TRAI Audit Wireless Report for Assam Circle

QE JUNE- 2016

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

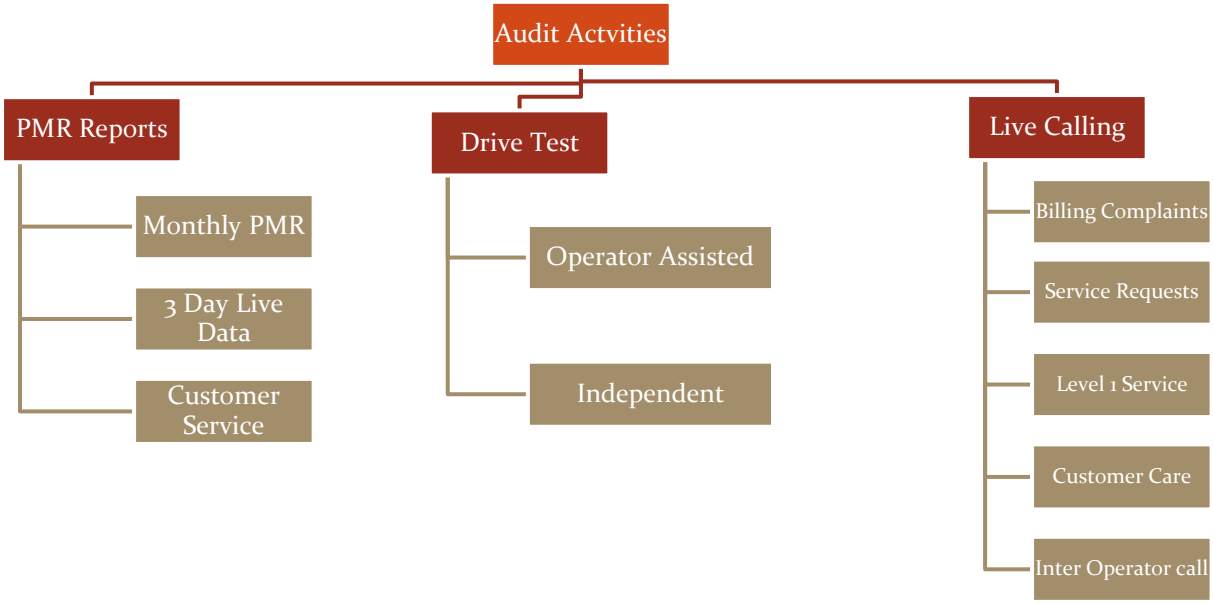
The primary objective of the Audit module is to-

- 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 Assam circle.

2.3 COVERAGE

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

2.4 FRAMEWORK USED

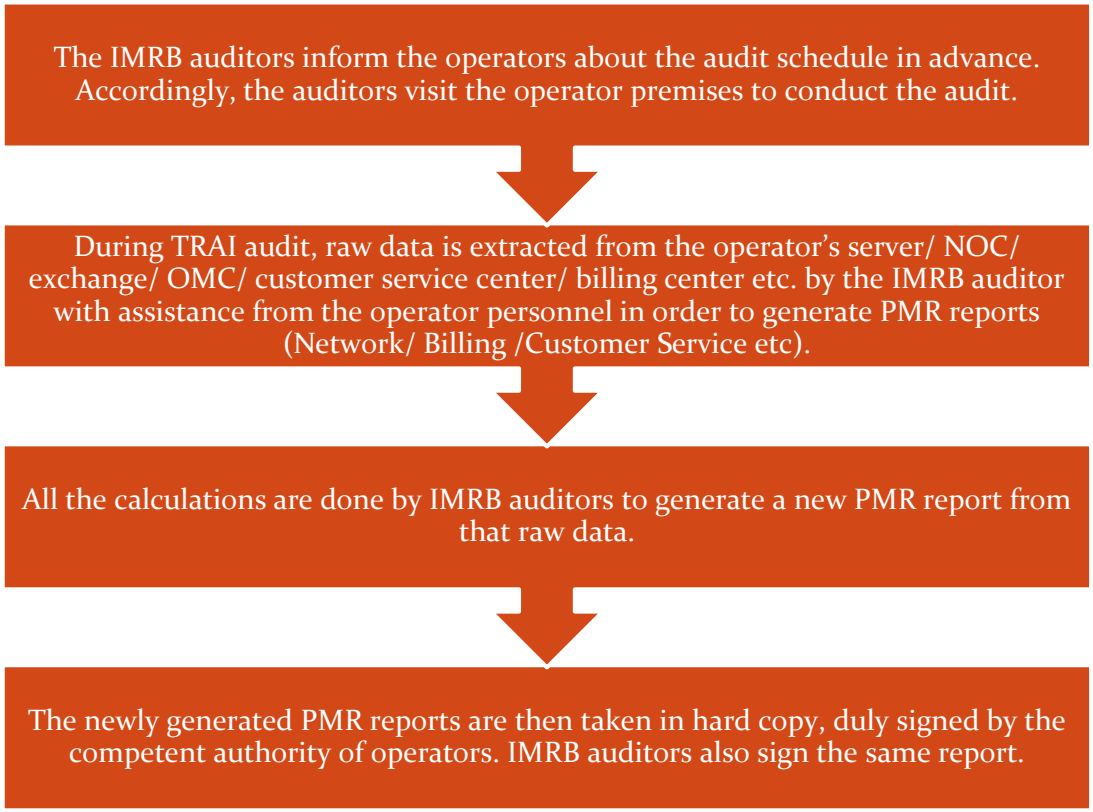


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

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



The 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, April 2016 audit data was collected in the month of May 2016.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2016 (AMJ'16) was collected in the month of July 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 April, May and June 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

Network Parameters - 2G		
Parameter Category	**Parameter**	**Benchmark**
Network Availability	**BTSs Accumulated downtime (not available for service)**	**≤ 2%**
	Worst affected BTSs due to downtime	**≤ 2%**
Connection Establishment (Accessibility)	**Call Set-up Success Rate (within licensee's own network)**	**≥ 95%**
	SDCCH/ Paging Chl. Congestion (%age)	**≤ 1%**
	TCH Congestion (%age)	**≤ 2%**
Connection Maintenance (Retainability)	**Call Drop Rate (%age)**	**≤ 2%**
	Worst affected cells having more than 3% TCH drop	**≤ 3%**
	%age of connection with good voice quality	**≥ 95%**
	Point of Interconnection (POI)	**≤ 0.5%**

2.4.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of April, May and June 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

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

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good Circuit Switched Voice Quality

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

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

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

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

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

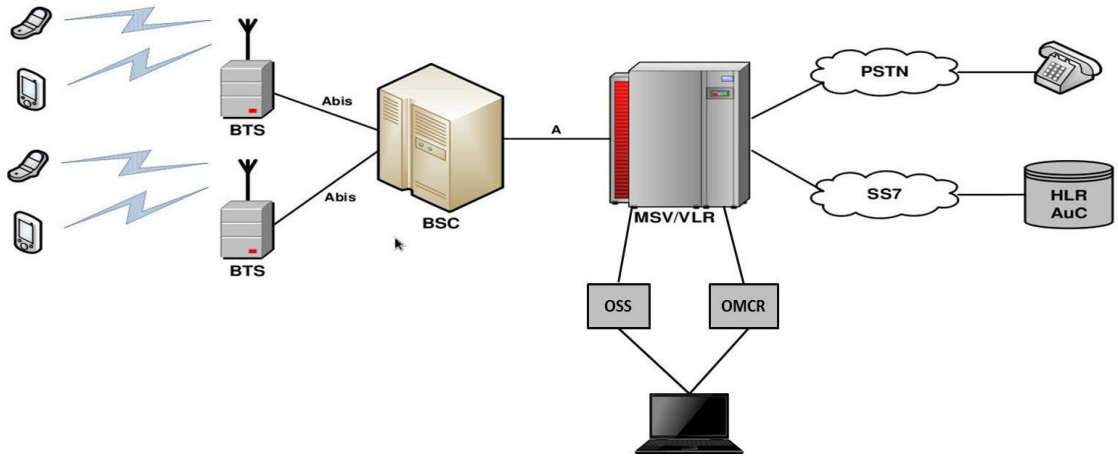
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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

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

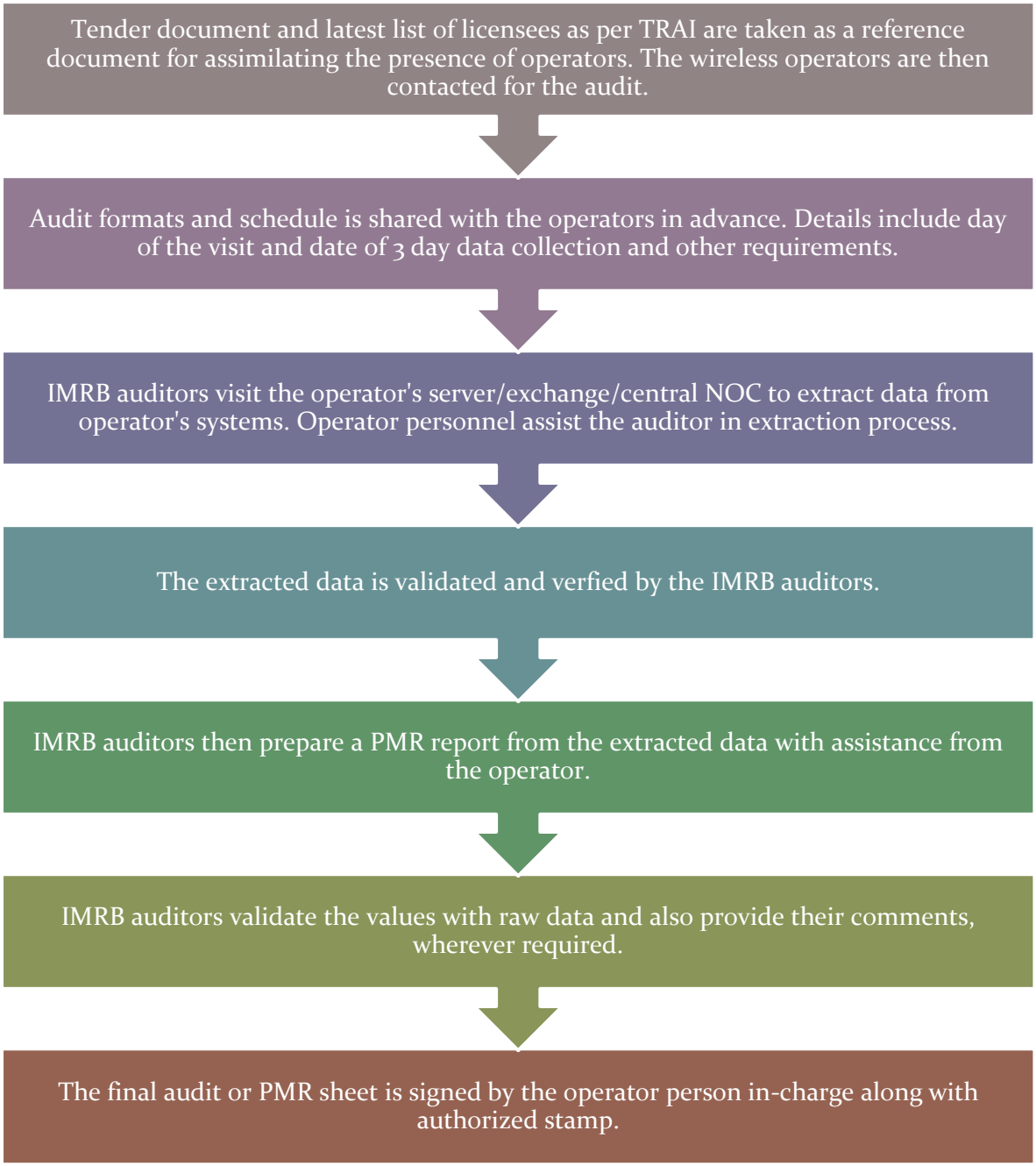
2.4.1.8 POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR & OSS on the operator network.



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

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



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.

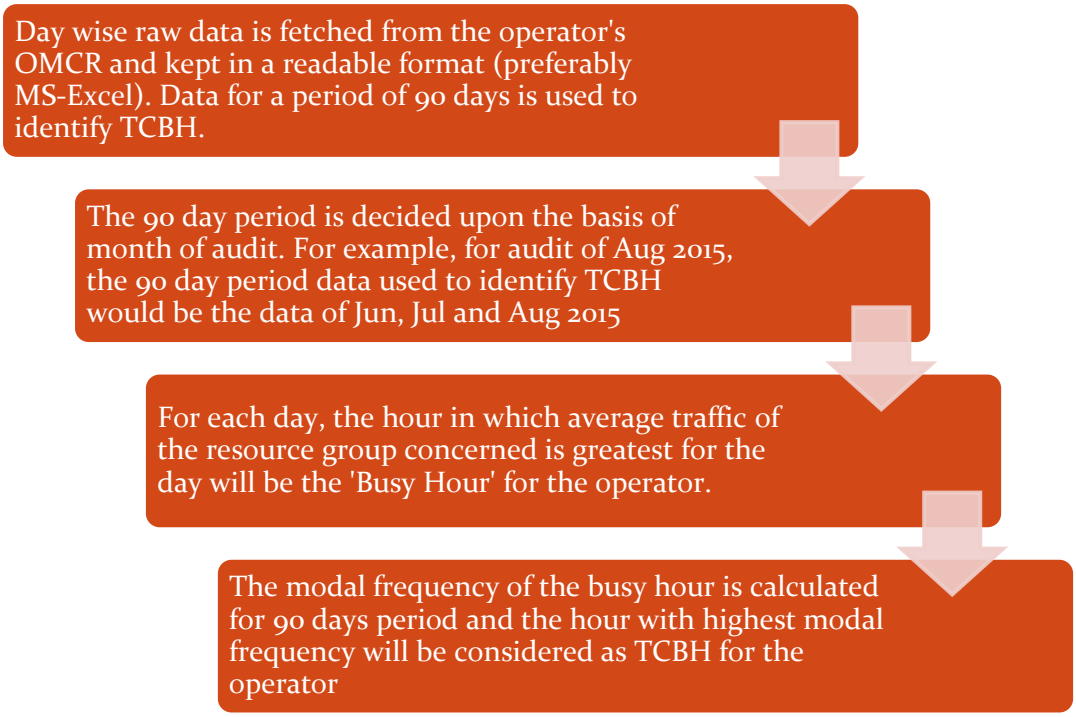
Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar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

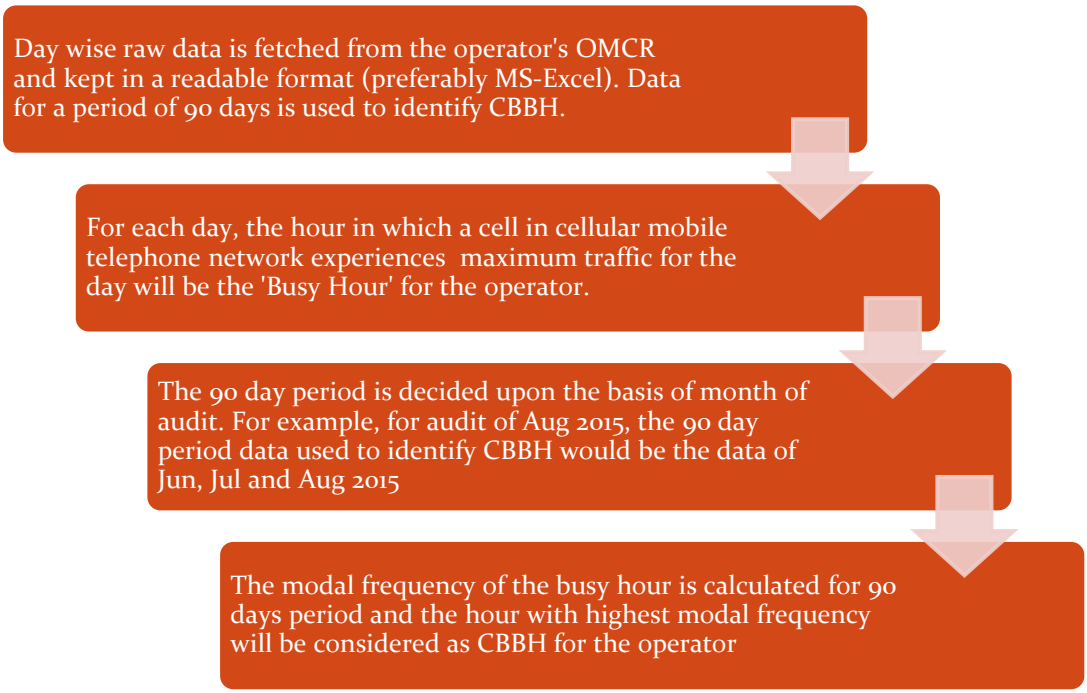
Step by step procedure to identify TCBH for an operator:



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 June 2016 (AMJ'16) was collected in the month of July 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.

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

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

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

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

Live calling activity was carried out during the period of June 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of May 2016 was considered for live calling activity conducted in June 2016.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th December, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

"Service request" means a request made to a service provider by its consumer pertaining to his account, and includes.

- A request for change of tariff plan
- A request for activation or deactivation of a value added service or a supplementary service or a special pack
- A request for activation of any service available on the service provider's network
- A request for shift or closure or termination of service or for billing details

All the complaints other than billing were covered. A total of 100 calls per service provider for each service in licensed service area were done by the IMRB auditors.

2.4.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 300 test calls were made per service provider in the quarter.

In AMJ'16, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

A total of 100 calls per service provider to all the other service providers in a licensed service area were done for the purpose of audit.

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the performance of an operator in a moving vehicle in a specified network coverage area.
The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

To assess the indoor coverage, the test is also conducted at two static indoor locations in each SSA, such as Malls, office buildings, shopping complexes, government buildings etc.

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

The main difference between the two is that in the operator assisted, operators participate in the drive test along with their hardware, software, phones etc. while in the independent drive test IMRB conducts the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the drive test being conducted.
A detailed explanation of the two methodologies has been provided below.

2.4.3.2 OPERATOR ASSISTED DRIVE TEST – VOICE 2G & 3G

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

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

1. Normal SSA
2. Difficult SSA

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

- 3 consecutive days were selected for drive test in selected SSA. SSAs were defined as per BSNL and SSA list was finalized by regional TRAI office.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 250kms in 3 days.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - 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 Rx Qual Samples– A
- ✓ Rx Qual samples with 0-5 value – B
- ✓ %age samples with good voice quality = B/A x 100

- Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]
- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

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

2.4.4.1 METHODOLOGY

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

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

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

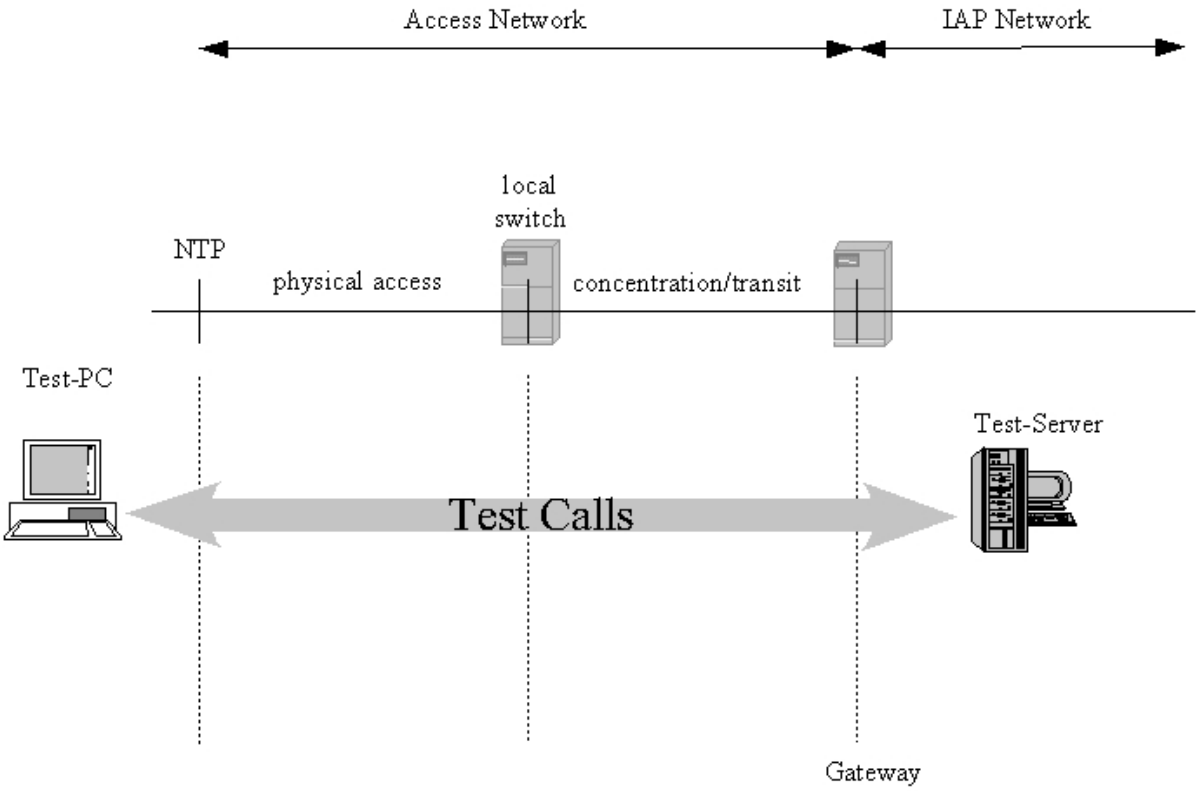


Figure for Measurement set-up

2.4.4.2 REQUIREMENTS FOR THE TEST-SERVER

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

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

However, the TCP stack of the reference server should at least be capable of the following:

- 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	148334.1292
Airtel	5543258
BSNL CDMA	6874
BSNL GSM	NDR
Idea	1110141
Reliance GSM	No Service
Vodafone	3935667
Name of Operator	**Number of Subscriber as per VLR-3G**
Aircel 3G	NDR
Airtel 3G	5543258
BSNL 3G	Not Providing
Reliance 3G	NDR
Vodafone 3G	NDR

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY-2G

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

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	4.09%	29.40%	90.89%	1.44%	6.48%	1.90%	17.30%	91.00%
Airtel	0.49%	0.83%	95.93%	0.81%	1.29%	0.98%	1.20%	99.05%
BSNL CDMA	0.30%	30.04%	98.73%	NA	NA	1.28%	4.80%	NA
BSNL GSM	2.33%	6.33%	97.27%	2.19%	2.32%	1.97%	3.71%	NA
Idea	1.50%	1.18%	97.52%	0.37%	0.53%	0.45%	2.27%	95.75%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.96%	1.68%	98.72%	0.66%	1.28%	0.71%	2.51%	96.62%

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

NDR: data not received

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

BTSs Accumulated Downtime:

Aircel and BSNL GSM did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for BSNL CDMA at 0.30%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL GSM & CDMA failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel at 0.83%.

Call Set-up Success Rate (CSSR):

Aircel failed to meet the benchmark for CSSR. The maximum CSSR was observed for BSNL CDMA with 98.73%.

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

SDCCH/ Paging Chl. Congestion:

Aircel and BSNL GSM failed to meet the benchmark on SDCCH / Paging Channel Congestion. Idea recorded the best SDCCH / Paging Channel Congestion at 0.37%.

TCH Congestion:

Aircel and BSNL GSM failed to meet the benchmark for TCH congestion, while Vodafone performed the best on TCH congestion at .53%.

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

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.45%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL GSM & CDMA failed to meet the benchmark. Best performance was recorded for Airtel at 1.20%.

Voice Quality

Aircel failed to meet the benchmark. Best performance was recorded for Airtel at 99.05%.

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 - APRIL FOR 2G

Month								
Name of Service Provider Month April	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	4.87%	37.03%	90.37%	2.27%	7.00%	1.83%	15.01%	91.05%
Airtel	0.48%	1.19%	96.05%	0.77%	1.38%	0.88%	1.09%	99.12%
BSNL CDMA	0.35%	32.51%	98.83%	NA	NA	1.32%	0.00%	NA
BSNL GSM	1.93%	1.94%	98.13%	0.86%	1.87%	1.96%	2.97%	NA
Idea	1.66%	1.19%	96.05%	0.28%	0.87%	0.41%	2.03%	95.71%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.16%	1.77%	98.66%	0.77%	1.34%	0.72%	2.96%	96.86%

3.1.2 PMR DATA – MAY FOR 2G

Month								
Name of Service Provider Month May	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	4.26%	30.43%	91.93%	1.06%	5.52%	1.91%	17.60%	90.94%
Airtel	0.51%	1.15%	95.93%	0.88%	1.24%	0.96%	1.26%	99.08%
BSNL CDMA	0.30%	30.45%	98.68%	NA	NA	1.30%	7.42%	NA
BSNL GSM	1.99%	1.94%	98.55%	0.89%	1.45%	1.88%	2.97%	NA
Idea	1.56%	1.34%	98.09%	0.50%	0.39%	0.44%	2.24%	95.75%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.02%	1.71%	98.80%	0.60%	1.20%	0.73%	2.02%	96.59%

3.1.3 PMR DATA - JUNE FOR 2G

Month								
Name of Service Provider Month June	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	3.13%	20.79%	90.37%	0.99%	6.90%	1.95%	19.27%	91.01%
Airtel	0.48%	0.14%	95.80%	0.78%	1.25%	1.09%	1.23%	98.96%
BSNL CDMA	0.26%	27.16%	98.67%	2.39%	NA	1.21%	6.99%	NA
BSNL GSM	5.99%	49.47%	95.15%	4.82%	3.64%	2.47%	11.05%	NA
Idea	1.30%	1.01%	98.44%	0.33%	0.32%	0.51%	2.54%	95.80%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.70%	1.56%	98.69%	0.61%	1.31%	0.69%	2.56%	96.42%

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	5.25%	4.08%	96.27%	1.23%	2.52%	1.53%	14.15%	92.47%
Airtel	0.51%	0.00%	96.56%	0.39%	0.58%	0.90%	1.24%	99.19%
BSNL CDMA	0.35%	5.49%	98.70%	NA	NA	1.39%	7.20%	NA
BSNL GSM	1.27%	1.40%	97.95%	6.34%	1.31%	2.07%	0.65%	NA
Idea	1.62%	0.92%	98.90%	0.28%	0.21%	0.41%	2.25%	96.55%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.20%	0.29%	99.29%	0.52%	0.71%	0.69%	2.58%	97.12%

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

BTSs Accumulated Downtime:

Aircel did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for BSNL CDMA at 0.35%.

Worst Affected BTSs Due to Downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.29%.

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

SDCCH/ Paging Chl. Congestion:

Aircel and BSNL GSM failed to meet the benchmark for SDCCH / Paging Channel Congestion. Idea recorded the best SDCCH / Paging Channel Congestion at 0.28%.

TCH Congestion:

Aircel failed to meet the benchmark for TCH congestion, while Idea performed the best on TCH congestion at 0.21%.

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

Call Drop Rate:

BSNL GSM failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.41%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA failed to meet the benchmark. Best performance was recorded for BSNL GSM at 0.65%.

Voice Quality

Aircel failed to meet the benchmark. Best performance was recorded for Airtel at 99.19%.

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 - APRIL FOR 2G

3 Day								
Name of Service Provider 3 Day April	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	5.45%	2.02%	95.73%	1.14%	2.99%	1.39%	12.39%	92.61%
Airtel	0.53%	0.00%	96.72%	0.38%	0.48%	0.87%	1.29%	99.17%
BSNL CDMA	0.39%	9.05%	98.72%	NA	NA	1.52%	6.89%	NA
BSNL GSM	0.33%	1.94%	98.31%	0.75%	1.69%	1.65%	3.04%	NA
Idea	1.85%	0.80%	98.51%	0.22%	0.33%	0.36%	1.78%	96.43%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.14%	0.21%	99.19%	0.57%	0.81%	0.66%	2.98%	97.24%

3.2.2 3 DAY DATA – MAY FOR 2G

3 Day								
Name of Service Provider 3 Day May	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	6.87%	5.11%	96.42%	2.18%	2.72%	1.67%	15.91%	92.44%
Airtel	0.45%	0.00%	96.60%	0.32%	0.61%	0.83%	1.24%	99.28%
BSNL CDMA	0.35%	6.17%	98.68%	NA	NA	1.43%	6.60%	NA
BSNL GSM	1.51%	0.36%	98.88%	2.06%	1.12%	2.67%	0.00%	NA
Idea	1.74%	1.12%	99.07%	0.44%	0.15%	0.42%	2.37%	96.49%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.92%	0.56%	99.28%	0.68%	0.72%	0.78%	2.07%	97.03%

3.2.3 3 DAY DATA - JUNE FOR 2G

3 Day								
Name of Service Provider 3 Day June	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	3.44%	5.09%	96.68%	0.38%	1.85%	1.52%	14.14%	92.63%
Airtel	0.55%	0.00%	96.36%	0.47%	0.65%	0.99%	1.20%	99.13%
BSNL CDMA	0.31%	1.23%	98.69%	2.21%	NA	1.23%	8.10%	NA
BSNL GSM	4.70%	3.89%	96.67%	16.22%	1.12%	1.38%	NA	NA
Idea	1.27%	0.84%	99.12%	0.16%	0.16%	0.48%	2.60%	96.57%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	0.55%	0.12%	99.39%	0.31%	0.61%	0.61%	2.68%	97.07%

3.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.87%	21.76%	99.00%	0.36%	0.00%	0.70%	8.21%	98.97%
Airtel 3G	0.36%	0.71%	97.93%	0.60%	0.50%	1.09%	1.30%	98.96%
BSNL 3G	Not Providin	Not Providin	Not Providin	Not Providin	Not Providing	Not Providin	Not Providin	Not Providin
Reliance 3G	0.12%	0.25%	99.42%	0.09%	0.01%	0.20%	1.06%	99.87%
Vodafone 3G	1.15%	1.20%	99.70%	0.08%	0.10%	0.37%	3.51%	98.90%

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

Note: BSNL 3G has not submitted the data.

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

Node Bs downtime:

All operators met the benchmark for Node Bs downtime.

Worst affected Node Bs due to downtime:

Aircel 3G failed to meet the benchmark for Worst affected Node Bs due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone 3G with 99.70%.

RRC Congestion:

All operators met the benchmark for RRC Congestion.

Circuit Switched RAB Congestion:

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

Circuit Switched Voice Call Drop Rate:

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

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

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

Circuit Switch Voice Quality:

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

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

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

3.3.1 PMR DATA - APRIL FOR 3G

Month								
Name of Service Provider Month April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	2.11%	12.18%	98.75%	0.46%	0.01%	0.76%	8.91%	98.97%
Airtel 3G	0.68%	1.23%	99.56%	0.63%	0.12%	0.82%	1.42%	98.79%
BSNL 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
Reliance 3G	0.03%	0.00%	99.51%	0.13%	0.02%	0.23%	1.63%	99.87%
Vodafone 3G	1.51%	1.33%	99.68%	0.10%	0.16%	0.45%	4.72%	98.91%

3.3.2 PMR DATA – MAY FOR 3G

Month								
Name of Service Provider Month May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	3.44%	24.63%	99.16%	0.35%	0.00%	0.67%	7.53%	98.97%
Airtel 3G	0.59%	1.09%	98.42%	0.40%	0.12%	Not Providin	Not Providing	98.80%
BSNL 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
Reliance 3G	0.17%	0.36%	99.87%	0.08%	0.01%	0.20%	1.40%	99.86%
Vodafone 3G	1.16%	1.20%	99.76%	0.09%	0.10%	0.30%	3.58%	98.91%

3.3.3 PMR DATA - JUNE FOR 3G

Month								
Name of Service Provider Month June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.66%	28.39%	99.09%	0.28%	0.00%	0.68%	8.29%	98.97%
Airtel 3G	0.08%	0.14%	95.80%	0.78%	1.25%	1.09%	1.23%	98.96%
BSNL 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
Reliance 3G	1.66%	0.36%	98.88%	0.05%	0.00%	0.16%	0.60%	99.88%
Vodafone 3G	0.83%	1.10%	99.66%	0.03%	0.03%	0.37%	2.39%	98.90%

3.4 3 DAY DATA – CONSOLIDATED FOR 3G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	1.69%	1.58%	99.21%	0.24%	0.00%	0.65%	5.88%	99.02%
Airtel 3G	0.55%	0.00%	96.36%	0.47%	0.65%	0.99%	1.19%	99.13%
BSNL 3G	Not Providin	Not Providin	Not Providin	Not Providin	Not Providin	Not Providin	Not Providin	Not Providin
Reliance 3G	0.00%	0.00%	99.73%	0.09%	0.01%	0.19%	0.46%	NDR
Vodafone 3G	1.20%	0.31%	99.82%	0.02%	0.02%	0.45%	3.29%	98.91%

Note: BSNL 3G did not submit the data for audit.

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

Node Bs downtime:

All operators met the benchmark for Node Bs downtime.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR.

RRC Congestion:

All operators met the benchmark for RRC Congestion.

Circuit Switched RAB Congestion:

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

Circuit Switched Voice Call Drop Rate:

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

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

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

Circuit Switch Voice Quality:

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

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

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

3.4.1 3 DAY DATA - APRIL FOR 3G

Name of Service Provider 3 Day April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.18%	0.74%	99.06%	0.23%	0.00%	0.73%	6.42%	99.01%
Airtel 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
BSNL 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
Reliance 3G	0.00%	0.00%	99.46%	0.14%	0.02%	0.23%	0.69%	NDR
Vodafone 3G	1.33%	0.33%	99.82%	0.04%	0.02%	0.45%	5.39%	98.92%

3.4.2 3 DAY DATA – MAY FOR 3G

3 Day								
Name of Service Provider 3 Day May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	3.16%	2.00%	99.37%	0.32%	0.00%	0.64%	5.52%	99.03%
Airtel 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	0.74%	1.17%	Not Providing
BSNL 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
Reliance 3G	0.00%	0.00%	99.90%	0.06%	0.00%	0.17%	0.68%	NDR
Vodafone 3G	1.69%	0.32%	99.84%	0.02%	0.03%	0.43%	3.24%	98.90%

3.4.3 3 DAY DATA - JUNE FOR 3G

3 Day								
Name of Service Provider 3 Day June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.06%	2.00%	99.19%	0.18%	0.00%	0.58%	5.64%	99.03%
Airtel 3G	0.55%	0.00%	96.36%	0.47%	0.65%	0.99%	1.20%	99.13%
BSNL 3G	Not Providing	Not Providing	Not Providin	Not Providing	Not Providin	Not Providin	Not Providing	Not Providing
Reliance 3G	0.00%	0.00%	99.83%	0.07%	0.01%	0.17%	0.23%	NDR
Vodafone 3G	0.65%	0.29%	99.81%	0.00%	0.01%	0.47%	1.50%	98.91%

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

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	99.08%	99.83%	1.90%	98.98%	99.72%	1.44%
Airtel	98.96%	NDR	NDR	NDR	NDR	NDR
BSNL CDMA	NDR	NDR	NDR	NDR	NDR	NDR
BSNL GSM	NDR	NDR	NDR	NDR	NDR	NDR
Idea	NDR	99.63%	0.18%	NDR	99.86%	0.18%
Reliance GSM	100.00%	99.56%	0.82%	NDR	NDR	NDR
Vodafone	99.76%	99.64%	2.92%	NDR	99.54%	2.47%

NDR: Data did not received from Operators

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

Activation done within 4 hours:

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

PDP Context activation success rate:

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

Drop Rate:

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

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

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel 3G	99.15%	99.92%	1.13%	NDR	NDR	NDR
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	100.00%	99.56%	0.82%	NDR	NDR	NDR

NDR: Data were not submitted by most of operators

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	56.00%	56.00%	13.00%	61.54%	76.52%	57.00%
Airtel	82.00%	83.00%	33.00%	42.42%	83.45%	81.00%
BSNL CDMA	NA	NA	13.00%	76.92%	75.59%	NA
BSNL GSM	71.00%	71.00%	29.00%	86.21%	50.00%	77.00%
Idea	63.00%	63.00%	97.00%	95.88%	77.66%	54.00%
Reliance GSM	41.00%	41.00%	6.00%	100.00%	68.13%	52.00%
Vodafone	77.00%	77.00%	94.00%	94.68%	68.67%	78.00%

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.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators failed to meet the TRAI benchmark of 95%, except Idea.

Customer Care / Helpline Assessment (voice to voice)

All operators failed to meet the benchmark for the parameter except Idea and Reliance GSM.

Level 1 Service

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

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

Complaint/Request Attended to Satisfaction

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

3.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.04%	0.02%	100.00%	100.00%	100.00%	96.12%	95.39%
Airtel	0.04%	0.00%	100.00%	100.00%	100.00%	99.98%	73.43%
BSNL CDMA	0.03%	NA	100.00%	100.00%	100.00%	100.00%	96.43%
BSNL GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.08%	97.60%
Idea	0.31%	0.07%	100.00%	100.00%	100.00%	96.62%	99.78%
Reliance GSM	0.09%	0.02%	100.00%	100.00%	100.00%	98.00%	96.68%
Vodafone	0.11%	0.04%	100.00%	100.00%	100.00%	99.64%	100.00%

Metering and Billing Credibility – Post-paid Subscribers

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

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, all operators met the benchmark of charging disputes. BSNL GSM performed the best with 0.00% disputes.

Resolution of billing complaints

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

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

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

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark of 95% IVR call.

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

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

3.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment							
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Aircel	NA	92.00%	89.00%	90.00%	92.00%	90.00%	86.00%
Airtel	94.00%	NA	85.00%	88.00%	95.00%	87.00%	92.00%
BSNL CDMA	93.00%	94.00%	NA	95.00%	94.00%	84.00%	85.00%
BSNL GSM	92.00%	93.00%	90.00%	NA	93.00%	87.00%	91.00%
Idea	91.00%	93.00%	92.00%	94.00%	NA	86.00%	95.00%
Reliance GSM	88.00%	81.00%	87.00%	88.00%	83.00%	NA	88.00%
Vodafone	93.00%	93.00%	92.00%	93.00%	95.00%	86.00%	NA

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

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

3.10 COMPARISON BETWEEN IMRB AND OPERATORS DATA FOR 3G

Circle	Operator	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call Drop Rate		Worst affected cells having more than 3%)		Connection with good voice quality		Point of Interconnection (POI)	
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
Assam	Aircel	4.18	4.09	29.42	29.40	90.89	90.89	1.44	1.44	6.47	6.48	1.90	1.90	17.22	17.30	91.00	91.00	0.00	0.00
	Airtel	0.50	0.49	1.06	0.83	95.97	95.93	0.82	0.81	1.30	1.29	0.94	0.98	1.18	1.20	99.08	99.05	0.00	0.00
	BSNL	1.99	2.33	1.94	6.33	98.27	97.27	0.89	2.19	1.73	2.32	1.92	1.97	2.97	3.71	96.07	NA	0.00	0.00
	Idea	1.54	1.50	1.18	1.18	97.53	97.52	0.37	0.37	0.53	0.53	0.45	0.45	2.27	2.27	95.75	95.75	0.00	0.00
	RTL		NS		NS		NS		NS		NS		NS		NS		NS		NS
	Vodafone	1.04	0.96	1.68	1.68	98.72	98.72	0.66	0.66	1.28	1.28	0.71	0.71	2.51	2.51	96.62	96.62	0.00	0.00

3.11 COMPARISON BETWEEN IMRB AND OPERATORS DATA FOR 3G

Circle	Operator	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		Call Set-up Success Rate		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched voice drop rate		%Circuit Switch Voice Quality		Point of Interconnection (POI)	
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
Assam	Aircel	3.13	1.87	21.70	21.76	99.00	99.00	0.36	0.36	0.00	0.00	0.70	0.70	8.24	8.21	98.97	98.97	0	0.00
	Airtel	0.64	0.36	1.15	0.71	97.64	97.93	0.48	0.60	0.12	0.50	0.77	1.09	1.27	1.30	98.80	98.96	0	0.00
	BSNL	1.90	NDR	1.97	NDR	96.00	NDR	0.00	NDR	0.00	NDR	1.77	NDR	2.90	NDR	96.07	NDR	0	NDR
	RTL	0.12	0.12	0.24	0.25	99.42	99.42	0.05	0.09	0.05	0.01	0.20	0.20	1.21	1.06	99.87	99.87	0	0.00
	vodafone	1.19	1.15	1.21	1.20	99.70	99.70	0.07	0.08	0.10	0.10	0.37	0.37	3.56	3.51	98.91	98.90	0	0.00

IMRB audit data

Difference between IMRB and Operators data

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel did not meet the benchmark for BTS Accumulated downtime; worst affected BTSs due to downtime (29.40%), TCH congestion, CSSR, SDCCH congestion, worst affected cells having more than 3% TCH drop and voice quality (17.30%).
- BSNL CDMA failed to meet the benchmark for worst affected BTSs due to downtime (30.04%) and Worst Affected Cells Having More than 3% TCH Drop
- BSNL GSM did not meet the benchmark for BTS Accumulated downtime (6.33%); worst affected BTSs due to downtime, SDCCH congestion, TCH congestion and Voice quality.

3 Day Live Measurement (Network Parameters) for 2G

- Aircel did not meet the benchmark for BTS Accumulated downtime; worst affected BTSs due to downtime, TCH congestion, SDCCH congestion, worst affected cells having more than 3% TCH drop (14.15%) and Voice quality.
- BSNL CDMA failed to meet the benchmark for worst affected BTSs due to downtime and worst affected cells having more than 3% TCH Drop (7.20%).
- Aircel and BSNL GSM failed to meet the benchmark for SDCCH congestion (6.34%) and call drop rate.

PMR Consolidated (Network Parameters) for 3G

- Aircel failed to meet the benchmark for worst affected Node Bs due to downtime (21.76%) and worst affected cells having more than 3% Circuit switched voice drop rate (8. 21%).
- Vodafone 3G 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 3G and Vodafone 3G failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate.

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.
- For the IVR aspect, all operators failed to meet the TRAI benchmark of 95%, except Idea.
- All operators failed to meet the benchmark for the parameter except Idea and Reliance GSM.
- None of the operators met the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

Metering and billing credibility

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

Customer Care

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

Drive Test Voice 2G

- In Silchar SSA Aircel, BSNL CDMA, BSNL GSM, Idea did not meet the benchmark for voice quality in outdoor locations and Vodafone did not meet the benchmark in indoor locations.
- In Silchar SSA BSNL CDMA, BSNL GSM and idea failed to meet the benchmark for CSSR in outdoor locations.
- In Silchar SSA BSNL CDMA, BSNL GSM and idea failed to meet the benchmark for call drop rate in outdoor locations.

Drive Test Voice 2G

- In Silchar SSA Airtel 3G did not meet the benchmark for voice quality in indoor locations and Vodafone 3G did not meet the benchmark in outdoor locations.
- In Silchar SSA Airtel 3G and BSNL 3G failed to meet the benchmark for CSSR in outdoor locations.
- In Silchar SSA Aircel 3G and BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.

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 –**

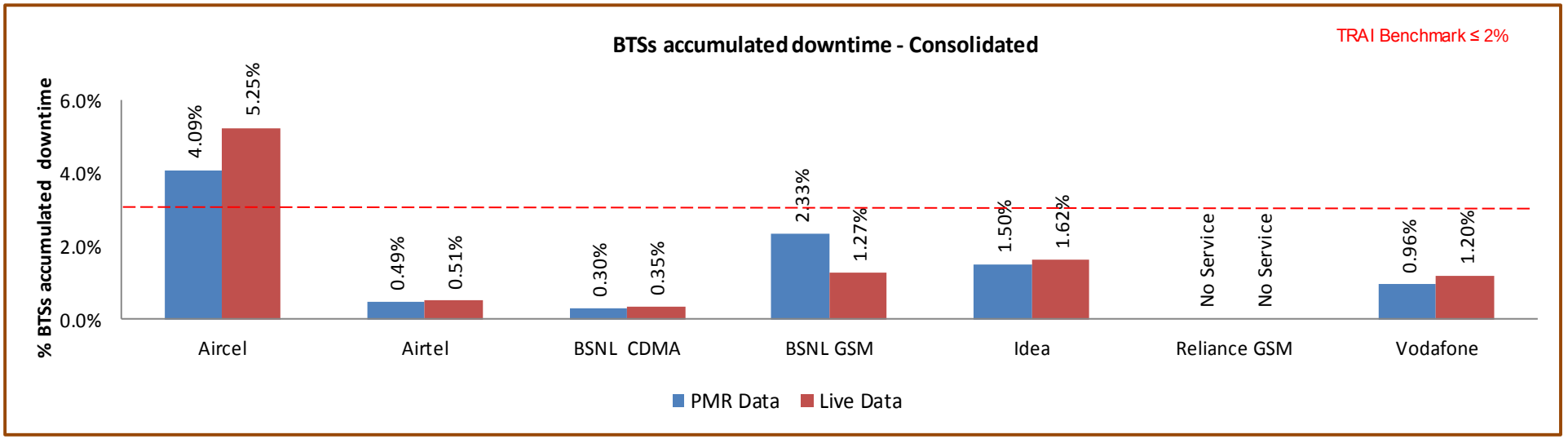
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

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

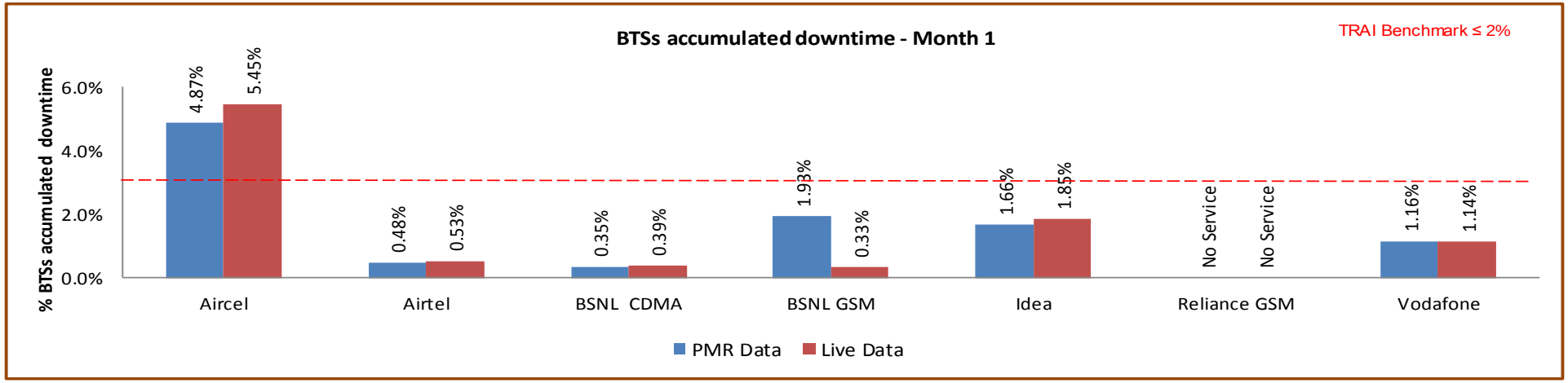


Data Source: Operations and Maintenance Center (OMC) of the operators

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

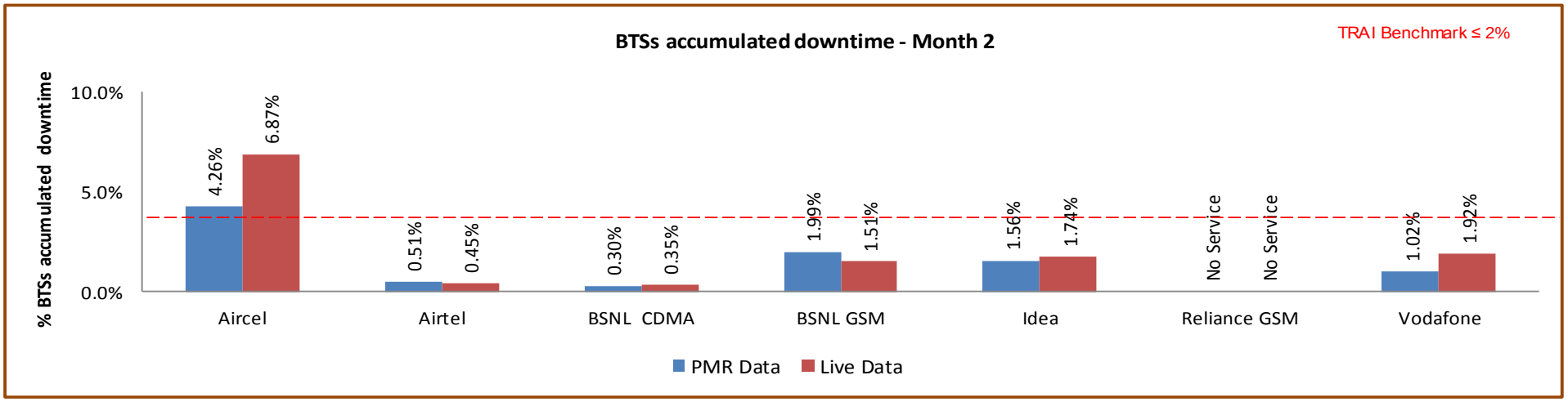
Significant difference was observed between PMR & live measurement data for Aircel and BSNL GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.1.2.1 KEY FINDINGS – MONTH 1



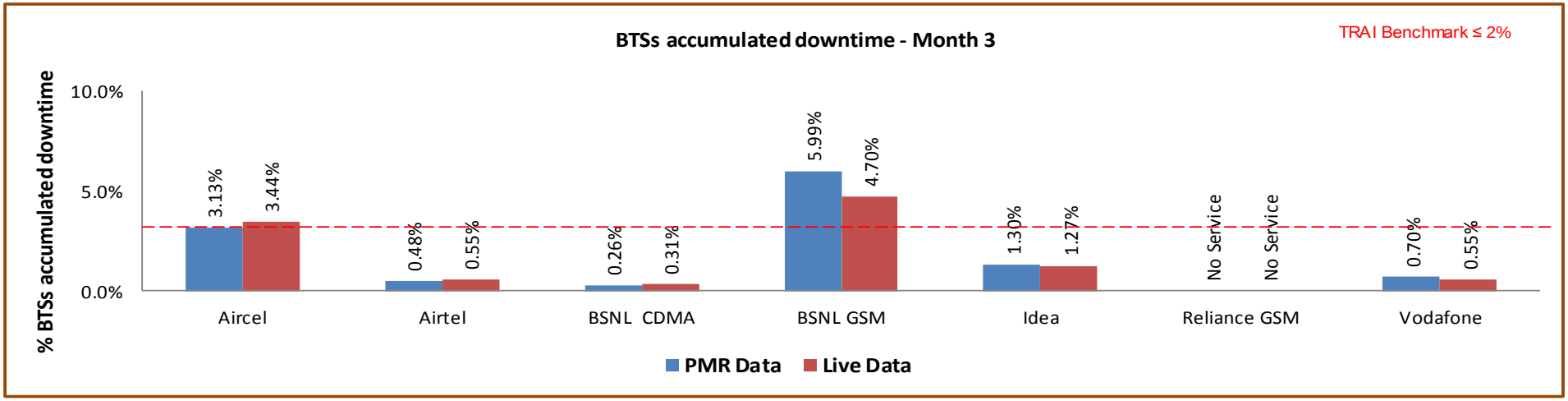
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

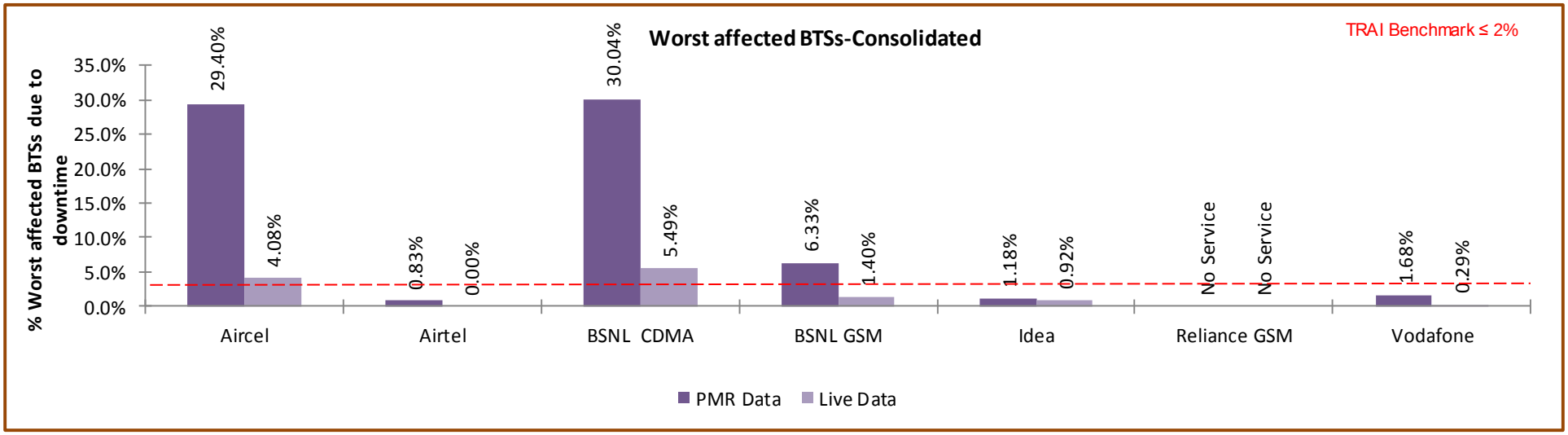
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

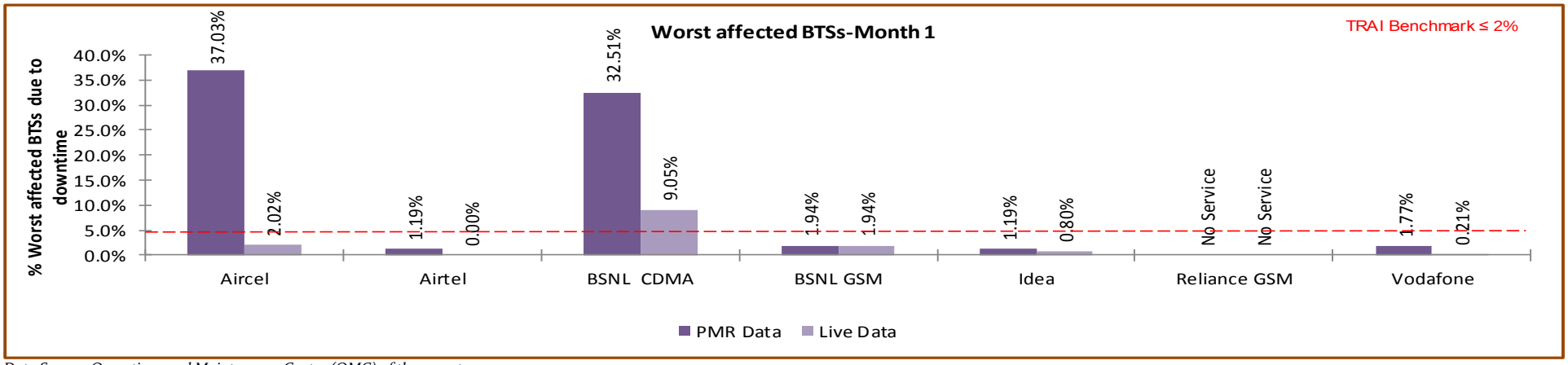


Data Source: Operations and Maintenance Center (OMC) of the operators

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

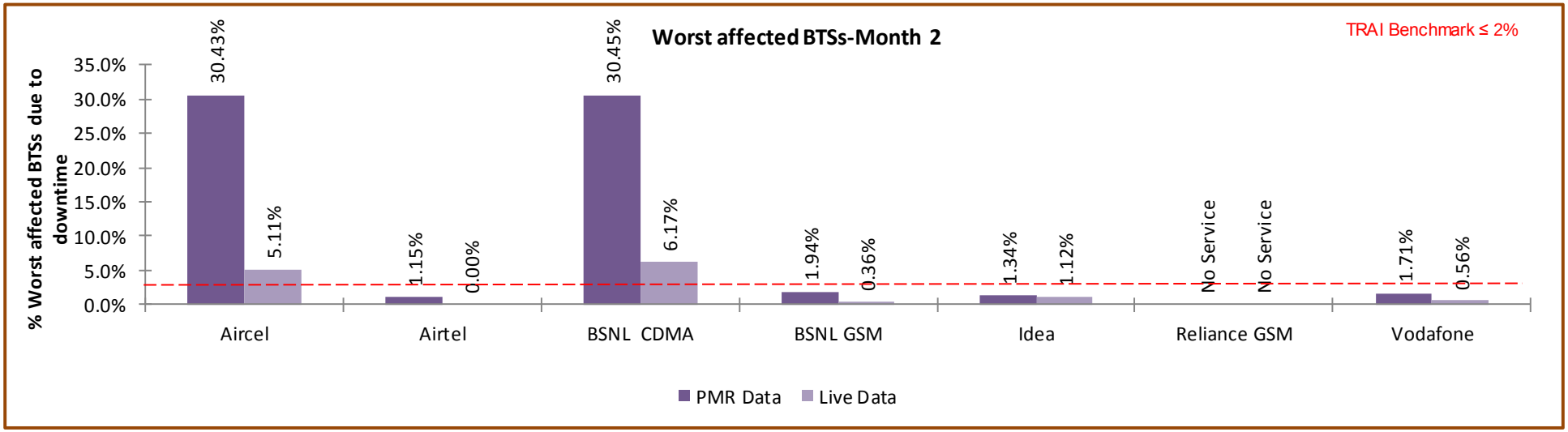
Significant difference was observed between PMR & live measurement data for Aircel and BSNL CDMA &GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



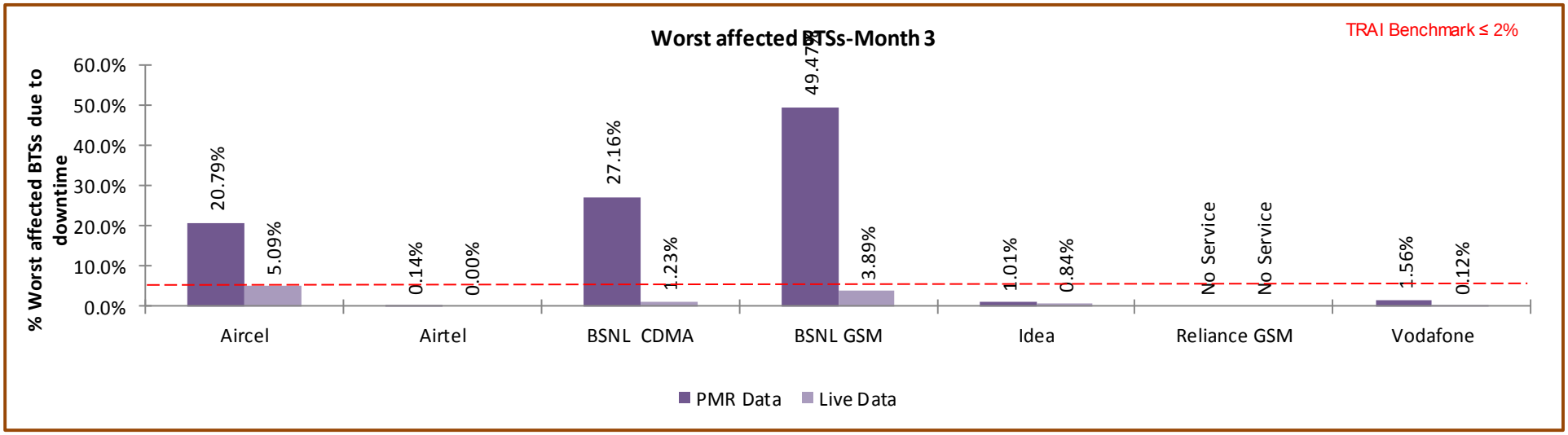
Data Source: Operations and Maintenance Center (OMC) of the operators

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

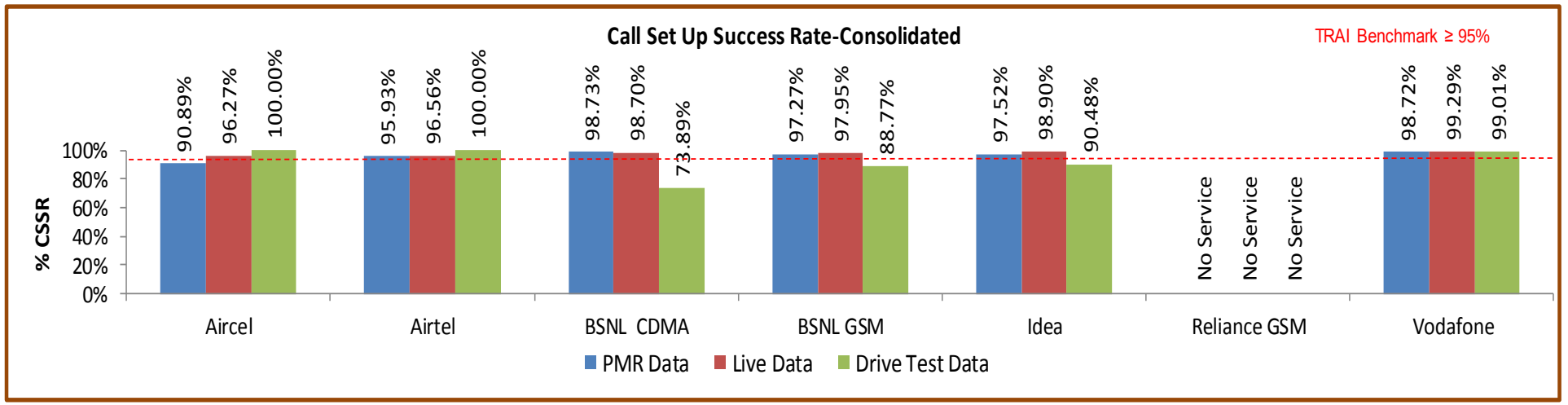
   Call Established means the following events have happened in call setup:-

   - 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

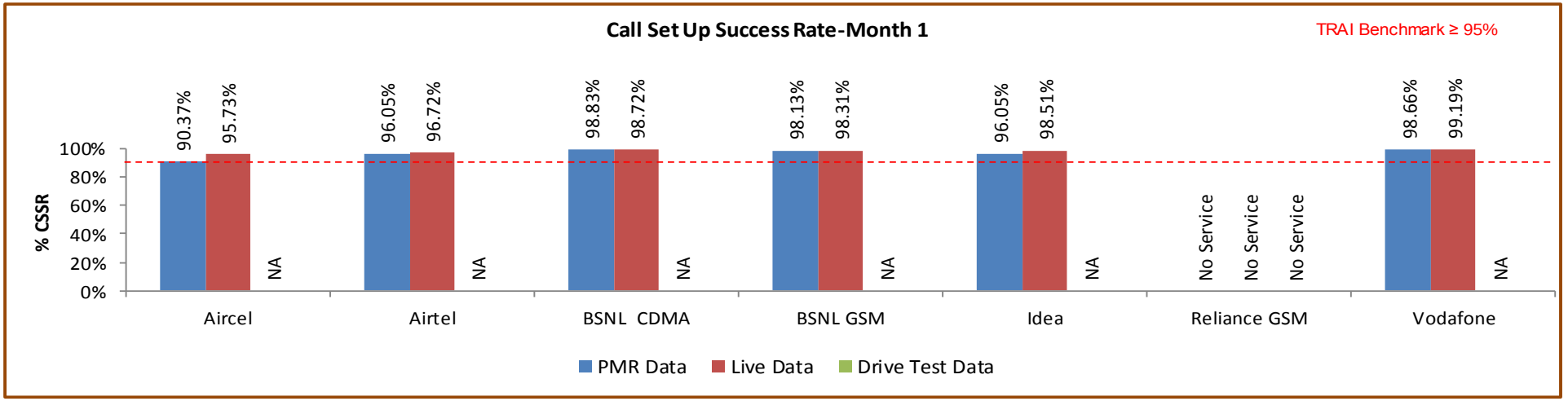


Data Source: Network Operations Center (NOC) of the operators

Aircel failed to meet the TRAI benchmark as per audit/PMR data. However, all operators met the benchmark for PMR as well as 3 days live. During drive test BSNL CDMA, BSNL GSM and Idea failed to meet the benchmark.

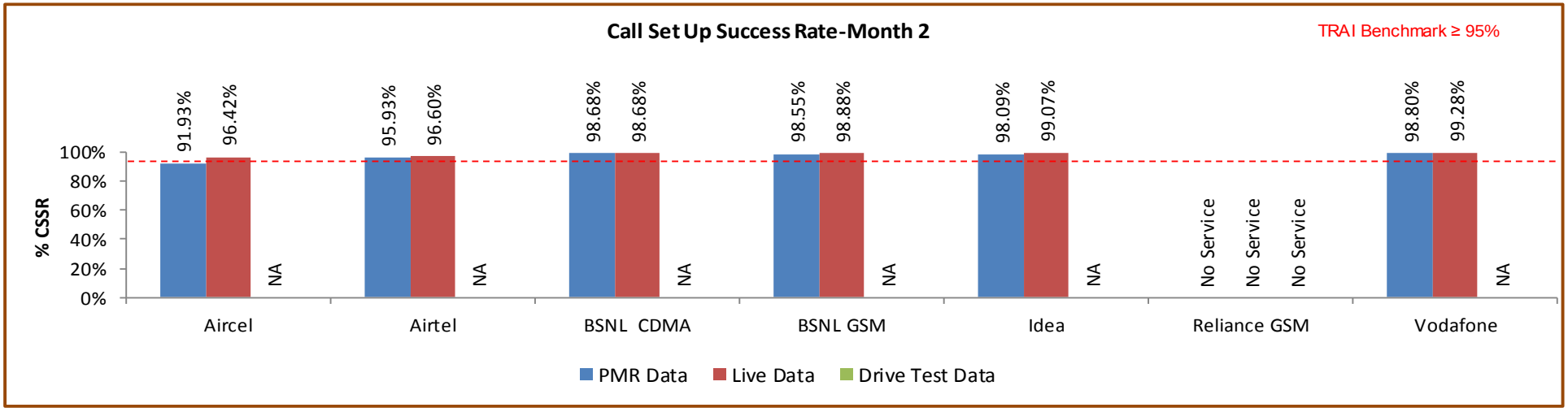
To calculate CSSR, Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in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

5.3.2.1 KEY FINDINGS – MONTH 1



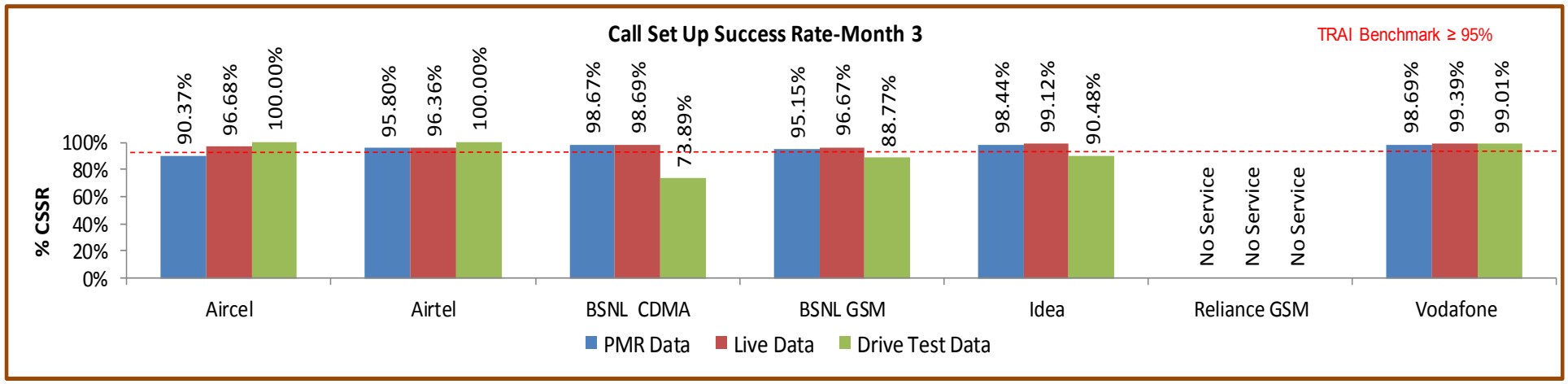
Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – MONTH 2



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

5.3.2.3 KEY FINDINGS – MONTH 3



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

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

5.4.1 PARAMETER DESCRIPTION

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

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

2. **Computational Methodology:**

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

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

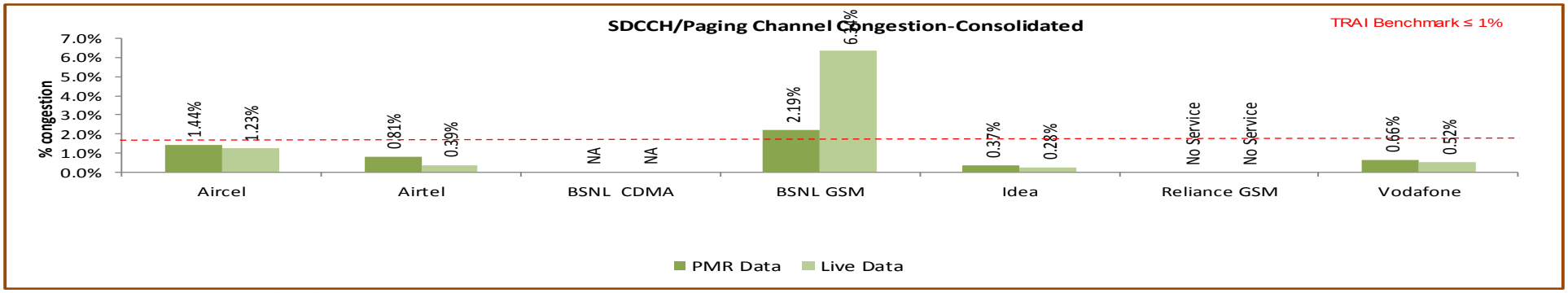
3. **Benchmark:**

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

4. **Audit Procedure –**

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

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



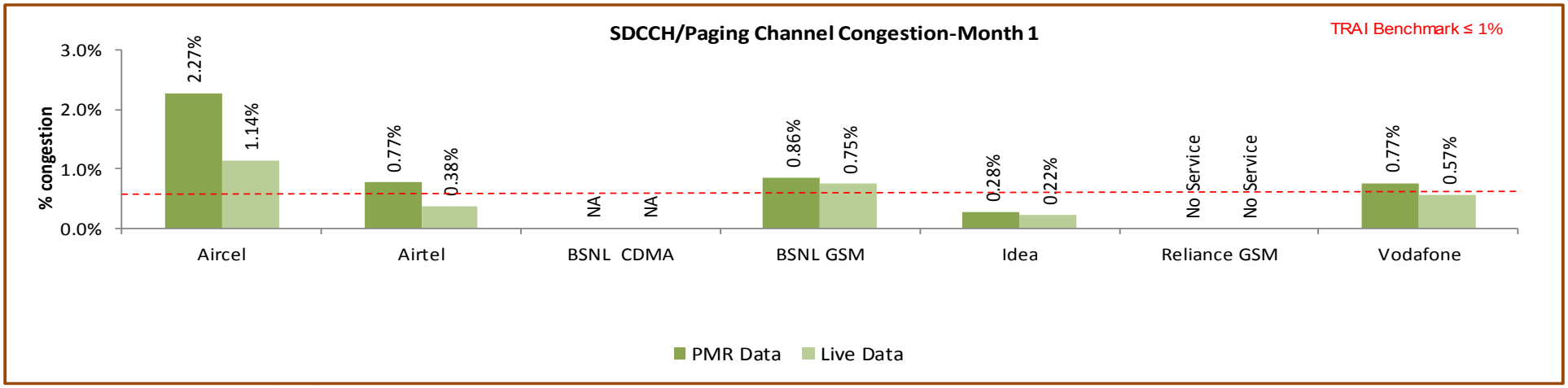
Data Source: Network Operations Center (NOC) of the operators

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

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

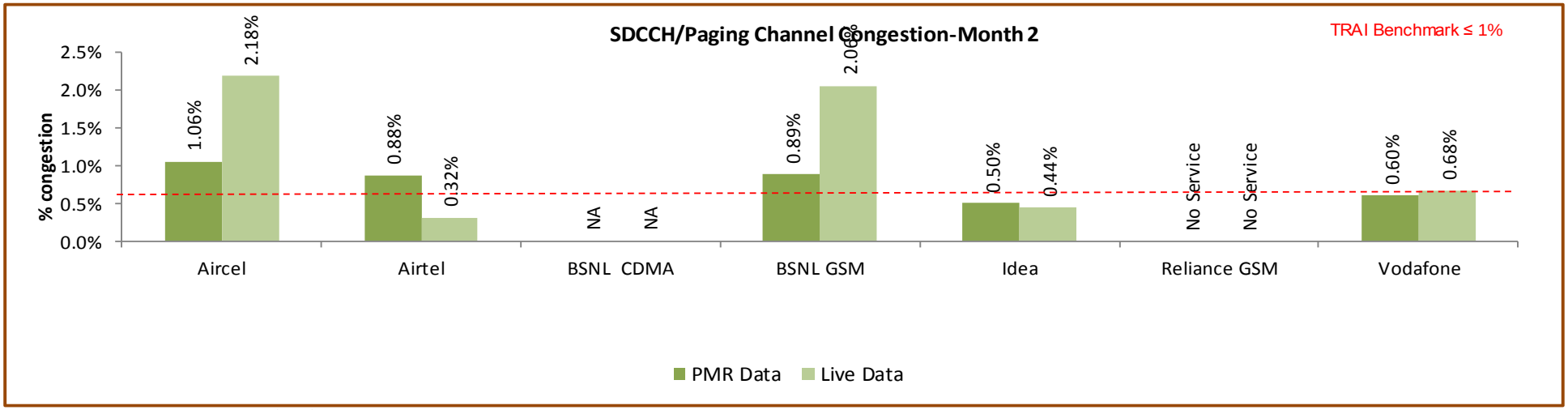
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

5.4.2.1 KEY FINDINGS – MONTH 1



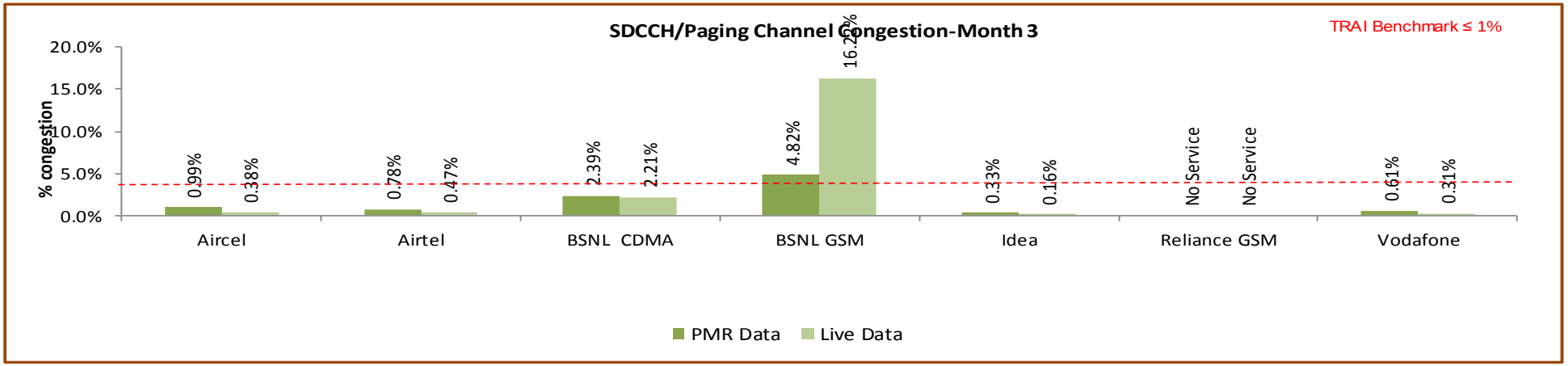
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



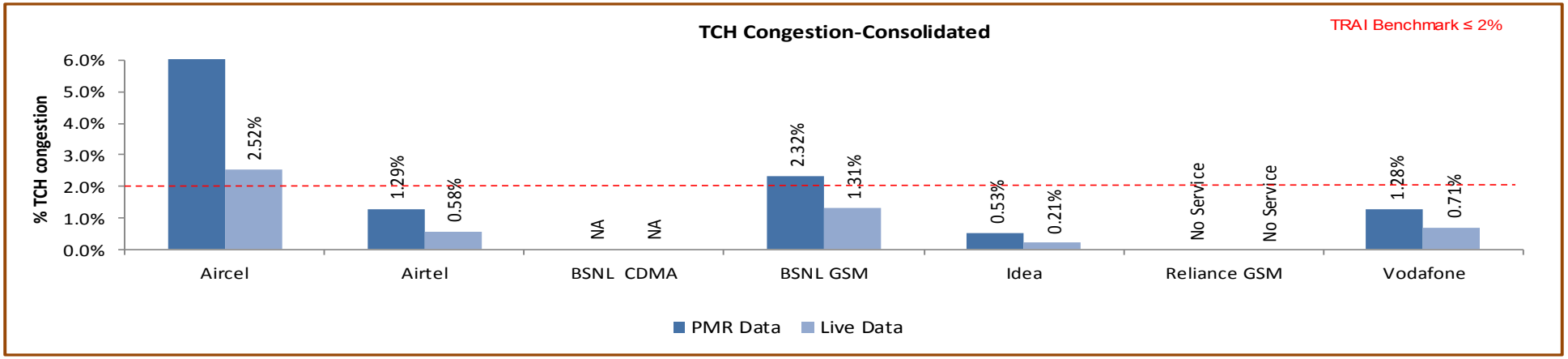
Data Source: Network Operations Center (NOC) of the operators

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)

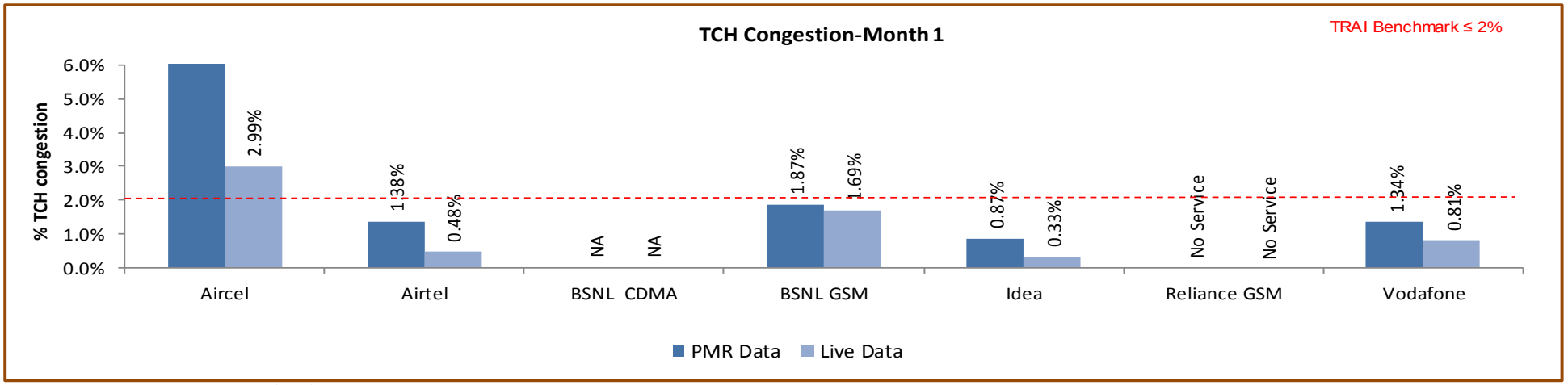


Data Source: Network Operations Center (NOC) of the operators

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

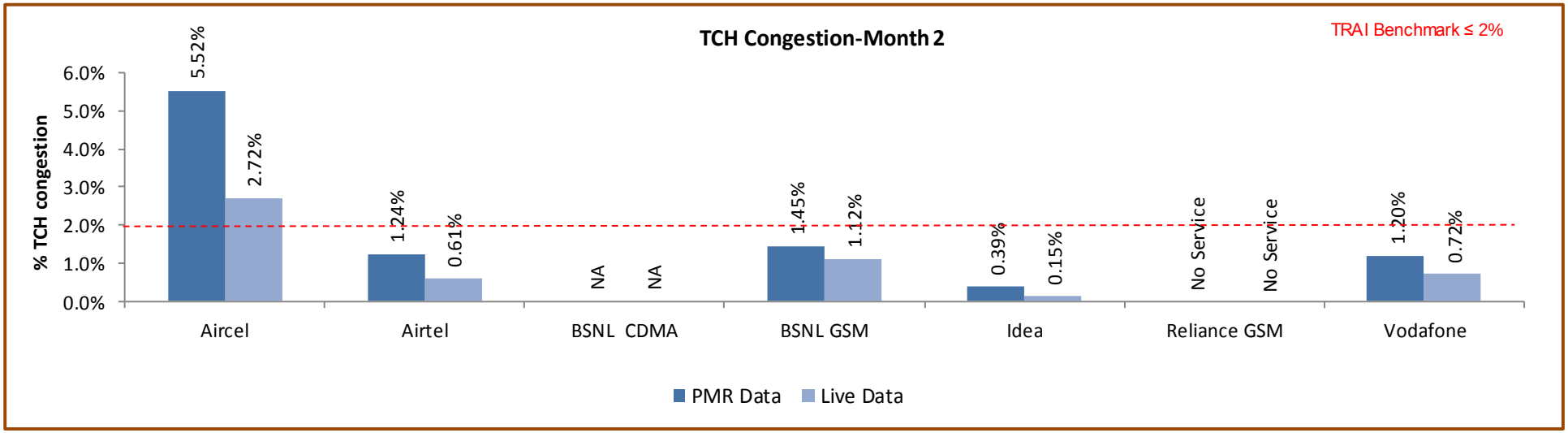
Significant difference was observed between PMR & live measurement data for Aircel, BSNL GSM, Airtel, Vodafone and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.4.3.1 KEY FINDINGS – MONTH 1



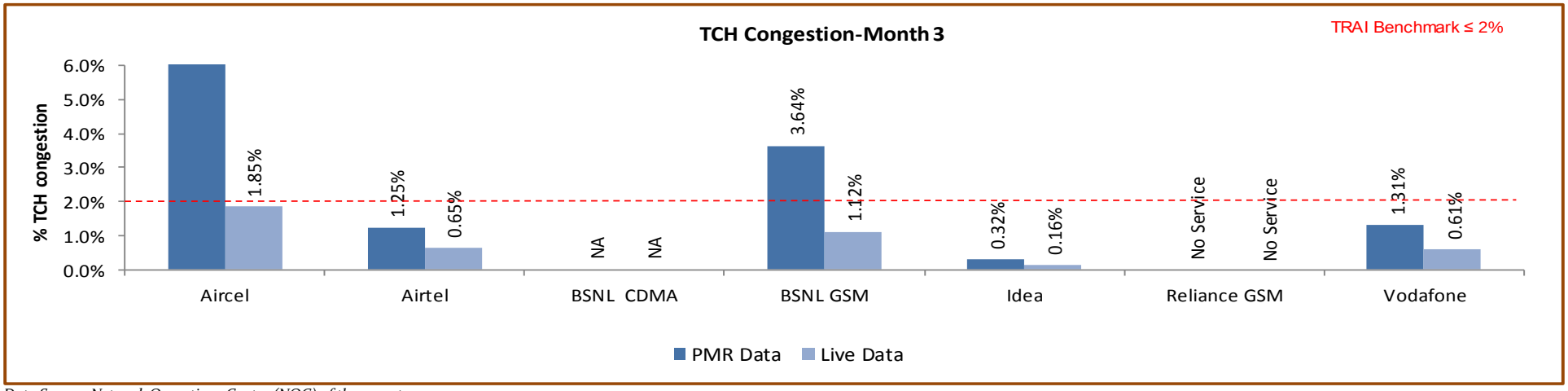
Data Source: Network Operations Center (NOC) of the operators

5.4.3.2 KEY FINDINGS – MONTH 2



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

5.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		55	15	0	13	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		294599	342801	0	50567	115424	No Service	5808939
Traffic served for all POIs (B)- in erlangs		186234	116011	0	44826	68098	No Service	4141421
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		54	15	0	13	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		291230	342725	0	50567	115695	No Service	1390690
Traffic served for all POIs (B)- in erlangs		130661	99495	0	40022	66814	No Service	667805
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

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

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-April								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		95893	114304	0	25284	44154	No Service	1926438
Traffic served for all POIs (B)- in erlangs		60732	37467	0	22605	25810	No Service	1265456
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-April								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		95767	114304	0	25284	43516	No Service	475533
Traffic served for all POIs (B)- in erlangs		6182	30016	0	22605	25392	No Service	148809
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-May								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		54	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		97187	114376	0	25284	34582	No Service	2003807
Traffic served for all POIs (B)- in erlangs		62019	39186	0	22222	20811	No Service	1386744
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		96818	114301	0	25284	35560	No Service	457573
Traffic served for all POIs (B)- in erlangs		61234	30122	0	17417	20526	No Service	381626
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-June								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		58	15	0	0	33	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		101520	114121	0	0	36688	No Service	1878694
Traffic served for all POIs (B)- in erlangs		63482	39357	0	0	21477	No Service	1489220
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		57	15	0	0	33	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		98645	114121	0	0	36618	No Service	457584
Traffic served for all POIs (B)- in erlangs		63246	39357	0	0	20896	No Service	137370
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

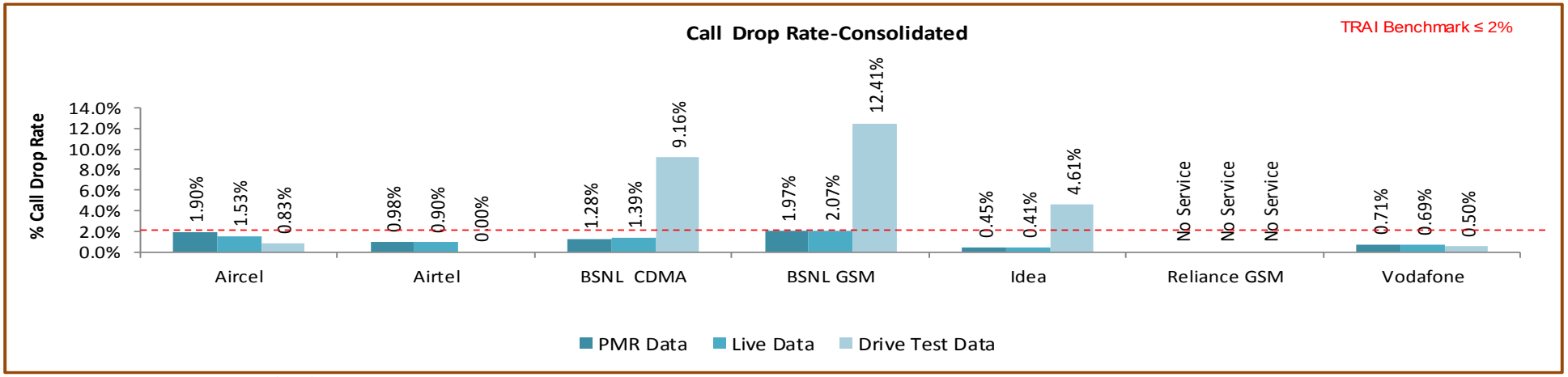
Data Source: Network Operations Center (NOC) of the operators

5.5 CALL DROP RATE

5.5.1 PARAMETER DESCRIPTION

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

5.5.2 KEY FINDINGS - CONSOLIDATED

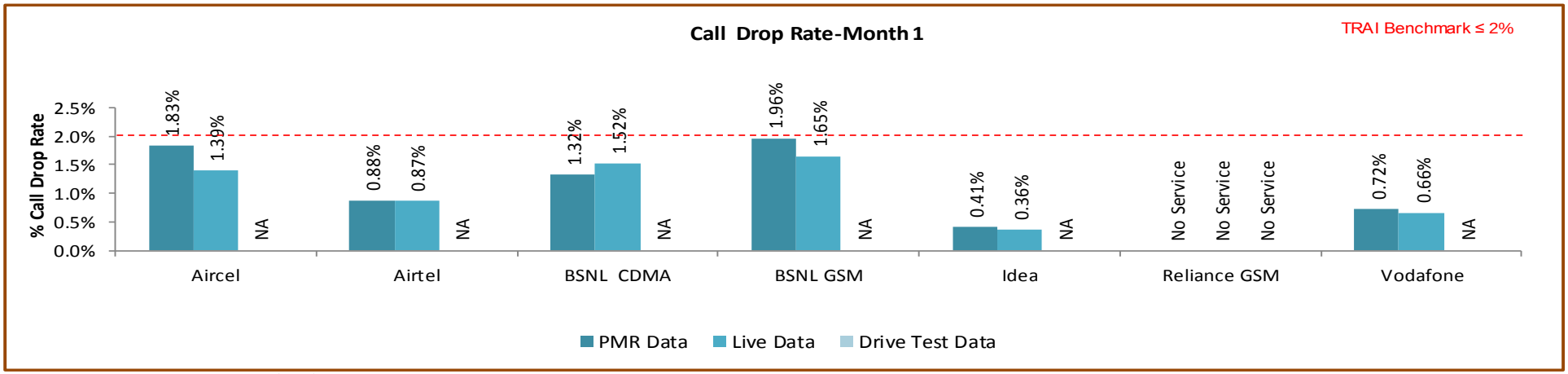


Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for call drop rate during audit except BSNL GSM for 3 days live. During drive test BSNL CDMA, BSNL GSM and Idea failed to meet the TRAI benchmark.

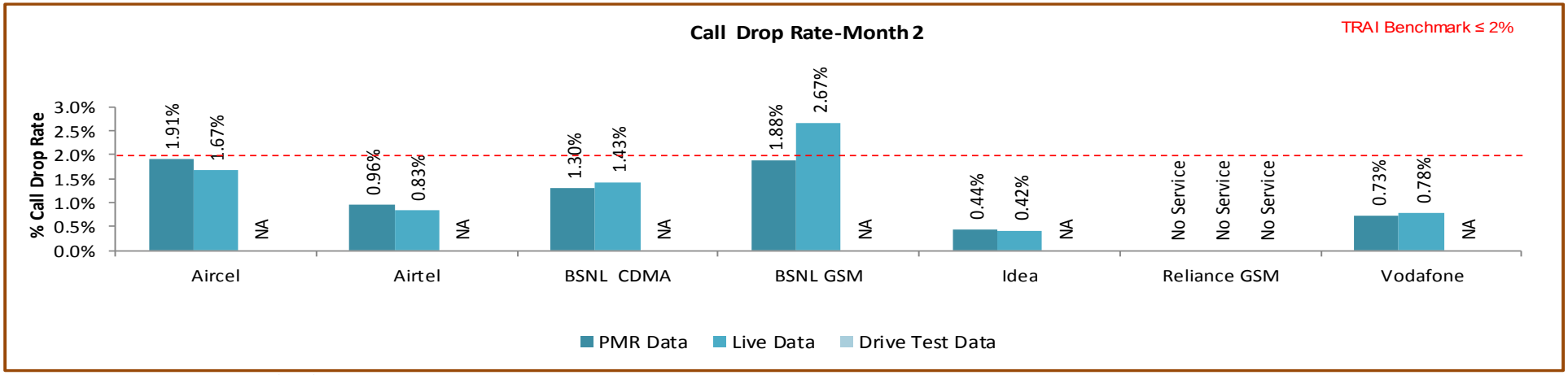
Significant difference was observed between PMR & live measurement data for Aircel. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.5.2.1 KEY FINDINGS – MONTH 1



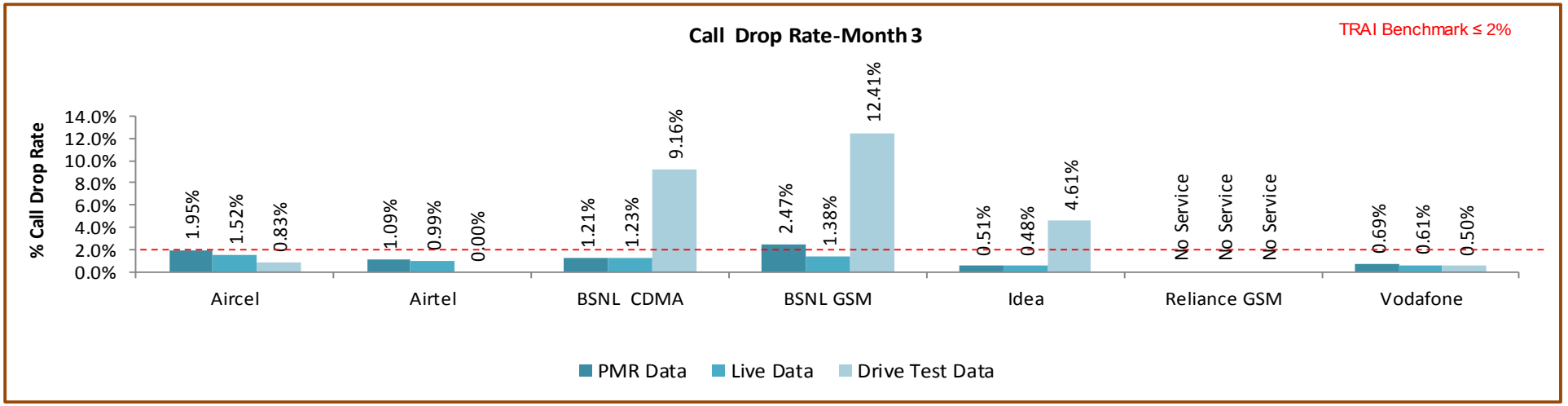
Data Source: Network Operations Center (NOC) of the operators

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 –**

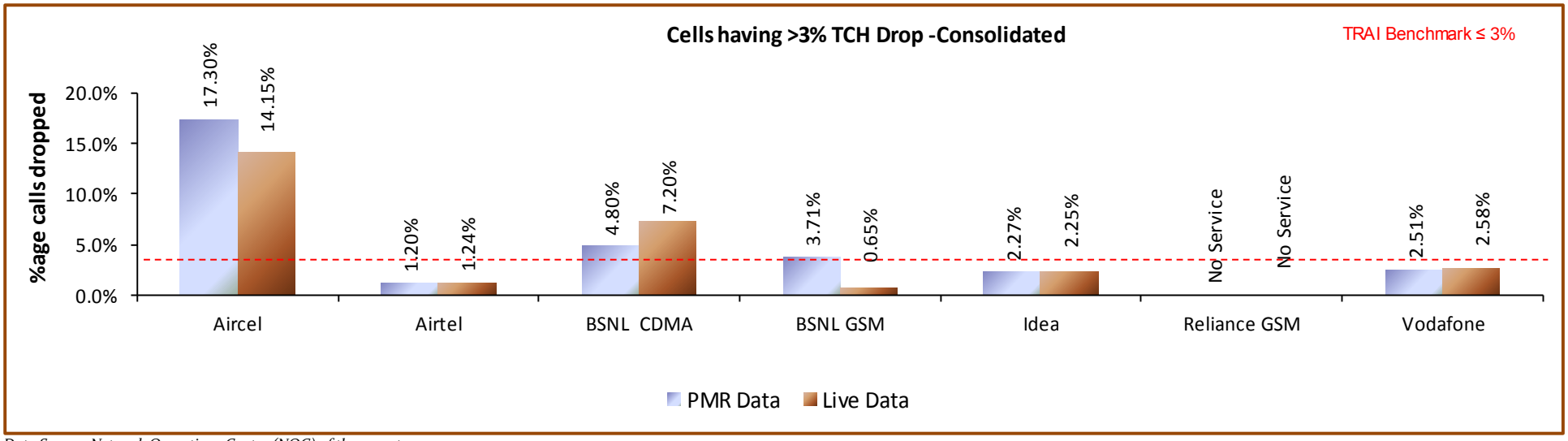
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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

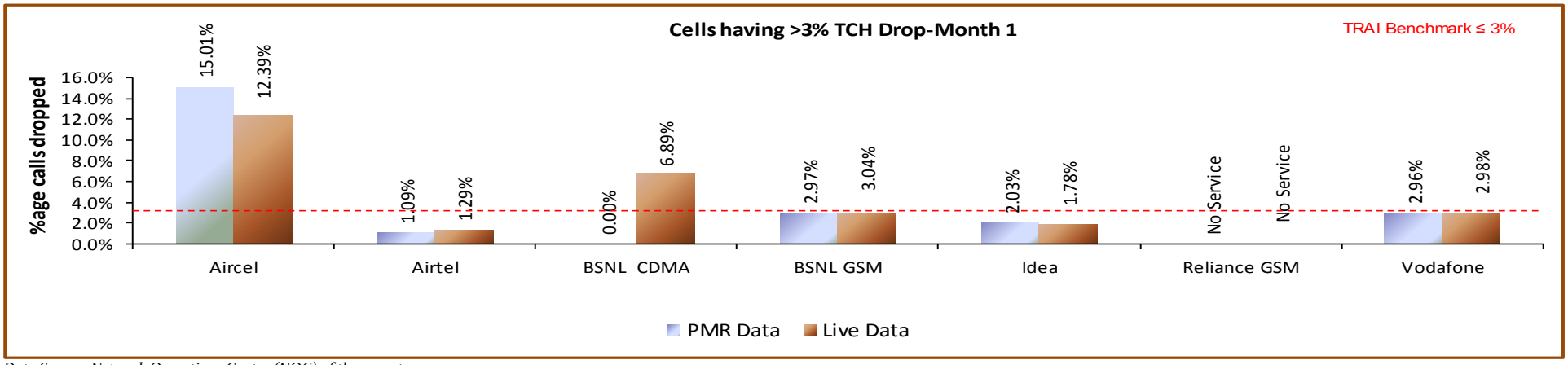


Data Source: Network Operations Center (NOC) of the operators

Aircel, BSNL GSM and BSNL CDMA failed to meet the TRAI benchmark.

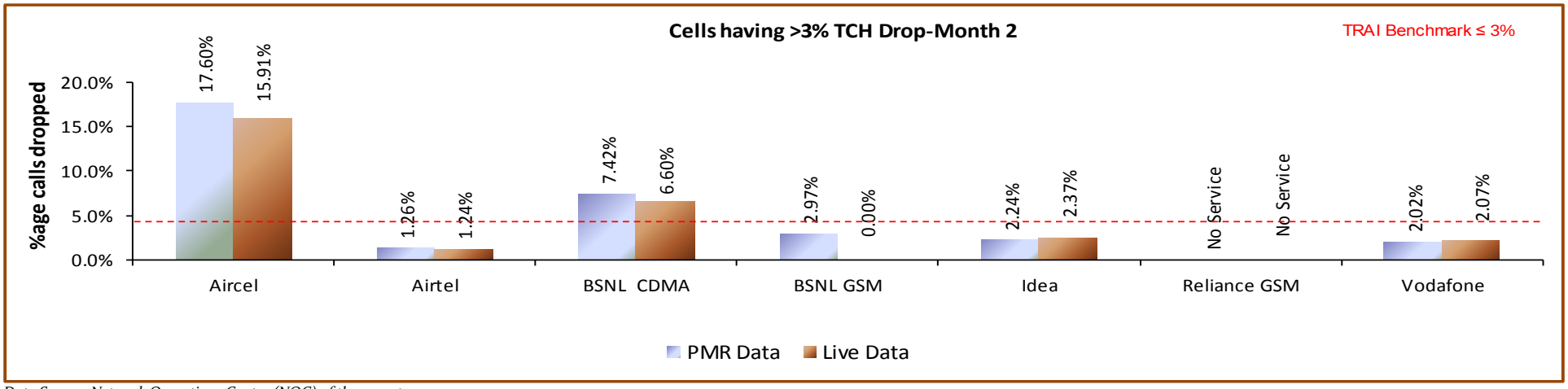
Significant difference was observed between PMR & live measurement data for Aircel and BSNL CDMA & GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.6.2.1 KEY FINDINGS – MONTH 1



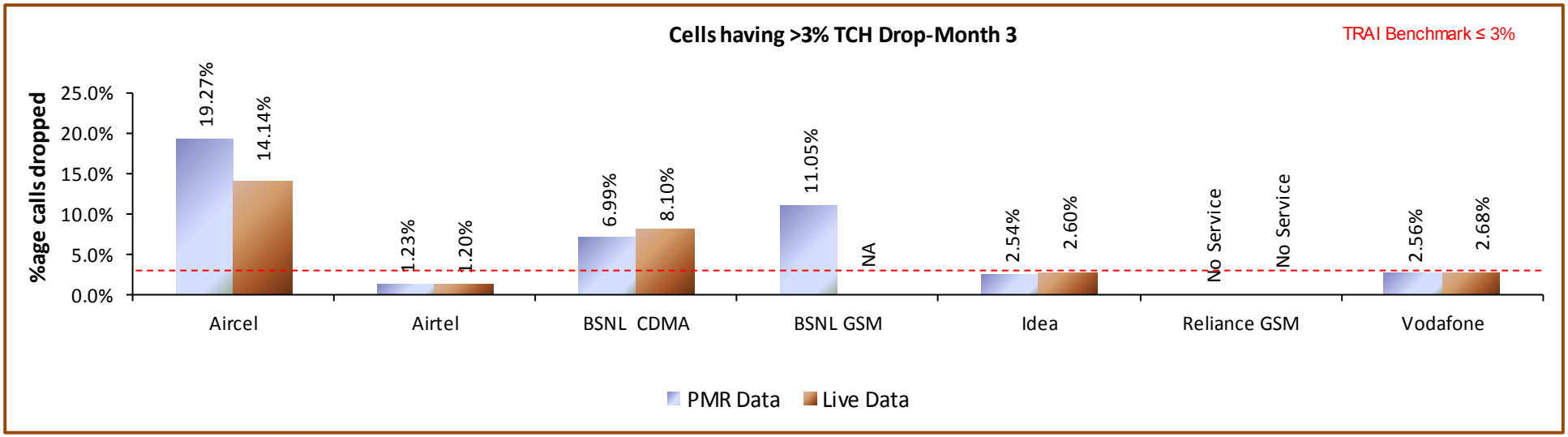
Data Source: Network Operations Center (NOC) of the operators

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**

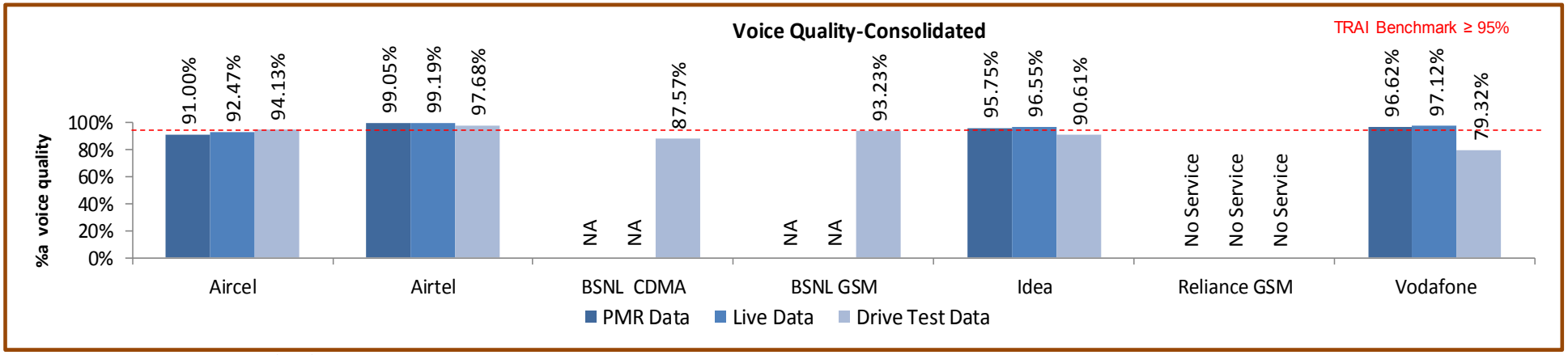
3. **TRAI Benchmark:** ≥ 95%

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.

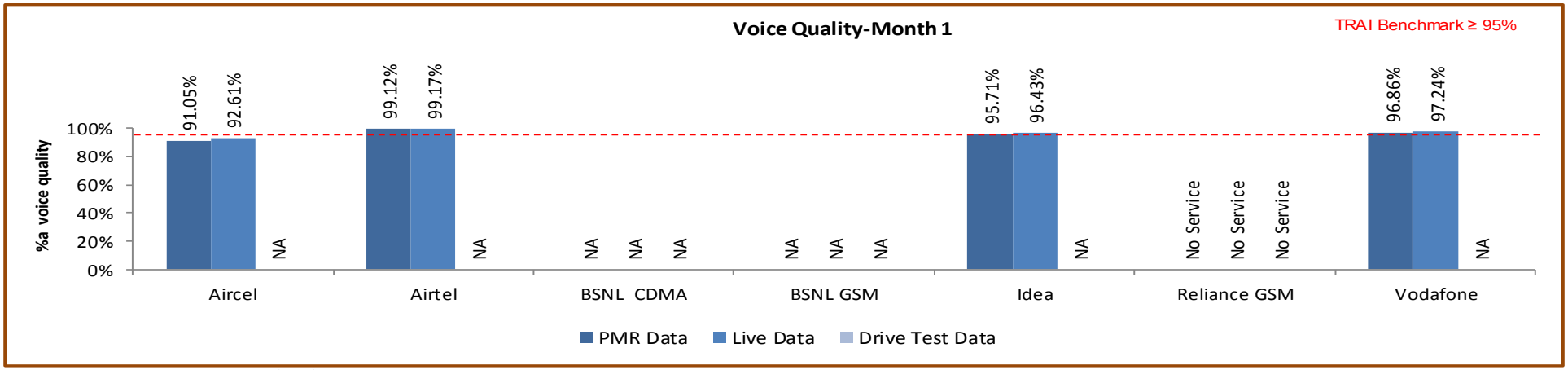
5.7.2 KEY FINDINGS



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

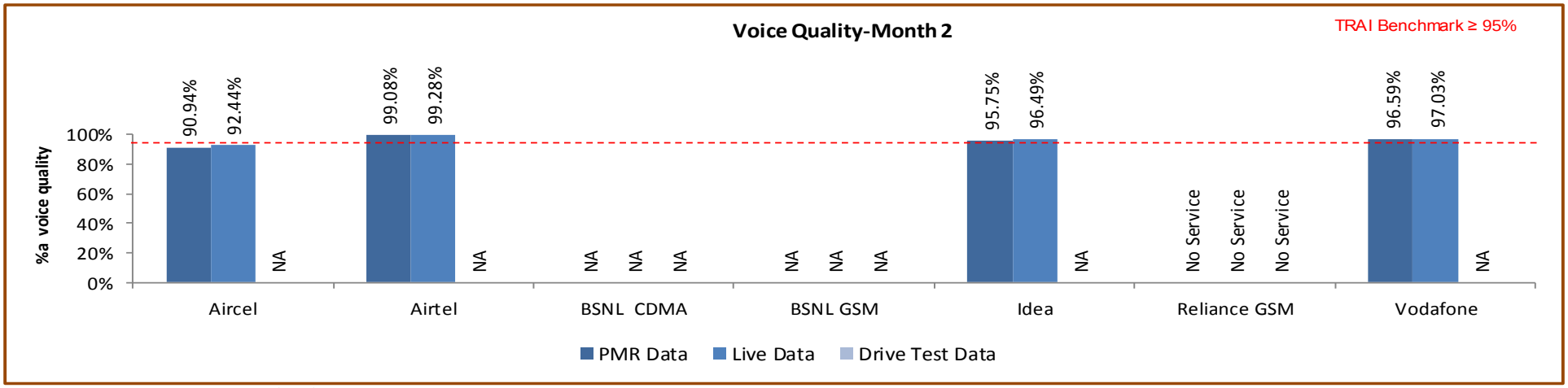
Aircel were not able to meet the benchmark for Voice quality as per PMR data. During drive test Aircel, BSNL CDMA, BSNL GSM, Idea and Vodafone failed to meet the benchmark.

5.7.2.1 KEY FINDINGS – MONTH 1



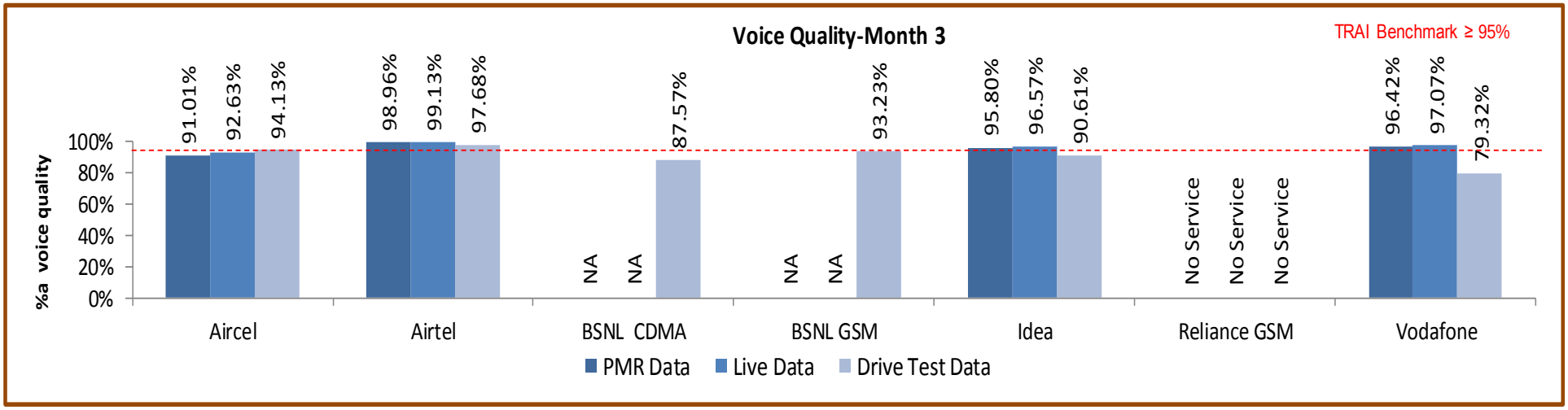
Data Source: Network Operations Center (NOC) of the operators

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 –

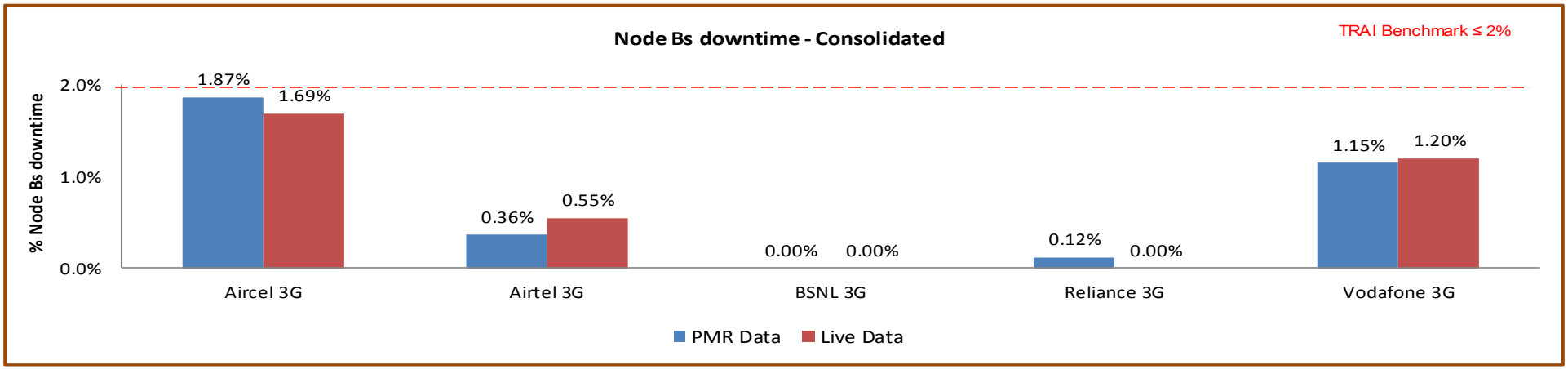
a. Node Bs downtime (not available for service) ≤ 2%

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

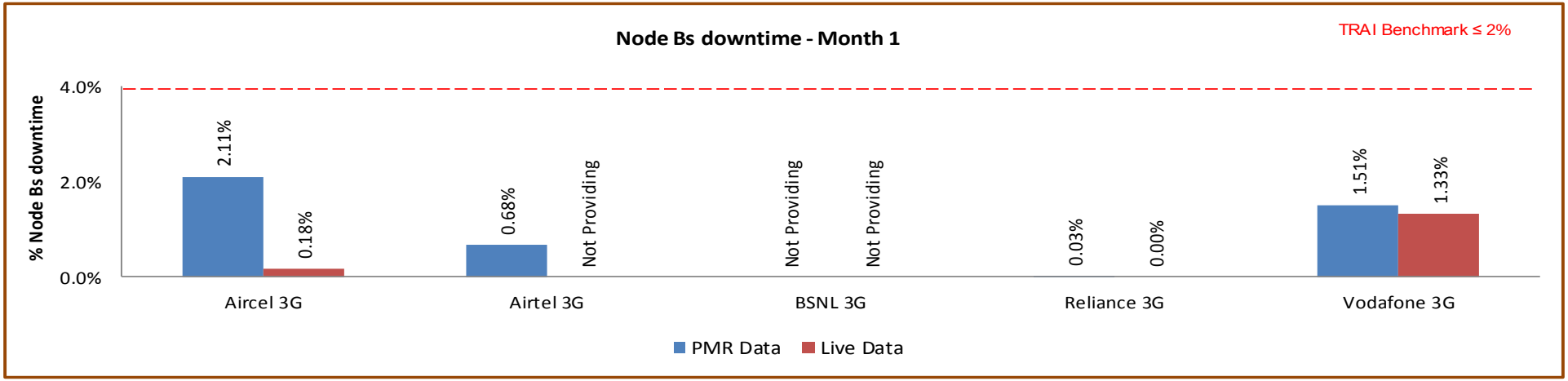


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL failed to meet the benchmark.

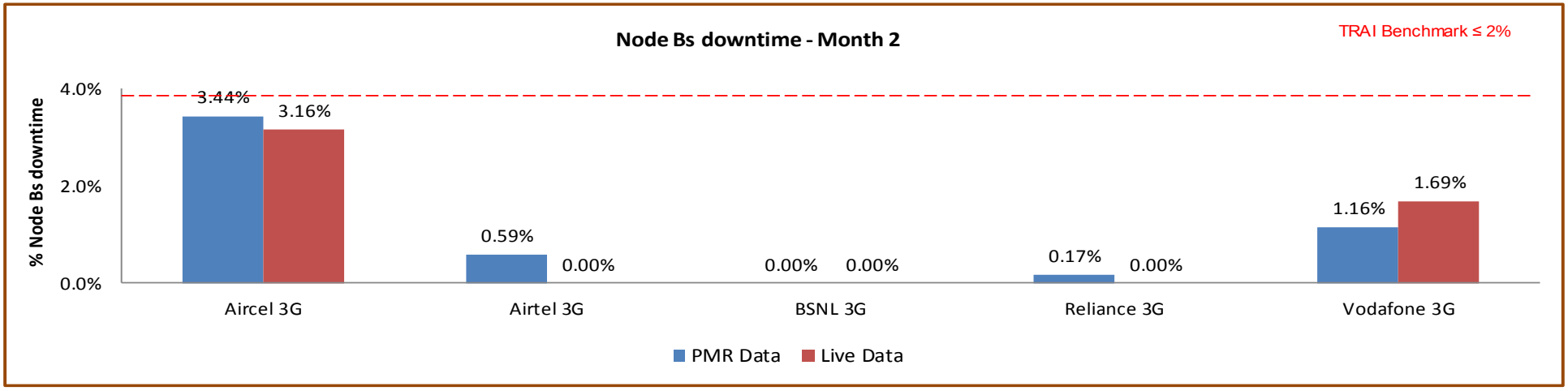
Significant difference was observed between PMR & live measurement data for Aircel, Airtel, Vodafone and Reliance CDMA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.1.2.1 KEY FINDINGS – MONTH 1



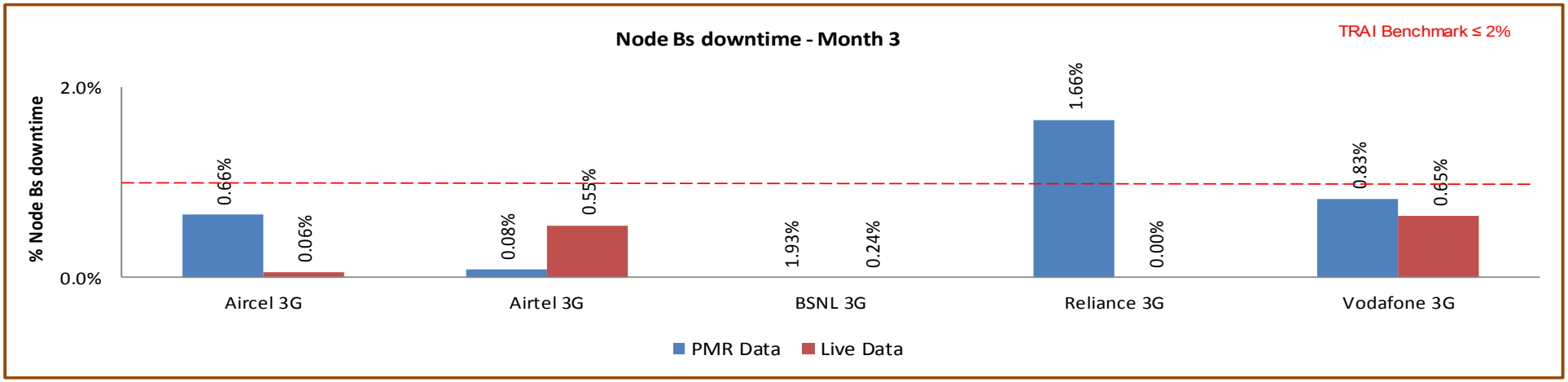
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

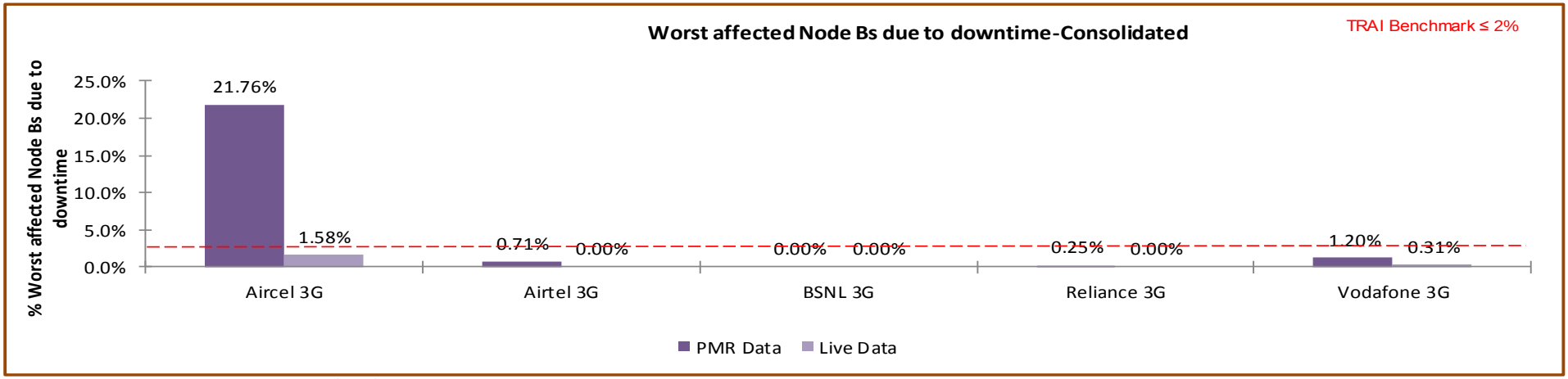
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

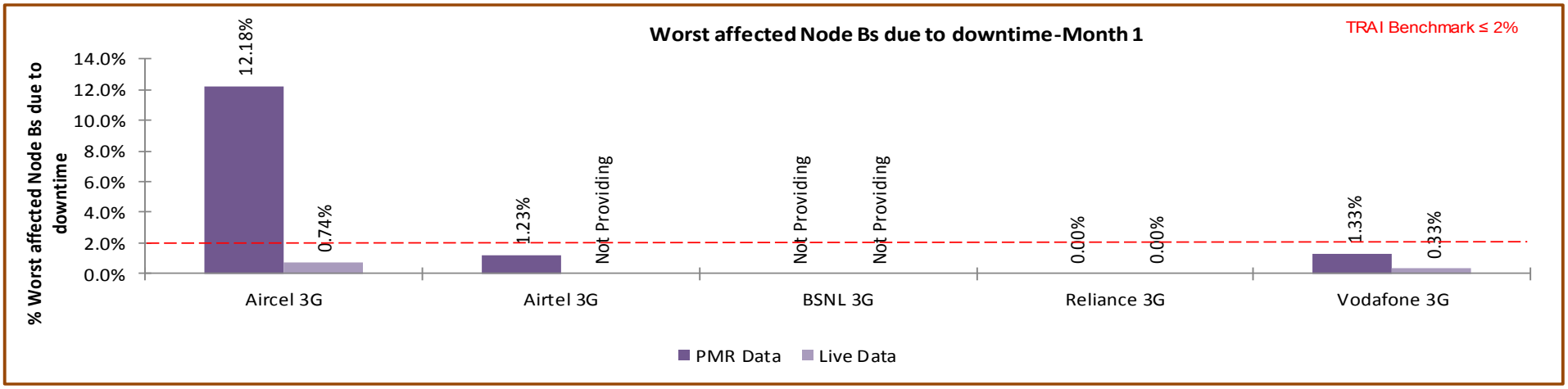


Data Source: Operations and Maintenance Center (OMC) of the operators

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

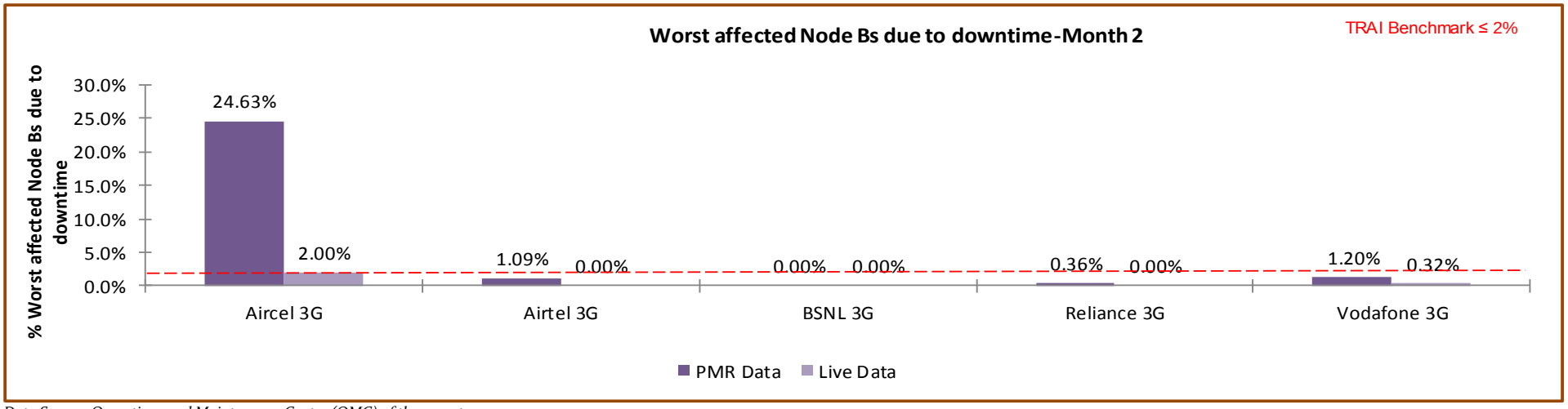
Significant difference was observed between PMR & live measurement data for Airce, Airtel, Vodafone and Reliance. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



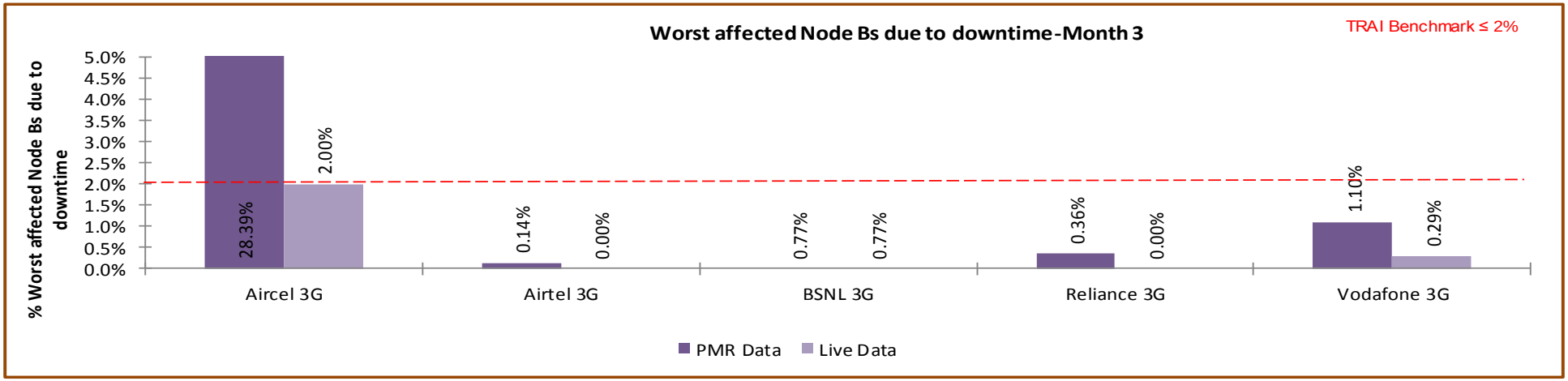
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



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

6.2.2.3 KEY FINDINGS – MONTH 3



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

6.3 CALL SET UP SUCCESS RATE

6.3.1 PARAMETER DESCRIPTION

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

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

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

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

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

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

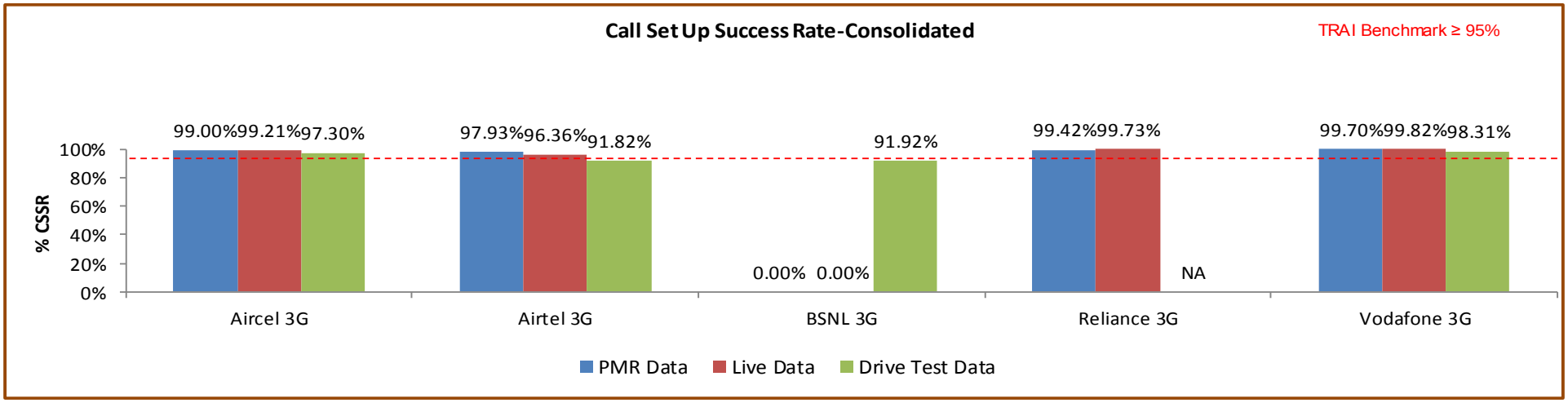
5. **TRAI Benchmark ≥** 95%

6. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

- CSSR calculation should be measured using OMC generated data only
- Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
- Counter data is extracted from the NOC of the operators.
- Total calls established include all calls established excluding RAB congestion.
  - The numerator and denominator values are derived from adding the counter values from the MSC.

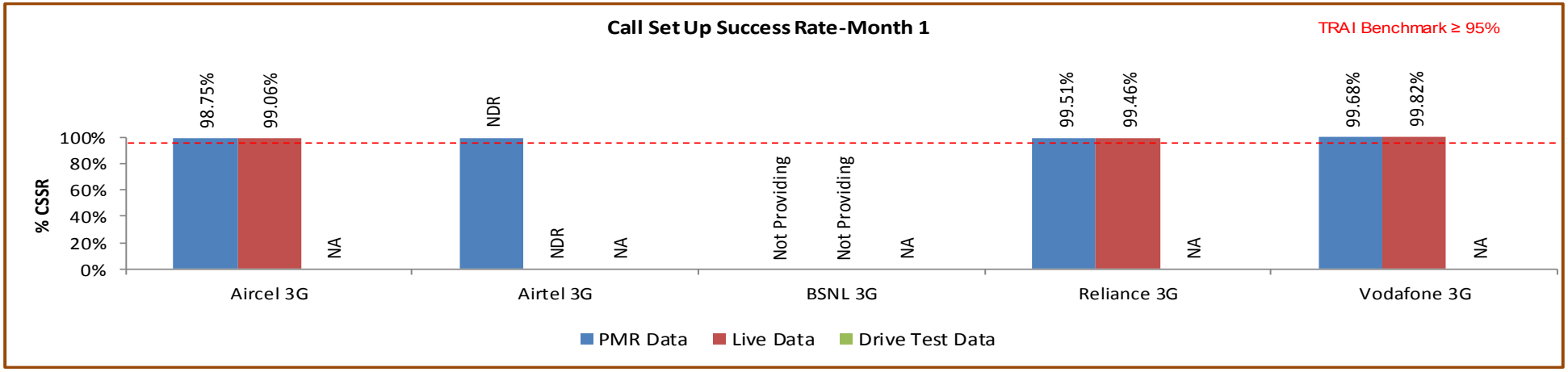
6.3.2 KEY FINDINGS - CONSOLIDATED



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

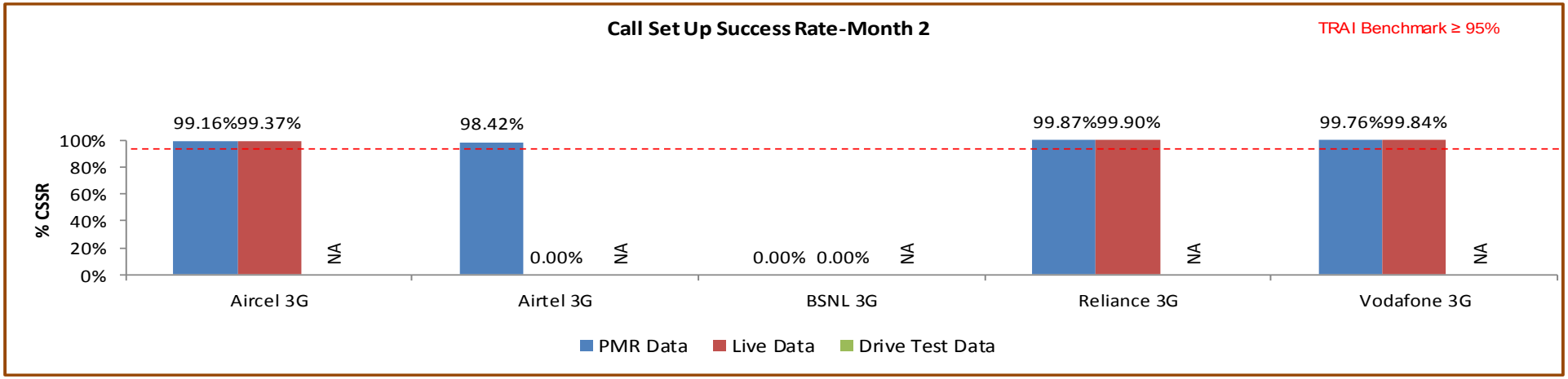
All operators met the TRAI benchmark as per audit/PMR data. During drive test Airtel 3G and BSNL 3G failed to meet the TRAI benchmark.

6.3.2.1 KEY FINDINGS – MONTH 1



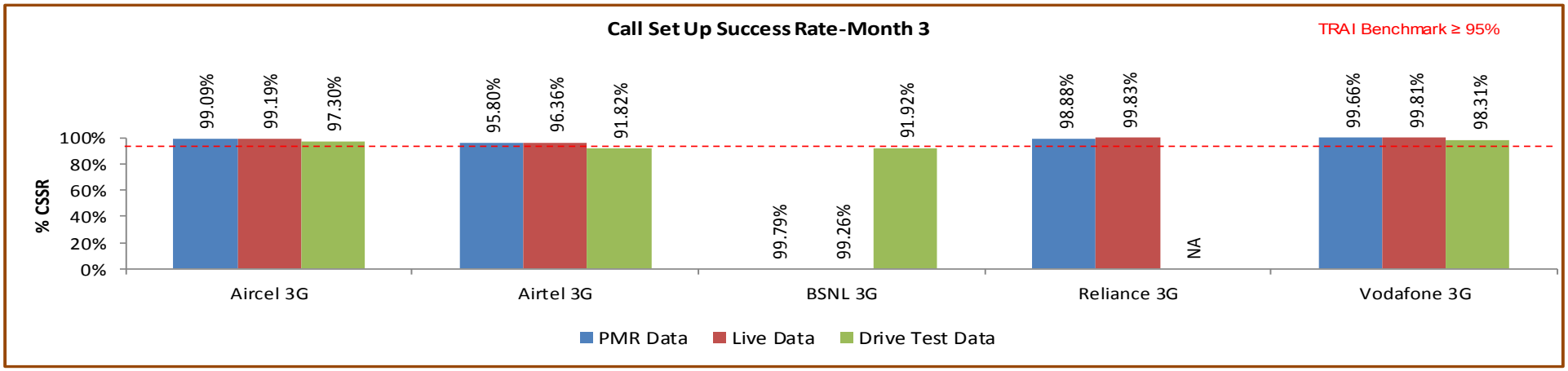
Data Source: Network Operations Center (NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2



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

6.3.2.3 KEY FINDINGS – MONTH 3



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

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

6.4.1 PARAMETER DESCRIPTION

1. **Definition (RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition (Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.
    - RRC Level: Stand-alone dedicated control channel
    - RAB Level: Traffic Channel
    - POI Level: Point of Interconnect
4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**
    - **RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
        - Where:-A1 = Number of attempts to establish RRC/ RAB made on day 1
        - C1 = Average RRC / RAB Congestion % on day 1
        - A2 = Number of attempts to establish RRC / RAB made on day 2
        - C2 = Average RRC / RAB Congestion % on day 2
        - An = Number of attempts to establish RRC / RAB made on day n
        - Cn = Average RRC / RAB Congestion % on day n

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

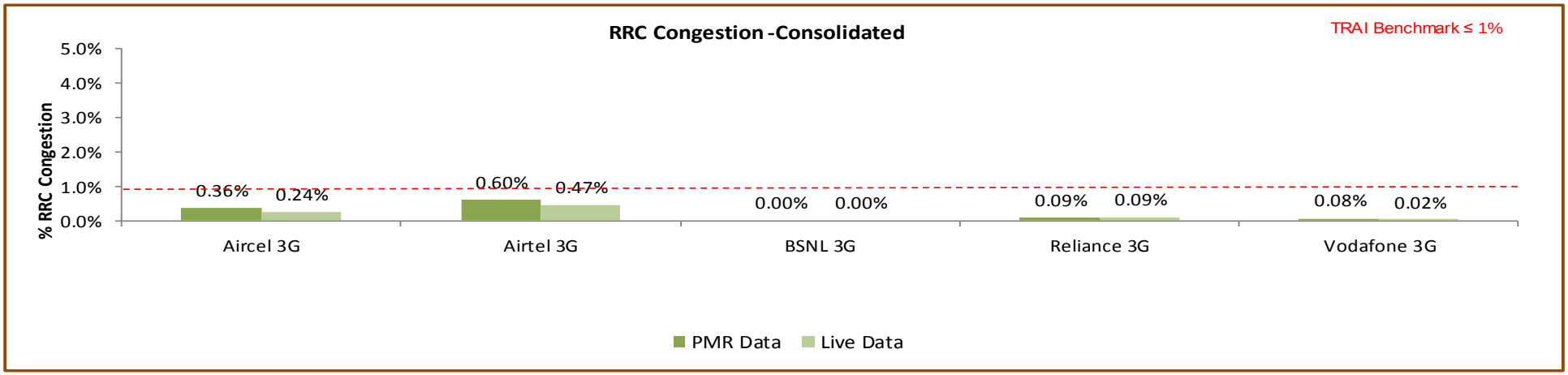
7. Benchmark:

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

8. Audit Procedure –

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

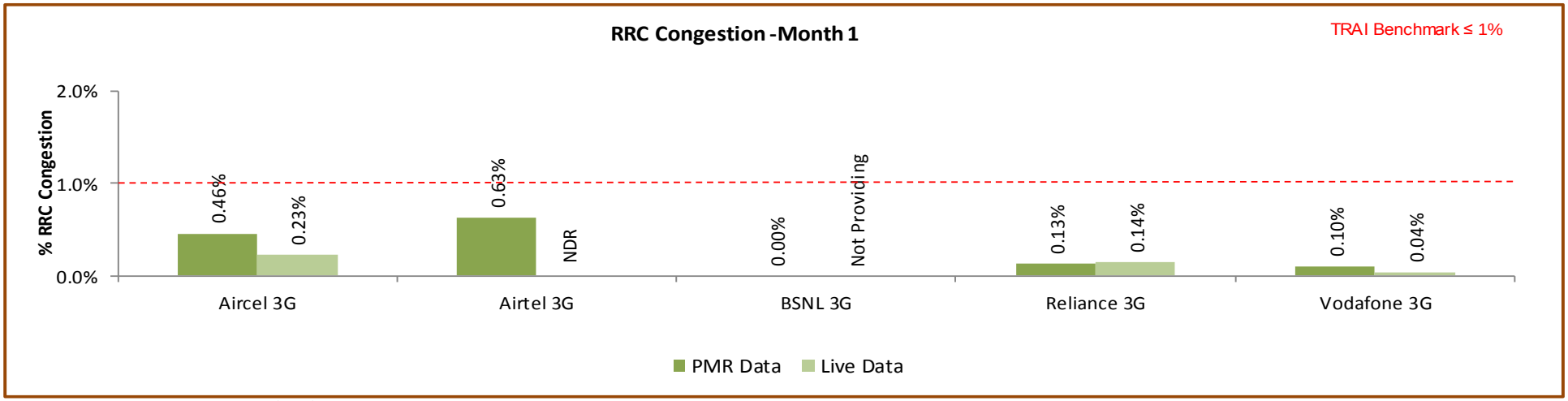
6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

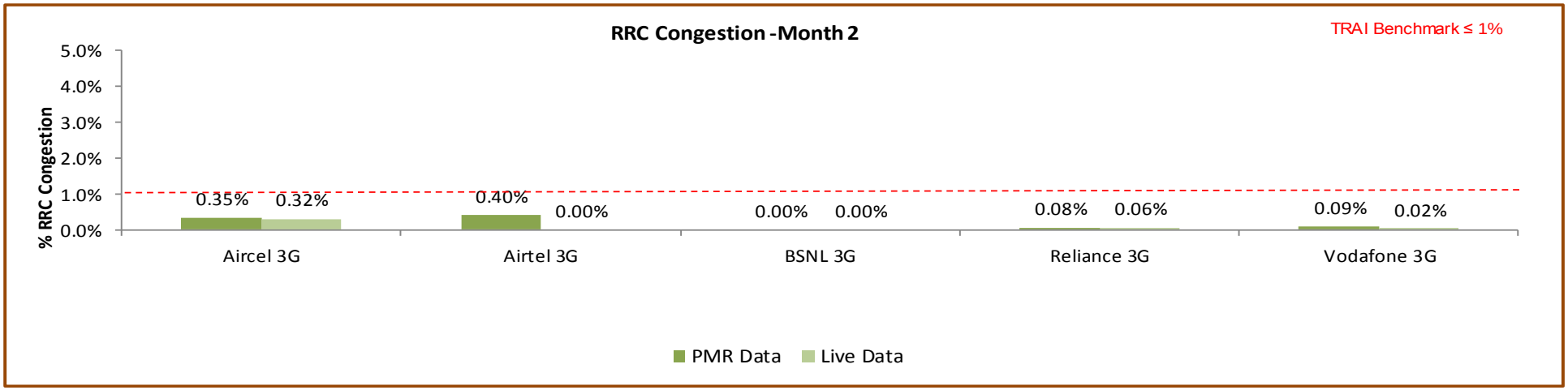
All operators met the benchmark.

6.4.2.1 KEY FINDINGS – MONTH 1



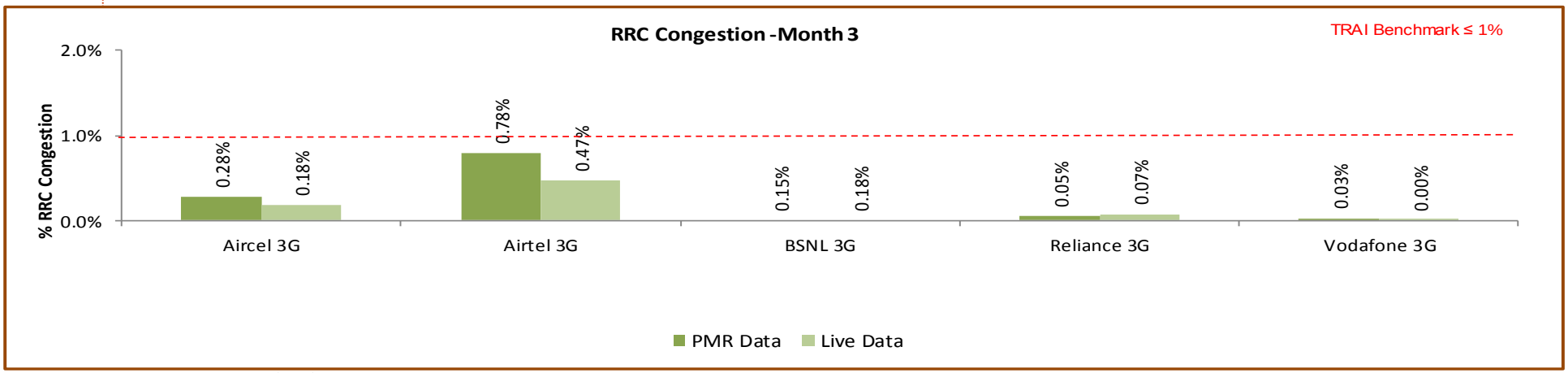
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



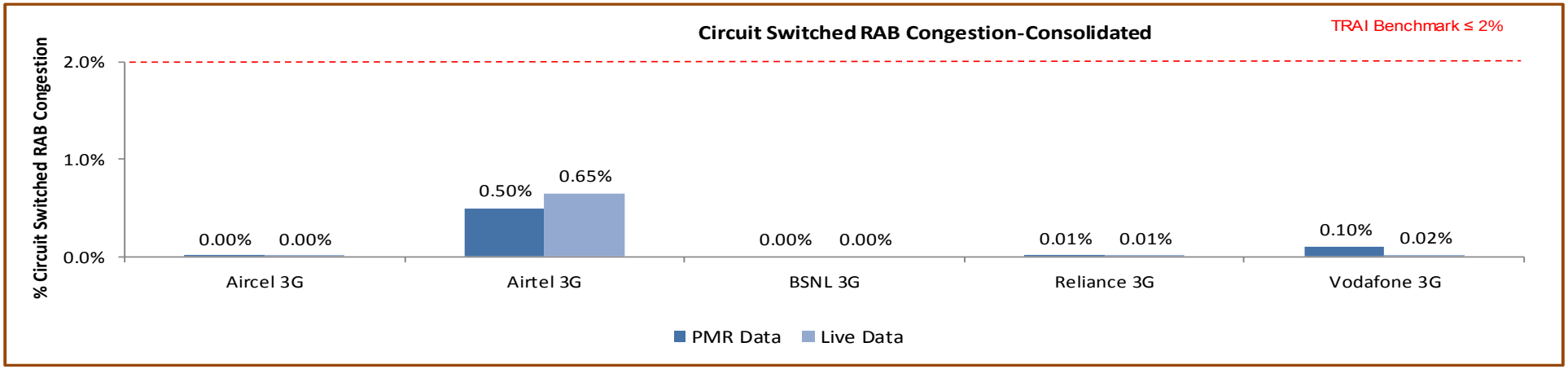
Data Source: Network Operations Center (NOC) of the operators

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)

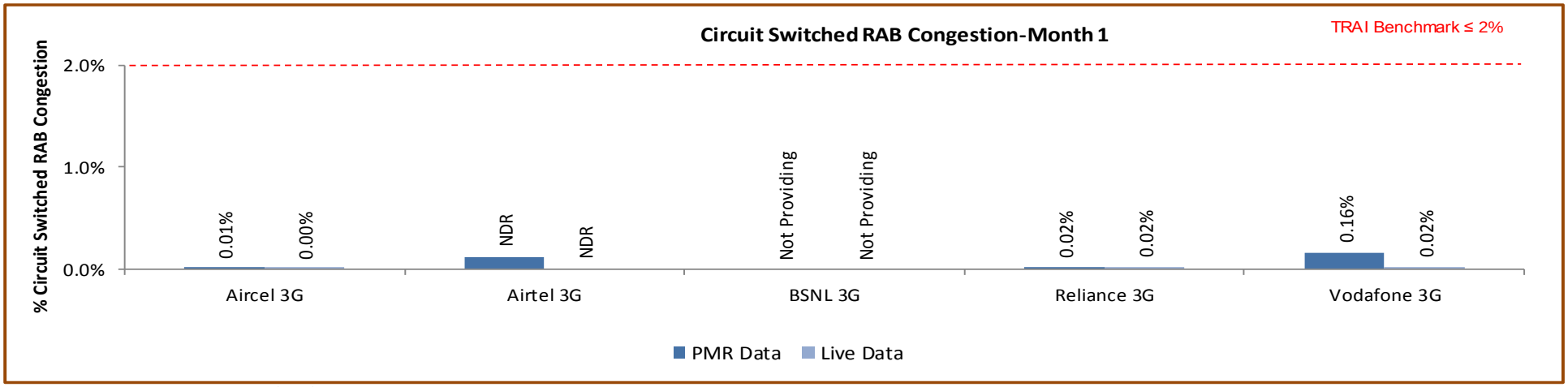


Data Source: Network Operations Center (NOC) of the operators

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

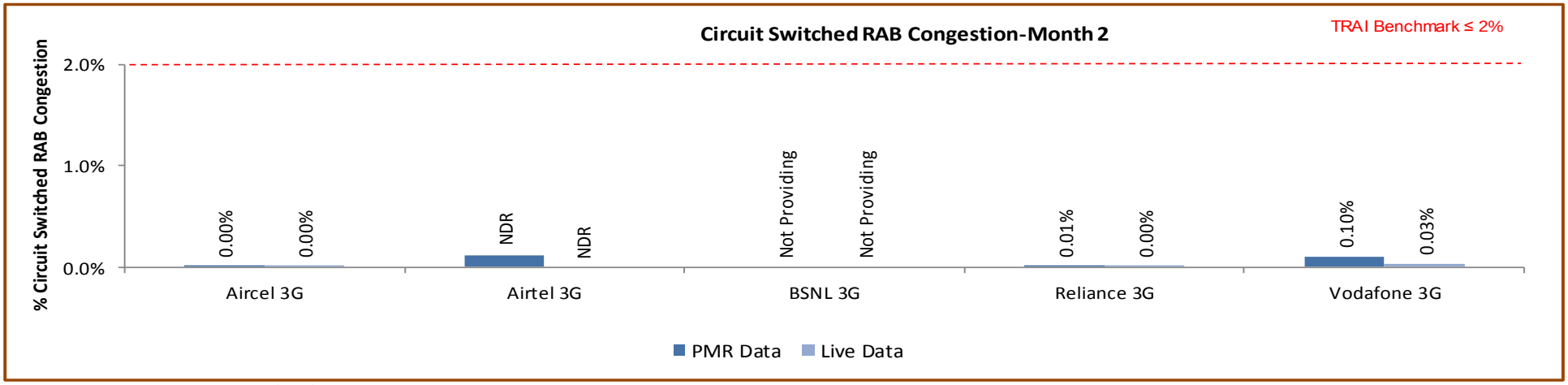
Significant difference was observed between PMR & live measurement data for Airtel and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



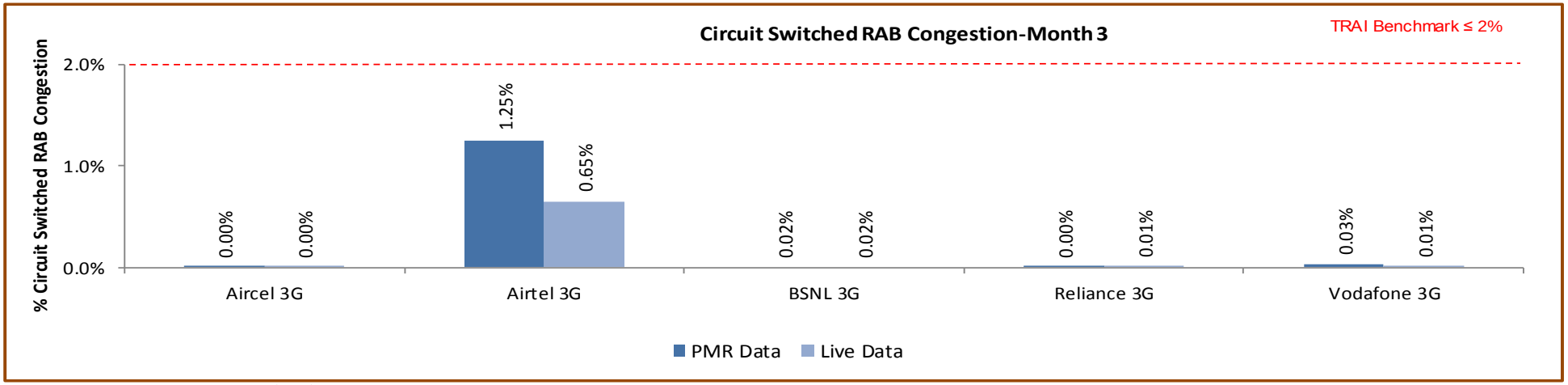
Data Source: Network Operations Center (NOC) of the operators

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 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		0	5	Not Providing	17	96
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	57209	196578
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	26679	133392
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		0	15	Not Providing	17	32
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	57209	1638900
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	26679	549427
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-April						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	0	Not Providing	18	32
No. of POIs not meeting benchmark		0	0	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	0	Not Providing	20110	68534
Traffic served for all POIs (B)- in erlangs		0	0	Not Providing	9659	43180
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-April						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	Not Providing	Not Providing	18	32
No. of POIs not meeting benchmark		0	Not Providing	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	Not Providing	Not Providing	20110	68534
Traffic served for all POIs (B)- in erlangs		0	Not Providing	Not Providing	9659	43033
POI congestion	≤ 0.5%	0.00%	Not Providing	Not Providing	0.00%	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-May						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	0	Not Providing	18	32
No. of POIs not meeting benchmark		0	0	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	0	Not Providing	20290	65567
Traffic served for all POIs (B)- in erlangs		0	0	Not Providing	8895	45949
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	Not Providing	Not Providing	18	32
No. of POIs not meeting benchmark		0	Not Providing	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	Not Providing	Not Providing	20290	65440
Traffic served for all POIs (B)- in erlangs		0	Not Providing	Not Providing	8895	45887
POI congestion	≤ 0.5%	0.00%	Not Providing	Not Providing	0.00%	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-June						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	15	Not Providing	14	32
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	16809	62478
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	8126	44263
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	15	Not Providing	14	32
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	16809	1504926
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	8126	460507
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%

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

6.5 CIRCUIT SWITCHED VOICE DROP RATE

6.5.1 PARAMETER DESCRIPTION

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

   - **Total No. of voice RAB abnormally released** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **No. of voice RAB normally released** = All calls that have RAB allocation during busy hour

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

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

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

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

5. **TRAI Benchmark –**

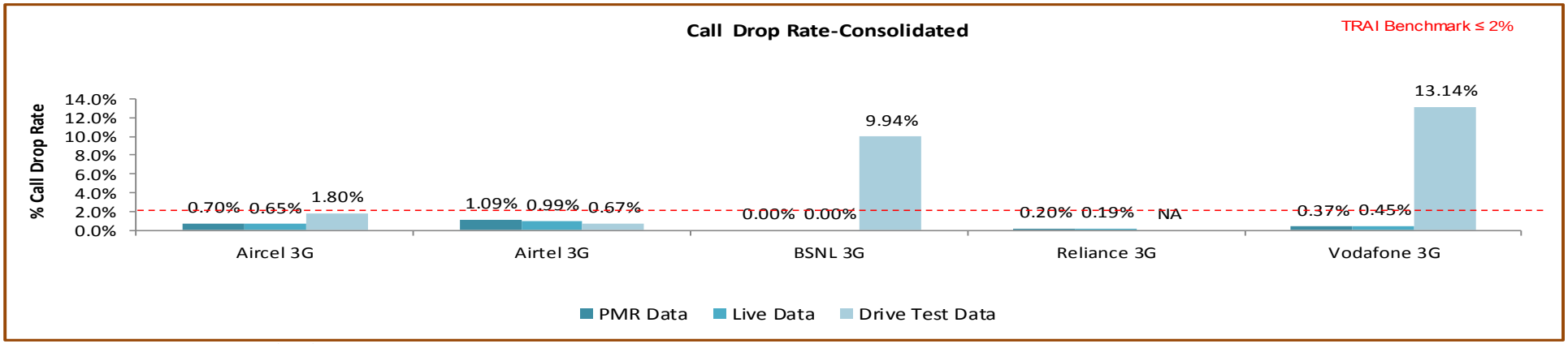
   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used

- The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

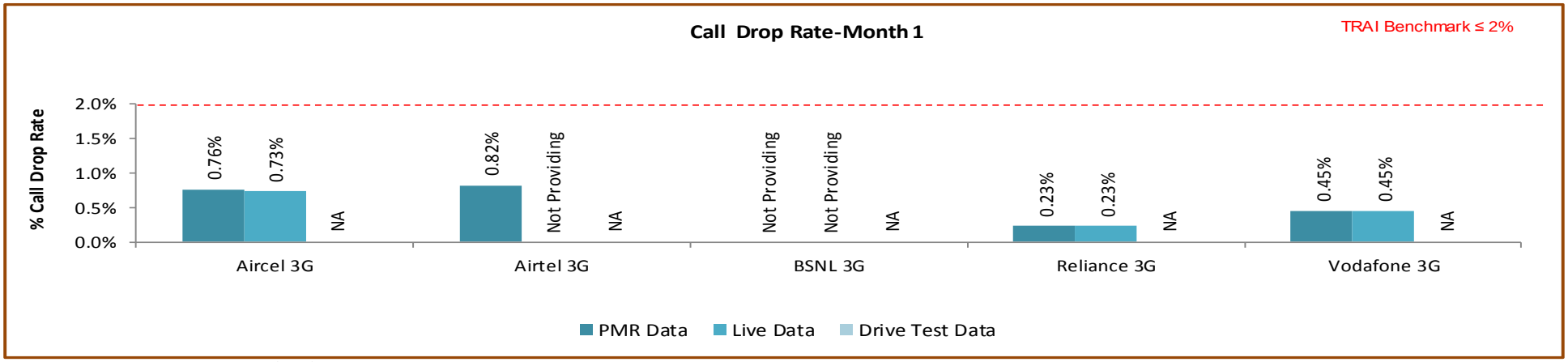
6.5.2 KEY FINDINGS - CONSOLIDATED



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

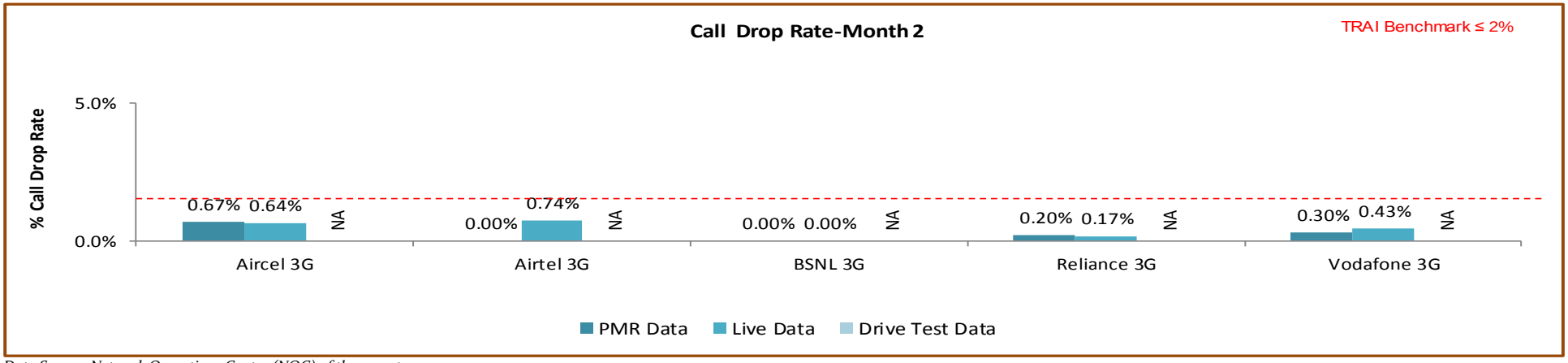
All operators met the benchmark for call drop rate during audit. During drive test BSNL 3G and Vodafone 3G failed to meet the benchmark.

6.5.2.1 KEY FINDINGS – MONTH 1



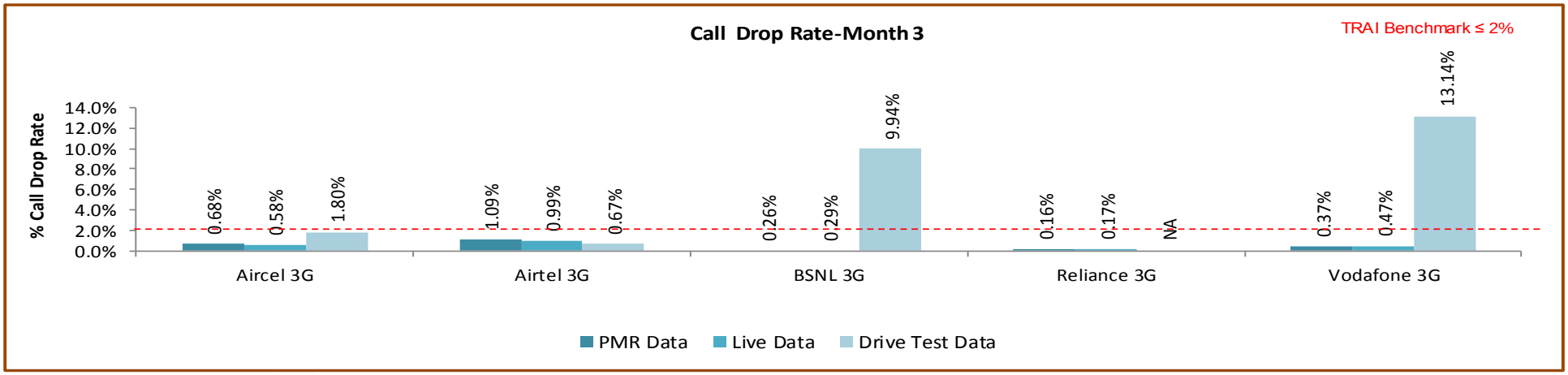
Data Source: Network Operations Center (NOC) of the operators

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** –

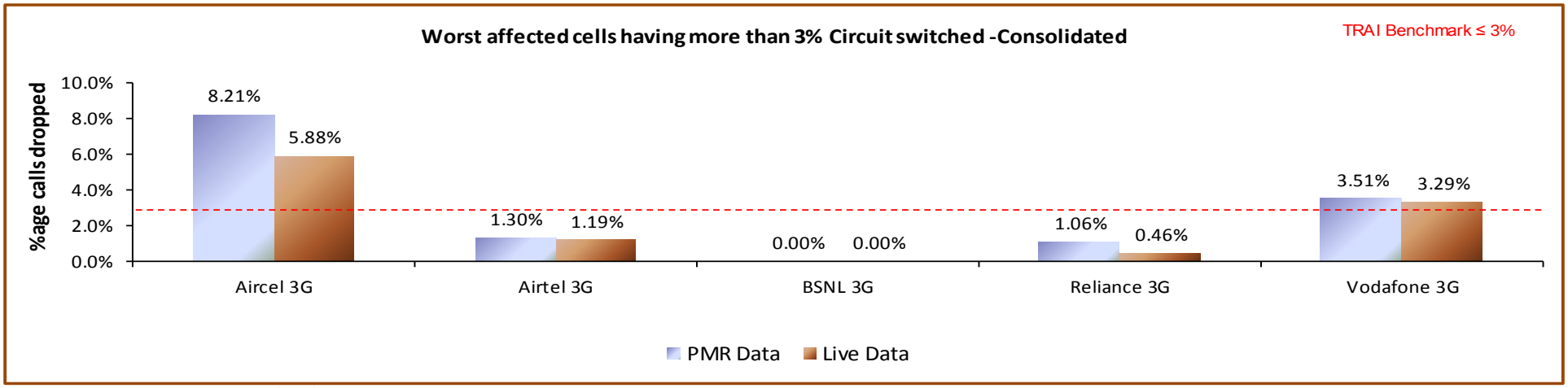
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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

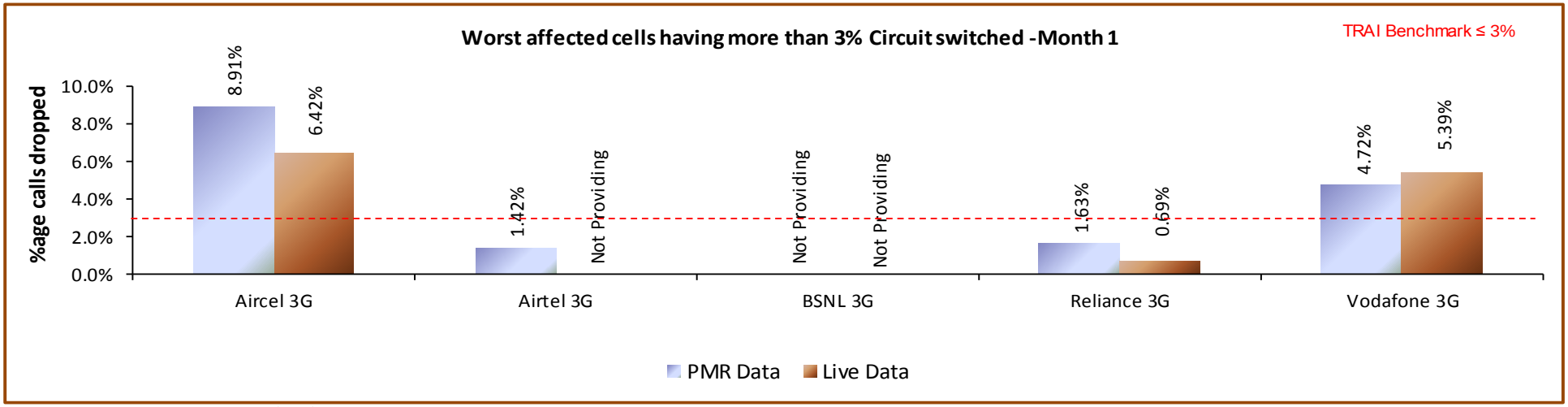


Data Source: Network Operations Center (NOC) of the operators

Aircel 3G and Vodafone 3G did not meet the benchmark during audit.

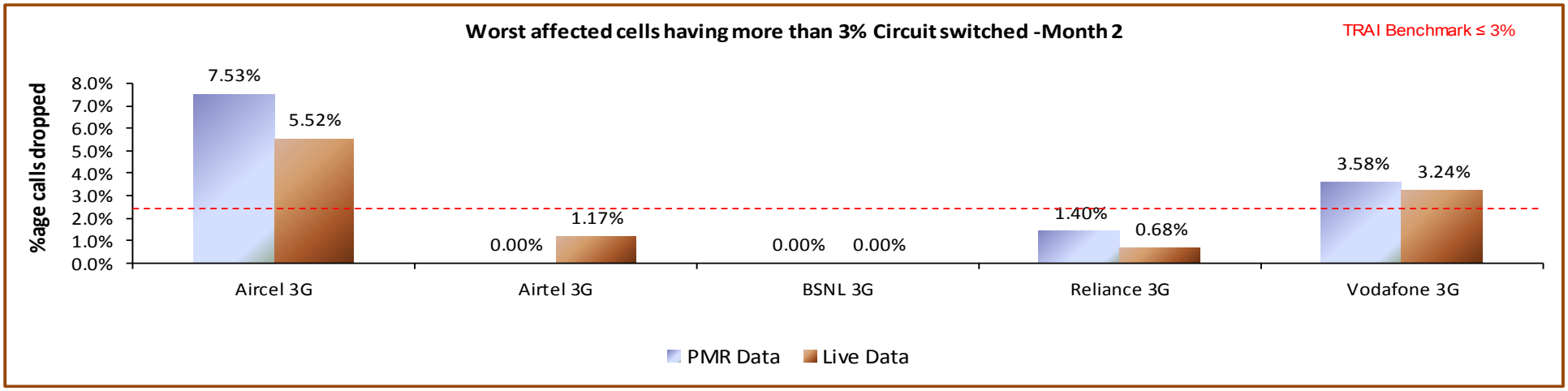
Significant difference was observed between PMR & live measurement data for Aircel, Reliance and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.6.2.1 KEY FINDINGS – MONTH 1



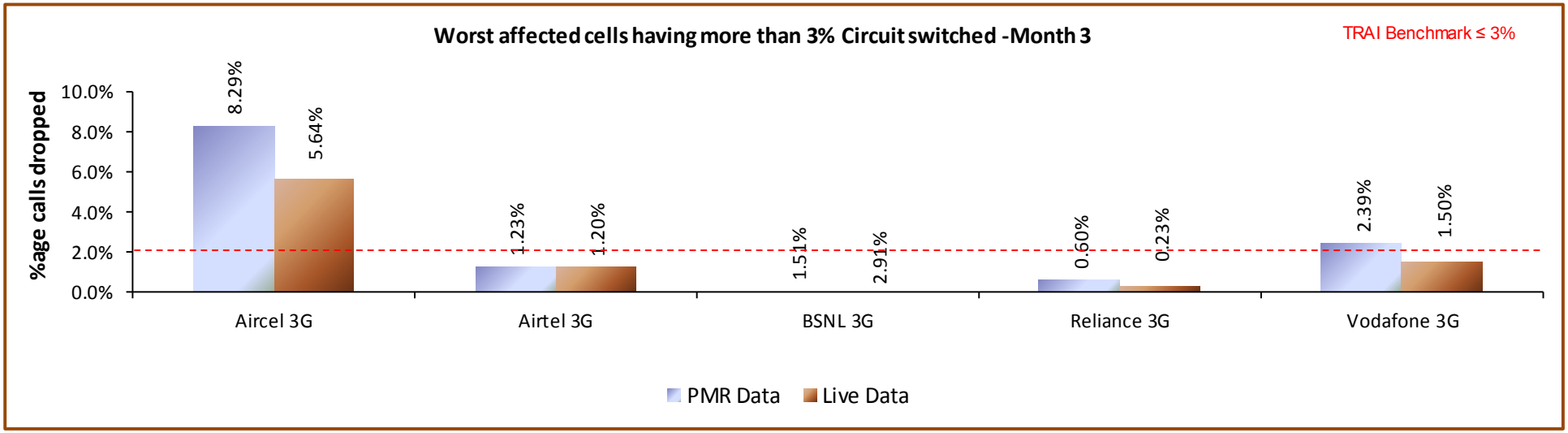
Data Source: Network Operations Center (NOC) of the operators

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**

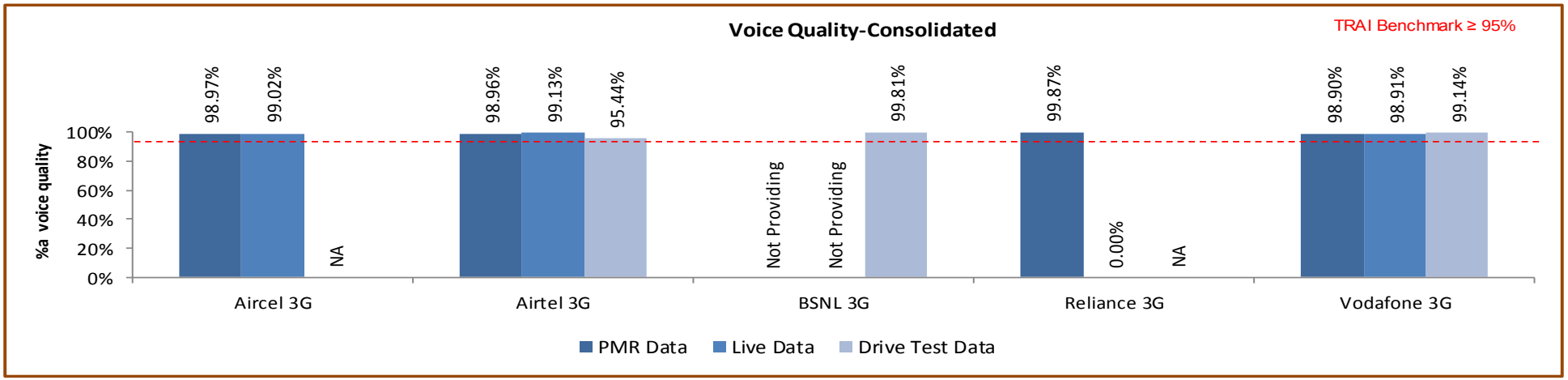
7. **TRAI Benchmark:** ≥ 95%

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.

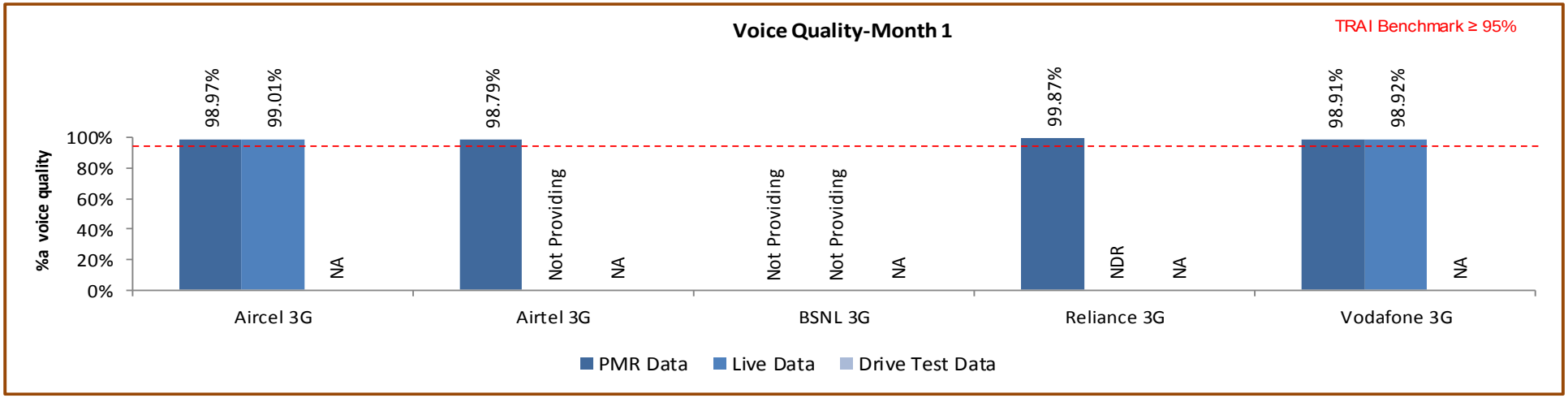
6.7.2 KEY FINDINGS



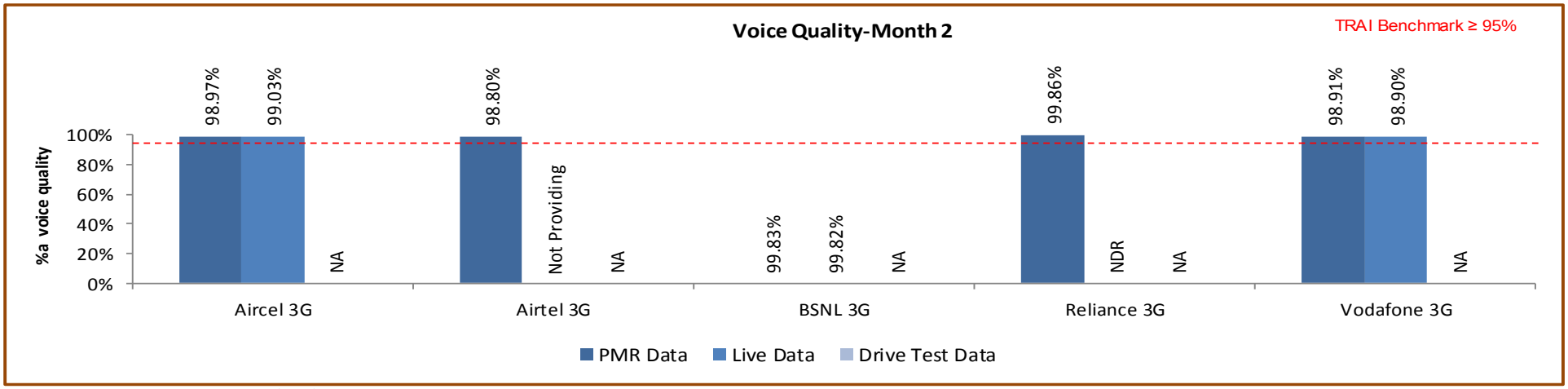
Data Source: Network Operations Center (NOC) of the operators

All Operators met the TRAI benchmark.

6.7.2.1 KEY FINDINGS – MONTH 1

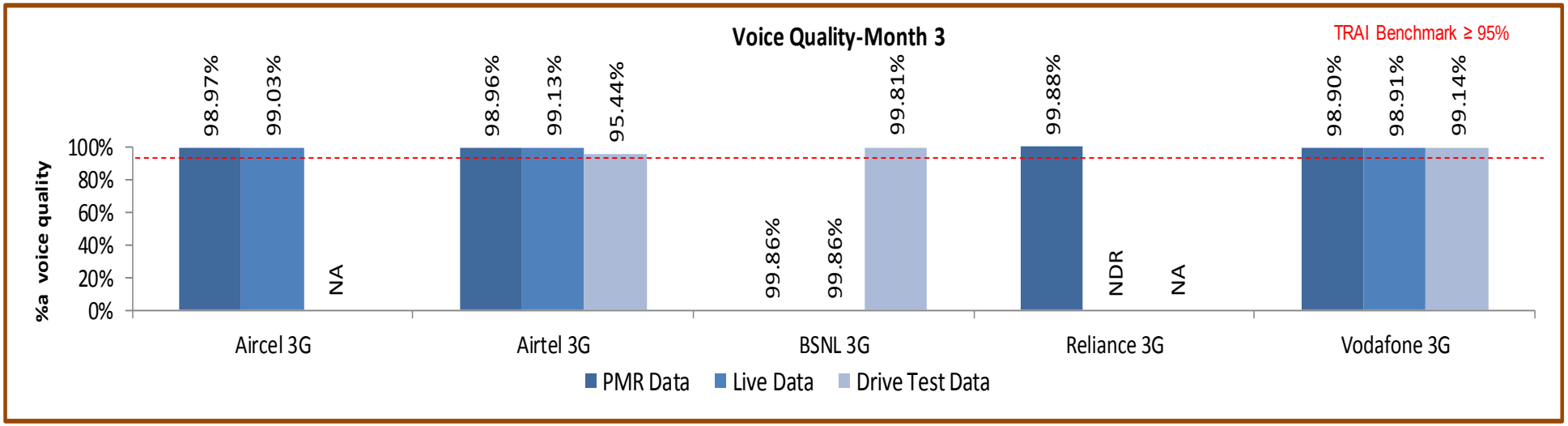


6.7.2.2 KEY FINDINGS – MONTH 2



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

6.7.2.3 KEY FINDINGS – MONTH 3



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

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

7.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

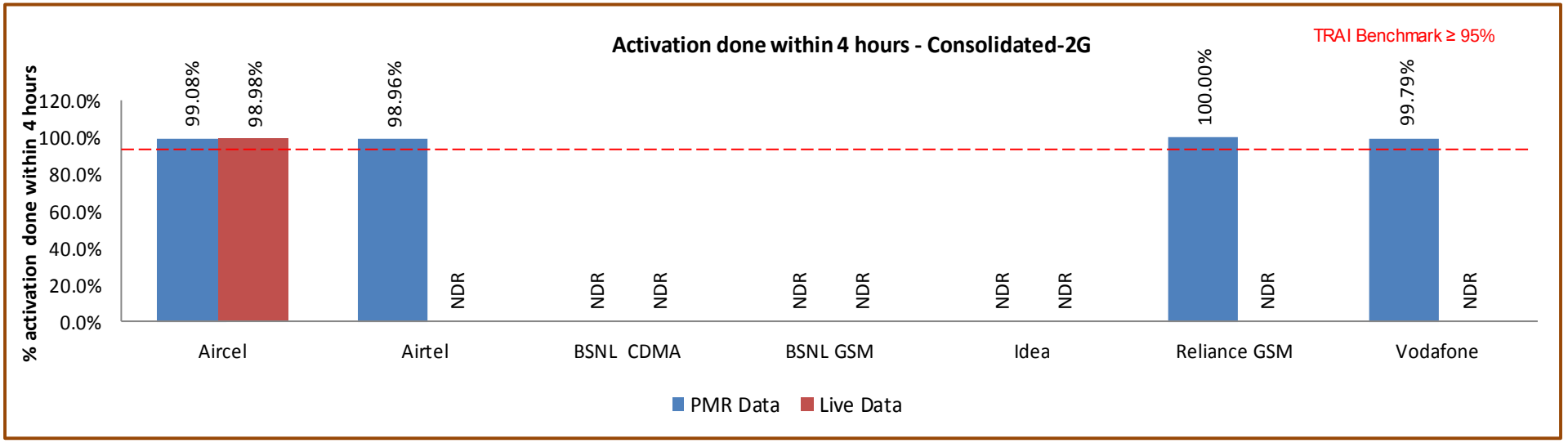
7.1.1 PARAMETER DESCRIPTION

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.

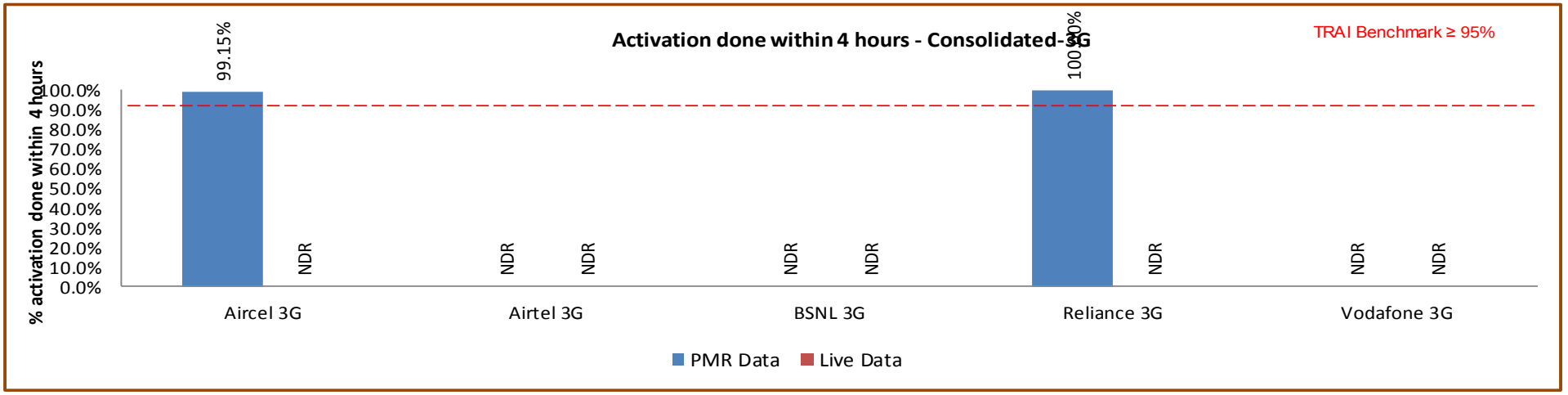
$$\textbf{\% activation done within 4 hours} = \frac{\text{Total Time Taken for Activation}}{\text{Total request time made}} \times 100$$

Benchmark: >=95%

7.1.2 KEY FINDINGS



All operators met the TRAI benchmark.



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

7.2.1 PARAMETER DESCRIPTION

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

Measurement

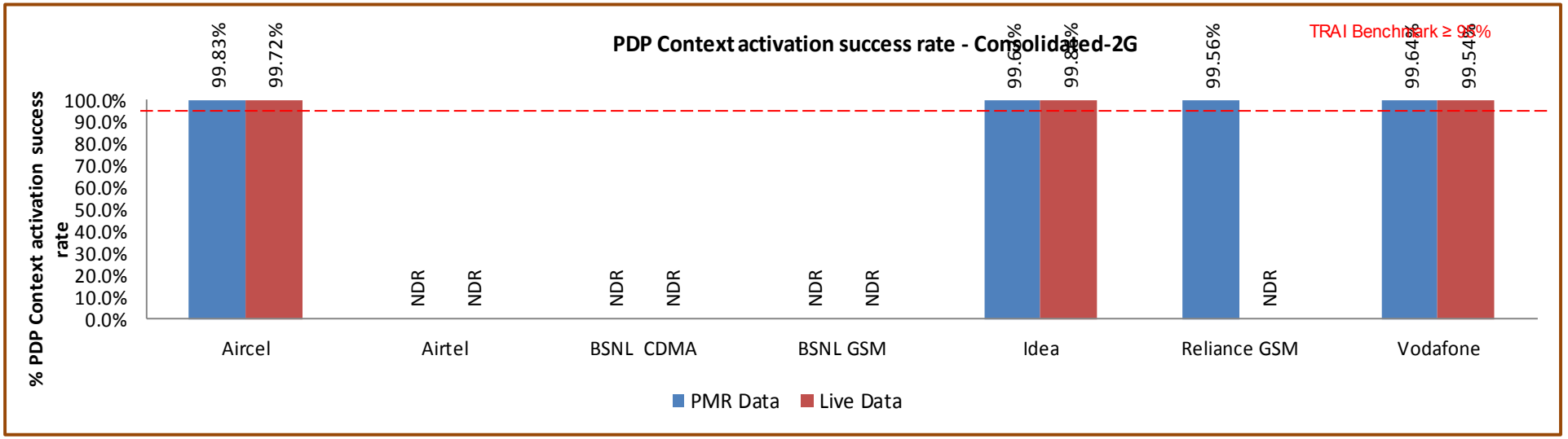
This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

PDP Context Activation Success Rate (%) =

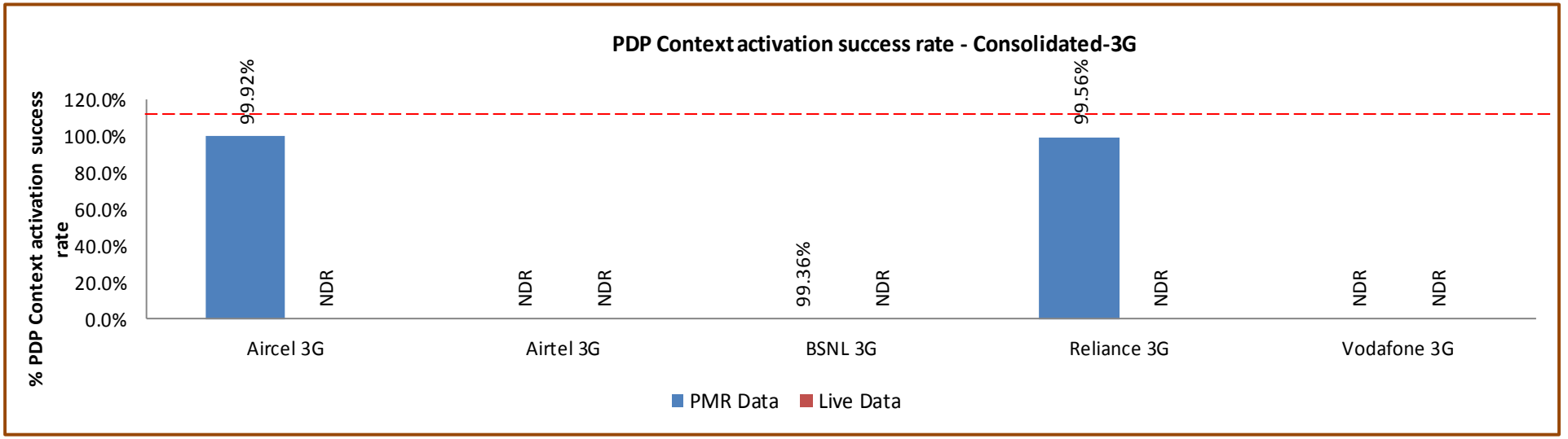
$$\frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

Benchmark: >=95%

7.2.2 KEY FINDINGS



All operators met the TRAI benchmark.



7.3 DROP RATE FOR 2G & 3G

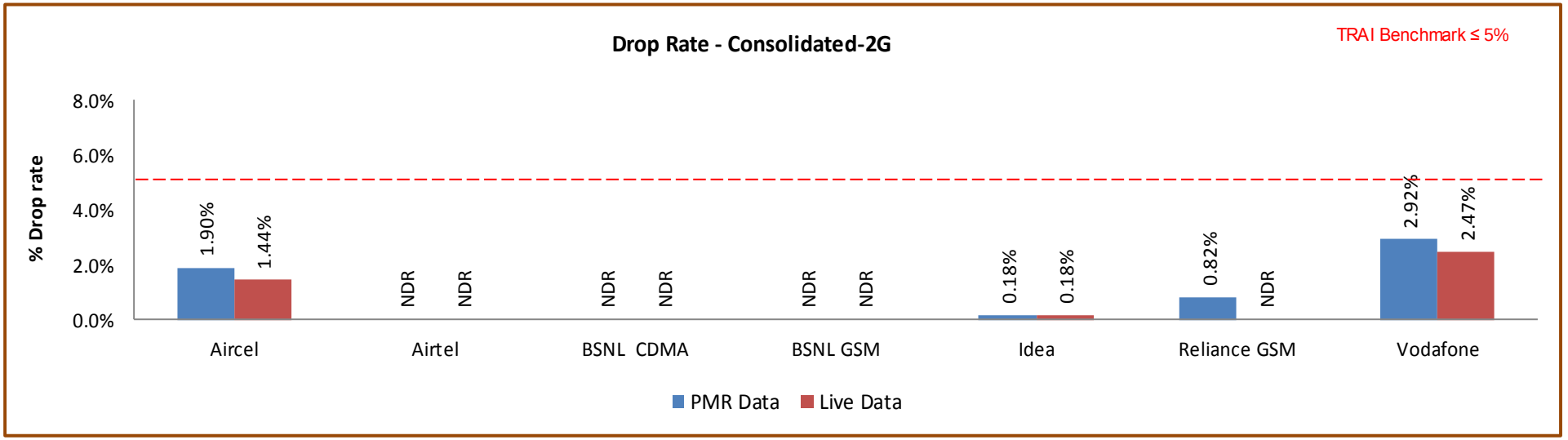
7.3.1 PARAMETER DESCRIPTION

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

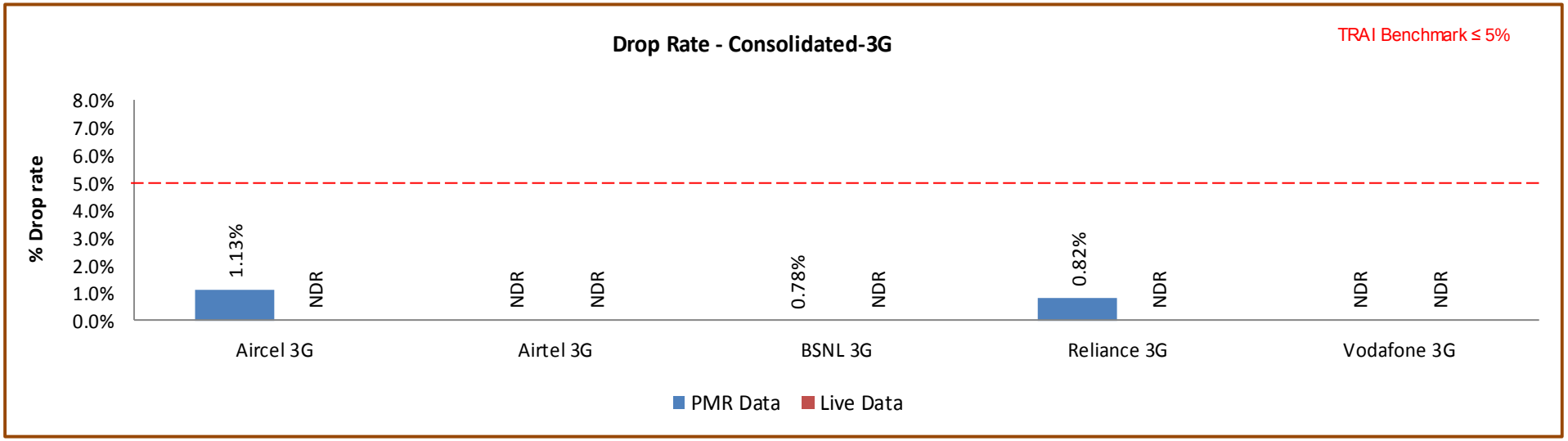
$$\textbf{Drop rate} = \frac{\text{No. of Dropped data Calls}}{\text{No. of Successful data calls}} \times 100$$

Benchmark: <=5%

7.3.2 KEY FINDINGS



All operators met the TRAI benchmarks.



8 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

8.1 METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

8.1.1 PARAMETER DESCRIPTION

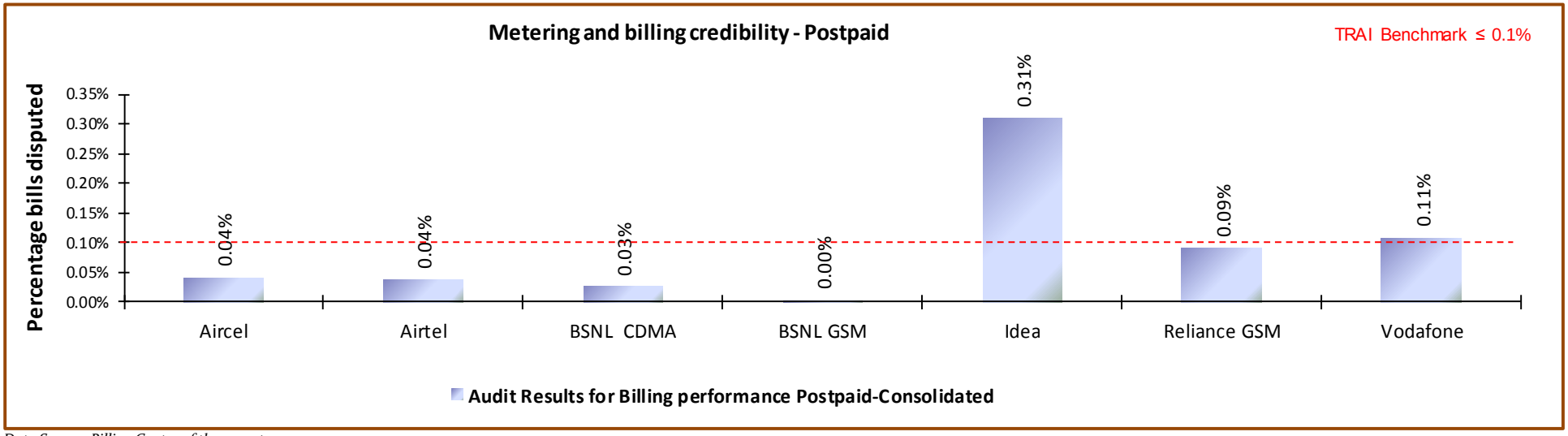
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th June, 2009 were covered. The types of billing complaints covered are listed below.

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

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

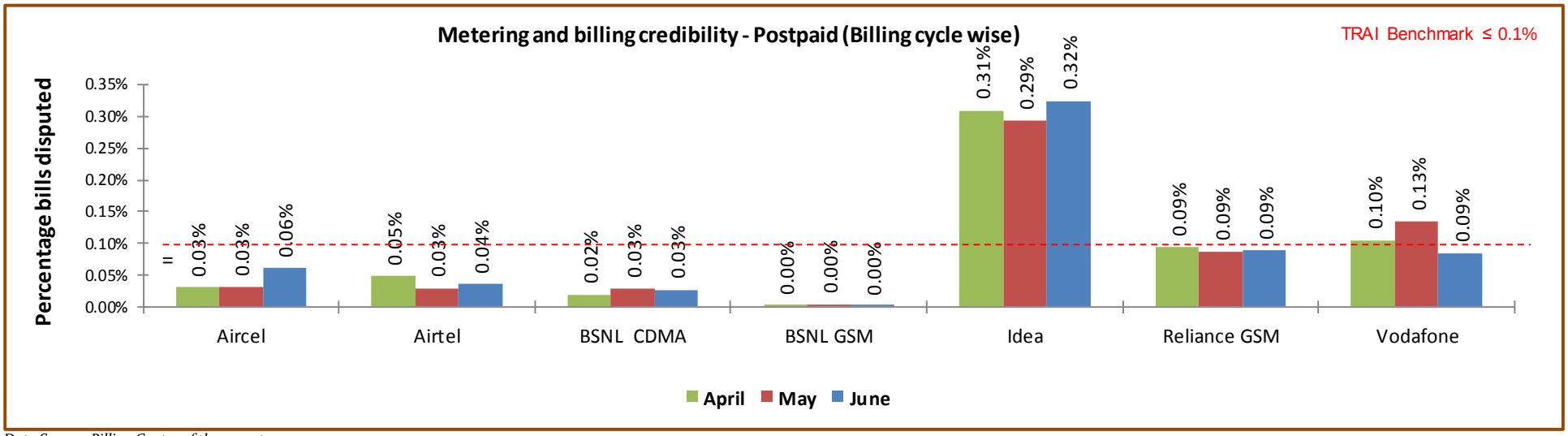
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
  - **Billing complaints here shall include only dispute related issues (including those that May arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
  - **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

8.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



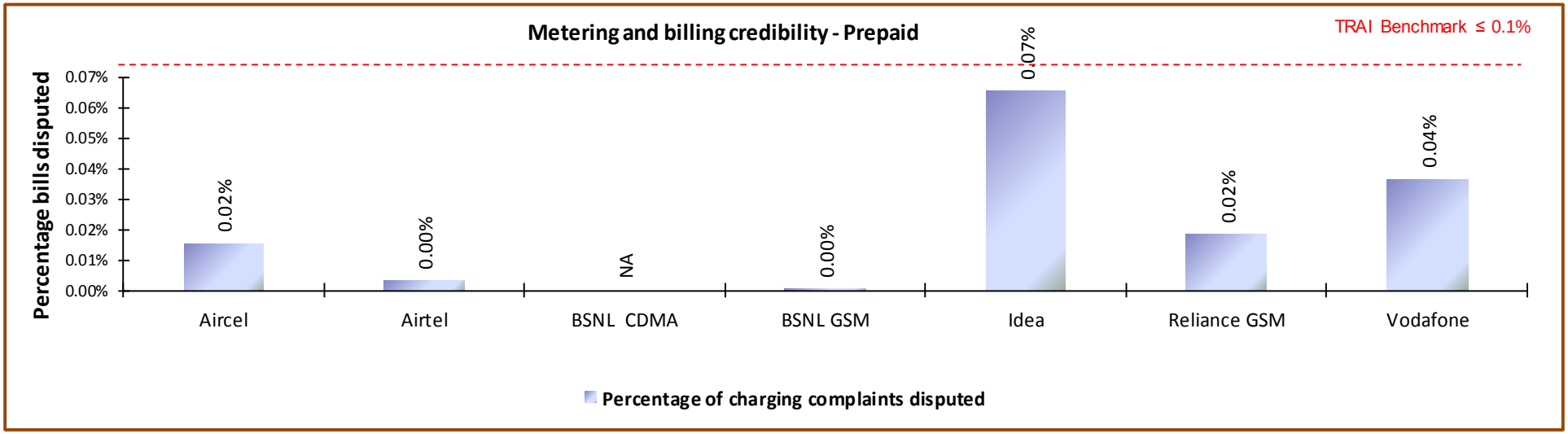
Data Source: Billing Center of the operators

Idea and Vodafone 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

All operators met the benchmark for metering and billing credibility of prepaid subscribers.

8.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

8.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

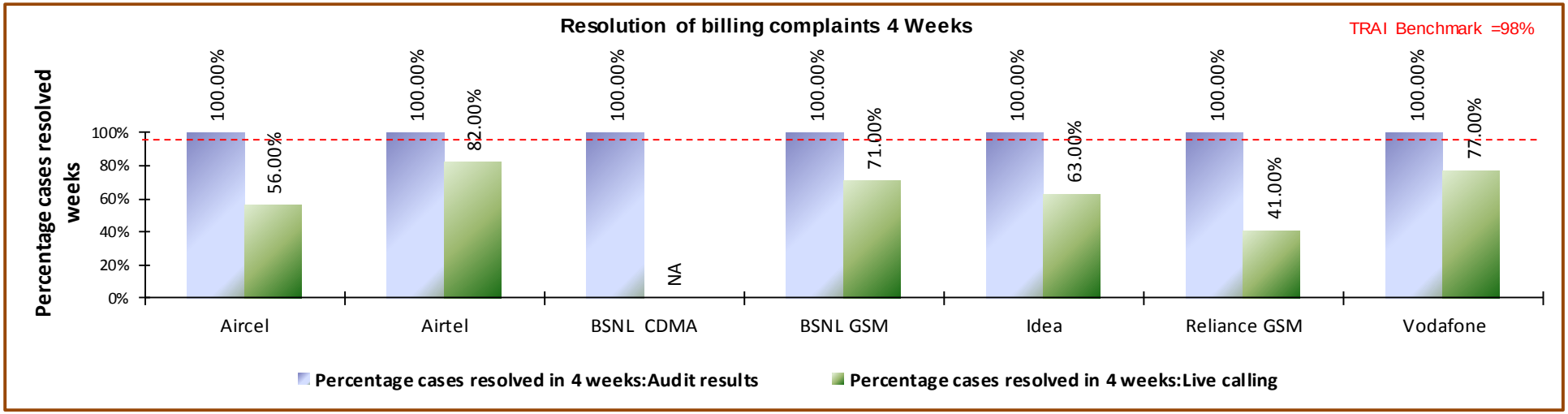
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

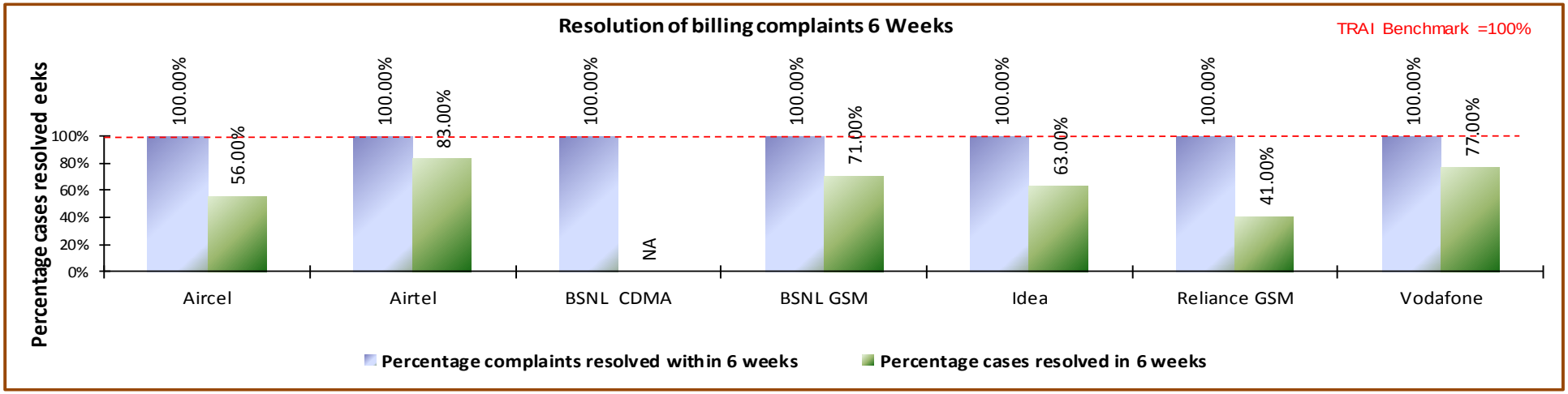
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

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

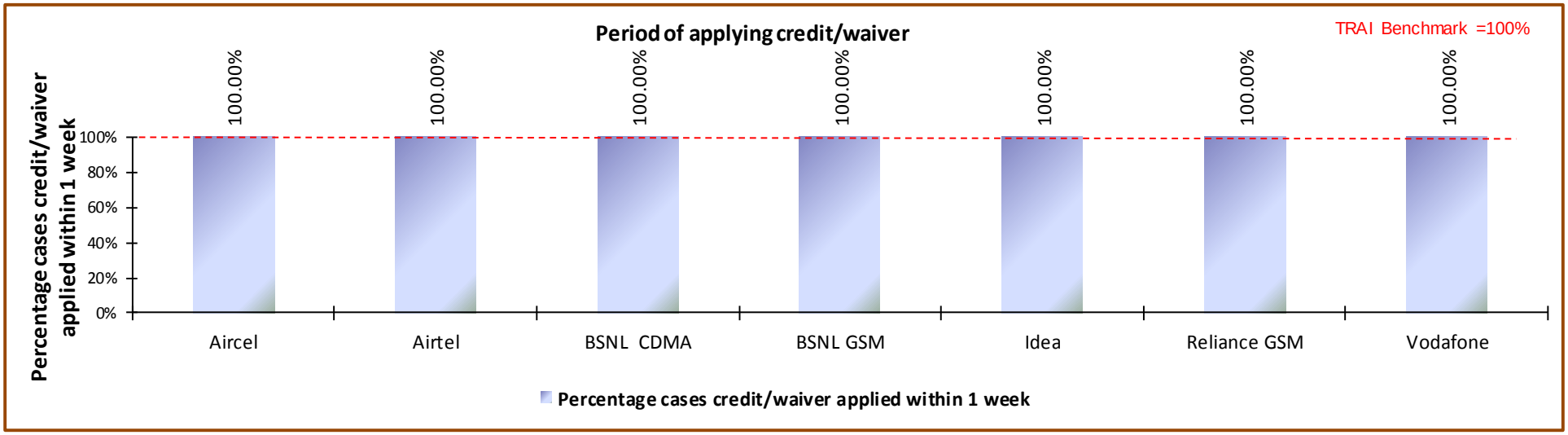
All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

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

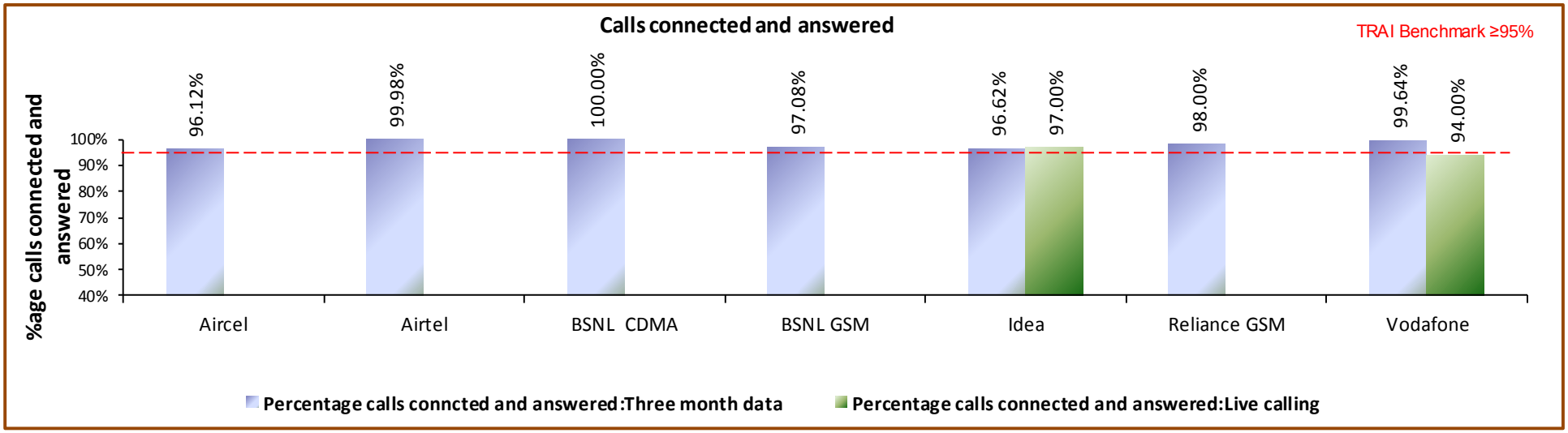
All operators met the benchmark for this parameter.

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 Vodafone for 3 days live, however in live calling operators are much below than PMR.

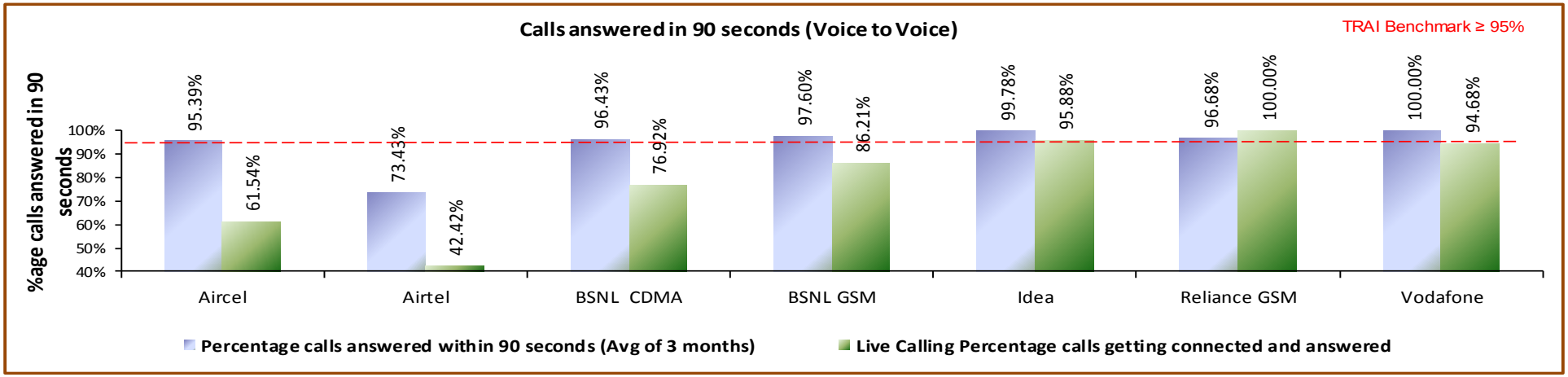
8.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

8.5.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by operator within 90 seconds
    - Total calls attempted to connect to the operator
  - Also live calling was done to test the calls answered within 90 seconds by the operator

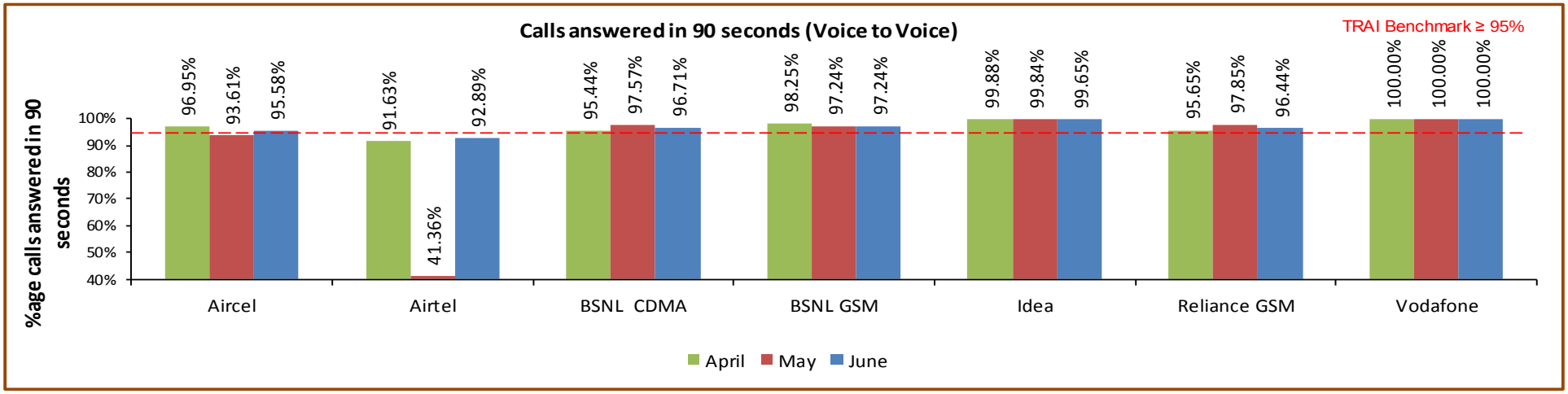
Benchmark: 95% calls to be answered within 90 seconds

8.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the benchmark as per Audit except Airtel. However, as per live calling done to customers, the performance of Aircel, Airtel, BSNL GSM & CDMA and Vodafone was far inferior to the PMR data.



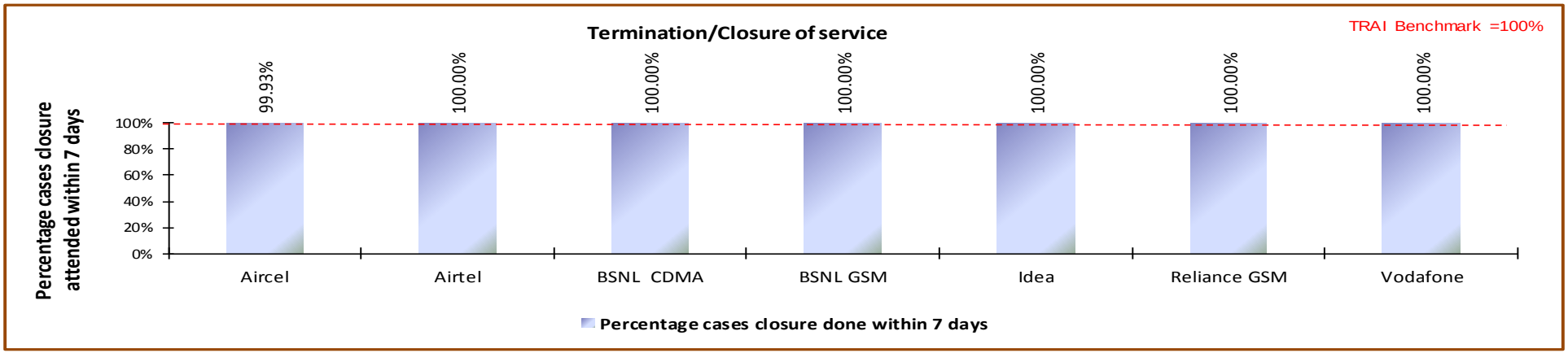
Data Source: Customer Service Center of the operators

8.6 TERMINATION/CLOSURE OF SERVICE

8.6.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**
- TRAI Benchmark:
  - Termination/Closure of Service: <=7 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/CS database:
    - Date of lodging the closure request (all requests in given period)
    - Date of closure of service

8.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

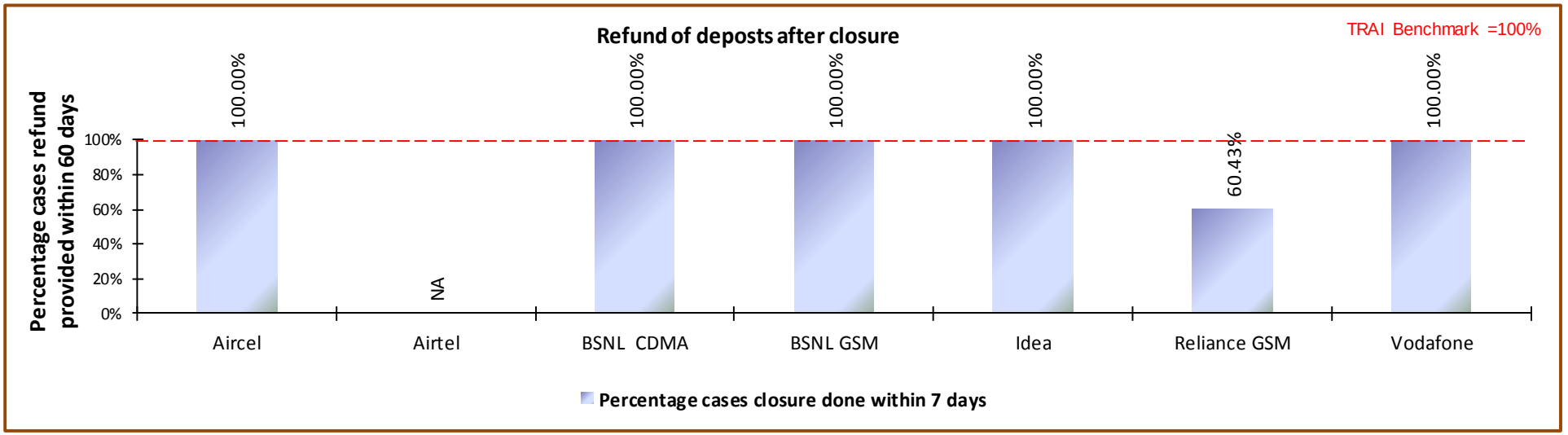
All operators met the TRAI benchmark for the parameter.

8.7 REFUND OF DEPOSITS AFTER CLOSURE

8.7.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**
  - Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.
- TRAI Benchmark:
  - Time taken for refund for deposit after closures: 100% within 60 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/refund database:
    - Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
    - Dates of refund pertaining to all closure request received during the relevant quarter

8.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter except Reliance GSM.

9 DETAILED FINDINGS - DRIVE TEST DATA

9.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the Assam circle. As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days. The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. The selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI regional teams. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

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

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

9.1.1 Silchar SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	Silchar	22-06-216	24-06-216	325

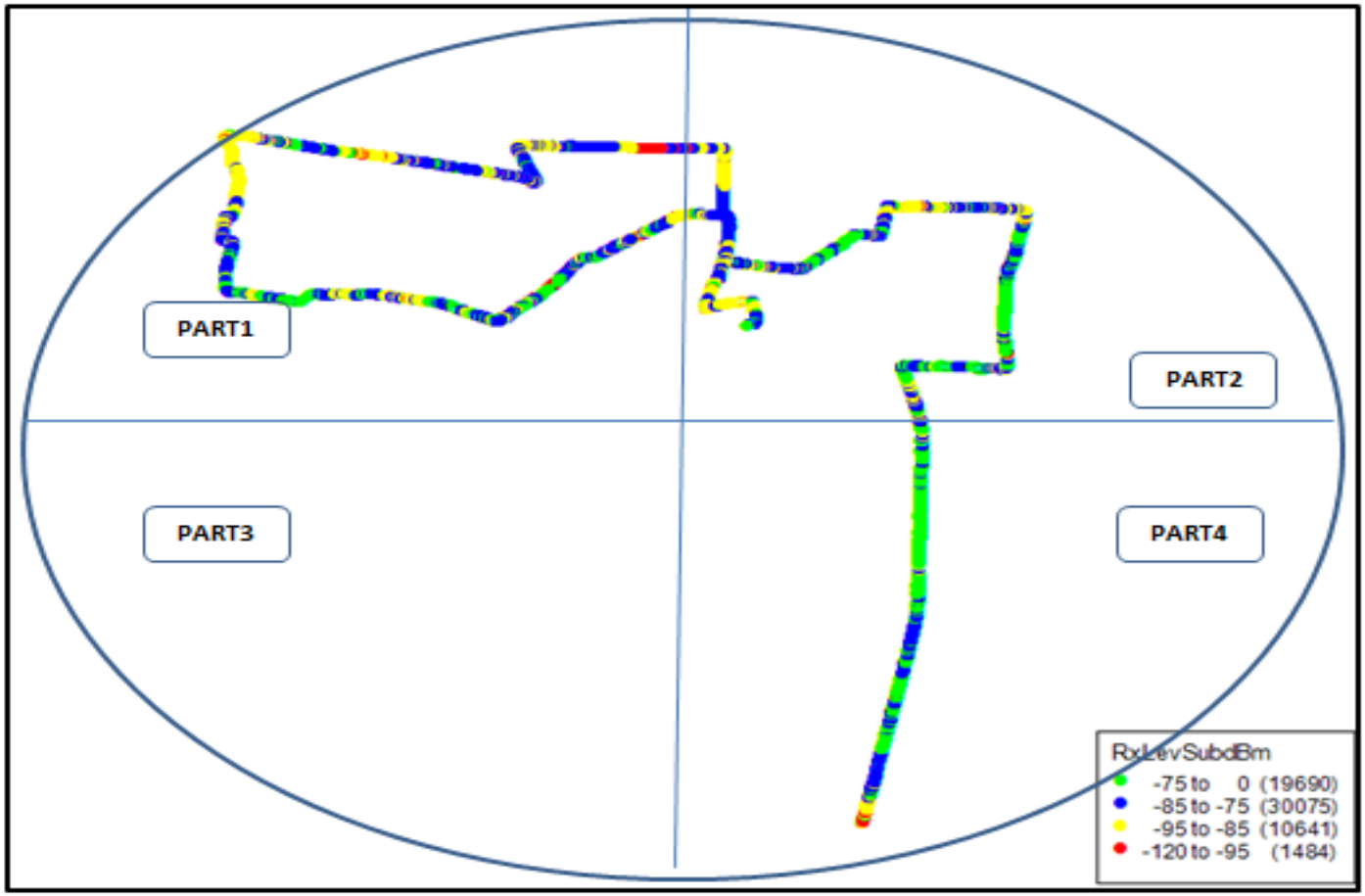
9.1.1.1 Route Details - Silchar SSA

Category	Type of location	June		
		Silchar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Karimganj, Silchar to Suaraibari	Silchar, Paikan to Harangajao	Haflong, Harangajao to Langting
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

9.1.1.2 Route Map - Silchar DAY 1

Rx Level Plot –Day-1
Date of Drive Test- 22/6/2016
Name of the SDCAs covered – City Drive_Karimganj



Route Covered- day 1

1. Faridpur, Karnamadhu, Karimganj

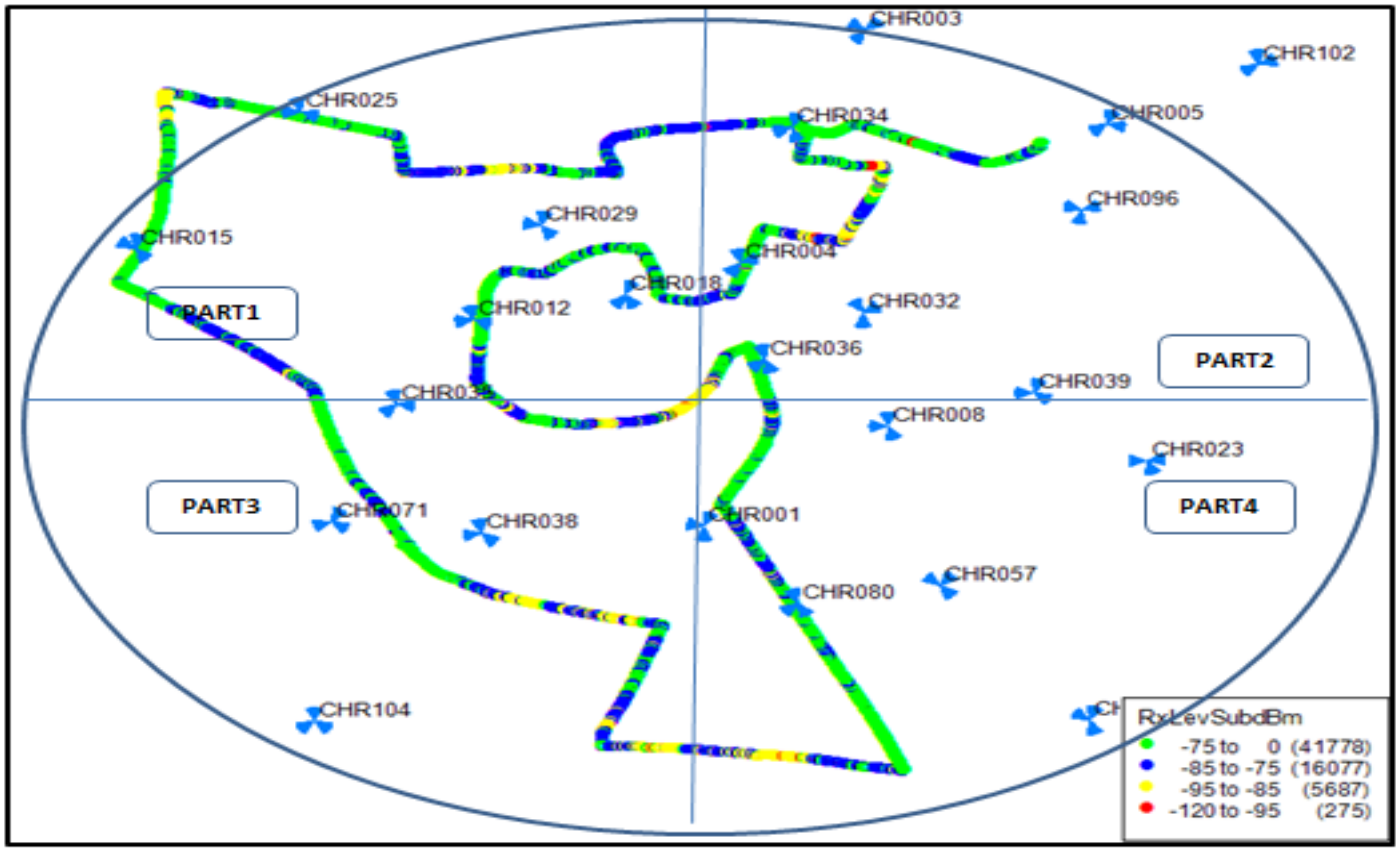
2. Zakiganj, Cherakuri

3. No drive plot

4. Sarisa, Banamali, Alongjuri

9.1.1.3 Route Map - Silchar DAY 2

Rx Level Plot –Day-2
Date of Drive Test- 23/6/2016
Name of the SDCAs covered – City Drive Silchar



Route Covered- day 2

1. Tarapur, ambicapur, Uttar krishapur

2. Nazirpatty, Mahut para, Lamba digi bilpara

3. Kanakpur, Meherpur

4. Link road, BKS villa road

9.1.1.4 Drive Test Results - Silchar SSA-2G

SILCHAR	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		48.66%	46.18%	31.84%	43.13%	99.84%	14.85%		58.83%	34.17%	36.83%			92.54%	34.34%
0 to -85 dBm		77.75%	85.56%	97.18%	71.58%	0.16%	33.22%		81.66%	97.59%	70.47%			47.90%	66.27%
0 to -95 dBm		99.45%	97.14%	99.98%	92.22%	0.00%	57.87%		95.97%	99.84%	92.29%			19.21%	89.15%
Voice quality	≥ 95%	98.86%	93.35%	99.69%	97.37%	100.00%	75.14%		91.08%	98.38%	90.36%			71.85%	95.42%
CSSR	≥ 95%	100.00%	98.64%	100.00%	100.00%	100.00%	70.67%	NA	86.86%	NA	90.48%	No Service		100.00%	98.82%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		13.40%	NA	9.52%			0.00%	1.18%
Call drop rate	≤ 2%	0.00%	1.36%	0.00%	0.00%	0.00%	10.75%		14.84%	NA	4.61%			0.00%	0.60%
Hands off success rate		100.00%	100.00%	100.00%	98.43%	100.00%	98.42%		93.97%	NA	98.52%			100.00%	99.40%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.1.1 Drive Test Results - Silchar SSA-3G

SILCHAR	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Reliance 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		0.00%	38.98%	76.07%	41.98%	NA	59.88%	NA		32.41%	19.91%
0 to -85 dBm		42.74%	60.52%	99.87%	68.13%		70.16%			81.48%	46.14%
0 to -95 dBm		98.13%	88.45%	100.00%	88.04%		81.84%			83.33%	70.71%
Voice quality	≥ 95%	NA	NA	92.95%	95.98%		99.81%			97.00%	91.00%
CSSR	≥ 95%	100.00%	100.00%	100.00%	89.76%		87.88%			96.00%	95.00%
%age Blocked calls		0.00%	1.23%	0.00%	10.24%		17.42%			2.43%	1.34%
Call drop rate	≤ 2%	0.00%	2.47%	0.00%	0.85%		15.65%			1.13%	0.54%
Hands off success rate		100.00%	100.00%	100.00%	100.00%		80.77%			91.00%	93.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Airtel 3G did not meet the benchmark in indoor locations and Vodafone 3G did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

Airtel 3G and BSNL 3G failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

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

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

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	RCOM CDMA	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	100%	NDR	100%	100%		100%
Succesful Data Transmission upload speed attempts	>75%	100%	100%	NDR	100%	100%		100%
Minimum download speed		3	70	NDR	NA	84	No Service	NA
Average throughput for Packet Data		98	81	NDR	101	115		171
Latency	<250ms	100	100%	NDR	100	NA		NA

All the parameters met the TRAI benchmark.

9.1.1.2 Drive Test Results - Silcha SSA- DATA-3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100%		100
Succesful Data Transmission upload speed attempts	>75%	100	100	100%		100
Minimum download speed		415	1424	NA	NA	NA
Average throughput for Packet Data		1362	1385	342		582
Latency	<250ms	100	100	100		NA

All the parameters met the TRAI benchmark.

10 ANNEXURE – CONSOLIDATED-2G

10.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		8638	10661	729	3065	5348	No Service	10171
Sum of downtime of BTSs in a month (in hours)		262607	38817	1643	53185	59874	No Service	72672
BTSs accumulated downtime (not available for service)	≤ 2%	4.09%	0.49%	0.30%	2.33%	1.50%	No Service	0.96%
Number of BTSs having accumulated downtime >24 hours		2540	88	219	194	63	No Service	171
Worst affected BTSs due to downtime	≤ 2%	29.40%	0.83%	30.04%	6.33%	1.18%	No Service	1.68%
Live Measurement Results for Network Availability- 3 Day live data								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		8638	10639	729	3065	5323	No Service	10171
Sum of downtime of BTSs in a month (in hours)		32662	3914	183	2806	6200	No Service	8812
BTSs accumulated downtime (not available for service)	≤ 2%	5.25%	0.51%	0.35%	1.27%	1.62%	No Service	1.20%
Number of BTSs having accumulated downtime >24 hours		352	0	40	43	49	No Service	30
Worst affected BTSs due to downtime	≤ 2%	4.08%	0.00%	5.49%	1.40%	0.92%	No Service	0.29%

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

10.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data								
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
CSSR	≥ 95%	90.89%	95.93%	98.73%	97.27%	97.52%	No Service	98.72%
SDCCH/Paging channel congestion	≤ 1%	1.44%	0.81%	NA	2.19%	0.37%	No Service	0.66%
TCH congestion	≤ 2%	6.48%	1.29%	NA	2.32%	0.53%	No Service	1.28%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data								
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
CSSR	≥ 95%	96.27%	96.56%	98.70%	97.95%	98.90%	No Service	99.29%
SDCCH/Paging channel congestion	≤ 1%	1.23%	0.39%	NA	6.34%	0.28%	No Service	0.52%
TCH congestion	≤ 2%	2.52%	0.58%	NA	1.31%	0.21%	No Service	0.71%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data								
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of call attempts		177	184	337	454	168	No Service	203
Total number of successful calls established		177	184	249	403	152	No Service	201
CSSR	≥ 95%	100.00%	100.00%	73.89%	88.77%	90.48%	No Service	99.01%
%age blocked calls		0.00%	0.00%	26.11%	11.23%	9.52%	No Service	0.99%

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

10.3 Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		675059223	670158902	995855	1085888445	126996667	No Service	429730837
Total number of calls dropped		12821688	6560351	12710	21414085	576031	No Service	3065925
Call drop rate	≤ 2%	1.90%	0.98%	1.28%	1.97%	0.45%	No Service	0.71%
Total number of cells in the network		25570	32039	2061	9128	16044	No Service	30356
Total number of cells having more than 3% TCH		4425	383	99	339	364	No Service	763
Worst affected cells having more than 3% TCH	≤ 3%	17.30%	1.20%	4.80%	3.71%	2.27%	No Service	2.51%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		730121146	693891196	1245164	112194217	134640171	No Service	511619988
Total number of calls dropped		11150445	6230247	17359	2326731	554318	No Service	3505798
Call drop rate	≤ 2%	1.53%	0.90%	1.39%	2.07%	0.41%	No Service	0.69%
Total number of cells in the network		25681	31913	2061	24532	15969	No Service	30356
Total number of cells having more than 3% TCH		3633	397	148	159	360	No Service	783
Worst affected cells having more than 3% TCH	≤ 3%	14.15%	1.24%	7.20%	0.65%	2.25%	No Service	2.58%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		240	184	251	403	152	No Service	201
Total number of calls dropped		2	0	23	50	7	No Service	1
Call drop rate	≤ 2%	0.83%	0.00%	9.16%	12.41%	4.61%	No Service	0.50%

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

10.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data								
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of sample calls		69118492725	66590469246	NA	NA	13657491839	No Service	63380158488
Total number of calls with good voice quality		62899162800	65960020871	NA	NA	13077713475	No Service	61240672100
%age calls with good voice quality	≥ 95%	91.00%	99.05%	NA	NA	95.75%	No Service	96.62%
Live measurement results for Voice quality-3 Day data								
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
NDR		28000200778	6875838341	NA	NA	5353206324	No Service	7003948351
Total number of calls with good voice quality		25891387269	6820437777	NA	NA	5168506148	No Service	6801885373
%age calls with good voice quality	≥ 95%	92.47%	99.19%	NA	NA	96.55%	No Service	97.12%
Drive test results for Voice quality (Average of three drive tests) - DT data								
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of sample calls		349141	368920	NA	744390	270637	No Service	300207
Total number of calls with good voice quality		328634	360346	NA	694017	245216	No Service	238139
%age calls with good voice quality	≥ 95%	94.13%	97.68%	87.57%	93.23%	90.61%	No Service	79.32%

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

10.5 POI CONGESTION

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		55	15	0	13	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		294599	342801	0	50567	115424	No Service	5808939
Traffic served for all POIs (B)- in erlangs		186234	116011	0	44826	68098	No Service	4141421
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		54	15	0	13	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		291230	342725	0	50567	115695	No Service	1390690
Traffic served for all POIs (B)- in erlangs		130661	99495	0	40022	66814	No Service	667805
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

10.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang							
Traffic in Erlang	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network	0	169435.4703	33750	0	43078	No Service	174226
Total taffic handled in erlang during TCBH	189027.6868	144153.22	120	0	29740.02	No Service	109630.5102
Total no. of customers served (as per VLR)	148334.1292	5543258	6874	0	1110141	No Service	3935667

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 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2845	8138	Not Providing	1587	3826
Sum of downtime (i.e. total outage time) of Node Bs		39558	21864	Not Providing	1474	32781
Node Bs downtime (not available for service)	≤ 2%	1.87%	0.36%	Not Providing	0.12%	1.15%
Number of Node Bs having accumulated downtime of >24 hours in a month		619	58	Not Providing	4	46
Worst affected Node Bs due to downtime	≤ 2%	21.76%	0.71%	Not Providing	0.25%	1.20%
Live Measurement Results for Network Availability- 3 Day live data						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2845	3562	Not Providing	1587	3826
Sum of downtime (i.e. total outage time) of Node Bs		3463	1421	Not Providing	0	3317
Node Bs downtime (not available for service)	≤ 2%	1.69%	0.55%	Not Providing	0.00%	1.20%
Number of Node Bs having accumulated downtime of >24 hours in a month		45	0	Not Providing	0	12
Worst affected Node Bs due to downtime	≤ 2%	1.58%	0.00%	Not Providing	0.00%	0.31%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.00%	97.93%	Not Providing	99.42%	99.70%
RRC Congestion	≤ 1%	0.36%	0.60%	Not Providing	0.09%	0.08%
Circuit Switched RAB Congestion	≤ 2%	0.00%	0.50%	Not Providing	0.01%	0.10%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.21%	96.36%	Not Providing	99.73%	99.82%
RRC Congestion	≤ 1%	0.24%	0.47%	Not Providing	0.09%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.00%	0.65%	Not Providing	0.01%	0.02%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data						
CSSR	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of RRC attempts (A)		111	159	198	NA	178
Total number of RRC established (B)		108	146	182	NA	175
Call setup success rate (B/A*100)	≥ 95%	97.30%	91.82%	91.92%	NA	98.31%
%age blocked calls		2.70%	8.18%	8.08%	NA	1.69%

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

11.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		16974051	222677666	Not Providing	6300732	31603240
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		118886	2436510	Not Providing	12344	115854
Call drop rate (B/A*100)	≤ 2%	0.70%	1.09%	Not Providing	0.20%	0.37%
Total no. of cells in the licensed service area (B)		8037	17563	Not Providing	3398	11617
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		660	229	Not Providing	36	408
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	8.21%	1.30%	Not Providing	1.06%	3.51%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		23481107	223578199	Not Providing	8351763	40983328
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		151674	2219014	Not Providing	15973	186102
Call drop rate (B/A*100)	≤ 2%	0.65%	0.99%	Not Providing	0.19%	0.45%
Total no. of cells in the licensed service area (B)		8073	18779	Not Providing	3398	11617
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		475	223	Not Providing	16	382
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	5.88%	1.19%	Not Providing	0.46%	3.29%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data						
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		111	150	181	NA	175
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		2	1	18	NA	23
Call drop rate (B/A*100)	≤ 2%	1.80%	0.67%	9.94%	NA	13.14%

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

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1904252987901	22712355820	Not Providing	49860784655	60893963552
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1884687088010	22476483973	Not Providing	49796758500	60226878731
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.97%	98.96%	Not Providing	99.87%	98.90%
Live measurement results for Voice quality-3 Day data						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		235644727813	2276000980	Not Providing	NA	7655819769
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		233341152898	2256248386	Not Providing	NA	7572319492
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.02%	99.13%	Not Providing	NA	98.91%
Drive test results for Voice quality (Average of three drive tests) - DT data						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	653024	183463	NA	576825
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	623258	183109	NA	571885
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	95.44%	99.81%	NA	99.14%

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 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	5	Not Providing	17	96
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	57209	196578
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	26679	133392
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	15	Not Providing	17	32
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	57209	1638900
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	26679	549427
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%

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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang						
Traffic in Erlang		Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Eqipped capacity of the network		NDR	169435.4703	Not Providing	NDR	NDR
Total taffic handled in erlang during TCBH		NDR	144153.22	Not Providing	NDR	NDR
Total no. of customers served (as per VLR)		NDR	5543258	Not Providing	NDR	NDR

12 ANNEXURE – CUSTOMER SERVICES

12.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated								
Billing Performance	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)								
Metering and billing credibility - Postpaid								
Total bills generated during the period		231438	243032	31228	614474	59245	299929	373285
Total number of bills disputed		95	92	8	17	183	270	403
Total number of valid billing complaints		7	31	0	17	2	267	295
Total complaints considered invalid		88	61	8	0	181	3	108
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.04%	0.04%	0.03%	0.00%	0.31%	0.09%	0.11%
April								
Total bills generated during the first billing cycle		76045	81129	10003	205777	18426	100795	121027
Total number of bills disputed in first billing cycle		23	39	2	5	57	95	127
Total number of valid billing complaints (billing cycle 1)		2	16	0	5	0	92	85
Total complaints considered invalid (billing cycle 1)		21	23	2	0	57	3	42
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.03%	0.05%	0.02%	0.00%	0.31%	0.09%	0.10%

May								
Total bills generated during the second billing cycle		77193	81084	10352	204740	20184	99462	124112
Total number of bills disputed in second billing cycle		24	24	3	9	59	87	167
Total number of valid billing complaints (billing cycle 2)		3	7	0	9	1	87	115
Total complaints considered invalid (billing cycle 2)		21	17	3	0	58	0	52
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.03%	0.03%	0.03%	0.00%	0.29%	0.09%	0.13%
June								
Total bills generated during the third billing cycle		78200	80819	10873	203957	20635	99672	128146
Total number of bills disputed in third billing cycle		48	29	3	3	67	88	109
Total number of valid billing complaints (billing cycle 3)		2	8	0	3	1	88	95
Total complaints considered invalid (billing cycle 3)		46	21	3	0	66	0	14
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.06%	0.04%	0.03%	0.00%	0.32%	0.09%	0.09%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid								
Performance prepaid	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		3	0	0	16	491	451	1566
Total complaints considered invalid (sum of 3 months)		2440	581	0	0	1742	265	1104
Total number of charging complaints (sum of 3 months)		2443	581	0	16	2233	716	2670
Total no of customers served (Sum of 3 months)		15814447	17881817	0	3079677	3414331	3895585	7301778
Percentage of charging complaints disputed	≤ 0.1%	0.02%	0.00%	NA	0.00%	0.07%	0.02%	0.04%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated								
Billing Performance	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of billing/charging complaints		5066	673	8	33	2416	1704	3073
Total number of complaints resolved in favour of customer		2538	31	8	33	493	986	1861
Total complaints considered invalid		2528	642	0	0	1923	718	1212
Number of complaints resolved in 4 weeks		2538	31	8	33	493	986	1861
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		2538	31	8	33	493	986	1861
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver								
Total number of complaints where credit/waiver is required		10	31	0	33	522	718	1699
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints								
Resolution of billing complaints	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total Number of calls made		100	100	0	100	100	100	100
Number of cases resolved in 4 weeks		56	82	0	71	63	41	77
Percentage cases resolved in 4 weeks	≥ 98%	56.00%	82.00%	NA	71.00%	63.00%	41.00%	77.00%
Number of cases resolved in 6 weeks		56	83	0	71	63	41	77
Percentage cases resolved in 6 weeks	100.00%	56.00%	83.00%	NA	71.00%	63.00%	41.00%	77.00%

Data Source: Billing Center of the operators

12.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		14547819	1817796	3010	1064024	6815626	813634	7012716
Number of calls getting connected and answered (electronically)		13982992	1817353	3010	1033006	6585341	797323	6987393
Percentage calls getting connected and answered	≥ 95%	96.12%	99.98%	100.00%	97.08%	96.62%	98.00%	99.64%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received (3 months)		2401723	1969246	1259	513990	1176779	265138	3164978
Total Number of calls answered within 90 seconds (3 months)		2290981	1445945	1214	501671	1174225	256346	3164978
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	95.39%	73.43%	96.43%	97.60%	99.78%	96.68%	100.00%
April								
Total calls received (Month 1)		805372	614849	504	185801	329948	85931	1064567
Total calls answered within 90 seconds (Month 1)		780840	563363	481	182556	329560	82193	1064567
% calls answered within 90 seconds (Month 1)	≥ 95%	96.95%	91.63%	95.44%	98.25%	99.88%	95.65%	100.00%
May								
Total calls received (Month 2)		794466	728689	329	171365	422030	94369	1087606
Total calls answered within 90 seconds (Month 2)		743715	301365	321	166627	421362	92337	1087606
% calls answered within 90 seconds (Month 2)	≥ 95%	93.61%	41.36%	97.57%	97.24%	99.84%	97.85%	100.00%
June								
Total calls received (Month 3)		801885	625708	426	156824	424801	84838	1012805
Total calls answered within 90 seconds (Month 3)		766426	581217	412	152488	423303	81816	1012805
% calls answered within 90 seconds (Month 3)	≥ 95%	95.58%	92.89%	96.71%	97.24%	99.65%	96.44%	100.00%

Live calling results for customer care (IVR)								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		13	33	13	29	97	6	94
Percentage calls getting connected and answered	≥ 95%	13.00%	33.00%	13.00%	29.00%	97.00%	6.00%	94.00%
Live calling results for customer care (Voice to Voice)								
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received		13	33	13	29	97	6	94
Total Number of calls getting connected and answered		8	14	10	25	93	6	89
Live Calling Percentage calls getting connected and answered	≥ 95%	61.54%	42.42%	76.92%	86.21%	95.88%	100.00%	94.68%

12.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated								
Termination	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		1402	1525	123	743	294	587	1026
Number of requests attended within 7 days		1401	1525	123	743	294	587	1026
Percentage cases in which termination done within 7 days	100.00%	99.93%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

12.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated								
Refund	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		1392	NA	126	706	205	2302	2721
Total number of cases where refund was made within 60 days		1392	NA	126	706	205	1391	2721
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	NA	100.00%	100.00%	100.00%	60.43%	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	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	0	100	100	100	100
Number of cases resolved to satisfaction	57	81	0	77	54	52	78
Percentage cases resolved in four weeks	57.00%	81.00%	NA	77.00%	54.00%	52.00%	78.00%

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

12.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services								
Level 1 services		Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total no. of calls made		132	145	127	150	94	91	150
Calls answered		101	121	96	75	73	62	103
% of calls connected	≥ 95%	76.52%	83.45%	75.59%	50.00%	77.66%	68.13%	68.67%

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

12.7 LEVEL 1 SERVICE CALLS MADE

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		25	17
101	Fire	Y		25	17
102	Ambulance	Y		25	17
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	Y		25	17
138	All India Helpline for passengers	Y		25	16
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		25	17
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		25	17
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		25	17
1077	Control Room for District Collector		N		

1090	Call Alart (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		25	17
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
10589	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				
1514	National Career Service(NCS)				
15100	Free Legal Service Helpline	Y		25	17
155304	Municipal Corporations		N		
155214	Labour Helpline				
1903	Sashastra Seema Bal (SSB)	Y		25	16
1909	National Do Not Call Registry				
1912	Complaint of Electricity	Y		25	17
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		

Airtel

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		28	22
101	Fire	Y		27	22
102	Ambulance				
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	Y		27	22

138	All India Helpine for Passangers	Y		28	22
149	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		28	22
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline				
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		27	22
1090	Call Alart (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		27	22
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)	Y		27	22
10740	Central Pollution Control Board		N		
10741	Pollution Control Board				
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	22
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		

155304	Municipal Corporations		N		
155214	Labour Helpline	Y		27	22
1903	Sashastra Seema Bal (SSB)				
1909	National Do Not Call Registry	Y		27	22
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		
BSNL CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		23	15
101	Fire	Y		23	14
102	Ambulance				
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		23	14
138	All India Helpine for Passangers	Y		24	15
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline				
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		23	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		23	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline				
1073	Road Accident Helpline				

1077	Control Room for District Collector				
1090	Call Alart (Crime Branch)				
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		23	15
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		23	15
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		23	15
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		23	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		23	15
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)				
1909	National Do Not Call Registry				
1912	Complaint of Electricity	Y		23	15
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		23	15

BSNL GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	10
101	Fire	Y		20	10
102	Ambulance		N		
104	Health Information Helpline		N		

108	Emergency and Disaster Management Helpline	Y		20	10
138	All India Helpine for Passangers				
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	10
182	Indian Railway Security Helpline	Y		20	10
1033	Road Accident Management Service	Y		20	10
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		20	10
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		20	10
1073	Road Accident Helpline	Y		20	10
1077	Control Room for District Collector		N		
1090	Call Alart (Crime Branch)				
1091	Women Helpline				
1097	National AIDS Helpline to NACO				
1099	Central Accident and Trauma Services (CATS)	Y		20	10
10580	Educationa & Vocational Guidance and Counselling		N		
10589	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		20	10

1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		20	10
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)				
1909	National Do Not Call Registry	Y		20	10
1912	Complaint of Electricity	Y		20	10
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		20	10
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	11
101	Fire	Y		22	11
102	Ambulance	Y		21	10
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	Y		22	10
138	All India Helpine for Passangers	Y		21	10
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		21	11
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		22	11
1071	Air Accident Helpline		N		

1072	Rail Accident Helpline	Y		21	10
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		22	11
1090	Call Alart (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		21	10
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
10589	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		22	11
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)				
1909	National Do Not Call Registry	Y		21	10
1912	Complaint of Electricity	Y		21	10
1916	Drinking Water Supply	Y		21	10
1950	Election Commission of India		N		
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		25	11
101	Fire	Y		25	11
102	Ambulance		N		

104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline				
138	All India Helpine for Passangers	Y		25	10
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline				
182	Indian Railway Security Helpline	Y		25	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		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		25	11
1071	Air Accident Helpline				
1072	Rail Accident Helpline				
1073	Road Accident Helpline	Y		25	11
1077	Control Room for District Collector				
1090	Call Alart (Crime Branch)				
1091	Women Helpline				
1097	National AIDS Helpline to NACO	Y		25	10
1099	Central Accident and Trauma Services (CATS)				
10580	Educationa & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		25	10
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway	Y		25	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	Y		25	10
1912	Complaint of Electricity	Y		25	10
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		25	10
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		25	18
101	Fire	Y		25	17
102	Ambulance				
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	Y		25	18
138	All India Helpine for Passangers	Y		25	17
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		25	17
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		25	17

1071	Air Accident Helpline	Y		25	17
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		25	17
1090	Call Alart (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		25	17
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
10589	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		25	17
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline				
1903	Sashastra Seema Bal (SSB)				
1909	National Do Not Call Registry	Y		25	17
1912	Complaint of Electricity	Y		25	17
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		

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.

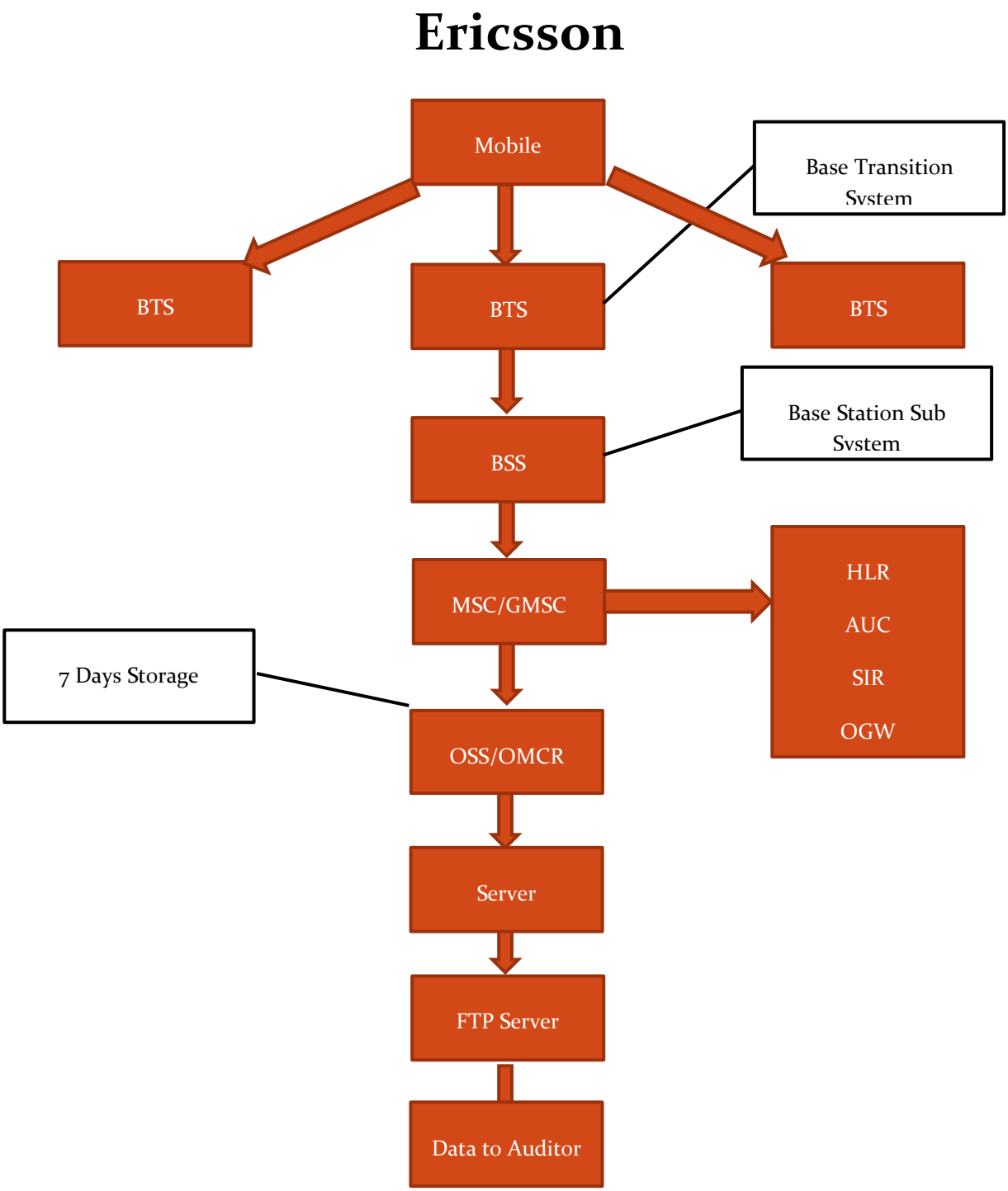
Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
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

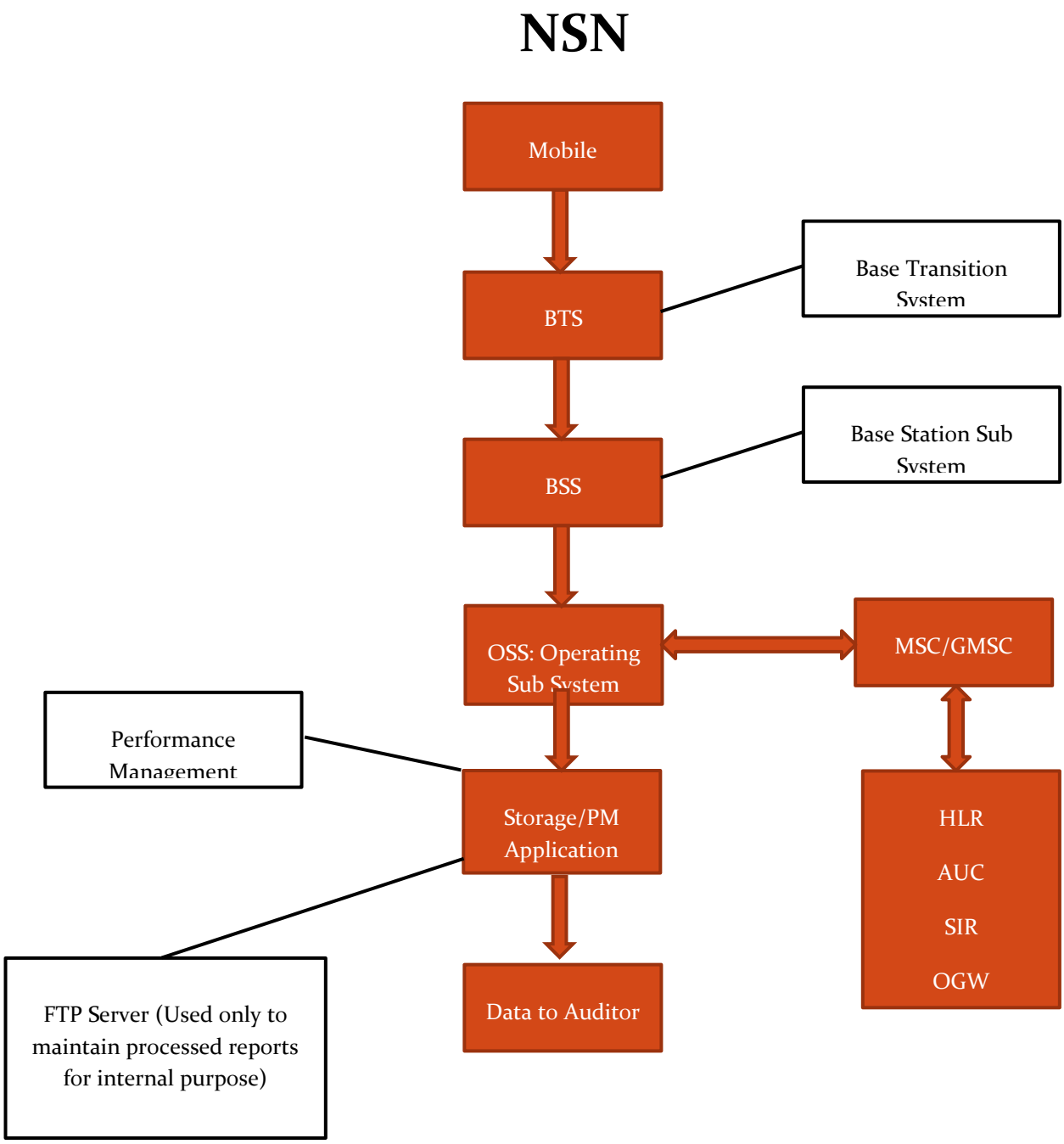
13.2.1 ERICSSON

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 – APRIL -2G

Audit Results for Network Availability- PMR data-April								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2873	3540	243	1391	1772	No Service	3385
Sum of downtime of BTSs in a month (in hours)		104140	12569	624	19976	21828	No Service	29234
BTSs accumulated downtime (not available for service)	≤ 2%	4.87%	0.48%	0.35%	1.93%	1.66%	No Service	1.16%
Number of BTSs having accumulated downtime >24 hours		1064	42	79	27	21	No Service	60
Worst affected BTSs due to downtime	≤ 2%	37.03%	1.19%	32.51%	1.94%	1.19%	No Service	1.77%
Live Measurement Results for Network Availability- 3 Day live data-April								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2873	3530	243	1391	1747	No Service	3385
Sum of downtime of BTSs in a month (in hours)		11275	1335	67	333	2330	No Service	2778
BTSs accumulated downtime (not available for service)	≤ 2%	5.45%	0.53%	0.39%	0.33%	1.85%	No Service	1.14%
Number of BTSs having accumulated downtime >24 hours		58	0	22	27	14	No Service	7
Worst affected BTSs due to downtime	≤ 2%	2.02%	0.00%	9.05%	1.94%	0.80%	No Service	0.21%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-April								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	90.37%	96.05%	98.83%	98.13%	96.05%	No Service	98.66%
SDCCH/Paging channel congestion	≤ 1%	2.27%	0.77%	NA	0.86%	0.28%	No Service	0.77%
TCH congestion	≤ 2%	7.00%	1.38%	NA	1.87%	0.87%	No Service	1.34%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-April								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.73%	96.72%	98.72%	98.31%	98.51%	No Service	99.19%
SDCCH/Paging channel congestion	≤ 1%	1.14%	0.38%	NA	0.75%	0.22%	No Service	0.57%
TCH congestion	≤ 2%	2.99%	0.48%	NA	1.69%	0.33%	No Service	0.81%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-April								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	No Service	NA
Total number of successful calls established		NA	NA	NA	NA	NA	No Service	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	No Service	NA
%age blocked calls		NA	NA	NA	NA	NA	No Service	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-April								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		217066904	217822323	335430	481817166	42818434	No Service	143769017
Total number of calls dropped		3966380	1926818	4418	9443617	177215	No Service	1037465
Call drop rate	≤ 2%	1.83%	0.88%	1.32%	1.96%	0.41%	No Service	0.72%
Total number of cells in the network		8449	10639	687	4143	5316	No Service	10197
Total number of cells having more than 3% TCH		1268	116	0	123	108	No Service	302
Worst affected cells having more than 3% TCH	≤ 3%	15.01%	1.09%	0.00%	2.97%	2.03%	No Service	2.96%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-April								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		245355777	233622630	424521	51560112	49278100	No Service	177004773
Total number of calls dropped		3419215	2041043	6446	852242	174978	No Service	1172097
Call drop rate	≤ 2%	1.39%	0.87%	1.52%	1.65%	0.36%	No Service	0.66%
Total number of cells in the network		8526	10594	687	4143	5241	No Service	10197
Total number of cells having more than 3% TCH		1056	136	47	126	93	No Service	304
Worst affected cells having more than 3% TCH	≤ 3%	12.39%	1.29%	6.89%	3.04%	1.78%	No Service	2.98%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-April								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL CDMA**	**BSNL GSM**	**Idea**	**Reliance GSM**	**Vodafone**
Total number of calls established		NA	NA	NA	NA	NA	No Service	NA
Total number of calls dropped		NA	NA	NA	NA	NA	No Service	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	No Service	NA

Audit Results for Voice quality -PMR Data-April								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		21940195264	21438370599	NA	NA	4540182799	No Service	20919336435
Total number of calls with good voice quality		19977593717	21250030812	NA	NA	4345610124	No Service	20261461511
%age calls with good voice quality	≥ 95%	91.05%	99.12%	NA	NA	95.71%	No Service	96.86%
Live measurement results for Voice quality-3 Day data-April								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		2436088678	2261924890	NA	NA	517523171	No Service	2431033000
Total number of calls with good voice quality		2256094157	2243169038	NA	NA	499037769	No Service	2363936620
%age calls with good voice quality	≥ 95%	92.61%	99.17%	NA	NA	96.43%	No Service	97.24%
Drive test results for Voice quality (Average of three drive tests) - DT data-April								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	No Service	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	No Service	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	No Service	NA

Audit Results for POI Congestion- PMR data-April								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		95893	114304	0	25284	44154	No Service	1926438
Traffic served for all POIs (B)- in erlangs		60732	37467	0	22605	25810	No Service	1265456
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-April								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		95767	114304	0	25284	43516	No Service	475533
Traffic served for all POIs (B)- in erlangs		6182	30016	0	22605	25392	No Service	148809
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

15 ANNEXURE – MAY-2G

Audit Results for Network Availability- PMR data-May								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2879	3552	243	1391	1788	No Service	3392
Sum of downtime of BTSs in a month (in hours)		91275	13381	545	20594	20748	No Service	25758
BTSs accumulated downtime (not available for service)	≤ 2%	4.26%	0.51%	0.30%	1.99%	1.56%	No Service	1.02%
Number of BTSs having accumulated downtime >24 hours		876	41	74	27	24	No Service	58
Worst affected BTSs due to downtime	≤ 2%	30.43%	1.15%	30.45%	1.94%	1.34%	No Service	1.71%
Live Measurement Results for Network Availability- 3 Day live data-May								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2879	3547	243	1391	1788	No Service	3392
Sum of downtime of BTSs in a month (in hours)		14243	1158	61	1516	2237	No Service	4692
BTSs accumulated downtime (not available for service)	≤ 2%	6.87%	0.45%	0.35%	1.51%	1.74%	No Service	1.92%
Number of BTSs having accumulated downtime >24 hours		147	0	15	5	20	No Service	19
Worst affected BTSs due to downtime	≤ 2%	5.11%	0.00%	6.17%	0.36%	1.12%	No Service	0.56%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-May								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	91.93%	95.93%	98.68%	98.55%	98.09%	No Service	98.80%
SDCCH/Paging channel congestion	≤ 1%	1.06%	0.88%	NA	0.89%	0.50%	No Service	0.60%
TCH congestion	≤ 2%	5.52%	1.24%	NA	1.45%	0.39%	No Service	1.20%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-May								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.42%	96.60%	98.68%	98.88%	99.07%	No Service	99.28%
SDCCH/Paging channel congestion	≤ 1%	2.18%	0.32%	NA	2.06%	0.44%	No Service	0.68%
TCH congestion	≤ 2%	2.72%	0.61%	NA	1.12%	0.15%	No Service	0.72%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-May								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	No Service	NA
Total number of successful calls established		NA	NA	NA	NA	NA	No Service	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	No Service	NA
%age blocked calls		NA	NA	NA	NA	NA	No Service	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-May								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		223576906	229658913	334088	500711427	42194639	No Service	145103346
Total number of calls dropped		4280516	2197023	4339	9413375	186176	No Service	1060960
Call drop rate	≤ 2%	1.91%	0.96%	1.30%	1.88%	0.44%	No Service	0.73%
Total number of cells in the network		8556	10675	687	4143	5364	No Service	10185
Total number of cells having more than 3% TCH		1506	135	51	123	120	No Service	206
Worst affected cells having more than 3% TCH	≤ 3%	17.60%	1.26%	7.42%	2.97%	2.24%	No Service	2.02%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-May								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		239408037	236690367	408573	49532207	44428815	No Service	177472454
Total number of calls dropped		4006762	1970190	5844	1320919	184711	No Service	1381288
Call drop rate	≤ 2%	1.67%	0.83%	1.43%	2.67%	0.42%	No Service	0.78%
Total number of cells in the network		8564	10608	687	20389	5364	No Service	10185
Total number of cells having more than 3% TCH		1363	131	45	0	127	No Service	211
Worst affected cells having more than 3% TCH	≤ 3%	15.91%	1.24%	6.60%	0.00%	2.37%	No Service	2.07%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-May								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	No Service	NA
Total number of calls dropped		NA	NA	NA	NA	NA	No Service	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	No Service	NA

Audit Results for Voice quality -PMR Data-May								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		23842981790	22850395509	NA	NA	4614394024	No Service	21773366563
Total number of calls with good voice quality		21683679576	22639242275	NA	NA	4418180182	No Service	21031976319
%age calls with good voice quality	≥ 95%	90.94%	99.08%	NA	NA	95.75%	No Service	96.59%
Live measurement results for Voice quality-3 Day data-May								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		23123461117	2337912472	NA	NA	466884230	No Service	2377753518
Total number of calls with good voice quality		21374629712	2321020353	NA	NA	450486282	No Service	2307020291
%age calls with good voice quality	≥ 95%	92.44%	99.28%	NA	NA	96.49%	No Service	97.03%
Drive test results for Voice quality (Average of three drive tests) - DT data-May								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	No Service	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	No Service	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	No Service	NA

Audit Results for POI Congestion- PMR data-May								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		54	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		97187	114376	0	25284	34582	No Service	2003807
Traffic served for all POIs (B)- in erlangs		62019	39186	0	22222	20811	No Service	1386744
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		53	15	0	19	32	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		96818	114301	0	25284	35560	No Service	457573
Traffic served for all POIs (B)- in erlangs		61234	30122	0	17417	20526	No Service	381626
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

16 ANNEXURE – JUNE-2G

Audit Results for Network Availability- PMR data-June								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2886	3569	243	283	1788	No Service	3394
Sum of downtime of BTSs in a month (in hours)		67193	12867	474	12615	17299	No Service	17680
BTSs accumulated downtime (not available for service)	≤ 2%	3.13%	0.48%	0.26%	5.99%	1.30%	No Service	0.70%
Number of BTSs having accumulated downtime >24 hours		600	5	66	140	18	No Service	53
Worst affected BTSs due to downtime	≤ 2%	20.79%	0.14%	27.16%	49.47%	1.01%	No Service	1.56%
Live Measurement Results for Network Availability- 3 Day live data-June								
	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2886	3562	243	283	1788	No Service	3394
Sum of downtime of BTSs in a month (in hours)		7145	1421	55	957	1633	No Service	1342
BTSs accumulated downtime (not available for service)	≤ 2%	3.44%	0.55%	0.31%	4.70%	1.27%	No Service	0.55%
Number of BTSs having accumulated downtime >24 hours		147	0	3	11	15	No Service	4
Worst affected BTSs due to downtime	≤ 2%	5.09%	0.00%	1.23%	3.89%	0.84%	No Service	0.12%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-June								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	90.37%	95.80%	98.67%	95.15%	98.44%	No Service	98.69%
SDCCH/Paging channel congestion	≤ 1%	0.99%	0.78%	2.39%	4.82%	0.33%	No Service	0.61%
TCH congestion	≤ 2%	6.90%	1.25%	NA	3.64%	0.32%	No Service	1.31%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-June								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	96.68%	96.36%	98.69%	96.67%	99.12%	No Service	99.39%
SDCCH/Paging channel congestion	≤ 1%	0.38%	0.47%	2.21%	16.22%	0.16%	No Service	0.31%
TCH congestion	≤ 2%	1.85%	0.65%	NA	1.12%	0.16%	No Service	0.61%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-June								
CSSR	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		177	184	337	454	168	No Service	203
Total number of successful calls established		177	184	249	403	152	No Service	201
CSSR	≥ 95%	100.00%	100.00%	73.89%	88.77%	90.48%	No Service	99.01%
%age blocked calls		0.00%	0.00%	26.11%	11.23%	9.52%	No Service	0.99%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-June								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		234415413	222677666	326337	103359852	41983594	No Service	140858474
Total number of calls dropped		4574792	2436510	3953	2557093	212640	No Service	967500
Call drop rate	≤ 2%	1.95%	1.09%	1.21%	2.47%	0.51%	No Service	0.69%
Total number of cells in the network		8565	10725	687	842	5364	No Service	9974
Total number of cells having more than 3% TCH		1650	132	48	93	136	No Service	255
Worst affected cells having more than 3% TCH	≤ 3%	19.27%	1.23%	6.99%	11.05%	2.54%	No Service	2.56%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-June								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		245357332	223578199	412070	11101898	40933256	No Service	157142761
Total number of calls dropped		3724468	2219014	5069	153570	194629	No Service	952413
Call drop rate	≤ 2%	1.52%	0.99%	1.23%	1.38%	0.48%	No Service	0.61%
Total number of cells in the network		8591	10711	687		5364	No Service	9974
Total number of cells having more than 3% TCH		1215	129	56	33	139	No Service	267
Worst affected cells having more than 3% TCH	≤ 3%	14.14%	1.20%	8.10%	NA	2.60%	No Service	2.68%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-June								
Call drop rate	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		240	184	251	403	152	No Service	201
Total number of calls dropped		2	0	23	50	7	No Service	1
Call drop rate	≤ 2%	0.83%	0.00%	9.16%	12.41%	4.61%	No Service	0.50%

Audit Results for Voice quality -PMR Data-June								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		23335315671	22301703138	NA	NA	4502915016	No Service	20687455490
Total number of calls with good voice quality		21237889507	22070747784	NA	NA	4313923169	No Service	19947234270
%age calls with good voice quality	≥ 95%	91.01%	98.96%	NA	NA	95.80%	No Service	96.42%
Live measurement results for Voice quality-3 Day data-June								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		2440650983	2276000980	NA	NA	4368798923	No Service	2195161833
Total number of calls with good voice quality		2260663400	2256248386	NA	NA	4218982097	No Service	2130928462
%age calls with good voice quality	≥ 95%	92.63%	99.13%	NA	NA	96.57%	No Service	97.07%
Drive test results for Voice quality (Average of three drive tests) - DT data-June								
Voice quality	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		349141	368920	NA	744390	270637	No Service	300207
Total number of calls with good voice quality		328634	360346	NA	694017	245216	No Service	238139
%age calls with good voice quality	≥ 95%	94.13%	97.68%	87.57%	93.23%	90.61%	No Service	79.32%

Audit Results for POI Congestion- PMR data-June								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		58	15	0	0	33	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		101520	114121	0	0	36688	No Service	1878694
Traffic served for all POIs (B)- in erlangs		63482	39357	0	0	21477	No Service	1489220
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June								
POI congestion	Benchmark	Aircel	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		57	15	0	0	33	No Service	32
No. of POIs not meeting benchmark		0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		98645	114121	0	0	36618	No Service	457584
Traffic served for all POIs (B)- in erlangs		63246	39357	0	0	20896	No Service	137370
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

17 ANNEXURE – APRIL -3G

Audit Results for Network Availability- PMR data-April						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		944	2275	Not Providing	479	1205
Sum of downtime (i.e. total outage time) of Node Bs		14784	11537	Not Providing	93	13505
Node Bs downtime (not available for service)	≤ 2%	2.11%	0.68%	Not Providing	0.03%	1.51%
Number of Node Bs having accumulated downtime of >24 hours in a month		115	28	Not Providing	0	16
Worst affected Node Bs due to downtime	≤ 2%	12.18%	1.23%	Not Providing	0.00%	1.33%
Live Measurement Results for Network Availability- 3 Day live data-April						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		944	Not Providing	Not Providing	479	1205
Sum of downtime (i.e. total outage time) of Node Bs		1263	Not Providing	Not Providing	0	1152
Node Bs downtime (not available for service)	≤ 2%	0.18%	Not Providing	Not Providing	0.00%	1.33%
Number of Node Bs having accumulated downtime of >24 hours in a month		7	Not Providing	Not Providing	0	4
Worst affected Node Bs due to downtime	≤ 2%	0.74%	Not Providing	Not Providing	0.00%	0.33%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-April						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	98.75%	99.56%	Not Providing	99.51%	99.68%
RRC Congestion	≤ 1%	0.46%	0.63%	Not Providing	0.13%	0.10%
Circuit Switched RAB Congestion	≤ 2%	0.01%	0.12%	Not Providing	0.02%	0.16%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-April						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.06%	Not Providing	Not Providing	99.46%	99.82%
RRC Congestion	≤ 1%	0.23%	Not Providing	Not Providing	0.14%	0.04%
Circuit Switched RAB Congestion	≤ 2%	0.00%	Not Providing	Not Providing	0.02%	0.02%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-April						
CSSR	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-April						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		5393709	NA	Not Providing	2143144	8749793
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		40816	NA	Not Providing	4863	39073
Call drop rate (B/A*100)	≤ 2%	0.76%	0.82%	Not Providing	0.23%	0.45%
Total no. of cells in the licensed service area (B)		2446	6838	Not Providing	860	3638
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		218	97	Not Providing	14	172
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	8.91%	1.42%	Not Providing	1.63%	4.72%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-April						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		7758900	Not Providing	Not Providing	2982243	12689190
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		56315	Not Providing	Not Providing	6851	57182
Call drop rate (B/A*100)	≤ 2%	0.73%	Not Providing	Not Providing	0.23%	0.45%
Total no. of cells in the licensed service area (B)		2868	Not Providing	Not Providing	860	3638
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		184	Not Providing	Not Providing	6	196
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	6.42%	Not Providing	Not Providing	0.69%	5.39%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-April						
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-April						
Voice quality	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		603093595830	NA	Not Providing	16464103393	18863976208
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		596900334704	NA	Not Providing	16443510599	18658131134
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.97%	98.79%	Not Providing	99.87%	98.91%
Live measurement results for Voice quality-3 Day data-April						
Voice quality	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		81793230633	Not Providing	Not Providing	NDR	2428207434
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		80982642580	Not Providing	Not Providing	NDR	2401888963
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.01%	Not Providing	Not Providing	NDR	98.92%
Drive test results for Voice quality (Average of three drive tests) - DT data-April						
Voice quality	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-April						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	0	Not Providing	18	32
No. of POIs not meeting benchmark		0	0	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	0	Not Providing	20110	68534
Traffic served for all POIs (B)- in erlangs		0	0	Not Providing	9659	43180
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-April						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	Not Providing	Not Providing	18	32
No. of POIs not meeting benchmark		0	Not Providing	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	Not Providing	Not Providing	20110	68534
Traffic served for all POIs (B)- in erlangs		0	Not Providing	Not Providing	9659	43033
POI congestion	≤ 0.5%	0.00%	Not Providing	Not Providing	0.00%	0.00%

18 ANNEXURE – MAY-3G

Audit Results for Network Availability- PMR data-May						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		950	2294	Not Providing	548	1252
Sum of downtime (i.e. total outage time) of Node Bs		24323	10113	Not Providing	710	10786
Node Bs downtime (not available for service)	≤ 2%	3.44%	0.59%	Not Providing	0.17%	1.16%
Number of Node Bs having accumulated downtime of >24 hours in a month		234	25	Not Providing	2	15
Worst affected Node Bs due to downtime	≤ 2%	24.63%	1.09%	Not Providing	0.36%	1.20%
Live Measurement Results for Network Availability- 3 Day live data-May						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		950	Not Providing	Not Providing	548	1252
Sum of downtime (i.e. total outage time) of Node Bs		2160	Not Providing	Not Providing	0	1520
Node Bs downtime (not available for service)	≤ 2%	3.16%	Not Providing	Not Providing	0.00%	1.69%
Number of Node Bs having accumulated downtime of >24 hours in a month		19	Not Providing	Not Providing	0	4
Worst affected Node Bs due to downtime	≤ 2%	2.00%	Not Providing	Not Providing	0.00%	0.32%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-May						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.16%	98.42%	Not Providing	99.87%	99.76%
RRC Congestion	≤ 1%	0.35%	0.40%	Not Providing	0.08%	0.09%
Circuit Switched RAB Congestion	≤ 2%	0.00%	0.12%	Not Providing	0.01%	0.10%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-May						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.37%	Not Providing	Not Providing	99.90%	99.84%
RRC Congestion	≤ 1%	0.32%	Not Providing	Not Providing	0.06%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.00%	Not Providing	Not Providing	0.00%	0.03%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-May						
CSSR	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-May						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		5552548	Not Providing	Not Providing	2131809	10994642
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		37348	Not Providing	Not Providing	4308	33013
Call drop rate (B/A*100)	≤ 2%	0.67%	Not Providing	Not Providing	0.20%	0.30%
Total no. of cells in the licensed service area (B)		2783	Not Providing	Not Providing	860	3851
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		209	Not Providing	Not Providing	12	138
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	7.53%	Not Providing	Not Providing	1.40%	3.58%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-May						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		7082387	NA	Not Providing	2675210	13068956
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		44975	NA	Not Providing	4625	56813
Call drop rate (B/A*100)	≤ 2%	0.64%	0.74%	Not Providing	0.17%	0.43%
Total no. of cells in the licensed service area (B)		2414	8068	Not Providing	860	3851
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		133	94	Not Providing	6	125
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	5.52%	1.17%	Not Providing	0.68%	3.24%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-May						
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-May						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		638525195689	410652682	Not Providing	17016499065	19709323608
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		631973323281	405736189	Not Providing	16993491876	19493898444
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.97%	98.80%	Not Providing	99.86%	98.91%
Live measurement results for Voice quality-3 Day data-May						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		72881882037	Not Providing	Not Providing	NDR	2395661162
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		72175046747	Not Providing	Not Providing	NDR	2369302284
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	Not Providing	Not Providing	NDR	98.90%
Drive test results for Voice quality (Average of three drive tests) - DT data-May						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-May						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	0	Not Providing	18	32
No. of POIs not meeting benchmark		0	0	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	0	Not Providing	20290	65567
Traffic served for all POIs (B)- in erlangs		0	0	Not Providing	8895	45949
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	Not Providing	Not Providing	18	32
No. of POIs not meeting benchmark		0	Not Providing	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	Not Providing	Not Providing	20290	65440
Traffic served for all POIs (B)- in erlangs		0	Not Providing	Not Providing	8895	45887
POI congestion	≤ 0.5%	0.00%	Not Providing	Not Providing	0.00%	0.00%

19 ANNEXURE – JUNE-3G

Audit Results for Network Availability- PMR data-June						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		951	3569	Not Providing	560	1369
Sum of downtime (i.e. total outage time) of Node Bs		451	214	Not Providing	671	8489
Node Bs downtime (not available for service)	≤ 2%	0.66%	0.08%	Not Providing	1.66%	0.83%
Number of Node Bs having accumulated downtime of >24 hours in a month		270	5	Not Providing	2	15
Worst affected Node Bs due to downtime	≤ 2%	28.39%	0.14%	Not Providing	0.36%	1.10%
Live Measurement Results for Network Availability- 3 Day live data-June						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		951	3562	Not Providing	560	1369
Sum of downtime (i.e. total outage time) of Node Bs		40	1421	Not Providing	0	645
Node Bs downtime (not available for service)	≤ 2%	0.06%	0.55%	Not Providing	0.00%	0.65%
Number of Node Bs having accumulated downtime of >24 hours in a month		19	0	Not Providing	0	4
Worst affected Node Bs due to downtime	≤ 2%	2.00%	0.00%	Not Providing	0.00%	0.29%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-June						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.09%	95.80%	Not Providing	98.88%	99.66%
RRC Congestion	≤ 1%	0.28%	0.78%	Not Providing	0.05%	0.03%
Circuit Switched RAB Congestion	≤ 2%	0.00%	1.25%	Not Providing	0.00%	0.03%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-June						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.19%	96.36%	Not Providing	99.83%	99.81%
RRC Congestion	≤ 1%	0.18%	0.47%	Not Providing	0.07%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.00%	0.65%	Not Providing	0.01%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-June						
CSSR	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of RRC attempts (A)		111	159	198	NA	178
Total number of RRC established (B)		108	146	182	NA	175
Call setup success rate (B/A*100)	≥ 95%	97.30%	91.82%	91.92%	NA	98.31%
%age blocked calls		2.70%	8.18%	8.08%	NA	1.69%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-June						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		6027794	222677666	Not Providing	2025779	11858805
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		40722	2436510	Not Providing	3173	43768
Call drop rate (B/A*100)	≤ 2%	0.68%	1.09%	Not Providing	0.16%	0.37%
Total no. of cells in the licensed service area (B)		2808	10725	Not Providing	1678	4128
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		233	132	Not Providing	10	99
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	8.29%	1.23%	Not Providing	0.60%	2.39%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-June						
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		8639820	223578199	Not Providing	2694310	15225182
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		50384	2219014	Not Providing	4497	72107
Call drop rate (B/A*100)	≤ 2%	0.58%	0.99%	Not Providing	0.17%	0.47%
Total no. of cells in the licensed service area (B)		2791	10711	Not Providing	1678	4128
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		157	129	Not Providing	4	62
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	5.64%	1.20%	Not Providing	0.23%	1.50%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-June						
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		111	150	181	NA	175
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		2	1	18	NA	23
Call drop rate (B/A*100)	≤ 2%	1.80%	0.67%	9.94%	NA	13.14%

Audit Results for Voice quality -PMR Data-June						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		662634196382	22301703138	Not Providing	16380182197	22320663736
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		655813430025	22070747784	Not Providing	16359756025	22074849153
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.97%	98.96%	Not Providing	99.88%	98.90%
Live measurement results for Voice quality-3 Day data-June						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		80969615143	2276000980	Not Providing	NDR	2831951173
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		80183463571	2256248386	Not Providing	NDR	2801128245
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.03%	99.13%	Not Providing	NDR	98.91%
Drive test results for Voice quality (Average of three drive tests) - DT data-June						
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	653024	183463	NA	576825
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	623258	183109	NA	571885
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	95.44%	99.81%	NA	99.14%

Audit Results for POI Congestion- PMR data-June						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	15	Not Providing	14	32
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	16809	62478
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	8126	44263
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June						
POI congestion	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Total number of working POIs		0	15	Not Providing	14	32
No. of POIs not meeting benchmark		0	15	Not Providing	0	0
Total Capacity of all POIs (A) - in erlangs		0	114121	Not Providing	16809	1504926
Traffic served for all POIs (B)- in erlangs		0	39357	Not Providing	8126	460507
POI congestion	≤ 0.5%	0.00%	0.00%	Not Providing	0.00%	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. AMJ'2016 – Refers to the quarter of April , May and June 2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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