends these settings to the subscriber's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

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

Benchmark :- >=95%

7.1.2 KEY FINDINGS





All operators met the benchmark during audit for 2G & 3G.

7.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G & 3G

7.2.1 PARAMETER DESCRIPTION

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

Measurement

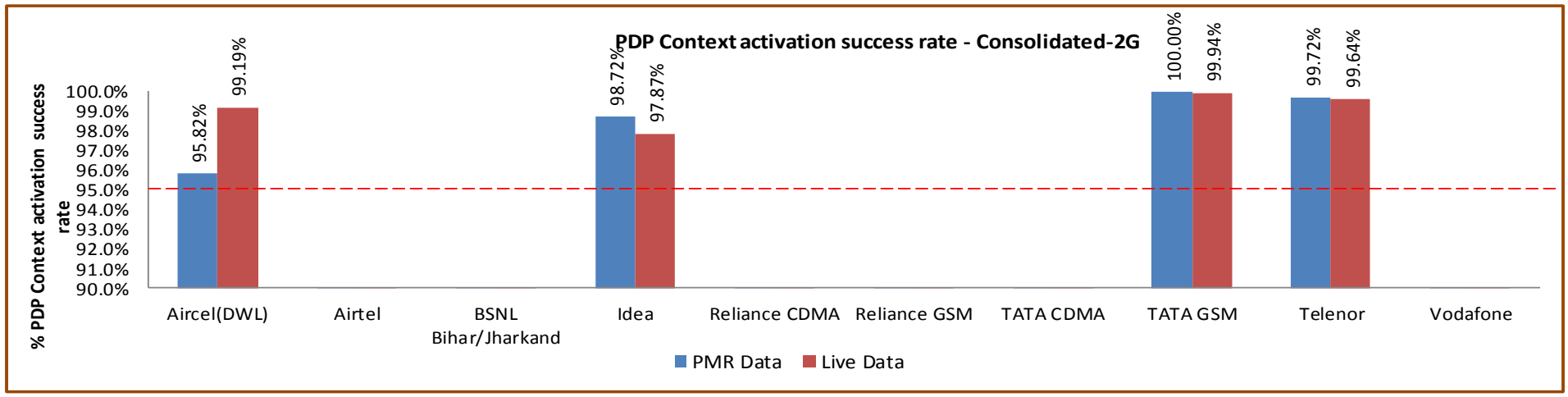
This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

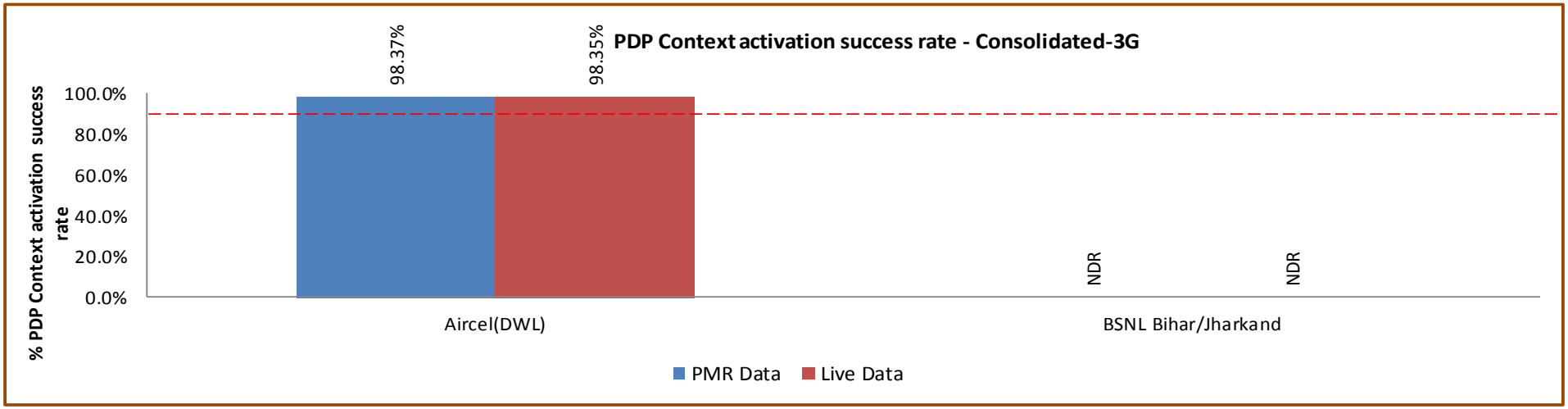
PDP Context Activation Success Rate (%) =

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

Benchmark: >=95%

7.2.2 KEY FINDINGS





All operators met the benchmark during audit for 2G & 3G.

7.3 DROP RATE FOR 2G & 3G

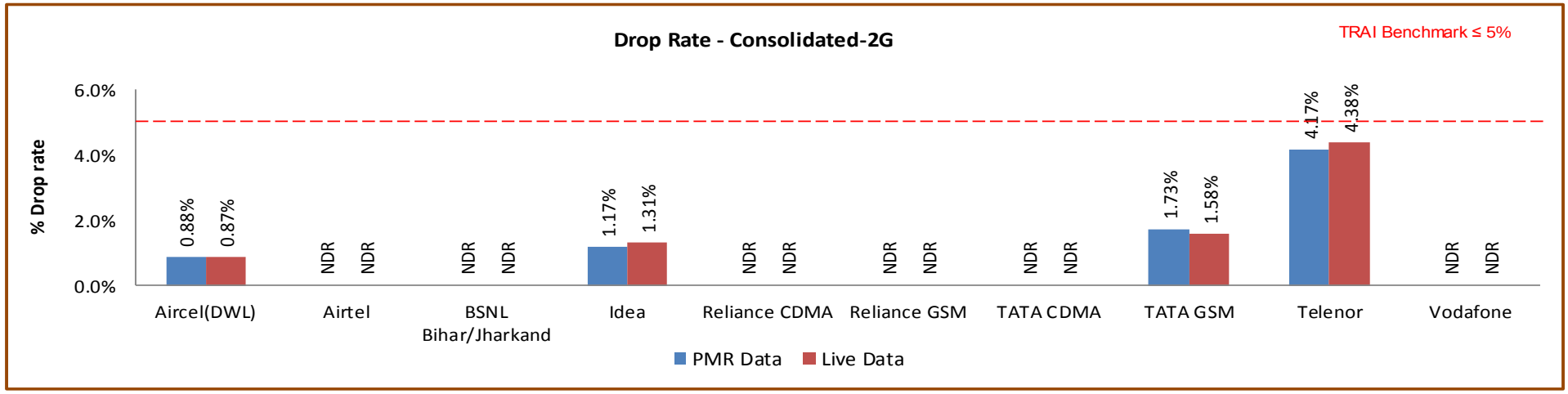
7.3.1 PARAMETER DESCRIPTION

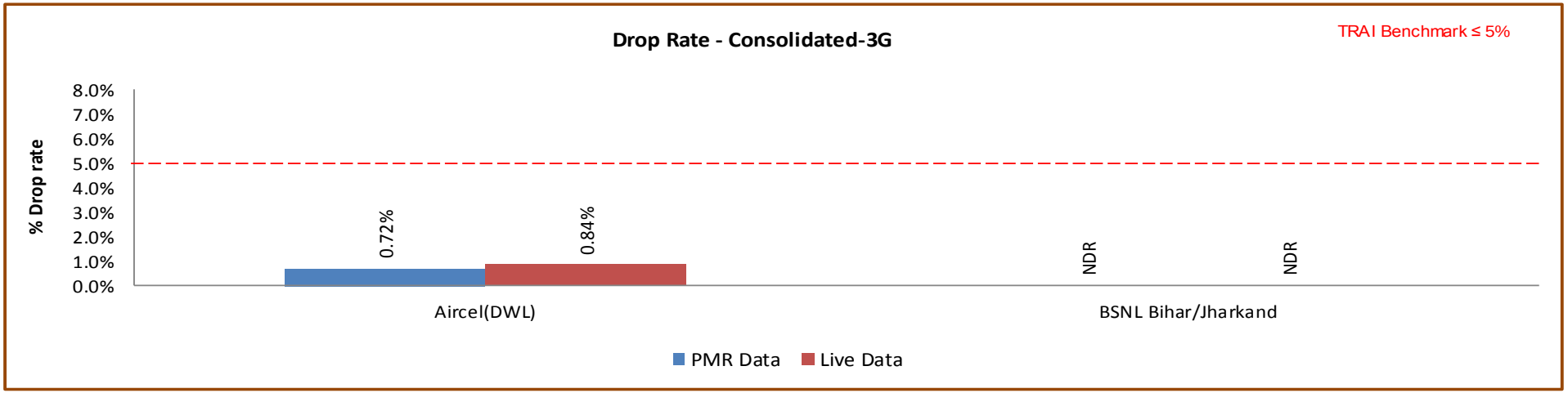
It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects (both normal and abnormal). An abnormal disconnect may happen because of Radio Link Failures, Uplink (UL) or Downlink (DL) interference, bad coverage, unsuccessful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

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

Benchmark: <=5%

7.3.2 KEY FINDINGS





All operators met the benchmark during audit for 2G & 3G.

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

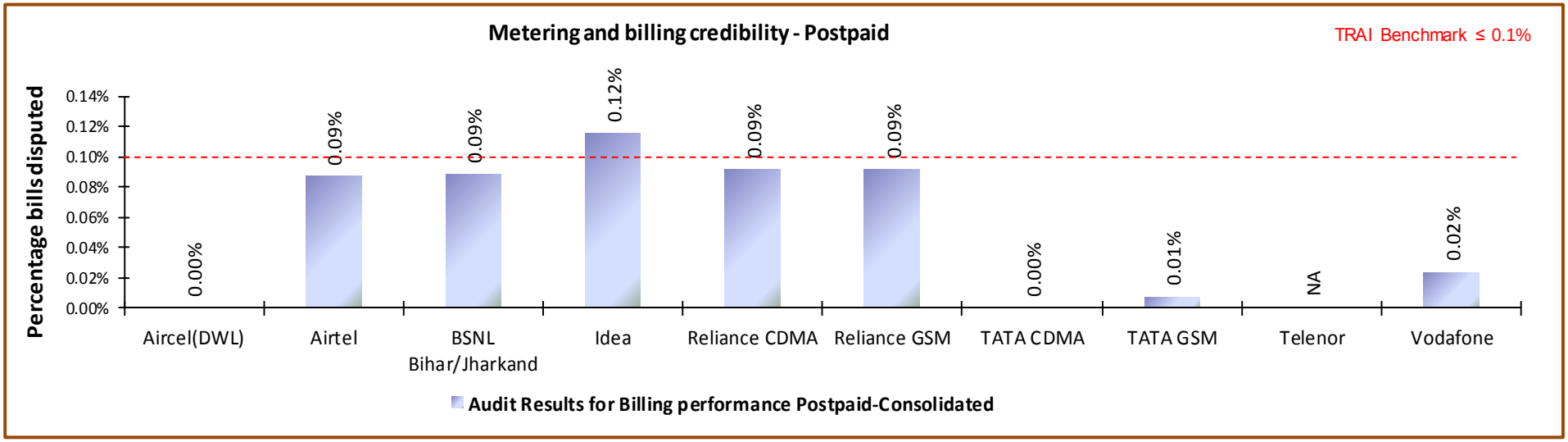
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

- 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.

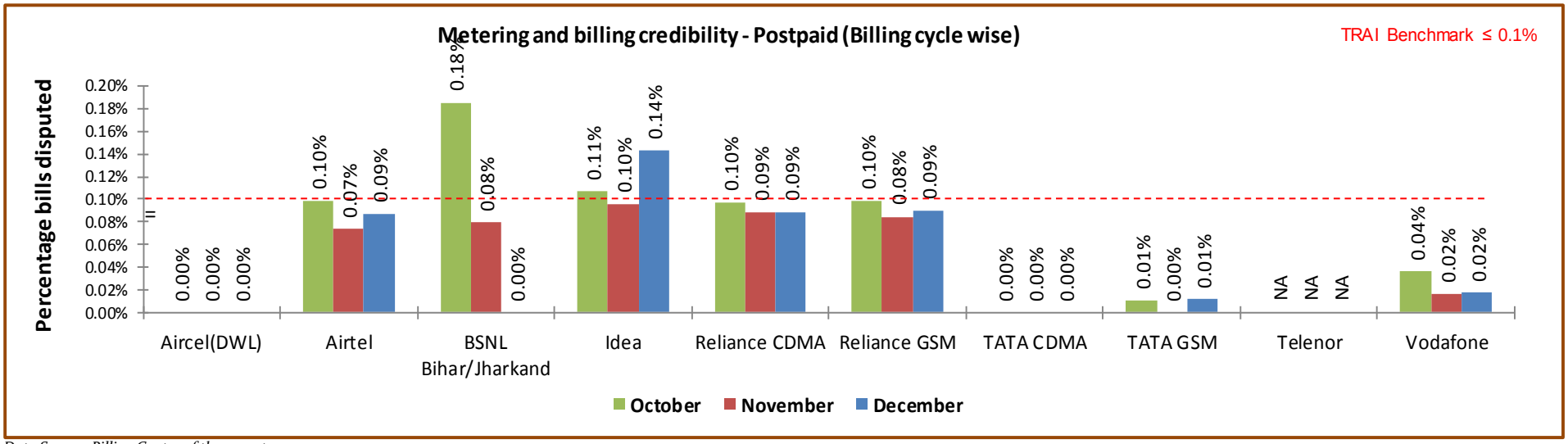
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would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



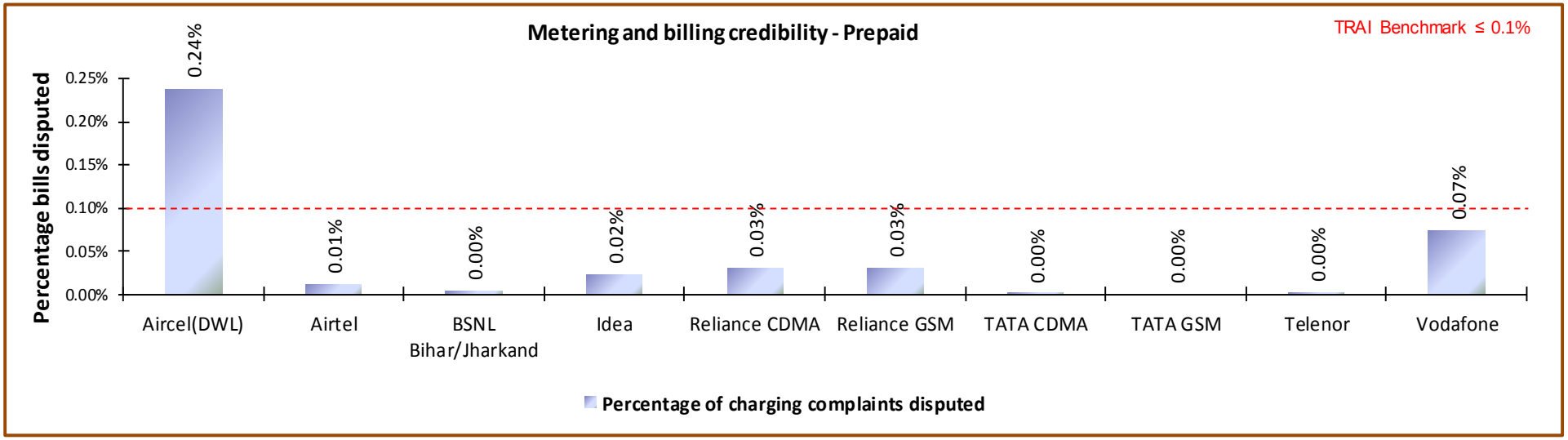
Data Source: Billing Center of the operators

Idea failed to meet the benchmark of 0.1% post-paid 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

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

8.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

8.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

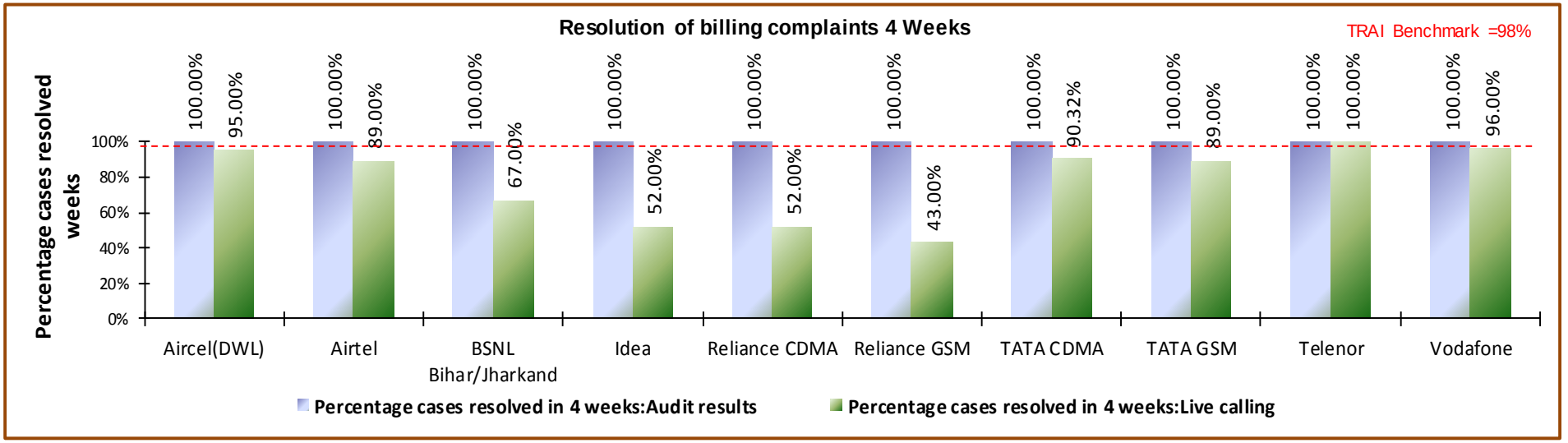
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

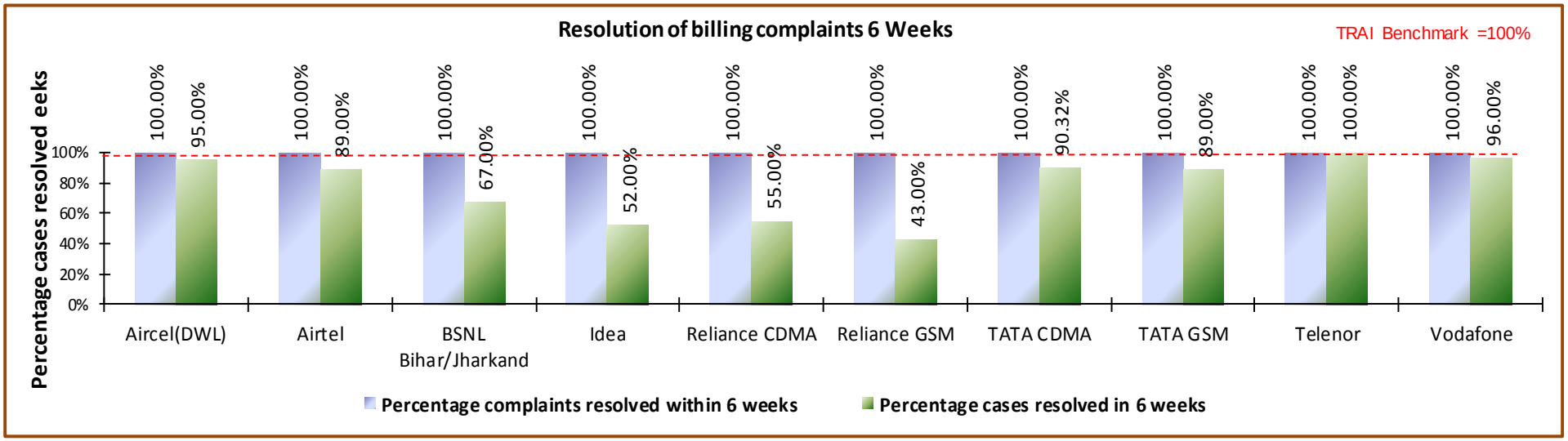
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

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

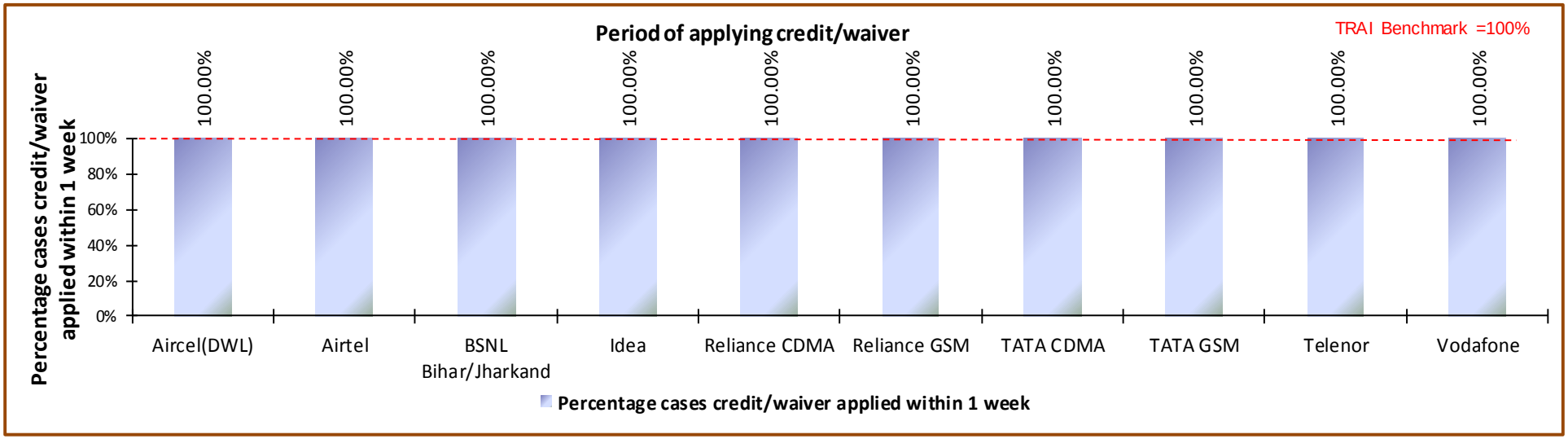
All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

8.3 PERIOD OF APPLYING CREDIT/WAVIER

8.3.1 PARAMETER DESCRIPTION

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

8.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

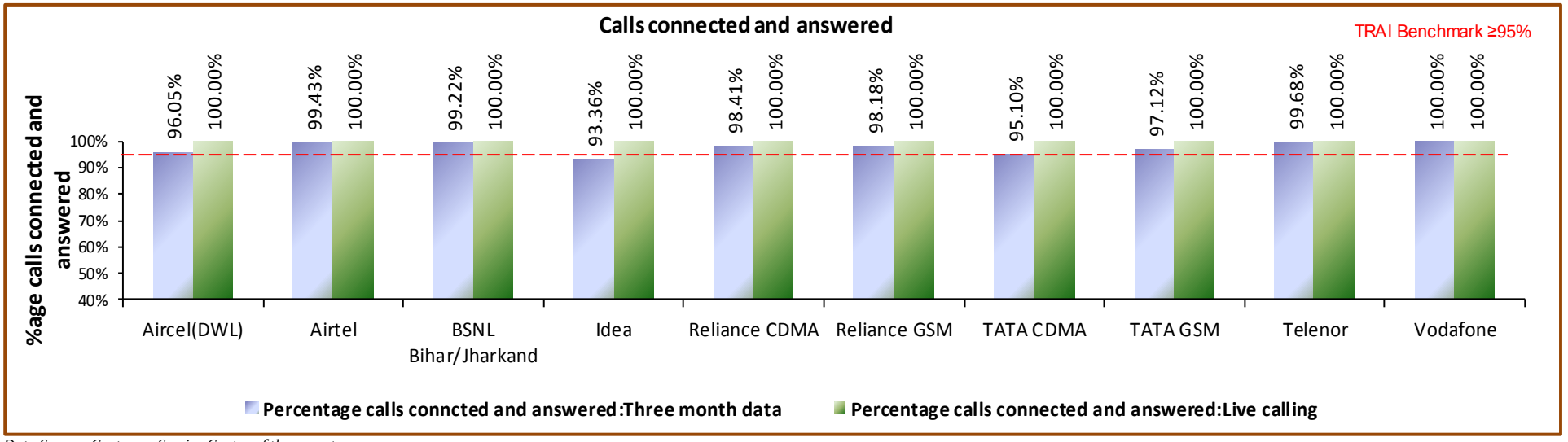
All operators met the benchmark for this parameter.

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 except Idea.

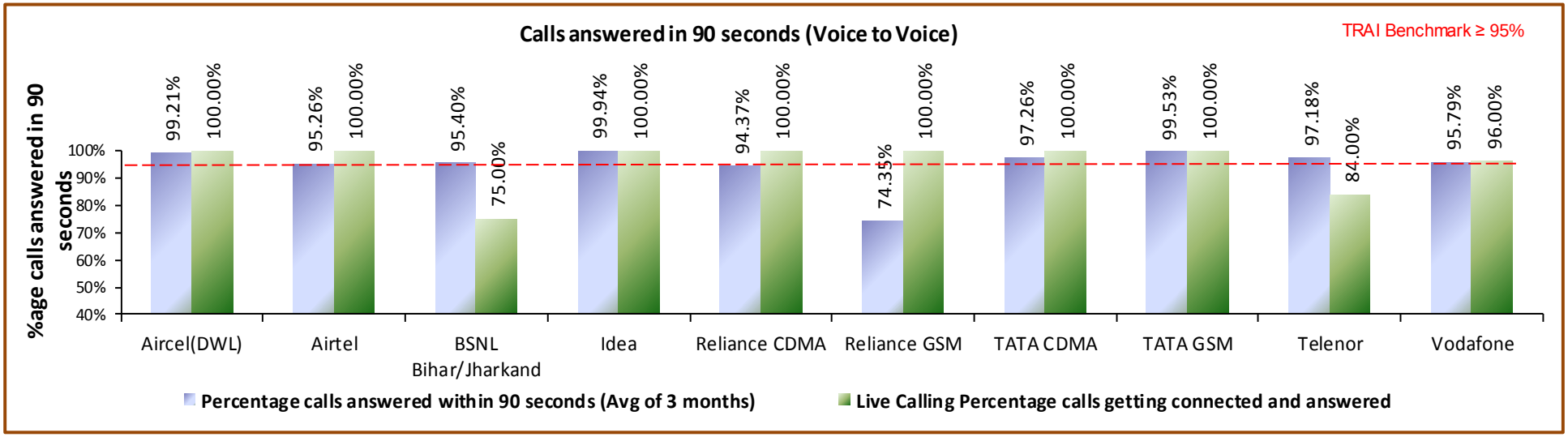
8.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

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

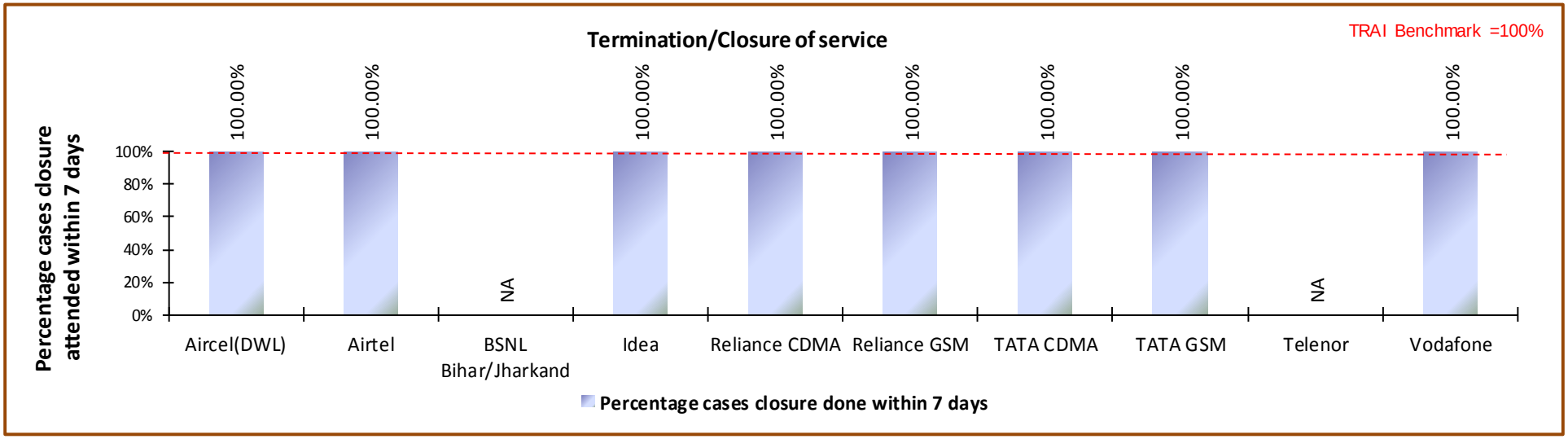
Reliance GSM & CDMA were not able to meet the benchmark as per audit. However, as per live calling done to customers, the performance of Telenor and BSNL were far inferior to the PMR data.

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

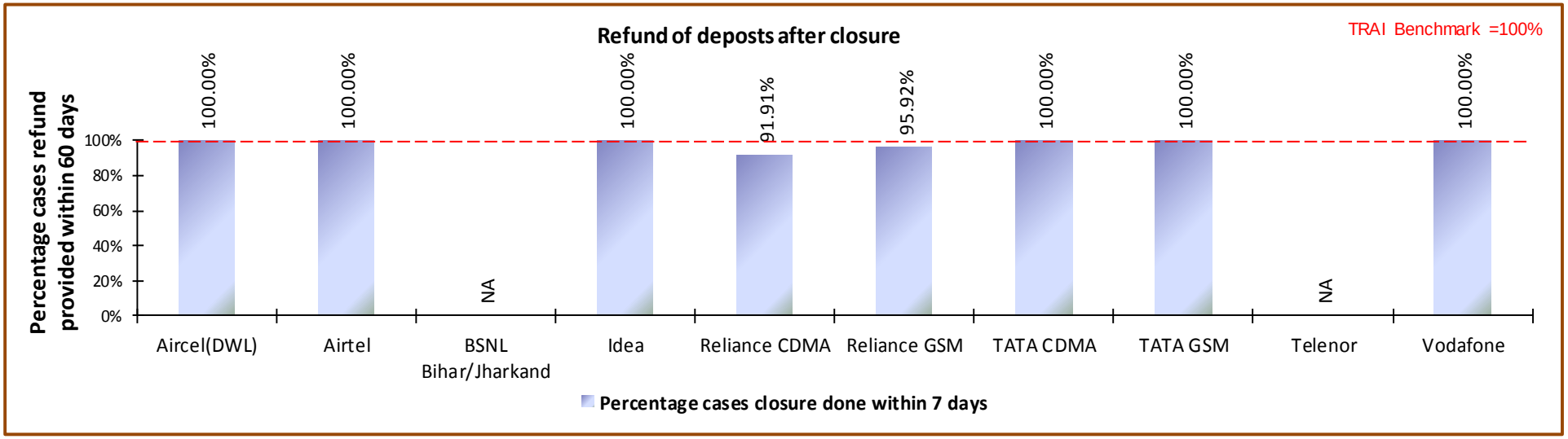
All operators met the TRAI benchmark for the parameter.

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 except Reliance GSM & CDMA.

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 Kolkata 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 Bihar circle are given below.

Name of Operator	Name of Operator
Aircel(DWL)	Aircel(DWL)
Airtel	Airtel
BSNL Bihar/Jharkand	BSNL Bihar/Jharkand
Idea	Reliance CDMA
Reliance CDMA	
Reliance GSM	
TATA CDMA	
TATA GSM	
Telenor	
Vodafone	

9.1.1 MUNGER SSA

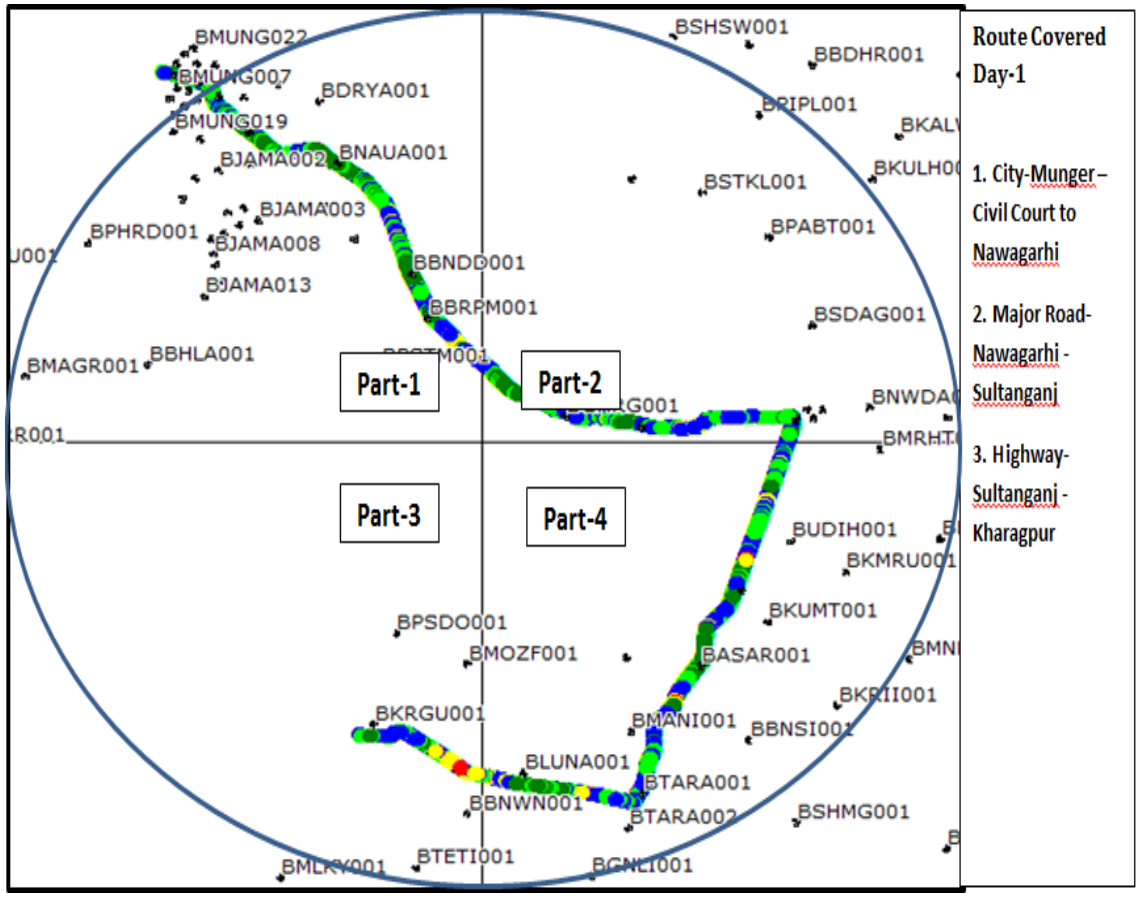
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Munger	22/12/15	24/12/15	340

9.1.1.1 Route Details - MUNGER SSA

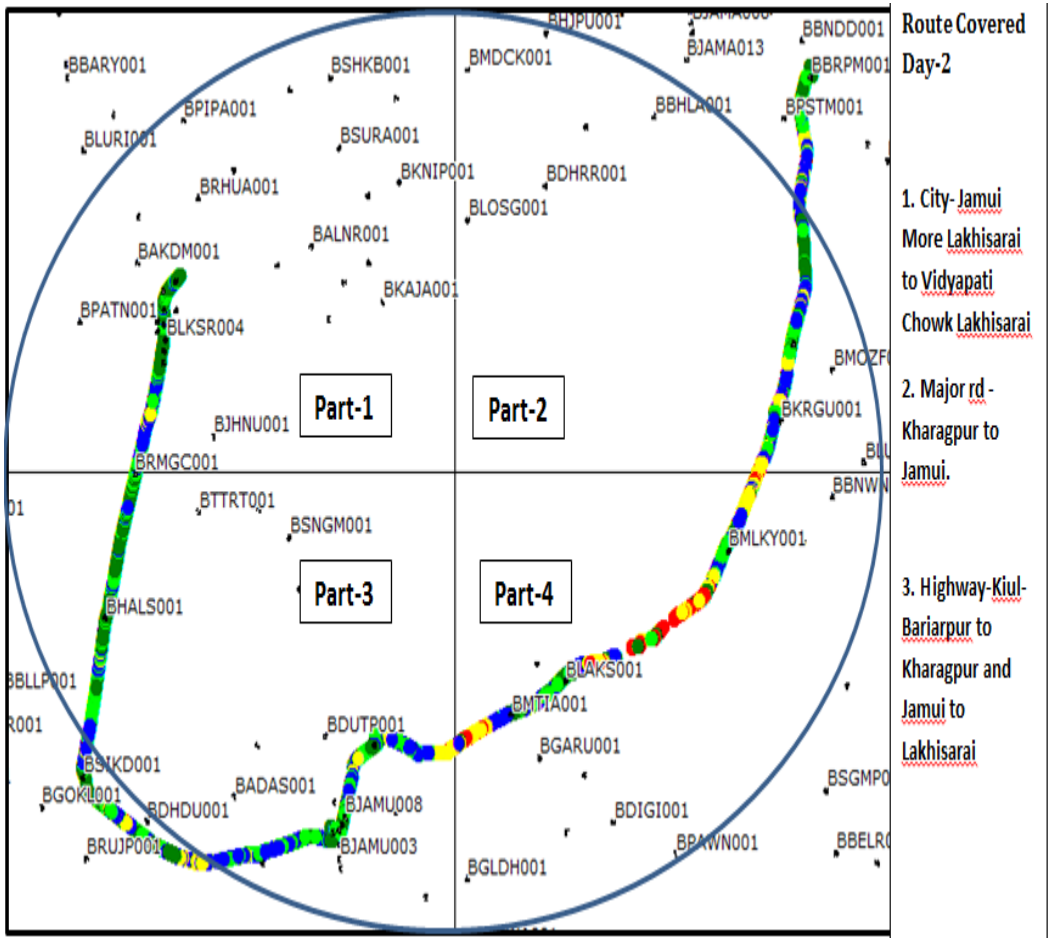
Category	Type of location	December		
		Munger		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Munger-Purab sarai-shastrinagar-DJ college Road-navagarhi-Bariyarpur-sultanganj-rahamtpur-tarapur-kharagpur	Munger-Bariyarpur-kharagpur-malaypur-jamui-sikandra-kiul-jamui more-vidyapith chawk	Munger-ITC gate-gumti no 2-Quila gate-Lalu pokhar-V-Mart-Chooha bag-Pharda-Kiranpur-Surajgarha-Lakhisarai-Mankhantha-barhaiya-Marachi
	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.

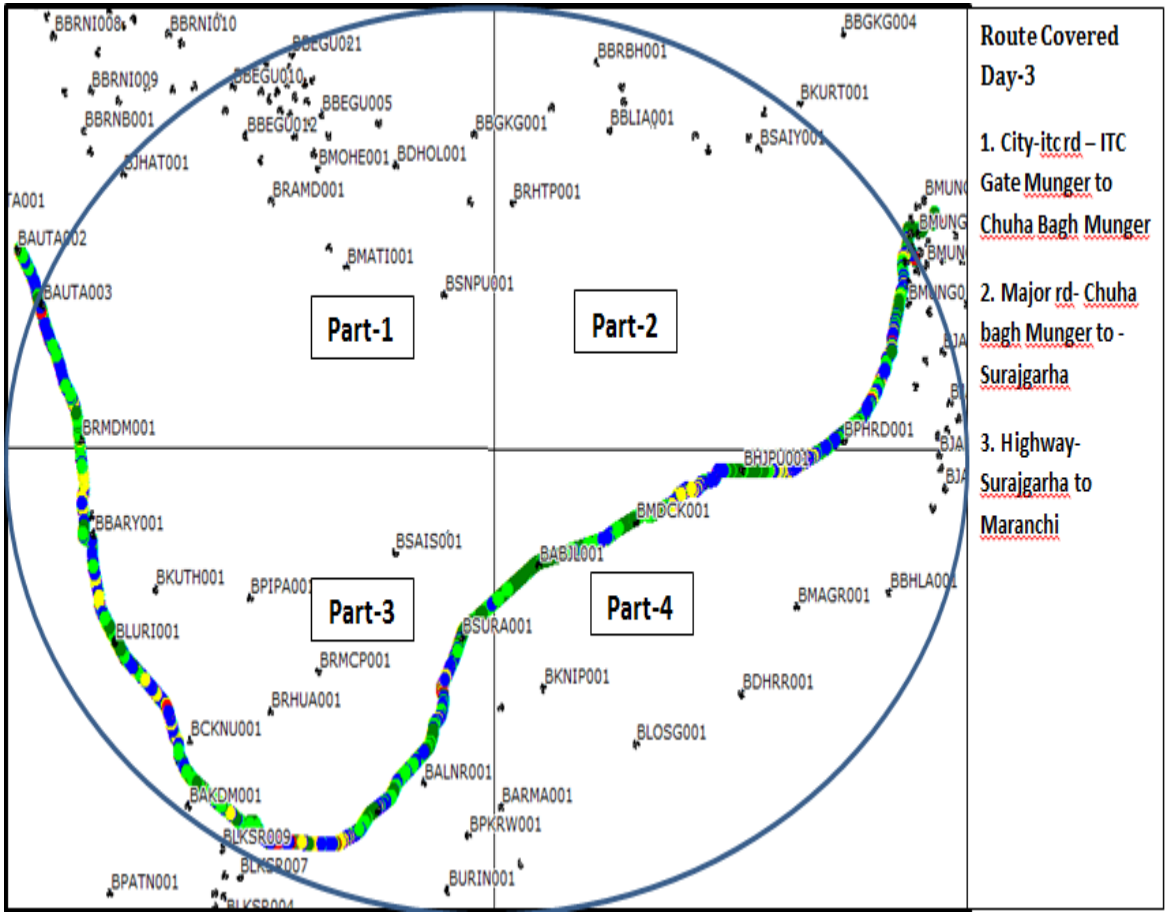
9.1.1.2 Route Map - MUNGER DAY 1



9.1.1.3 Route Map - MUNGER DAY 2



9.1.1.4 Route Map - MUNGER DAY 3



9.1.1.5 Drive Test Results - MUNGER SSA-2G

November																					
	B'mark	Aircel(DWL)		Airtel		BSNL Bihar/Jharkand		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		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		98.68%	55.46%	88.81%	74.19%	34.94%	31.52%	73.91%	63.78%	99.34%	33.48%	NDR		2.61%	28.37%	23.62%	21.28%	33.33%	17.50%	NDR	
0 to -85 dBm		99.98%	79.80%	100.00%	90.74%	93.36%	71.02%	99.36%	90.55%	100.00%	60.60%			37.39%	40.21%	90.27%	54.65%	66.67%	69.95%		
0 to -95 dBm		100.00%	95.19%	100.09%	92.03%	100.00%	94.40%	99.98%	98.70%	100.00%	99.46%			72.86%	60.36%	99.92%	80.04%	100.00%	100.00%		
Voice quality	≥ 95%	98.18%	93.74%	98.78%	95.82%	88.54%	78.69%	99.48%	96.89%	99.54%	85.70%			85.79%	77.38%	88.28%	84.24%	99.74%	93.05%		
CSSR	≥ 95%	100.00%	96.55%	100.00%	100.00%	100.00%	93.03%	100.00%	100.00%	100.00%	96.62%			100.00%	94.18%	100.00%	76.94%	100.00%	100.00%		
%age Blocked calls		0.00%	3.45%	0.00%	0.00%	0.00%	3.94%	0.00%	0.00%	0.00%	3.38%			0.00%	8.74%	0.00%	22.64%	0.00%	0.00%		
Call drop rate	≤ 2%	0.00%	4.29%	0.00%	0.00%	0.00%	2.28%	0.00%	0.00%	1.52%	13.50%			0.00%	3.36%	0.00%	6.16%	0.00%	1.45%		
Hands off success rate		100.00%	96.49%	100.00%	100.00%	100.00%	89.47%	100.00%	99.74%	100.00%	100.00%			100.00%	96.71%	100.00%	96.71%	100.00%	99.26%		

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, Reliance CDMA, Telenor did not meet the TRAI benchmark in outdoor locations whereas BSNL, TATA CDMA and TATA GSM did not meet the TRAI benchmark on both the locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

Aircel, BSNL, Reliance CDMA, TATA CDMA, TATA GSM failed to meet the benchmark for call drop rate in outdoor locations.

9.1.1.6 DRIVE TEST RESULTS - MUNGER SSA-3G

November							
	B'mark	Aircel(DWL)		BSNL Bihar/Jharkand		Reliance WCDMA	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA	75.63%	7.01%	14.96%	NDR	
0 to -85 dBm		NA	79.10%	62.75%	23.31%		
0 to -95 dBm		NA	83.02%	92.64%	66.89%		
Voice quality	≥ 95%	NA	82.70%	NDR	NDR		
CSSR	≥ 95%	NA	100.00%	100.00%	96.27%		
%age Blocked calls		NA	15.38%	0.00%	3.73%		
Call drop rate	≤ 2%	NA	4.08%	0.00%	5.81%		
Hands off success rate		NA	100.00%	100.00%	100.00%		

Voice Quality

Aircel failed to meet the benchmark in outdoor locations

Call Set Success Rate (CSSR)

All the operators met the TRAI benchmark.

Call Drop Rate

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

9.1.1.1 Drive Test Results - MUNGER SSA-DATA- 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%			100%					100%	100%
Succesful Data Transmission upload speed attempts	>75%	100%			100%					100%	100%
Minimum download speed		88	NDR	NDR	121	NDR	NDR	NDR	NDR	48	NDR
Average throughput for Packet Data		94			130					105	124
Latency	<250ms	NDR			100					NDR	NDR

All the parameters met the TRAI benchmark.

9.1.1.1 Drive Test Results - MUNGER SSA-DATA- 3G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Reliance WCDMA
Succesful Data Transmission download speed attempts	>80%	100%		100%	
Succesful Data Transmission upload speed attempts	>75%	100%		100%	
Minimum download speed		973	NDR	184	NDR
Average throughput for Packet Data		973		184	
Latency	<250ms	NDR		NDR	

All the parameters met the TRAI benchmark.

9.1.2 MUZAFFARPUR SSA

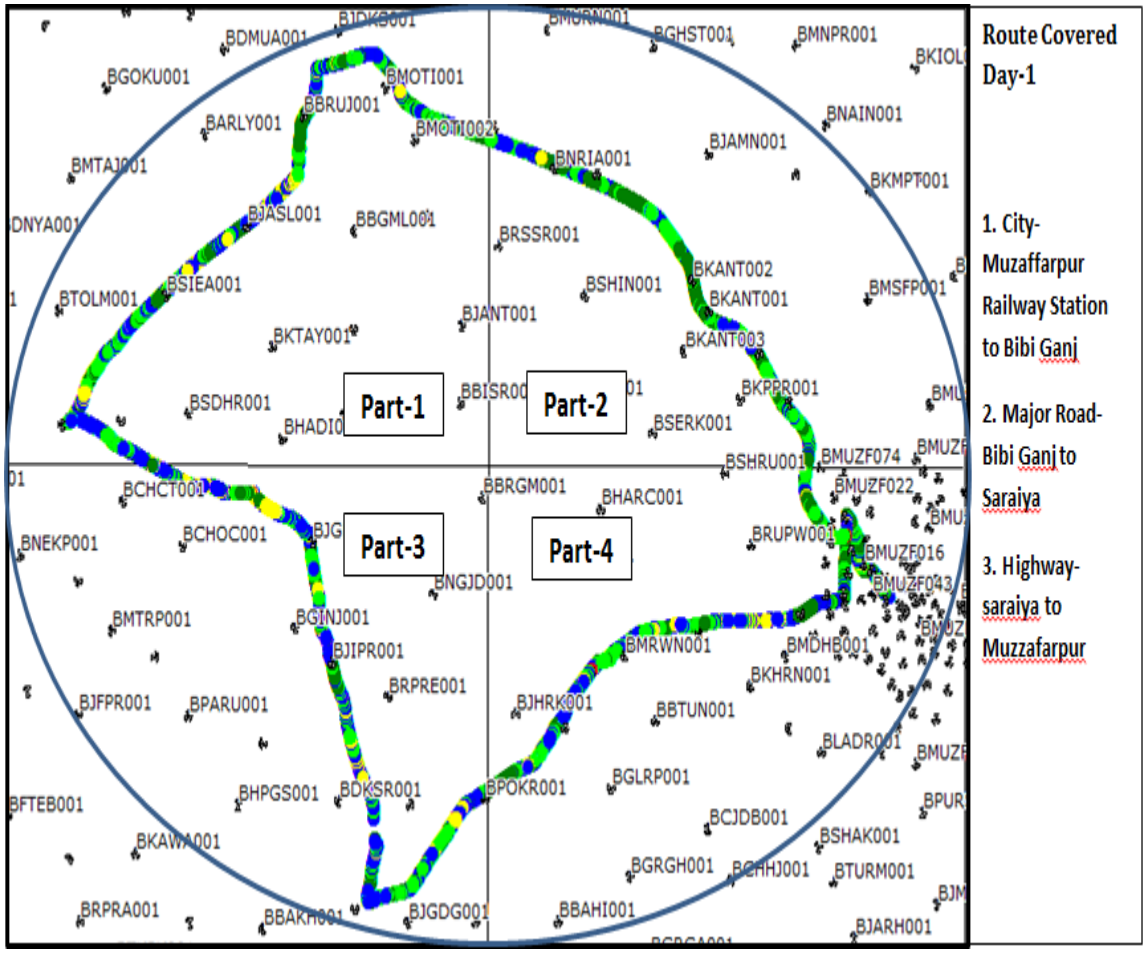
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Muzaffarpur	29/12/15	31/12/15	327

9.1.2.1 Route Details - MUZAFFARPUR SSA

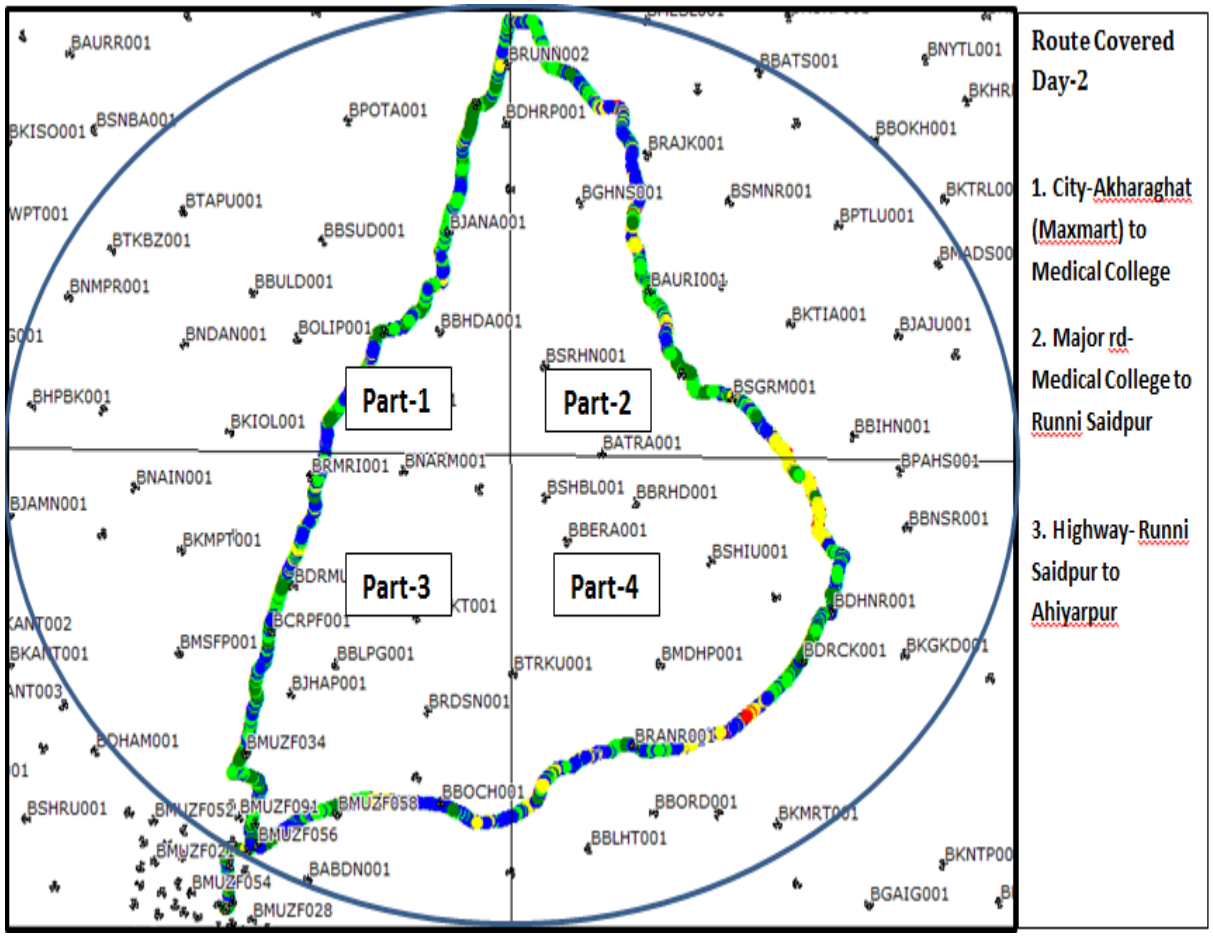
Category	Type of location	December		
		Muzaffarpur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Railway station-imalichatti bus stand-bhrampura-baria-bibigunj-marban-saria-dharfari road-motipur-kanti-muzaffarpur	Max Mart-balughat-zero mile-medical college-runni saidpur-morsand-aurai-katra-aipur-muzaffarpur	Railway station-moti jheel-kalambag-agoria bazar-kachi pakki-sakra-maricha-garaul- ramdayalu-kachi pakki-chainpur bangra-markhan-sakra
	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.

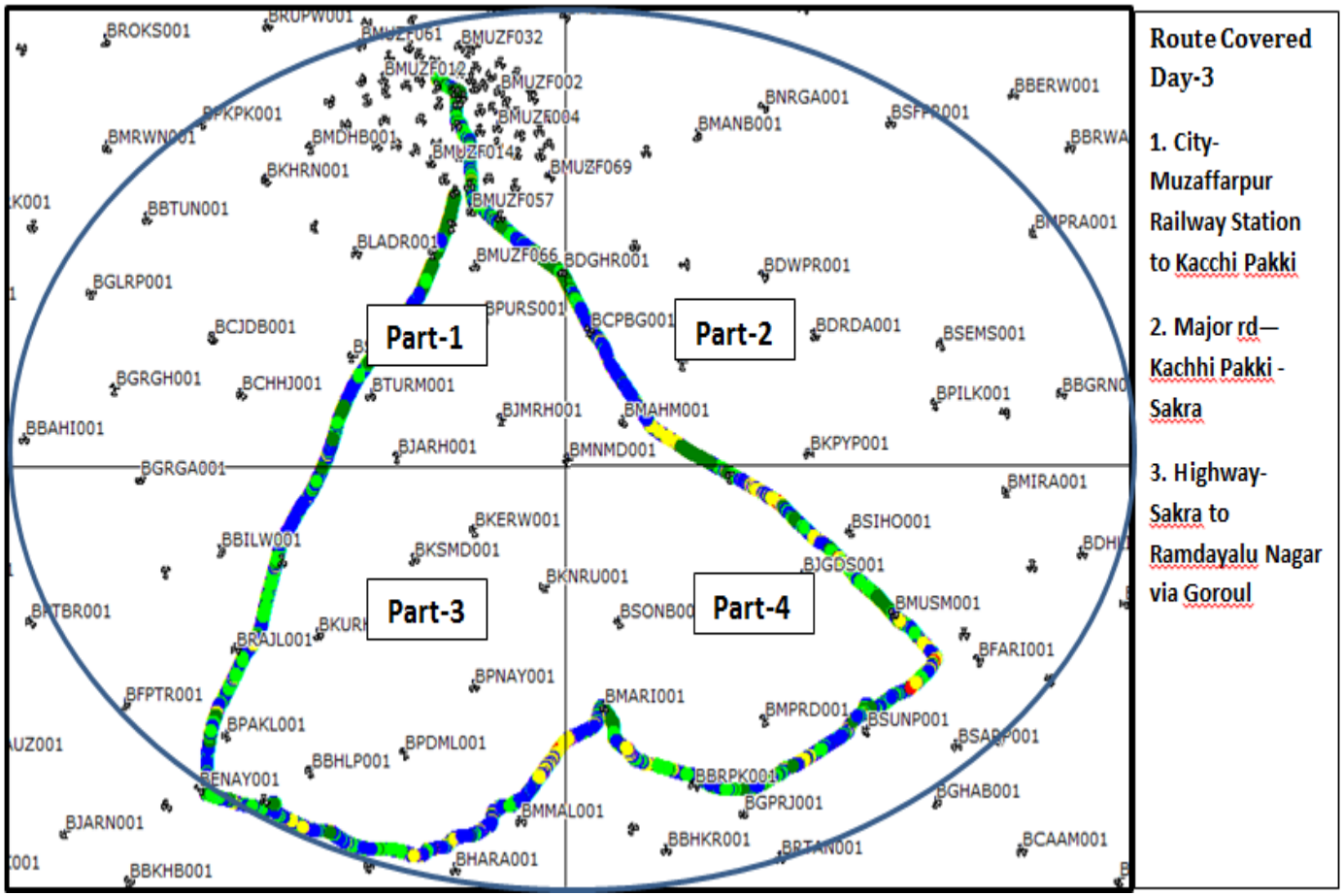
9.1.2.2 Route Map - MUZAFFARPUR DAY 1



9.1.2.3 Route Map - MUZAFFARPUR DAY 2



9.1.2.4 Route Map - MUZAFFARPUR DAY 3



Route Covered Day-3

1. City- Muzaffarpur Railway Station to Kacchi Pakki
2. Major rd— Kachhi Pakki - Sakra
3. Highway- Sakra to Ramdayalu Nagar via Goroul

9.1.2.5 Drive Test Results - MUZAFFARPUR SSA-2G

December																				
	B'mark	Aircel(DWL)		Airtel		BSNL Bihar/Jharkand		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		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		88.61%	63.86%	98.67%	77.67%	88.61%	63.86%	94.26%	63.84%	97.60%	35.00%	NDR		59.39%	14.20%	66.01%	27.14%	33.24%	22.68%	32.28%	23.76%
0 to -85 dBm		99.92%	77.42%	99.94%	98.13%	99.92%	77.42%	99.65%	93.33%	99.27%	66.39%			66.23%	35.58%	89.58%	63.39%	66.62%	57.31%	66.14%	59.06%
0 to -95 dBm		100.00%	89.32%	99.99%	99.83%	100.00%	89.32%	100.00%	99.64%	100.00%	99.83%			66.41%	58.97%	99.85%	85.92%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	98.53%	95.19%	97.98%	95.88%	98.53%	95.19%	96.48%	95.64%	99.98%	91.45%			92.78%	82.22%	89.82%	88.45%	98.71%	94.43%	97.60%	95.87%
CSSR	≥ 95%	100.00%	80.75%	100.00%	100.00%	100.00%	80.75%	100.00%	100.00%	100.00%	95.53%			100.00%	90.96%	100.00%	80.94%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	14.97%	0.00%	0.00%	0.00%	14.97%	0.00%	0.00%	0.00%	4.47%			0.00%	6.84%	0.00%	22.11%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	7.95%	0.00%	0.00%	0.00%	7.95%	0.00%	0.00%	0.00%	6.47%			0.00%	2.86%	0.00%	3.60%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	98.06%	100.00%	100.00%	100.00%	98.06%	100.00%	99.82%	100.00%	100.00%			100.00%	94.84%	100.00%	97.13%	100.00%	95.85%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance CDMA, TATA CDMA, TATA GSM, Telenor failed to meet the benchmark in outdoor locations. TATA CDMA, TATA GSM did not meet the benchmark in Indoor locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

Aircel, BSNL, Reliance CDMA, TATA CDMA, TATA GSM failed to meet the benchmark for call drop rate in outdoor locations.

9.1.2.6 DRIVE TEST RESULTS - MUZAFFARPUR SSA-3G

October							
	B'mark	Aircel(DWL)		BSNL Bihar/Jharkand		Reliance WCDMA	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.48%	67.48%	NDR		1.00%	10.13%
0 to -85 dBm		99.99%	83.20%			58.05%	24.02%
0 to -95 dBm		100.00%	92.70%			89.92%	40.36%
Voice quality	≥ 95%	99.79%	94.39%			NDR	NDR
CSSR	≥ 95%	100.00%	100.00%			95.16%	57.75%
%age Blocked calls		1.47%	60.82%			1.61%	36.99%
Call drop rate	≤ 2%	0.00%	2.30%			0.00%	6.52%
Hands off success rate		100.00%	100.00%			100.00%	100.00%

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

Aircel, Reliance WCDMA failed to meet the benchmark in outdoor as well as indoor locations.

9.1.2.7 Drive Test Results - MUZAFFARPUR SSA-DATA- 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	NDR	NDR	100%	100%	NDR	NDR	NDR	100%	100%
Succesful Data Transmission upload speed attempts	>75%	100%			100%	100%				100%	100%
Minimum download speed		128			116	NDR				48	NDR
Average throughput for Packet Data		126			125	NDR				114	94
Latency	<250ms	NDR			100	NDR				NDR	NDR

All the parameters met the TRAI benchmark.

9.1.2.8 Drive Test Results - MUZAFFARPUR SSA-DATA- 3G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Reliance W CDMA
Succesful Data Transmission download speed attempts	>80%	100%	NDR	NDR	NDR
Succesful Data Transmission upload speed attempts	>75%	100%			
Minimum download speed		689			
Average throughput for Packet Data		1194			
Latency	<250ms	NDR			

All the parameters met the TRAI benchmark.

10 ANNEXURE – CONSOLIDATED-2G

10.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data											
	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		8667	9560	9401	23084	4548	9421	1176	2883	10064	26524
Sum of downtime of BTSs in a month (in hours)		134868	4092	185948	96715	4576	3907	36912	4193	15513	5418019
BTSs accumulated downtime (not available for service)	≤ 2%	2.09%	0.06%	2.66%	0.56%	0.14%	0.06%	4.22%	0.20%	0.21%	27.46%
Number of BTSs having accumulated downtime >24 hours		957	16	1185	405	28	9	0	9	36	513
Worst affected BTSs due to downtime	≤ 2%	11.04%	0.17%	12.61%	1.75%	0.62%	0.10%	0.00%	0.31%	0.36%	1.93%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		8667	9560	9401	23043	NDR	NDR	784	2869	9777	26524
Sum of downtime of BTSs in a month (in hours)		12804	327	32100	10535	NDR	NDR	150	454	1722	489199
BTSs accumulated downtime (not available for service)	≤ 2%	2.05%	0.05%	4.74%	0.63%	NDR	NDR	0.26%	0.22%	0.24%	25.62%
Number of BTSs having accumulated downtime >24 hours		0	0	164	11	NDR	NDR	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.74%	0.05%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	87.72%	95.64%	89.69%	95.87%	97.02%	98.41%	97.89%	98.33%	92.77%	99.15%
SDCCH/Paging channel congestion	≤ 1%	0.92%	0.79%	2.97%	0.92%	NA	0.20%	NA	0.19%	2.10%	0.52%
TCH congestion	≤ 2%	12.54%	1.18%	7.27%	1.90%	0.81%	0.50%	0.41%	0.34%	5.79%	0.85%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	88.31%	95.65%	89.93%	96.50%	NDR	NDR	96.62%	98.78%	94.83%	99.52%
SDCCH/Paging channel congestion	≤ 1%	0.92%	0.79%	3.25%	0.94%	NA	NDR	NA	0.08%	0.84%	0.52%
TCH congestion	≤ 2%	10.88%	1.15%	6.85%	1.88%	NDR	NDR	0.20%	0.12%	3.94%	0.48%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		227	648	319	398	314	NDR	366	344	345	436
Total number of successful calls established		207	648	289	398	304	NDR	347	270	345	436
CSSR	≥ 95%	90.97%	100.00%	90.74%	100.00%	96.81%	NDR	94.80%	78.46%	100.00%	100.00%
%age blocked calls		9.03%	0.00%	9.26%	0.00%	3.19%	NDR	5.20%	21.54%	0.00%	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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		398534793	783932829	66963544	972661776	249284320	275623193	50265389	76099280	615647242	793469250
Total number of calls dropped		6794518	12555304	10021869	10419757	371289	768312	180251	375664	3213653	6792871
Call drop rate	≤ 2%	1.70%	1.60%	14.97%	1.07%	0.15%	0.28%	0.36%	0.49%	0.52%	0.86%
Total number of cells in the network		25726	28745	28178	69673	13156	29229	2624	5722	30160	79730
Total number of cells having more than 3% TCH		3095	634	1980	1876	38	193	44	141	374	2268
Worst affected cells having more than 3% TCH	≤ 3%	12.03%	2.21%	7.03%	2.69%	0.29%	0.66%	1.67%	2.46%	1.24%	2.84%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		38241420	1675404321	9311474	91177319	NDR	NDR	25807319	38398314	59641701	419422151
Total number of calls dropped		643472	26669588	6370717	991223	NDR	NDR	274039	187890	286497	3368325
Call drop rate	≤ 2%	1.68%	1.59%	68.42%	1.09%	NDR	NDR	1.06%	0.49%	0.48%	0.80%
Total number of cells in the network		25967	85732	23605	69296	NDR	NDR	3786	8583	29349	79730
Total number of cells having more than 3% TCH		3053	1912	2214	1811	NDR	NDR	156	216	318	2280
Worst affected cells having more than 3% TCH	≤ 3%	11.76%	2.23%	9.38%	2.61%	NDR	NDR	4.12%	2.51%	1.08%	2.86%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		207	648	289	368	304	NDR	347	270	345	436
Total number of calls dropped		9	0	10	0	23	NDR	8	9	2	0
Call drop rate	≤ 2%	4.36%	0.00%	3.29%	0.00%	7.58%	NDR	2.31%	3.15%	0.44%	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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		67953900554	174216484175	1260	178802739229	NA	16462263745	1582241855001	9138991509	106373732073	144172614532
Total number of calls with good voice quality		64735296331	166787678278	1215	171675975297	NA	16286397864	1554610209550	8913601356	100710987889	140652788536
%age calls with good voice quality	≥ 95%	95.26%	95.74%	96.43%	96.01%	98.71%	98.93%	98.25%	97.53%	94.68%	97.56%
Live measurement results for Voice quality-3 Day data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		6503911862	16046802163	540	17455747342	NDR	NDR	157543680162	6288563593	10882336990	48823052985
Total number of calls with good voice quality		6201077576	15356044849	519	16788012623	NDR	NDR	154791457608	6142779699	10306894470	47823649368
%age calls with good voice quality	≥ 95%	95.34%	95.70%	96.11%	96.17%	NDR	NDR	98.25%	97.68%	94.71%	97.95%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		721551	1234537	436438	676258	NA	NDR	29729	515295	34397	1315265
Total number of calls with good voice quality		686016	1186192	415153	650959	NA	NDR	24256	449402	32727	1263937
%age calls with good voice quality	≥ 95%	95.08%	96.08%	95.12%	96.26%	92.62%	NDR	81.59%	87.21%	95.14%	96.10%

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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		144	841	54	249	357	456	459	60	196	174
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		388902	719424	146854	859529	194181	246738	5299562	512690	151380	2093704
Traffic served for all POIs (B)- in erlangs		223567	400501	29830	524280	115063	49239	574998	72329	103109	919875
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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		144	841	54	249	NDR	NDR	459	60	195	174
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		390128	2159405	146854	859529	NDR	NDR	220632	31492	225810	2113437
Traffic served for all POIs (B)- in erlangs		104302	1297120	14211	540686	NDR	NDR	24179	3930	157640	436463
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	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(DWL)	Airtel	NL Bihar/Jharka	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Eqipped capacity of the network	165971.73	NDR	237000	231366.0751	NDR	NDR	73177	49825	188675.2949	252197.6805
Total taffic handled in erlang during TCBH	137732.5676	NDR	100597	278365.9898	NDR	NDR	11133	18972.9275	203400.0389	231220.8387
Total no. of customers served (as per VLR)	5146028	NDR	1422885	10899788	NDR	NDR	167926.89	951364	5873824	10312878

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(DWL)	Airtel	BSNL Bihar/Jharkand
(Number of Node Bs in the network in the licensed service area		1948	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		31118	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	2.15%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		225	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	11.55%	NDR	NDR
Live Measurement Results for Network Availability- 3 Day live data				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
(Number of Node Bs in the network in the licensed service area		1948	NDR	850
Sum of downtime (i.e. total outage time) of Node Bs		3530	NDR	555
Node Bs downtime (not available for service)	≤ 2%	2.52%	NDR	0.91%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	NDR	16
Worst affected Node Bs due to downtime	≤ 2%	0.00%	NDR	1.88%

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(DWL)	Airtel	BSNL Bihar/Jharkand
CSSR	≥ 95%	93.35%	NDR	NDR
RRC Congestion	≤ 1%	0.97%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	0.26%	NDR	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
CSSR	≥ 95%	94.40%	NDR	91.08%
RRC Congestion	≤ 1%	0.85%	NDR	3.45%
Circuit Switched RAB Congestion	≤ 2%	0.38%	NDR	0.83%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data				
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of RRC attempts (A)		102	0	221
Total number of RRC established (B)		102	0	215
Call setup success rate (B/A*100)	≥ 95%	100.00%	NA	97.29%
%age blocked calls		0.00%	NA	2.71%

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 Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		12024541	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		141026	NDR	NDR
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.17%	NDR	NDR
Total no. of cells in the licensed service area (B)		5463	NDR	NDR
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		641	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.74%	NDR	NDR

Live measurement results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		1323732	NDR	144138
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		15170	NDR	2602
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.15%	NDR	1.81%
Total no. of cells in the licensed service area (B)		5800	NDR	2550
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		686	NDR	267
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.83%	NDR	10.48%
Drive test results for Circuit switched voice drop rate (Average of three drive tests) - Drive Test Data				
Circuit switched voice drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		99	0	215
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		2	0	9
Circuit switched voice drop rate (B/A*100)	≤ 2%	2.02%	NA	4.19%

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(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1608874482087	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1593910734508	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.07%	NDR	NDR
Live measurement results for Voice quality-3 Day data				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		185704981401	NDR	300
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		183911458958	NDR	285
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	NDR	95.00%
Drive test results for Voice quality (Average of three drive tests) - DT data				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		718592	0	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		653650	0	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	90.96%	NA	NDR

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(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		144	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		388902	NDR	NDR
Traffic served for all POIs (B)- in erlangs		223567	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total number of working POIs		144	NDR	21
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		390128	NDR	15538
Traffic served for all POIs (B)- in erlangs		104302	NDR	0
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang			
Traffic in Erlang	Aircel(DWL)	Airtel	SNL Bihar/Jharkar
Eqipped capacity of the network	NDR	NDR	NDR
Total taffic handled in erlang during TCBH	2671	NDR	NDR
Total no. of customers served (as per VLR)	202148	NDR	NDR

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

12 ANNEXURE – CUSTOMER SERVICES

12.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		3970	283576	71257	56336	193217	190721	32960	26441	0	244817
Total number of bills disputed		0	246	64	65	177	174	0	2	0	58
Total number of valid billing complaints		0	23	43	10	177	174	0	2	0	33
Total complaints considered invalid		0	223	21	55	0	0	0	0	0	25
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.09%	0.09%	0.12%	0.09%	0.09%	0.00%	0.01%	NA	0.02%
October											
Total bills generated during the first billing cycle		1373	93892	24884	18749	66608	59545	11129	8987	0	82393
Total number of bills disputed in first billing cycle		0	93	46	20	65	59	0	1	0	30
Total number of valid billing complaints (billing cycle 1)		0	6	29	4	65	59	0	1	0	20
Total complaints considered invalid (billing cycle 1)		0	87	17	16	0	0	0	0	0	10
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.10%	0.18%	0.11%	0.10%	0.10%	0.00%	0.01%	NA	0.04%

Data Source: Billing Center of the operators

November											
Total bills generated during the second billing cycle		1262	93658	22620	18707	64490	63677	11129	8840	0	82991
Total number of bills disputed in second billing cycle		0	69	18	18	57	54	0	0	0	14
Total number of valid billing complaints (billing cycle 2)		0	7	14	4	57	54	0	0	0	8
Total complaints considered invalid (billing cycle 2)		0	62	4	14	0	0	0	0	0	6
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.07%	0.08%	0.10%	0.09%	0.08%	0.00%	0.00%	NA	0.02%
December											
Total bills generated during the third billing cycle		1335	96026	23753	18880	62119	67499	10702	8614	0	79433
Total number of bills disputed in third billing cycle		0	84	0	27	55	61	0	1	0	14
Total number of valid billing complaints (billing cycle 3)		0	10	0	2	55	61	0	1	0	5
Total complaints considered invalid (billing cycle 3)		0	74	0	25	0	0	0	0	0	9
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.09%	0.00%	0.14%	0.09%	0.09%	0.00%	0.01%	NA	0.02%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of charging complaints (valid) - sum of 3 months		1	637	132	1481	2065	4524	4	0	428	6825
Total complaints considered invalid (sum of 3 months)		48670	8075	64	5659	0	0	0	0	0	13468
Total number of charging complaints (sum of 3 months)		48671	8712	196	7140	2065	4524	4	0	428	20293
Total no of customers served (Sum of 3 months)		20476171	79314966	5461485	31477876	6903054	15068583	5087570	1220158	23969454	27532161
Percentage of charging complaints disputed	≤ 0.1%	0.24%	0.01%	0.00%	0.02%	0.03%	0.03%	0.00%	0.00%	0.00%	0.07%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of billing/charging complaints		48672	8958	196	7205	2242	4698	4	2	428	20351
Total number of complaints resolved in favour of customer		48671	660	132	1491	2242	4698	4	2	428	6858
Total complaints considered invalid		1	8298	64	5714	0	0	0	0	0	13493
Number of complaints resolved in 4 weeks		48670	660	132	1491	2242	4698	4	2	428	6858
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		1	0	0	1491	2242	4698	4	2	428	6858
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		1	660	0	1491	2242	4698	4	2	0	6858
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%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made		100	100	100	100	100	100	62	100	100	100
Number of cases resolved in 4 weeks		95	89	67	52	52	43	56	89	100	96
Percentage cases resolved in 4 weeks	≥ 98%	95.00%	89.00%	67.00%	52.00%	52.00%	43.00%	90.32%	89.00%	100.00%	96.00%
Number of cases resolved in 6 weeks		95	89	67	52	55	43	56	89	100	96
Percentage cases resolved in 6 weeks	100.00%	95.00%	89.00%	67.00%	52.00%	55.00%	43.00%	90.32%	89.00%	100.00%	96.00%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of billing/charging complaints		48672	8958	196	7205	2242	4698	4	2	428	20351
Total number of complaints resolved in favour of customer		48671	660	132	1491	2242	4698	4	2	428	6858
Total complaints considered invalid		1	8298	64	5714	0	0	0	0	0	13493
Number of complaints resolved in 4 weeks		48670	660	132	1491	2242	4698	4	2	428	6858
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		1	0	0	1491	2242	4698	4	2	428	6858
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		1	660	0	1491	2242	4698	4	2	0	6858
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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made		100	100	100	100	100	100	62	100	100	100
Number of cases resolved in 4 weeks		95	89	67	52	52	43	56	89	100	96
Percentage cases resolved in 4 weeks	≥ 98%	95.00%	89.00%	67.00%	52.00%	52.00%	43.00%	90.32%	89.00%	100.00%	96.00%
Number of cases resolved in 6 weeks		95	89	67	52	55	43	56	89	100	96
Percentage cases resolved in 6 weeks	100.00%	95.00%	89.00%	67.00%	52.00%	55.00%	43.00%	90.32%	89.00%	100.00%	96.00%

Data Source: Live calling made to customers

12.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		27424167	9019999	50559	51868252	5263997	12389357	302909	47051	25117076	22296058
Number of calls getting connected and answered (electronically)		26340764	8968750	50166	48422943	5180252	12164202	288071	45698	25037743	22296058
Percentage calls getting connected and answered	≥ 95%	96.05%	99.43%	99.22%	93.36%	98.41%	98.18%	95.10%	97.12%	99.68%	100.00%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received (3 months)		4515335	12442222	40509	11961096	1172848	2593553	367479	45305	7630805	35588802
Total Number of calls answered within 90 seconds (3 months)		4479484	11852660	38644	11954473	1106844	1928356	357397	45090	7415477	8635050
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	99.21%	95.26%	95.40%	99.94%	94.37%	74.35%	97.26%	99.53%	97.18%	95.79%

October											
Total calls received (Month 1)		1505388	4385918	12279	4048884	341772	998771	120316	15644	2505528	3274563
Total calls answered within 90 seconds (Month 1)		1491794	4255028	11775	4044838	296943	724310	118138	15615	2496637	3113580
% calls answered within 90 seconds (Month 1)	≥ 95%	99.10%	97.02%	95.90%	99.90%	86.88%	72.52%	98.19%	99.81%	99.65%	95.08%
November											
Total calls received (Month 2)		1403257	3984248	12933	3807373	411675	974136	117447	15120	2421675	29525219
Total calls answered within 90 seconds (Month 2)		1397049	3803659	12334	3805469	407158	769034	115587	14961	2409351	2858785
% calls answered within 90 seconds (Month 2)	≥ 95%	99.56%	95.47%	95.37%	99.95%	98.90%	78.95%	98.42%	98.95%	99.49%	96.83%
December											
Total calls received (Month 3)		1606690	4072056	15297	4104839	419401	620646	129716	14541	2703602	2789020
Total calls answered within 90 seconds (Month 3)		1590641	3793973	14535	4104166	402743	435012	123672	14514	2509489	2662685
% calls answered within 90 seconds (Month 3)	≥ 95%	99.00%	93.17%	95.02%	99.98%	96.03%	70.09%	95.34%	99.81%	92.82%	95.47%

Data Source: Customer Service Center of the operators

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		100	100	200	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	200	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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received		100	100	200	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	150	100	100	100	100	100	84	96
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	84.00%	96.00%

12.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of closure request		25	1706	0	797	307	517	587	323	0	2061
Number of requests attended within 7 days		25	1706	0	797	307	517	587	323	0	2061
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of cases requiring refund of deposits		13	122	0	201	1446	1618	143	109	0	1549
Total number of cases where refund was made within 60 days		13	122	0	201	1329	1552	143	109	0	1549
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	NA	100.00%	91.91%	95.92%	100.00%	100.00%	NA	100.00%

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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made	100	100	100	100	100	100	0	0	0	100
Number of cases resolved to satisfaction	94	93	65	67	90	85	0	0	0	100
Percentage cases resolved in four weeks	94.00%	93.00%	65.00%	67.00%	90.00%	85.00%	NA	NA	NA	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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total no. of calls made		300	300	600	300	300	300	300	300	300	300
Calls answered		292	295	491	217	286	274	292	277	276	269
% of calls connected	≥ 95%	97.33%	98.33%	81.83%	72.33%	95.33%	91.33%	97.33%	92.33%	92.00%	89.67%

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

12.7 LEVEL 1 SERVICE CALLS MADE

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	17
101	Fire	Y		17	18
102	Ambulance	Y		18	17
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	18
138	All India Helpine for Passangers	Y		17	16
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	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		18	15
1071	Air Accident Helpline	Y		17	18
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		17	18
1077	Control Room for District Collector	Y		18	17
10120	Call Alart (Crime Branch)	Y		17	16

10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	18
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	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	18
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	18
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	17
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	18

Airtel

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		13	13
101	Fire	Y		14	14
102	Ambulance	Y		13	13
104	Health Information Helpline	Y		13	12
108	Emergency and Disaster Management Helpline	Y		13	13

138	All India Helpine for Passangers	Y		13	13
1412	Public Road Transport Utility Service	Y		13	13
181	Chief Minister Helpline	Y		13	13
182	Indian Railway Security Helpline	Y		13	13
1033	Road Accident Management Service	Y		13	12
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		13	13
1073	Road Accident Helpline	Y		13	12
1077	Control Room for District Collector	Y		13	13
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		13	13
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		13	12
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		

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	Y		13	12
11203	Sashastra Seema Bal (SSB)	Y		13	13
112012	National Do Not Call Registry	Y		13	13
11212	Complaint of Electricity	Y		13	13
11216	Drinking Water Supply	Y		13	13
11250	Election Commission of India	Y		13	13
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	22
101	Fire	Y		21	20
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	20
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	20
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	20
1071	Air Accident Helpline	Y		22	20
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		21	20
10120	Call Alart (Crime Branch)	Y		21	20
10121	Women Helpline	Y		21	20
10127	National AIDS Helpline to NACO	Y		22	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		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	20
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	20
11212	Complaint of Electricity	Y		21	20
11216	Drinking Water Supply	Y		22	20
11250	Election Commission of India		N		
Idea					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		14	10
101	Fire	Y		13	9
102	Ambulance		N		
104	Health Information Helpline	Y		13	10
108	Emergency and Disaster Management Helpline	Y		13	10
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		13	10
182	Indian Railway Security Helpline	Y		13	10
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	Y		13	9
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		13	10
1070	Relief Commission for Natural Calamities	Y		13	10
1071	Air Accident Helpline	Y		13	9
1072	Rail Accident Helpline	Y		13	10
1073	Road Accident Helpline	Y		13	10
1077	Control Room for District Collector	Y		13	10
10120	Call Alart (Crime Branch)	Y		13	10
10121	Women Helpline	Y		13	10
10127	National AIDS Helpline to NACO		N		

101212	Central Accident and Trauma Services (CATS)	Y		13	10
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		13	10
10741	Pollution Control Board	Y		13	10
1511	Police Related Service for all Metro Railway Project	Y	N	13	
1512	Prevention of Crime in Railway	Y		13	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		13	10
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)				
112012	National Do Not Call Registry	Y		13	10
11212	Complaint of Electricity	Y		13	10
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		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		
Reliance CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	22
101	Fire	Y		21	21
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	21
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	20
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	20
1071	Air Accident Helpline	Y		22	20
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		21	21
10120	Call Alart (Crime Branch)	Y		21	20
10121	Women Helpline	Y		21	21
10127	National AIDS Helpline to NACO	Y		22	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		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	20
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	20
11212	Complaint of Electricity	Y		21	20
11216	Drinking Water Supply	Y		22	20
11250	Election Commission of India		N		
Reliance GSM					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	18
101	Fire	Y		17	16
102	Ambulance	Y		18	16
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	16
138	All India Helpine for Passangers	Y		17	16
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	16
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		17	16
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		17	16
1077	Control Room for District Collector	Y		18	16
10120	Call Alart (Crime Branch)	Y		17	16
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	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	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	16
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	16
TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police		N		
101	Fire		N		
102	Ambulance		N		
104	Health Information Helpline	Y		38	36
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
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		37	36
1071	Air Accident Helpline	Y		38	36
1072	Rail Accident Helpline	Y		37	36
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
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		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		38	37
1514	National Career Service(NCS)				

15100	Free Legal Service Helpline	Y		38	37
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		37	
11212	Complaint of Electricity		N		37
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		37	37
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		24	22
101	Fire				
102	Ambulance	Y		23	21
104	Health Information Helpline	Y		23	21
108	Emergency and Disaster Management Helpline	Y		23	22
138	All India Helpine for Passangers	Y		23	21
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		23	22
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service				
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	22
1071	Air Accident Helpline	Y		23	21
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline				
1077	Control Room for District Collector				
10120	Call Alart (Crime Branch)				
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO				
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		23	21
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		23	21
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		23	21
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		23	21
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		23	21
Telenor					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	26
101	Fire	Y		28	25
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		28	25
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		27	25
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	25
1071	Air Accident Helpline	Y		28	25
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	25
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	25
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	25
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	25
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Vodafone

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	15
101	Fire	Y		16	14
102	Ambulance	Y		15	14
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		16	14
1412	Public Road Transport Utility Service		N		

181	Chief Minister Helpline	Y		15	15
182	Indian Railway Security Helpline	Y		16	14
1033	Road Accident Management Service	Y		16	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		16	15
1071	Air Accident Helpline	Y		15	14
1072	Rail Accident Helpline				
1073	Road Accident Helpline				
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	14
10121	Women Helpline	Y		16	14
10127	National AIDS Helpline to NACO	Y		16	14
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		16	14
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	Y		15	14
155304	Municipal Corporations	Y		16	14
155214	Labour Helpline	Y		16	14
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		16	14
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		16	14
11250	Election Commission of India	Y		16	14

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

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

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

13 COUNTER DETAILS

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

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

13.1.1 ERICSSON

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

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

Ericsson Counters

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

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

13.1.2 NSN (NOKIA SIEMENS NETWORKS)

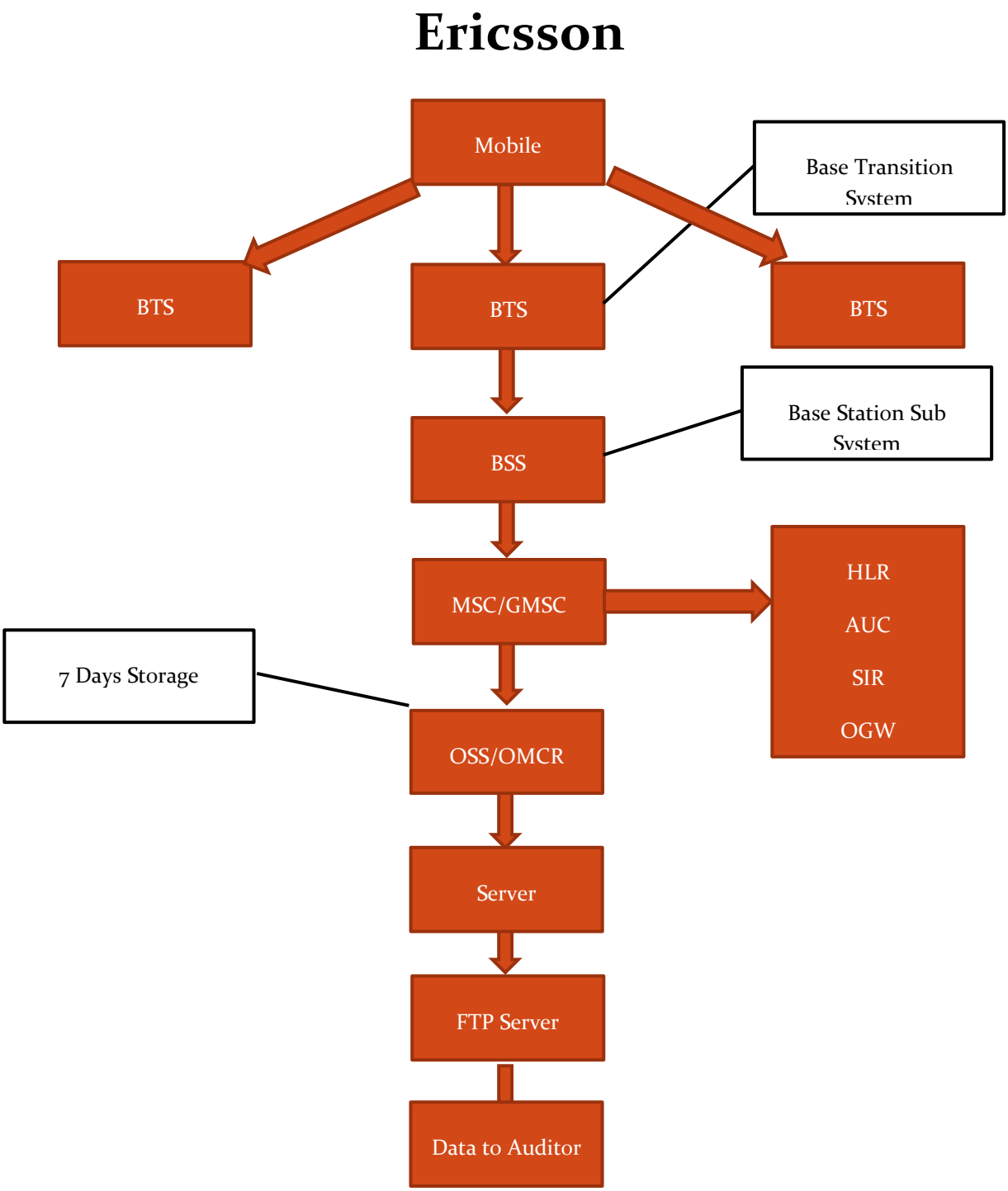
NSN provides network support to Vodafone in the circle.

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

13.2 BLOCK SCHEMATIC DIAGRAMS

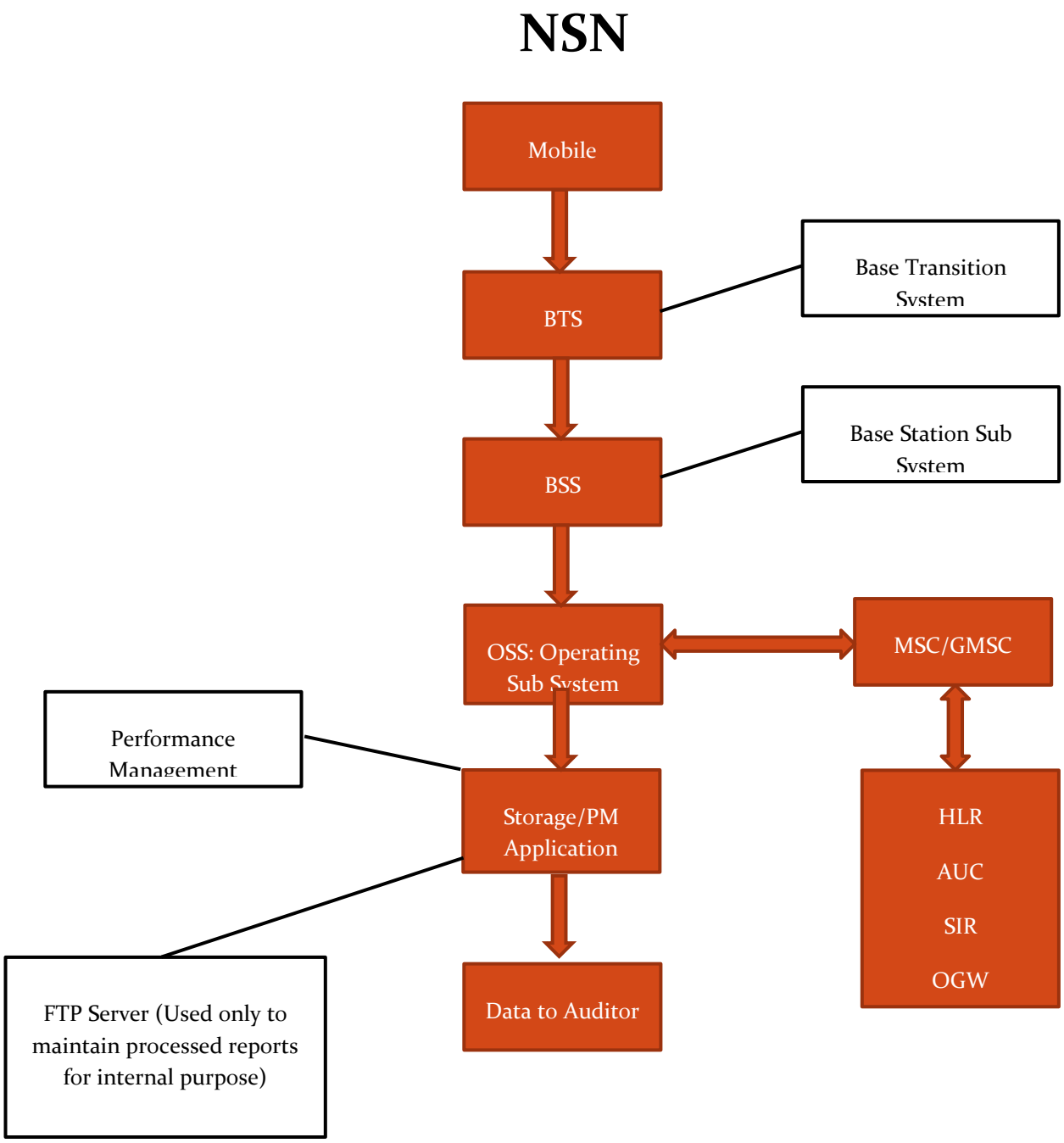
13.2.1 ERICSSON

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



13.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



14 ANNEXURE – OCTOBER -2G

1. Network Availability											
Audit Results for Network Availability- PMR data-October											
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2811	NDR	2434	7565	1516	3141	393	961	3229	8839
Sum of downtime of BTSs in a month (in hours)		54782	NDR	65731	32267	1454	972	36044	2417	5847	1887778
BTSs accumulated downtime (not available for service)	≤ 2%	2.62%	NDR	3.63%	0.57%	0.13%	0.04%	12.33%	0.34%	0.24%	28.71%
Number of BTSs having accumulated downtime >24 hours		378	NDR	554	119	6	1	0	7	22	175
Worst affected BTSs due to downtime	≤ 2%	13.45%	NDR	22.76%	1.57%	0.40%	0.03%	0.00%	0.73%	0.68%	1.98%
Live Measurement Results for Network Availability- 3 Day live data-October											
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2811	NDR	2434	7524	NDR	NDR	393	954	3229	8839
Sum of downtime of BTSs in a month (in hours)		5290	NDR	14278	3545	NDR	NDR	78	237	568	188526
BTSs accumulated downtime (not available for service)	≤ 2%	2.61%	NDR	8.15%	0.65%	NDR	NDR	0.28%	0.34%	0.24%	29.62%
Number of BTSs having accumulated downtime >24 hours		0	NDR	64	3	NDR	NDR	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	NDR	2.63%	0.04%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-October											
CSSR	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
CSSR	≥ 95%	88.18%	NDR	87.81%	95.53%	96.96%	98.44%	97.49%	98.16%	92.81%	99.03%
SDCCH/Paging channel congestion	≤ 1%	0.82%	NDR	0.38%	0.96%	NA	0.20%	NA	0.29%	1.15%	0.44%
TCH congestion	≤ 2%	11.35%	NDR	1.24%	1.95%	0.82%	0.49%	0.75%	0.61%	5.84%	0.97%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October											
CSSR	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
CSSR	≥ 95%	90.99%	NDR	89.23%	96.28%	NDR	NDR	94.41%	98.83%	97.02%	99.57%
SDCCH/Paging channel congestion	≤ 1%	0.45%	NDR	0.00%	0.92%	NA	NDR	NA	NA	0.71%	0.43%
TCH congestion	≤ 2%	8.66%	NDR	0.00%	1.91%	NDR	NDR	0.11%	0.12%	2.08%	0.43%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October											
CSSR	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**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

3. Connection Maintenance (Retainability)											
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-October											
Call drop rate	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of calls established		125902197	NDR	14242210	328617522	79319492	126742603	12175635	21807243	211373167	250502292
Total number of calls dropped		2314374	NDR	9019023	3504396	131432	351981	74324	126566	1067971	2246492
Call drop rate	≤ 2%	1.84%	NDR	63.33%	1.07%	0.17%	0.28%	0.61%	0.58%	0.51%	0.90%
Total number of cells in the network		8635	NDR	7302	22835	4317	9743	NDR	2857	9695	26570
Total number of cells having more than 3% TCH		1086	NDR	613	608	14	65	NDR	74	143	752
Worst affected cells having more than 3% TCH	≤ 3%	12.58%	NDR	8.39%	2.66%	0.32%	0.67%	NDR	2.58%	1.48%	2.83%
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(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of calls established		9952968	NDR	2241069	29223515	NDR	NDR	1745251	1935826	19201358	23812937
Total number of calls dropped		155499	NDR	180456	322897	NDR	NDR	76699	11847	89329	200840
Call drop rate	≤ 2%	1.56%	NDR	8.05%	1.10%	NDR	NDR	0.44%	0.49%	0.42%	0.77%
Total number of cells in the network		8429	NDR	3870	22714	NDR	NDR	1262	2857	9695	26570
Total number of cells having more than 3% TCH		899	NDR	194	597	NDR	NDR	43	74	113	761
Worst affected cells having more than 3% TCH	≤ 3%	10.66%	NDR	5.00%	2.63%	NDR	NDR	3.39%	2.59%	1.17%	2.87%

4. Voice quality											
Audit Results for Voice quality -PMR Data-October											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		22789094183	NDR	NDR	59596546816	NA	7440872010	551004245894	22244721	36437837820	46752812781
Total number of calls with good voice quality		21721262534	NDR	NDR	57090208415	NA	7362860769	541387583463	21835844	34483400979	45573046239
%age calls with good voice quality	≥ 95%	95.31%	NDR	NDR	95.79%	98.71%	98.95%	98.25%	98.16%	94.64%	97.48%
Live measurement results for Voice quality-3 Day data-October											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		1977760657	NDR	NDR	5722830621	NDR	NDR	54149765895	1971401	3543748111	4569788967
Total number of calls with good voice quality		1892140073	NDR	NDR	5512151887	NDR	NDR	53204667305	1938287	3362003489	4460369433
%age calls with good voice quality	≥ 95%	95.67%	NDR	NDR	96.32%	NDR	NDR	98.25%	97.74%	95.42%	98.02%
Drive test results for Voice quality (Average of three drive tests) - DT data-October											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**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

5. POI Congestion											
Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	NDR	11	83	112	183	153	20	65	58
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		129008	NDR	43772	285574	58753	102469	1779371	249858	74692	1582849
Traffic served for all POIs (B)- in erlangs		76170	NDR	15619	161692	32552	19633	209326	35443	52000	628467
POI congestion	≤ 0.5%	0.00%	NDR	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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	NDR	11	83	NDR	NDR	153	20	65	58
No. of POIs not meeting benchmark		0	NDR	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		130270	NDR	43772	285574	NDR	NDR	74087	10506	75328	1601693
Traffic served for all POIs (B)- in erlangs		32915	NDR	0	172835	NDR	NDR	8348	1438	50684	303251
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

15 ANNEXURE – NOVEMBER-2G

1. Network Availability											
Audit Results for Network Availability- PMR data-November											
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2923	NDR	3752	7700	1516	3140	393	961	3311	8840
Sum of downtime of BTSs in a month (in hours)		40163	NDR	85043	27726	674	855	341	757	5197	1935179
BTSs accumulated downtime (not available for service)	≤ 2%	1.91%	NDR	3.15%	0.50%	0.06%	0.04%	0.12%	0.11%	0.22%	30.40%
Number of BTSs having accumulated downtime >24 hours		294	NDR	581	137	4	3	0	1	12	170
Worst affected BTSs due to downtime	≤ 2%	10.06%	NDR	15.49%	1.78%	0.26%	0.10%	0.00%	0.10%	0.36%	1.92%
Live Measurement Results for Network Availability- 3 Day live data-November											
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2923	NDR	3752	7700	NDR	NDR	1	957	3226	8840
Sum of downtime of BTSs in a month (in hours)		3517	NDR	15201	3356	NDR	NDR	35	93	787	151674
BTSs accumulated downtime (not available for service)	≤ 2%	1.67%	NDR	5.63%	0.61%	NDR	NDR	48.19%	0.14%	0.34%	23.83%
Number of BTSs having accumulated downtime >24 hours		0	NDR	91	1	NDR	NDR	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	NDR	2.43%	0.01%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	87.40%	NDR	91.08%	95.31%	97.25%	98.44%	98.18%	98.61%	93.29%	99.18%
SDCCH/Paging channel congestion	≤ 1%	1.11%	NDR	5.66%	0.93%	NA	0.20%	NA	0.10%	0.88%	0.59%
TCH congestion	≤ 2%	14.16%	NDR	19.09%	1.95%	0.77%	0.43%	0.16%	0.13%	5.05%	0.82%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	86.74%	NDR	89.60%	96.15%	NDR	NDR	98.21%	98.89%	96.80%	99.57%
SDCCH/Paging channel congestion	≤ 1%	1.36%	NDR	6.40%	0.95%	NA	NDR	NA	0.05%	0.48%	0.48%
TCH congestion	≤ 2%	11.42%	NDR	19.72%	1.92%	NDR	NDR	0.11%	0.12%	2.26%	0.43%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	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

3. Connection Maintenance (Retainability)											
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-November											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	SNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		125329071	NDR	28993738	323636672	79923031	113115803	26686467	25957834	197827769	258466657
Total number of calls dropped		2056380	NDR	416616	3682500	122700	322737	66006	116468	983124	2169942
Call drop rate	≤ 2%	1.64%	NDR	1.44%	1.14%	0.15%	0.29%	0.25%	0.45%	0.50%	0.84%
Total number of cells in the network		8339	NDR	11231	23238	4317	9743	1362	0	9941	26572
Total number of cells having more than 3% TCH		955	NDR	987	656	13	102	30	0	104	774
Worst affected cells having more than 3% TCH	≤ 3%	11.45%	NDR	8.79%	2.82%	0.30%	1.05%	2.20%	NA	1.05%	2.91%

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(DWL)	Airtel	SNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		13707996	NDR	3053028	31558177	NDR	NDR	2284606	2687207	20050921	25013666
Total number of calls dropped		248010	NDR	3085953	343236	NDR	NDR	6492	13017	85856	208636
Call drop rate	≤ 2%	1.81%	NDR	1.57%	1.09%	NDR	NDR	0.18%	0.44%	0.39%	0.72%
Total number of cells in the network		8763	NDR	10090	23270	NDR	NDR	1262	2861	9686	26572
Total number of cells having more than 3% TCH		1029	NDR	598	602	NDR	NDR	26	74	105	773
Worst affected cells having more than 3% TCH	≤ 3%	11.75%	NDR	5.92%	2.59%	NDR	NDR	2.04%	2.59%	1.08%	2.91%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	SNL Bihar/Jharkan	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	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

4. Voice quality											
Audit Results for Voice quality -PMR Data-November											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkan**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		20321337966	NDR	1260	59198413748	NA	6798131003	508708717365	4364268666	34104401380	46194614046
Total number of calls with good voice quality		19354789416	NDR	1215	56780627457	NA	6726885746	499827700114	4257683556	32268940823	45041959473
%age calls with good voice quality	≥ 95%	95.24%	NDR	96.43%	95.92%	98.71%	98.95%	98.25%	97.56%	94.62%	97.50%
Live measurement results for Voice quality-3 Day data-November											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkan**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		2022308297	NDR	540	5893305577	NDR	NDR	52906848127	455440886	3716778682	4665454113
Total number of calls with good voice quality		1928148806	NDR	519	5659556149	NDR	NDR	51983002599	444390418	3514253529	4553314077
%age calls with good voice quality	≥ 95%	95.34%	NDR	96.11%	96.03%	NDR	NDR	98.25%	97.83%	95.23%	97.98%
Drive test results for Voice quality (Average of three drive tests) - DT data-November											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkan**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**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

16 ANNEXURE – DECEMBER-2G

PERFORMANCE REPORTS - PARAMETER WISE -Month 3											
1. Network Availability											
Audit Results for Network Availability- PMR data-December											
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2933	9560	3215	7819	1516	3140	390	961	3524	8845
Sum of downtime of BTSs in a month (in hours)		39922	4092	35174	36722	2449	2080	527	1019	4469	1595063
BTSs accumulated downtime (not available for service)	≤ 2%	1.83%	0.06%	1.47%	0.63%	0.22%	0.09%	0.18%	0.14%	0.17%	24.24%
Number of BTSs having accumulated downtime >24 hours		285	16	50	149	18	5	0	1	2	168
Worst affected BTSs due to downtime	≤ 2%	9.72%	0.17%	1.56%	1.91%	1.19%	0.16%	0.00%	0.10%	0.06%	1.90%
Live Measurement Results for Network Availability- 3 Day live data-December											
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2933	9560	3215	7819	NDR	NDR	390	958	3322	8845
Sum of downtime of BTSs in a month (in hours)		3998	327	2621	3633	NDR	NDR	37	124	367	149000
BTSs accumulated downtime (not available for service)	≤ 2%	1.89%	0.05%	1.13%	0.65%	NDR	NDR	0.13%	0.18%	0.15%	23.40%
Number of BTSs having accumulated downtime >24 hours		0	0	9	7	NDR	NDR	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.28%	0.09%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	87.57%	95.64%	90.19%	96.77%	96.83%	98.34%	97.99%	98.22%	92.22%	99.23%
SDCCH/Paging channel congestion	≤ 1%	0.85%	0.79%	2.87%	0.86%	0.00%	0.19%	NA	0.18%	4.27%	0.52%
TCH congestion	≤ 2%	12.11%	1.18%	1.47%	1.79%	0.85%	0.58%	0.33%	0.29%	6.47%	0.77%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	87.19%	95.65%	90.97%	97.08%	NDR	NDR	97.23%	98.64%	90.68%	99.41%
SDCCH/Paging channel congestion	≤ 1%	0.95%	0.79%	3.34%	0.94%	NDR	NDR	NA	0.12%	1.32%	0.66%
TCH congestion	≤ 2%	12.56%	1.15%	0.84%	1.81%	NDR	NDR	0.39%	0.12%	7.48%	0.59%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		227	648	319	398	314	NDR	366	344	345	436
Total number of successful calls established		207	648	289	398	304	NDR	347	270	345	436
CSSR	≥ 95%	90.97%	100.00%	90.74%	100.00%	96.81%	NDR	94.80%	78.46%	100.00%	100.00%
%age blocked calls		9.03%	0.00%	9.26%	0.00%	3.19%	NDR	5.20%	21.54%	0.00%	0.00%

3. Connection Maintenance (Retainability)											
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-December											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		147303525	783932829	23727596	320407582	90041797	35764787	11403287	28334203	206446306	284500301
Total number of calls dropped		2423764	12555304	586230	3232861	117157	93594	39921	132630	1162558	2376437
Call drop rate	≤ 2%	1.65%	1.60%	2.47%	1.01%	0.13%	0.26%	0.35%	0.47%	0.56%	0.84%
Total number of cells in the network		8752	28745	9645	23600	4522	9743	1262	2865	10524	26588
Total number of cells having more than 3% TCH		1054	634	380	612	11	26	14	67	127	741
Worst affected cells having more than 3% TCH	≤ 3%	12.04%	2.21%	3.94%	2.59%	0.24%	0.27%	1.09%	2.35%	1.20%	2.79%

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(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		14580456	1675404321	4017377	30395627	NDR	NDR	21777462	33775281	20389422	370595548
Total number of calls dropped		239963	26669588	3104308	325090	NDR	NDR	190848	163026	111312	2958849
Call drop rate	≤ 2%	1.65%	1.59%	77.27%	1.07%	NDR	NDR	0.88%	0.48%	0.55%	0.80%
Total number of cells in the network		8775	85732	9645	23312	NDR	NDR	1262	2865	9968	26588
Total number of cells having more than 3% TCH		1125	1912	1423	612	NDR	NDR	87	68	100	746
Worst affected cells having more than 3% TCH	≤ 3%	12.82%	2.23%	14.75%	2.63%	NDR	NDR	6.92%	2.36%	1.00%	2.81%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		207	648	289	368	304	NDR	347	270	345	436
Total number of calls dropped		9	0	10	0	23	NDR	8	9	2	0
Call drop rate	≤ 2%	4.36%	0.00%	3.29%	0.00%	7.58%	NDR	2.31%	3.15%	0.44%	0.00%

4. Voice quality											
Audit Results for Voice quality -PMR Data-December											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		24843468405	174216484175	NDR	60007778665	NA	2223260732	522528891742	4752478122	35831492873	51225187705
Total number of calls with good voice quality		23659244381	166787678278	NDR	57805139425	NA	2196651349	513394925973	4634081956	33958646087	50037782824
%age calls with good voice quality	≥ 95%	95.23%	95.74%	NDR	96.33%	98.71%	98.80%	98.25%	97.51%	94.77%	97.68%
Live measurement results for Voice quality-3 Day data-December											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		2503842908	16046802163	NDR	5839611144	NDR	NDR	50487066140	5831151306	3621810197	39587809905
Total number of calls with good voice quality		2380788697	15356044849	NDR	5616304587	NDR	NDR	49603787704	5696450994	3430637452	38809965858
%age calls with good voice quality	≥ 95%	95.09%	95.70%	NDR	96.18%	NDR	NDR	98.25%	97.69%	94.72%	98.04%
Drive test results for Voice quality (Average of three drive tests) - DT data-December											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		721551	1234537	436438	676258	NA	NDR	29729	515295	34397	1315265
Total number of calls with good voice quality		686016	1186192	415153	650959	NA	NDR	24256	449402	32727	1263937
%age calls with good voice quality	≥ 95%	95.08%	96.08%	95.12%	96.26%	92.62%	NDR	81.59%	87.21%	95.14%	96.10%

5. POI Congestion											
Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	841	11	83	120	137	153	20	66	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		129524	719424	43772	287241	64765	72207	1740819	10505	75529	256048
Traffic served for all POIs (B)- in erlangs		75647	400501	0	181424	41118	12516	186299	2761	50336	145611
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-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		48	841	11	83	NDR	NDR	153	20	65	58
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		129464	2159405	43772	287241	NDR	NDR	72534	10430	75286	255897
Traffic served for all POIs (B)- in erlangs		36129	1297120	0	185176	NDR	NDR	7931	1029	53657	65635
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	0.00%

17 ANNEXURE – OCTOBER -3G

1. Network Availability				
Audit Results for Network Availability- PMR data				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
(Number of Node Bs in the network in the licensed service area		1948	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		31118	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	2.15%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		225	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	11.55%	NDR	NDR
Live Measurement Results for Network Availability- 3 Day live data				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
(Number of Node Bs in the network in the licensed service area		1948	NDR	850
Sum of downtime (i.e. total outage time) of Node Bs		3530	NDR	555
Node Bs downtime (not available for service)	≤ 2%	2.52%	NDR	0.91%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	NDR	16
Worst affected Node Bs due to downtime	≤ 2%	0.00%	NDR	1.88%

2. Connection Establishment (Accessibility)				
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
CSSR	≥ 95%	93.35%	NDR	NDR
RRC Congestion	≤ 1%	0.97%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	0.26%	NDR	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
CSSR	≥ 95%	94.40%	NDR	91.08%
RRC Congestion	≤ 1%	0.85%	NDR	3.45%
Circuit Switched RAB Congestion	≤ 2%	0.38%	NDR	0.83%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data				
CSSR	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of RRC attempts (A)		102	0	221
Total number of RRC established (B)		102	0	215
Call setup success rate (B/A*100)	≥ 95%	100.00%	NA	97.29%
%age blocked calls		0.00%	NA	2.71%

3. Connection Maintenance (Retainability)				
Audit Results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		12024541	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		141026	NDR	NDR
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.17%	NDR	NDR
Total no. of cells in the licensed service area (B)		5463	NDR	NDR
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		641	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.74%	NDR	NDR

Live measurement results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		1323732	NDR	144138
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		15170	NDR	2602
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.15%	NDR	1.81%
Total no. of cells in the licensed service area (B)		5800	NDR	2550
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		686	NDR	267
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.83%	NDR	10.48%
Drive test results for Circuit switched voice drop rate (Average of three drive tests) - Drive Test Data				
Circuit switched voice drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		99	0	215
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		2	0	9
Circuit switched voice drop rate (B/A*100)	≤ 2%	2.02%	NA	4.19%

4. Voice quality				
Audit Results for Voice quality -PMR Data				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1608874482087	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1593910734508	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.07%	NDR	NDR
Live measurement results for Voice quality-3 Day data				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		185704981401	NDR	300
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		183911458958	NDR	285
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	NDR	95.00%
Drive test results for Voice quality (Average of three drive tests) - DT data				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		718592	0	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		653650	0	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	90.96%	NA	NDR

5. POI Congestion				
Audit Results for POI Congestion- PMR data				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		144	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		388902	NDR	NDR
Traffic served for all POIs (B)- in erlangs		223567	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		144	NDR	21
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		390128	NDR	15538
Traffic served for all POIs (B)- in erlangs		104302	NDR	0
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

18 ANNEXURE – NOVEMBER-3G

1. Network Availability				
Audit Results for Network Availability- PMR data-October				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
(Number of Node Bs in the network in the licensed service area		573	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		10767	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	2.53%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		78	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	13.61%	NDR	NDR
Live Measurement Results for Network Availability- 3 Day live data-October				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
(Number of Node Bs in the network in the licensed service area		573	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		1252	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	3.04%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		0	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	0.00%	NDR	NDR

2. Connection Establishment (Accessibility)				
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-October				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
CSSR	≥ 95%	98.78%	NDR	NDR
RRC Congestion	≤ 1%	0.63%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	0.07%	NDR	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-October				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
CSSR	≥ 95%	98.66%	NDR	NDR
RRC Congestion	≤ 1%	0.48%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	0.08%	NDR	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October				
CSSR	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
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

3. Connection Maintenance (Retainability)				
Audit Results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-October				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		2863189	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		34992	NDR	NDR
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.22%	NDR	NDR
Total no. of cells in the licensed service area (B)		1721	NDR	NDR
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		208	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	12.09%	NDR	NDR
Live measurement results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-October				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		320782	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		4060	NDR	NDR
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.27%	NDR	NDR
Total no. of cells in the licensed service area (B)		1721	NDR	NDR
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		203	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.80%	NDR	NDR
Drive test results for Circuit switched voice drop rate (Average of three drive tests) - Drive Test Data-October				
Circuit switched voice drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
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
Circuit switched voice drop rate (B/A*100)	≤ 2%	NA	NA	NA

4. Voice quality				
Audit Results for Voice quality -PMR Data-October				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1602974227060	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1588066566748	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.07%	NDR	NDR
Live measurement results for Voice quality-3 Day data-October				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		181608901110	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		179829133879	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.02%	NDR	NDR
Drive test results for Voice quality (Average of three drive tests) - DT data-October				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
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

5. POI Congestion				
Audit Results for POI Congestion- PMR data-October				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		129008	NDR	NDR
Traffic served for all POIs (B)- in erlangs		76170	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-October				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		130270	NDR	NDR
Traffic served for all POIs (B)- in erlangs		32915	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR

19 ANNEXURE – DECEMBER-3G

1. Network Availability				
Audit Results for Network Availability- PMR data-November				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
(Number of Node Bs in the network in the licensed service area		681	NDR	NDR
Sum of downtime (i.e. total outage time) of Node Bs		11056	NDR	NDR
Node Bs downtime (not available for service)	≤ 2%	2.18%	NDR	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		85	NDR	NDR
Worst affected Node Bs due to downtime	≤ 2%	12.48%	NDR	NDR
Live Measurement Results for Network Availability- 3 Day live data-November				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
(Number of Node Bs in the network in the licensed service area		681	NDR	850
Sum of downtime (i.e. total outage time) of Node Bs		1160	NDR	555
Node Bs downtime (not available for service)	≤ 2%	2.36%	NDR	0.91%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	NDR	16
Worst affected Node Bs due to downtime	≤ 2%	0.00%	NDR	1.88%

2. Connection Establishment (Accessibility)				
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-November				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
CSSR	≥ 95%	97.16%	NDR	NDR
RRC Congestion	≤ 1%	0.65%	NDR	NDR
Circuit Switched RAB Congestion	≤ 2%	0.12%	NDR	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-November				
	Benchmark	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
CSSR	≥ 95%	97.99%	NDR	91.08%
RRC Congestion	≤ 1%	1.02%	NDR	3.45%
Circuit Switched RAB Congestion	≤ 2%	0.28%	NDR	0.83%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November				
CSSR	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
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

3. Connection Maintenance (Retainability)				
Audit Results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-November				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		3610397	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		44724	NDR	NDR
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.24%	NDR	NDR
Total no. of cells in the licensed service area (B)		1728	NDR	NDR
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		217	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	12.56%	NDR	NDR

Live measurement results for Circuit switched voice drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-November				
	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
Total calls successfully established (A) (Number of voice RAB normally released)		425504	NDR	144138
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		5645	NDR	2602
Circuit switched voice drop rate (B/A*100)	≤ 2%	1.33%	NDR	1.81%
Total no. of cells in the licensed service area (B)		2045	NDR	2550
No. of affected cells having CSV Circuit switched voice drop rate >3% during (CBBH) in a month (A)		281	NDR	267
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	13.74%	NDR	10.48%
Drive test results for Circuit switched voice drop rate (Average of three drive tests) - Drive Test Data-November				
Circuit switched voice drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL Bihar/Jharkand
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
Circuit switched voice drop rate (B/A*100)	≤ 2%	NA	NA	NA

4. Voice quality				
Audit Results for Voice quality -PMR Data-November				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		3141098521	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		3117854392	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.26%	NDR	NDR
Live measurement results for Voice quality-3 Day data-November				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1353860774	NDR	300
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1345159491	NDR	285
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.36%	NDR	95.00%
Drive test results for Voice quality (Average of three drive tests) - DT data-November				
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
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

5. POI Congestion				
Audit Results for POI Congestion- PMR data-November				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		48	NDR	NDR
No. of POIs not meeting benchmark		0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		130369	NDR	NDR
Traffic served for all POIs (B)- in erlangs		71750	NDR	NDR
POI congestion	≤ 0.5%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-November				
POI congestion	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL Bihar/Jharkand**
Total number of working POIs		48	NDR	21
No. of POIs not meeting benchmark		0	NDR	0
Total Capacity of all POIs (A) - in erlangs		130394	NDR	15538
Traffic served for all POIs (B)- in erlangs		35259	NDR	0
POI congestion	≤ 0.5%	0.00%	NDR	0.00%

20 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. 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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