TRAI Audit Wireless Report for Maharashtra & Goa Circle-OND Quarter-2015

WEST ZONE

QE December 2015

Prepared by:

Submitted to:

TRAI
Telecom Regulatory Authority of India

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

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

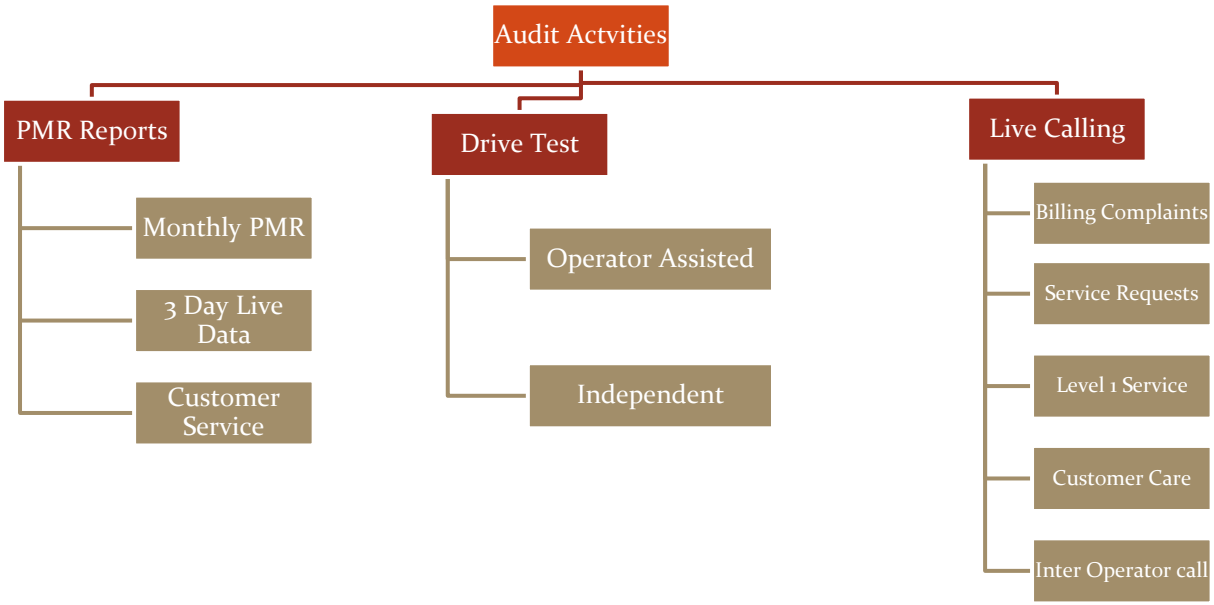
The primary objective of the Audit module is to-

- 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 Maharashtra & Goa circle.

2.3 COVERAGE

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

2.4 FRAMEWORK USED



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

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

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

The IMRB auditors inform the operators about the audit schedule in advance. Accordingly, the auditors visit the operator premises to conduct the audit.

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

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

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

The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, October2015 audit data was collected in the month of November2015.

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 December2015 (OND'15) was collected in the month of January2016.

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

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

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of October, November and December2015.The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

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

2.4.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of October, November and December2015.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-

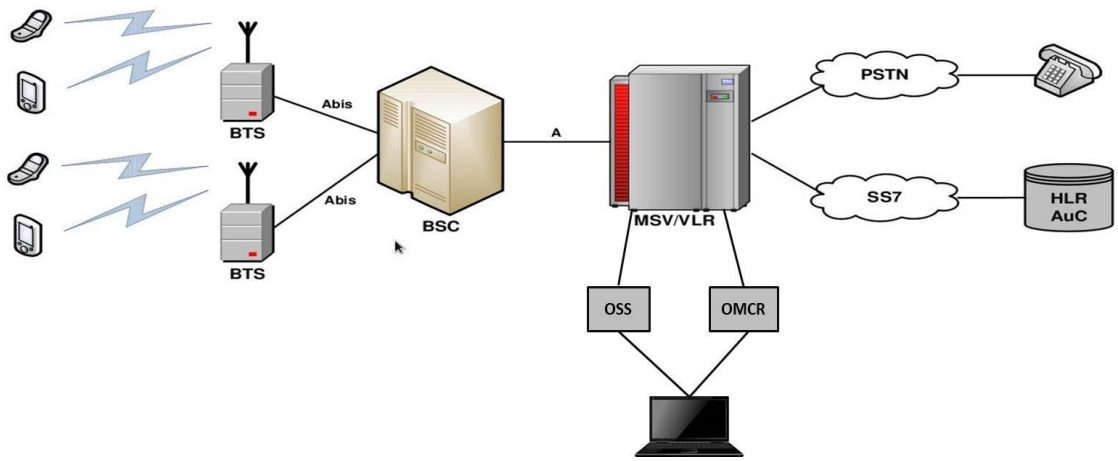
- Services Activation/ provisioning:- Activation done within 4 hours≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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%

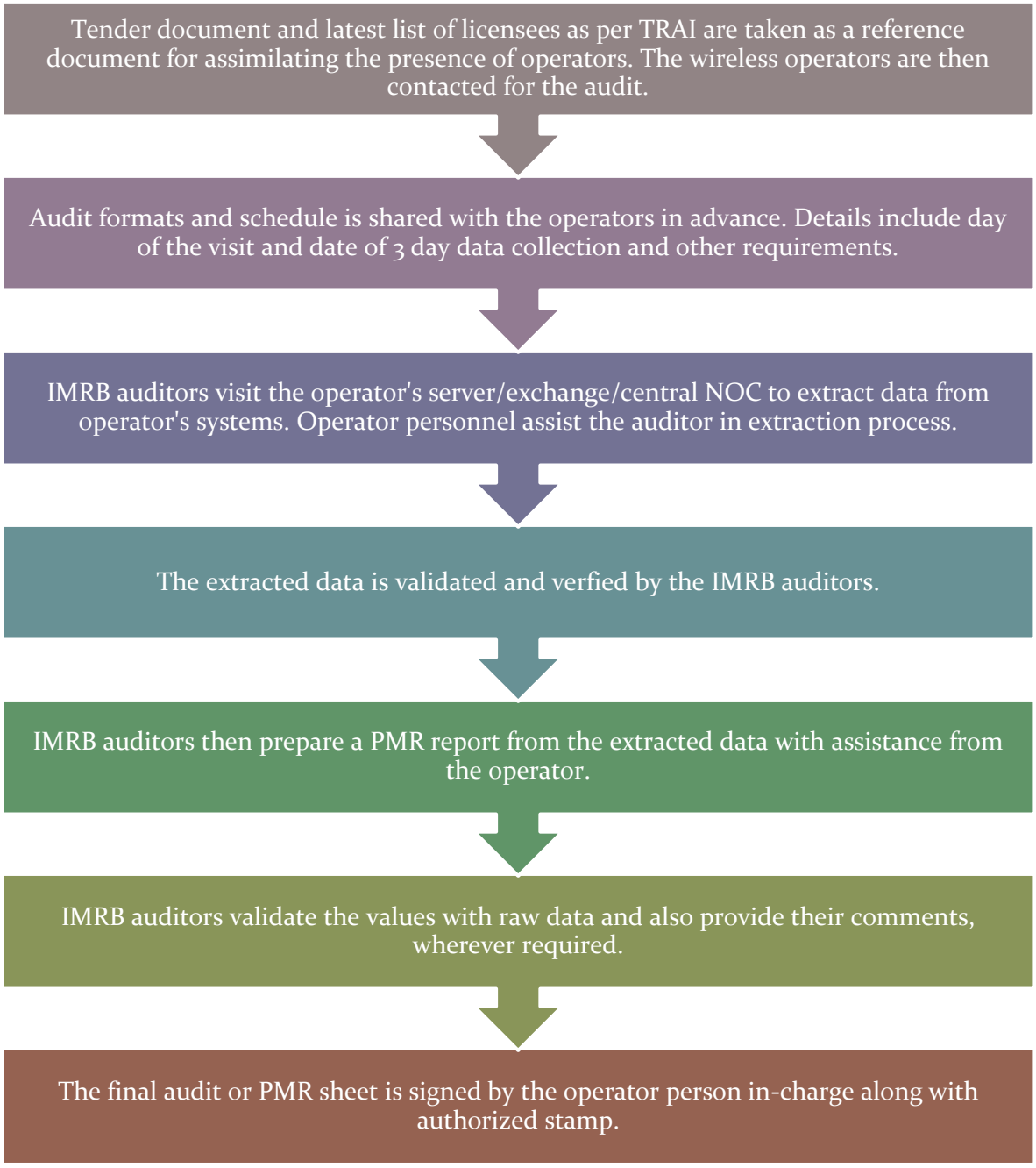
2.4.1.8 POINT OF DATA EXTRACTION

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.

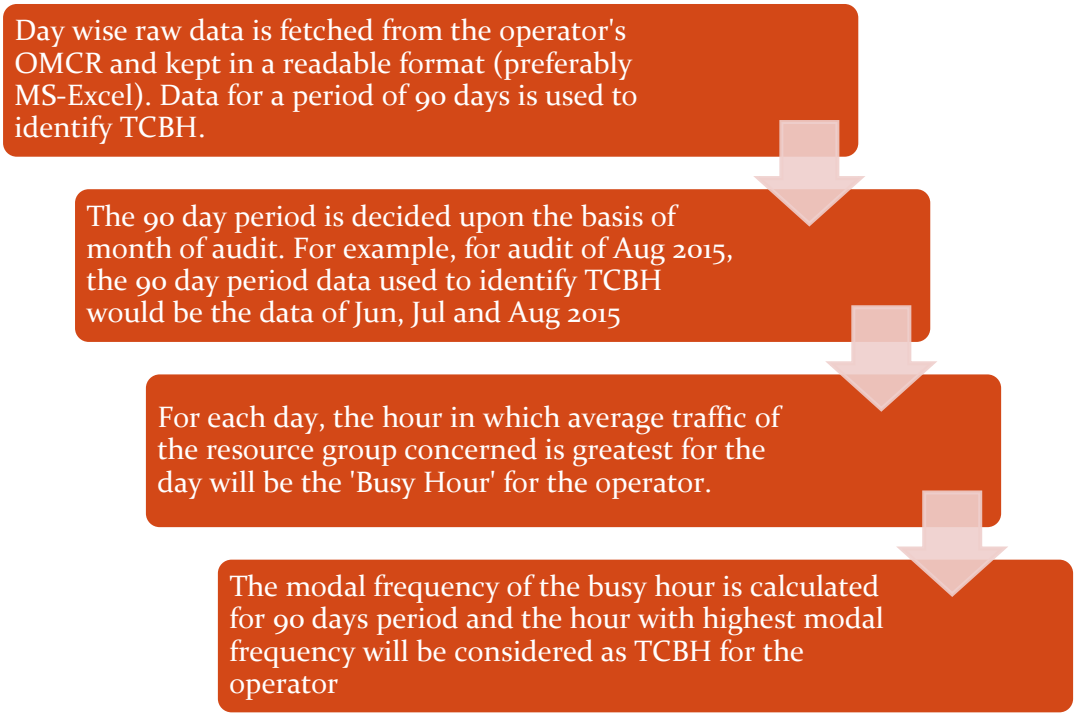
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

Sl. No.	Name of Service Provider	Dates of live measurement Audit		
GSM Operators		Oct-15	Nov-15	Dec-15
1	AIRCEL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
2	AIRTEL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
3	BSNL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
4	TATA GSM	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
5	IDEA	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
6	RCOM GSM	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
7	Telenor	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
8	VODAFONE	28th to 30th Oct'15	3rd to 5th Nov'2015	1st to 3rd Dec'15
CDMA Operators				
9	RCOM CDMA	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
10	TATA CDMA	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
3G Operators				
11	BSNL 3G	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
12	Idea 3G	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
13	TATA 3G	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
14	Vodafone 3G	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15

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.

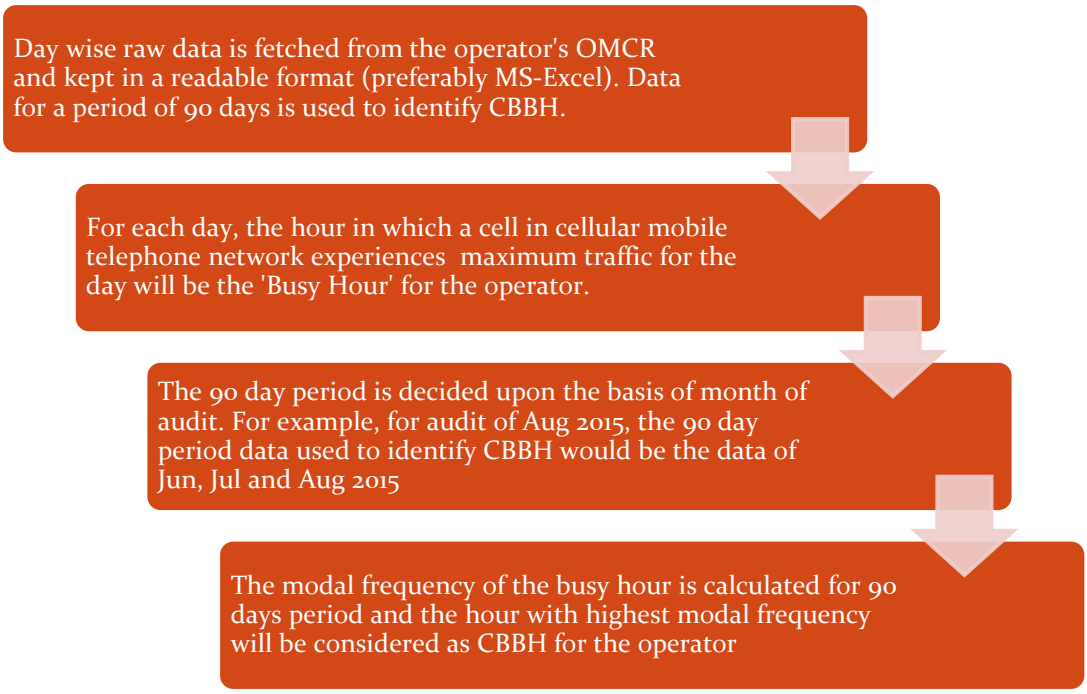
Step by step procedure to identify TCBH for an operator:



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 December2015 (OND'15) was collected in the month of January2016. 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 – Post-paid	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 (Post-paid + 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 December2015. 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 November2015 was considered for live calling activity conducted in December 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

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

TRAI benchmark-

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.4 LEVEL 1 SERVICE

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

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

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

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

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

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

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

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

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

SSAs are selected according to the total no. of SSAs on that region and audited in each quarter, at least 1 SSA in each month it may be more depends on the total no. of drive on that circle. The drive tests were conducted for all operators in the circle, for both 2G and 3G voice services. As per TRAI instructions, the 2G drive was done in 2G only mode, while 3G drive test was conducted in dual mode (3G on priority).

As per the new directive given by TRAI Office New Delhi, 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 and SSA list was finalized by TRAI office New Delhi.
- 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 Office New Delhi.
- 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 and SSA list was finalized by TRAI office New Delhi.
- 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. SSA list was finalized by TRAI office New Delhi.
- 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.

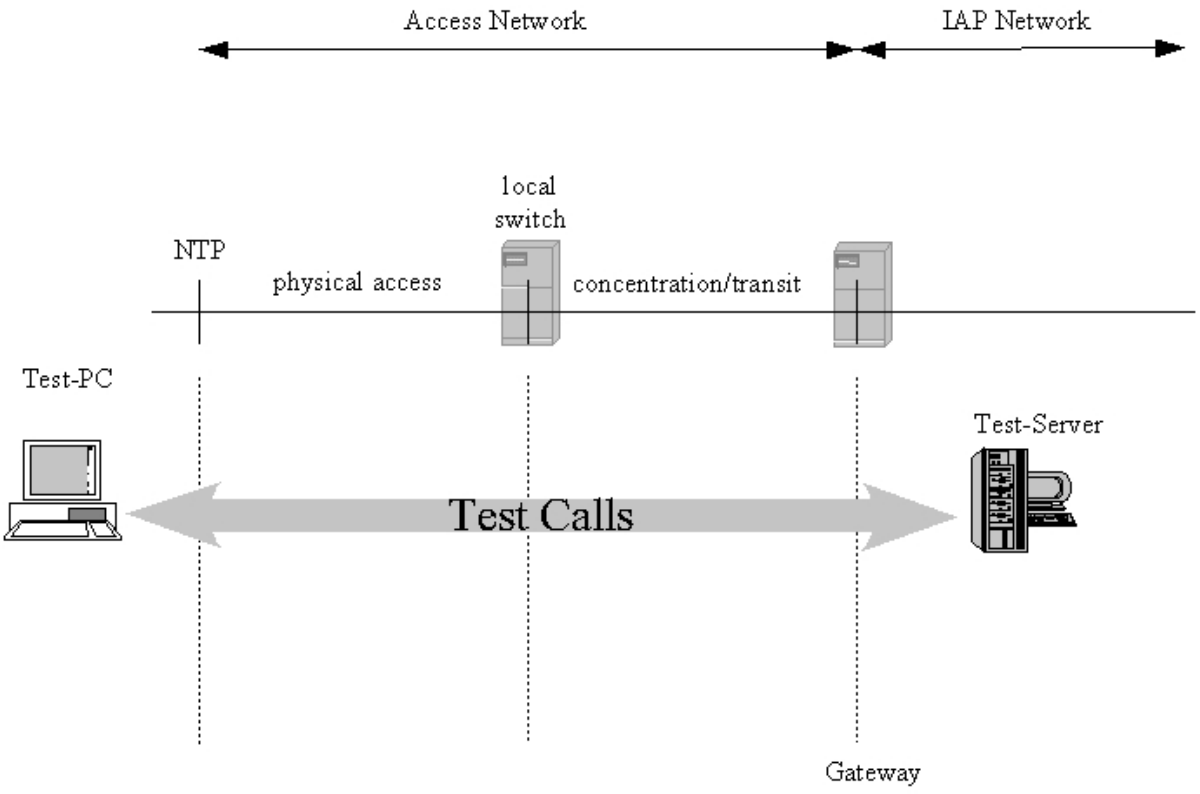


Figure for Measurement set-up

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) = $\frac{\text{Download speed A 1+A2+A3+A4+A5+A6)}}{6} \times 100$

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 sec

2.4.4.5.5 LATENCY

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

Measurement:

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

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

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel(DWL)	1509807
Airtel	11620724
BSNL	4376945
Idea	21782129
Reliance CDMA	1547743
Reliance GSM	3476368
TATA CDMA	985410
TATA GSM	6709784
Telenor	5833994
Vodafone	17437924
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	0
BSNL 3G	4376945
Idea 3G	21782129
TATA 3G	813408
Vodafone 3G	2015653

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel and TATA GSM & CDMA failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop.
- TATA GSM failed to meet the benchmark for BTS Accumulated downtime.

3 Day Live Measurement (Network Parameters) for 2G

- TATA GSM failed to meet the benchmark of Voice Quality.
- Aircel, TATA GSM & CDMA failed to meet the benchmark of Worst Affected Cells having more than 3% TCH Drop.

PMR & 3 Day Live Consolidated (Network Parameters) for 3G

- TATA 3G failed to meet the benchmark for Worst Affected Cells having more than 3% TCH Drop for PMR as well as 3 day live audit.
- TATA 3G failed to meet the benchmark for RRC Congestion for monthly PMR audit as well 3day live audit.
- All operators met the TRAI benchmark of monthly PMR as well as 3days live.

Wireless Data Services for 2G

- Aircel failed to meet the benchmark PDP Context activation success rate.

Wireless Data Services for 3G

- All operators met the TRAI benchmark.

Live Calling

- As per the consumers (live calling exercise) BSNL, Idea, Reliance CDMA & GSM and TATA CDMA failed to meet the benchmark of resolving 98% complaints within 4 weeks however all operators met the benchmark of 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except Reliance CDMA.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter.
- Aircel failed to meet the benchmark with 90.61% IVR call being attended.
- BSNL and Vodafone failed to meet the TRAI specified benchmark of calls answered by operators within 90 seconds.

Drive test

- In Beed SSA BSNL failed to meet the benchmark in outdoor as well as indoor locations, however Telenor failed to meet the benchmark in outdoor locations only.
- In Beed SSA BSNL 2G & 3G failed to meet the benchmark for call drop rate in outdoor locations only.
- In Beed SSA BSNL 3G failed to meet the benchmark for Voice quality in outdoor locations.

Data Drive test

- All operators met the TRAI benchmark for data drive in Beed SSA.

Note: In Beed SSA Aircel 2G, Reliance CDMA & GSM, TATA CDMA, BSNL 3G, Idea 3G and Vodafone 3G did not submit the data.

4 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 Maharashtra & Goa circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

4.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.06%	0.02%	99.36%	0.12%	0.09%	0.91%	5.47%	95.51%
Airtel	0.00%	0.00%	98.82%	0.05%	0.17%	0.54%	0.55%	97.53%
BSNL	1.89%	1.87%	96.38%	0.61%	1.34%	1.10%	2.17%	96.03%
Idea	0.10%	0.17%	97.78%	0.50%	0.91%	0.91%	2.14%	97.24%
Reliance CDMA	0.14%	0.88%	97.64%	NA	0.84%	0.14%	2.07%	NDR
Reliance GSM	0.17%	1.26%	97.11%	0.19%	0.33%	0.11%	0.57%	99.26%
TATA CDMA	0.02%	0.00%	97.80%	NA	0.94%	0.95%	7.70%	95.91%
TATA GSM	2.18%	0.00%	99.02%	0.05%	0.08%	0.71%	4.12%	98.71%
Telenor	0.15%	0.87%	98.10%	0.34%	0.51%	0.51%	0.12%	97.23%
Vodafone	0.12%	0.49%	99.29%	0.71%	0.01%	0.88%	2.82%	96.91%

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

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

BTSs Accumulated Downtime:

TATA GSM failed to meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.00%.

Worst Affected BTSs Due to Downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Aircel with 99.36%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Airtel recorded the best SDCCH / Paging Channel Congestion with 0.05%.

TCH Congestion:

All operators met the benchmark for TCH congestion. Vodafone performed the best on TCH congestion with 0.01%.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM at 0.11%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and TATA GSM & CDMA failed to meet the benchmark. Best performance was recorded for Telenor at 0.12%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Reliance GSM at 99.26%.

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.

4.1.1 PMR DATA - OCTOBERFOR 2G

Month								
Name of Service Provider Month October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.08%	0.00%	99.03%	0.15%	0.10%	0.90%	5.33%	95.67%
Airtel	0.00%	0.00%	98.89%	0.05%	0.17%	0.52%	0.49%	97.96%
BSNL	1.91%	1.91%	95.88%	0.62%	1.56%	1.25%	2.43%	95.78%
Idea	0.08%	0.19%	97.54%	0.75%	1.37%	0.74%	2.35%	97.24%
Reliance CDMA	0.17%	1.20%	97.60%	NA	0.96%	0.15%	2.34%	NA
Reliance GSM	0.19%	1.50%	96.53%	0.21%	0.31%	0.11%	0.63%	99.24%
TATA CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
TATA GSM	4.47%	0.00%	98.56%	0.04%	0.05%	0.59%	2.79%	98.83%
Telenor	0.23%	1.25%	97.96%	0.34%	0.68%	0.51%	1.34%	97.23%
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.1.2 PMR DATA –NOVEMBER FOR 2G

Month								
Name of Service Provider Month November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.06%	0.05%	99.57%	0.09%	0.08%	0.97%	6.26%	95.47%
Airtel	0.00%	0.00%	98.75%	0.05%	0.17%	0.57%	0.61%	97.13%
BSNL	1.86%	1.86%	96.60%	0.58%	1.26%	1.05%	2.07%	96.30%
Idea	0.08%	0.19%	97.54%	0.75%	1.37%	0.67%	2.15%	97.24%
Reliance CDMA	0.17%	1.03%	97.96%	NA	0.69%	0.15%	2.08%	NA
Reliance GSM	0.20%	1.24%	97.05%	0.18%	0.29%	0.12%	0.54%	99.25%
TATA CDMA	0.02%	0.00%	97.80%	NA	0.94%	0.95%	7.70%	95.91%
TATA GSM	0.72%	0.00%	99.48%	0.07%	0.11%	0.82%	4.23%	98.65%
Telenor	0.23%	1.38%	98.19%	0.24%	0.32%	0.52%	1.20%	97.40%
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.1.3 PMR DATA - DECEMBER FOR 2G

Month								
Name of Service Provider Month December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.05%	0.00%	99.48%	0.11%	0.10%	0.86%	4.81%	95.39%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL	1.89%	1.84%	96.66%	0.61%	1.22%	0.99%	2.02%	96.07%
Idea	0.28%	0.00%	98.26%	0.00%	0.00%	0.92%	1.93%	97.45%
Reliance CDMA	0.09%	0.40%	97.37%	NA	0.87%	0.14%	1.78%	NDR
Reliance GSM	0.12%	1.02%	97.75%	0.18%	0.38%	0.11%	0.55%	99.30%
TATA CDMA	0.02%	0.00%	97.80%	NA	0.94%	0.95%	7.70%	95.91%
TATA GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Telenor	0.00%	0.00%	98.17%	0.44%	0.54%	0.51%	0.05%	97.08%
Vodafone	0.12%	0.49%	99.29%	0.71%	0.01%	0.88%	2.82%	96.91%

4.2 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.

For Reliance GSM, data is pertaining to Oct'15. Data for Nov'15 and Dec'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.86%	0.00%	97.94%	0.09%	0.04%	0.85%	6.03%	95.80%
Airtel	0.00%	0.00%	98.84%	0.05%	0.16%	0.52%	0.49%	97.73%
BSNL	1.66%	0.05%	97.39%	0.72%	0.92%	1.09%	1.10%	96.34%
Idea	0.09%	0.00%	97.74%	0.66%	1.52%	0.73%	2.16%	97.39%
Reliance CDMA	0.18%	0.90%	97.80%	NA	0.73%	0.14%	2.31%	NDR
Reliance GSM	0.19%	1.26%	96.94%	0.14%	0.30%	0.11%	0.84%	99.26%
TATA CDMA	0.00%	0.00%	97.83%	NA	1.04%	1.00%	7.90%	96.08%
TATA GSM	0.49%	0.15%	98.47%	0.29%	0.14%	0.81%	4.51%	93.11%
Telenor	0.17%	0.00%	98.34%	0.29%	0.27%	0.40%	1.66%	97.67%
Vodafone	0.12%	0.00%	99.47%	0.37%	0.53%	0.89%	2.80%	96.92%

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

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel and TATA CDMA at 0.00%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Aircel, Airtel, Idea, Telenor, Vodafone and TATA GSM at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.47%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Airtel recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All operators met the benchmark for TCH congestion. Aircel performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM at 0.11%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, TATA GSM & CDMA failed to meet the benchmark. Best performance was recorded for Airtel at 0.49%.

Voice Quality

TATA GSM failed to meet the benchmark. Best performance was recorded for Reliance GSM at 99.26%.

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.

4.2.1 3 DAY DATA - OCTOBERFOR 2G

3 Day								
Name of Service Provider 3 Day October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.09%	0.00%	94.05%	0.09%	0.03%	0.98%	6.52%	95.56%
Airtel	0.00%	0.00%	98.86%	0.05%	0.16%	0.49%	0.38%	97.93%
BSNL	1.63%	0.03%	97.98%	0.68%	0.69%	1.10%	2.20%	96.26%
Idea	0.07%	0.00%	97.92%	0.43%	1.17%	0.67%	1.96%	97.43%
Reliance CDMA	0.19%	1.20%	97.70%	NA	0.99%	0.14%	2.56%	NA
Reliance GSM	0.19%	1.50%	95.07%	0.14%	0.29%	0.11%	0.61%	99.25%
TATA CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
TATA GSM	0.59%	0.37%	97.56%	0.50%	0.12.%	0.80%	5.64%	99.64%
Telenor	0.26%	0.00%	98.50%	0.16%	0.13%	0.40%	1.38%	97.63%
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.2.2 3 DAY DATA –NOVEMBER FOR 2G

3 Day								
Name of Service Provider 3 Day November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	5.41%	0.00%	99.92%	0.06%	0.02%	0.83%	6.59%	95.88%
Airtel	0.00%	0.00%	98.82%	0.05%	0.16%	0.55%	0.53%	97.55%
BSNL	1.52%	0.06%	98.00%	0.65%	0.68%	1.10%	1.10%	96.45%
Idea	0.08%	0.00%	97.56%	0.89%	1.86%	0.74%	2.35%	97.36%
Reliance CDMA	0.27%	1.03%	97.66%	NA	0.99%	0.14%	2.21%	NA
Reliance GSM	0.32%	1.24%	96.72%	0.14%	0.26%	0.12%	1.82%	99.24%
TATA CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
TATA GSM	0.42%	0.00%	99.37%	0.08%	0.14%	0.81%	4.47%	92.71%
Telenor	0.24%	0.00%	98.59%	0.22%	0.15%	0.38%	1.28%	97.74%
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.2.3 3 DAY DATA - DECEMBER FOR 2G

3 Day								
Name of Service Provider 3 Day December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.07%	0.00%	99.87%	0.13%	0.07%	0.92%	4.98%	95.63%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL	1.83%	0.06%	96.20%	0.83%	1.38%	0.90%	1.85%	96.04%
Idea	0.25%	0.00%	NDR	NDR	NDR	NDR	NDR	NDR
Reliance CDMA	0.09%	0.43%	98.04%	NA	0.20%	0.14%	1.65%	NDR
Reliance GSM	0.06%	1.02%	99.04%	0.14%	0.35%	0.12%	0.54%	99.27%
TATA CDMA	0.00%	0.00%	97.83%	NA	1.04%	1.00%	7.90%	96.08%
TATA GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Telenor	0.00%	0.00%	97.93%	0.48%	0.53%	0.70%	2.32%	97.28%
Vodafone	0.12%	0.00%	99.47%	0.37%	0.53%	0.89%	2.80%	96.92%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

For Reliance GSM, data is pertaining to Oct'15. Data for Nov'15 and Dec'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.85%	1.82%	95.48%	0.92%	1.58%	1.60%	2.31%	NDR
Idea 3G	0.07%	0.13%	99.49%	0.68%	0.23%	0.30%	1.77%	98.60%
TATA 3G	0.00%	0.00%	95.11%	1.21%	0.73%	0.50%	3.71%	99.67%
Vodafone 3G	0.20%	0.91%	99.65%	0.65%	0.11%	0.32%	1.87%	99.22%

NDR: No Data received

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for TATA 3G at 0.00%.

Worst affected Node Bs due to downtime:

All operators met the benchmark. Minimum worst affected Node Bs due to downtime was recorded for TATA 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Idea with 99.49%.

RRC Congestion:

TATA 3G failed to meet the benchmark for RRC Congestion. The maximum RRC Congestion was observed for Idea with 0.68%.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. The maximum Circuit Switched RAB Congestion was observed for Idea with 0.23%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.30%.

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

TATA CDMA failed to meet the benchmark for the parameter. Minimum Worst affected cells having more than 3% Circuit switched voice drop rate was recorded for Idea at 1.77%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for TATA CDMA at 99.67%.

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.

4.3.1 PMR DATA - OCTOBERFOR 3G

Month								
Name of Service Provider Month October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.83%	1.85%	95.51%	0.94%	1.70%	1.80%	2.29%	NDR
Idea 3G	0.07%	0.13%	99.49%	0.68%	0.23%	0.30%	1.77%	98.60%
TATA 3G	0.00%	0.00%	94.34%	1.35%	0.82%	0.52%	3.84%	99.66%
Vodafone 3G	0.19%	0.91%	99.66%	0.64%	0.11%	0.31%	1.88%	98.89%

4.3.2 PMR DATA –NOVEMBER FOR 3G

Month								
Name of Service Provider Month November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.83%	1.77%	95.45%	0.91%	1.60%	1.60%	2.33%	NDR
Idea 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA 3G	0.00%	0.00%	95.88%	1.06%	0.64%	0.49%	3.60%	99.67%
Vodafone 3G	0.22%	0.90%	99.63%	0.65%	0.11%	0.33%	1.86%	99.88%

4.3.3 PMR DATA - DECEMBER FOR 3G

Month								
Name of Service Provider Month December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.88%	1.84%	95.46%	0.90%	1.45%	1.42%	2.31%	NDR
Idea 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone 3G	0.20%	0.91%	99.67%	0.65%	0.11%	0.31%	1.88%	98.89%

4.4 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%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.63%	0.05%	96.19%	0.80%	1.08%	1.67%	2.47%	NDR
Idea 3G	0.07%	0.00%	99.54%	0.88%	0.22%	0.32%	1.91%	98.59%
TATA 3G	0.03%	0.00%	95.54%	1.19%	0.70%	0.52%	3.78%	99.66%
Vodafone 3G	0.11%	0.86%	99.14%	1.00%	0.10%	0.51%	1.49%	99.22%

NDR: No Data Received

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for Ideal at 0.07%.

Worst affected Node Bs due to downtime:

All operators met the benchmark. Minimum worst affected Node Bs due to downtime was recorded for Idea at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Idea with 99.54%.

RRC Congestion:

All operators met the benchmark for RRC Congestion. The maximum RRC Congestion was observed for BSNL with 0.80%.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. The maximum Circuit Switched RAB Congestion was observed for Idea with 0.22%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.32%.

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

All operators met the benchmark for the parameter. Minimum Worst affected cells having more than 3% Circuit switched voice drop rate was recorded for Vodafone at 1.91%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Idea at 98.59%.

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.

4.4.1 3 DAY DATA - OCTOBERFOR 3G

3 Day								
Name of Service Provider 3 Day October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.79%	0.00%	96.72%	0.72%	0.84%	1.75%	2.40%	NDR
Idea 3G	0.05%	0.00%	99.53%	0.90%	0.21%	0.30%	1.91%	98.58%
TATA 3G	0.02%	NDR	95.14%	1.25%	0.83%	0.56%	4.04%	99.65%
Vodafone 3G	0.10%	0.85%	99.15%	0.99%	0.09%	0.51%	1.49%	99.21%

4.4.2 3 DAY DATA –NOVEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.14%	0.11%	96.48%	0.76%	0.85%	1.60%	NDR	NDR
Idea 3G	0.08%	0.00%	99.54%	0.85%	0.23%	0.33%	NDR	98.60%
TATA 3G	0.03%	0.00%	95.93%	1.12%	0.57%	0.49%	3.53%	98.60%
Vodafone 3G	0.11%	0.86%	99.12%	1.00%	0.10%	0.52%	1.50%	99.23%

4.4.3 3 DAY DATA - DECEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.96%	0.04%	95.36%	0.92%	1.54%	1.39%	2.55%	NDR
Idea 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone 3G	0.12%	0.86%	99.16%	1.00%	0.12%	0.51%	1.49%	99.21%

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

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel(DWL)	100.00%	87.86%	0.69%	100.00%	87.11%	0.70%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR
BSNL	100.00%	96.66%	3.11%	NDR	96.89%	2.02%
Idea	100.00%	99.73%	1.00%	100.00%	99.99%	0.97%
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	NDR	NDR	NDR	NDR	NDR	NDR
TATA GSM	NDR	NDR	NDR	NDR	NDR	NDR
Telenor	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR

NDR- No data received

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

Activation done within 4 hours:

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

PDP Context activation success rate:

Aircel failed to meet the benchmark PDP Context activation success rate.

Drop Rate:

All operators met the benchmark for Drop Rate.

4.6 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%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	NDR	96.66%	2.48%	NDR	97.01%	2.57%
Idea 3G	100.00%	99.86%	1.66%	NDR	99.93%	1.65%
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone 3G	NDR	NDR	NDR	NDR	NDR	NDR

Note: NDR (No Data Received)

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

Activation done within 4 hours:

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

PDP Context activation success rate:

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

Drop Rate:

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

4.7 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel(DWL)	98.00%	100.00%	100.00%	100.00%	43.67%	NA
Airtel	98.00%	100.00%	100.00%	100.00%	63.00%	96.00%
BSNL	89.00%	100.00%	95.00%	100.00%	70.33%	94.00%
Idea	96.00%	100.00%	100.00%	100.00%	81.67%	95.00%
Reliance CDMA	97.00%	100.00%	100.00%	100.00%	100.00%	98.00%
Reliance GSM	97.00%	100.00%	100.00%	100.00%	91.67%	96.00%
TATA CDMA	96.00%	100.00%	100.00%	100.00%	80.00%	99.00%
TATA GSM	100.00%	100.00%	100.00%	98.00%	72.33%	95.00%
Telenor	NA	NA	100.00%	100.00%	84.33%	98.00%
Vodafone	100.00%	100.00%	100.00%	95.00%	83.67%	100.00%

Resolution of billing complaints

As per the consumers (live calling exercise) BSNL, Idea, Reliance CDMA & GSM and TATA CDMA failed to meet the benchmark of resolving 98% complaints within 4 weeks however all operators met the benchmark of 100% complaints within 6 weeks.

Complaint/Request Attended to Satisfaction

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

Level 1 Service

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

Accessibility of Call Centre/Customer Care-IVR

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

Customer Care / Helpline Assessment (voice to voice)

All operators met the benchmark for the parameter.

4.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.06%	0.00%	100.00%	100.00%	100.00%	90.61%	96.03%
Airtel	0.02%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	0.01%	0.02%	100.00%	100.00%	100.00%	100.00%	94.63%
Idea	0.57%	0.08%	100.00%	100.00%	100.00%	99.01%	99.45%
Reliance CDMA	0.09%	0.01%	100.00%	100.00%	100.00%	98.24%	95.67%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	98.28%	95.60%
TATA CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	99.37%	99.37%
TATA GSM	0.00%	0.00%	100.00%	100.00%	100.00%	98.03%	97.90%
Telenor	NA	NA	100.00%	100.00%	100.00%	99.62%	99.64%
Vodafone	0.04%	0.02%	100.00%	100.00%	100.00%	99.10%	94.95%

Metering and Billing Credibility – Post-paid Subscribers

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

Resolution of billing complaints

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

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

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

Customer Care Percentage of calls answered by the IVR

Aircel failed to meet the benchmark with 90.61% IVR call being attended. BSNL and Airtel recorded the best performance for the parameter.

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

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

4.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

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

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

In the inter-operator call assessment, most of the operators did not face any problems in connecting to other operators.

4.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA

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	
	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%	
	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator
Aircel(DWL)	0.06%	0.06%	0.02%	0.02%	99.36%	99.36%	0.12%	0.12%	0.09%	0.09%	0.91%	0.91%	5.47%	5.47%	95.51%	95.51%
Airtel	0.00%	0.02%	0.00%	0.00%	98.82%	98.41%	0.05%	0.06%	0.17%	0.26%	0.54%	0.58%	0.55%	0.88%	97.53%	97.38%
BSNL	1.89%	1.92%	1.87%	1.87%	96.38%	96.38%	0.61%	0.60%	1.34%	1.34%	1.10%	1.10%	2.17%	2.18%	96.03%	96.05%
Idea	0.10%	0.07%	0.17%	0.16%	97.78%	97.43%	0.50%	0.72%	0.91%	1.33%	0.91%	0.68%	2.14%	2.11%	97.24%	97.34%
Reliance CDMA	0.14%	0.15%	0.88%	0.88%	97.64%	97.65%	NA	0.00%	0.84%	0.84%	0.14%	0.15%	2.07%	1.92%	NDR	98.74%
Reliance GSM	0.17%	0.18%	1.26%	1.27%	97.11%	97.21%	0.19%	0.17%	0.33%	0.46%	0.11%	0.12%	0.57%	0.57%	99.26%	99.11%
TATA CDMA	0.02%	0.03%	0.00%	0.00%	97.80%	97.99%	NA	0.00%	0.94%	0.56%	0.95%	1.03%	7.70%	7.32%	95.91%	99.96%
TATA GSM	2.18%	0.02%	0.00%	0.00%	99.02%	99.45%	0.05%	0.08%	0.08%	0.17%	0.71%	0.76%	4.12%	5.67%	98.71%	97.08%
Telenor	0.15%	0.21%	0.87%	1.07%	98.10%	98.10%	0.34%	0.34%	0.51%	0.51%	0.51%	0.51%	0.12%	1.32%	97.23%	97.24%
Vodafone	0.12%	0.13%	0.49%	0.53%	99.29%	99.45%	0.71%	0.49%	0.01%	0.55%	0.88%	0.76%	2.82%	2.71%	96.91%	97.14%

Value calculated by IMRB match		Value calculated by Operator and IMRB do not match	

5 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel and TATA GSM & CDMA failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop.
- TATA GSM failed to meet the benchmark for BTS Accumulated downtime.

3 Day Live Measurement (Network Parameters) for 2G

- TATA GSM failed to meet the benchmark of Voice Quality.
- Aircel, TATA GSM & CDMA failed to meet the benchmark of Worst Affected Cells having more than 3% TCH Drop.

PMR & 3 Day Live Consolidated (Network Parameters) for 3G

- TATA 3G failed to meet the benchmark for Worst Affected Cells having more than 3% TCH Drop for PMR as well as 3 day live audit.
- TATA 3G failed to meet the benchmark for RRC Congestion for monthly PMR audit as well 3day live audit.
- All operators met the TRAI benchmark of monthly PMR as well as 3days live.

Wireless Data Services for 2G

- Aircel failed to meet the benchmark PDP Context activation success rate.

Wireless Data Services for 3G

- All operators met the TRAI benchmark.

Live Calling

- As per the consumers (live calling exercise) BSNL, Idea, Reliance CDMA & GSM and TATA CDMA failed to meet the benchmark of resolving 98% complaints within 4 weeks however all operators met the benchmark of 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except Reliance CDMA.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter.
- Aircel failed to meet the benchmark with 90.61% IVR call being attended.
- BSNL and Vodafone failed to meet the TRAI specified benchmark of calls answered by operators within 90 seconds.

Drive test

- In Beed SSA BSNL failed to meet the benchmark in outdoor as well as indoor locations, however Telenor failed to meet the benchmark in outdoor locations only.
- In Beed SSA BSNL 2G & 3G failed to meet the benchmark for call drop rate in outdoor locations only.
- In Beed SSA BSNL 3G failed to meet the benchmark for Voice quality in outdoor locations.

Data Drive test

- All operators met the TRAI benchmark for data drive in Beed SSA.

Note: In Beed SSA Aircel 2G, Reliance CDMA & GSM, TATA CDMA, BSNL 3G, Idea 3G and Vodafone 3G did not submit the data.

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

6.1 BTS ACCUMULATED DOWNTIME

6.1.1 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%

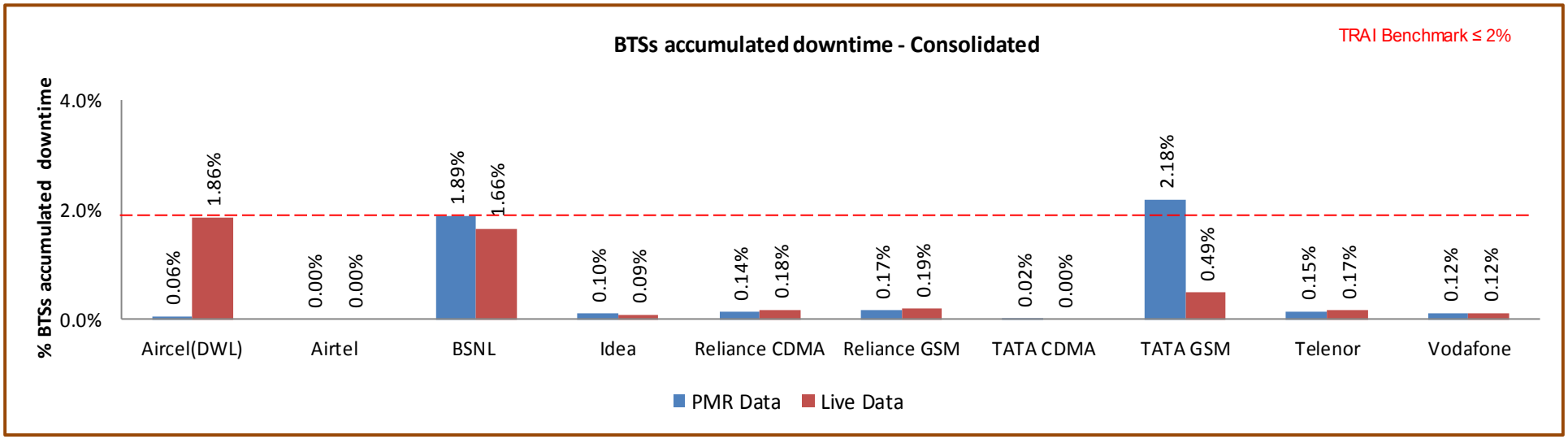
4. **Audit Procedure –**

   ➲ 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.

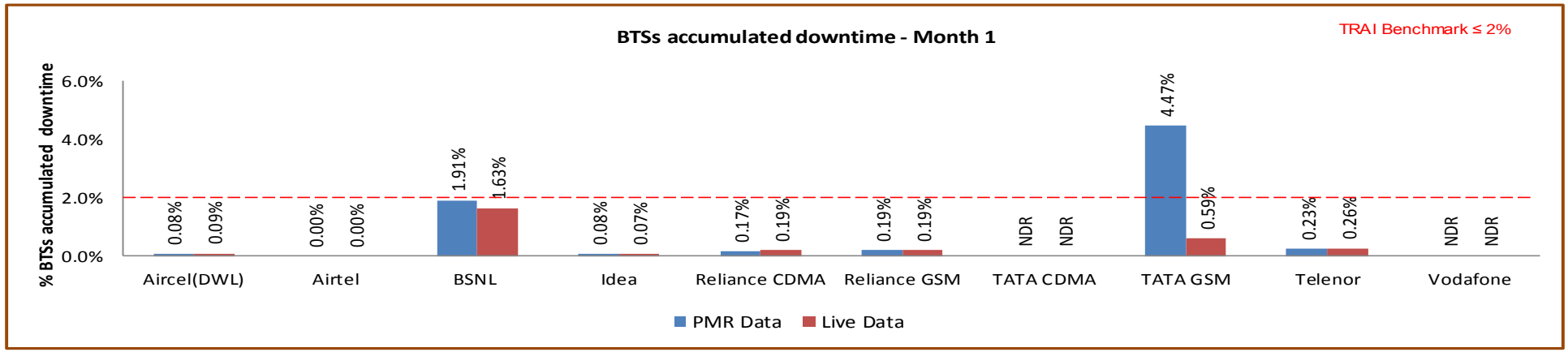
6.1.2 KEY FINDINGS - CONSOLIDATED



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

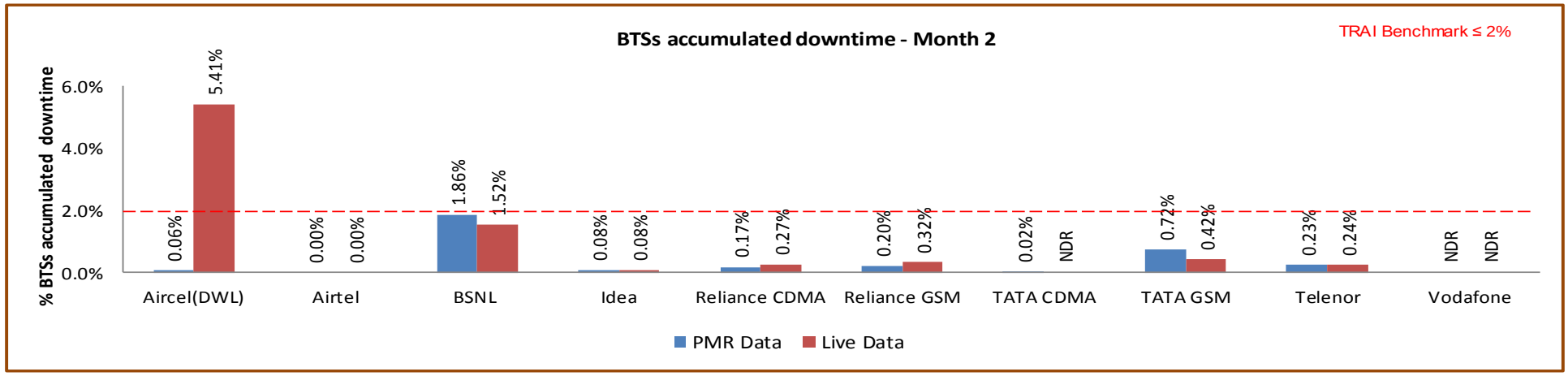
TATA GSM did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

6.1.2.1 KEY FINDINGS – MONTH 1



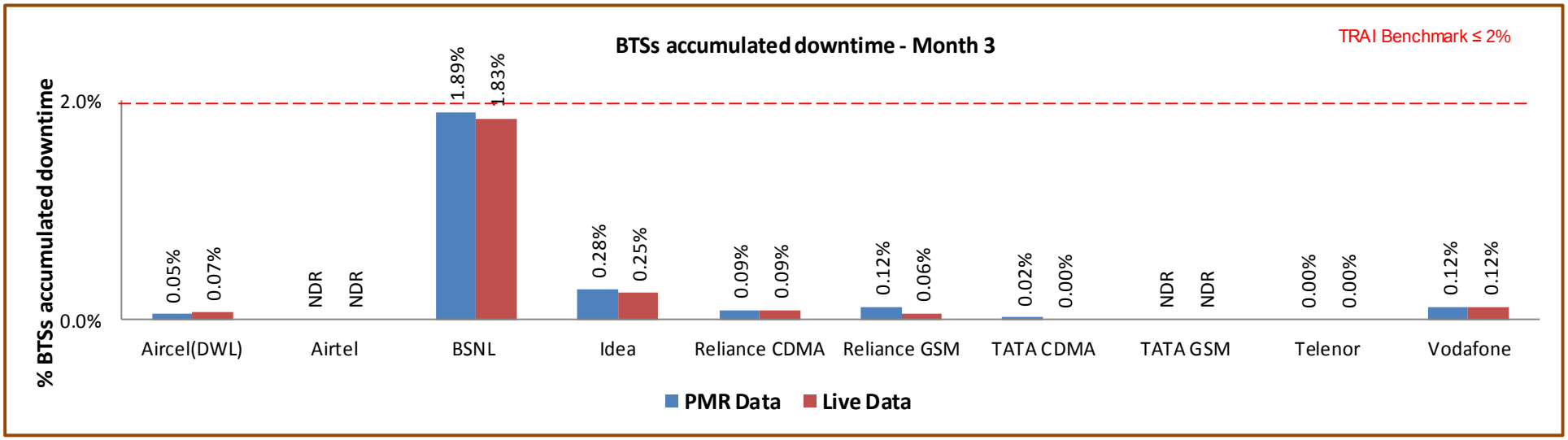
Data Source: Operations and Maintenance Center (OMC) of the operators

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 BTS DUE TO DOWNTIME

6.2.1 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.

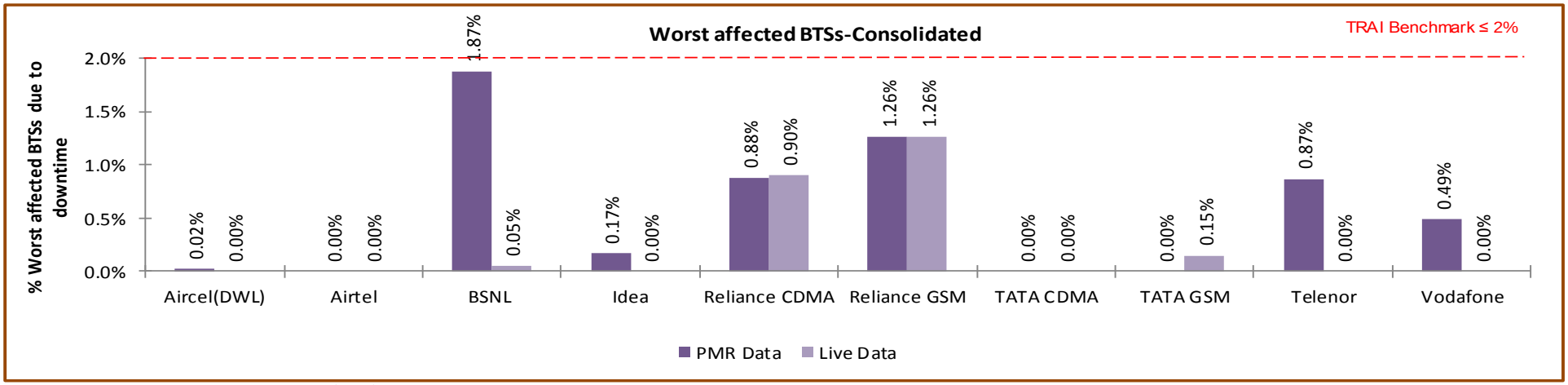
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

6.2.2 KEY FINDINGS– CONSOLIDATED

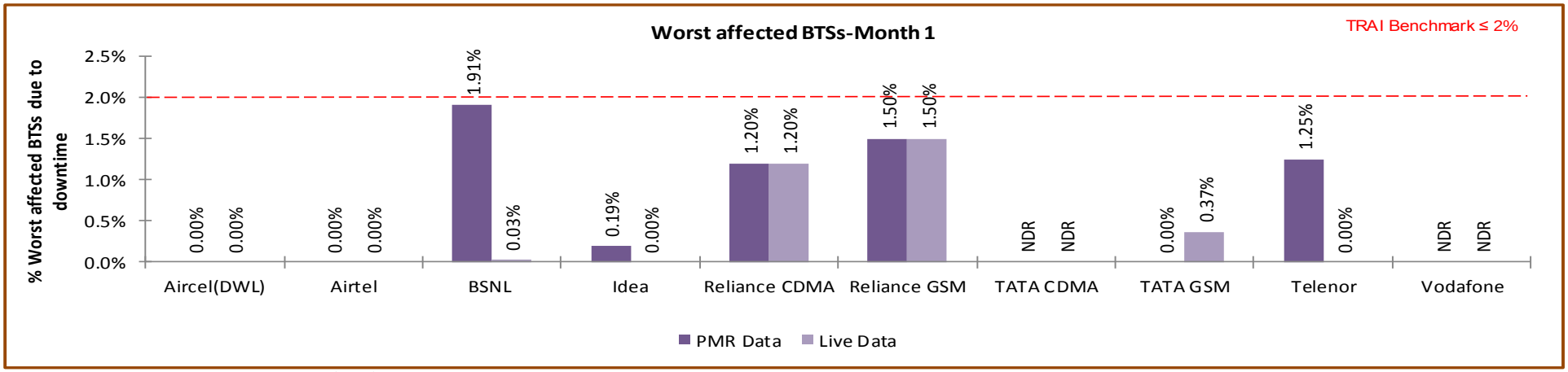


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

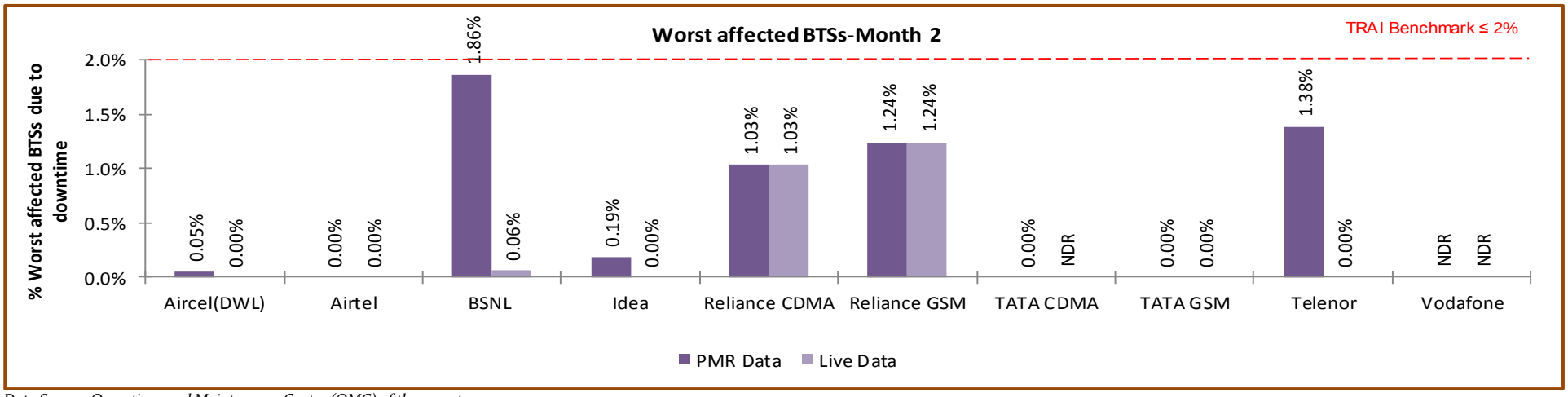
Significant difference was observed between PMR & live measurement data for BSNL Telenor and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



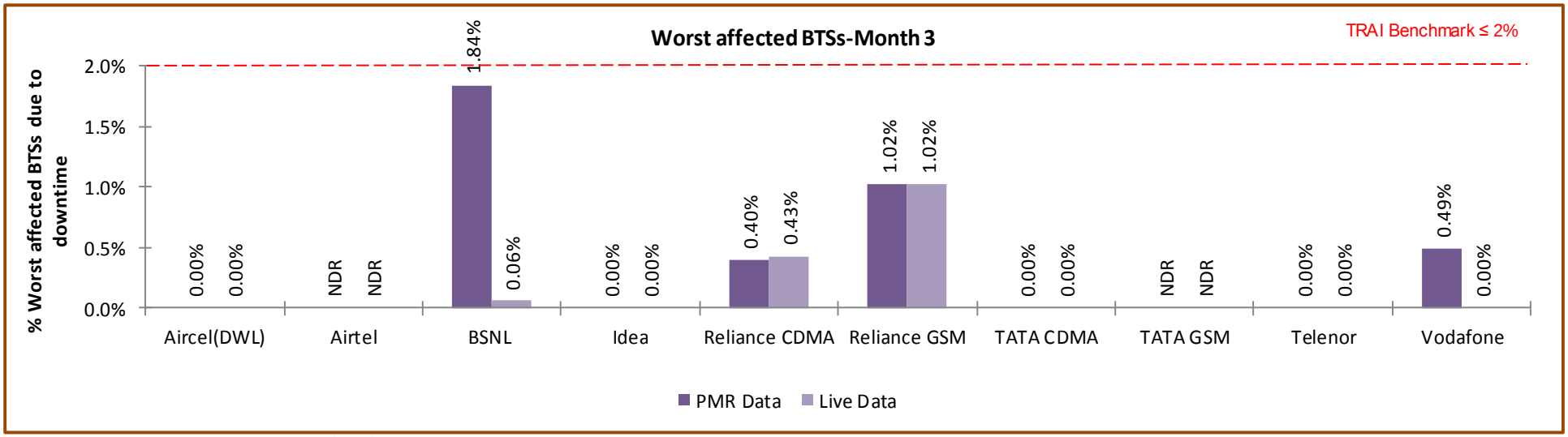
Data Source: Operations and Maintenance Center (OMC) of the operators

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:** 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

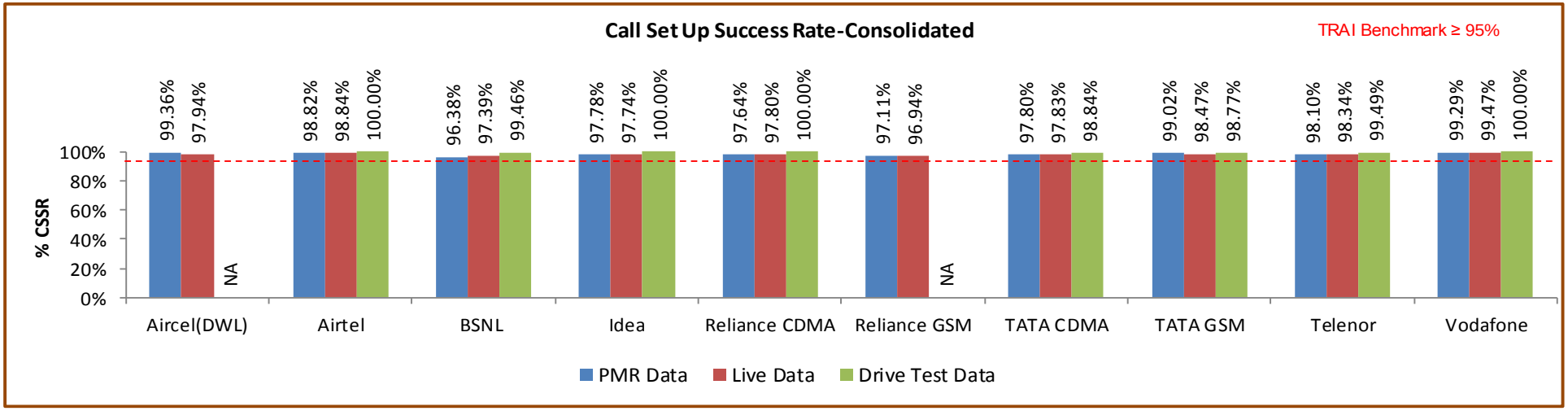
   Call Established means the following events have happened in call setup:-

   - 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.

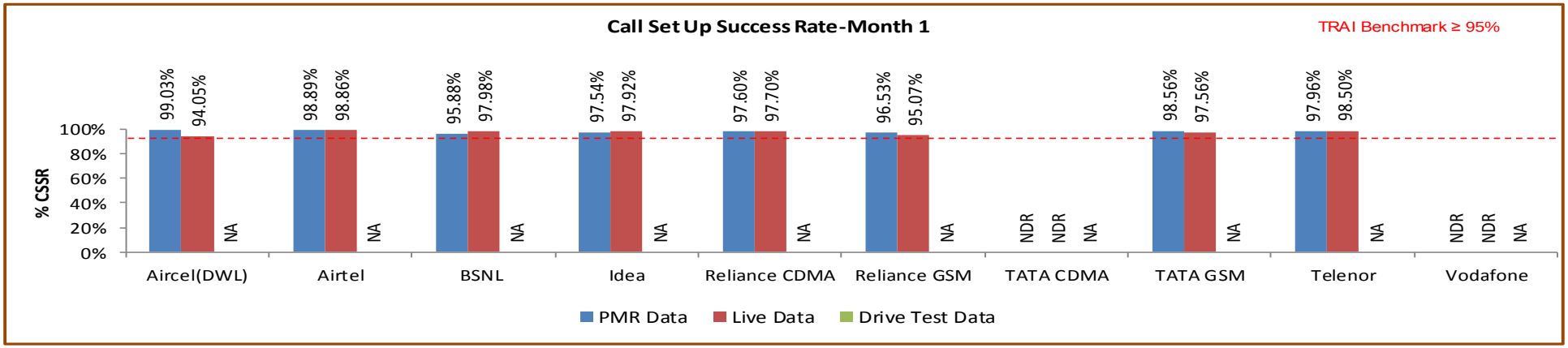
6.3.2 KEY FINDINGS - CONSOLIDATED



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

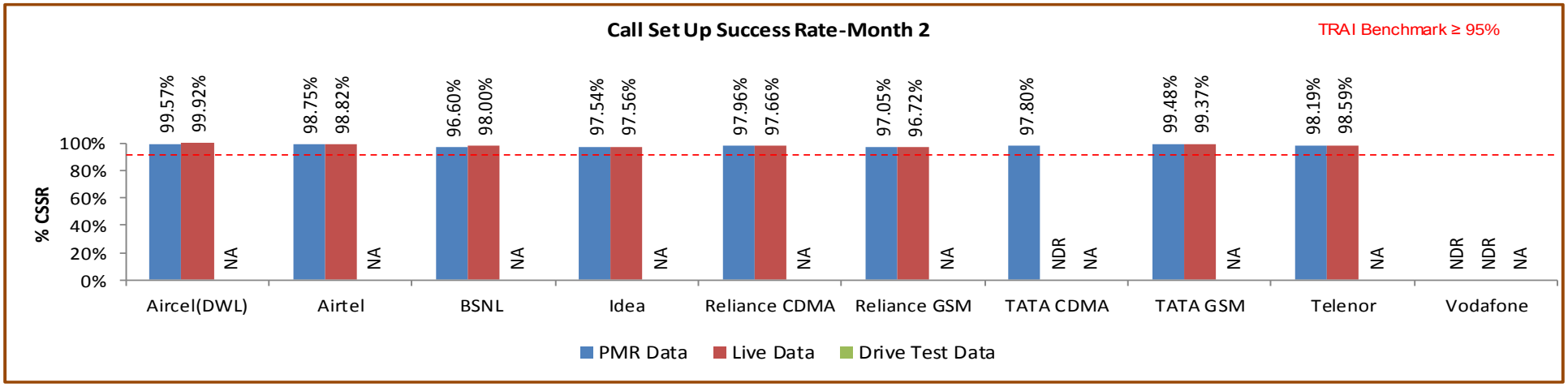
All operators met the TRAI benchmark as per audit/PMR, 3days live as well as drive test

6.3.2.1 KEY FINDINGS – MONTH 1



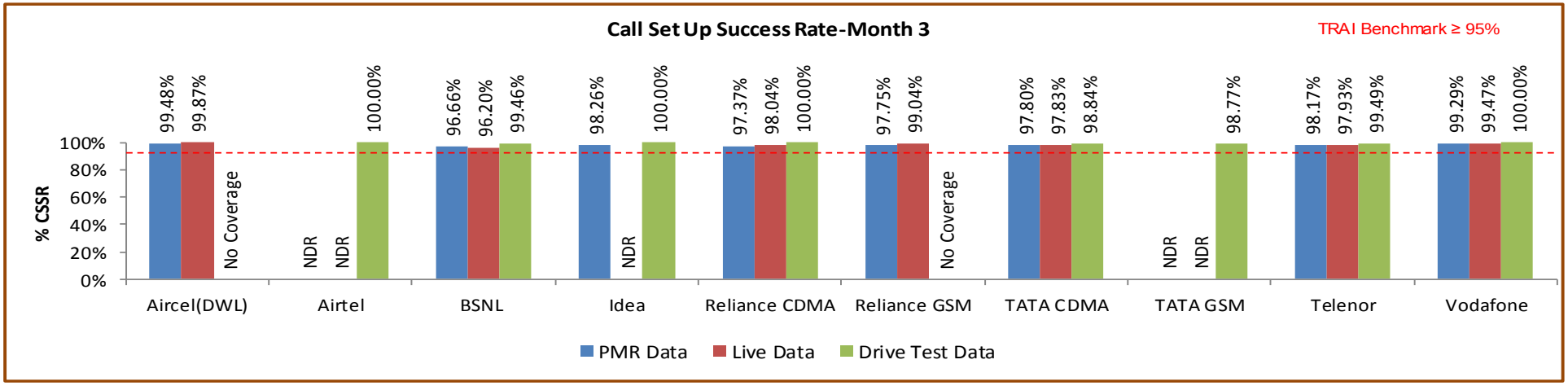
Data Source: Network Operations Center(NOC) of the operators

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- PAGING CHANNEL /TCH CONGESTION/POI

6.4.1 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

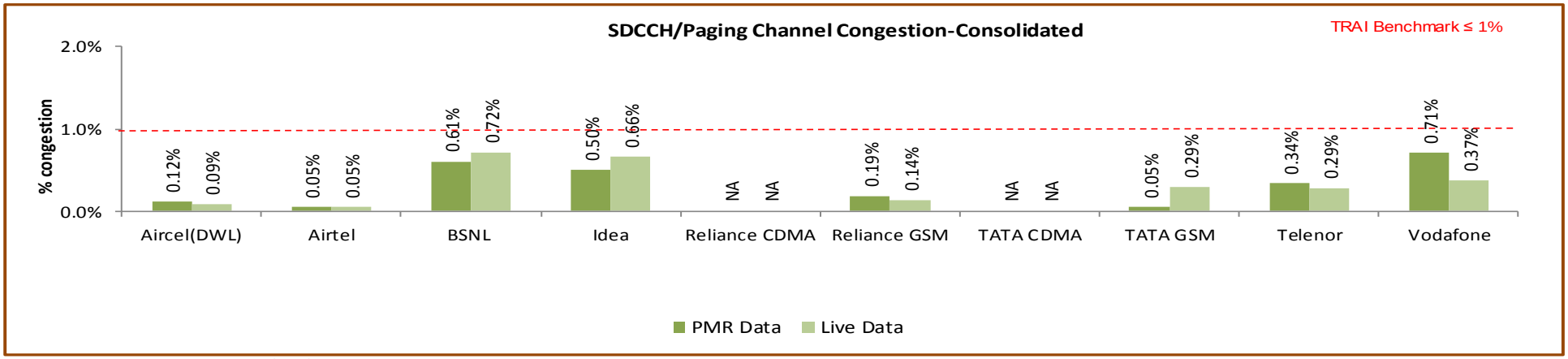
3. **Benchmark:**

   - 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

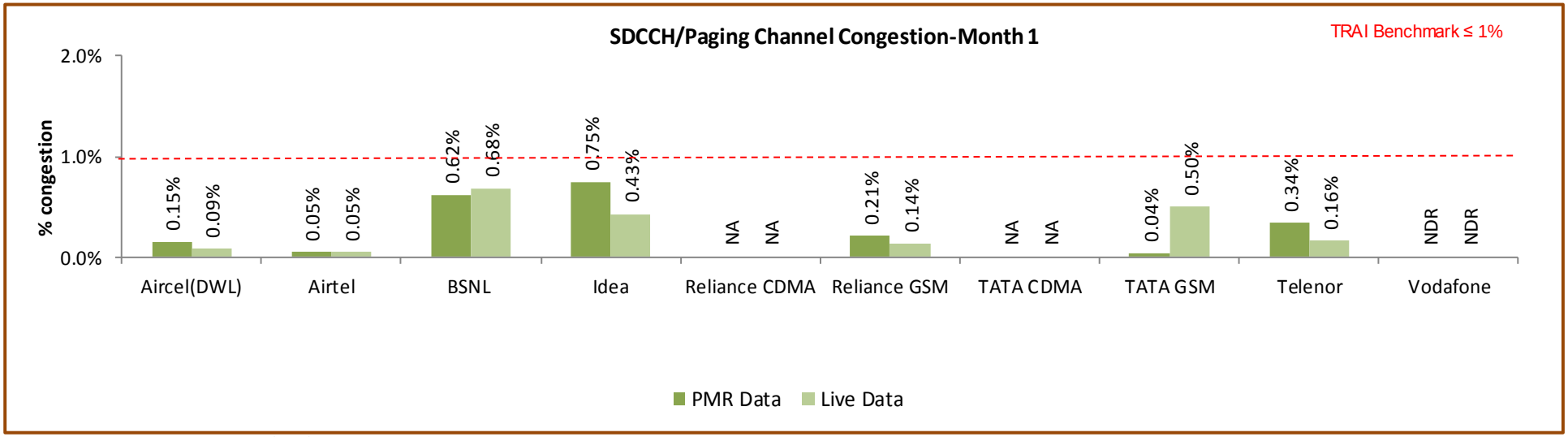
6.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



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

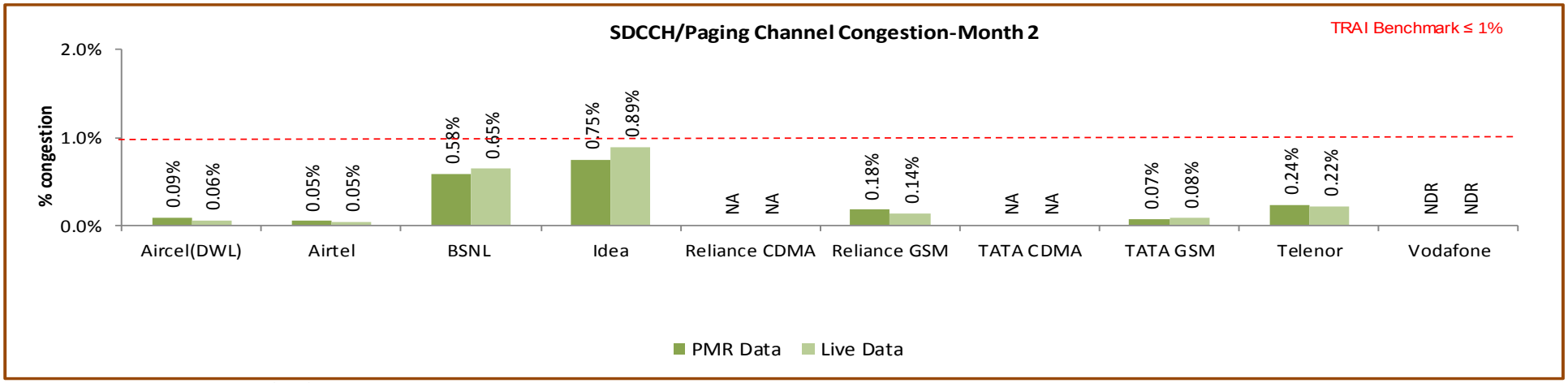
All operators met the benchmark as per PMR/audit Data.
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

6.4.2.1 KEY FINDINGS – MONTH 1



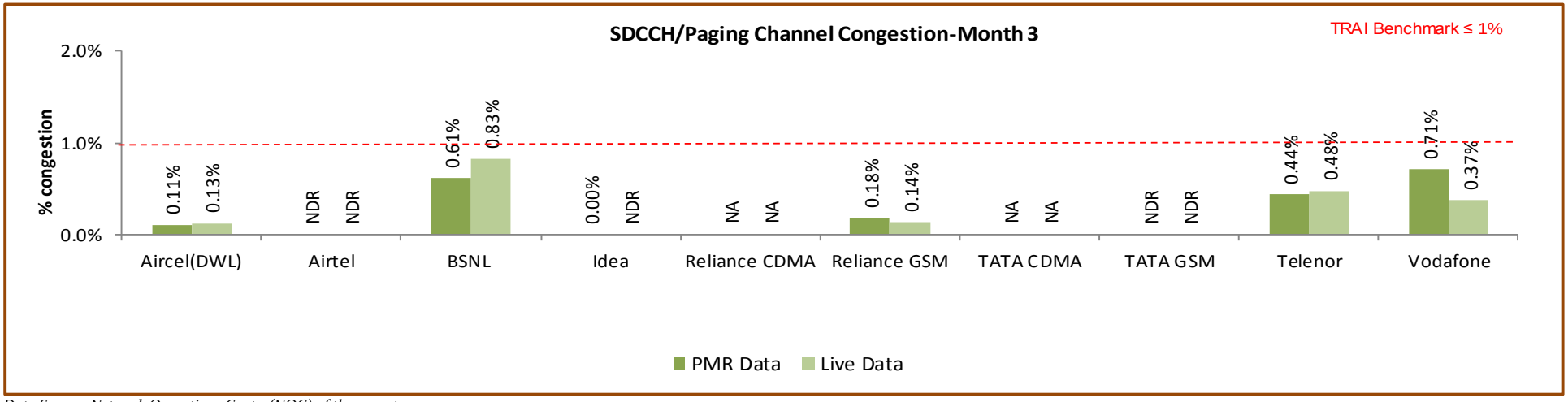
Data Source: Network Operations Center(NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



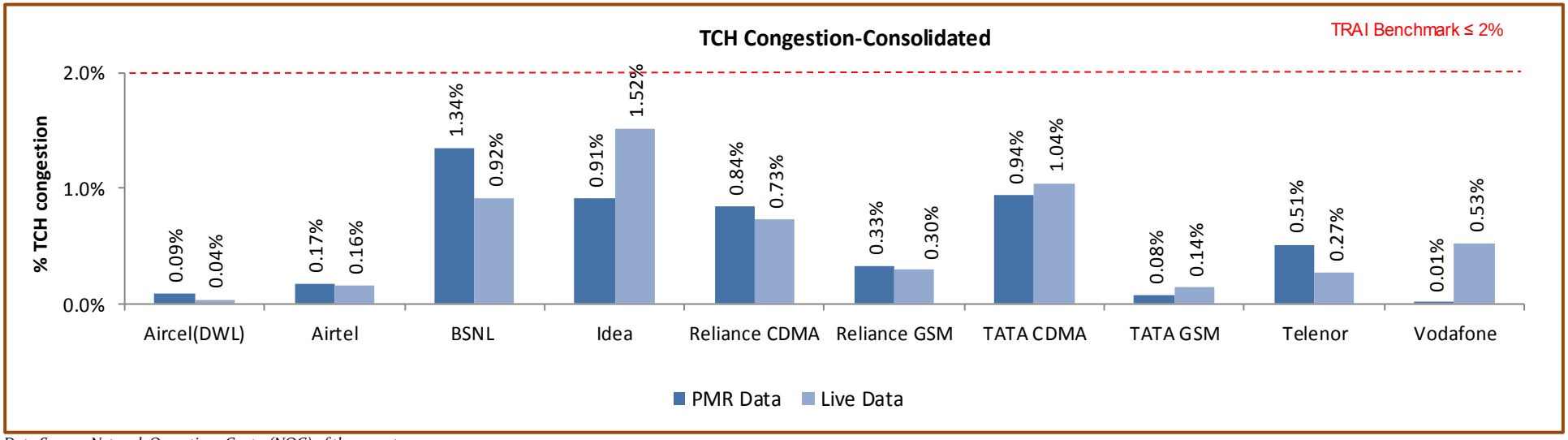
Data Source: Network Operations Center(NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



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

6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

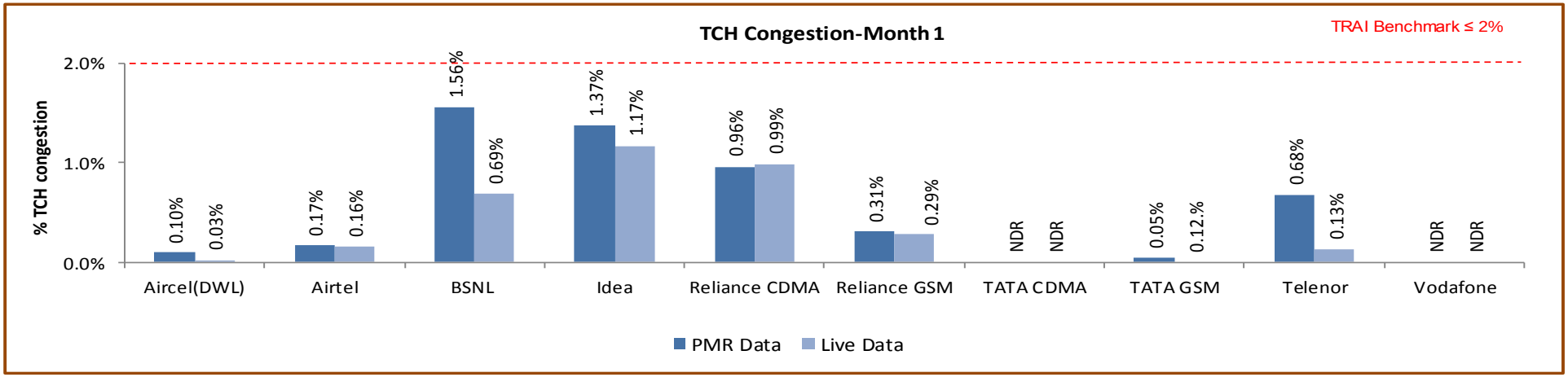


Data Source: Network Operations Center(NOC) of the operators

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

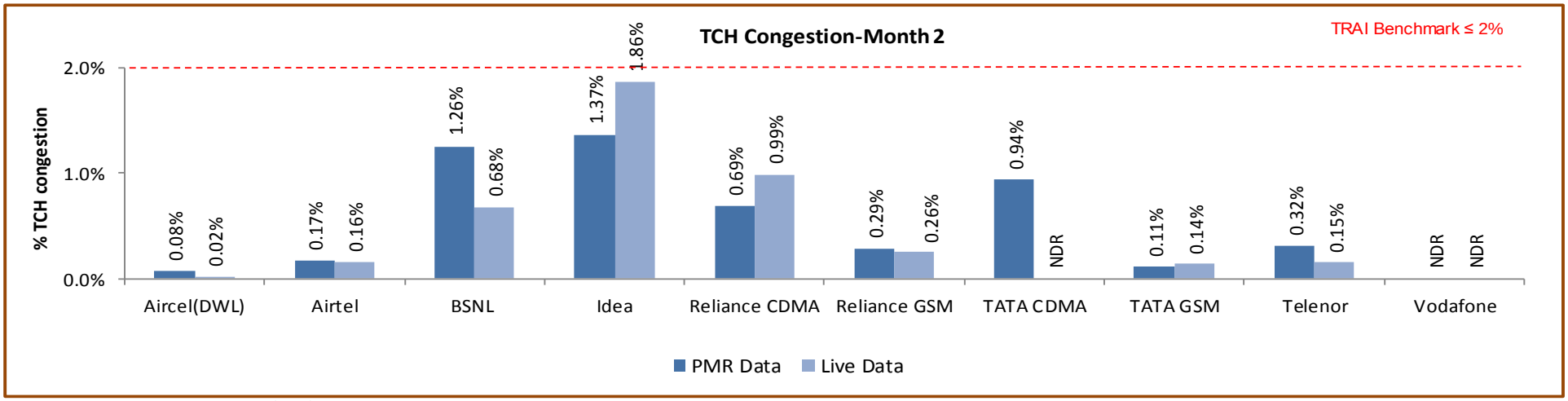
Significant difference was observed between PMR & live measurement data for Vodafone, BSNL, Telenor and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



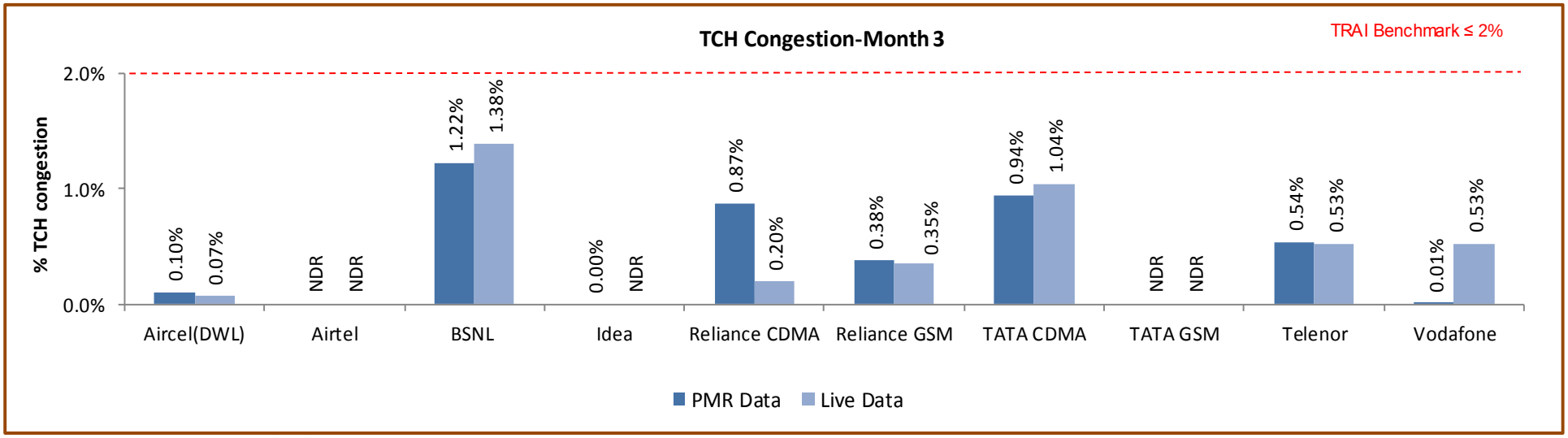
Data Source: Network Operations Center(NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2



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

6.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		2466	945	189	2890	232	90	784	273	73	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		609526	542755	312504	2500511	52170	53693	162067	124371	411715	7571787
Traffic served for all POIs (B)- in erlangs		393401	316874	170239	3919099	13559	26596	55915	54146	216863	158040
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		651	934	189	1936	232	90	392	446	73	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		152142	312652	312580	2222316	75728	54035	81034	132264	410940	160209
Traffic served for all POIs (B)- in erlangs		86371	558796	173906	601969	16954	25985	27709	33304	218675	291542
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		71	466	63	963	116	45	NDR	54	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	0	0	NDR	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		16583	263478	104128	1091078	26213	26963	NDR	43337	136319	NDR
Traffic served for all POIs (B)- in erlangs		8597	157205	59499	1085815	7230	14493	NDR	22653	73094	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	NDR
Live Measurement Results for POI Congestion- 3 Day data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		213	458	63	968	116	45	NDR	54	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	0	0	NDR	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		50259	153311	104275	1110524	49565	27053	NDR	51230	136319	NDR
Traffic served for all POIs (B)- in erlangs		26122	266285	57232	286903	10284	13938	NDR	2543	72879	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	NDR

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		72	480	63	963	NDR	NDR	392	219	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	0	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		17087	279277	104069	1091078	NDR	NDR	81034	81034	136804	NDR
Traffic served for all POIs (B)- in erlangs		10478	159669	55027	1085815	NDR	NDR	27957	31493	70744	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	NDR
Live Measurement Results for POI Congestion- 3 Day data-November											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		219	476	63	968	NDR	NDR	NDR	392	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	NDR	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		49202	159341	104161	1111792	NDR	NDR	NDR	81034	136319	NDR
Traffic served for all POIs (B)- in erlangs		24450	292511	57550	315066	NDR	NDR	NDR	30761	72794	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	NDR	0.00%	0.00%	NDR

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		2323	NDR	63	964	116	45	392	NDR	25	209
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	NDR	0	0
Total Capacity of all POIs (A) - in erlangs		575856	NDR	104307	318355	25957	26730	81034	NDR	138592	7571787
Traffic served for all POIs (B)- in erlangs		374325	NDR	55712	1747469	6330	12103	27957	NDR	73025	158040
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
NDR		219	NDR	63	NDR	116	45	392	NDR	25	209
No. of POIs not meeting benchmark		0	NDR	0	NDR	0	0	0	NDR	0	0
Total Capacity of all POIs (A) - in erlangs		52681	NDR	104144	NDR	26162	26982	81034	NDR	138302	160209
Traffic served for all POIs (B)- in erlangs		35799	NDR	59124	NDR	6671	12046	27709	NDR	73002	291542
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	NDR	0.00%	0.00%	0.00%	NDR	0.00%	0.00%

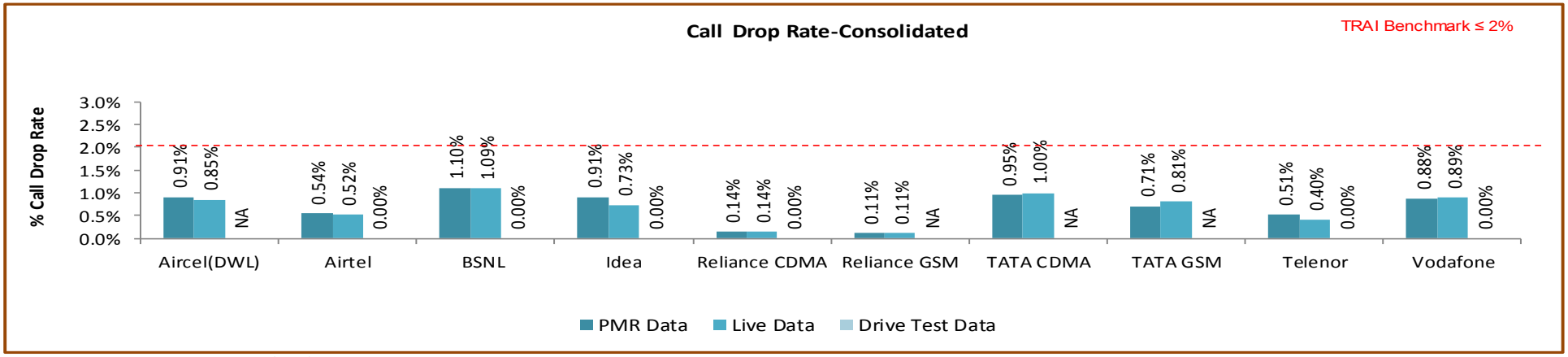
Data Source: Network Operations Center(NOC) of the operators

6.5 CALL DROP RATE

6.5.1 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.

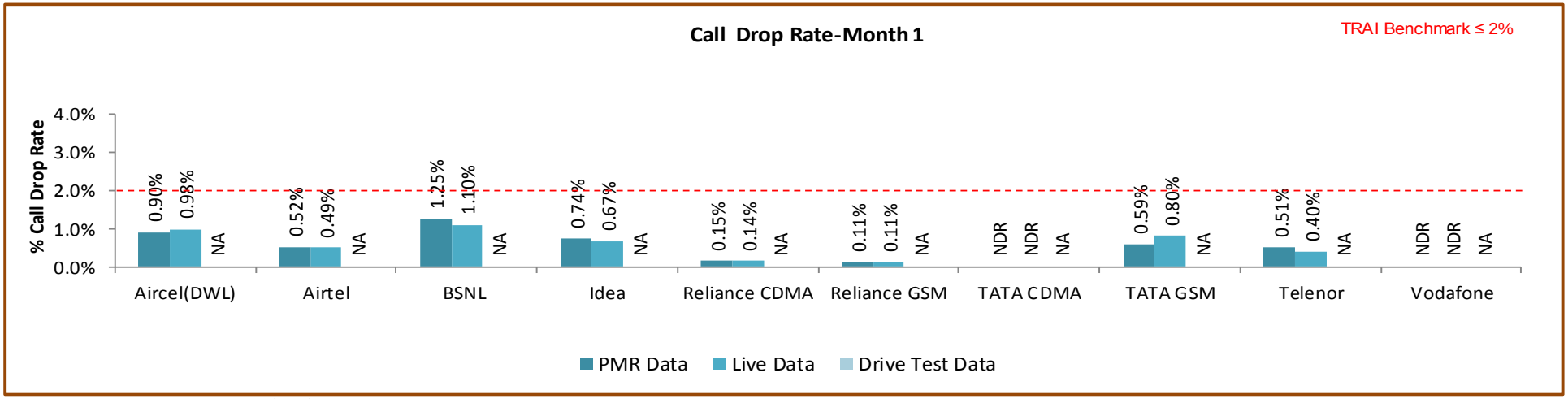
6.5.2 KEY FINDINGS - CONSOLIDATED



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

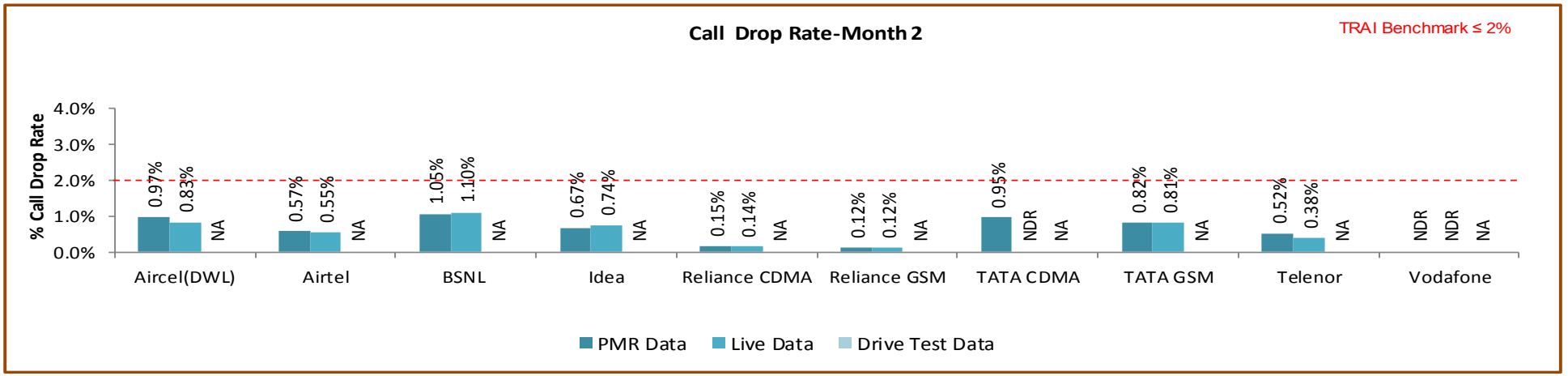
All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



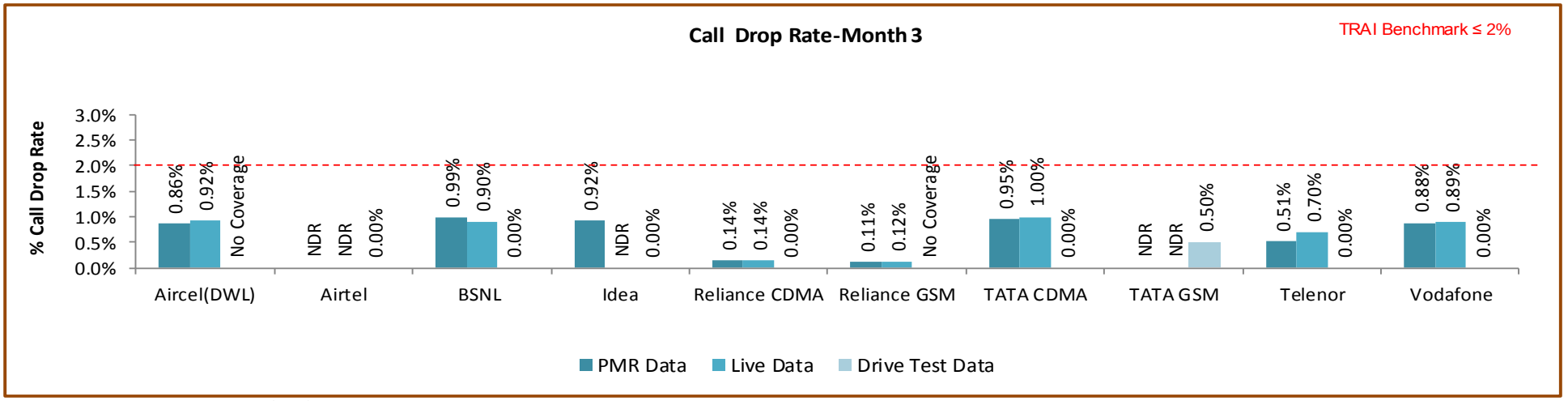
Data Source: Network Operations Center(NOC) of the operators

6.5.2.2 KEY FINDINGS – MONTH 2



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

6.5.2.3 KEY FINDINGS – MONTH 3



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

6.6 CELLS HAVING GREATER THAN 3% TCH DROP

6.6.1 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 –**

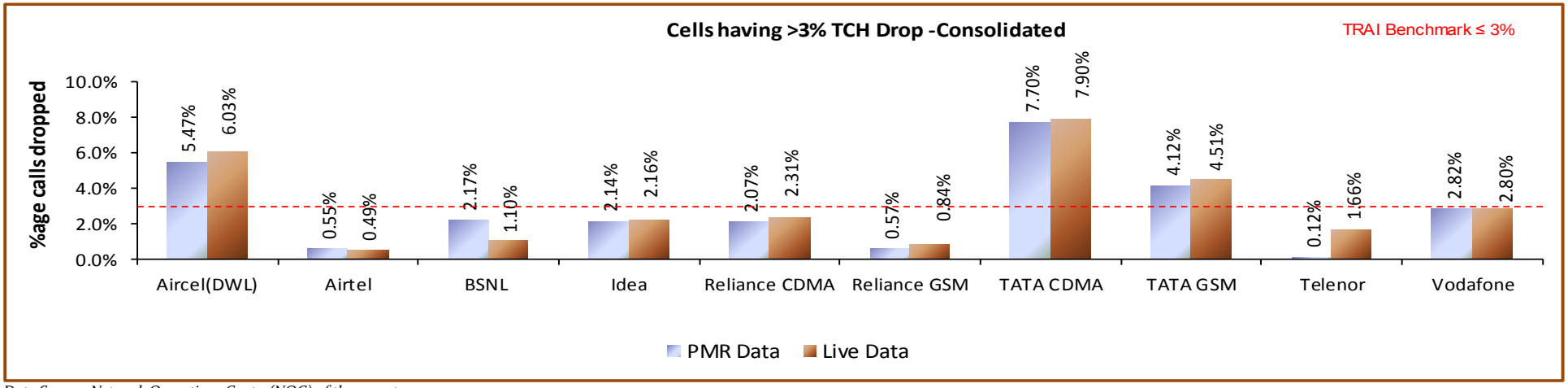
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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.

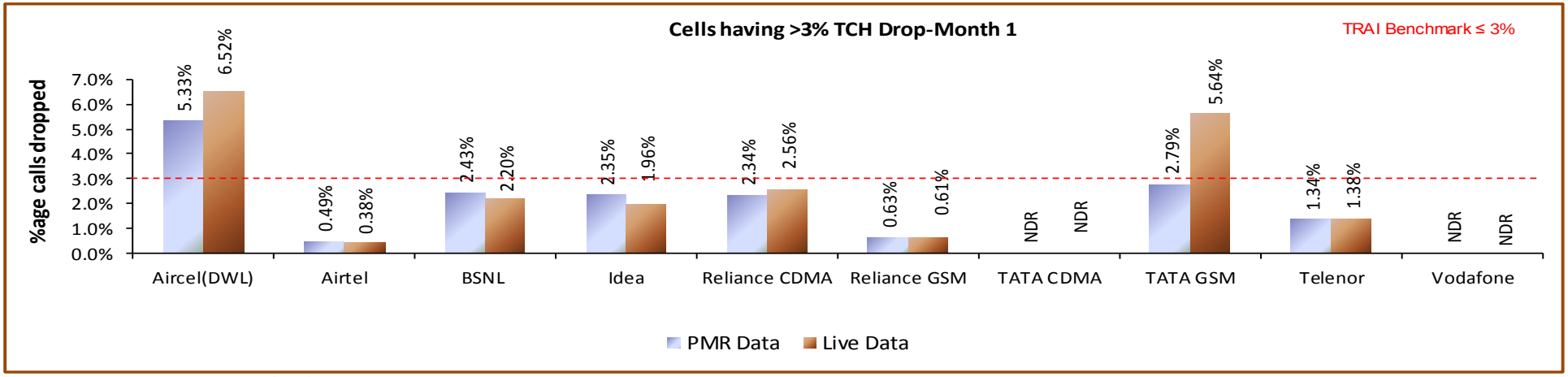
6.6.2 KEY FINDINGS - CONSOLIDATED



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

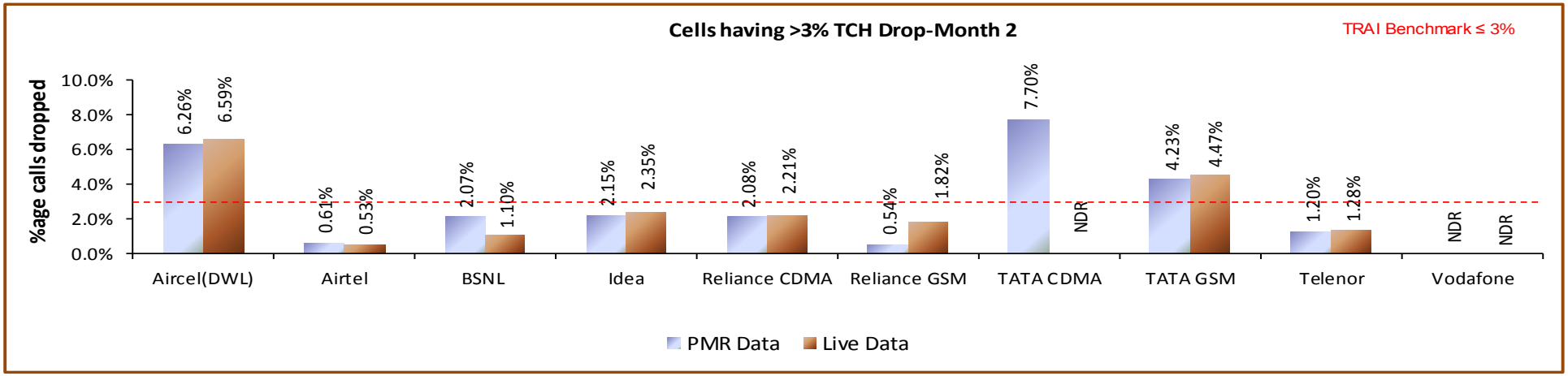
Aircel, TATA CDMA and TATA GSM failed to meet the TRAI benchmark.

6.6.2.1 KEY FINDINGS – MONTH 1



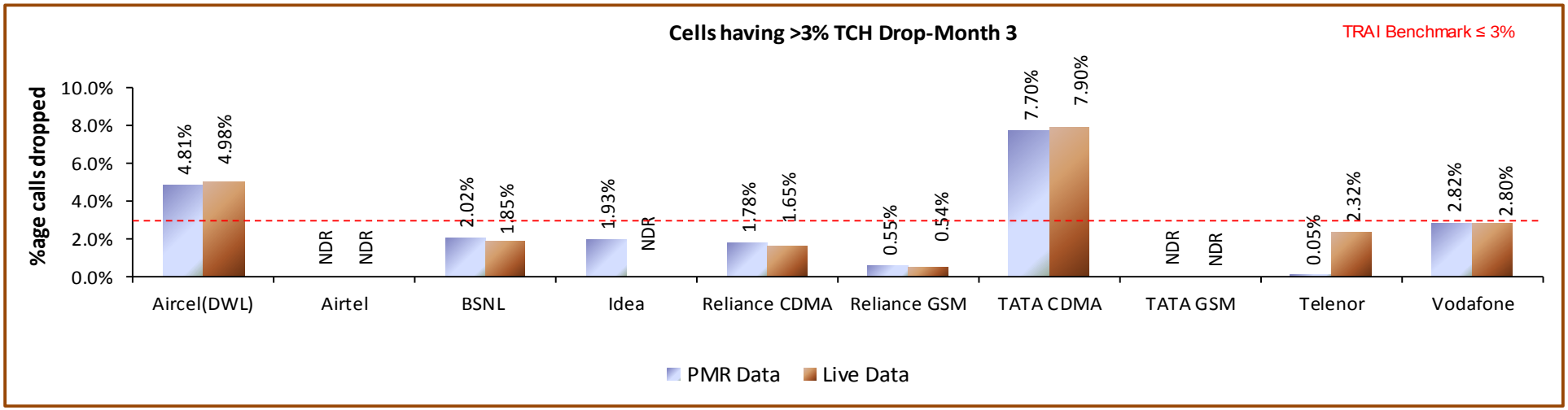
Data Source: Network Operations Center(NOC) of the operators

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 VOICE QUALITY

6.7.1 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**

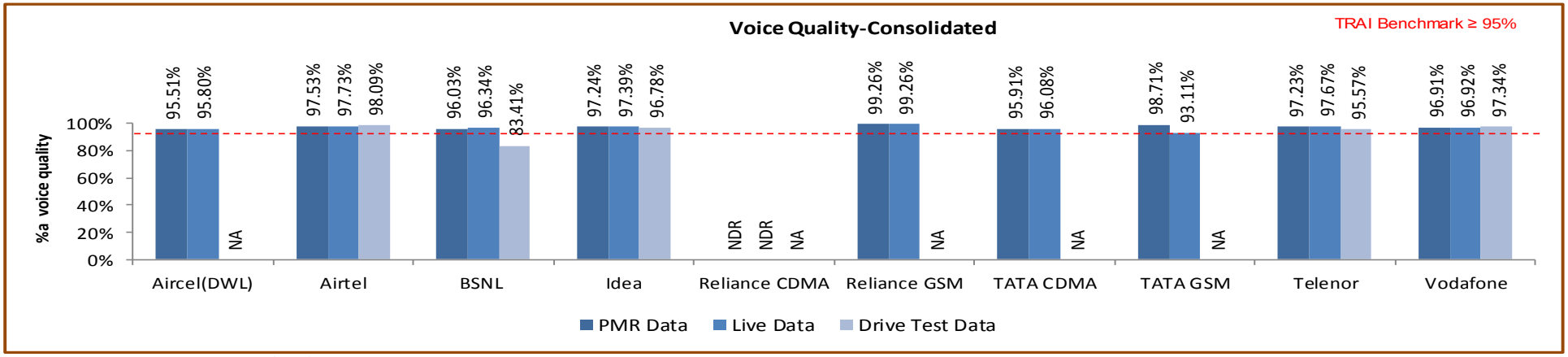
3. **TRAI Benchmark:** ≥ 95%

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.

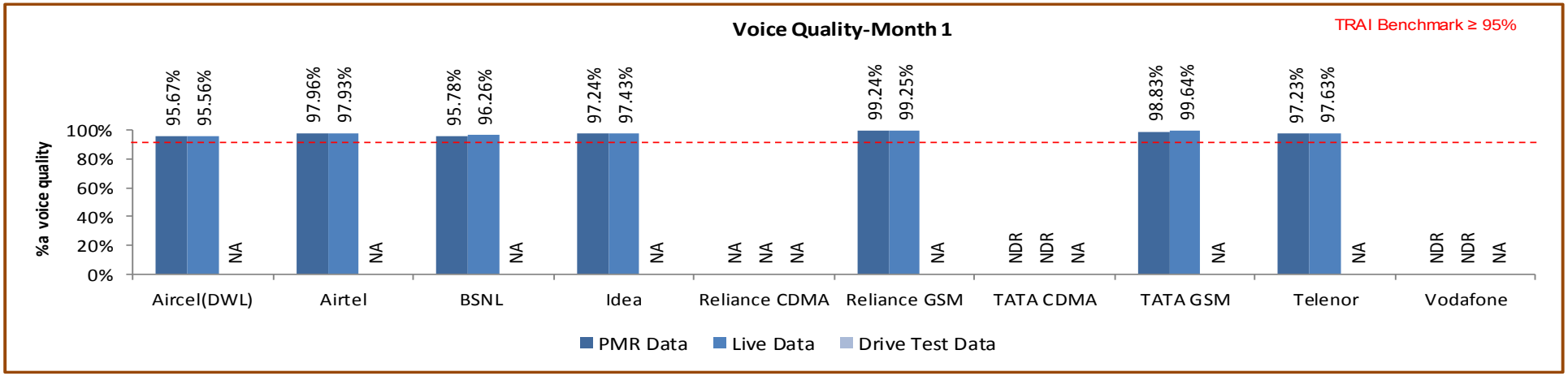
6.7.2 KEY FINDINGS



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

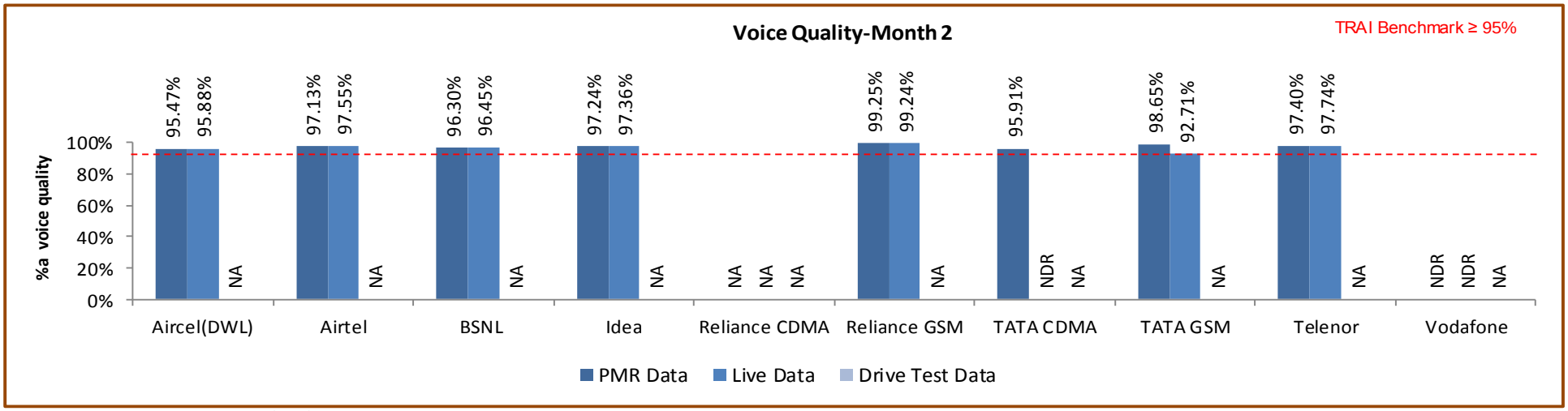
TATA GSM failed to meet the benchmark for Voice quality as per live data and BSNL failed to meet the benchmark in drive test.

6.7.2.1 KEY FINDINGS – MONTH 1



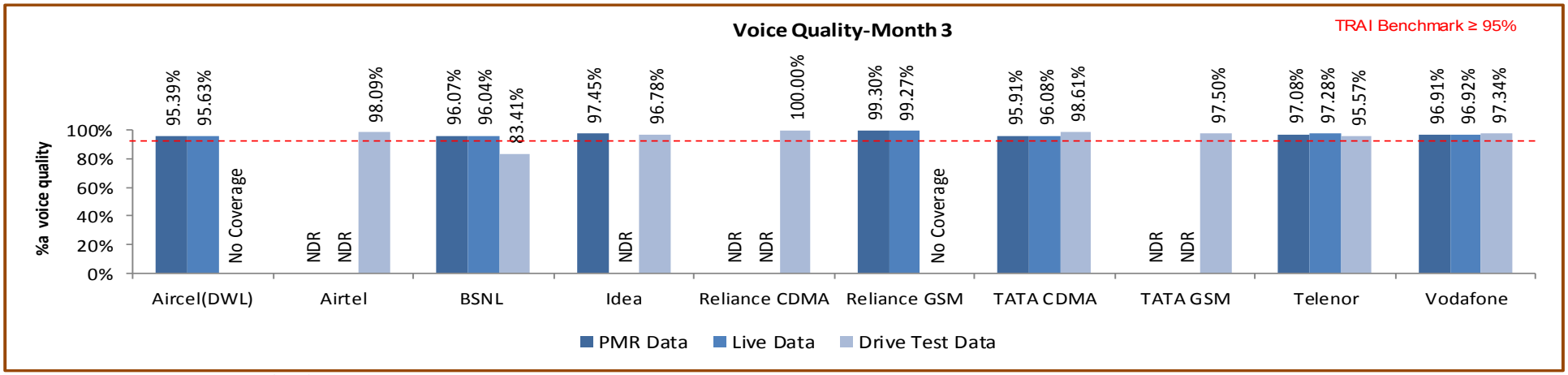
Data Source: Network Operations Center(NOC) of the operators

6.7.2.2 KEY FINDINGS – MONTH 2



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

6.7.2.3 KEY FINDINGS – MONTH 3



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

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

7.1 NODE BS DOWNTIME

7.1.1 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 –

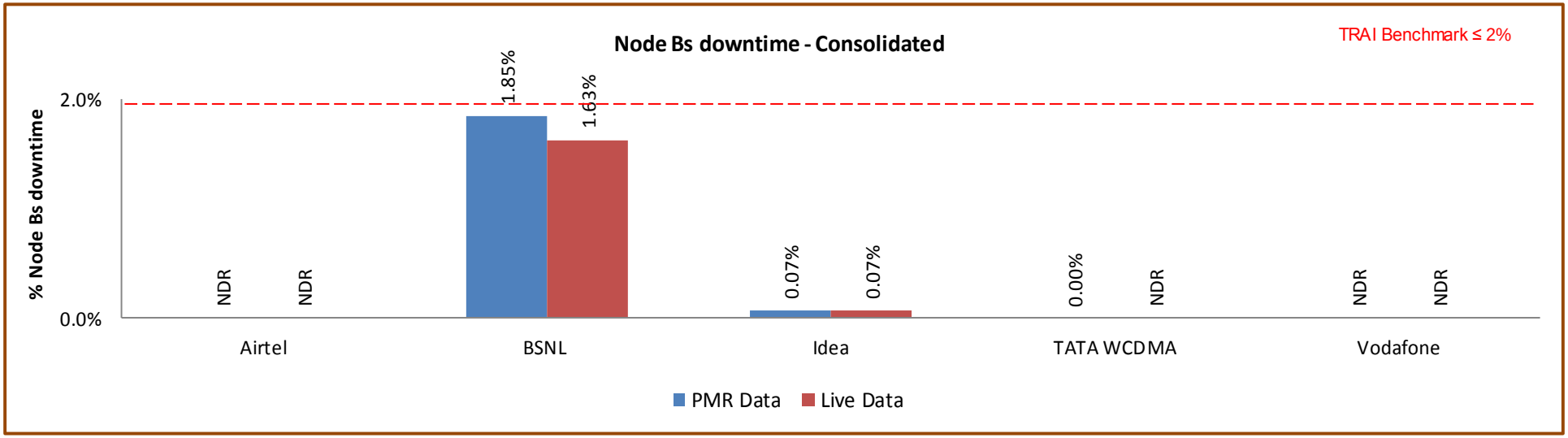
a. Node Bs downtime (not available for service) ≤ 2%

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 Bsdowntime and worst affected Node Bs due to downtime.

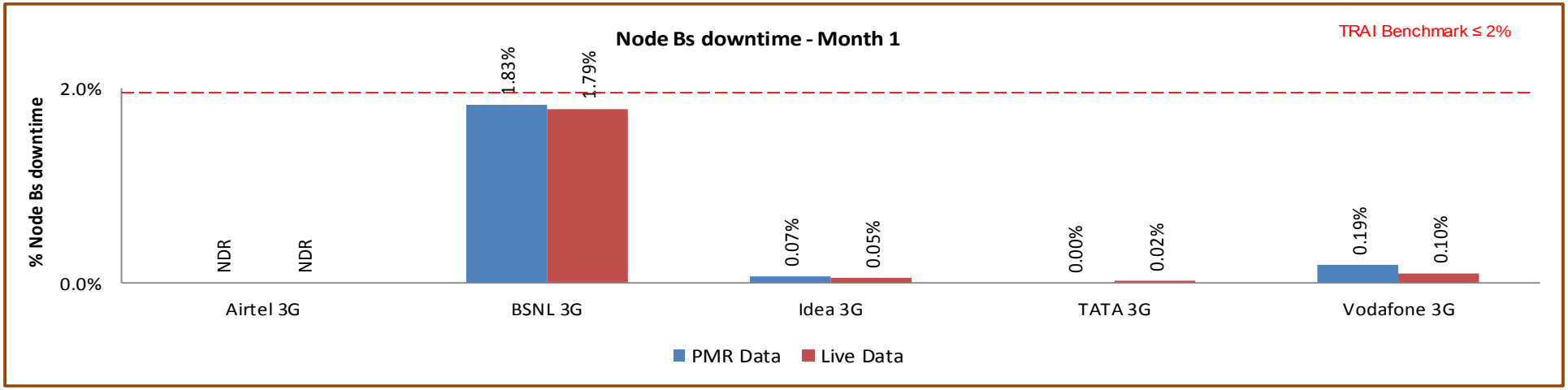
7.1.2 KEY FINDINGS - CONSOLIDATED



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

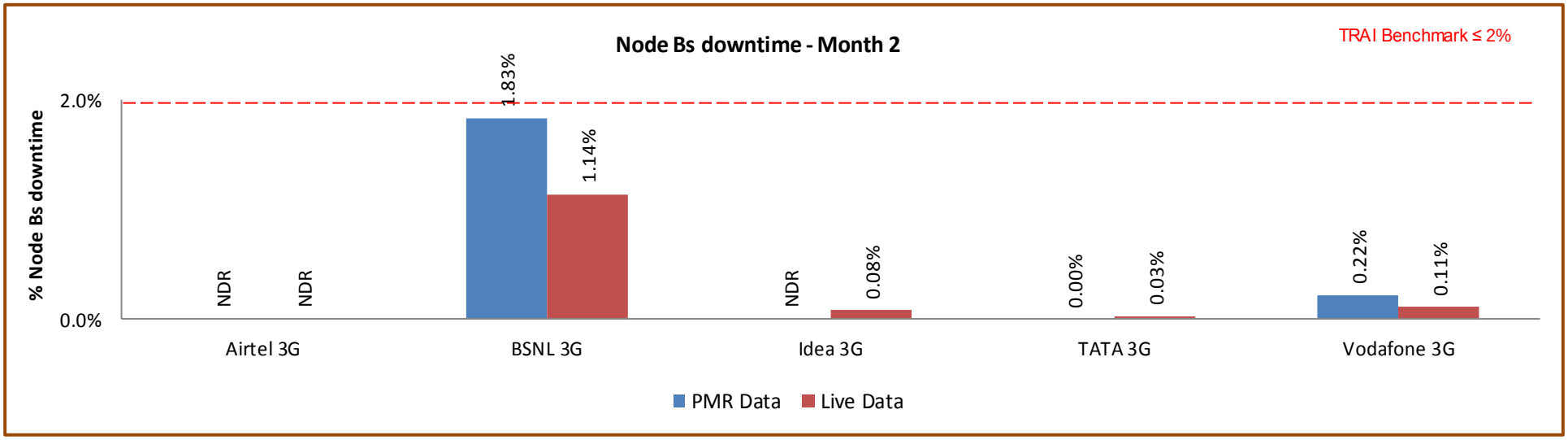
All operators met the TRAI benchmark.

7.1.2.1 KEY FINDINGS – MONTH 1



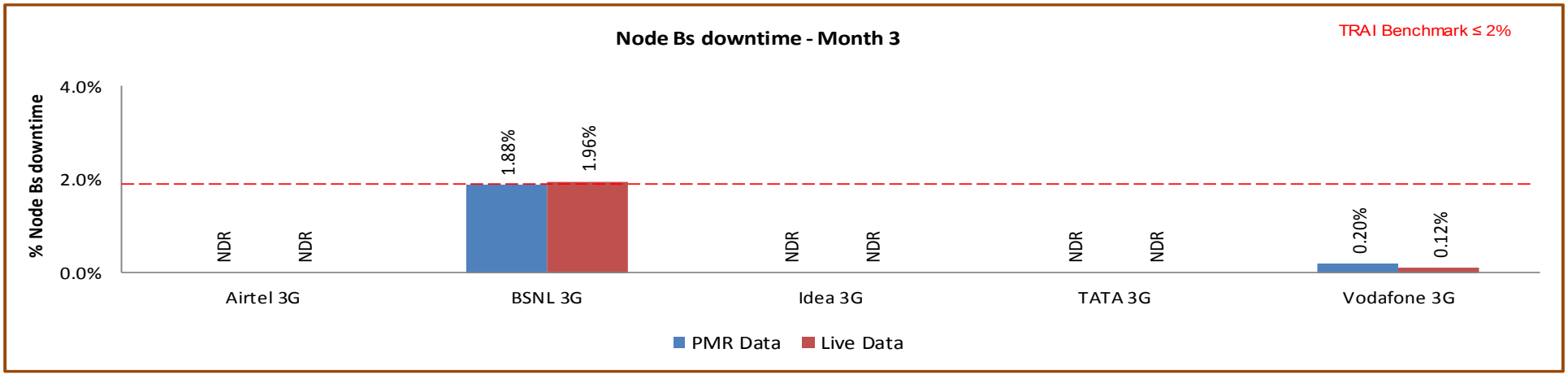
Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.2 KEY FINDINGS – MONTH 2



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

7.1.2.3 KEY FINDINGS – MONTH 3



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

7.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

7.2.1 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.

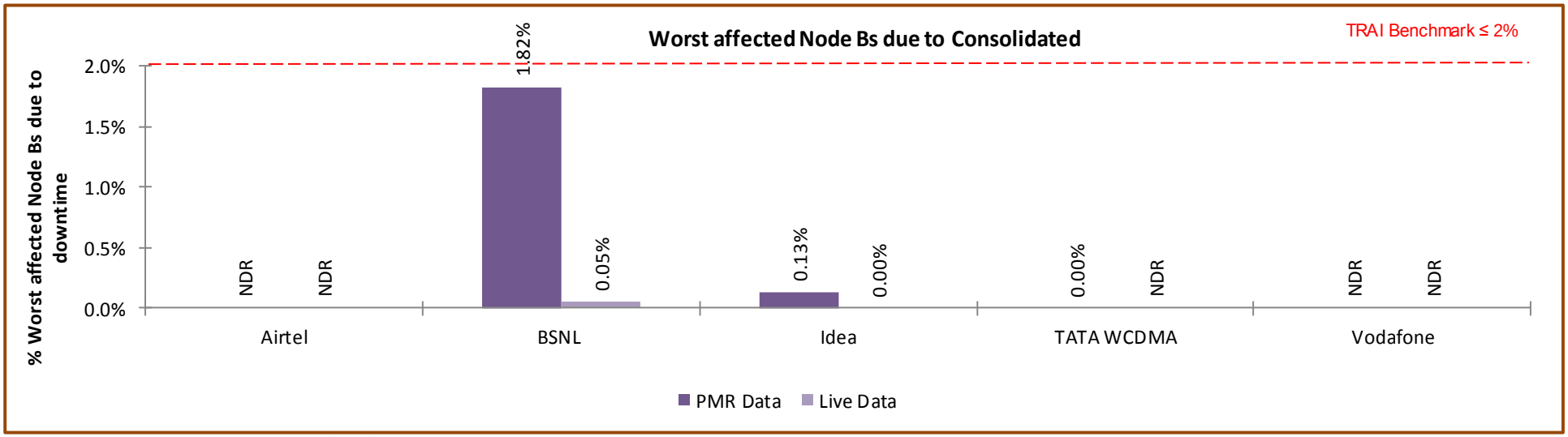
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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 NodeBs accumulated downtime is computed in accordance.

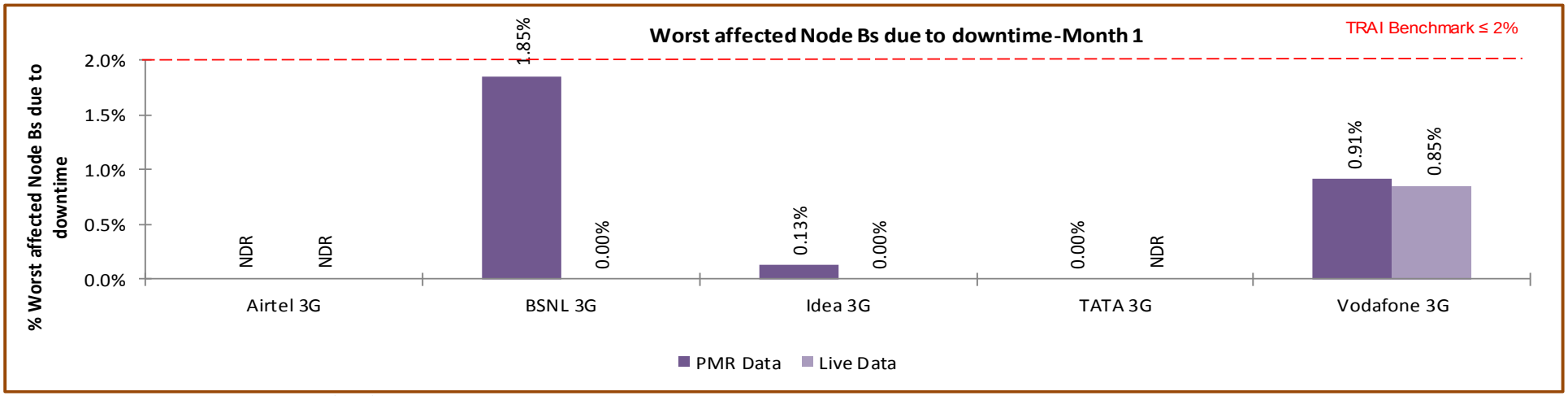
7.2.2 KEY FINDINGS – CONSOLIDATED



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

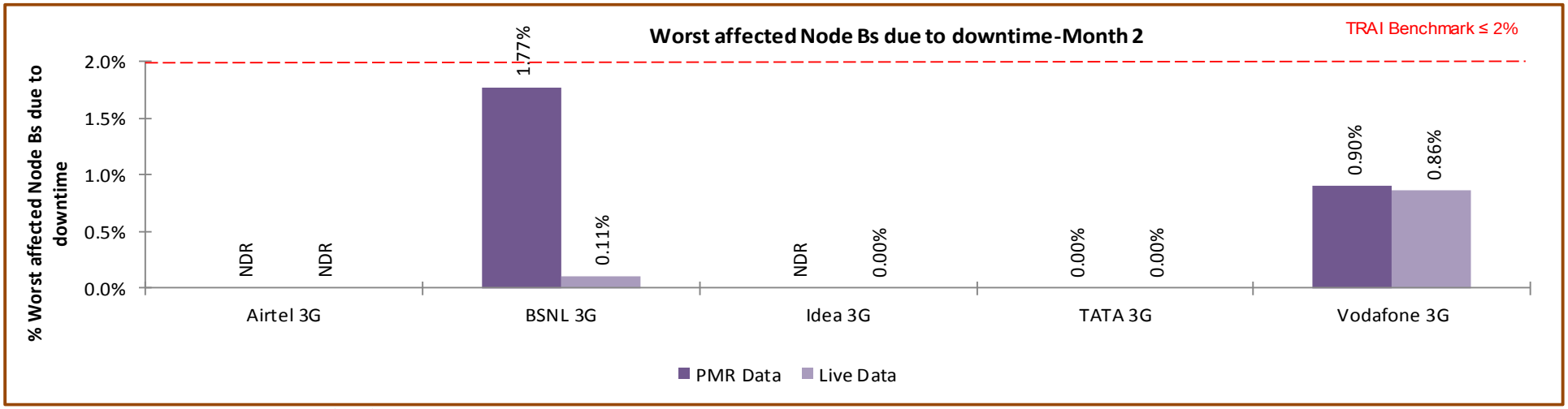
All operators met the TRAI benchmark for worst affected Node Bs due to downtime as per audit/PMR data.

7.2.2.1 KEY FINDINGS – MONTH 1



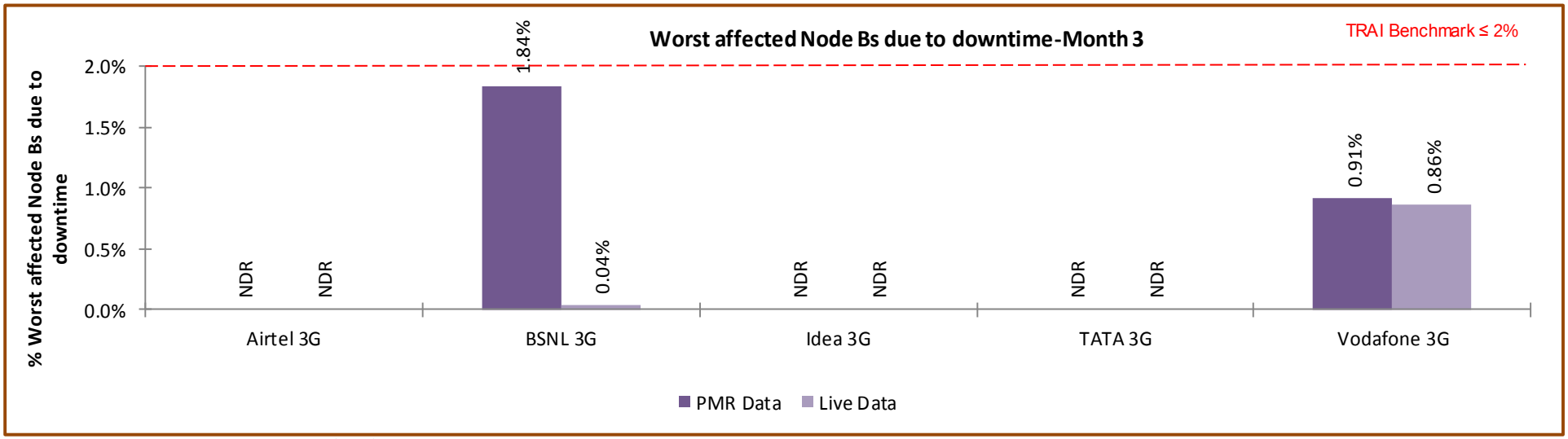
Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.2 KEY FINDINGS – MONTH 2



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

7.2.2.3 KEY FINDINGS – MONTH 3



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

7.3 CALL SET UP SUCCESS RATE

7.3.1 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

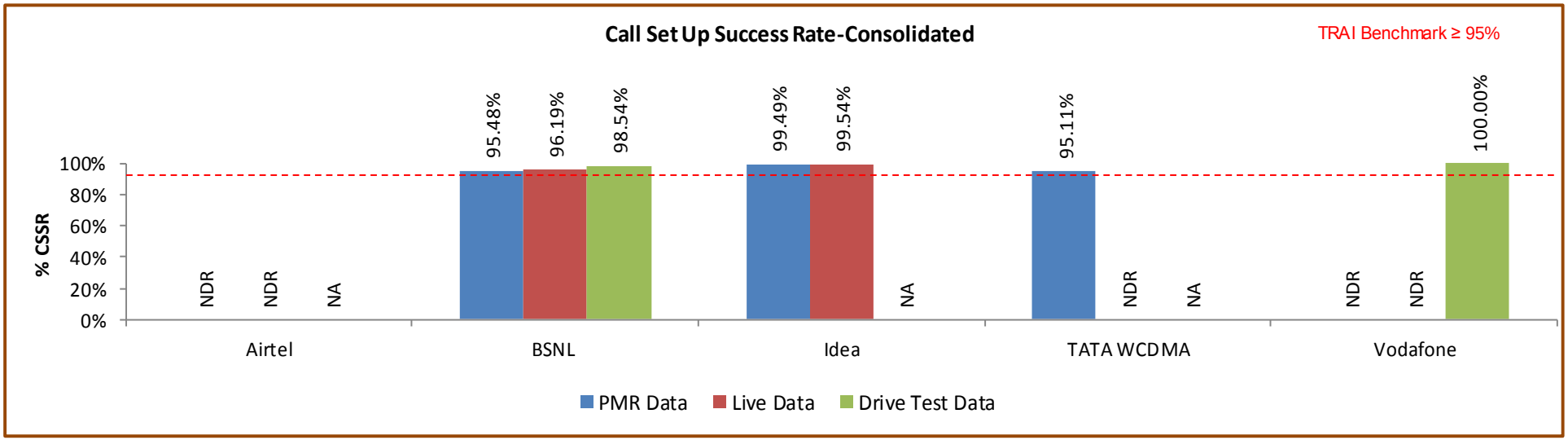
5. **TRAI Benchmark≥** 95%

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.

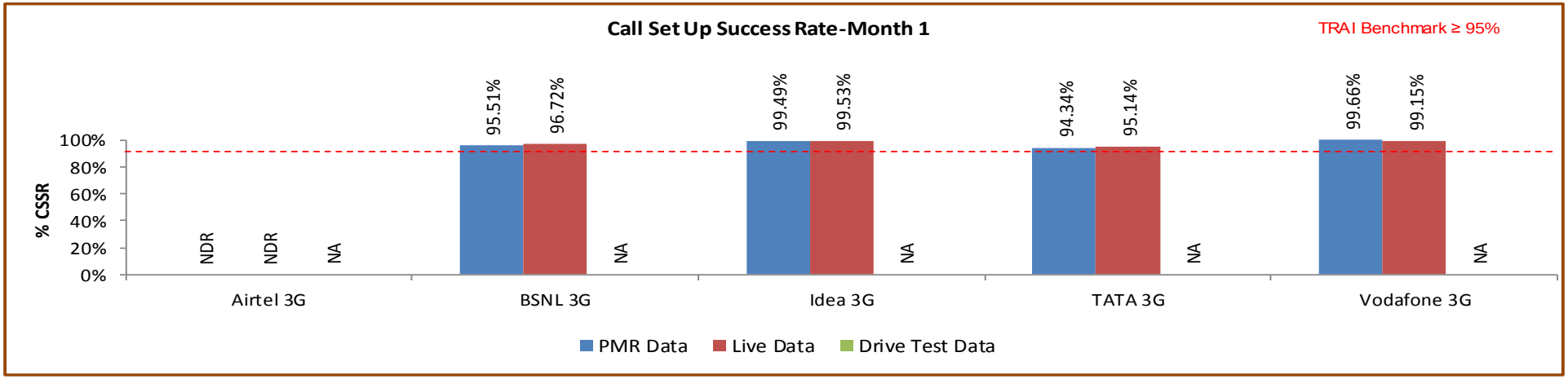
7.3.2 KEY FINDINGS - CONSOLIDATED



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

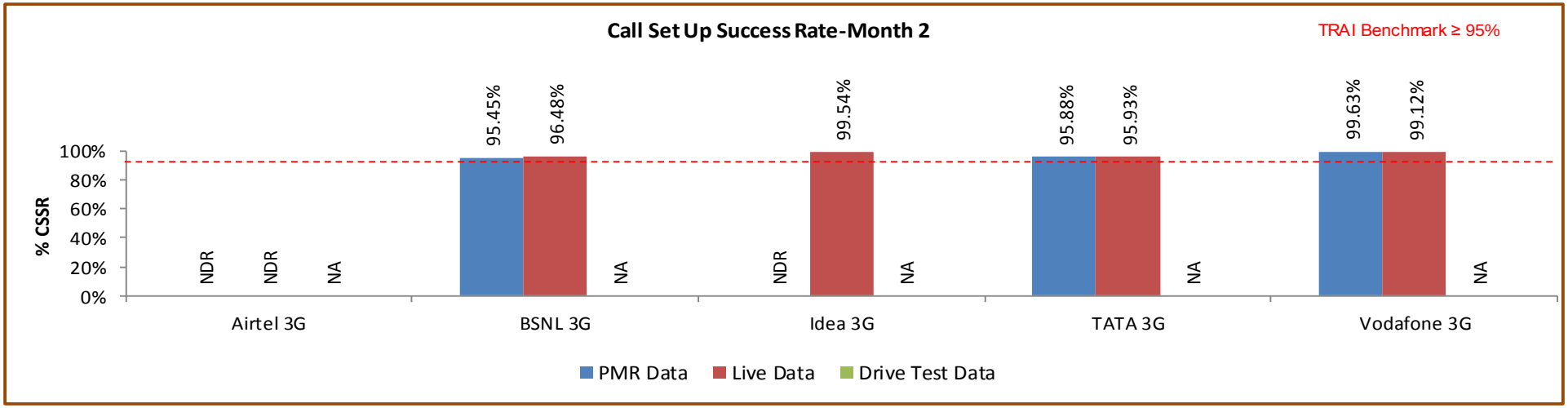
All operators met the TRAI benchmark as per audit/PMR, 3days live as well as drive test data.

7.3.2.1 KEY FINDINGS – MONTH 1



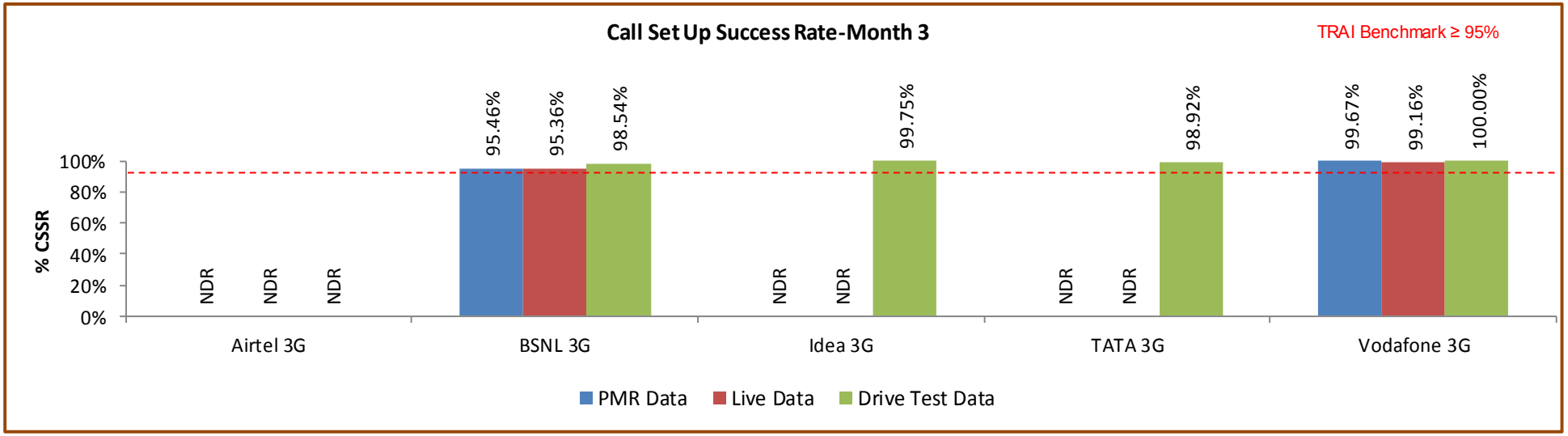
Data Source: Network Operations Center(NOC) of the operators

7.3.2.2 KEY FINDINGS – MONTH 2



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

7.3.2.3 KEY FINDINGS – MONTH 3



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

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

7.4.1 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

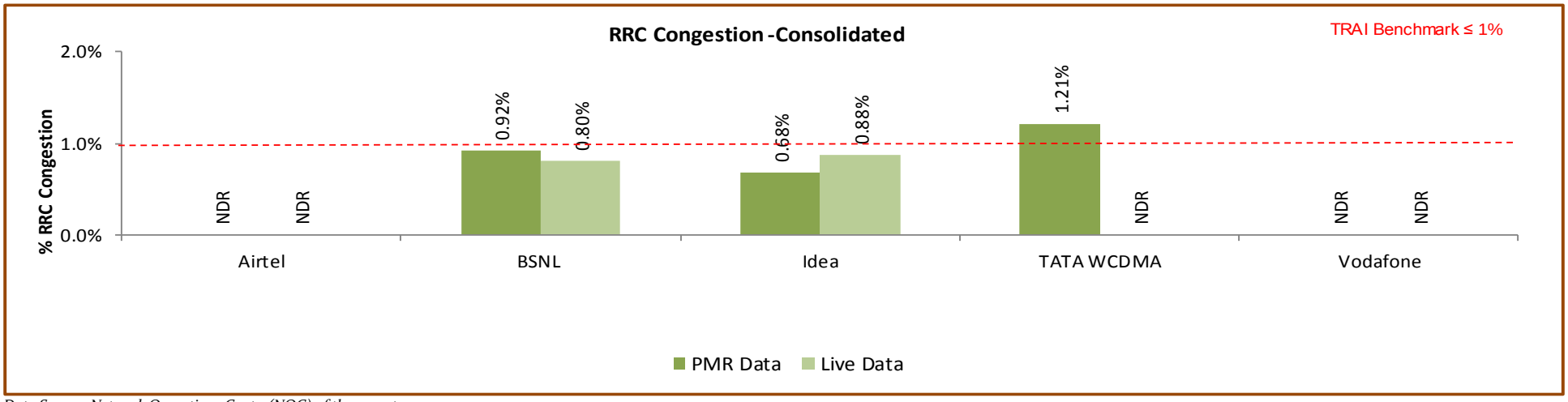
7. Benchmark:

- 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

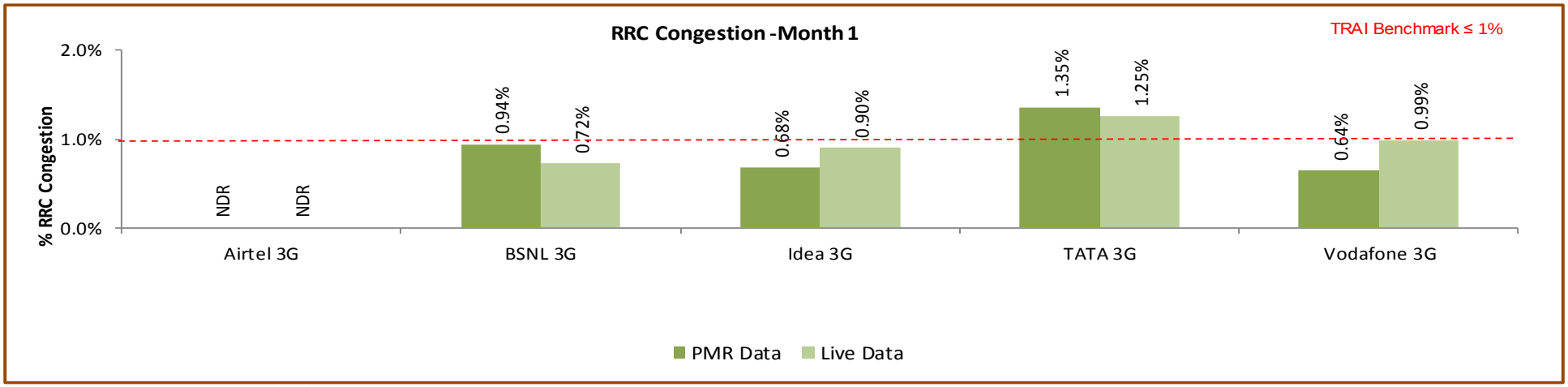
7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

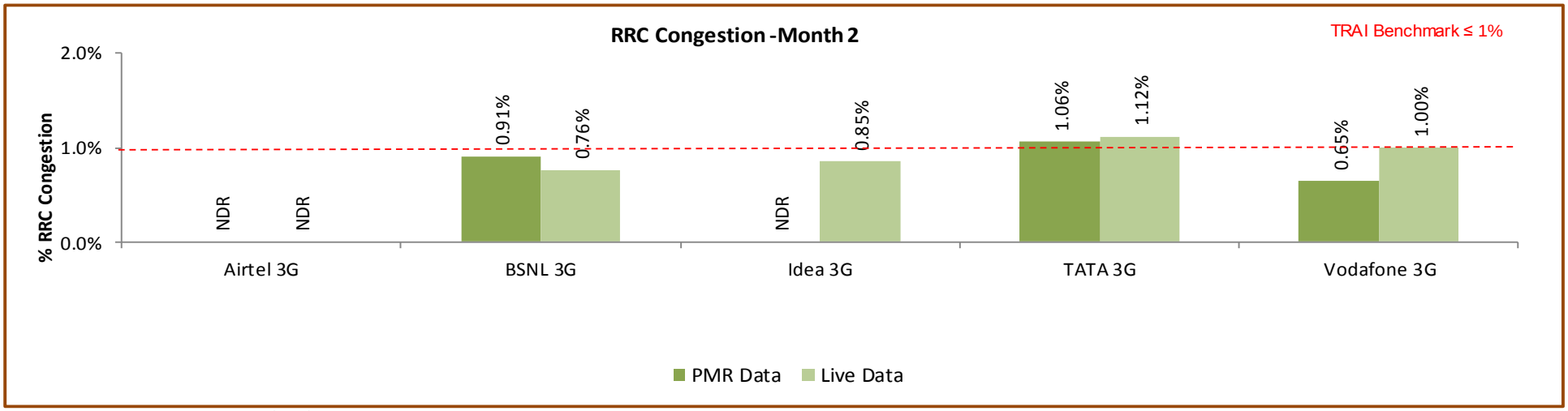
TATA 3G failed to meet the TRAI benchmark for PMR and live audit.

7.4.2.1 KEY FINDINGS – MONTH 1



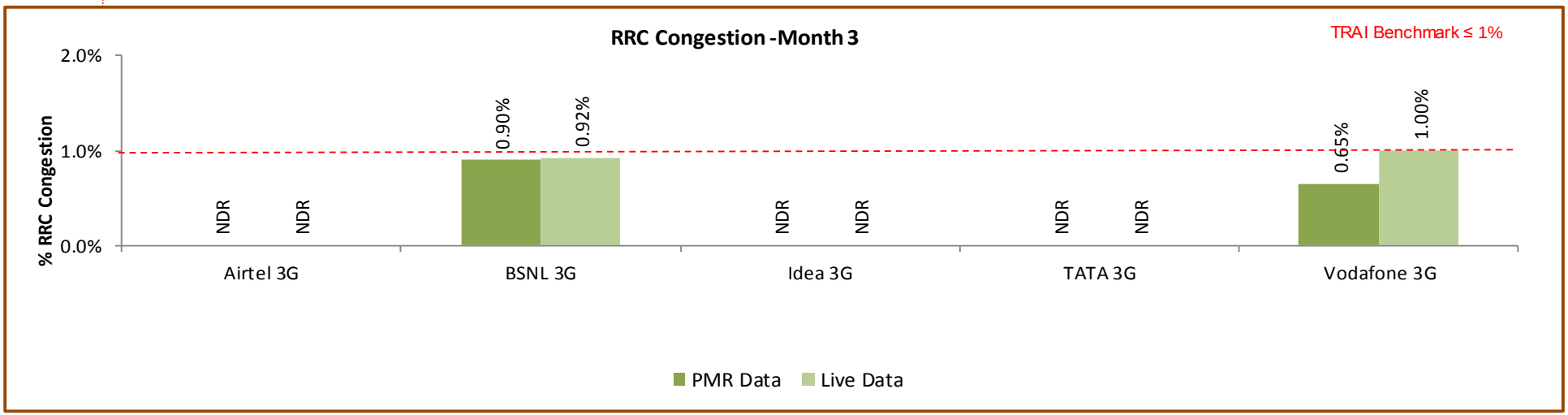
Data Source: Network Operations Center(NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2



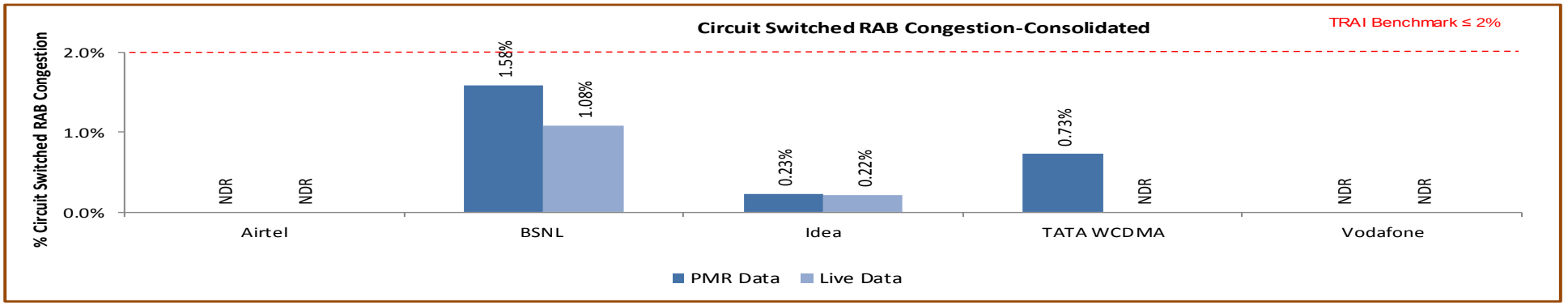
Data Source: Network Operations Center(NOC) of the operators

7.4.2.3 KEY FINDINGS – MONTH 3



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

7.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

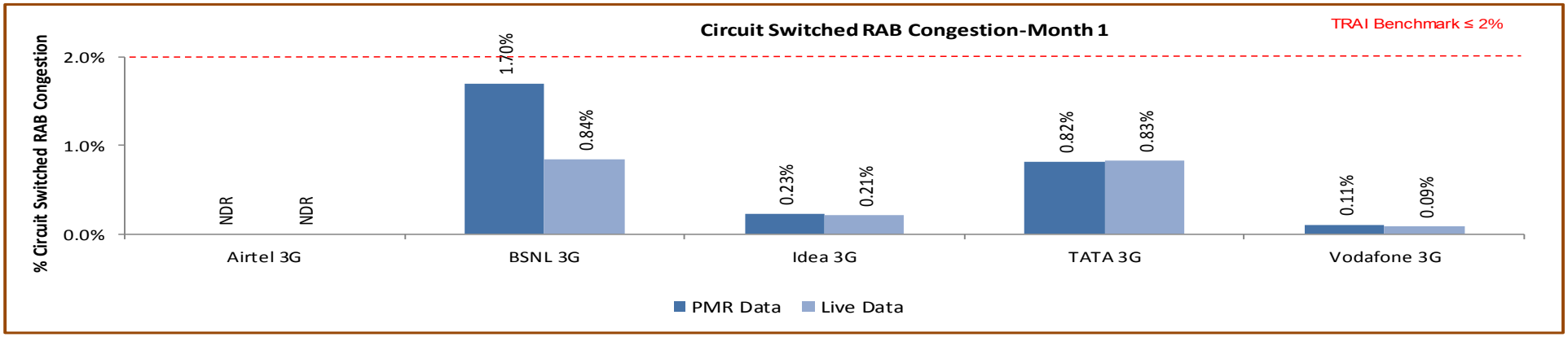


Data Source: Network Operations Center(NOC) of the operators

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

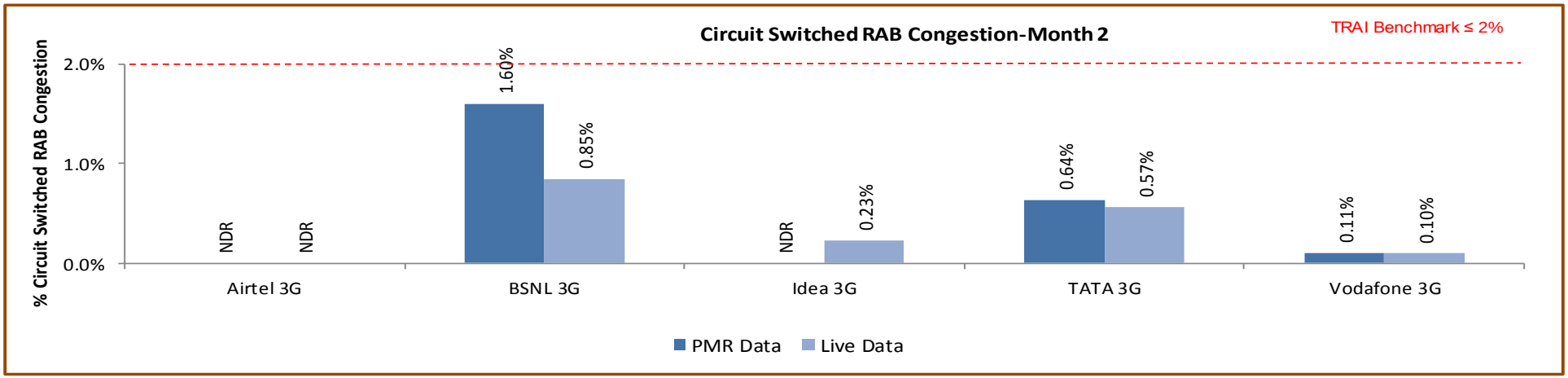
Significant difference was observed between PMR & live measurement data for BSNL and TATA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.4.3.1 KEY FINDINGS – MONTH 1



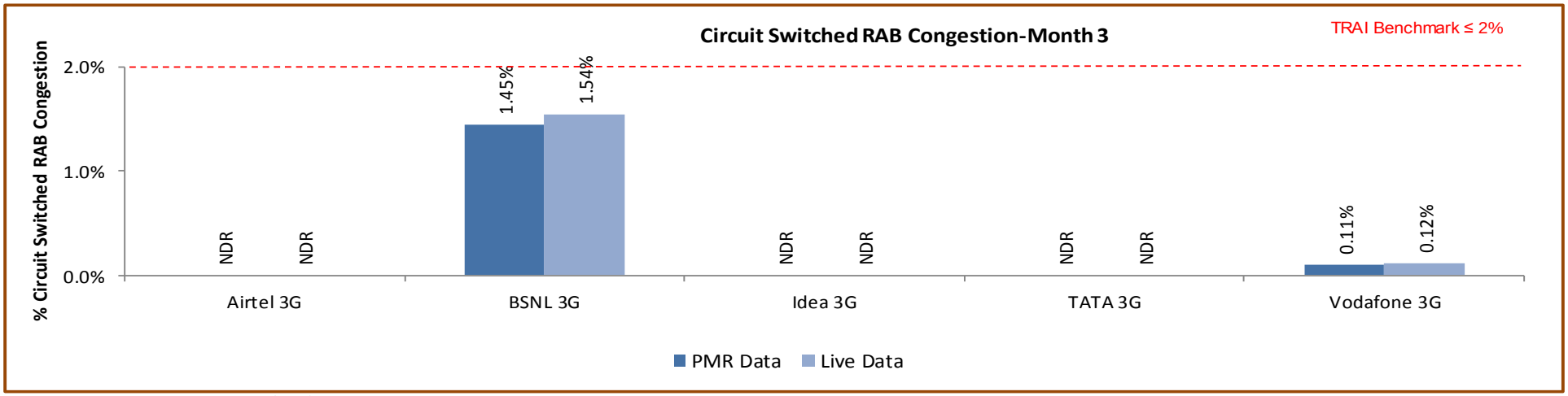
Data Source: Network Operations Center(NOC) of the operators

7.4.3.2 KEY FINDINGS – MONTH 2



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

7.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total number of working POIs		NDR	126	963	384	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	208375	1091078	148099	0
Traffic served for all POIs (B)- in erlangs		NDR	110740	1085815	64640	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total number of working POIs		NDR	189	1936	384	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	312580	2222316	148099	0
Traffic served for all POIs (B)- in erlangs		NDR	173906	601969	64521	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

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

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

7.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	NDR	963	192	0
No. of POIs not meeting benchmark		NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	NDR	1091078	69779	0
Traffic served for all POIs (B)- in erlangs		NDR	NDR	1085815	33147	0
POI congestion	≤ 0.5%	NDR	NDR	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	968	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104275	1110524	69779	0
Traffic served for all POIs (B)- in erlangs		NDR	57232	286903	33760	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

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

7.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	NDR	192	0
No. of POIs not meeting benchmark		NDR	0	NDR	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104069	NDR	78320	0
Traffic served for all POIs (B)- in erlangs		NDR	55027	NDR	31493	0
POI congestion	≤ 0.5%	NDR	0.00%	NDR	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	968	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104161	1111792	78320	0
Traffic served for all POIs (B)- in erlangs		NDR	57550	315066	30761	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

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

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	NDR	NDR	0
No. of POIs not meeting benchmark		NDR	0	NDR	NDR	0
Total Capacity of all POIs (A) - in erlangs		NDR	104307	NDR	NDR	0
Traffic served for all POIs (B)- in erlangs		NDR	55712	NDR	NDR	0
POI congestion	≤ 0.5%	NDR	0.00%	NDR	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	NDR	NDR	0
No. of POIs not meeting benchmark		NDR	0	NDR	NDR	0
Total Capacity of all POIs (A) - in erlangs		NDR	104144	NDR	NDR	0
Traffic served for all POIs (B)- in erlangs		NDR	59124	NDR	NDR	0
POI congestion	≤ 0.5%	NDR	0.00%	NDR	NDR	0.00%

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

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 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

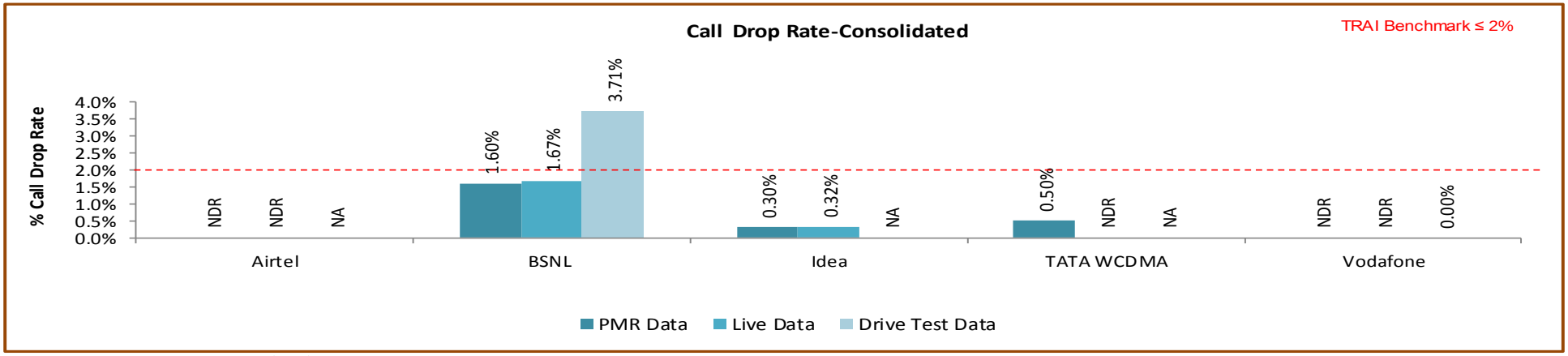
5. **TRAI Benchmark** –

   - 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.

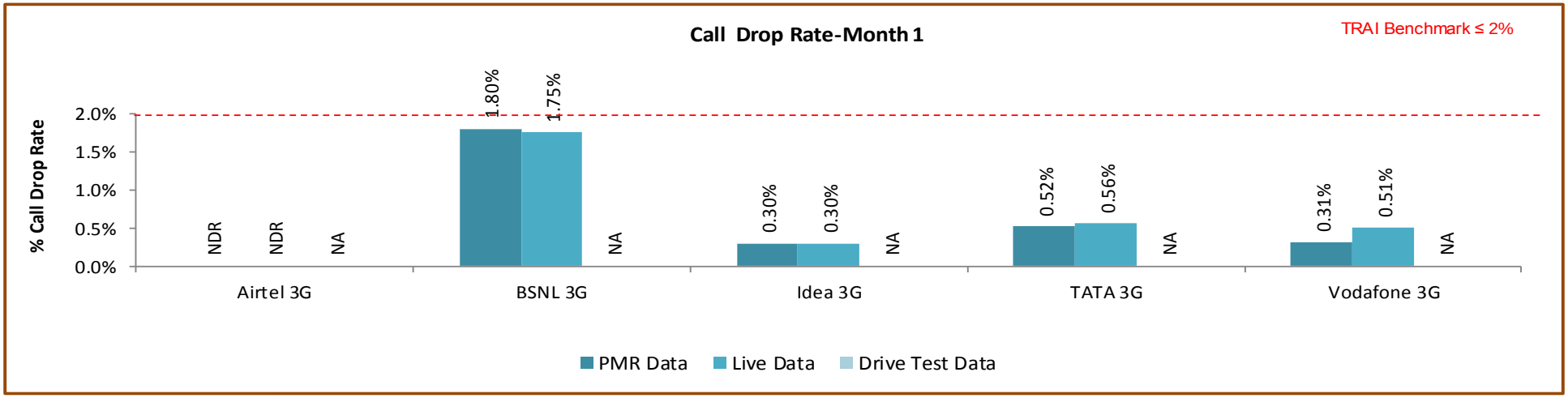
7.5.2 KEY FINDINGS - CONSOLIDATED



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

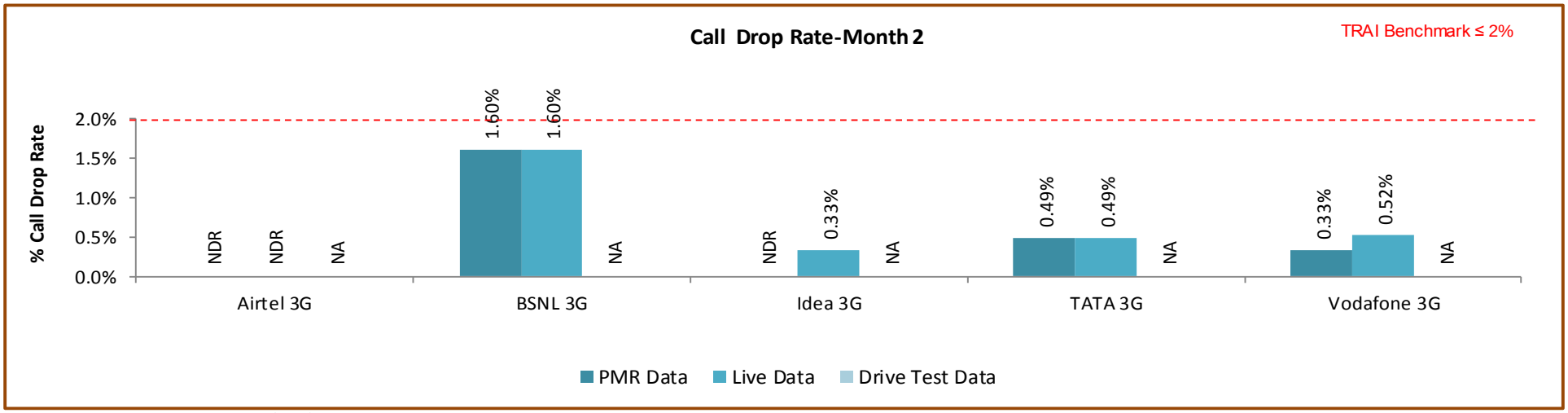
All operators met the benchmark for call drop rate during audit. The call drop rate during drive test was observed to be higher than audit for BSNL.

7.5.2.1 KEY FINDINGS – MONTH 1



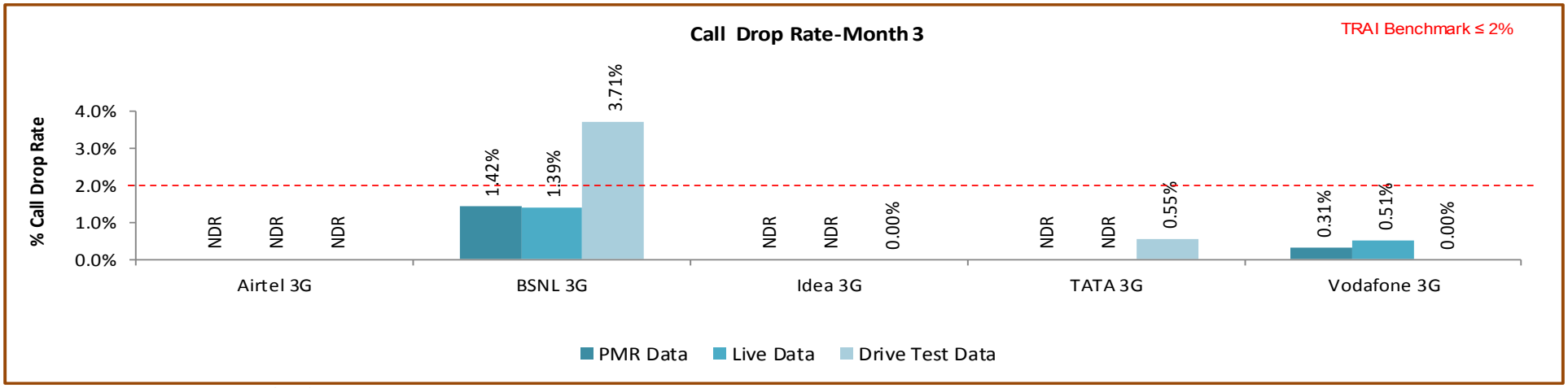
Data Source: Network Operations Center(NOC) of the operators

7.5.2.2 KEY FINDINGS – MONTH 2



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

7.5.2.3 KEY FINDINGS – MONTH 3



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

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

7.6.1 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** –

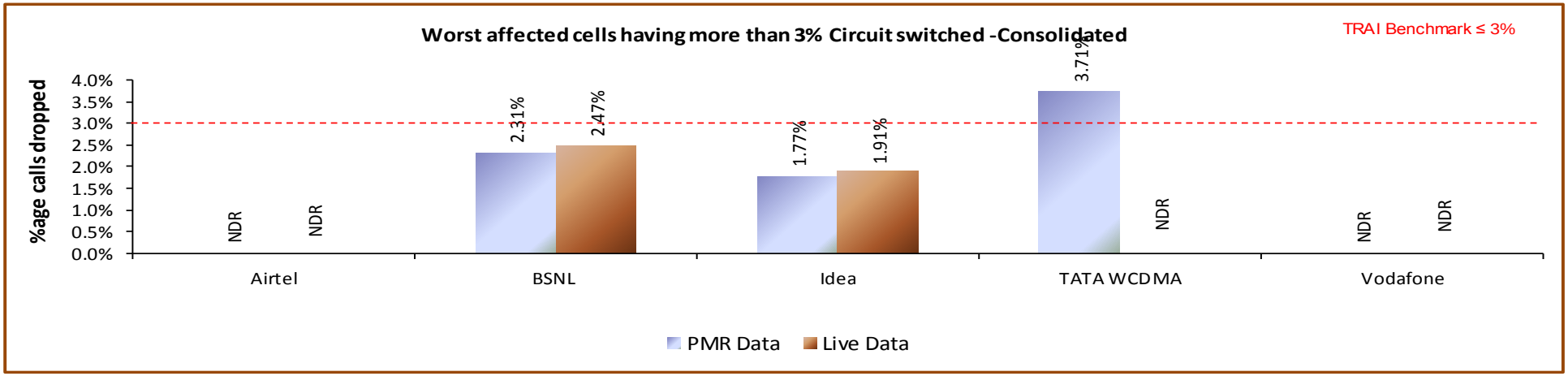
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

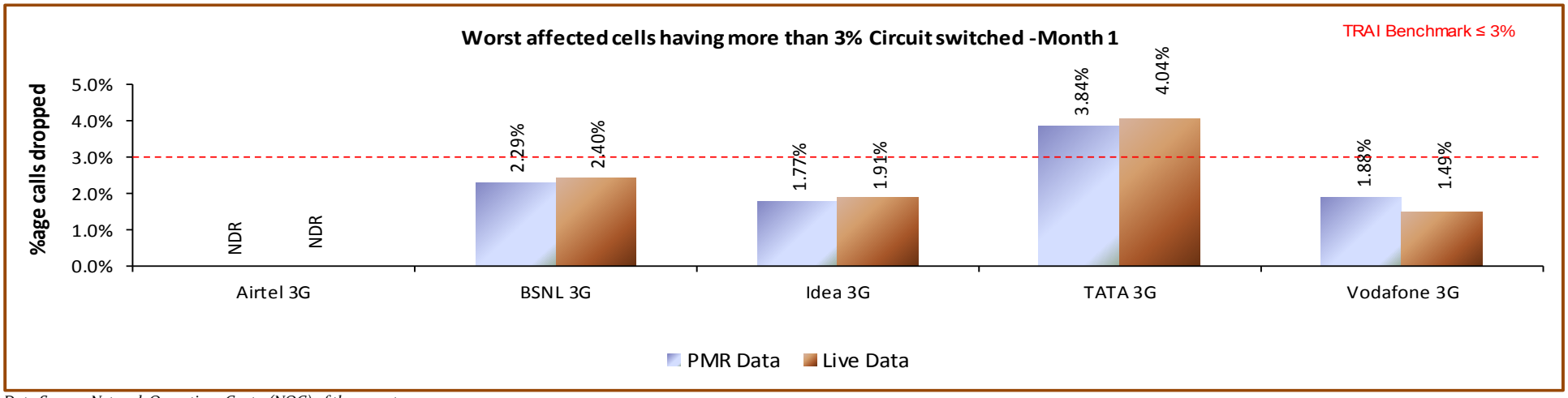
7.6.2 KEY FINDINGS - CONSOLIDATED



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

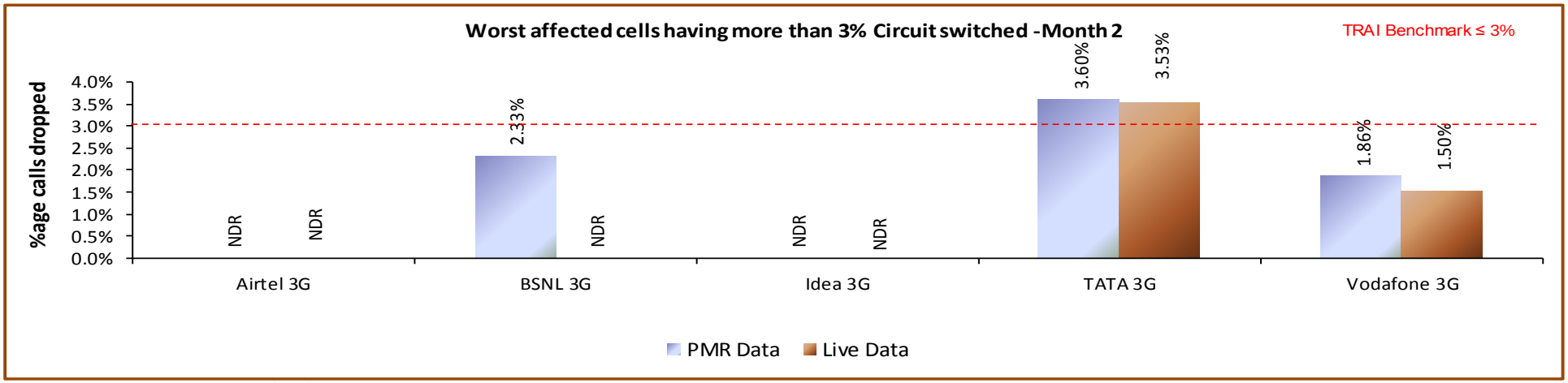
TATA 3G failed to meet the benchmark during audit.

7.6.2.1 KEY FINDINGS – MONTH 1



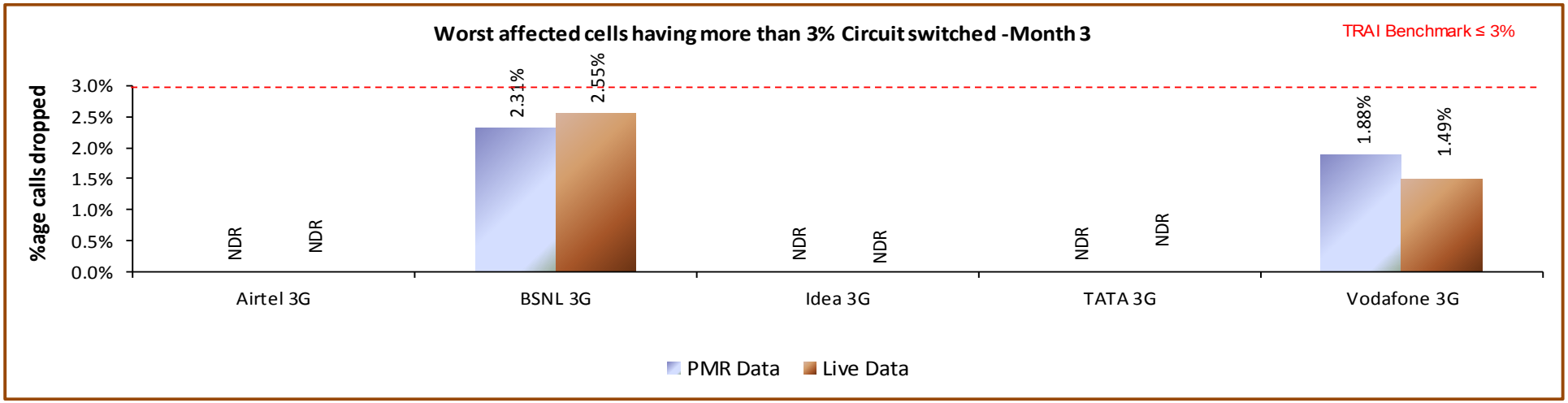
Data Source: Network Operations Center(NOC) of the operators

7.6.2.2 KEY FINDINGS – MONTH 2



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

7.6.2.3 KEY FINDINGS – MONTH 3



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

7.7 CIRCUIT SWITCH VOICE QUALITY

7.7.1 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**

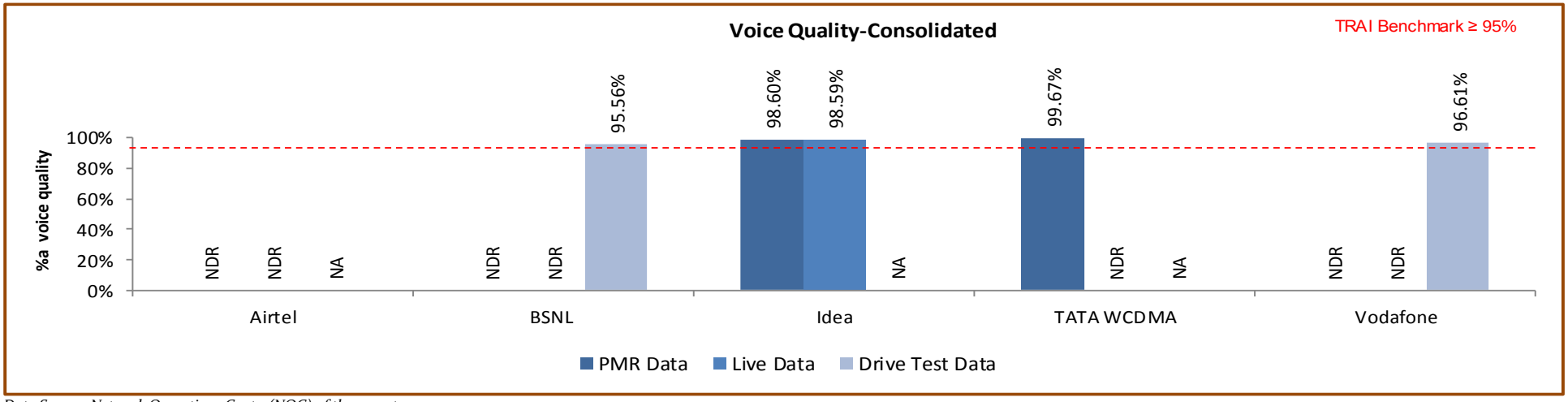
7. **TRAI Benchmark:≥** 95%

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.

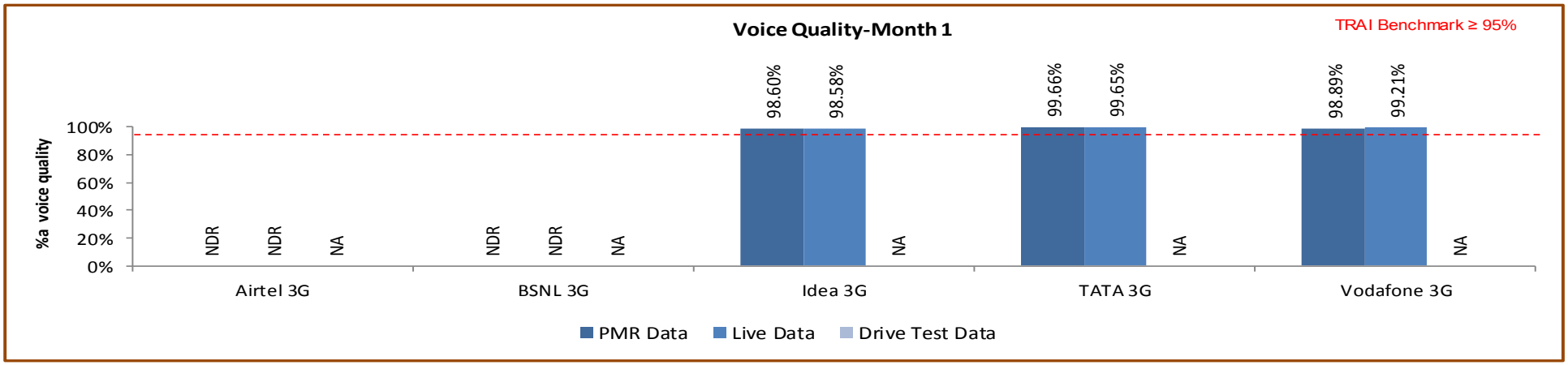
7.7.2 KEY FINDINGS



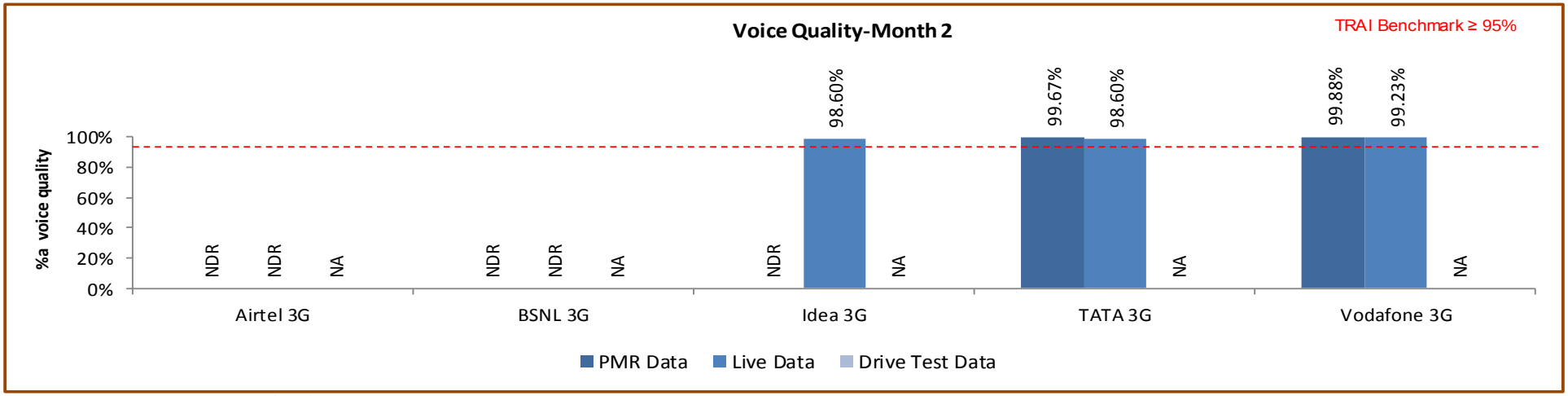
Data Source: Network Operations Center(NOC) of the operators

All operators met the TRAI benchmark.

7.7.2.1 KEY FINDINGS – MONTH 1

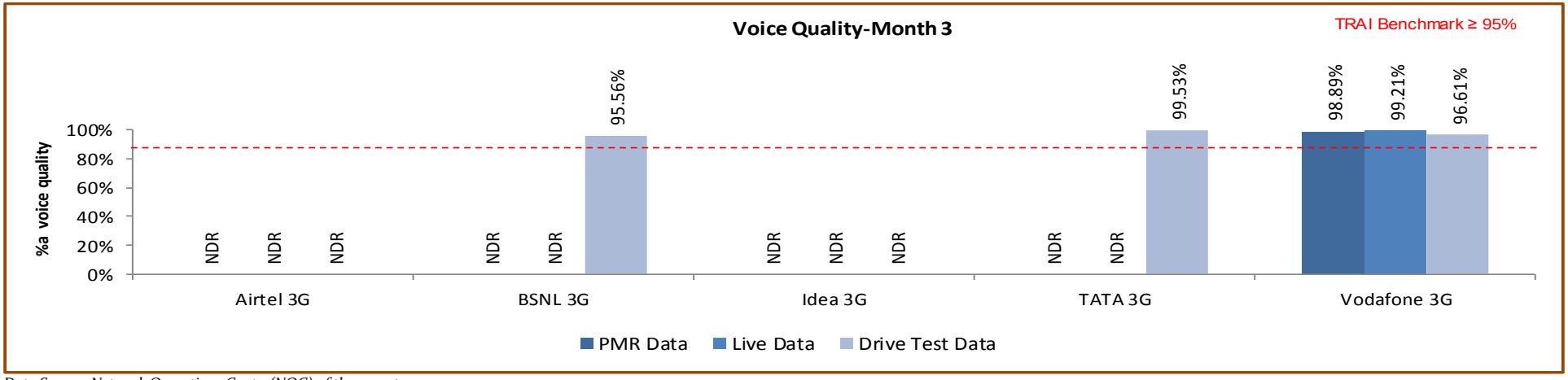


7.7.2.2 KEY FINDINGS – MONTH 2



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

7.7.2.3 KEY FINDINGS – MONTH 3



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

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

8.1 OCTOBER

Wireless Data-PMR											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		159319	NDR	NDR	86647	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		159307	NDR	NDR	86647	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	99.99%	NDR	NDR	100.00%	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		1200083444	NDR	841675870	896914	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		1127258928	NDR	812501283	894514	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	93.93%	NDR	96.53%	99.73%	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		1984008527	NDR	84907089	9455913060	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		13910306	NDR	2273925	94801732	NDR	NDR	NDR	NDR	NDR	NDR
% Drop rate	≤ 5%	0.70%	NDR	2.68%	1.00%	NDR	NDR	NDR	NDR	NDR	NDR
Wireless Data-Live Data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		124029169	NDR	80318844	895474	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		108322836	NDR	77854280	895384	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	87.34%	NDR	96.93%	99.99%	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		1414417568	NDR	8207671	876194566	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		9867342	NDR	225218	8535325	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	0.70%	NDR	2.74%	0.97%	NDR	NDR	NDR	NDR	NDR	NDR

8.2 NOVEMBER

Wireless Data-PMR											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		302776	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		302763	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	100.00%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		1345823935	NDR	811012128	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		1142955150	NDR	783984669	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	84.93%	NDR	96.67%	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		##########	NDR	71253486	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		245343694	NDR	2845231	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	0.68%	NDR	3.99%	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Wireless Data-Live Data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		100	NDR	NDR	100	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		100	NDR	NDR	100	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	100.00%	NDR	NDR	100.00%	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		124930263	NDR	82109460	877786	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		108546689	NDR	79344683	877738	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	86.89%	NDR	96.63%	99.99%	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		3835185752	NDR	8783419	870880276	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		26870295	NDR	238449	8345980	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	0.70%	NDR	2.71%	0.96%	NDR	NDR	NDR	NDR	NDR	NDR

8.3 DECEMBER

Wireless Data-PMR											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		343522	NDR	100	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		343509	NDR	100	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	100.00%	NDR	100.00%	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		1548359597	NDR	838020591	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		1326839857	NDR	811008526	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	85.69%	NDR	96.78%	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		##########	NDR	86677439	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		274554995	NDR	2426520	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	0.70%	NDR	2.80%	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Wireless Data-Live Data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		NDR	NDR	38020591	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		NDR	NDR	37008526	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	NDR	97.34%	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		NDR	NDR	76677439	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	1426520	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	NDR	1.86%	NDR	NDR	NDR	NDR	NDR	NDR	NDR

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

9.1 OCTOBER

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	117385	NDR	NDR
Total Time Taken for Activation		NDR	NDR	117385	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	100.00%	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	841675870	722385	NDR	NDR
No. of data Session Successful		NDR	812501283	721370	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.53%	99.86%	NDR	NDR
Drop Rate						
No. of Successful data calls		NDR	2504921495	1206110413	NDR	NDR
No. of Dropped data Calls		NDR	66129927	20022893	NDR	NDR
% Drop rate	≤ 5%	NDR	2.64%	1.66%	NDR	NDR

Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	80318844	722385	NDR	NDR
No. of data Session Successful		NDR	77854280	721370	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.93%	99.86%	NDR	NDR
Drop Rate						
No. of Successful data calls		NDR	235715440	118158478	NDR	NDR
No. of Dropped data Calls		NDR	6015923	2043617	NDR	NDR
Drop rate	≤ 5%	NDR	2.55%	1.73%	NDR	NDR

9.2 NOVEMBER

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	811012128	NDR	NDR	NDR
No. of data Session Successful		NDR	783984669	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.67%	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls		NDR	2424674357	NDR	NDR	NDR
No. of Dropped data Calls		NDR	59908064	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	2.47%	NDR	NDR	NDR
Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	82109460	736661	NDR	NDR
No. of data Session Successful		NDR	79344683	736661	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.63%	100.00%	NDR	NDR
Drop Rate						
No. of Successful data calls		NDR	235715440	108659971	NDR	NDR
No. of Dropped data Calls		NDR	6150135	1701149	NDR	NDR
Drop rate	≤ 5%	NDR	2.61%	1.57%	NDR	NDR

9.3 DECEMBER

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	838020591	NDR	NDR	NDR
No. of data Session Successful		NDR	811008526	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.78%	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls		NDR	2363387570	NDR	NDR	NDR
No. of Dropped data Calls		NDR	54594555	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	2.31%	NDR	NDR	NDR
Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	80677008	NDR	NDR	NDR
No. of data Session Successful		NDR	78639506	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	97.47%	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls		NDR	244425070	NDR	NDR	NDR
No. of Dropped data Calls		NDR	6258516	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	2.56%	NDR	NDR	NDR

10 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

10.1 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.

10.1.1 PARAMETER DESCRIPTION

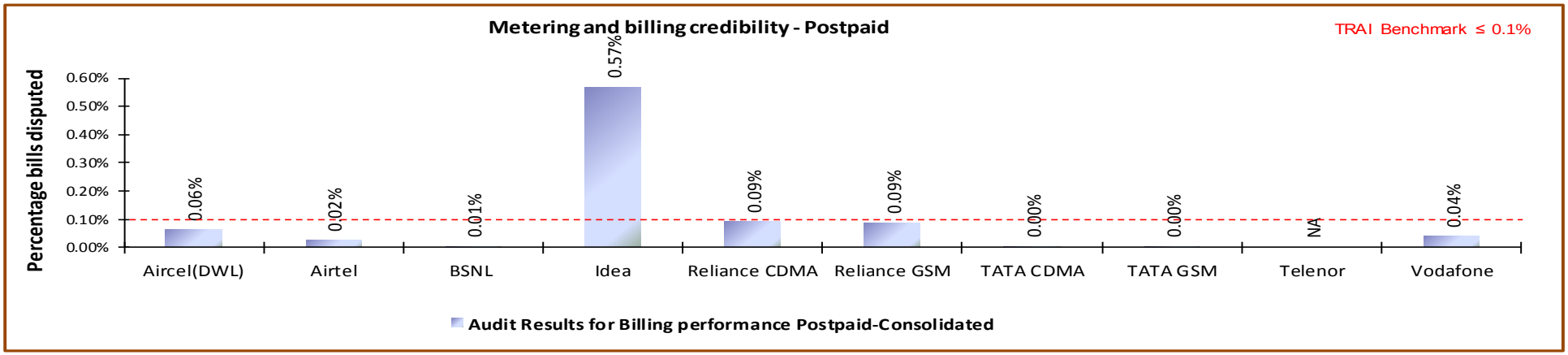
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20thDecember, 2009 were covered. The types of billing complaints covered are listed below.

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

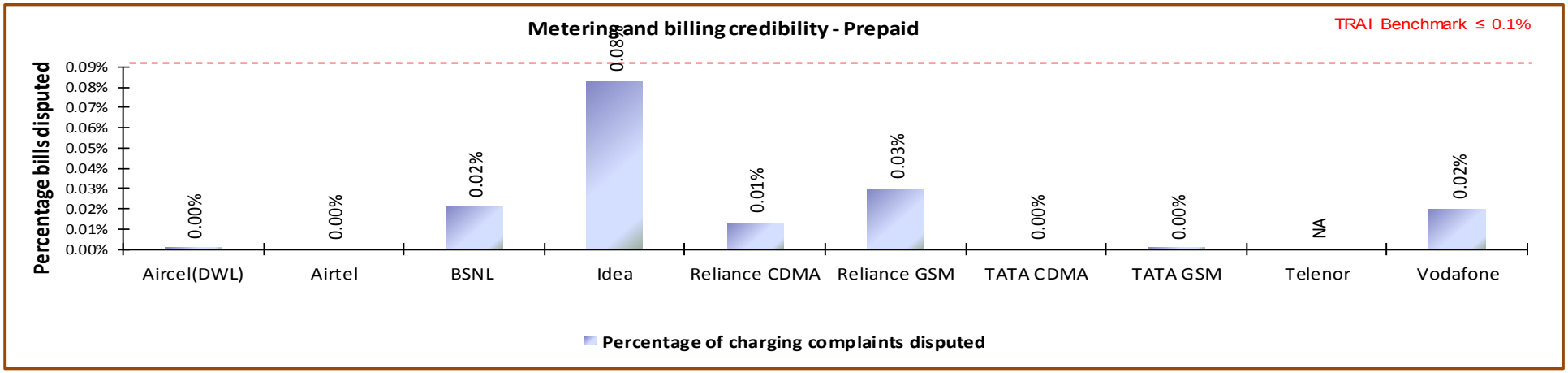
10.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

Idea failed to meet the benchmark of 0.1% post-paid metering and billing credibility.

10.1.3 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.

10.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

10.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

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

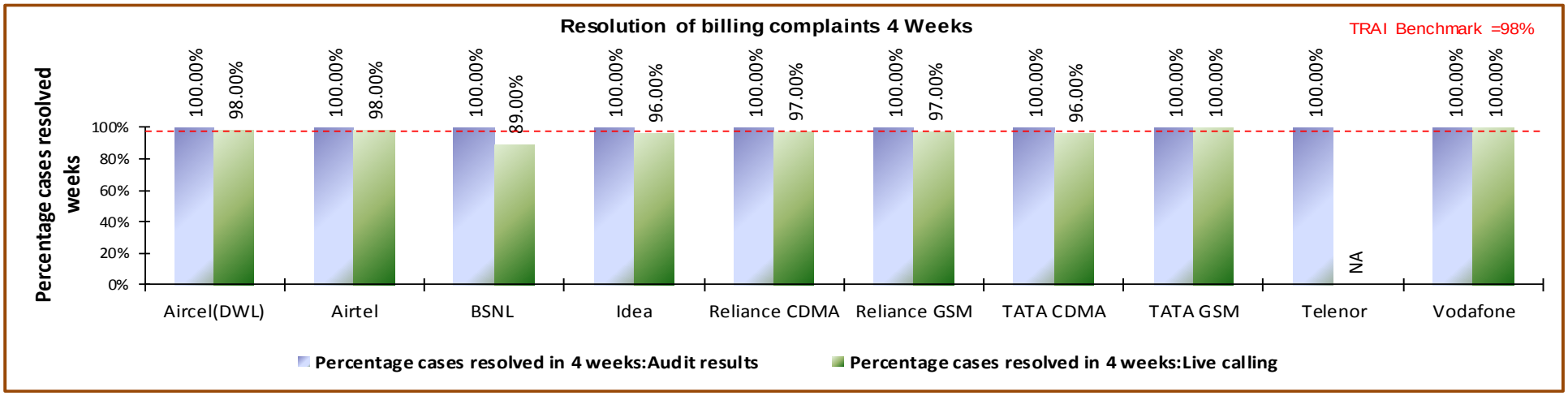
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

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

- The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.
- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

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

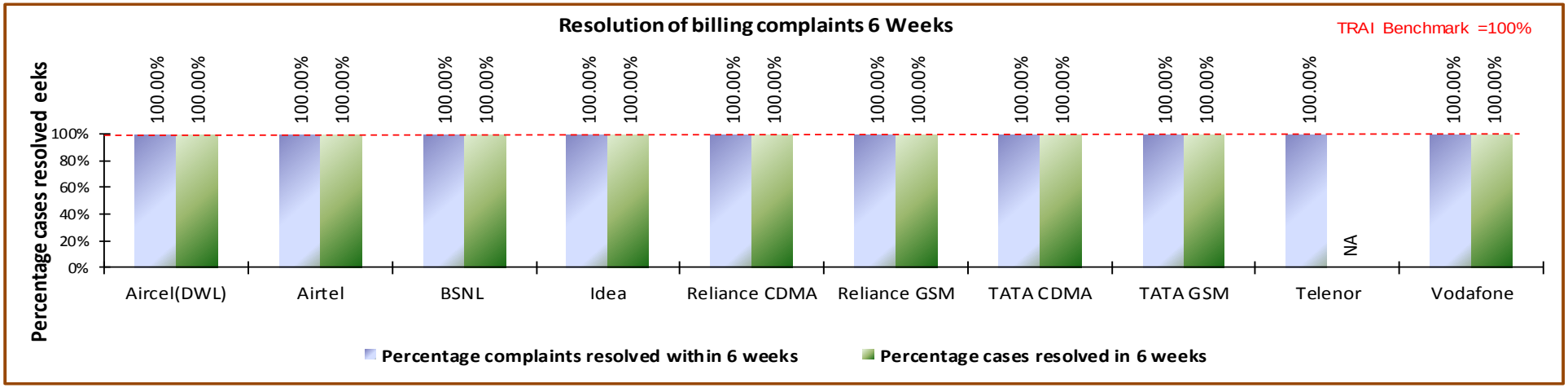
10.2.2 KEY FINDINGS- WITHIN 4 WEEKS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data in which BSNL, Idea, Reliance GSM & CDMA and TATA CDMA failed to meet the benchmark.

10.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

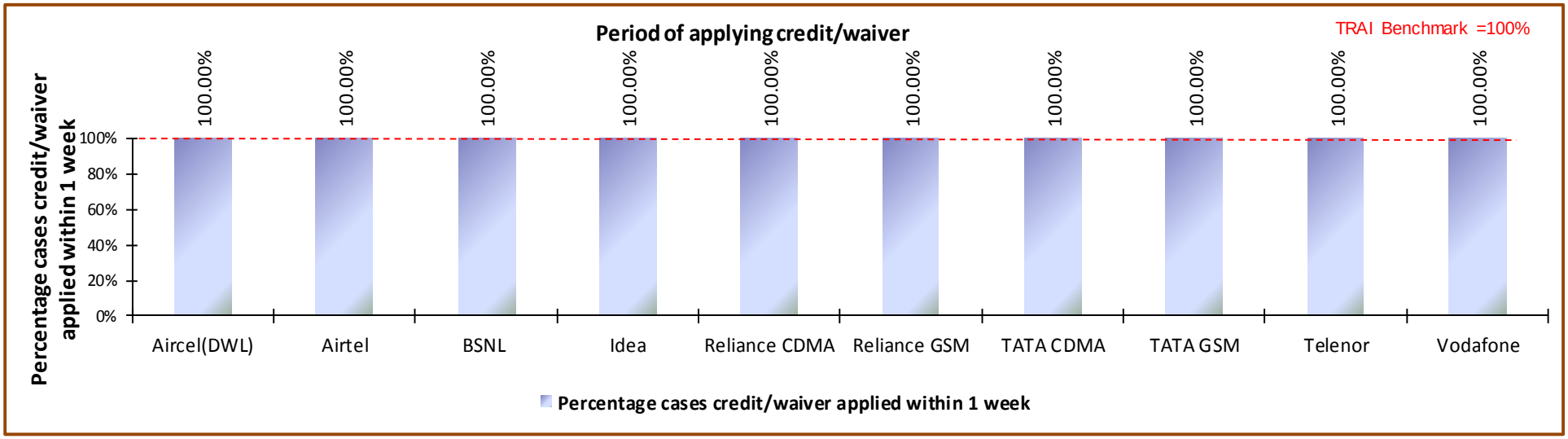
All operators met the TRAI benchmark of resolution of billing complaints within 6 weeks.

10.3 PERIOD OF APPLYING CREDIT/WAVIER

10.3.1 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

10.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

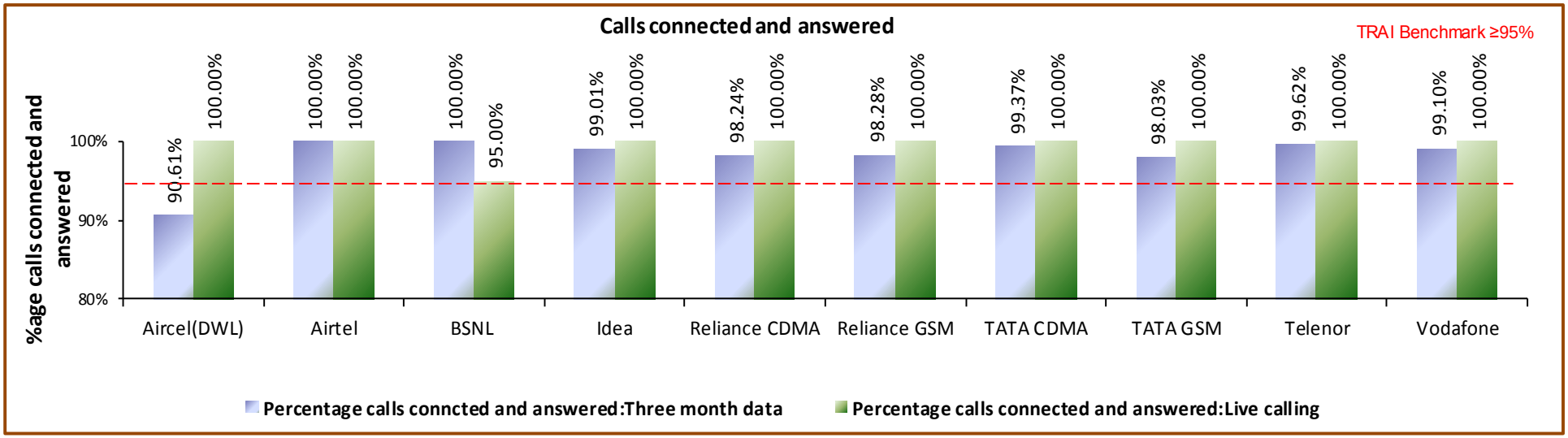
All operators met the benchmark for this parameter.

10.4 CALL CENTRE PERFORMANCE-IVR

10.4.1 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

10.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel failed to meet the benchmark.

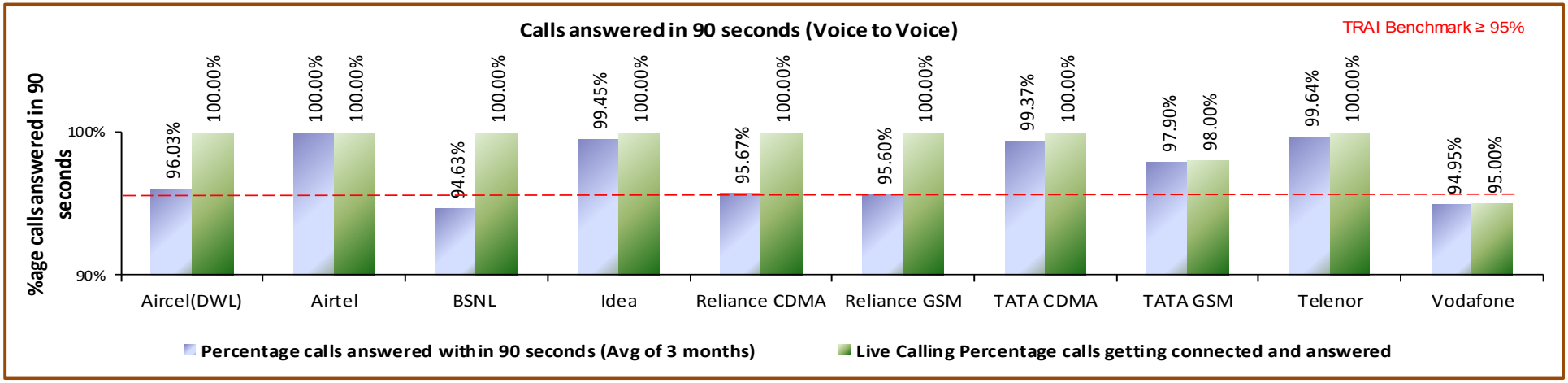
10.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

10.5.1 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

10.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

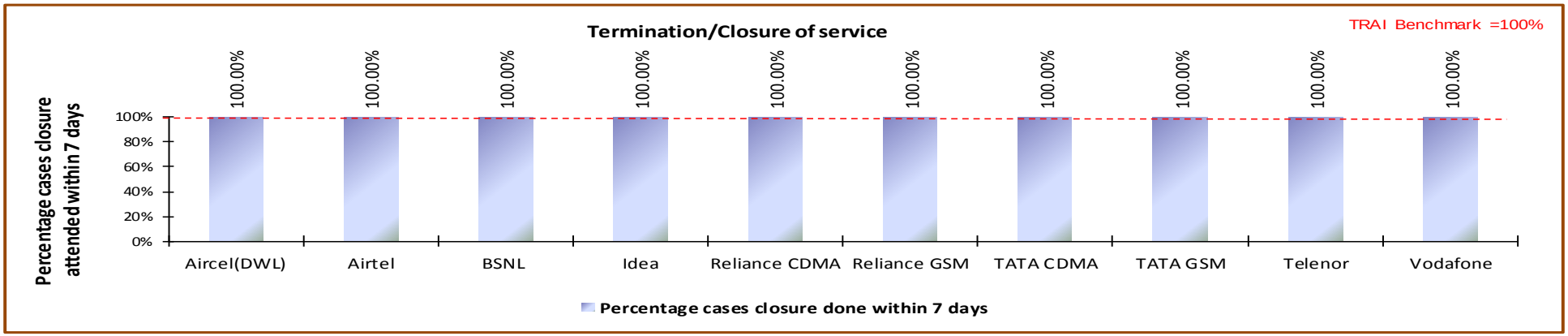
BSNL and Vodafone is not able to meet the benchmark as per audit. However, as per live calling done to customers, the performance was good for all the operators except Vodafone.

10.6 TERMINATION/CLOSURE OF SERVICE

10.6.1 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

10.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

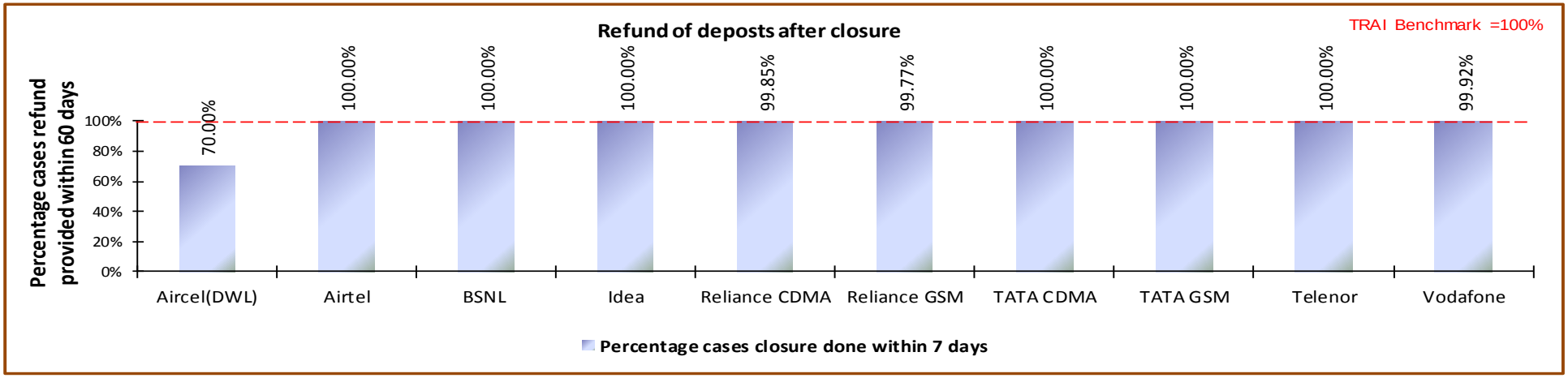
All operators met the TRAI benchmark for the parameter.

10.7 REFUND OF DEPOSITS AFTER CLOSURE

10.7.1 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

10.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel failed to meet the TRAI benchmark for the parameter.

11 DETAILED FINDINGS - DRIVE TEST DATA

11.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the Maharashtra & Goa 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 Maharashtra & Goa circle are given below.

2G	3G
Name of Operator	Name of Operator
Aircel(DWL)	Airtel
Airtel	BSNL
BSNL	Idea
Idea	TATA WCDMA
Reliance CDMA	Vodafone
Reliance GSM	
TATA CDMA	
TATA GSM	
Telenor	
Vodafone	

11.1.1 Beed SSA

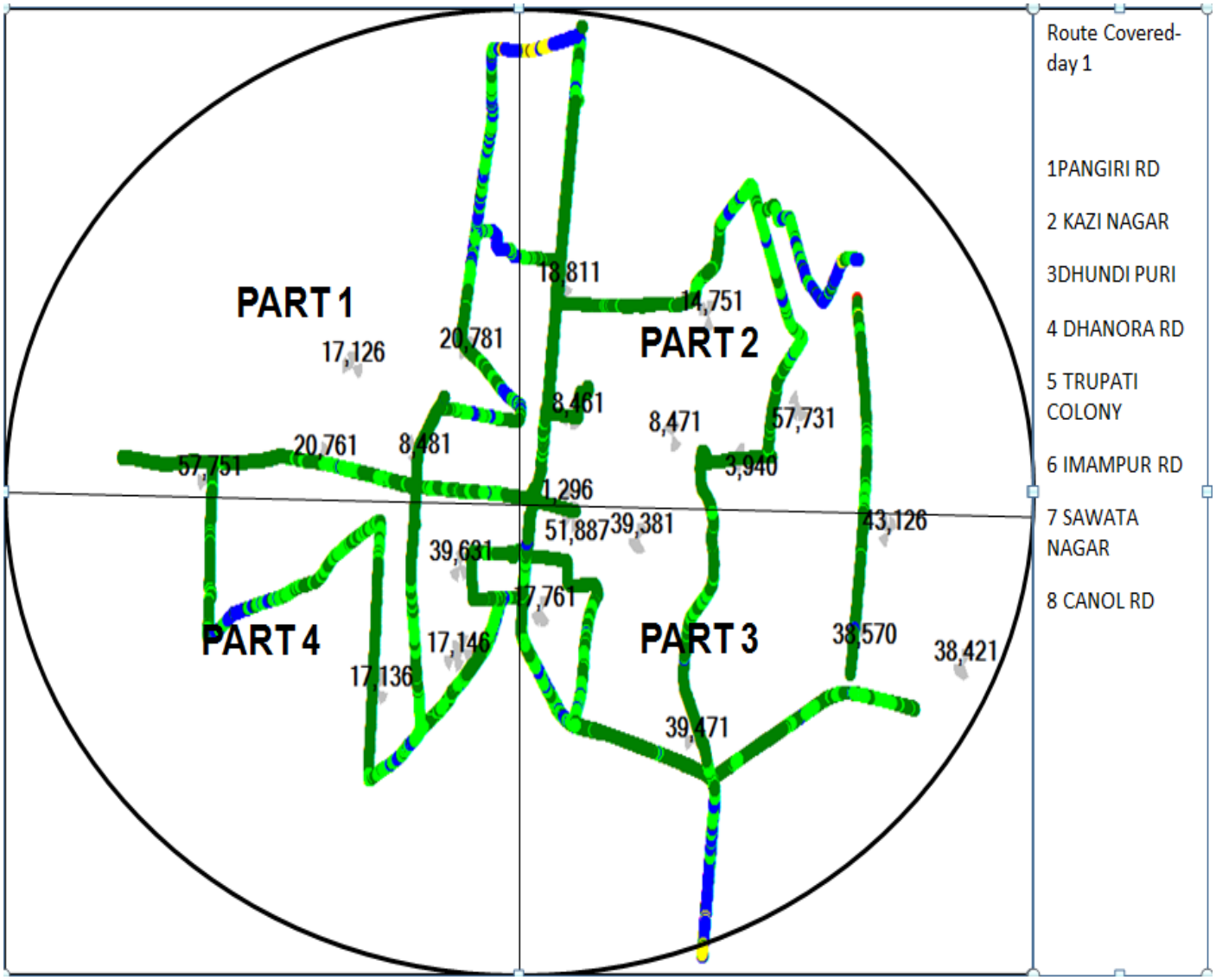
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	BEED	28/12/15	30/12/15	321

11.1.1.1 Route Details – Beed SSA

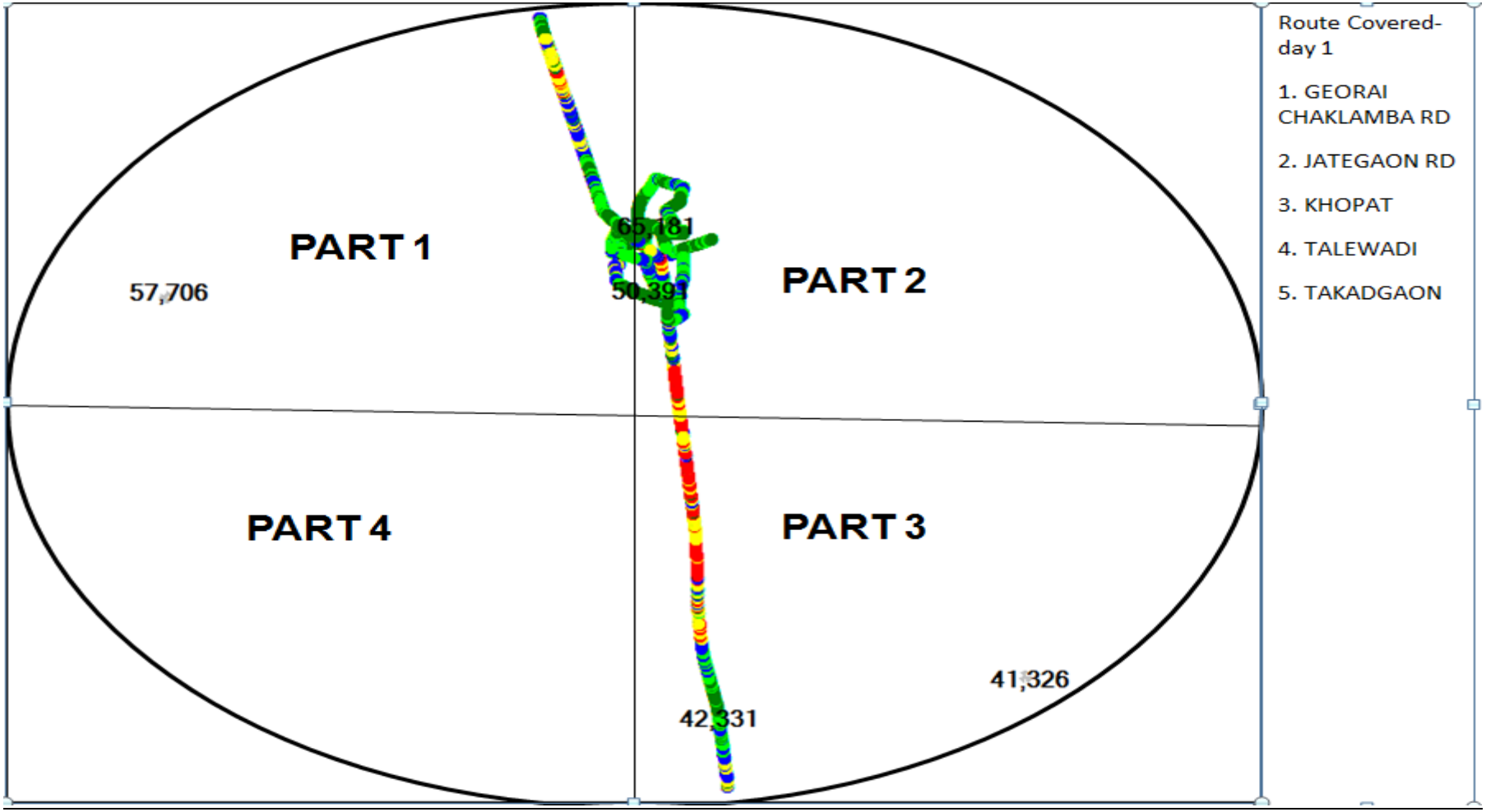
Category	Type of location	December		
		BEED		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1PANGIRI RD2 KAZI NAGAR 3DHUNDI PURI 4 DHANORA RD 5 TRUPATI COLONY 6 IMAMPUR RD 7 SAWATA NAGAR 8 CANOL RD	GEORAI CHAKLAMBA RD JATEGAON RD KHOPAT TALEWADI TAKADGAON DAM BRIDGE RD MANUR ABEGAON RD TALGAON RD GHALAWADI	DR BR AMBEDHKAR RD WAGHALA RD POKHARI RD Kaij ambajogai RD Yogeshwari mandir Jogaiwadi rd Sonpeth parali rd sangam Parali ambajogai rd Purli Gharnikar rd Shivaji chow
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We November observe three different colors (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.

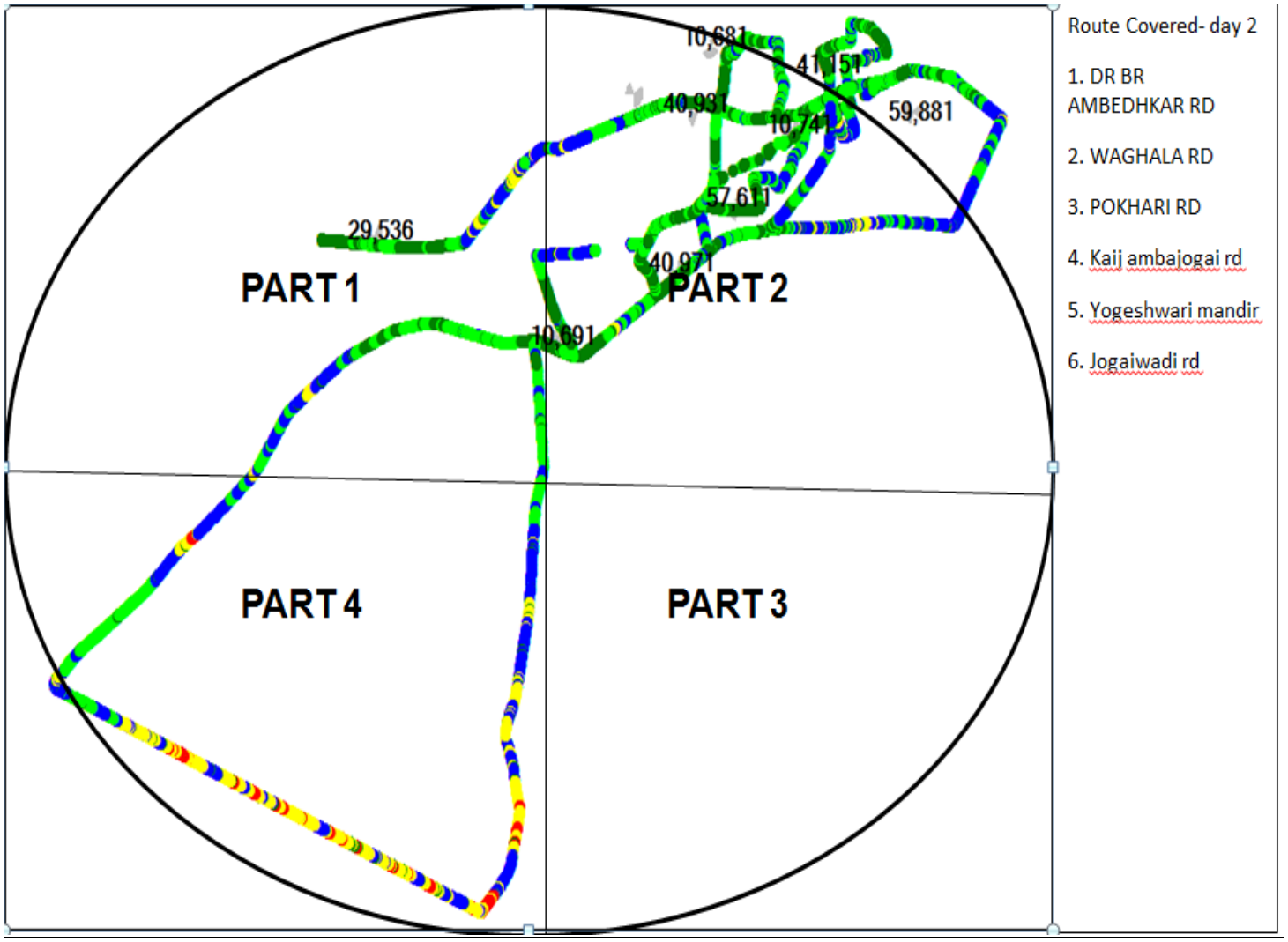
11.1.1.2 Route Map – Beed DAY 1



11.1.1.3 Route Map – Beed DAY 2



11.1.1.4 Route Map – Beed DAY 3



11.1.1.5 Drive Test Results – Beed SSA 2G

December																					
BEED	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Coverage		87.44%	76.23%	74.68%	68.72%	88.30%	95.84%	70.17%	46.39%	No Coverage		98.91%	93.72%	99.74%	93.98%	97.89%	77.42%	92.63%	91.97%
0 to -85 dBm				99.71%	90.71%	99.94%	98.16%	99.89%	99.72%	99.87%	72.20%			100.00%	99.95%	100.00%	99.89%	100.00%	95.89%	97.40%	98.75%
0 to -95 dBm				100.00%	98.27%	99.99%	99.96%	99.97%	99.92%	100.00%	92.99%			100.00%	100.00%	100.00%	100.00%	100.00%	99.72%	99.78%	99.69%
Voice quality	≥ 95%			98.69%	97.99%	90.09%	81.89%	98.86%	96.48%	99.83%	95.78%			100.00%	97.22%	99.95%	97.10%	99.46%	94.81%	98.29%	97.26%
CSSR	≥ 95%			100.00%	100.00%	100.00%	99.36%	100.00%	100.00%	100.00%	100.00%			100.00%	98.59%	100.00%	98.56%	100.00%	99.39%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	0.64%	0.00%	0.00%	0.00%	0.00%			0.00%	1.41%	0.00%	1.15%	0.00%	0.61%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	2.59%	0.00%	0.00%	0.00%	0.00%			0.00%	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	99.09%	100.00%	100.00%	100.00%	100.00%			100.00%	100.00%	100.00%	98.65%	97.37%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL failed to meet the benchmark in outdoor as well as indoor locations. Telenor did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in outdoor locations.

Call Drop Rate

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

11.1.1.1 Drive Test Results – Beed SSA 3G

December											
BEED	B'mark	Airtel		BSNL		Idea		TATA WCDMA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		69.01%	39.78%	97.93%	39.86%	100.00%	93.01%	99.21%	49.16%
0 to -85 dBm				99.56%	73.89%	100.00%	68.97%	100.00%	99.54%	100.00%	78.54%
0 to -95 dBm				99.78%	94.01%	100.00%	89.17%	100.00%	100.00%	100.00%	93.49%
Voice quality	≥ 95%			99.10%	94.15%	NDR	NDR	100.00%	99.44%	97.95%	96.42%
CSSR	≥ 95%			100.00%	97.94%	100.00%	99.71%	100.00%	97.30%	100.00%	100.00%
%age Blocked calls				0.00%	2.51%	0.00%	0.29%	0.00%	1.21%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	5.14%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%
Hands off success rate				100.00%	98.92%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

NDR: No data received

Voice Quality

In Beed SSA BSNL 3G failed to meet the benchmark for Voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in outdoor locations.

Call Drop Rate

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

11.1.1.1 Data Drive Test Results – Beed SSA 2G

December											
Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	100	100	100	NDR	NDR	NDR	100	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	100	100	100	NDR	NDR	NDR	100	100	100
Minimum download speed		NDR	117	35	116	NDR	NDR	NDR	74	115	131
Average throughput for Packet Data	>75%	NDR	1053	58	674	NDR	NDR	NDR	133	454	150
Latency	<250ms	NDR	100	100	100	NDR	NDR	NDR	100	100	100

Note: Aircel, Reliance CDMA & GSM and TATA CDMA did not submit data.

All operators met the TRAI benchmark for data drive test.

11.1.1.1 Data Drive Test Results – Beed SSA 3G

Name of the Parameter	Bench Mark	BSNL	Idea	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	NDR
Minimum download speed		NDR	NDR	NDR
Average throughput for Packet Data	>75%	NDR	NDR	NDR
Latency	<250ms	NDR	NDR	NDR

Note: BSNL, Idea and Vodafone did not submit data.

All operators met the TRAI benchmark for data drive test.

12 ANNEXURE– CONSOLIDATED-2G

12.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		5907	21456	20700	24942	5240	8206	3888	7553	13520	11278
Sum of downtime of BTSs in a month (in hours)		2770	70	290641	18612	5640	10490	576	122554	15516	10183
BTSs accumulated downtime (not available for service)	≤ 2%	0.06%	0.00%	1.89%	0.10%	0.14%	0.17%	0.02%	2.18%	0.15%	0.12%
Number of BTSs having accumulated downtime >24 hours		1	0	387	42	46	103	0	0	118	55
Worst affected BTSs due to downtime	≤ 2%	0.02%	0.00%	1.87%	0.17%	0.88%	1.26%	0.00%	0.00%	0.87%	0.49%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		5907	21447	20700	24942	5137	8203	1924	7553	13427	11278
Sum of downtime of BTSs in a month (in hours)		7905	30	24756	1673	678	1112	5	2663	1603	950
BTSs accumulated downtime (not available for service)	≤ 2%	1.86%	0.00%	1.66%	0.09%	0.18%	0.19%	0.00%	0.49%	0.17%	0.12%
Number of BTSs having accumulated downtime >24 hours		0	0	10	0	46	103	0	11	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.05%	0.00%	0.90%	1.26%	0.00%	0.15%	0.00%	0.00%

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

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.36%	98.82%	96.38%	97.78%	97.64%	97.11%	97.80%	99.02%	98.10%	99.29%
SDCCH/Paging channel congestion	≤ 1%	0.12%	0.05%	0.61%	0.50%	NA	0.19%	NA	0.05%	0.34%	0.71%
TCH congestion	≤ 2%	0.09%	0.17%	1.34%	0.91%	0.84%	0.33%	0.94%	0.08%	0.51%	0.01%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	97.94%	98.84%	97.39%	97.74%	97.80%	96.94%	97.83%	98.47%	98.34%	99.47%
SDCCH/Paging channel congestion	≤ 1%	0.09%	0.05%	0.72%	0.66%	NA	0.14%	NA	0.29%	0.29%	0.37%
TCH congestion	≤ 2%	0.04%	0.16%	0.92%	1.52%	0.73%	0.30%	1.04%	0.14%	0.27%	0.53%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		0	502	371	473	243	0	345	408	390	438
Total number of successful calls established		0	502	369	473	243	0	341	403	388	438
CSSR	≥ 95%	NA	100.00%	99.46%	100.00%	100.00%	NA	98.84%	98.77%	99.49%	100.00%
%age blocked calls		NA	0.00%	0.54%	0.00%	0.00%	NA	1.16%	1.23%	0.51%	0.00%

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

12.3 Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		125299379	23312418	336934754	8597172231	94953320	126904879	72890986	162638277	632575097	478911003
Total number of calls dropped		1134539	126789	3722679	77853525	137601	144294	695148	1161579	3247770	4222262
Call drop rate	≤ 2%	0.91%	0.54%	1.10%	0.91%	0.14%	0.11%	0.95%	0.71%	0.51%	0.88%
Total number of cells in the network		17858	65560	60831	101785	15699	24480	11726	123236	450820	1047979
Total number of cells having more than 3% TCH		976	360	1322	2180	325	140	903	5082	542	29519
Worst affected cells having more than 3% TCH	≤ 3%	5.47%	0.55%	2.17%	2.14%	2.07%	0.57%	7.70%	4.12%	0.12%	2.82%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		63468460	21818394	290369046	606996576	10099783	12381928	3714756	9415734	516269408	15564570
Total number of calls dropped		538088	114260	3170900	4456872	14183	14157	37117	76159	2058203	138516
Call drop rate	≤ 2%	0.85%	0.52%	1.09%	0.73%	0.14%	0.11%	1.00%	0.81%	0.40%	0.89%
Total number of cells in the network		17862	131098	137944747	67132	26163	40791	5863	108811	40848	34219
Total number of cells having more than 3% TCH		1078	644	1518106	1447	604	343	463	4906	678	959
Worst affected cells having more than 3% TCH	≤ 3%	6.03%	0.49%	1.10%	2.16%	2.31%	0.84%	7.90%	4.51%	1.66%	2.80%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		0	502	369	473	243	0	341	404	388	438
Total number of calls dropped		0	0	0	0	0	0	0	2	0	0
Call drop rate	≤ 2%	NA	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.50%	0.00%	0.00%

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

12.4 VOICE QUALITY

4. Voice quality											
Audit Results for Voice quality -PMR Data											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		20324831168	3770572871	336934754	149003703099	NDR	21605027166	1885548580	31091391668	114301325906	70923621283
Total number of calls with good voice quality		19412369242	3677617047	323565415	144897991014	NDR	21444599897	1808429788	30690977530	111136247109	68734940478
%age calls with good voice quality	≥ 95%	95.51%	97.53%	96.03%	97.24%	NDR	99.26%	95.91%	98.71%	97.23%	96.91%
Live measurement results for Voice quality-3 Day data											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		4528153658	3790418007	290369046	15386130870	NDR	2289872453	99739305	2171542370	96399474761	2322271594
Total number of calls with good voice quality		4337848337	3704305474	279743545	14984879390	NDR	2272819261	95828013	2022020054	94151583726	2250710114
%age calls with good voice quality	≥ 95%	95.80%	97.73%	96.34%	97.39%	NDR	99.26%	96.08%	93.11%	97.67%	96.92%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	**Benchmark**	**Aircel(DWL)**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of sample calls		0	110279	69343	124136	0	0	0	774483	45419	383138
Total number of calls with good voice quality		0	108173	57842	120133	0	0	0	755113	43407	372961
%age calls with good voice quality	≥ 95%	NA	98.09%	83.41%	96.78%	NA	NA	NA	97.50%	95.57%	97.34%

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

12.5 POI CONGESTION

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		2466	945	189	2890	232	90	784	273	73	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		609526	542755	312504	2500511	52170	53693	162067	124371	411715	7571787
Traffic served for all POIs (B)- in erlangs		393401	316874	170239	3919099	13559	26596	55915	54146	216863	158040
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		651	934	189	1936	232	90	392	446	73	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		152142	312652	312580	2222316	75728	54035	81034	132264	410940	160209
Traffic served for all POIs (B)- in erlangs		86371	558796	173906	601969	16954	25985	27709	33304	218675	291542
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

13 ANNEXURE – CONSOLIDATED-3G

13.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	7974	7076	5636	3882
Sum of downtime (i.e. total outage time) of Node Bs		NDR	109495	3888	62	26091
Node Bs downtime (not available for service)	≤ 2%	NDR	1.85%	0.07%	0.00%	0.20%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	145	9	0	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.82%	0.13%	0.00%	0.91%
Live Measurement Results for Network Availability- 3 Day live data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	7965	14152	5624	3882
Sum of downtime (i.e. total outage time) of Node Bs		NDR	9362	683	102	1701
Node Bs downtime (not available for service)	≤ 2%	NDR	1.63%	0.07%	0.03%	0.11%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	4	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.05%	0.00%	0.00%	0.86%

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

13.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.48%	99.49%	95.11%	99.65%
RRC Congestion	≤ 1%	NDR	0.92%	0.68%	1.21%	0.65%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.58%	0.23%	0.73%	0.11%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	96.19%	99.54%	95.54%	99.14%
RRC Congestion	≤ 1%	NDR	0.80%	0.88%	1.19%	1.00%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.08%	0.22%	0.70%	0.10%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	411	404	185	379
Total number of RRC established (B)		NDR	405	403	183	379
Call setup success rate (B/A*100)	≥ 95%	NDR	98.54%	99.75%	98.92%	100.00%
%age blocked calls		NDR	1.46%	0.25%	1.08%	0.00%

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

13.3 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	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	66725412	134283863	56517291	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	1065855	405394	284548	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.60%	0.30%	0.50%	0.32%
Total no. of cells in the licensed service area (B)		NDR	24036	23845	16753	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	556	423	622	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.31%	1.77%	3.71%	1.87%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	65831037	27962530	5457558	0
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	1096266	88189	28629	0
Call drop rate (B/A*100)	≤ 2%	NDR	1.67%	0.32%	0.52%	0.51%
Total no. of cells in the licensed service area (B)		NDR	16015	23632	16717	0
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	396	452	632	0
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.47%	1.91%	3.78%	1.49%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	431	404	183	379
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	16	0	1	0
Call drop rate (B/A*100)	≤ 2%	NDR	3.71%	0.00%	0.55%	0.00%

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

13.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	203697479790	133975676000	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	200853159653	133527018792	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.60%	99.67%	99.22%
Live measurement results for Voice quality-3 Day data						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	41696731201	12891704000	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	41108118875	12848459814	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.59%	99.66%	99.22%
Drive test results for Voice quality (Average of three drive tests) - DT data						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	131153	NDR	606790	45030
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	125328	NDR	603929	43503
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	95.56%	NDR	99.53%	96.61%

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

13.5 POI CONGESTION

Audit Results for POI Congestion- PMR data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	126	963	384	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	208375	1091078	148099	0
Traffic served for all POIs (B)- in erlangs		NDR	110740	1085815	64640	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	189	1936	384	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	312580	2222316	148099	0
Traffic served for all POIs (B)- in erlangs		NDR	173906	601969	64521	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

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

14 ANNEXURE –CUSTOMER SERVICES

14.1 METERING AND BILLING CREDIBILITY

Metering and billing credibility - Postpaid											
Total bills generated during the period		4747	1776537	1014052	5101181	533959	134626	80958	320438	0	56543
Total number of bills disputed		3	2867	56	28938	483	120	3	14	0	23
Total number of valid billing complaints		3	444	0	4826	483	120	3	14	0	0
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.06%	0.02%	0.01%	0.57%	0.09%	0.09%	0.00%	0.00%	NA	0.04%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of charging complaints (valid) - sum of 3 months		32	186	1114	17842	249	3096	0	2	NA	2341
Total number of charging complaints (sum of 3 months)		32	6548	3046	52633	610	3096	0	2	NA	0
Total no of customers served (Sum of 3 months)		7217014	35366688	14478167	63480500	4624016	10306059	2024063	8357370	NA	34567289
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.00%	0.02%	0.08%	0.01%	0.03%	0.00%	0.00%	NA	0.02%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of billing/charging complaints		35	630	3102	81571	1093	3216	3	16	202	NDR
Total number of complaints resolved in favour of customer		35	630	1114	22668	732	3216	3	16	202	NDR
Total complaints considered invalid		0	8785	1988	58903	361	0	0	0	0	NDR
Number of complaints resolved in 4 weeks		35	630	1114	22668	732	3216	3	16	202	NDR
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		35	630	1114	22668	732	3216	3	16	202	NDR
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		35	1	1114	22668	732	3216	3	16	0	NDR
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made		100	100	100	45	75	77	100	100	NA	59
Number of cases resolved in 4 weeks		98	85	89	43	72	74	96	100	NA	59
Percentage cases resolved in 4 weeks	≥ 98%	98.00%	98.00%	89.00%	96.00%	97.00%	97.00%	96.00%	100.00%	NA	100.00%
Number of cases resolved in 6 weeks		100	100	100	45	75	77	100	100	NA	59
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Data Source: Billing Center of the operators

14.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		6896661	3683620	6691364	75140699	1273830	5074774	92491	491263	20431878	NDR
Number of calls getting connected and answered (electronically)		6249145	3683387	6691364	74398961	1251451	4987397	91912	481590	20353685	NDR
Percentage calls getting connected and answered	≥ 95%	90.61%	100.00%	100.00%	99.01%	98.24%	98.28%	99.37%	98.03%	99.62%	99.10%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received (3 months)		1186522	6140716	1869795	13852538	261364	1049730	69485	770551	4381301	NDR
Total Number of calls answered within 90 seconds (3 months)		1139411	5604908	1769325	13776736	250047	1003572	69050	754368	4365633	NDR
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	96.03%	100.00%	94.63%	99.45%	95.67%	95.60%	99.37%	97.90%	99.64%	94.95%

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	95	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	95.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	100	100	100	95
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	95.00%

14.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of closure request		0	6921	16256	0	4580	398	2363	3779	0	NDR
Number of requests attended within 7 days		0	6921	16256	0	4580	398	2363	3779	0	NDR
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

14.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of cases requiring refund of deposits		10	3403	776	0	1943	860	358	245	0	NDR
Total number of cases where refund was made within 60 days		7	3403	776	0	1940	858	358	245	0	NDR
Percentage cases in which refund was receive within 60 days	100.00%	70.00%	100.00%	100.00%	100.00%	99.85%	99.77%	100.00%	100.00%	100.00%	99.92%

Data Source: Billing Center of the operators

14.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling for level 1 services											
Level 1 services		Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300
Calls answered		131	189	189	189	300	275	240	217	253	251
% of calls connected	≥ 95%	43.67%	63.00%	70.33%	81.67%	100.00%	91.67%	80.00%	72.33%	84.33%	83.67%

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

14.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling results for resolution of service requests										
Resolution of service requests	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made		100	88	61	92	86	81	77	43	41
Number of cases resolved to satisfaction		96	83	58	90	83	80	73	42	41
Percentage cases resolved in four weeks	NA	96.00%	94.00%	95.00%	98.00%	96.00%	99.00%	95.00%	98.00%	100.00%

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

14.7 LEVEL 1 SERVICE CALLS MADE

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

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	8
101	Fire		N		
102	Ambulance	Y		18	8
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	8
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		18	8
182	Indian Railway Security Helpline	Y		18	7
1033	Road Accident Management Service	Y		17	7
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		18	8
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	7
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		18	8
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		18	8
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	7
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		17	8
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		18	7
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		17	8
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		17	8
11212	Complaint of Electricity	Y		17	8
11216	Drinking Water Supply	Y		17	8
11250	Election Commission of India		N		

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

Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	11
101	Fire	Y		18	11
102	Ambulance	Y		17	11
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	11
138	All India Helpine for Passangers	Y		18	12
1412	Public Road Transport Utility Service	Y		18	11
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'	Y		17	11
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	12
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	11
1071	Air Accident Helpline	Y		17	11
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	11
101212	Central Accident and Trauma Services (CATS)	Y		17	11
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board	Y		18	11
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	11
1514	National Career Service(NCS)	Y		18	11
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		18	11
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	11
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	13
101	Fire	Y		20	12
102	Ambulance	Y		20	13
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		20	13
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	13
182	Indian Railway Security Helpline	Y		20	12
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		20	13
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		20	12
1070	Relief Commission for Natural Calamities	Y		20	13
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		20	13
10127	National AIDS Helpline to NACO	Y		20	13
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		20	12
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		20	13
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		20	12
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		20	12
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police		N		
101	Fire	Y		19	12
102	Ambulance	Y		19	12
104	Health Information Helpline	Y		18	11
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		19	11
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		19	11
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services	Y		19	12
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		19	12
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		19	12
1072	Rail Accident Helpline	Y		19	12
1073	Road Accident Helpline	Y		19	12
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		19	12
10127	National AIDS Helpline to NACO	Y		18	12
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)	Y		19	12
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		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	12
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		18	12
11216	Drinking Water Supply	Y		18	12
11250	Election Commission of India		N		

Reliance CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	18
101	Fire	Y		18	18
102	Ambulance		N		
104	Health Information Helpline	Y		17	17
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	17
181	Chief Minister Helpline	Y		18	18
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	17
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	17
1064	Anti Corruption Helpline	Y		18	18
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		18	18
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		18	18
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	17
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	18
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		18	18
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)	Y		17	17
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		18	18
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		18	18
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		18	18
11250	Election Commission of India		N		

Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	17
101	Fire		N		
102	Ambulance	Y		17	16
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	16
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	16
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		18	16
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		17	17
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	16
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		17	16
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		18	17
105812	Mother and Child Tracking (MCTH)	Y		18	16
10740	Central Pollution Control Board	Y		18	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	16
1514	National Career Service(NCS)				
15100	Free Legal Service Helpline	Y		18	16
155304	Municipal Corporations	Y		18	16
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	16
11212	Complaint of Electricity	Y		18	16
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	14
101	Fire	Y		17	13
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		16	14
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	13
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		16	13
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	13
1064	Anti Corruption Helpline	Y		17	14
1070	Relief Commission for Natural Calamities	Y		17	13
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		17	13
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		16	13
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	14
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		17	13
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	14
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		16	13
11203	Sashastra Seema Bal (SSB)	Y		17	13
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		16	13
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		16	13

TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		23	17
101	Fire	Y		23	17
102	Ambulance		N		
104	Health Information Helpline	Y		23	17
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		24	17
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		23	16
1033	Road Accident Management Service	Y		23	17
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		23	17
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		23	16
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		23	17
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		23	16
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		23	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		23	17
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		23	17
11250	Election Commission of India		N		

Telenor					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	23
101	Fire	Y		28	23
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		27	23
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		27	23
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		28	23
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	Y		27	23
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		27	23
10120	Call Alart (Crime Branch)				
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		28	23
10741	Pollution Control Board				
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)	Y		27	23
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		27	23
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		27	23
11250	Election Commission of India		N		

Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	15
101	Fire	Y		18	15
102	Ambulance	Y		17	14
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	15
181	Chief Minister Helpline	Y		17	14
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	15
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		18	14
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		18	15
1064	Anti Corruption Helpline	Y		18	15
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		18	15
1072	Rail Accident Helpline	Y		17	15
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		18	15
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		18	15
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	15
1514	National Career Service(NCS)	Y		17	15
15100	Free Legal Service Helpline	Y		18	14
155304	Municipal Corporations	Y		18	15
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

15 COUNTER DETAILS

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

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))**

15.1.1 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.

15.1.2 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)

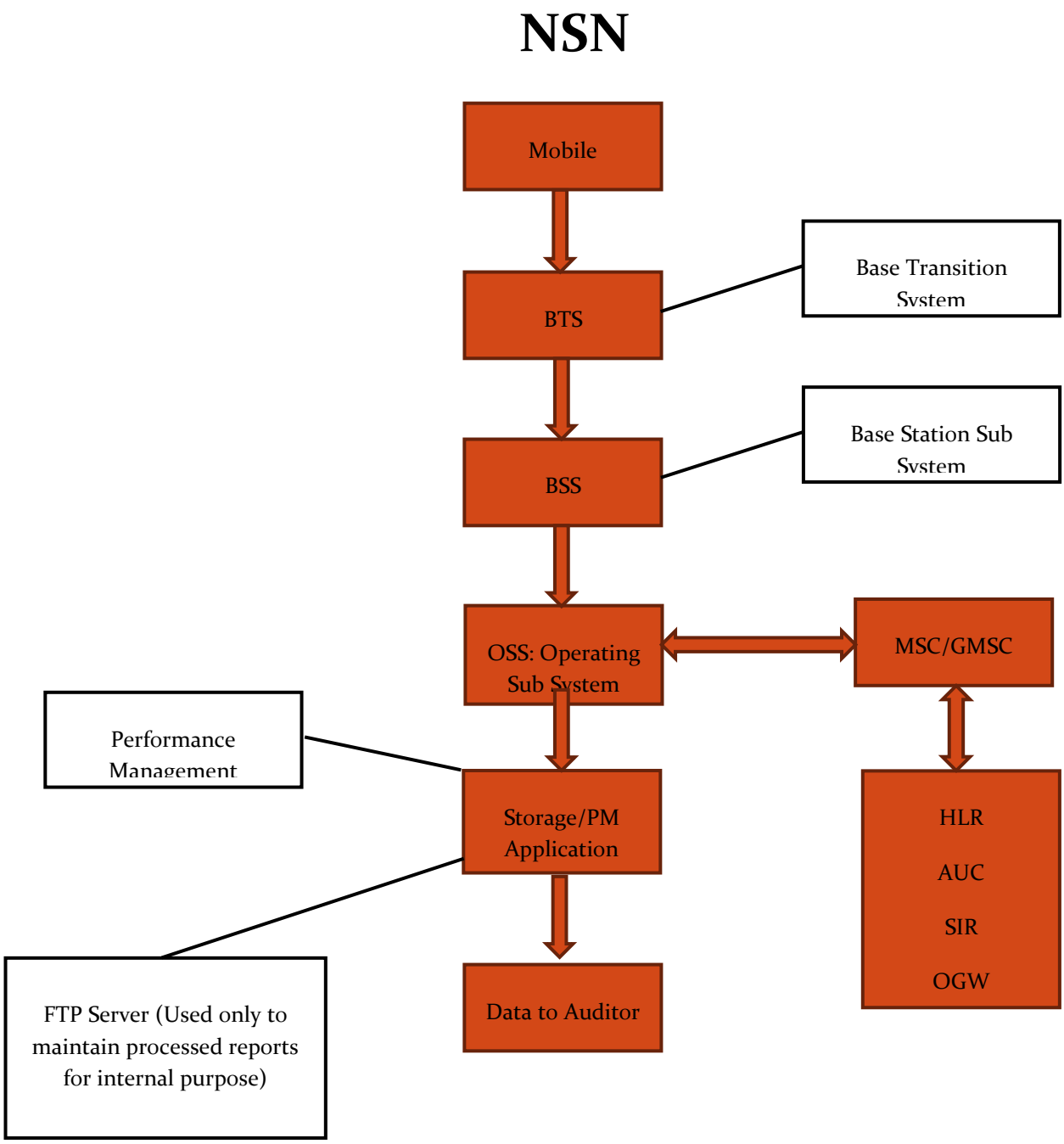
15.2 BLOCK SCHEMATIC DIAGRAMS

15.2.1 ERICSSON

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

15.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



16 ANNEXURE –OCTOBER-2G

Audit Results for Network Availability- PMR data-October											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1972	10721	6900	11329	1747	2735	NDR	2946	4492	NDR
Sum of downtime of BTSs in a month (in hours)		1132	32	98070	6896	2235	3960	NDR	97984	7732	NDR
BTSs accumulated downtime (not available for service)	≤ 2%	0.08%	0.00%	1.91%	0.08%	0.17%	0.19%	NDR	4.47%	0.23%	NDR
Number of BTSs having accumulated downtime >24 hours		0	0	132	21	21	41	NDR	0	56	NDR
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.91%	0.19%	1.20%	1.50%	NDR	0.00%	1.25%	NDR
Live Measurement Results for Network Availability- 3 Day live data-October											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1972	10722	6900	11329	1747	2735	NDR	2946	4432	NDR
Sum of downtime of BTSs in a month (in hours)		127	0	8111	608	234	367	NDR	1256	829	NDR
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	0.00%	1.63%	0.07%	0.19%	0.19%	NDR	0.59%	0.26%	NDR
Number of BTSs having accumulated downtime >24 hours		0	0	2	0	21	41	NDR	11	0	NDR
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.03%	0.00%	1.20%	1.50%	NDR	0.37%	0.00%	NDR

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-October											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.03%	98.89%	95.88%	97.54%	97.60%	96.53%	NDR	98.56%	97.96%	NDR
SDCCH/Paging channel congestion	≤ 1%	0.15%	0.05%	0.62%	0.75%	NA	0.21%	NA	0.04%	0.34%	NDR
TCH congestion	≤ 2%	0.10%	0.17%	1.56%	1.37%	0.96%	0.31%	NDR	0.05%	0.68%	NDR
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	94.05%	98.86%	97.98%	97.92%	97.70%	95.07%	NDR	97.56%	98.50%	NDR
SDCCH/Paging channel congestion	≤ 1%	0.09%	0.05%	0.68%	0.43%	NA	0.14%	NA	0.50%	0.16%	NDR
TCH congestion	≤ 2%	0.03%	0.16%	0.69%	1.17%	0.99%	0.29%	NDR	0.12.%	0.13%	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-October											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		41663187	10757086	122205693	554677116	32762959	45282820	NDR	74839653	210672653	NDR
Total number of calls dropped		374871	55678	1531230	4106918	49574	51755	NDR	442398	1071547	NDR
Call drop rate	≤ 2%	0.90%	0.52%	1.25%	0.74%	0.15%	0.11%	NDR	0.59%	0.51%	NDR
Total number of cells in the network		5965	32760	20277	33574	5235	8160	NDR	8809	13613	NDR
Total number of cells having more than 3% TCH		318	160	492	790	123	51	NDR	245	183	NDR
Worst affected cells having more than 3% TCH	≤ 3%	5.33%	0.49%	2.43%	2.35%	2.34%	0.63%	NDR	2.79%	1.34%	NDR
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-October											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		3757246	10105015	141174382	52319460	3175305	4314256	NDR	652415	245222670	NDR
Total number of calls dropped		36994	49380	1551447	349954	4456	4819	NDR	5243	973913	NDR
Call drop rate	≤ 2%	0.98%	0.49%	1.10%	0.67%	0.14%	0.11%	NDR	0.80%	0.40%	NDR
Total number of cells in the network		5963	32764	20277	33558	15705	24480	NDR	3561	13613	NDR
Total number of cells having more than 3% TCH		389	123	446	657	402	150	NDR	201	188	NDR
Worst affected cells having more than 3% TCH	≤ 3%	6.52%	0.38%	2.20%	1.96%	2.56%	0.61%	NDR	5.64%	1.38%	NDR
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

4. Voice quality

Audit Results for Voice quality -PMR Data-October

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7008484854	1829300725	122205693	74501813490	NA	10317503355	NDR	10702707196	38825377370	NDR
Total number of calls with good voice quality		6704839270	1791982990	117052799	72448958417	NA	10238760542	NDR	10577274265	37749782400	NDR
%age calls with good voice quality	≥ 95%	95.67%	97.96%	95.78%	97.24%	NA	99.24%	NDR	98.83%	97.23%	NDR

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		678046726	1787490176	141174382	7439816723	NA	1155410330	NDR	125468210	46261535975	NDR
Total number of calls with good voice quality		647935590	1750529165	135888927	7248744411	NA	1146772808	NDR	125022379	45163356824	NDR
%age calls with good voice quality	≥ 95%	95.56%	97.93%	96.26%	97.43%	NA	99.25%	NDR	99.64%	97.63%	NDR

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		71	466	63	963	116	45	NDR	54	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	0	0	NDR	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		16583	263478	104128	1091078	26213	26963	NDR	43337	136319	NDR
Traffic served for all POIs (B)- in erlangs		8597	157205	59499	1085815	7230	14493	NDR	22653	73094	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	NDR
Live Measurement Results for POI Congestion- 3 Day data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		213	458	63	968	116	45	NDR	54	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	0	0	NDR	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		50259	153311	104275	1110524	49565	27053	NDR	51230	136319	NDR
Traffic served for all POIs (B)- in erlangs		26122	266285	57232	286903	10284	13938	NDR	2543	72879	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	NDR

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Audit Results for Network Availability- PMR data-November											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1964	10735	6900	11329	1748	2735	1944	4607	4497	NDR
Sum of downtime of BTSs in a month (in hours)		917	38	95543	6896	2211	4145	288	24570	7784	NDR
BTSs accumulated downtime (not available for service)	≤ 2%	0.06%	0.00%	1.86%	0.08%	0.17%	0.20%	0.02%	0.72%	0.23%	NDR
Number of BTSs having accumulated downtime >24 hours		1	0	128	21	18	34	0	0	62	NDR
Worst affected BTSs due to downtime	≤ 2%	0.05%	0.00%	1.86%	0.19%	1.03%	1.24%	0.00%	0.00%	1.38%	NDR
Live Measurement Results for Network Availability- 3 Day live data-November											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1972	10725	6900	11329	1747	2735	NDR	4607	4497	NDR
Sum of downtime of BTSs in a month (in hours)		7681	30	7546	652	337	628	NDR	1407	773	NDR
BTSs accumulated downtime (not available for service)	≤ 2%	5.41%	0.00%	1.52%	0.08%	0.27%	0.32%	NDR	0.42%	0.24%	NDR
Number of BTSs having accumulated downtime >24 hours		0	0	4	0	18	34	NDR	0	0	NDR
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.06%	0.00%	1.03%	1.24%	NDR	0.00%	0.00%	NDR

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.57%	98.75%	96.60%	97.54%	97.96%	97.05%	97.80%	99.48%	98.19%	NDR
SDCCH/Paging channel congestion	≤ 1%	0.09%	0.05%	0.58%	0.75%	NA	0.18%	NA	0.07%	0.24%	NDR
TCH congestion	≤ 2%	0.08%	0.17%	1.26%	1.37%	0.69%	0.29%	0.94%	0.11%	0.32%	NDR
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.92%	98.82%	98.00%	97.56%	97.66%	96.72%	NDR	99.37%	98.59%	NDR
SDCCH/Paging channel congestion	≤ 1%	0.06%	0.05%	0.65%	0.89%	NA	0.14%	NA	0.08%	0.22%	NDR
TCH congestion	≤ 2%	0.02%	0.16%	0.68%	1.86%	0.99%	0.26%	NDR	0.14%	0.15%	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-November											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		36295348	12555332	97266830	64301758	31170929	39448778	36445493	87798624	193639148	NDR
Total number of calls dropped		352111	71111	1025815	431953	45296	47322	347574	719181	1005887	NDR
Call drop rate	≤ 2%	0.97%	0.57%	1.05%	0.67%	0.15%	0.12%	0.95%	0.82%	0.52%	NDR
Total number of cells in the network		5939	32800	20277	33912	5235	8160	5863	114427	13630	NDR
Total number of cells having more than 3% TCH		372	201	420	729	109	44	452	4837	163	NDR
Worst affected cells having more than 3% TCH	≤ 3%	6.26%	0.61%	2.07%	2.15%	2.08%	0.54%	7.70%	4.23%	1.20%	NDR
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-November											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		55364186	11713378	137904193	554677116	3294371	3849485	NDR	8763319	250261952	NDR
Total number of calls dropped		461247	64880	1517285	4106918	4542	4445	NDR	70916	939179	NDR
Call drop rate	≤ 2%	0.83%	0.55%	1.10%	0.74%	0.14%	0.12%	NDR	0.81%	0.38%	NDR
Total number of cells in the network		5963	98334	137904193	33574	5235	8160	NDR	105250	13611	NDR
Total number of cells having more than 3% TCH		393	521	1517285	790	116	149	NDR	4705	174	NDR
Worst affected cells having more than 3% TCH	≤ 3%	6.59%	0.53%	1.10%	2.35%	2.21%	1.82%	NDR	4.47%	1.28%	NDR
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-November											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		6305941937	1941272146	97266830	74501813490	NA	5293612352	942774290	20388684472	35241524475	NDR
Total number of calls with good voice quality		6020000205	1885634056	93672224	72448958417	NA	5254090670	904214894	20113703265	34325635249	NDR
%age calls with good voice quality	≥ 95%	95.47%	97.13%	96.30%	97.24%	NA	99.25%	95.91%	98.65%	97.40%	NDR
Live measurement results for Voice quality-3 Day data-November											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		3180666506	2002927831	137904193	7946314147	NA	534393085	NDR	2046074160	46381558162	NDR
Total number of calls with good voice quality		3049734035	1953776309	133010797	7736134979	NA	530353019	NDR	1896997675	45334201781	NDR
%age calls with good voice quality	≥ 95%	95.88%	97.55%	96.45%	97.36%	NA	99.24%	NDR	92.71%	97.74%	NDR
Drive test results for Voice quality (Average of three drive tests) - DT data-November											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		72	480	63	963	NDR	NDR	392	219	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	0	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		17087	279277	104069	1091078	NDR	NDR	81034	81034	136804	NDR
Traffic served for all POIs (B)- in erlangs		10478	159669	55027	1085815	NDR	NDR	27957	31493	70744	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	NDR
Live Measurement Results for POI Congestion- 3 Day data-November											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		219	476	63	968	NDR	NDR	NDR	392	24	NDR
No. of POIs not meeting benchmark		0	0	0	0	NDR	NDR	NDR	0	0	NDR
Total Capacity of all POIs (A) - in erlangs		49202	159341	104161	1111792	NDR	NDR	NDR	81034	136319	NDR
Traffic served for all POIs (B)- in erlangs		24450	292511	57550	315066	NDR	NDR	NDR	30761	72794	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	NDR	0.00%	0.00%	NDR

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Audit Results for Network Availability- PMR data-December											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1971	NDR	6900	2284	1745	2736	1944	NDR	4531	11278
Sum of downtime of BTSs in a month (in hours)		721	NDR	97028	4820	1193	2386	288	NDR	0	10183
BTSs accumulated downtime (not available for service)	≤ 2%	0.05%	NDR	1.89%	0.28%	0.09%	0.12%	0.02%	NDR	0.00%	0.12%
Number of BTSs having accumulated downtime >24 hours		0	NDR	127	0	7	28	0	NDR	0	55
Worst affected BTSs due to downtime	≤ 2%	0.00%	NDR	1.84%	0.00%	0.40%	1.02%	0.00%	NDR	0.00%	0.49%
Live Measurement Results for Network Availability- 3 Day live data-December											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1963	NDR	6900	2284	1643	2733	1924	NDR	4498	11278
Sum of downtime of BTSs in a month (in hours)		97	NDR	9099	413	107	117	5	NDR	1	950
BTSs accumulated downtime (not available for service)	≤ 2%	0.07%	NDR	1.83%	0.25%	0.09%	0.06%	0.00%	NDR	0.00%	0.12%
Number of BTSs having accumulated downtime >24 hours		0	NDR	4	0	7	28	0	NDR	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	NDR	0.06%	0.00%	0.43%	1.02%	0.00%	NDR	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.48%	NDR	96.66%	98.26%	97.37%	97.75%	97.80%	NDR	98.17%	99.29%
SDCCH/Paging channel congestion	≤ 1%	0.11%	NDR	0.61%	0.00%	NA	0.18%	NA	NDR	0.44%	0.71%
TCH congestion	≤ 2%	0.10%	NDR	1.22%	0.00%	0.87%	0.38%	0.94%	NDR	0.54%	0.01%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.87%	NDR	96.20%	NDR	98.04%	99.04%	97.83%	NDR	97.93%	99.47%
SDCCH/Paging channel congestion	≤ 1%	0.13%	NDR	0.83%	NDR	NA	0.14%	NA	NDR	0.48%	0.37%
TCH congestion	≤ 2%	0.07%	NDR	1.38%	NDR	0.20%	0.35%	1.04%	NDR	0.53%	0.53%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		No Coverage	502	371	473	243	No Coverage	345	408	390	438
Total number of successful calls established		No Coverage	502	369	473	243	No Coverage	341	403	388	438
CSSR	≥ 95%	No Coverage	100.00%	99.46%	100.00%	100.00%	No Coverage	98.84%	98.77%	99.49%	100.00%
%age blocked calls		No Coverage	0.00%	0.54%	0.00%	0.00%	No Coverage	1.16%	1.23%	0.51%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-December											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		47340844	NDR	117462231	7978193357	31019432	42173281	36445493	NDR	228263296	478911003
Total number of calls dropped		407557	NDR	1165634	73314654	42731	45217	347574	NDR	1170336	4222262
Call drop rate	≤ 2%	0.86%	NDR	0.99%	0.92%	0.14%	0.11%	0.95%	NDR	0.51%	0.88%
Total number of cells in the network		5954	NDR	20277	34299	5229	8160	5863	NDR	423577	1047979
Total number of cells having more than 3% TCH		287	NDR	410	661	93	45	452	NDR	196	29519
Worst affected cells having more than 3% TCH	≤ 3%	4.81%	NDR	2.02%	1.93%	1.78%	0.55%	7.70%	NDR	0.05%	2.82%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-December											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		4347028	NDR	11290471	NDR	3630107	4218187	3714756	NDR	20784786	15564570
Total number of calls dropped		39847	NDR	102168	NDR	5185	4893	37117	NDR	145111	138516
Call drop rate	≤ 2%	0.92%	NDR	0.90%	NDR	0.14%	0.12%	1.00%	NDR	0.70%	0.89%
Total number of cells in the network		5936	NDR	20277	NDR	5223	8151	5863	NDR	13624	34219
Total number of cells having more than 3% TCH		296	NDR	374	NDR	86	44	463	NDR	316	959
Worst affected cells having more than 3% TCH	≤ 3%	4.98%	NDR	1.85%	NDR	1.65%	0.54%	7.90%	NDR	2.32%	2.80%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		No Coverage	502	369	473	243	No Coverage	341	404	388	438
Total number of calls dropped		No Coverage	0	0	0	0	No Coverage	0	2	0	0
Call drop rate	≤ 2%	No Coverage	0.00%	0.00%	0.00%	0.00%	No Coverage	0.00%	0.50%	0.00%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data-December

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7010404377	NDR	117462231	76119	NDR	5993911459	942774290	NDR	40234424061	70923621283
Total number of calls with good voice quality		6687529767	NDR	112840392	74180	NDR	5951748685	904214894	NDR	39060829460	68734940478
%age calls with good voice quality	≥ 95%	95.39%	NDR	96.07%	97.45%	NDR	99.30%	95.91%	NDR	97.08%	96.91%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		669440426	NDR	11290471	NDR	NDR	600069038	99739305	NDR	3756380624	2322271594
Total number of calls with good voice quality		640178712	NDR	10843821	NDR	NDR	595693434	95828013	NDR	3654025121	2250710114
%age calls with good voice quality	≥ 95%	95.63%	NDR	96.04%	NDR	NDR	99.27%	96.08%	NDR	97.28%	96.92%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		No Coverage	110279	69343	124136	NA	No Coverage	NA	774483	45419	383138
Total number of calls with good voice quality		No Coverage	108173	57842	120133	NA	No Coverage	NA	755113	43407	372961
%age calls with good voice quality	≥ 95%	No Coverage	98.09%	83.41%	96.78%	100.00%	No Coverage	98.61%	97.50%	95.57%	97.34%

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		2323	NDR	63	964	116	45	392	NDR	25	209
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	NDR	0	0
Total Capacity of all POIs (A) - in erlangs		575856	NDR	104307	318355	25957	26730	81034	NDR	138592	7571787
Traffic served for all POIs (B)- in erlangs		374325	NDR	55712	1747469	6330	12103	27957	NDR	73025	158040
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
NDR		219	NDR	63	NDR	116	45	392	NDR	25	209
No. of POIs not meeting benchmark		0	NDR	0	NDR	0	0	0	NDR	0	0
Total Capacity of all POIs (A) - in erlangs		52681	NDR	104144	NDR	26162	26982	81034	NDR	138302	160209
Traffic served for all POIs (B)- in erlangs		35799	NDR	59124	NDR	6671	12046	27709	NDR	73002	291542
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	NDR	0.00%	0.00%	0.00%	NDR	0.00%	0.00%

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Audit Results for Network Availability- PMR data-October						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2652	7076	2780	1294
Sum of downtime (i.e. total outage time) of Node Bs		NDR	36047	3888	16	8697
Node Bs downtime (not available for service)	≤ 2%	NDR	1.83%	0.07%	0.00%	0.19%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	49	9	0	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.85%	0.13%	0.00%	0.91%
Live Measurement Results for Network Availability- 3 Day live data-October						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2652	7076	2780	1294
Sum of downtime (i.e. total outage time) of Node Bs		NDR	3412	276	39	567
Node Bs downtime (not available for service)	≤ 2%	NDR	1.79%	0.05%	0.02%	0.10%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	0	0	NDR	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.00%	0.00%	NDR	0.85%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-October						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.51%	99.49%	94.34%	99.66%
RRC Congestion	≤ 1%	NDR	0.94%	0.68%	1.35%	0.64%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.70%	0.23%	0.82%	0.11%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-October						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	96.72%	99.53%	95.14%	99.15%
RRC Congestion	≤ 1%	NDR	0.72%	0.90%	1.25%	0.99%
Circuit Switched RAB Congestion	≤ 2%	NDR	0.84%	0.21%	0.83%	0.09%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 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-October						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	20570802	134283863	28774519	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	371299	405394	149756	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.80%	0.30%	0.52%	0.31%
Total no. of cells in the licensed service area (B)		NDR	7994	23845	8263	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	183	423	317	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.29%	1.77%	3.84%	1.88%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-October						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	31644118	13697582	2680693	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	554305	41625	15108	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.75%	0.30%	0.56%	0.51%
Total no. of cells in the licensed service area (B)		NDR	7994	23632	8263	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	192	452	334	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.40%	1.91%	4.04%	1.49%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 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-October						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	203697479790	68493100000	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	200853159653	68259102195	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.60%	99.66%	98.89%
Live measurement results for Voice quality-3 Day data-October						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	20430800529	6108409500	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	20139911232	6086995757	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.58%	99.65%	99.21%
Drive test results for Voice quality (Average of three drive tests) - DT data-October						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 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-October						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	NDR	963	192	0
No. of POIs not meeting benchmark		NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	NDR	1091078	69779	0
Traffic served for all POIs (B)- in erlangs		NDR	NDR	1085815	33147	0
POI congestion	≤ 0.5%	NDR	NDR	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	968	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104275	1110524	69779	0
Traffic served for all POIs (B)- in erlangs		NDR	57232	286903	33760	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-November						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2661	NDR	2856	1294
Sum of downtime (i.e. total outage time) of Node Bs		NDR	36313	NDR	46	8697
Node Bs downtime (not available for service)	≤ 2%	NDR	1.83%	NDR	0.00%	0.22%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	47	NDR	0	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.77%	NDR	0.00%	0.90%
Live Measurement Results for Network Availability- 3 Day live data-November						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2652	7076	2844	1294
Sum of downtime (i.e. total outage time) of Node Bs		NDR	2186	407	63	567
Node Bs downtime (not available for service)	≤ 2%	NDR	1.14%	0.08%	0.03%	0.11%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	3	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.11%	0.00%	0.00%	0.86%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-November						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.45%	NDR	95.88%	99.63%
RRC Congestion	≤ 1%	NDR	0.91%	NDR	1.06%	0.65%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.60%	NDR	0.64%	0.11%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-November						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	96.48%	99.54%	95.93%	99.12%
RRC Congestion	≤ 1%	NDR	0.76%	0.85%	1.12%	1.00%
Circuit Switched RAB Congestion	≤ 2%	NDR	0.85%	0.23%	0.57%	0.10%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 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-November						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	22514306	NDR	27742772	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	359418	NDR	134792	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.60%	NDR	0.49%	0.33%
Total no. of cells in the licensed service area (B)		NDR	8021	NDR	8490	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	187	NDR	305	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.33%	NDR	3.60%	1.86%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-November						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	31795845	14264948	2776865	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	508735	46564	13521	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.60%	0.33%	0.49%	0.52%
Total no. of cells in the licensed service area (B)		NDR	NDR	NDR	8454	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	NDR	NDR	298	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	NDR	NDR	3.53%	1.50%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 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-November						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	NDR	65482576000	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	NDR	65267916597	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	NDR	99.67%	99.88%
Live measurement results for Voice quality-3 Day data-November						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	21265930672	6783294500	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	20968207643	6761464057	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.60%	98.60%	99.23%
Drive test results for Voice quality (Average of three drive tests) - DT data-November						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 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-November						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	NDR	192	0
No. of POIs not meeting benchmark		NDR	0	NDR	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104069	NDR	78320	0
Traffic served for all POIs (B)- in erlangs		NDR	55027	NDR	31493	0
POI congestion	≤ 0.5%	NDR	0.00%	NDR	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	968	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104161	1111792	78320	0
Traffic served for all POIs (B)- in erlangs		NDR	57550	315066	30761	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-December						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2661	NDR	NDR	1294
Sum of downtime (i.e. total outage time) of Node Bs		NDR	37135	NDR	NDR	8697
Node Bs downtime (not available for service)	≤ 2%	NDR	1.88%	NDR	NDR	0.20%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	49	NDR	NDR	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.84%	NDR	NDR	0.91%
Live Measurement Results for Network Availability- 3 Day live data-December						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2661	NDR	NDR	1294
Sum of downtime (i.e. total outage time) of Node Bs		NDR	3764	NDR	NDR	567
Node Bs downtime (not available for service)	≤ 2%	NDR	1.96%	NDR	NDR	0.12%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	1	NDR	NDR	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.04%	NDR	NDR	0.86%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-December						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.46%	NDR	NDR	99.67%
RRC Congestion	≤ 1%	NDR	0.90%	NDR	NDR	0.65%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.45%	NDR	NDR	0.11%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-December						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.36%	NDR	NDR	99.16%
RRC Congestion	≤ 1%	NDR	0.92%	NDR	NDR	1.00%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.54%	NDR	NDR	0.12%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	411	404	185	379
Total number of RRC established (B)		NDR	405	403	183	379
Call setup success rate (B/A*100)	≥ 95%	NDR	98.54%	99.75%	98.92%	100.00%
%age blocked calls		NDR	1.46%	0.25%	1.08%	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-December						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	23640304	NDR	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	335138	NDR	NDR	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.42%	NDR	NDR	0.31%
Total no. of cells in the licensed service area (B)		NDR	8021	NDR	NDR	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	186	NDR	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.31%	NDR	NDR	1.88%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-December						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	2391074	NDR	NDR	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	33226	NDR	NDR	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.39%	NDR	NDR	0.51%
Total no. of cells in the licensed service area (B)		NDR	8021	NDR	NDR	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	205	NDR	NDR	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.55%	NDR	NDR	1.49%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	431	404	183	379
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	16	0	1	0
Call drop rate (B/A*100)	≤ 2%	NDR	3.71%	0.00%	0.55%	0.00%

Audit Results for Voice quality -PMR Data-December						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	NDR	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	NDR	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	NDR	NDR	98.89%
Live measurement results for Voice quality-3 Day data-December						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	NDR	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	NDR	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	NDR	NDR	99.21%
Drive test results for Voice quality (Average of three drive tests) - DT data-December						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	131153	NDR	606790	45030
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	125328	NDR	603929	43503
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	95.56%	NDR	99.53%	96.61%

Audit Results for POI Congestion- PMR data-December						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	NDR	NDR	0
No. of POIs not meeting benchmark		NDR	0	NDR	NDR	0
Total Capacity of all POIs (A) - in erlangs		NDR	104307	NDR	NDR	0
Traffic served for all POIs (B)- in erlangs		NDR	55712	NDR	NDR	0
POI congestion	≤ 0.5%	NDR	0.00%	NDR	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	NDR	NDR	0
No. of POIs not meeting benchmark		NDR	0	NDR	NDR	0
Total Capacity of all POIs (A) - in erlangs		NDR	104144	NDR	NDR	0
Traffic served for all POIs (B)- in erlangs		NDR	59124	NDR	NDR	0
POI congestion	≤ 0.5%	NDR	0.00%	NDR	NDR	0.00%

22 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. OND'15 – Refers to the quarter of October, November and December2015
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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