EAST ZONE

TRAI AUDIT WIRELESS REPORT-WEST BENGAL CIRCLE - JAS QUARTER, 2015

Prepared By -

IMRB International | eTech

Prepared For-

TRAI

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated September 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated July 6, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

2.2 OBJECTIVES

The primary objective of the Audit module is to-

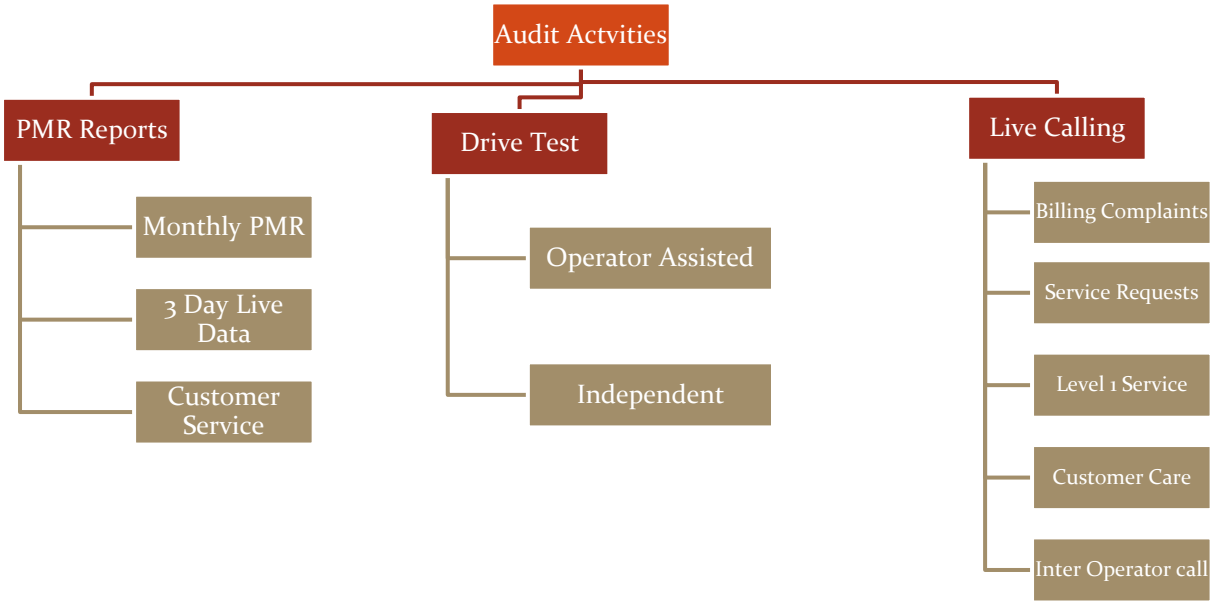
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

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

Image Source: BSNL website

2.4 FRAMEWORK USED

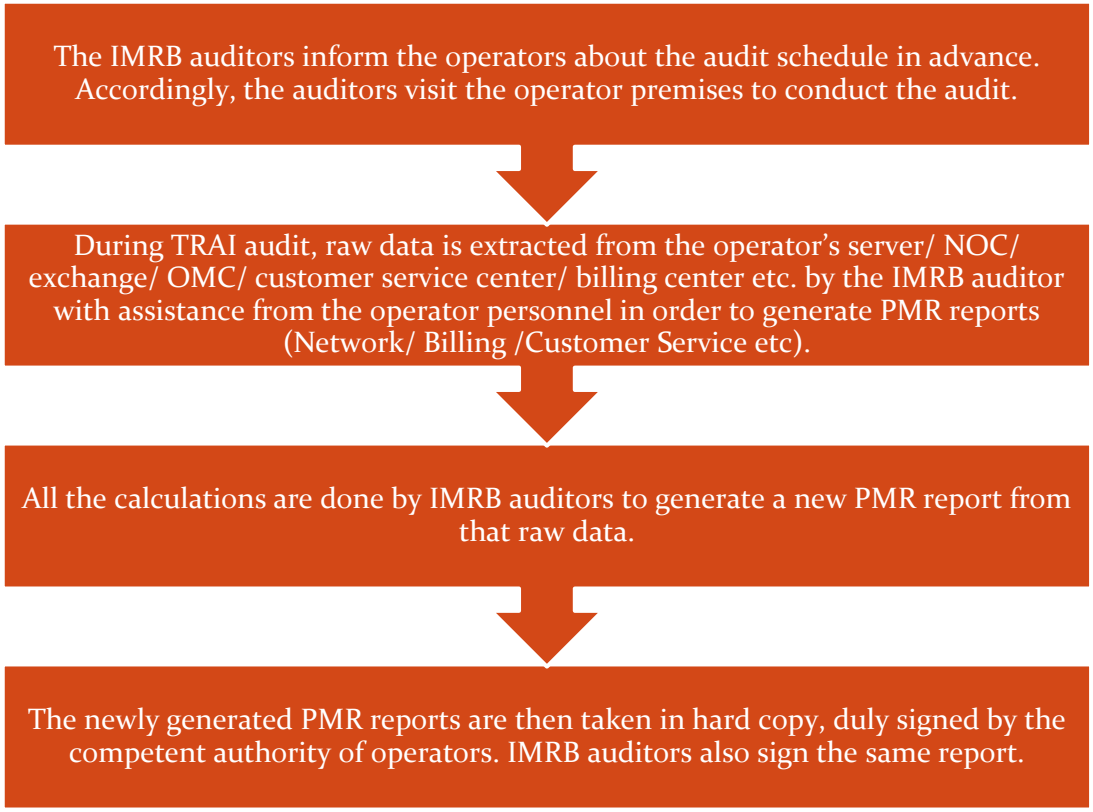


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

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



The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, August 2015 audit data was collected in the month of September 2015.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending September 2015 (JAS'15) was collected in the month of October 2015.

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

- Monthly PMR (Network Parameters)
- 3 Day Live Measurement Data (Network Parameters)
- Customer Service Data

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR

This involved calculation of the various 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 July, August and September 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS - NETWORK

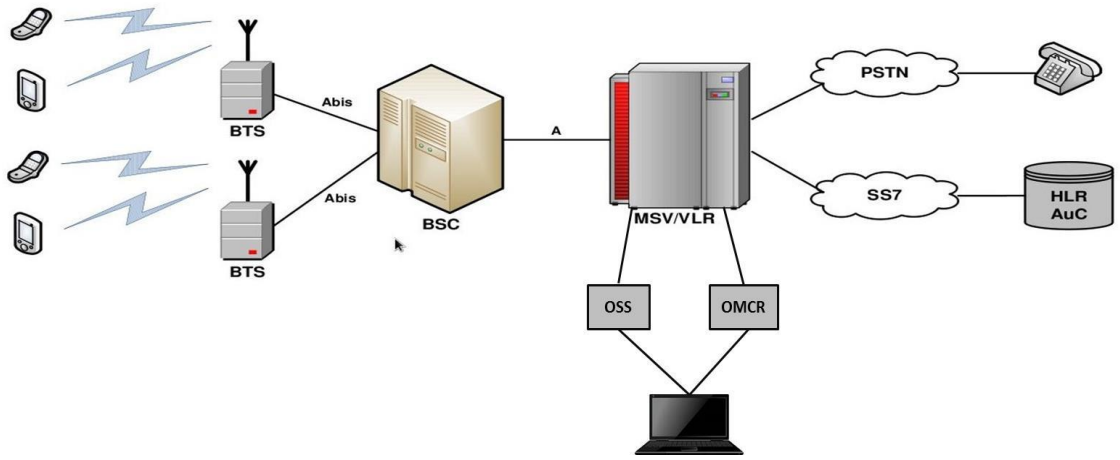
Let us now look at the various parameters involved in the audit reports.

Network Related

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 Channel Congestion	≤ 1 %
TCH Congestion	≤ 2%
Connection Maintenance (Retainability)	
Call Drop Rate	≤ 2%
Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%
Connections with good voice quality	≥ 95%
Point of Interconnection	
(POI) Congestion (on individual POI)	≤ 0.5%

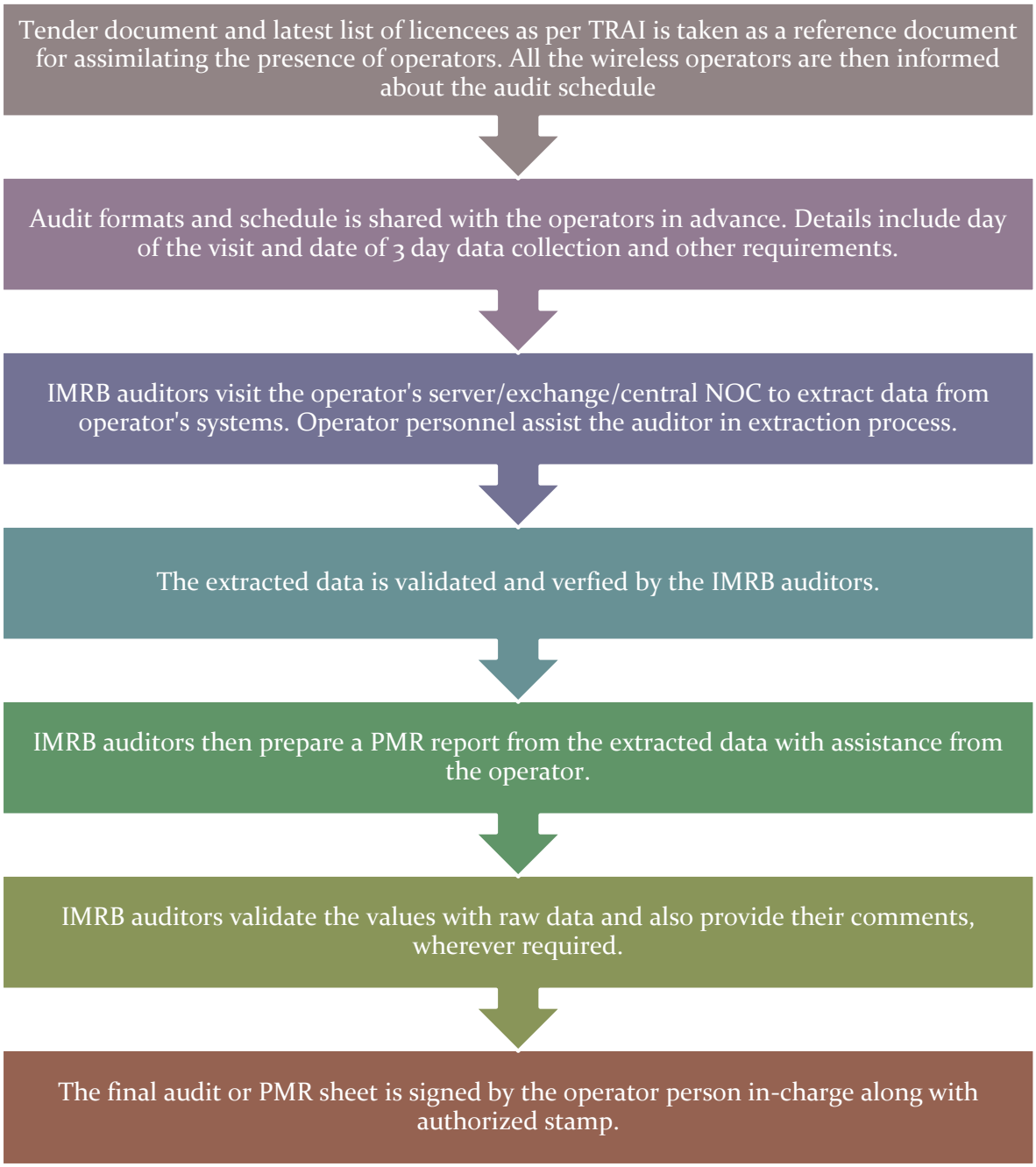
2.4.1.4 POINT OF DATA EXTRACTION

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



2.4.1.5 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.

2.4.1.6 CALCULATION METHODOLOGY – NETWORK PARAMETERS

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

2.4.1.7 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.

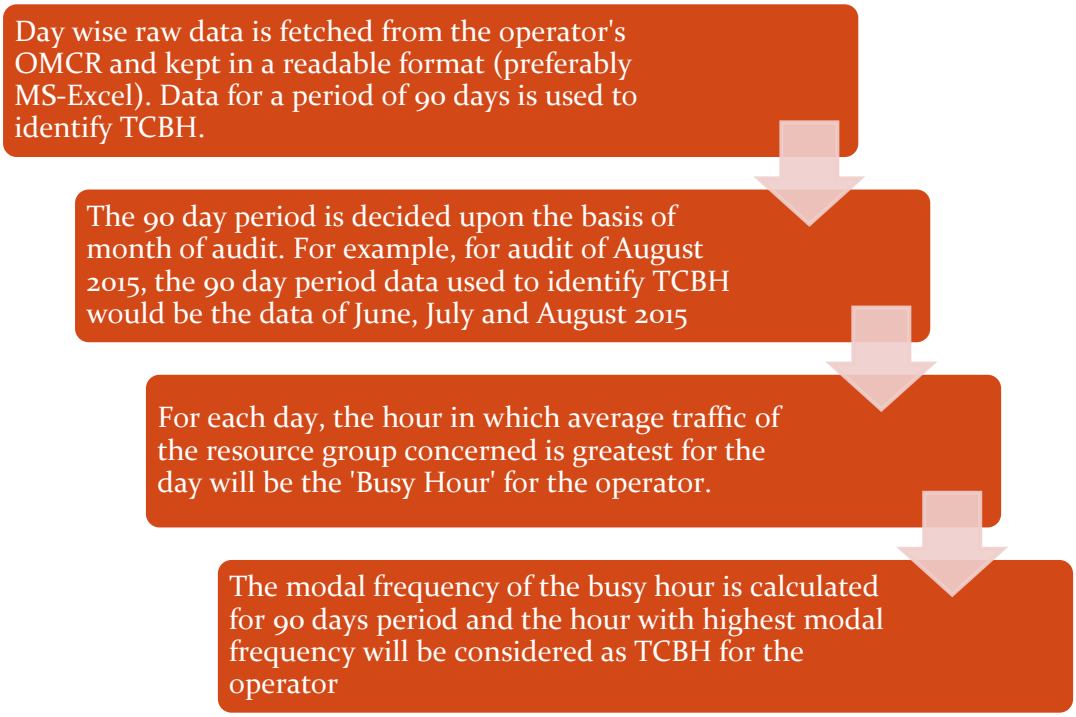
The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak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

2.4.1.8 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:



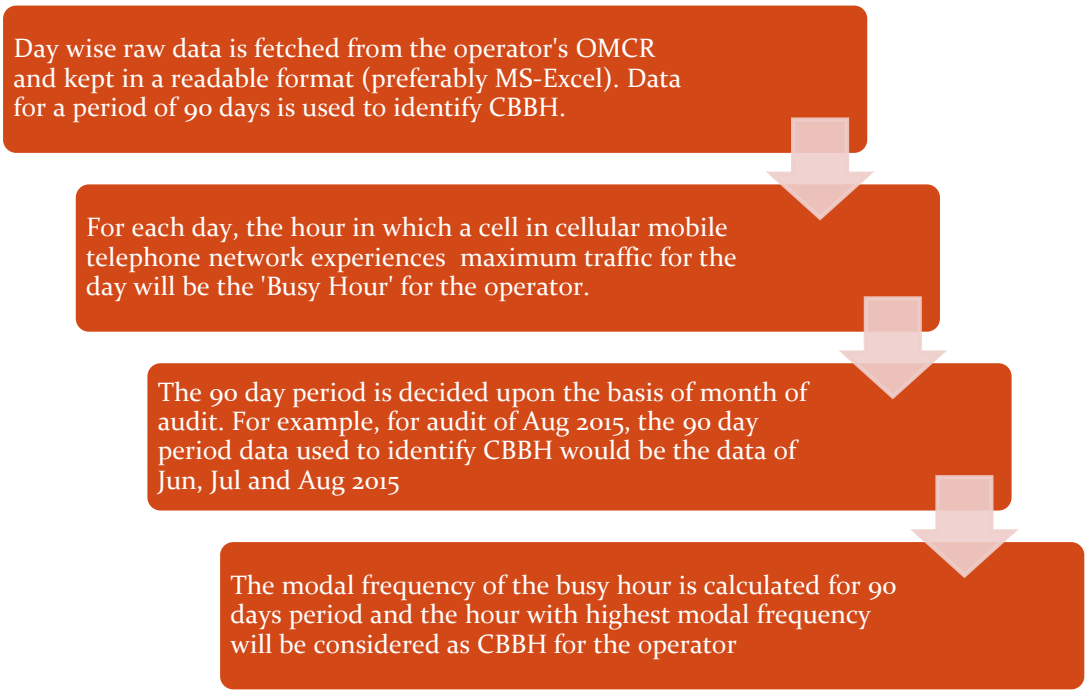
During audit, the auditors identified from the raw data that the TCBH for the operators in JAS'15 was the time period as given below.

Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00

2.4.1.9 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:



2.4.1.10 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 September 2015 (JAS'15) was collected in the month of October 2015. 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.

2.4.1.11 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%

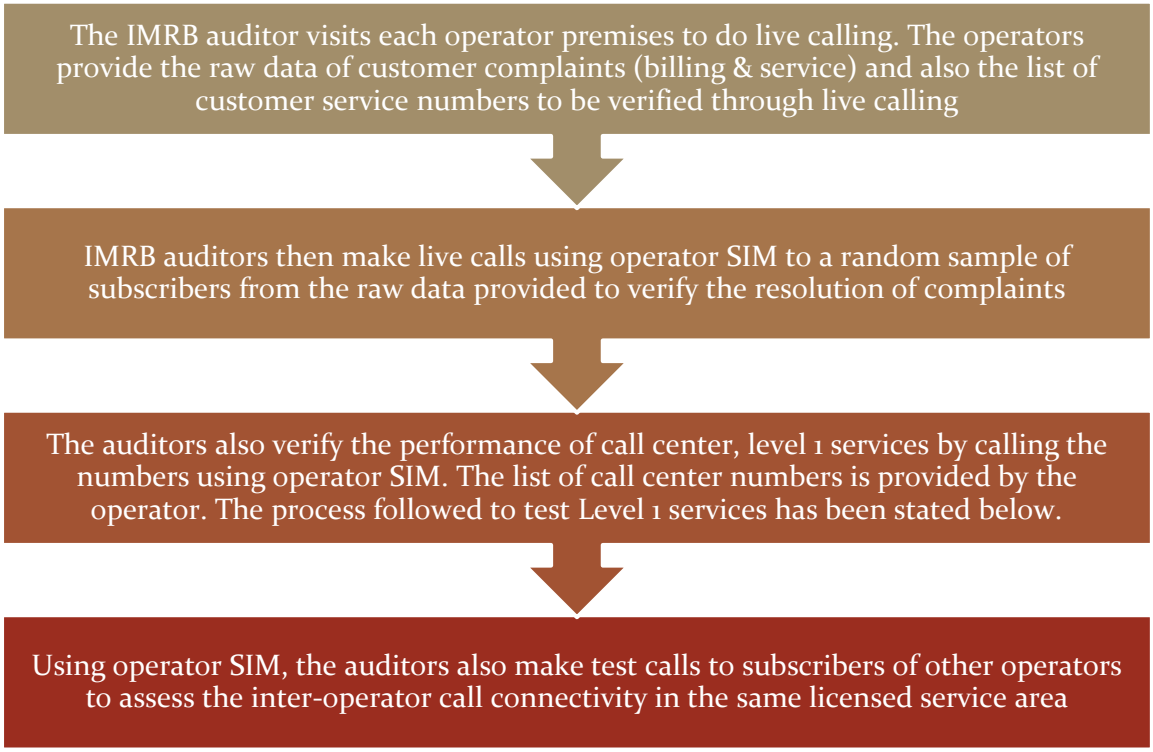
2.4.1.12 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Metering and billing credibility – Prepaid	Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter * 100
Resolution of billing/ charging complaints (Postpaid + Prepaid)	There are two benchmarks involved here: Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100 Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100
Period of applying credit waiver	Number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver * 100
Call centre performance IVR (Calling getting connected and answered by IVR)	Number of calls connected and answered by IVR/ All calls attempted to IVR * 100
Call centre performance (Voice to Voice)	Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100 The calculation excludes the calls dropped before 90 seconds
Time taken for termination/ closure of service	Number of closures done within 7 days/ total number of closure requests * 100
Time taken for refund for deposit after closures	Number of cases of refund after closure done within 60 days/ total number of cases of refund after closure * 100

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers. Below is a step wise procedure of live calling.



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

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th September, 2015 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 150 test calls were made per service provider in the quarter.

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

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.

- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 DRIVE TEST

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the outdoor coverage 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

A total of 3 SSA were selected and audited in each quarter, 1 SSA in each month. The methodology adopted for the drive test-

- 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- On an average, a minimum of 100 kilometers were covered each day
- 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 and we can start from the point from where we had left last day (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 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.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.3 INDEPENDENT DRIVE TEST

The number of independent drive tests to be conducted and their locations are decided basis TRAI recommendation.

- A minimum of 100 kilometers was traversed during the independent drive test in a SSA. The SSA would be defined as per BSNL and SSA list will be finalized by regional TRAI office.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.

- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
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- The speed of the vehicle was kept at around 30 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.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING DRIVE TEST

The parameters which were captured during the drive test include. Below are the parameters which are captured for the GSM and CDMA operators.

- Coverage-Signal strength (GSM)
    - ✓ Total calls made (A)
    - ✓ Number of calls with signal strength between 0 to -75 dBm
    - ✓ Number of calls with signal strength between 0 to -85 dBm
    - ✓ Number of calls with signal strength between 0 to -95 dBm
- Coverage-Signal strength (CDMA)
    - ✓ Total Ec/Io BINS (A)
    - ✓ Total Ec/Io BINS with less than –15 (B)
    - ✓ Low Interference = [1 - (B/A)] x 100
- Voice quality (GSM)
    - ✓ Total RxQual Samples– A
    - ✓ RxQual samples with 0-5 value – B
    - ✓ %age samples with good voice quality = B/A x 100
- Voice quality (CDMA)
    - ✓ Total FER BINs (forward FER) – A
    - ✓ FER BINs with 0-2 value (forward FER) – B
    - ✓ FER BINs with 0-4 value (forward FER) – C

- ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
- ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
- ✓ No. of FER samples with value > 4 = [A-C]

- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.5 OPERATORS COVERED

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	3214865
Airtel	12499058
BSNL	1219829
Idea	4992791
MTS	1011110
Reliance CDMA	769327
Reliance GSM	6467508
Tata CDMA	3113
Tata GSM	238342
Vodafone	15037985

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY

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

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED

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)	1.37%	7.91%	97.29%	0.60%	1.40%	1.41%	13.43%	96.06%
Airtel	0.10%	0.26%	97.79%	0.38%	0.77%	1.32%	2.57%	96.22%
BSNL	6.23%	36.64%	97.88%	2.70%	1.30%	1.13%	17.78%	95.03%
Idea	0.12%	0.62%	98.60%	0.10%	0.23%	0.45%	0.64%	97.24%
MTS	0.28%	0.00%	99.56%	NA	0.26%	0.76%	2.54%	99.67%
Reliance CDMA	0.18%	0.37%	97.94%	NA	0.07%	0.32%	0.92%	99.68%
Reliance GSM	0.22%	0.94%	98.69%	0.01%	0.04%	0.58%	0.08%	98.42%
Tata CDMA	0.05%	0.00%	99.41%	NA	0.00%	0.29%	2.26%	98.19%
Tata GSM	0.05%	0.13%	99.03%	0.08%	0.12%	0.55%	3.14%	97.72%
Vodafone	0.03%	0.17%	99.04%	0.54%	0.96%	0.78%	2.88%	95.23%

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

Following are the parameter wise observations for Wireless Operators in West Bengal circle:

BTSs Accumulated Downtime

BSNL failed to meet the benchmark for BTS accumulated downtime. Vodafone had the best performance with 0.03% downtime.

Worst Affected BTSs Due to Downtime

Aircel and BSNL failed to meet the TRAI benchmark for the parameter. MTS and Tata CDMA performed the best with 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR)

All the operators met the TRAI benchmark for the ratio of successful call attempts to the overall call attempts. The best performance was recorded for the MTS at 99.56% CSSR.

All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

BSNL did not meet the benchmark for SDCCH/Paging channel congestion. Best performance was recorded for Reliance GSM with 0.01% congestion.

For TCH congestion, all operators met the benchmark while Tata CDMA was the best performer by recording 0.00% TCH congestion.

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

Call Drop Rate

All operators met the benchmark for call drop rate while Tata CDMA was the best performer with 0.29% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL and Tata GSM failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.08% worst affected cells having more than 3% TCH drop.

Voice Quality

All the operators ensured an appropriate amount of voice quality, above the benchmark. Reliance CDMA reported the best performance at 99.68%.

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

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

3.1.1 PMR DATA – JULY

Name of Service Provider Month July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.58%	10.05%	97.23%	0.77%	1.66%	1.36%	12.81%	96.01%
Airtel	0.08%	0.06%	98.88%	0.41%	0.86%	1.24%	2.56%	95.78%
BSNL	8.06%	46.47%	97.83%	2.75%	1.43%	1.08%	18.31%	95.02%
Idea	0.20%	0.87%	98.31%	0.16%	0.41%	0.50%	0.51%	97.27%
MTS	0.31%	0.00%	99.42%	NA	0.43%	0.70%	2.75%	99.75%
Reliance CDMA	0.08%	0.00%	98.08%	NA	0.05%	0.33%	1.01%	99.68%
Reliance GSM	0.10%	0.97%	98.71%	0.00%	0.00%	0.58%	0.08%	98.46%
Tata CDMA	0.13%	0.00%	99.34%	NA	0.00%	0.30%	2.46%	98.20%
Tata GSM	0.10%	0.39%	98.96%	0.13%	0.17%	0.56%	3.33%	97.67%
Vodafone	0.07%	0.41%	99.07%	0.52%	0.93%	0.75%	2.88%	95.31%

3.1.2 PMR DATA – AUGUST

Name of Service Provider Month August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.31%	7.28%	97.38%	0.58%	1.32%	1.42%	13.18%	96.09%
Airtel	0.14%	0.54%	98.89%	0.43%	0.81%	1.38%	2.50%	95.74%
BSNL	7.13%	40.18%	97.86%	2.78%	1.25%	1.32%	16.12%	95.03%
Idea	0.10%	0.62%	98.92%	0.07%	0.17%	0.38%	0.66%	97.44%
MTS	0.52%	0.00%	99.53%	NA	0.29%	0.74%	2.40%	99.74%
Reliance CDMA	0.20%	0.49%	97.81%	NA	0.09%	0.31%	0.81%	99.69%
Reliance GSM	0.28%	1.01%	98.75%	0.00%	0.00%	0.57%	0.08%	98.34%
Tata CDMA	0.01%	0.00%	99.42%	NA	0.00%	0.26%	2.38%	98.20%
Tata GSM	0.02%	0.00%	99.08%	0.06%	0.09%	0.53%	2.92%	97.77%
Vodafone	0.01%	0.00%	98.83%	0.62%	1.17%	0.73%	2.87%	95.33%

3.1.3 PMR DATA - SEPTEMBER

Name of Service Provider Month September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.21%	6.41%	97.27%	0.45%	1.22%	1.44%	14.31%	96.08%
Airtel	0.08%	0.19%	95.61%	0.30%	0.65%	1.34%	2.66%	97.13%
BSNL	3.49%	23.28%	97.94%	2.57%	1.21%	0.99%	18.92%	95.04%
Idea	0.05%	0.36%	98.56%	0.07%	0.11%	0.48%	0.75%	97.02%
MTS	0.00%	0.00%	99.73%	NA	0.07%	0.83%	2.48%	99.53%
Reliance CDMA	0.25%	0.62%	97.93%	NA	0.08%	0.31%	0.93%	99.68%
Reliance GSM	0.29%	0.84%	98.60%	0.03%	0.13%	0.59%	0.07%	98.47%
Tata CDMA	0.02%	0.00%	99.46%	NA	0.00%	0.30%	1.93%	98.17%
Tata GSM	0.02%	0.00%	99.06%	0.06%	0.09%	0.55%	3.16%	97.71%
Vodafone	0.02%	0.10%	99.23%	0.48%	0.77%	0.85%	2.88%	95.04%

3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.28%	0.64%	97.30%	0.55%	1.33%	1.38%	12.19%	96.20%
Airtel	0.09%	0.01%	97.75%	0.44%	0.70%	1.16%	2.55%	95.72%
BSNL	4.59%	4.72%	97.70%	2.85%	1.38%	1.14%	19.84%	95.03%
Idea	0.11%	0.05%	99.45%	0.06%	0.07%	0.35%	1.07%	97.91%
MTS	0.67%	0.00%	99.80%	NA	0.02%	0.95%	2.30%	99.35%
Reliance CDMA	0.28%	0.00%	98.10%	NA	0.05%	0.29%	1.69%	99.69%
Reliance GSM	0.82%	0.00%	98.71%	0.03%	0.14%	0.56%	0.22%	98.35%
Tata CDMA	0.00%	0.00%	99.34%	NA	0.00%	0.26%	2.64%	98.12%
Tata GSM	0.01%	0.00%	99.27%	0.06%	0.05%	0.52%	3.13%	97.86%
Vodafone	0.03%	0.00%	99.74%	0.26%	0.26%	0.59%	2.68%	96.19%

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

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

BTSs Accumulated Downtime

During live measurement, it was found that BSNL failed to meet the TRAI specified benchmark for the outage due to downtime of the base transceiver stations (BTS). Tata CDMA performed the best with 0.00% BTS accumulate downtime reported.

Worst Affected BTSs Due to Downtime

BSNL failed to meet the TRAI benchmark for the parameter while all other operators met the benchmark with most of them reporting 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR)

All the operators met the TRAI benchmark for the ratio of successful call attempts to the overall call attempts. The best performance was recorded for the MTS at 99.80% CSSR

All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

BSNL did not meet the benchmark for SDCCH/Paging channel congestion ratio. The best performance was recorded for Reliance GSM with 0.03% congestion.

For TCH congestion, all operators met the benchmark. Tata CDMA performed the best by recording 0.00% TCH congestion.

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

Call Drop Rate

All operators met the benchmark for call drop rate. Tata CDMA was the best performer with 0.26% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL and Tata GSM failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.22% worst affected cells having more than 3% TCH drop.

Voice Quality

All the operators ensured an appropriate amount of voice quality, above the benchmark. Reliance CDMA reported the best performance at 99.69%.

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

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

3.2.1 3 DAY DATA - JULY

Name of Service Provider 3 day July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.45%	0.71%	97.22%	0.89%	1.49%	1.33%	10.36%	96.16%
Airtel	0.04%	0.00%	98.70%	0.58%	0.87%	1.17%	2.57%	95.77%
BSNL	3.57%	2.26%	97.61%	2.90%	1.57%	1.11%	19.94%	95.02%
Idea	0.18%	0.09%	99.15%	0.10%	0.13%	0.41%	1.46%	97.72%
MTS	0.31%	0.00%	99.77%	NA	0.00%	1.81%	2.55%	99.22%
Reliance CDMA	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Tata CDMA	0.00%	0.00%	99.28%	NA	0.00%	0.25%	2.20%	98.12%
Tata GSM	0.03%	0.00%	99.17%	0.11%	0.08%	0.56%	3.91%	97.83%
Vodafone	0.05%	0.00%	99.78%	0.27%	0.22%	0.61%	2.87%	96.16%

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

3.2.2 3 DAY DATA – AUGUST

Name of Service Provider 3 Day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.16%	0.61%	97.30%	0.38%	1.39%	1.51%	13.52%	96.12%
Airtel	0.14%	0.02%	98.85%	0.45%	0.78%	1.38%	2.65%	95.74%
BSNL	4.78%	4.44%	98.08%	3.33%	1.18%	1.23%	21.25%	95.04%
Idea	0.09%	0.07%	99.59%	0.03%	0.04%	0.29%	0.74%	97.97%
MTS	1.69%	0.00%	99.82%	NA	0.04%	0.54%	2.01%	99.05%
Reliance CDMA	0.36%	0.00%	98.10%	NA	0.03%	0.30%	1.42%	99.69%
Reliance GSM	0.16%	0.00%	98.75%	0.02%	0.12%	0.56%	0.16%	98.29%
Tata CDMA	0.00%	0.00%	99.23%	NA	0.00%	0.29%	3.51%	98.12%
Tata GSM	0.00%	0.00%	99.28%	0.04%	0.03%	0.52%	2.75%	97.86%
Vodafone	0.02%	0.00%	99.69%	0.23%	0.31%	0.60%	2.49%	96.14%

3.2.3 3 DAY DATA - SEPTEMBER

Name of Service Provider 3 Day September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.24%	0.61%	97.38%	0.38%	1.11%	1.29%	12.68%	96.33%
Airtel	0.08%	0.00%	95.70%	0.30%	0.45%	0.94%	2.44%	95.65%
BSNL	5.41%	7.46%	97.40%	2.32%	1.40%	1.08%	18.34%	95.02%
Idea	0.05%	0.00%	99.62%	0.04%	0.03%	0.34%	1.02%	98.03%
MTS	0.01%	0.00%	99.82%	NA	0.01%	0.50%	2.33%	99.77%
Reliance CDMA	0.19%	0.00%	98.09%	NA	0.07%	0.28%	1.95%	99.68%
Reliance GSM	1.47%	0.00%	98.66%	0.03%	0.15%	0.56%	0.28%	98.41%
Tata CDMA	0.00%	0.00%	99.52%	NA	0.00%	0.25%	2.20%	98.13%
Tata GSM	0.01%	0.00%	99.36%	0.04%	0.03%	0.49%	2.73%	97.89%
Vodafone	0.03%	0.00%	99.75%	0.27%	0.25%	0.56%	2.68%	96.26%

3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Service Requests	Level 1 Service	Customer Care	
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Complaint /Request attended to Satisfaction	Call answered in 60 seconds	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	98.00%	100.00%		≥ 95%	≥ 95%	≥ 95%
Aircel(DWL)	99.00%	100.00%	100.00%	86.67%	100.00%	97.00%
Airtel	98.00%	100.00%	96.00%	84.67%	100.00%	100.00%
BSNL	93.00%	100.00%	98.00%	90.00%	100.00%	100.00%
Idea	100.00%	100.00%	99.00%	90.67%	100.00%	100.00%
MTS	100.00%	100.00%	100.00%	88.00%	100.00%	100.00%
Reliance CDMA	97.00%	100.00%	98.00%	93.33%	100.00%	100.00%
Reliance GSM	95.00%	100.00%	98.00%	90.00%	100.00%	100.00%
Tata CDMA	NA	NA	NA	85.53%	100.00%	100.00%
Tata GSM	NA	NA	92.00%	83.33%	100.00%	100.00%
Vodafone	100.00%	100.00%	100.00%	86.67%	100.00%	100.00%

Resolution of billing complaints

BSNL, Reliance CDMA and Reliance GSM failed to meet the TRAI benchmark for resolving 98% complaints within 4 weeks. Idea and MTS performed best with 100.00% resolution of complaints within 4 weeks and all operators resolved the complaints within 6 weeks.

NA: Database of complaints to conduct live calling was not available for Tata CDMA and Tata GSM due to zero or very low base of complaints for the respective operators.

Complaint/Request Attended to Satisfaction

Aircel, MTS and Vodafone showed complete satisfaction for the customers with regards to their service requests/complaints being attended.

Level 1 Service

All operators failed to meet the TRAI benchmark for Level 1 services. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

It is to be noted that for 'level 1' services, many Category-I (i.e. mandatory) services were not being operated by most of the operators.

Accessibility of Call Centre/Customer Care-IVR

All operators met the TRAI benchmark of accessibility of Call Centre/Customer care-IVR.

Percentage of Calls Answered by the Operators (voice to voice) within 90 seconds

All operators met the TRAI benchmark of answering 95% calls by the operators (voice to voice) within 90 seconds.

3.4 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 voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.00%	0.03%	100.00%	100.00%	100.00%	98.31%	97.74%
Airtel	0.04%	0.02%	100.00%	100.00%	100.00%	99.59%	88.25%
BSNL	0.00%	0.06%	98.27%	99.63%	100.00%	96.33%	95.98%
Idea	0.42%	0.08%	100.00%	100.00%	100.00%	98.12%	99.84%
MTS	0.09%	0.02%	100.00%	100.00%	100.00%	98.88%	97.23%
Reliance CDMA	0.10%	0.02%	100.00%	100.00%	100.00%	NDR	56.12%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	NDR	19.24%
Tata CDMA	NA	0.00%	NA	NA	NA	99.64%	98.08%
Tata GSM	NA	0.00%	NA	NA	NA	96.71%	85.89%
Vodafone	0.06%	0.02%	100.00%	100.00%	100.00%	100.00%	96.97%

Metering and billing credibility – Postpaid Subscribers

For the postpaid customers, Idea failed to meet the TRAI benchmark. Aircel and BSNL were the best performers with 0.00% billing disputes.

NA: Tata CDMA and GSM do not have postpaid service in the circle.

Metering and billing credibility – Prepaid Subscribers

For the prepaid customers, all operators met the TRAI benchmark. Tata CDMA and Tata GSM had the best performance with 0.00% charging disputes.

Resolution of Billing Complaints

All operators met the TRAI benchmark for resolving billing complaints within 4 weeks; however only BSNL failed to meet the benchmark for resolving billing complaints within 6 weeks.

It is to be noted that Aircel, Airtel, Idea, MTS and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. Further details can be found in annexure (section 8.7).

Response Time to customer for assistance - % of cases in which advance wavier 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 operators IVR.

All operators met the benchmark for calls answered by IVR. Vodafone performed the best by connecting 100% IVR calls.

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

Airtel, Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark of 95% calls (voice to voice) answered within 90 seconds by the call center operators. Best performance was recorded for Idea at 99.84%.

3.5 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Aircel(DWL)	NA	100.00%	92.00%	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	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%	100.00%	100.00%	100.00%	100.00%	100.00%
MTS	98.00%	100.00%	94.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	97.00%	100.00%	100.00%	100.00%	95.00%	NA	100.00%	100.00%	100.00%	100.00%
Reliance GSM	98.00%	100.00%	100.00%	100.00%	99.00%	100.00%	NA	100.00%	100.00%	100.00%
Tata CDMA	100.00%	100.00%	95.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
Tata GSM	100.00%	100.00%	98.00%	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%	100.00%	NA

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

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the providers. Aircel with BSNL & MTS, Airtel with BSNL, MTS with Aircel & BSNL, Reliance CDMA with Aircel & MTS, Reliance GSM with Aircel and TATA GSM & CDMA with BSNL operators faced problem in inter-operator connectivity.

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

BSNL did not meet the benchmark for BTS Accumulated Downtime, Worst Affected BTS due to Downtime, SDCCH/ Paging Channel Congestion and Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters)

BSNL did not meet the benchmark for BTS Accumulated Downtime, Worst Affected BTS due to Downtime, SDCCH/ Paging Channel Congestion and Worst Affected Cells Having More than 3% TCH Drop.

For 'Worst affected BTSs due to downtime', significant difference was observed between PMR & live measurement data for BSNL and Aircel. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for 3 days.

Live Calling

BSNL, Reliance CDMA and Reliance GSM failed to meet the TRAI benchmark for resolving 98% complaints within 4 weeks.

As per live calling conducted for 'level 1' services, none of the operators met the benchmark for the same. Also, many Category-I (i.e. mandatory) services were not being operated by most of the operators.

Metering and billing credibility

For the postpaid customers, Idea failed to meet the TRAI benchmark.

Resolution of Billing Complaints

BSNL failed to meet the TRAI benchmark for resolving billing complaints within 6 weeks.

It is to be noted that Aircel, Airtel, Idea, MTS and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Customer Care

Airtel, Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark of 95% calls (voice to voice) answered within 90 seconds by the call center executives.

Drive Test (Operator Assisted)

Aircel, BSNL, MTS, Reliance CDMA and Reliance GSM consistently failed to meet the various benchmarks during drive tests.

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

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 PARAMETER DESCRIPTION

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

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

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

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

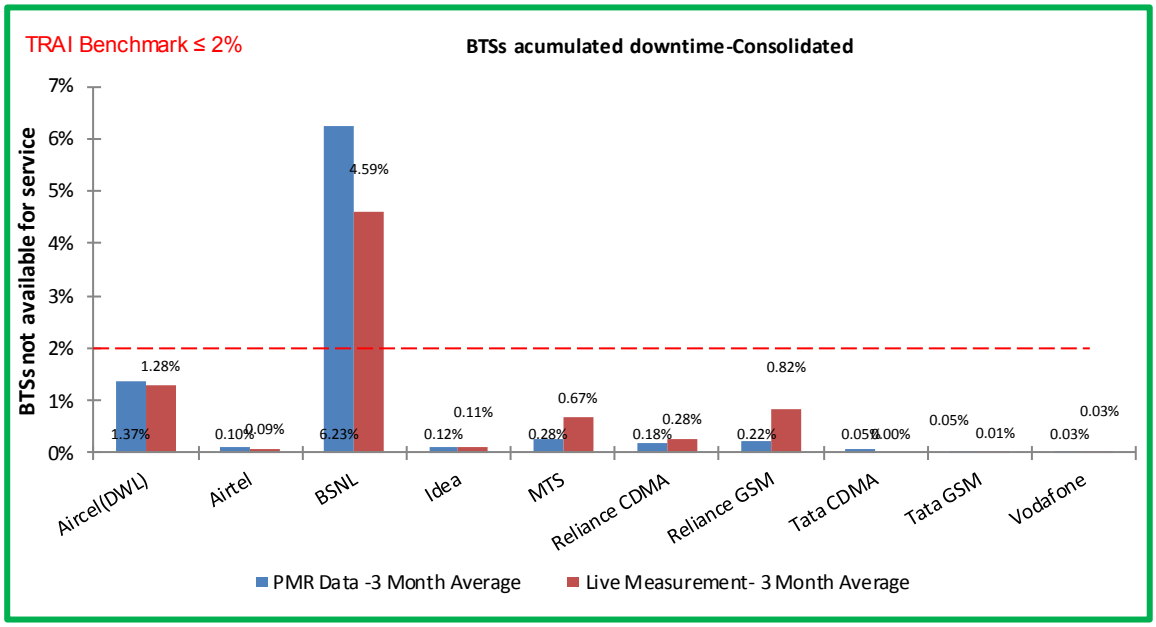
3. **TRAI Benchmark –**

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

4. **Audit Procedure –**

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

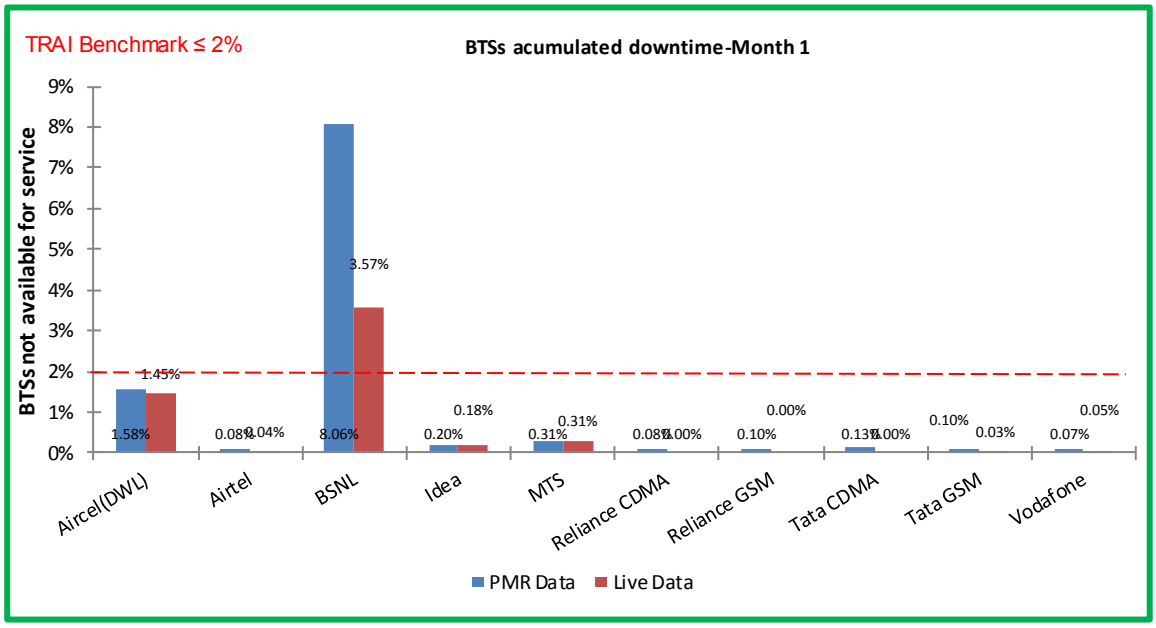
5.1.2 KEY FINDINGS



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

BSNL failed to meet the benchmark for BTS accumulated downtime.

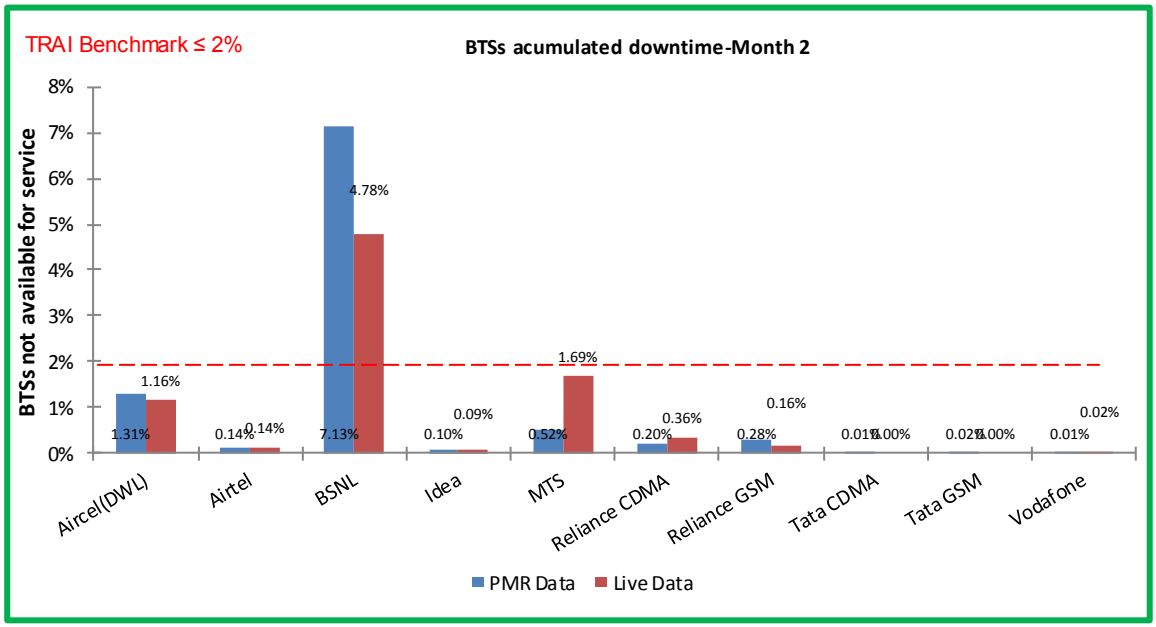
5.1.2.1 KEY FINDINGS – MONTH 1



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

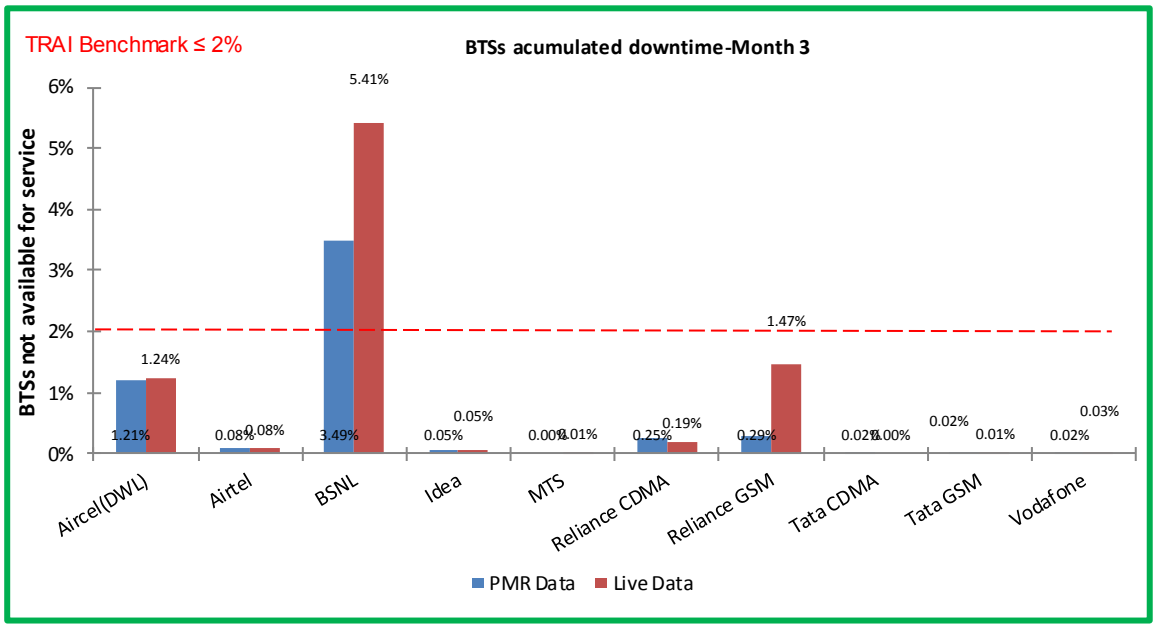
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.1.2.2 KEY FINDINGS – MONTH 2



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

5.1.2.3 KEY FINDINGS – MONTH 3



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

5.2 WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1 PARAMETER DESCRIPTION

1. **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.

2. **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

3. **TRAI Benchmark –**

   a. Worst affected BTSs due to downtime ≤ 2%

4. **Audit Procedure –**

   i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

   ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

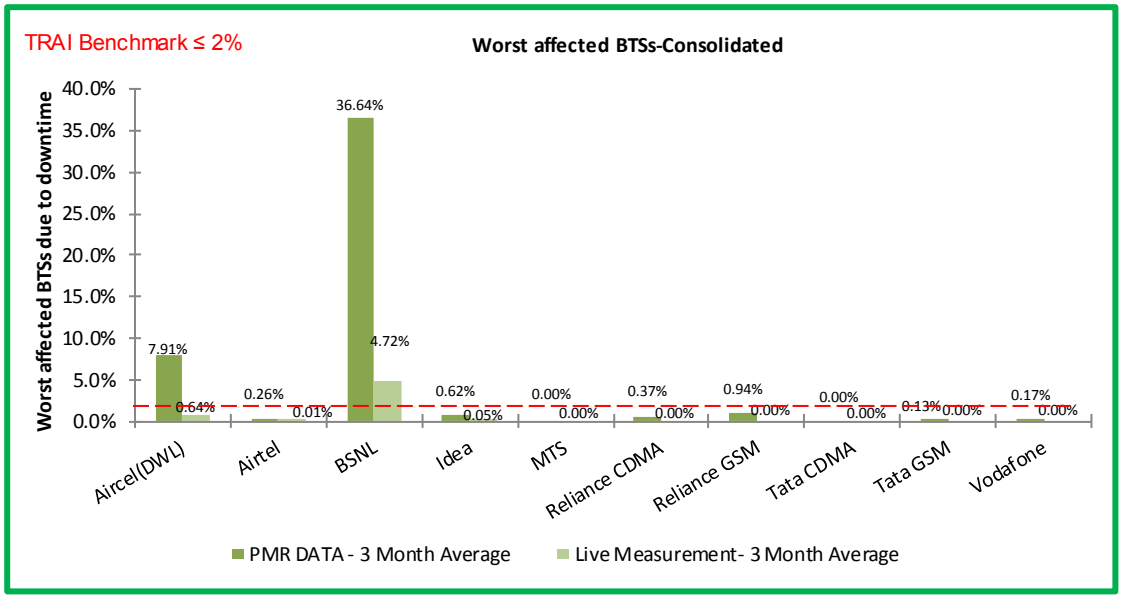
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   iv. Any outage as a result of force majeure was not considered at the time of calculation.

   v. List of operating sites with cell details and ids are taken from the operator.

   vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

5.2.2 KEY FINDINGS

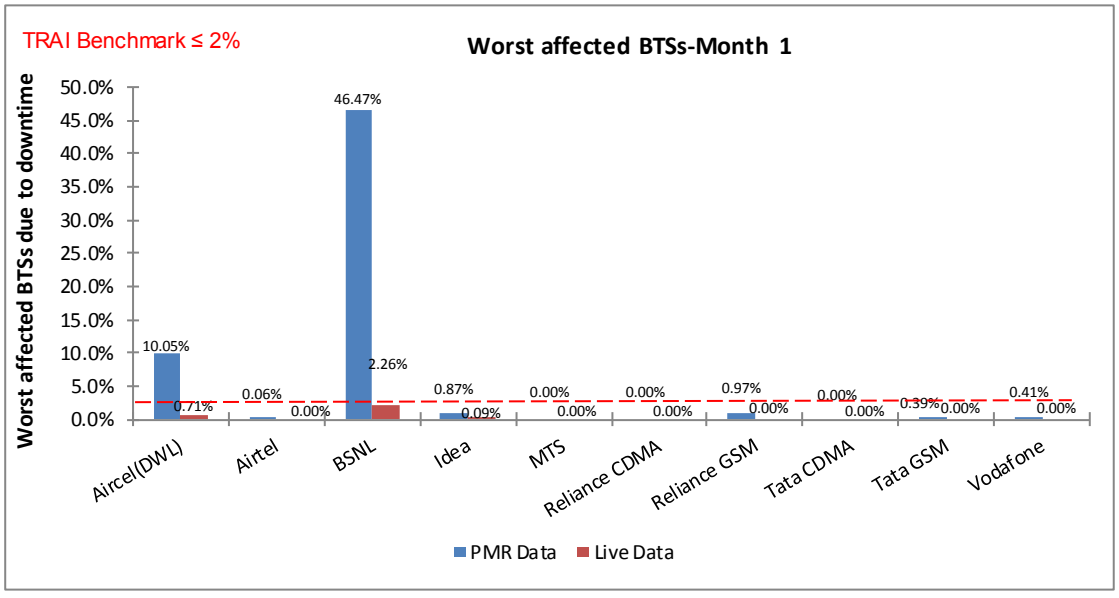


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL failed to meet the benchmark for the parameter.

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

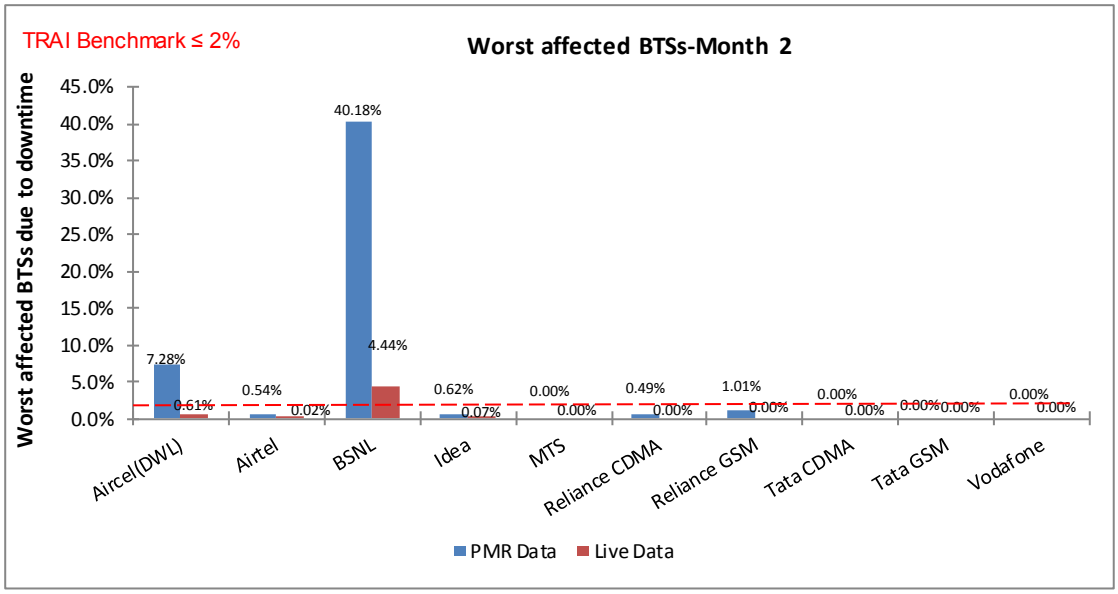
5.2.2.1 KEY FINDINGS – MONTH 1



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

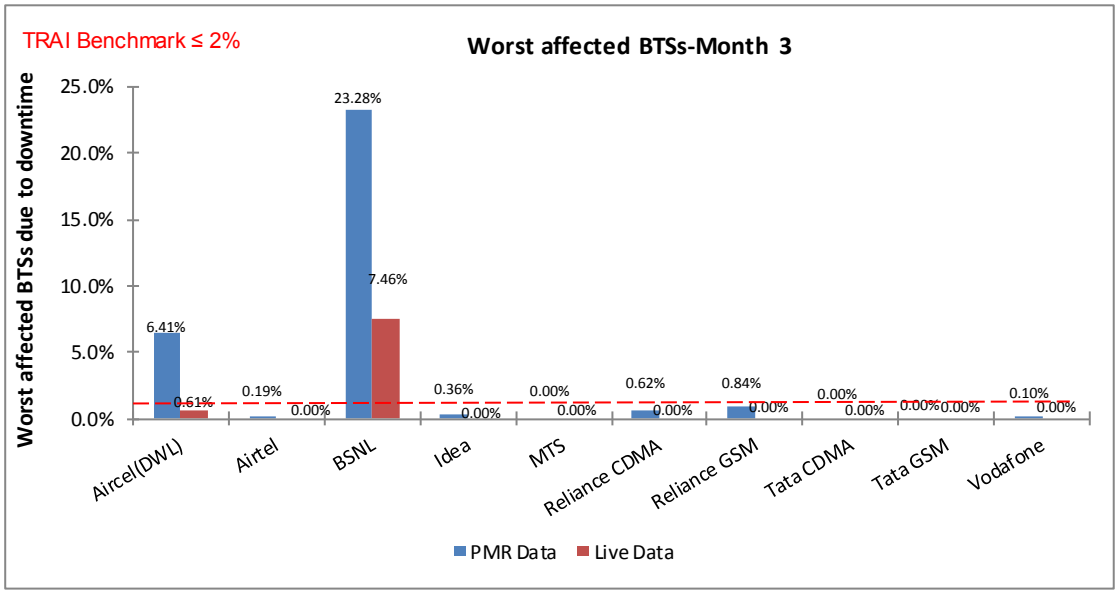
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.2.2.2 KEY FINDINGS – MONTH 2



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

5.2.2.3 KEY FINDINGS – MONTH 3



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

5.3 CALL SET UP SUCCESS RATE

5.3.1 PARAMETER DESCRIPTION

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

   (Calls Established / Total Call Attempts) * 100

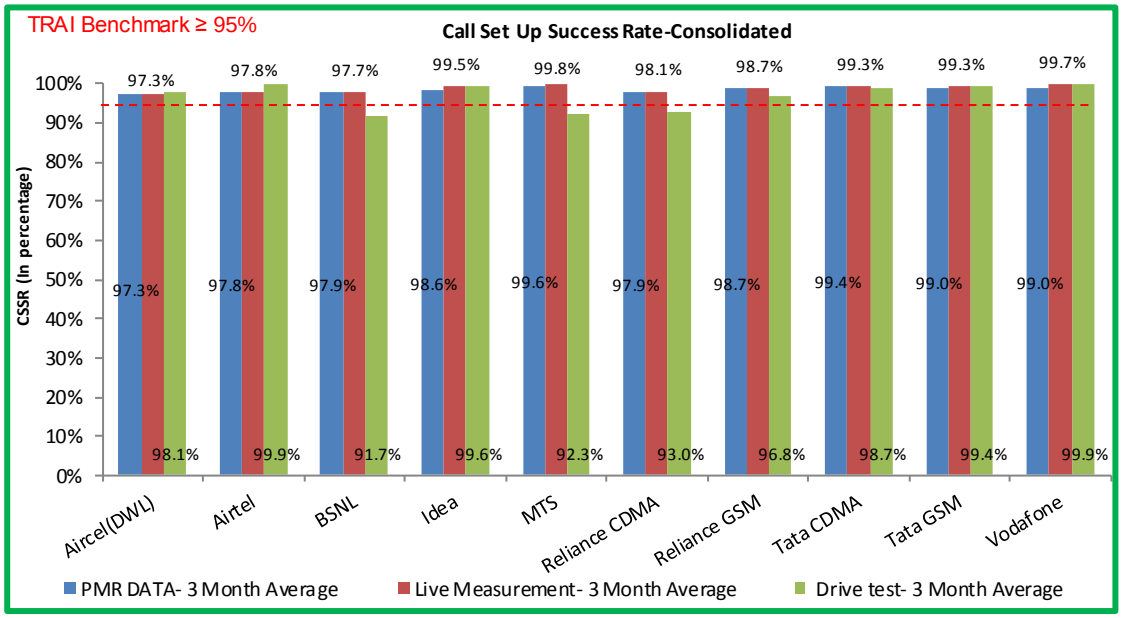
   Call Established means the following events have happened in call setup:-

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

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

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

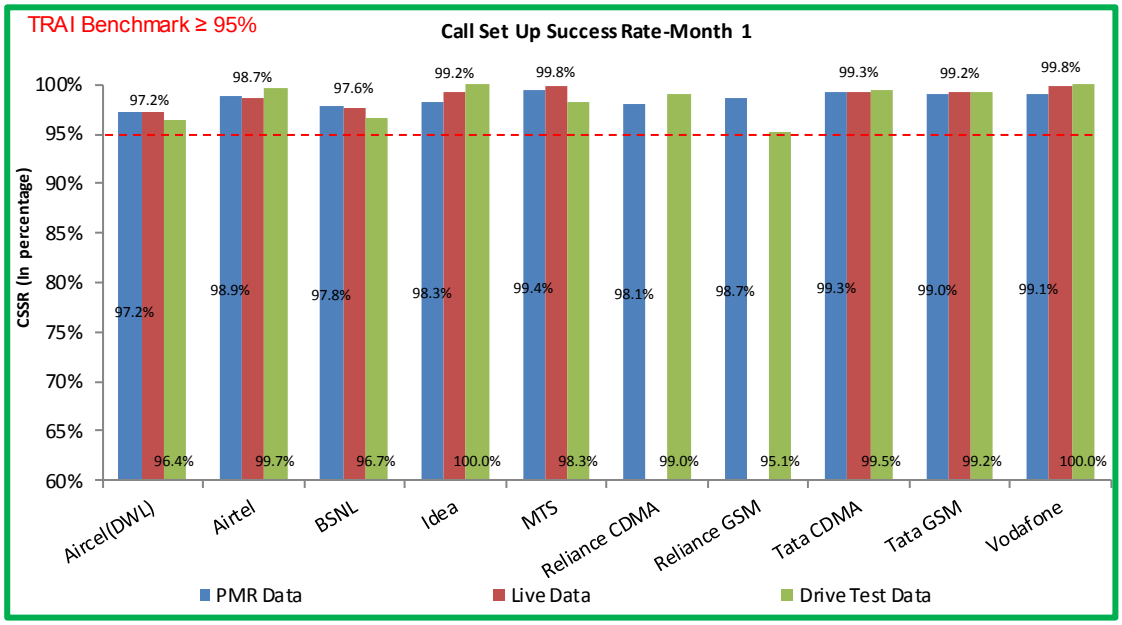
5.3.2 KEY FINDINGS



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

All operators met the TRAI specified benchmark as per audit data.

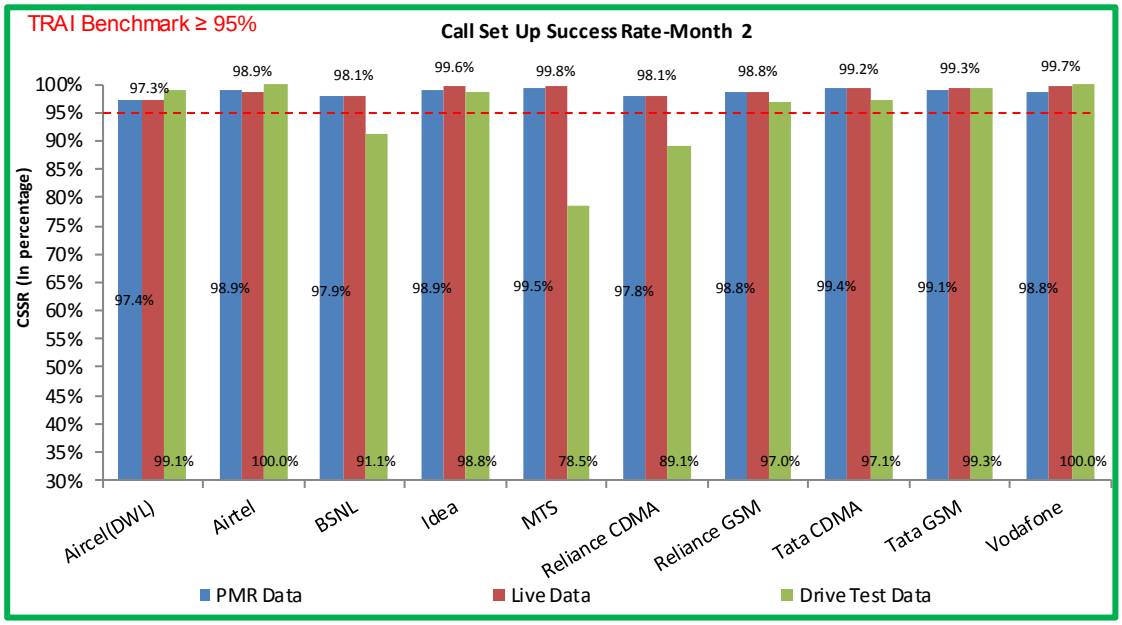
5.3.2.1 KEY FINDINGS – MONTH 1



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

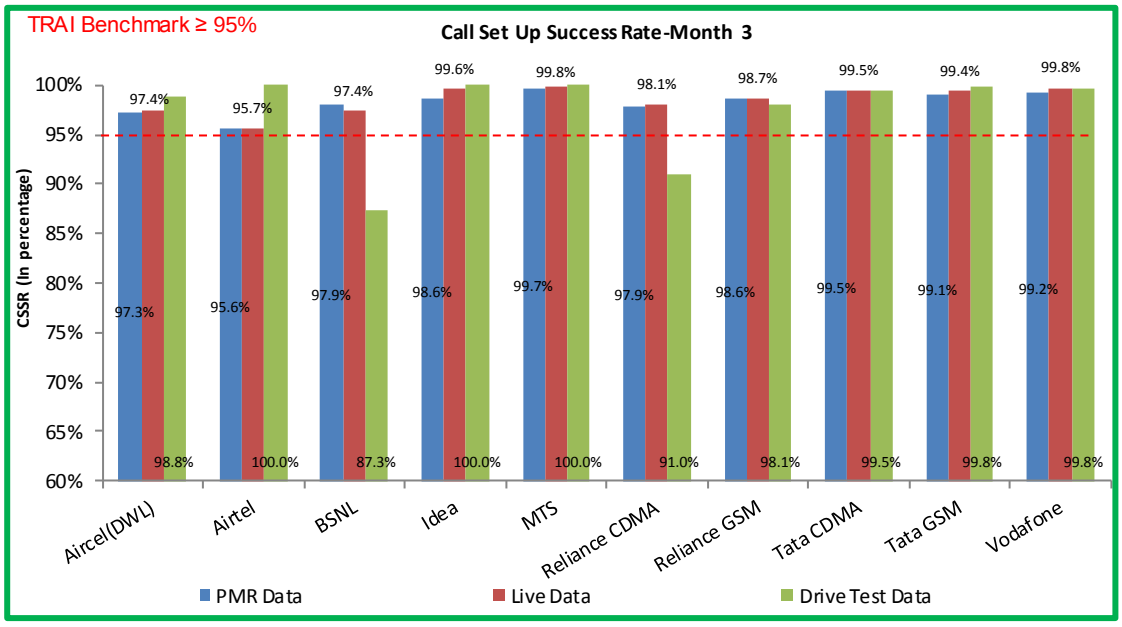
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.3.2.2 KEY FINDINGS – MONTH 2



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

5.3.2.3 KEY FINDINGS – MONTH 3



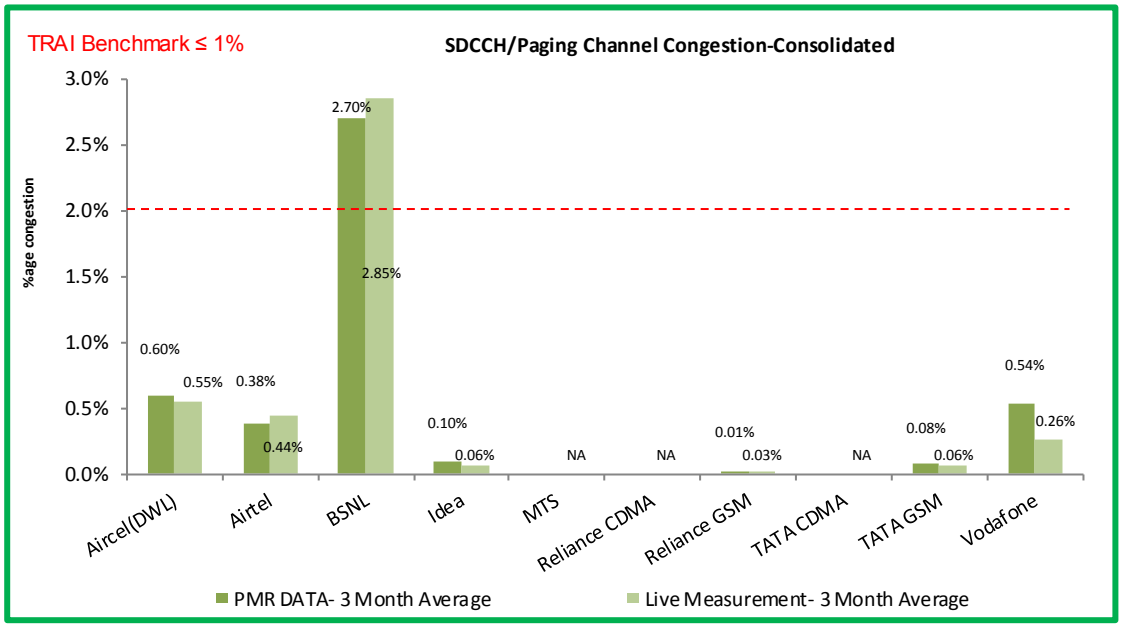
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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

5.4.1 PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:
   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point of Interconnect
2. **Computational Methodology:**
   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
     - C1 = Average SDCCH / TCH Congestion % on day 1
     - A2 = Number of attempts to establish SDCCH / TCH made on day 2
     - C2 = Average SDCCH / TCH Congestion % on day 2
     - An = Number of attempts to establish SDCCH / TCH made on day n
     - Cn = Average SDCCH / TCH Congestion % on day n
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
     - C1 = Average POI Congestion % on day 1
     - A2 = POI traffic offered on all POIs (no. of calls) on day 2
     - C2 = Average POI Congestion % on day 2
     - An = POI traffic offered on all POIs (no. of calls) on day n
     - Cn = Average POI Congestion % on day n
3. **Benchmark:**
   - SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%
4. **Audit Procedure –**
   - Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
   - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

5.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION

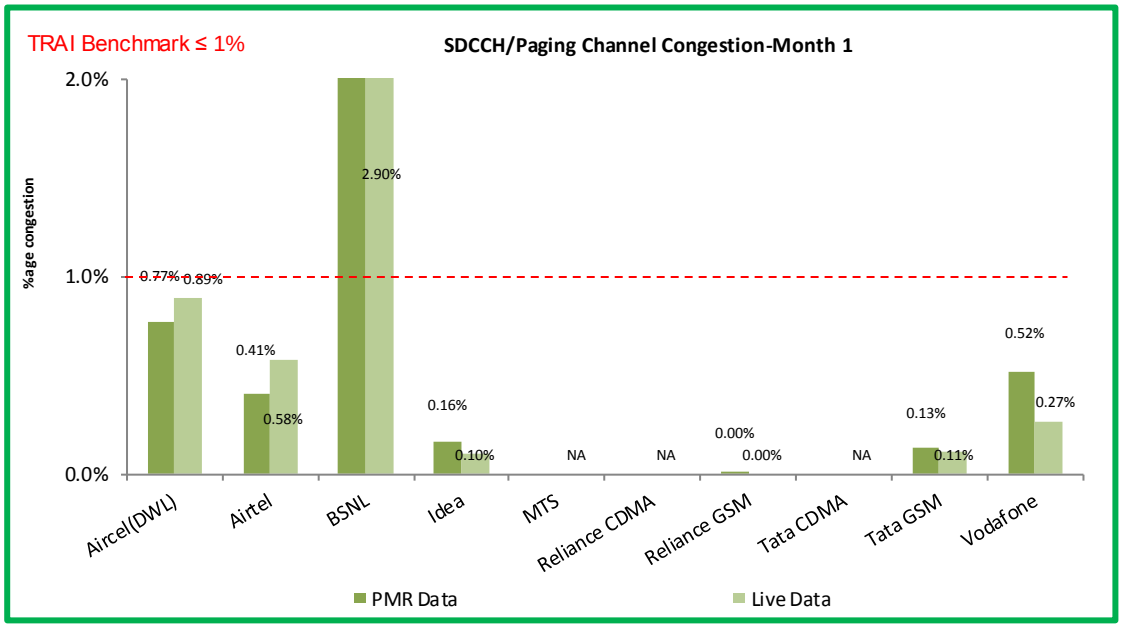


Data Source: Network Operations Center (NOC) of the operators

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

BSNL did not meet the benchmark for the parameter as per audit.

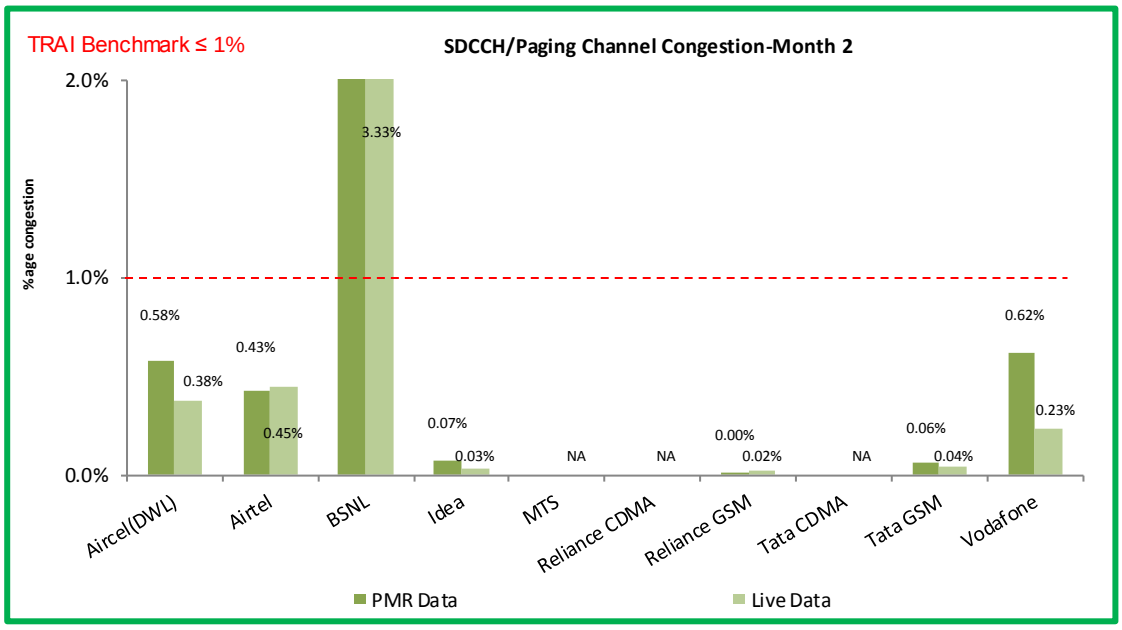
5.4.2.1 KEY FINDINGS – MONTH 1



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

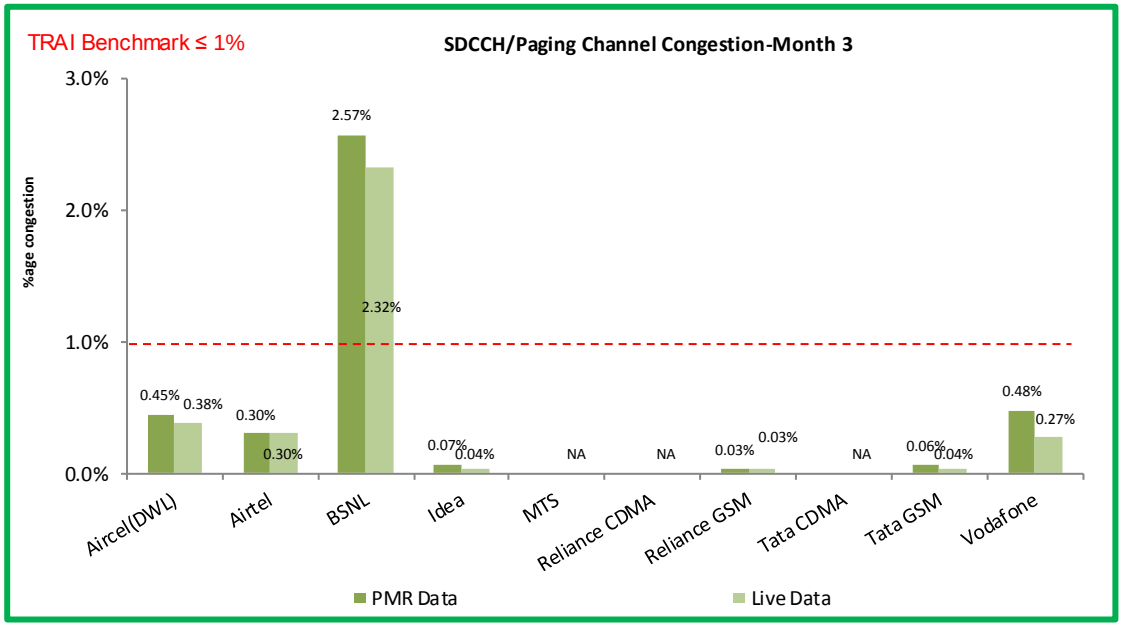
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.2.2 KEY FINDINGS – MONTH 2



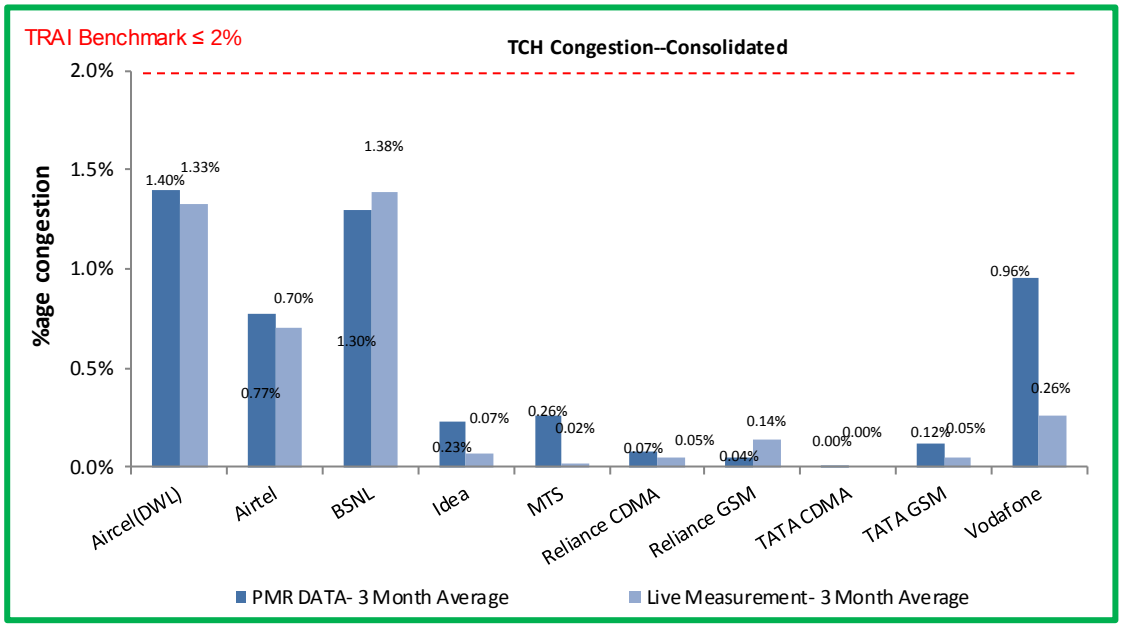
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MONTH 3



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

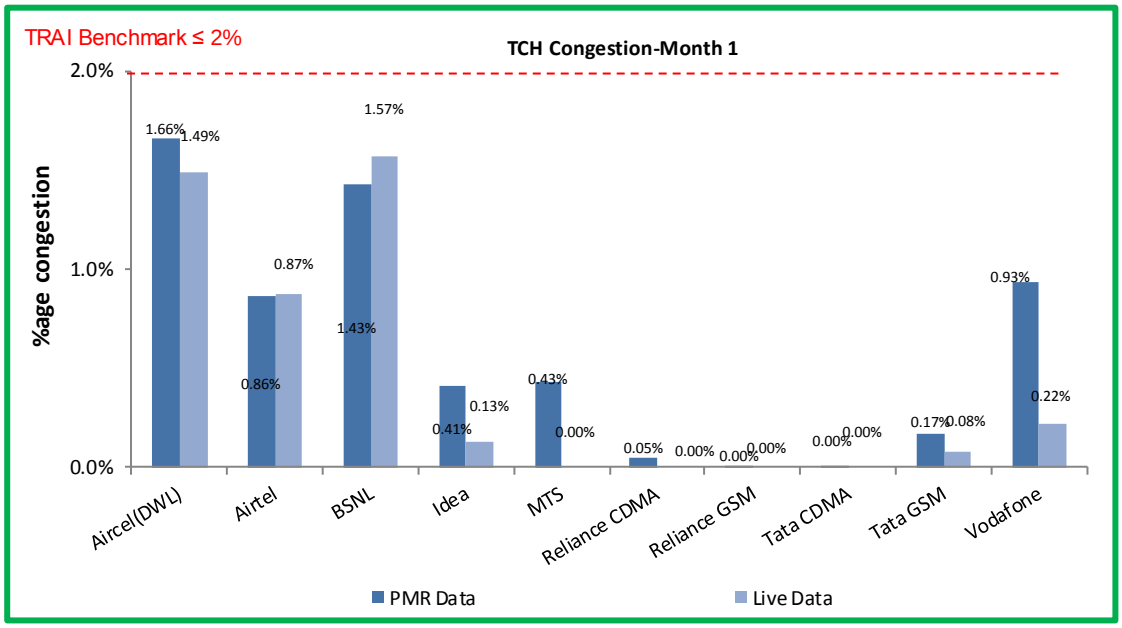
5.4.3 KEY FINDINGS – TCH CONGESTION



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

For TCH congestion, all operators met the TRAI benchmark.

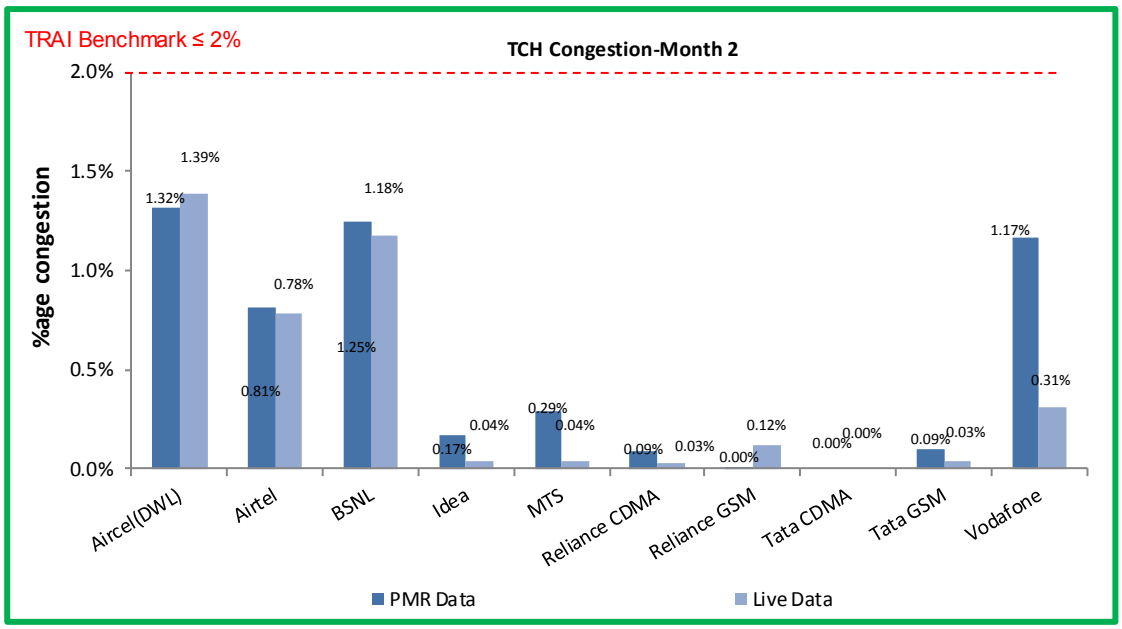
5.4.3.1 KEY FINDINGS – MONTH 1



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

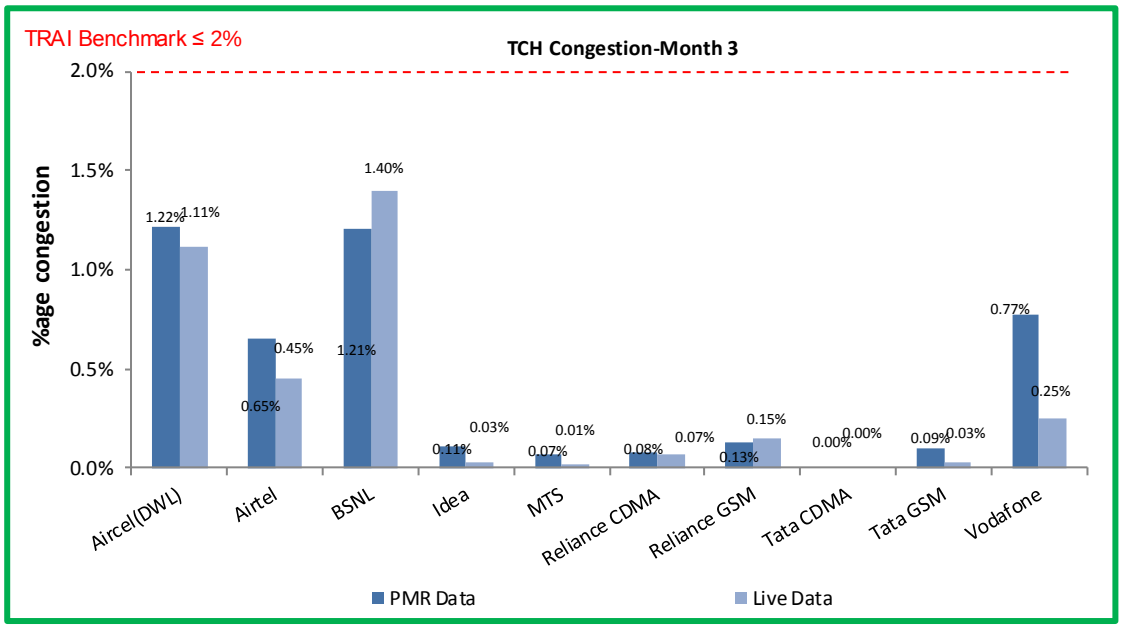
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.3.2 KEY FINDINGS – MONTH 2



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

5.4.3.3 KEY FINDINGS – MONTH 3



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

5.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		65	38	77	118	39	21	36	47	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79598	147858	185025	114457	51444	7359	27595	11654	6289	347530
Traffic served for all POIs (B)- in erlangs		36398	81212	35771	69669	20740	2561	13077	1505	1045	190617
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											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		64	37	67	118	37	21	48	47	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79496	447964	159980	114625	56246	6786	37316	11654	6287	344803
Traffic served for all POIs (B)- in erlangs		36614	261408	33858	69986	23351	2669	18263	1443	1041	190583
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 the operators met the benchmark of POI congestion as per audit data.

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		62	37	77	118	38	21	12	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		78088	144675	186362	114460	55681	NDR	8153	11654	6293	343281
Traffic served for all POIs (B)- in erlangs		36206	78550	36662	69308	22425	NDR	3224	1554	1089	200695
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		62	37	77	118	37	NDR	NDR	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		78302	431444	186390	114923	56536	NDR	NDR	11654	6287	340375
Traffic served for all POIs (B)- in erlangs		36586	262589	37585	69199	23806	NDR	NDR	1561	1072	188211
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

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

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		67	37	77	118	40	21	48	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79787	144675	183217	114123	55648	7366	37316	11654	6286	349481
Traffic served for all POIs (B)- in erlangs		37338	78550	35615	69232	22384	2533	18386	1554	1045	186038
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-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		63	34	48	118	37	21	48	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		78897	449351	108021	114060	55664	6205	37316	11654	6287	343281
Traffic served for all POIs (B)- in erlangs		36706	270921	27555	69942	23306	2720	18596	1349	1052	194952
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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		67	39	77	118	40	21	48	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		80919	154224	185496	114789	43003	7351	37316	11654	6287	349827
Traffic served for all POIs (B)- in erlangs		35652	86535	35037	70466	17411	2589	17622	1408	1001	185117
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-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		68	39	77	118	37	21	48	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81290	463096	185530	114893	56537	7366	37316	11654	6287	350752
Traffic served for all POIs (B)- in erlangs		36550	250713	36435	70816	22940	2618	17929	1421	999	188587
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

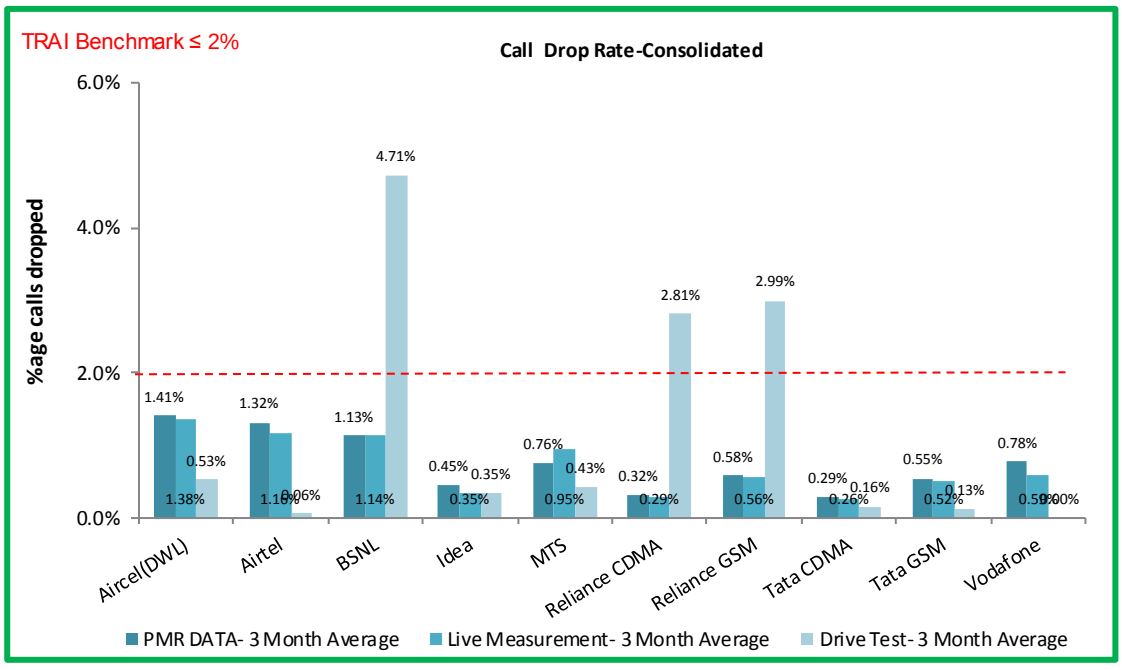
Data Source: Network Operations Center (NOC) of the operators

5.5 CALL DROP RATE

5.5.1 PARAMETER DESCRIPTION

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

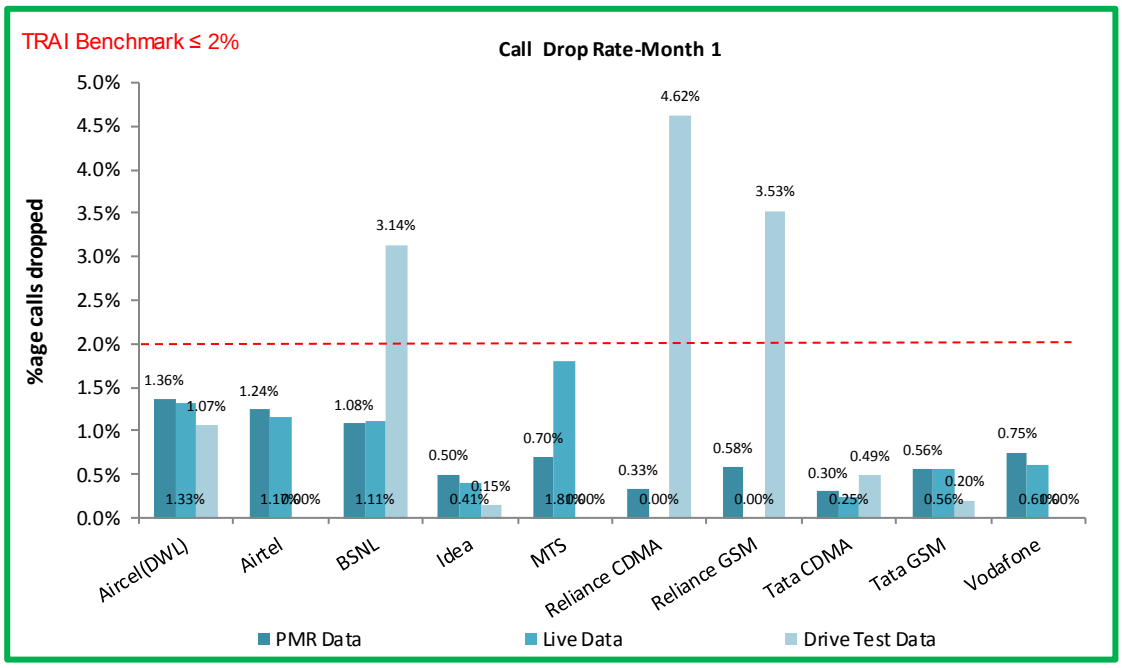
5.5.2 KEY FINDINGS



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

All operators met the benchmark during audit. High call drop rate was observed for BSNL, Reliance CDMA and Reliance GSM during drive tests.

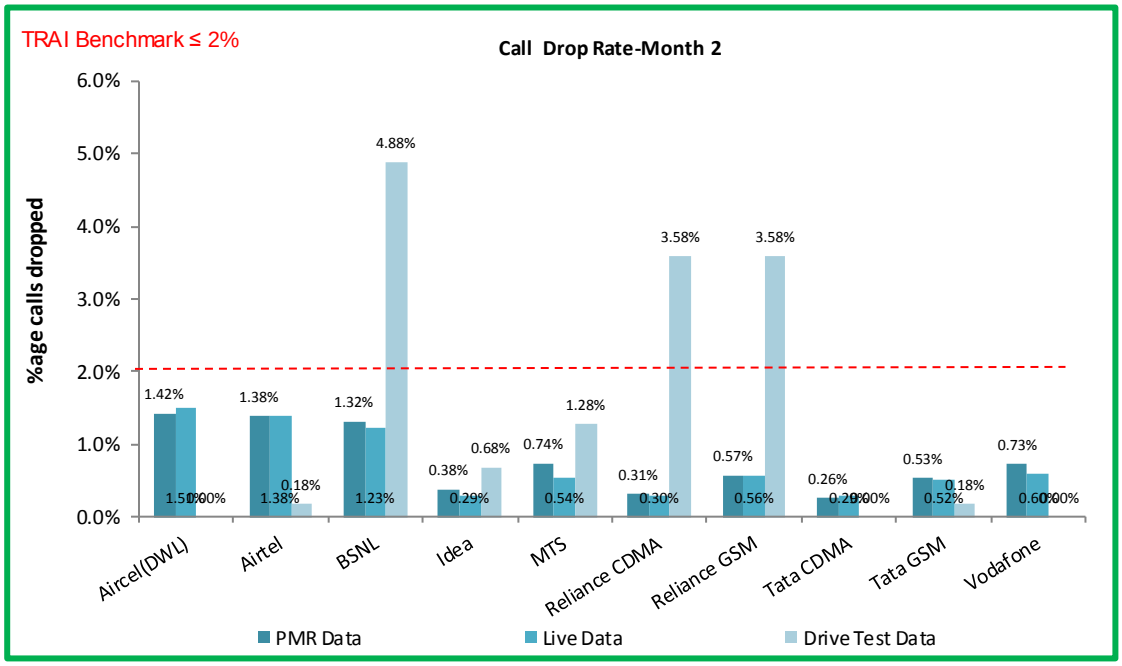
5.5.2.1 KEY FINDINGS – MONTH 1



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

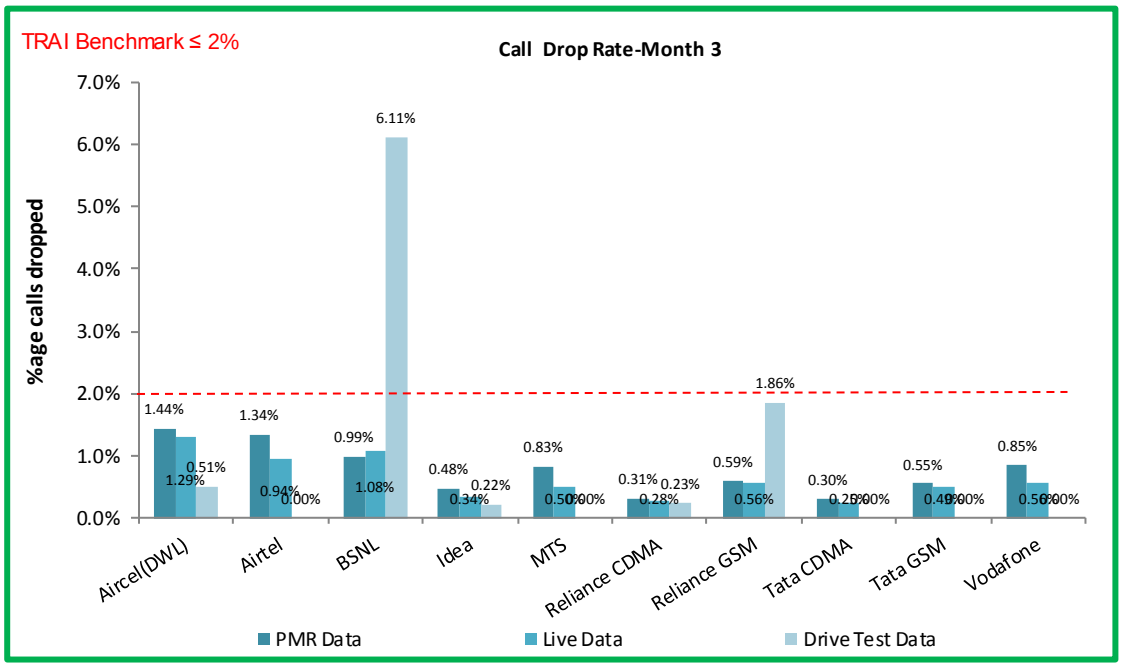
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.5.2.2 KEY FINDINGS – MONTH 2



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

5.5.2.3 KEY FINDINGS – MONTH 3



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

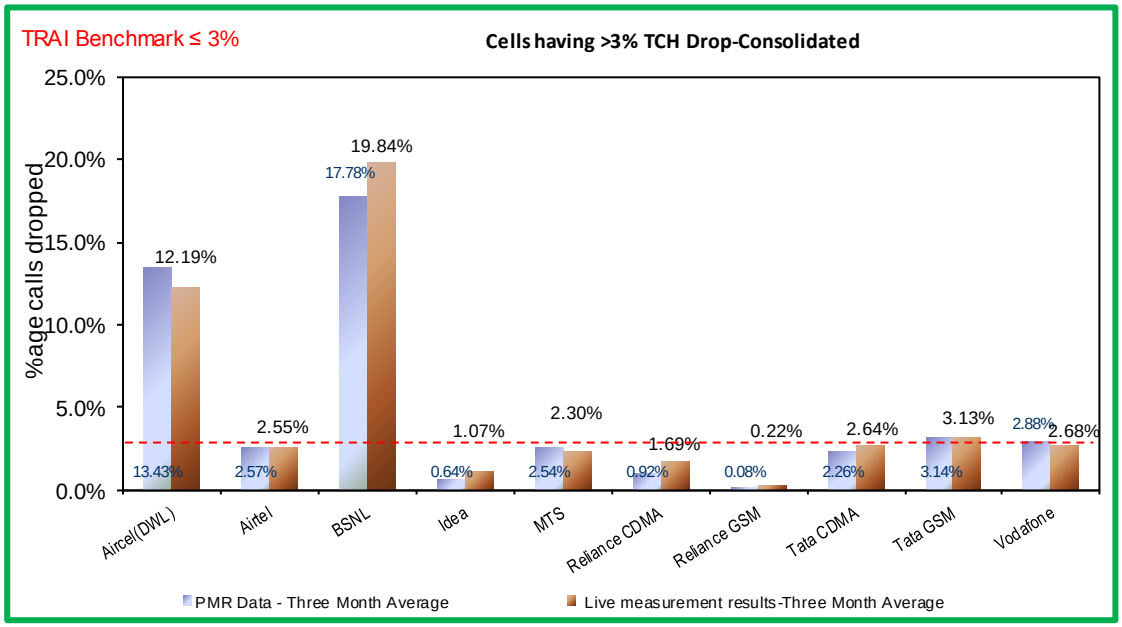
5.6 CELLS HAVING GREATER THAN 3% TCH DROP

5.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.
2. **Computational Methodology: (Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**
3. **TRAI Benchmark –**
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%
4. **Audit Procedure –**
   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

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

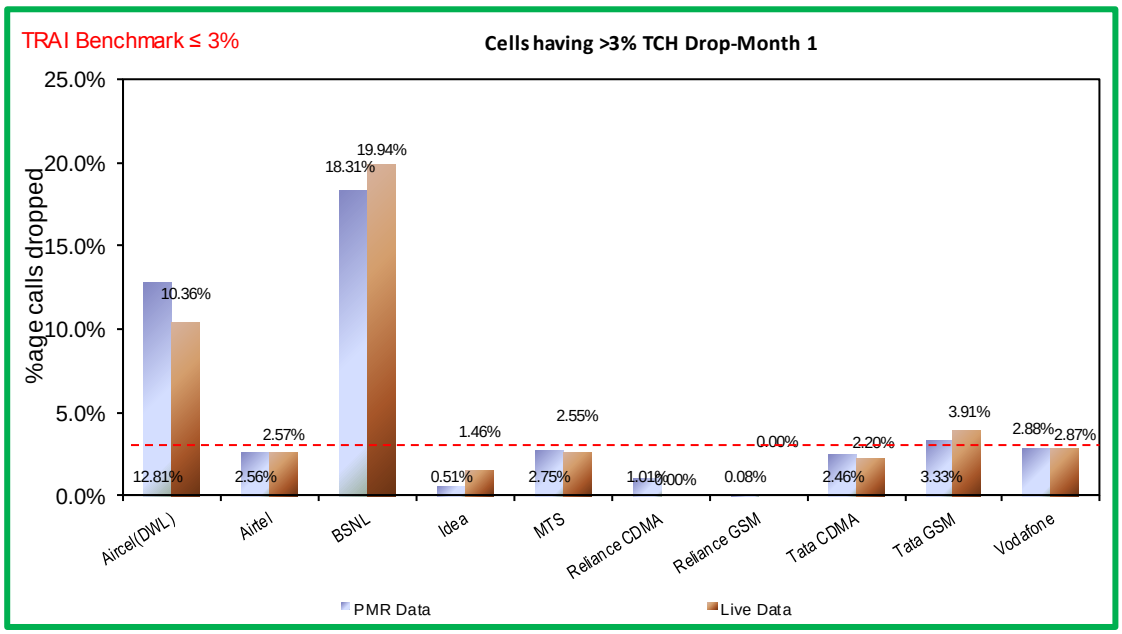
5.6.2 KEY FINDINGS



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

Aircel, BSNL and Tata GSM failed to meet the benchmark for the parameter during audit.

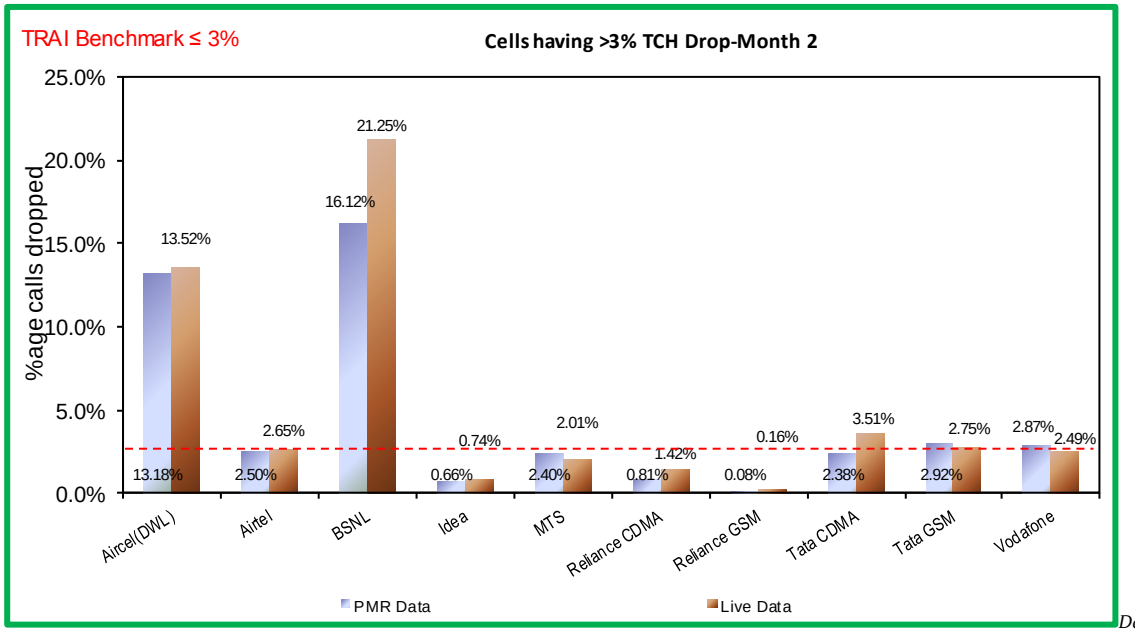
5.6.2.1 KEY FINDINGS – MONTH 1



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

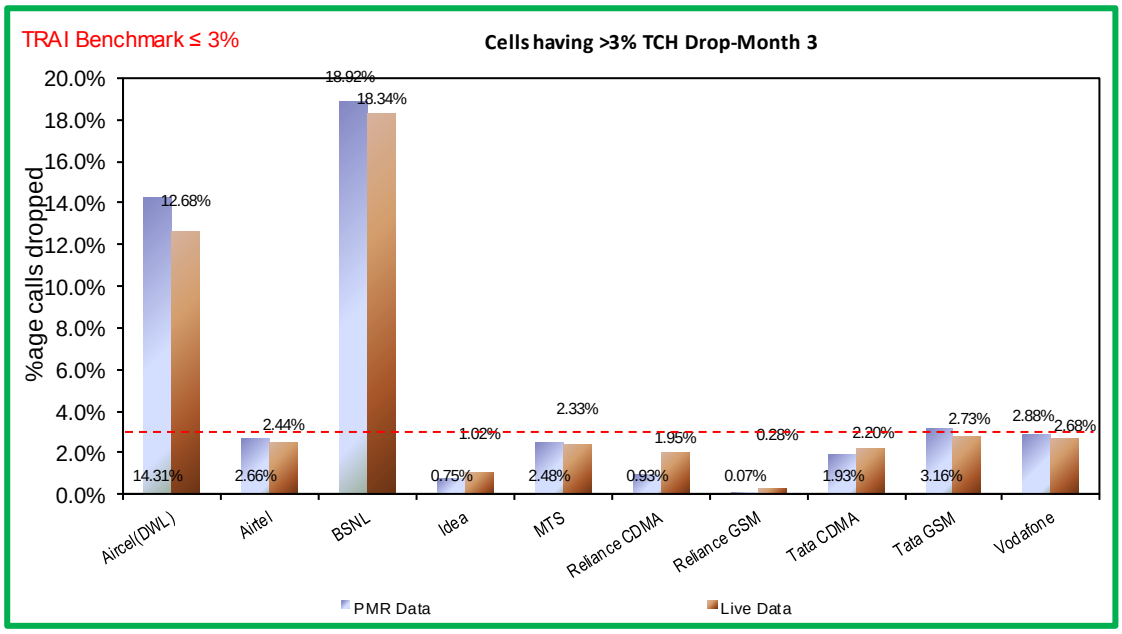
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.6.2.2 KEY FINDINGS – MONTH 2



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

5.6.2.3 KEY FINDINGS – MONTH 3



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

5.7 VOICE QUALITY

5.7.1 PARAMETER DESCRIPTION

1. **Definition:**

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

2. **Computational Methodology:**

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

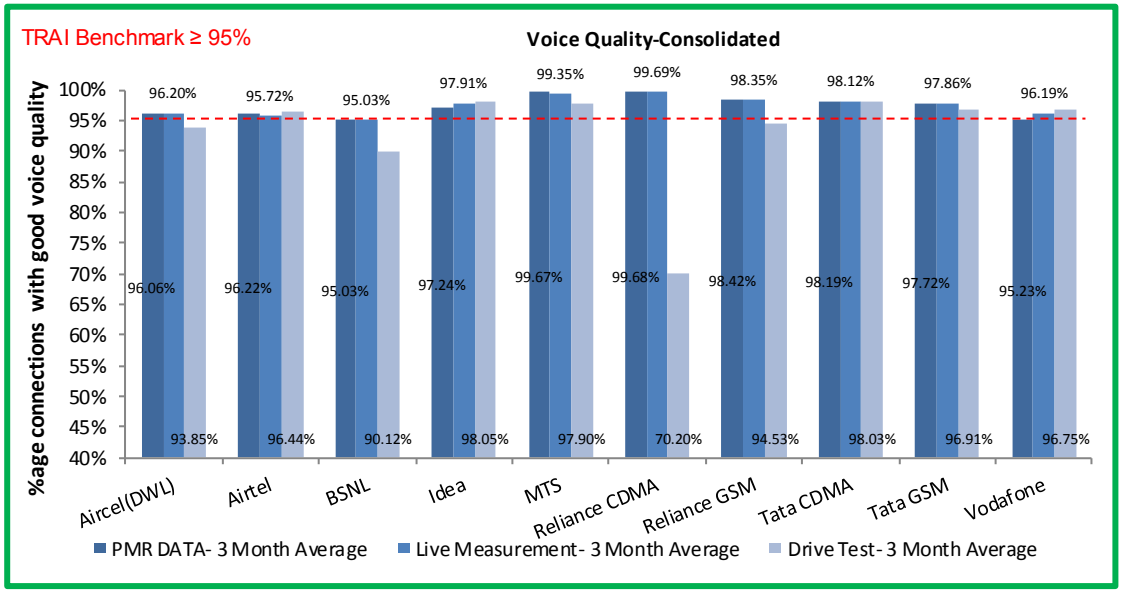
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

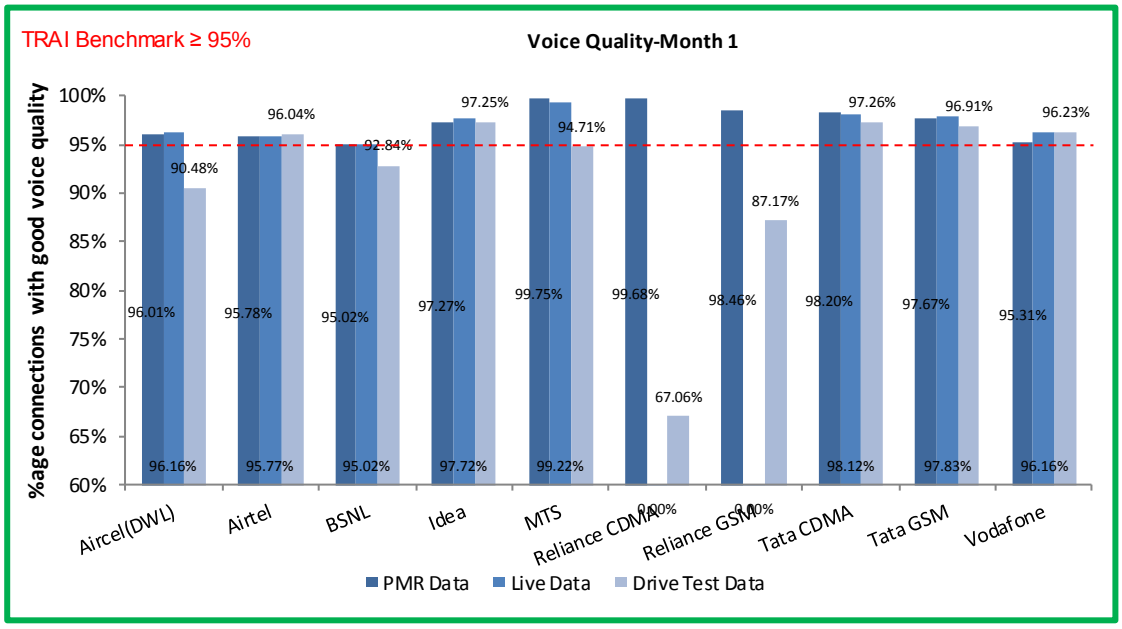
5.7.2 KEY FINDINGS



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

All operators met the benchmark for voice quality during the audit.

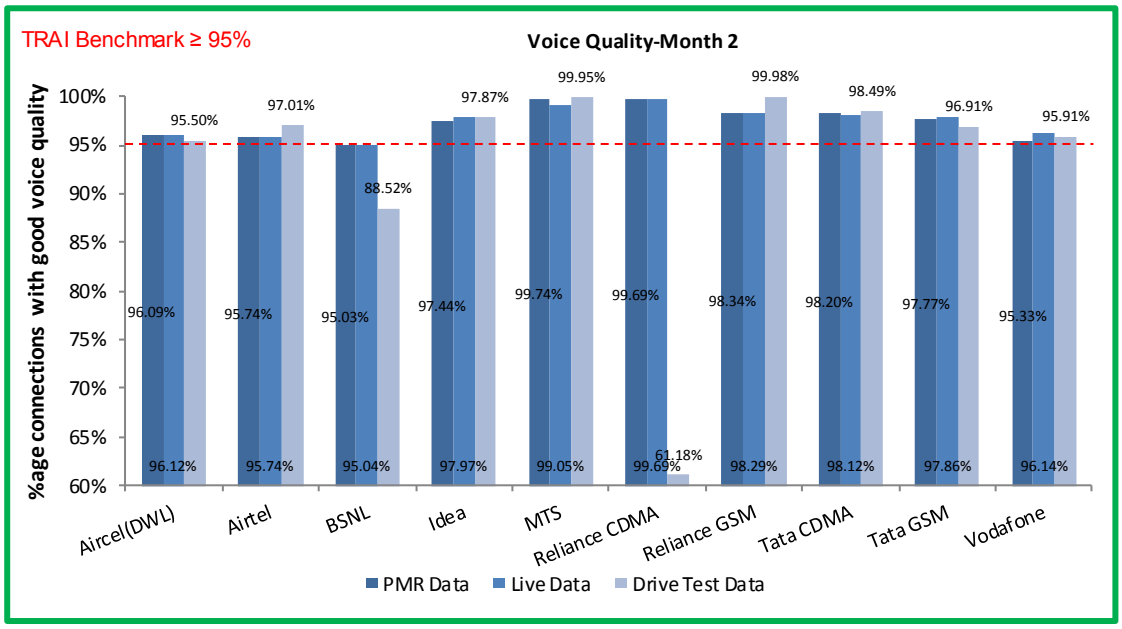
5.7.2.1 KEY FINDINGS – MONTH 1



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

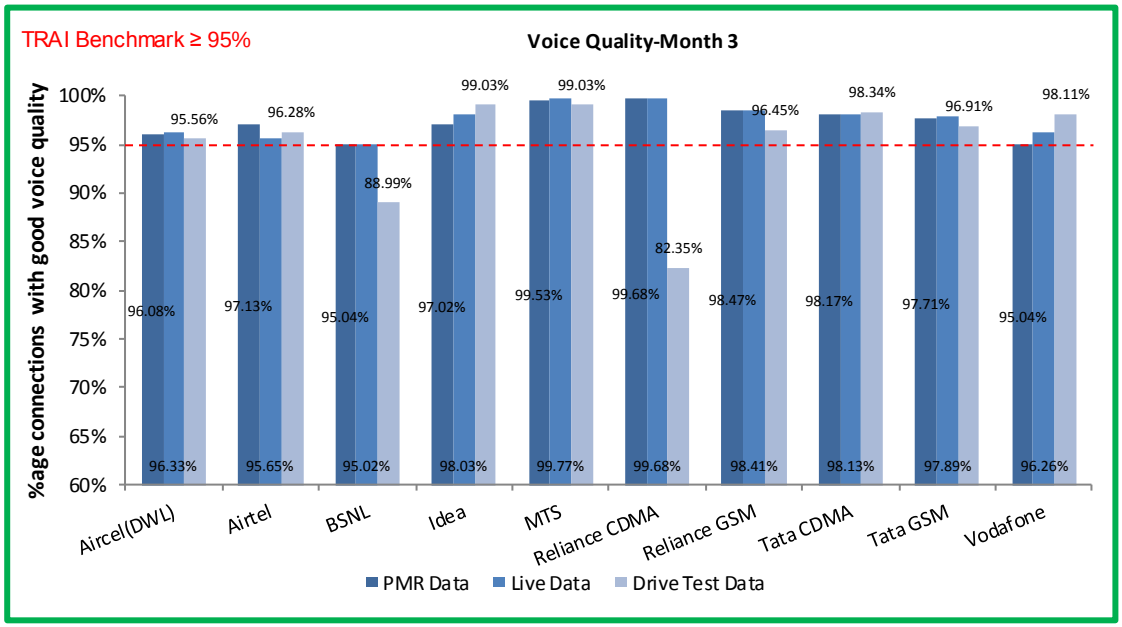
For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.7.2.2 KEY FINDINGS – MONTH 2



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

5.7.2.3 KEY FINDINGS – MONTH 3



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

6 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

6.1 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.

6.1.1 PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th September, 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:

- **Metering and billing credibility (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
- *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

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

- **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

- TRAI Benchmark: <= 0.1%

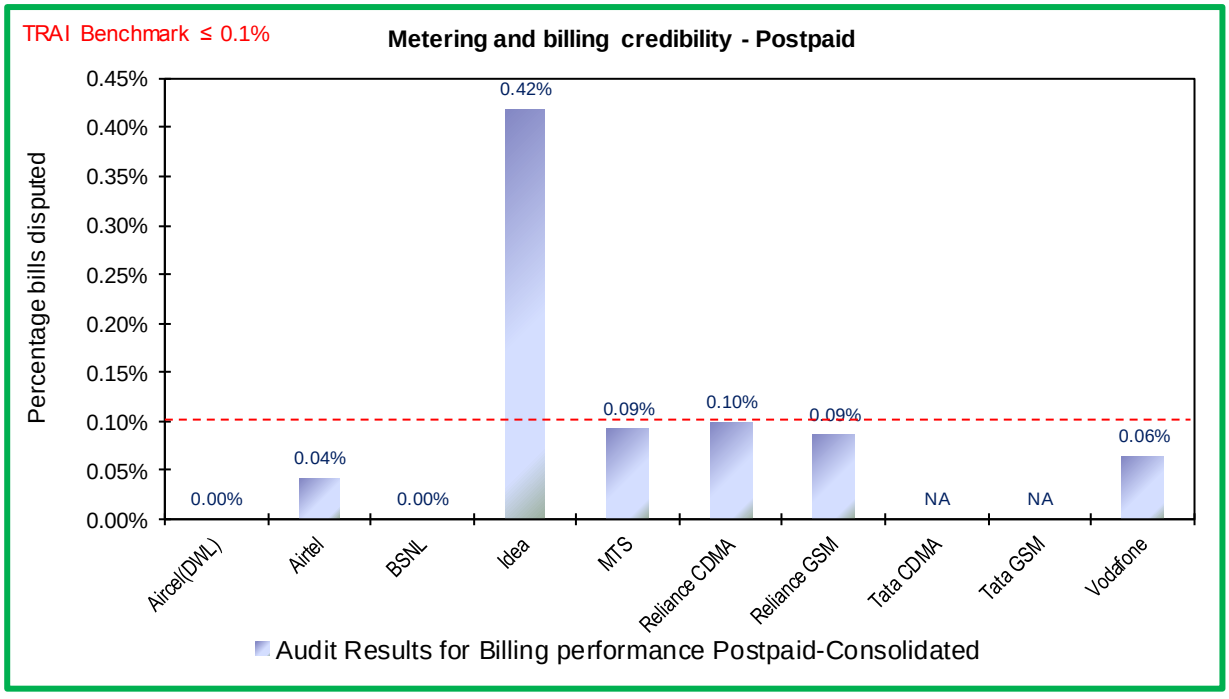
- Audit Procedure:

  - 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.

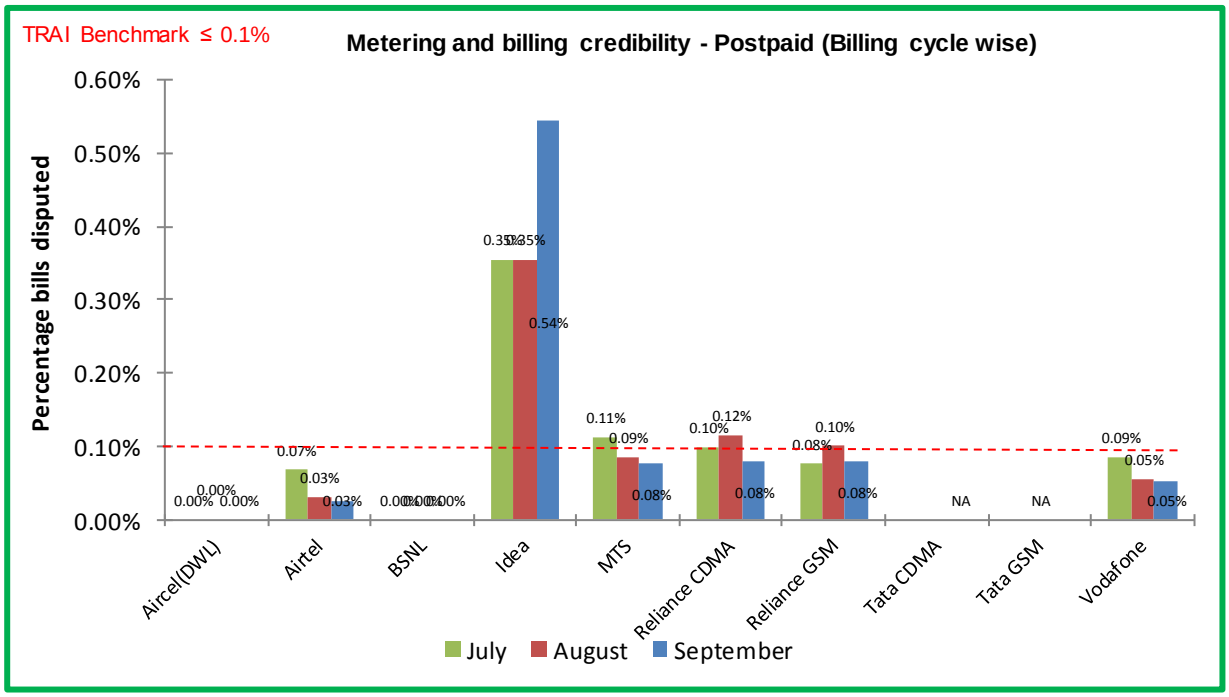
6.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

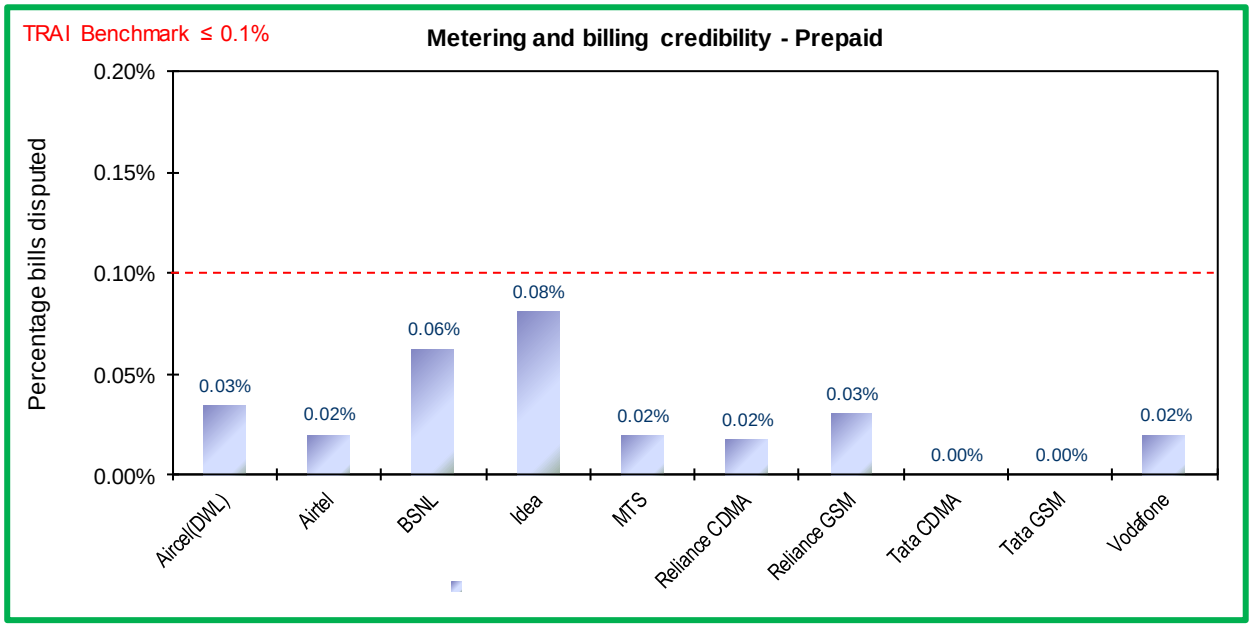
For the postpaid customers, Idea failed to meet the TRAI benchmark.

NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal.



Data Source: Billing Center of the operators

6.1.3 KEY FINDINGS – METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

For the prepaid customers, all operators met the TRAI benchmark.

6.2 RESOLUTION OF BILLING COMPLAINTS

6.2.1 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:

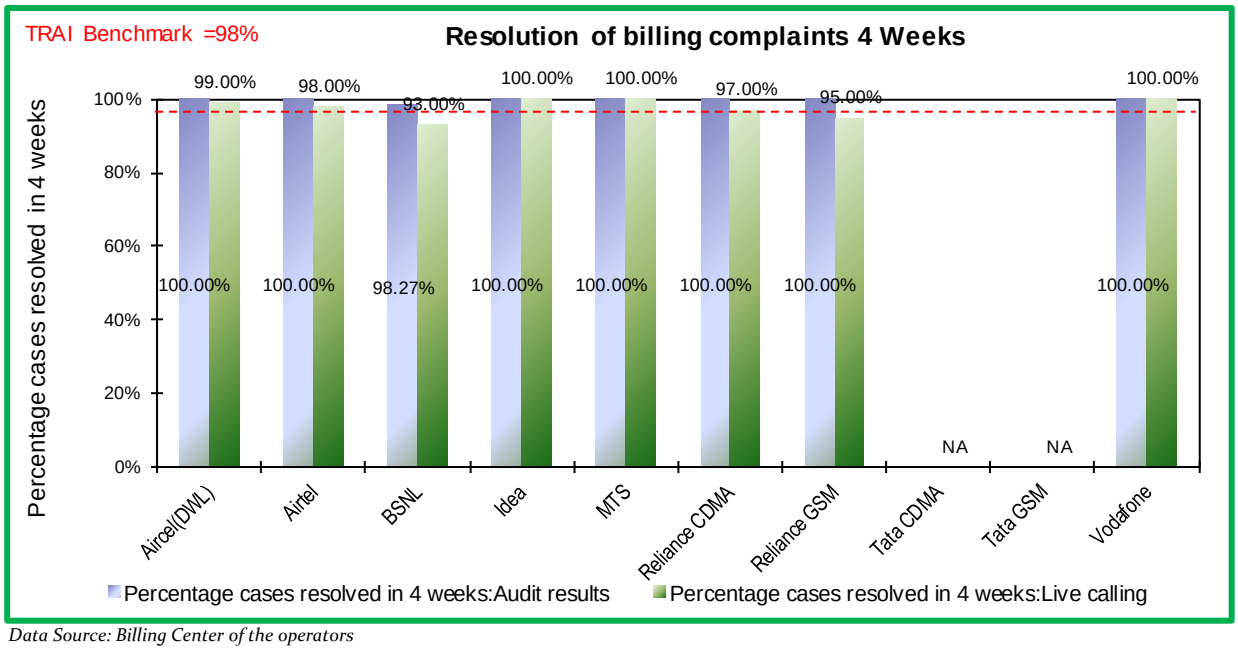
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

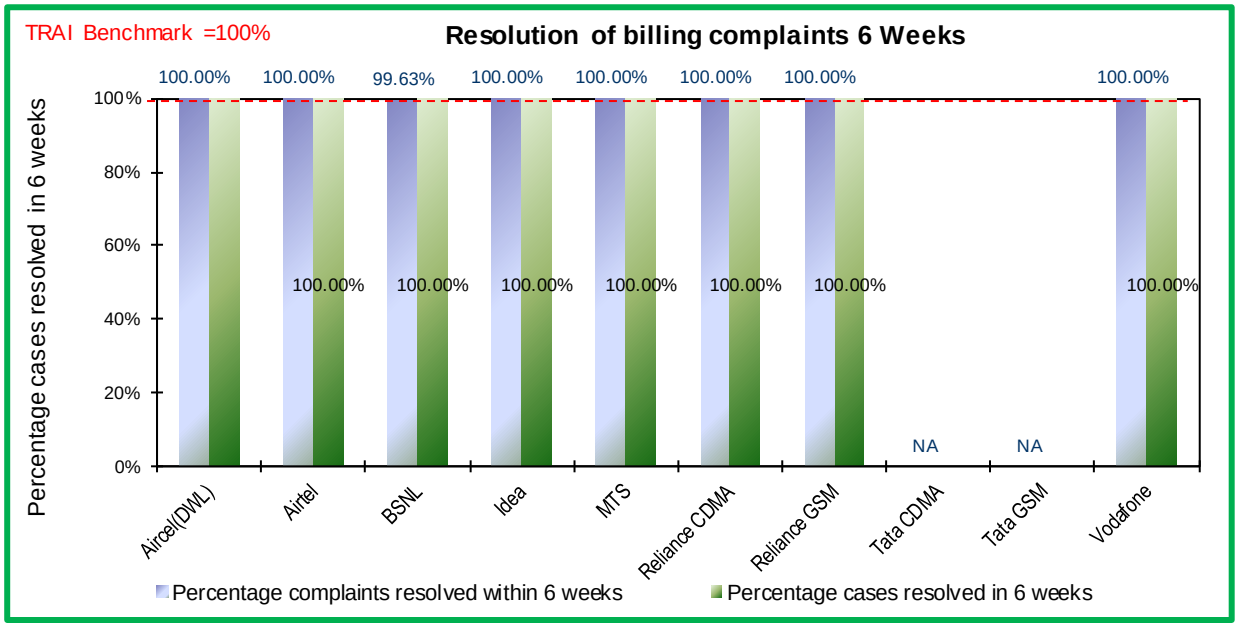
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

6.2.2 KEY FINDINGS 4 WEEKS



Data Source: Billing Center of the operators

6.2.3 KEY FINDINGS 6 WEEKS



Data Source: Billing Center of the operators

NA: Database of complaints to conduct audit was not available for Tata CDMA and Tata GSM due to zero or very low base of complaints for the respective operators.

BSNL failed to meet the benchmark of resolving 100% complaints within 6 weeks.

During live calling, it was observed that BSNL, Reliance GSM and Reliance CDMA remained below the TRAI benchmark for resolving billing complaints within 4 weeks.

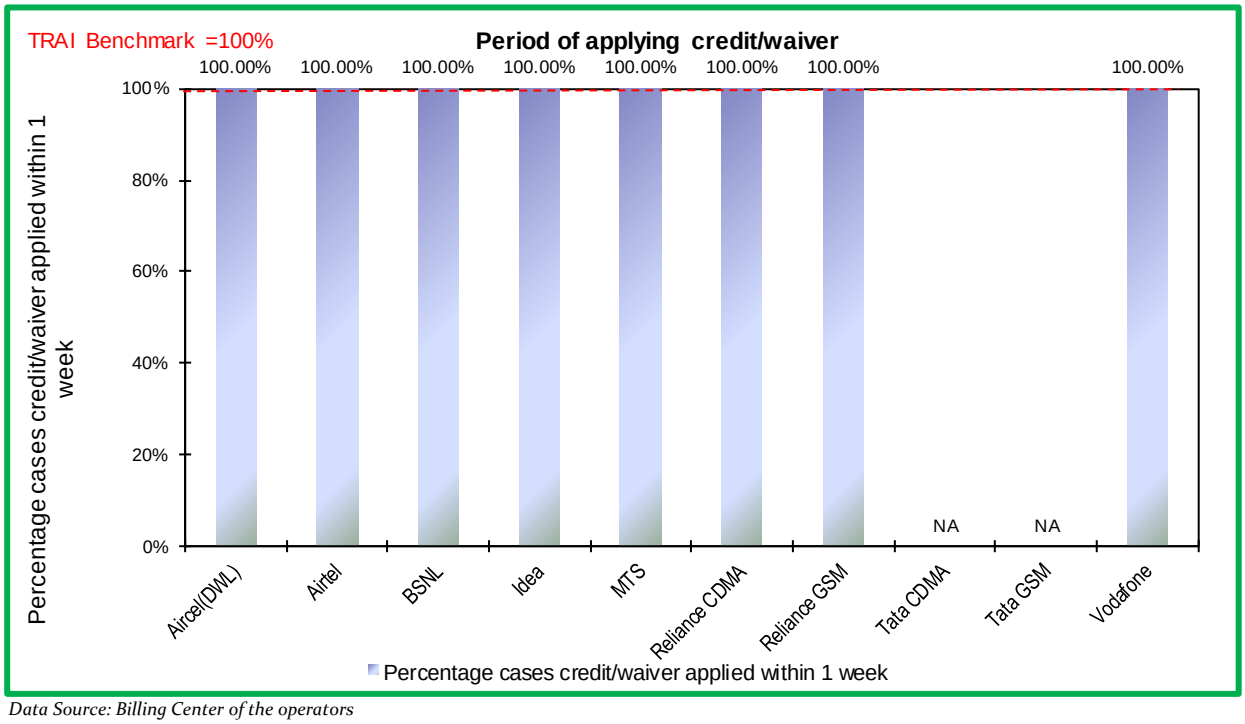
It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. Further details can be found in annexure (section 8.7).

6.3 PERIOD OF APPLYING CREDIT/WAVIER

6.3.1 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

6.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

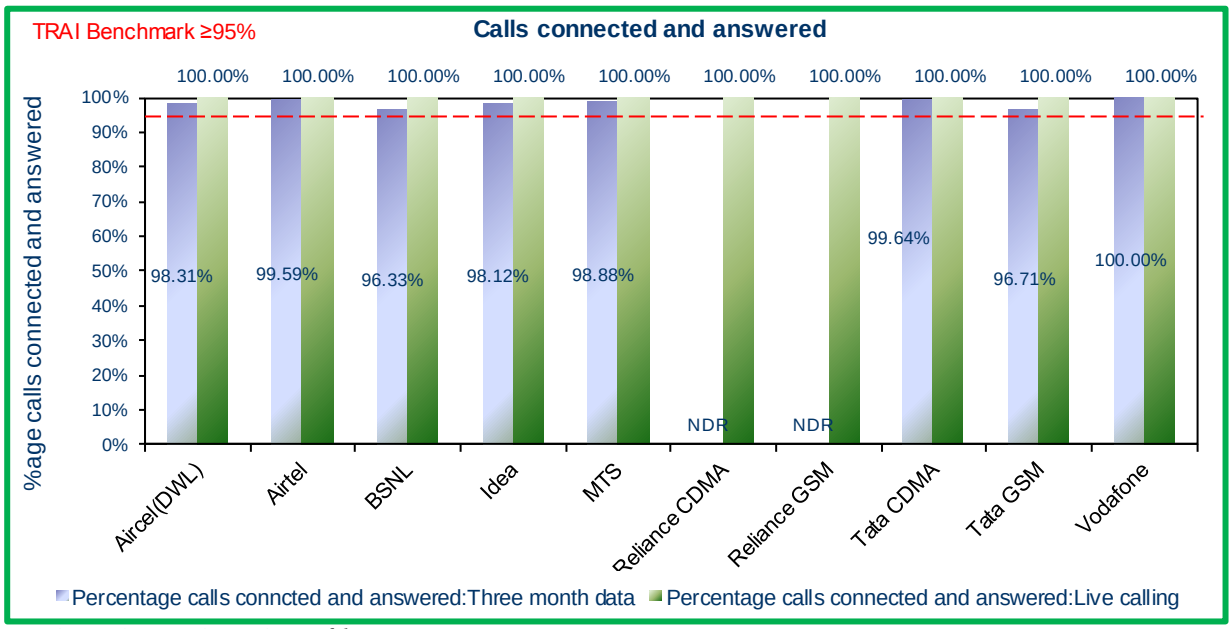
NA: For Tata CDMA and Tata GSM there were no cases where credit waiver was applicable.

6.4 CALL CENTRE PERFORMANCE-IVR

6.4.1 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

6.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the benchmark for calls answered by IVR as per audit data.

NDR: Audit for the parameter was not conducted due to a technical issue in the operator server at the time of audit.

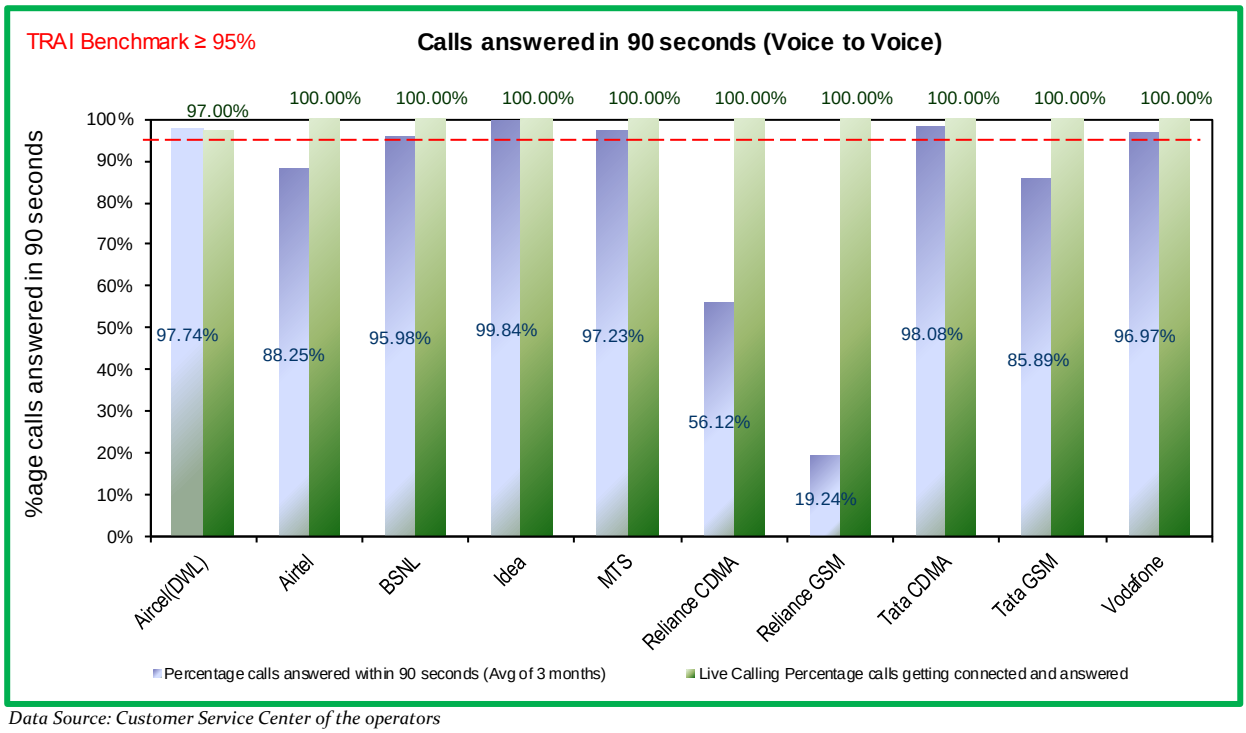
6.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

6.5.1 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

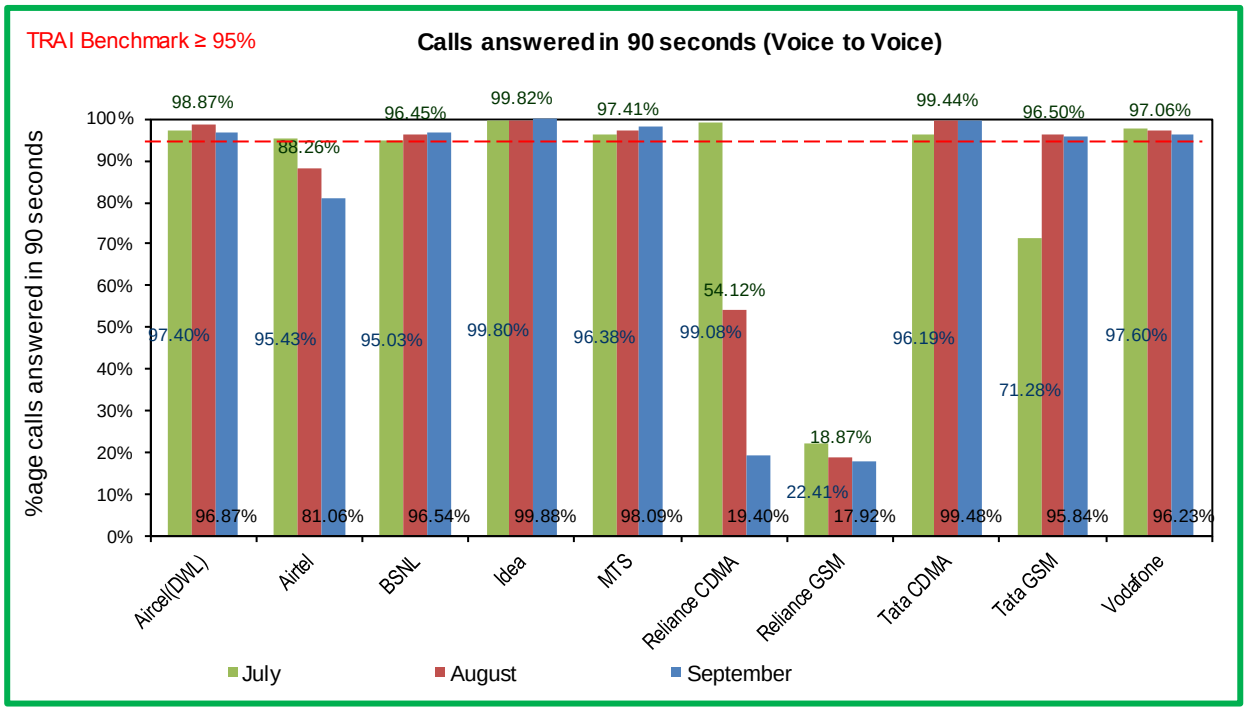
Benchmark: 95% calls to be answered within 90 seconds.

6.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Airtel, Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark of 95% calls (voice to voice) answered within 90 seconds by the call center operators.



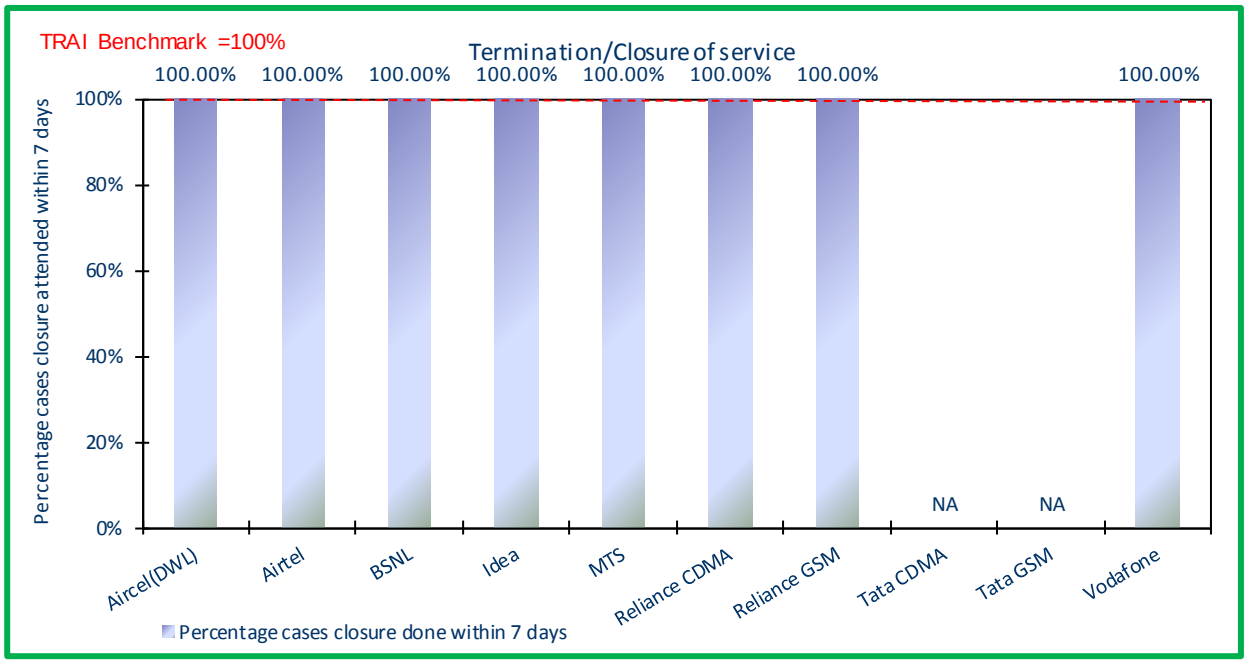
Data Source: Customer Service Center of the operators

6.6 TERMINATION/CLOSURE OF SERVICE

6.6.1 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

6.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the benchmark for the parameter.

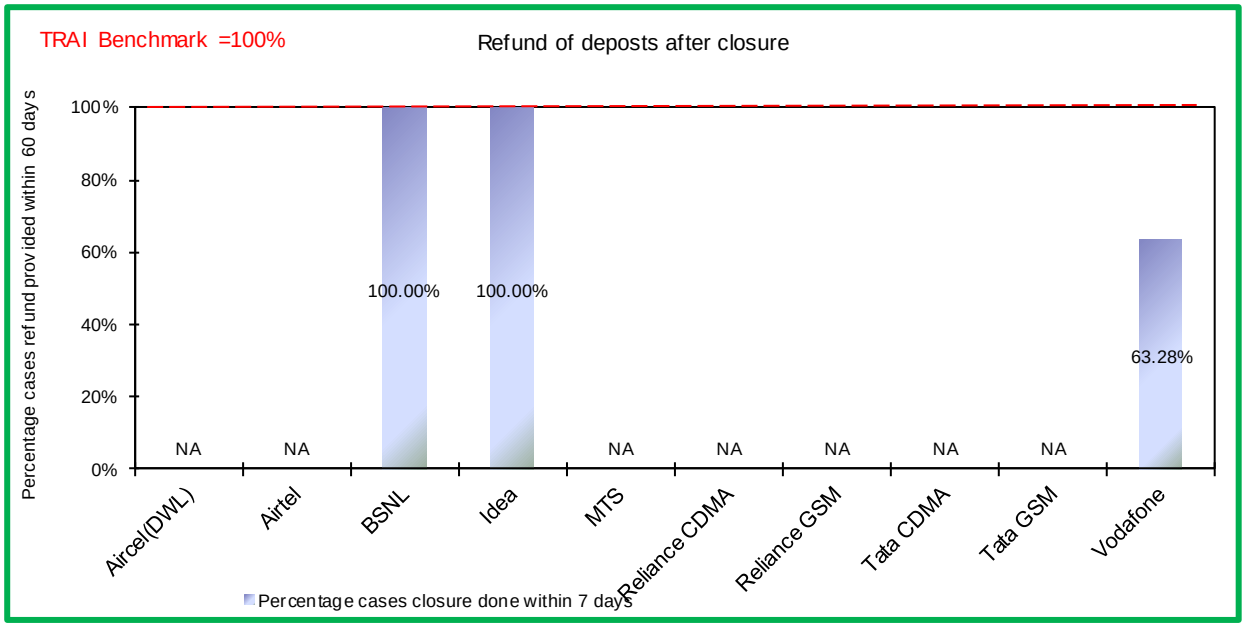
NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal.

6.7 REFUND OF DEPOSITS AFTER CLOSURE

6.7.1 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 relevant quarter

6.7.2 KEY FINDINGS



Data Source: Billing Center of the operators

Vodafone failed to meet the TRAI benchmark for the parameter.

NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal. None of the postpaid subscribers of Aircel, Airtel, MTS, Reliance CDMA and Reliance GSM were eligible for refund.

7 DETAILED FINDINGS - DRIVE TEST DATA

7.1 OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the West Bengal circle. As per the new directive given by TRAI headquarters, drive test for the month of July, August and September 2015 were conducted at a SSA level. Drive test was conducted for three days in each SSA and 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 advisors. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

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

Name of Operator
Aircel(DWL)
Airtel
BSNL
Idea
MTS
Reliance CDMA
Reliance GSM
TATA CDMA
TATA GSM
Vodafone

7.1.1 July – Burdhwan SSA

Month	Name of SSA Covered	Date of Drive Test
July	BURDHWAN	22nd to 24th July 2015

7.1.1.1 Route Details - Burdhwan SSA

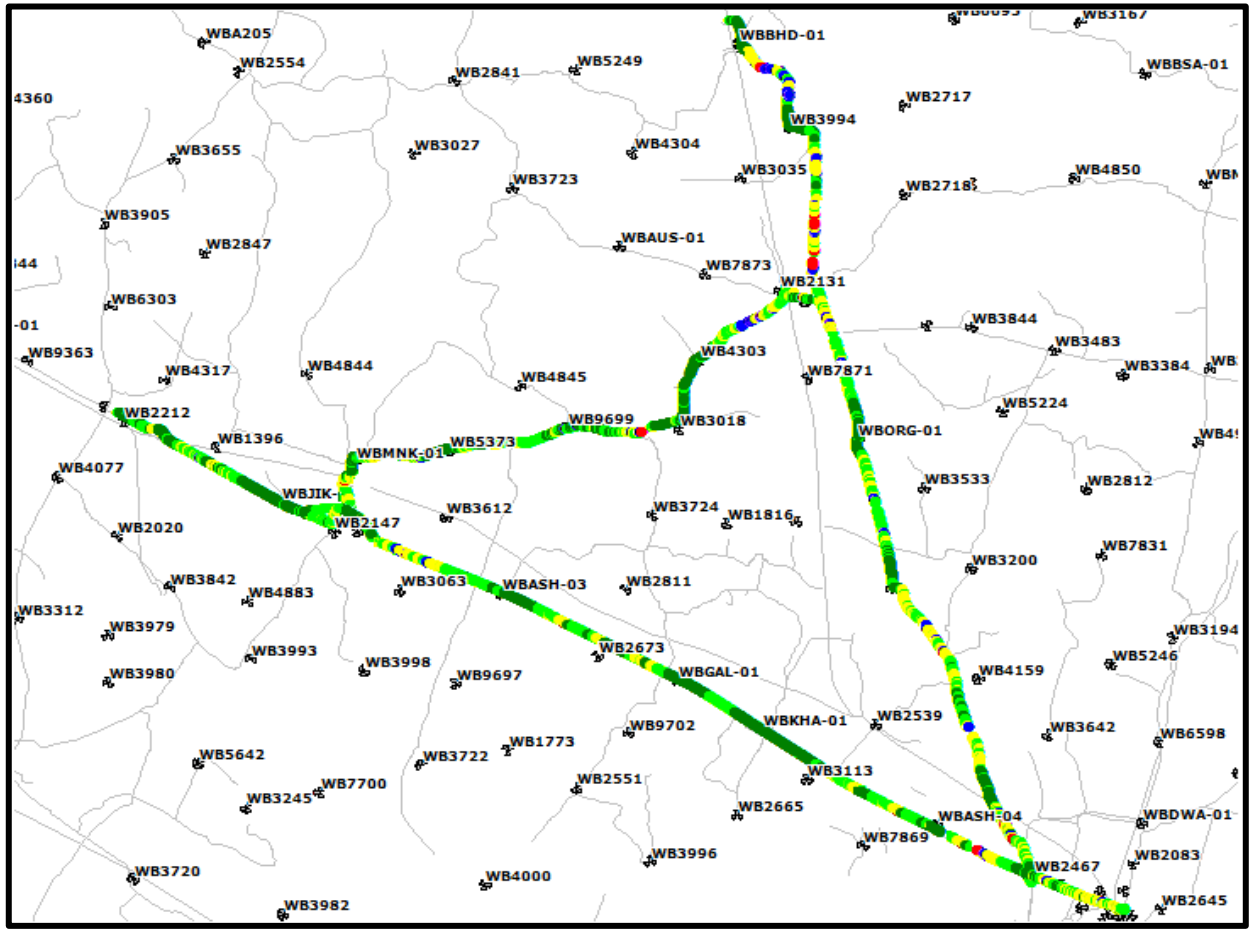
Category	Type of location	West Bengal		
		BURDHWAN		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	NA	NA
	Highways	Burdwan, Panagarh, Mankar, Guskhara, Bhedia	Burdwan, Katwa, Ketugram, Daihat, Maldanga.	Burdwan, Satgachiya, Kalna, Boichi, Memari, Shaktigarh.
	With in the City	NA	NA	NA
Indoor	Shopping complex	Monalisa Hotel - Panagarh.	Nigon Hotel	Hotel Priyodarshini. - Kalna
	Office complex	Guskhara Police Chowki.	Bhatar Police Station	Bulbulitala Police Station.

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

7.1.1.2 Kilometers Travelled- Burdhwan SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Burdwan	130	128	110	368

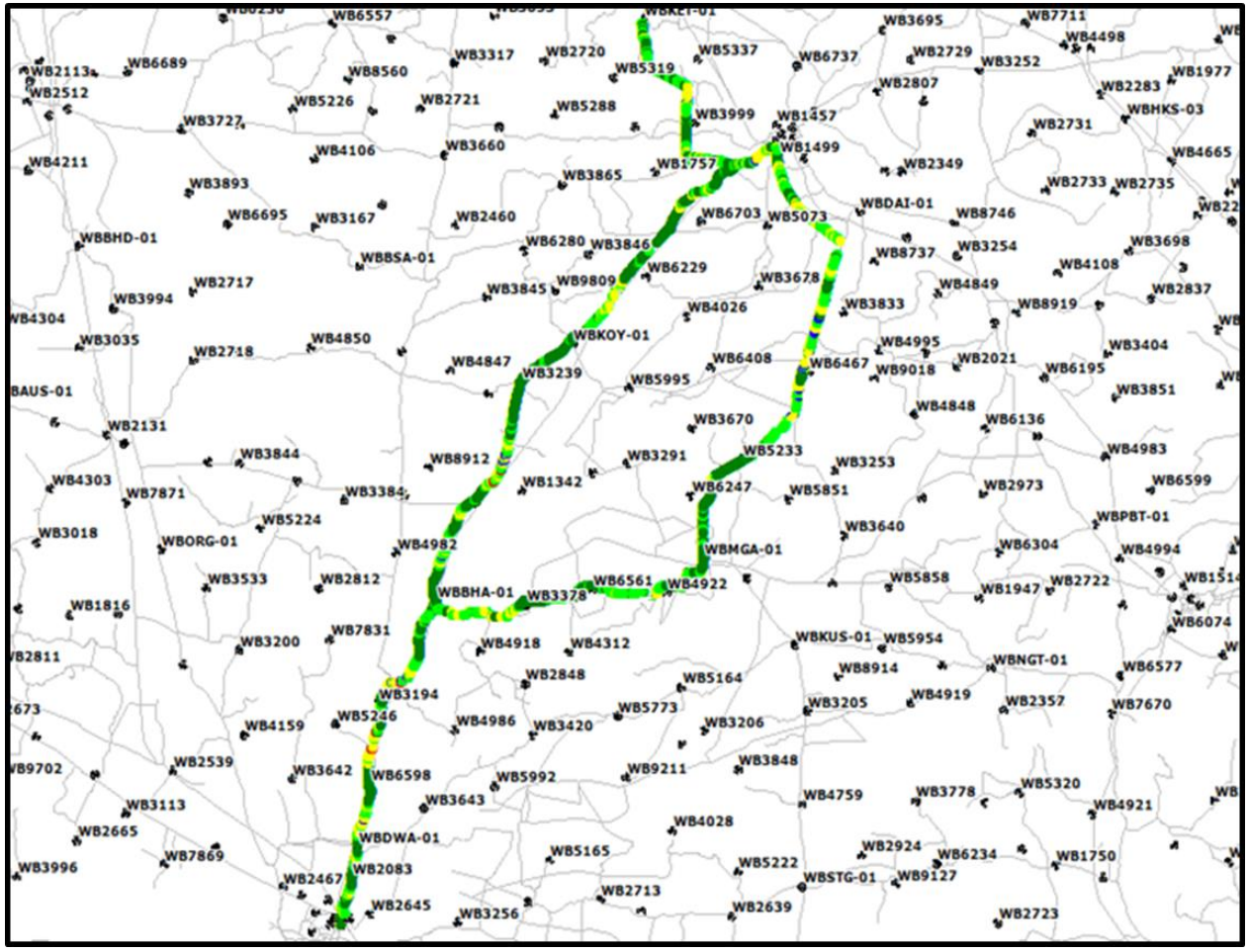
7.1.1.3 Route Map - Burdhwan Day 1



ROUTE COVERED- DAY 1

1. BURDHWAN
2. PANAGARH
3. MANKAR
4. GUSKARA
5. BHEDIA

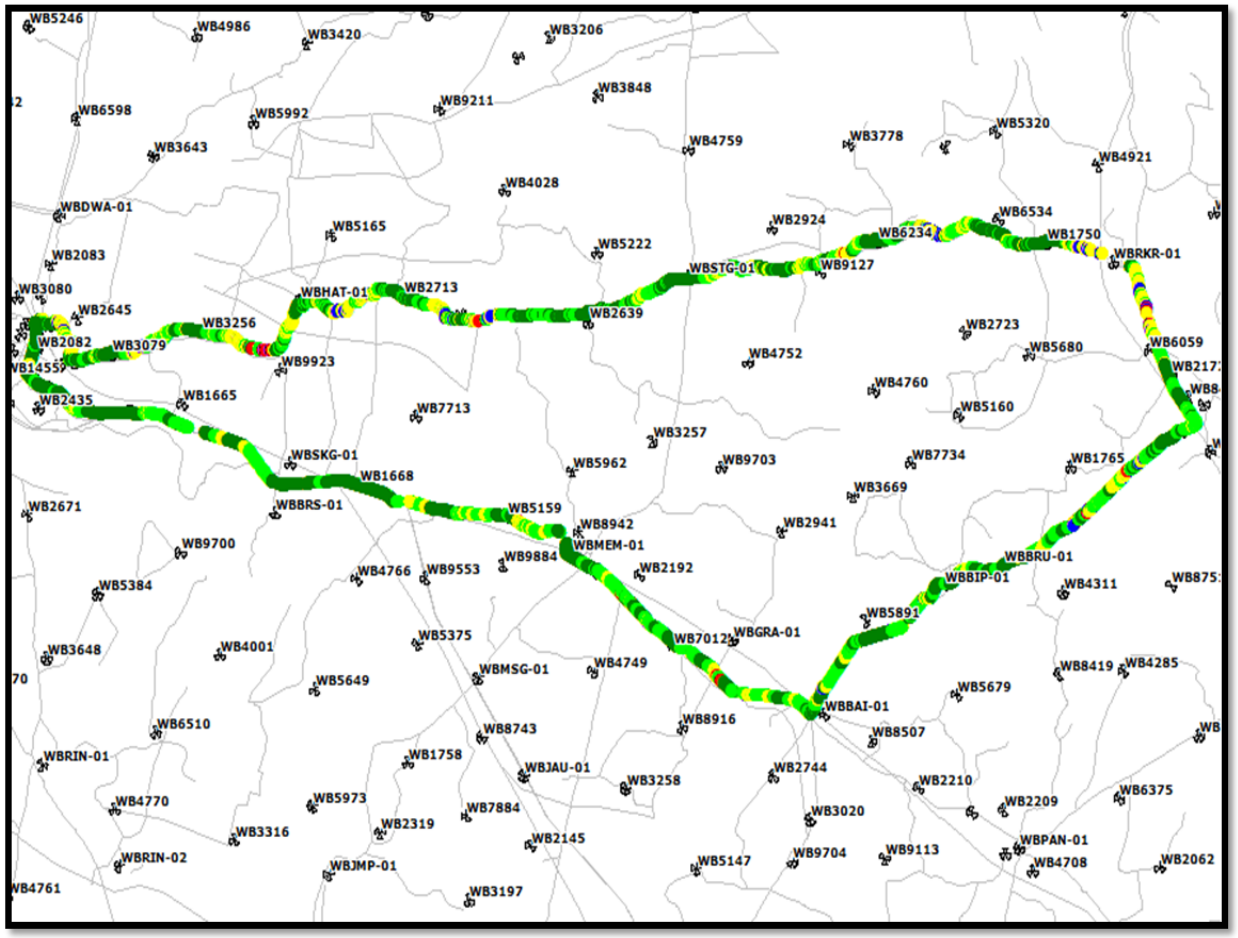
7.1.1.4 Route Map - Burdhwan Day 2



ROUTE COVERED DAY-2

1. BURDWAN,
2. KATWA,
3. KETUGRAM,
4. DAIHAT,
5. MALDANGA

7.1.1.5 Route Map - Burdhwan Day 3



ROUTE COVERED DAY-3

1. BURDWAN,
2. SATGACHIYA,
3. KALNA,
4. BOICHI,
5. MEMARI,
6. SHAKTIGARH

7.1.1.6 Drive Test Results - Burdhwan SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		20.47%	39.28%	94.01%	83.74%	11.83%	31.58%	100.00%	82.25%	51.04%	71.51%	22.31%	41.51%	32.00%	22.11%	64.82%	52.85%	28.33%	44.78%	89.47%	88.34%
0 to -85 dBm		69.09%	83.27%	99.54%	97.42%	52.98%	65.68%	100.00%	98.17%	96.86%	94.38%	70.66%	72.06%	68.09%	56.08%	97.18%	84.03%	87.95%	87.04%	99.89%	96.22%
0 to -95 dBm		85.36%	97.83%	99.93%	99.52%	91.26%	92.35%	100.00%	99.95%	100.00%	99.99%	99.99%	94.43%	90.77%	84.21%	99.88%	98.07%	98.96%	99.19%	100.00%	99.50%
Voice quality	≥ 95%	89.03%	90.36%	98.17%	95.41%	96.17%	91.83%	99.42%	97.15%	94.74%	94.82%	62.68%	71.44%	84.94%	89.39%	98.13%	97.03%	99.55%	96.77%	99.48%	95.56%
CSSR	≥ 95%	97.30%	95.73%	100.00%	99.67%	97.51%	96.43%	100.00%	100.00%	100.00%	98.10%	99.00%	99.00%	95.13%	95.12%	100.00%	99.42%	100.00%	98.87%	100.00%	100.00%
%age Blocked calls		2.70%	4.27%	0.00%	0.00%	2.49%	3.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.84%	0.00%	0.00%
Call drop rate	≤ 2%	0.64%	1.22%	0.00%	0.00%	1.36%	3.72%	0.00%	0.19%	0.00%	0.00%	4.65%	4.52%	3.69%	3.50%	0.00%	0.59%	0.00%	0.25%	0.00%	0.00%
Hands off success rate		100.00%	97.14%	100.00%	99.36%	100.00%	100.00%	100.00%	99.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	97.92%	100.00%	100.00%	100.00%	100.00%	99.85%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

Reliance CDMA and GSM failed to meet the benchmark for call drop rate in indoor as well as in outdoor locations. BSNL did not meet the benchmark in outdoor locations.

7.1.2 August – Cooch Behar SSA

Month	Name of SSA Covered	Date of Drive Test
August	COOCH BEHAR	26-08-2015 TO 28-08-2015

7.1.2.1 Route Details – Cooch Behar SSA

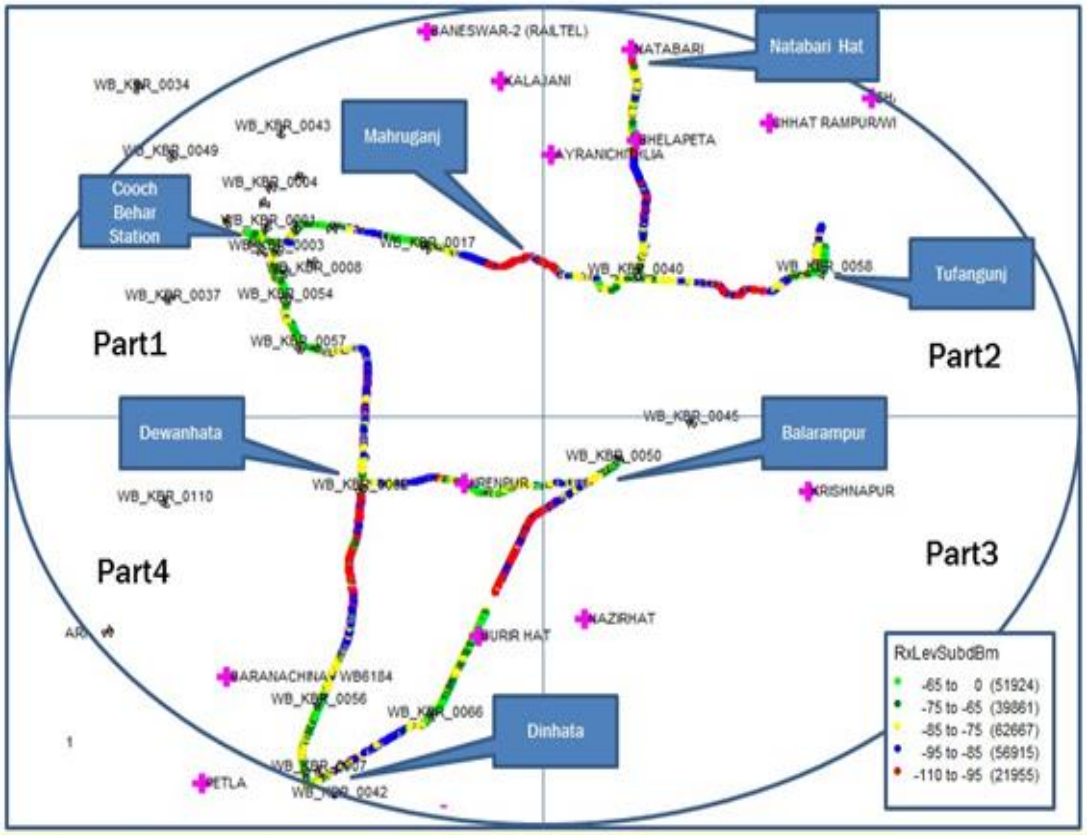
Category	Type of location	WEST BENGAL COOCH BEHAR		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Coochbihar, Chilakhana, Tufanganj, Natabari, Bwanhat, Balarampur, Dinhata	Coochbihar, Ghogsadanga, Fulbari, Mathabhanga, Sitalkuchi, Sitai, Nisiganj, Coochbihar.	Coochbihar, Dodearhut, Baneswar, Alipurduar Junction, Alipurduar
	Highways			
	With in the City			
Indoor	Shopping complex	Yubaraj Hotel	Mitali Hotel	Vodafone Store
	Office complex	Coochbihar Register Office	Mathabhanga Bdo Office	Alipurduar Municipality Office

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

7.1.2.2 Kilometers Travelled– Cooch Behar SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Cooch Behar	142	138	125	405

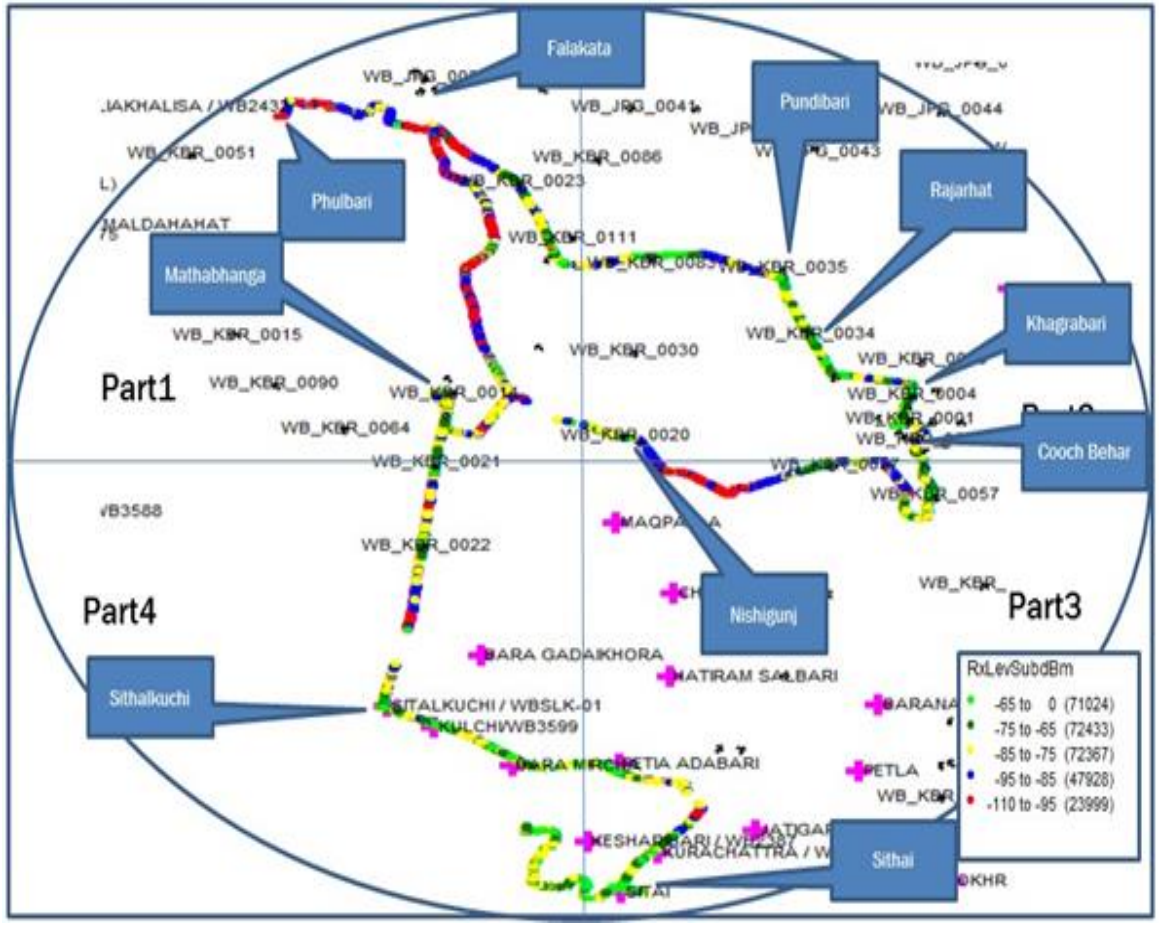
7.1.2.3 Route Map Cooch Behar Day 1



ROUTE COVERED DAY-1

1. COOCH BEHAR STATION
2. MAHRUGANJ
3. TUFANGUNJ
4. NATABARI HAT
5. DINHATA
6. DEWANHAT
7. BALARAMPUR

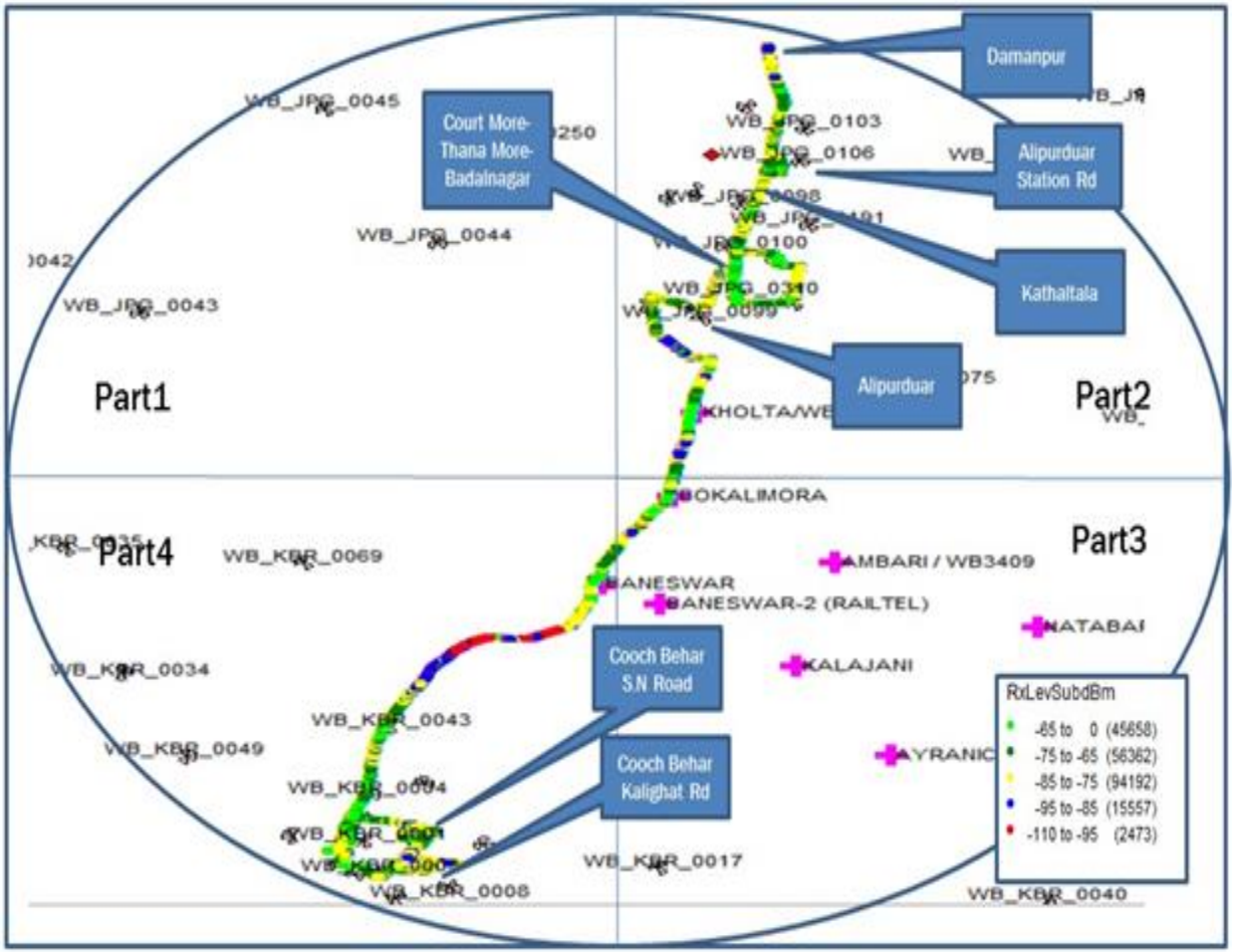
7.1.2.4 Route Map Cooch Behar Day 2



ROUTE COVERED DAY-2

1. COOCH BEHAR STATION
2. KHAGRABARI
3. RAJARAHAT
4. FALAKATA
5. PUNDIBARI
6. PHULBARI
7. MATHABHANGA
8. SITHAI
9. SITHALKUCHI
10. NISHIGUNJ

7.1.2.5 Route Map Cooch Behar Day 3



ROUTE COVERED DAY-3

1. COOCH BEHAR STATION
2. KALIGHAT ROAD
3. S.N. ROAD
4. ALIPURDUAR
5. ALIPURDUAR STATION ROAD
6. ALIPURDUAR COURT MORE
7. THANA MORE
8. BADALNAGAR
9. KATHALTALLA
10. DAMANPUR

7.1.2.6 Drive Test Results – Cooch Behar SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		68.17%	42.67%	96.80%	81.93%	56.31%	49.80%	65.27%	45.57%	1.05%	31.17%	74.43%	30.29%	79.63%	58.94%	22.49%	72.08%	46.72%	56.27%	99.99%	83.46%
0 to -85 dBm		95.94%	81.04%	99.93%	96.57%	91.12%	80.96%	93.91%	77.54%	54.76%	56.10%	99.77%	45.17%	89.58%	81.71%	46.62%	93.99%	89.19%	89.13%	100.00%	97.04%
0 to -95 dBm		99.95%	95.78%	66.70%	99.67%	99.18%	95.45%	99.13%	93.63%	81.19%	78.19%	100.00%	62.92%	98.07%	95.15.%	99.99%	99.72%	99.76%	99.18%	100.00%	99.95%
Voice quality	≥ 95%	96.20%	95.22%	98.88%	96.27%	94.36%	86.38%	99.51%	96.74%	99.27%	93.88%	62.68%	61.68%	95.81%	97.68%	99.74%	97.71%	99.19%	96.08%	98.58%	95.37%
CSSR	≥ 95%	100.00%	97.69%	100.00%	100.00%	90.38%	92.56%	100.00%	98.57%	100.00%	83.58%	89.05%	88.05%	97.02%	95.81%	89.35%	100.00%	100.00%	99.19%	100.00%	100.00%
%age Blocked calls		0.00%	1.75%	0.00%	0.00%	9.62%	9.33%	0.00%	1.43%	0.00%	17.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.81%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.19%	5.91%	3.23%	0.00%	0.76%	0.00%	1.41%	9.26%	9.10%	3.66%	3.49%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%
Hands off success rate		100.00%	97.31%	100.00%	99.80%	100.00%	100.00%	100.00%	99.23%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.74%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

BSNL and Reliance CDMA failed to meet the benchmark for CSSR in indoor as well as outdoor locations. MTS did not meet the benchmark in outdoor locations while Tata CDMA failed to meet the benchmark in indoor locations.

Call Drop Rate

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

7.1.3 September – Darjeeling SSA

Month	Name of SSA Covered	Date of Drive Test
September	DARJEELING	21st to 23rd Sep' 2015

7.1.3.1 Route Details – Darjeeling SSA

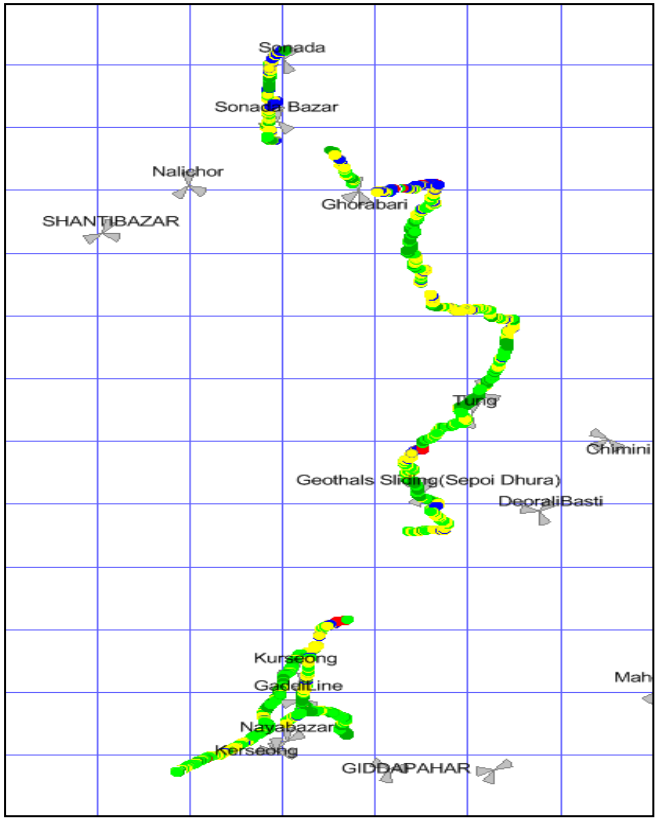
Category	Type of location	West Bengal		
		DARJEELING		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	NA	NA
	Highways	Kurseong Taxi Stand – Hill Cart Rd. – Sounerni – Kurseong Rly Stn. – Kurseong Court – Castle Ton Tea Garden – Pankhabari Rd. – Hill Cart Rd – Ambotia Tea Garden – Tourist Lodge – Sonada Rd. – Sonada.	Darjeeling Lalkuthi – Kakhjora – Darjeeling Rly Stn. – Mahakal Mandir – Darjeeling Big Bazar – Loreto School – Hill Cart Rd. – Happy Valley Tea Estate – Saipatri – Darjeeling District Jail – Hotel Anand Palace – Darjeeling Telephone Exchange – Darjeeling P.S. – SBI – Darjeeling P.O.	Kalimpong Taxi Stand – Dr. Graham's School – SBI ATM – Chalisay Gaon – St. Augustine School – St. Teresa Catholic Church – St. Joseph's Convent – Kalimpong Hospital – Hotel Silver Oak – Delo – Pranami Balika Vidyalaya – Rishi Road – Kalimpong Exchange
	With in the City	NA	NA	NA
Indoor	Shopping complex	Kurseong Fancy Market.	Darjeeling Big Bazar.	Chang's Plaza.
	Office complex	Castleton Tea Garden Office.	Darjeeling Television Tower Office.	Kalimpong Army Base Office.

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

7.1.3.2 Kilometers Travelled– Darjeeling SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Darjeeling	85	70	90	245

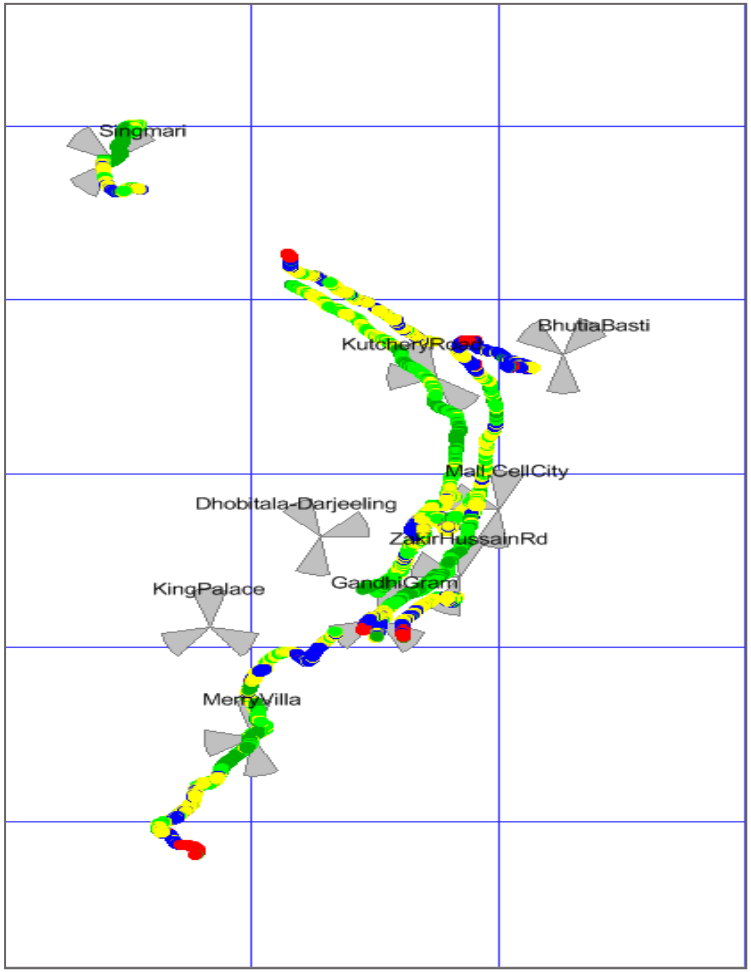
7.1.3.3 Route Map Darjeeling Day 1



Route Covered - Day 1

Kurseong Taxi Stand – Hill Cart Rd. – Sounerni – Kurseong Rly Stn. – Kurseong Court – Castle Ton Tea Garden – Pankhabari Rd. – Hill Cart Rd – Ambotia Tea Garden – Tourist Lodge – Sonada Rd. - Sonada.

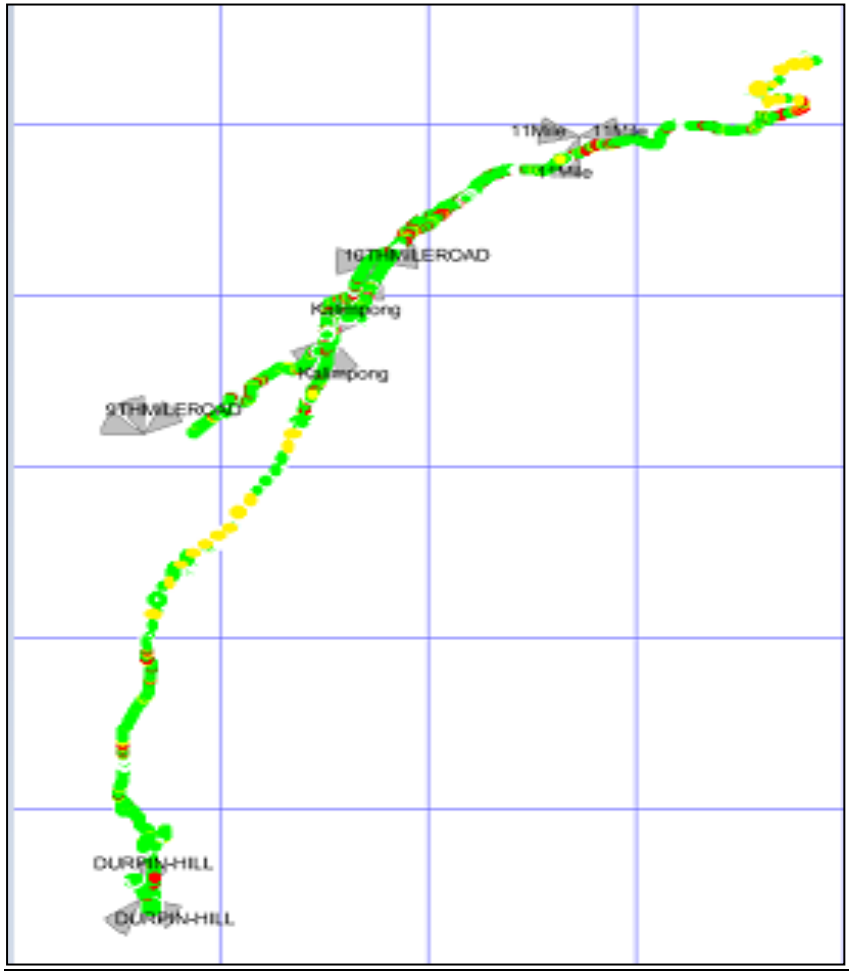
7.1.3.4 Route Map Darjeeling Day 2



Route Covered - Day 2

Darjeeling Lalkuthi – Kakhjora – Darjeeling Rly Stn. – Mahakal Mandir – Darjeeling Big Bazar – Loreto School – Hill Cart Rd. – Happy Valley Tea Estate – Saipatri – Darjeeling District Jail – Hotel Anand Palace – Darjeeling Telephone Exchange – Darjeeling P.S. – SBI – Darjeeling P.O.

7.1.3.5 Route Map Darjeeling Day 3



Route Covered- Day 3

Kalimpong Taxi Stand – Dr. Graham's School – SBI ATM – Chalisay Gaon – St. Augustine School – St. Teresa Catholic Church – St. Joseph's Convent – Kalimpong Hospital – Hotel Silver Oak – Delo – Pranami Balika Vidyalaya – Rishi Road – Kalimpong Exchange.

7.1.3.6 Drive Test Results – Darjeeling SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		77.88%	66.47%	99.37%	85.41%	31.27%	13.01%	67.48%	59.06%	51.84%	57.02%	28.22%	28.07%	69.36%	65.73%	69.98%	81.35%	66.62%	53.40%	98.27%	92.08%
0 to -85 dBm		98.26%	94.25%	99.92%	99.21%	79.01%	56.60%	86.95%	88.90%	98.53%	93.47%	56.65%	64.90%	92.63%	88.60%	98.53%	95.45%	94.16%	91.66%	99.99%	99.54%
0 to -95 dBm		99.93%	99.39%	100.00%	99.94%	82.78%	91.91%	99.29%	97.91%	100.00%	99.22%	99.78%	96.36%	99.65%	98.39%	100.00%	99.96%	99.36%	99.35%	100.00%	100.00%
Voice quality	≥ 95%	95.33%	93.50%	99.23%	96.99%	94.31%	86.17%	99.49%	98.18%	99.81%	98.83%	76.74%	85.78%	95.32%	97.23%	99.36%	97.90%	97.49%	95.49%	98.96%	97.17%
CSSR	≥ 95%	98.41%	98.80%	100.00%	100.00%	99.17%	95.45%	100.00%	100.00%	100.00%	100.00%	90.95%	76.74%	97.43%	95.32%	100.00%	99.47%	100.00%	99.67%	100.00%	99.47%
%age Blocked calls		1.59%	1.20%	0.00%	0.00%	0.83%	6.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%	0.33%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.88%	0.00%	0.00%	2.54%	8.96%	0.00%	0.32%	0.00%	0.00%	0.48%	0.30%	2.20%	1.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	97.88%	100.00%	100.00%	100.00%	100.00%	100.00%	99.07%	100.00%	66.70%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

7.1.4 September – Gangtok SSA

Month	Name of SSA Covered	Date of Drive Test
September	GANGTOK	24th to 26th sep' 2015

7.1.4.1 Route Details – Gangtok SSA

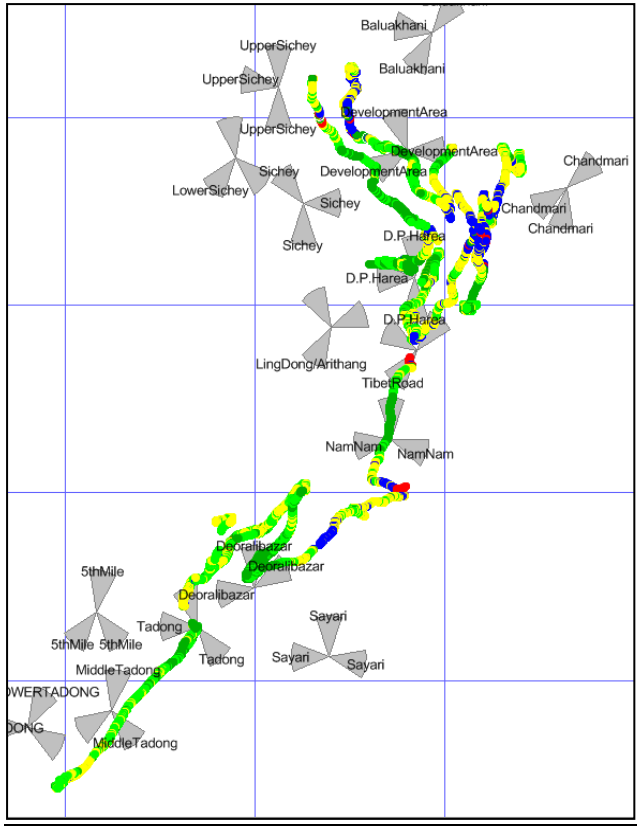
Category	Type of location	West Bengal – GANGTOK		
		Day 1	Day 2	Day 3
Outdoor	Major	NA	NA	NA
	Highways	Gangtok Taxi Stand – Gangtok Children's Park – Sichey Group – DC Office – Animal Husbandry – ICAR – Sikkim Govt. College – Upper Tadong – Tadong Bazar – Enchacy Monastery – Gangtok Flower Show Center.	Namchi Government college – Loyola College – Namchi public school – Kolkata hotel – Nandak Gumpha – Tamang Gumpha – Dak Bunglow – Womens hospital – District hospital – Taxi stand – Tendoing Education hall Institute – Jawaharlal Nehru hospital – District Jail – Blind school – Namchi Municipal Office – Panchayat office – Catholic church – Baichung stadium.	Jorthang ground – Bazar – Taxi Stand – Shantinagar – FCI – SNT Bus Stand – Motor vehicle Office – Power Office – Police Station – River road – BDO office – Majigaon – Old Bus Stand – Akra Bridge – Milk Processing Plant – DM Headquarter – Jorthang Supermarket – State Institute of Capacity Building.
	With in the city	NA	NA	NA
Indoor	Shopping complex	Woodland Hotel.	Alphanso Inn.	Pushpanjali Market.
	Office complex	District Administrative Centre	Namchi Fire Station.	Jorthang Power & Electric Supply Office.

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

7.1.4.2 Kilometers Travelled– Gangtok SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Gangtok	80	82	62	224

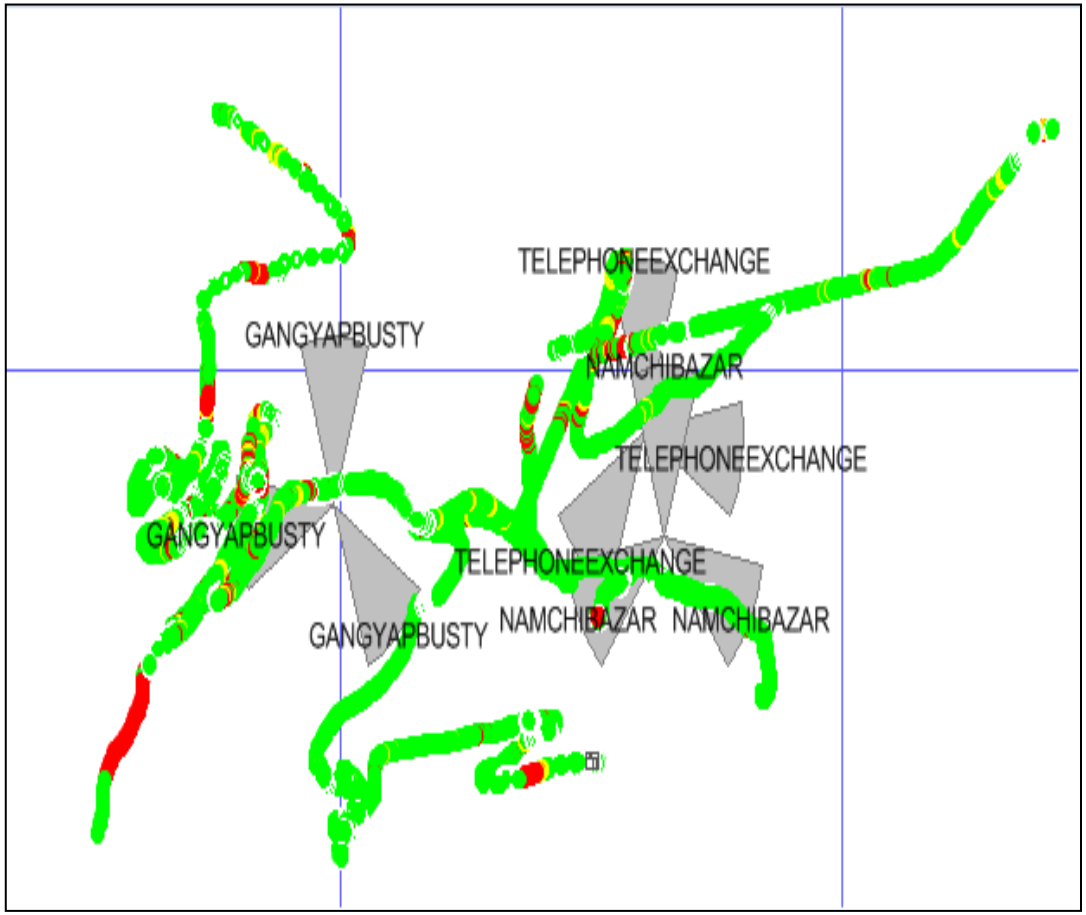
7.1.4.3 Route Map Gangtok Day 1



Route Covered- Day 1

Gangtok Taxi Stand – Gangtok Children's Park – Sichey Group – DC Office – Animal Husbandry – ICAR – Sikkim Govt. College – Upper Tadong – Tadong Bazar – Enchacy Monastery – Gangtok Flower Show Center.

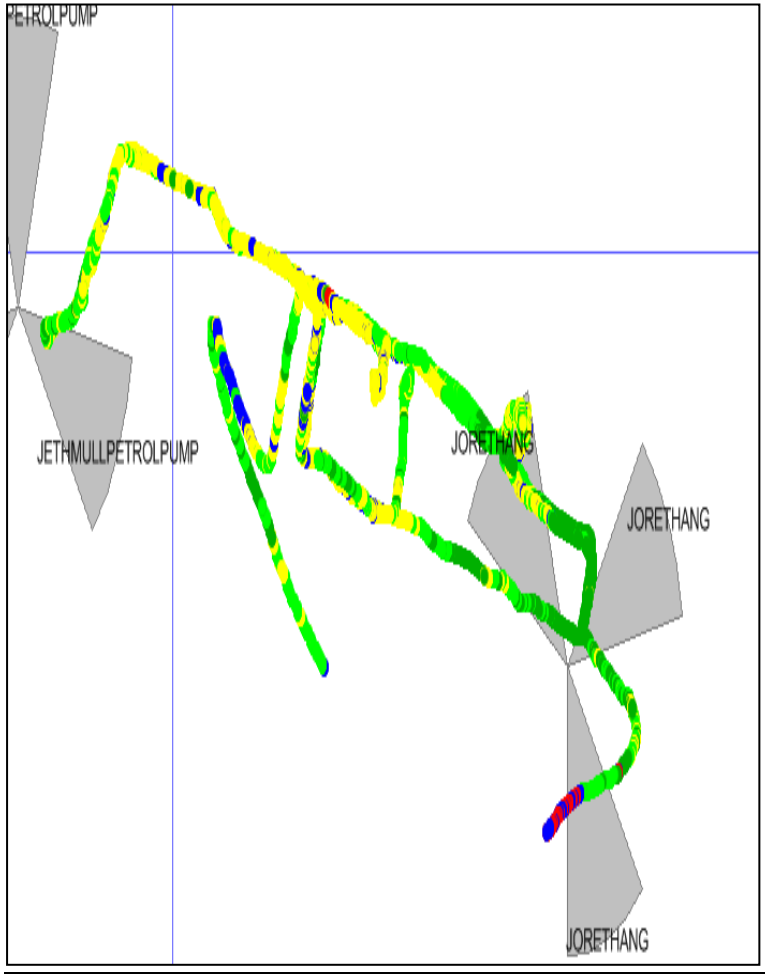
7.1.4.4 Route Map Gangtok Day 2



Route Covered - Day 2

Namchi Government college – Loyola College – Namchi public school – Kolkata hotel – Nandak Gumpha – Tamang Gumpha – Dak Bunglow – Womens hospital – District hospital – Taxi stand – Tendoing Education hall Institute – Jawaharlal Nehru hospital – District Jail – Blind school – Namchi Municipal Office – Panchayat office – Catholic church – Baichung stadium.

7.1.4.5 Route Map Gangtok Day 3



Route Covered - Day 3

Jorthang ground – Bazar – Taxi Stand – Shantinagar – FCI – SNT Bus Stand – Motor vehicle Office – Power Office – Police Station – River road – BDO office – Majigaon – Old Bus Stand – Akra Bridge – Milk Processing Plant – DM Headquarter – Jorthang Supermarket – State Institute of Capacity Building.

7.1.4.6 Drive Test Results – Gangtok SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		67.22%	60.50%	96.61%	98.67%	17.03%	34.09%	84.17%	66.86%	49.66%	52.45%	62.47%	56.36%	85.11%	79.08%	80.80%	81.45%	56.97%	45.14%	99.88%	92.27%
0 to -85 dBm		95.62%	93.55%	99.96%	99.76%	67.33%	56.45%	98.76%	92.12%	65.46%	64.20%	99.83%	93.73%	97.93%	94.37%	93.19%	94.85%	95.86%	91.92%	100.00%	99.44%
0 to -95 dBm		99.81%	99.49%	100.00%	99.94%	97.51%	80.26%	99.98%	98.57%	74.56%	79.43%	100.00%	99.99%	99.98%	98.62%	99.77%	99.80%	99.73%	99.30%	100.00%	100.00%
Voice quality	≥ 95%	97.35%	96.24%	98.60%	96.18%	92.89%	85.08%	99.98%	99.52%	99.47%	98.60%	79.14%	87.73%	97.57%	98.74%	99.15%	98.08%	98.57%	97.29%	99.44%	98.13%
CSSR	≥ 95%	99.02%	98.59%	100.00%	100.00%	96.67%	56.48%	100.00%	100.00%	100.00%	100.00%	91.23%	79.14%	98.73%	97.57%	100.00%	99.06%	100.00%	99.69%	100.00%	100.00%
%age Blocked calls		0.98%	1.41%	0.00%	0.00%	3.33%	43.52%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%	0.00%	0.31%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.50%	0.00%	0.00%	0.00%	13.17%	0.00%	0.00%	0.00%	0.00%	0.77%	0.50%	1.76%	1.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		97.44%	99.52%	100.00%	100.00%	100.00%	100.00%	100.00%	99.76%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

8 ANNEXURE

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		8895	18855	7437	13028	2751	2437	7457	78	765	22028
Sum of downtime of BTSs in a month (in hours)		89636	13888	342509	11402	5680	3213	12115	30	275	5719
BTSs accumulated downtime (not available for service)	≤ 2%	1.37%	0.10%	6.23%	0.12%	0.28%	0.18%	0.22%	0.05%	0.05%	0.03%
Number of BTSs having accumulated downtime >24 hours		704	50	2725	80	0	9	70	0	1	37
Worst affected BTSs due to downtime	≤ 2%	7.91%	0.26%	36.64%	0.62%	0.00%	0.37%	0.94%	0.00%	0.13%	0.17%
Live Measurement- BTSs accumulated downtime											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		8895	18807	7437	12827	2750	1643	4978	78	765	22024
Sum of downtime of BTSs in a month (in hours)		8224	1182	24555	988	1325	322	2924	0	7	467
BTSs accumulated downtime (not available for service)	≤ 2%	1.28%	0.09%	4.59%	0.11%	0.67%	0.28%	0.82%	0.00%	0.01%	0.03%
Number of BTSs having accumulated downtime >24 hours		57	1	351	7	0	0	0	0	0	0
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	0.64%	0.01%	4.72%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.29%	97.79%	97.88%	98.60%	99.56%	97.94%	98.69%	99.41%	99.03%	99.04%
SDCCH/Paging channel congestion	≤ 1%	0.60%	0.38%	2.70%	0.10%	NA	NA	0.01%	NA	0.08%	0.54%
TCH congestion	≤ 2%	1.40%	0.77%	1.30%	0.23%	0.26%	0.07%	0.04%	0.00%	0.12%	0.96%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.30%	97.75%	97.70%	99.45%	99.80%	98.10%	98.71%	99.34%	99.27%	99.74%
SDCCH/Paging channel congestion	≤ 1%	0.55%	0.44%	2.85%	0.06%	NA	NA	0.03%	NA	0.06%	0.26%
TCH congestion	≤ 2%	1.33%	0.70%	1.38%	0.07%	0.02%	0.05%	0.14%	0.00%	0.05%	0.26%

Drive test results for CSSR (Average of three drive tests) and blocked calls

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of call attempts		1805	2332	1837	2147	2543	2583	3171	1825	1897	2138
Total number of successful calls established		1770	2330	1682	2140	2339	2389	3084	1807	1887	2136
CSSR	≥ 95%	98.10%	99.90%	91.69%	99.60%	92.27%	93.03%	96.76%	98.71%	99.42%	99.92%
%age blocked calls		1.90%	0.10%	8.31%	0.40%	7.73%	6.97%	3.24%	1.29%	0.58%	0.08%

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

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

8.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		341173531	1148280921	198184112	461158704	124055727	34094896	162837539	397593	21562548	1446843471
Total number of calls dropped		4799557	15112469	2236959	2089105	932922	107484	942766	1138	117830	11224681
Call drop rate	≤ 2%	1.41%	1.32%	1.13%	0.45%	0.76%	0.32%	0.58%	0.29%	0.55%	0.78%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		25635	59972	21738	39250	10145	7410	22443	228	2300	66267
Total number of cells having more than 3% TCH		3446	1543	3866	252	258	68	17	5	72	1907
Worst affected cells having more than 3% TCH	≤ 3%	13.43%	2.57%	17.78%	0.64%	2.54%	0.92%	0.08%	2.26%	3.14%	2.88%

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

Live measurement results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		30767608	132012298	20995385	528505098	50783464	2951658	13327669	554925	22603502	1562438292
Total number of calls dropped		424799	1511202	239953	1827107	489022	8644	74548	1453	117765	9215246
Call drop rate	≤ 2%	1.38%	1.16%	1.14%	0.35%	0.95%	0.29%	0.56%	0.26%	0.52%	0.59%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		25944	179305	21738	38642	10138	4937	15008	228	2301	66254
Total number of cells having more than 3% TCH		3165	4580	4314	415	233	83	33	6	72	1776
Worst affected cells having more than 3% TCH	≤ 3%	12.19%	2.55%	19.84%	1.07%	2.30%	1.69%	0.22%	2.64%	3.13%	2.68%
Drive test results for Call drop rate (Average of three drive tests)											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		1770	2332	1682	1723	2351	2389	3084	1808	1888	2138
Total number of calls dropped		11	1	79	6	9	63	81	3	2	0
Call drop rate	≤ 2%	0.53%	0.06%	4.71%	0.35%	0.43%	2.81%	2.99%	0.16%	0.13%	0.00%

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

8.4 VOICE QUALITY

Audit Results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		57530354947	262869518849	21168	72793867481	86722889	NA	26693979550	30422294	3550929471	243344538090
Total number of calls with good voice quality		55263792599	251728817714	20116	70788923146	86501148	NA	26270221782	29872329	3469761491	231729001227
%age calls with good voice quality	≥ 95%	96.06%	96.22%	95.03%	97.24%	99.67%	99.68%	98.42%	98.19%	97.72%	95.23%

Live measurement results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		5551012994	35355323345	2473	64660685129	50823163	NA	2226785825	16314900	3881470608	247657382747
Total number of calls with good voice quality		5340078745	33842396283	2350	63303846828	50487547	NA	2189845136	16009018	3798426428	238217199307
%age calls with good voice quality	≥ 95%	96.20%	95.72%	95.03%	97.91%	99.35%	99.69%	98.35%	98.12%	97.86%	96.19%

Drive test results for Voice quality (Average of three drive tests)											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		2501389	2696514	2600957	3708349	268388	NA	NA	1833411	2777323	673092
Total number of calls with good voice quality		2342060	2596159	2348567	3640573	262650	NA	NA	1802377	2691460	648933
%age calls with good voice quality	≥ 95%	93.85%	96.44%	90.12%	98.05%	97.90%	70.20%	94.53%	98.03%	96.91%	96.75%

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

Note: MTS and Reliance CDMA have not shared the bases for calculating the voice quality, as it is not feasible to fetch the parameters from the current system of the operator.

8.5 POI CONGESTION

Audit Results for POI Congestion

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		65	38	77	118	39	21	36	47	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79598	147858	185025	114457	51444	7359	27595	11654	6289	347530
Traffic served for all POIs (B)- in erlangs		36398	81212	35771	69669	20740	2561	13077	1505	1045	190617
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

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		64	37	67	118	37	21	48	47	20	48
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79496	447964	159980	114625	56246	6786	37316	11654	6287	344803
Traffic served for all POIs (B)- in erlangs		36614	261408	33858	69986	23351	2669	18263	1443	1041	190583
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

8.6 TOTAL CALLS MADE DURING DRIVE TEST – VOICE QUALITY

July										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls	949744	388046	966708	970717	86400	NA	766338	70270	580988	413946
August										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls	58611	128325	688847	1256363	65305	NA	323670	51711	889732	165321
September										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls	1493034	2180143	945402	1481269	116683	NA	464881	1711430	1306603	93825

Data Source: Drive test reports submitted by operators to auditors

The system used by Reliance CDMA was not equipped to provide total calls made for voice quality.

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		798	175895	102971	15208	39284	23288	61851	NA	NA	1013308
Total number of bills disputed		0	74	0	64	36	23	53	NA	NA	655
Total number of valid billing complaints		0	13	0	7	16	0	53	NA	NA	327
Total complaints considered invalid		0	61	0	57	20	23	0	NA	NA	328
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.04%	0.00%	0.42%	0.09%	0.10%	0.09%	NA	NA	0.06%
July											
Total bills generated during the first billing cycle		272	60421	34446	4790	13362	8037	21021	0	0	346879
Total number of bills disputed in first billing cycle		0	41	0	17	15	8	16	NA	NA	296
Total number of valid billing complaints (billing cycle 1)		0	8	0	3	6	0	16	0	0	189
Total complaints considered invalid (billing cycle 1)		0	33	0	14	9	8	0	0	0	107
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.07%	0.00%	0.35%	0.11%	0.10%	0.08%	NA	NA	0.09%

Data Source: Billing Center of the operators

August											
Total bills generated during the second billing cycle		262	55103	34411	5075	12839	7791	20891	0	0	356647
Total number of bills disputed in second billing cycle		0	17	0	18	11	9	21	NA	NA	196
Total number of valid billing complaints (billing cycle 2)		0	3	0	0	5	0	21	0	0	101
Total complaints considered invalid (billing cycle 2)		0	14	0	18	6	9	0	0	0	95
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.03%	0.00%	0.35%	0.09%	0.12%	0.10%	NA	NA	0.05%
September											
Total bills generated during the third billing cycle		264	60371	34114	5343	13083	7460	19939	0	0	309782
Total number of bills disputed in third billing cycle		0	16	0	29	10	6	16	0	0	163
Total number of valid billing complaints (billing cycle 3)		0	2	0	4	5	0	16	0	0	37
Total complaints considered invalid (billing cycle 3)		0	14	0	25	5	6	0	0	0	126
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.03%	0.00%	0.54%	0.08%	0.08%	0.08%	NA	NA	0.05%

Data Source: Billing Center of the operators

NA: Tata CDMA and GSM do not have postpaid service in the circle.

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		1	804	2429	1768	189	333	5903	0	0	1371
Total complaints considered invalid (sum of 3 months)		5214	6831	184	9490	123	102	0	0	0	1693
Total number of charging complaints (sum of 3 months)		5215	7635	2613	11258	312	435	5903	0	0	3064
Total no of customers served (Sum of 3 months)		15319568	38351380	4215183	13985622	1617576	2505418	19692873	212985	2158088	15426732
Percentage of charging complaints disputed	≤ 0.1%	0.03%	0.02%	0.06%	0.08%	0.02%	0.02%	0.03%	0.00%	0.00%	0.02%

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of billing/charging complaints		5215	7709	2613	20869	348	559	5958	0	0	3719
Total number of complaints resolved in favour of customer		1	817	2429	11322	205	457	5958	0	0	1698
Total complaints considered invalid		5214	6892	184	9547	143	102	0	0	0	2021
Number of complaints resolved in 4 weeks		1	817	2387	11322	205	457	5958	0	0	1698
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	98.27%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%
Number of complaints resolved in 6 weeks		1	817	2420	11322	205	457	5958	0	0	1698
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	99.63%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		1	1828	659	1775	205	355	5958	0	0	1698
Percentage cases in which credit/waiver was received within 1	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Billing Center of the operators

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

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.

Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total Number of calls made		100	100	100	100	100	100	100	NA	NA	100
Number of cases resolved in 4 weeks		99	98	93	100	100	97	95	NA	NA	100
Percentage cases resolved in 4 weeks	≥ 98%	99.00%	98.00%	93.00%	100.00%	100.00%	97.00%	95.00%	NA	NA	100.00%
Number of cases resolved in 6 weeks		100	100	100	100	100	100	100	NA	NA	100
Percentage cases resolved in 6 weeks	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

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

NA: Database of complaints to conduct live calling was not available Tata CDMA and Tata GSM due to zero or very low base of complaints for the respective operators.

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of call attempts to customer care for assistance		17937413	4207649	1729941	16286686	4367176	NDR	NDR	8688	103415	30537924
Number of calls getting connected and answered (electronically)		17635131	4190322	1666523	15980416	4318396	NDR	NDR	8657	100013	30537924
Percentage calls getting connected and answered	≥ 95%	98.31%	99.59%	96.33%	98.12%	98.88%	NDR	NDR	99.64%	96.71%	100.00%

Data Source: Customer Service Center of the operators

Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total Number of calls received (3 months)		3735270	6929601	503331	5022973	1406035	508711	2041143	6728	147435	10290402
Total Number of calls answered within 90 seconds (3 months)		3650834	6115090	483092	5014794	1367070	285513	392761	6599	126635	9978289
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	97.74%	88.25%	95.98%	99.84%	97.23%	56.12%	19.24%	98.08%	85.89%	96.97%
July											
Total calls received (Month 1)		1337193	2327544	177018	1635315	520261	149130	443664	2832	60979	3457967
Total calls answered within 90 seconds (Month 1)		1302371	2221257	168226	1632093	501409	147762	99446	2724	43466	3374808
% calls answered within 90 seconds (Month 1)	≥ 95%	97.40%	95.43%	95.03%	99.80%	96.38%	99.08%	22.41%	96.19%	71.28%	97.60%
August											
Total calls received (Month 2)		1272932	2270226	176595	1716930	468272	195794	744976	2160	46932	3449901
Total calls answered within 90 seconds (Month 2)		1258570	2003607	170329	1713919	456143	105971	140561	2148	45288	3348504
% calls answered within 90 seconds (Month 2)	≥ 95%	98.87%	88.26%	96.45%	99.82%	97.41%	54.12%	18.87%	99.44%	96.50%	97.06%
September											
Total calls received (Month 3)		1125145	2331831	149718	1670728	417502	163787	852503	1736	39524	3382534
Total calls answered within 90 seconds (Month 3)		1089893	1890226	144537	1668782	409518	31780	152754	1727	37881	3254977
% calls answered within 90 seconds (Month 3)	≥ 95%	96.87%	81.06%	96.54%	99.88%	98.09%	19.40%	17.92%	99.48%	95.84%	96.23%

Data Source: Customer Service Center of the operators

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

Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		97	100	100	100	100	100	100	100	100	100
Live Calling Percentage calls getting connected and answered	≥ 95%	97.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of closure request		8	375	857	218	452	86	189	NA	NA	5451
Number of requests attended within 7 days		8	375	857	218	452	86	189	NA	NA	5451
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Customer Service Center of the operators

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cases requiring refund of deposits		NA	NA	218	98	NA	NA	NA	NA	NA	3954
Total number of cases where refund was made within 60 days		NA	NA	218	98	NA	NA	NA	NA	NA	2502
Percentage cases in which refund was receive within 60 days	100.00%	NA	NA	100.00%	100.00%	NA	NA	NA	NA	NA	63.28%

Data Source: Customer Service Center of the operators

NA: Tata CDMA and GSM do not have postpaid service in the circle. Also, none of the Aircel, Airtel, MTS, Reliance CDMA and Reliance GSM customers was found to be eligible for refund.

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Eqipped capacity of the network	151730	321237	236000	157471	109200	118000	174000	5617	13844	378675
Total taffic handled in erlang during TCBH	89126	275833	67173	138799	33537	26501	80806	116	5109	378698
Total no. of customers served (as per VLR)	3214865	12499058	1219829	4992791	1011110	769327	6467508	3113	238342	15037985

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

8.12 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests										
Resolution of service requests	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total Number of calls made	100	100	100	100	100	100	100	NA	100	100
Number of cases resolved to satisfaction	100	96	98	99	100	98	98	NA	92	100
Percentage cases resolved in four weeks	100.00%	96.00%	98.00%	99.00%	100.00%	98.00%	98.00%	NA	92.00%	100.00%

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

8.13 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services											
Level 1 services		Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150	152	150	150
Calls answered		130	127	135	136	132	140	135	130	125	130
% of calls connected	≥ 95%	86.67%	84.67%	90.00%	90.67%	88.00%	93.33%	90.00%	85.53%	83.33%	86.67%

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

8.14 DETAILS - LEVEL 1 SERVICES CALLS

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	✓		15	13
101	Fire	✓		15	13
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	✓		15	13
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		15	13
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline	✓		15	13
1073	Road Accident Helpline	✓		15	13
1077	Control Room for District Collector	✓		15	13
1090	Call Alart (Crime Branch)	✓		15	13
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		15	13
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	✓		15	13
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	☐	×		

Airtel

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		8	6
101	Fire	✓		7	6
102	Ambulance	✓	☐	8	6
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	✓	☐	7	7
1033	Road Accident Management Service	✓	☐	8	6
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	☐	×		
1056	Emergency Medical Services	✓	☐	7	7
106X	State of the Art Hospitals	✓	☐	8	6
1063	Public Grievance Cell DoT Hq	☐	×		
1064	Anti Corruption Helpline	☐	×		
1070	Relief Commission for Natural Calamities	☐	×		
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	✓	☐	7	6
1073	Road Accident Helpline	✓	☐	7	7
1077	Control Room for District Collector	✓	☐	8	6
1090	Call Alart (Crime Branch)	✓	☐	8	6
1091	Women Helpline	☐	×		
1097	National AIDS Helpline to NACO	✓	☐	7	6
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educationa & Vocational Guidance and Counselling	✓	☐	8	7
10589	Mother and Child Tracking (MCTH)	✓	☐	7	6
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	✓	☐	8	7
155214	Labour Helpline	✓	☐	7	6
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	8	7
1912	Complaint of Electricity	✓	☐	7	6

1916	Drinking Water Supply	✓		7	6
1950	Election Commission of India	✓		8	7
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		7	7
101	Fire	✓		8	7
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline		×		
138	All India Helpine for Passangers		×		
149	Public Road Transport Utility Service	✓		8	7
181	Chief Minister Helpline	✓		7	7
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	✓		8	6
106X	State of the Art Hospitals	✓		8	7
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities		×		
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline	✓		7	7
1073	Road Accident Helpline	✓		7	7
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)	✓		8	6
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		7	7
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling	✓		8	7
10589	Mother and Child Tracking (MCTH)	✓		7	6
10740	Central Pollution Control Board		×		
10741	Pollution Control Board	✓		8	7
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		7	7
1514	National Career Service(NCS)	✓		8	7
15100	Free Legal Service Helpline	✓		8	6
155304	Municipal Corporations	✓		7	7
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		8	6
1909	National Do Not Call Registry	✓		7	7
1912	Complaint of Electricity		×		
1916	Drinking Water Supply	✓		7	7
1950	Election Commission of India		×		
Idea					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		9	8
101	Fire	✓		9	8
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline		×		
138	All India Helpine for Passangers		×		
149	Public Road Transport Utility Service	✓		9	8
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	✓		8	8
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline	✓		9	8
1070	Relief Commission for Natural Calamities		×		
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline	✓		9	8
1073	Road Accident Helpline	✓		9	8
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)	✓		8	8
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		9	8
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)	✓		9	8
10740	Central Pollution Control Board		×		
10741	Pollution Control Board	✓		9	8
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		9	8
1514	National Career Service(NCS)	✓		9	8
15100	Free Legal Service Helpline	✓		9	8
155304	Municipal Corporations	✓		8	8
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)		×		
1909	National Do Not Call Registry		×		
1912	Complaint of Electricity		×		
1916	Drinking Water Supply	✓		9	8
1950	Election Commission of India	✓		9	8
MTS					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected

100	Police	✓		7	6
101	Fire	✓		7	6
102	Ambulance	✓		7	6
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	✓		7	6
106X	State of the Art Hospitals	✓		7	6
1063	Public Grievance Cell DoT Hq	✓		6	6
1064	Anti Corruption Helpline	✓		7	6
1070	Relief Commission for Natural Calamities	✓		6	6
1071	Air Accident Helpline	✓		7	6
1072	Rail Accident Helpline	✓		7	6
1073	Road Accident Helpline	✓		7	6
1077	Control Room for District Collector	✓		6	6
1090	Call Alart (Crime Branch)	✓		7	6
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		7	6
1099	Central Accident and Trauma Services (CATS)	✓		7	6
10580	Educationa & Vocational Guidance and Counselling	✓		7	6
10589	Mother and Child Tracking (MCTH)	✓		7	6
10740	Central Pollution Control Board	✓		6	6
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	✓		7	6
155214	Labour Helpline	✓		7	6
1903	Sashastra Seema Bal (SSB)	✓			
1909	National Do Not Call Registry		×		
1912	Complaint of Electricity	✓		7	6
1916	Drinking Water Supply	✓		7	6
1950	Election Commission of India		×		

Reliance CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	9
101	Fire	✓		9	9
102	Ambulance		×		

104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	☐	×		
138	All India Helpine for Passangers	☐	×		
149	Public Road Transport Utility Service	✓	☐	10	9
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	✓	☐	9	8
106X	State of the Art Hospitals	✓	☐	10	9
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	✓	☐	9	8
1077	Control Room for District Collector	☐	×		
1090	Call Alart (Crime Branch)	✓	☐	9	9
1091	Women Helpline	☐	×		
1097	National AIDS Helpline to NACO	☐	×		
1099	Central Accident and Trauma Services (CATS)	✓	☐	10	9
10580	Educationa & Vocational Guidance and Counselling	✓	☐	9	8
10589	Mother and Child Tracking (MCTH)	✓	☐	10	9
10740	Central Pollution Control Board	✓	☐	9	9
10741	Pollution Control Board	✓	☐	10	8
1511	Police Related Service for all Metro Railway Project	☐	×		
1512	Prevention of Crime in Railway	✓	☐	9	9
1514	National Career Service(NCS)	✓	☐	9	9
15100	Free Legal Service Helpline	✓	☐	9	9
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	✓	☐	9	9

Reliance GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		7	6
101	Fire	✓		7	6
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	☐	×		

138	All India Helpine for Passangers	☐	×		
149	Public Road Transport Utility Service	✓	☐	6	6
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	✓	☐	6	6
106X	State of the Art Hospitals	✓	☐	7	6
1063	Public Grievance Cell DoT Hq	☐	×		
1064	Anti Corruption Helpline	✓	☐	7	7
1070	Relief Commission for Natural Calamities	☐	×		
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	✓	☐	7	6
1073	Road Accident Helpline	✓	☐	7	6
1077	Control Room for District Collector	☐	×		
1090	Call Alart (Crime Branch)	✓	☐	7	6
1091	Women Helpline	☐	×		
1097	National AIDS Helpline to NACO	✓	☐	6	6
1099	Central Accident and Trauma Services (CATS)	✓	☐	7	7
10580	Educationa & Vocational Guidance and Counselling	✓	☐	7	6
10589	Mother and Child Tracking (MCTH)	✓	☐	7	6
10740	Central Pollution Control Board	☐	×		
10741	Pollution Control Board	✓	☐	7	6
1511	Police Related Service for all Metro Railway Project	☐	×		
1512	Prevention of Crime in Railway	✓	☐	7	7
1514	National Career Service(NCS)	✓	☐	6	6
15100	Free Legal Service Helpline	✓	☐	7	6
155304	Municipal Corporations	✓	☐	7	6
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	✓	☐	7	6
1909	National Do Not Call Registry	☐	×		
1912	Complaint of Electricity	✓	☐	7	6
1916	Drinking Water Supply	✓	☐	7	6
1950	Election Commission of India	✓	☐	7	6

TATA CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		9	7
101	Fire	✓		9	7
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	☐	×		
138	All India Helpine for Passangers	☐	×		
149	Public Road Transport Utility Service	✓	☐	9	7
181	Chief Minister Helpline	✓	☐	8	7

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	✓	☐	8	7
106X	State of the Art Hospitals	✓	☐	8	8
1063	Public Grievance Cell DoT Hq	☐	×		
1064	Anti Corruption Helpline	☐	×		
1070	Relief Commission for Natural Calamities	☐	×		
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	✓	☐	8	7
1073	Road Accident Helpline	✓	☐	8	8
1077	Control Room for District Collector	☐	×		
1090	Call Alart (Crime Branch)	✓	☐	9	7
1091	Women Helpline	☐	×		
1097	National AIDS Helpline to NACO	✓	☐	8	7
1099	Central Accident and Trauma Services (CATS)	✓	☐	8	8
10580	Educationa & Vocational Guidance and Counselling	☐	×		
10589	Mother and Child Tracking (MCTH)	☐	×		
10740	Central Pollution Control Board	☐	×		
10741	Pollution Control Board	✓	☐	9	7
1511	Police Related Service for all Metro Railway Project	✓	☐	8	7
1512	Prevention of Crime in Railway	✓	☐	8	7
1514	National Career Service(NCS)	✓	☐	8	7
15100	Free Legal Service Helpline	✓	☐	8	8
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	☐	×		
1912	Complaint of Electricity	✓	☐	8	7
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	✓	☐	9	7

TATA GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		8	7
101	Fire	✓		7	6
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	☐	×		
138	All India Helpine for Passangers	☐	×		
149	Public Road Transport Utility Service	✓	☐	8	6
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	✓	☐	7	7
106X	State of the Art Hospitals	✓	☐	8	6
1063	Public Grievance Cell DoT Hq	☐	×		
1064	Anti Corruption Helpline	✓	☐	7	6
1070	Relief Commission for Natural Calamities	☐	×		
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	✓	☐	8	7
1073	Road Accident Helpline	✓	☐	7	7
1077	Control Room for District Collector	☐	×		
1090	Call Alart (Crime Branch)	✓	☐	8	6
1091	Women Helpline	☐	×		
1097	National AIDS Helpline to NACO	✓	☐	8	6
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educationa & Vocational Guidance and Counselling	✓	☐	7	6
10589	Mother and Child Tracking (MCTH)	✓	☐	8	6
10740	Central Pollution Control Board	☐	×		
10741	Pollution Control Board	✓	☐	7	6
1511	Police Related Service for all Metro Railway Project	☐	×		
1512	Prevention of Crime in Railway	✓	☐	8	6
1514	National Career Service(NCS)	✓	☐	7	6
15100	Free Legal Service Helpline	✓	☐	7	6
155304	Municipal Corporations	✓	☐	7	7
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	✓	☐	8	6
1909	National Do Not Call Registry	☐	×		
1912	Complaint of Electricity	✓	☐	7	6
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	✓	☐	8	6

Vodafone

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		8	7
101	Fire	✓		8	7
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	☐	×		
138	All India Helpine for Passangers	☐	×		
149	Public Road Transport Utility Service	✓	☐	8	6
181	Chief Minister Helpline	☐	×		
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	8	7
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	☐	×		
1056	Emergency Medical Services	✓	☐	8	7

106X	State of the Art Hospitals	✓	☐	8	7
1063	Public Grievance Cell DoT Hq	☐	×		
1064	Anti Corruption Helpline	☐	×		
1070	Relief Commission for Natural Calamities	☐	×		
1071	Air Accident Helpline	✓	☐	8	7
1072	Rail Accident Helpline	✓	☐	8	6
1073	Road Accident Helpline	✓	☐	7	7
1077	Control Room for District Collector	☐	×		
1090	Call Alart (Crime Branch)	✓	☐	8	7
1091	Women Helpline	☐	×		
1097	National AIDS Helpline to NACO	✓	☐	8	6
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educationa & Vocational Guidance and Counselling	☐	×		
10589	Mother and Child Tracking (MCTH)	✓	☐	8	7
10740	Central Pollution Control Board	☐	×		
10741	Pollution Control Board	✓	☐	7	7
1511	Police Related Service for all Metro Railway Project	☐	×		
1512	Prevention of Crime in Railway	✓	☐	8	7
1514	National Career Service(NCS)	✓	☐	8	7
15100	Free Legal Service Helpline	☐	×		
155304	Municipal Corporations	✓	☐	8	7
155214	Labour Helpline	✓	☐	8	7
1903	Sashastra Seema Bal (SSB)	✓	☐	8	7
1909	National Do Not Call Registry	☐	×		
1912	Complaint of Electricity	☐	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	✓	☐	8	7

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

8.14.1 SDCA WISE LEVEL 1 SERVICE CALLS MADE FOR MANDATORY SERVICES

Operator Name	GANGTOK					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel(DWL)	4	3	4	3	4	3
Airtel	2	2	2	2	2	2
BSNL	2	2	2	1	2	2
Idea	3	2	3	2	3	2
MTS	1	1	1	1	1	1
Reliance CDMA	3	2	2	2	2	2
Reliance GSM	1	1	2	1	2	2
Tata CDMA	2	2	2	2	2	2
Tata GSM	2	2	2	2	2	1
Vodafone	2	2	2	2	2	2
Operator Name	DARJEELING					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel(DWL)	3	3	3	3	3	3
Airtel	2	2	2	2	2	2
BSNL	1	1	2	2	1	1
Idea	2	2	3	2	3	2
MTS	2	2	2	2	2	2
Reliance CDMA	2	2	2	2	3	2
Reliance GSM	2	1	1	1	2	1
Tata CDMA	2	1	2	2	3	2
Tata GSM	2	2	2	2	2	2
Vodafone	2	1	2	1	2	1
Operator Name	SURI					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel(DWL)	4	4	4	4	4	4
Airtel	2	1	2	1	2	1
BSNL	2	2	2	2	2	2
Idea	2	2	3	2	3	2
MTS	2	1	2	1	2	2
Reliance CDMA	2	2	2	2	3	2
Reliance GSM	2	2	2	2	2	2

Tata CDMA	3	2	2	2	2	2
Tata GSM	2	2	2	1	2	2
Vodafone	2	2	2	2	2	2
Operator Name	DURGAPUR					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel(DWL)	4	3	4	3	4	3
Airtel	2	1	1	1	2	1
BSNL	2	2	2	2	2	2
Idea	2	2	2	2	2	2
MTS	2	2	2	1	2	2
Reliance CDMA	3	3	3	3	2	2
Reliance GSM	2	2	2	2	1	1
Tata CDMA	2	2	3	2	2	2
Tata GSM	2	1	1	1	2	1
Vodafone	2	2	2	2	2	2

8.15 COUNTER DETAILS

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

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

8.15.1 ERICSSON

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

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

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.

TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH
CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.
TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

8.15.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel in the circle.

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

3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

8.15.3 HUAWEI

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

HUAWEI CDMA		
SR .NO	KPI	HUAWEI FORMULA
1	CALL SETUP SUCCES (NUM)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups] ([1157628567] + [1157628587] + [1157628568] + [1157628588])

2	CALL SETUP SUCCES (DEN)	[CS IS-95 Orig Attempts + CS IS-2000 Orig Attempts + CS IS-95 Term Attempts + CS IS-2000 Term Attempts] ([1157628553] + [1157628573] + [1157628554] + [1157628574])
3	CALL SETUP SUCCESS RATE (%)	CALL SETUP SUCCES (NUM) / CALL SETUP SUCCES (DEN) * 100\
4	CALL DROP RATE (NUM)	[CS IS-95 Call Drops (Too many Erasure frames) + CS IS-2000 Call Drops (Too many Erasure frames) + CS IS-95 Call Drops (No reverse frame received) + CS IS-2000 Call Drops (No reverse frame received) + CS IS-95 Call Drops (Abis interface abnormal) + CS IS-2000 Call Drops (Abis interface abnormal) + CS IS-95 Call Drops (A2 interface abnormal) + CS IS-2000 Call Drops (A2 interface abnormal) + CS IS-95 Call Drops (HHO fail) + CS IS-2000 Call Drops (HHO fail) + CS IS-95 Call Drops (Other causes) + CS IS-2000 Call Drops (Other causes)] ([1157628608] + [1157628614] + [1157628609] + [1157628615] + [1157628610] + [1157628616] + [1157628611] + [1157628617] + [1157628612] + [1157628618] + [1157628613] + [1157628619])
5	CALL DROP RATE(DEN)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups + CS IS-95 Successful Incoming Hard HOs + CS IS-2000 Successful Incoming Hard HOs] [1157628619]) x 100/([1157628567] + [1157628587] + [1157628568] + [1157628588] + [1157628569] + [1157628589])]
6	Call DROP Rate	CALL DROP RATE (NUM) / CALL DROP RATE(DEN) * 100\
7	RF BLOCK RATE (NUM)	{[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]) - (Successful TCH Assignments-CS Orig-IS95[Times] + Successful TCH Assignments-CS Orig-IS2000[Times] + Successful TCH Assignments-CS Term-IS95[Times] + Successful TCH Assignments-CS Term-IS2000[Times])] {[(1157628621 + 1157628628 + 1157628635+ 1157628642)
8	RF BLOCK RATE (DEN)	[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]))]} [(1157628621 + 1157628628 + 1157628635+ 1157628642)]}
9	RF BLOCK RATE	RF BLOCK RATE (NUM) / RF BLOCK RATE (DEN) *100
10	Call Quality (RFER)	CS Reverse Link Average FER of Carrier[%]

8.15.4 ZTE

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

1. Connection Establishment (Accessibility)

A. CALL SETUP SUCCESS RATE:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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

B. SDCCH BLOCKING:

KPI is calculated as Average over the month at TCBH

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

Where,

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

C. TCH BLOCKING:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

(C900060054+C900060055)/(C900060028+C900060036+C900060199+C900060210+C900060098+C900060102 -(C900960094+C900060095))

Where,

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

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

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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

Total no of cells with TCH drop>3%

C. Total No. of cells in the Network:

Active cell from last day of the month.

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

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

E. %age of Connection with Good Voice Quality:

KPI is calculated as Average over the month at TCBH

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

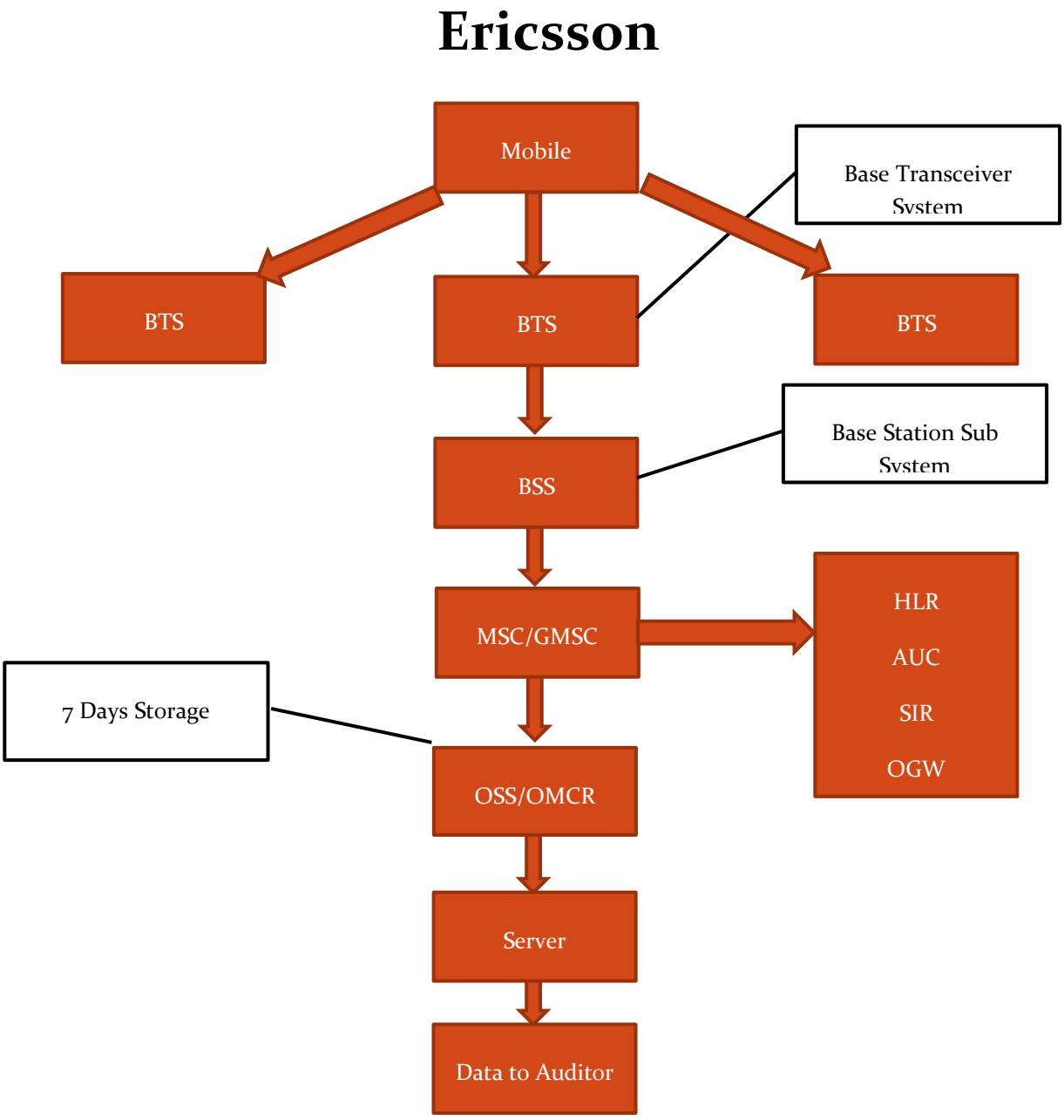
Where,

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

8.16 BLOCK SCHEMATIC DIAGRAMS

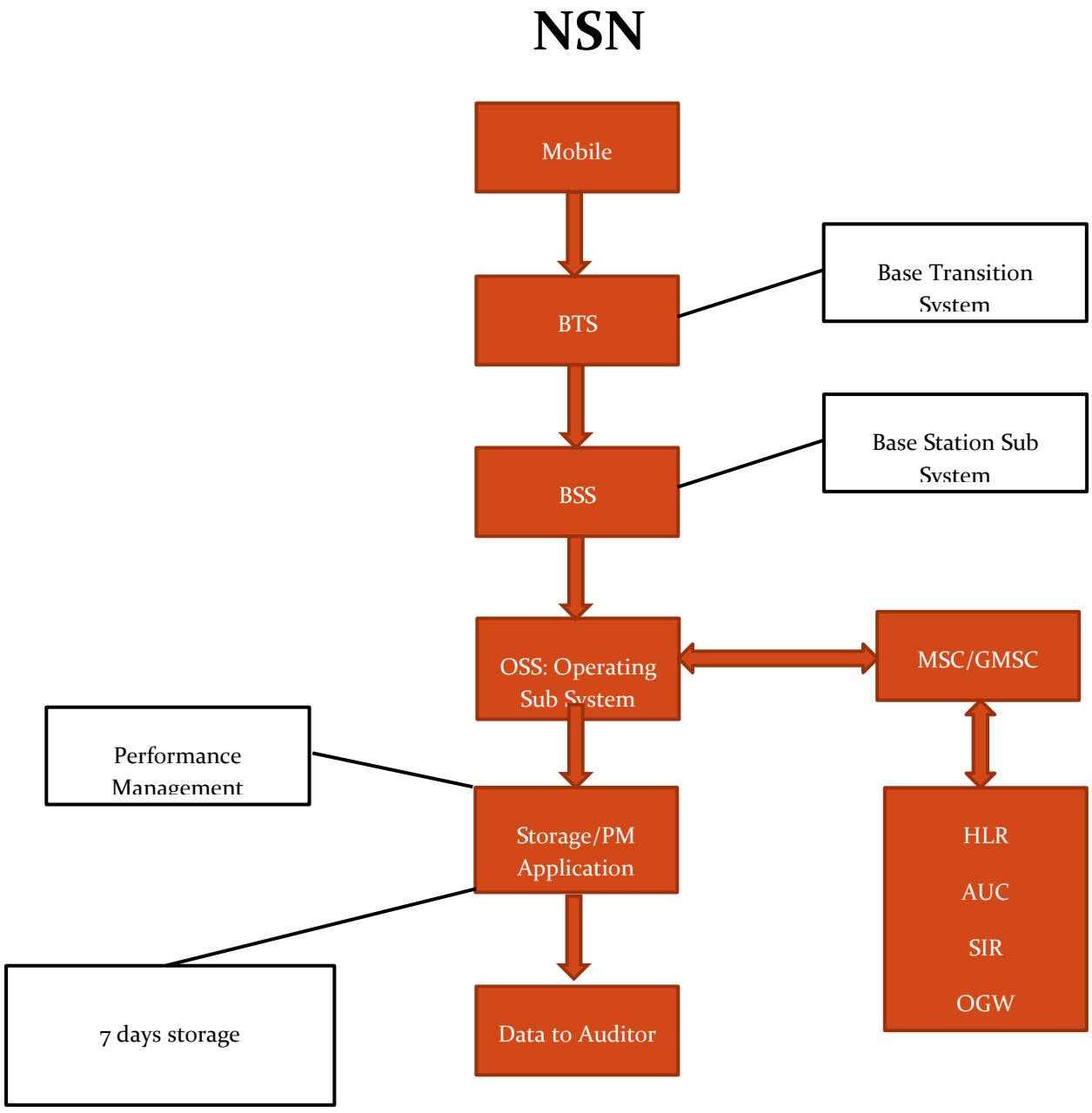
8.16.1 ERICSSON

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



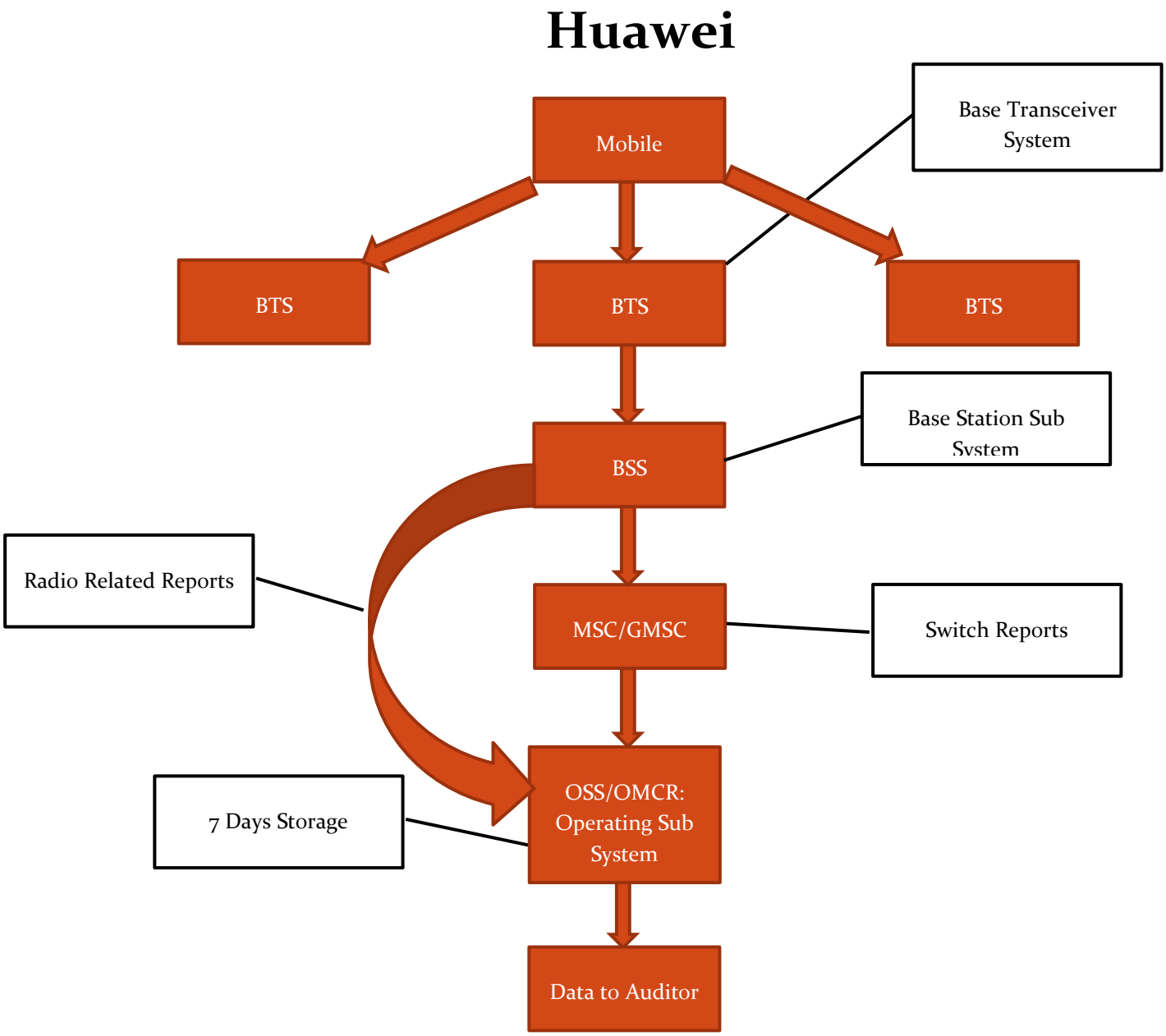
8.16.2 NSN (NOKIA SIEMENS NETWORKS)

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



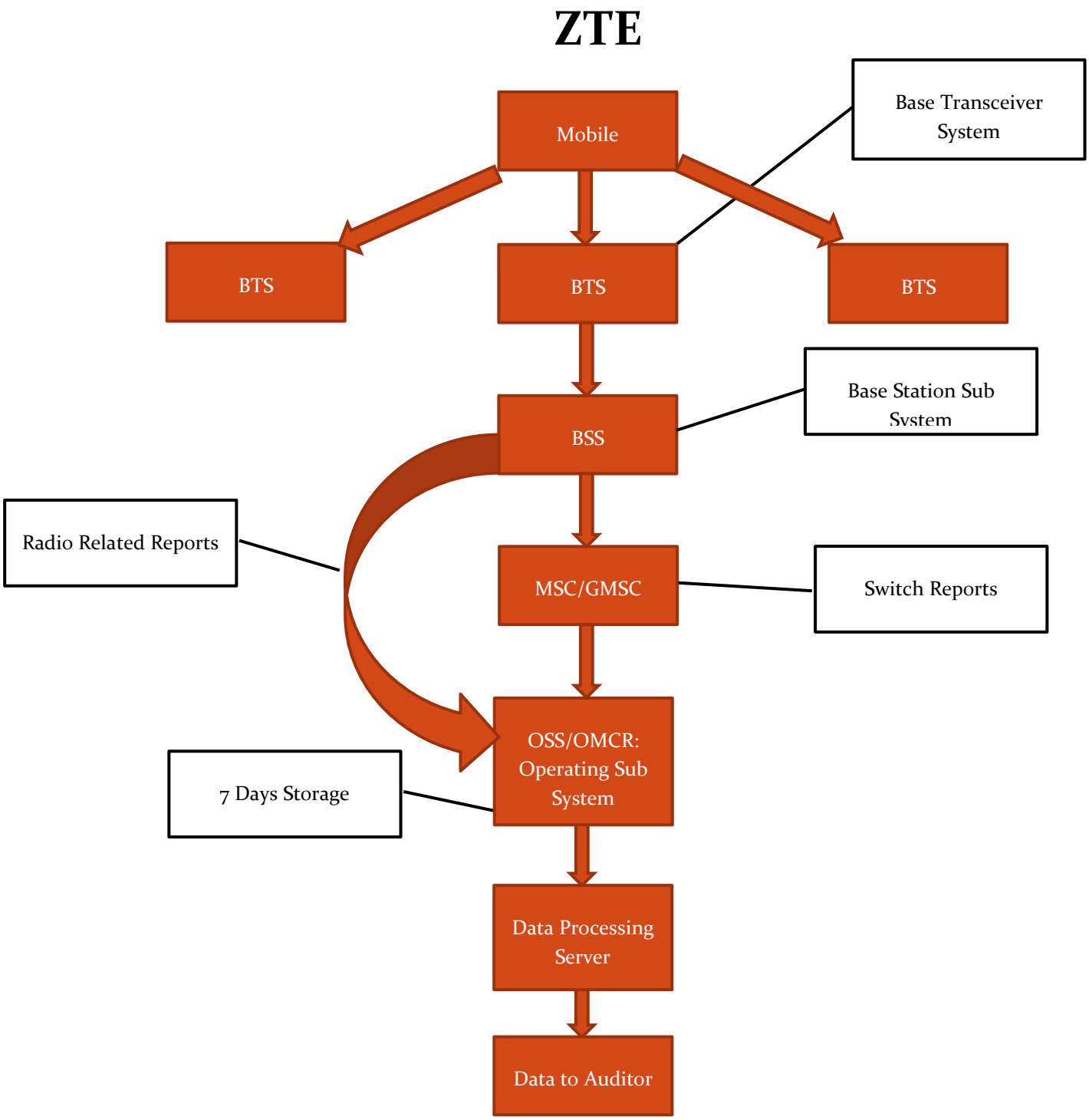
8.16.3 HUAWEI

Huawei provides network support to Uninor in the circle.



8.16.4 ZTE

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



9 ANNEXURE – JULY

For Reliance GSM, 3 day live measurement in the month of July'15 could not be conducted due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

Audit Results for Network Availability- PMR data-July											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		2965	6198	2479	4239	917	808	2484	26	255	7340
Sum of downtime of BTSs in a month (in hours)		34747	3494	148609	6435	2089	494	1812	24	182	4014
BTSs accumulated downtime (not available for service)	≤ 2%	1.58%	0.08%	8.06%	0.20%	0.31%	0.08%	0.10%	0.13%	0.10%	0.07%
Number of BTSs having accumulated downtime >24 hours		298	4	1152	37	0	0	24	0	1	30
Worst affected BTSs due to downtime	≤ 2%	10.05%	0.06%	46.47%	0.87%	0.00%	0.00%	0.97%	0.00%	0.39%	0.41%
Live Measurement Results for Network Availability- 3 Day live data-July											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		2965	6211	2479	4237	916	NDR	NDR	26	255	7340
Sum of downtime of BTSs in a month (in hours)		3088	192	6366	548	203	NDR	NDR	0	5	243
BTSs accumulated downtime (not available for service)	≤ 2%	1.45%	0.04%	3.57%	0.18%	0.31%	NDR	NDR	0.00%	0.03%	0.05%
Number of BTSs having accumulated downtime >24 hours		21	0	56	4	0	NDR	NDR	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.71%	0.00%	2.26%	0.09%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-July											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.23%	98.88%	97.83%	98.31%	99.42%	98.08%	98.71%	99.34%	98.96%	99.07%
SDCCH/Paging channel congestion	≤ 1%	0.77%	0.41%	2.75%	0.16%	NA	NA	0.00%	NA	0.13%	0.52%
TCH congestion	≤ 2%	1.66%	0.86%	1.43%	0.41%	0.43%	0.05%	0.00%	0.00%	0.17%	0.93%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-July											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.22%	98.70%	97.61%	99.15%	99.77%	NDR	NDR	99.28%	99.17%	99.78%
SDCCH/Paging channel congestion	≤ 1%	0.89%	0.58%	2.90%	0.10%	NA	NA	NDR	NA	0.11%	0.27%
TCH congestion	≤ 2%	1.49%	0.87%	1.57%	0.13%	0.00%	NDR	NDR	0.00%	0.08%	0.22%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-July											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of call attempts		580	642	626	687	704	700	596	618	506	673
Total number of successful calls established		559	640	605	687	692	693	567	615	502	673
CSSR	≥ 95%	96.38%	99.69%	96.65%	100.00%	98.30%	99.00%	95.13%	99.51%	99.21%	100.00%
%age blocked calls		3.62%	0.31%	3.35%	0.00%	1.70%	1.00%	4.87%	0.49%	0.79%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-July											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		108827388	412921246	69578637	150548778	44631269	5358716	23260637	148368	7649697	502448910
Total number of calls dropped		1477319	5128103	749190	749728	312086	17759	134291	443	43015	3744389
Call drop rate	≤ 2%	1.36%	1.24%	1.08%	0.50%	0.70%	0.33%	0.58%	0.30%	0.56%	0.75%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		8264	19712	7246	12771	3380	2473	7484	76	768	22081
Total number of cells having more than 3% TCH		1059	504	1327	65	93	25	6	2	26	637
Worst affected cells having more than 3% TCH	≤ 3%	12.81%	2.56%	18.31%	0.51%	2.75%	1.01%	0.08%	2.46%	3.33%	2.88%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-July											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		9779104	40919947	7319174	175787314	17351714	NDR	NDR	201104	7725422	517764362
Total number of calls dropped		129634	477940	81303	723581	313910	NDR	NDR	504	43083	3151073
Call drop rate	≤ 2%	1.33%	1.17%	1.11%	0.41%	1.81%	NDR	NDR	0.25%	0.56%	0.61%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		8588	59380	7246	12762	3374	NDR	NDR	76	768	22078
Total number of cells having more than 3% TCH		890	1529	1445	186	86	NDR	NDR	2	30	634
Worst affected cells having more than 3% TCH	≤ 3%	10.36%	2.57%	19.94%	1.46%	2.55%	NDR	NDR	2.20%	3.91%	2.87%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-July											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		559	642	605	687	704	693	567	615	502	673
Total number of calls dropped		6	0	19	1	0	32	20	3	1	0
Call drop rate	≤ 2%	1.07%	0.00%	3.14%	0.15%	0.00%	4.62%	3.53%	0.49%	0.20%	0.00%

Audit Results for Voice quality -PMR Data-July											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		19489414142	140258702154	7031	24292771388	44631269	NA	3791145967	11275964	1233529690	81205562912
Total number of calls with good voice quality		18712499949	134336466012	6681	23628917778	44521234	NA	3732643956	11073184	1204757370	77396374235
%age calls with good voice quality	≥ 95%	96.01%	95.78%	95.02%	97.27%	99.75%	99.68%	98.46%	98.20%	97.67%	95.31%

Live measurement results for Voice quality-3 Day data-July											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		1802739141	12208037347	804	23766048220	17391413	NDR	NDR	5658401	1312466629	81319287539
Total number of calls with good voice quality		1733435915	11691799138	764	23224649443	17255050	NDR	NDR	5552092	1283999067	78195377420
%age calls with good voice quality	≥ 95%	96.16%	95.77%	95.02%	97.72%	99.22%	NDR	NDR	98.12%	97.83%	96.16%

Drive test results for Voice quality (Average of three drive tests) - DT data-July											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		949744	388046	966708	970717	86400	NA	766338	70270	580988	413946
Total number of calls with good voice quality		859331	372662	897508	944036	81832	NA	668017	68343	563052	398324
%age calls with good voice quality	≥ 95%	90.48%	96.04%	92.84%	97.25%	94.71%	67.06%	87.17%	97.26%	96.91%	96.23%

Audit Results for POI Congestion- PMR data-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		62	37	77	118	38	21	12	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		78088	144675	186362	114460	55681	NDR	8153	11654	6293	343281
Traffic served for all POIs (B)- in erlangs		36206	78550	36662	69308	22425	NDR	3224	1554	1089	200695
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		62	37	77	118	37	NDR	NDR	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		78302	431444	186390	114923	56536	NDR	NDR	11654	6287	340375
Traffic served for all POIs (B)- in erlangs		36586	262589	37585	69199	23806	NDR	NDR	1561	1072	188211
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

10 ANNEXURE – AUGUST

Audit Results for Network Availability- PMR data-August											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		2965	6313	2479	4347	917	821	2484	26	255	7344
Sum of downtime of BTSs in a month (in hours)		28988	6775	131528	3276	3562	1246	5183	2	47	705
BTSs accumulated downtime (not available for service)	≤ 2%	1.31%	0.14%	7.13%	0.10%	0.52%	0.20%	0.28%	0.01%	0.02%	0.01%
Number of BTSs having accumulated downtime >24 hours		216	34	996	27	0	4	25	0	0	0
Worst affected BTSs due to downtime	≤ 2%	7.28%	0.54%	40.18%	0.62%	0.00%	0.49%	1.01%	0.00%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-August											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		2965	6279	2479	4239	917	822	2494	26	255	7340
Sum of downtime of BTSs in a month (in hours)		2486	633	8530	285	1113	212	293	0	0	91
BTSs accumulated downtime (not available for service)	≤ 2%	1.16%	0.14%	4.78%	0.09%	1.69%	0.36%	0.16%	0.00%	0.00%	0.02%
Number of BTSs having accumulated downtime >24 hours		18	1	110	3	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.61%	0.02%	4.44%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-August											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.38%	98.89%	97.86%	98.92%	99.53%	97.81%	98.75%	99.42%	99.08%	98.83%
SDCCH/Paging channel congestion	≤ 1%	0.58%	0.43%	2.78%	0.07%	NA	NA	0.00%	NA	0.06%	0.62%
TCH congestion	≤ 2%	1.32%	0.81%	1.25%	0.17%	0.29%	0.09%	0.00%	0.00%	0.09%	1.17%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-August											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.30%	98.85%	98.08%	99.59%	99.82%	98.10%	98.75%	99.23%	99.28%	99.69%
SDCCH/Paging channel congestion	≤ 1%	0.38%	0.45%	3.33%	0.03%	NA	NA	0.02%	NA	0.04%	0.23%
TCH congestion	≤ 2%	1.39%	0.78%	1.18%	0.04%	0.04%	0.03%	0.12%	0.00%	0.03%	0.31%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-August											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of call attempts		228	555	517	589	893	913	874	380	559	673
Total number of successful calls established		226	555	471	582	701	813	848	369	555	673
CSSR	≥ 95%	99.12%	100.00%	91.10%	98.81%	78.50%	89.05%	97.03%	97.11%	99.28%	100.00%
%age blocked calls		0.88%	0.00%	8.90%	1.19%	21.50%	10.95%	2.97%	2.89%	0.72%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-August											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		129480181	350021220	65715601	147601372	41990140	15366205	65704525	132754	7206377	488821870
Total number of calls dropped		1837321	4830177	864804	561611	310279	47853	372322	351	37914	3587561
Call drop rate	≤ 2%	1.42%	1.38%	1.32%	0.38%	0.74%	0.31%	0.57%	0.26%	0.53%	0.73%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		8696	20083	7246	13097	3381	2473	7484	76	766	22093
Total number of cells having more than 3% TCH		1146	503	1168	86	81	20	6	2	22	633
Worst affected cells having more than 3% TCH	≤ 3%	13.18%	2.50%	16.12%	0.66%	2.40%	0.81%	0.08%	2.38%	2.92%	2.87%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-August											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		11170705	40272624	7229515	174485383	17077125	1563271	7443251	176298	7512056	524528462
Total number of calls dropped		168246	554188	88735	497381	92686	4697	41815	510	38704	3144357
Call drop rate	≤ 2%	1.51%	1.38%	1.23%	0.29%	0.54%	0.30%	0.56%	0.29%	0.52%	0.60%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		8769	59653	7246	12771	3380	2473	7504	76	765	22081
Total number of cells having more than 3% TCH		1186	1580	1540	95	68	35	12	3	21	549
Worst affected cells having more than 3% TCH	≤ 3%	13.52%	2.65%	21.25%	0.74%	2.01%	1.42%	0.16%	3.51%	2.75%	2.49%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-August											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		226	555	471	589	701	813	848	369	555	673
Total number of calls dropped		0	1	23	4	9	29	30	0	1	0
Call drop rate	≤ 2%	0.00%	0.18%	4.88%	0.68%	1.28%	3.58%	3.58%	0.00%	0.18%	0.00%

Audit Results for Voice quality -PMR Data-August											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		19933583514	122212885282	7061	24672972906	41990140	NA	10738687513	10033204	1186627827	82800593114
Total number of calls with good voice quality		19153879379	117005853629	6710	24042211757	41878914	NA	10559893817	9852402	1160124611	78930268358
%age calls with good voice quality	≥ 95%	96.09%	95.74%	95.03%	97.44%	99.74%	99.69%	98.34%	98.20%	97.77%	95.33%

Live measurement results for Voice quality-3 Day data-August											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		1970976870	12015033458	826	15977475377	17077125	NA	1281651027	5369590	1286665351	82763267839
Total number of calls with good voice quality		1894582159	11502914333	785	15653743960	16914897	NA	1259759704	5268679	1259141743	79569486797
%age calls with good voice quality	≥ 95%	96.12%	95.74%	95.04%	97.97%	99.05%	99.69%	98.29%	98.12%	97.86%	96.14%

Drive test results for Voice quality (Average of three drive tests) - DT data-August											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		58611	128325	688847	1256363	65305	NA	323670	51711	889732	165321
Total number of calls with good voice quality		55974	124482	609777	1229569	65270	NA	323604	50930	862241	158559
%age calls with good voice quality	≥ 95%	95.50%	97.01%	88.52%	97.87%	99.95%	61.18%	99.98%	98.49%	96.91%	95.91%

Audit Results for POI Congestion- PMR data-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		67	37	77	118	40	21	48	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		79787	144675	183217	114123	55648	7366	37316	11654	6286	349481
Traffic served for all POIs (B)- in erlangs		37338	78550	35615	69232	22384	2533	18386	1554	1045	186038
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-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		63	34	48	118	37	21	48	47	20	47
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		78897	449351	108021	114060	55664	6205	37316	11654	6287	343281
Traffic served for all POIs (B)- in erlangs		36706	270921	27555	69942	23306	2720	18596	1349	1052	194952
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE – SEPTEMBER

Audit Results for Network Availability- PMR data-September											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		2965	6344	2479	4442	917	808	2489	26	255	7344
Sum of downtime of BTSs in a month (in hours)		25901	3619	62372	1691	29	1473	5120	4	46	1001
BTSs accumulated downtime (not available for service)	≤ 2%	1.21%	0.08%	3.49%	0.05%	0.00%	0.25%	0.29%	0.02%	0.02%	0.02%
Number of BTSs having accumulated downtime >24 hours		190	12	577	16	0	5	21	0	0	7
Worst affected BTSs due to downtime	≤ 2%	6.41%	0.19%	23.28%	0.36%	0.00%	0.62%	0.84%	0.00%	0.00%	0.10%
Live Measurement Results for Network Availability- 3 Day live data-September											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Number of BTSs in the licensed service area		2965	6317	2479	4351	917	821	2484	26	255	7344
Sum of downtime of BTSs in a month (in hours)		2650	358	9660	155	9	110	2631	0	2	134
BTSs accumulated downtime (not available for service)	≤ 2%	1.24%	0.08%	5.41%	0.05%	0.01%	0.19%	1.47%	0.00%	0.01%	0.03%
Number of BTSs having accumulated downtime >24 hours		18	0	185	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.61%	0.00%	7.46%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-September											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.27%	95.61%	97.94%	98.56%	99.73%	97.93%	98.60%	99.46%	99.06%	99.23%
SDCCH/Paging channel congestion	≤ 1%	0.45%	0.30%	2.57%	0.07%	NA	NA	0.03%	NA	0.06%	0.48%
TCH congestion	≤ 2%	1.22%	0.65%	1.21%	0.11%	0.07%	0.08%	0.13%	0.00%	0.09%	0.77%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-September											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
CSSR	≥ 95%	97.38%	95.70%	97.40%	99.62%	99.82%	98.09%	98.66%	99.52%	99.36%	99.75%
SDCCH/Paging channel congestion	≤ 1%	0.38%	0.30%	2.32%	0.04%	NA	NA	0.03%	NA	0.04%	0.27%
TCH congestion	≤ 2%	1.11%	0.45%	1.40%	0.03%	0.01%	0.07%	0.15%	0.00%	0.03%	0.25%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-September											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of call attempts		997	1135	694	871	946	970	1701	827	832	792
Total number of successful calls established		985	1135	606	871	946	883	1669	823	830	790
CSSR	≥ 95%	98.80%	100.00%	87.32%	100.00%	100.00%	91.03%	98.12%	99.52%	99.76%	99.75%
%age blocked calls		1.20%	0.00%	12.68%	0.00%	0.00%	8.97%	1.88%	0.48%	0.24%	0.25%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-September											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		102865962	385338455	62889874	163008554	37434318	13369975	73872377	116471	6706474	455572691
Total number of calls dropped		1484917	5154189	622965	777766	310557	41872	436153	344	36901	3892731
Call drop rate	≤ 2%	1.44%	1.34%	0.99%	0.48%	0.83%	0.31%	0.59%	0.30%	0.55%	0.85%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		8675	20177	7246	13382	3384	2464	7475	76	766	22093
Total number of cells having more than 3% TCH		1241	536	1371	101	84	23	5	1	24	637
Worst affected cells having more than 3% TCH	≤ 3%	14.31%	2.66%	18.92%	0.75%	2.48%	0.93%	0.07%	1.93%	3.16%	2.88%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-September											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		9817799	50819727	6446696	178232401	16354625	1388387	5884418	177523	7366024	520145468
Total number of calls dropped		126919	479074	69915	606145	82426	3947	32733	439	35978	2919816
Call drop rate	≤ 2%	1.29%	0.94%	1.08%	0.34%	0.50%	0.28%	0.56%	0.25%	0.49%	0.56%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of cells in the network		8587	60272	7246	13109	3384	2464	7504	76	768	22095
Total number of cells having more than 3% TCH		1089	1471	1329	134	79	48	21	2	21	593
Worst affected cells having more than 3% TCH	≤ 3%	12.68%	2.44%	18.34%	1.02%	2.33%	1.95%	0.28%	2.20%	2.73%	2.68%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-September											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of calls established		985	1135	606	447	946	883	1669	824	831	792
Total number of calls dropped		5	0	37	1	0	2	31	0	0	0
Call drop rate	≤ 2%	0.51%	0.00%	6.11%	0.22%	0.00%	0.23%	1.86%	0.00%	0.00%	0.00%

Audit Results for Voice quality -PMR Data-September											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		18107357291	397931413	7076	23828123187	101480	NA	12164146070	9113126	1130771954	79338382064
Total number of calls with good voice quality		17397413271	386498073	6725	23117793611	101000	NA	11977684009	8946743	1104879510	75402358634
%age calls with good voice quality	≥ 95%	96.08%	97.13%	95.04%	97.02%	99.53%	99.68%	98.47%	98.17%	97.71%	95.04%

Live measurement results for Voice quality-3 Day data-September											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		1777296983	11132252540	843	24917161532	16354625	NA	945134798	5286909	1282338628	83574827369
Total number of calls with good voice quality		1712060671	10647682812	801	24425453425	16317600	NA	930085432	5188247	1255285618	80452335090
%age calls with good voice quality	≥ 95%	96.33%	95.65%	95.02%	98.03%	99.77%	99.68%	98.41%	98.13%	97.89%	96.26%

Drive test results for Voice quality (Average of three drive tests) - DT data-September											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of sample calls		1493034	2180143	945402	1481269	116683	NA	464881	1711430	1306603	93825
Total number of calls with good voice quality		1426755	2099015	841282	1466968	115548	NA	434632	1683104	1266167	92050
%age calls with good voice quality	≥ 95%	95.56%	96.28%	88.99%	99.03%	99.03%	82.35%	96.45%	98.34%	96.91%	98.11%

Audit Results for POI Congestion- PMR data-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		67	39	77	118	40	21	48	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		80919	154224	185496	114789	43003	7351	37316	11654	6287	349827
Traffic served for all POIs (B)- in erlangs		35652	86535	35037	70466	17411	2589	17622	1408	1001	185117
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-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Vodafone
Total number of working POIs		68	39	77	118	37	21	48	47	20	49
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81290	463096	185530	114893	56537	7366	37316	11654	6287	350752
Traffic served for all POIs (B)- in erlangs		36550	250713	36435	70816	22940	2618	17929	1421	999	188587
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

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