EAST ZONE

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

Prepared By -

Prepared For-

IMRB International | eTech

TRAI सत्यमेव जयते

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 June 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated April 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
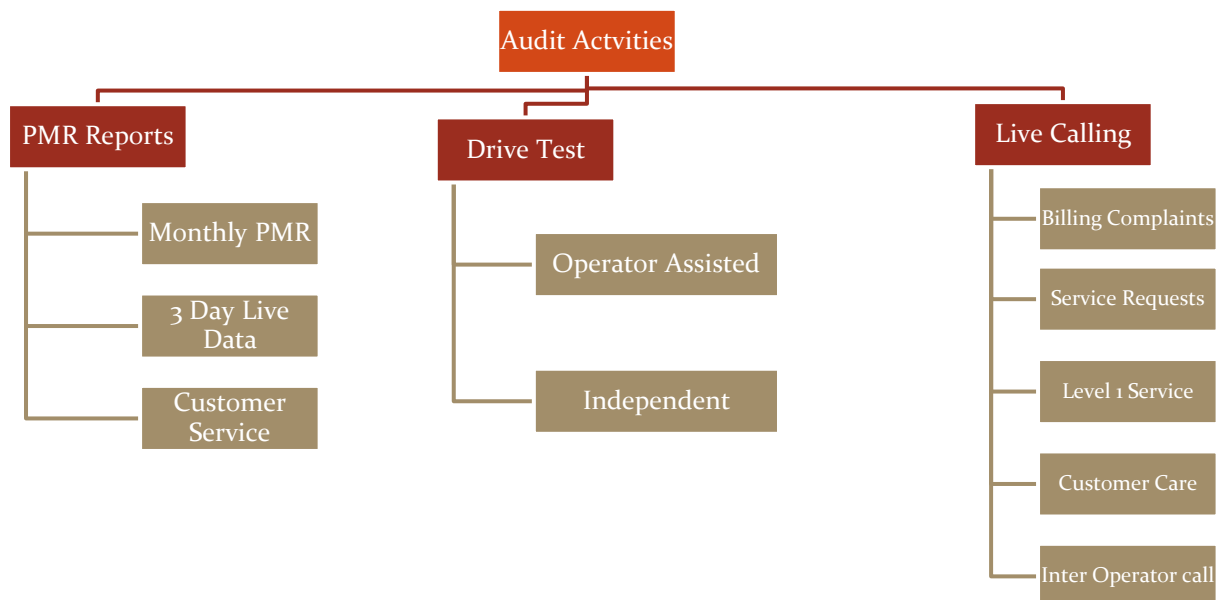
Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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

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

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

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

The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, May 2015 audit data was collected in the month of June 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 June 2015 (AMJ'15) was collected in the month of July 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 April, May and June 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.
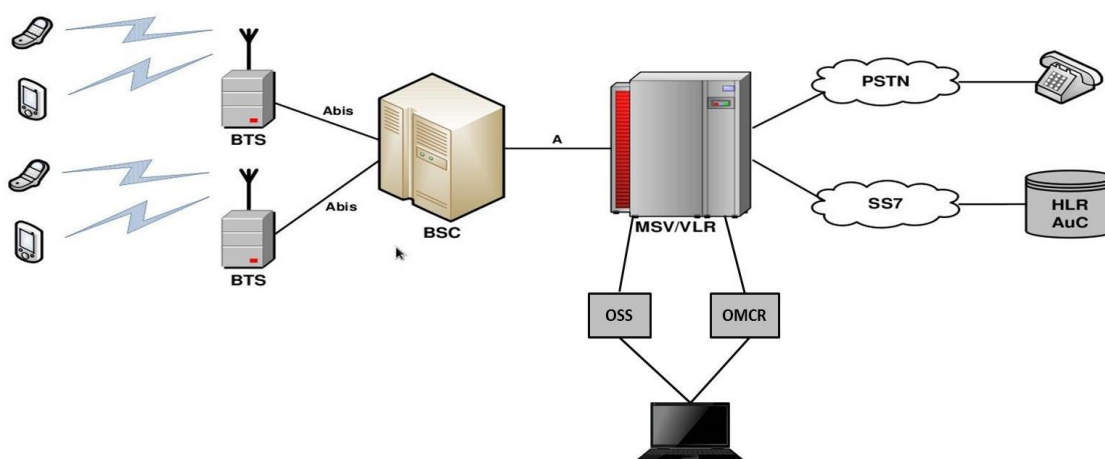
2.4.1.5   STEP BY STEP AUDIT PROCEDURE

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

Tender document and latest list of licencees as per TRAI is taken as a reference document for assimilating the presence of operators. All the wireless operators are then informed about the audit schedule

Audit formats and schedule is shared with the operators in advance. Details include day of the visit and date of 3 day data collection and other requirements.

IMRB auditors visit the operator's server/exchange/central NOC to extract data from operator's systems. Operator personnel assist the auditor in extraction process.

The extracted data is validated and verfied by the IMRB auditors.

IMRB auditors then prepare a PMR report from the extracted data with assistance from the operator.

IMRB auditors validate the values with raw data and also provide their comments, wherever required.

The final audit or PMR sheet is signed by the operator person in-charge along with authorized stamp.

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
TCH Congestion	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	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:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify TCBH.

The 90 day period is decided upon the basis of month of audit. For example, for audit of May 2015, the 90 day period data used to identify TCBH would be the data of Mar, Apr and May 2015

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

During audit, the auditors identified from the raw data that the TCBH for the operators in AMJ'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:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify CBBH.

For each day, the hour in which a cell in cellular mobile telephone network experiences maximum traffic for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as CBBH for the operator

During audit, the auditors identified from the raw data that the CBBH for the operators in AMJ'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	20:00-21:00	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

2.4.1.10   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 June 2015 (AMJ'15) was collected in the month of July 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:

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- 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

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2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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

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

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

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

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

Live calling activity was carried out during the period of June 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 May 2015 was considered for live calling activity conducted in June 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 June, 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.

While most of the Level 1 services are toll free, it has been observed that some Level 1 services may not be toll free. In AMJ'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-
    o With In city
    o Major Roads
    o Highways
    o Shopping complex/ Mall
    o 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 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.

2.4.3.4 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)	3350257
Airtel	12036460
BSNL	1254780
Idea	4662431
MTS	1093938
Reliance CDMA	760457
Reliance GSM	6015052
TATA CDMA	3778
TATA GSM	249832
Vodafone	14703556

Jun'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

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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)	2.58%	16.93%	97.17%	1.90%	1.66%	1.34%	8.74%	95.80%
Airtel	0.06%	0.08%	98.52%	0.73%	1.02%	1.04%	2.05%	95.62%
BSNL	8.97%	49.99%	97.80%	3.78%	1.11%	0.99%	13.48%	95.04%
Idea	0.25%	1.26%	98.53%	0.15%	0.40%	0.33%	0.39%	97.33%
MTS	0.31%	0.00%	99.37%	NA	0.42%	0.63%	1.99%	99.68%
Reliance CDMA	0.47%	1.28%	96.87%	NA	0.23%	0.31%	0.77%	99.68%
Reliance GSM	0.37%	1.04%	98.74%	0.06%	0.22%	0.59%	0.08%	98.35%
TATA CDMA	0.04%	0.00%	97.83%	NA	0.11%	0.74%	5.19%	98.03%
TATA GSM	0.08%	0.00%	98.90%	0.23%	0.30%	0.52%	2.72%	97.68%
Vodafone	0.07%	0.39%	99.03%	0.45%	0.97%	0.68%	2.36%	95.60%

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

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

Aircel and BSNL failed to meet the benchmark for BTS accumulated downtime. Tata CDMA had the best performance with 0.04% downtime.

Worst Affected BTSs Due to Downtime

Aircel and BSNL failed to meet the TRAI benchmark for the parameter. MTS, Tata CDMA and Tata GSM 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 99.37% 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:

Aircel and BSNL did not meet the benchmark for SDCCH/Paging channel congestion ratio. The best performance was recorded for Reliance GSM with 0.06% congestion.

For TCH congestion, all operators met the benchmark while Tata CDMA was the best performer by recording 0.11% 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 Reliance CDMA was the best performer with 0.31% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL and Tata CDMA 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. MTS 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 – APRIL

Name of Service Provider Month April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.02%	20.39%	97.22%	2.64%	1.62%	1.42%	9.18%	95.62%
Airtel	0.08%	0.10%	98.42%	0.76%	1.30%	1.05%	1.70%	95.55%
BSNL	8.03%	46.55%	98.06%	4.08%	0.96%	1.01%	13.47%	95.03%
Idea	0.32%	1.44%	98.82%	0.27%	0.64%	0.39%	0.37%	96.75%
MTS	0.35%	0.00%	99.38%	NA	0.36%	0.66%	2.01%	99.74%
Reliance CDMA	0.51%	1.46%	96.65%	NA	0.28%	0.32%	0.93%	99.68%
Reliance GSM	0.39%	1.08%	98.73%	0.06%	0.21%	0.59%	0.07%	98.36%
TATA CDMA	0.04%	0.00%	97.41%	NA	0.29%	0.73%	2.76%	97.97%
TATA GSM	0.09%	0.00%	98.79%	0.31%	0.42%	0.50%	2.74%	97.65%
Vodafone	0.09%	0.53%	98.94%	0.47%	1.06%	0.67%	2.49%	95.49%

3.1.2   PMR DATA – MAY

Name of Service Provider Month May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	2.72%	17.23%	97.25%	1.54%	1.61%	1.28%	8.04%	95.79%
Airtel	0.03%	0.02%	98.55%	0.72%	0.84%	1.02%	1.83%	95.58%
BSNL	8.29%	50.22%	98.14%	3.16%	1.00%	0.98%	12.81%	95.07%
Idea	0.23%	1.44%	99.07%	0.12%	0.21%	0.25%	0.31%	97.66%
MTS	0.27%	0.00%	99.29%	0.00%	0.55%	0.62%	1.88%	99.56%
Reliance CDMA	0.42%	1.09%	97.09%	0.00%	0.19%	0.30%	0.61%	99.68%
Reliance GSM	0.34%	1.00%	98.74%	0.05%	0.22%	0.59%	0.09%	98.34%
TATA CDMA	0.02%	0.00%	98.37%	0.00%	0.01%	0.73%	2.97%	98.03%
TATA GSM	0.04%	0.00%	98.99%	0.28%	0.24%	0.52%	2.54%	97.69%
Vodafone	0.07%	0.40%	99.04%	0.45%	0.96%	0.68%	2.39%	95.65%

3.1.3   PMR DATA - JUNE

Name of Service Provider Month June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	2.00%	13.18%	97.05%	1.53%	1.74%	1.33%	9.01%	95.99%
Airtel	0.07%	0.11%	98.58%	0.72%	0.91%	1.05%	2.61%	95.72%
BSNL	10.58%	53.21%	97.20%	4.11%	1.36%	0.99%	14.17%	95.01%
Idea	0.19%	0.90%	97.71%	0.07%	0.36%	0.34%	0.49%	97.58%
MTS	0.31%	0.00%	99.45%	NA	0.34%	0.61%	2.08%	99.75%
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.06%	0.00%	97.72%	NA	0.02%	0.75%	9.83%	98.08%
TATA GSM	0.12%	0.00%	98.92%	0.10%	0.25%	0.53%	2.88%	97.69%
Vodafone	0.04%	0.23%	99.11%	0.42%	0.89%	0.68%	2.20%	95.65%

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

3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators. It was seen from the live data collected, that the performance of the operators across all parameters more or less corroborated with the audit data collected.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	2.23%	1.85%	97.36%	1.38%	1.29%	1.29%	8.07%	95.75%
Airtel	0.02%	0.00%	98.56%	0.70%	0.96%	1.09%	1.82%	95.40%
BSNL	4.95%	4.73%	97.71%	3.76%	1.19%	0.99%	13.01%	95.02%
Idea	0.14%	0.10%	99.48%	0.06%	0.11%	0.31%	0.75%	97.52%
MTS	0.25%	0.00%	99.67%	NA	0.16%	0.51%	1.98%	99.70%
Reliance CDMA	0.30%	0.00%	97.02%	NA	0.22%	0.25%	0.81%	99.68%
Reliance GSM	0.19%	0.00%	98.68%	0.06%	0.20%	0.59%	0.18%	98.42%
TATA CDMA	0.00%	0.00%	97.67%	NA	0.73%	0.71%	5.12%	97.89%
TATA GSM	0.01%	0.00%	99.17%	0.04%	0.11%	0.54%	2.90%	97.79%
Vodafone	0.02%	0.00%	99.72%	0.25%	0.28%	0.57%	2.68%	96.30%

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

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

BTSs Accumulated Downtime

During live measurement, it was found that Aircel and 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 Vodafone at 99.72% 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:

Aircel and BSNL did not meet the benchmark for SDCCH/Paging channel congestion ratio. The best performance was recorded for Tata GSM with 0.04% congestion.

For TCH congestion, all operators met the benchmark. Idea and Tata GSM were the best performers by recording 0.11% 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. Reliance CDMA was the best performer with 0.25% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL and Tata CDMA failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.18% worst affected cells having more than 3% TCH drop.

Voice Quality

All the operators ensured an appropriate amount of voice quality, above the benchmark. MTS reported the best performance at 99.70%.

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

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

3.2.1   3 DAY DATA - APRIL

Name of Service Provider 3 day April	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.97%	1.82%	97.41%	0.85%	1.08%	1.37%	7.97%	95.53%
Airtel	0.02%	0.00%	98.50%	0.66%	1.19%	1.15%	1.72%	95.37%
BSNL	3.95%	3.59%	98.11%	3.60%	0.92%	0.94%	14.06%	95.01%
Idea	0.08%	0.05%	99.29%	0.05%	0.17%	0.34%	0.94%	96.82%
MTS	0.26%	0.00%	99.48%	NA	0.32%	0.56%	2.29%	99.64%
Reliance CDMA	0.23%	0.00%	95.66%	NA	0.40%	0.28%	0.93%	99.68%
Reliance GSM	0.14%	0.00%	98.67%	0.07%	0.18%	0.59%	0.20%	98.50%
TATA CDMA	0.00%	0.00%	98.55%	NA	0.00%	0.63%	3.07%	97.85%
TATA GSM	0.00%	0.00%	99.16%	0.02%	0.12%	0.52%	2.33%	97.82%
Vodafone	0.01%	0.00%	99.67%	0.26%	0.33%	0.58%	2.79%	96.23%

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3.2.2   3 DAY DATA – MAY

Name of Service Provider 3 Day May	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	2.66%	2.19%	97.38%	0.92%	1.47%	0.96%	7.40%	95.69%
Airtel	0.02%	0.00%	98.67%	0.62%	0.82%	1.06%	1.87%	95.25%
BSNL	4.13%	3.95%	97.38%	2.58%	1.14%	1.03%	11.25%	95.04%
Idea	0.14%	0.12%	99.52%	0.05%	0.05%	0.27%	0.60%	97.91%
MTS	0.29%	0.00%	99.73%	0.00%	0.10%	0.47%	1.70%	99.89%
Reliance CDMA	0.36%	0.00%	98.37%	0.00%	0.04%	0.21%	0.69%	99.67%
Reliance GSM	0.24%	0.00%	98.69%	0.04%	0.22%	0.59%	0.15%	98.33%
TATA CDMA	0.00%	0.00%	98.69%	0.00%	0.00%	0.74%	3.07%	97.90%
TATA GSM	0.00%	0.00%	99.29%	0.03%	0.06%	0.52%	2.46%	97.84%
Vodafone	0.03%	0.00%	99.75%	0.23%	0.25%	0.55%	2.57%	96.36%

3.2.3 3 DAY DATA - JUNE

Name of Service Provider 3 Day June	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	2.05%	1.53%	97.29%	2.38%	1.32%	1.54%	8.85%	96.03%
Airtel	0.03%	0.00%	98.52%	0.81%	0.86%	1.05%	1.86%	95.58%
BSNL	6.77%	6.66%	97.64%	5.09%	1.52%	1.01%	13.73%	95.02%
Idea	0.19%	0.12%	99.63%	0.07%	0.10%	0.31%	0.70%	97.83%
MTS	0.19%	0.00%	99.81%	NA	0.05%	0.51%	1.96%	99.56%
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	0.00%	0.00%	95.76%	NA	2.20%	0.76%	9.21%	97.93%
TATA GSM	0.04%	0.00%	99.05%	0.07%	0.16%	0.57%	3.91%	97.70%
Vodafone	0.02%	0.00%	99.74%	0.27%	0.26%	0.59%	2.68%	96.30%

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

3.3   LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Service Requests	Level 1 Service	Response time to customer for assistance	
	%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)	NA	NA	98.00%	98.67%	100.00%	100.00%
Airtel	96.00%	96.00%	95.00%	100.00%	100.00%	96.00%
BSNL	100.00%	100.00%	94.00%	99.33%	100.00%	100.00%
Idea	98.00%	98.00%	97.00%	96.00%	100.00%	100.00%
MTS	91.00%	91.00%	95.00%	97.33%	100.00%	97.00%
Reliance CDMA	95.00%	95.00%	88.00%	100.00%	100.00%	100.00%
Reliance GSM	90.00%	100.00%	83.00%	100.00%	100.00%	100.00%
TATA CDMA	NA	NA	75.00%	97.33%	100.00%	100.00%
TATA GSM	NA	NA	90.00%	96.67%	100.00%	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Resolution of billing complaints

Airtel, MTS, Reliance CDMA. Tata CDMA and Tata GSM failed to meet the TRAI benchmark for resolving 98% complaints within 4 weeks as well as 100% complaints within 6 weeks. Reliance GSM failed meet the benchmark for resolving 98% complaints within 4 weeks while Idea failed to meet the benchmark for resolving 100% complaints within 6 weeks.

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

Complaint/Request Attended to Satisfaction

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

Level 1 Service

All operators met 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

Aircel failed to meet the TRAI benchmark of answering 95% calls by IVR.

Customer Care / Helpline Assessment

Aircel, Airtel and Reliance GSM failed to meet 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%	NA	NA	NA	73.53%	84.29%
Airtel	0.06%	0.02%	100.00%	100.00%	100.00%	99.81%	86.28%
BSNL	0.05%	0.06%	25.99%	25.99%	100.00%	95.98%	96.28%
Idea	0.58%	0.06%	100.00%	100.00%	100.00%	98.62%	98.63%
MTS	0.10%	0.02%	100.00%	100.00%	100.00%	98.28%	96.02%
Reliance CDMA	0.09%	0.02%	100.00%	100.00%	100.00%	99.48%	99.83%
Reliance GSM	0.09%	0.09%	100.00%	100.00%	100.00%	98.98%	42.18%
TATA CDMA	NA	0.00%	NA	NA	NA	99.62%	99.10%
TATA GSM	NA	0.00%	NA	NA	NA	96.61%	98.75%
Vodafone	0.05%	0.01%	100.00%	100.00%	100.00%	100.00%	96.91%

Metering and billing credibility – Postpaid Subscribers

For the postpaid customers, Idea and MTS failed to meet the TRAI benchmark. Aircel was 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

BSNL failed to meet the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 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).

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

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.

Aircel failed to meet 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)

Aircel, Airtel and Reliance 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 Reliance CDMA at 99.83%.

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%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	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	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	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. None of the operators faced any issues in inter-operator connectivity.

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4   CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

BSNL and Aircel 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.

Tata CDMA failed to meet the benchmark of Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters)

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

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

Airtel, MTS, Reliance CDMA and Reliance GSM failed to meet the TRAI benchmark for resolving 98% complaints within 4 weeks. Airtel, Idea, MTS and Reliance CDMA failed to meet the TRAI benchmark for resolving 100% complaints within 6 weeks.

As per live calling conducted for 'level 1' services, 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 and MTS failed to meet the TRAI benchmark.

Resolution of Billing Complaints

BSNL failed to meet the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 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 and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Customer Care

Aircel failed to meet the benchmark for calls answered by IVR. Aircel, Airtel and Reliance 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
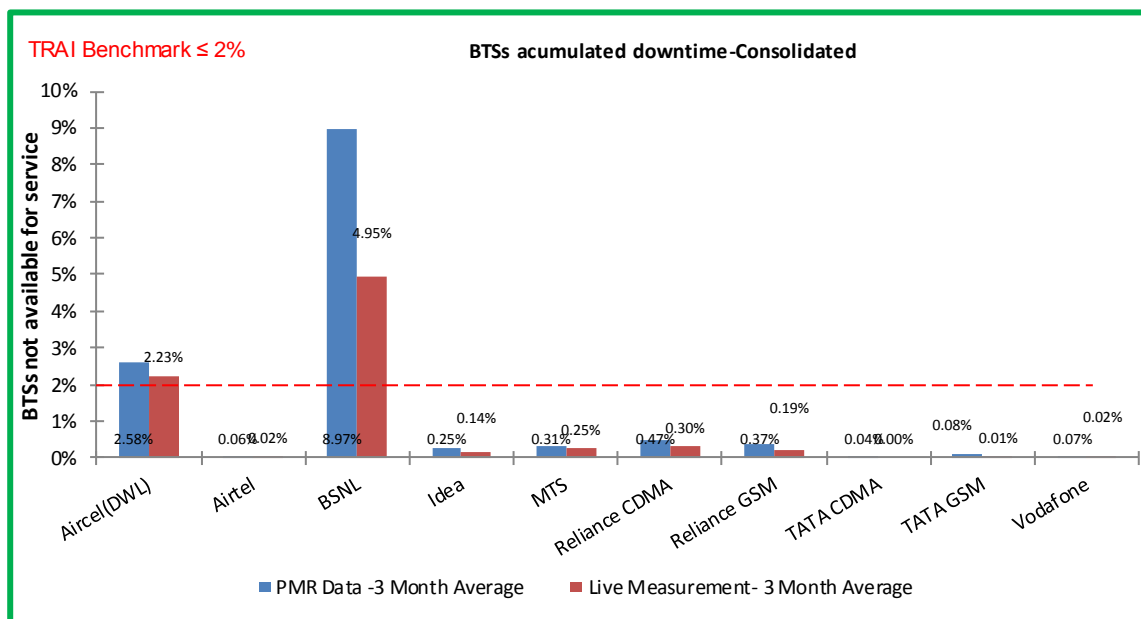
Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL failed to meet the benchmark for BTS accumulated downtime.

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

5.1.2.1 KEY FINDINGS – MONTH 1
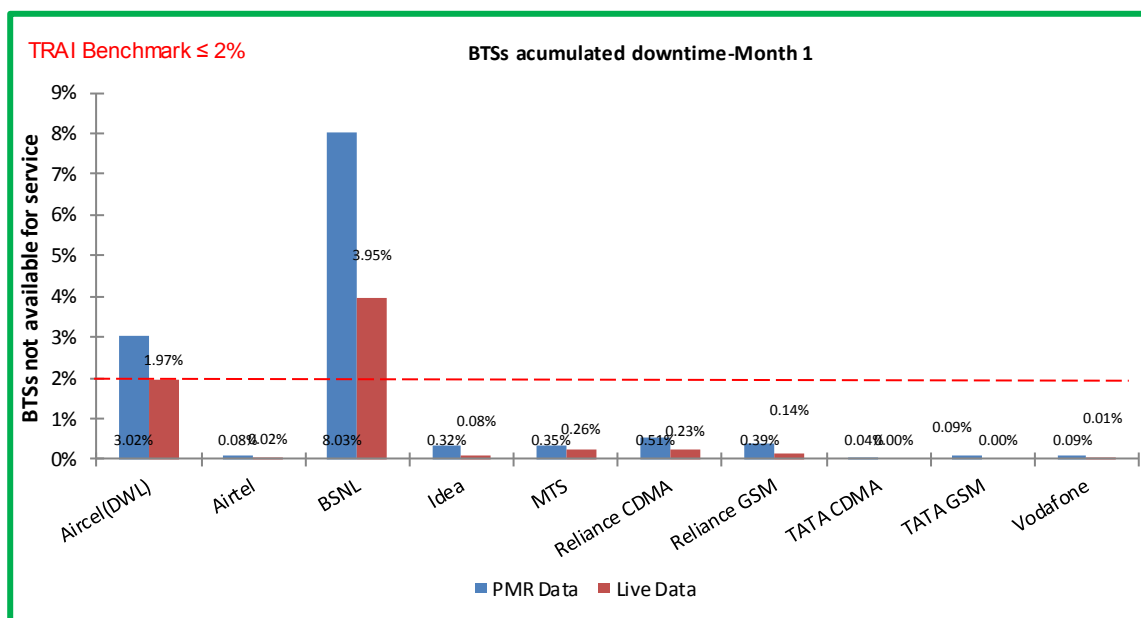
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 2%

BTSs acumulated downtime-Month 2

BTSs not available for service

Operator	PMR Data	Live Data
Aircel(DWL)	2.72%	2.66%
Airtel	0.03%	0.02%
BSNL	8.29%	4.13%
Idea	0.23%	0.14%
MTS	0.27%	0.29%
Reliance CDMA	0.42%	0.36%
Reliance GSM	0.34%	0.24%
TATA CDMA	0.02%	0.00%
TATA GSM	0.04%	0.00%
Vodafone	0.07%	0.03%

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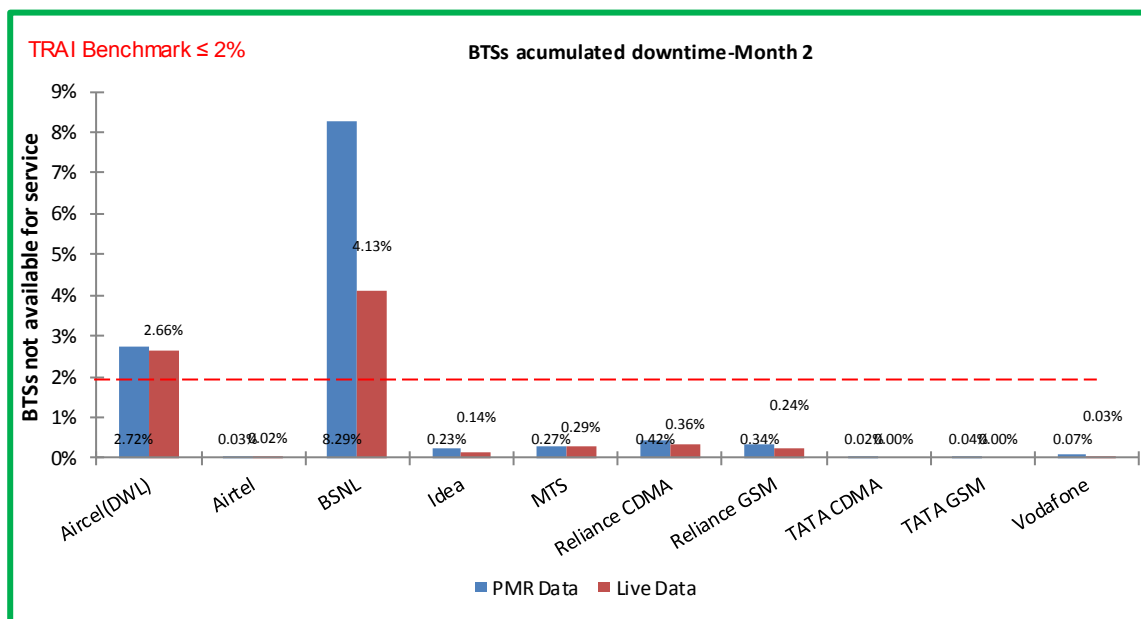
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.3 KEY FINDINGS – MONTH 3
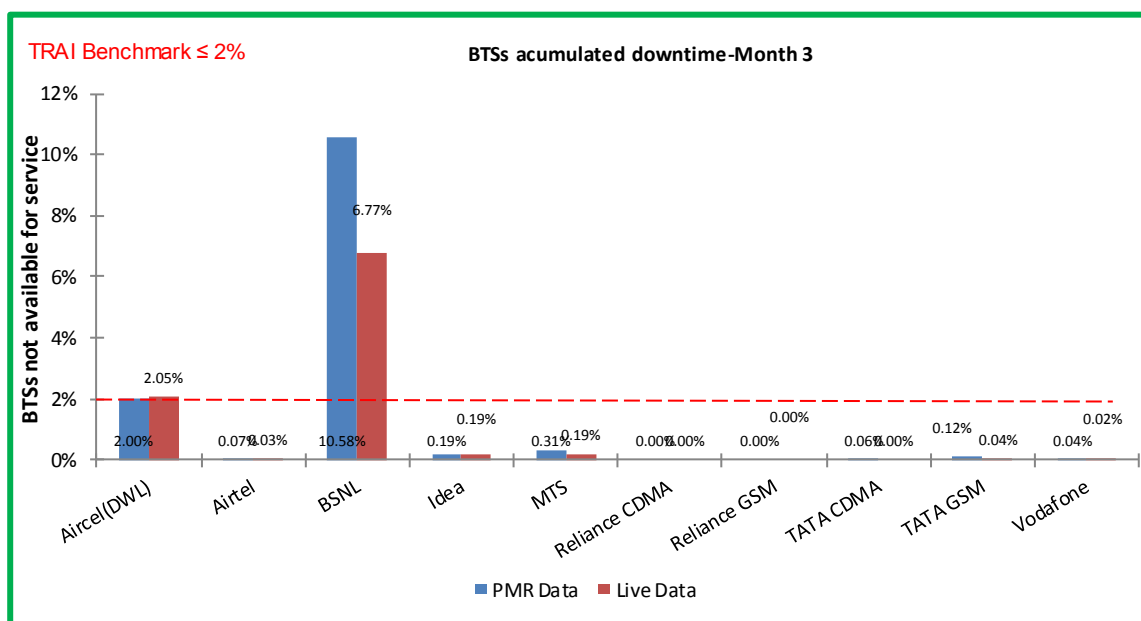
TRAI Benchmark ≤ 2%

BTSs acumulated downtime-Month 3

BTSs not available for service

Operator	PMR Data	Live Data
Aircel(DWL)	2.00%	2.05%
Airtel	0.07%	0.03%
BSNL	10.58%	6.77%
Idea	0.19%	0.19%
MTS	0.31%	0.19%
Reliance CDMA	0.00%	0.00%
Reliance GSM	0.00%	0.00%
TATA CDMA	0.06%	0.00%
TATA GSM	0.12%	0.04%
Vodafone	0.04%	0.02%

■ PMR Data ■ Live Data

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

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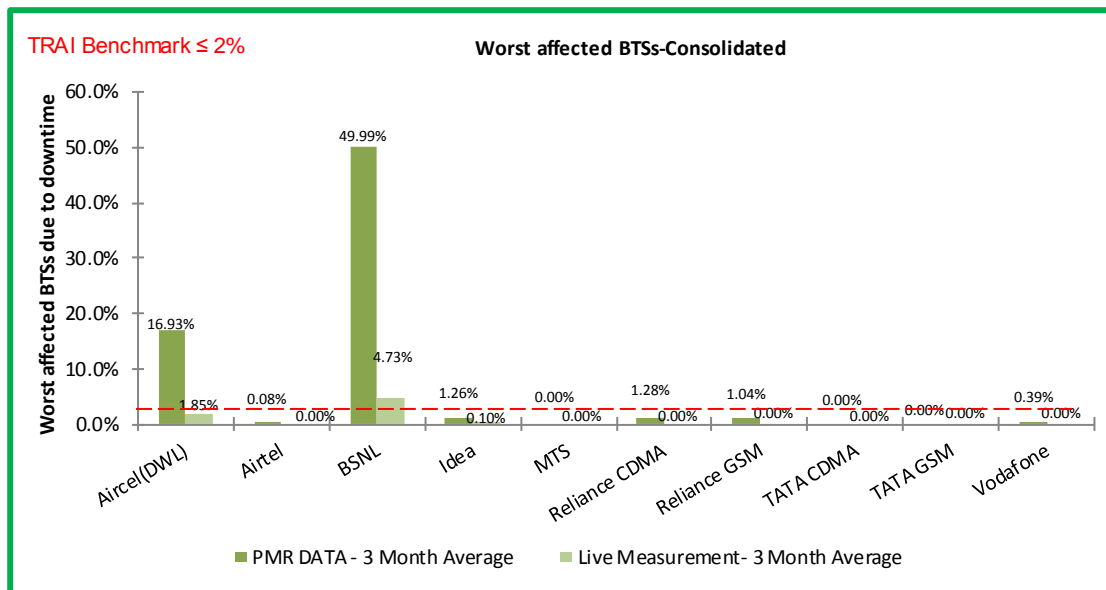
Data Source: Operations and Maintenance Center (OMC) of the operators

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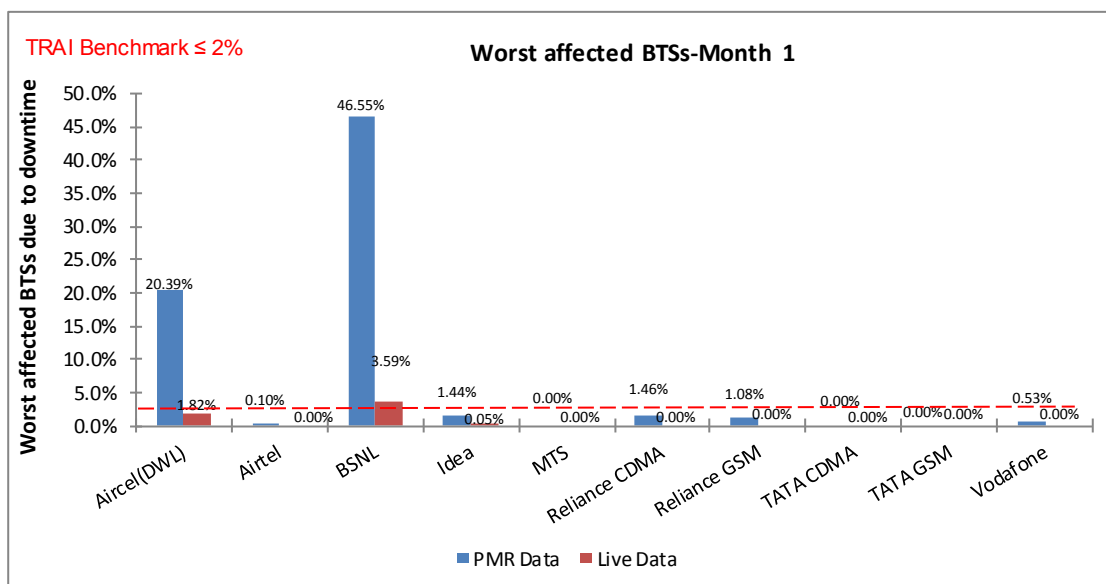
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.2   KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 2%

Worst affected BTSs-Month 2
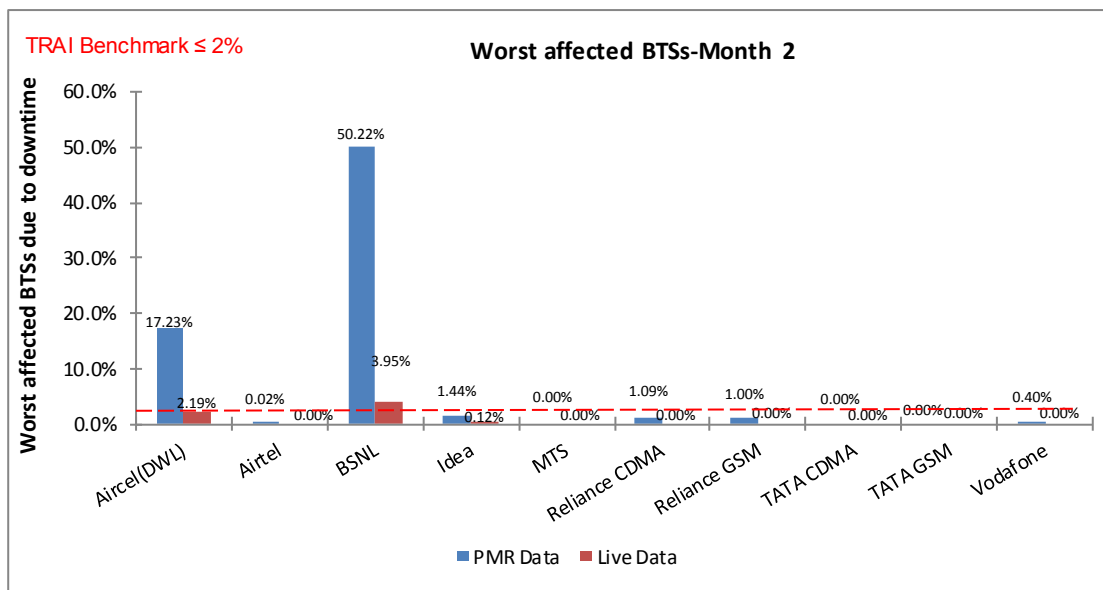
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.3   KEY FINDINGS – MONTH 3
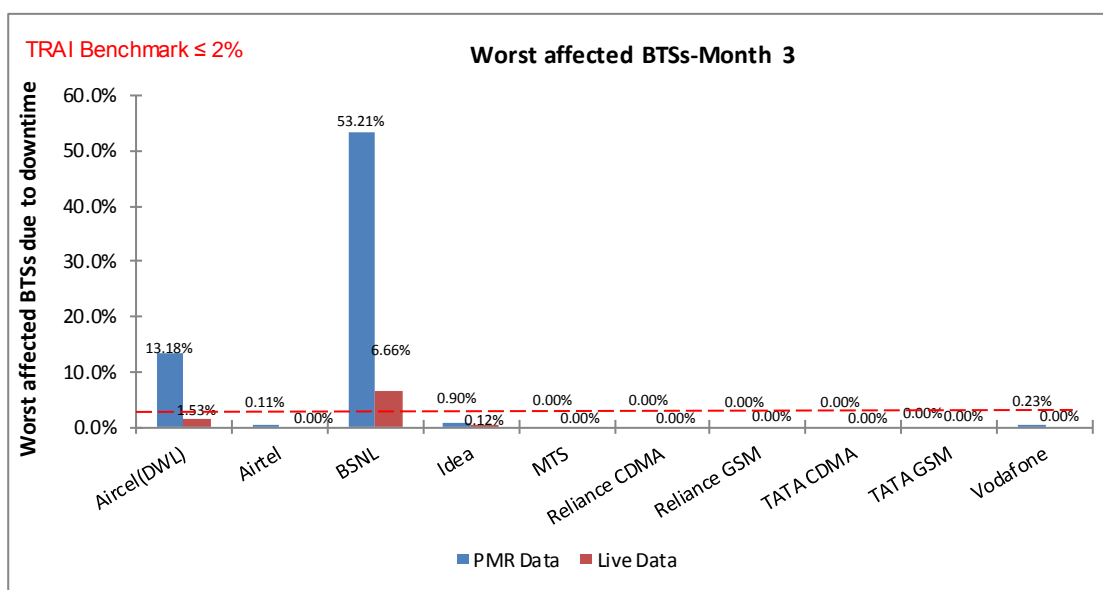
TRAI Benchmark ≤ 2%

Worst affected BTSs-Month 3

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

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
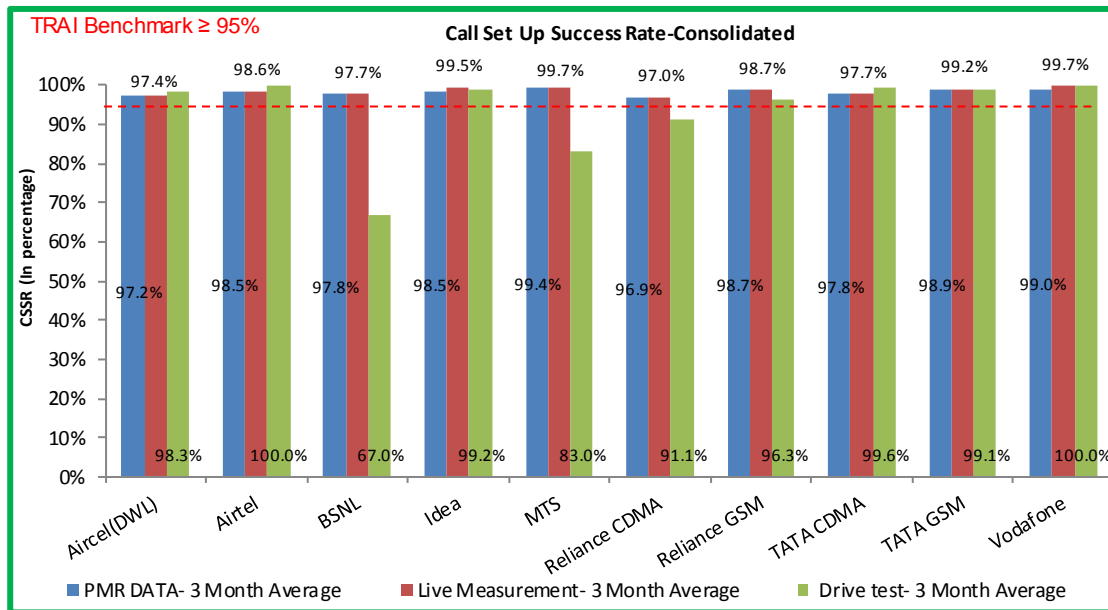
Call Set Up Success Rate-Consolidated

TRAI Benchmark ≥ 95%

PMR DATA- 3 Month Average   Live Measurement- 3 Month Average   Drive test- 3 Month Average

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
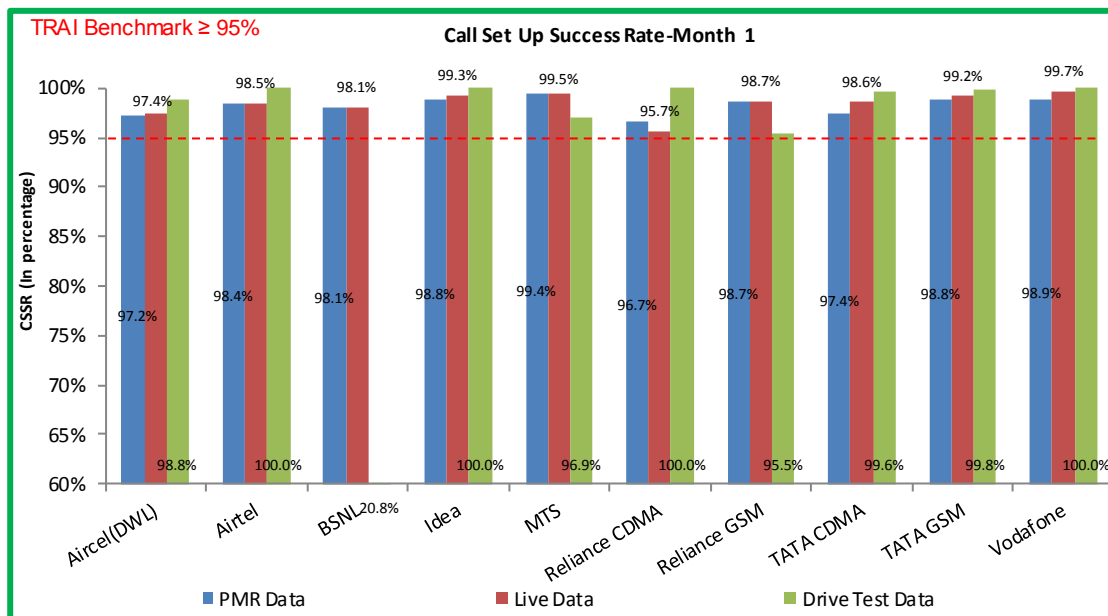
Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%

PMR Data   Live Data   Drive Test Data

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

5.3.2.2   KEY FINDINGS – MONTH 2
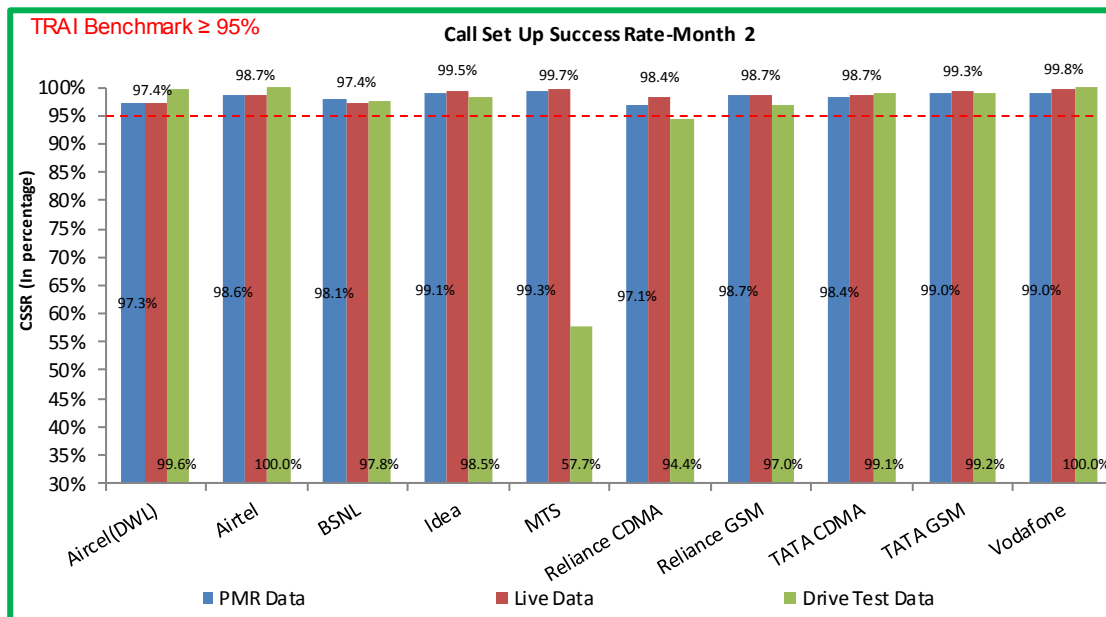
TRAI Benchmark ≥ 95%

Call Set Up Success Rate-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
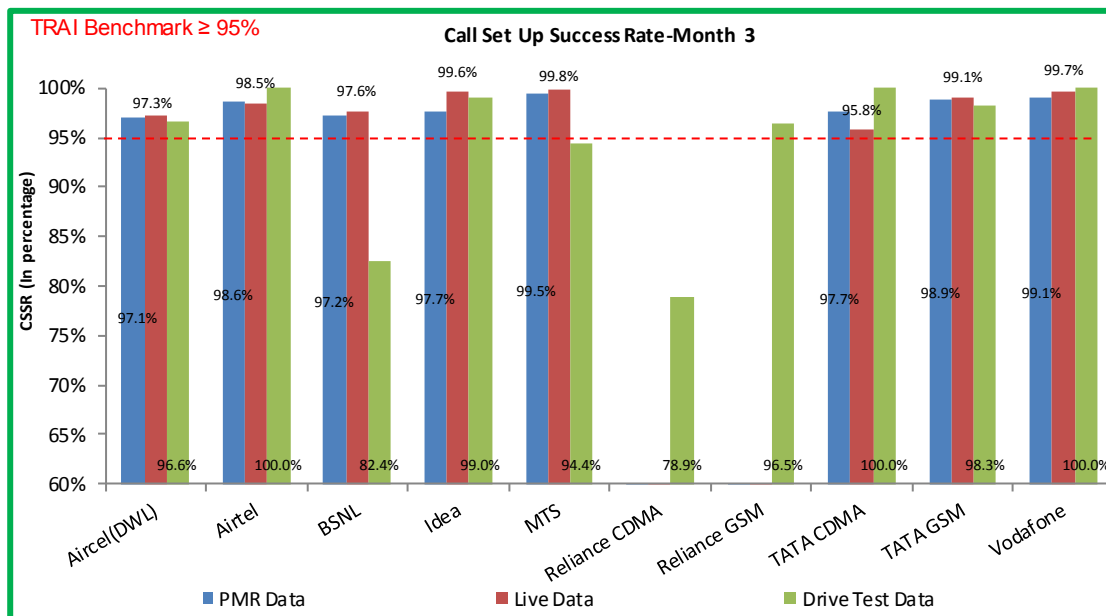
TRAI Benchmark ≥ 95%

Call Set Up Success Rate-Month 3

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

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% = $[(A_1 \times C_1) + (A_2 \times C_2) + \ldots + (A_n \times C_n)] / (A_1 + A_2 + \ldots + A_n)$**

   - Where:-A_1 = Number of attempts to establish SDCCH / TCH made on day 1

   - C_1 = Average SDCCH / TCH Congestion % on day 1

   - A_2 = Number of attempts to establish SDCCH / TCH made on day 2

   - C_2 = Average SDCCH / TCH Congestion % on day 2

   - A_n = Number of attempts to establish SDCCH / TCH made on day n

   - C_n = Average SDCCH / TCH Congestion % on day n

   ↳ **POI Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) + \ldots + (A_n \times C_n)] / (A_1 + A_2 + \ldots + A_n)$**

   - Where:-A_1 = POI traffic offered on all POIs (no. of calls) on day 1

   - C_1 = Average POI Congestion % on day 1

   - A_2 = POI traffic offered on all POIs (no. of calls) on day 2

   - C_2 = Average POI Congestion % on day 2

   - A_n = POI traffic offered on all POIs (no. of calls) on day n

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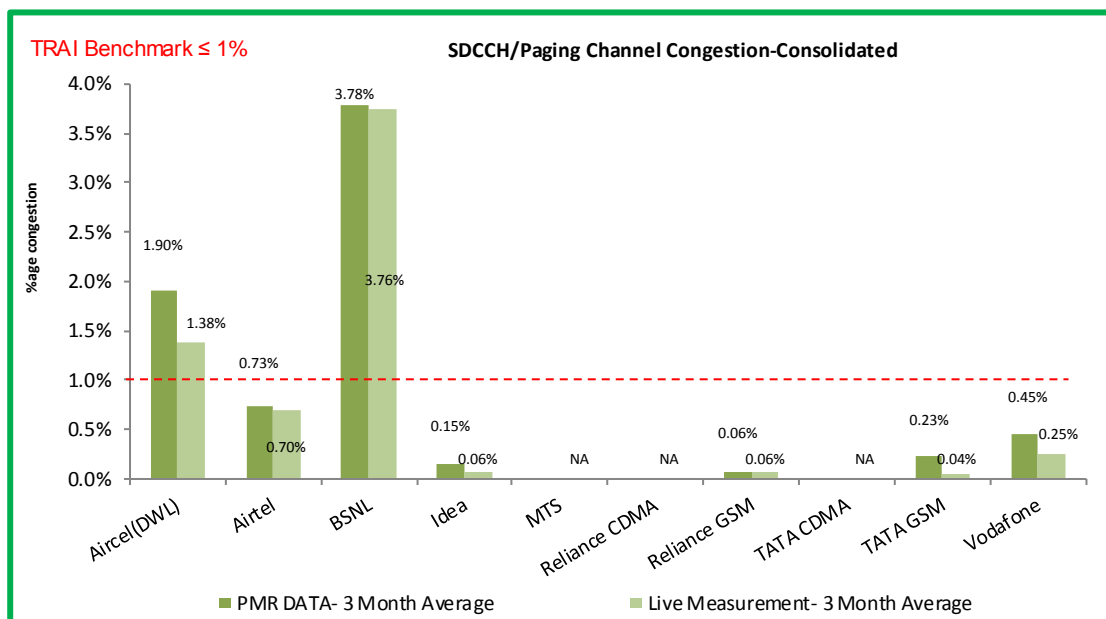
Data Source: Network Operations Center (NOC) of the operators

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

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

5.4.2.1   KEY FINDINGS – MONTH 1
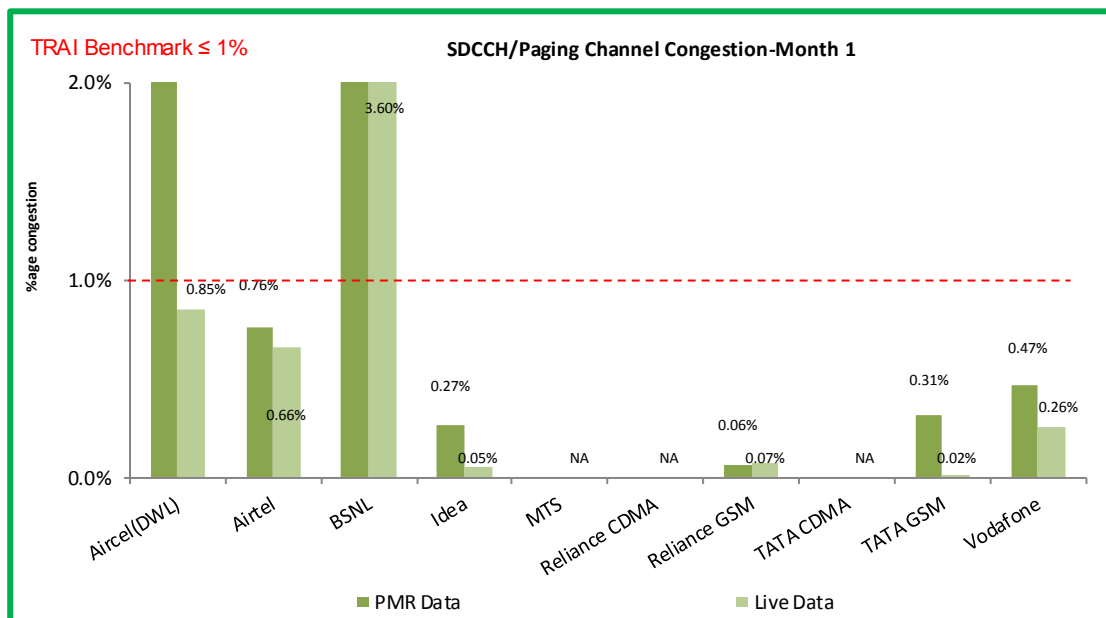
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 1%

SDCCH/Paging Channel Congestion-Month 2
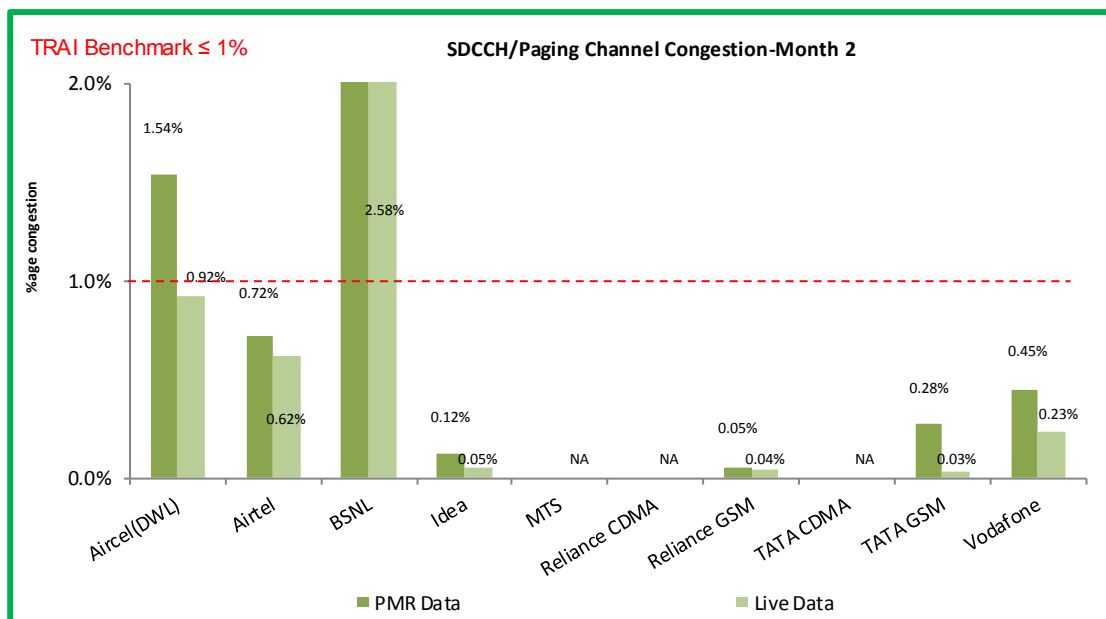
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MONTH 3
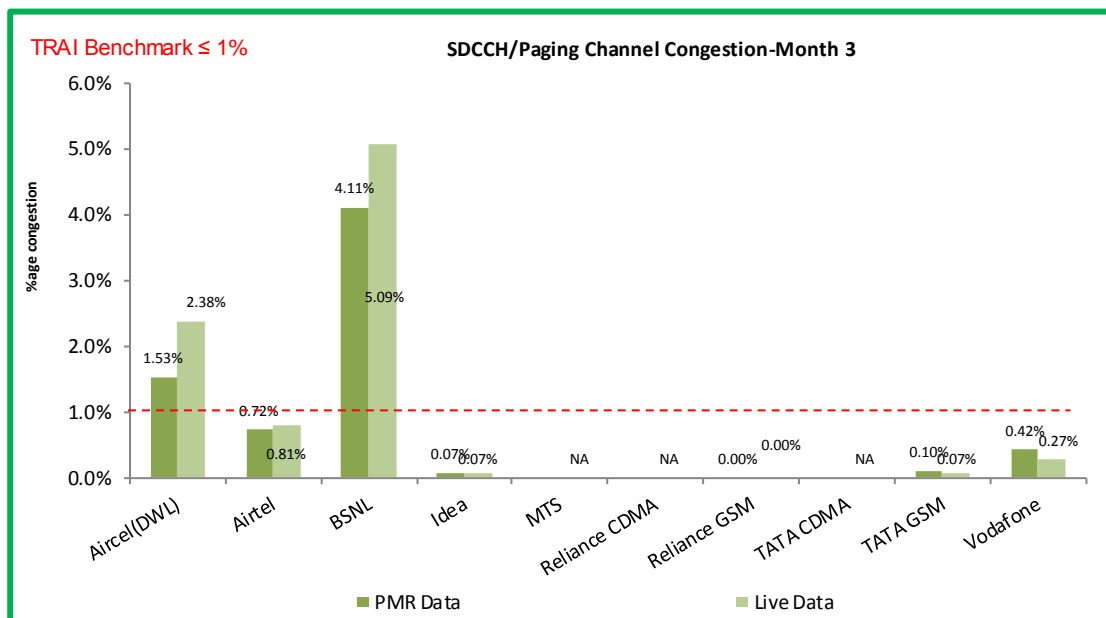
TRAI Benchmark ≤ 1%

SDCCH/Paging Channel Congestion-Month 3

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

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

5.4.3 KEY FINDINGS – TCH CONGESTION
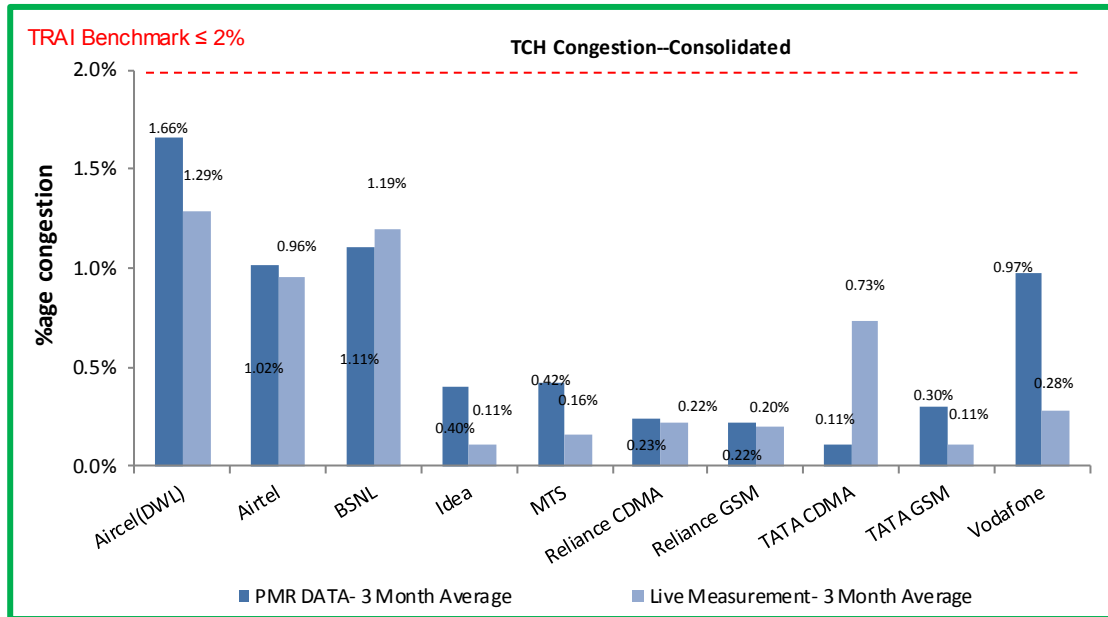
Data Source: Network Operations Center (NOC) of the operators

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

5.4.3.2 KEY FINDINGS – MONTH 2
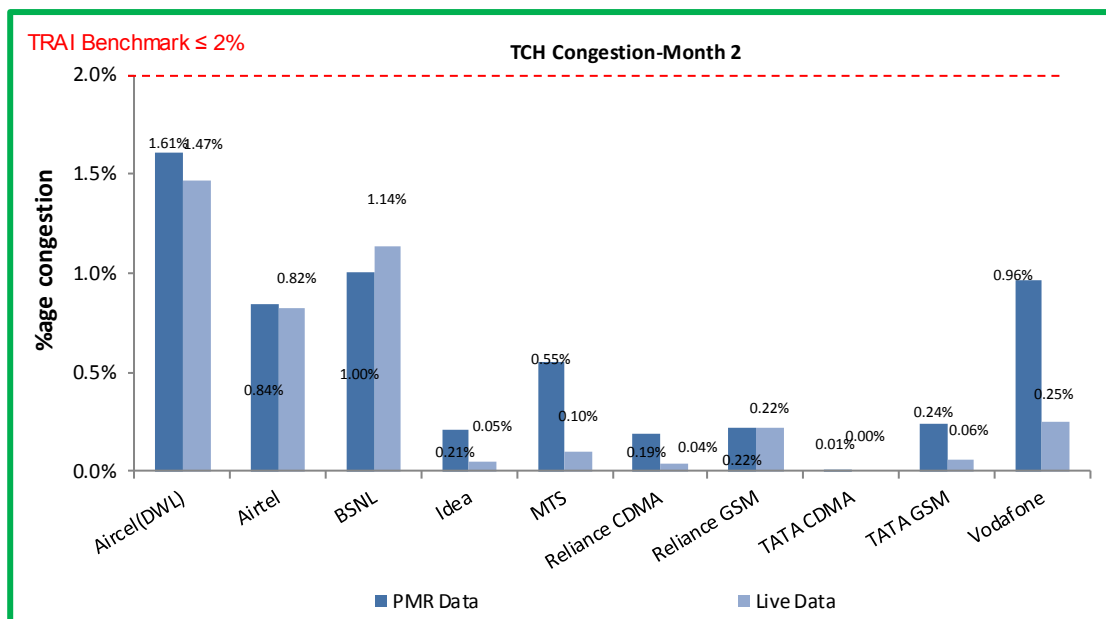
Data Source: Network Operations Center (NOC) of the operators

5.4.3.3 KEY FINDINGS – MONTH 3
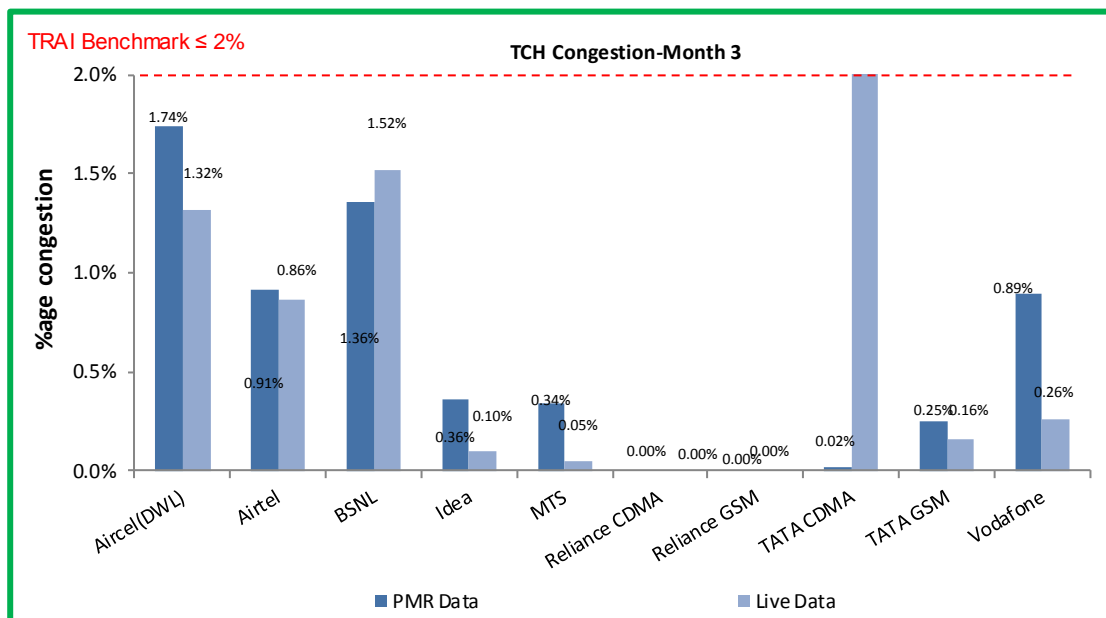
For Reliance CDMA and Reliance GSM, Data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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		62	37	77	114	38	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76894	144235	185897	107500	56006	7028	37316	12250	6293	341513
Traffic served for all POIs (B)- in erlangs		38407	93673	29434	68188	25470	2552	22299	1761	1268	203814
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		62	37	77	114	37	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76408	423706	186390	107775	53799	7028	37316	12249	6286	340974
Traffic served for all POIs (B)- in erlangs		37231	275755	29622	68586	26319	2407	22594	1695	1273	198549
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-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		61	37	77	112	38	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76580	143618	186390	103893	56150	7851	37316	12460	6293	340381
Traffic served for all POIs (B)- in erlangs		38045	92625	25520	65903	26064	2515	21932	1811	1339	195057
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		61	37	77	112	37	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76570	425193	186390	104156	56158	7851	37316	12460	6287	339989
Traffic served for all POIs (B)- in erlangs		32734	273333	25576	66364	26606	2515	21932	1822	1327	192964
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

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-May											
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	112	38	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76715	146648	186390	103450	56218	6205	37316	12459	6293	340904
Traffic served for all POIs (B)- in erlangs		38883	97895	24626	65023	25745	2589	22665	1786	1266	214781
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-May											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		62	37	77	112	37	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76626	430255	186390	103518	56474	6205	37316	12458	6286	340560
Traffic served for all POIs (B)- in erlangs		40636	281976	24329	64190	27136	2298	23256	1747	1259	200355
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-June											
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	NDR	NDR	58	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		77387	142440	184910	115158	55651	NDR	NDR	11830	6293	343254
Traffic served for all POIs (B)- in erlangs		38294	90499	38155	73639	24601	NDR	NDR	1686	1199	201605
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

| Live Measurement Results for POI Congestion- 3 Day data-June											
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	58	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		76027	415670	186390	115652	48764	NDR	NDR	11830	6286	342374
Traffic served for all POIs (B)- in erlangs		38321	271955	38962	75205	25217	NDR	NDR	1515	1234	202328
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

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

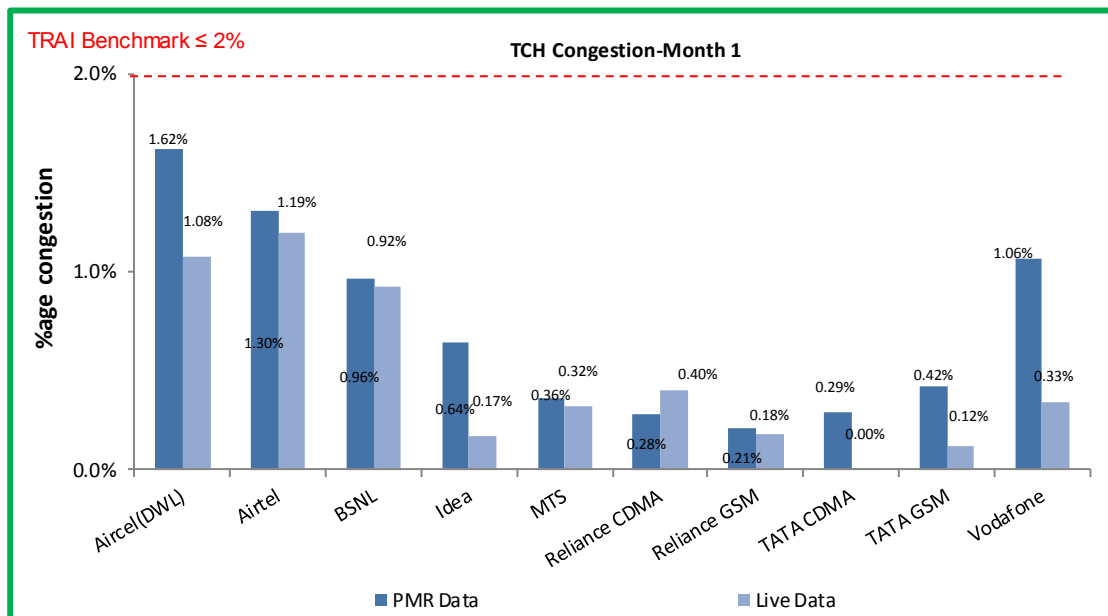*Data Source: Network Operations Center (NOC) of the operators*

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 and Reliance GSM during drive tests.

5.5.2.1   KEY FINDINGS – MONTH 1
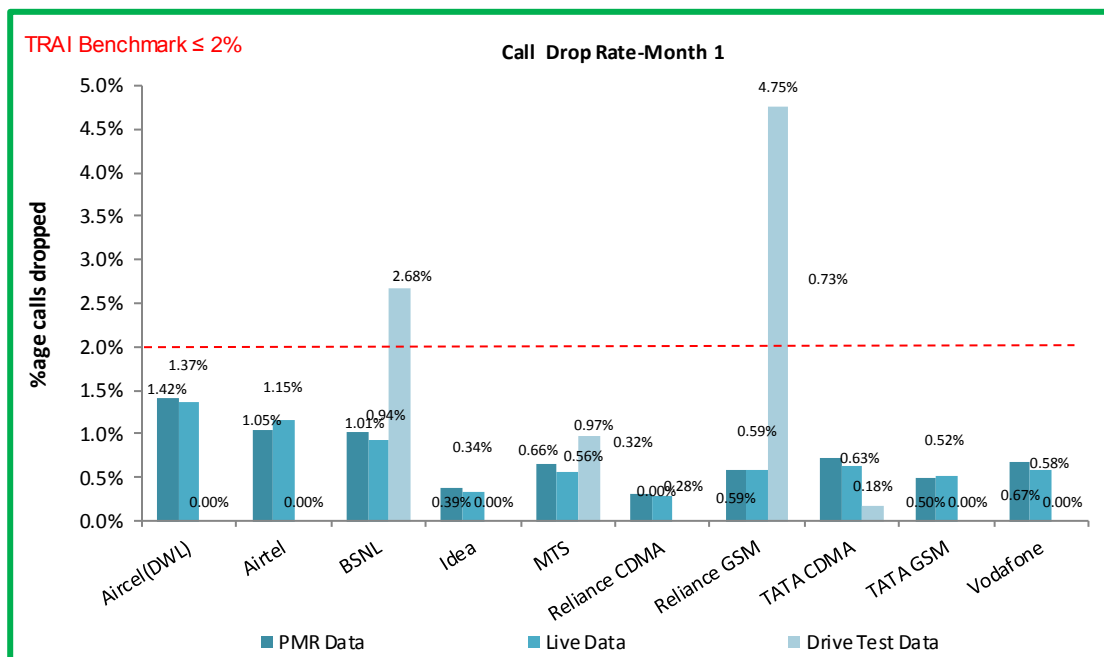
TRAI Benchmark ≤ 2%

Call Drop Rate-Month 1

%age calls dropped

Aircel(DWL): PMR 1.42%, Live 1.37%, Drive 0.00%
Airtel: PMR 1.05%, Live 1.15%, Drive 0.00%
BSNL: PMR 1.01%, Live 0.94%, Drive 2.68%
Idea: PMR 0.39%, Live 0.34%, Drive 0.00%
MTS: PMR 0.66%, Live 0.56%, Drive 0.97%
Reliance CDMA: PMR 0.32%, Live 0.00%, Drive 0.28%
Reliance GSM: PMR 0.59%, Live 0.59%, Drive 4.75%
TATA CDMA: PMR 0.73%, Live 0.63%, Drive 0.18%
TATA GSM: PMR 0.50%, Live 0.52%, Drive 0.00%
Vodafone: PMR 0.67%, Live 0.58%, Drive 0.00%

■ PMR Data   ■ Live Data   ■ Drive Test Data

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

5.5.2.2   KEY FINDINGS – MONTH 2

TRAI Benchmark ≤ 2%

Call Drop Rate-Month 2

%age calls dropped

Aircel(DWL): PMR 1.28%, Live 0.96%, Drive 0.00%
Airtel: PMR 1.02%, Live 1.06%, Drive 0.18%
BSNL: PMR 0.98%, Live 1.03%, Drive 1.77%
Idea: PMR 0.25%, Live 0.27%, Drive 0.38%
MTS: PMR 0.62%, Live 0.47%, Drive 3.63%
Reliance CDMA: PMR 0.30%, Live 0.00%, Drive 0.21%
Reliance GSM: PMR 0.59%, Live 0.59%, Drive 3.11%
TATA CDMA: PMR 0.74%, Live 0.00%, Drive 0.73%
TATA GSM: PMR 0.52%, Live 0.52%, Drive 0.63%
Vodafone: PMR 0.68%, Live 0.55%, Drive 0.00%

■ PMR Data   ■ Live Data   ■ Drive Test Data

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

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5.5.2.3   KEY FINDINGS – MONTH 3
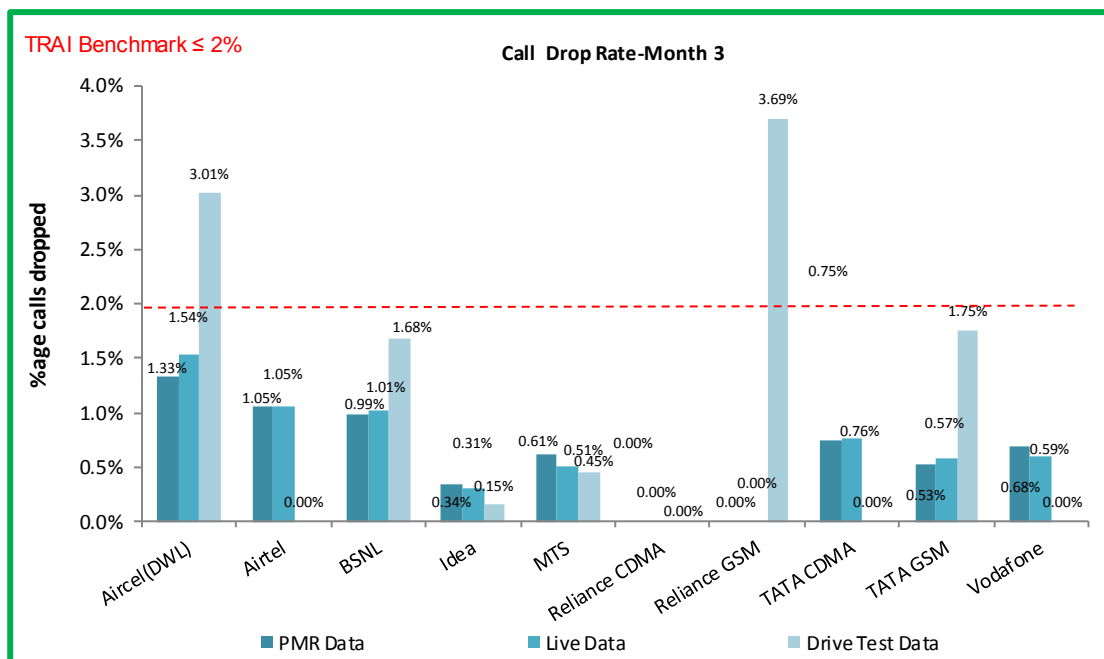
For Reliance CDMA and Reliance GSM, Data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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.

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5.6.2 KEY FINDINGS

Cells having >3% TCH Drop-Consolidated

TRAI Benchmark ≤ 3%
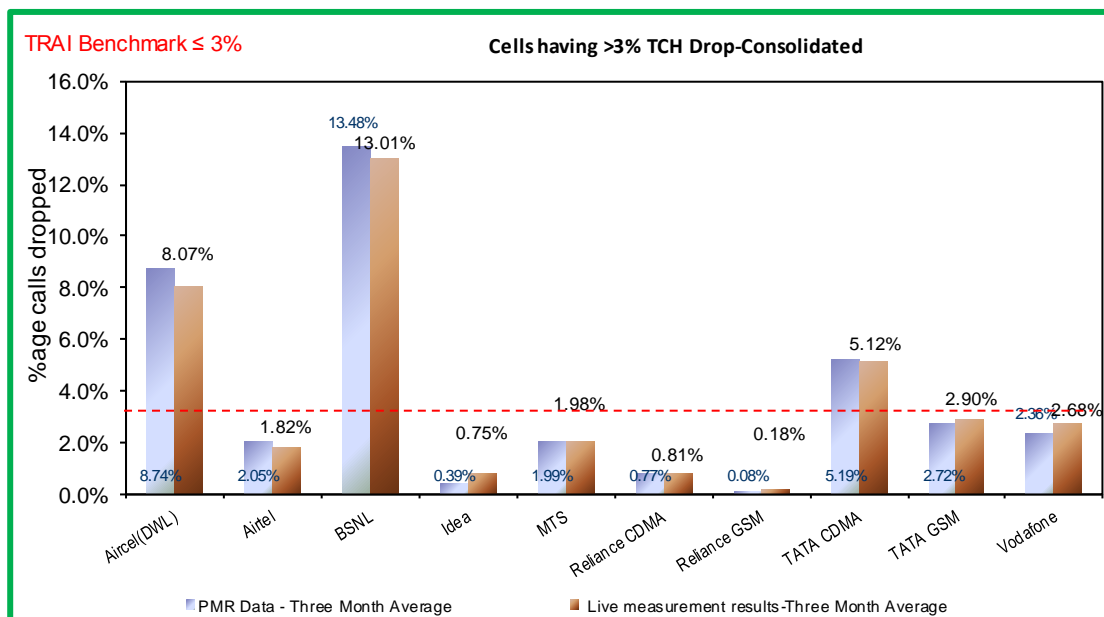
Data Source: Network Operations Center (NOC) of the operators

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

5.6.2.1 KEY FINDINGS – MONTH 1

Cells having >3% TCH Drop-Month 1

TRAI Benchmark ≤ 3%
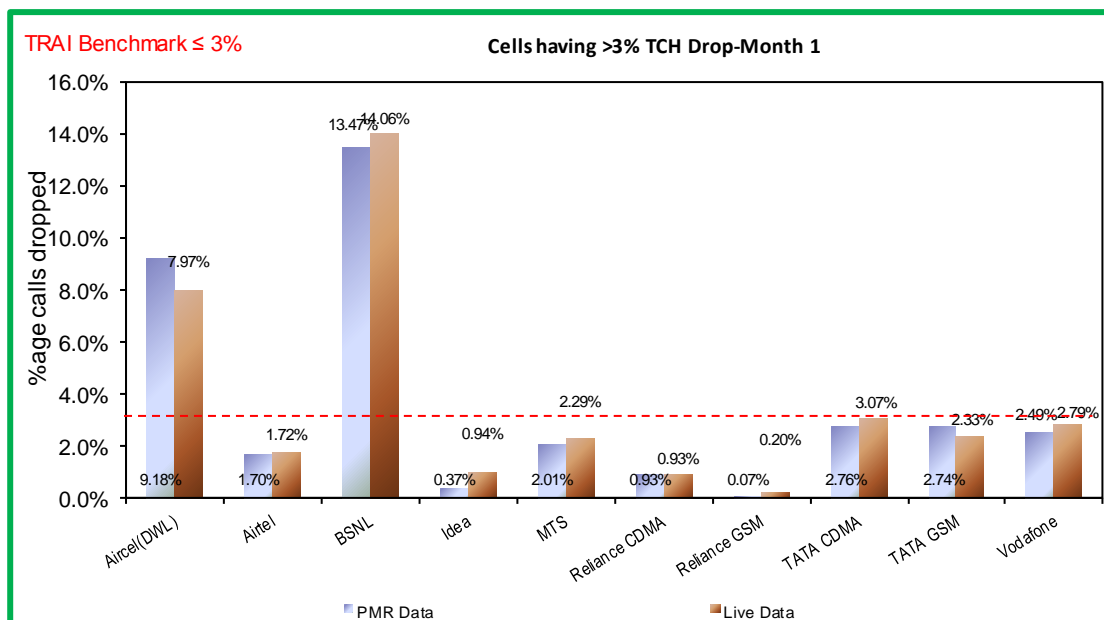
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2
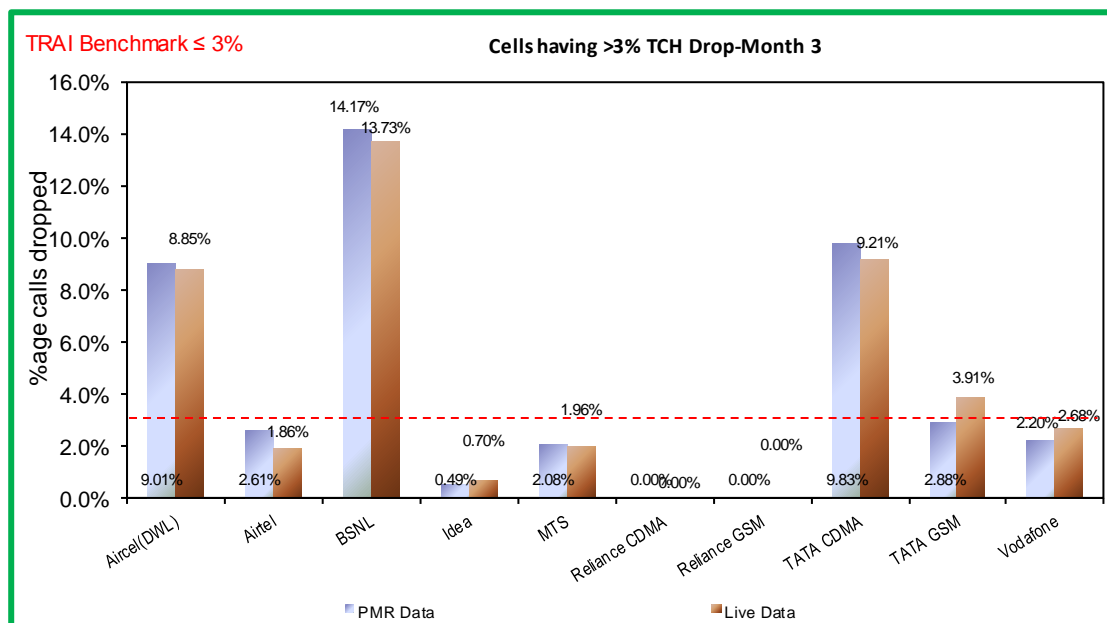
Source: Network Operations Center (NOC) of the operators

5.6.2.3 KEY FINDINGS – MONTH 3

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

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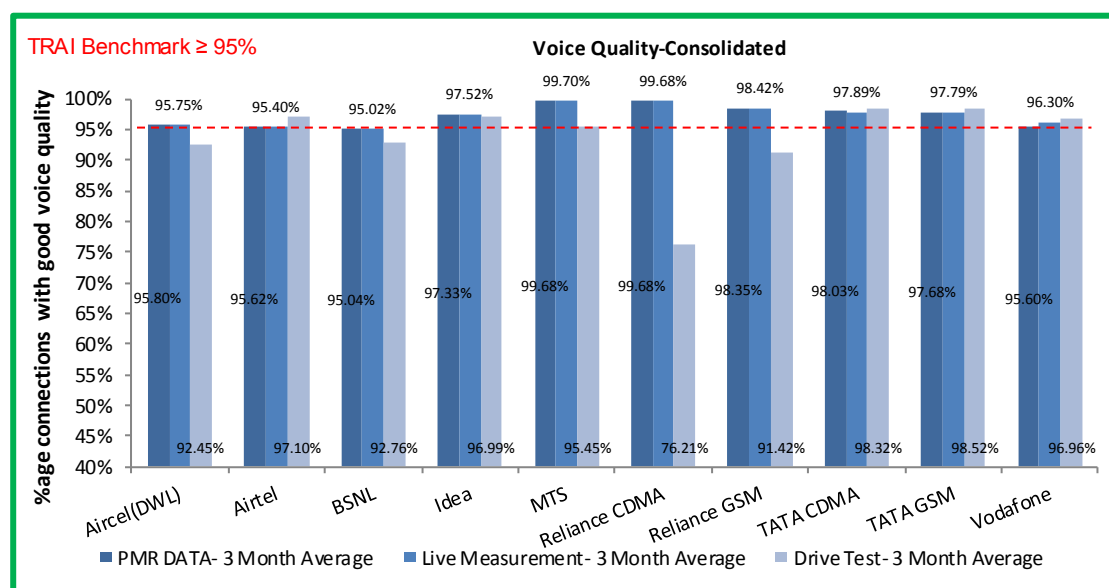
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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

5.7.2.1 KEY FINDINGS – MONTH 1
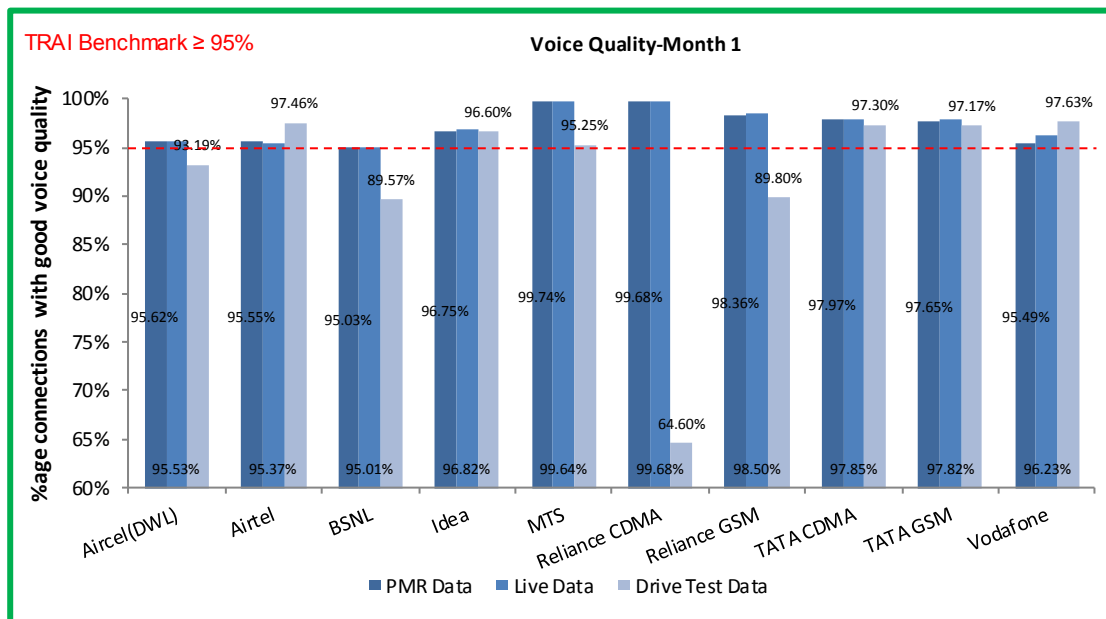
Voice Quality-Month 1

TRAI Benchmark ≥ 95%

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

5.7.2.2 KEY FINDINGS – MONTH 2
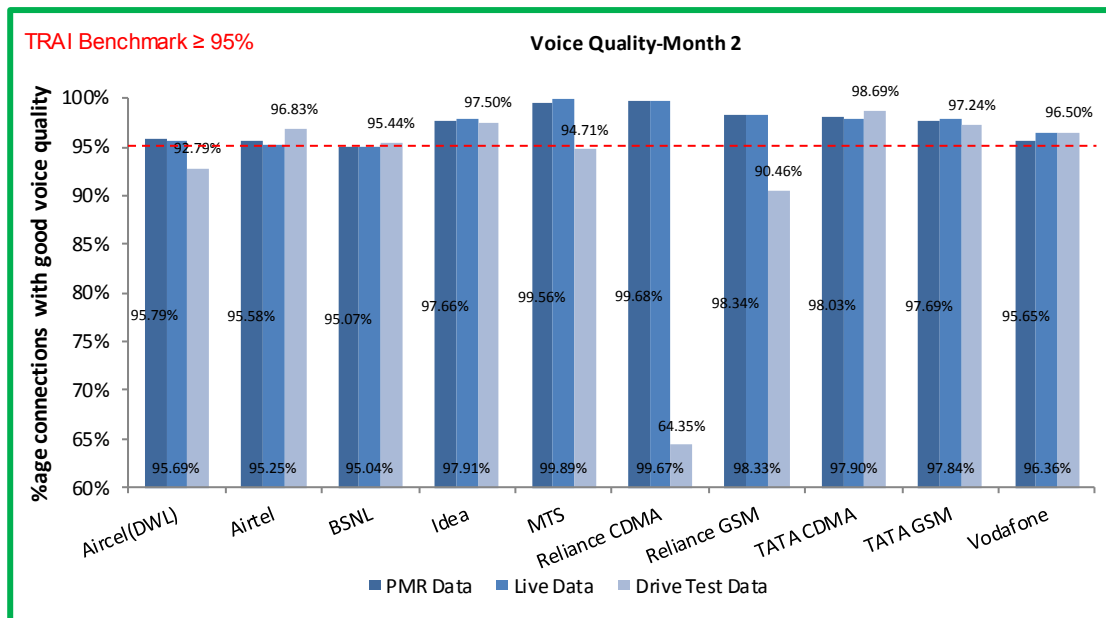
Voice Quality-Month 2

TRAI Benchmark ≥ 95%

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
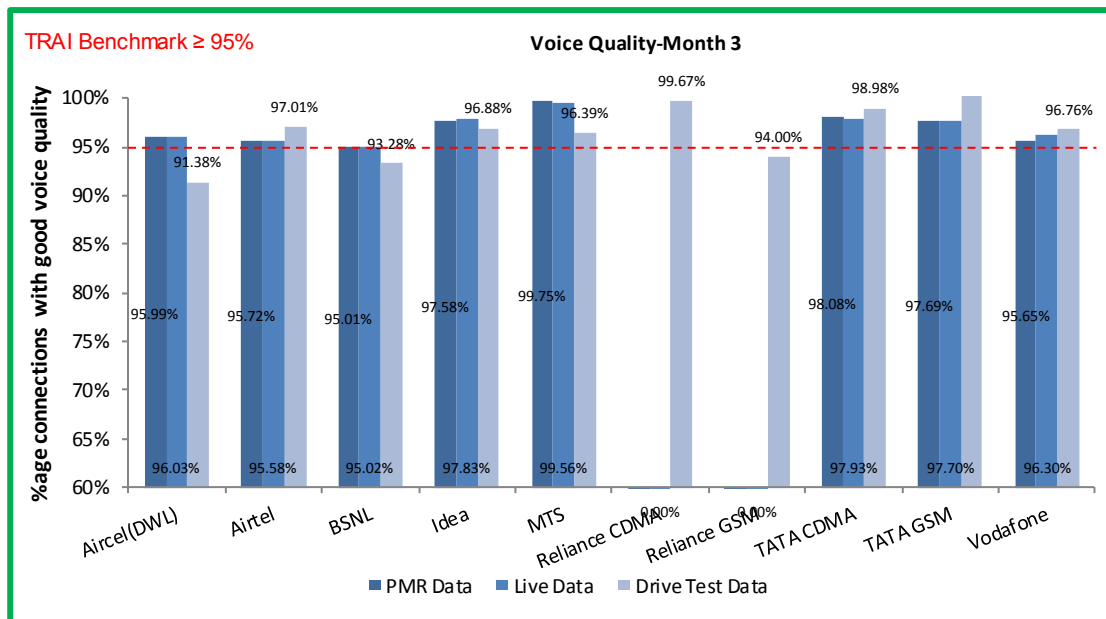
For Reliance CDMA and Reliance GSM, Data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.
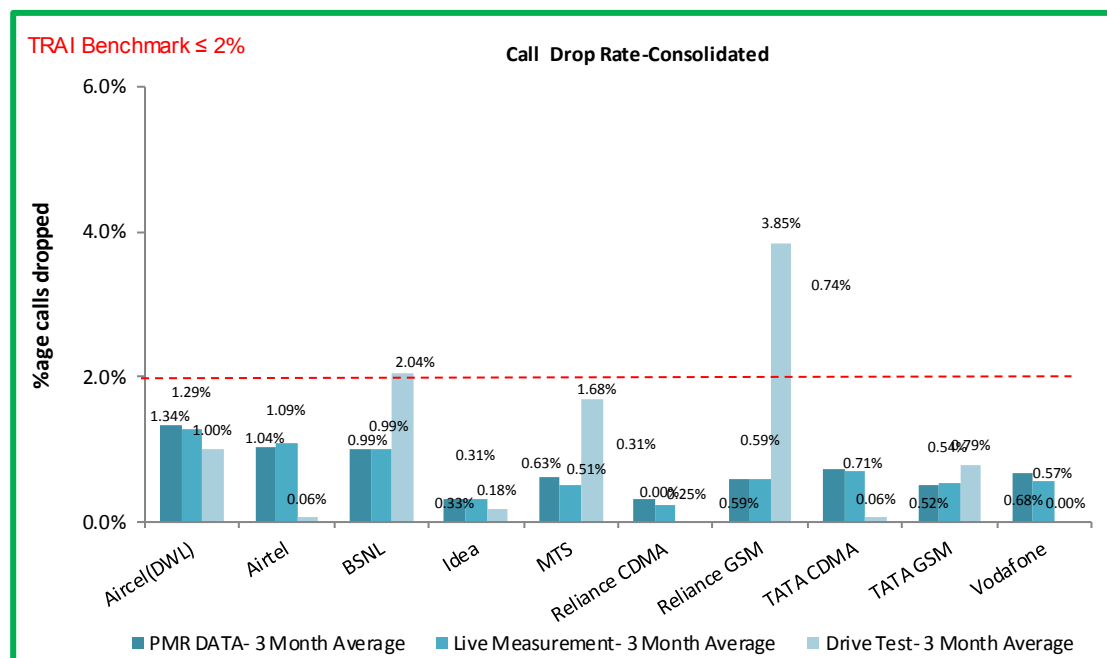
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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 June, 2009 were covered. The types of billing complaints covered are listed below.

- ↳ Payments made and not credited to the subscriber account

- ↳ Payment made on time but late payment charge levied wrongly

- ↳ Wrong roaming charges

- ↳ Double charges

- ↳ Charging for toll free services

- ↳ Local calls charged/billed as STD/ISD or vice versa

- ↳ Calls or messages made disputed

- ↳ Validity related complaints

- ↳ Credit agreed to be given in resolution of complaint, but not accounted in the bill

- ↳ Charging for services provided without consent

- ↳ Charging not as per tariff plans or top up vouchers/ special packs etc.

- ↳ Overcharging or undercharging

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

- ➲ Computational Methodology:

  - ↳ **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 may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

- ↳ **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)

TRAI Benchmark ≤ 0.1%

Metering and billing credibility - Postpaid

Percentage bills disputed

- Aircel(DWL): 0.00%
- Airtel: 0.06%
- BSNL: 0.05%
- Idea: 0.58%
- MTS: 0.10%
- Reliance CDMA: 0.09%
- Reliance GSM: 0.09%
- TATA CDMA: NA
- TATA GSM: NA
- Vodafone: 0.05%

■ Audit Results for Billing performance Postpaid-Consolidated
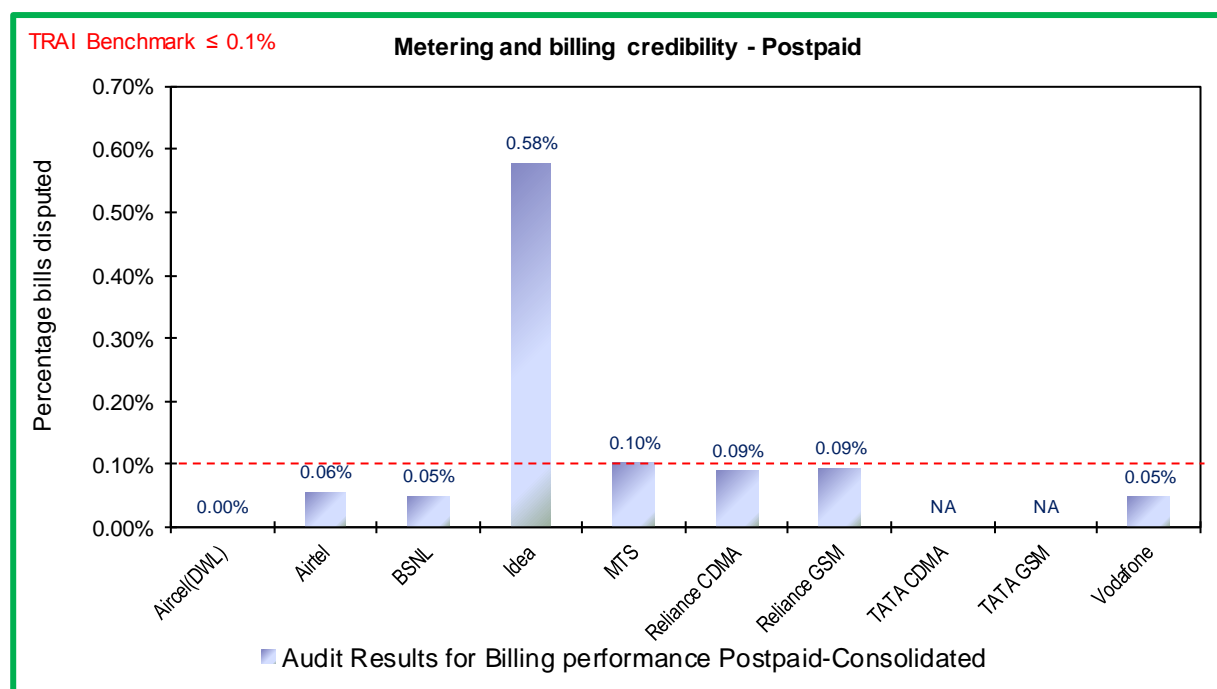
Data Source: Billing Center of the operators

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

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

Metering and billing credibility - Postpaid (Billing cycle wise)
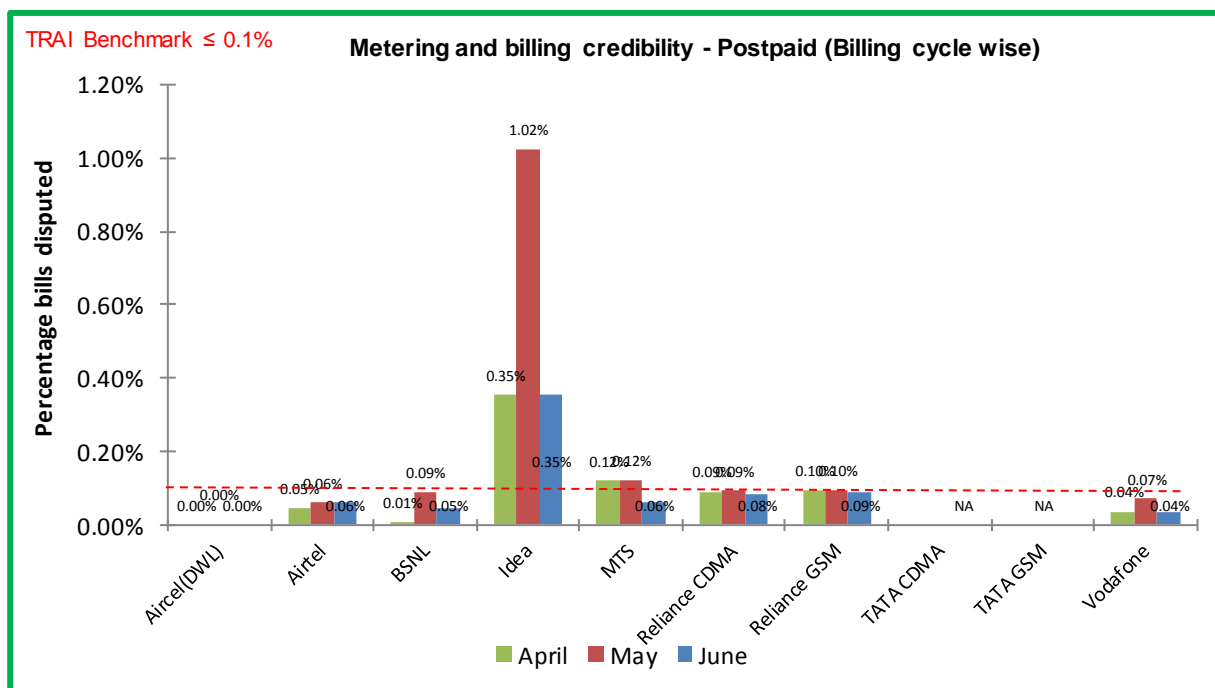
TRAI Benchmark ≤ 0.1%

Data Source: Billing Center of the operators

6.1.3 KEY FINDINGS – METERING AND BILLING CREDIBILITY (PREPAID)

Metering and billing credibility - Prepaid
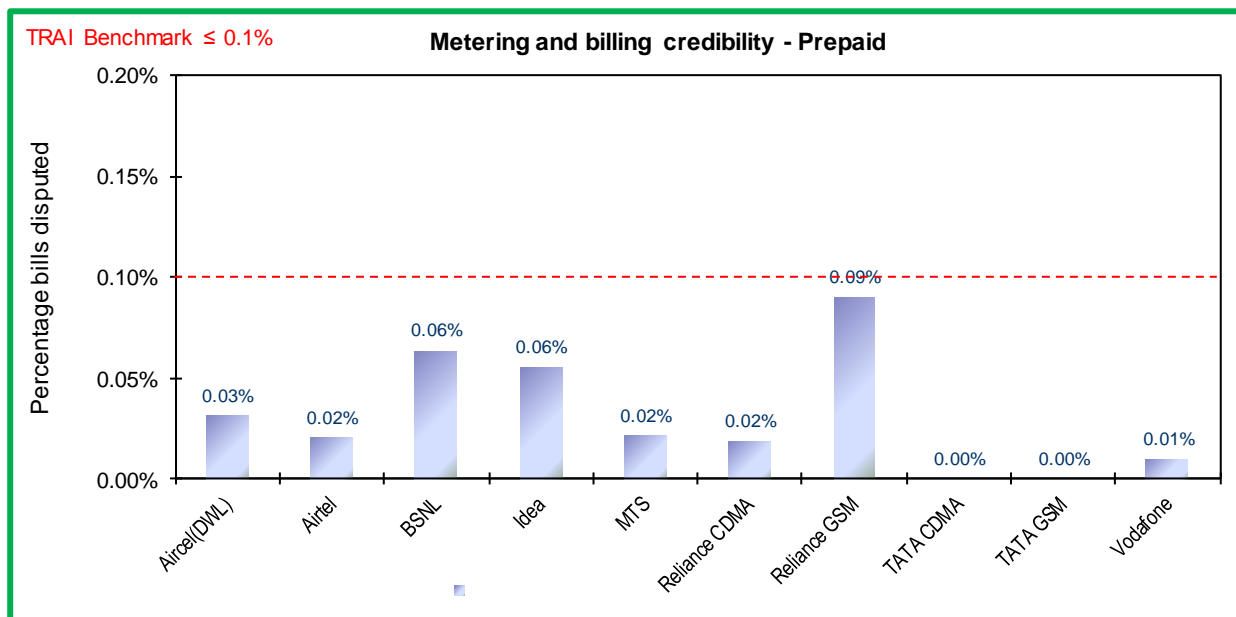
TRAI Benchmark ≤ 0.1%

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

☟

➚ *** 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
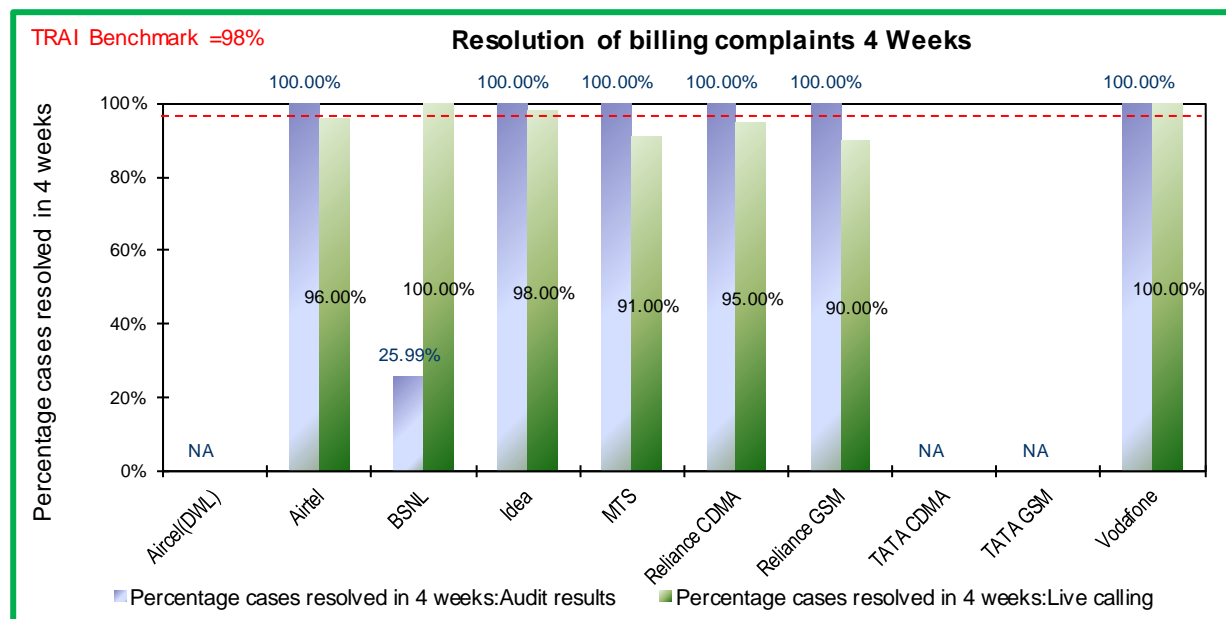
Data Source: Billing Center of the operators

6.2.3 KEY FINDINGS 6 WEEKS
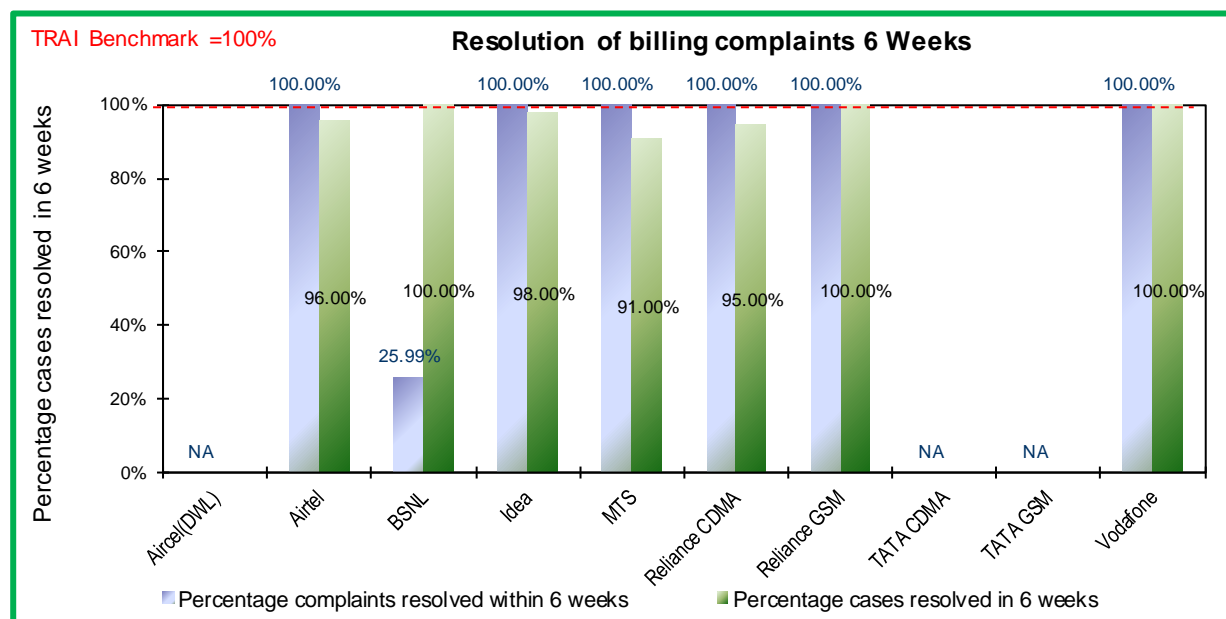
Data Source: Billing Center of the operators

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

BSNL failed to meet the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 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
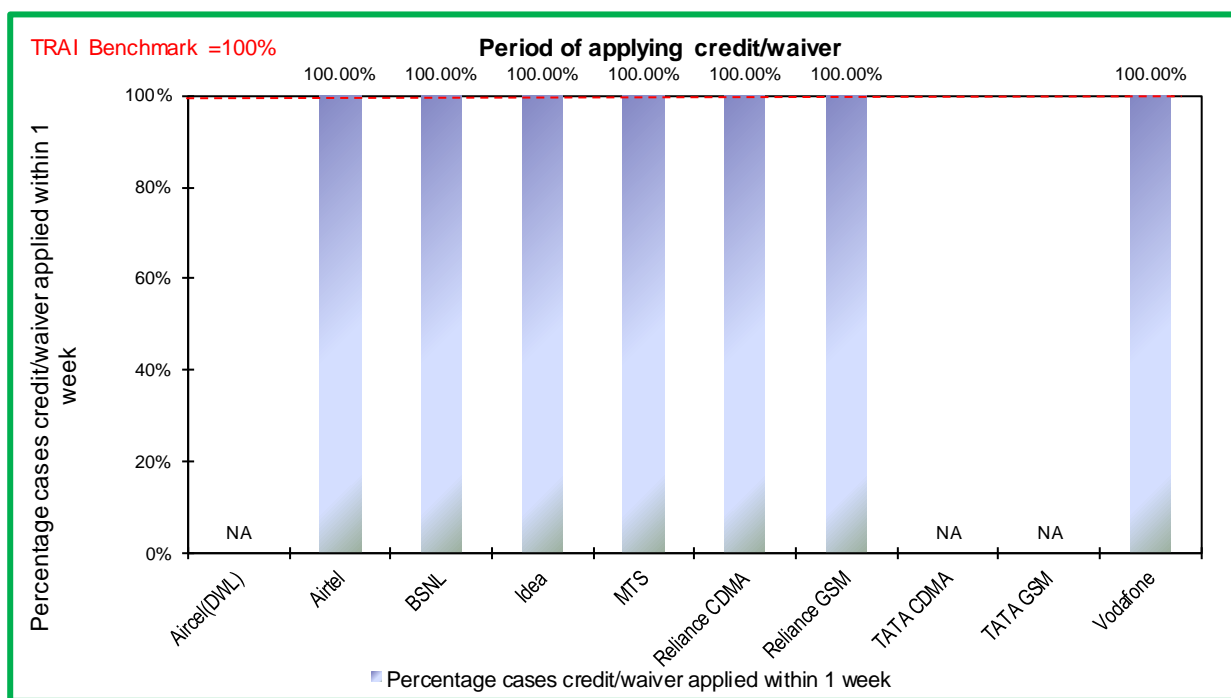
Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

NA: For Aircel, 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
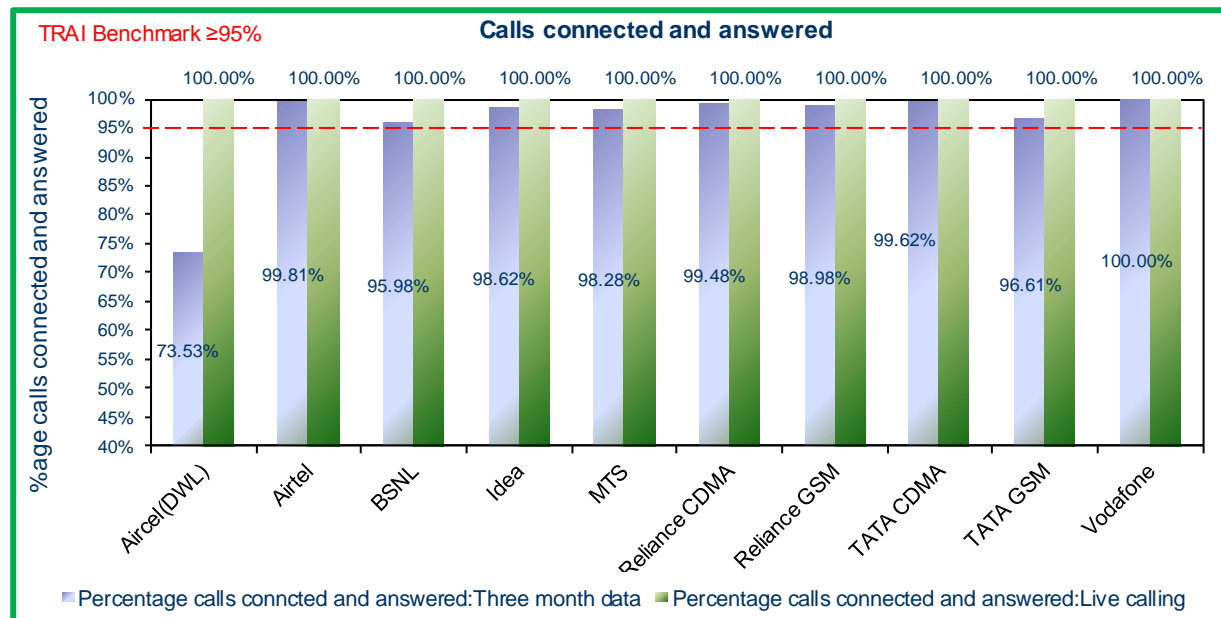
Data Source: Customer Service Center of the operators

Aircel failed to meet the benchmark for calls answered by IVR as per audit data.

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
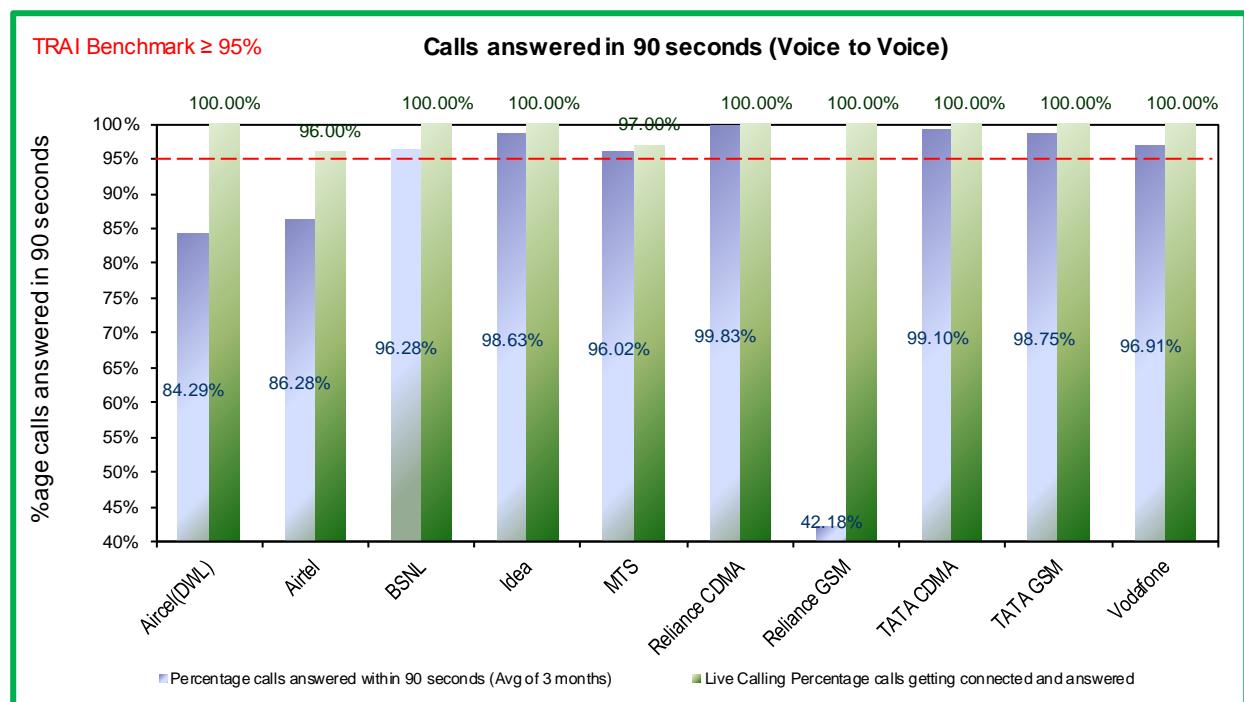
Data Source: Customer Service Center of the operators

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

Calls answered in 90 seconds (Voice to Voice)

TRAI Benchmark ≥ 95%
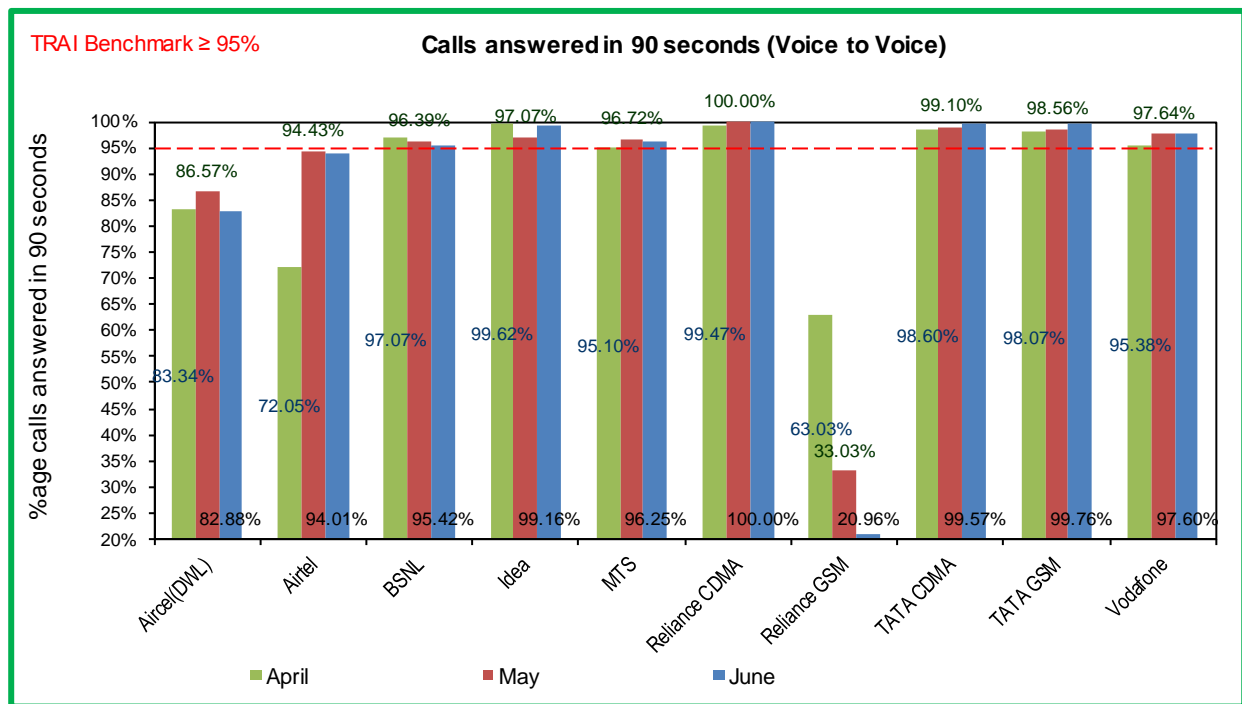
Data Source: Customer Service Center of the operators

6.6 TERMINATION/CLOSURE OF SERVICE

6.6.1 PARAMETER DESCRIPTION

- ⮞ Computational Methodology:

  - ꝏ **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**

- ⮞ TRAI Benchmark:

  - ꝏ Termination/Closure of Service: <=7 days

- ⮞ Audit Procedure:

  - ꝏ 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

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6.6.2 KEY FINDINGS
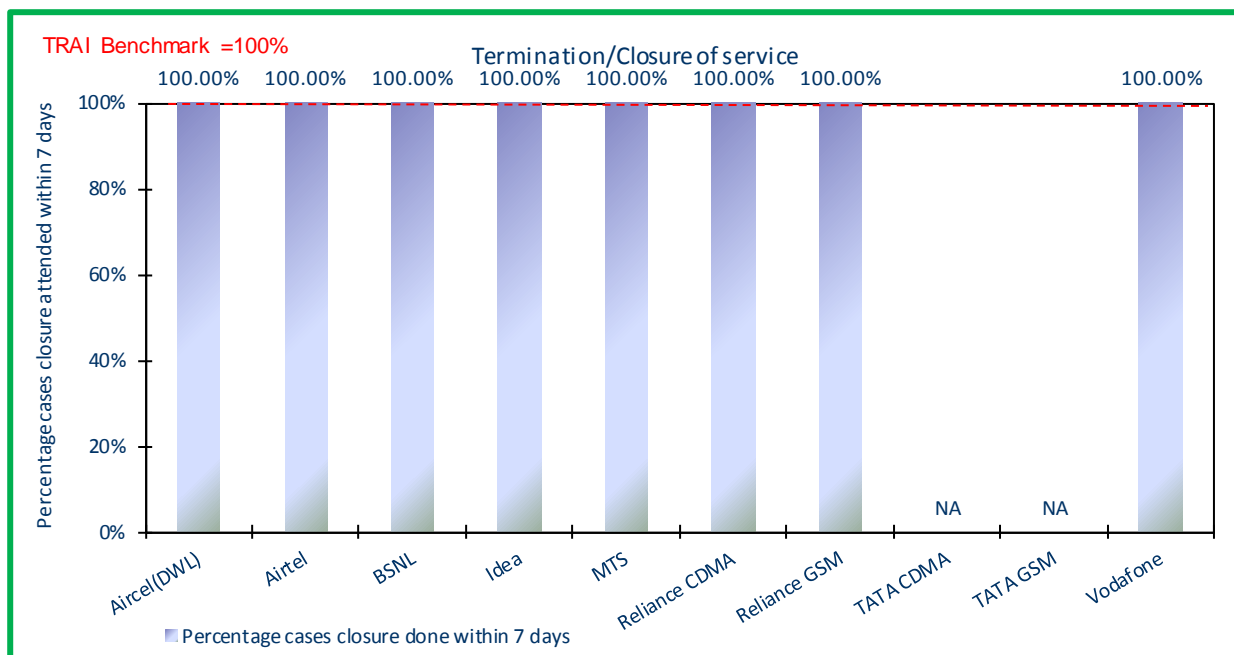
Data Source: Customer Service Center of the operators

All operators met the benchmark.

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

TRAI Benchmark =100%

Refund of deposts after closure
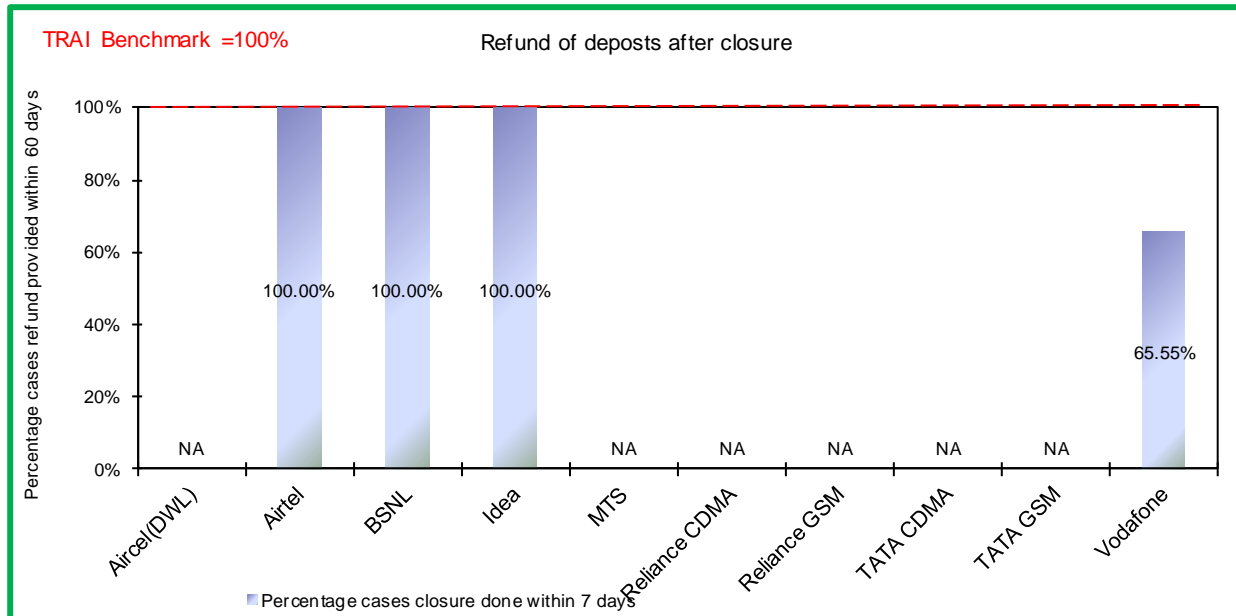
Data Source: Billing Center of the operators

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, 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 April, May and June, 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 on basis of the complaints received from the customers. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and the gap between calls was 10 seconds.

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

Below is the schedule and operators involved in the drive test for the West Bengal circle-

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

7.1.1 APRIL - BEHRAMPORE SSA

Month	Name of SSA Covered	Date of Drive Test
April	BEHRAMPORE	22-04-2015 to 24-04-2015

7.1.1.1 ROUTE DETAILS – BEHRAMPORE SSA

Category	Type of location	West Bengal BEHRAMPORE		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Behrampore Court Station,panchanan Tala,Karbara Road,kasim bazar,Bhatpara,Chunakhali Marg,Ayeshbag,Roshan Bag,Lal bag,Lalbag PWD Office,Indrajit Hotel,NakurdTala,Amuipara,Jia Guanj,Bhagwan Gola,Bhowanipore,Krishnapur,Lalgola,Panditpur,Mirzapur	Behrampur Court Station,Chvapur,Sargachi,Mahula More,Mahula Gram Panchayat,Beldanga,Badua,Gangapur, GopiNathpur,Bhakuri Gram,NH 34,Hotel Samrat,Bhulbona More,Girza More,Palsanda,Sagar Dighi,Korjora,Nava Gram,Panch Gram,Ali Nagar,Rampurahat Nagar Bazar,Khar Gram	Behampore Court station,Station Road,cantonment Road,Radhar, Ghat,Jiwanti,Gokrishna,Bhabanipur,kandi,Jiwanti,Khargra Stion Road
	Highways	NA	NA	NA
	With in the City	NA	NA	NA
Indoor	Shopping complex	LaLBah PWD Office,Ibdrjit Hotel	Mahula Gram Panchayat,Hotel Samrat	Kandi
	Office complex	PWD Office	Girza More	Behrampore court 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 colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

7.1.1.2 KILOMETERS TRAVELLED – BEHRAMPORE SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
SSA Name-Behrampur	107	122	109	338

7.1.1.3   ROUTE MAP BEHRAMPORE DAY 1

Route Covered_Day1 :

Behrampore Court Station,panchanan Tala,Karbara Road,kasim bazar,Bhatpara,Chunakhali Marg,Ayeshbag,Roshan Bag,Lal bag,Lalbag PWD Office,Indrajit Hotel,NakurdTala,Amuipara,Jia Guanj,Bhagwan Gola,Bhowanipore,Krishnapur,Lalgola,Panditpur,Mirzapur

7.1.1.4 ROUTE MAP BEHRAMPORE DAY 2

Route Covered_Day1
Behrampur Court Station,Chvapur,Sargachi,Mahula More,Mahula Gram Panchayat,Beldanga,Badua,Gangapur,GopiNathpur,Bhakuri Gram,NH 34,Hotel Samrat,Bhulbona More,Girza More,Palsanda,Sagar Dighi,Korjora,Nava Gram,Panch Gram,Ali Nagar,Rampurahat Nagar Bazar,Khar Gram

7.1.1.5   ROUTE MAP BEHRAMPORE DAY 3

Route Covered_Day3

Behampore Court station,Station Road,cantonment Road,Radhar Ghat,Jiwanti,Gokrishna,Bhabanipur,kandi,Jiwanti,Khargra Stion Road

7.1.1.6   DRIVE TEST RESULTS – BEHRAMPORE SSA

Parameter's	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
		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		28.99%	34.33%	99.03%	94.90%	39.22%	54.59%	68.95%	51.17%	32.25%	68.40%	56.00%	16.47%	57.14%	43.08%	14.58%	62.90%	40.07%	25.80%	96.60%	92.83%
0 to -85 dBm		73.18%	80.67%	100.00%	99.33%	73.56%	94.09%	90.33%	88.75%	85.26%	87.77%	66.95%	43.20%	92.21%	74.06%	71.71%	87.82%	76.87%	69.97%	99.99%	98.75%
0 to -95 dBm		98.90%	96.98%	100.00%	99.87%	97.85%	99.55%	97.07%	99.23%	100.00%	98.01%	96.29%	73.25%	99.43%	91.54%	99.90%	99.71%	99.56%	96.68%	100.00%	99.71%
Voice quality	≥ 95%	97.36%	91.95%	99.14%	96.93%	85.42%	88.57%	98.09%	96.30%	98.75%	94.22%	64.69%	64.50%	90.00%	89.00%	98.76%	96.85%	98.86%	96.39%	98.66%	97.33%
CSSR	≥ 95%	100.00%	98.48%	100.00%	100.00%	46.88%	62.46%	100.00%	100.00%	100.00%	96.06%	100.00%	100.00%	95.47%	96.00%	100.00%	99.47%	100.00%	99.68%	100.00%	100.00%
%age Blocked calls		0.00%	1.52%	0.00%	0.00%	53.13%	37.54%	0.00%	0.00%	0.00%	1.88%	0.00%	0.00%	4.74%	4.75%	0.00%	0.53%	0.00%	0.32%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	5.36%	0.00%	0.00%	0.00%	0.00%	1.25%	0.00%	0.00%	5.65%	5.66%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	95.43%	100.00%	99.83%	100.00%	100.00%	100.00%	99.19%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.70%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmark for CSSR in outdoor as well as indoor areas.

Call Drop Rate

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

7.1.2 MAY – JALPAIGURI SSA

Month	Name of SSA Covered	Date of Drive Test
May	JALPAIGURI	12-05-2015 to 14-05-2015

7.1.2.1 ROUTE DETAILS – JALPAIGURI SSA

Category	Type of location	WB		
		JALPAIGURI		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NA	NA	NA
	Highways	Jalpaiguri Stn. – Domohoni – Lakshirhat – Lataguri – Malbazar – Meteli – Gorumara – Chalsa – Odlabari – Kranti – Rajdanga – Chengmari – Chatrabridge – Moulani – Bolbari.	Jalpaiguri Police Line – Moynaguri – Jalangi – Hosuldanga - Joldhaka Bridge – Moyantali – Jhumur – Dhupguri – Falakata – Birpara – Binnaguri – Banarhat – Gorumara.	Jalpaiguri – Dhapgunj - Berubari – Debnagar - Kadamtala Bazar - NH 31 – Paharpur - Teesta Bridge – Fatapukur – Rajgunj – Fulbari – Siliguri – Dabgram.
	With in the City	NA	NA	NA
Indoor	Shopping complex	Bapi Hotel - Malbazar.	Sangam Dhaba.	Chandni Chowk Hotel.
	Office complex	Domohoni Post Office.	Moynaguri B.D.O. Office.	Income Tax Department – Jalpaiguri.

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

7.1.2.2 KILOMETERS TRAVELLED – JALPAIGURI SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
SSA Name-Jaipaguri	111	121	107	339

7.1.2.3 ROUTE MAP JALPAIGURI DAY 1

Route Covered Day1 :

Jalpaiguri Stn. –
Domohoni –
Lakshirhat –
Lataguri –
Malbazar –
Meteli –
Gorumara –
Chalsa –
Odlabari –
Kranti –
Rajdanga –
Chengmari –
Chatrabridge –
Moulani –
Bolbari

7.1.2.4   ROUTE MAP JALPAIGURI DAY 2

Route
Covered Day2 :

Jalpaiguri Police
Line –
Moynaguri –
Jalangi –
Hosuldanga -
Joldhaka Bridge
– Movantali –
Jhumur –
Dhupguri –
Falakata –
Birpara –
Binnaguri –
Banarhat –
Gorumara.

7.1.2.5   ROUTE MAP JALPAIGURI DAY 3

Route Covered Day3 :

Jalpaiguri – Dhapguni - Berubari – Debnagar - Kadamtala Bazar - NH 31 – Paharpur - Teesta Bridge – Fatapukur – Rajgunj – Fulbari – Siliguri – Dabgram.

7.1.2.6   DRIVE TEST RESULTS – JALPAIGURI SSA

Parameter's	B'mark	Aircel(DWL) In door	Aircel(DWL) Outdoor	Airtel In door	Airtel Outdoor	BSNL In door	BSNL Outdoor	Idea In door	Idea Outdoor	MTS In door	MTS Outdoor	Reliance CDMA In door	Reliance CDMA Outdoor	Reliance GSM In door	Reliance GSM Outdoor	TATA CDMA In door	TATA CDMA Outdoor	TATA GSM In door	TATA GSM Outdoor	Vodafone In door	Vodafone Outdoor
0 to -75 dBm		35.20%	39.87%	99.92%	94.00%	55.97%	56.50%	36.18%	56.47%	12.95%	13.96%	6.09%	11.49%	43.27%	56.84%	4.53%	53.13%	24.10%	22.88%	99.72%	89.40%
0 to -85 dBm		70.86%	74.55%	99.98%	98.07%	88.57%	91.88%	94.40%	85.13%	21.27%	38.05%	23.08%	31.73%	81.09%	83.54%	67.20%	85.39%	78.66%	72.33%	100.00%	97.48%
0 to -95 dBm		98.94%	95.48%	100.00%	99.50%	98.67%	99.16%	99.49%	96.71%	83.70%	73.19%	67.17%	56.77%	98.53%	96.56%	99.50%	98.54%	99.58%	97.22%	100.00%	99.26%
Voice quality	≥ 95%	97.61%	91.02%	98.73%	96.29%	98.68%	93.91%	98.93%	97.35%	99.06%	93.54%	64.69%	64.00%	91.00%	90.46%	99.98%	98.34%	98.75%	96.63%	98.02%	96.12%
CSSR	≥ 95%	100.00%	99.45%	100.00%	100.00%	100.00%	97.34%	100.00%	98.14%	82.05%	56.05%	92.20%	93.99%	96.98%	96.68%	100.00%	98.77%	100.00%	98.80%	100.00%	100.00%
%age Blocked calls		0.00%	0.55%	0.00%	0.00%	0.00%	2.66%	0.00%	1.86%	17.31%	14.26%	0.00%	0.00%	3.00%	3.11%	0.00%	0.00%	0.00%	1.20%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.33%	0.00%	2.63%	0.00%	0.44%	1.39%	4.58%	0.00%	0.00%	2.02%	1.99%	0.00%	0.00%	0.00%	0.89%	0.00%	0.00%
Hands off success rate		100.00%	99.36%	100.00%	99.86%	100.00%	100.00%	100.00%	99.35%	100.00%	99.94%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.03%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

MTS and Reliance CDMA failed to meet the benchmark for CSSR in outdoor as well as indoor areas.

Call Drop Rate

BSNL and MTS failed to meet the benchmark for call drop rate in outdoor areas. Reliance GSM did not meet the benchmark in indoor areas.

7.1.3   JUNE – MALDA SSA

Month	Name of SSA Covered	Date of Drive Test
June	MALDA	01/06/15 to 03/06/15

7.1.3.1   ROUTE DETAILS – MALDA SSA

Category	Type of location	WB		
		MALDA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads			
	Highways	Malda town stn.-Mangalbari-Bulbul Chandi-Habibpur-Bamangola-Gazole-Kumargunj-Gour	Malda-Uttar Ramchandrapur-Malda Polytechnic-Powergrid-Amrity-Milky-Sobhanagar-Manikchwak-Ratua-Samsi-Bhagabanpur-Chanchol-Harishchandrapur	Malda-Suthlapu-Susthani more-Kaliachak-Mothabari-Gita more-Amrity-Powergrid-Uttar Ramchandrapur-Rathbari-Malda.
	With in the City			
Indoor	Shopping complex	Banphool Plaza	Chanchol Hotel	Food Court,Malda
	Office complex	Gazole B.D.O. Office	Chanchol S.D.O	Gram Unnayan Bhawan, Malda

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

7.1.3.2   KILOMETERS TRAVELLED – MALDA SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
SSA Name-Malda	112	114	119	345

7.1.3.3   ROUTE MAP MALDA DAY 1

Route Covered Day1 :

Malda town stn.- Mangalbari- BulbulChandi- Habibpur- Bamongola Gazole- Kumargunj- Gour
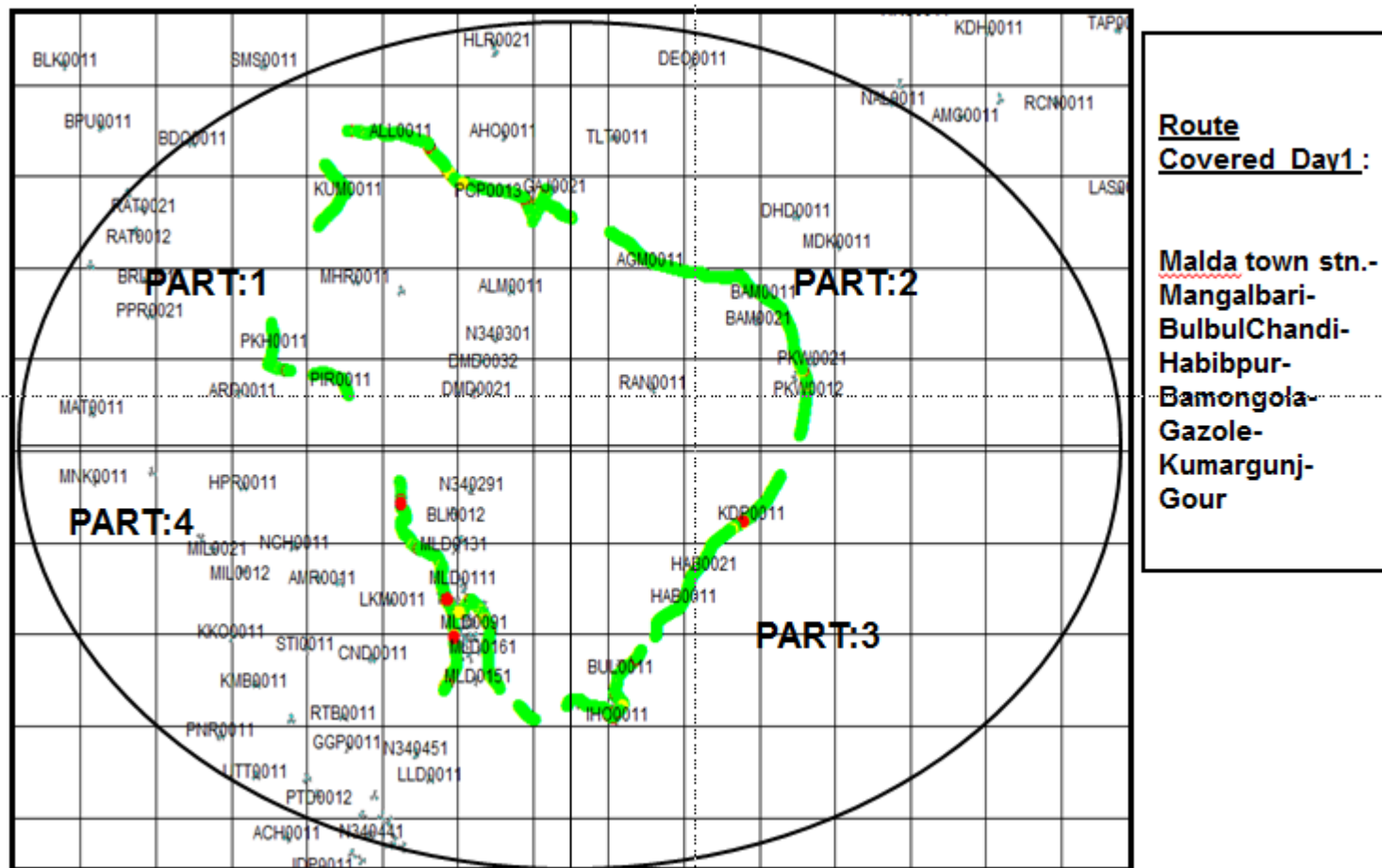
7.1.3.4   ROUTE MAP MALDA DAY 2

7.1.3.5   ROUTE MAP MALDA DAY 3

Route Covered Day3 :

Malda-Suthlapur-Susthani More-Kaliachak-Mothabari-gita more-amrity-Powergrid-Uttar Ramchandrapur-Rathbari-Malda
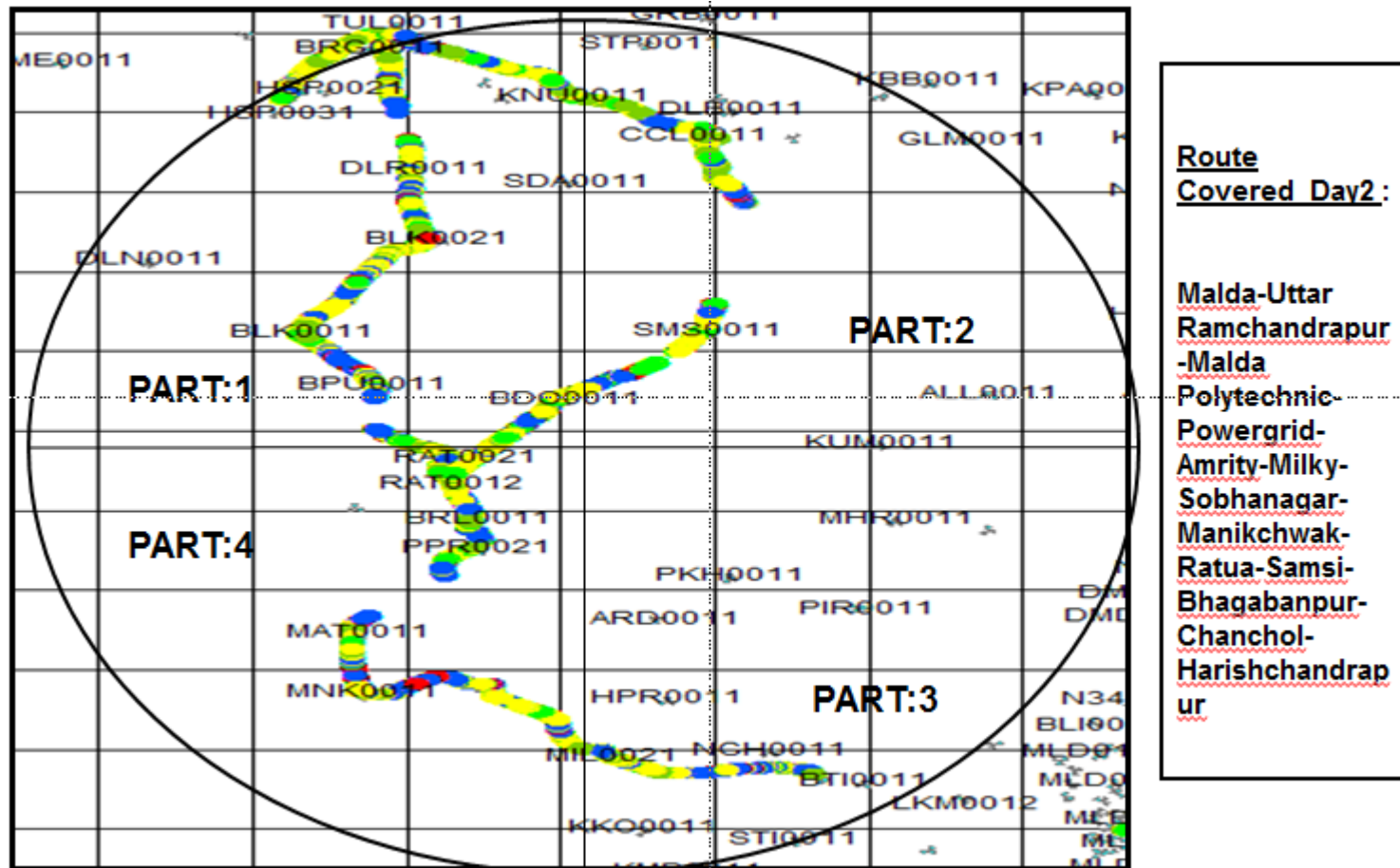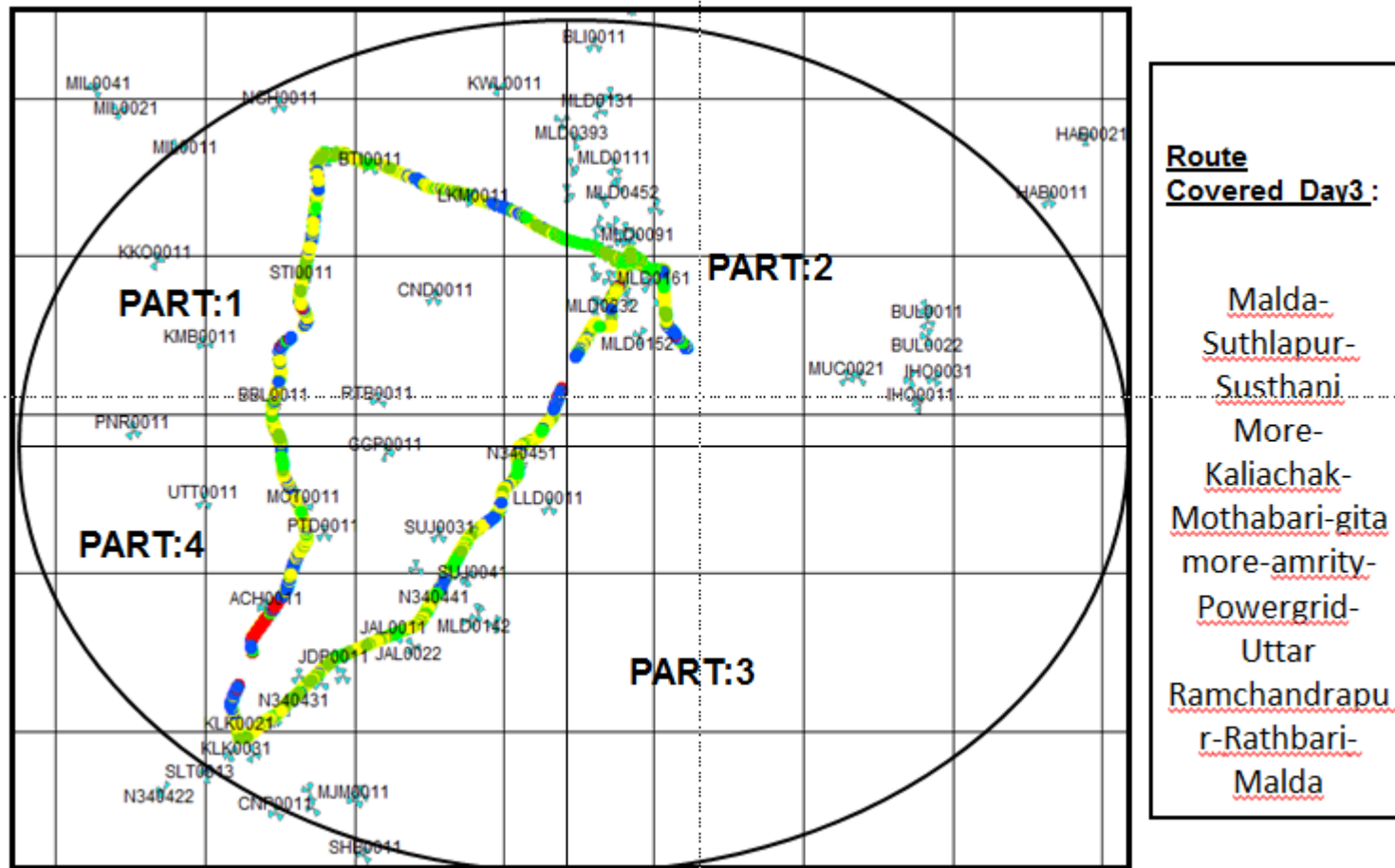
7.1.3.6   DRIVE TEST RESULTS – MALDA SSA

Parameter's	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
		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		47.89%	48.27%	96.61%	84.17%	36.11%	28.12%	45.28%	58.05%	59.52%	41.16%	26.13%	15.76%	49.87%	53.08%	65.22%	70.04%	51.13%	45.45%	64.00%	83.92%
0 to -85 dBm		85.13%	83.81%	99.96%	98.37%	77.66%	63.58%	84.99%	82.01%	81.72%	58.93%	58.85%	44.14%	75.46%	74.06%	78.16%	90.25%	91.37%	82.64%	96.80%	97.02%
0 to -95 dBm		97.40%	97.13%	100.00%	99.87%	100.14%	91.60%	97.27%	94.36%	99.78%	86.79%	99.99%	99.98%	91.38%	91.54%	99.84%	98.95%	99.51%	97.07%	99.95%	99.55%
Voice quality	≥ 95%	89.51%	91.68%	98.60%	96.54%	97.63%	91.94%	99.73%	96.27%	99.20%	95.81%	99.65%	99.69%	92.36%	94.90%	99.79%	98.76%	98.80%	96.06%	98.60%	96.24%
CSSR	≥ 95%	100.00%	95.22%	100.00%	100.00%	85.54%	85.02%	100.00%	98.78%	100.00%	94.33%	77.20%	78.90%	96.50%	95.20%	100.00%	100.00%	98.61%	98.20%	100.00%	100.00%
%age Blocked calls		0.00%	3.29%	0.00%	0.00%	14.46%	14.98%	0.00%	1.04%	0.00%	5.11%	0.00%	0.00%	3.20%	3.69%	0.00%	0.40%	1.39%	1.41%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	4.22%	0.00%	0.00%	0.83%	2.05%	0.00%	0.18%	0.00%	0.59%	11.00%	12.36%	5.20%	5.70%	0.00%	0.00%	0.00%	2.38%	0.00%	0.00%
Hands off success rate		100.00%	98.36%	100.00%	99.88%	100.00%	100.00%	100.00%	99.77%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	64.96%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel and Reliance GSM failed to meet the benchmark for voice quality in outdoor as well as indoor areas. BSNL did not meet the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

8   ANNEXURE

For Reliance CDMA and Reliance GSM, data is pertaining to Apr'15 and May'15. Data for Jun'15 could not be audited 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		8529	18568	7437	12362	2746	1648	4988	78	767	22394
Sum of downtime of BTSs in a month (in hours)		160156	7965	491512	22363	6251	5620	13323	23	468	11322
BTSs accumulated downtime (not available for service)	≤ 2%	2.58%	0.06%	8.97%	0.25%	0.31%	0.47%	0.37%	0.04%	0.08%	0.07%
Number of BTSs having accumulated downtime >24 hours		1442	14	3718	155	0	21	52	0	0	87
Worst affected BTSs due to downtime	≤ 2%	16.93%	0.08%	49.99%	1.26%	0.00%	1.28%	1.04%	0.00%	0.00%	0.39%
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		8457	18550	7437	12163	2743	1648	4988	78	767	21937
Sum of downtime of BTSs in a month (in hours)		13575	296	26499	1176	484	348	691	0	8	317
BTSs accumulated downtime (not available for service)	≤ 2%	2.23%	0.02%	4.95%	0.14%	0.25%	0.30%	0.19%	0.00%	0.01%	0.02%
Number of BTSs having accumulated downtime >24 hours		156	0	352	12	0	0	0	0	0	0
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	1.85%	0.00%	4.73%	0.10%	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%	97.17%	98.52%	97.80%	98.53%	99.37%	96.87%	98.74%	97.83%	98.90%	99.03%
SDCCH/Paging channel congestion	≤ 1%	1.90%	0.73%	3.78%	0.15%	NA	NA	0.06%	NA	0.23%	0.45%
TCH congestion	≤ 2%	1.66%	1.02%	1.11%	0.40%	0.42%	0.23%	0.22%	0.11%	0.30%	0.97%

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%	97.36%	98.56%	97.71%	99.48%	99.67%	97.02%	98.68%	97.67%	99.17%	99.72%
SDCCH/Paging channel congestion	≤ 1%	1.38%	0.70%	3.76%	0.06%	NA	NA	0.06%	NA	0.04%	0.25%
TCH congestion	≤ 2%	1.29%	0.96%	1.19%	0.11%	0.16%	0.22%	0.20%	0.73%	0.11%	0.28%

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		1686	1805	1666	1791	2181	1790	1900	1509	1521	1715
Total number of successful calls established		1657	1805	1103	1776	1760	1603	1830	1504	1506	1715
CSSR	≥ 95%	98.33%	100.00%	66.99%	99.16%	83.04%	91.11%	96.30%	99.57%	99.08%	100.00%
%age blocked calls		1.67%	0.00%	33.01%	0.84%	16.96%	8.89%	3.70%	0.43%	0.92%	0.00%

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		374009625	1260824898	159667061	517340115	139973827	31778373	205113786	742959	24179206	1308279217
Total number of calls dropped		5019313	13142674	1588543	1699544	882362	98616	1217428	5481	124505	8875307
Call drop rate	≤ 2%	1.34%	1.04%	0.99%	0.33%	0.63%	0.31%	0.59%	0.74%	0.52%	0.68%

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		25097	59129	21738	37245	10051	4946	15008	228	2310	66108
Total number of cells having more than 3% TCH		2193	1211	2931	146	200	38	12	12	63	1560
Worst affected cells having more than 3% TCH	≤ 3%	8.74%	2.05%	13.48%	0.39%	1.99%	0.77%	0.08%	5.19%	2.72%	2.36%

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		37339379	125972787	15902885	574517599	174264657	3498356	22112804	1039747	26035136	1645590103
Total number of calls dropped		429878	1368451	157459	1759300	897018	8666	130163	7323	139177	9408238
Call drop rate	≤ 2%	1.29%	1.09%	0.99%	0.31%	0.51%	0.25%	0.59%	0.71%	0.54%	0.57%

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		24896	177184	21737	36648	10028	4946	15008	228	2310	65946
Total number of cells having more than 3% TCH		2008	3220	2829	274	199	40	26	12	67	1768
Worst affected cells having more than 3% TCH	≤ 3%	8.07%	1.82%	13.01%	0.75%	1.98%	0.81%	0.18%	5.12%	2.90%	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		1657	1805	1103	1776	1779	1603	1830	1507	1506	1715
Total number of calls dropped		17	1	20	3	27	0	70	1	13	0
Call drop rate	≤ 2%	1.00%	0.06%	2.04%	0.18%	1.68%	0.00%	3.85%	0.06%	0.79%	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		60861640852	359034907769	21032	72445290180	139973827	NA	30627751638	41951201	4017935210	244769614503
Total number of calls with good voice quality		58303120173	343296904887	19988	70518019754	139528530	NA	30122062329	41123025	3924475436	234003201281
%age calls with good voice quality	≥ 95%	95.80%	95.62%	95.04%	97.33%	99.68%	99.68%	98.35%	98.03%	97.68%	95.60%

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		5895987774	34545994742	2451	102035085354	174372217	NA	3051815875	22460891	4430158693	258389763864
Total number of calls with good voice quality		5645642808	32958684167	2329	99605845451	173840036	NA	3003438062	21988442	4332070102	248827543484
%age calls with good voice quality	≥ 95%	95.75%	95.40%	95.02%	97.52%	99.70%	99.68%	98.42%	97.89%	97.79%	96.30%

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		1595852	437448	1742549	3459724	NA	0	1581165	3276960	2436549	901207
Total number of calls with good voice quality		1468807	424756	1630508	3353826	NA	0	1432182	3221128	2403908	874489
%age calls with good voice quality	≥ 95%	92.45%	97.10%	92.76%	96.99%	95.45%	76.21%	91.42%	98.32%	98.52%	96.96%

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		62	37	77	114	38	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76894	144235	185897	107500	56006	7028	37316	12250	6293	341513
Traffic served for all POIs (B)- in erlangs		38407	93673	29434	68188	25470	2552	22299	1761	1268	203814
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		62	37	77	114	37	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76408	423706	186390	107775	53799	7028	37316	12249	6286	340974
Traffic served for all POIs (B)- in erlangs		37231	275755	29622	68586	26319	2407	22594	1695	1273	198549
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

April										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	336593	142565	204675	1313402	74731	NA	617618	1215670	749259	387243
May										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	315247	136015	586570	926548	64967	NA	795858	696922	788744	344317
June										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	944012	158868	951304	1219774	76124	NA	167689	1364368	898546	169647

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		834	185454	102948	13064	39263	25860	60123	NA	NA	964794
Total number of bills disputed		0	104	50	75	40	23	56	NA	NA	467
Total number of valid billing complaints		0	28	50	26	13	23	19	NA	NA	133
Total complaints considered invalid		0	76	0	49	27	0	37	NA	NA	334
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.06%	0.05%	0.58%	0.10%	0.09%	0.09%	NA	NA	0.05%
April											
Total bills generated during the first billing cycle		282	62125	34446	4239	13392	8745	19816	NA	NA	309499
Total number of bills disputed in first billing cycle		0	29	3	15	16	8	19	NA	NA	115
Total number of valid billing complaints (billing cycle 1)		0	8	3	0	8	8	19	NA	NA	10
Total complaints considered invalid (billing cycle 1)		0	21	0	15	8	0	0	NA	NA	105
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.05%	0.01%	0.35%	0.12%	0.09%	0.10%	NA	NA	0.04%

Data Source: Billing Center of the operators

May											
Total bills generated during the second billing cycle		280	61617	34233	4307	13007	8668	19832	NA	NA	320288
Total number of bills disputed in second billing cycle		0	37	31	44	16	8	19	NA	NA	229
Total number of valid billing complaints (billing cycle 2)		0	13	31	22	5	8	0	NA	NA	104
Total complaints considered invalid (billing cycle 2)		0	24	0	22	11	0	19	NA	NA	125
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.06%	0.09%	1.02%	0.12%	0.09%	0.10%	NA	NA	0.07%
June											
Total bills generated during the third billing cycle		272	61712	34269	4518	12864	8447	20475	NA	NA	335007
Total number of bills disputed in third billing cycle		0	38	16	16	8	7	18	NA	NA	123
Total number of valid billing complaints (billing cycle 3)		0	7	16	4	0	7	0	NA	NA	19
Total complaints considered invalid (billing cycle 3)		0	31	0	12	8	0	18	NA	NA	104
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.06%	0.05%	0.35%	0.06%	0.08%	0.09%	NA	NA	0.04%

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		0	239	2655	474	281	285	5549	0	0	794
Total complaints considered invalid (sum of 3 months)		4572	2282	173	2010	84	176	0	0	0	3539
Total number of charging complaints (sum of 3 months)		4572	2521	2828	2484	365	461	5549	0	0	4333
Total no of customers served (Sum of 3 months)		14773439	12453443	4460888	4488537	1709690	2484732	6170614	220749	2265297	45355280
Percentage of charging complaints disputed	≤ 0.1%	0.03%	0.02%	0.06%	0.06%	0.02%	0.02%	0.09%	0.00%	0.00%	0.01%

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		0	7655	2878	7505	432	660	5605	0	0	8548
Total number of complaints resolved in favour of customer		0	743	2705	7505	321	484	5605	0	0	4696
Total complaints considered invalid		4572	6912	173	6079	111	176	0	0	0	3852
Number of complaints resolved in 4 weeks		0	743	703	7505	321	484	5605	0	0	4696
Percentage complaints resolved within 4 weeks	≥ 98%	NA	100.00%	25.99%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%
Number of complaints resolved in 6 weeks		0	743	703	7505	321	484	5605	0	0	4696
Percentage complaints resolved within 6 weeks	100.00%	NA	100.00%	25.99%	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		0	743	703	1426	210	308	5605	0	0	844
Percentage cases in which credit/waiver was received within 1	100%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Billing Center of the operators

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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.

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		NA	100	100	100	100	100	100	NA	NA	100
Number of cases resolved in 4 weeks		NA	96	100	98	91	95	90	NA	NA	100
Percentage cases resolved in 4 weeks	≥ 98%	NA	96.00%	100.00%	98.00%	91.00%	95.00%	90.00%	NA	NA	100.00%
Number of cases resolved in 6 weeks		NA	96	100	98	91	95	100	NA	NA	100
Percentage cases resolved in 6 weeks	100%	NA	96.00%	100.00%	98.00%	91.00%	95.00%	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 for Aircel, 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		21345015	4646366	1175794	15527853	5275245	1016985	7434503	10993	109846	33331733
Number of calls getting connected and answered (electronically)		15695234	4637585	1128581	15313850	5184602	1011745	7358693	10951	106122	33331733
Percentage calls getting connected and answered	≥ 95%	73.53%	99.81%	95.98%	98.62%	98.28%	99.48%	98.98%	99.62%	96.61%	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)		3981056	6778375	914722	5043762	1894293	439863	1966842	10358	136599	9657620
Total Number of calls answered within 90 seconds (3 months)		3355585	5848217	880701	4974489	1818917	439100	829643	10265	134889	9359444
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	84.29%	86.28%	96.28%	98.63%	96.02%	99.83%	42.18%	99.10%	98.75%	96.91%
April											
Total calls received (Month 1)		1226137	2428728	308674	1733067	663886	144984	796418	2362	50046	3059623
Total calls answered within 90 seconds (Month 1)		1021855	1749921	299633	1726539	631379	144221	501978	2329	49082	2918351
% calls answered within 90 seconds (Month 1)	≥ 95%	83.34%	72.05%	97.07%	99.62%	95.10%	99.47%	63.03%	98.60%	98.07%	95.38%
May											
Total calls received (Month 2)		1366471	2195234	285815	1669192	687764	143780	682095	5447	44978	3252806
Total calls answered within 90 seconds (Month 2)		1182953	2072946	275493	1620316	665231	143780	225291	5398	44332	3176144
% calls answered within 90 seconds (Month 2)	≥ 95%	86.57%	94.43%	96.39%	97.07%	96.72%	100.00%	33.03%	99.10%	98.56%	97.64%
June											
Total calls received (Month 3)		1388448	2154413	320233	1641503	542643	151099	488329	2549	41575	3345191
Total calls answered within 90 seconds (Month 3)		1150777	2025350	305575	1627634	522307	151099	102374	2538	41475	3264949
% calls answered within 90 seconds (Month 3)	≥ 95%	82.88%	94.01%	95.42%	99.16%	96.25%	100.00%	20.96%	99.57%	99.76%	97.60%

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		100	96	100	100	97	100	100	100	100	100
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	96.00%	100.00%	100.00%	97.00%	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

Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Audit results for termination / closure of service-Consolidated											
Total number of closure request		8	410	250	400	608	88	267	0	0	6075
Number of requests attended within 7 days		8	410	250	400	608	88	267	0	0	6075
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

Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Audit results for refund of deposits-Consolidated											
Total number of cases requiring refund of deposits		NA	103	231	135	NA	NA	NA	NA	NA	1646
Total number of cases where refund was made within 60 days		NA	103	231	135	NA	NA	NA	NA	NA	1079
Percentage cases in which refund was receive within 60 days	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	NA	NA	NA	65.55%

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, 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	159461	310514	23600	15100	109200	118000	174000	5617	13868	380874
Total taffic handled in erlang during TCBH	98180	300208	68008	142958	40784	31060	91034	162	5816	389928
Total no. of customers served (as per VLR)	3350257	12036460	1254780	4662431	1093938	760457	6015052	3778	249832	14703556

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	16	100	100
Number of cases resolved to satisfaction	98	95	94	97	95	88	83	12	90	100
Percentage cases resolved in four weeks	98.00%	95.00%	94.00%	97.00%	95.00%	88.00%	83.00%	75.00%	90.00%	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	150	150	150
Calls answered		148	150	149	144	146	150	150	146	145	150
% of calls connected	≥ 95%	98.67%	100.00%	99.33%	96.00%	97.33%	100.00%	100.00%	97.33%	96.67%	100.00%

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

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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	✓		14	14
101	Fire	✓		14	14
102	Ambulance		✗		
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	✓		14	14
138	All India Helpine for Passangers	✓		14	14
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	✓		14	13
1071	Air Accident Helpline	✓		14	14
1072	Rail Accident Helpline	✓		14	13
1073	Road Accident Helpline	✓		13	13
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	✓		13	13
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline		✗		
155304	Municipal Corporations		✗		

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
155214	Labour Helpline	✓			
1903	Sashastra Seema Bal (SSB)		✗		
1909	National Do Not Call Registry	✓		13	13
1912	Complaint of Electricity		✗		
1916	Drinking Water Supply		✗		
1950	Election Commission of India	✓		13	13

Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		8	8
101	Fire	✓		8	8
102	Ambulance	✓		8	8
104	Health Information Helpline		✗		
108	Emergency and Disaster Management Helpline		✗		
138	All India Helpine for Passangers	✓		8	8
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline	✓		8	8
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	✓		8	8
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		8	8
1071	Air Accident Helpline	✓		7	7
1072	Rail Accident Helpline	✓		7	7
1073	Road Accident Helpline	✓		8	8
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)	✓		8	8
1091	Women Helpline	✓		7	7
1097	National AIDS Helpline to NACO	✓		8	8
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	✓		7	7
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	✓		7	7
155304	Municipal Corporations		✗		
155214	Labour Helpline	✓		7	7
1903	Sashastra Seema Bal (SSB)	✓		7	7

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1909	National Do Not Call Registry	✓		7	7
1912	Complaint of Electricity	✓		7	7
1916	Drinking Water Supply		✗		
1950	Election Commission of India	✓		7	7

BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		11	11
101	Fire	✓		11	11
102	Ambulance		✗	11	11
104	Health Information Helpline		✗	11	11
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	✓		11	11
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities		✗		
1071	Air Accident Helpline	✓		11	10
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline	✓		11	11
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)	✓		11	11
1091	Women Helpline	✓		11	11
1097	National AIDS Helpline to NACO	✓		11	11
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	✓		10	10
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✓		10	10
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)		✗		
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity	✓		10	10

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1916	Drinking Water Supply		✘		
1950	Election Commission of India		✘		
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✔		14	14
101	Fire	✔		14	14
102	Ambulance		✘		
104	Health Information Helpline		✘		
108	Emergency and Disaster Management Helpline		✘		
138	All India Helpine for Passangers	✔		14	12
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	✔		14	14
1071	Air Accident Helpline	✔		14	14
1072	Rail Accident Helpline		✘		
1073	Road Accident Helpline	✔		14	11
1077	Control Room for District Collector		✘		
1090	Call Alart (Crime Branch)		✘		
1091	Women Helpline	✔		14	14
1097	National AIDS Helpline to NACO	✔		13	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		✘		
155214	Labour Helpline		✘		
1903	Sashastra Seema Bal (SSB)	✔		13	12
1909	National Do Not Call Registry	✔		13	13
1912	Complaint of Electricity	✔		13	13
1916	Drinking Water Supply		✘		
1950	Election Commission of India		✘		

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MTS					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		12	12
101	Fire	✓		11	11
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	✓		11	11
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	✓		10	10
1071	Air Accident Helpline	✓		10	10
1072	Rail Accident Helpline	✓		10	10
1073	Road Accident Helpline	✓		11	11
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)	✓		11	11
1091	Women Helpline	✓		11	11
1097	National AIDS Helpline to NACO	✓		11	10
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	✓		10	9
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✓		10	10
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		11	11
1909	National Do Not Call Registry	✓		11	11
1912	Complaint of Electricity		✗		
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		

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	Reliance CDMA				
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	10
101	Fire	✓		10	10
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	✓		10	10
1071	Air Accident Helpline	✓		10	10
1072	Rail Accident Helpline	✓		10	10
1073	Road Accident Helpline	✓		10	10
1077	Control Room for District Collector	✓		10	10
1090	Call Alart (Crime Branch)	✓		10	10
1091	Women Helpline	✓		10	10
1097	National AIDS Helpline to NACO	✓		10	10
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	✓		10	10
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✓		10	10
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		10	10
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity		✗		
1916	Drinking Water Supply		✗		
1950	Election Commission of India	✓		10	10

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	Reliance GSM				
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	10
101	Fire	✓		10	10
102	Ambulance		✗		
104	Health Information Helpline		✗		
108	Emergency and Disaster Management Helpline		✗		
138	All India Helpine for Passangers	✓		10	10
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline	✓		10	10
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	✓		10	10
1071	Air Accident Helpline	✓		10	10
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline	✓		10	10
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)	✓		10	10
1091	Women Helpline	✓		10	10
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	✓		10	10
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✓		10	10
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		10	10
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity	✓		10	10
1916	Drinking Water Supply		✗		
1950	Election Commission of India	✓		10	10

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TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		30	30
101	Fire	✓		30	29
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	✓		30	28
1071	Air Accident Helpline		✗		
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline	✓		30	29
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline	✓		30	30
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		✗		

TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		25	25
101	Fire	✓		25	25
102	Ambulance		✗		
104	Health Information Helpline		✗		
108	Emergency and Disaster Management Helpline		✗		
138	All India Helpline 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	✓		25	23
1071	Air Accident Helpline	✓		25	25
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline	✓		25	22
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)		✗		
1091	Women Helpline	✓		25	25
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		✗		

	Vodafone				
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	10
101	Fire	✓		10	10
102	Ambulance		✗		
104	Health Information Helpline		✗		
108	Emergency and Disaster Management Helpline		✗		
138	All India Helpine for Passangers	✓		10	10
149	Public Road Transport Utility Service		✗		
181	Chief Minister Helpline		✗		
182	Indian Railway Security Helpline	✓		9	9
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	✓		9	9
1064	Anti Corruption Helpline		✗		
1070	Relief Commission for Natural Calamities	✓		10	10
1071	Air Accident Helpline	✓		9	9
1072	Rail Accident Helpline		✗		
1073	Road Accident Helpline	✓		9	9
1077	Control Room for District Collector		✗		
1090	Call Alart (Crime Branch)	✓		9	9
1091	Women Helpline	✓		9	9
1097	National AIDS Helpline to NACO	✓		9	9
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	✓		10	10
1514	National Career Service(NCS)		✗		
15100	Free Legal Service Helpline	✓		9	9
155304	Municipal Corporations		✗		
155214	Labour Helpline		✗		
1903	Sashastra Seema Bal (SSB)	✓		9	9
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity	✓		9	9
1916	Drinking Water Supply		✗		
1950	Election Commission of India		✗		

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

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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)])

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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))

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8.15.1 ERICSSON

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

SI 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.

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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

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

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

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 Vodafone, Aircel, BSNL, Reliance CDMA and Reliance GSM in the circle.

Ericsson

8.16.2 NSN (NOKIA SIEMENS NETWORKS)
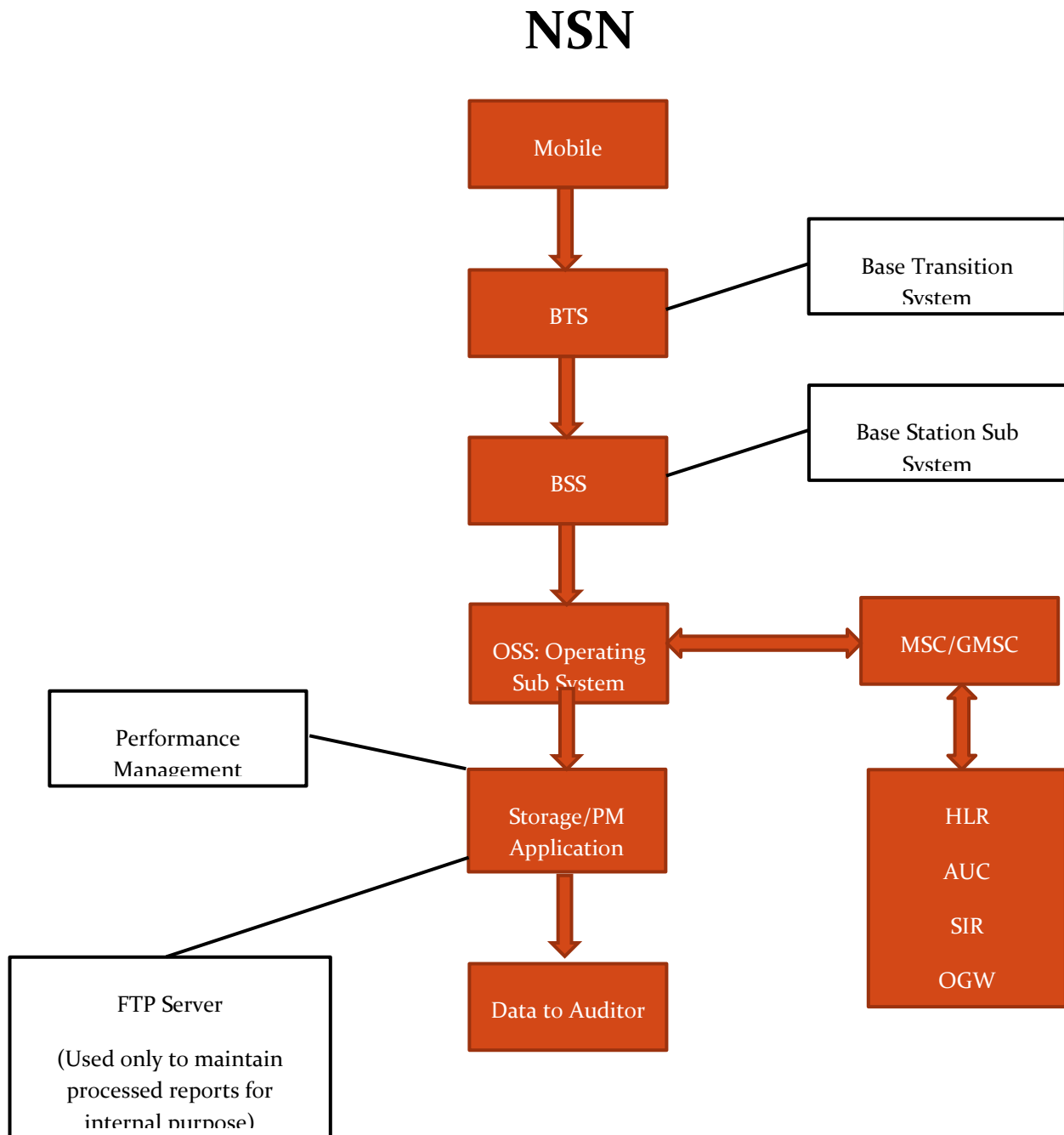
NSN provides network support to Airtel in the circle.

NSN

```
                    ┌─────────────┐
                    │   Mobile    │
                    └─────────────┘
                           │
                           ▼
                    ┌─────────────┐         ┌──────────────────┐
                    │    BTS      │─────────│ Base Transition  │
                    └─────────────┘         │     System       │
                           │                └──────────────────┘
                           ▼
                    ┌─────────────┐         ┌──────────────────┐
                    │    BSS      │─────────│ Base Station Sub │
                    └─────────────┘         │     System       │
                           │                └──────────────────┘
                           ▼
        ┌─────────────────────────┐    ┌──────────────┐
        │ OSS: Operating          │◄──►│   MSC/GMSC   │
        │ Sub System              │    └──────────────┘
        └─────────────────────────┘           │
                           │                   ▼
┌──────────────┐   ┌─────────────────┐   ┌──────────────┐
│ Performance  │───│   Storage/PM    │   │     HLR      │
│ Management   │   │   Application   │   │     AUC      │
└──────────────┘   └─────────────────┘   │     SIR      │
                           │             │     OGW      │
                           ▼             └──────────────┘
┌──────────────┐   ┌─────────────────┐
│              │───│ Data to Auditor │
│  FTP Server  │   └─────────────────┘
│              │
│ (Used only to maintain
│ processed reports for
│ internal purpose)
└──────────────┘
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8.16.3 HUAWEI

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

Huawei

```
                              Mobile                    Base Transition
                                                        System

        BTS                    BTS                       BTS

                               BSS                   Base Station Sub
                                                     System

Radio Related Reports        MSC/GMSC                Switch Reports

                           OSS/OMCR:
                           Operating Sub
                           System
                                                    Data Processing Server

                           Data to Auditor
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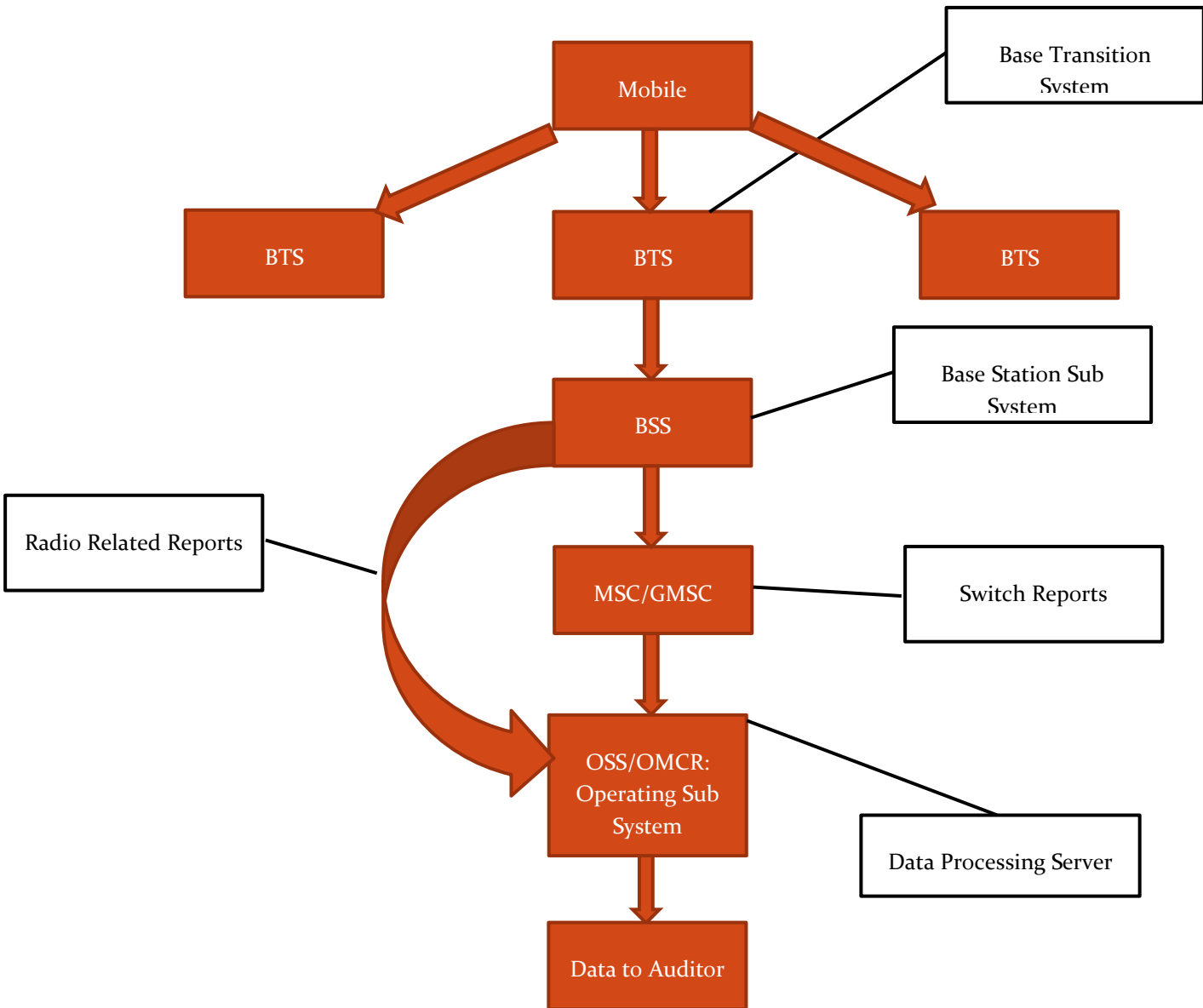
8.16.4 ZTE

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

ZTE
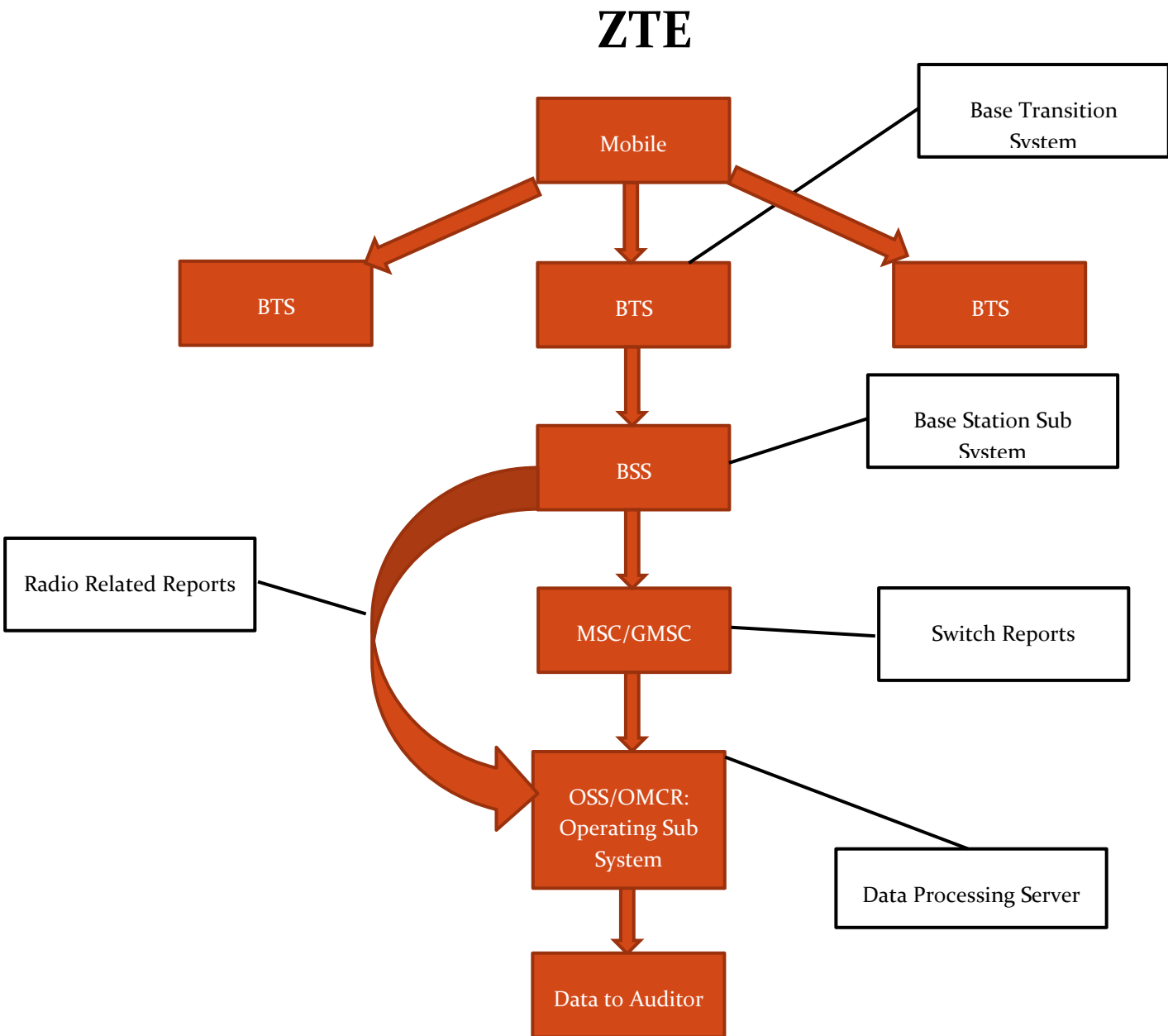
9 ANNEXURE – APRIL

Audit Results for Network Availability- PMR data-April											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2795	6154	2479	4026	914	824	2494	26	256	7315
Sum of downtime of BTSs in a month (in hours)		60831	3514	143399	9270	2308	3054	6954	8	172	4908
BTSs accumulated downtime (not available for service)	≤ 2%	3.02%	0.08%	8.03%	0.32%	0.35%	0.51%	0.39%	0.04%	0.09%	0.09%
Number of BTSs having accumulated downtime >24 hours		570	6	1154	58	0	12	27	0	0	39
Worst affected BTSs due to downtime	≤ 2%	20.39%	0.10%	46.55%	1.44%	0.00%	1.46%	1.08%	0.00%	0.00%	0.53%

Live Measurement Results for Network Availability- 3 Day live data-April											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2753	6144	2479	3951	912	824	2494	26	256	7266
Sum of downtime of BTSs in a month (in hours)		3914	92	7049	221	168	136	253	0	1	64
BTSs accumulated downtime (not available for service)	≤ 2%	1.97%	0.02%	3.95%	0.08%	0.26%	0.23%	0.14%	0.00%	0.00%	0.01%
Number of BTSs having accumulated downtime >24 hours		50	0	89	2	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	1.82%	0.00%	3.59%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-April

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.22%	98.42%	98.06%	98.82%	99.38%	96.65%	98.73%	97.41%	98.79%	98.94%
SDCCH/Paging channel congestion	≤ 1%	2.64%	0.76%	4.08%	0.27%	NA	NA	0.06%	NA	0.31%	0.47%
TCH congestion	≤ 2%	1.62%	1.30%	0.96%	0.64%	0.36%	0.28%	0.21%	0.29%	0.42%	1.06%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-April

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.41%	98.50%	98.11%	99.29%	99.48%	95.66%	98.67%	98.55%	99.16%	99.67%
SDCCH/Paging channel congestion	≤ 1%	0.85%	0.66%	3.60%	0.05%	NA	NA	0.07%	NA	0.02%	0.26%
TCH congestion	≤ 2%	1.08%	1.19%	0.92%	0.17%	0.32%	0.40%	0.18%	0.00%	0.12%	0.33%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-April

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		583	593	539	567	620	416	618	555	456	557
Total number of successful calls established		576	593	112	567	601	416	590	553	455	557
CSSR	≥ 95%	98.80%	100.00%	20.78%	100.00%	96.94%	100.00%	95.47%	99.64%	99.78%	100.00%
%age blocked calls		1.20%	0.00%	79.22%	0.00%	3.06%	0.00%	4.53%	0.36%	0.22%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-April

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		121036628	411544015	52330845	174033213	48376929	16862320	101048778	259701	8470726	448886151
Total number of calls dropped		1724065	4330097	530177	687014	319059	53849	600547	1895	42129	3019994
Call drop rate	≤ 2%	1.42%	1.05%	1.01%	0.39%	0.66%	0.32%	0.59%	0.73%	0.50%	0.67%

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		8291	19600	7246	12131	3332	2473	7504	76	771	21993
Total number of cells having more than 3% TCH		761	334	976	45	67	23	5	2	21	548
Worst affected cells having more than 3% TCH	≤ 3%	9.18%	1.70%	13.47%	0.37%	2.01%	0.93%	0.07%	2.76%	2.74%	2.49%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-April

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		11577079	41779651	5417109	193919752	59502776	1873193	11147559	375348	9077871	543537661
Total number of calls dropped		158298	478665	50704	659094	331162	5307	65594	2347	47492	3142932
Call drop rate	≤ 2%	1.37%	1.15%	0.94%	0.34%	0.56%	0.28%	0.59%	0.63%	0.52%	0.58%

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		8219	58705	7245	11906	3321	2473	7504	76	771	21846
Total number of cells having more than 3% TCH		655	1008	1019	112	76	23	15	2	18	610
Worst affected cells having more than 3% TCH	≤ 3%	7.97%	1.72%	14.06%	0.94%	2.29%	0.93%	0.20%	3.07%	2.33%	2.79%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-April

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		576	593	112	567	620	416	590	553	455	557
Total number of calls dropped		0	0	3	0	6	0	28	1	0	0
Call drop rate	≤ 2%	0.00%	0.00%	2.68%	0.00%	0.97%	0.00%	4.75%	0.18%	0.00%	0.00%

Audit Results for Voice quality -PMR Data-April

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		20428133545	118422251182	7002	23204675718	48376929	NA	15059147741	14534896	1361398429	79091635220
Total number of calls with good voice quality		19532909338	113151774468	6654	22449552583	48251070	NA	14811498103	14240404	1329388675	75525545017
%age calls with good voice quality	≥ 95%	95.62%	95.55%	95.03%	96.75%	99.74%	99.68%	98.36%	97.97%	97.65%	95.49%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1782623936	12154679295	802	25615219448	59502776	NA	1514585047	7607818	1505225089	87534785557
Total number of calls with good voice quality		1702882008	11592398368	762	24801912820	59289569	NA	1491917016	7444469	1472361412	84237574819
%age calls with good voice quality	≥ 95%	95.53%	95.37%	95.01%	96.82%	99.64%	99.68%	98.50%	97.85%	97.82%	96.23%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		336593	142565	204675	1313402	74731	NA	617618	1215670	749259	387243
Total number of calls with good voice quality		313669	138942	183326	1268737	71180	NA	554621	1182872	728055	378069
%age calls with good voice quality	≥ 95%	93.19%	97.46%	89.57%	96.60%	95.25%	64.60%	89.80%	97.30%	97.17%	97.63%

Audit Results for POI Congestion- PMR data-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		61	37	77	112	38	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76580	143618	186390	103893	56150	7851	37316	12460	6293	340381
Traffic served for all POIs (B)- in erlangs		38045	92625	25520	65903	26064	2515	21932	1811	1339	195057
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-April											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		61	37	77	112	37	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76570	425193	186390	104156	56158	7851	37316	12460	6287	339989
Traffic served for all POIs (B)- in erlangs		32734	273333	25576	66364	26606	2515	21932	1822	1327	192964
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – MAY

Audit Results for Network Availability- PMR data-May											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2867	6189	2479	4111	916	824	2494	26	256	7739
Sum of downtime of BTSs in a month (in hours)		58061	1172	152926	7170	1854	2566	6369	3	74	4245
BTSs accumulated downtime (not available for service)	≤ 2%	2.72%	0.03%	8.29%	0.23%	0.27%	0.42%	0.34%	0.02%	0.04%	0.07%
Number of BTSs having accumulated downtime >24 hours		494	1	1245	59	0	9	25	0	0	31
Worst affected BTSs due to downtime	≤ 2%	17.23%	0.02%	50.22%	1.44%	0.00%	1.09%	1.00%	0.00%	0.00%	0.40%
Live Measurement Results for Network Availability- 3 Day live data-May											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2837	6187	2479	4068	915	824	2494	26	256	7332
Sum of downtime of BTSs in a month (in hours)		5427	76	7367	396	191	212	438	0	0	139
BTSs accumulated downtime (not available for service)	≤ 2%	2.66%	0.02%	4.13%	0.14%	0.29%	0.36%	0.24%	0.00%	0.00%	0.03%
Number of BTSs having accumulated downtime >24 hours		62	0	98	5	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	2.19%	0.00%	3.95%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-May

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.25%	98.55%	98.14%	99.07%	99.29%	97.09%	98.74%	98.37%	98.99%	99.04%
SDCCH/Paging channel congestion	≤ 1%	1.54%	0.72%	3.16%	0.12%	0.00%	0.00%	0.05%	0.00%	0.28%	0.45%
TCH congestion	≤ 2%	1.61%	0.84%	1.00%	0.21%	0.55%	0.19%	0.22%	0.01%	0.24%	0.96%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-May

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.38%	98.67%	97.38%	99.52%	99.73%	98.37%	98.69%	98.69%	99.29%	99.75%
SDCCH/Paging channel congestion	≤ 1%	0.92%	0.62%	2.58%	0.05%	0.00%	0.00%	0.04%	0.00%	0.03%	0.23%
TCH congestion	≤ 2%	1.47%	0.82%	1.14%	0.05%	0.10%	0.04%	0.22%	0.00%	0.06%	0.25%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-May

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		518	568	404	528	859	663	663	322	484	565
Total number of successful calls established		516	568	395	520	496	626	643	319	480	565
CSSR	≥ 95%	99.61%	100.00%	97.77%	98.48%	57.74%	94.42%	96.98%	99.07%	99.17%	100.00%
%age blocked calls		0.39%	0.00%	2.23%	1.52%	42.26%	5.58%	3.02%	0.93%	0.83%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-May										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		136491820	437333856	51045447	186553086	47891126	14916053	104065008	273967	7661163	430663826
Total number of calls dropped		1744589	4470302	502005	473469	297821	44767	616881	2007	39851	2948239
Call drop rate	≤ 2%	1.28%	1.02%	0.98%	0.25%	0.62%	0.30%	0.59%	0.73%	0.52%	0.68%

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		8480	19704	7246	12386	3349	2473	7504	76	771	22056
Total number of cells having more than 3% TCH		682	360	928	39	63	15	7	2	20	527
Worst affected cells having more than 3% TCH	≤ 3%	8.04%	1.83%	12.81%	0.31%	1.88%	0.61%	0.09%	2.97%	2.54%	2.39%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-May										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		21712534	42398157	4860833	191059628	57842579	1625163	10965245	349357	8453831	549180266
Total number of calls dropped		209281	449330	50016	509773	274187	3359	64569	2578	43592	3023656
Call drop rate	≤ 2%	0.96%	1.06%	1.03%	0.27%	0.47%	0.21%	0.59%	0.74%	0.52%	0.55%

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		8488	59078	7246	12257	3344	2473	7504	76	771	22044
Total number of cells having more than 3% TCH		628	1105	815	74	57	17	11	2	19	566
Worst affected cells having more than 3% TCH	≤ 3%	7.40%	1.87%	11.25%	0.60%	1.70%	0.69%	0.15%	3.07%	2.46%	2.57%

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Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-May

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		516	568	395	520	496	626	643	322	480	565
Total number of calls dropped		0	1	7	2	18	0	20	0	3	0
Call drop rate	≤ 2%	0.00%	0.18%	1.77%	0.38%	3.63%	0.00%	3.11%	0.00%	0.63%	0.00%

Audit Results for Voice quality -PMR Data-May

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		21023390067	122305710926	7018	24072955010	47891126	NA	15568603897	14319442	1371408312	83832656207
Total number of calls with good voice quality		20137813340	116904259129	6672	23509717788	47681657	NA	15310564226	14036967	1339695084	80188822550
%age calls with good voice quality	≥ 95%	95.79%	95.58%	95.07%	97.66%	99.56%	99.68%	98.34%	98.03%	97.69%	95.65%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		2133350471	11027426120	826	50926121596	57842579	NA	1537230828	7421476	1475428960	85551706729
Total number of calls with good voice quality		2041382593	10504129576	785	49864240086	57777274	NA	1511521046	7265937	1443561301	82439468497
%age calls with good voice quality	≥ 95%	95.69%	95.25%	95.04%	97.91%	99.89%	99.67%	98.33%	97.90%	97.84%	96.36%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		315247	136015	586570	926548	64967	NA	795858	696922	788744	344317
Total number of calls with good voice quality		292512	131703	559794	903380	61532	NA	719933	687759	766975	332263
%age calls with good voice quality	≥ 95%	92.79%	96.83%	95.44%	97.50%	94.71%	64.35%	90.46%	98.69%	97.24%	96.50%

Audit Results for POI Congestion- PMR data-May

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	112	38	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76715	146648	186390	103450	56218	6205	37316	12459	6293	340904
Traffic served for all POIs (B)- in erlangs		38883	97895	24626	65023	25745	2589	22665	1786	1266	214781
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-May

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		62	37	77	112	37	21	48	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		76626	430255	186390	103518	56474	6205	37316	12458	6286	340560
Traffic served for all POIs (B)- in erlangs		40636	281976	24329	64190	27136	2298	23256	1747	1259	200355
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 – JUNE

For Reliance CDMA and Reliance GSM, Data for Jun'15 could not be audited 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-June											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2867	6225	2479	4225	916	NDR	NDR	26	255	7340
Sum of downtime of BTSs in a month (in hours)		41264	3279	195187	5923	2089	NDR	NDR	12	222	2169
BTSs accumulated downtime (not available for service)	≤ 2%	2.00%	0.07%	10.58%	0.19%	0.31%	NDR	NDR	0.06%	0.12%	0.04%
Number of BTSs having accumulated downtime >24 hours		378	7	1319	38	0	NDR	NDR	0	0	17
Worst affected BTSs due to downtime	≤ 2%	13.18%	0.11%	53.21%	0.90%	0.00%	NDR	NDR	0.00%	0.00%	0.23%
Live Measurement Results for Network Availability- 3 Day live data-June											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2867	6219	2479	4144	916	NDR	NDR	26	255	7339
Sum of downtime of BTSs in a month (in hours)		4234	128	12083	559	125	NDR	NDR	0	8	114
BTSs accumulated downtime (not available for service)	≤ 2%	2.05%	0.03%	6.77%	0.19%	0.19%	NDR	NDR	0.00%	0.04%	0.02%
Number of BTSs having accumulated downtime >24 hours		44	0	165	5	0	NDR	NDR	0	0	0
Worst affected BTSs due to downtime	≤ 2%	1.53%	0.00%	6.66%	0.12%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-June

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.05%	98.58%	97.20%	97.71%	99.45%	NDR	NDR	97.72%	98.92%	99.11%
SDCCH/Paging channel congestion	≤ 1%	1.53%	0.72%	4.11%	0.07%	NA	NDR	NDR	NA	0.10%	0.42%
TCH congestion	≤ 2%	1.74%	0.91%	1.36%	0.36%	0.34%	NDR	NDR	0.02%	0.25%	0.89%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-June

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.29%	98.52%	97.64%	99.63%	99.81%	NDR	NDR	95.76%	99.05%	99.74%
SDCCH/Paging channel congestion	≤ 1%	2.38%	0.81%	5.09%	0.07%	NA	NDR	NDR	NA	0.07%	0.27%
TCH congestion	≤ 2%	1.32%	0.86%	1.52%	0.10%	0.05%	NDR	NDR	2.20%	0.16%	0.26%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-June

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		585	644	723	696	702	711	619	632	581	593
Total number of successful calls established		565	644	596	689	663	561	597	632	571	593
CSSR	≥ 95%	96.58%	100.00%	82.43%	98.99%	94.44%	78.90%	96.45%	100.00%	98.28%	100.00%
%age blocked calls		3.42%	0.00%	17.57%	1.01%	5.56%	21.10%	3.55%	0.00%	1.72%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-June

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		116481177	411947027	56290769	156753816	43705772	NDR	NDR	209291	8047317	428729240
Total number of calls dropped		1550659	4342275	556361	539061	265482	NDR	NDR	1579	42525	2907074
Call drop rate	≤ 2%	1.33%	1.05%	0.99%	0.34%	0.61%	NDR	NDR	0.75%	0.53%	0.68%

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		8326	19825	7246	12728	3370	NDR	NDR	76	768	22059
Total number of cells having more than 3% TCH		750	517	1027	62	70	NDR	NDR	7	22	485
Worst affected cells having more than 3% TCH	≤ 3%	9.01%	2.61%	14.17%	0.49%	2.08%	NDR	NDR	9.83%	2.88%	2.20%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-June

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		4049766	41794979	5624943	189538219	56919302	NDR	NDR	315042	8503434	552872176
Total number of calls dropped		62299	440456	56739	590433	291669	NDR	NDR	2398	48093	3241650
Call drop rate	≤ 2%	1.54%	1.05%	1.01%	0.31%	0.51%	NDR	NDR	0.76%	0.57%	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		8189	59401	7246	12485	3363	NDR	NDR	76	768	22056
Total number of cells having more than 3% TCH		725	1107	995	88	66	NDR	NDR	7	30	592
Worst affected cells having more than 3% TCH	≤ 3%	8.85%	1.86%	13.73%	0.70%	1.96%	NDR	NDR	9.21%	3.91%	2.68%

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Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-June

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		565	644	596	689	663	561	597	632	571	593
Total number of calls dropped		17	0	10	1	3	0	22	0	10	0
Call drop rate	≤ 2%	3.01%	0.00%	1.68%	0.15%	0.45%	0.00%	3.69%	0.00%	1.75%	0.00%

Audit Results for Voice quality -PMR Data-June

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		19410117240	118306945661	7012	25167659452	43705772	NDR	NDR	13096863	1285128469	81845323076
Total number of calls with good voice quality		18632397495	113240871290	6662	24558749383	43595803	NDR	NDR	12845654	1255391677	78288833714
%age calls with good voice quality	≥ 95%	95.99%	95.72%	95.01%	97.58%	99.75%	NDR	NDR	98.08%	97.69%	95.65%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1980013367	11363889327	823	25493744310	57026862	NDR	NDR	7431597	1449504644	85303271578
Total number of calls with good voice quality		1901378207	10862156223	782	24939692545	56773193	NDR	NDR	7278036	1416147389	82150500168
%age calls with good voice quality	≥ 95%	96.03%	95.58%	95.02%	97.83%	99.56%	NDR	NDR	97.93%	97.70%	96.30%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		944012	158868	951304	1219774	76124	NA	167689	1364368	898546	169647
Total number of calls with good voice quality		862626	154111	887388	1181709	73379	NA	157628	1350497	908878	164157
%age calls with good voice quality	≥ 95%	91.38%	97.01%	93.28%	96.88%	96.39%	99.67%	94.00%	98.98%	101.15%	96.76%

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Audit Results for POI Congestion- PMR data-June

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	NDR	NDR	58	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	NDR	NDR	0	0	0
Total Capacity of all POIs (A) - in erlangs		77387	142440	184910	115158	55651	NDR	NDR	11830	6293	343254
Traffic served for all POIs (B)- in erlangs		38294	90499	38155	73639	24601	NDR	NDR	1686	1199	201605
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-June

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	58	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		76027	415670	186390	115652	48764	NDR	NDR	11830	6286	342374
Traffic served for all POIs (B)- in erlangs		38321	271955	38962	75205	25217	NDR	NDR	1515	1234	202328
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	NDR	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. AMJ'15 – Refers to the quarter of April, May and June 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