TRAI Audit Wireless Report for Maharashtra & Goa Circle

WEST ZONE

QE June 2016

Prepared by:

Submitted to:

TRAI
Telecom Regulatory Authority of India

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

1 TABLE OF CONTENTS

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

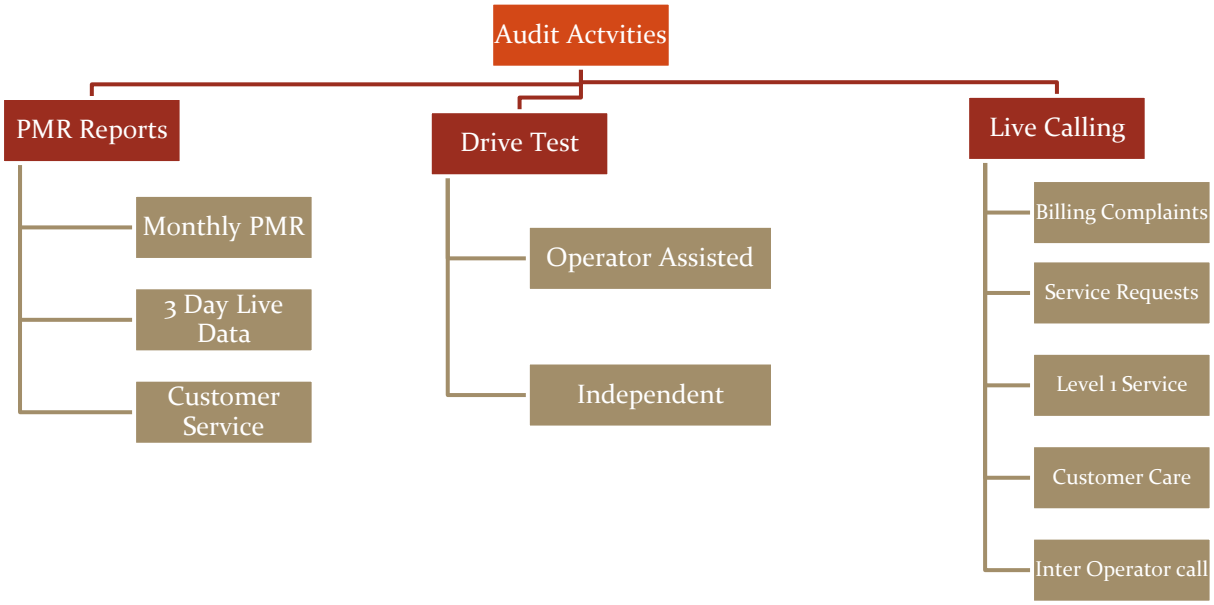
The primary objective of the Audit module is to-

- 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

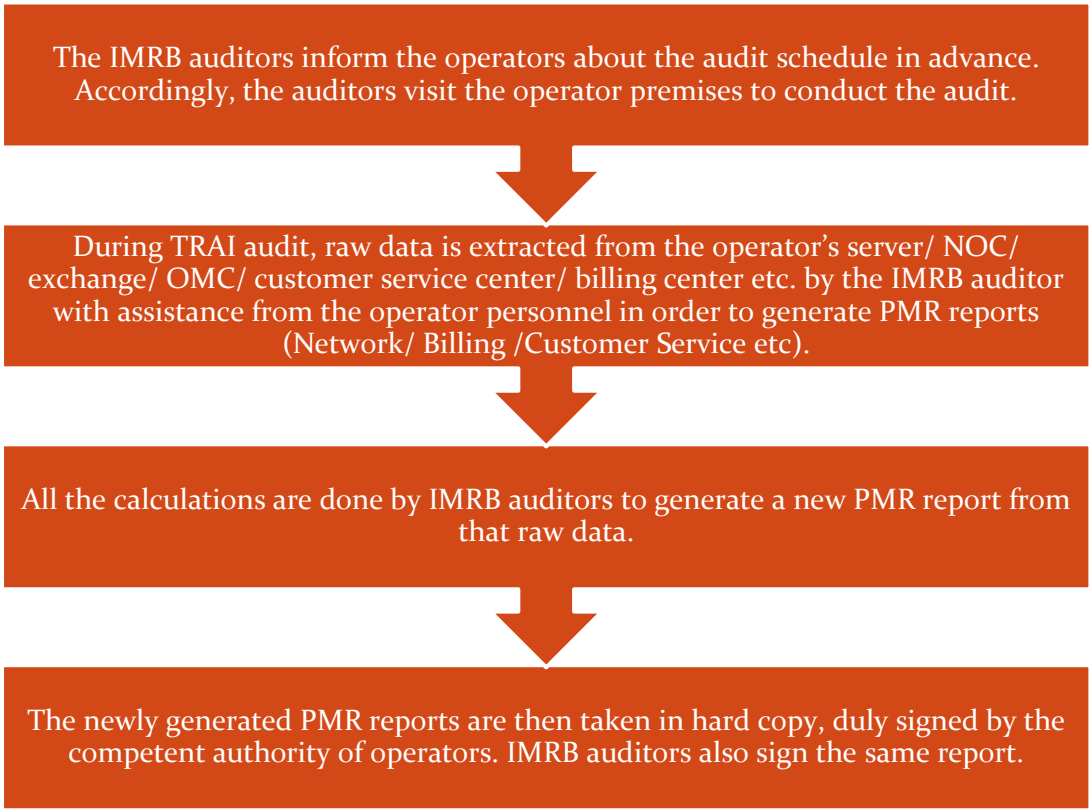


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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 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, April2016 audit data was collected in the month of May2016.

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 June2016 (AMJ'16) was collected in the month of July 2016.

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

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

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of April, May and June2016.The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

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

2.4.1.4 MONTHLY PMR 3G

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

Network Availability

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

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good Circuit Switched Voice Quality

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

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

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

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

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

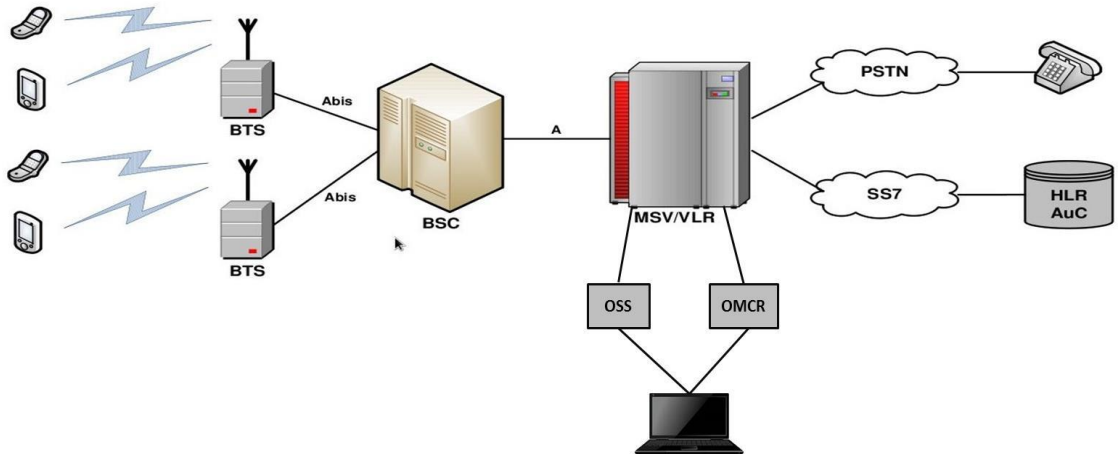
- Services Activation/ provisioning:- Activation done within 4 hours≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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

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

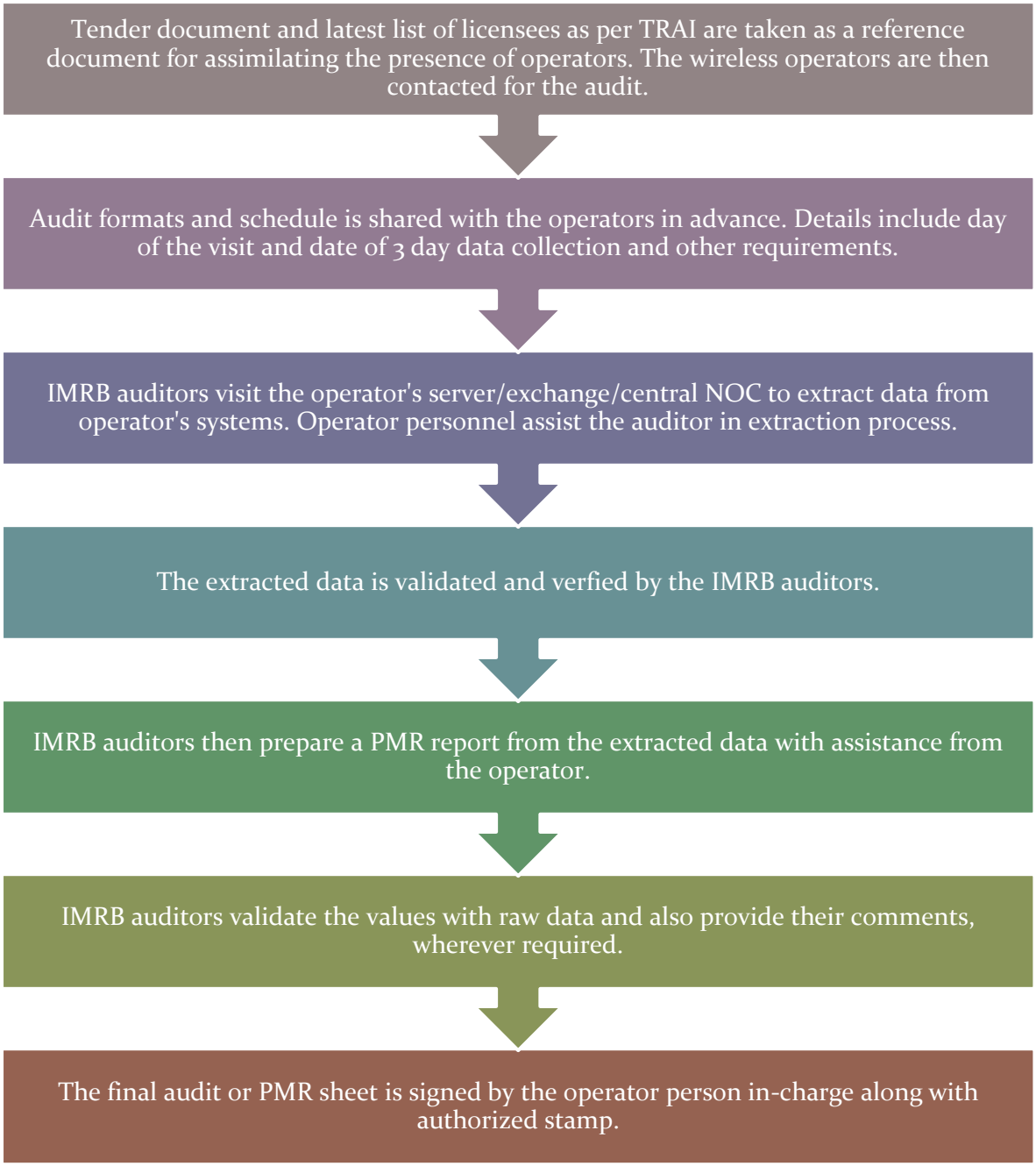
2.4.1.8 POINT OF DATA EXTRACTION

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



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

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



Data has been extracted and calculated as per the counter details provided by the operators. The details of counters have been provided in section 8.15 of the report. The calculation methodology for each parameter has been stated in the table given below.

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100
SDCCH/ Paging Channel Congestion	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

Parameter	Calculation Methodology
Node Bs Accumulated Downtime	Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100
Worst Affected Node Bs Due to Downtime	(Number of Node Bs having accumulated downtime greater than 24 hours in a month / Number of Node B in Licensed Service Area) * 100
Call Setup Success Rate	(RRC Established / Total RRC Attempts) * 100
RRC Congestion	RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish RRC/ RAB made on day 1 C1 = Average RRC/ RAB Congestion % on day 1 A2 = Number of attempts to establish RRC/ RAB made on day 2 C2 = Average RRC/ RAB Congestion % on day 2 An = Number of attempts to establish RRC/ RAB made on day n Cn = Average RRC/ RAB Congestion % on day n
Circuit Switched RAB Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Circuit Switched Voice Drop Rate	No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released) x 100
Worst Affected Cells having more than 3% Circuit Switched Voice Drop Rate	Number of cells having CSV drop rate > 3% during CBBH in a month / Total number of cells in the licensed area) x 100
Connections with good Circuit switched voice quality	1- (Number of Faulty Transport Blocks In Uplink downlink After Selection Combining Speech / Total number of Transport Blocks In Uplink downlink After Selection Combining Speech)) x 100

2.4.1.12 3 DAY LIVE DATA

The main purpose of 3 day live measurement is to evaluate the network parameters on intraday basis. While the monthly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the network parameters discussed earlier. All the calculations are done on the basis of that raw data of 3 days.

The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak hours.

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

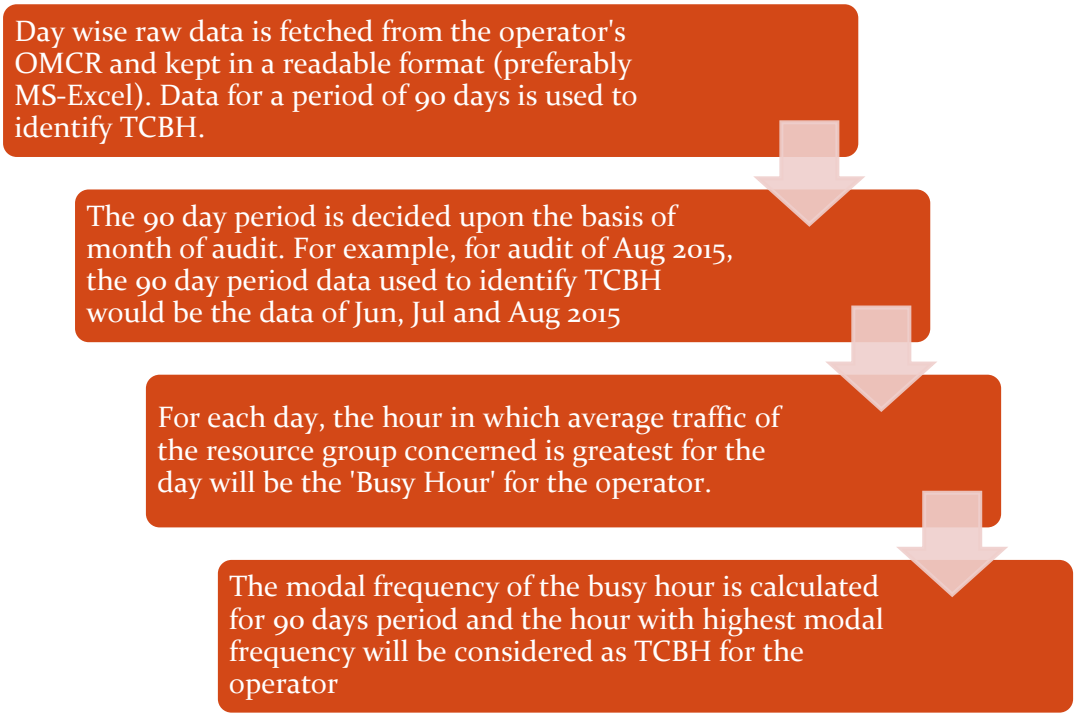
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

S. No.	Name of Service Provider	Date of Live Measurement Audit		
GSM		Apr-16	May-16	Jun-16
1	Aircel	April 05, 06, 07	May 02, 03, 04	June 01, 02, 03
2	Airtel	April 05, 06, 07	May 02, 03, 04	June 01, 02, 03
3	BSNL	April 11, 12, 13	May 01, 02, 03	June 07, 08, 09
4	IDEA	April 04, 05, 06	May 03, 04, 05	June 07, 08, 09
5	RCOM GSM	April 11, 12, 13	May 05, 06, 07	June 05, 06, 07
6	Tata GSM	April 12, 13, 14	May 05, 06, 07	June 04, 05, 06
7	Telenor	April 04, 05, 06	May 03, 04, 05	June 06, 07, 08
8	VODAFONE	April 04, 05, 06	May 03, 04, 05	June 02, 03, 04
CDMA Operators				
9	Reliance	April 11, 12, 13	May 05, 06, 07	June 05, 06, 07
10	TATA	April 12, 13, 14	May 05, 06, 07	June 04, 05, 06
3G Operators				
11	Airtel	April 05, 06, 07	May 02, 03, 04	June 01, 02, 03
12	BSNL	April 11, 12, 13	May 01, 02, 03	June 07, 08, 09
13	IDEA	April 04, 05, 06	May 03, 04, 05	June 07, 08, 09
14	Tata	April 12, 13, 14	May 05, 06, 07	June 04, 05, 06
15	Vodafone	April 04, 05, 06	May 03, 04, 05	June 02, 03, 04

2.4.1.13 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

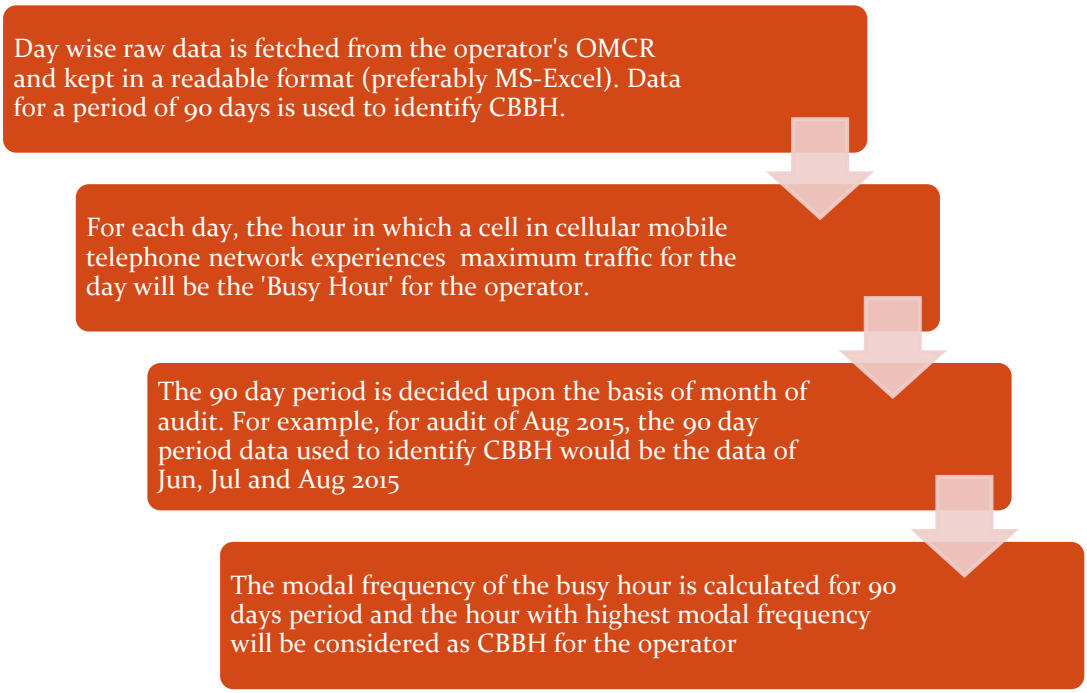
Step by step procedure to identify TCBH for an operator:



2.4.1.14 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

Step by step procedure to identify CBBH for an operator:



2.4.1.15 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2016 (AMJ'16) was collected in the month of July 2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

The operators are duly informed in advance about the audit schedule.

The Customer Service Quality Parameters include the following:

- Metering and billing credibility (postpaid and prepaid)
- Resolution of billing/charging complaints
- Period of applying credit/waiver/adjustment to customer's account
- Response time to the customer for assistance
- Termination/closure of service
- Time taken for refund of security deposit after closures.

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle for a quarter.

All the parameters have been described in detail along with key findings of the parameter in section 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

Metering and Billing Credibility	Benchmark
No of billing complaints received - Post paid	≤ 0.1%
No. of billing complaints received- Prepaid	≤ 0.1%
Resolution of billing/ charging complaints within 4 weeks	98%
Resolution of billing/ charging complaints within 6 weeks	100%
Period of applying credit/ waiver within 1 week of resolution of complaint	100%
Response Time to the Customer form Assistance	
Accessibility of call centre/customer care	≥ 95%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility – 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 June 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of May2016 was considered for live calling activity conducted in June 2016.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

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

TRAI benchmark-

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.4 LEVEL 1 SERVICE

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

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

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

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

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

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

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

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

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

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

As per the new directive given by TRAI 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.

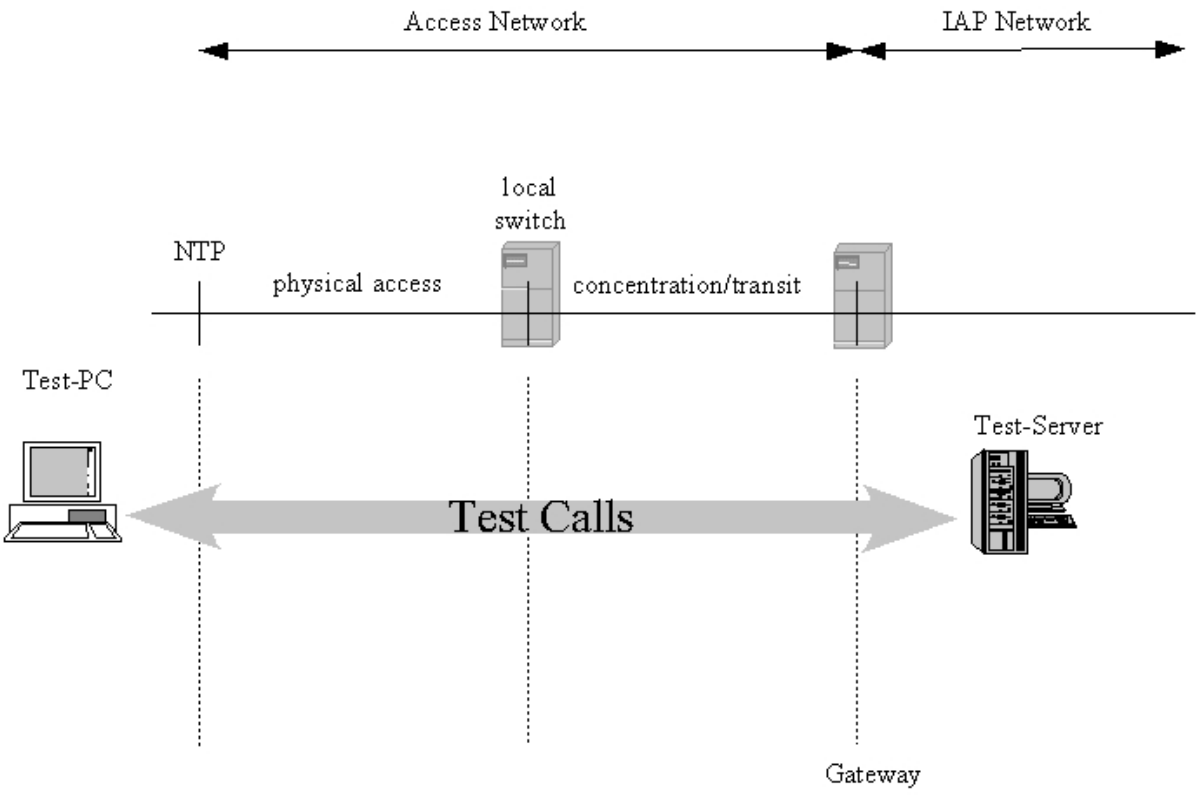


Figure for Measurement set-up

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)	1533759
Airtel	11171951
BSNL	4538429
Idea	20997756
Reliance CDMA	NA
Reliance GSM	NA
TATA CDMA	887746.8893
TATA GSM	3061795
Telenor	6030063
Vodafone	17671243
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	1477565
BSNL 3G	649724
Idea 3G	3598954
TATA 3G	984735
Vodafone 3G	2037300

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Telenor failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop.
- TATA CDMA failed to meet the benchmark for Voice quality.

3 Day Live Measurement (Network Parameters) for 2G

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

Wireless Data Services for 2G

- Telenor and TATA CDMA failed to meet the benchmark for Activation done within 4 hours in PMR audit.

Live Calling

- As per the consumers (live calling exercise) BSNL, Idea, Reliance CDMA failed to meet the benchmark of resolving 98% complaints within 4 weeks and BSNL, Idea, Reliance CDMA & GSM failed to meet 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.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea and Vodafone failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers all operators met the benchmark of charging disputes except Idea.
- All operators met the benchmark for IVR call being attended except Aircel.
- Airtel and Reliance GSM & CDMA failed to meet the TRAI specified benchmark of 95%.

Operators Assisted Drive test (Voice) for 2G

- In Buldhana SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.
- In Buldhana SSA BSNL failed to meet the benchmarks for CSSR.
- In Buldhana SSA BSNL failed to meet the benchmark of call drop rate.
- In Panji SSA Reliance GSM and Reliance CDMA failed to meet the benchmark for voice quality in outdoor locations.
- In Panji SSA BSNL and Reliance GSM failed to meet the benchmark for call drop rate in outdoor
- In Jalgaon SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations.
- In Jalgaon SSA BSNL failed to meet the benchmarks of CSSR in indoor
- In Jalgaon SSA BSNL failed to meet the benchmark of call drop rate in outdoor location.
- In Nasik SSA Reliance GSM failed to meet the benchmark for voice quality in outdoor
- In Akola SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.

- In Akola SSA BSNL failed to meet the benchmarks of CSSR in indoor as well as outdoor location
- In Kolhapur SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations and Telenor failed in outdoor location
- In Kolhapur SSA BSNL failed to meet the benchmark for CSSR in outdoor
- In Kolhapur SSA BSNL failed to meet the benchmark for call drop rate in outdoor
- In Beed SSA BSNL failed to meet the benchmark for voice quality in indoor as well as outdoor locations and Telenor failed in outdoor location.
- In Beed SSA BSNL failed to meet the benchmark of call drop rate in outdoor locations.

Operators Assisted Drive test (Voice) for 3G

- In Buldhana SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as out door.
- In Buldhana SSA BSNL 3G met the benchmark for call drop rate in outdoor locations.
- In Panji SSA BSNL 3G and Reliance GSM failed to meet the benchmark for CSSR in indoor.
- In Panji SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor.
- In Jalgaon SSA Vodafone 3G failed to meet the benchmark for Voice quality in indoor location.
- In Jalgaon SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.
- In Akola SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor location.
- In Akola SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor location
- In Kolhapur SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.
- In Kolhapur SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations
- In Beed SSA BSNL 3G failed to meet the benchmark for Voice quality in outdoor locations
- In Beed SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations

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)	0.09%	0.22%	99.33%	0.14%	0.17%	0.64%	2.64%	96.25%
Airtel	1.22%	0.00%	98.40%	0.10%	0.73%	0.62%	1.76%	96.92%
BSNL	1.91%	1.75%	96.67%	0.55%	1.17%	1.11%	2.74%	96.71%
Idea	0.08%	0.10%	98.26%	0.67%	1.25%	0.59%	2.16%	98.59%
Reliance CDMA	0.19%	1.16%	97.82%	NA	0.70%	0.12%	0.45%	NA
Reliance GSM	0.13%	1.00%	98.35%	0.20%	0.45%	0.11%	0.42%	99.24%
TATA CDMA	0.04%	0.07%	98.21%	NA	0.82%	0.63%	2.41%	91.06%
TATA GSM	1.28%	0.00%	99.54%	0.09%	0.12%	0.40%	1.67%	97.55%
Telenor	0.23%	1.04%	98.50%	0.38%	0.53%	0.91%	3.83%	97.33%
Vodafone	0.23%	0.86%	99.33%	0.35%	0.67%	0.73%	2.66%	97.12%

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:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for TATA CDMA.

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.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for TATA GSM.

SDCCH/ Paging Chl. Congestion:

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

TCH Congestion:

All operators met the benchmark for TCH congestion. TATA GSM 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.

Worst Affected Cells Having More than 3% TCH Drop:

Telenor failed to meet the benchmark. Best performance was recorded for Reliance GSM.

Voice Quality

TATA CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM.

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 - APRILFOR 2G

Month								
Name of Service Provider Month April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.05%	0.00%	99.51%	0.09%	0.06%	0.60%	2.38%	96.52%
Airtel	1.75%	0.00%	98.43%	0.11%	0.74%	0.63%	1.81%	97.02%
BSNL	1.92%	1.74%	96.61%	0.56%	1.22%	1.13%	2.75%	96.60%
Idea	0.06%	0.09%	97.96%	0.70%	1.39%	0.62%	2.00%	98.46%
Reliance CDMA	0.15%	0.76%	98.23%	NA	0.50%	0.11%	0.50%	99.48%
Reliance GSM	0.13%	0.92%	98.10%	0.15%	0.39%	0.10%	0.36%	99.29%
TATA CDMA	0.03%	0.00%	98.26%	NA	0.59%	0.62%	2.32%	90.57%
TATA GSM	0.51%	0.00%	99.50%	0.09%	0.14%	0.39%	1.63%	97.65%
Telenor	0.18%	0.84%	98.43%	0.34%	0.64%	0.96%	4.61%	97.51%
Vodafone	0.14%	0.41%	99.37%	0.36%	0.63%	0.70%	2.60%	97.18%

4.1.2 PMR DATA –MAY FOR 2G

Name of Service Provider Month May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.12%	0.40%	99.32%	0.19%	0.25%	0.64%	2.59%	96.39%
Airtel	1.86%	0.00%	98.45%	0.08%	0.71%	0.65%	1.77%	97.00%
BSNL	1.90%	1.71%	96.74%	0.52%	1.15%	1.09%	2.55%	96.73%
Idea	0.07%	0.05%	98.45%	0.62%	1.19%	0.54%	1.98%	98.68%
Reliance CDMA	0.16%	1.22%	98.09%	NA	0.55%	0.13%	0.64%	99.53%
Reliance GSM	0.16%	1.40%	98.48%	0.15%	0.32%	0.10%	0.44%	99.28%
TATA CDMA	0.04%	0.00%	98.22%	NA	0.83%	0.64%	2.37%	90.47%
TATA GSM	1.72%	0.00%	99.56%	0.06%	0.10%	0.38%	1.68%	97.65%
Telenor	0.21%	0.80%	98.67%	0.43%	0.40%	0.83%	3.24%	97.34%
Vodafone	0.24%	0.75%	99.24%	0.24%	0.76%	0.70%	2.69%	97.19%

4.1.3 PMR DATA - JUNE FOR 2G

Month								
Name of Service Provider Month June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.11%	0.25%	99.16%	0.14%	0.21%	0.69%	2.95%	95.85%
Airtel	0.04%	0.00%	98.32%	0.11%	0.75%	0.55%	1.69%	96.74%
BSNL	1.90%	1.80%	96.67%	0.58%	1.13%	1.10%	2.92%	96.81%
Idea	0.11%	0.15%	98.38%	0.69%	1.18%	0.60%	2.50%	98.64%
Reliance CDMA	0.26%	1.51%	97.14%	NA	1.06%	0.17%	0.20%	99.16%
Reliance GSM	0.11%	0.67%	98.48%	0.29%	0.65%	0.14%	0.45%	99.16%
TATA CDMA	0.05%	0.21%	98.15%	NA	1.03%	0.62%	2.55%	91.93%
TATA GSM	1.60%	0.00%	99.56%	0.12%	0.12%	0.43%	1.71%	97.36%
Telenor	0.29%	1.48%	98.39%	0.35%	0.55%	0.95%	3.62%	97.17%
Vodafone	0.31%	1.40%	99.38%	0.44%	0.62%	0.80%	2.70%	96.99%

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.

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)	0.09%	0.00%	99.54%	0.08%	0.07%	0.54%	2.57%	96.52%
Airtel	1.70%	0.00%	98.43%	0.11%	0.74%	0.67%	1.78%	96.99%
BSNL	1.90%	0.61%	96.41%	0.68%	1.28%	1.14%	2.76%	96.34%
Idea	0.11%	0.04%	98.25%	0.74%	1.36%	0.53%	2.08%	98.52%
Reliance CDMA	0.31%	0.25%	98.17%	NA	0.53%	0.13%	0.42%	NA
Reliance GSM	0.13%	0.31%	98.21%	0.33%	0.46%	0.11%	0.36%	99.25%
TATA CDMA	0.05%	0.00%	98.19%	NA	0.63%	0.61%	2.32%	90.78%
TATA GSM	0.89%	0.00%	99.50%	0.18%	0.14%	0.41%	1.73%	97.54%
Telenor	0.28%	0.00%	98.38%	0.41%	0.64%	0.81%	4.76%	97.43%
Vodafone	0.32%	0.47%	99.36%	0.40%	0.64%	0.77%	2.21%	97.11%

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 TATA CDMA.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark for worst affected BTSs due to downtime. Minimum Worst Affected BTSs Due to Downtime was recorded for Aircel, Airtel, TATA CDMA & GSM and Telenor.

Call Set-up Success Rate (CSSR):

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

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Aircel 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.

Worst Affected Cells Having More than 3% TCH Drop:

Telenor failed to meet the benchmark. Best performance was recorded for Reliance GSM.

Voice Quality

TATA CDMA failed to meet the benchmark. Best performance was recorded for Reliance GSM.
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 - APRILFOR 2G

3 Day								
Name of Service Provider 3 Day April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.08%	0.00%	99.43%	0.14%	0.11%	0.60%	2.38%	96.51%
Airtel	1.76%	0.00%	98.45%	0.14%	0.85%	0.64%	1.77%	97.00%
BSNL	1.95%	1.74%	96.37%	0.54%	1.31%	1.13%	2.78%	96.92%
Idea	0.09%	0.09%	98.20%	0.81%	1.37%	0.53%	2.34%	98.30%
Reliance CDMA	0.29%	0.75%	98.53%	NA	0.22%	0.11%	0.53%	99.51%
Reliance GSM	0.24%	0.92%	97.62%	0.16%	0.31%	0.10%	0.24%	99.30%
TATA CDMA	0.00%	0.00%	98.12%	NA	0.55%	0.60%	2.25%	91.04%
TATA GSM	0.05%	0.00%	99.50%	0.21%	0.21%	0.39%	1.63%	97.60%
Telenor	0.02%	0.00%	98.38%	0.38%	0.66%	1.04%	5.92%	97.50%
Vodafone	0.02%	0.00%	99.35%	0.31%	0.65%	0.81%	2.66%	97.06%

4.2.2 3 DAY DATA –MAY FOR 2G

3 Day								
Name of Service Provider 3 Day May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.03%	0.00%	99.65%	0.04%	0.05%	0.53%	2.57%	96.52%
Airtel	1.75%	0.00%	98.45%	0.08%	0.67%	0.61%	1.82%	97.06%
BSNL	1.85%	0.04%	96.62%	0.67%	1.23%	1.06%	2.59%	96.30%
Idea	0.08%	0.00%	98.43%	0.59%	1.25%	0.48%	1.52%	98.64%
Reliance CDMA	0.11%	0.00%	97.68%	NA	0.81%	0.16%	0.58%	99.47%
Reliance GSM	0.13%	0.00%	98.63%	0.17%	0.39%	0.11%	0.44%	99.27%
TATA CDMA	0.01%	0.00%	97.79%	NA	0.87%	0.64%	2.34%	89.52%
TATA GSM	1.59%	0.00%	99.50%	0.06%	0.07%	0.36%	1.72%	97.67%
Telenor	0.17%	0.00%	98.52%	0.35%	0.51%	0.80%	3.53%	97.57%
Vodafone	0.19%	0.00%	99.37%	0.28%	0.63%	0.71%	1.26%	97.24%

4.2.3 3 DAY DATA - JUNE FOR 2G

3 Day								
Name of Service Provider 3 Day June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.15%	0.00%	99.55%	0.07%	0.04%	0.55%	2.75%	96.52%
Airtel	1.58%	0.00%	98.39%	0.13%	0.70%	0.77%	1.74%	96.90%
BSNL	1.89%	0.06%	96.23%	0.82%	1.30%	1.25%	2.92%	95.81%
Idea	0.15%	0.02%	98.11%	0.82%	1.46%	0.59%	2.38%	98.65%
Reliance CDMA	0.52%	0.00%	98.31%	NA	0.54%	0.07%	0.14%	99.49%
Reliance GSM	0.01%	0.00%	98.39%	0.67%	0.68%	0.12%	0.41%	99.17%
TATA CDMA	0.12%	0.00%	98.66%	NA	0.46%	0.59%	2.38%	91.53%
TATA GSM	0.59%	0.00%	99.50%	0.27%	0.14%	0.46%	1.83%	97.35%
Telenor	0.45%	0.00%	98.26%	0.50%	0.76%	0.59%	4.84%	97.22%
Vodafone	0.62%	1.40%	99.37%	0.61%	0.63%	0.77%	2.71%	97.02%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	1.28%	0.00%	99.46%	0.06%	0.22%	0.52%	1.68%	NA
BSNL 3G	1.87%	1.58%	96.05%	0.79%	1.70%	1.38%	2.33%	NA
Idea 3G	0.10%	0.10%	99.66%	0.25%	0.09%	0.35%	1.95%	98.59%
TATA 3G	0.74%	0.00%	99.44%	0.17%	0.67%	0.43%	2.52%	99.72%
Vodafone 3G	0.20%	0.88%	99.83%	0.09%	0.03%	0.18%	1.37%	98.93%

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 Idea 3G.

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 and Airtel 3G.

Call Set-up Success Rate (CSSR):

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

RRC Congestion:

All operators met the benchmark for RRC Congestion. The maximum RRC Congestion was observed for Airtel.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. The minimum Circuit Switched RAB Congestion was observed for Vodafone 3G.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Vodafone 3G.

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.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Tata 3G.

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 - APRILFOR 3G

Name of Service Provider Month April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.09%	0.00%	99.23%	0.12%	0.37%	0.58%	1.88%	98.91%
BSNL 3G	1.82%	1.46%	96.03%	0.80%	1.58%	1.45%	2.25%	NA
Idea 3G	0.07%	0.09%	99.64%	0.35%	0.11%	0.31%	1.63%	98.61%
TATA 3G	0.00%	0.00%	99.35%	0.23%	0.71%	0.41%	2.39%	99.73%
Vodafone 3G	0.12%	0.40%	99.82%	0.13%	0.04%	0.18%	1.23%	98.93%

4.3.2 PMR DATA –MAY FOR 3G

Name of Service Provider Month May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	3.68%	0.00%	99.60%	0.03%	0.16%	0.50%	1.79%	99.09%
BSNL 3G	1.88%	1.57%	96.10%	0.78%	1.81%	1.30%	2.48%	NA
Idea 3G	0.09%	0.09%	99.68%	0.18%	0.07%	0.35%	2.07%	98.58%
TATA 3G	2.19%	0.00%	99.55%	0.14%	0.60%	0.42%	2.53%	99.73%
Vodafone 3G	0.21%	0.73%	99.84%	0.06%	0.03%	0.18%	1.34%	98.95%

4.3.3 PMR DATA - JUNE FOR 3G

Month								
Name of Service Provider Month June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtim	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	0.09%	0.00%	99.57%	0.03%	0.15%	0.49%	1.40%	99.12%
BSNL 3G	1.92%	1.72%	96.01%	0.78%	1.72%	1.38%	2.26%	NA
Idea 3G	0.15%	0.11%	99.66%	0.22%	0.08%	0.38%	2.13%	98.58%
TATA 3G	0.00%	0.00%	99.42%	0.15%	0.72%	0.45%	2.63%	99.71%
Vodafone 3G	0.29%	1.51%	99.84%	0.07%	0.02%	0.19%	1.54%	98.91%

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.

Live Data - 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	1.05%	0.00%	99.25%	0.21%	0.55%	0.54%	1.79%	NA
BSNL 3G	1.22%	0.57%	95.89%	0.86%	1.59%	1.50%	2.62%	NA
Idea 3G	0.10%	0.04%	99.66%	0.25%	0.10%	0.35%	1.96%	98.60%
TATA 3G	0.02%	0.00%	99.34%	0.19%	0.27%	0.42%	2.40%	99.72%
Vodafone 3G	0.37%	0.52%	99.58%	0.11%	0.05%	0.19%	1.30%	98.50%

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for Tata 3G.

Worst affected Node Bs due to downtime:

All operators met the benchmark. Minimum worst affected Node Bs due to downtime was recorded for Airtel 3G and Tata 3G.

Call Set-up Success Rate (CSSR):

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

RRC Congestion:

All operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Vodafone 3G.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. The maximum Circuit Switched RAB Congestion was observed for Vodafone 3G.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Vodafone 3G.

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 3G.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Maximum Circuit Switch Voice Quality was recorded for TATA 3G.

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 - APRILFOR 3G

3 Day								
Name of Service Provider 3 Day April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.31%	0.00%	97.88%	0.54%	1.39%	0.63%	2.07%	99.00%
BSNL 3G	0.18%	1.48%	96.27%	0.72%	1.24%	1.34%	2.23%	NA
Idea 3G	0.01%	0.09%	99.63%	0.38%	0.15%	0.31%	1.80%	98.62%
TATA 3G	0.00%	0.00%	98.89%	0.30%	0.82%	0.40%	2.18%	99.72%
Vodafone 3G	0.02%	0.00%	99.25%	0.15%	0.07%	0.16%	1.12%	97.70%

4.4.2 3 DAY DATA –MAY FOR 3G

3 Day								
Name of Service Provider 3 Day May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.00%	0.00%	99.95%	0.06%	0.14%	0.54%	1.57%	99.57%
BSNL 3G	1.85%	0.26%	95.56%	0.92%	1.75%	1.69%	2.73%	NA
Idea 3G	0.09%	0.01%	99.69%	0.13%	0.08%	0.33%	1.86%	98.60%
TATA 3G	0.00%	0.00%	99.56%	0.15%	0.00%	0.41%	2.39%	99.74%
Vodafone 3G	0.36%	0.05%	99.62%	0.17%	0.06%	0.20%	1.39%	97.70%

4.4.3 3 DAY DATA - JUNE FOR 3G

3 Day								
Name of Service Provider 3 Day June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.14%	0.00%	99.92%	0.03%	0.11%	0.50%	1.75%	99.55%
BSNL 3G	0.00%	0.00%	95.83%	0.93%	1.80%	1.46%	2.89%	NA
Idea 3G	0.16%	0.01%	99.66%	0.23%	0.08%	0.40%	2.21%	98.58%
TATA 3G	0.05%	0.00%	99.57%	0.12%	0.00%	0.46%	2.64%	99.71%
Vodafone 3G	0.57%	1.51%	99.86%	0.01%	0.01%	0.20%	1.39%	98.97%

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)	99.87%	98.02%	0.81%	NDR	95.76%	0.82%
Airtel	NDR	99.60%	3.40%	NDR	99.79%	3.60%
BSNL	NDR	96.95%	2.56%	NDR	96.89%	2.61%
Idea	NDR	99.82%	1.00%	NDR	99.12%	1.02%
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	92.00%	96.56%	1.28%	NDR	NDR	NDR
TATA GSM	NDR	97.78%	1.55%	NDR	NDR	1.61%
Telenor	95.69%	99.29%	0.90%	92.14%	99.65%	0.83%
Vodafone	NDR	NDR	4.79%	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:

Telenor and TATA CDMA failed to meet the benchmark for Activation done within 4 hours in PMR and Live audit. Aircel had maximum percentage in Activation done within 4 hours for PMR data.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate. Maximum PDP Context activation Success rate was recorded for Idea in PMR data and Airtel in Live data.

Drop Rate:

All operators met the benchmark for Drop Rate. Minimum Drop Rate was recorded for Aircel in PMR and Live data.

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	99.45%	0.56%	NDR	99.96%	0.63%
BSNL 3G	NDR	96.95%	2.65%	NDR	96.70%	2.89%
Idea 3G	NDR	99.90%	0.86%	NDR	99.96%	0.85%
TATA 3G	100.00%	99.99%	3.18%	100.00%	NDR	3.13%
Vodafone 3G	NDR	NDR	0.55%	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:

No data received from operators for Activation done within 4 hours in PMR audit as well as live.

PDP Context activation success rate:

All operators met the benchmark PDP Context activation success rate in PMR audit as well as live. Maximum PDP Context activation success rate was recorded for TATA 3G in PMR data and Idea 3G in Live data.

Drop Rate:

All operators met the benchmark for Drop Rate in PMR audit as well as live. Minimum Drop Rate was recorded for Vodafone 3G in PMR data and Airtel 3G in Live data.

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)	NDR	NDR	100.00%	98.00%	90.00%	NDR
Airtel	99.00%	100.00%	100.00%	100.00%	84.33%	99.00%
BSNL	96.00%	96.00%	98.00%	98.00%	85.33%	96.00%
Idea	96.00%	96.00%	100.00%	100.00%	94.33%	99.00%
Reliance CDMA	95.00%	95.00%	100.00%	100.00%	86.00%	99.00%
Reliance GSM	98.00%	98.00%	100.00%	100.00%	92.33%	100.00%
TATA CDMA	NDR	NDR	100.00%	100.00%	89.67%	NDR
TATA GSM	NDR	NDR	100.00%	100.00%	66.67%	NDR
Telenor	NDR	NDR	100.00%	98.00%	92.33%	NDR
Vodafone	100.00%	100.00%	100.00%	100.00%	89.00%	100.00%

Resolution of billing complaints

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

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.

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.

Complaint/Request Attended to Satisfaction

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

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)	0.00%	0.00%	100.00%	100.00%	100.00%	89.43%	95.23%
Airtel	0.09%	0.02%	100.00%	100.00%	100.00%	99.95%	87.25%
BSNL	0.00%	0.01%	100.00%	100.00%	100.00%	100.00%	99.31%
Idea	0.50%	0.14%	100.00%	100.00%	100.00%	98.79%	99.68%
Reliance CDMA	0.09%	0.01%	100.00%	100.00%	100.00%	98.71%	84.79%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	99.53%	82.75%
TATA CDMA	0.00%	0.00%	NA	NA	NA	100.00%	99.78%
TATA GSM	0.00%	0.00%	100.00%	100.00%	100.00%	95.57%	97.97%
Telenor	NA	NA	100.00%	100.00%	100.00%	99.51%	98.76%
Vodafone	0.21%	0.02%	100.00%	100.00%	100.00%	99.96%	98.30%

Metering and Billing Credibility – Post-paid Subscribers

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

All operators met the benchmark for IVR call being attended except Aircel. BSNL and TATA CDMA recorded the best performance for the parameter.

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

Airtel and Reliance GSM & CDMA failed to meet the TRAI specified benchmark of 95%. TATA CDMA 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%	100.00%	100.00%	92.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%
BSNL	100.00%	100.00%	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%	99.00%	100.00%	100.00%	99.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	98.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	98.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	97.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
Telenor	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.00%	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 COMPARISON BETWEEN IMRB AND OPERATOR'S PMR DATA 2G

Circle	Operator	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call Drop Rate		Worst affected cells having more than 3%)		Connection with good voice quality		Point of Interconnection (POI)	
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
Maharashtra & Goa	Aircel	0.10	0.09	0.22	0.22	99.33	99.33	0.14	0.14	0.17	0.17	0.64	0.64	2.64	2.64	96.25	96.25	0.00	0.00
	Airtel	0.03	1.22	0.00	0.00	98.47	98.40	0.10	0.10	0.67	0.73	0.63	0.62	1.78	1.76	96.94	96.92	0.00	0.00
	BSNL	1.95	1.91	1.75	1.75	96.67	96.67	0.55	0.55	1.17	1.17	1.11	1.11	2.74	2.74	96.71	96.71	0.00	0.00
	Idea	0.08	0.08	0.10	0.10	98.26	98.26	0.67	0.67	1.25	1.25	0.59	0.59	2.16	2.16	98.60	98.59	0.00	0.00
	RCOM CDMA	0.20	0.19	1.16	1.16	97.82	97.82	0.00	NA	0.70	0.70	0.13	0.12	0.42	0.45	99.62	99.39	0.00	0.00
	RCOM GSM	0.13	0.13	1.00	1.00	98.35	98.35	0.20	0.20	0.45	0.45	0.11	0.11	0.41	0.42	99.24	99.24	0.00	0.00
	TTML CDMA	0.04	0.04	0.00	0.07	98.21	98.21	0.00	NA	0.82	0.82	0.63	0.63	2.41	2.41	99.91	91.06	0.00	0.00
	TTML GSM	0.02	1.28	0.00	0.00	99.54	99.54	0.09	0.09	0.12	0.12	0.40	0.40	1.67	1.67	97.55	97.55	0.00	0.00
	Telenor	0.23	0.23	1.04	1.04	98.50	98.50	0.38	0.38	0.53	0.53	0.91	0.91	3.82	3.83	97.34	97.33	0.00	0.00
	Vodafone	0.24	0.23	0.86	0.86	99.33	99.33	0.41	0.35	0.67	0.67	0.73	0.73	2.69	2.66	97.12	97.12	0.00	0.00

IMRB audit data

Difference between IMRB and Operators data

4.11 COMPARISON BETWEEN IMRB AND OPERATOR'S PMR DATA 3G

Circle	Operator	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		Call Set-up Success Rate		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched voice drop rate		%Circuit Switch Voice Quality		Point of Interconnection (POI)	
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
Maharashtra & Goa	Airtel	0.07	1.28	0.00	0.00	99.42	99.46	0.07	0.06	0.25	0.22	0.54	0.52	1.78	1.68	99.02	NA	0.00	0.00
	BSNL	1.83	1.87	1.53	1.58	96.00	96.05	0.73	0.79	1.67	1.70	1.33	1.38	2.27	2.33	96.70	NA	0.00	0.00
	IDEA	0.11	0.10	0.10	0.10	99.66	99.66	0.25	0.25	0.09	0.09	0.35	0.35	1.95	1.95	98.59	98.59	0.00	0.00
	Tata	0.04	0.74	0.00	0.00	98.78	99.44	0.17	0.17	0.31	0.67	0.43	0.43	2.52	2.52	100.00	99.72	0.00	0.00
	Vodafone	0.21	0.20	0.88	0.88	99.83	99.83	0.09	0.09	0.03	0.03	0.18	0.18	1.37	1.37	98.93	98.93	0.00	0.00

IMRB audit data

Difference between IMRB and Operators data

5 CRITICAL FINDINGS

6 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Telenor failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop.
- TATA CDMA failed to meet the benchmark for Voice quality.

3 Day Live Measurement (Network Parameters) for 2G

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

Wireless Data Services for 2G

- Telenor and TATA CDMA failed to meet the benchmark for Activation done within 4 hours in PMR audit.

Live Calling

- As per the consumers (live calling exercise) BSNL, Idea, Reliance CDMA failed to meet the benchmark of resolving 98% complaints within 4 weeks and BSNL, Idea, Reliance CDMA & GSM failed to meet 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.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea and Vodafone failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers all operators met the benchmark of charging disputes except Idea.
- All operators met the benchmark for IVR call being attended except Aircel.
- Airtel and Reliance GSM & CDMA failed to meet the TRAI specified benchmark of 95%.

Operators Assisted Drive test (Voice) for 2G

- In Buldhana SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.
- In Buldhana SSA BSNL failed to meet the benchmarks for CSSR.
- In Buldhana SSA BSNL failed to meet the benchmark of call drop rate.
- In Panji SSA Reliance GSM and Reliance CDMA failed to meet the benchmark for voice quality in outdoor locations.
- In Panji SSA BSNL and Reliance GSM failed to meet the benchmark for call drop rate in outdoor
- In Jalgaon SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations.
- In Jalgaon SSA BSNL failed to meet the benchmarks of CSSR in indoor

- In Jalgaon SSA BSNL failed to meet the benchmark of call drop rate in outdoor location.
- In Nasik SSA Reliance GSM failed to meet the benchmark for voice quality in outdoor
- In Akola SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.
- In Akola SSA BSNL failed to meet the benchmarks of CSSR in indoor as well as outdoor location
- In Kolhapur SSA BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations and Telenor failed in outdoor location
- In Kolhapur SSA BSNL failed to meet the benchmark for CSSR in outdoor
- In Kolhapur SSA BSNL failed to meet the benchmark for call drop rate in outdoor
- In Beed SSA BSNL failed to meet the benchmark for voice quality in indoor as well as outdoor locations and Telenor failed in outdoor location.
- In Beed SSA BSNL failed to meet the benchmark of call drop rate in outdoor locations.

Operators Assisted Drive test (Voice) for 3G

- In Buldhana SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as out door.
- In Buldhana SSA BSNL 3G met the benchmark for call drop rate in outdoor locations.
- In Panji SSA BSNL 3G and Reliance GSM failed to meet the benchmark for CSSR in indoor.
- In Panji SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor.
- In Jalgaon SSA Vodafone 3G failed to meet the benchmark for Voice quality in indoor location.
- In Jalgaon SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.
- In Akola SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor location.
- In Akola SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor location
- In Kolhapur SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.
- In Kolhapur SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations
- In Beed SSA BSNL 3G failed to meet the benchmark for Voice quality in outdoor locations
- In Beed SSA BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations

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

7.1 BTS ACCUMULATED DOWNTIME

7.1.1 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 –**

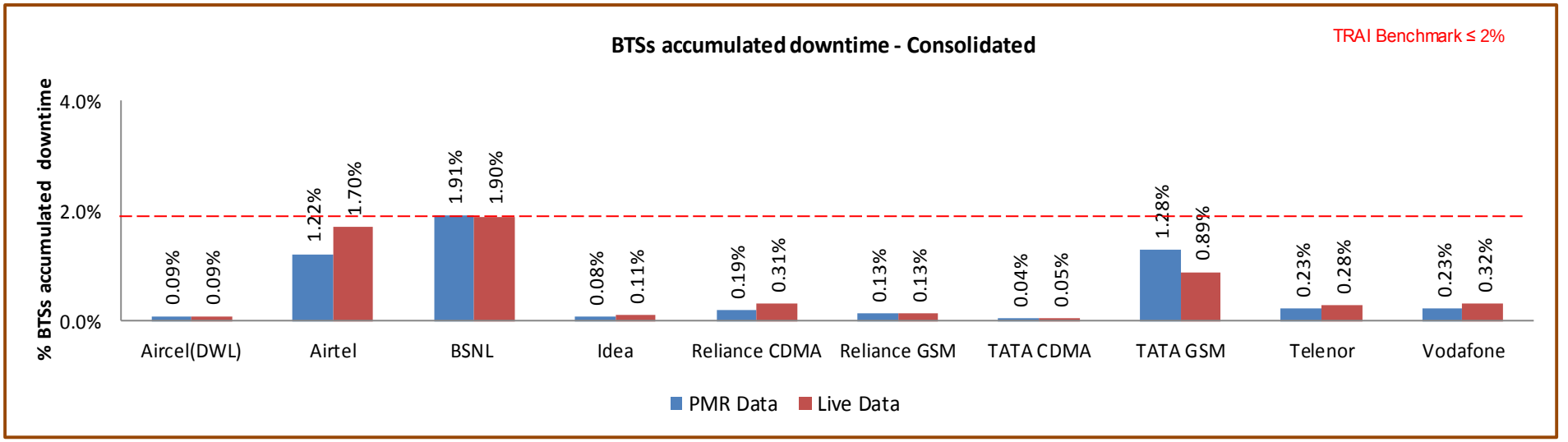
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

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.

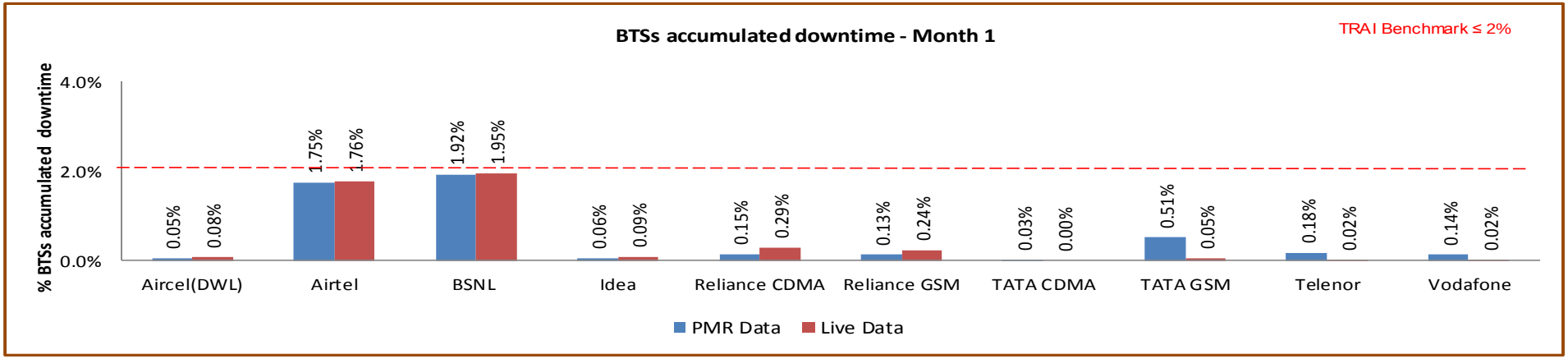
7.1.2 KEY FINDINGS - CONSOLIDATED



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

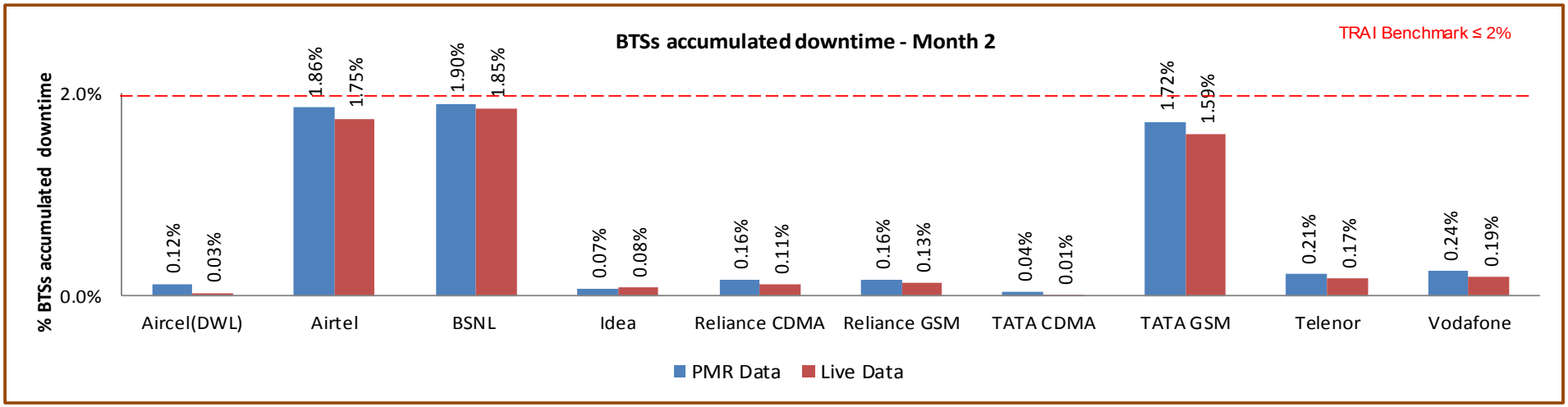
All operators met the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

7.1.2.1 KEY FINDINGS – MONTH 1



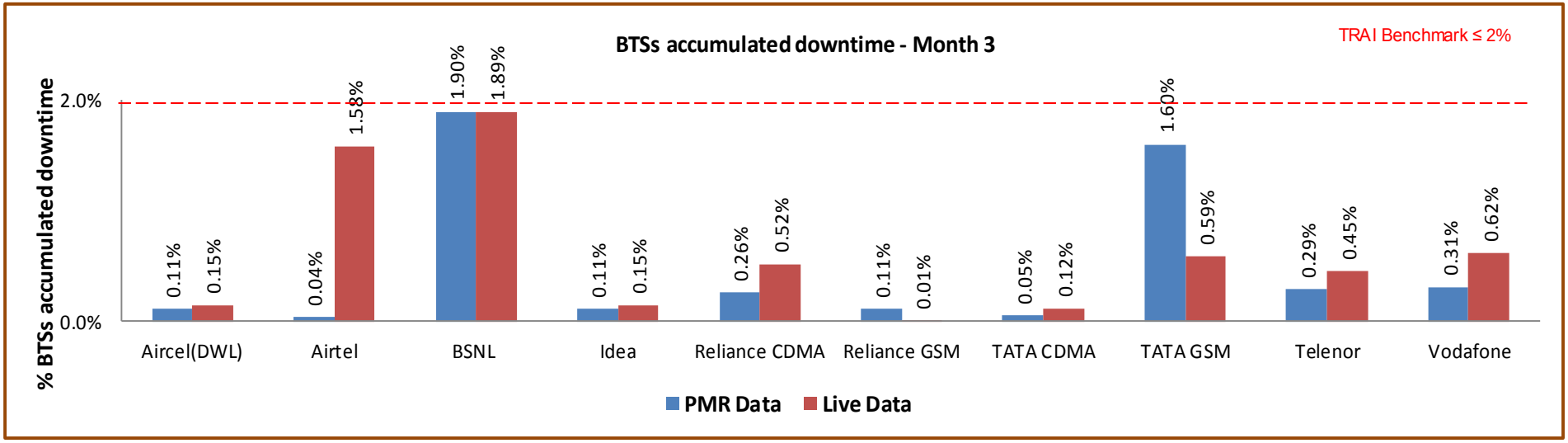
Data Source: Operations and Maintenance Center (OMC) of the operators

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 BTS DUE TO DOWNTIME

7.2.1 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.

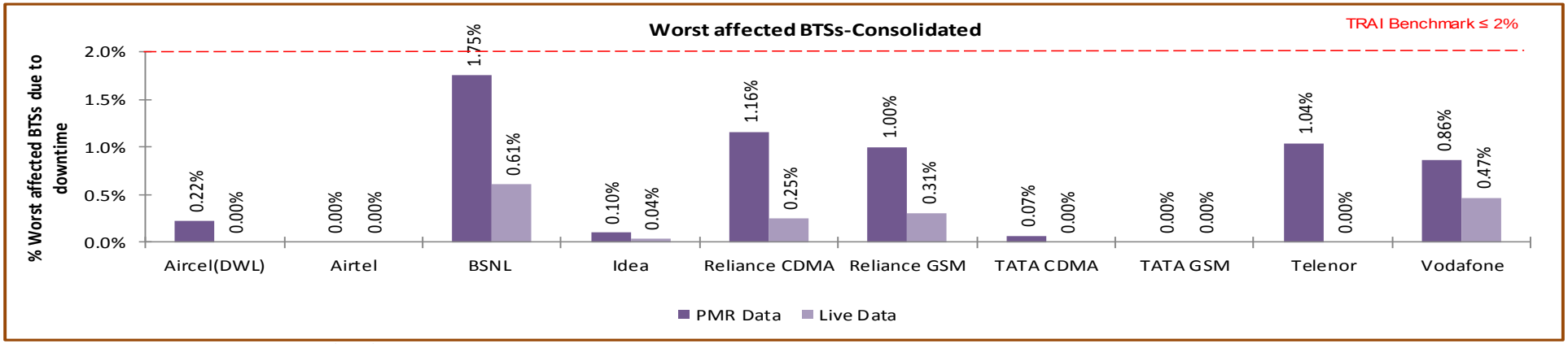
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

7.2.2 KEY FINDINGS– CONSOLIDATED

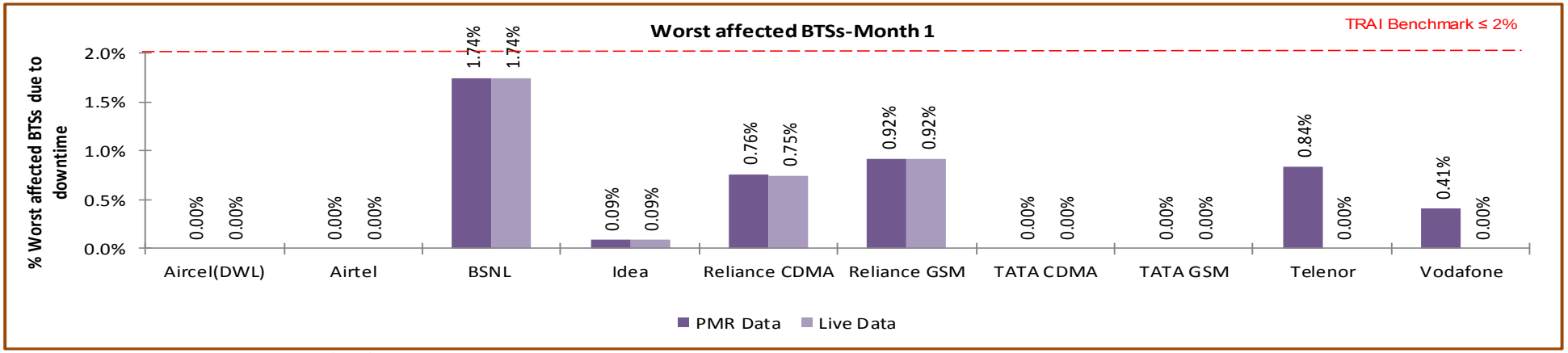


Data Source: Operations and Maintenance Center (OMC) of the operators

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

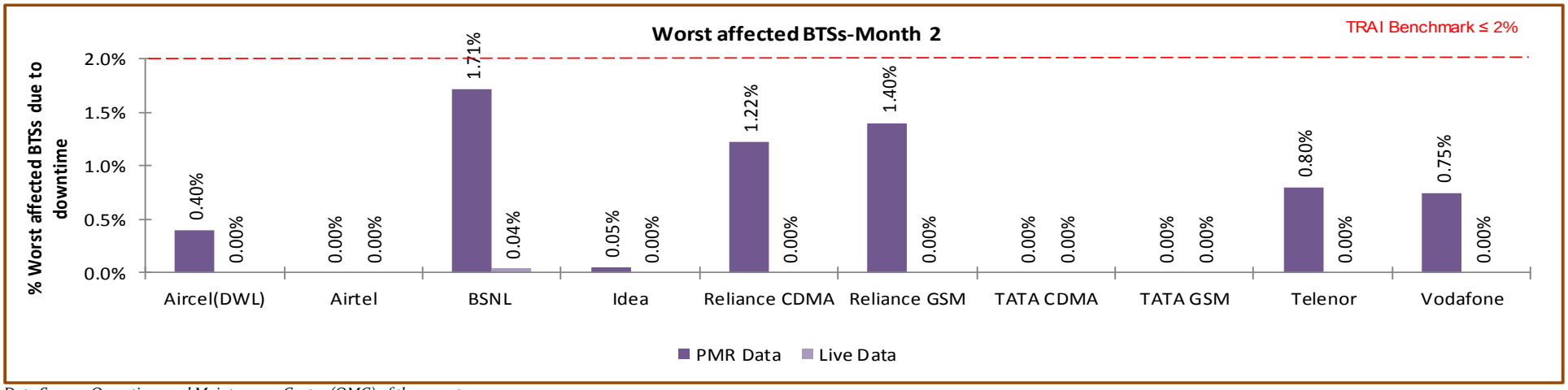
Significant difference was observed between PMR & live measurement data for BSNL Telenor, reliance GSM & CDMA and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.2.2.1 KEY FINDINGS – MONTH 1



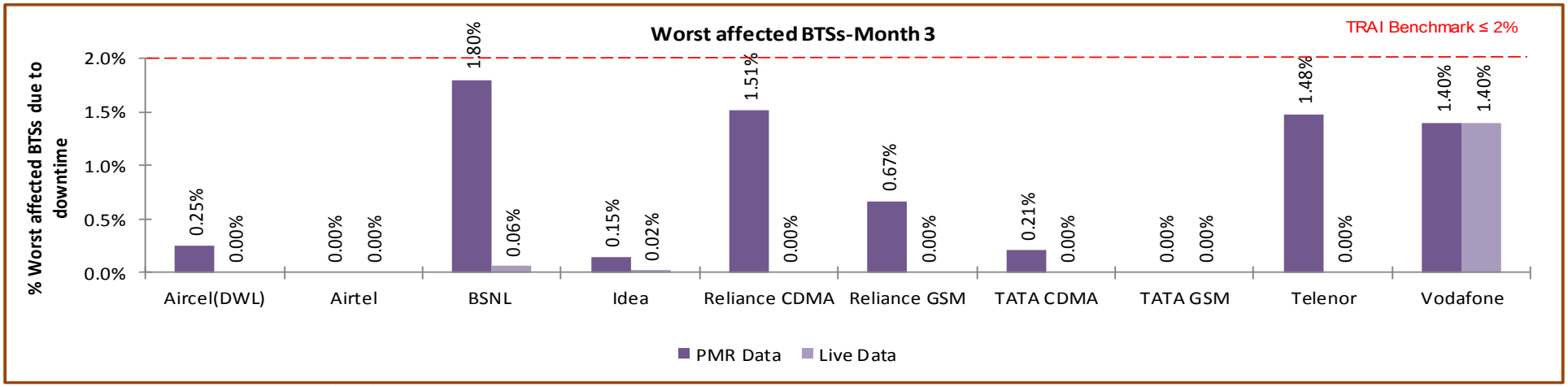
Data Source: Operations and Maintenance Center (OMC) of the operators

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:** 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

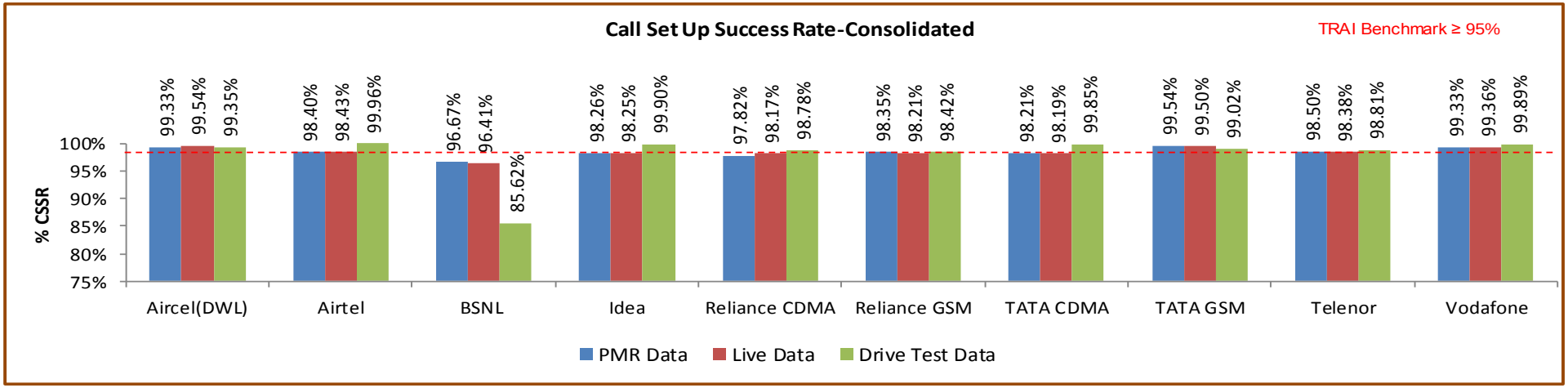
   Call Established means the following events have happened in call setup:-

   - 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.

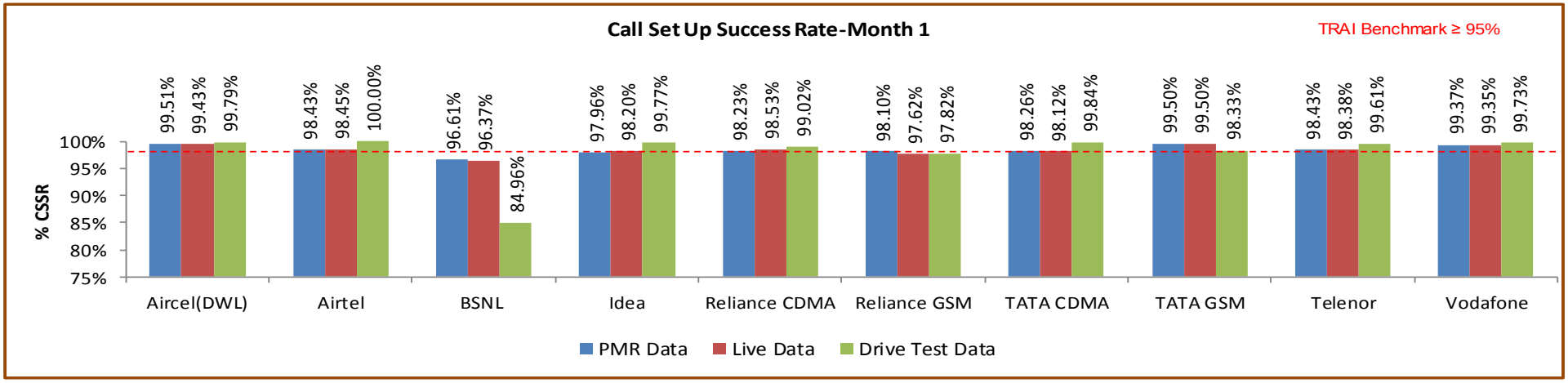
7.3.2 KEY FINDINGS - CONSOLIDATED



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

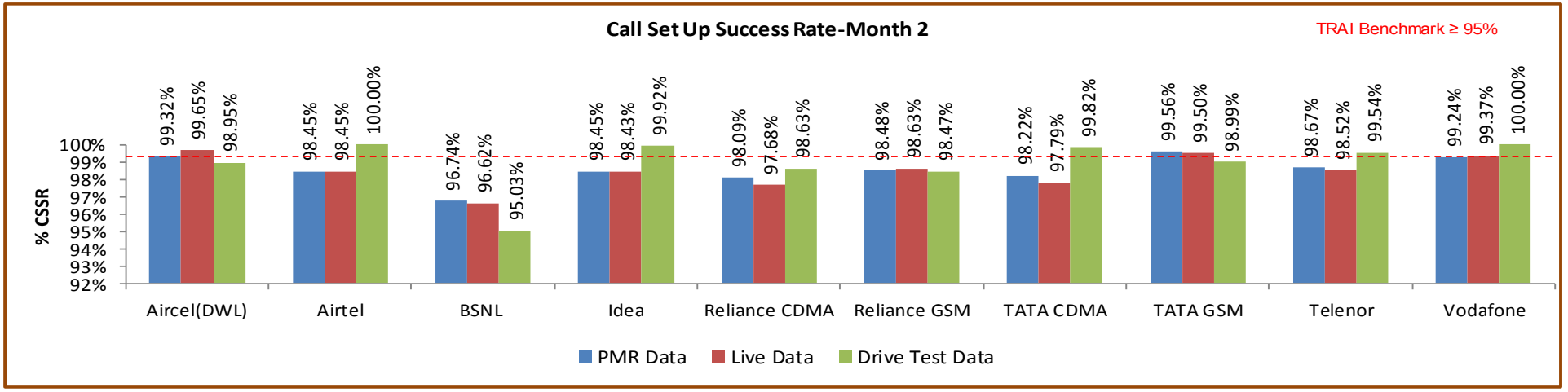
All operators met the TRAI benchmark as per audit/PMR, 3days live. During drive test BSNL failed to meet the TRAI benchmark.

7.3.2.1 KEY FINDINGS – MONTH 1



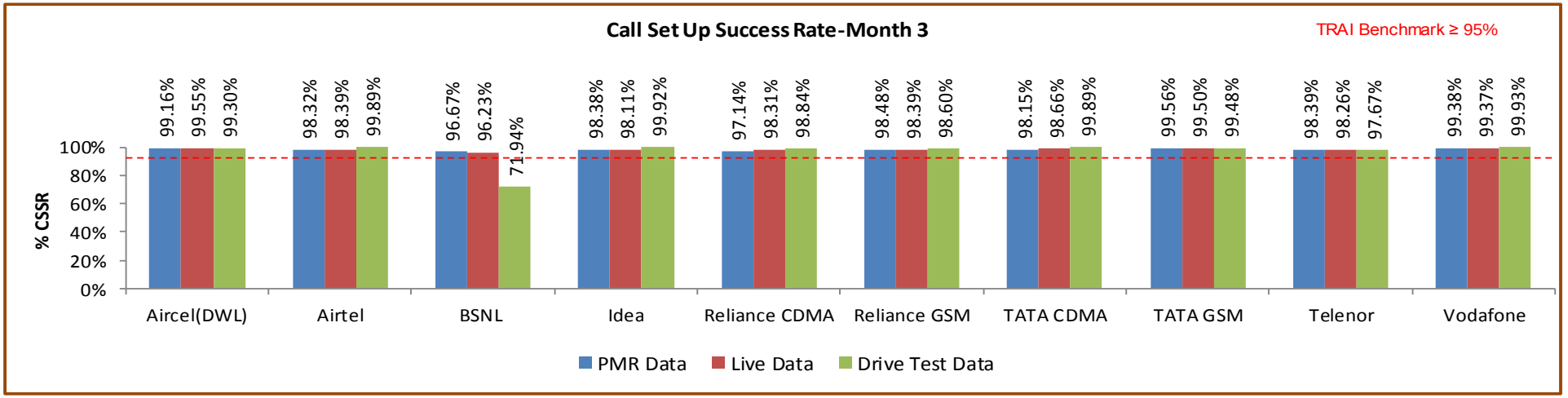
Data Source: Network Operations Center(NOC) of the operators

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- PAGING CHANNEL /TCH CONGESTION/POI

7.4.1 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

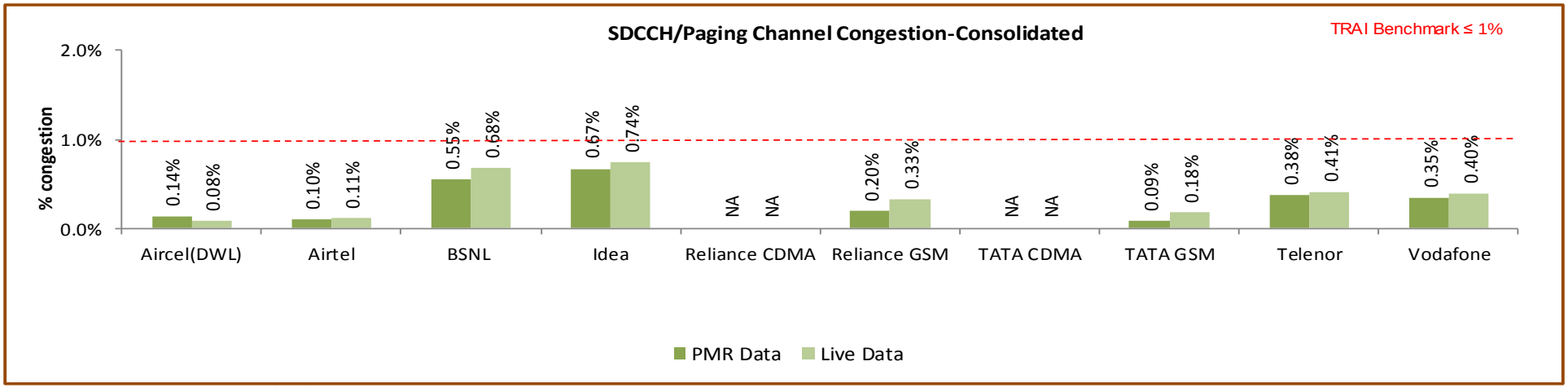
3. **Benchmark:**

   - 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

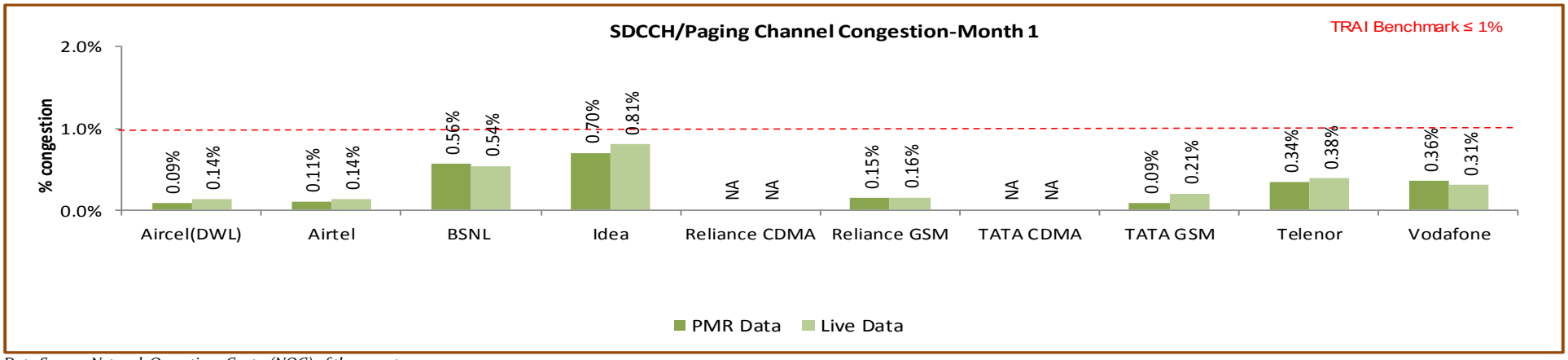
7.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



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

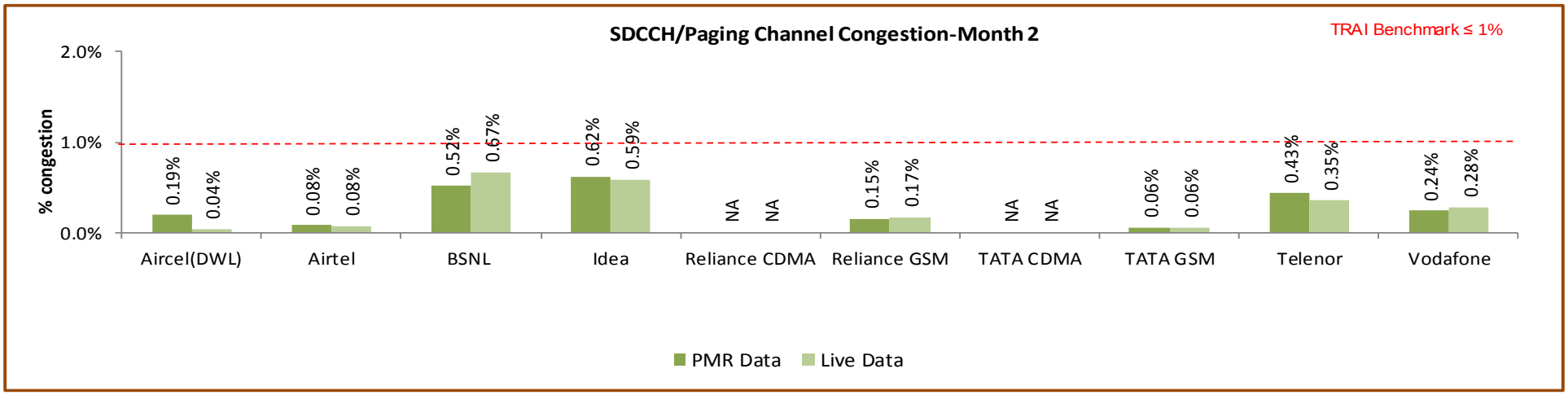
All operators met the benchmark as per PMR/audit Data.
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

7.4.2.1 KEY FINDINGS – MONTH 1



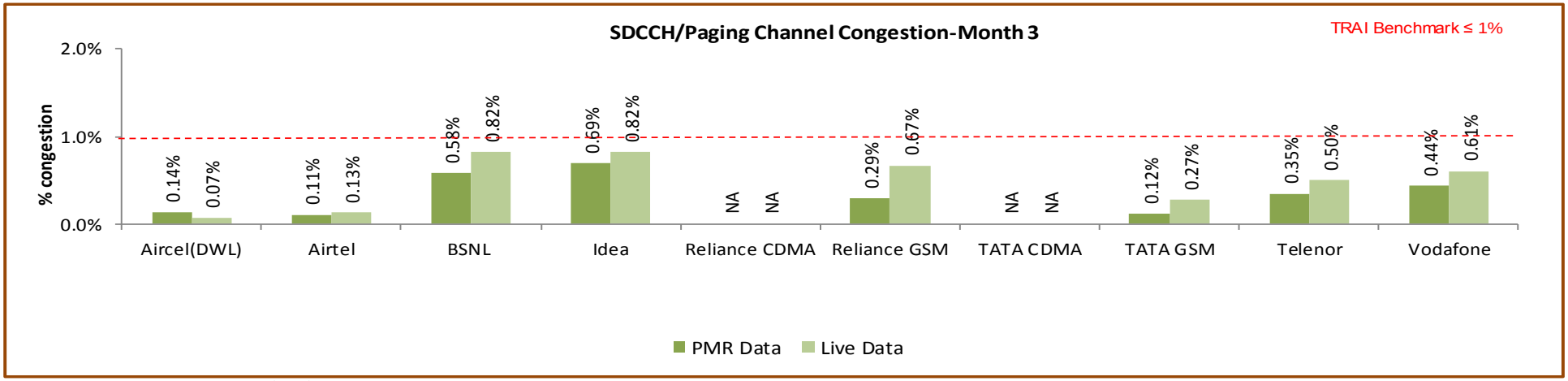
Data Source: Network Operations Center(NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2



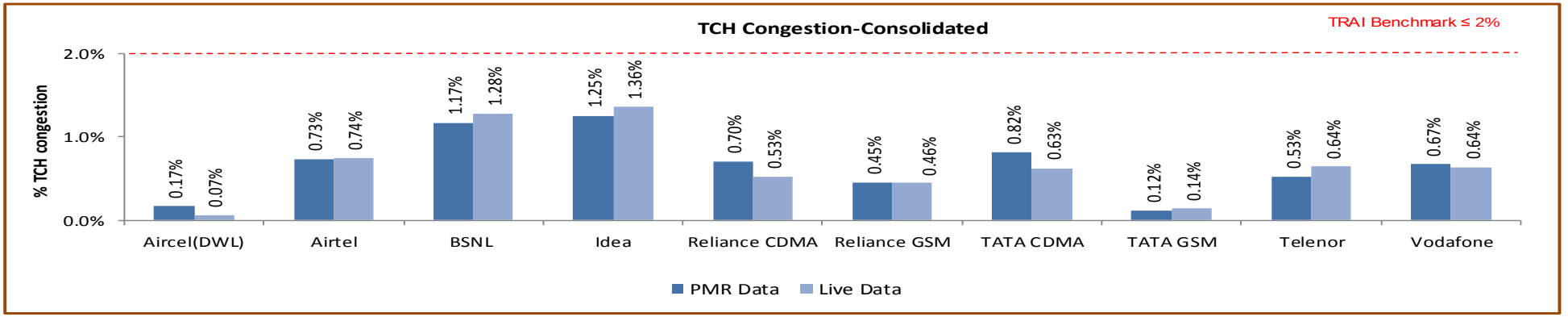
Data Source: Network Operations Center(NOC) of the operators

7.4.2.3 KEY FINDINGS – MONTH 3



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

7.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

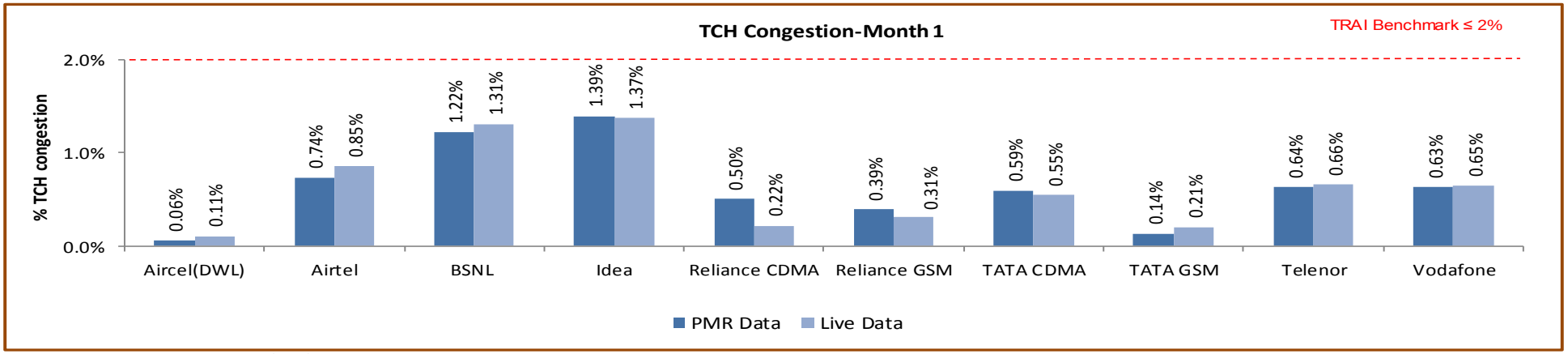


Data Source: Network Operations Center(NOC) of the operators

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

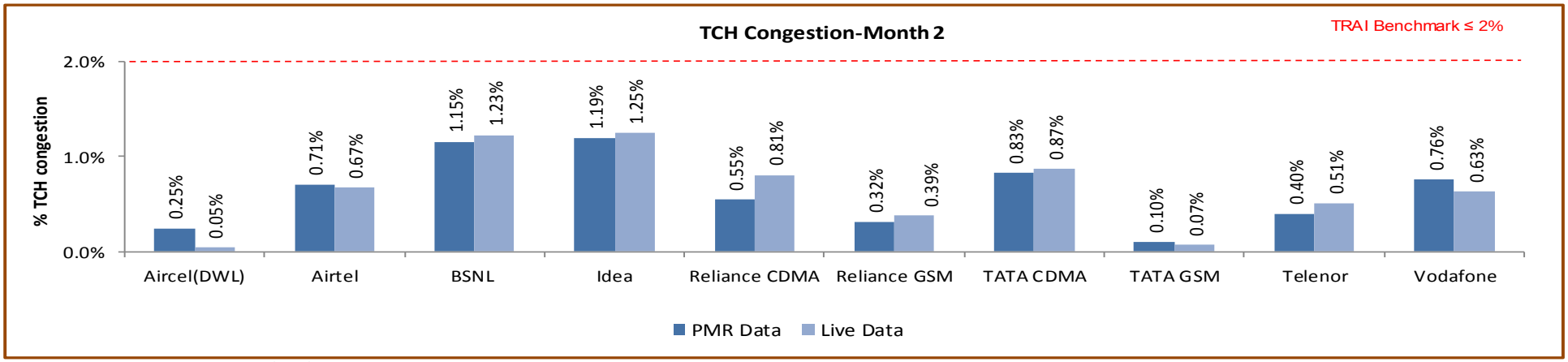
Significant difference was observed between PMR & live measurement data for BSNL, Telenor. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.4.3.1 KEY FINDINGS – MONTH 1



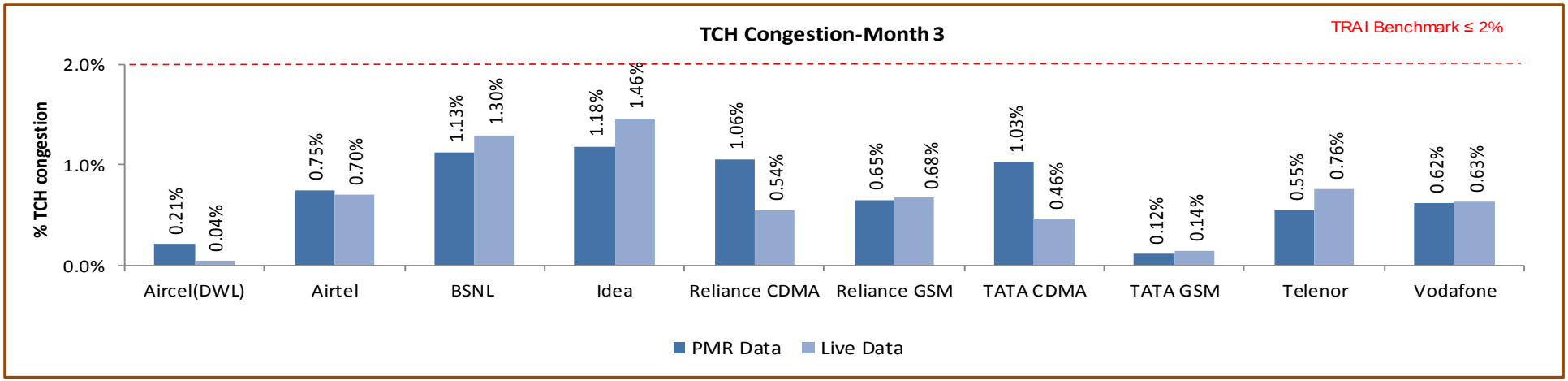
Data Source: Network Operations Center(NOC) of the operators

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	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		234	1497	194	2862	354	134	1176	576	79	295
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		58054	908067	299452	3455063	60598	82089	207219	193896	441648	12427037
Traffic served for all POIs (B)- in erlangs		38817	509403	162226	898738	12065	42561	84360	88515	253523	2907721
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		234	1500	194	2862	353	141	1176	576	87	295
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		57506	752250	301087	3452934	60407	79970	207219	193896	431369	6401694
Traffic served for all POIs (B)- in erlangs		24259	501605	161019	903647	11377	41951	73564	72642	175524	238563
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.

7.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	501	63	954	118	48	392	192	25	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19265	300537	100570	1150830	21563	27028	70290	65446	142545	2777061
Traffic served for all POIs (B)- in erlangs		12926	168618	56598	308518	6034	13606	29804	31195	81159	1347539
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-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	504	63	954	117	47	392	192	26	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19265	297972	100570	1150830	21399	26191	70290	65446	141548	95761
Traffic served for all POIs (B)- in erlangs		12303	166337	56380	308518	6087	13104	20056	22926	8668	46467
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

7.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-May											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	498	63	954	118	43	392	192	25	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19124	301770	99454	1150830	20917	26851	71003	65199	151643	2871817
Traffic served for all POIs (B)- in erlangs		12813	171169	54025	308518	5225	13099	28039	29720	80864	1411444
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-May											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	497	63	956	118	48	392	192	25	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19037	148810	101095	1141052	20904	26716	71003	65199	144354	102565
Traffic served for all POIs (B)- in erlangs		5975	171067	53191	306960	5185	13003	27120	29680	77931	50409
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

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-June											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	498	68	954	118	43	392	192	29	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		19665	305760	99428	1153404	18117	28210	65926	63252	147459	6778160
Traffic served for all POIs (B)- in erlangs		13078	169616	51602	281701	806	15856	26517	27601	91500	148738
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-June											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
NDR		78	499	68	952	118	46	392	192	36	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		19204	305468	99422	1161052	18104	27063	65926	63252	145467	6203368
Traffic served for all POIs (B)- in erlangs		5982	164200	51447	288168	105	15845	26389	20036	88925	141687
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

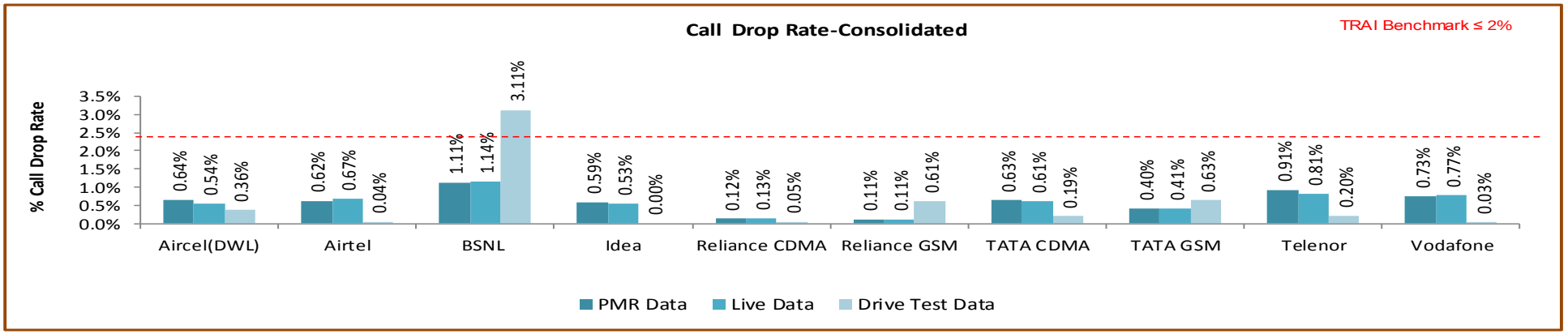
Data Source: Network Operations Center(NOC) of the operators

7.5 CALL DROP RATE

7.5.1 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.

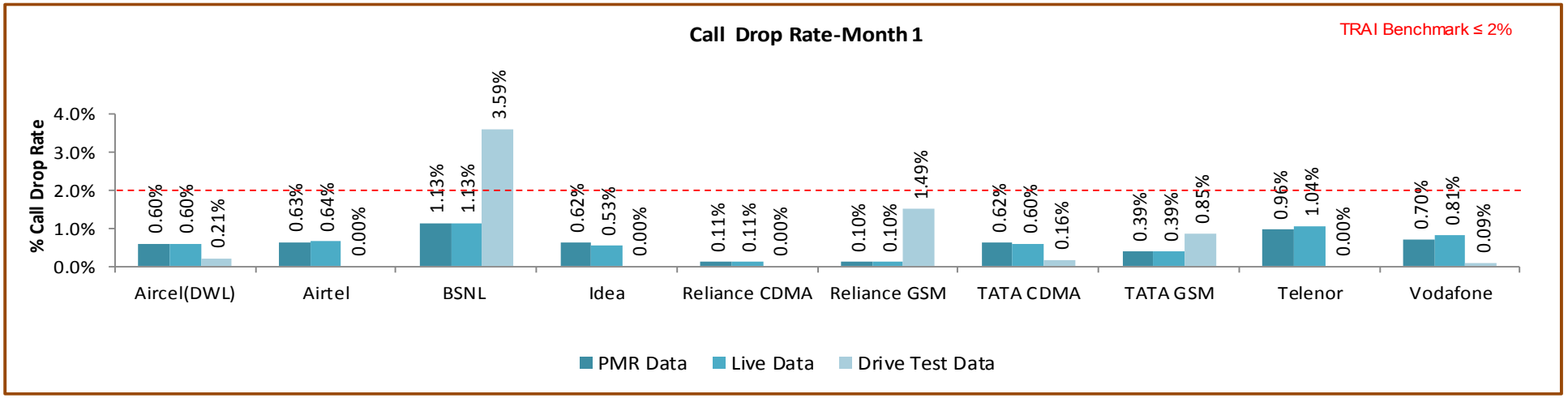
7.5.2 KEY FINDINGS - CONSOLIDATED



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

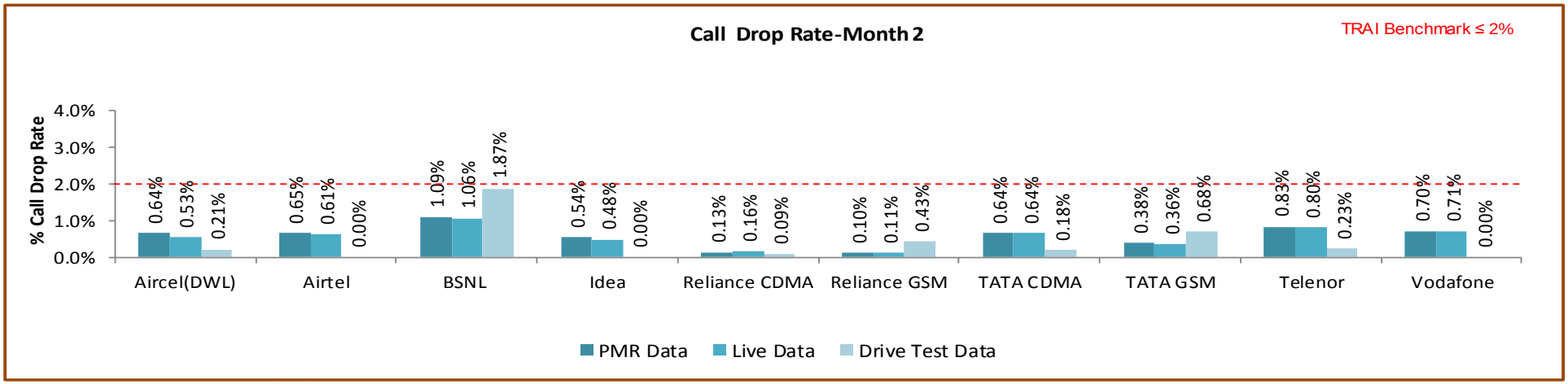
All operators met the benchmark for call drop rate during audit. During drive test BSNL failed to meet the TRAI benchmark

7.5.2.1 KEY FINDINGS – MONTH 1



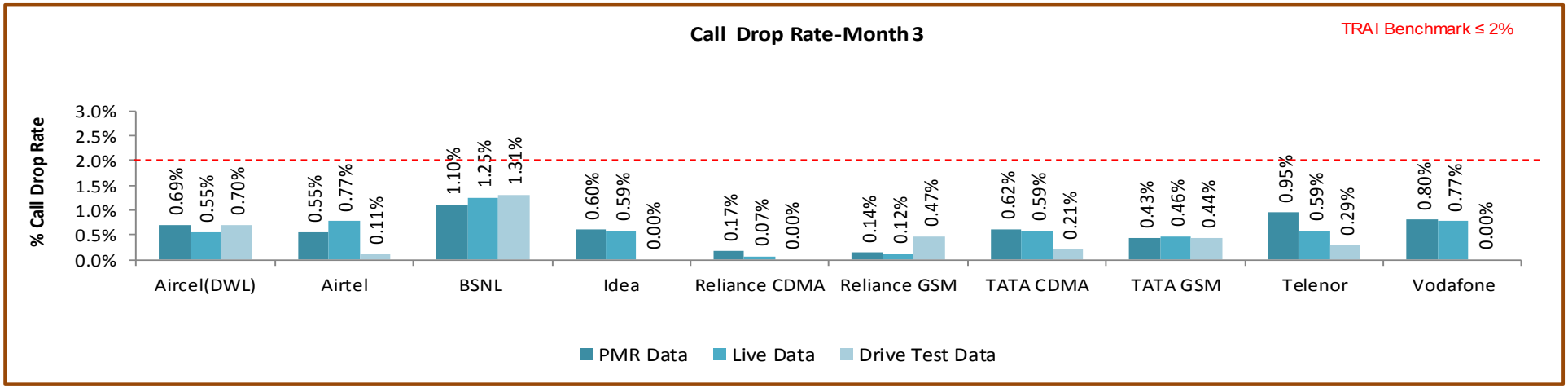
Data Source: Network Operations Center(NOC) of the operators

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 CELLS HAVING GREATER THAN 3% TCH DROP

7.6.1 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 –**

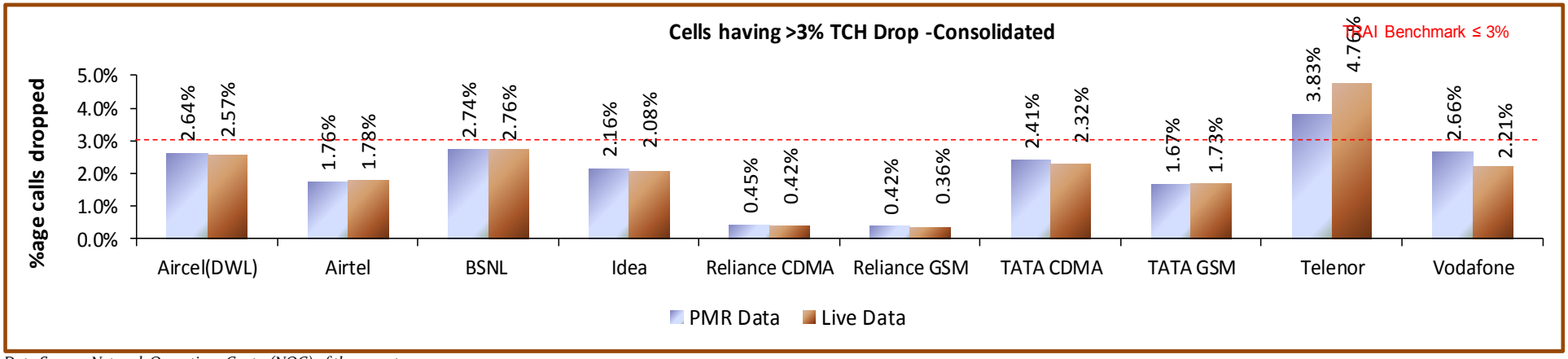
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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.

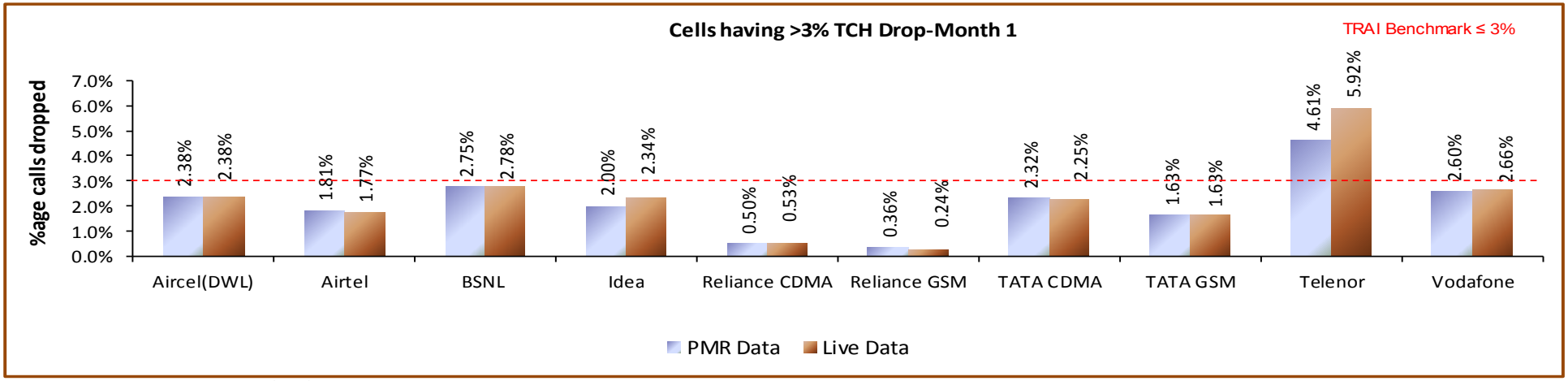
7.6.2 KEY FINDINGS - CONSOLIDATED



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

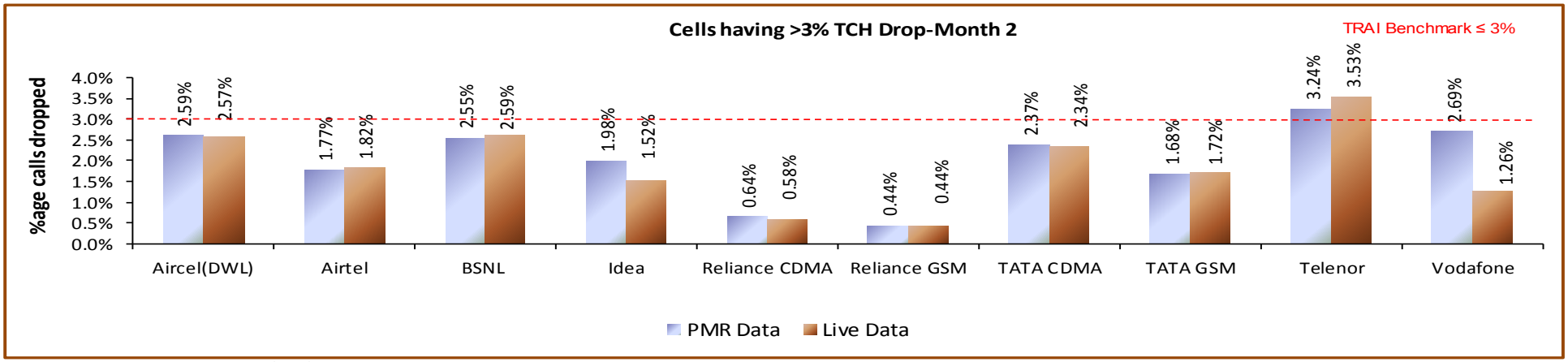
Aircel, BSNL and Telenor failed to meet the TRAI benchmark in PMR data and Live data and Vodafone failed to meet in PMR Data.

7.6.2.1 KEY FINDINGS – MONTH 1



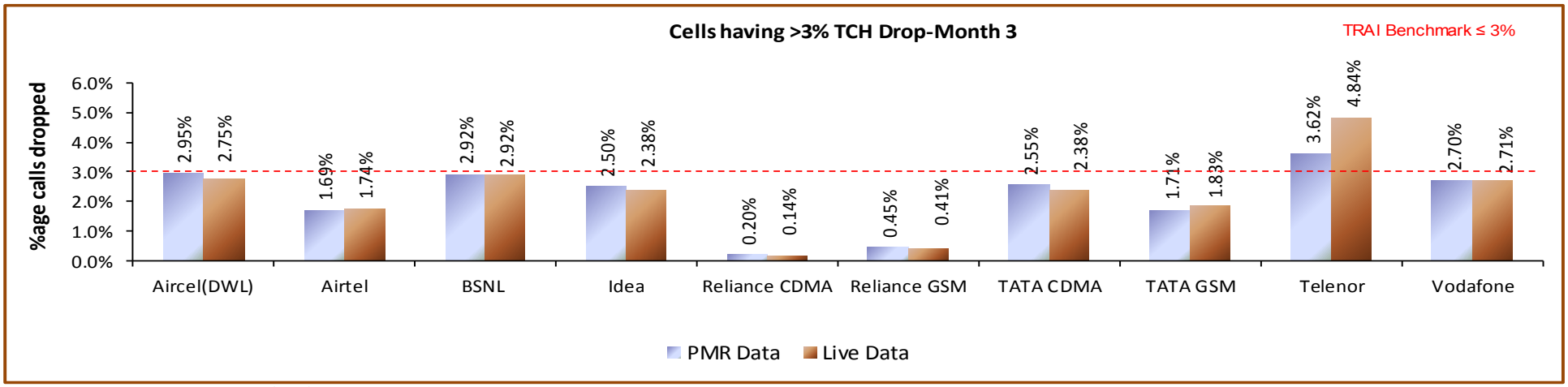
Data Source: Network Operations Center(NOC) of the operators

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 VOICE QUALITY

7.7.1 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**

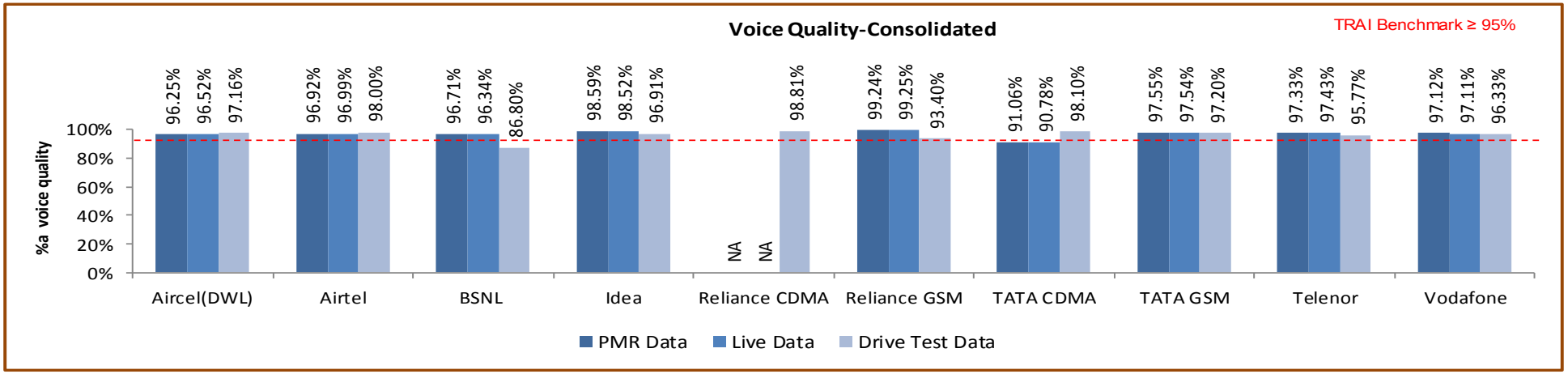
3. **TRAI Benchmark:** ≥ 95%

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.

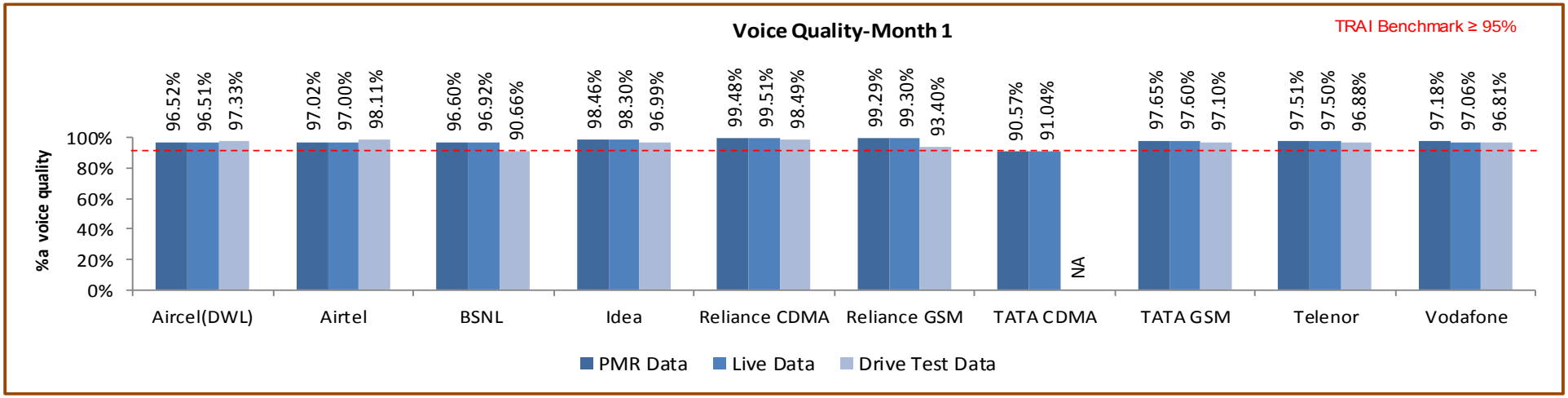
7.7.2 KEY FINDINGS



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

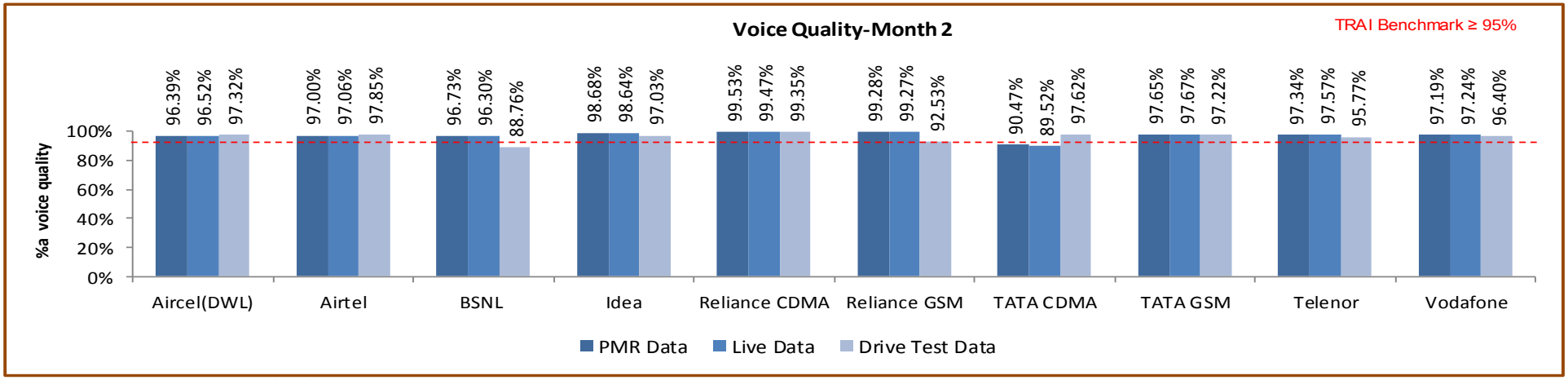
TATA CDMA failed to meet the benchmark for PMR Data and Live Data. During drive test BSNL and Reliance GSM failed to meet the TRAI benchmark.

7.7.2.1 KEY FINDINGS – MONTH 1



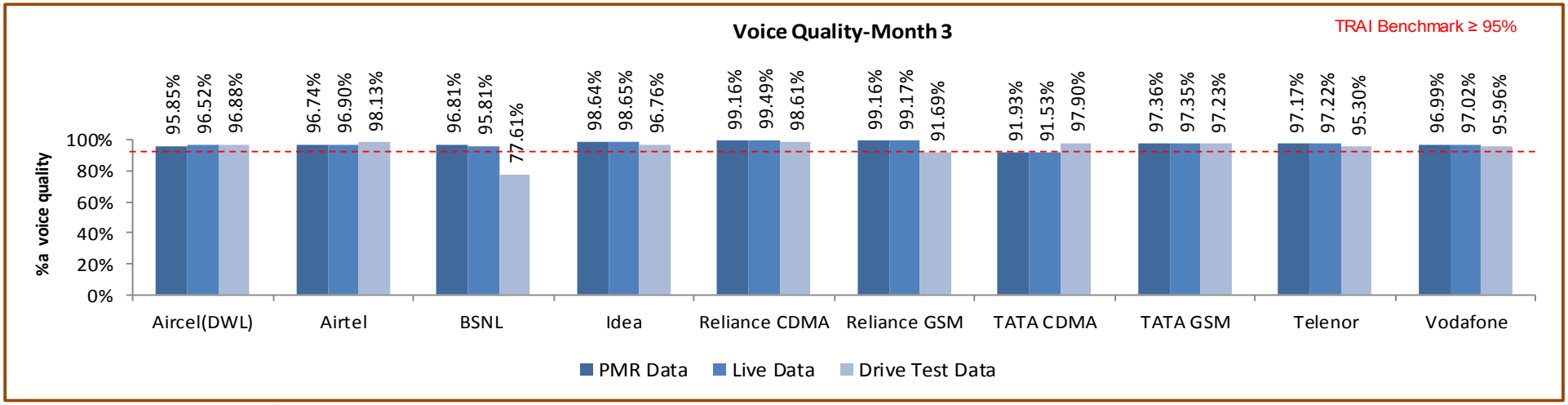
Data Source: Network Operations Center(NOC) of the operators

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 - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

8.1 NODE BS DOWNTIME

8.1.1 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 –

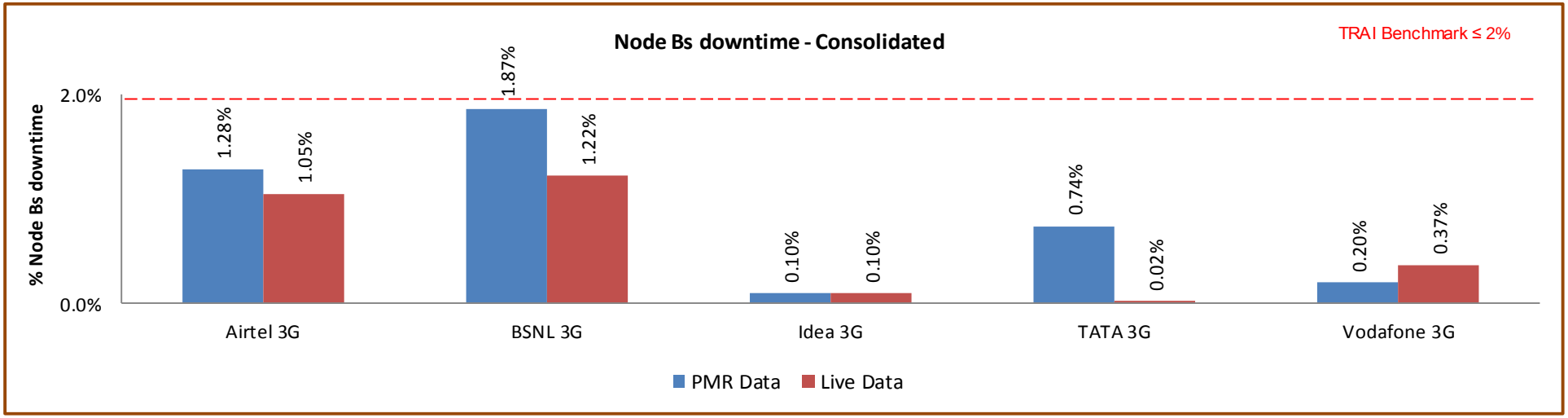
a. Node Bs downtime (not available for service) ≤ 2%

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.

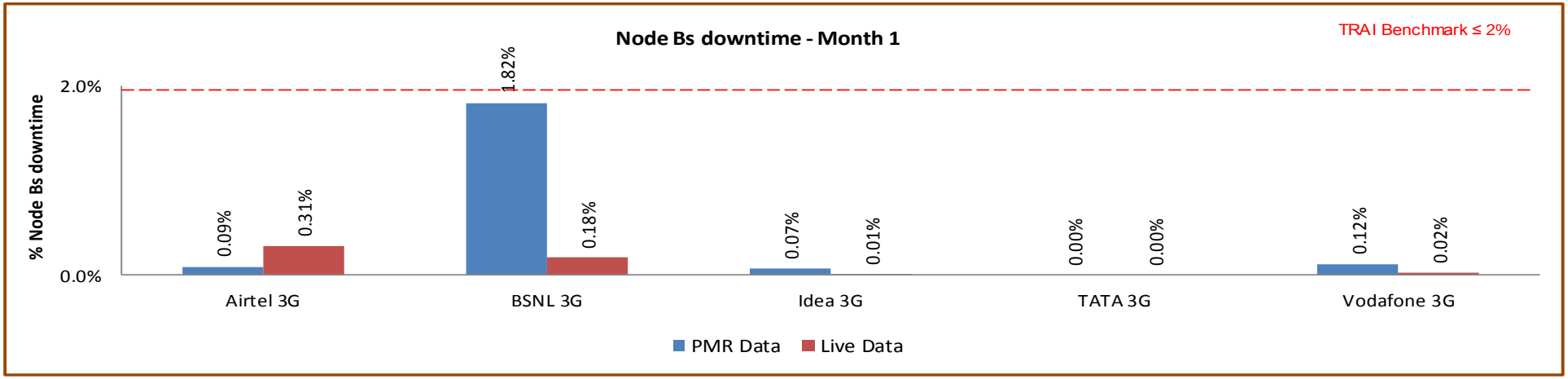
8.1.2 KEY FINDINGS - CONSOLIDATED



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

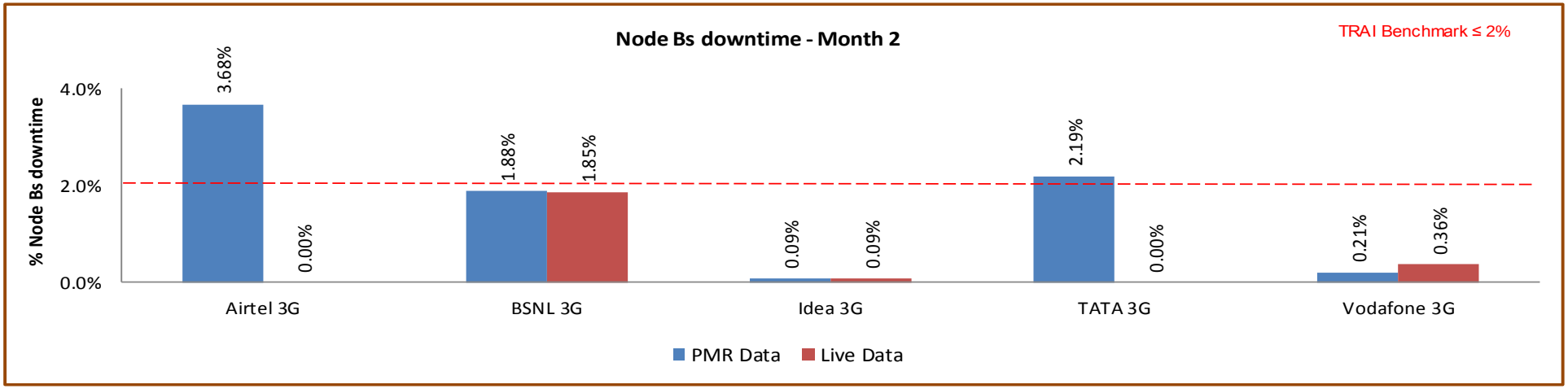
All operators met the TRAI benchmark.

8.1.2.1 KEY FINDINGS – MONTH 1



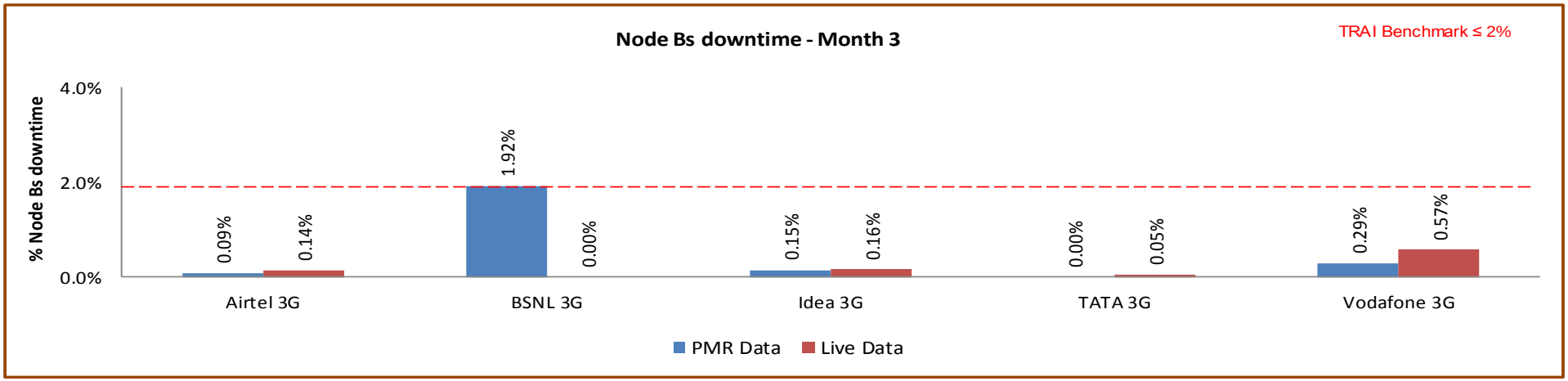
Data Source: Operations and Maintenance Center (OMC) of the operators

8.1.2.2 KEY FINDINGS – MONTH 2



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

8.1.2.3 KEY FINDINGS – MONTH 3



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

8.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

8.2.1 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.

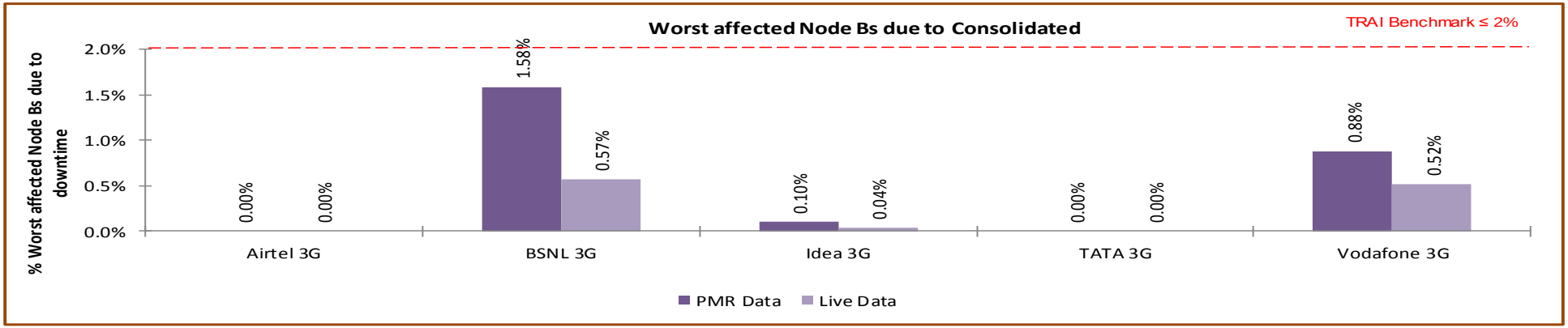
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

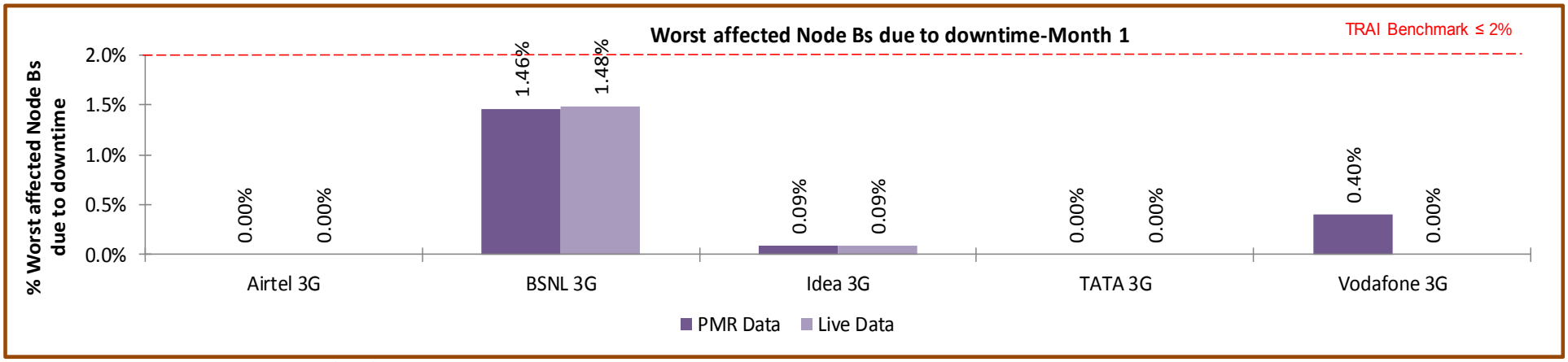
8.2.2 KEY FINDINGS – CONSOLIDATED



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

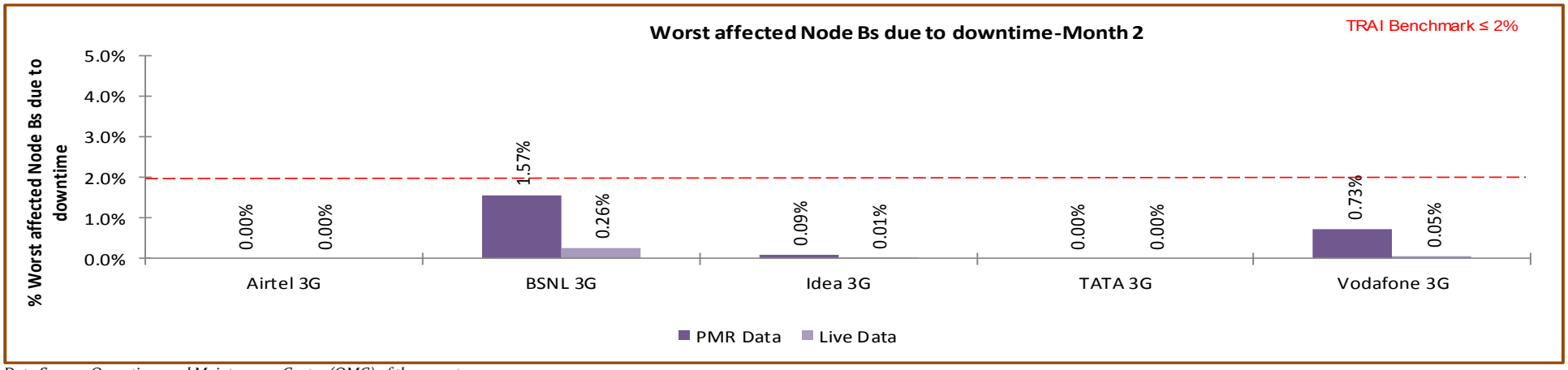
All operators met the TRAI benchmark for worst affected Node Bs due to downtime as per audit/PMR data.

8.2.2.1 KEY FINDINGS – MONTH 1



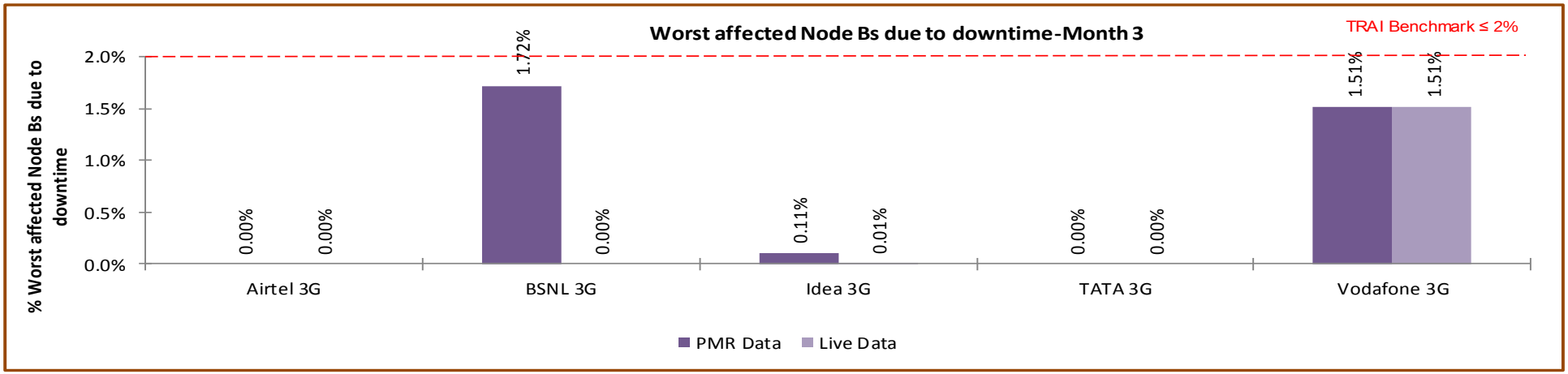
Data Source: Operations and Maintenance Center (OMC) of the operators

8.2.2.2 KEY FINDINGS – MONTH 2



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

8.2.2.3 KEY FINDINGS – MONTH 3



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

8.3 CALL SET UP SUCCESS RATE

8.3.1 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

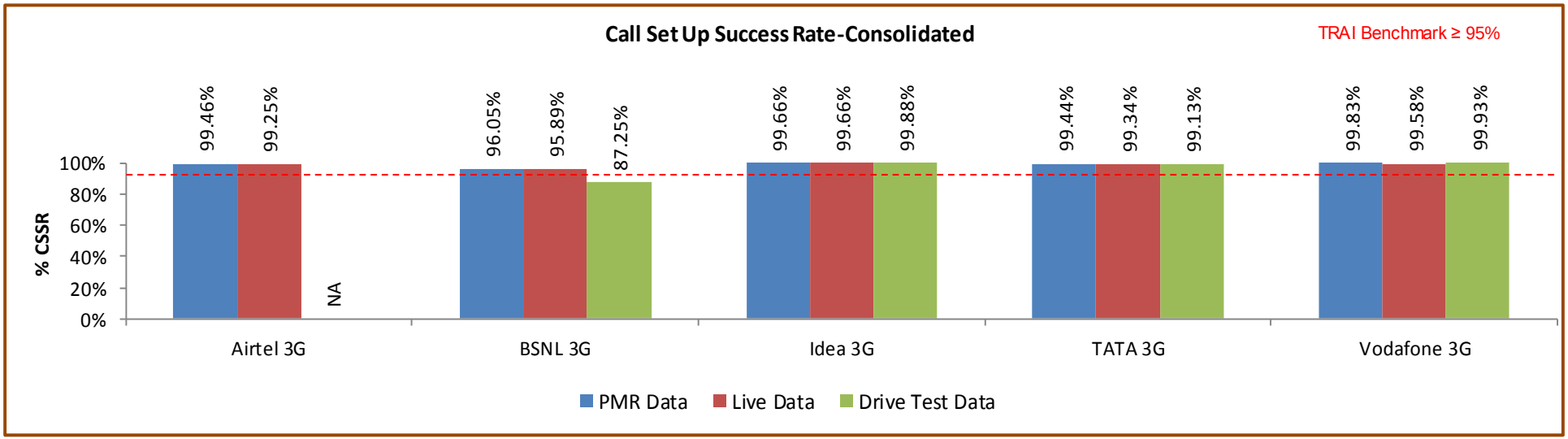
5. **TRAI Benchmark≥** 95%

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.

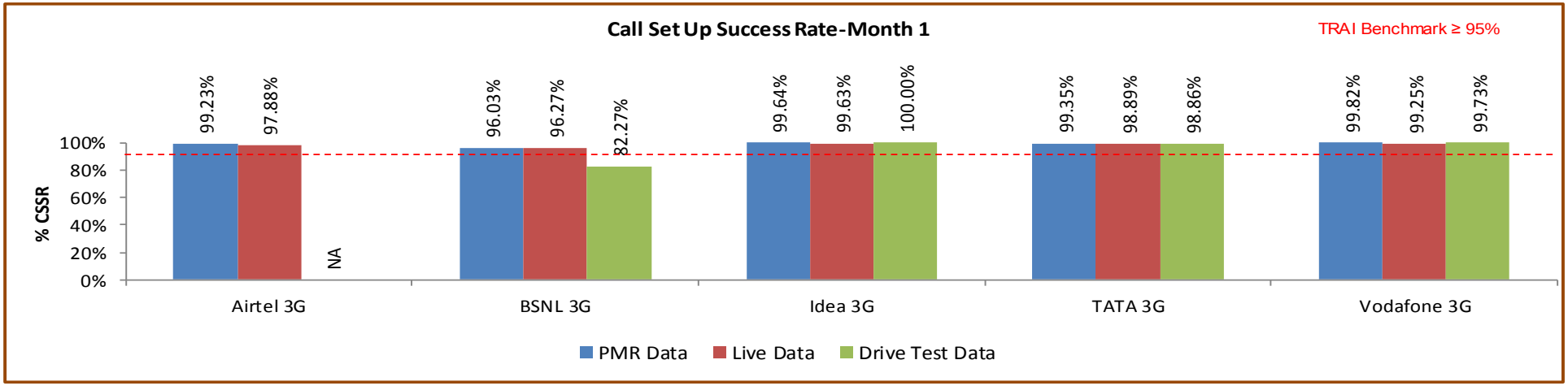
8.3.2 KEY FINDINGS - CONSOLIDATED



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

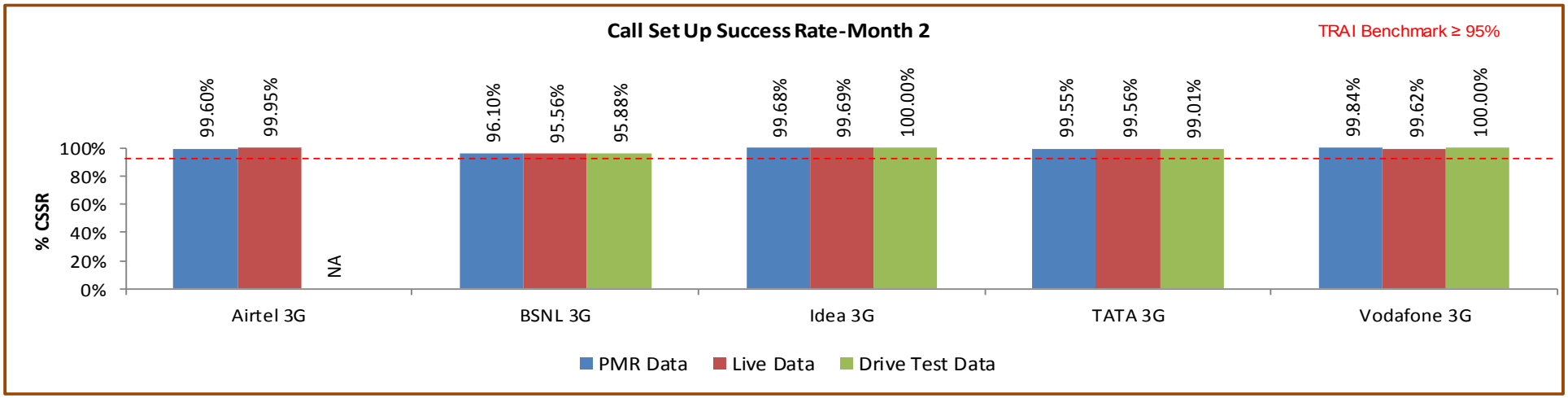
All operators met the TRAI benchmark as per audit/PMR 3days live. During drive test data BSNL 3G failed.

8.3.2.1 KEY FINDINGS – MONTH 1



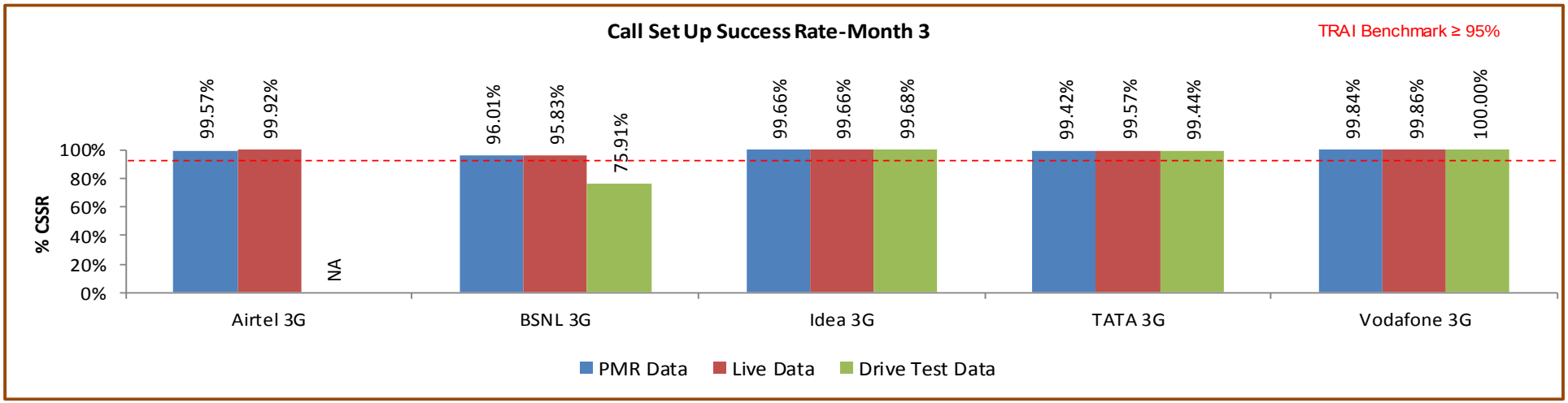
Data Source: Network Operations Center(NOC) of the operators

8.3.2.2 KEY FINDINGS – MONTH 2



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

8.3.2.3 KEY FINDINGS – MONTH 3



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

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

8.4.1 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

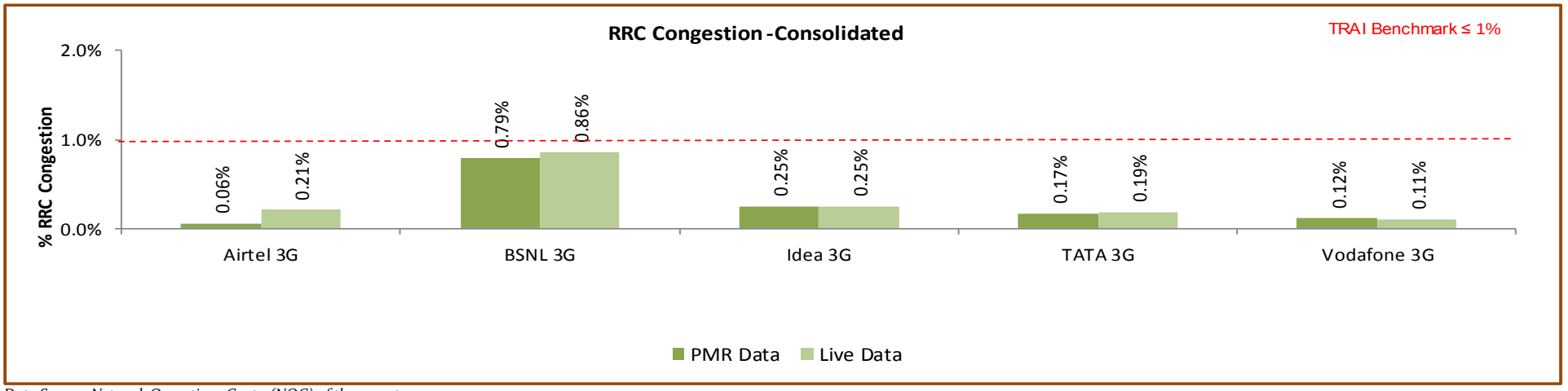
7. Benchmark:

- 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

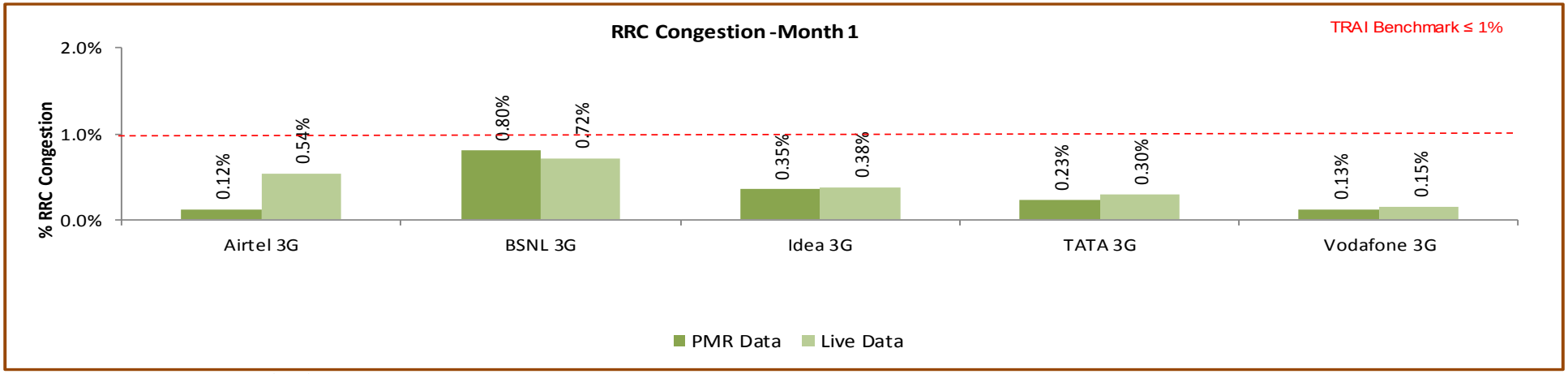
8.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

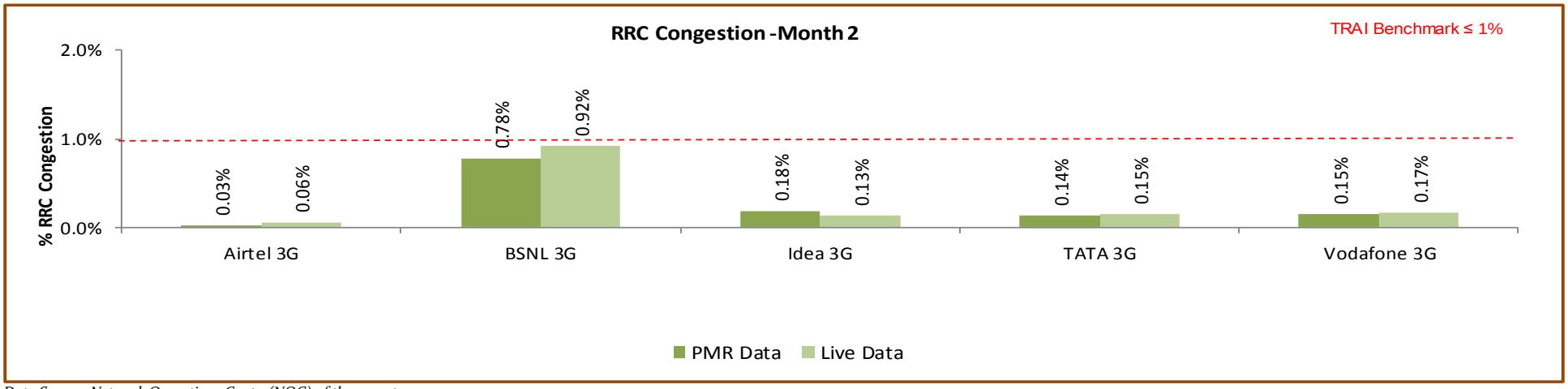
All operators met the TRAI benchmark for PMR and live audit.

8.4.2.1 KEY FINDINGS – MONTH 1



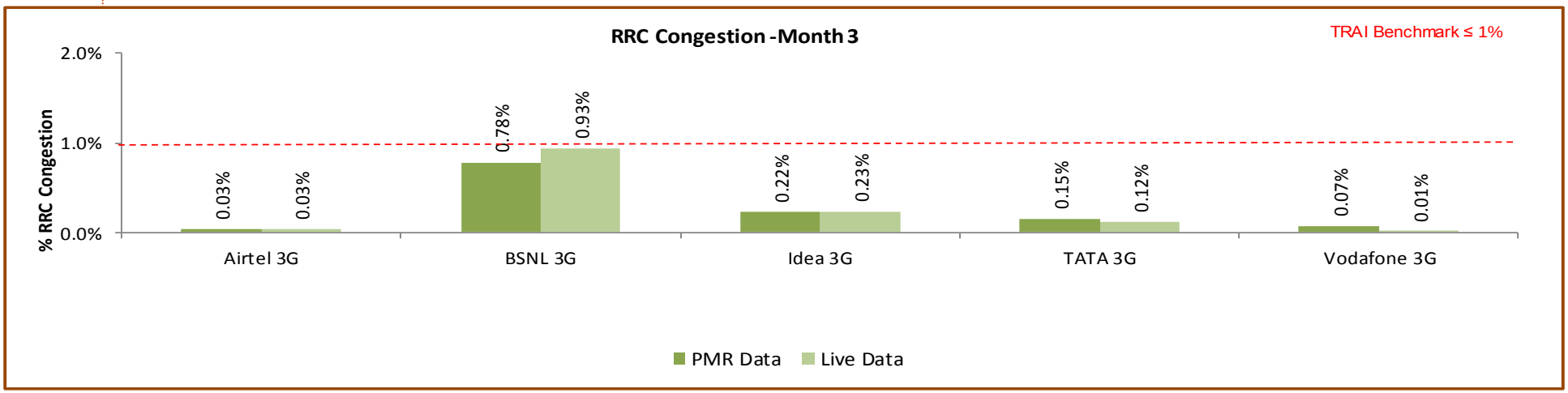
Data Source: Network Operations Center(NOC) of the operators

8.4.2.2 KEY FINDINGS – MONTH 2



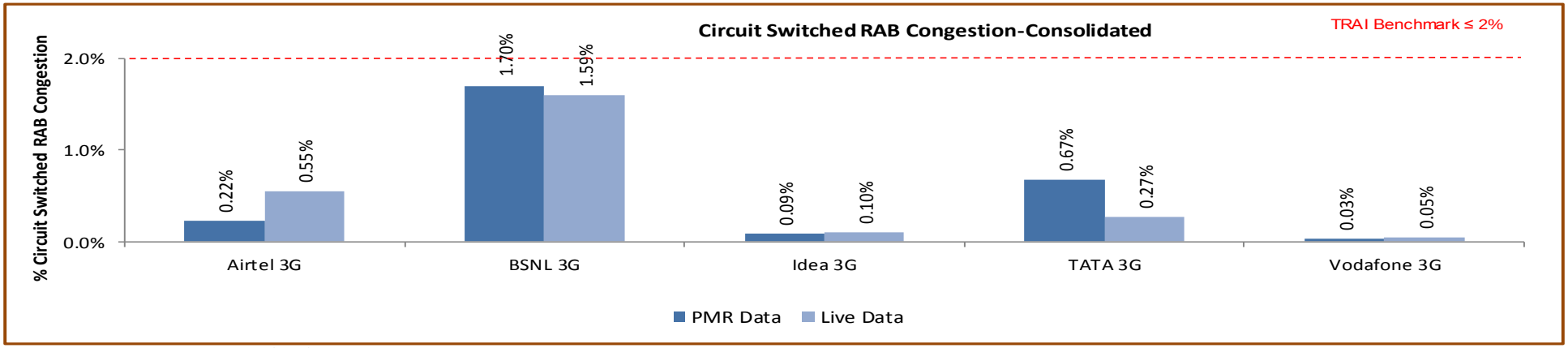
Data Source: Network Operations Center(NOC) of the operators

8.4.2.3 KEY FINDINGS – MONTH 3



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

8.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

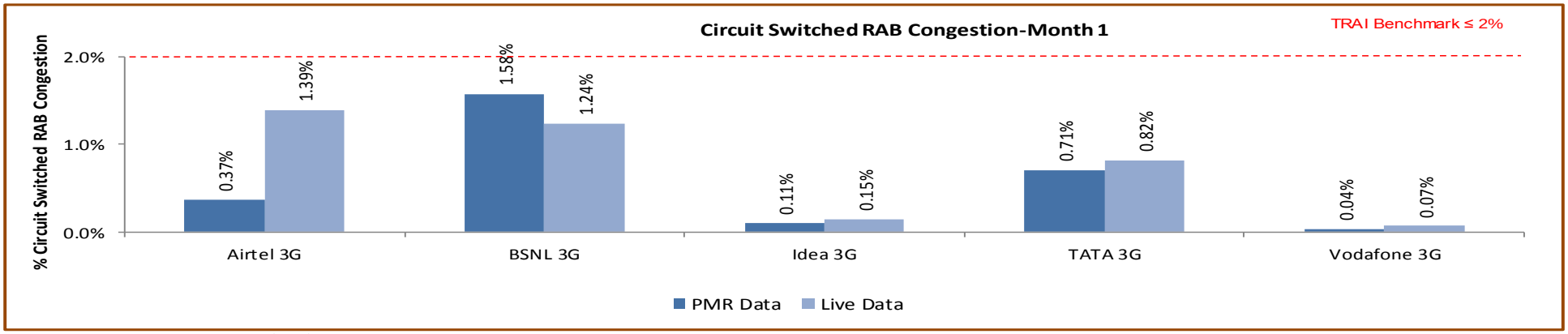


Data Source: Network Operations Center(NOC) of the operators

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

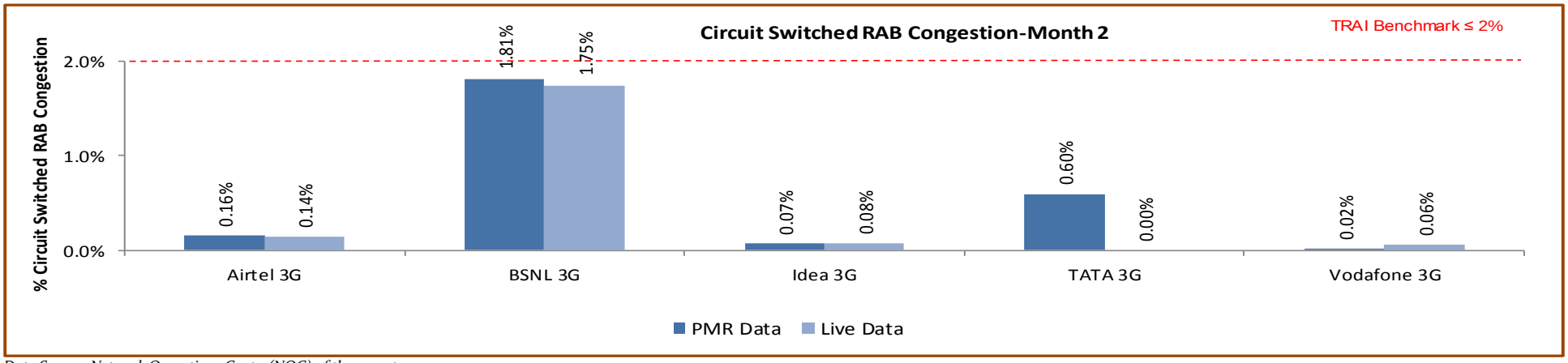
Significant difference was observed between PMR & live measurement data for BSNL, Airtel and TATA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

8.4.3.1 KEY FINDINGS – MONTH 1



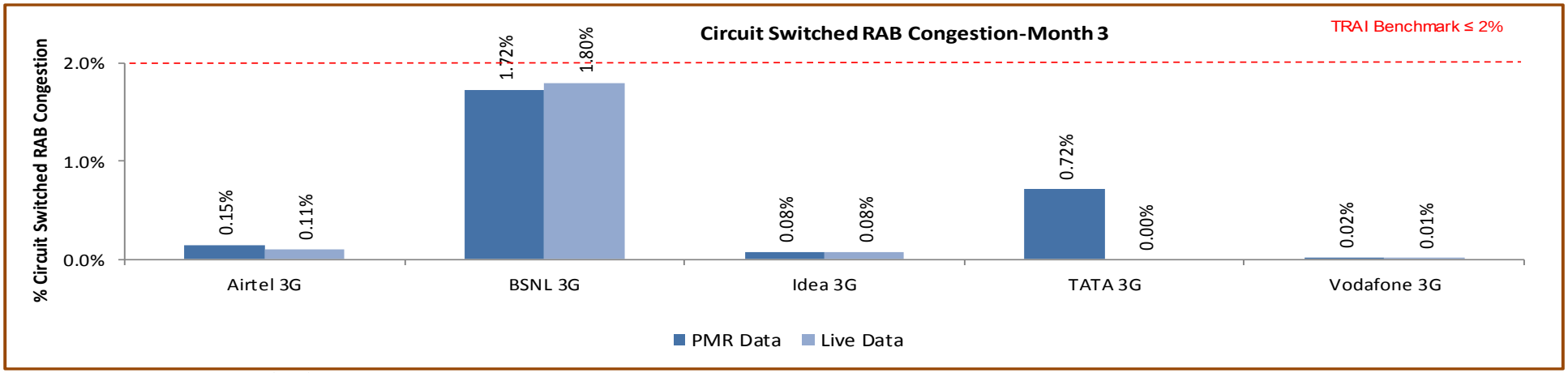
Data Source: Network Operations Center(NOC) of the operators

8.4.3.2 KEY FINDINGS – MONTH 2



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

8.4.3.3 KEY FINDINGS – MONTH 3



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

8.4.4 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		1497	194	2862	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		908067	299452	3468764	193896	0
Traffic served for all POIs (B)- in erlangs		509403	162226	884152	88509	0
POI congestion	≤ 0.5%	0.00%	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		1500	194	2864	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		752250	209540	3451045	193843	0
Traffic served for all POIs (B)- in erlangs		501605	161019	617880	87686	0
POI congestion	≤ 0.5%	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.

8.4.4.1 KEY FINDINGS – MONTH 1

©

Audit Results for POI Congestion- PMR data-April						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		501	63	956	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		300537	100570	1158941	65446	NA
Traffic served for all POIs (B)- in erlangs		168618	56598	306015	31195	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-April						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		504	63	956	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		297972	100019	1158941	65446	NA
Traffic served for all POIs (B)- in erlangs		166337	56380	306015	31126	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

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

8.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-May						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		498	63	952	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		301770	99454	1156419	65199	NA
Traffic served for all POIs (B)- in erlangs		171169	54025	296436	29714	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		497	63	956	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		148810	10109	1141052	65199	NA
Traffic served for all POIs (B)- in erlangs		171067	53191	30696	29680	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

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

8.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-June						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		498	68	954	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		305760	99428	1153404	63252	NA
Traffic served for all POIs (B)- in erlangs		169616	51602	281701	27601	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		499	68	952	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		305468	99412	1151052	63199	NA
Traffic served for all POIs (B)- in erlangs		164200	51447	281168	26880	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

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

8.5 CIRCUIT SWITCHED VOICE DROP RATE

8.5.1 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

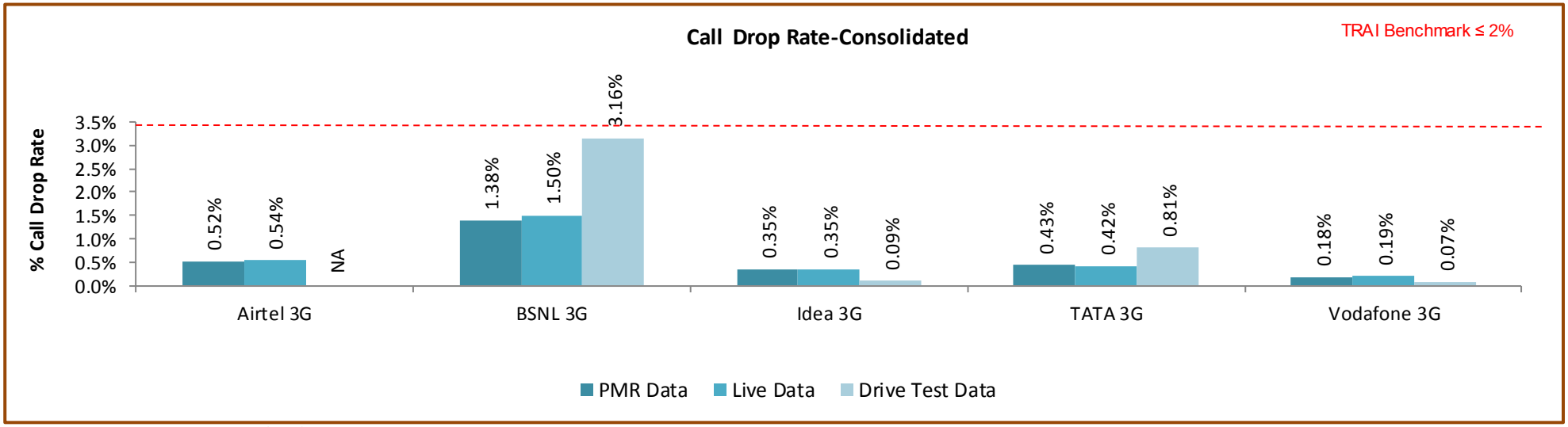
5. **TRAI Benchmark** –

   - 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.

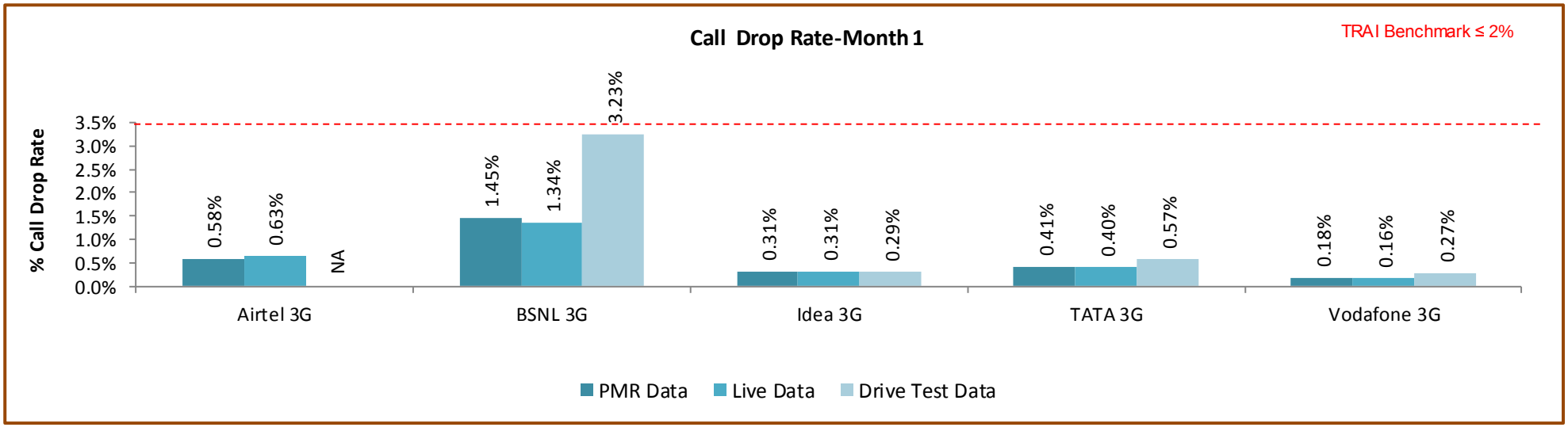
8.5.2 KEY FINDINGS - CONSOLIDATED



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

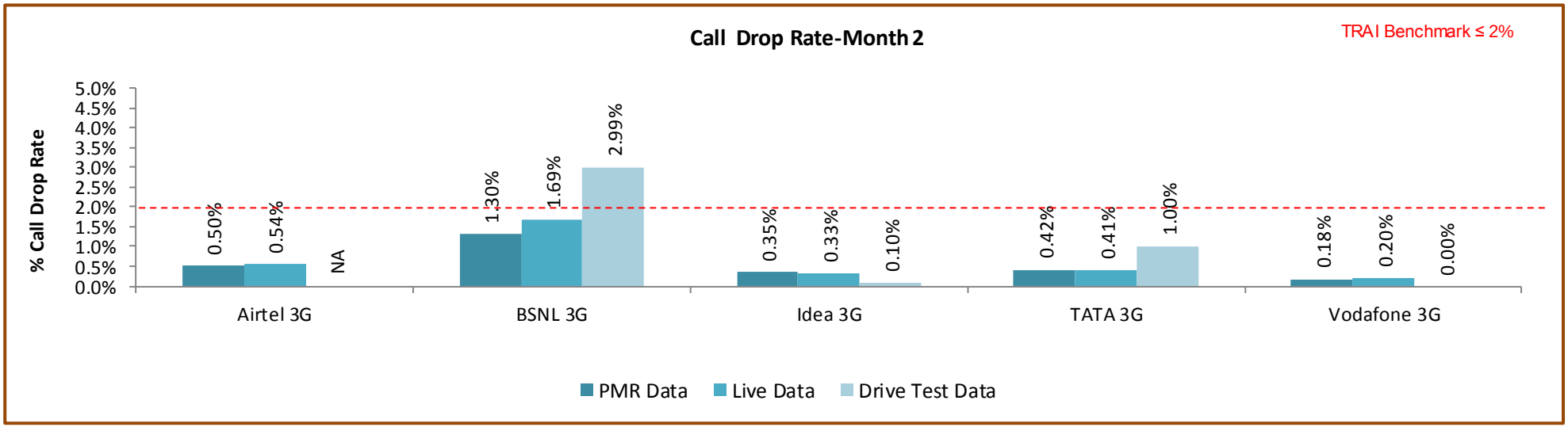
All operators met the benchmark for call drop rate during audit.

8.5.2.1 KEY FINDINGS – MONTH 1



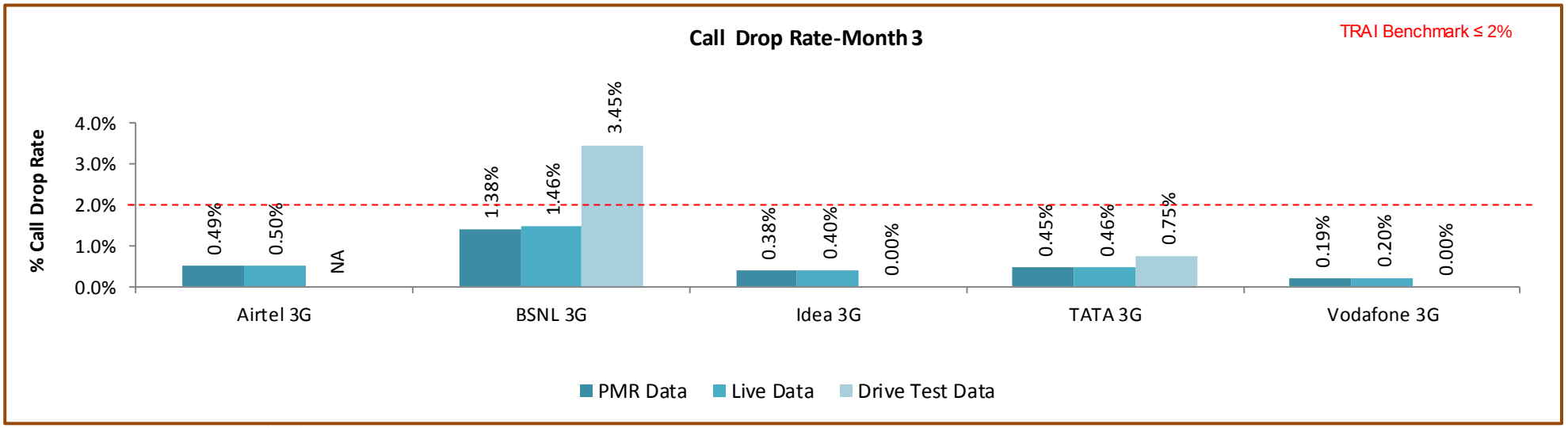
Data Source: Network Operations Center(NOC) of the operators

8.5.2.2 KEY FINDINGS – MONTH 2



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

8.5.2.3 KEY FINDINGS – MONTH 3



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

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

8.6.1 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** –

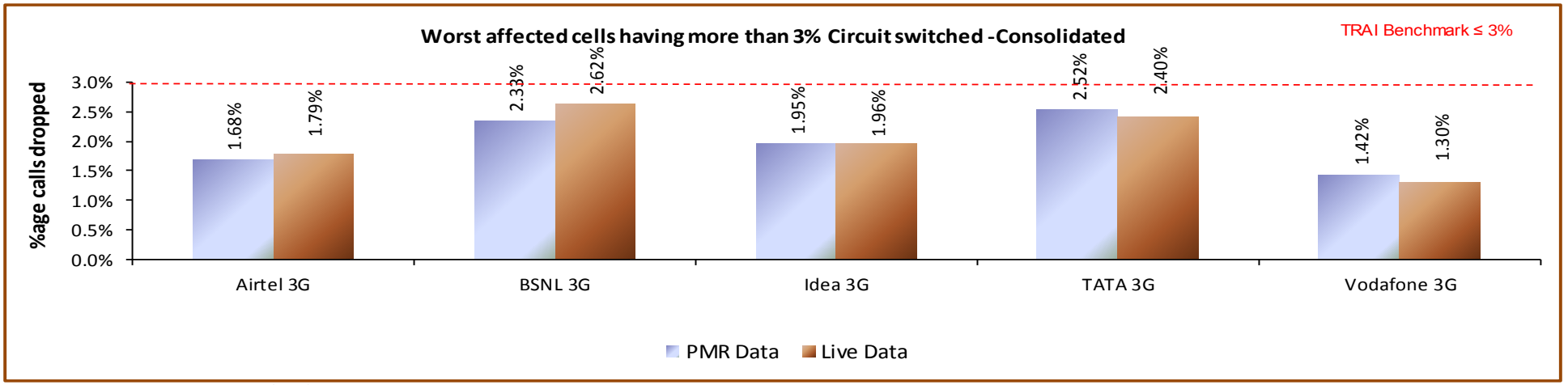
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

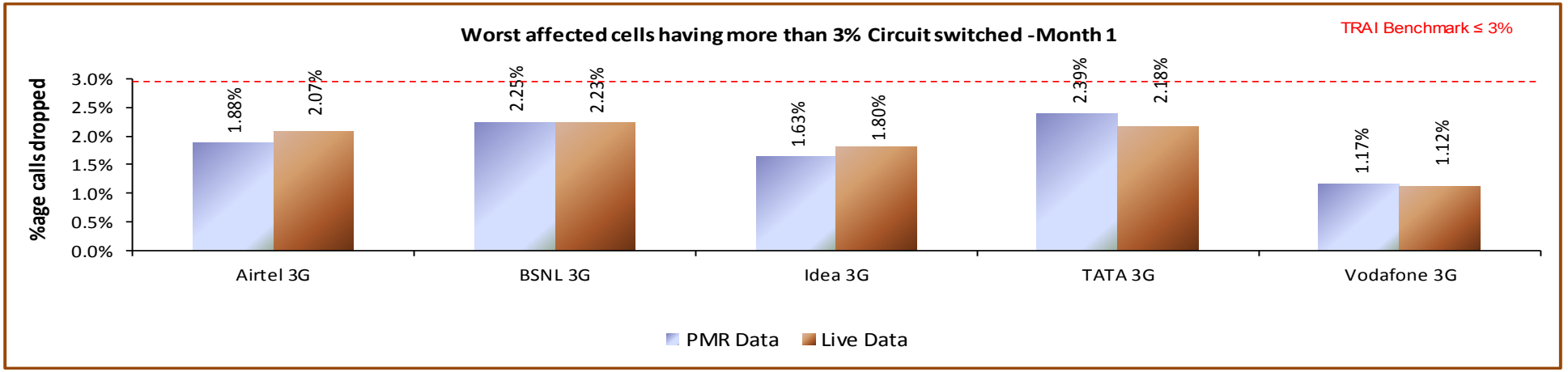
8.6.2 KEY FINDINGS - CONSOLIDATED



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

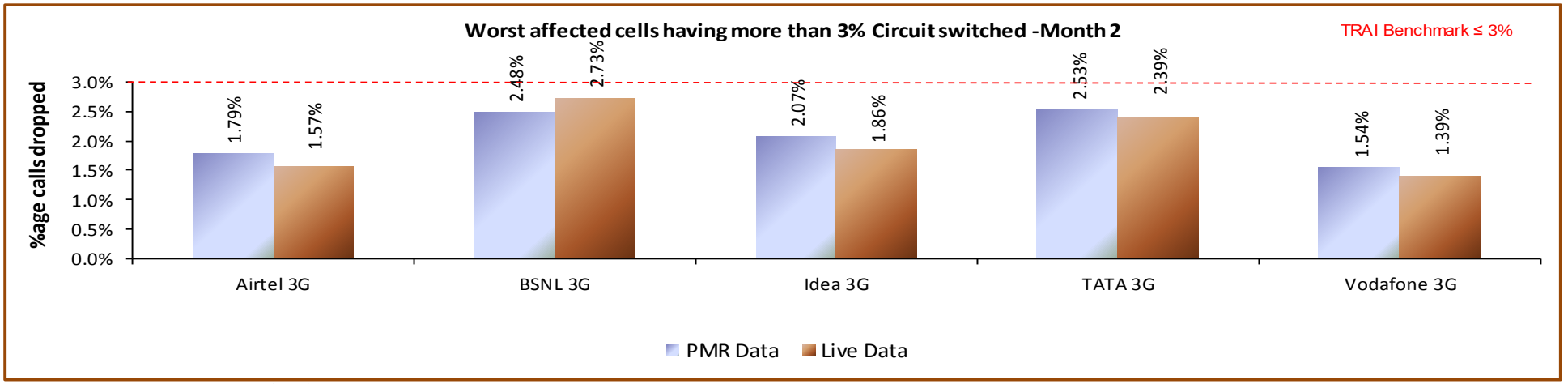
All operators met the benchmark during audit.

8.6.2.1 KEY FINDINGS – MONTH 1



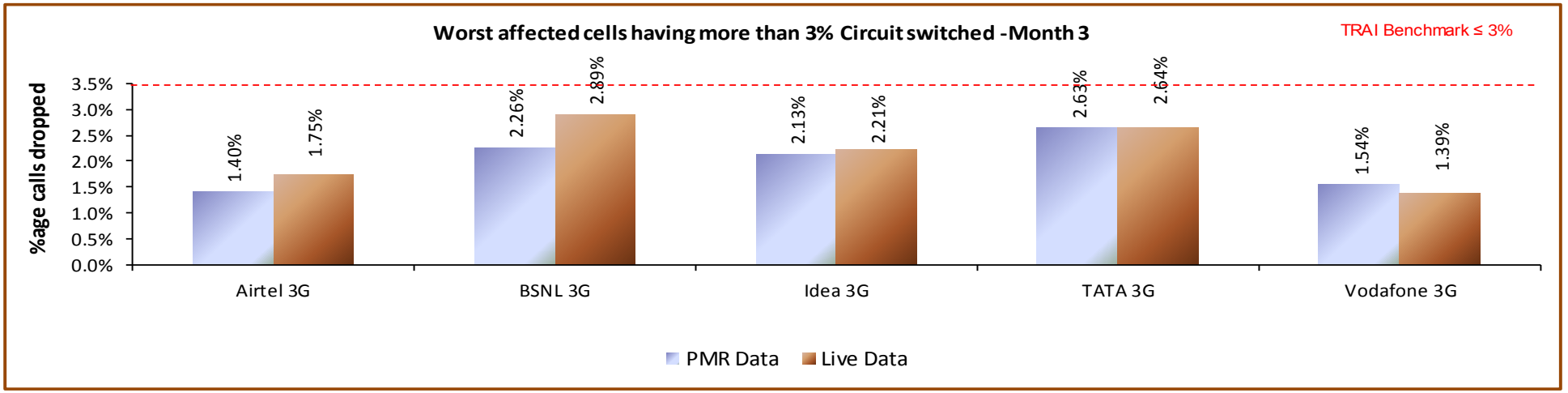
Data Source: Network Operations Center(NOC) of the operators

8.6.2.2 KEY FINDINGS – MONTH 2



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

8.6.2.3 KEY FINDINGS – MONTH 3



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

8.7 CIRCUIT SWITCH VOICE QUALITY

8.7.1 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**

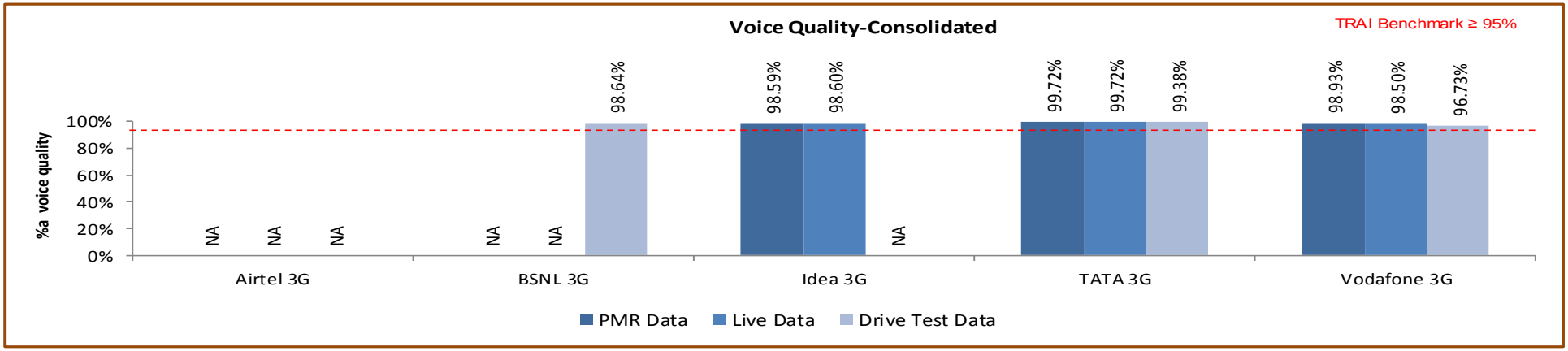
7. **TRAI Benchmark:≥** 95%

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.

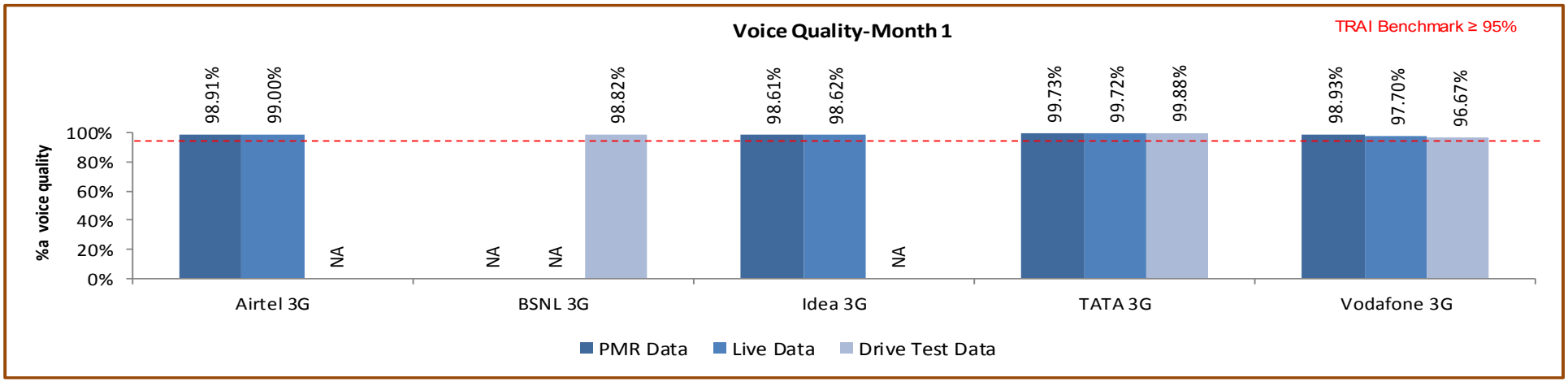
8.7.2 KEY FINDINGS



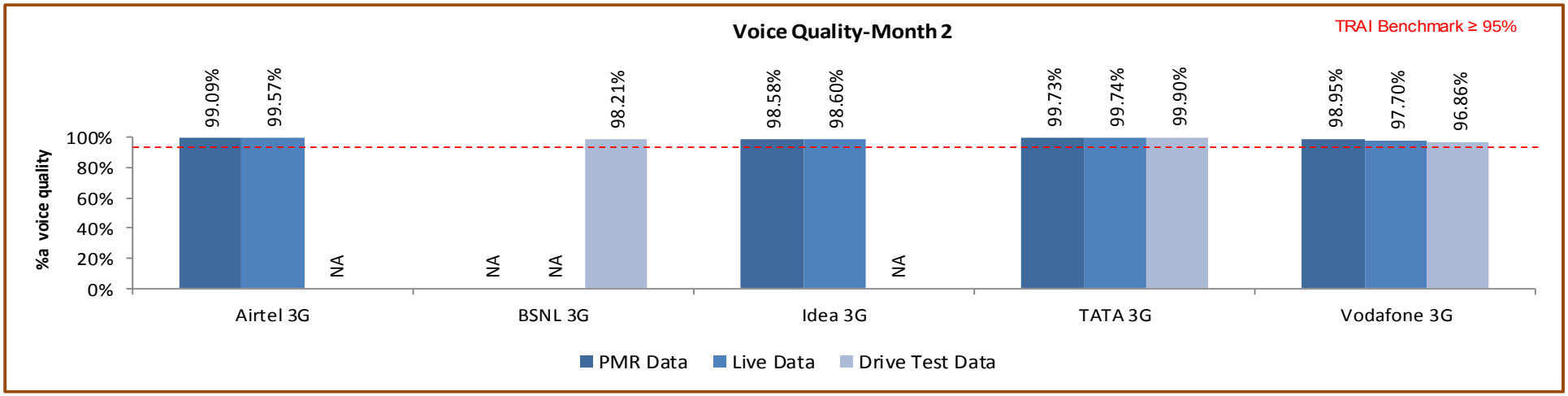
Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark in live audit.

8.7.2.1 KEY FINDINGS – MONTH 1

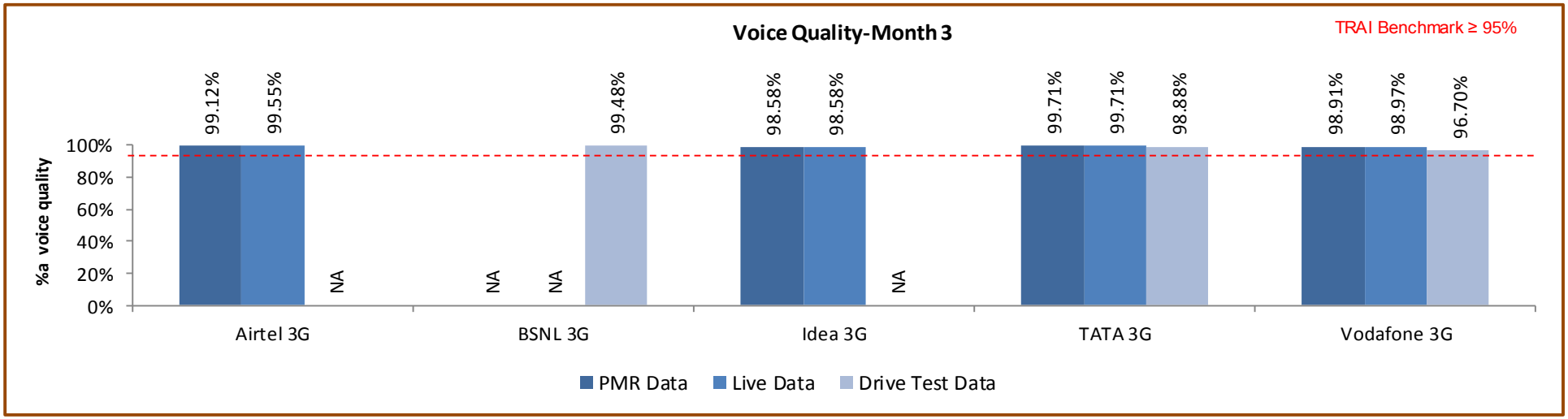


8.7.2.2 KEY FINDINGS – MONTH 2



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

8.7.2.3 KEY FINDINGS – MONTH 3



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

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

9.1 APRIL

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		157489	NDR	NDR	NA	NA	NA	NDR	NDR	101035	NDR
Total Time Taken for Activation		156546	NDR	NDR	NA	NA	NA	NDR	NDR	94440	NDR
% activation done within 4 hours	≥ 95%	99.40%	NDR	NDR	NA	NA	NA	NDR	NDR	93.47%	NDR
PDP Context activation success rate											
No. of data Session requested		1202160001	666970630	304977896	15774858	NA	NA	NDR	NDR	1141173243	NDR
No. of data Session Successful		1164289814	664898966	293648011	15759496	NA	NA	NDR	NDR	1134019069	NDR
PDP Context activation success rate	≥ 95%	96.85%	99.69%	96.29%	99.90%	NA	NA	NDR	NDR	99.37%	NDR
Drop Rate											
No. of Successful data calls		34324599835	9258140397	87404656	302748065532	NA	NA	NDR	NDR	6042703026	NDR
No. of Dropped data Calls		268881750	288560696	2003821	3018334753	NA	NA	NDR	NDR	49200272	NDR
% Drop rate	≤ 5%	0.78%	3.12%	2.29%	1.00%	NA	NA	NDR	NDR	0.81%	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	NA	NA	NA	NDR	NDR	8299	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NA	NA	NA	NDR	NDR	8085	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NA	NA	NA	NDR	NDR	97.42%	NDR
PDP Context activation success rate											
No. of data Session requested		NDR	NDR	NDR	NDR	NA	NA	NDR	NDR	122584728	NDR
No. of data Session Successful		NDR	NDR	NDR	NDR	NA	NA	NDR	NDR	122243148	NDR
PDP Context activation success rate	≥ 95%	NDR	NDR	NDR	NDR	NA	NA	NDR	NDR	99.72%	NDR
Drop Rate											
No. of Successful data calls		NDR	NDR	NDR	NDR	NA	NA	NDR	NDR	588754267	NDR
No. of Dropped data Calls		NDR	NDR	NDR	NDR	NA	NA	NDR	NDR	4755924	NDR
Drop rate	≤ 5%	NDR	NDR	NDR	NDR	NA	NA	NDR	NDR	0.81%	NDR

9.2 MAY

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		417005	NDR	NDR	NDR	NDR	NDR	25	NDR	317404	NDR
Total Time Taken for Activation		416765	NDR	NDR	NDR	NDR	NDR	23	NDR	306027	NDR
% activation done within 4 hours	≥ 95%	99.94%	NDR	NDR	NDR	NDR	NDR	92.00%	NDR	96.42%	NDR
PDP Context activation success rate											
No. of data Session requested		1223546972	702453772	283450791	18663993	NDR	NDR	5441460	5126558	1021657684	NDR
No. of data Session Successful		1200197041	701102447	275154083	18657757	NDR	NDR	5256759	5113798	1017723136	NDR
PDP Context activation success rate	≥ 95%	98.09%	99.81%	97.07%	99.97%	NDR	NDR	96.61%	99.75%	99.61%	NDR
Drop Rate											
No. of Successful data calls		34894873852	9254718106	91953258	8507662781	NDR	NDR	20399757	2813772636	2024421455	NDR
No. of Dropped data Calls		281561240	340998695	2492651	86275807	NDR	NDR	262135	42975159	20630736	NDR
Drop rate	≤ 5%	0.81%	3.68%	2.71%	1.01%	NDR	NDR	1.28%	1.53%	1.02%	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	17619	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	16015	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	90.90%	NDR
PDP Context activation success rate											
No. of data Session requested		126349815	69650687	27365909	1552043	NDR	NDR	NDR	NDR	98994350	NDR
No. of data Session Successful		116445484	69555454	26356496	1551645	NDR	NDR	NDR	NDR	98600025	NDR
PDP Context activation success rate	≥ 95%	92.16%	99.86%	96.31%	99.97%	NDR	NDR	NDR	NDR	99.60%	NDR
Drop Rate											
No. of Successful data calls		3319588486	953466270	8674825	766915956	NDR	NDR	NDR	NDR	558589755	NDR
No. of Dropped data Calls		26616416	31808976	193100	7555019	NDR	NDR	NDR	NDR	4734783	NDR
Drop rate	≤ 5%	0.80%	3.34%	2.23%	0.99%	NDR	NDR	NDR	NDR	0.85%	NDR

9.3 JUNE

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		385537	NDR	NDR	NDR	NDR	NDR	NDR	NDR	344793	NDR
Total Time Taken for Activation		385464	NDR	NDR	NDR	NDR	NDR	NDR	NDR	329892	NDR
% activation done within 4 hours	≥ 95%	99.98%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	95.68%	NDR
PDP Context activation success rate											
No. of data Session requested		1100908493	700816489	275719753	16618095	NDR	NDR	5555653	5007251	805700660	NDR
No. of data Session Successful		1092277382	695917099	269006396	16549409	NDR	NDR	5362460	4795472	795820759	NDR
PDP Context activation success rate	≥ 95%	99.22%	99.30%	97.57%	99.59%	NDR	NDR	96.52%	95.77%	98.77%	NDR
Drop Rate											
No. of Successful data calls		34348927775	9254718106	88931709	7445565229	NDR	NDR	17170517	2661025963	6313982923	161650866
No. of Dropped data Calls		290500900	313662562	2368807	77844090	NDR	NDR	217823	41919214	59392509	7736994
Drop rate	≤ 5%	0.85%	3.39%	2.66%	1.05%	NDR	NDR	1.27%	1.58%	0.94%	4.79%
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	17619	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	16015	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	90.90%	NDR
PDP Context activation success rate											
No. of data Session requested		108883918	74462054	27565100	1685555	NDR	NDR	NDR	NDR	98994350	NDR
No. of data Session Successful		108818659	74259194	26865014	1657430	NDR	NDR	NDR	NDR	98600025	NDR
PDP Context activation success rate	≥ 95%	99.94%	99.73%	97.46%	98.33%	NDR	NDR	NDR	NDR	99.60%	NDR
Drop Rate											
No. of Successful data calls		3430669220	859896546	8780412	838407696	NDR	NDR	NDR	271244274	558589755	NDR
No. of Dropped data Calls		28407074	33522646	263078	8739095	NDR	NDR	NDR	4353622	4734783	NDR
Drop rate	≤ 5%	0.83%	3.90%	3.00%	1.04%	NDR	NDR	NDR	1.61%	0.85%	NDR

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

10.1 APRIL

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	304977896	23466825	NDR	NDR
No. of data Session Successful		NDR	293648011	23420178	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.29%	99.80%	NDR	NDR
Drop Rate						
No. of Successful data calls		42372638	3348613824	2081899360	292825160	NDR
No. of Dropped data Calls		269098	95677179	18066754	9030376	NDR
% Drop rate	≤ 5%	0.64%	2.86%	0.87%	3.08%	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	27365909	NDR	NDR	NDR
No. of data Session Successful		NDR	26356496	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.31%	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls		4017722	290503804	NDR	NDR	NDR
No. of Dropped data Calls		27220	8876489	NDR	NDR	NDR
Drop rate	≤ 5%	0.68%	3.06%	NDR	NDR	NDR

10.2 MAY

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	0	NDR
Total Time Taken for Activation		NDR	NDR	NDR	0	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	100.00%	NDR
PDP Context activation success rate						
No. of data Session requested		192278167	283450791	24082872	NDR	NDR
No. of data Session Successful		192033028	275154083	24072391	NDR	NDR
PDP Context activation success rate	≥ 95%	99.87%	97.07%	99.96%	NDR	NDR
Drop Rate						
No. of Successful data calls		67229558	3438436881	2213522055	258351113	NDR
No. of Dropped data Calls		320335	90209839	18748738	8014397	NDR
Drop rate	≤ 5%	0.48%	2.62%	0.85%	3.10%	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	27365909	2324677	NDR	NDR
No. of data Session Successful		NDR	26356496	2324601	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	96.31%	100.00%	NDR	NDR
Drop Rate						
No. of Successful data calls		4017722	290503804	208597046	18357825	NDR
No. of Dropped data Calls		27220	8876489	1764662	534492	NDR
Drop rate	≤ 5%	0.68%	3.06%	0.85%	2.91%	NDR

10.3 JUNE

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	0	NDR
Total Time Taken for Activation		NDR	NDR	NDR	0	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	100.00%	NDR
PDP Context activation success rate						
No. of data Session requested		226119398	275719753	24099988	238802	NDR
No. of data Session Successful		224075304	269006396	24083547	238789	NDR
PDP Context activation success rate	≥ 95%	99.10%	97.57%	99.93%	99.99%	NDR
Drop Rate						
No. of Successful data calls		79845659	3261708791	2018150406	261375352	1353840952
No. of Dropped data Calls		473754	80726389	17241902	8813442	7384572
Drop rate	≤ 5%	0.59%	2.47%	0.85%	3.37%	0.55%
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	0	NDR
Total Time Taken for Activation		NDR	NDR	NDR	0	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	100.00%	NDR
PDP Context activation success rate						
No. of data Session requested		22583686	27565100	2402149	NDR	NDR
No. of data Session Successful		22574106	26865014	2400345	NDR	NDR
PDP Context activation success rate	≥ 95%	99.96%	97.46%	99.92%	NDR	NDR
Drop Rate						
No. of Successful data calls		7980031	302576569	225087962	27372816	NDR
No. of Dropped data Calls		46437	7755230	1934724	897316	NDR
Drop rate	≤ 5%	0.58%	2.56%	0.86%	3.28%	NDR

11 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

11.1 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.

11.1.1 PARAMETER DESCRIPTION

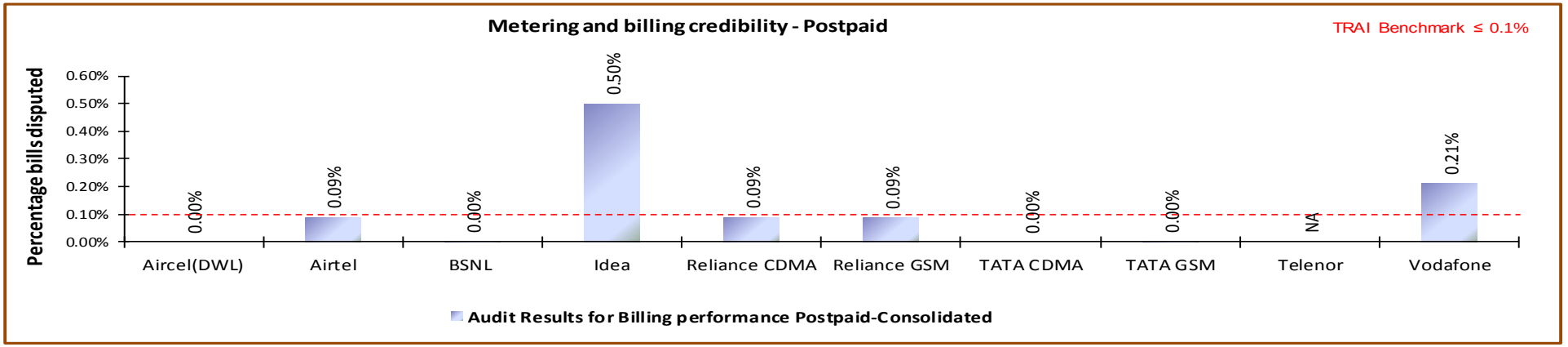
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20thDecember, 2009 were covered. The types of billing complaints covered are listed below.

- 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 may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
  - **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

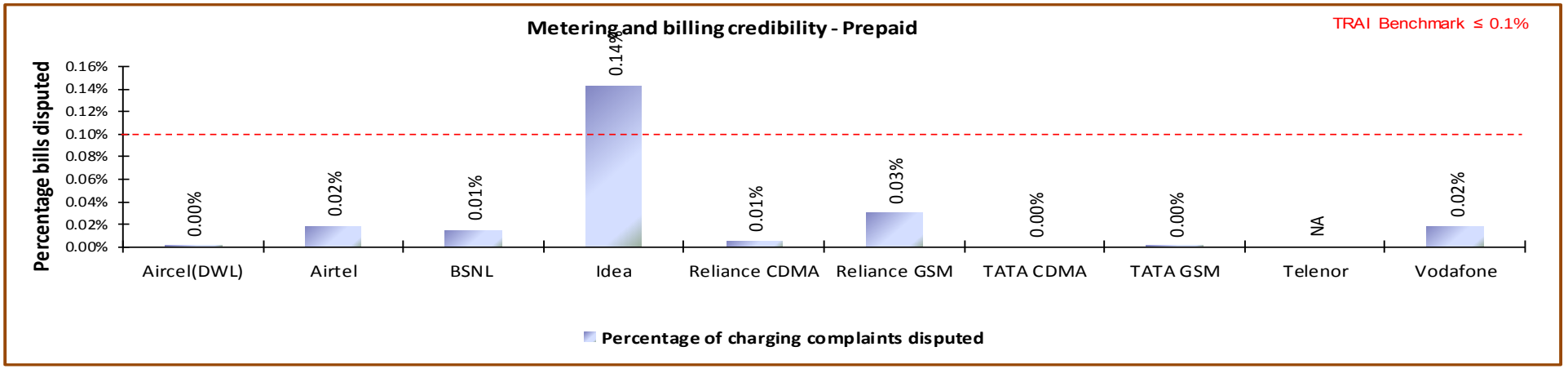
11.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

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

11.1.3 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 except Idea.

11.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

11.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

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

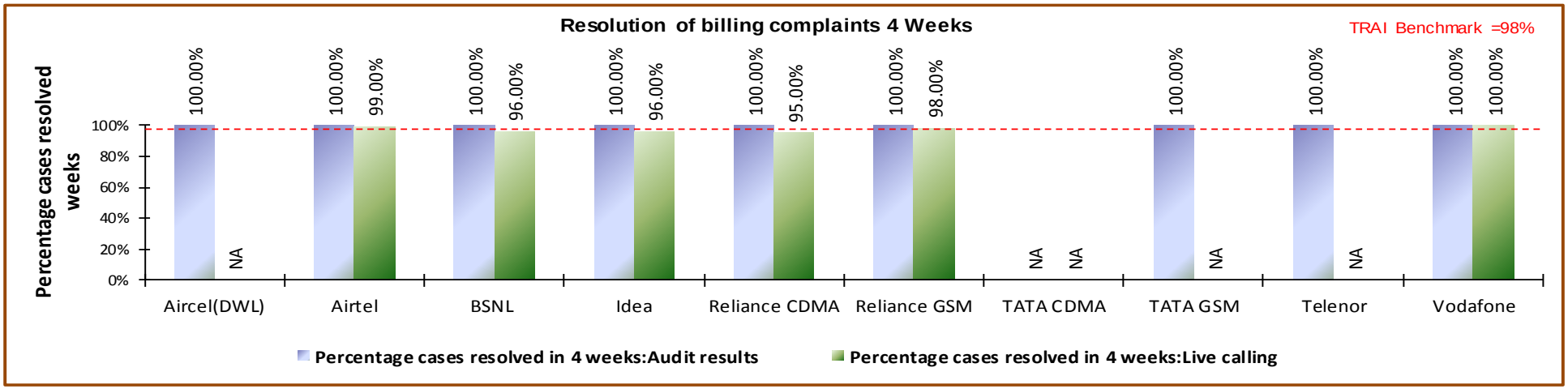
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

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

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

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

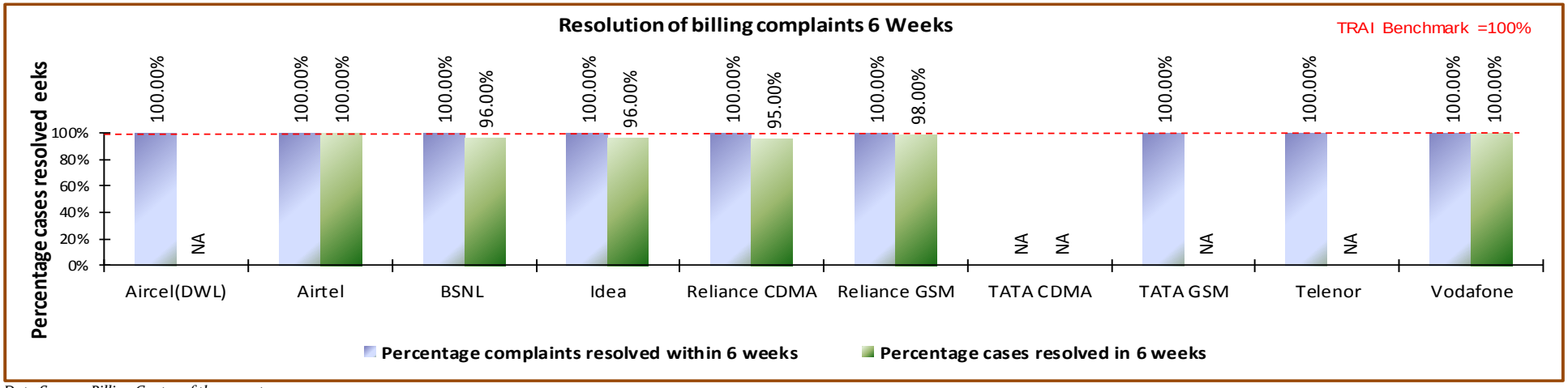
11.2.2 KEY FINDINGS- WITHIN 4 WEEKS



Data Source: Billing Center of the operators

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

11.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

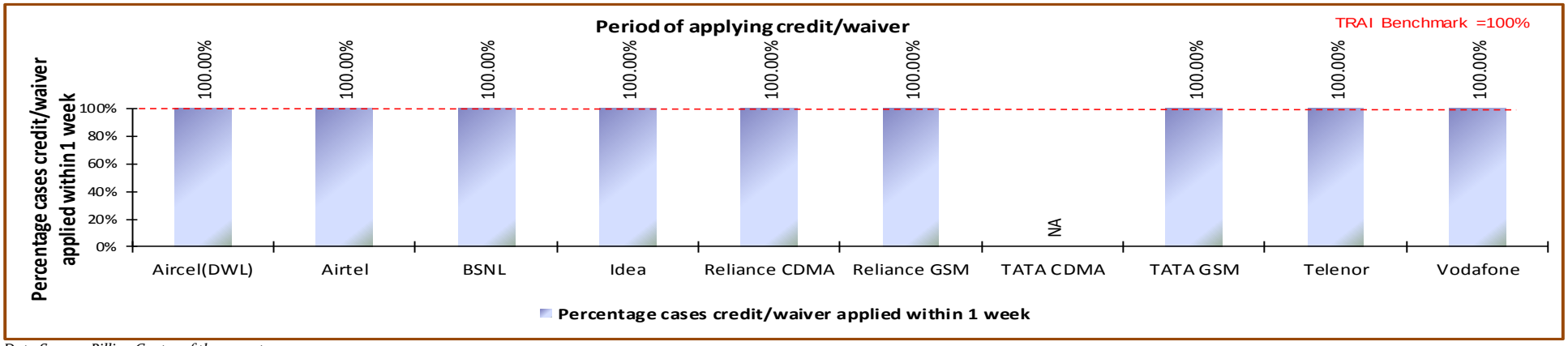
All operators met the TRAI benchmark of resolution of billing complaints within 6 weeks. BSNL, Idea, Reliance CDMA & GSM failed to meet Percentage cases resolved in 6 weeks.

11.3 PERIOD OF APPLYING CREDIT/WAVIER

11.3.1 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

11.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

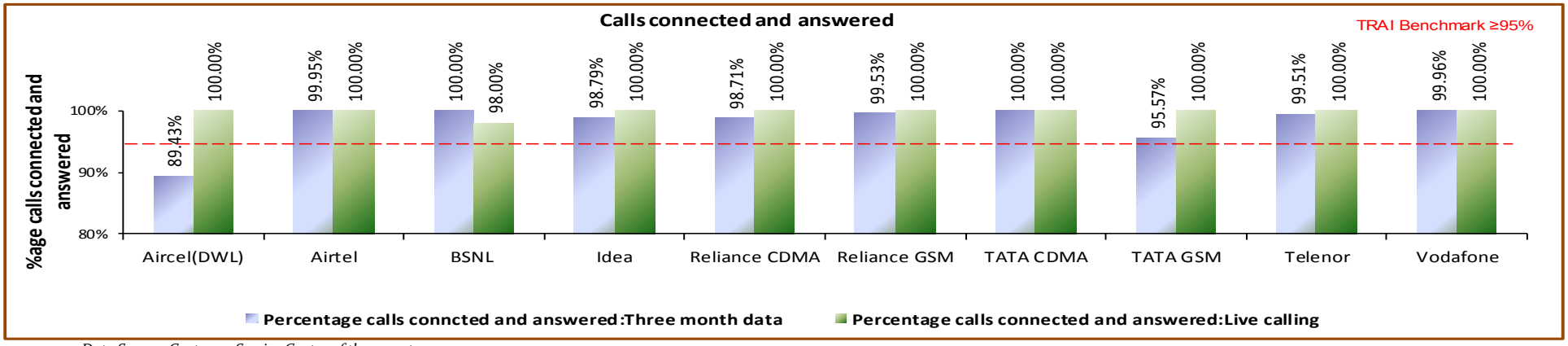
All operators met the benchmark for this parameter.

11.4 CALL CENTRE PERFORMANCE-IVR

11.4.1 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

11.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark except Aircel PMR data.

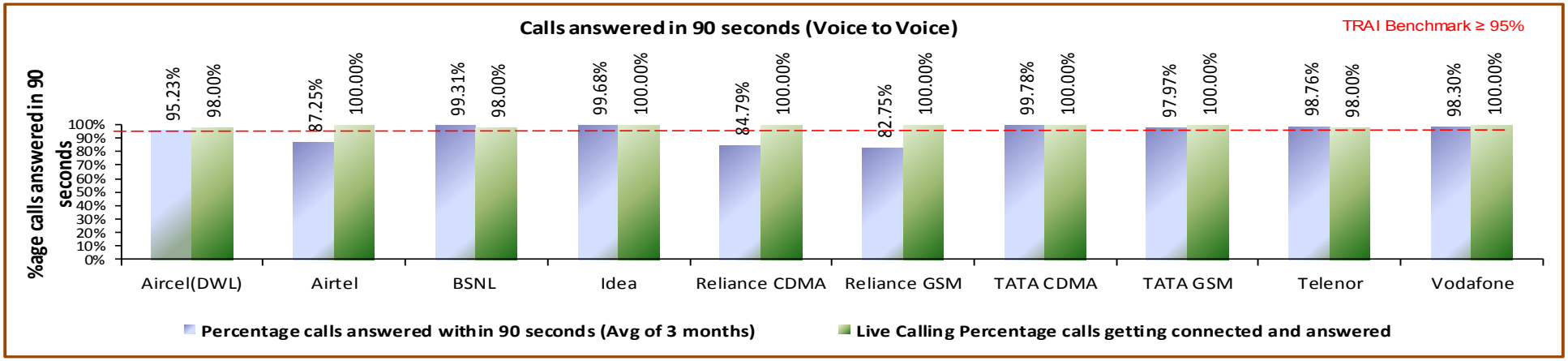
11.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

11.5.1 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

11.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

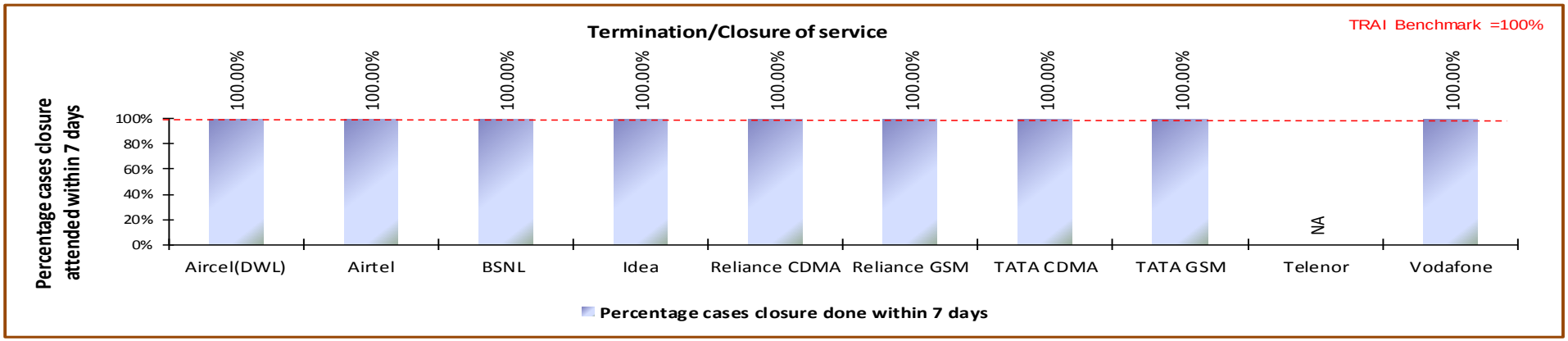
Airtel, Reliance CDMA, Reliance GSM was not able to meet the benchmark as per audit. However, as per live calling done to customers, the performance was good for all the operators.

11.6 TERMINATION/CLOSURE OF SERVICE

11.6.1 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

11.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

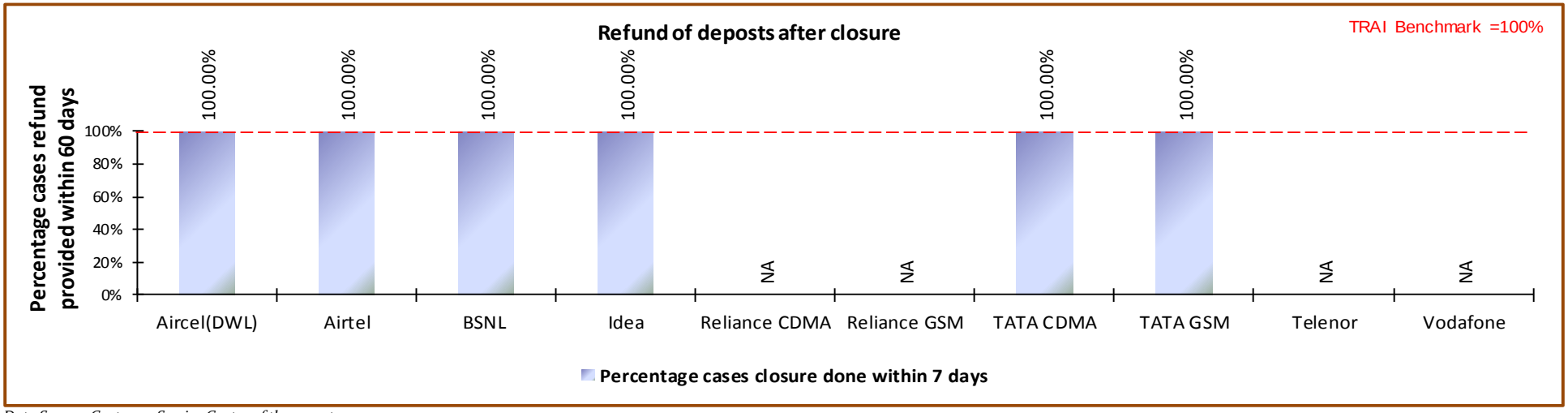
All operators met the TRAI benchmark for the parameter.

11.7 REFUND OF DEPOSITS AFTER CLOSURE

11.7.1 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

11.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel failed to meet the TRAI benchmark for the parameter.

12 DETAILED FINDINGS - DRIVE TEST DATA

12.1 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
Aircel(DWL)	Airtel 3G
Airtel	BSNL 3G
BSNL	Idea 3G
Idea	TATA 3G
Reliance CDMA	Vodafone 3G
Reliance GSM	
TATA CDMA	
TATA GSM	
Telenor	
Vodafone	

Month	Circle Name	Name of SSA Covered
April	Maha. And Goa	BULDHANA
May	Maha. And Goa	Jalgaon
May	Maha. And Goa	Nashik
June	Maha. And Goa	Kolhapur
June	Maha. And Goa	BEED
April	Maha. And Goa	PANJI (GOA)

12.1.1 Buldhana SSA

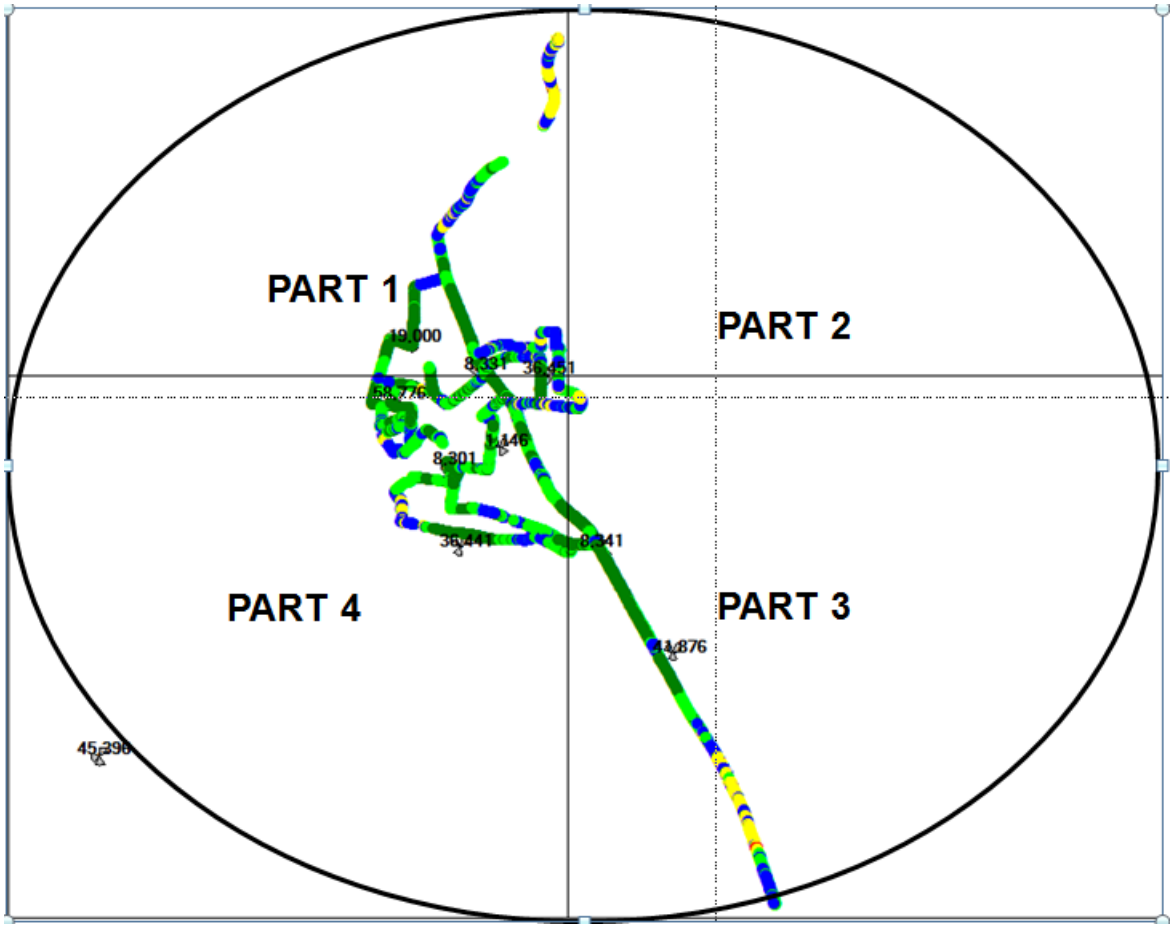
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	BULDHANA	27-04-2016	29-04-2016	304

12.1.1.1 Route Details - Buldhana SSA

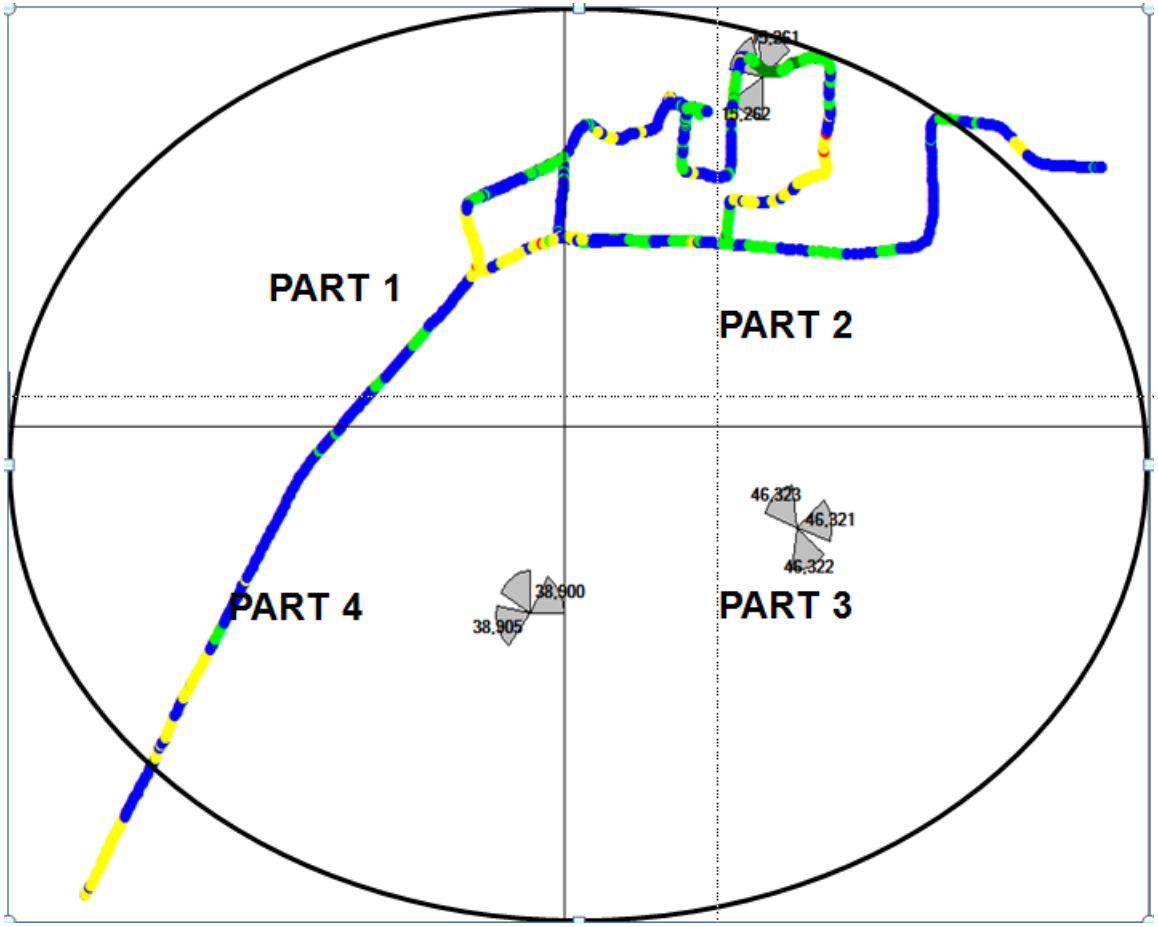
Category	Type of location	April		
		BULDHANA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Buldhana City, Major Roads, Highways; Motala Major roads, Malkapur city, major roads and Highway; Nandura City, Highway.	Khamgaon City, highways and Major Roads; Jalgaon jamod City and Major roads; Sangrampur Major Roads ; Shegaon Highway,major roads.	Chikhali city, highway; Mehkar major roads, city ; Lonar major roads ; s.raja highway, major roads
	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 observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

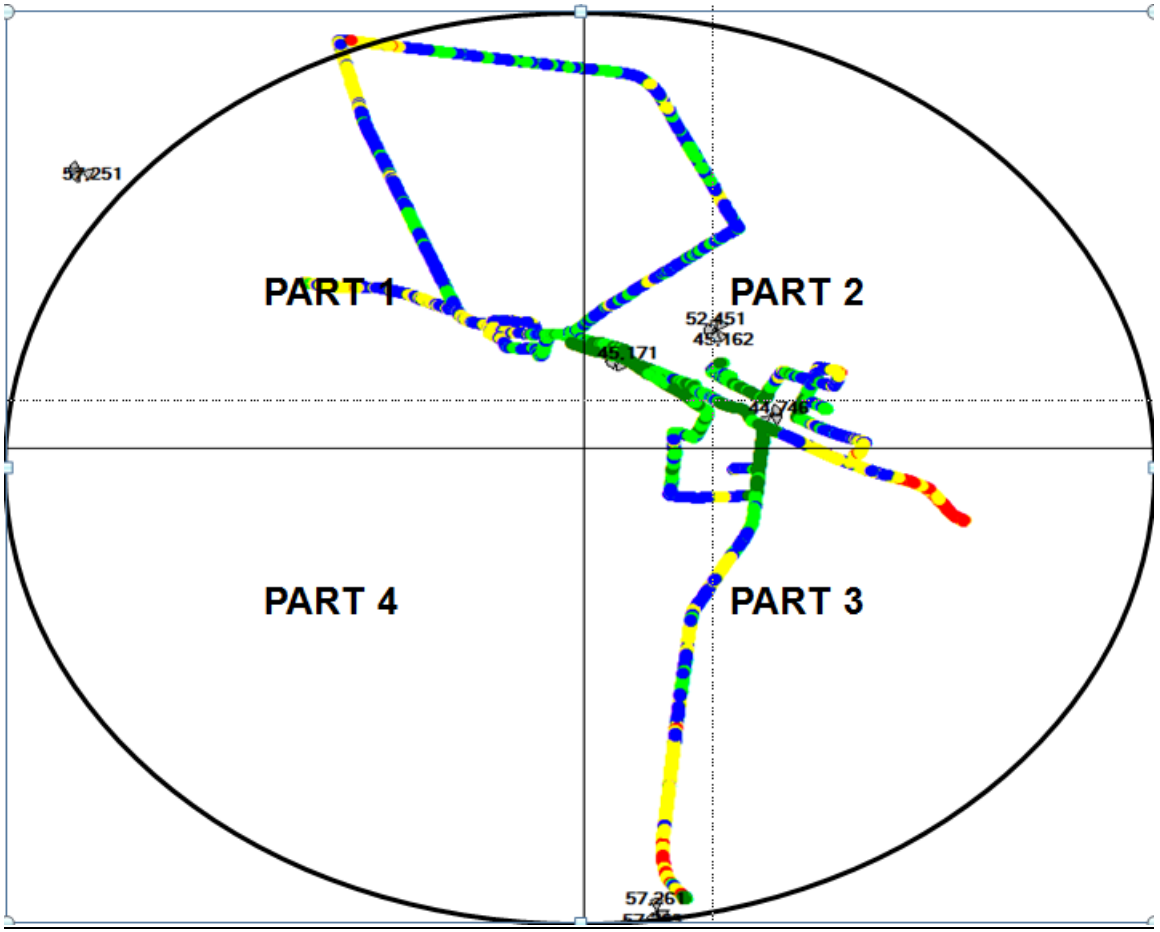
12.1.1.1 Route Map - Buldhana DAY 1



12.1.1.2 Route Map - Buldhana DAY 2



12.1.1.3 Route Map - Buldhana DAY 3



12.1.1.4 Drive Test Results - Buldhana SSA-2G

BULDHANA	B'mark	Aircel		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 Service		94.36%	52.75%	15.20%	47.56%	100.00%	87.97%	0.19%	41.92%	NA	11.44%	100.00%	99.95%	99.79%	91.66%	99.26%	73.27%	80.23%	83.80%
0 to -85 dBm				100.00%	82.75%	99.37%	93.61%	100.00%	98.49%	39.08%	68.57%	NA	32.81%	100.00%	100.00%	100.00%	99.41%	100.00%	94.90%	99.26%	96.16%
0 to -95 dBm				100.00%	97.69%	100.00%	99.83%	100.00%	99.82%	98.96%	94.97%	NA	75.12%	100.00%	100.00%	100.00%	100.00%	100.00%	99.80%	99.96%	97.43%
Voice quality	≥ 95%			99.28%	98.15%	98.07%	89.87%	99.41%	96.61%	99.90%	99.28%	NA	93.40%	99.01%	99.23%	99.99%	97.29%	98.63%	96.30%	98.46%	97.02%
CSSR	≥ 95%			100.00%	100.00%	94.74%	82.01%	100.00%	99.73%	97.56%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	98.51%	100.00%	99.71%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	9.26%	0.00%	0.27%	2.44%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	1.48%	0.00%	0.29%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	1.85%	4.19%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	1.13%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	98.79%	100.00%	99.86%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	99.32%	100.00%	98.23%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmarks for CSSR.

Call Drop Rate

BSNL failed to meet the benchmark of call drop rate.

12.1.1.5 Drive Test Results - Buldhana SSA-3G

BULDHANA	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		4.55%	44.54%	99.94%	31.22%	NA	93.18%	100.00%	40.26%
0 to -85 dBm				22.73%	72.74%	100.00%	70.25%	NA	99.49%	100.00%	72.95%
0 to -95 dBm				90.91%	94.51%	100.00%	91.87%	NA	100.00%	100.00%	92.45%
Voice quality	≥ 95%			95.00%	98.83%	NA	NA	NA	99.83%	99.99%	99.04%
CSSR	≥ 95%			94.59%	79.78%	100.00%	100.00%	NA	98.48%	100.00%	100.00%
%age Blocked calls				5.41%	14.89%	0.00%	1.73%	NA	98.48%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	3.79%	0.00%	0.35%	NA	0.00%	0.00%	0.00%
Hands off success rate				100.00%	94.12%	100.00%	99.65%	NA	97.92%	100.00%	100.00%

Voice Quality

All operators met the benchmark for Voice quality.

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark for CSSR in indoor as well as out door.

Call Drop Rate

BSNL 3G met the benchmark for call drop rate in outdoor locations.

12.1.1.6 Data Drive Test Results - Buldhana SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Successful Data Transmission download speed attempts	>80%	No Service	100	100	100	100	100	NDR	100	100	100
Successful Data Transmission upload speed attempts	>75%		100	100	100	100	100	NDR	100	100	100
Minimum download speed			133	27	110	32	43	NDR	102	105	176
Average throughput for Packet Data			152	47	148	97	85	NDR	123	136	185
Latency	<250ms		100	100	100	100	100	NDR	100	100	100

Note: TATA CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

12.1.1.7 Data Drive Test Results - Buldhana SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Successful Data Transmission download speed attempts	>80%	NDR	100	100	100	100
Successful Data Transmission upload speed attempts	>75%	NDR	100	100	100	100
Minimum download speed		NDR	1506	1160	1774	2869
Average throughput for Packet Data		NDR	2043	2184	2154	3254
Latency	<250ms	NDR	100	100	100	100

Note: Airtel did not submit the data.

All operators met the TRAI benchmark for data drive test.

12.1.2 Panji (Goa) SSA

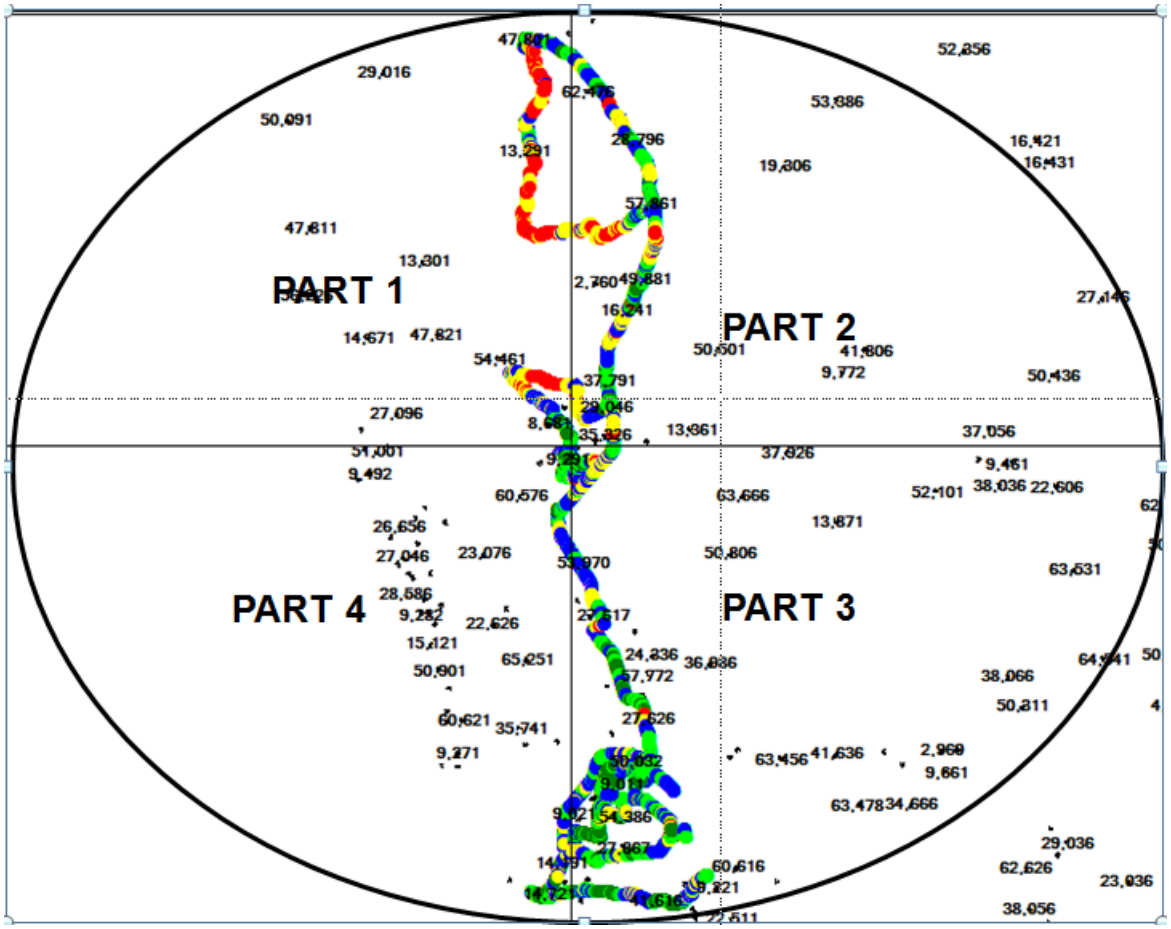
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	PANJI (GOA)	21-04-2016	23-04-2016	300

12.1.2.1 Route Details - Panji (Goa) SSA

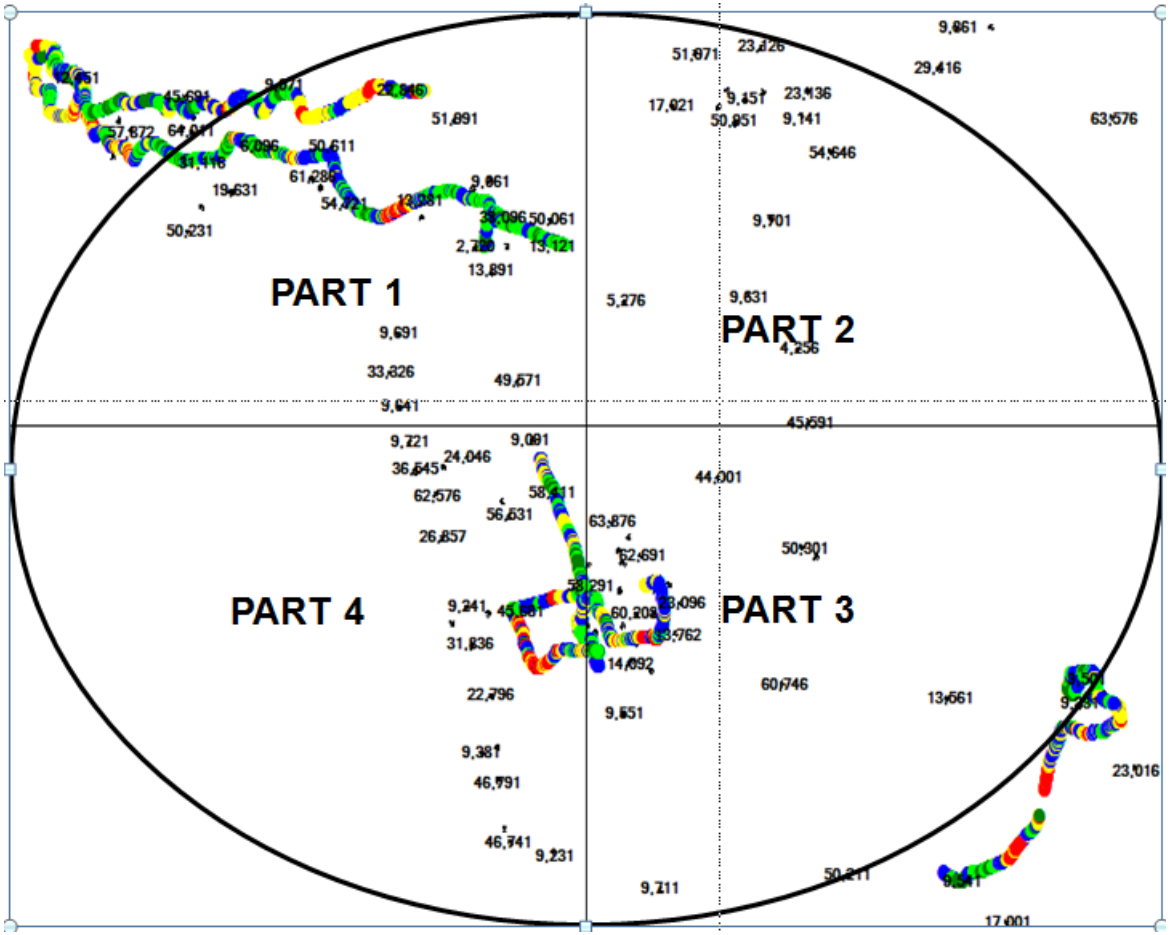
Category	Type of location	April		
		PANJI (GOA)		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	PERNEM		
	Highways	REVORA	VASCO	SANQUELIM
	With in the City	MAPUSA	MAJORDA	VELHA GOA
Indoor	Shopping complex	VAGATOR	BETALBATIM	TISCA
	Office complex	CAMURLIM	MARGAON	PONDA
		ALDONA	QUEPEM	BANDODA
		VELHA GOA	VERCA	BORIM
		PANJIM		

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

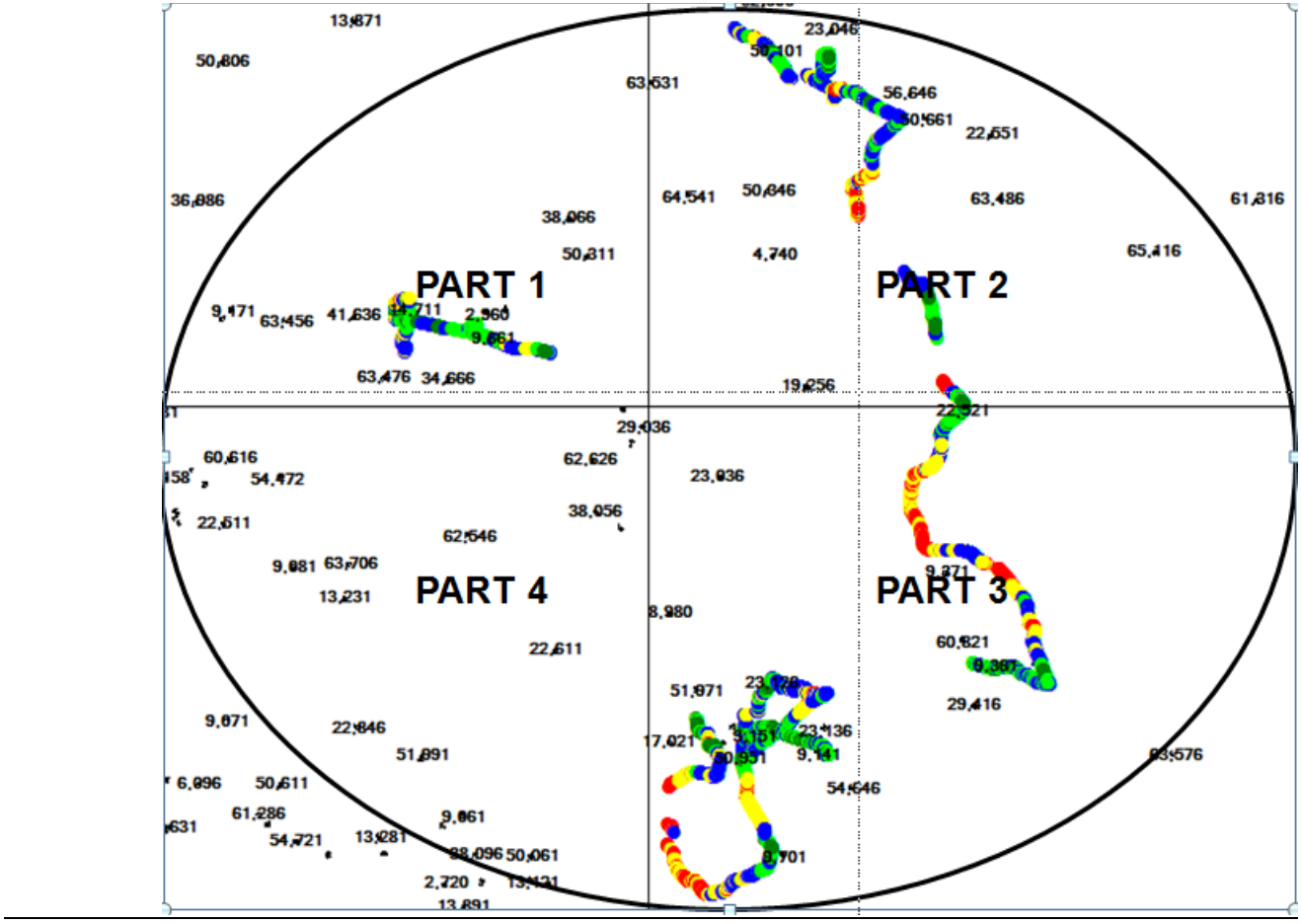
12.1.2.2 Route Map - Panji (Goa) DAY 1



12.1.2.3 Route Map - Panji (Goa) DAY 2



12.1.2.4 Route Map - Panji (Goa) DAY 3



12.1.2.5 Drive Test Results - Panji (Goa) SSA-2G

PANJI (GOA)	B'mark	Aircel		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		99.93%	80.25%	67.95%	51.89%	89.10%	53.21%	NDR		94.65%	54.05%	77.89%	25.27%	100.00%	99.96%	96.22%	90.79%	40.15%	39.20%	98.09%	88.32%
0 to -85 dBm		100.00%	95.47%	77.78%	78.70%	10.66%	39.61%			100.00%	78.50%	96.18%	54.88%	100.00%	100.00%	99.14%	99.73%	68.24%	65.91%	99.96%	95.83%
0 to -95 dBm		100.00%	99.67%	99.34%	93.91%	0.24%	6.32%			100.00%	93.98%	99.89%	85.76%	100.00%	100.00%	100.00%	100.00%	98.17%	95.38%	100.00%	99.08%
Voice quality	≥ 95%	99.64%	97.10%	99.28%	97.23%	99.75%	82.71%			99.88%	94.92%	99.84%	90.19%	98.93%	98.03%	99.38%	95.69%	98.10%	96.91%	98.00%	96.53%
CSSR	≥ 95%	100.00%	99.76%	100.00%	100.00%	98.21%	98.39%			100.00%	98.51%	100.00%	96.84%	100.00%	99.68%	100.00%	99.59%	100.00%	99.33%	100.00%	99.52%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	1.79%	0.81%			0.00%	1.49%	0.00%	3.16%	0.00%	0.00%	0.00%	0.41%	0.00%	0.67%	0.00%	0.48%
Call drop rate	≤ 2%	0.00%	0.24%	0.00%	0.00%	0.00%	13.93%			0.00%	0.00%	0.00%	2.17%	0.00%	0.32%	0.00%	0.61%	0.00%	0.00%	0.00%	0.16%
Hands off success rate		100.00%	99.08%	100.00%	100.00%	100.00%	82.52%			100.00%	100.00%	100.00%	98.55%	100.00%	100.00%	100.00%	98.94%	100.00%	98.44%	100.00%	99.55%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance GSM and Reliance CDMA failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

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

12.1.2.6 Drive Test Results - Panji (Goa) SSA-3G

April	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
PANJI (GOA)		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		94.55%	36.99%	NDR		94.26%	97.88%	100.00%	78.94%
0 to -85 dBm				0.17%	26.03%			100.00%	99.12%	100.00%	89.19%
0 to -95 dBm				5.28%	36.85%			100.00%	100.00%	100.00%	96.26%
Voice quality	≥ 95%			99.05%	96.32%			100.00%	99.88%	96.98%	95.64%
CSSR	≥ 95%			90.91%	96.89%			100.00%	98.78%	100.00%	99.44%
%age Blocked calls				1.82%	3.11%			0.00%	1.22%	0.00%	0.56%
Call drop rate	≤ 2%			8.00%	3.67%			0.00%	0.83%	0.00%	0.56%
Hands off success rate				36.36%	87.14%			100.00%	98.64%	100.00%	100.00%

Voice Quality

All operators met the benchmark for Voice quality.

Call Set Success Rate (CSSR)

BSNL and Reliance GSM failed to meet the benchmark for CSSR in indoor.

Call Drop Rate

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

12.1.2.7 Data Drive Test Results - Panji (Goa) SSA-2G

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%	100	100	100	NDR	100	100	NDR	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	NDR	100	100	NDR	100	100	100
Minimum download speed		104	112	44	NDR	61	51	NDR	99	161	125
Average throughput for Packet Data		123	129	59	NDR	127	107	NDR	125	174	150
Latency	<250ms	100	100	NA	NDR	100	100	NDR	100	100	100

Note: Idea and Tata CDMA did not submit the data

All operators met the TRAI benchmark for data drive test.

12.1.2.8 Data Drive Test Results - Panji (Goa) SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	NDR	100	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	100	NDR	100	100
Minimum download speed		NDR	594	NDR	3174	125
Average throughput for Packet Data		NDR	781	NDR	3833	150
Latency	<250ms	NDR	100	NDR	100	100

Note: Idea did not submit the data and Airtel don't have services.

All operators met the TRAI benchmark for data drive test.

12.1.3 Jalgaon SSA

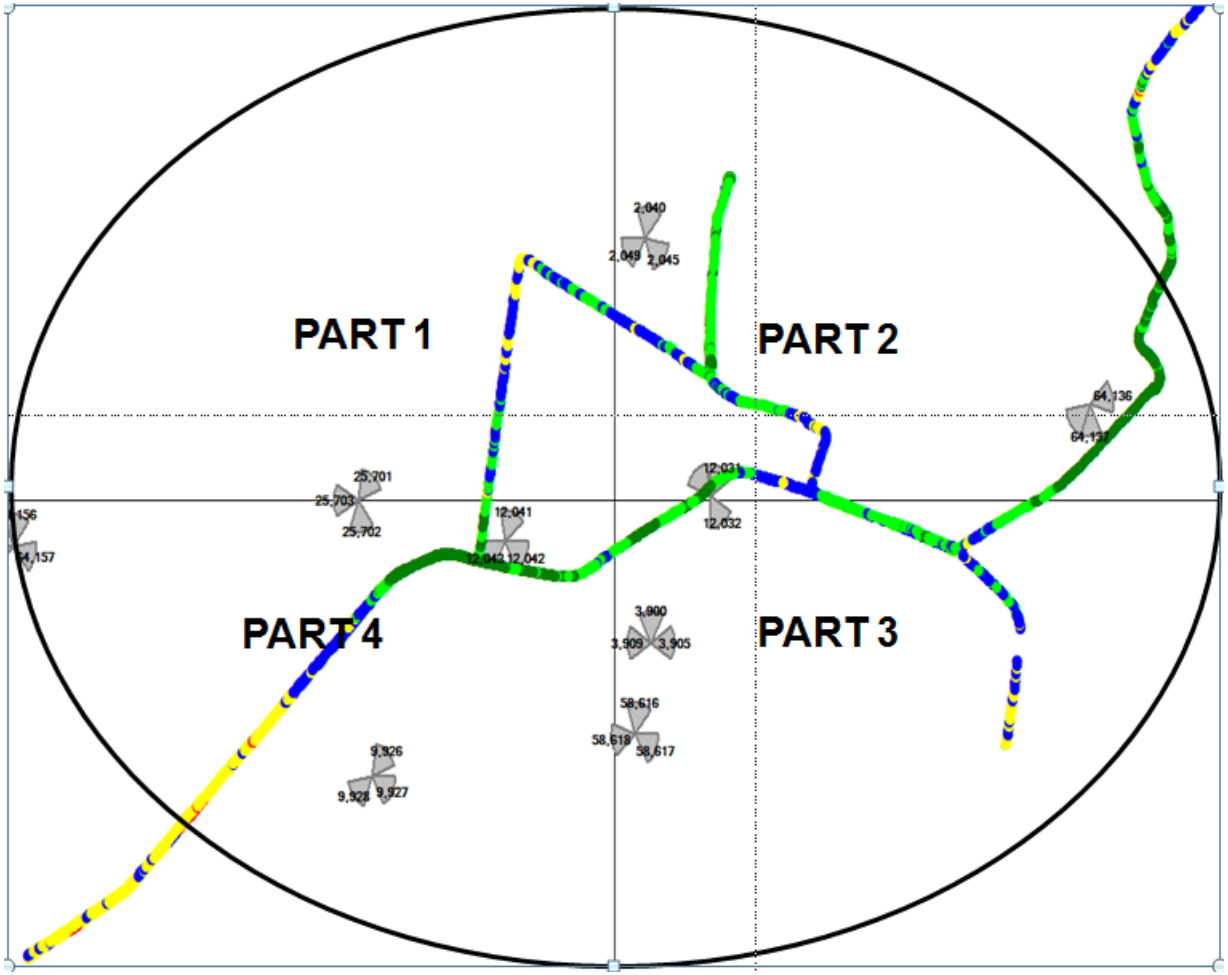
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
May	Jalgaon	05-05-2016	07-05-2016	260

12.1.3.1 Route Details - Jalgaon SSA

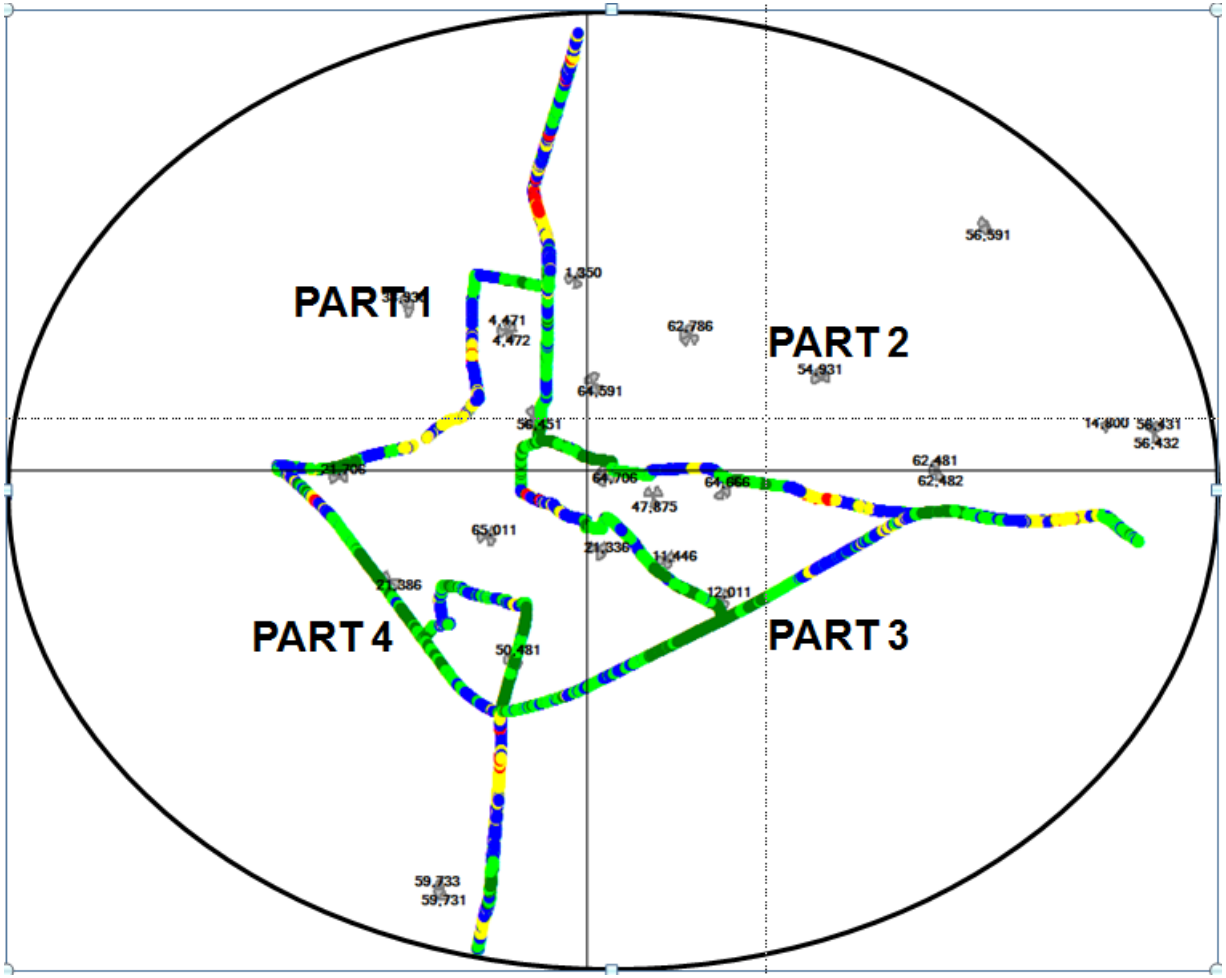
Category	Type of location	May		
		Jalgaon		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Jalgaon Major Road Jalgaon within City Jalgaon Highway Erandol Highway Parola Highway Amalner Major Road Chopda within City	Bhusawal Highway Bhusawal within City Bhusawal Major Road Raver Major Road Muktainagar Highway Muktainagar Major Road	Pachora Highway Bhadgaon Major Road Chalisgaon Within City
	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 observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

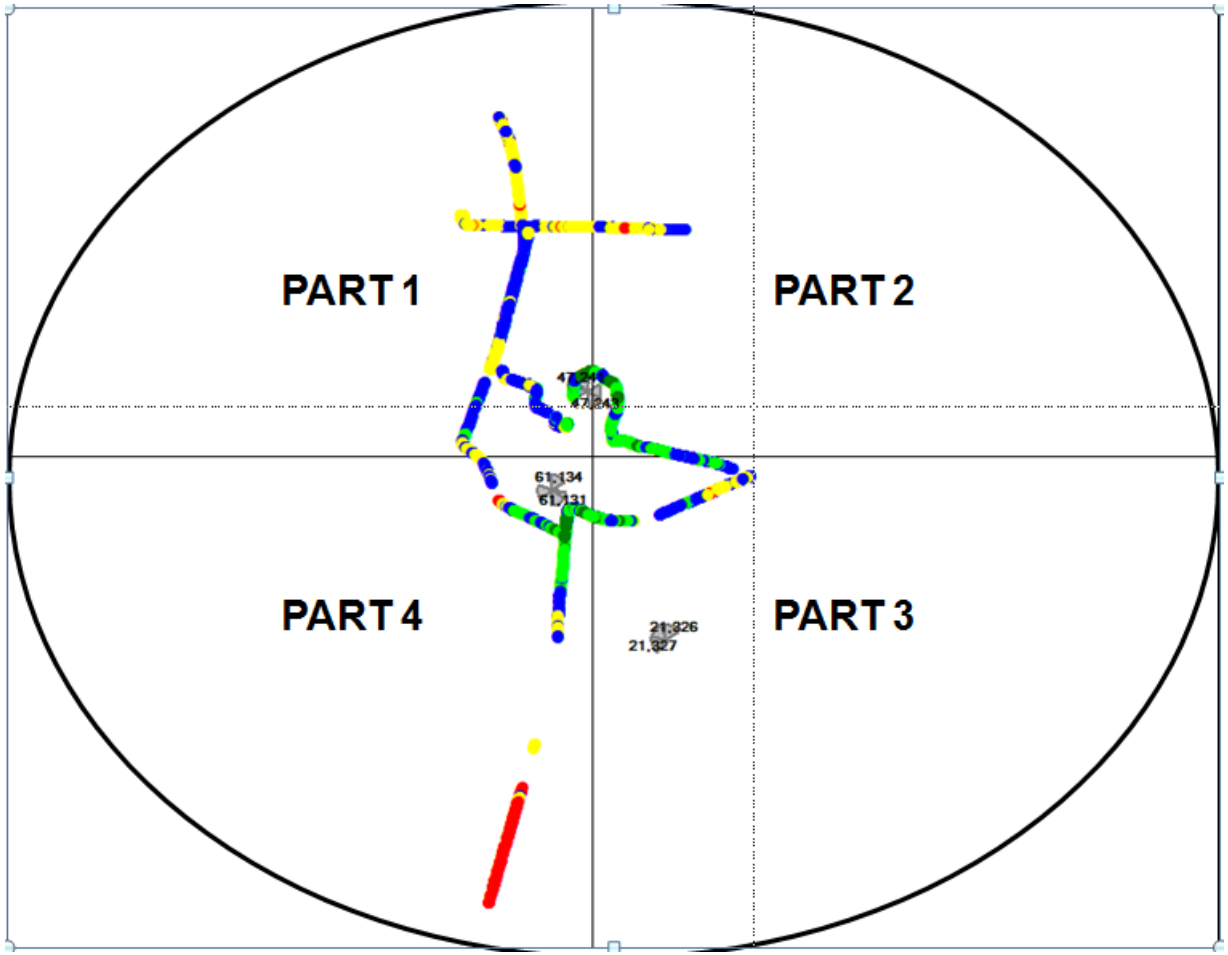
12.1.3.2 Route Map - Jalgaon DAY 1



12.1.3.3 Route Map - Jalgaon DAY 2



12.1.3.4 Route Map - Jalgaon DAY 3



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

12.1.3.5 Drive Test Results - Jalgaon SSA-2G

JALGAON	B'mark	Aircel		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 Service		28.40%	58.80%	73.92%	56.04%	100.00%	84.29%	66.30%	71.83%	4.01%	25.02%	99.98%	99.92%	93.67%	91.44%	55.39%	56.66%	82.90%	83.09%
0 to -85 dBm				58.40%	87.54%	99.92%	95.71%	100.00%	98.17%	99.96%	93.24%	37.54%	56.44%	100.00%	99.98%	100.00%	99.25%	87.29%	84.76%	99.59%	96.69%
0 to -95 dBm				94.59%	98.41%	100.00%	99.84%	100.00%	99.91%	100.00%	99.86%	82.31%	89.10%	100.00%	100.00%	100.00%	100.00%	99.97%	98.55%	100.00%	99.47%
Voice quality	≥ 95%			99.25%	97.60%	94.08%	88.61%	99.62%	96.84%	99.98%	99.16%	88.39%	90.66%	98.94%	96.51%	99.07%	96.93%	98.44%	95.39%	97.03%	95.87%
CSSR	≥ 95%			100.00%	100.00%	92.37%	95.73%	100.00%	100.00%	98.46%	99.22%	98.36%	98.55%	100.00%	100.00%	100.00%	98.54%	100.00%	99.73%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	7.63%	4.27%	0.00%	0.00%	1.54%	0.78%	1.64%	1.45%	0.00%	0.00%	0.00%	1.45%	0.00%	0.27%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.92%	2.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.17%	0.00%	0.27%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	98.66%	100.00%	99.80%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.05%	100.00%	97.11%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmarks of CSSR in indoor.

Call Drop Rate

BSNL failed to meet the benchmark of call drop rate in outdoor location.

12.1.3.6 Drive Test Results - Jalgaon SSA-3G

JALGAON	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		7.17%	34.56%	98.04%	51.43%	NA	94.72%	100.00%	37.62%
0 to -85 dBm				25.57%	68.06%	99.98%	87.48%	NA	99.00%	100.00%	81.59%
0 to -95 dBm				87.01%	92.05%	100.00%	99.08%	NA	100.00%	100.00%	94.10%
Voice quality	≥ 95%			99.67%	98.16%	NA	NA	NA	99.45%	94.61%	96.71%
CSSR	≥ 95%			98.15%	95.33%	100.00%	100.00%	NA	98.13%	100.00%	100.00%
%age Blocked calls				1.85%	4.67%	0.00%	0.00%	NA	1.86%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	3.73%	0.00%	0.00%	NA	1.89%	0.00%	0.00%
Hands off success rate				100.00%	98.29%	100.00%	100.00%	NA	97.81%	100.00%	100.00%

Voice Quality

Vodafone 3G failed to meet the benchmark for Voice quality in indoor location.

Note: Idea 3G did not submit data for voice quality

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR.

Call Drop Rate

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

12.1.3.7 Data Drive Test Results - Jalgaon SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Successful Data Transmission download speed attempts	>80%	No Service	100	100	100	100	100	NDR	100	100	100
Successful Data Transmission upload speed attempts	>75%		100	100	100	100	100	NDR	100	100	100
Minimum download speed			151	80	116	51	41	NDR	94	129	147
Average throughput for Packet Data			171	98	153	94	100	NDR	113	152	166
Latency	<250ms		100	100	100	100	100	NDR	100	100	100

Note: TATA CDMA did not submit the data and Aircel don't have services

All operators met the TRAI benchmark for data drive test.

12.1.3.8 Data Drive Test Results - Jalgaon SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Successful Data Transmission download speed attempts	>80%	NDR	100	100	100	100
Successful Data Transmission upload speed attempts	>75%	NDR	100	100	100	100
Minimum download speed		NDR	499	1126	1800	3173
Average throughput for Packet Data		NDR	629	2224	1944	4711
Latency	<250ms	NDR	100	100	100	100

Note: Airtel did not submit

All operators met the TRAI benchmark for data drive test.

12.1.4 Nashik SSA

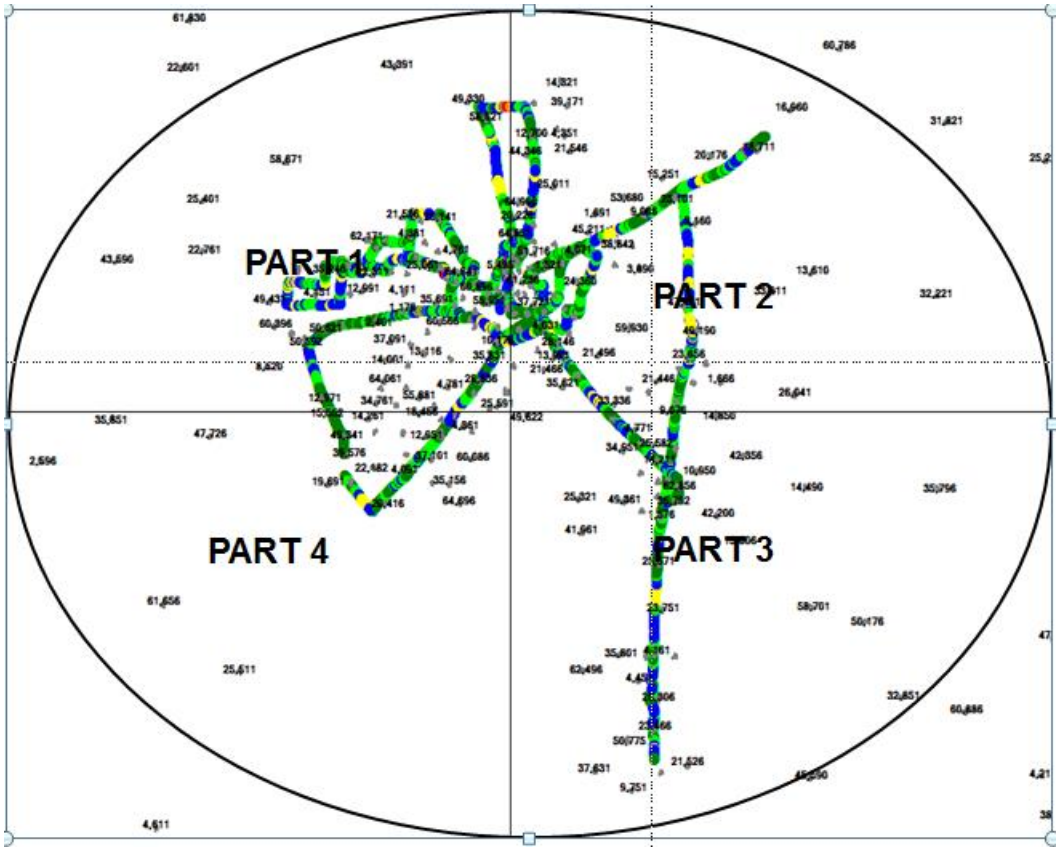
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
May	Nashik	16-05-2016	21-05-2016	576

12.1.4.1 Route Details - Nashik SSA

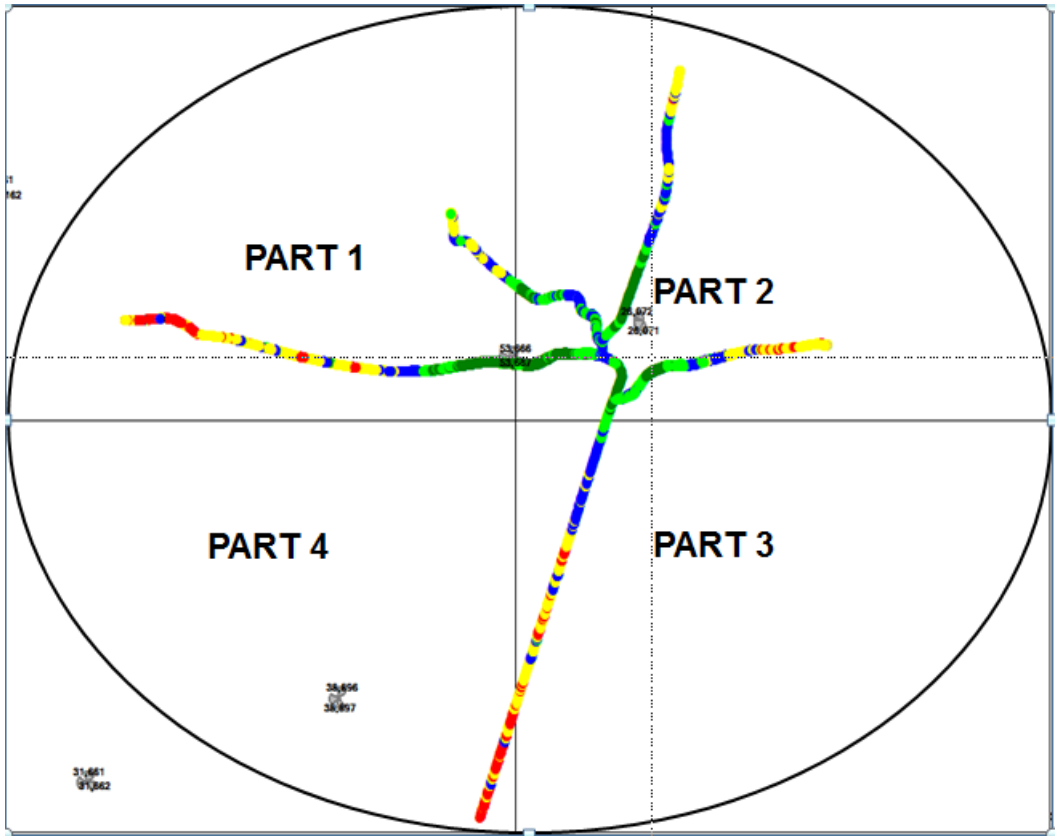
Category	Type of location	May Nashik					
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Outdoor	Major Roads	Panchvati	Vijaynagar Malwadi Saptashrungi nagar Camp road Iqbal road Maldhe Mumbadevi temple Mohmd Ali road Tilak road Seema nagar Bhivasan nagar Satana police station Munjwad Lord Ganesha temple Suraj petroloium Lohoner Nashik road Kotak mahindra bank	Awankhed Parmori Pimplagao Ketki Patil vasti road Lakhampur koshambi road Santosi mata mandir Bagwan pura Boricha pada Vani dahivi road Bhagwati nagar Kalwan bk Shivaji nagr S.T. colony Dalwat link road Eklahare	Bagalvasti, Bazar Peth,Shiv road,Renukanagar, Bramhagaon Mazgaon,Aadhad Chambar vada Khaerikwada KhardodkuleMazgaon Aadhad, Chambar vada Khaerikwada KhardodkuleNeggde road Balhegaon, Kapse paithani park Rayate, nandesar FCI road,Wagdardi road Rapali road,ShingveDongaon	Take Ghoti budrul Khmable Igatpuri TringalwadiMIDC sinnar Sradwadi STICE Musalgaon Malegaon	Daji ki hotel State bank of india Rahul cyber café Peint Kapuzira Teli gali Ambedkar chauk Jawar road Gulve vadi Akhil bhartiya
	Highways	Gangapur road					
	With in the City	Nashik road					
Indoor	Shopping complex	Satpur colony					
	Office complex	Dadhegaon					

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

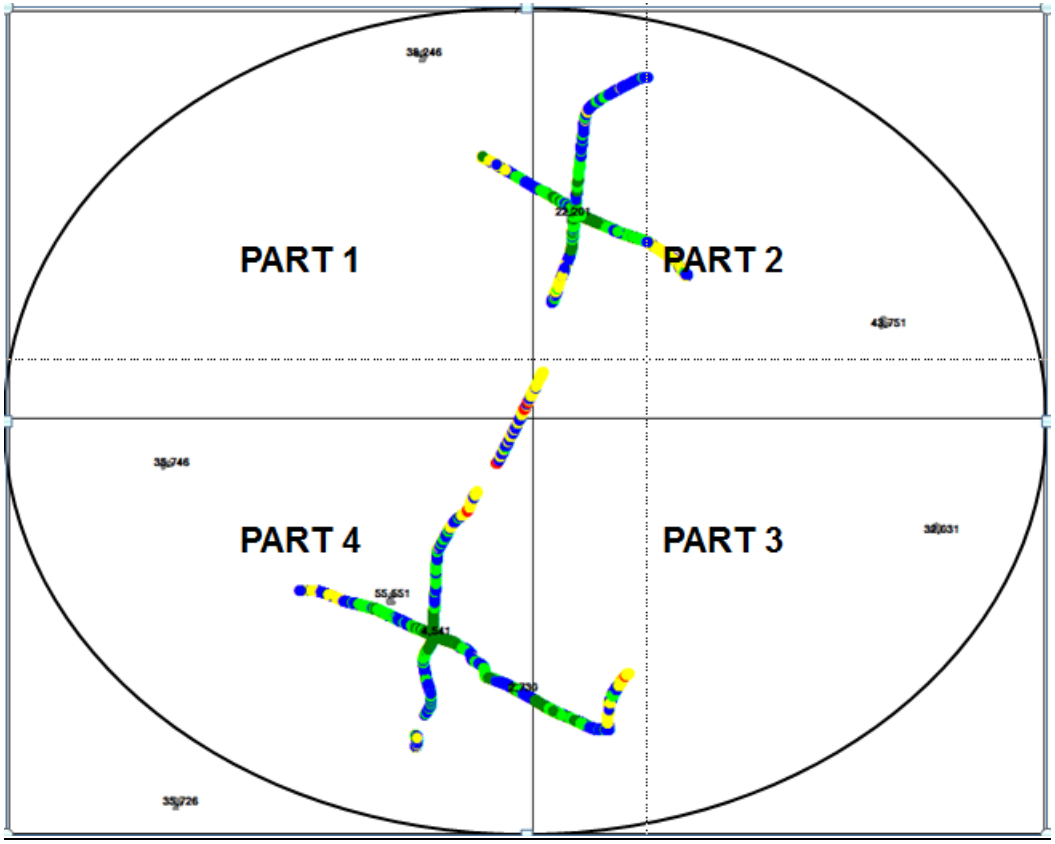
12.1.4.2 Route Map - Nashik DAY 1



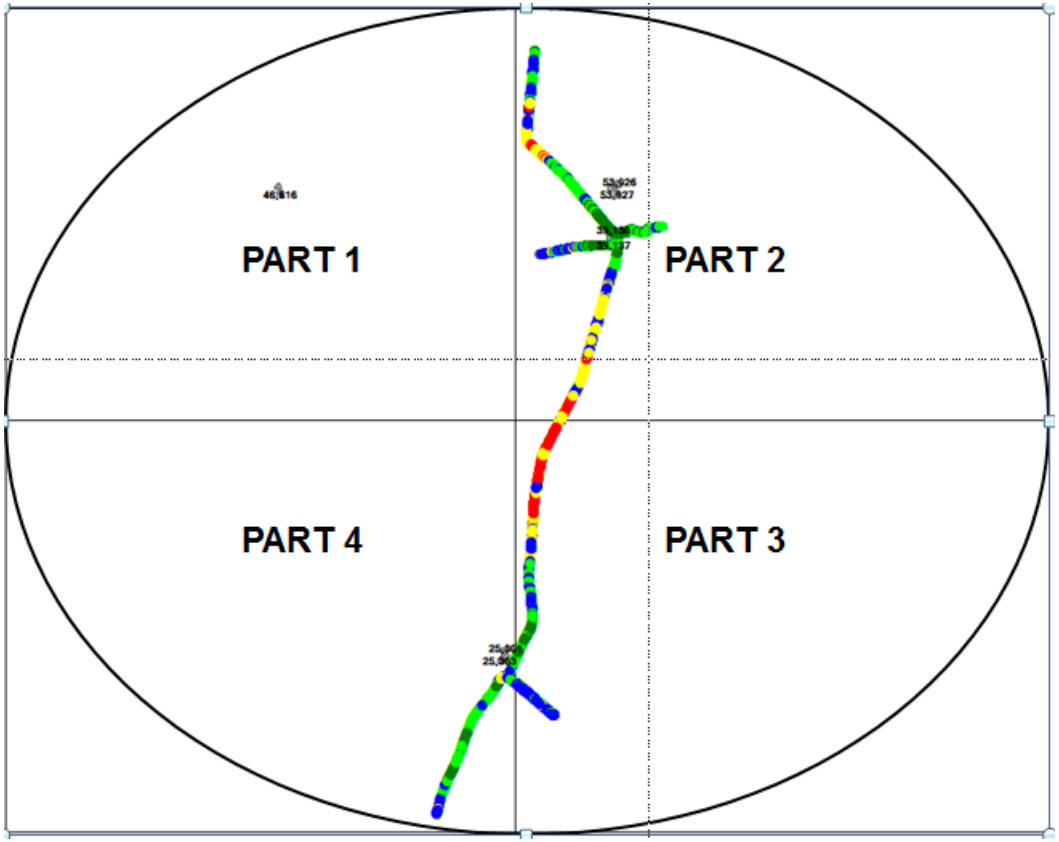
12.1.4.3 Route Map - Nashik DAY 2



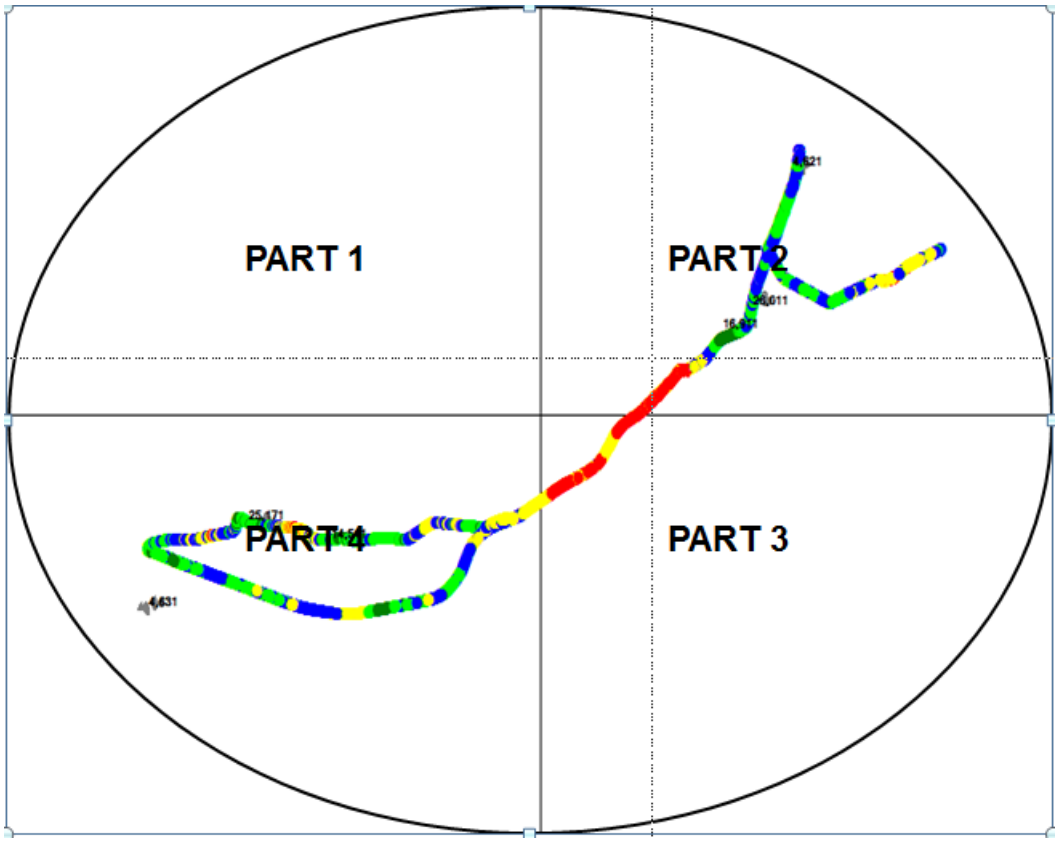
12.1.4.4 Route Map - Nashik DAY 3



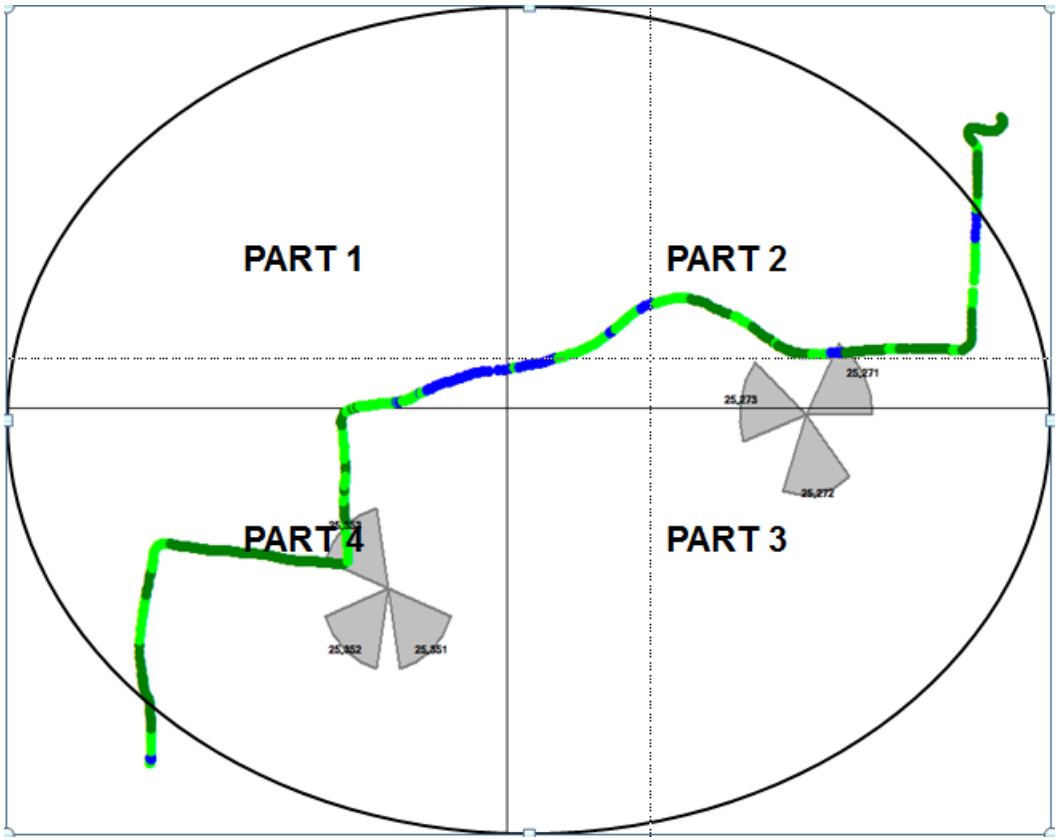
12.1.4.5 Route Map - Nashik DAY 3



12.1.4.6 Route Map - Nashik DAY 3



12.1.4.7 Route Map - Nashik DAY 3



12.1.4.8 Drive Test Results - Nashik SSA-2G

Nashik	B'mark	Aircel		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		99.89%	73.68%	99.36%	52.83%	64.30%	27.99%	99.51%	83.15%	80.75%	62.87%	48.83%	33.45%	99.99%	99.97%	98.91%	91.96%	77.21%	72.92%	98.83%	75.23%
0 to -85 dBm		100.00%	93.09%	99.98%	81.08%	98.72%	77.82%	100.00%	97.56%	98.59%	89.29%	82.27%	68.25%	100.00%	99.99%	100.00%	99.55%	99.37%	91.50%	99.99%	94.46%
0 to -95 dBm		100.00%	99.68%	100.00%	96.14%	99.99%	97.94%	100.00%	99.80%	100.00%	99.42%	99.26%	94.57%	100.00%	100.00%	100.00%	100.00%	100.00%	98.61%	100.00%	99.39%
Voice quality	≥ 95%	99.79%	96.83%	99.15%	97.58%	96.56%	96.23%	99.26%	96.55%	99.97%	98.29%	98.11%	92.97%	98.64%	96.39%	98.95%	96.88%	99.20%	95.19%	97.99%	96.32%
CSSR	≥ 95%	100.00%	98.67%	100.00%	100.00%	100.00%	97.35%	100.00%	99.86%	100.00%	98.05%	98.40%	98.45%	100.00%	99.70%	100.00%	98.78%	100.00%	99.34%	100.00%	100.00%
%age Blocked calls		0.00%	1.59%	0.00%	0.00%	0.00%	2.65%	0.00%	0.14%	0.00%	1.95%	1.60%	1.55%	0.00%	0.30%	0.00%	1.06%	0.00%	0.66%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.27%	0.00%	0.00%	0.81%	0.61%	0.00%	0.00%	0.00%	0.17%	0.00%	0.79%	0.00%	0.30%	0.00%	0.61%	0.00%	0.27%	0.00%	0.00%
Hands off success rate		100.00%	98.18%	100.00%	100.00%	100.00%	98.45%	100.00%	99.91%	100.00%	100.00%	100.00%	99.47%	100.00%	99.91%	92.31%	99.23%	100.00%	98.67%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance GSM failed to meet the benchmark for voice quality in outdoor.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

All operators met the benchmark of call drop rate.

12.1.4.9 Drive Test Results - Nashik SSA-3G

Nashik	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		1.35%	45.27%	82.38%	41.64%	100.00%	92.96%	80.09%	48.55%
0 to -85 dBm				64.65%	77.99%	95.35%	74.83%	100.00%	98.22%	85.47%	74.68%
0 to -95 dBm				99.10%	97.28%	100.00%	96.03%	100.00%	100.00%	100.00%	92.74%
Voice quality	≥ 95%			99.91%	97.83%	NA	NA	99.99%	98.36%	97.99%	96.94%
CSSR	≥ 95%			98.44%	96.16%	100.00%	100.00%	100.00%	98.95%	100.00%	100.00%
%age Blocked calls				1.56%	3.84%	0.00%	0.00%	0.00%	0.77%	0.00%	0.00%
Call drop rate	≤ 2%			0.79%	0.42%	0.00%	0.16%	0.00%	0.78%	0.00%	0.00%
Hands off success rate				100.00%	99.84%	100.00%	99.46%	100.00%	99.32%	100.00%	100.00%

NDR: - Data not submitted

Voice Quality

All operators met the benchmark for Voice quality in indoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR.

Call Drop Rate

All operators met the benchmark for call drop rate in indoor locations.

12.1.4.10 Data Drive Test Results - Nashik SSA-2G

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%	100	100	100	100	100	100	NDR	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	NDR	100	100	100
Minimum download speed		103	118	89	112	36	48	NDR	122	120	161
Average throughput for Packet Data		126	139	108	147	56	98	NDR	165	150	176
Latency	<250ms	100	100	100	100	100	100	NDR	100	100	100

Note: TATA CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

12.1.4.11 Data Drive Test Results - Nashik SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	NDR	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	100	100	100	100
Minimum download speed		NDR	2510	1098	2536	3786
Average throughput for Packet Data		NDR	3024	2220	2926	4438
Latency	<250ms	NDR	100	100	100	100

Note: Airtel did not submit the data.

All operators met the TRAI benchmark for data drive test.

12.1.5 Akola SSA

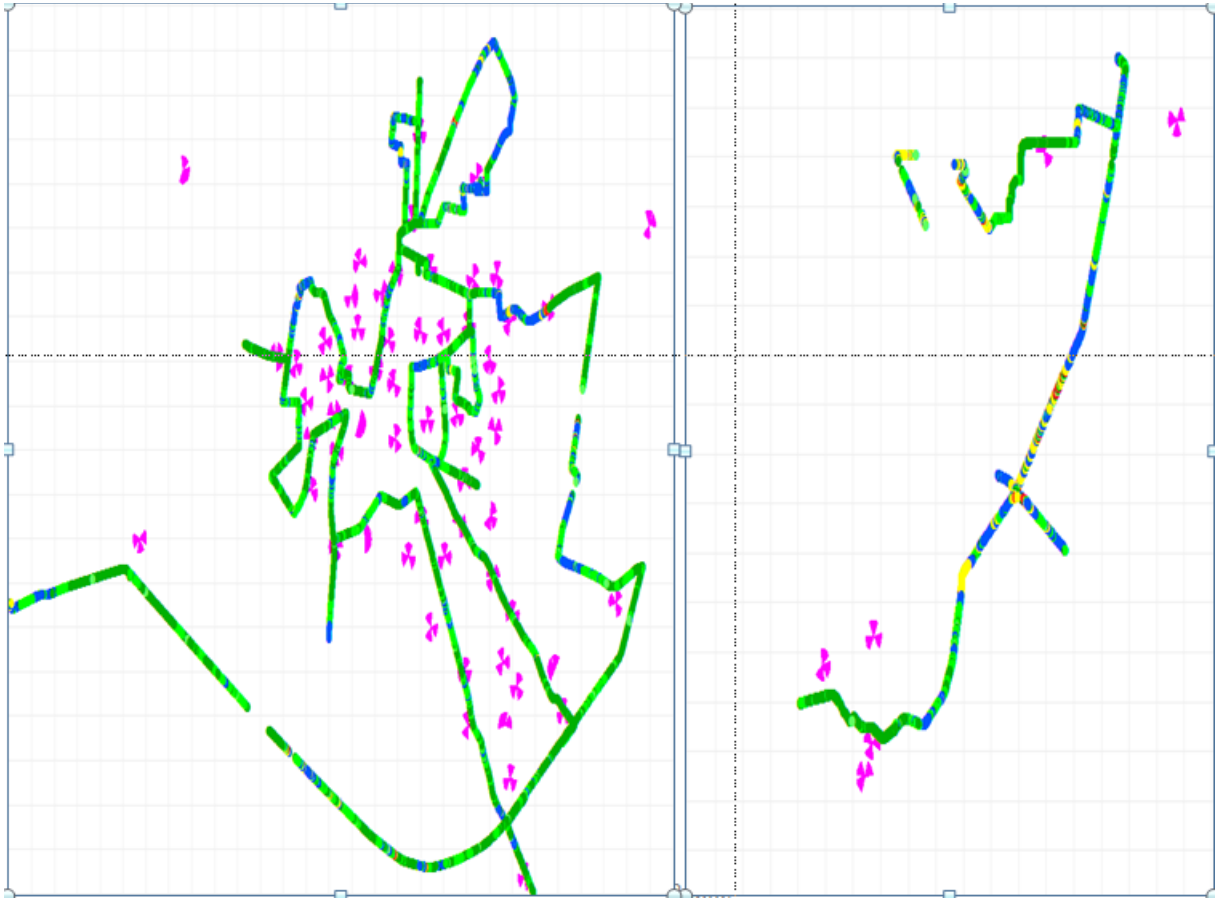
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	AKOLA	01-06-2016	03-06-2016	265

12.1.5.1 Route Details - Akola SSA

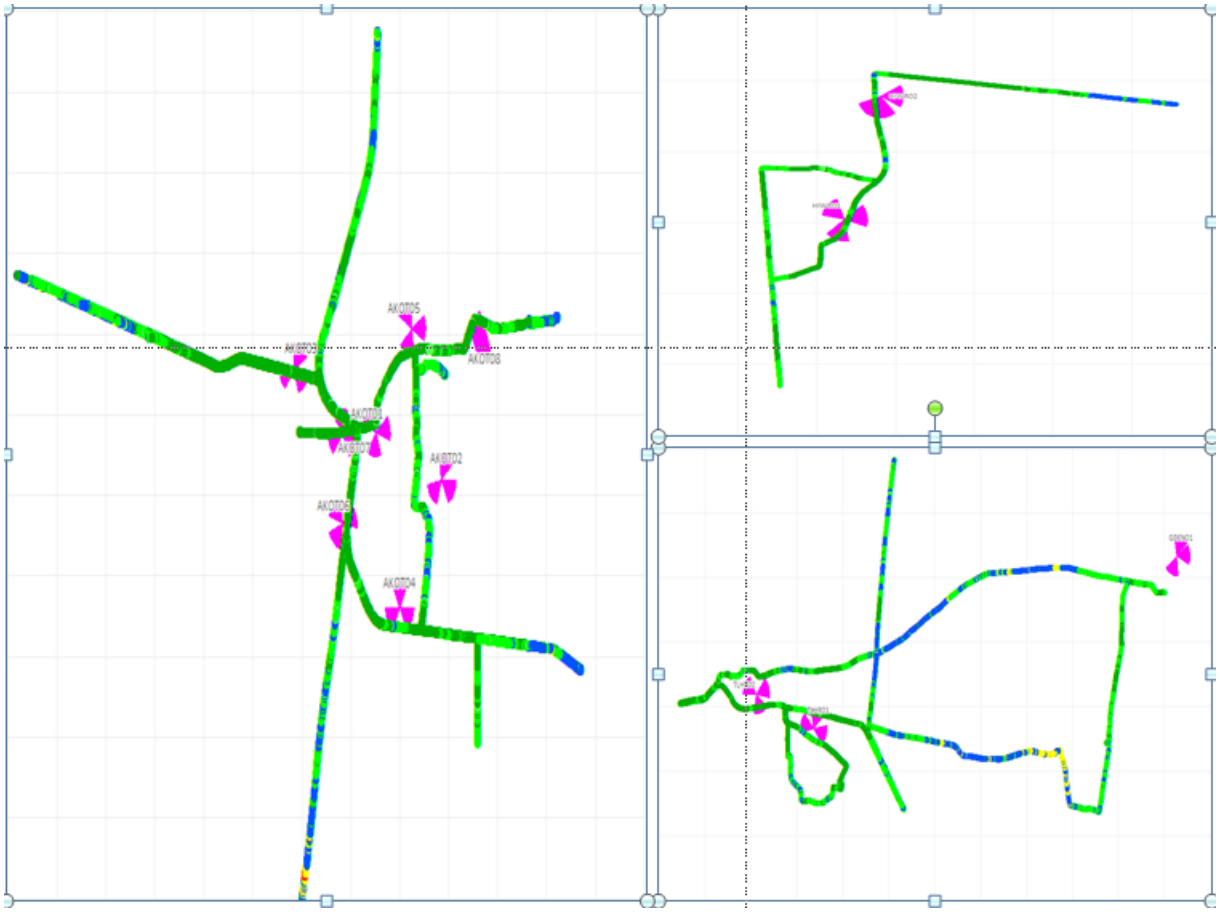
Category	Type of location	June		
		AKOLA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Akola, Balapur	Akot, Hivarkhed, Telhara	Murtizapur, Barshi Takli, Patur
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

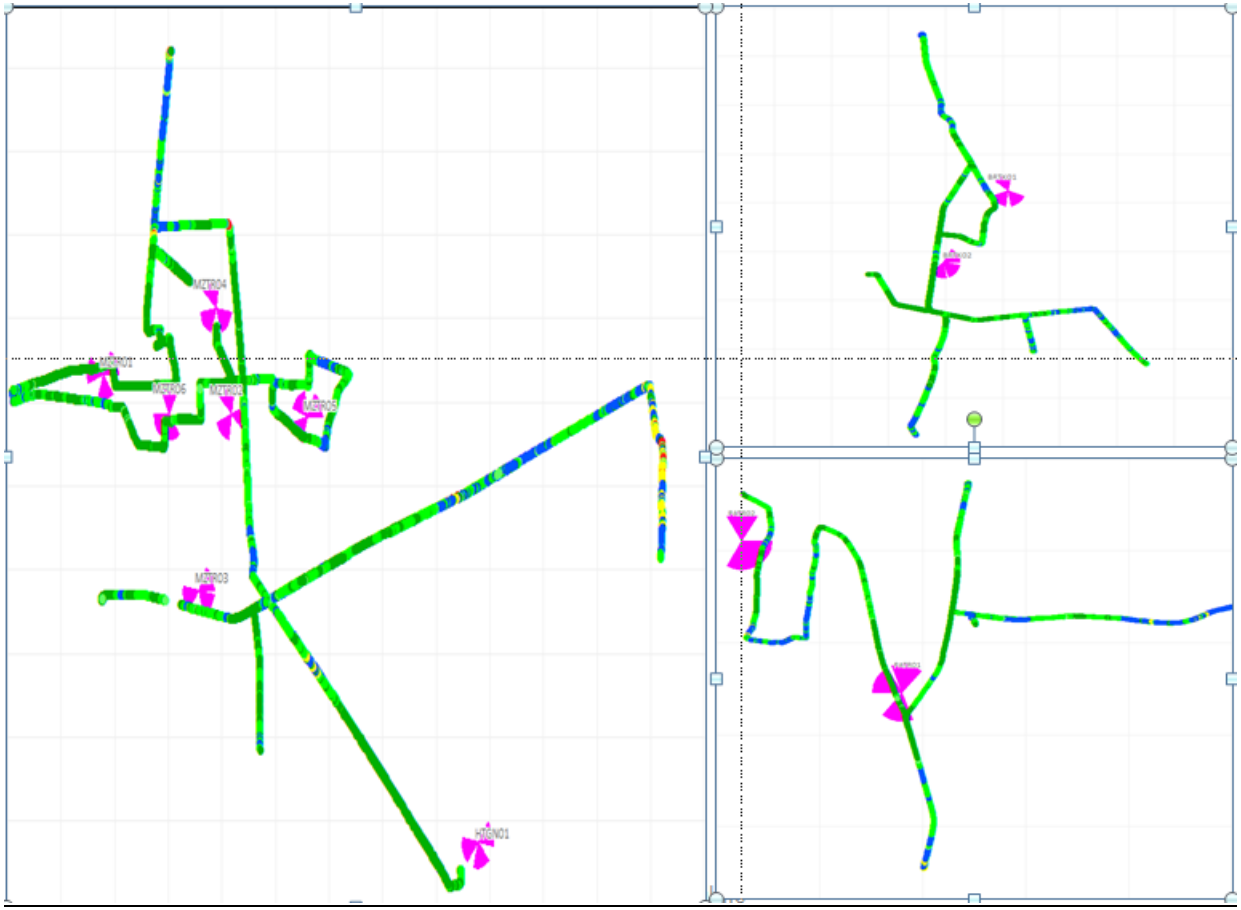
12.1.5.2 Route Map - Akola DAY 1



12.1.5.3 Route Map - Akola DAY 2



12.1.5.4 Route Map - Akola DAY 3



12.1.5.5 Drive Test Results - Akola SSA-2G

AKOLA	B'mark	Aircel		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 service		64.20%	58.93%	93.62%	62.39%	95.53%	80.52%	73.78%	47.88%	59.62%	18.50%	99.93%	99.94%	97.86%	92.51%	85.35%	61.48%	88.17%	85.75%
0 to -85 dBm				71.14%	85.52%	99.29%	96.57%	99.59%	97.12%	99.96%	80.50%	95.98%	51.50%	100.00%	99.99%	99.81%	99.79%	99.75%	86.80%	99.68%	97.60%
0 to -95 dBm				99.65%	96.50%	100.00%	100.00%	100.00%	99.59%	100.00%	97.61%	99.93%	88.38%	100.00%	100.00%	100.00%	100.00%	100.00%	98.54%	99.97%	99.61%
Voice quality	≥ 95%			99.05%	97.45%	100.00%	77.38%	98.82%	96.45%	99.93%	98.91%	99.92%	94.88%	99.67%	98.17%	99.91%	97.80%	96.91%	95.12%	97.84%	95.82%
CSSR	≥ 95%			100.00%	100.00%	80.46%	70.27%	100.00%	100.00%	100.00%	98.66%	100.00%	99.58%	100.00%	99.28%	100.00%	99.38%	100.00%	97.53%	100.00%	100.00%
%age Blocked calls				0.00%	0.26%	19.54%	29.73%	0.00%	0.00%	0.00%	1.34%	0.00%	0.42%	0.00%	0.72%	0.00%	0.63%	0.00%	2.47%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	1.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				0.00%	100.00%	NA	96.63%	100.00%	99.84%	100.00%	100.00%	100.00%	98.82%	100.00%	100.00%	100.00%	99.58%	97.87%	97.40%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmarks of CSSR in indoor as well as outdoor location

Call Drop Rate

All operators met the benchmark of call drop rate.

12.1.5.6 Drive Test Results - Akola SSA-3G

AKOLA	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		0.00%	44.46%	98.81%	48.87%	100.00%	93.50%	55.00%	18.70%
0 to -85 dBm				38.68%	76.22%	100.00%	93.08%	100.00%	99.14%	85.42%	48.89%
0 to -95 dBm				61.32%	95.42%	100.00%	97.74%	100.00%	100.00%	99.56%	81.07%
Voice quality	≥ 95%			100.00%	99.43%	NA	NA	100.00%	98.58%	97.95%	95.90%
CSSR	≥ 95%			82.61%	74.82%	100.00%	100.00%	100.00%	99.15%	100.00%	100.00%
%age Blocked calls				17.39%	23.05%	0.00%	0.00%	0.00%	0.85%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	4.07%	0.00%	0.00%	0.00%	0.85%	0.00%	0.00%
Hands off success rate				NA	NA	100.00%	100.00%	100.00%	99.45%	100.00%	100.00%

Voice Quality

All operators met the benchmark for Voice quality.

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor location.

Call Drop Rate

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

12.1.5.7 Data Drive Test Results - Akola SSA-2G

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%	No Service	100	100	100	100	100	100	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	NDR	100	100
Minimum download speed			116	14	117	34	39	86	NDR	115	182
Average throughput for Packet Data			131	31	154	58	69	91	NDR	174	198
Latency	<250ms		100	99	100	100	100	100	NDR	100	100

Note: TATA GSM and Airtel did not submit the data and Aircel don't have services

All operators met the TRAI benchmark for data drive test.

12.1.5.8 Data Drive Test Results - Akola SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Successful Data Transmission download speed attempts	>80%	NDR	100	100	100	100
Successful Data Transmission upload speed attempts	>75%	NDR	100	100	100	100
Minimum download speed		NDR	1055	1523	1707	4216
Average throughput for Packet Data		NDR	1219	2429	1898	4868
Latency	<250ms	NDR	100	100	100	100

Note: Airtel don't have services

All operators met the TRAI benchmark for data drive test.

12.1.6 Kolhapur SSA

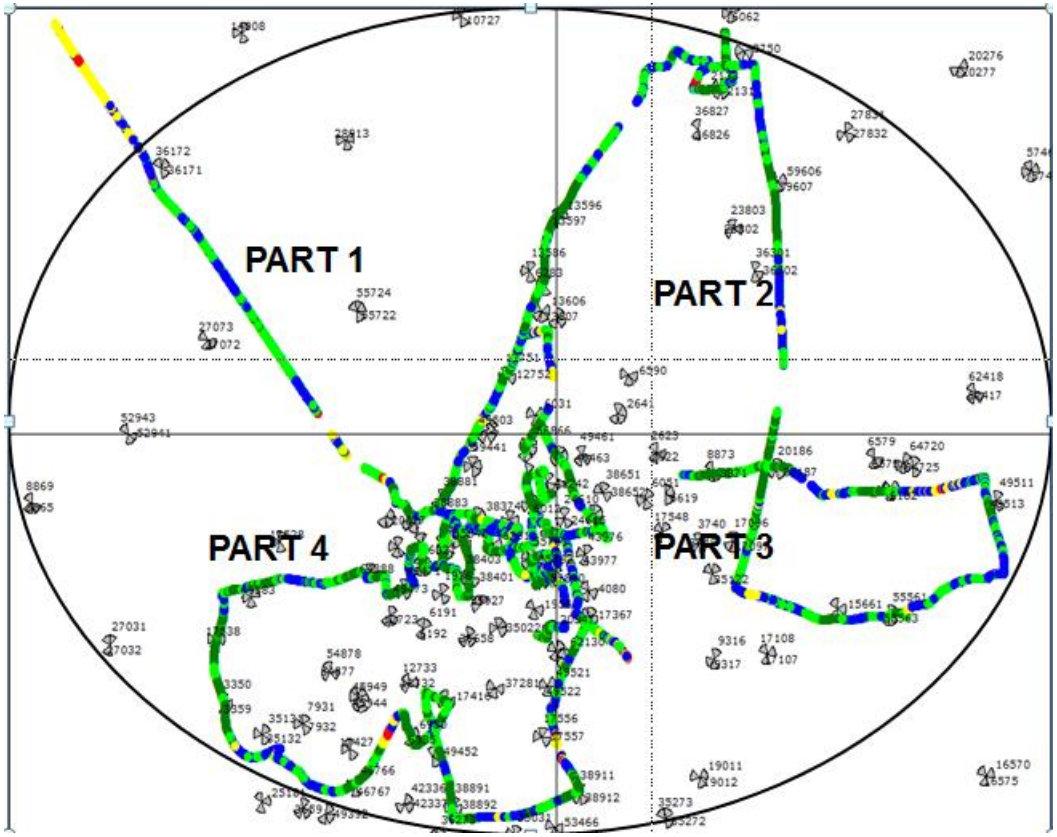
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	Kolhapur	21-06-2016	23-06-2016	325

12.1.6.1 Route Details - Kolhapur SSA

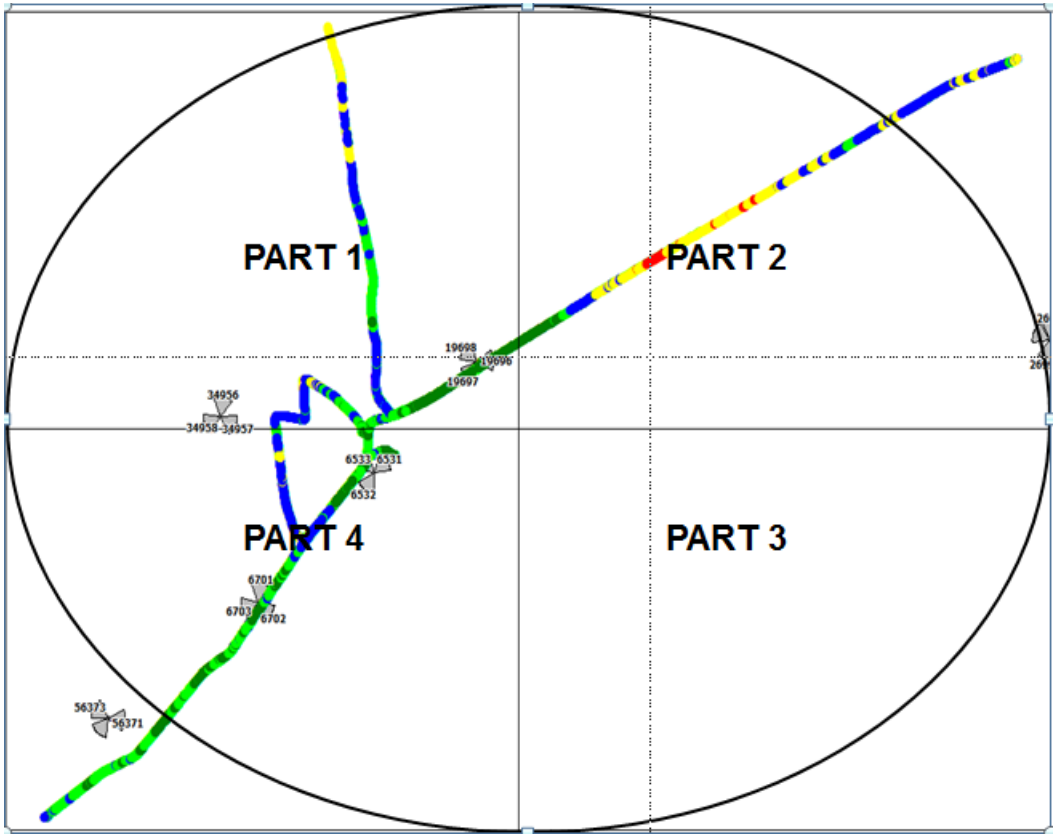
Category	Type of location	June		
		Kolhapur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Kolhapur Highway, kolhapur Major road, Kolhapur Within city, Panhala major road	Radhanagari Major Raod, Gargoti Within city, Ajra Major Road, Changhad Highway, Gadhinglaj Highway, Gadhinglaj Major Road, Kagal Highway	Hatkanangle Major Raod, Ichalkarangi Major Raod, Ichalkarangi Within City, Jaishingpur Within City, Narsobachi Wadi Major Road, Shirol Highway
	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 observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

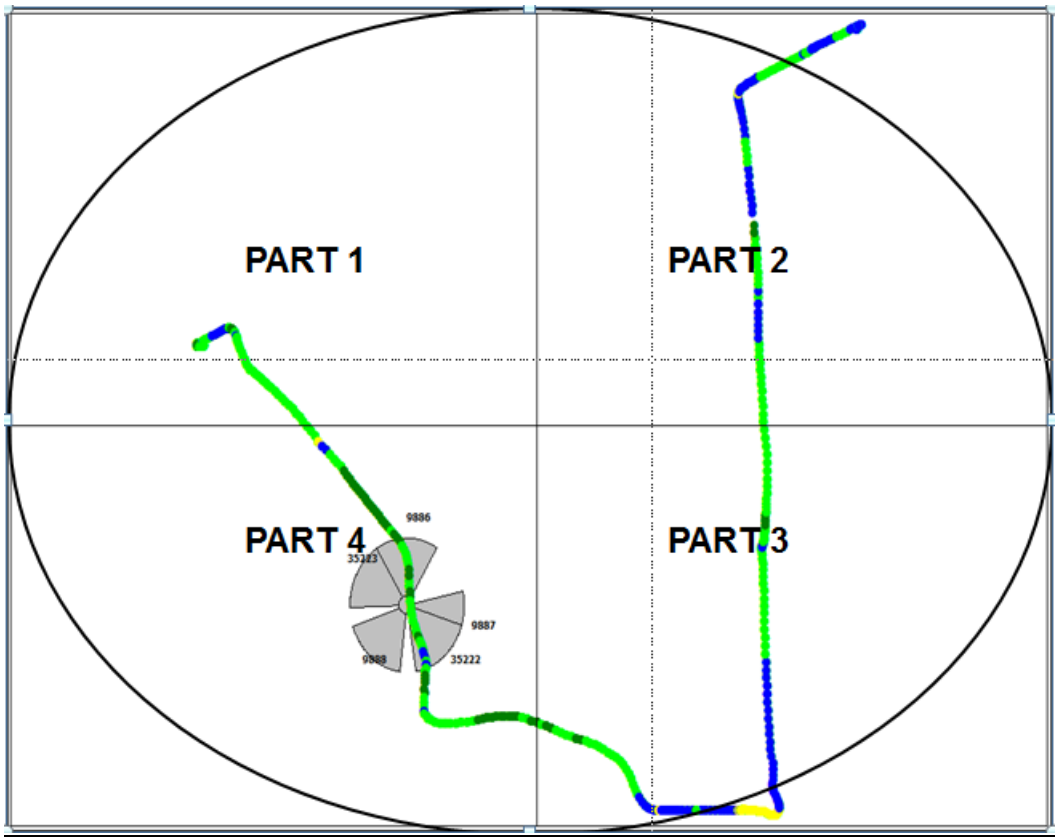
12.1.6.2 Route Map - Kolhapur DAY 1



12.1.6.3 Route Map - Kolhapur DAY 2



12.1.6.4 Route Map - Kolhapur DAY 3



12.1.6.5 Drive Test Results - Kolhapur SSA-2G

Kolhapur	B'mark	Aircel		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		99.70%	85.77%	100.00%	66.10%	23.98%	41.46%	80.88%	69.13%	NDR		33.68%	28.82%	100.00%	99.94%	99.88%	92.86%	100.00%	79.52%	99.89%	71.89%
0 to -85 dBm		100.00%	97.26%	100.00%	90.66%	97.34%	92.38%	98.21%	93.63%			75.12%	71.57%	100.00%	99.98%	100.00%	99.53%	100.00%	95.23%	99.97%	94.17%
0 to -95 dBm		100.00%	99.90%	100.00%	98.16%	76.78%	98.74%	99.91%	99.74%			96.03%	95.56%	100.00%	100.00%	100.00%	100.00%	100.00%	99.84%	99.98%	99.21%
Voice quality	≥ 95%	99.84%	96.34%	99.84%	97.40%	78.01%	68.15%	99.66%	96.55%			83.81%	88.13%	96.22%	96.15%	98.93%	95.72%	99.13%	94.67%	95.49%	95.17%
CSSR	≥ 95%	100.00%	98.45%	100.00%	99.76%	100.00%	93.98%	100.00%	100.00%			100.00%	98.36%	100.00%	100.00%	100.00%	98.11%	100.00%	98.81%	100.00%	100.00%
%age Blocked calls		0.00%	1.04%	0.00%	0.24%	0.00%	4.01%	0.00%	0.00%			0.00%	1.64%	0.00%	0.00%	0.00%	0.90%	0.00%	1.19%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	1.05%	0.00%	0.24%	1.41%	2.40%	0.00%	0.00%			0.00%	0.67%	0.00%	0.30%	0.00%	0.90%	0.00%	0.24%	0.00%	0.00%
Hands off success rate		100.00%	98.56%	100.00%	99.76%	100.00%	94.46%	100.00%	99.00%			98.82%	98.15%	100.00%	100.00%	100.00%	99.61%	100.00%	96.65%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Note: BSNL and Reliance CDMA did not submit the data

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations and Telenor failed in outdoor location

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmark for CSSR in outdoor

Call Drop Rate

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

12.1.6.6 Drive Test Results - Kolhapur SSA-3G

Kolhapur	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR		0.68%	50.48%	95.02%	37.13%	99.98%	91.53%	100.00%	41.94%
0 to -85 dBm				89.80%	75.55%	100.00%	71.39%	100.00%	98.80%	100.00%	74.70%
0 to -95 dBm				97.13%	89.05%	100.00%	92.67%	100.00%	100.00%	100.00%	93.45%
Voice quality	≥ 95%			100.00%	97.14%	NA	NA	99.53%	97.50%	100.00%	96.52%
CSSR	≥ 95%			100.00%	90.16%	100.00%	100.00%	100.00%	98.48%	100.00%	100.00%
%age Blocked calls				0.00%	9.84%	0.00%	0.00%	0.00%	1.05%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	4.80%	0.00%	0.00%	0.00%	1.05%	0.00%	0.00%
Hands off success rate				NA	NA	100.00%	100.00%	100.00%	99.63%	100.00%	100.00%

Note: BSNL and Airtel did not submit the data

Voice Quality

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

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

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

12.1.6.7 Data Drive Test Results - Kolhapur SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Successful Data Transmission download speed attempts	>80%	100	100	NDR	100	NDR	100	NDR	100	100	100
Successful Data Transmission upload speed attempts	>75%	100	100	NDR	100	NDR	100	NDR	100	100	100
Minimum download speed		103	98	NDR	124	NDR	50	NDR	106	128	116
Average throughput for Packet Data		127	121	NDR	152	NDR	94	NDR	131	158	143
Latency	<250ms	100	100	NDR	100	NDR	100	NDR	100	100	100

Note: BSNL, Reliance CDMA and TATA CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

12.1.6.8 Data Drive Test Results - Kolhapur SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Successful Data Transmission download speed attempts	>80%	NDR	NDR	100	100	100
Successful Data Transmission upload speed attempts	>75%	NDR	NDR	100	100	100
Minimum download speed		NDR	NDR	3251	3058	3177
Average throughput for Packet Data		NDR	NDR	4571	3242	3642
Latency	<250ms	NDR	NDR	100	100	100

Note: BSNL and Airtel did not submit the data

All operators met the TRAI benchmark for data drive test.

12.1.7 Beed SSA

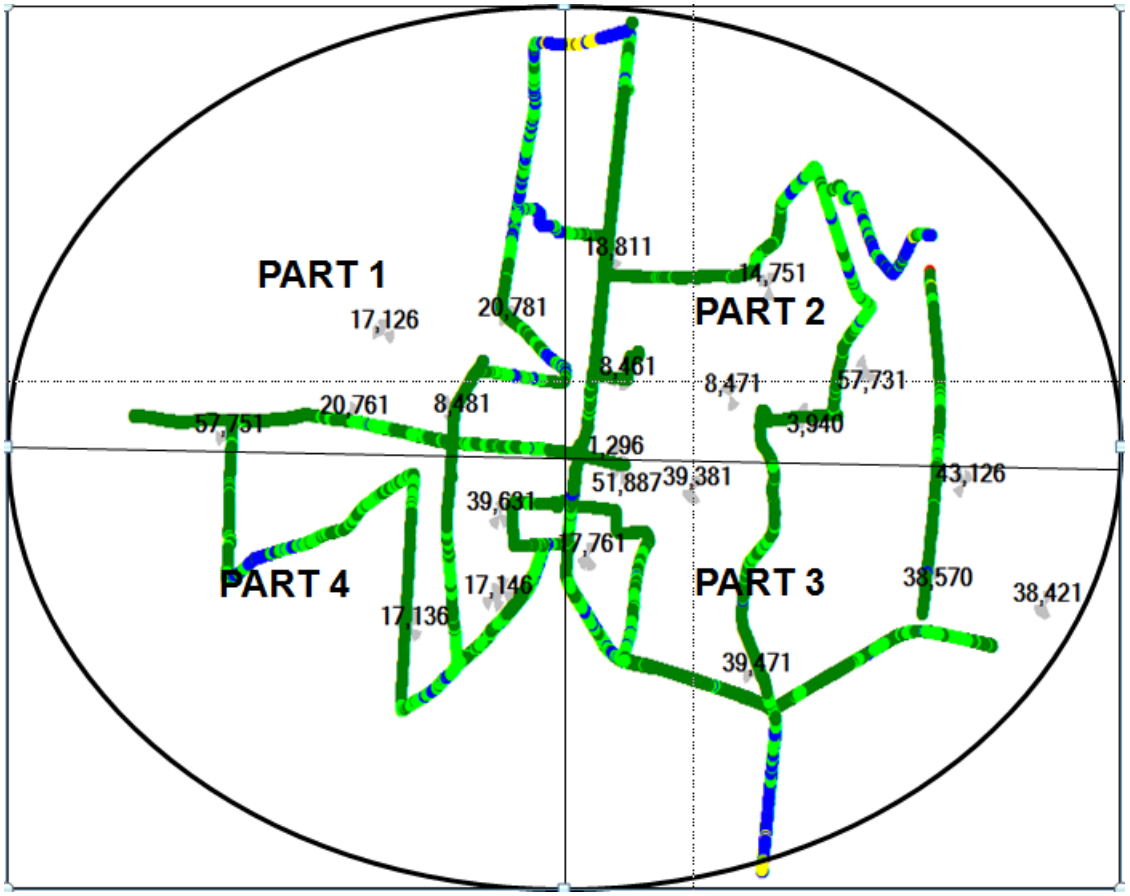
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	BEED	28-06-2016	30-06-2016	330

12.1.7.1 Route Details - Beed SSA

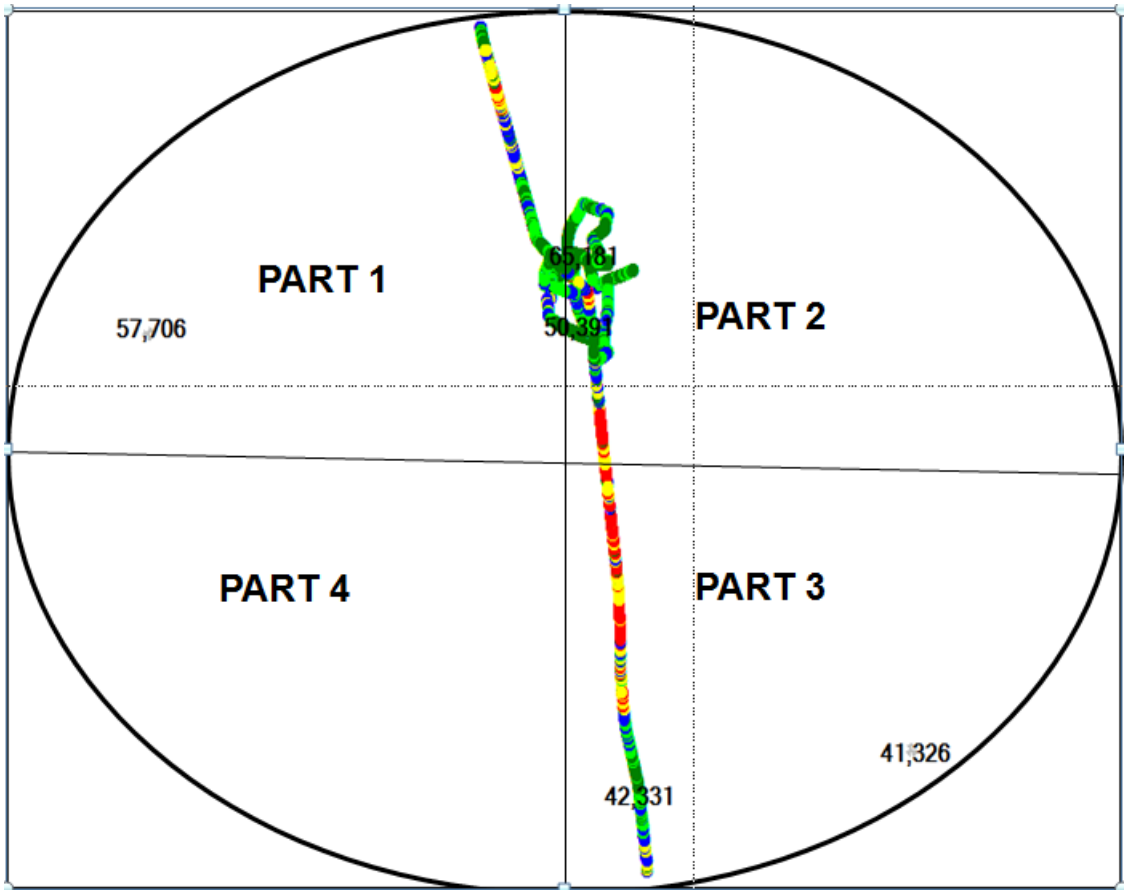
Category	Type of location	June BEED		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Shivaji Chowk, Bus stand, Balbhim chowk, subhash road, jalna road, shahu nagar, Ambika chowk, DP road, Nagar naka, Mane compex, Natyagrah, Danori road, Ambedkar chowk, nalwandi naka, Aditya Engg. College, Barshi naka, swaraj nagar, Civil hospital, pingale nagar, kranti nagar, jawahar colony, police colony, Balepir nagar road, Gov poly beed, Monda, Navnath nagar, MIDC.	Gevrai Bus Stand, Santosh nagar, monda naka, jaykwadi colony, vir lahuji nagar, Gajanan nagar, ganesh nagar, sevalal nagar, naik nagar, Jalna road, Majlgoan Bus stand, water tank, Dharur chowk, civil hospital, sidhewar college, shivaji nagr, gadi road, panchcil nagar,	ST Stand parali, Vaidhynath temple, Parli ambejogai road, vidhyanagr, shnarda naga, thermal power plant naded road, habib pura, police colony Railway station , pathan pura, Ambejogai ST stand, jogai temple, Engg college, yogeshwari college, Jaywant nagar, mukunraj colony
	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 observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

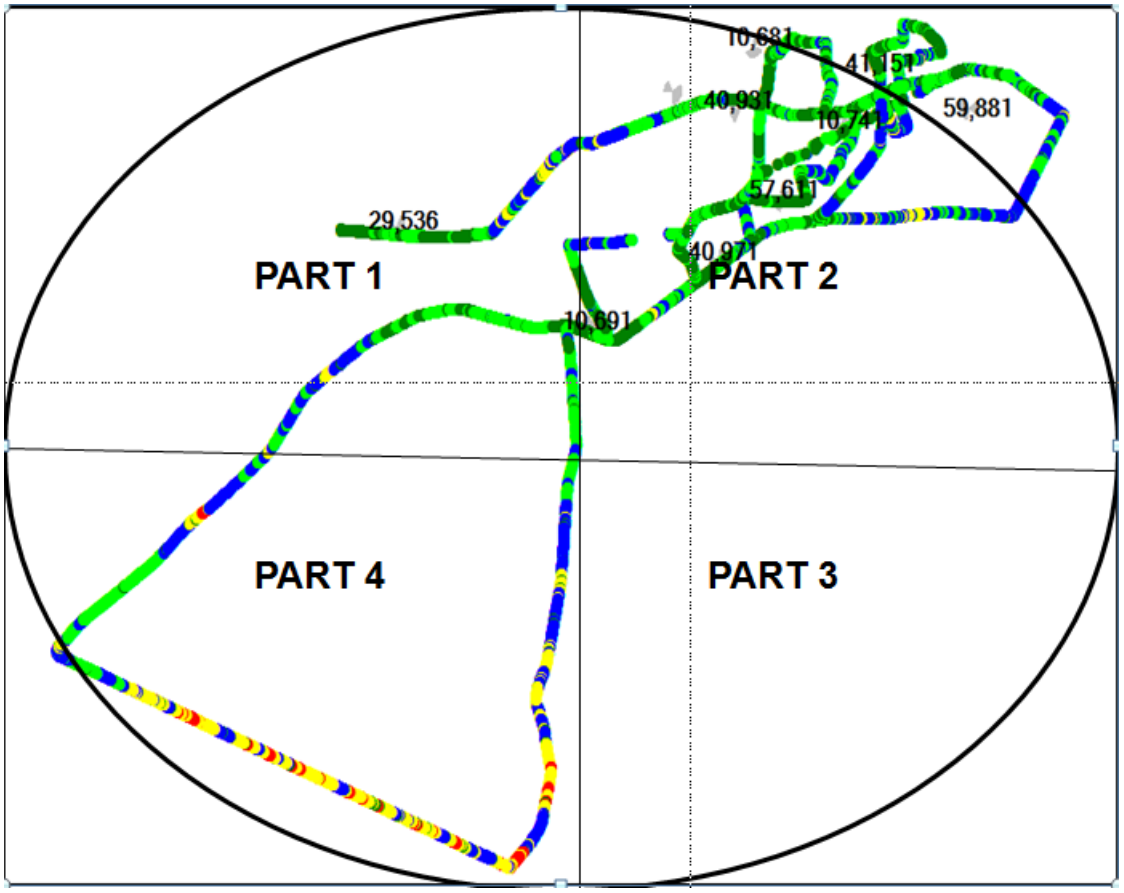
12.1.7.2 Route Map - Beed DAY 1



12.1.7.3 Route Map - Beed DAY 2



12.1.7.4 Route Map - Beed DAY 3



12.1.7.5 Drive Test Results - Beed SSA-2G

Beed	B'mark	Aircel		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 Service		87.44%	76.23%	74.68%	68.72%	88.30%	95.84%	70.17%	46.39%	NDR		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

Note: - Reliance did not submit the data

Voice Quality

BSNL failed to meet the benchmark for voice quality in indoor as well as outdoor locations and Telenor failed in outdoor location.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

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

12.1.7.6 Drive Test Results - Beed SSA-3G

June	B'mark	Airtel 3G		BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Beed		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%	NA	NA	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%

Note: Data not submitted by Airtel 3G

Voice Quality

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 indoor as well as outdoor locations.

Call Drop Rate

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

12.1.7.7 Data Drive Test Results - Beed SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Successful Data Transmission download speed attempts	>80%	No Service	100	100	100	NDR	NDR	NDR	100	100	100
Successful Data Transmission upload speed attempts	>75%		100	100	100	NDR	NDR	NDR	100	100	100
Minimum download speed			117	26	116	NDR	NDR	NDR	74	115	131
Average throughput for Packet Data			126	56	161	NDR	NDR	NDR	110	154	135
Latency	<250ms		100	100	100	NDR	NDR	NDR	100	100	100

Note: Reliance and TATA CDMA did not submit the data, Aircel is no service.

All operators met the TRAI benchmark for data drive test.

12.1.7.8 Data Drive Test Results - Beed SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Successful Data Transmission download speed attempts	>80%	NDR	100	NDR	100	NDR
Successful Data Transmission upload speed attempts	>75%	NDR	100	NDR	100	NDR
Minimum download speed		NDR	80	NDR	3365	NDR
Average throughput for Packet Data		NDR	357	NDR	4610	NDR
Latency	<250ms	NDR	100	NDR	100	NDR

Note: Airtel, Idea and Vodafone did not submit the data.

All operators met the TRAI benchmark for data drive test.

13 ANNEXURE– CONSOLIDATED-2G

13.1 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		5925	32632	20840	35868	5156	8136	5758	14088	13579	35457
Sum of downtime of BTSs in a month (in hours)		4154	295288	295716	20795	7311	7905	1573	134057	22867	61148
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	1.22%	1.91%	0.08%	0.19%	0.13%	0.04%	1.28%	0.23%	0.23%
Number of BTSs having accumulated downtime >24 hours		13	0	365	35	60	81	4	0	141	304
Worst affected BTSs due to downtime	≤ 2%	0.22%	0.00%	1.75%	0.10%	1.16%	1.00%	0.07%	0.00%	1.04%	0.86%
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		5916	32504	20700	35797	5173	8162	5758	14074	13562	35457
Sum of downtime of BTSs in a month (in hours)		377	39675	28293	2720	1141	749	225	9034	2717	8282
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	1.70%	1.90%	0.11%	0.31%	0.13%	0.05%	0.89%	0.28%	0.32%
Number of BTSs having accumulated downtime >24 hours		0	0	127	13	13	25	0	0	0	166
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.61%	0.04%	0.25%	0.31%	0.00%	0.00%	0.00%	0.47%

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

13.2 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%	99.33%	98.40%	96.67%	98.26%	97.82%	98.35%	98.21%	99.54%	98.50%	99.33%
SDCCH/Paging channel congestion	≤ 1%	0.14%	0.10%	0.55%	0.67%	NA	0.20%	NA	0.09%	0.38%	0.35%
TCH congestion	≤ 2%	0.17%	0.73%	1.17%	1.25%	0.70%	0.45%	0.82%	0.12%	0.53%	0.67%
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%	99.54%	98.43%	96.41%	98.25%	98.17%	98.21%	98.19%	99.50%	98.38%	99.36%
SDCCH/Paging channel congestion	≤ 1%	0.08%	0.11%	0.68%	0.74%	NA	0.33%	NA	0.18%	0.41%	0.40%
TCH congestion	≤ 2%	0.07%	0.74%	1.28%	1.36%	0.53%	0.46%	0.63%	0.14%	0.64%	0.64%
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		1383	2857	1586	2986	2215	2661	2638	3051	3449	3620
Total number of successful calls established		1374	2856	1335	2983	2188	2619	2634	3021	3408	3616
CSSR	≥ 95%	99.35%	99.96%	84.17%	99.90%	98.78%	98.42%	99.85%	99.02%	98.81%	99.89%
%age blocked calls		0.65%	0.04%	15.83%	0.10%	1.22%	1.58%	0.15%	0.98%	1.19%	0.11%

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 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		151950198	1094897600	328972504	1919002496	73884044	148132041	99628471	255672764	626422116	1297994629
Total number of calls dropped		978766	6741763	3637150	11245985	85610	165838	626462	1029470	5723956	9495972
Call drop rate	≤ 2%	0.64%	0.62%	1.11%	0.59%	0.12%	0.11%	0.63%	0.40%	0.91%	0.73%
Total number of cells in the network		17896	99615	61251	107258	15450	24312	16930	41690	41169	108142
Total number of cells having more than 3% TCH		472	1750	1680	2316	69	101	408	698	1575	2880
Worst affected cells having more than 3% TCH	≤ 3%	2.64%	1.76%	2.74%	2.16%	0.45%	0.42%	2.41%	1.67%	3.83%	2.66%
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		124746878	113021824	32582779	198929454	7906186	13101076	10216470	26846090	63556003	130742387
Total number of calls dropped		676058	758193	372132	1056480	10150	14303	62598	108812	513537	1001376
Call drop rate	≤ 2%	0.54%	0.67%	1.14%	0.53%	0.13%	0.11%	0.61%	0.41%	0.81%	0.77%
Total number of cells in the network		17881	99226	60831	107323	15501	24342	17145	41658	41041	108142
Total number of cells having more than 3% TCH		459	1764	1681	2229	65	89	398	719	1955	2387
Worst affected cells having more than 3% TCH	≤ 3%	2.57%	1.78%	2.76%	2.08%	0.42%	0.36%	2.32%	1.73%	4.76%	2.21%
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		1374	2856	1335	2984	2188	2620	2635	3019	3426	3615
Total number of calls dropped		5	1	30	0	1	16	5	19	7	1
Call drop rate	≤ 2%	0.36%	0.04%	2.25%	0.00%	0.05%	0.61%	0.19%	0.63%	0.20%	0.03%

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	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		23465586944	371680537795	328972504	208815709534	NA	19814704362	32567751675	36355527240	122440333814	215101562995
Total number of calls with good voice quality		22586270978	360237380598	318154363	205875153223	NA	19664288315	29657617415	35463994338	119169340711	208909552709
%age calls with good voice quality	≥ 95%	96.25%	96.92%	96.71%	98.59%	NA	99.24%	91.06%	97.55%	97.33%	97.12%
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		9065051217	37345698313	32582779	22113270503	NA	1767821349	3210447085	3774359513	11532661637	21319476112
Total number of calls with good voice quality		8749645105	36219991073	31388691	21786096872	NA	1754647414	2914443782	3681454088	11236080054	20703241231
%age calls with good voice quality	≥ 95%	96.52%	96.99%	96.34%	98.52%	NA	99.25%	90.78%	97.54%	97.43%	97.11%
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		254545	1624411	68819	791726	NA	21757	NA	5816343	458583	1105780
Total number of calls with good voice quality		247320	1591898	59734	767232	NA	20320	NA	5653310	439193	1065240
%age calls with good voice quality	≥ 95%	97.16%	98.00%	86.80%	96.91%	98.81%	93.40%	98.10%	97.20%	95.77%	96.33%

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	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		234	1497	194	2862	354	134	1176	576	79	295
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		58054	908067	299452	3455063	60598	82089	207219	193896	441648	12427037
Traffic served for all POIs (B)- in erlangs		38817	509403	162226	898738	12065	42561	84360	88515	253523	2907721
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		234	1500	194	2862	353	141	1176	576	87	295
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		57506	752250	301087	3452934	60407	79970	207219	193896	431369	6401694
Traffic served for all POIs (B)- in erlangs		24259	501605	161019	903647	11377	41951	73564	72642	175524	238563
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

14 ANNEXURE – CONSOLIDATED-3G

14.1 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		16625	8211	24181	9167	19443
Sum of downtime (i.e. total outage time) of Node Bs		158864	114456	18866	50246	29518
Node Bs downtime (not available for service)	≤ 2%	1.28%	1.87%	0.10%	0.74%	0.20%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	130	23	0	171
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.58%	0.10%	0.00%	0.88%
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		15852	8176	24156	9140	19443
Sum of downtime (i.e. total outage time) of Node Bs		12040	7191	1791	151	5244
Node Bs downtime (not available for service)	≤ 2%	1.05%	1.22%	0.10%	0.02%	0.37%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	47	9	0	101
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.57%	0.04%	0.00%	0.52%

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

14.2 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%	99.46%	96.05%	99.66%	99.44%	99.83%
RRC Congestion	≤ 1%	0.06%	0.79%	0.25%	0.17%	0.09%
Circuit Switched RAB Congestion	≤ 2%	0.22%	1.70%	0.09%	0.67%	0.03%
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%	99.25%	95.89%	99.66%	99.34%	99.58%
RRC Congestion	≤ 1%	0.21%	0.86%	0.25%	0.19%	0.11%
Circuit Switched RAB Congestion	≤ 2%	0.55%	1.59%	0.10%	0.27%	0.05%
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	1106	2410	1499	3045
Total number of RRC established (B)		NDR	965	2407	1486	3043
Call setup success rate (B/A*100)	≥ 95%	NA	87.25%	99.88%	99.13%	99.93%
%age blocked calls		NA	12.75%	0.12%	0.87%	0.07%

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

14.3 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)		148527869	77957244	477392580	88573873	266511728
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		776310	1073712	1655326	378786	491340
Call drop rate (B/A*100)	≤ 2%	0.52%	1.38%	0.35%	0.43%	0.18%
Total no. of cells in the licensed service area (B)		49368	24751	90560	27337	58878
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		830	577	1764	688	808
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.68%	2.33%	1.95%	2.52%	1.37%
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)		17172922	7681087	50687590	8708172	19627455
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		93380	114870	175934	37009	37488
Call drop rate (B/A*100)	≤ 2%	0.54%	1.50%	0.35%	0.42%	0.19%
Total no. of cells in the licensed service area (B)		46991	24651	89960	27266	60396
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		842	645	1761	656	786
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.79%	2.62%	1.96%	2.40%	1.30%
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	1044	2311	1486	3038
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	33	2	12	2
Call drop rate (B/A*100)	≤ 2%	NA	3.16%	0.09%	0.81%	0.07%

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

14.4 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		NA	NA	790580925736	259402548000	600152116072
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	779436335764	258678937870	593727341493
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	98.59%	99.72%	98.93%
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		NA	NA	82627905513	24908806000	32845254640
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	81474192796	24839589122	32354129976
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	98.60%	99.72%	98.50%
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		NA	46803	NA	3537998	6492838
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	46168	NA	3515961	6280810
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.64%	NA	99.38%	96.73%

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

14.5 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		1497	194	2862	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		908067	299452	3468764	193896	0
Traffic served for all POIs (B)- in erlangs		509403	162226	884152	88509	0
POI congestion	≤ 0.5%	0.00%	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		1500	194	2864	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		752250	209540	3451045	193843	0
Traffic served for all POIs (B)- in erlangs		501605	161019	617880	87686	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

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

15 ANNEXURE –CUSTOMER SERVICES

15.1 METERING AND BILLING CREDIBILITY

Metering and billing credibility - Postpaid											
Total bills generated during the period		3974	1961967	837654	5509121	456282	177643	54668	414214	NA	4563092
Total number of bills disputed		0	1752	9	27428	406	156	0	7	NA	9611
Total number of valid billing complaints		0	283	0	3420	373	156	0	7	NA	1802
Total complaints considered invalid		0	1469	9	24008	33	0	0	0	NA	7809
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.09%	0.00%	0.50%	0.09%	0.09%	0.00%	0.00%	NA	0.21%
April											
Total bills generated during the first billing cycle		1351	685477	288870	1818981	157514	57954	18468	140168	NA	1483748
Total number of bills disputed in first billing cycle		0	690	2	9049	143	54	0	7	NA	2068
Total number of valid billing complaints (billing cycle 1)		0	94	0	1075	143	54	0	7	NA	524
Total complaints considered invalid (billing cycle 1)		0	596	2	7974	0	0	0	0	NA	1544
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.10%	0.00%	0.50%	0.09%	0.09%	0.00%	0.00%	NA	0.14%
May											
Total bills generated during the second billing cycle		1321	636078	277449	1834916	153046	54543	17952	136271	NA	1525438
Total number of bills disputed in second billing cycle		0	548	5	9251	135	46	0	0	NA	3475
Total number of valid billing complaints (billing cycle 2)		0	87	0	1190	135	46	0	0	NA	723
Total complaints considered invalid (billing cycle 2)		0	461	5	8061	0	0	0	0	NA	2752
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.09%	0.00%	0.50%	0.09%	0.08%	0.00%	0.00%	NA	0.23%
June											
Total bills generated during the third billing cycle		1302	640412	271335	1855224	145722	65146	18248	137775	NA	1553906
Total number of bills disputed in third billing cycle		0	514	2	9128	128	56	0	0	NA	4068
Total number of valid billing complaints (billing cycle 3)		0	102	0	1155	95	56	0	0	NA	555
Total complaints considered invalid (billing cycle 3)		0	412	2	7973	33	0	0	0	NA	3513
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.08%	0.00%	0.49%	0.09%	0.09%	0.00%	0.00%	NA	0.26%

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		30	735	1196	12353	93	3394	0	3	69	6503
Total complaints considered invalid (sum of 3 months)		0	6328	1309	18469	153	7	0	0	0	2826
Total number of charging complaints (sum of 3 months)		30	7063	2505	30822	246	3401	0	3	69	9329
Total no of customers served (Sum of 3 months)		7898166	37914513	16736886	21616103	4559319	11357741	1284265	5276428	0	51490958
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.02%	0.01%	0.14%	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		30	8815	2514	58250	652	3557	NA	10	69	17636
Total number of complaints resolved in favour of customer		30	1018	1196	15773	466	3550	NA	10	69	8305
Total complaints considered invalid		0	7797	1318	42477	186	7	NA	0	0	9331
Number of complaints resolved in 4 weeks		30	1018	1196	15773	466	3550	NA	10	69	8305
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		30	1018	1196	15773	466	3550	NA	10	69	8305
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		30	1018	1196	15773	466	3550	NA	10	0	8305
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	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		NA	100	100	100	100	100	NA	NA	NA	100
Number of cases resolved in 4 weeks		NA	99	96	96	95	98	NA	NA	NA	100
Percentage cases resolved in 4 weeks	≥ 98%	NA	99.00%	96.00%	96.00%	95.00%	98.00%	NA	NA	NA	100.00%
Number of cases resolved in 6 weeks		NA	100	96	96	95	98	NA	NA	NA	100
Percentage cases resolved in 6 weeks	100.00%	NA	100.00%	96.00%	96.00%	95.00%	98.00%	NA	NA	NA	100.00%

Data Source: Billing Center of the operators

15.2 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		7658737	3432578	5264241	79872719	1316421	4203019	0	888461	12703744	20640082
Number of calls getting connected and answered (electronically)		6848884	3431021	5264241	78907964	1299378	4183308	0	849078	12641229	20631447
Percentage calls getting connected and answered	≥ 95%	89.43%	99.95%	100.00%	98.79%	98.71%	99.53%	100.00%	95.57%	99.51%	99.96%
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)		1276652	5738609	1844158	12211849	189202	786890	83677	1465389	3223593	9622182
Total Number of calls answered within 90 seconds (3 months)		1215714	5006910	1831499	12172169	160415	651184	83492	1435677	3183708	9458497
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	95.23%	87.25%	99.31%	99.68%	84.79%	82.75%	99.78%	97.97%	98.76%	98.30%
April											
Total calls received (Month 1)		409754	1998973	642818	3900955	68257	230633	26160	486403	1046139	3057826
Total calls answered within 90 seconds (Month 1)		393211	1729974	635129	3890921	64738	221899	26103	479979	1039986	3028582
% calls answered within 90 seconds (Month 1)	≥ 95%	95.96%	86.54%	98.80%	99.74%	94.84%	96.21%	99.78%	98.68%	99.41%	99.04%
May											
Total calls received (Month 2)		431873	2002194	599916	4199991	89295	260031	27369	487361	1143233	3220883
Total calls answered within 90 seconds (Month 2)		409046	1616791	598869	4179474	74685	223716	27315	476528	1128372	3184153
% calls answered within 90 seconds (Month 2)	≥ 95%	94.71%	80.75%	99.83%	99.51%	83.64%	86.03%	99.80%	97.78%	98.70%	98.86%
June											
Total calls received (Month 3)		435025	1737442	601424	4110903	31650	296226	30148	491625	1034221	3343473
Total calls answered within 90 seconds (Month 3)		413457	1660145	597501	4101774	20992	205569	30074	479170	1015350	3245762
% calls answered within 90 seconds (Month 3)	≥ 95%	95.04%	95.55%	99.35%	99.78%	66.33%	69.40%	99.75%	97.47%	98.18%	97.08%

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	98	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	98.00%	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		98	100	98	100	100	100	100	100	98	100
Live Calling Percentage calls getting connected and answered	≥ 95%	98.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%

15.3 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		1	10287	18351	26428	4746	482	820	1762	NA	20736
Number of requests attended within 7 days		1	10287	18351	26428	4746	482	820	1762	NA	20736
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%	NA	100.00%

Data Source: Customer Service Center of the operators

15.4 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		16	2772	899	5861	NA	NA	217	80	NA	0
Total number of cases where refund was made within 60 days		16	2772	899	5861	NA	NA	217	80	NA	0
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	NA	NA

Data Source: Billing Center of the operators

15.5 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		270	253	256	283	258	277	269	200	277	267
% of calls connected	≥ 95%	90.00%	84.33%	85.33%	94.33%	86.00%	92.33%	89.67%	66.67%	92.33%	89.00%

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

15.6 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	NA	100	100	100	100	100	NA	NA	NA	100
Number of cases resolved to satisfaction	NA	99	96	99	99	100	NA	NA	NA	100
Percentage cases resolved in four weeks	NA	99.00%	96.00%	99.00%	99.00%	100.00%	NA	NA	NA	100.00%

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

15.7 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		
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		

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

16 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))**

16.1.1 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.

16.1.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

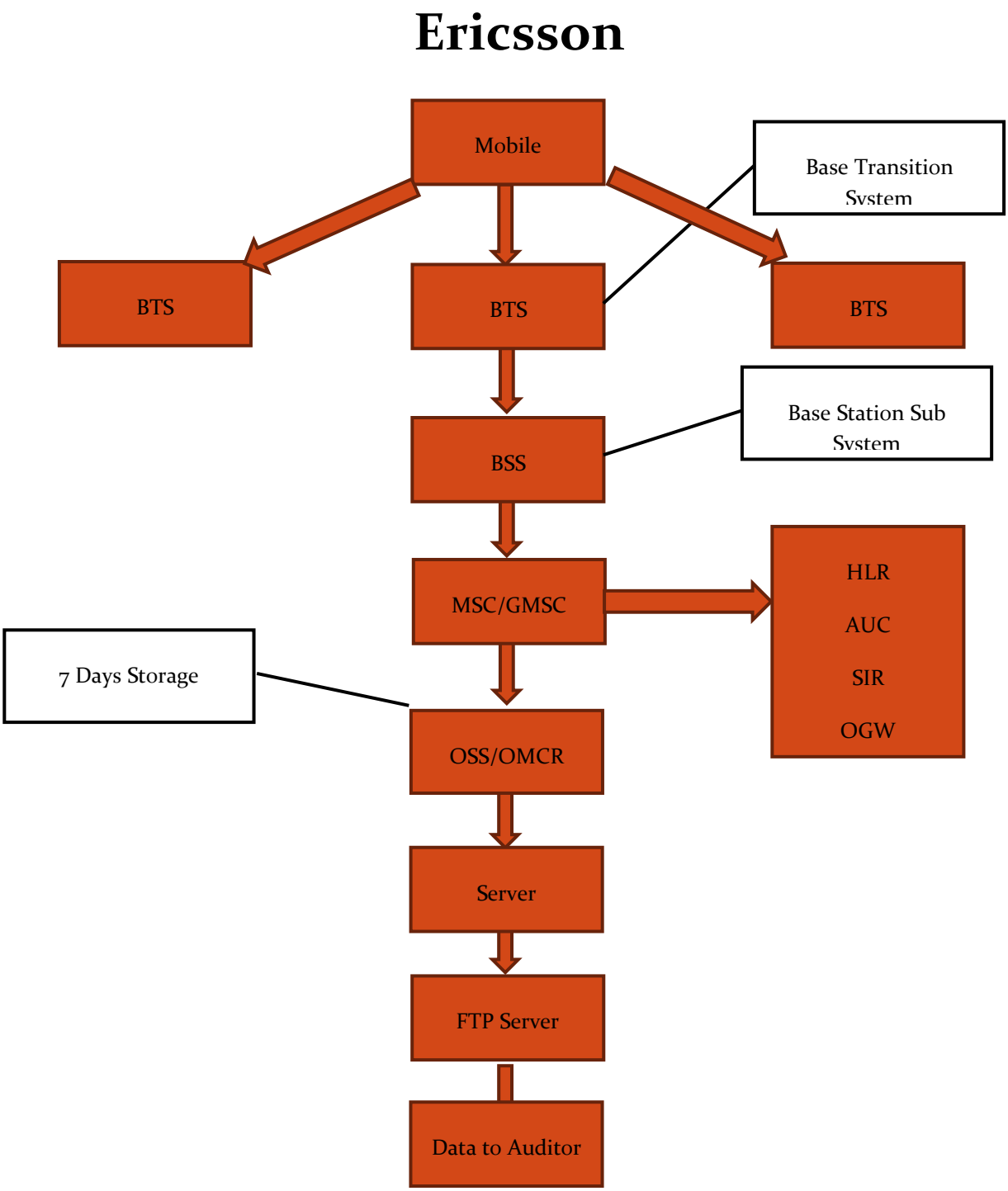
Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}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

16.2 BLOCK SCHEMATIC DIAGRAMS

16.2.1 ERICSSON

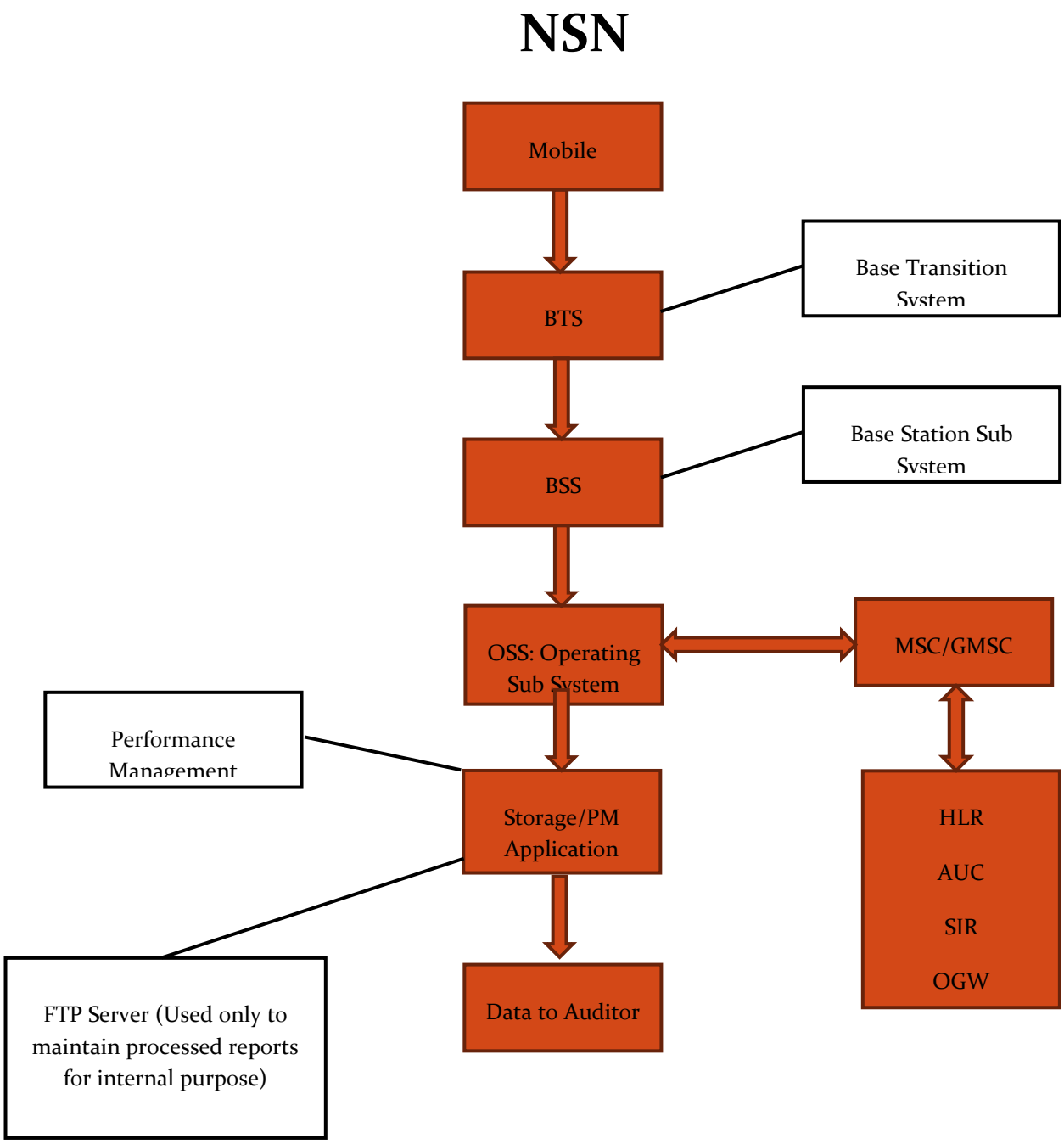
Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.



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

16.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



17 ANNEXURE –APRIL-2G

Audit Results for Network Availability- PMR data-April											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1973	10827	6900	11909	1718	2716	1920	4692	4549	11819
Sum of downtime of BTSs in a month (in hours)		731	141315	98357	5063	1877	2561	360	17937	6149	12299
BTSs accumulated downtime (not available for service)	≤ 2%	0.05%	1.75%	1.92%	0.06%	0.15%	0.13%	0.03%	0.51%	0.18%	0.14%
Number of BTSs having accumulated downtime >24 hours		0	0	120	11	13	25	0	0	38	49
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.74%	0.09%	0.76%	0.92%	0.00%	0.00%	0.84%	0.41%
Live Measurement Results for Network Availability- 3 Day live data-April											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1973	10791	6900	11909	1736	2730	1920	4692	4523	11819
Sum of downtime of BTSs in a month (in hours)		113	13649	9709	746	358	478	42	1653	707	1380
BTSs accumulated downtime (not available for service)	≤ 2%	0.08%	1.76%	1.95%	0.09%	0.29%	0.24%	0.00%	0.05%	0.02%	0.02%
Number of BTSs having accumulated downtime >24 hours		0	0	120	11	13	25	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.74%	0.09%	0.75%	0.92%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-April											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.51%	98.43%	96.61%	97.96%	98.23%	98.10%	98.26%	99.50%	98.43%	99.37%
SDCCH/Paging channel congestion	≤ 1%	0.09%	0.11%	0.56%	0.70%	NA	0.15%	NA	0.09%	0.34%	0.36%
TCH congestion	≤ 2%	0.06%	0.74%	1.22%	1.39%	0.50%	0.39%	0.59%	0.14%	0.64%	0.63%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-April											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.43%	98.45%	96.37%	98.20%	98.53%	97.62%	98.12%	99.50%	98.38%	99.35%
SDCCH/Paging channel congestion	≤ 1%	0.14%	0.14%	0.54%	0.81%	NA	0.16%	NA	0.21%	0.38%	0.31%
TCH congestion	≤ 2%	0.11%	0.85%	1.31%	1.37%	0.22%	0.31%	0.55%	0.21%	0.66%	0.65%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-April											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		475	841	492	426	614	412	607	718	764	1104
Total number of successful calls established		474	841	418	425	608	403	606	706	761	1101
CSSR	≥ 95%	99.79%	100.00%	84.96%	99.77%	99.02%	97.82%	99.84%	98.33%	99.61%	99.73%
%age blocked calls		0.21%	0.00%	15.04%	0.23%	0.98%	2.18%	0.16%	1.67%	0.39%	0.27%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-April											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		48838708	355422644	110745998	673100731	40160765	46563165	36358443	77875118	211723922	440047689
Total number of calls dropped		294104	2256635	1246091	4189368	42498	44702	224999	305360	2030320	3087255
Call drop rate	≤ 2%	0.60%	0.63%	1.13%	0.62%	0.11%	0.10%	0.62%	0.39%	0.96%	0.70%
Total number of cells in the network		5966	33048	20277	35518	5148	8100	5713	13938	13843	36154
Total number of cells having more than 3% TCH		142	597	558	712	26	29	133	228	638	941
Worst affected cells having more than 3% TCH	≤ 3%	2.38%	1.81%	2.75%	2.00%	0.50%	0.36%	2.32%	1.63%	4.61%	2.60%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-April											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		4947341	37064660	10458743	67264926	4642633	4792154	3591244	9006796	21283344	45641443
Total number of calls dropped		29712	236213	117785	354716	5180	4584	21553	35150	221119	370236
Call drop rate	≤ 2%	0.60%	0.64%	1.13%	0.53%	0.11%	0.10%	0.60%	0.39%	1.04%	0.81%
Total number of cells in the network		5966	32937	20277	35542	5202	8142	5714	13832	13688	36154
Total number of cells having more than 3% TCH		142	582	564	830	28	20	128	226	810	961
Worst affected cells having more than 3% TCH	≤ 3%	2.38%	1.77%	2.78%	2.34%	0.53%	0.24%	2.25%	1.63%	5.92%	2.66%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-April											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		474	841	418	425	608	403	607	706	761	1100
Total number of calls dropped		1	0	15	0	0	6	1	6	0	1
Call drop rate	≤ 2%	0.21%	0.00%	3.59%	0.00%	0.00%	1.49%	0.16%	0.85%	0.00%	0.09%

Audit Results for Voice quality -PMR Data-April											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7701565755	123850950040	110745998	73825659279	NA	6397391558	9535399772	10889448788	35108228175	72362251145
Total number of calls with good voice quality		7433596028	120156204848	106981206	72687462650	NA	6352246499	8635738795	10634032042	34232488734	70319103697
%age calls with good voice quality	≥ 95%	96.52%	97.02%	96.60%	98.46%	99.48%	99.29%	90.57%	97.65%	97.51%	97.18%
Live measurement results for Voice quality-3 Day data-April											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		824030279	12467508053	10458743	7892197244	NA	675663967	1004926350	1267835695	4143511350	7451248509
Total number of calls with good voice quality		795269504	12093368874	10136323	7758077906	NA	670930870	914892366	1237399750	4039780088	7232470752
%age calls with good voice quality	≥ 95%	96.51%	97.00%	96.92%	98.30%	99.51%	99.30%	91.04%	97.60%	97.50%	97.06%
Drive test results for Voice quality (Average of three drive tests) - DT data-April											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		83111	355773	23102	114529	NA	21757	NA	1380024	89105	334379
Total number of calls with good voice quality		80896	349036	20945	111079	NA	20320	NA	1339939	86326	323708
%age calls with good voice quality	≥ 95%	97.33%	98.11%	90.66%	96.99%	98.49%	93.40%	NA	97.10%	96.88%	96.81%

Audit Results for POI Congestion- PMR data-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	501	63	954	118	48	392	192	25	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19265	300537	100570	1150830	21563	27028	70290	65446	142545	2777061
Traffic served for all POIs (B)- in erlangs		12926	168618	56598	308518	6034	13606	29804	31195	81159	1347539
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-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	504	63	954	117	47	392	192	26	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19265	297972	100570	1150830	21399	26191	70290	65446	141548	95761
Traffic served for all POIs (B)- in erlangs		12303	166337	56380	308518	6087	13104	20056	22926	8668	46467
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

18 ANNEXURE –MAY-2G

Audit Results for Network Availability- PMR data-May											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1976	10882	6900	11979	1719	2716	1920	4706	4514	11819
Sum of downtime of BTSs in a month (in hours)		1815	150721	97681	5866	2062	3147	532	60159	7109	21459
BTSs accumulated downtime (not available for service)	≤ 2%	0.12%	1.86%	1.90%	0.07%	0.16%	0.16%	0.04%	1.72%	0.21%	0.24%
Number of BTSs having accumulated downtime >24 hours		8	0	118	6	21	38	0	0	36	89
Worst affected BTSs due to downtime	≤ 2%	0.40%	0.00%	1.71%	0.05%	1.22%	1.40%	0.00%	0.00%	0.80%	0.75%
Live Measurement Results for Network Availability- 3 Day live data-May											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1973	10825	6900	11909	1718	2716	1920	4692	4521	11819
Sum of downtime of BTSs in a month (in hours)		46	13636	9194	650	133	260	21	5373	550	1588
BTSs accumulated downtime (not available for service)	≤ 2%	0.03%	1.75%	1.85%	0.08%	0.11%	0.13%	0.01%	1.59%	0.17%	0.19%
Number of BTSs having accumulated downtime >24 hours		0	0	3	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-May											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.32%	98.45%	96.74%	98.45%	98.09%	98.48%	98.22%	99.56%	98.67%	99.24%
SDCCH/Paging channel congestion	≤ 1%	0.19%	0.08%	0.52%	0.62%	NA	0.15%	NA	0.06%	0.43%	0.24%
TCH congestion	≤ 2%	0.25%	0.71%	1.15%	1.19%	0.55%	0.32%	0.83%	0.10%	0.40%	0.76%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-May											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.65%	98.45%	96.62%	98.43%	97.68%	98.63%	97.79%	99.50%	98.52%	99.37%
SDCCH/Paging channel congestion	≤ 1%	0.04%	0.08%	0.67%	0.59%	NA	0.17%	NA	0.06%	0.35%	0.28%
TCH congestion	≤ 2%	0.05%	0.67%	1.23%	1.25%	0.81%	0.39%	0.87%	0.07%	0.51%	0.63%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-May											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		477	1087	563	1274	1169	1175	1092	1185	1309	1172
Total number of successful calls established		472	1087	535	1273	1153	1157	1090	1173	1303	1172
CSSR	≥ 95%	98.95%	100.00%	95.03%	99.92%	98.63%	98.47%	99.82%	98.99%	99.54%	100.00%
%age blocked calls		1.05%	0.00%	4.97%	0.08%	1.37%	1.53%	0.18%	1.01%	0.46%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-May											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		52115382	391011596	115842958	682181332	32276363	47788177	37468581	90346329	207148114	452576720
Total number of calls dropped		331579	2557126	1265843	3687039	40705	46777	241182	343945	1723243	3172489
Call drop rate	≤ 2%	0.64%	0.65%	1.09%	0.54%	0.13%	0.10%	0.64%	0.38%	0.83%	0.70%
Total number of cells in the network		5957	33227	20277	35829	5151	8100	5717	13883	13665	36154
Total number of cells having more than 3% TCH		154	588	517	708	33	35	135	234	443	972
Worst affected cells having more than 3% TCH	≤ 3%	2.59%	1.77%	2.55%	1.98%	0.64%	0.44%	2.37%	1.68%	3.24%	2.69%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-May											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		58322774	38724368	11199733	67297761	2976638	4378986	3676346	8701481	20751259	43379020
Total number of calls dropped		306987	235784	118334	323974	4767	4985	23564	31738	165750	309040
Call drop rate	≤ 2%	0.53%	0.61%	1.06%	0.48%	0.16%	0.11%	0.64%	0.36%	0.80%	0.71%
Total number of cells in the network		5963	33040	20277	35809	5148	8100	5714	13949	13697	36154
Total number of cells having more than 3% TCH		153	602	526	544	30	36	134	240	484	456
Worst affected cells having more than 3% TCH	≤ 3%	2.57%	1.82%	2.59%	1.52%	0.58%	0.44%	2.34%	1.72%	3.53%	1.26%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-May											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		472	1087	535	1273	1153	1157	1090	1171	1303	1172
Total number of calls dropped		1	0	10	0	1	5	2	8	3	0
Call drop rate	≤ 2%	0.21%	0.00%	1.87%	0.00%	0.09%	0.43%	0.18%	0.68%	0.23%	0.00%

Audit Results for Voice quality -PMR Data-May											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7859337586	127509686748	115842958	71932041722	NA	6362287236	10406037780	12730466358	45913902477	73819289638
Total number of calls with good voice quality		7575836539	123678540284	112052914	70984548144	NA	6316277155	9414595681	12430901086	44690637273	71747221184
%age calls with good voice quality	≥ 95%	96.39%	97.00%	96.73%	98.68%	99.53%	99.28%	90.47%	97.65%	97.34%	97.19%
Live measurement results for Voice quality-3 Day data-May											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7387596189	12602446333	11199733	7123370559	NA	608393615	953696675	1237682346	3670555423	7047650703
Total number of calls with good voice quality		7130648261	12231633189	10785478	7026373253	NA	603960196	853796299	1208870777	3581215957	6853295646
%age calls with good voice quality	≥ 95%	96.52%	97.06%	96.30%	98.64%	99.47%	99.27%	89.52%	97.67%	97.57%	97.24%
Drive test results for Voice quality (Average of three drive tests) - DT data-May											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		75859	751378	29658	325974	NA	NA	NA	2258342	158804	292513
Total number of calls with good voice quality		73827	735255	26325	316297	NA	NA	NA	2195651	152086	281987
%age calls with good voice quality	≥ 95%	97.32%	97.85%	88.76%	97.03%	99.35%	92.53%	97.62%	97.22%	95.77%	96.40%

Audit Results for POI Congestion- PMR data-May											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	498	63	954	118	43	392	192	25	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19124	301770	99454	1150830	20917	26851	71003	65199	151643	2871817
Traffic served for all POIs (B)- in erlangs		12813	171169	54025	308518	5225	13099	28039	29720	80864	1411444
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-May											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	497	63	956	118	48	392	192	25	43
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19037	148810	101095	1141052	20904	26716	71003	65199	144354	102565
Traffic served for all POIs (B)- in erlangs		5975	171067	53191	306960	5185	13003	27120	29680	77931	50409
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

19 ANNEXURE –JUNE-2G

Audit Results for Network Availability- PMR data-June											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1976	10923	7040	11980	1719	2704	1918	4690	4516	11819
Sum of downtime of BTSs in a month (in hours)		1608	3252	99678	9866	3372	2197	681	55960	9609	27390
BTSs accumulated downtime (not available for service)	≤ 2%	0.11%	0.04%	1.90%	0.11%	0.26%	0.11%	0.05%	1.60%	0.29%	0.31%
Number of BTSs having accumulated downtime >24 hours		5	0	127	18	26	18	4	0	67	166
Worst affected BTSs due to downtime	≤ 2%	0.25%	0.00%	1.80%	0.15%	1.51%	0.67%	0.21%	0.00%	1.48%	1.40%
Live Measurement Results for Network Availability- 3 Day live data-June											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1970	10888	6900	11979	1719	2716	1918	4690	4518	11819
Sum of downtime of BTSs in a month (in hours)		219	12390	9390	1324	650	11	162	2008	1461	5314
BTSs accumulated downtime (not available for service)	≤ 2%	0.15%	1.58%	1.89%	0.15%	0.52%	0.01%	0.12%	0.59%	0.45%	0.62%
Number of BTSs having accumulated downtime >24 hours		0	0	4	2	0	0	0	0	0	166
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.06%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	1.40%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-June											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.16%	98.32%	96.67%	98.38%	97.14%	98.48%	98.15%	99.56%	98.39%	99.38%
SDCCH/Paging channel congestion	≤ 1%	0.14%	0.11%	0.58%	0.69%	NA	0.29%	NA	0.12%	0.35%	0.44%
TCH congestion	≤ 2%	0.21%	0.75%	1.13%	1.18%	1.06%	0.65%	1.03%	0.12%	0.55%	0.62%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-June											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.55%	98.39%	96.23%	98.11%	98.31%	98.39%	98.66%	99.50%	98.26%	99.37%
SDCCH/Paging channel congestion	≤ 1%	0.07%	0.13%	0.82%	0.82%	NA	0.67%	NA	0.27%	0.50%	0.61%
TCH congestion	≤ 2%	0.04%	0.70%	1.30%	1.46%	0.54%	0.68%	0.46%	0.14%	0.76%	0.63%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-June											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		431	929	531	1286	432	1074	939	1148	1376	1344
Total number of successful calls established		428	928	382	1285	427	1059	938	1142	1344	1343
CSSR	≥ 95%	99.30%	99.89%	71.94%	99.92%	98.84%	98.60%	99.89%	99.48%	97.67%	99.93%
%age blocked calls		0.70%	0.11%	28.06%	0.08%	1.16%	1.40%	0.11%	0.52%	2.33%	0.07%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-June											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		50996108	348463360	102383548	563720433	1446916	53780699	25801447	87451317	207550080	405370220
Total number of calls dropped		353083	1928002	1125216	3369578	2407	74359	160281	380165	1970393	3236228
Call drop rate	≤ 2%	0.69%	0.55%	1.10%	0.60%	0.17%	0.14%	0.62%	0.43%	0.95%	0.80%
Total number of cells in the network		5973	33340	20697	35911	5151	8112	5500	13869	13661	35834
Total number of cells having more than 3% TCH		176	564	604	896	11	37	140	237	494	966
Worst affected cells having more than 3% TCH	≤ 3%	2.95%	1.69%	2.92%	2.50%	0.20%	0.45%	2.55%	1.71%	3.62%	2.70%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-June											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		61476763	37232796	10924303	64366767	286915	3929936	2948880	9137813	21521400	41721924
Total number of calls dropped		339359	286196	136013	377790	203	4734	17481	41924	126668	322100
Call drop rate	≤ 2%	0.55%	0.77%	1.25%	0.59%	0.07%	0.12%	0.59%	0.46%	0.59%	0.77%
Total number of cells in the network		5952	33249	20277	35972	5151	8100	5717	13877	13656	35834
Total number of cells having more than 3% TCH		164	579	592	855	7	33	136	253	661	970
Worst affected cells having more than 3% TCH	≤ 3%	2.75%	1.74%	2.92%	2.38%	0.14%	0.41%	2.38%	1.83%	4.84%	2.71%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-June											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		428	928	382	1286	427	1060	938	1142	1362	1343
Total number of calls dropped		3	1	5	0	0	5	2	5	4	0
Call drop rate	≤ 2%	0.70%	0.11%	1.31%	0.00%	0.00%	0.47%	0.21%	0.44%	0.29%	0.00%

Audit Results for Voice quality -PMR Data-June											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7904683603	120319901007	102383548	63058008533	NA	7055025568	12626314123	12735612094	41418203162	68920022212
Total number of calls with good voice quality		7576838411	116402635466	99120243	62203142429	NA	6995764661	11607282940	12399061210	40246214704	66843227828
%age calls with good voice quality	≥ 95%	95.85%	96.74%	96.81%	98.64%	99.16%	99.16%	91.93%	97.36%	97.17%	96.99%
Live measurement results for Voice quality-3 Day data-June											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		853424749	12275743927	10924303	7097702700	NA	483763767	1251824060	1268841472	3718594864	6820576900
Total number of calls with good voice quality		823727340	11894989010	10466890	7001645713	NA	479756348	1145755117	1235183561	3615084009	6617474833
%age calls with good voice quality	≥ 95%	96.52%	96.90%	95.81%	98.65%	99.49%	99.17%	91.53%	97.35%	97.22%	97.02%
Drive test results for Voice quality (Average of three drive tests) - DT data-June											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		95575	517260	16059	351223	NA	NA	NA	2177977	210674	478888
Total number of calls with good voice quality		92597	507607	12464	339856	NA	NA	NA	2117720	200781	459545
%age calls with good voice quality	≥ 95%	96.88%	98.13%	77.61%	96.76%	98.61%	91.69%	97.90%	97.23%	95.30%	95.96%

Audit Results for POI Congestion- PMR data-June											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	498	68	954	118	43	392	192	29	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		19665	305760	99428	1153404	18117	28210	65926	63252	147459	6778160
Traffic served for all POIs (B)- in erlangs		13078	169616	51602	281701	806	15856	26517	27601	91500	148738
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-June											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
NDR		78	499	68	952	118	46	392	192	36	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		19204	305468	99422	1161052	18104	27063	65926	63252	145467	6203368
Traffic served for all POIs (B)- in erlangs		5982	164200	51447	288168	105	15845	26389	20036	88925	141687
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

20 ANNEXURE – APRIL -3G

Audit Results for Network Availability- PMR data-April						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		5323	2734	8044	3004	6481
Sum of downtime (i.e. total outage time) of Node Bs		3750	37111	4390	79	5665
Node Bs downtime (not available for service)	≤ 2%	0.09%	1.82%	0.07%	0.00%	0.12%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	40	7	0	26
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.46%	0.09%	0.00%	0.40%
Live Measurement Results for Network Availability- 3 Day live data-April						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		4940	2708	8044	3006	6481
Sum of downtime (i.e. total outage time) of Node Bs		11459	3559	319	39	927
Node Bs downtime (not available for service)	≤ 2%	0.31%	0.18%	0.01%	0.00%	0.02%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	40	7	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.48%	0.09%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-April						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.23%	96.03%	99.64%	99.35%	99.82%
RRC Congestion	≤ 1%	0.12%	0.80%	0.35%	0.23%	0.13%
Circuit Switched RAB Congestion	≤ 2%	0.37%	1.58%	0.11%	0.71%	0.04%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-April						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	97.88%	96.27%	99.63%	98.89%	99.25%
RRC Congestion	≤ 1%	0.54%	0.72%	0.38%	0.30%	0.15%
Circuit Switched RAB Congestion	≤ 2%	1.39%	1.24%	0.15%	0.82%	0.07%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-April						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	220	285	352	741
Total number of RRC established (B)		NDR	181	285	348	739
Call setup success rate (B/A*100)	≥ 95%	NA	82.27%	100.00%	98.86%	99.73%
%age blocked calls		NA	17.73%	0.00%	1.14%	0.27%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-April						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		46055503	26966533	166151332	28517114	86625829
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		268530	390787	522757	117043	153353
Call drop rate (B/A*100)	≤ 2%	0.58%	1.45%	0.31%	0.41%	0.18%
Total no. of cells in the licensed service area (B)		15767	8240	29829	9012	19159
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		296	186	487	215	237
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.88%	2.25%	1.63%	2.39%	1.23%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-April						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		4225865	2593642	17011649	3382505	2707057
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		26597	34810	53578	13548	4382
Call drop rate (B/A*100)	≤ 2%	0.63%	1.34%	0.31%	0.40%	0.16%
Total no. of cells in the licensed service area (B)		14631	8162	29212	9018	20132
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		303	182	525	196	225
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.07%	2.23%	1.80%	2.18%	1.12%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-April						
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	248	343	348	739
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	8	1	2	2
Call drop rate (B/A*100)	≤ 2%	NA	3.23%	0.29%	0.57%	0.27%

Audit Results for Voice quality -PMR Data-April						
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	263505980038	82869383000	174798105219
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	259845372982	82642740249	172924604504
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.91%	NA	98.61%	99.73%	98.93%
Live measurement results for Voice quality-3 Day data-April						
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	27014966759	9546859000	6027520870
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	26643329792	9519982289	5889053531
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.00%	NA	98.62%	99.72%	97.70%
Drive test results for Voice quality (Average of three drive tests) - DT data-April						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	8132	NA	693337	2095863
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	8036	NA	692539	2026083
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.82%	NA	99.88%	96.67%

Audit Results for POI Congestion- PMR data-April						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		501	63	956	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		300537	100570	1158941	65446	NA
Traffic served for all POIs (B)- in erlangs		168618	56598	306015	31195	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-April						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		504	63	956	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		297972	100019	1158941	65446	NA
Traffic served for all POIs (B)- in erlangs		166337	56380	306015	31126	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

21 ANNEXURE – MAY-3G

Audit Results for Network Availability- PMR data-May						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		5519	2737	8068	3078	6481
Sum of downtime (i.e. total outage time) of Node Bs		151114	38234	5313	50113	10012
Node Bs downtime (not available for service)	≤ 2%	3.68%	1.88%	0.09%	2.19%	0.21%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	43	7	0	47
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.57%	0.09%	0.00%	0.73%
Live Measurement Results for Network Availability- 3 Day live data-May						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		5331	2734	8044	3042	6481
Sum of downtime (i.e. total outage time) of Node Bs		0	3632	520	4	1672
Node Bs downtime (not available for service)	≤ 2%	0.00%	1.85%	0.09%	0.00%	0.36%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	7	1	0	3
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.26%	0.01%	0.00%	0.05%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-May						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.60%	96.10%	99.68%	99.55%	99.84%
RRC Congestion	≤ 1%	0.03%	0.78%	0.18%	0.14%	0.06%
Circuit Switched RAB Congestion	≤ 2%	0.16%	1.81%	0.07%	0.60%	0.03%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-May						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.95%	95.56%	99.69%	99.56%	99.62%
RRC Congestion	≤ 1%	0.06%	0.92%	0.13%	0.15%	0.17%
Circuit Switched RAB Congestion	≤ 2%	0.14%	1.75%	0.08%	0.00%	0.06%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-May						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	558	1200	608	1157
Total number of RRC established (B)		NDR	535	1200	602	1157
Call setup success rate (B/A*100)	≥ 95%	NA	95.88%	100.00%	99.01%	100.00%
%age blocked calls		NA	4.12%	0.00%	0.99%	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-May						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		49497335	26875514	169783580	29129211	89574575
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		248314	349986	593820	121851	163436
Call drop rate (B/A*100)	≤ 2%	0.50%	1.30%	0.35%	0.42%	0.18%
Total no. of cells in the licensed service area (B)		16379	8249	30279	9162	19587
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		293	205	627	231	262
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.79%	2.48%	2.07%	2.53%	1.34%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-May						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		5773669	2589643	17418410	2091308	8460199
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		30904	43691	57649	8493	16553
Call drop rate (B/A*100)	≤ 2%	0.54%	1.69%	0.33%	0.41%	0.20%
Total no. of cells in the licensed service area (B)		15797	8240	30334	9049	20132
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		249	225	565	216	281
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.57%	2.73%	1.86%	2.39%	1.39%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-May						
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	535	1030	602	1157
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	16	1	6	0
Call drop rate (B/A*100)	≤ 2%	NA	2.99%	0.10%	1.00%	0.00%

Audit Results for Voice quality -PMR Data-May						
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	281984122569	84684224500	214294407364
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	277974147137	84456200498	212048394647
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.09%	NA	98.58%	99.73%	98.95%
Live measurement results for Voice quality-3 Day data-May						
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	27496167092	6138093500	6027520870
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	27112327615	6122139035	5889053531
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.57%	NA	98.60%	99.74%	97.70%
Drive test results for Voice quality (Average of three drive tests) - DT data-May						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	26665	NA	1035878	1862587
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	26189	NA	1034892	1804024
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.21%	NA	99.90%	96.86%

Audit Results for POI Congestion- PMR data-May						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		498	63	952	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		301770	99454	1156419	65199	NA
Traffic served for all POIs (B)- in erlangs		171169	54025	296436	29714	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		497	63	956	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		148810	10109	1141052	65199	NA
Traffic served for all POIs (B)- in erlangs		171067	53191	30696	29680	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

22 ANNEXURE – JUNE-3G

Audit Results for Network Availability- PMR data-June						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		5783	2740	8069	3085	6481
Sum of downtime (i.e. total outage time) of Node Bs		4000	39111	9163	54	13841
Node Bs downtime (not available for service)	≤ 2%	0.09%	1.92%	0.15%	0.00%	0.29%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	47	9	0	98
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.72%	0.11%	0.00%	1.51%
Live Measurement Results for Network Availability- 3 Day live data-June						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		5581	2734	8068	3092	6481
Sum of downtime (i.e. total outage time) of Node Bs		580	0	953	108	2645
Node Bs downtime (not available for service)	≤ 2%	0.14%	0.00%	0.16%	0.05%	0.57%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	0	1	0	98
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.00%	0.01%	0.00%	1.51%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-June						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.57%	96.01%	99.66%	99.42%	99.84%
RRC Congestion	≤ 1%	0.03%	0.78%	0.22%	0.15%	0.07%
Circuit Switched RAB Congestion	≤ 2%	0.15%	1.72%	0.08%	0.72%	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-June						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.92%	95.83%	99.66%	99.57%	99.86%
RRC Congestion	≤ 1%	0.03%	0.93%	0.23%	0.12%	0.01%
Circuit Switched RAB Congestion	≤ 2%	0.11%	1.80%	0.08%	0.00%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-June						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	328	925	539	1147
Total number of RRC established (B)		NDR	249	922	536	1147
Call setup success rate (B/A*100)	≥ 95%	NA	75.91%	99.68%	99.44%	100.00%
%age blocked calls		NA	24.09%	0.32%	0.56%	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-June						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		52975031	24115197	141457668	30927548	90311324
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		259466	332939	538749	139892	174551
Call drop rate (B/A*100)	≤ 2%	0.49%	1.38%	0.38%	0.45%	0.19%
Total no. of cells in the licensed service area (B)		17222	8262	30452	9163	20132
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		241	187	650	241	310
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.40%	2.26%	2.13%	2.63%	1.54%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-June						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		7173388	2497802	16257531	3234359	8460199
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		35879	36369	64707	14968	16553
Call drop rate (B/A*100)	≤ 2%	0.50%	1.46%	0.40%	0.46%	0.20%
Total no. of cells in the licensed service area (B)		16563	8249	30414	9199	20132
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		291	238	671	243	281
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.75%	2.89%	2.21%	2.64%	1.39%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-June						
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	261	938	536	1142
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	9	0	4	0
Call drop rate (B/A*100)	≤ 2%	NA	3.45%	0.00%	0.75%	0.00%

Audit Results for Voice quality -PMR Data-June						
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	245090823129	91848940500	211059603489
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	241616815645	91579997123	208754342342
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.12%	NA	98.58%	99.71%	98.91%
Live measurement results for Voice quality-3 Day data-June						
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	28116771662	9223853500	20790212901
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	27718535389	9197467798	20576022914
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.55%	NA	98.58%	99.71%	98.97%
Drive test results for Voice quality (Average of three drive tests) - DT data-June						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	12006	NA	1808783	2534388
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	11943	NA	1788530	2450703
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	99.48%	NA	98.88%	96.70%

Audit Results for POI Congestion- PMR data-June						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		498	68	954	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		305760	99428	1153404	63252	NA
Traffic served for all POIs (B)- in erlangs		169616	51602	281701	27601	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		499	68	952	192	NA
No. of POIs not meeting benchmark		0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		305468	99412	1151052	63199	NA
Traffic served for all POIs (B)- in erlangs		164200	51447	281168	26880	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

23 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. AMJ'16 – Refers to the quarter of April, May and June2016
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

SCO 47, 5th Floor, Old Judicial Complex, Sector 15
Part 1, Gurgaon, Haryana – 122001

✆+91 (124) 4217300

www.imrbint.com