EAST ZONE

TRAI AUDIT WIRELESS REPORT-WEST BENGAL CIRCLE - JAS QUARTER, 2014

Prepared By -

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Prepared For-

TRAI

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

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

2.2 OBJECTIVES

The primary objective of the Audit module is to-

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

2.3 IMPORTANT NOTE (CHANGE OF BENCHMARKS)

TRAI had recommended a change of benchmarks for all operators and IMRB in the month of September for two parameters.

- Resolution of billing/charging complaints
- Percentage of calls answered by operators (voice to voice)

Some of the operators have been able to change their systems as per the new benchmarks and IMRB has audited the data as per new benchmarks for those operators.

However, some operators are still in the process of changing their systems as per new benchmarks. Hence, IMRB has audited these operators as per previous benchmarks.

Thus, IMRB has reported the parameters as per the data availability with the operators. The key changes in the benchmark are given in the table below.

Parameter	Old Benchmark	New Benchmark
Resolution of billing complaints	100% within 4 weeks	98% within 4 weeks, 100% within 6 weeks
Percentage of calls answered by operators (voice to voice)	within 60 seconds: In 90% of the cases or more	within 90 seconds: In 95% of the cases or more

For resolution of billing/ charging complaints all operators provided the data as per new benchmark levels, except BSNL.

For calls answered by operators (voice to voice) following operators provided the data as per new benchmark levels.

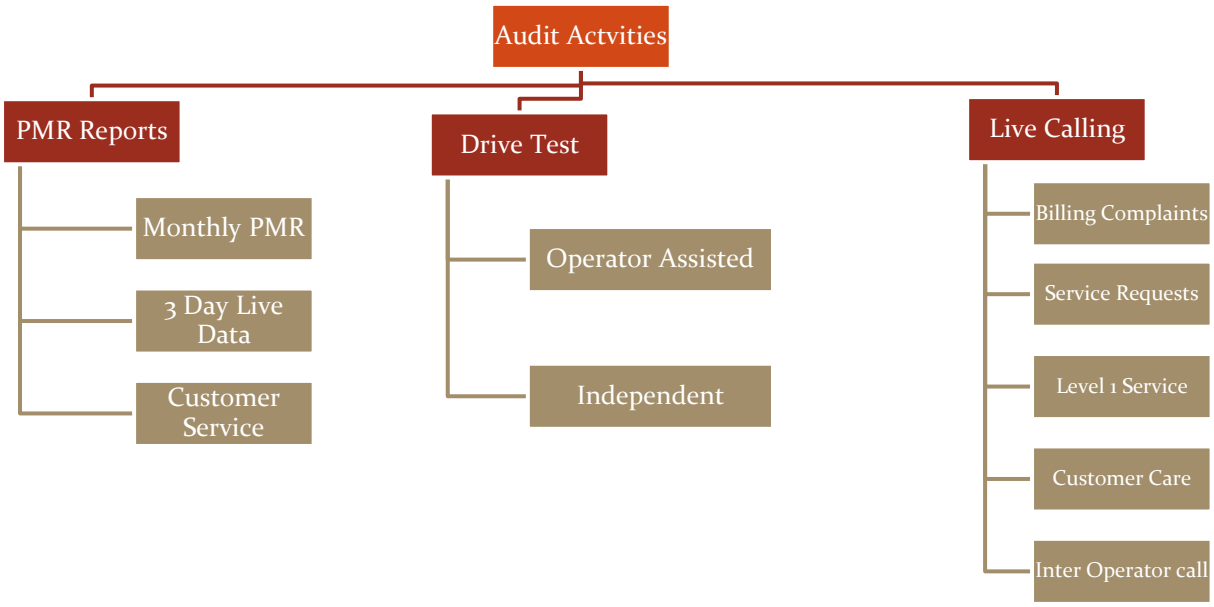
- Airtel
- BSNL
- Reliance CDMA
- Reliance GSM
- Tata CDMA
- Tata GSM
- Vodafone

2.4 COVERAGE

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

Image Source: BSNL website

2.5 FRAMEWORK USED



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

2.5.1 PMR REPORTS

2.5.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated by operators 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. As per schedule, 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 created 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 generally extracted and verified in the first week of the subsequent month of the audit month. For example, August 2014 audit data was collected in the month of September 2014.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending September 2014 (JAS'14) was collected in the month of October 2014.

The raw data is extracted from operator's systems 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.

2.5.1.2 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were extracted in presence of IMRB representative from the operator's premises for the month of Jul, Aug and Sep 2014. 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 4 of the report. The benchmark values for each parameter have been given in the table below.

2.5.1.3 AUDIT PARAMETERS - NETWORK

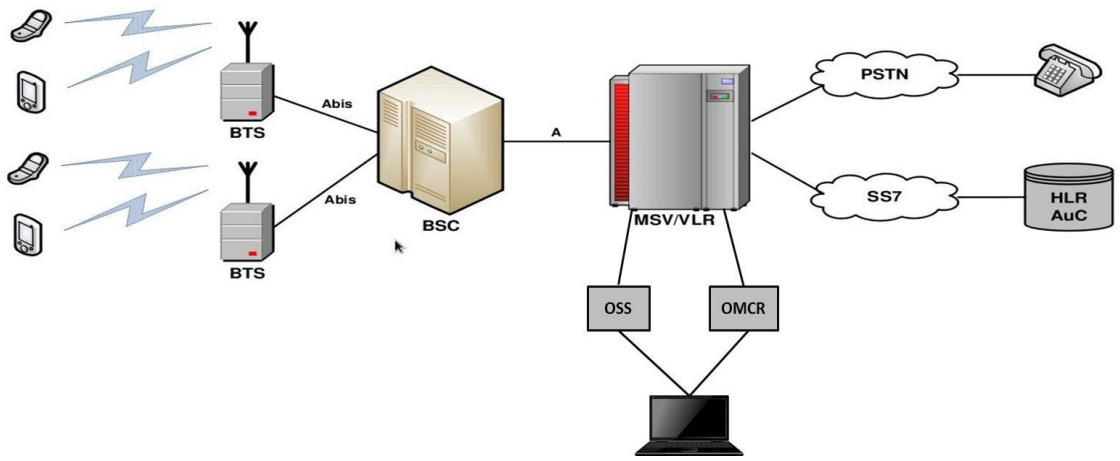
Let us now look at the various parameters involved in the audit reports.

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%

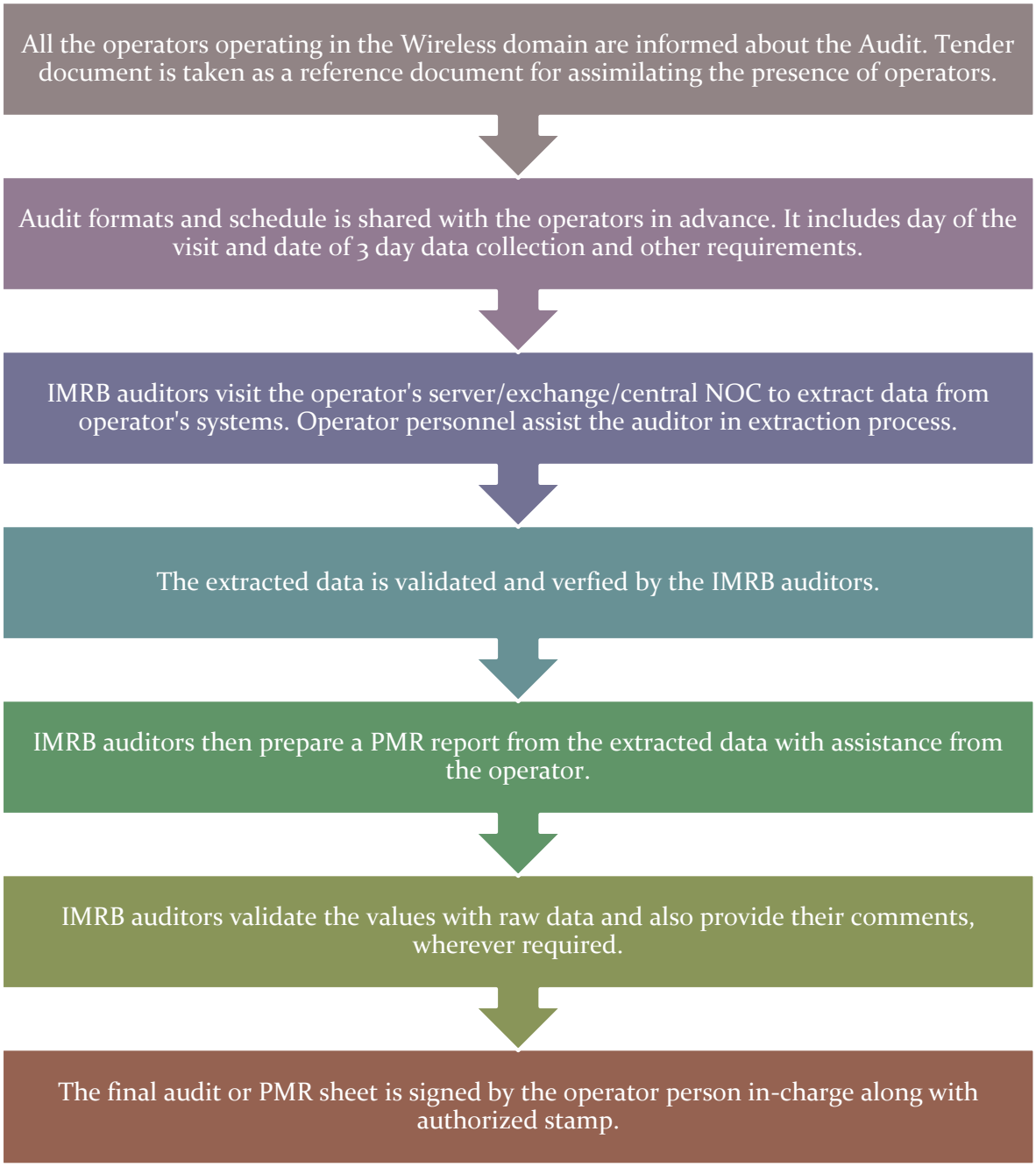
2.5.1.4 POINT OF DATA EXTRACTION

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



2.5.1.5 STEP BY STEP AUDIT PROCEDURE

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



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

2.5.1.6 CALCULATION METHODOLOGY – NETWORK PARAMETERS

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

2.5.1.7 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.

2.5.1.8 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.

During audit, the auditors identified from the raw data that the TCBH for all operators in JAS'14 was the time period between 20:00 to 21:00 hours.

2.5.1.9 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.

During audit, the auditors identified from the raw data that the CBBH for the operators in JAS'14 was the time period as given below.

Aircel(DWL)	Airtel	BSNL	Idea	MTS
20:00 - 21:00	20:00 - 21:00	19:00 - 20:00	20:00 - 21:00	20:00 - 21:00
Reliance CDMA	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
19:00 - 20:00	19:00 - 20:00	20:00 - 21:00	20:00 - 21:00	20:00 - 21:00

2.5.1.10 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 Sep 2014 (JAS'14) was collected in the month of Oct 2014. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

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

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

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

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2.5.1.11 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 (Old Benchmark)	100%
Resolution of billing/ charging complaints within 4 weeks (New Benchmark)	98%
Resolution of billing/ charging complaints within 6 weeks (New Benchmark)	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 60 seconds (Old benchmark)	≥ 90%
Percentage of calls answered by the operators (voice to voice) within 90 seconds (New benchmark)	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

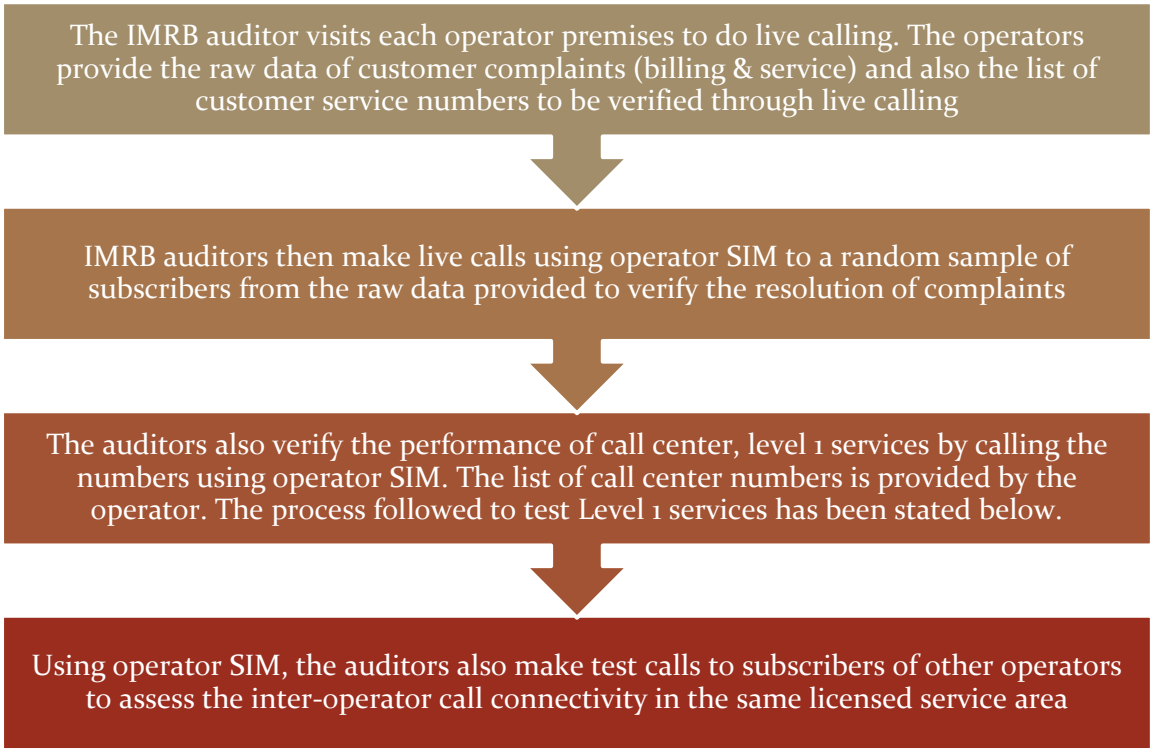
2.5.1.12 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Billing complaints per 100 bills issued - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Charging complaints per 100 subscribers – Prepaid	Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter * 100
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 center performance (Voice to Voice)	There are two benchmarks involved here (Old and New): Old Benchmark: Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) * 100 New Benchmark: 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 60 seconds (for old benchmark) and before 90 seconds (for new benchmark)
Time taken for termination/ closure of service	Number of closures done within 7 days/ total number of closure requests * 100
Time taken for refund for deposit after closures	Number of cases of refund after closure done within 60 days/ total number of cases of refund after closure * 100

2.5.2 LIVE CALLING

2.5.2.1 SIGNIFICANCE AND METHODOLOGY

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



Live calling activity was carried out during the period of Sep-Oct 2014. 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 Aug 2014 was considered for live calling activity conducted in Sep 2014.

A detailed explanation of each parameter is explained below.

2.5.2.2 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 March, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 5.1.1.

TRAI benchmark-

% of complaints resolved in 4 weeks – 100%

Metering and billing credibility–Post Paid- Not more than 0.1% of bills issued should be disputed over a billing cycle

Metering and billing credibility –- Prepaid - Not more than 1 complaint per 1000 customers i.e. 0.1% complaints for metering, charging, credit, and validity

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

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling has been done to check billing performance as per old benchmarks.

2.5.2.3 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.

2.5.2.4 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 JAS'14, IMRB has tried contacting only the toll free emergency L1 services for the purpose of live calling. The list of numbers tested by IMRB has been provided below.

L1 Code	Description	L1 Code	Description
100	Police	1072	Rail Accident Helpline
101	Fire	1073	Road Accident Helpline
102	Ambulance	1076	Chief Minister's Grievance Redressal
103	Traffic Police	1091	Women Helpline
104	State Heath Information Helpline	1095	Traffic Control Helpline
1056	Emergency Medical Service	1096	Natural Disaster Helpline
1070	Natural Calamities Helpline	1098	Child Helpline
1071	Air Accident Helpline		

2.5.2.5 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 within 60 seconds by operator's IVR.
- % age of calls answered by operator / voice to voice) within 60 seconds: In 90% of the cases or more (Old Benchmark)
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more (New Benchmark)

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 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 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.

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling has been done to check call center performance (voice to voice) as per old benchmarks.

2.5.2.6 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.

2.5.3 DRIVE TEST

2.5.3.1 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.

2.5.3.2 OPERATOR ASSISTED DRIVE TEST

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

- 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- On an average, a minimum of 100 kilometers were covered each day
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads and we can start from the point from where we had left last day (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For

indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.

- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed.
- Height of the antenna was kept uniform in case of all service providers.

2.5.3.3 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.
- 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.

2.5.3.4 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

2.6 OPERATORS COVERED

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	3235462
Airtel	10667773
BSNL	1398018
Idea	3657601
MTS	1174663
Reliance CDMA	1025983
Reliance GSM	5969870
TATA CDMA	8105
TATA GSM	515365
Vodafone	13610026

September'14 VLR data was considered for the number of subscribers.

2.7 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY

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

Note: TCBH (Time Consistent Busy Hour) identified by auditors for all operators was 20:00 – 21:00.

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.62%	8.44%	97.45%	0.85%	1.92%	1.48%	10.57%	95.76%
Airtel	0.02%	0.03%	98.80%	0.21%	1.73%	1.18%	1.55%	95.78%
BSNL	7.81%	33.90%	98.57%	1.03%	0.86%	1.93%	14.99%	95.02%
Idea	0.13%	0.67%	98.35%	0.09%	0.67%	0.44%	1.87%	95.77%
MTS	0.29%	0.00%	99.35%	0.00%	0.34%	0.85%	2.52%	99.86%
Reliance CDMA	0.30%	0.86%	98.54%	0.00%	0.06%	0.32%	1.19%	99.67%
Reliance GSM	0.25%	0.70%	98.69%	0.02%	0.15%	0.65%	0.09%	98.21%
TATA CDMA	0.04%	0.00%	97.80%	0.00%	0.01%	0.60%	3.09%	98.02%
TATA GSM	0.17%	0.81%	98.17%	0.19%	0.82%	0.71%	3.91%	97.75%
Vodafone	0.04%	0.24%	99.36%	0.15%	0.64%	0.87%	2.95%	95.21%

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

BTSs Accumulated Downtime

BSNL failed to meet the benchmark for BTS accumulated downtime while all other operators met the benchmark for the parameter. Airtel had the best performance with 0.02% downtime.

Worst Affected BTSs Due to Downtime

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

Call Set-up Success Rate (CSSR)

All the operators met the TRAI benchmark for the ratio of successful call attempts to the overall call attempts. The best performance was recorded for the Vodafone at 99.36% CSSR.

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

Network Congestion parameters:

BSNL did not meet the benchmark for SDCCH/Paging channel congestion ratio. The best performance was recorded for MTS, Reliance CDMA and Tata CDMA with 0.00% congestion.

For TCH congestion, all operators met the benchmark while Tata CDMA was the best performer by recording 0.01% 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 0.32% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL, Tata CDMA and Tata GSM failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.09% 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 99.86%.

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

3.2 3 DAY DATA - 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 (%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)	2.29%	1.87%	96.52%	0.59%	2.50%	1.69%	9.72%	95.04%
Airtel	0.03%	0.00%	98.89%	0.19%	1.44%	1.19%	1.60%	95.53%
BSNL	7.03%	2.67%	98.49%	0.97%	1.30%	2.06%	16.09%	95.04%
Idea	0.12%	0.07%	99.50%	0.07%	0.20%	0.37%	0.07%	96.51%
MTS	0.25%	0.00%	99.78%	0.00%	0.03%	0.61%	2.61%	99.86%
Reliance CDMA	0.27%	0.00%	98.54%	0.00%	0.07%	0.31%	1.63%	99.67%
Reliance GSM	0.25%	0.00%	98.79%	0.95%	0.12%	0.59%	0.15%	98.21%
TATA CDMA	0.12%	0.00%	98.10%	0.00%	0.01%	0.47%	2.63%	97.90%
TATA GSM	0.17%	0.00%	98.90%	0.09%	0.25%	0.64%	4.10%	97.90%
Vodafone	0.13%	0.05%	99.65%	0.18%	0.35%	0.75%	3.29%	95.93%

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). Airtel performed the best with 0.03% BTS accumulate downtime reported.

Worst Affected BTSs Due to Downtime

BSNL did not meet the benchmark while all other operators met the TRAI benchmark for the parameter with most of them reporting 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR)

All the operators met the TRAI benchmark for the ratio of successful call attempts to the overall call attempts. The best performance was recorded for the MTS at 99.78% 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:

For SDCCH/Paging channel congestion, all operators met the TRAI benchmark. The best performance was recorded for MTS, Reliance CDMA and Tata CDMA with 0.00% congestion.

For TCH congestion, Aircel did not meet the TRAI specified benchmark. Tata CDMA was the best performer as 0.01% TCH congestion was recorded for the operator.

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

Call Drop Rate

BSNL did not meet the benchmark for call drop rate. Reliance CDMA was the best performer with 0.31% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL, Tata GSM and Vodafone failed to meet the benchmark for the parameter. Idea was the best performer with 0.07% 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 99.86%.

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

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	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 60 seconds
Benchmark	100.00%		≥ 95%	≥ 95%	≥ 90%
Aircel(DWL)	100.00%	100.00%	33.33%	100.00%	100.00%
Airtel	97.00%	98.00%	53.33%	100.00%	100.00%
BSNL	34.85%	74.58%	34.00%	100.00%	100.00%
Idea	98.00%	100.00%	53.33%	100.00%	100.00%
MTS	100.00%	100.00%	60.00%	100.00%	100.00%
Reliance CDMA	98.00%	95.00%	29.33%	100.00%	100.00%
Reliance GSM	97.00%	95.00%	26.00%	100.00%	100.00%
TATA CDMA	No Complaints	100.00%	60.00%	100.00%	91.00%
TATA GSM	85.71%	52.00%	53.33%	100.00%	84.00%
Vodafone	100.00%	100.00%	53.33%	100.00%	100.00%

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling for metering and billing and Customer care (voice to voice) has been done to check billing performance as per old benchmarks.

Resolution of billing complaints

Resolving billing complaints within stipulated time is a key concern for majority of the operators. Aircel, MTS and Vodafone were the few operators that met the benchmark for the parameter.

Tata CDMA did not report any billing/charging complaints. Hence, live calling activity to verify resolution of billing complaints was not conducted for the operator.

Complaint/Request Attended to Satisfaction

There is no benchmark set by TRAI for this parameter.

Aircel, Idea, MTS, Tata CDMA and Vodafone showed complete satisfaction for the customers with regards to their requests being attended.

BSNL and Tata GSM performed below circle average of 91%.

Level 1 Service

None of the 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.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect all the service providers met the TRAI benchmark with 100% accessibility of all call centers/customer care centers, which was much above the TRAI benchmark of 95%.

Customer Care / Helpline Assessment

Tata GSM did not meet the benchmark while all other operators exceeded the TRAI benchmark of 90% of calls answered by the operators (voice to voice) within 60 seconds.

3.4 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Billing Disputes		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 operators IVR within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 90%	≥ 95%
Aircel(DWL)	0.00%	0.51%	100.00%	100.00%	100.00%	98.75%	95.94%	NA
Airtel	0.11%	0.03%	100.00%	100.00%	100.00%	100.00%	NA	99.30%
BSNL	NC	NC	NC	NC	NC	NC	NC	NC
Idea	0.19%	0.15%	100.00%	100.00%	100.00%	99.02%	NA	97.40%
MTS	0.02%	0.01%	100.00%	100.00%	100.00%	96.06%	NA	96.59%
Reliance CDMA	0.12%	0.11%	100.00%	100.00%	100.00%	99.30%	NA	95.52%
Reliance GSM	0.09%	0.10%	100.00%	100.00%	100.00%	98.98%	NA	97.34%
TATA CDMA	NA	0.00%	100.00%	100.00%	100.00%	99.43%	95.40%	NA
TATA GSM	NA	0.00%	100.00%	100.00%	100.00%	96.88%	87.24%	NA
Vodafone	0.05%	0.14%	100.00%	100.00%	100.00%	100.00%	NA	97.46%

Note: For Customer Care (voice to voice), there are two different benchmarks (old – within 60 seconds and new – within 90 seconds). In the above table, if data was audited as per old benchmark, NA is written in the column showing data as per new benchmark and vice versa.
NC: Auditors were not able to get billing and customer service data from BSNL as the operator did not have the required data available at its central billing and central customer service centres respectively. Hence it has been reported as non-compliance (NC) for the operator.

Billing Disputes – Postpaid Subscribers

For the postpaid customers, Airtel, Idea and Reliance CDMA did not 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.

Billing/ Charging Disputes – Prepaid Subscribers

For the prepaid customers, Aircel, Idea, Reliance CDMA, Reliance GSM and Vodafone did not meet the TRAI benchmark. Tata CDMA was the best performer with 0.00% charging disputes.

Resolution of Billing Complaints

All the operators met the TRAI criteria of resolving the billing complaints within stipulated time.

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 within 60 seconds

All operators met the benchmark for calls answered by IVR. Airtel and Vodafone performed the best by connecting 100% IVR calls within 60 seconds.

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

Aircel, Tata CDMA and Tata GSM provided the data as per old benchmark while all other operators provided the data as per new benchmark.

Tata GSM failed to meet the benchmark. As per old benchmark, Aircel was the best performer with 95.94% calls answered within 60 seconds. As per new benchmark, Airtel was the best performer with 99.30% calls being answered within 90 seconds.

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. All operators were able to connect with each other were having 100% connectivity.

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

4.1 BTS ACCUMULATED DOWNTIME

4.1.1 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

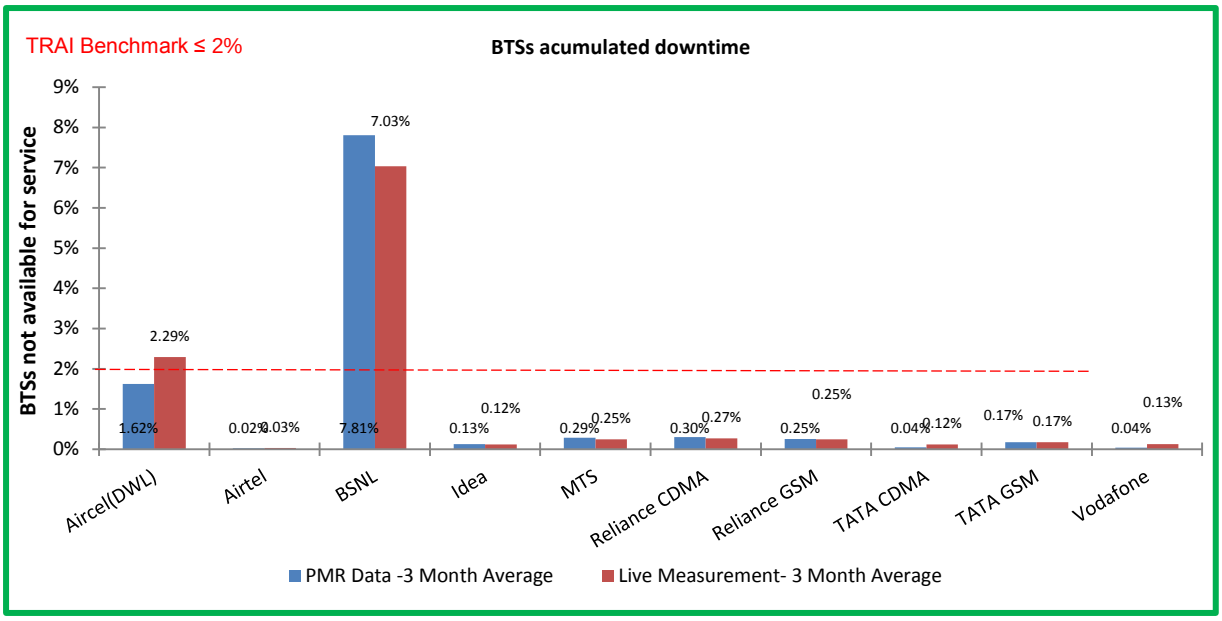
3. **TRAI Benchmark –**

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

4. **Audit Procedure –**

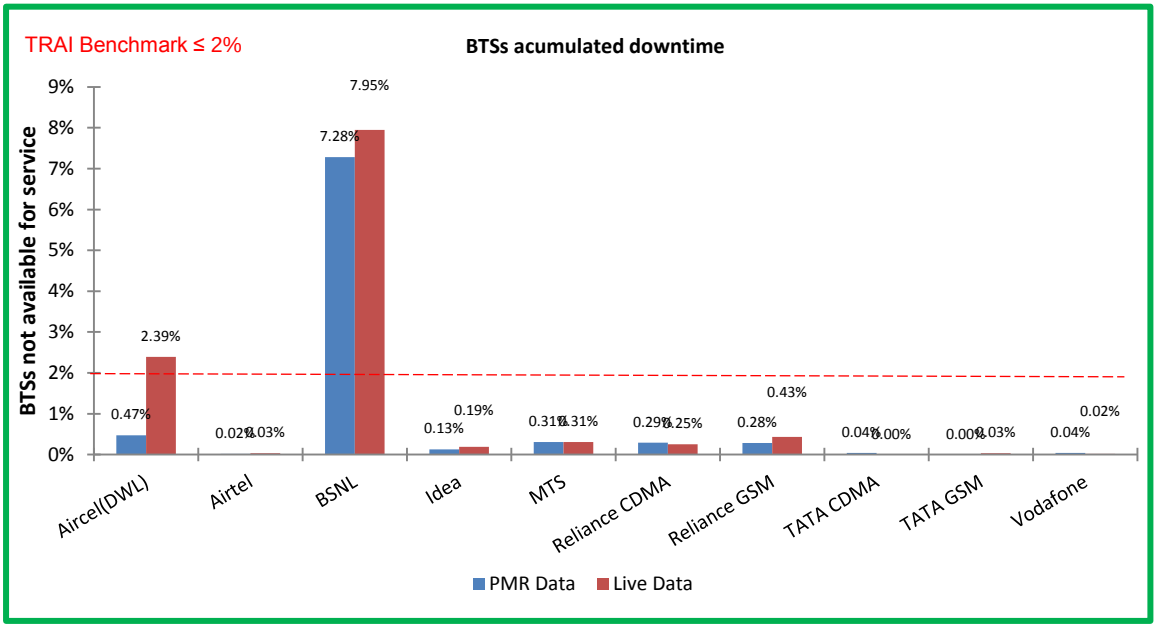
    - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
    - All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.
    - Any 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.

4.1.2 KEY FINDINGS

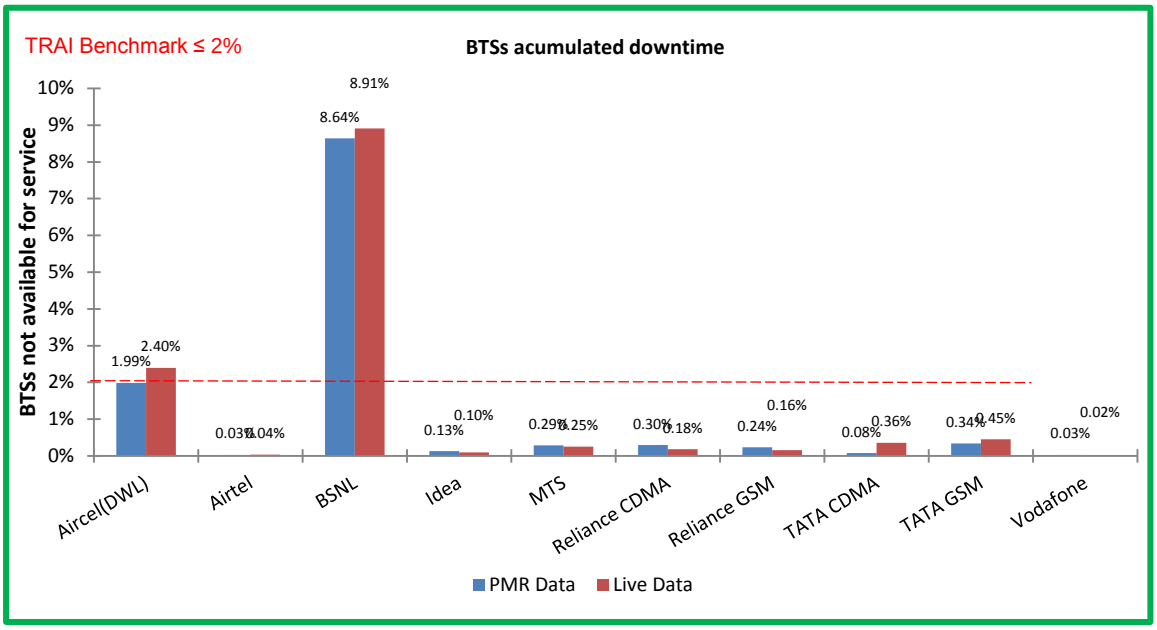


BSNL failed to meet the benchmark for BTS accumulated downtime while all other operators met the benchmark for the parameter.

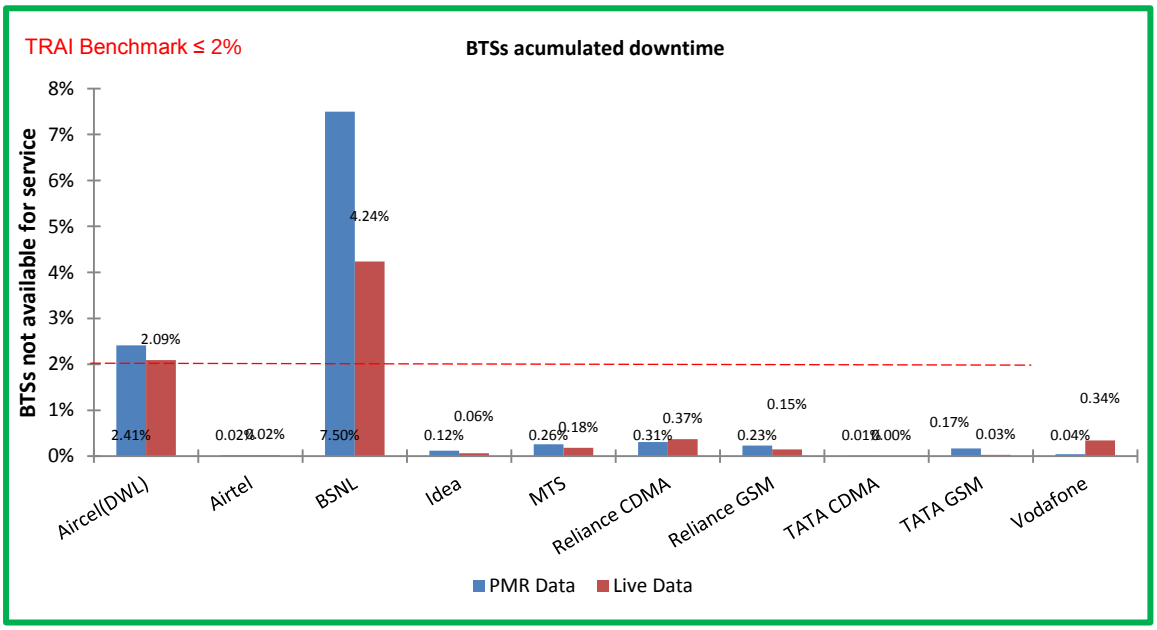
4.1.2.1 KEY FINDINGS – MONTH 1



4.1.2.2 KEY FINDINGS – MONTH 2



4.1.2.3 KEY FINDINGS – MONTH 3



4.2 WORST AFFECTED BTS DUE TO DOWNTIME

4.2.1 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.

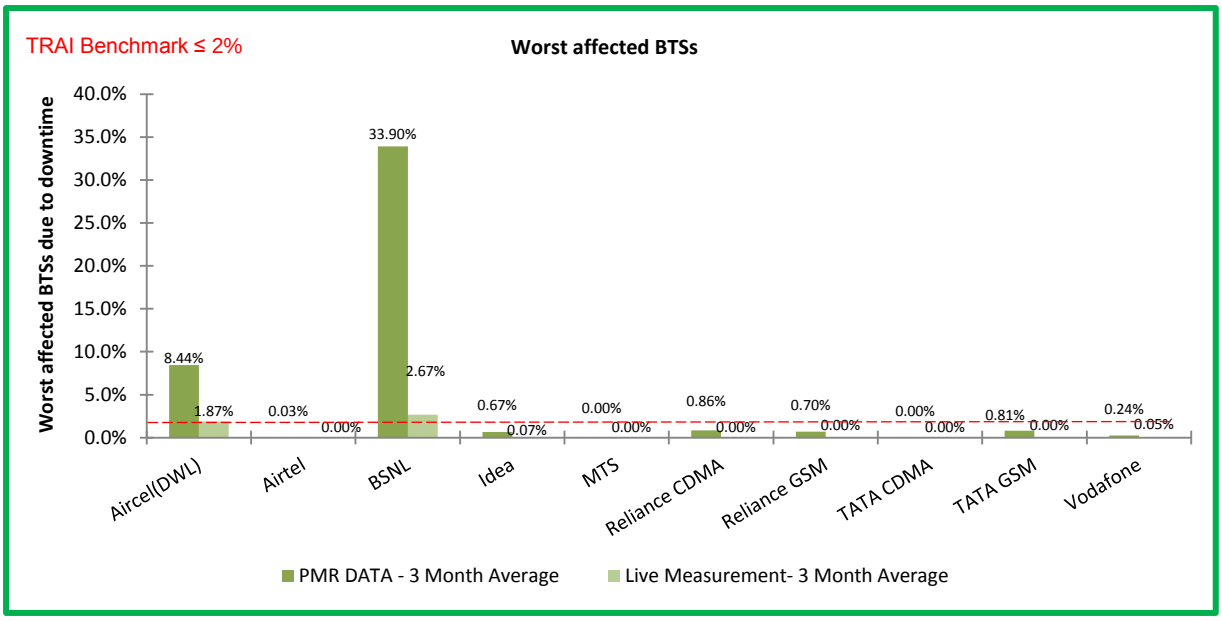
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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.

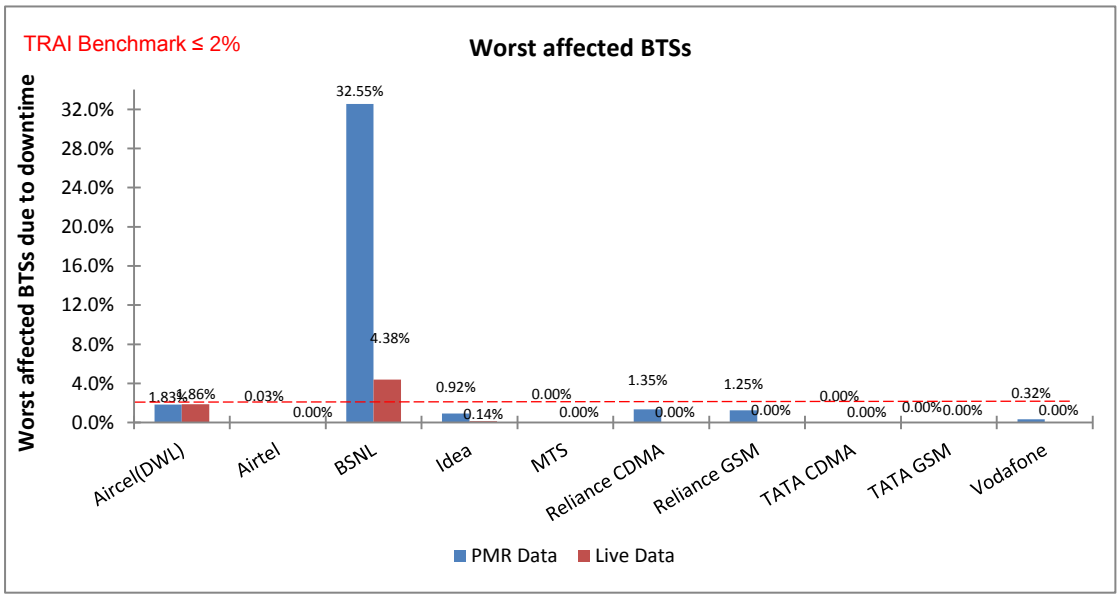
4.2.2 KEY FINDINGS



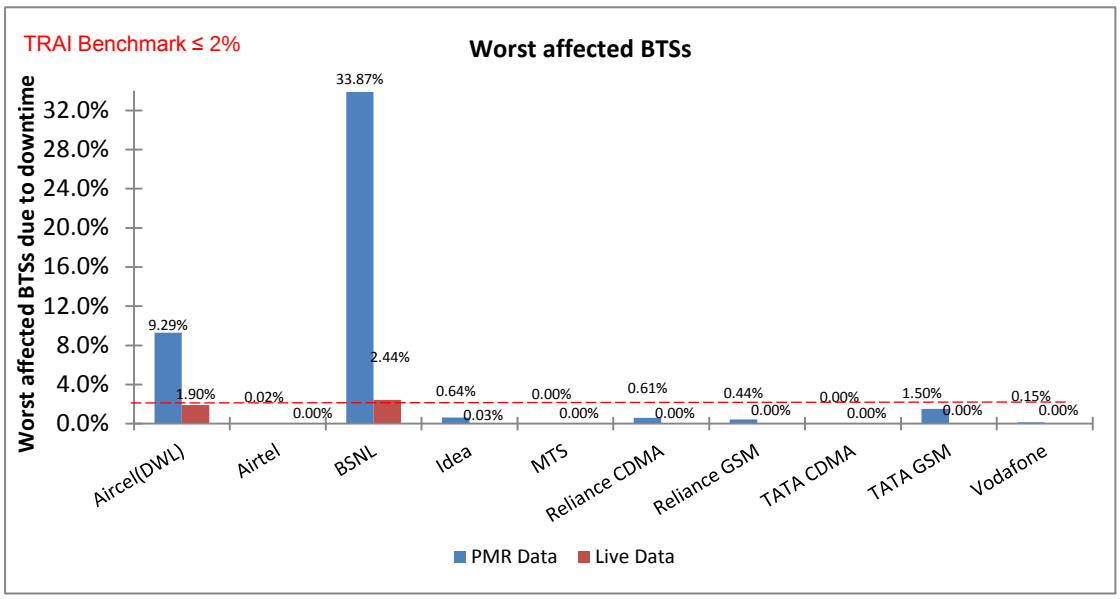
Aircel and BSNL failed to meet the benchmark while all the other operators met the TRAI benchmark for the parameter.

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.

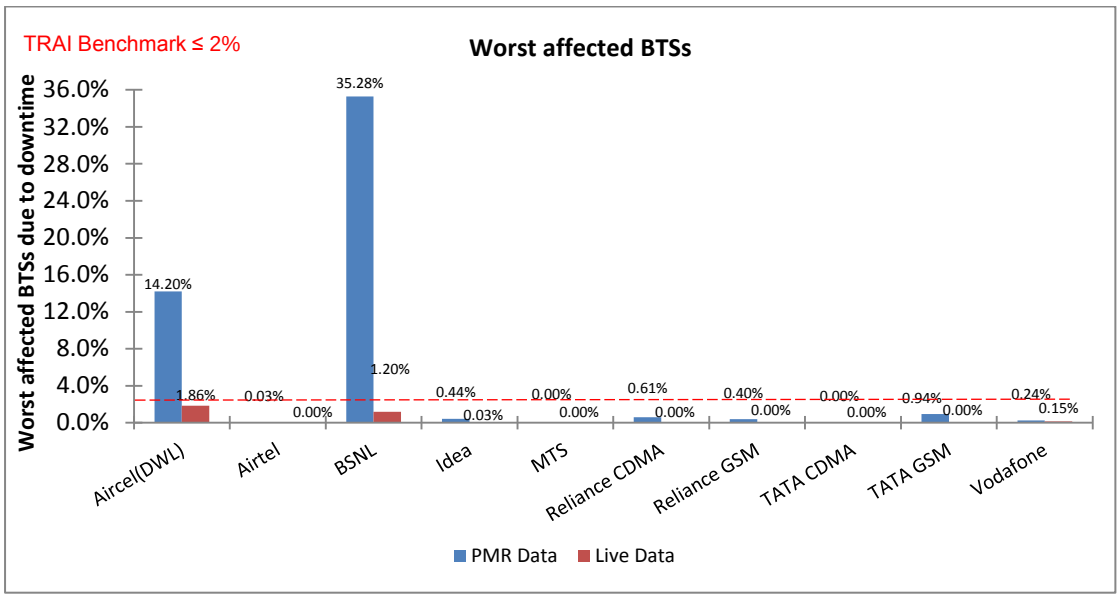
4.2.2.1 KEY FINDINGS – MONTH 1



4.2.2.2 KEY FINDINGS – MONTH 2



4.2.2.3 KEY FINDINGS – MONTH 3



4.3 CALL SET UP SUCCESS RATE

4.3.1 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

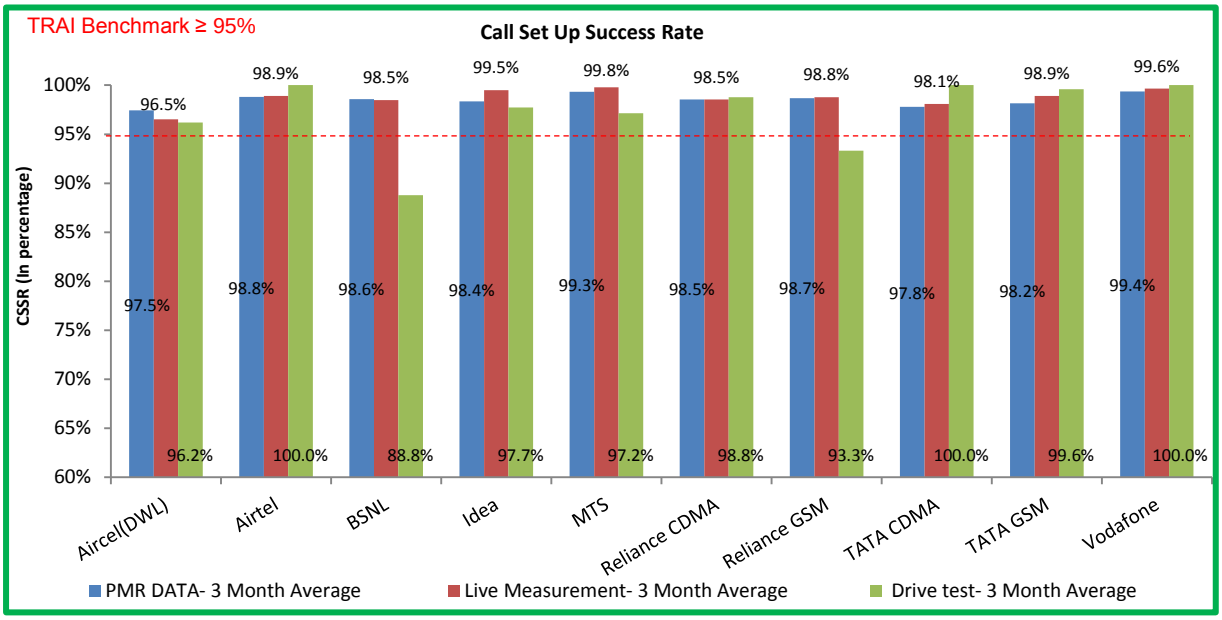
   Call Established means the following events have happened in call setup:-

   - 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 –**

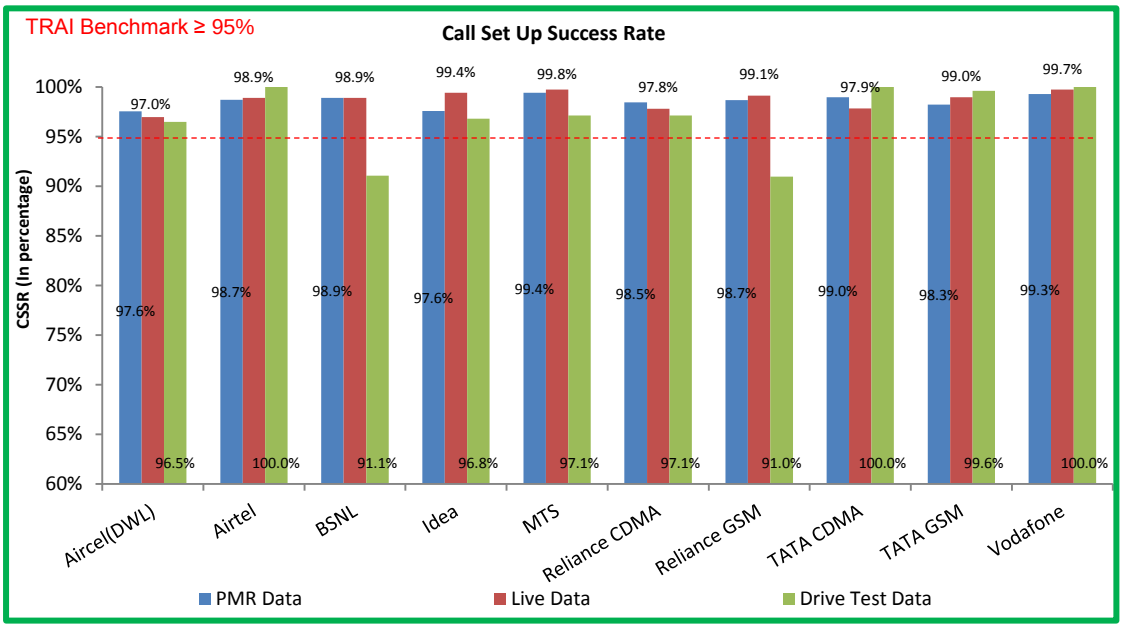
   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
   - CSSR calculation should be measured using OMC generated data only
   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
   - Counter data is extracted 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.

4.3.2 KEY FINDINGS

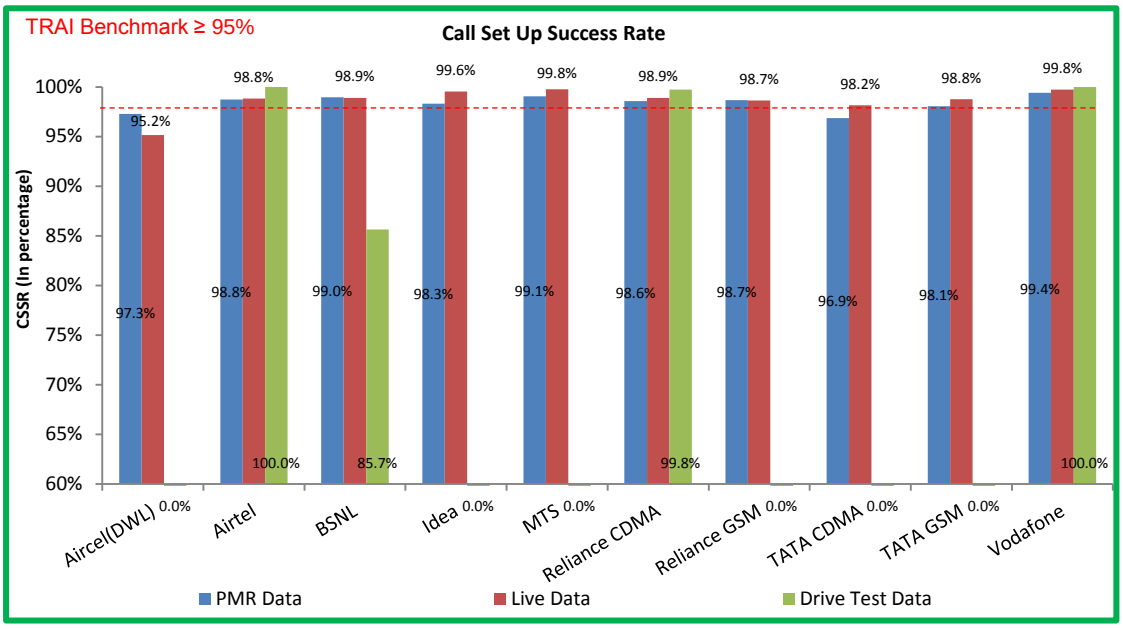


All operators met the TRAI specified benchmark.

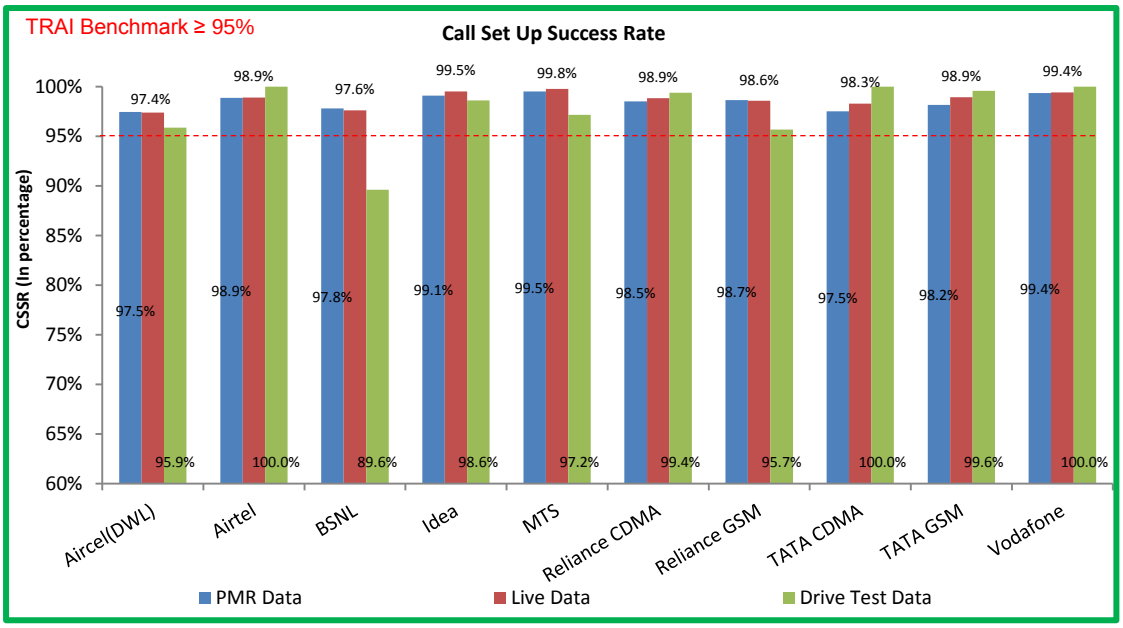
4.3.2.1 KEY FINDINGS – MONTH 1



4.3.2.2 KEY FINDINGS – MONTH 2



4.3.2.3 KEY FINDINGS – MONTH 3

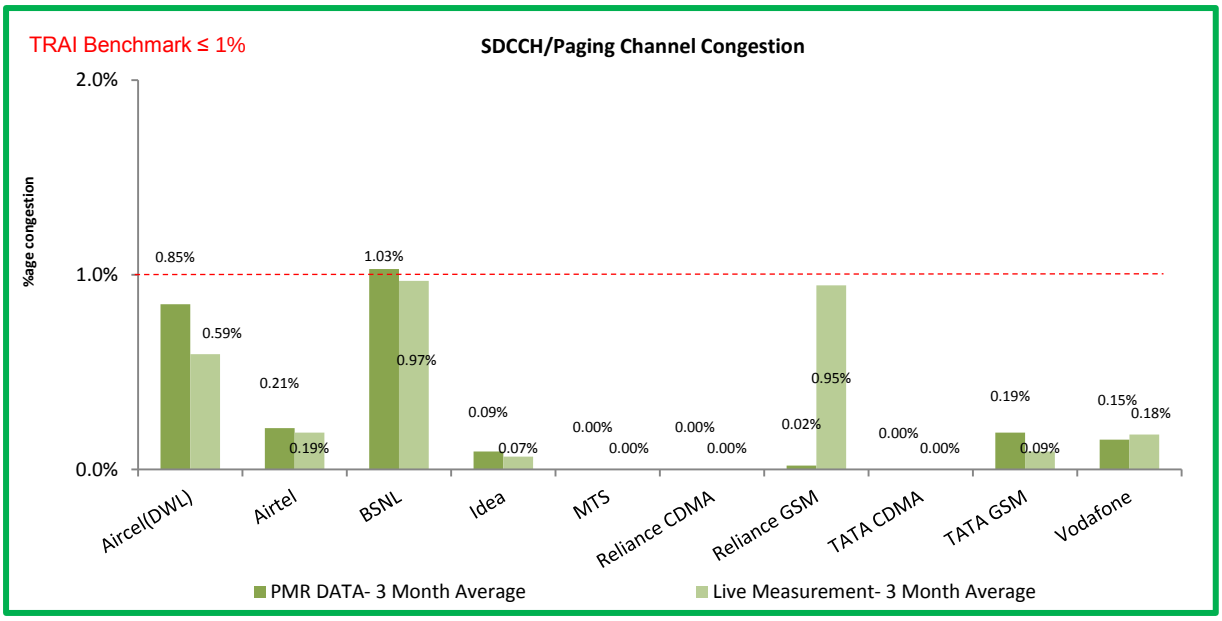


4.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

4.4.1 PARAMETER DESCRIPTION

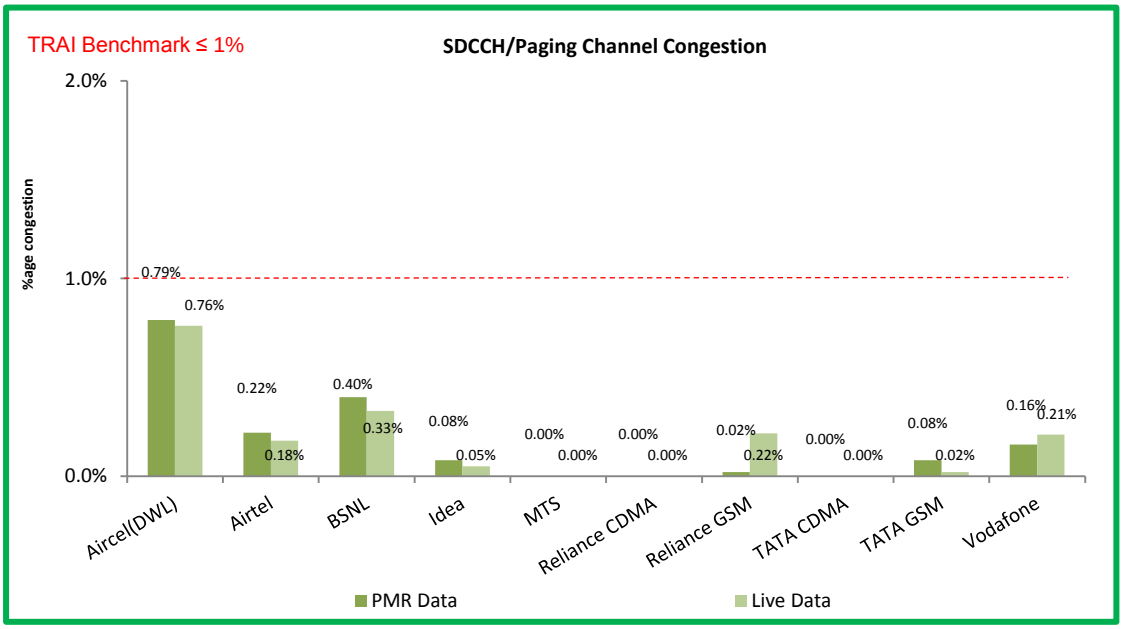
1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:
   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point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

4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION

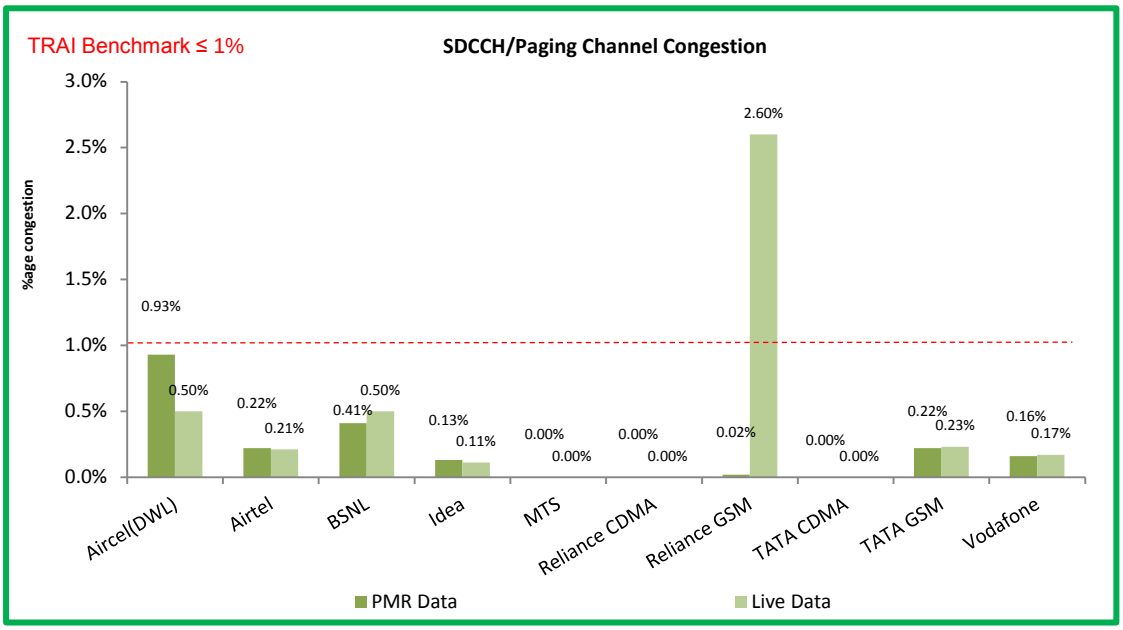


BSNL did not meet the benchmark while all the other operators met the benchmark as per audit. Significant difference was observed between PMR & live measurement data for Reliance GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

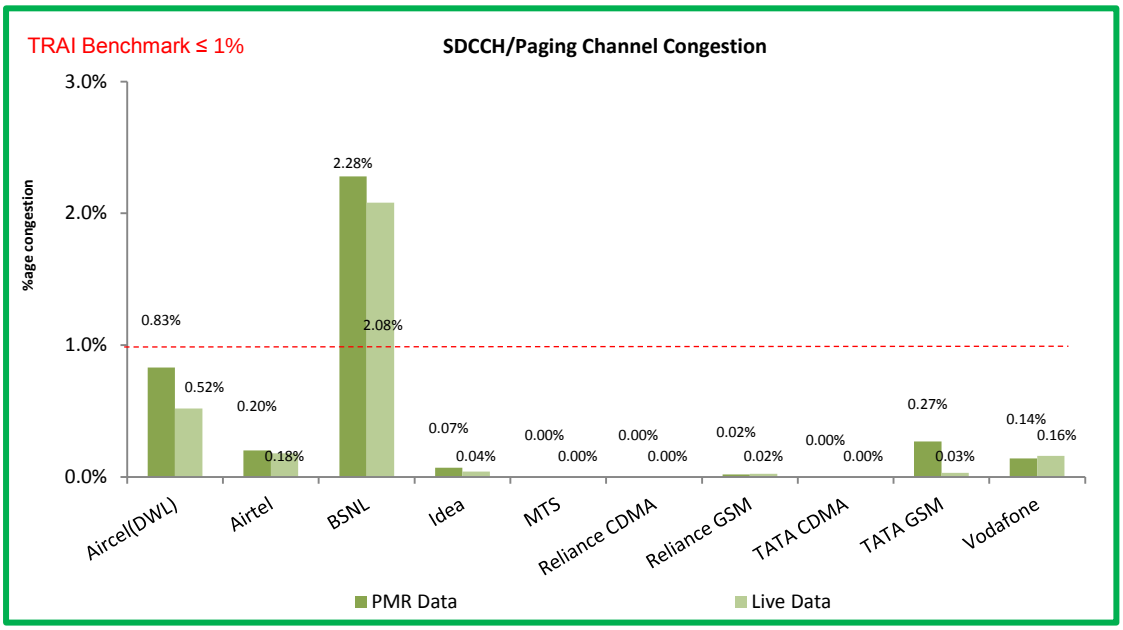
4.4.2.1 KEY FINDINGS – MONTH 1



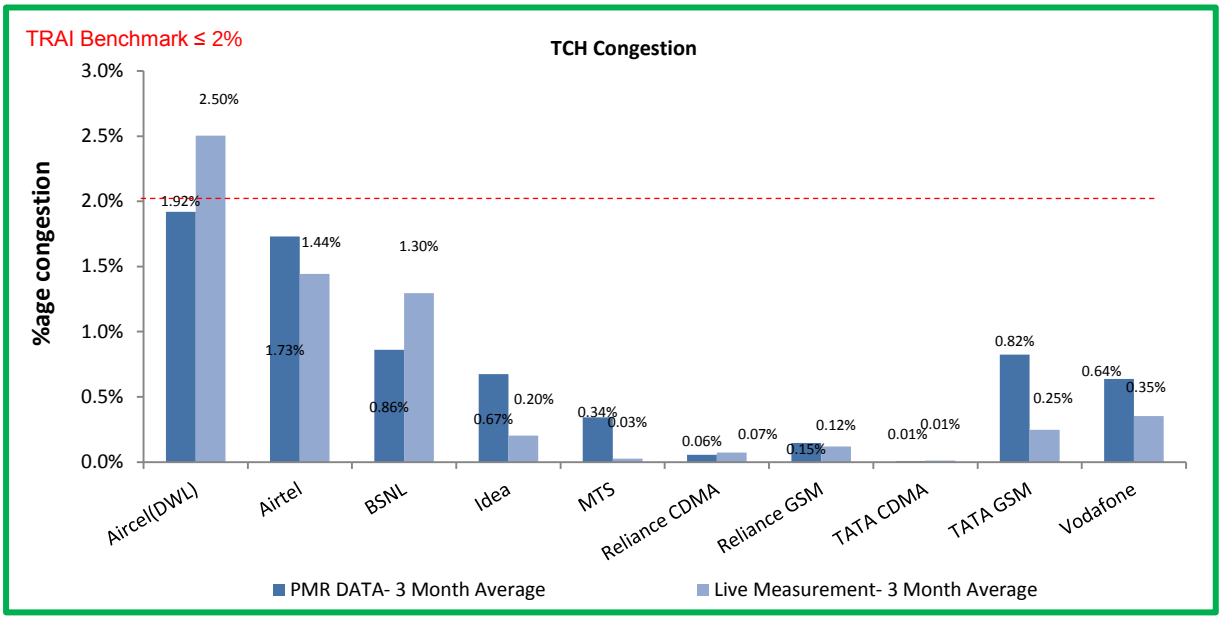
4.4.2.2 KEY FINDINGS – MONTH 2



4.4.2.3 KEY FINDINGS – MONTH 3

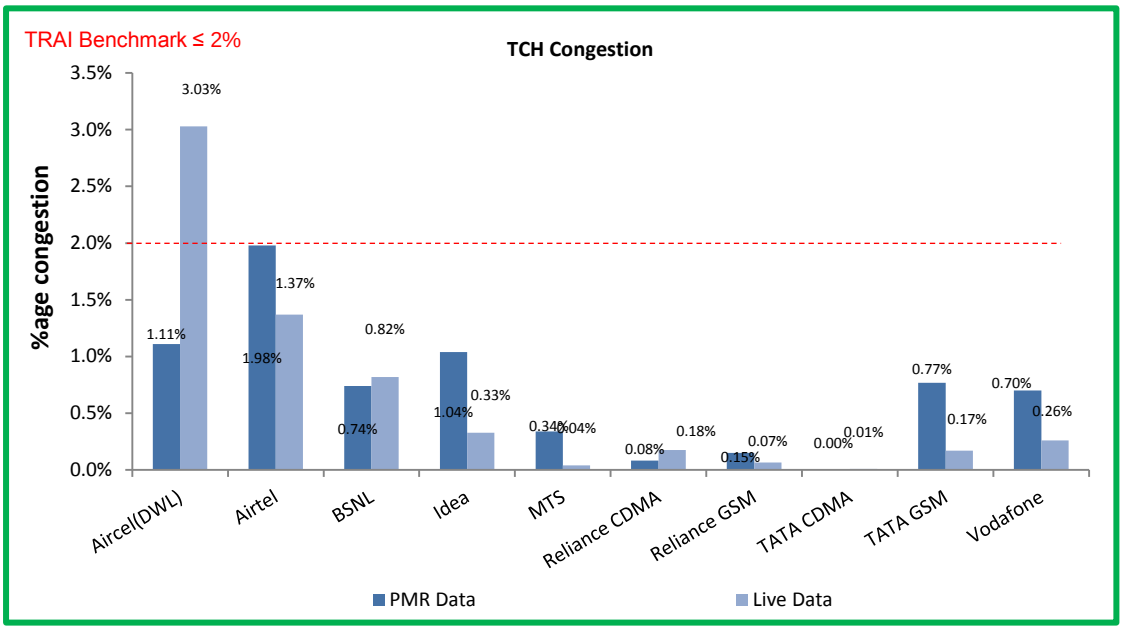


4.4.3 KEY FINDINGS – TCH CONGESTION

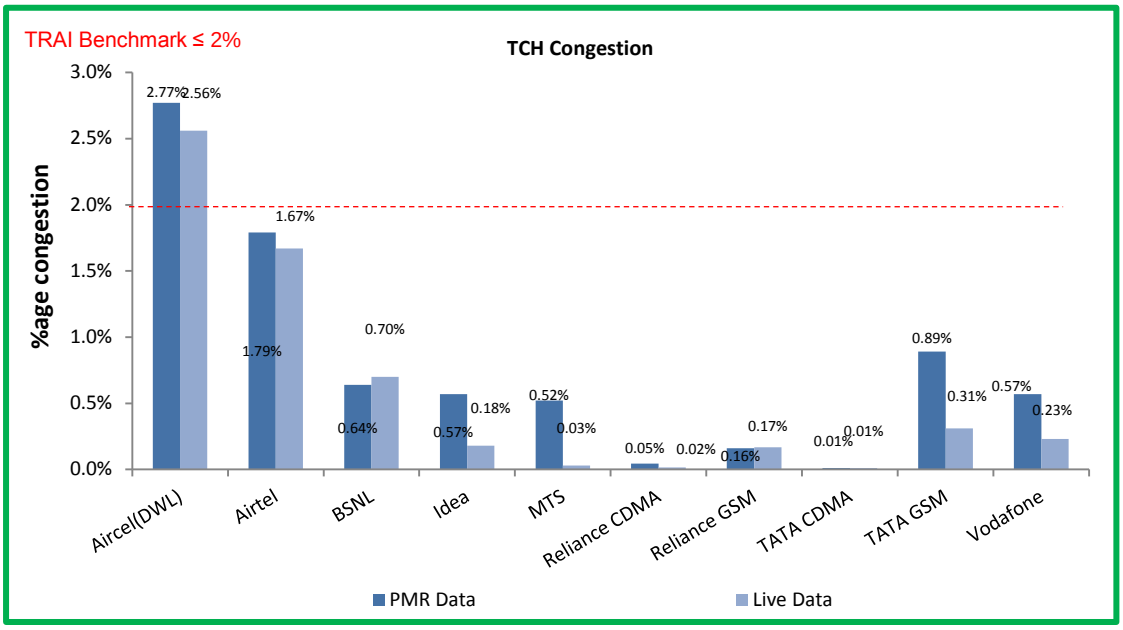


For TCH congestion, all operators met the benchmark.

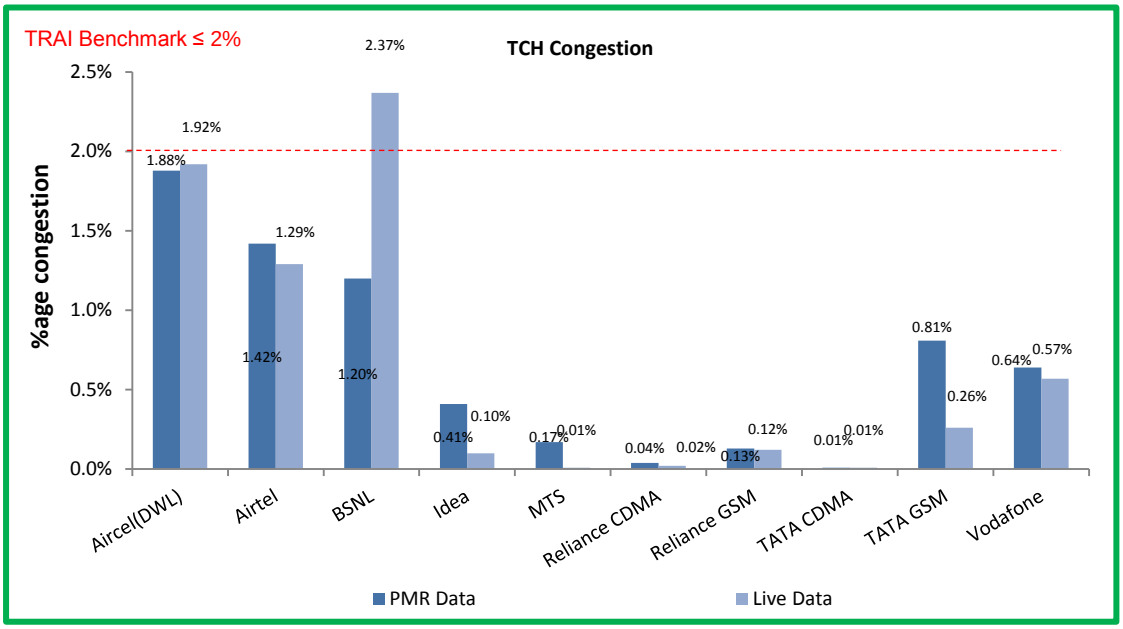
4.4.3.1 KEY FINDINGS – MONTH 1



4.4.3.2 KEY FINDINGS – MONTH 2



4.4.3.3 KEY FINDINGS – MONTH 3



4.4.4 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		49	37	78	110	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65665	134900	92439	102405	56316	7851	37316	13318	6038	323517
Traffic served for all POIs (B)- in erlangs		35900	79347	17855	59139	28076	3016	20212	3281	1436	178917
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		55	37	81	111	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		64730	402617	59106	103481	55923	7851	37316	13315	6038	318859
Traffic served for all POIs (B)- in erlangs		38984	236390	16813	60288	28611	2982	20385	3286	1495	184931
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

All the operators met the benchmark of POI congestion as per audit data.

4.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	37	81	111	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		54644	134221	92440	102784	55910	7851	37316	13325	6038	316840
Traffic served for all POIs (B)- in erlangs		30958	82298	18840	57864	29643	3052	21698	3400	1653	182337
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		54	37	81	111	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		62478	401276	82440	102675	55817	7851	37316	13319	6038	316394
Traffic served for all POIs (B)- in erlangs		40214	249567	14770	57216	30238	3171	22096	3444	1696	187598
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

4.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		56	37	76	111	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		68690	134411	92439	103294	55978	7851	37316	13312	6038	323007
Traffic served for all POIs (B)- in erlangs		38941	80519	17406	59145	28274	3060	20209	3312	1138	187809
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		54	37	81	111	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		66981	402285	2440	103282	55998	7851	37316	13312	6038	317176
Traffic served for all POIs (B)- in erlangs		38434	234097	18769	60861	28579	2619	20449	3309	1259	179385
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

4.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	76	108	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		73660	136067	92439	101138	57059	7851	37316	13318	6038	330705
Traffic served for all POIs (B)- in erlangs		37802	75225	17320	60407	26310	2936	18730	3131	1518	166604
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

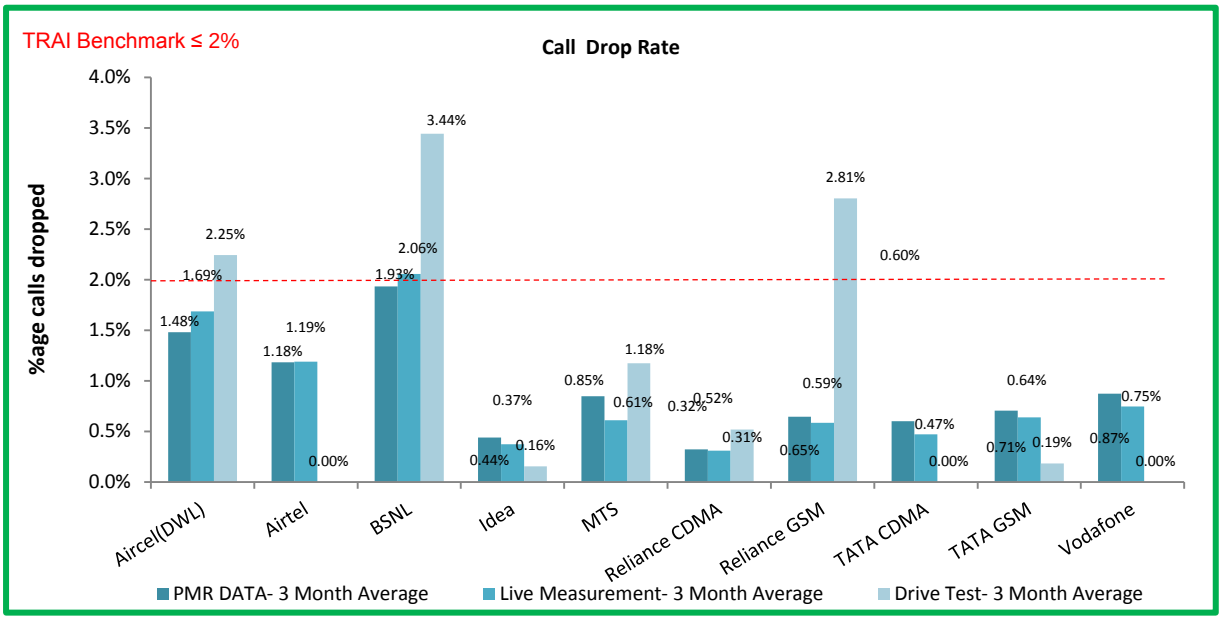
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		57	37	81	111	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74382..91	404291	92438	104485	55954	7851	37316	13312	6038	323007
Traffic served for all POIs (B)- in erlangs		38303	225507	16900	62788	27017	3155	18610	3105	1531	187809
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

4.5 CALL DROP RATE

4.5.1 PARAMETER DESCRIPTION

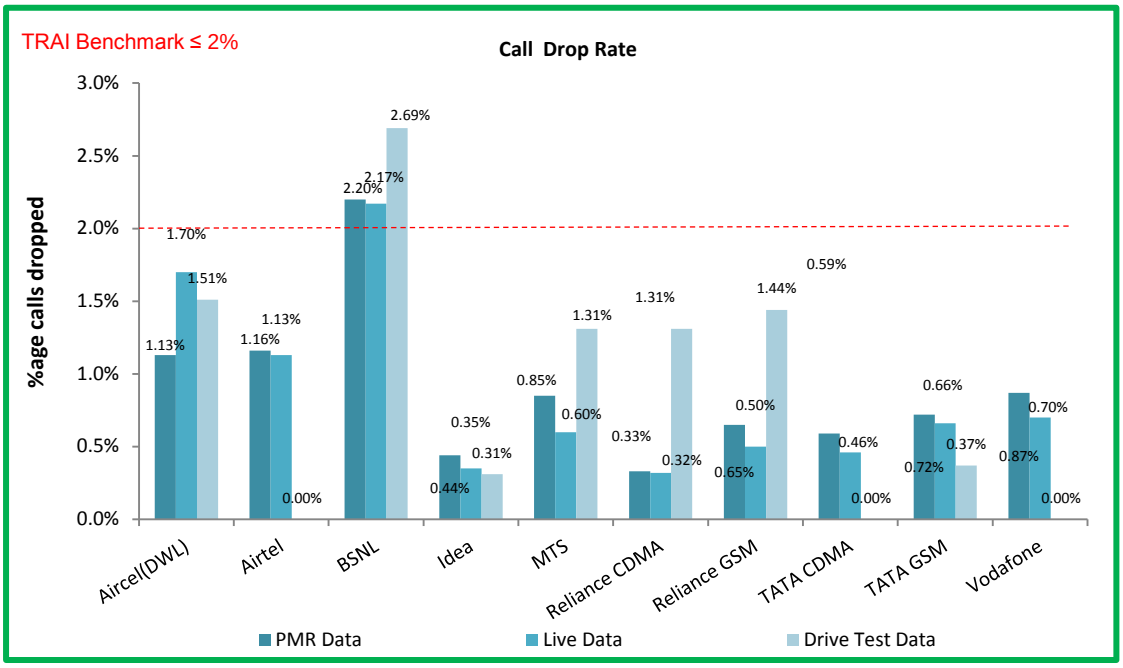
1. **Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
   - **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **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.

4.5.2 KEY FINDINGS

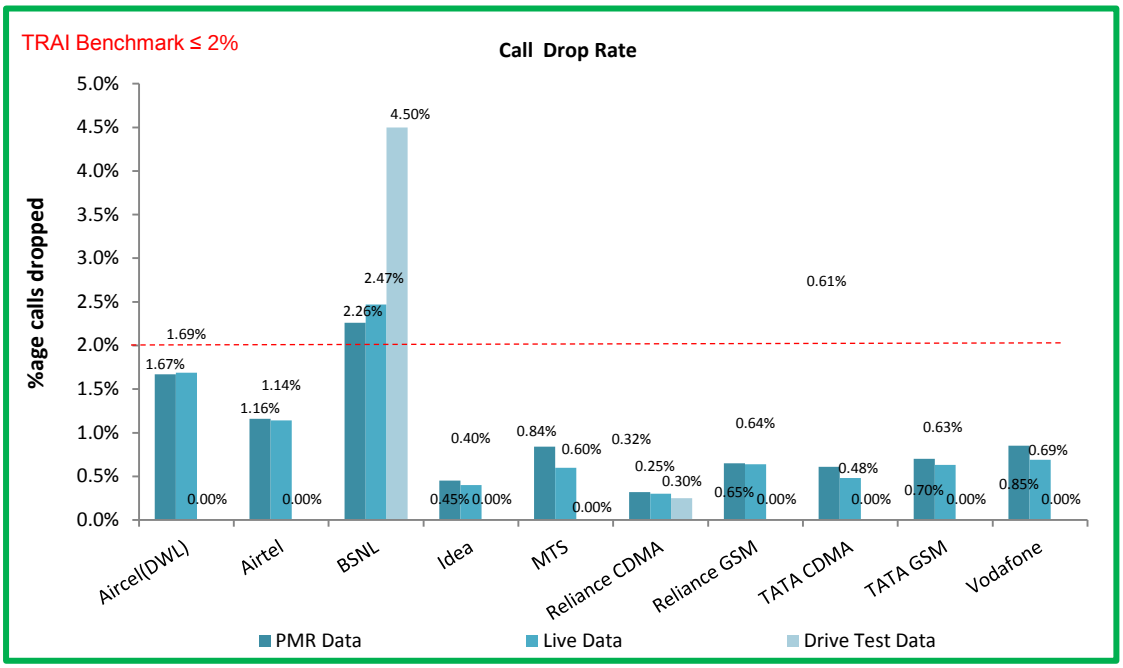


All operators met the benchmark during audit. Aircel, BSNL and Reliance GSM showed high call drop rate during drive tests.

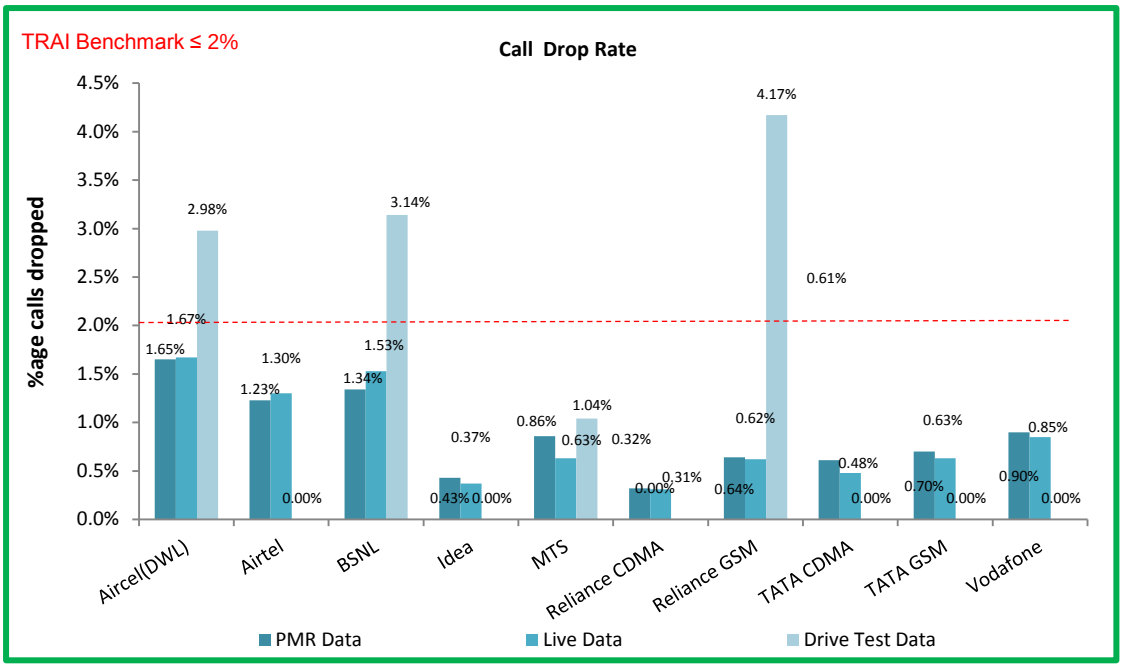
4.5.2.1 KEY FINDINGS – MONTH 1



4.5.2.2 KEY FINDINGS – MONTH 2



4.5.2.3 KEY FINDINGS – MONTH 3



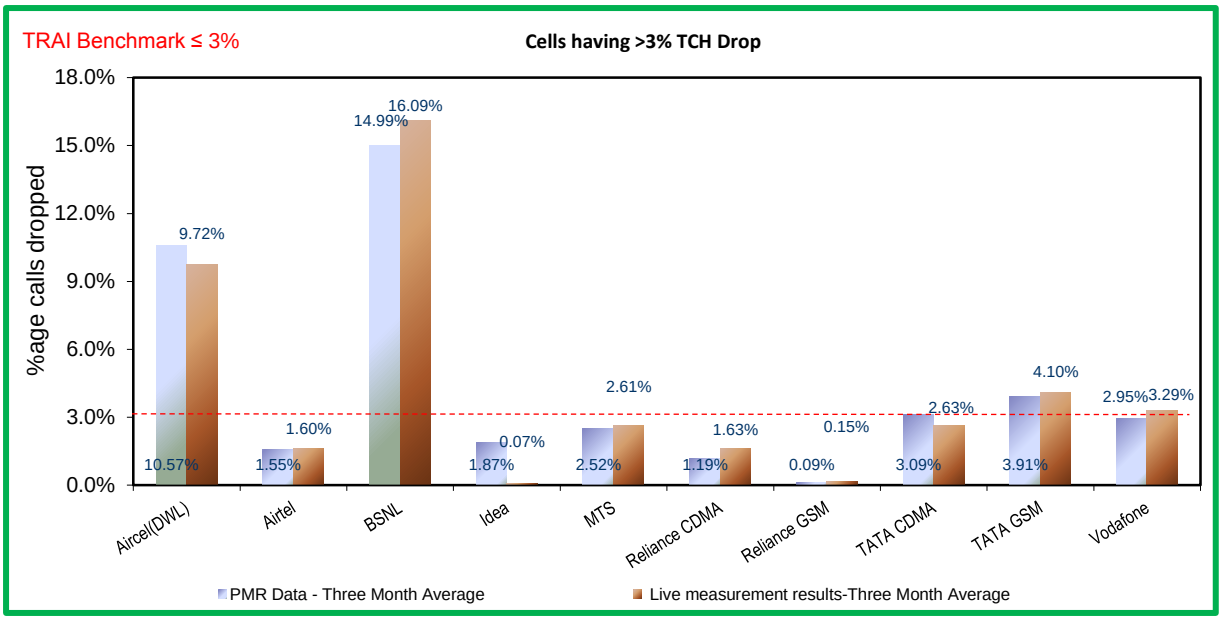
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

4.6.1 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.

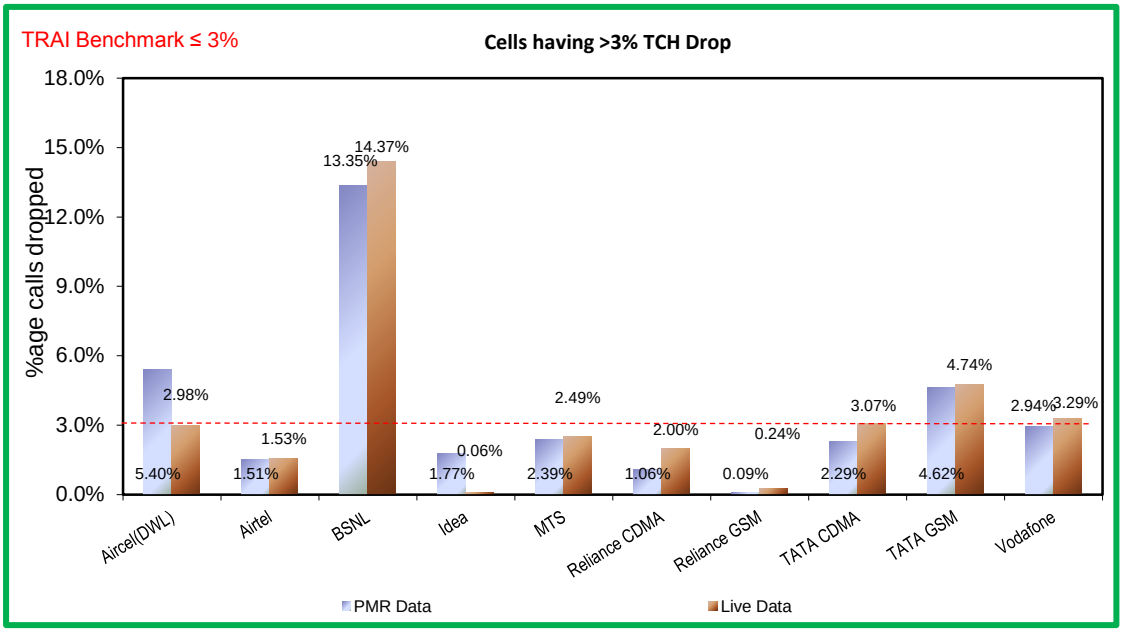
The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

4.6.2 KEY FINDINGS

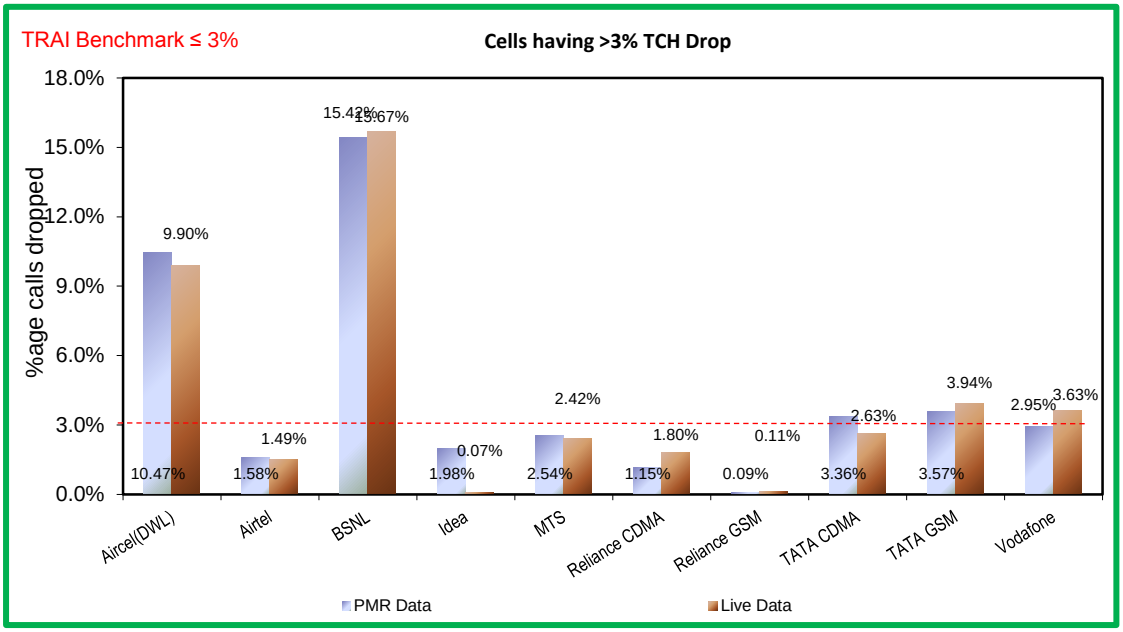


Aircel, BSNL, Tata CDMA and Tata GSM failed to meet the benchmark for the parameter.

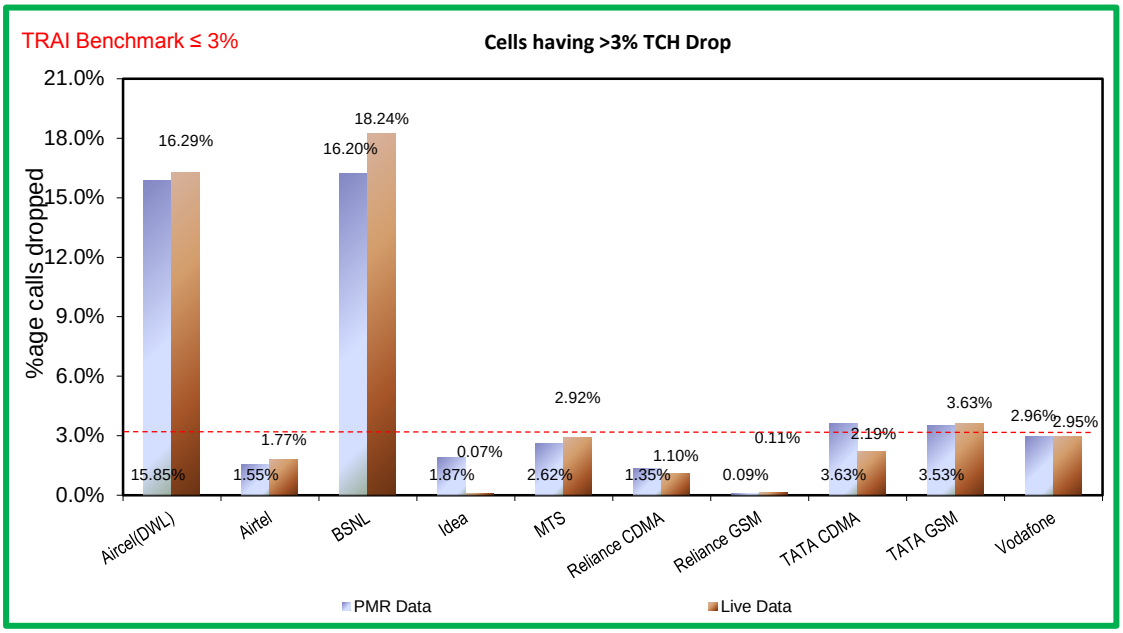
4.6.2.1 KEY FINDINGS – MONTH 1



4.6.2.2 KEY FINDINGS – MONTH 2



4.6.2.3 KEY FINDINGS – MONTH 3



4.7 VOICE QUALITY

4.7.1 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**

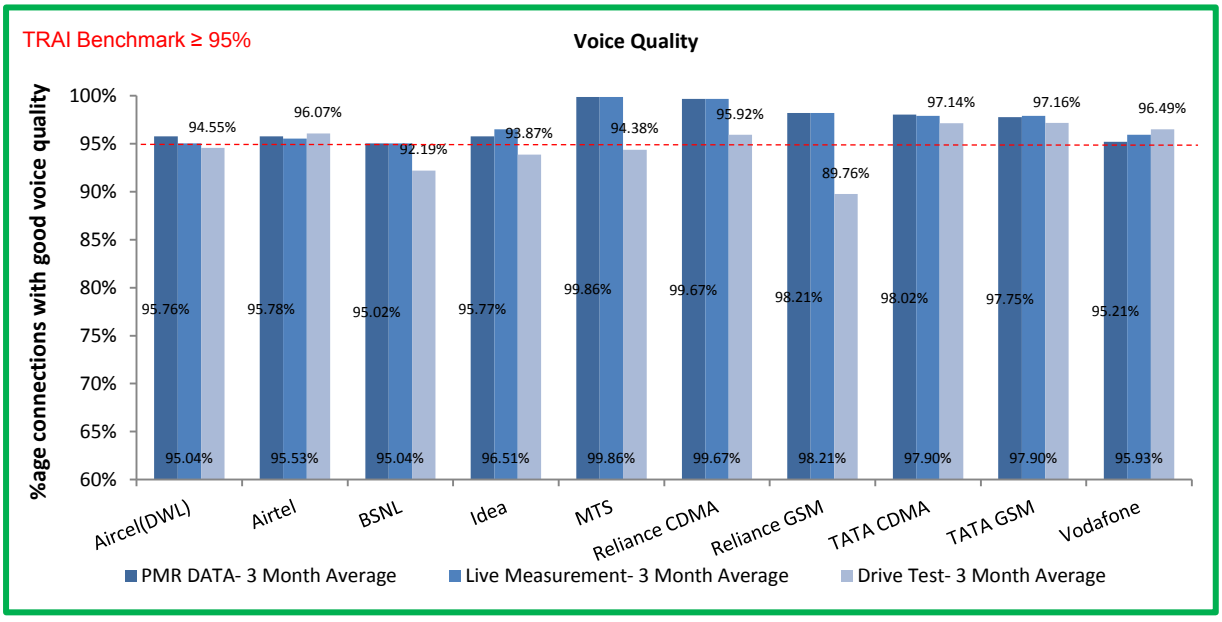
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

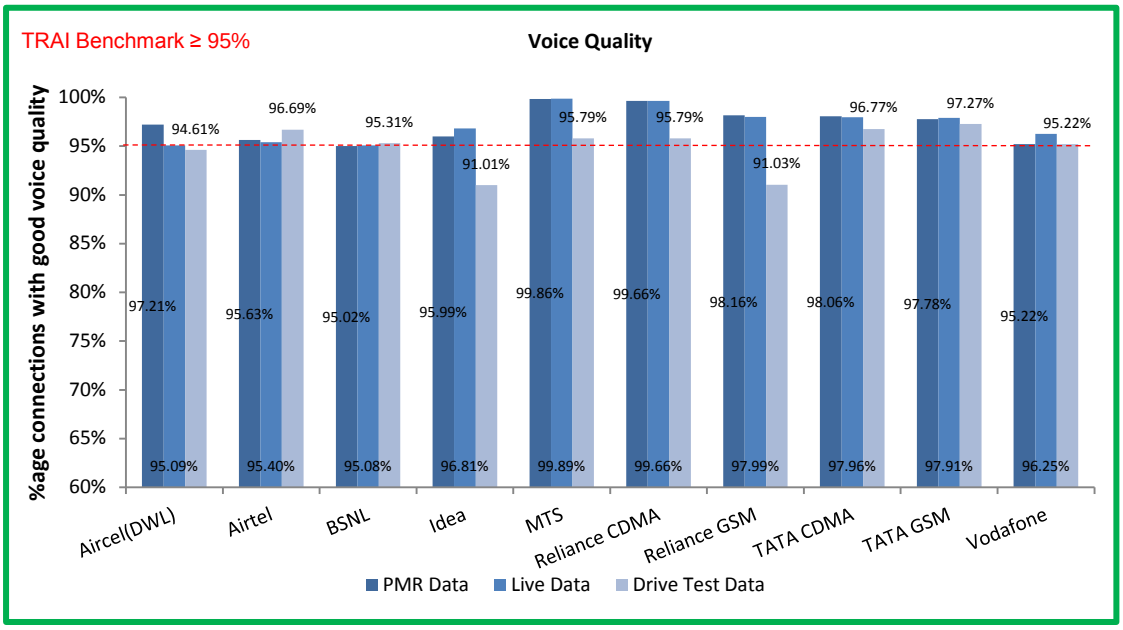
   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

4.7.2 KEY FINDINGS

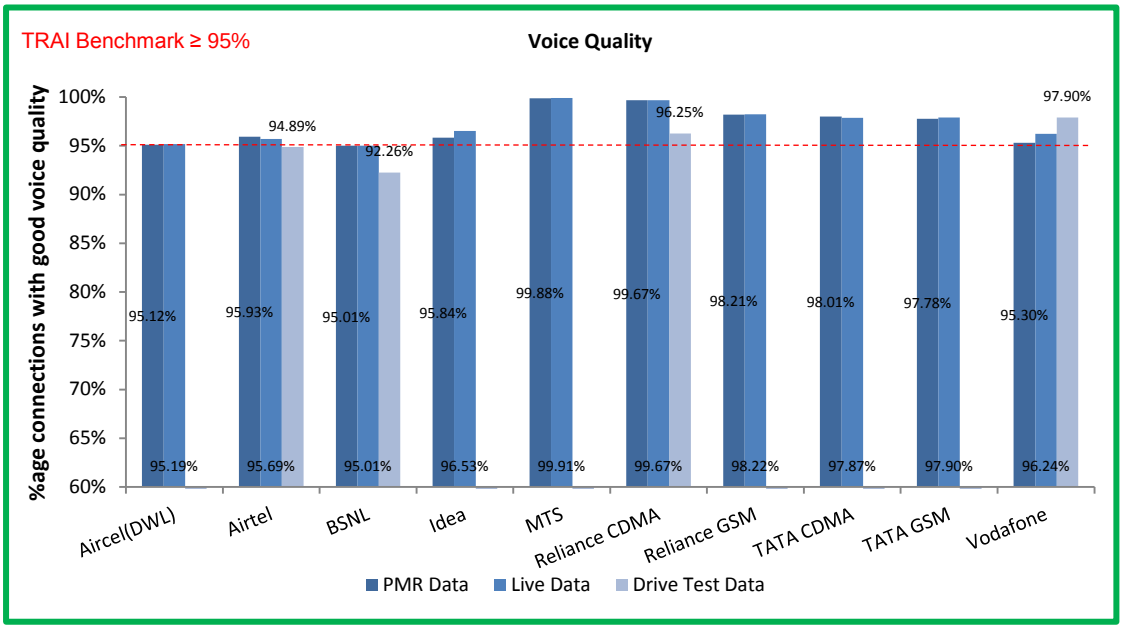


All operators met the benchmark for voice quality during the audit.

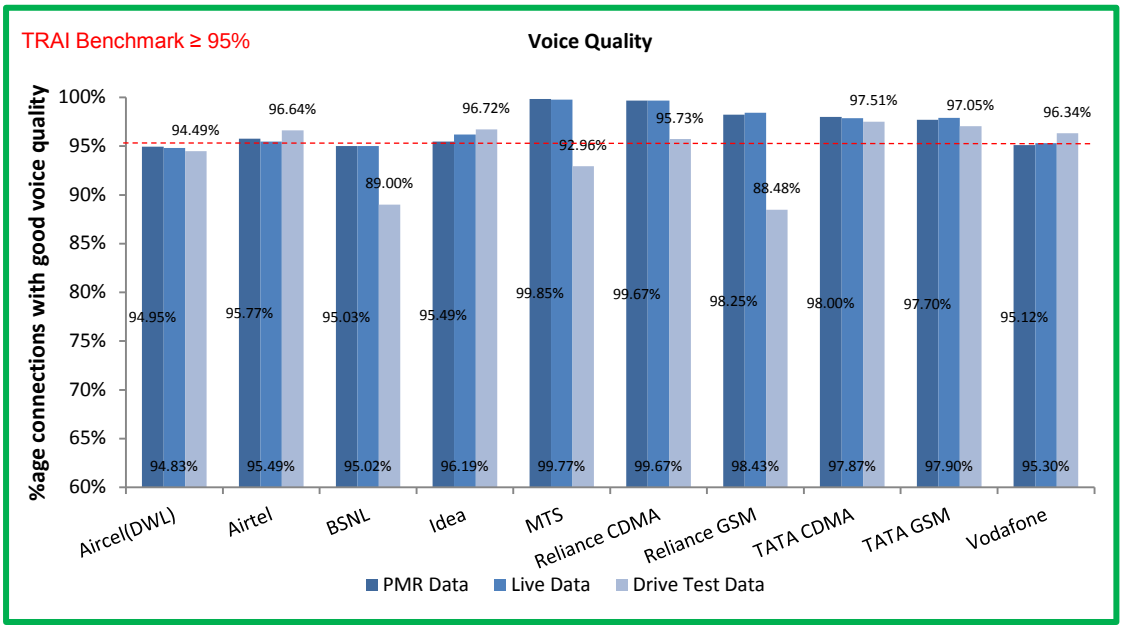
4.7.2.1 KEY FINDINGS – MONTH 1



4.7.2.2 KEY FINDINGS – MONTH 2



4.7.2.3 KEY FINDINGS – MONTH 3



5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

5.1 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.

5.1.1 PARAMETER DESCRIPTION

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

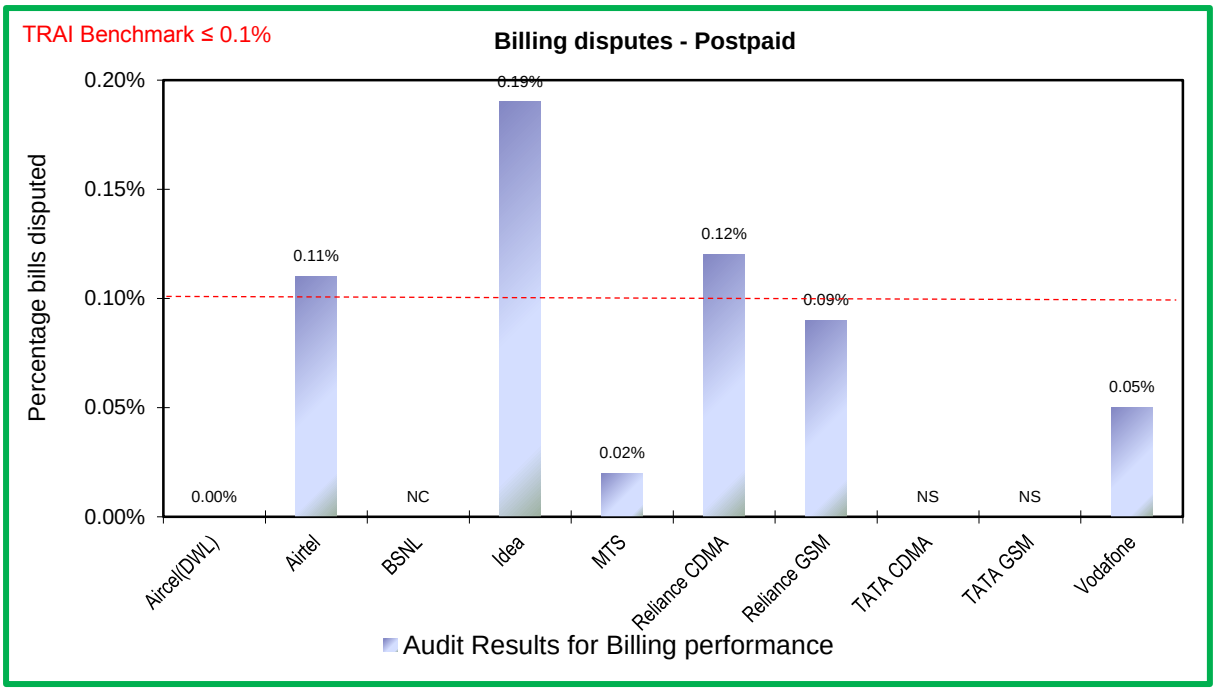
- Payments made and not credited to the subscriber account
- Payment made on time but late payment charge levied wrongly
- Wrong roaming charges
- Double charges

- Charging for toll free services
- Local calls charged/billed as STD/ISD or vice versa
- Calls or messages made disputed
- Validity related complaints
- Credit agreed to be given in resolution of complaint, but not accounted in the bill
- Charging for services provided without consent
- Charging not as per tariff plans or top up vouchers/ special packs etc.
- Overcharging or undercharging

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

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

5.1.2 KEY FINDINGS – POSTPAID BILLING DISPUTES

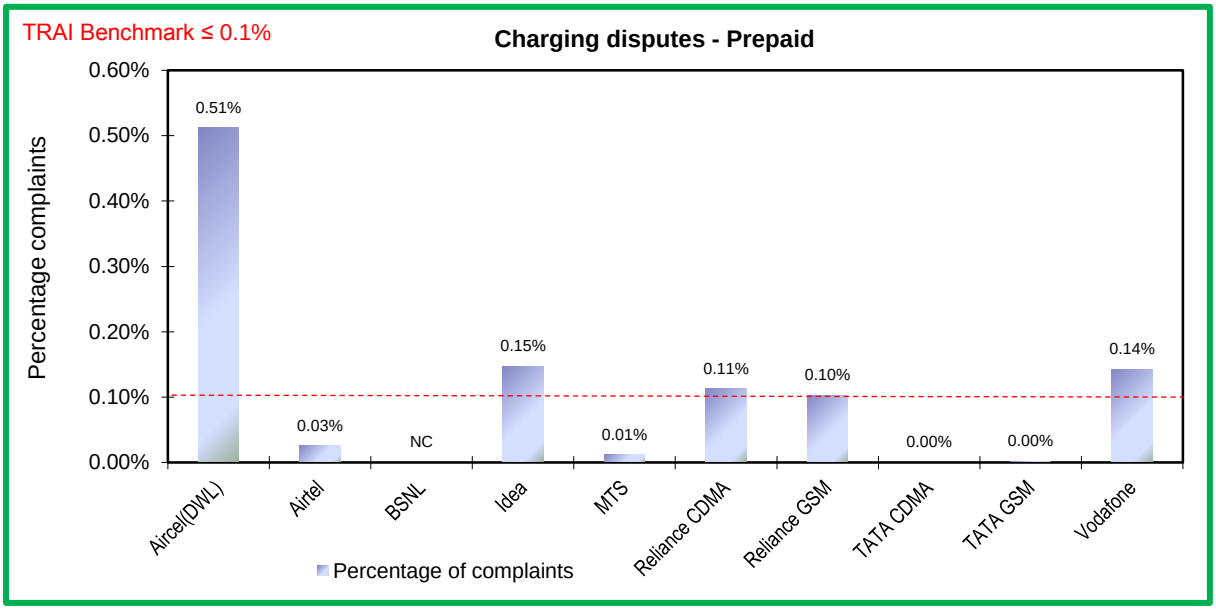


For the postpaid customers, Airtel, Idea and Reliance CDMA did not meet the TRAI benchmark.

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

NC: Auditors were not able to get billing data from BSNL as the operator did not have the required data available at its central billing center. Hence it has been reported as non-compliance (NC) for the operator.

5.1.3 KEY FINDINGS – PREPAID CHARGING DISPUTES



For the prepaid customers, Aircel, Idea, Reliance CDMA, Reliance GSM and Vodafone did not meet the TRAI benchmark.

NC: Auditors were not able to get billing data from BSNL as the operator did not have the required data available at its central billing center. Hence it has been reported as non-compliance (NC) for the operator.

5.2 RESOLUTION OF BILLING COMPLAINTS

5.2.1 PARAMETER DESCRIPTION

Important Note (Change of Benchmarks): TRAI had recommended a change of benchmarks to all operators and IMRB in the month of September for Resolution of billing complaints parameter.

For wireless audit of JAS'14 quarter, all operators provided the data for PMR preparation as per old benchmark levels.

The difference between the old and new benchmark has been given below.

Parameter	Old Benchmark	New Benchmark
Resolution of billing complaints	100% within 4 weeks	98% within 4 weeks, 100% within 6 weeks

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.

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

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

- **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.

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling for metering and billing has been done to check billing performance as per old benchmarks.

5.2.2 KEY FINDINGS

Audit Findings **Live Calling Results**.

Name of Service Provider	Resolution of billing complaints		Resolution of Billing Complaints
	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	%age complaints resolved within 4 weeks
Benchmark	≥ 98%	≥ 100%	100.00%
Aircel(DWL)	100.00%	100.00%	100.00%
Airtel	100.00%	100.00%	97.00%
BSNL	NC	NC	34.85%
Idea	100.00%	100.00%	98.00%
MTS	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	98.00%
Reliance GSM	100.00%	100.00%	97.00%
TATA CDMA	100.00%	100.00%	No Complaints
TATA GSM	100.00%	100.00%	85.71%
Vodafone	100.00%	100.00%	100.00%

The audit results showed that all the operators met the TRAI benchmark for 100% resolution of complaints. The performance of resolving billing complaints during live calling was found to be much inferior to audit results for most of the operators.

NC: Auditors were not able to get billing data from BSNL as the operator did not have the required data available at its central billing center. Hence it has been reported as non-compliance (NC) for the operator.

5.3 PERIOD OF APPLYING CREDIT/WAVIER

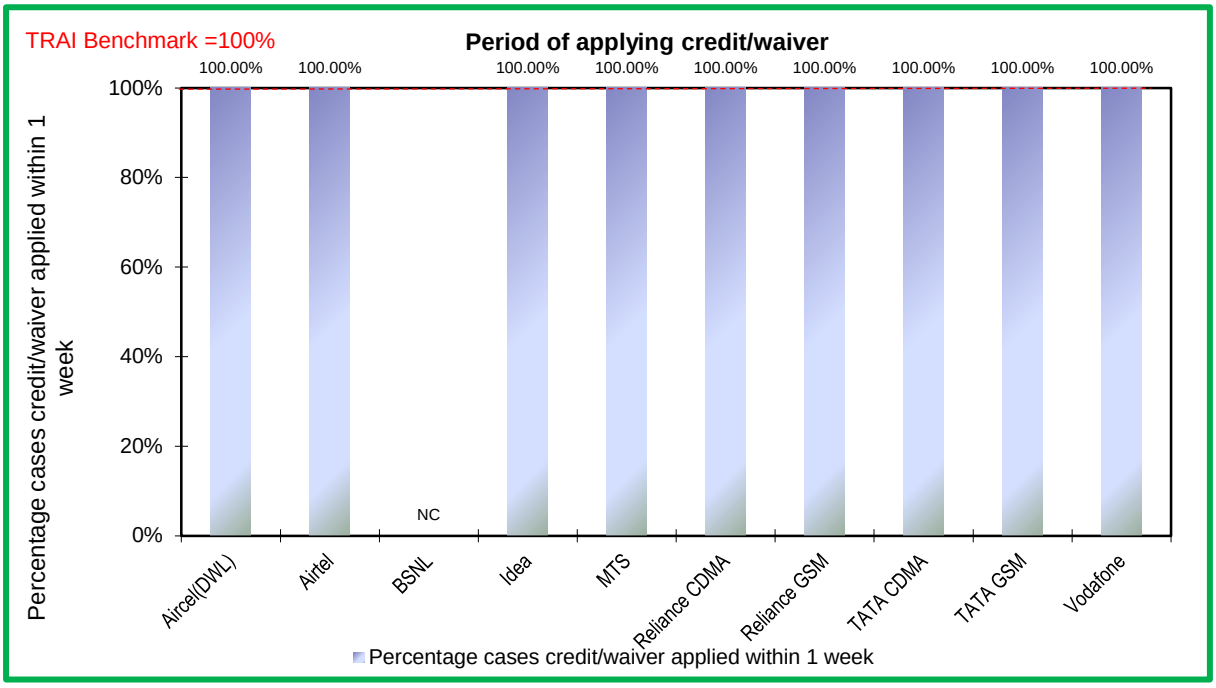
5.3.1 PARAMETER DESCRIPTION

- 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

5.3.2 KEY FINDINGS



All operators met the benchmark.

NC: Auditors were not able to get billing data from BSNL as the operator did not have the required data available at its central billing center. Hence it has been reported as non-compliance (NC) for the operator.

5.4 CALL CENTRE PERFORMANCE-IVR

5.4.1 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%

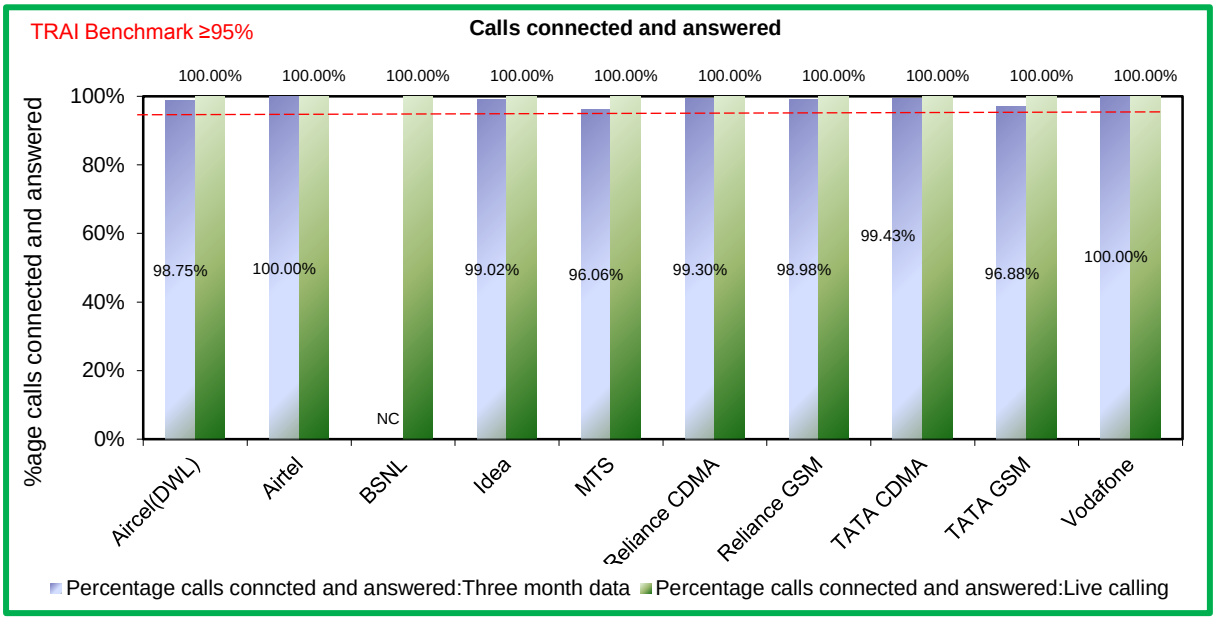
- Audit Procedure:

  - 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

5.4.2 KEY FINDINGS



All operators met the TRAI specified benchmark.

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

5.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

5.5.1 PARAMETER DESCRIPTION

- Computational Methodology:

  There has been a change of benchmark levels for the parameter from Sep 2014.

  Some of the operators have been able to change their systems as per the new benchmarks and IMRB has audited the data as per new benchmarks for those operators.

  However, some operators are still in the process of changing their systems as per new benchmarks. Hence, IMRB has audited these operators as per previous benchmarks.

  Thus, IMRB has reported the parameters as per the data availability with the operators. The key changes in the benchmark are given in the table below.

  - **Old Benchmark:** Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) * 100
  - **New Benchmark:** 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 60 seconds (for old benchmark) and before 90 seconds (for new benchmark)

Parameter	Old Benchmark	New Benchmark
Percentage of calls answered by operators (voice to voice)	within 60 seconds: In 90% of the cases or more	within 90 seconds: In 95% of the cases or more

- Audit Procedure:

  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by operator within 60 seconds (old benchmark)
    - Total calls connected and answered by operator within 90 seconds (new benchmark)
    - Total calls attempted to connect to the operator
  - Also live calling was done to test the calls answered within 60 seconds by the operator

Note: The live calling activity had started before the intimation of new benchmarks. Hence, the live calling for customer care (voice to voice) has been done to check performance as per old benchmarks.

5.5.2 KEY FINDINGS

Audit Findings **Live Calling Results**

Name of Service Provider	Customer Care		Customer Care
	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 90 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 90%	≥ 95%	≥ 90%
Aircel(DWL)	95.94%	NA	100.00%
Airtel	NA	99.30%	100.00%
BSNL	NC	NC	100.00%
Idea	NA	97.40%	100.00%
MTS	NA	96.59%	100.00%
Reliance CDMA	NA	95.52%	100.00%
Reliance GSM	NA	97.34%	100.00%
TATA CDMA	95.40%	NA	91.00%
TATA GSM	87.24%	NA	84.00%
Vodafone	NA	97.46%	100.00%

Tata GSM failed to meet the benchmark during audit. Similar results were found during live calling for the operator.

NA: Aircel, Tata CDMA and Tata GSM provided the data as per old benchmark while all other operators provided the data as per new benchmark.

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

5.6 TERMINATION/CLOSURE OF SERVICE

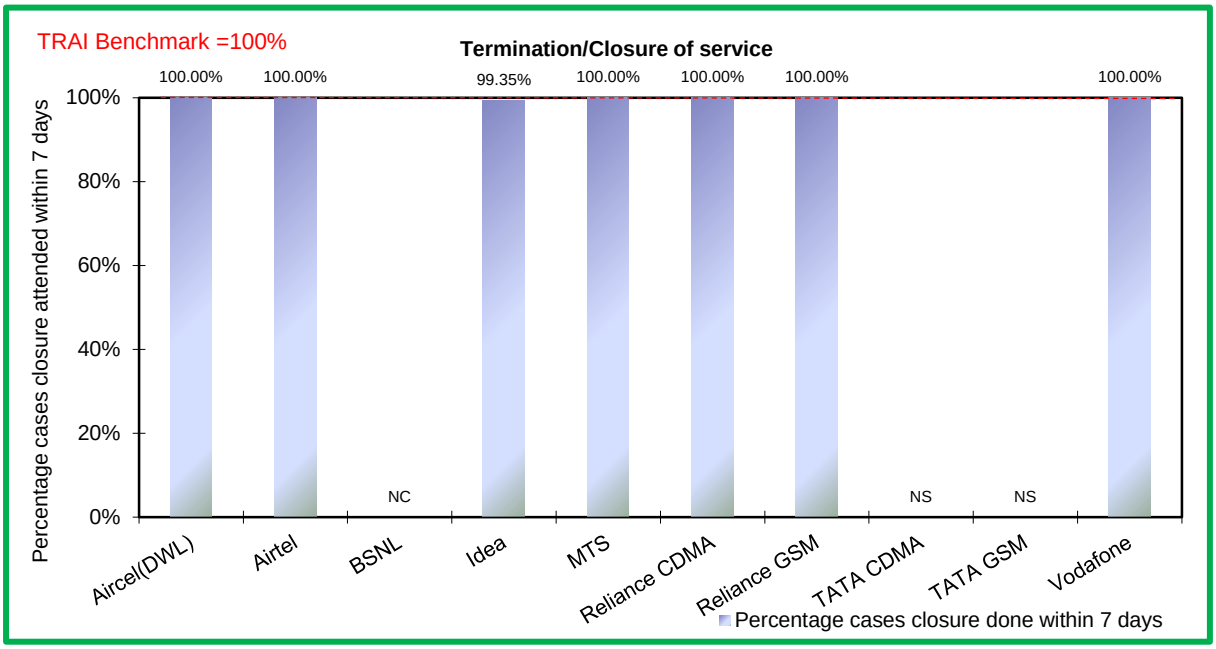
5.6.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**
- TRAI Benchmark:

- Termination/Closure of Service: <=7 days

- Audit Procedure:
  - Operator provide details of the following from their central billing/CS database:
    - Date of lodging the closure request (all requests in given period)
    - Date of closure of service

5.6.2 KEY FINDINGS



All operators met the benchmark.

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

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

5.7 REFUND OF DEPOSITS AFTER CLOSURE

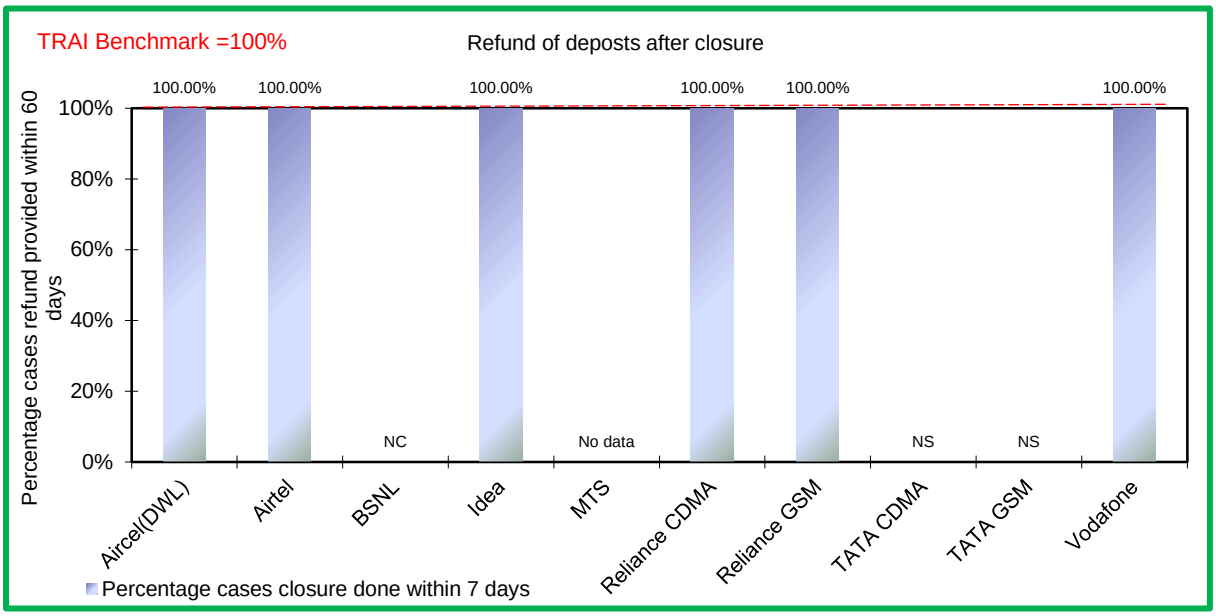
5.7.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**

- Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.

- TRAI Benchmark:
  - Time taken for refund for deposit after closures: 100% within 60 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/refund database:
    - Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
    - Dates of refund pertaining to all closure request received during the relevant quarter

5.7.2 KEY FINDINGS



All operators met the benchmark.

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

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

None of the postpaid subscribers of MTS were eligible for refund.

6 DETAILED FINDINGS - DRIVE TEST DATA

6.1 OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the West Bengal circle. As per the new directive given by TRAI headquarters, drive test for the month of July, August and September, 2014 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-

Month	Name of SSA Covered	Date of Drive Test
July	Medinipur	15th to 17th July 2014
August	Andaman	20th to 22nd August 2014
September	Balurghat	15th to 17th September 2014

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

6.1.1 JULY - MEDINIPUR SSA

Month	Name of SSA Covered	Date of Drive Test
July	Medinapur	15th to 17th July 2014

6.1.1.1 ROUTE DETAILS – MEDINIPUR SSA

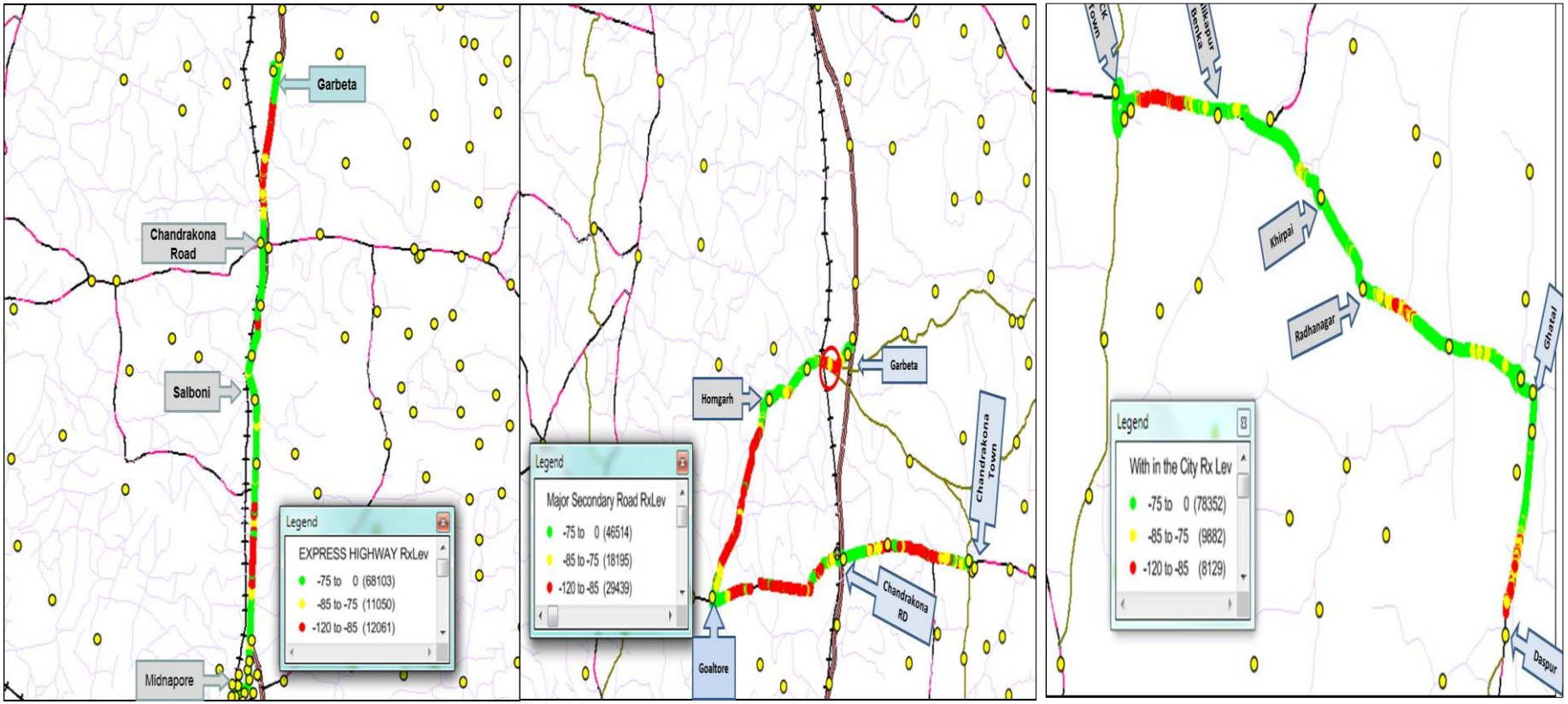
Category	Type of location	West Bengal-July		
		Medinapur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Garbeta-Goaltore-Rangamati – Chandrakona Road.	Gopiballavpur-Jamboni-Binpur	Danton-Sakrail-Dasagram-Sabang
	Highways	Midnapore-Salboni-Chandrakona Road-Garbeta	Midnapore-Salboni-Chandrakona Road-Garbeta	Chowringhee-Mokrampur-Belda
	With in the City	Radhanagar-Ghatal-Daspur, Chandrakona town-Gonsaibaazar-Kalikapur-Khirpai-Radhanagar	Jhargram-Raghunathpur, Raghunathpur-Ghoradhara	Sabang-Pingla-Benapur-Balichawk, Balichawk-Debra
Indoor	Shopping complex	Gitanjali Hotel, Chandrakona Road	Green Park Hotel, Jhargram.	Srijoni Hotel, Datun
	Office complex	Garbeta B.D.O. Office	Jhargram S.D. Office	Jhargram S.D. Office

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

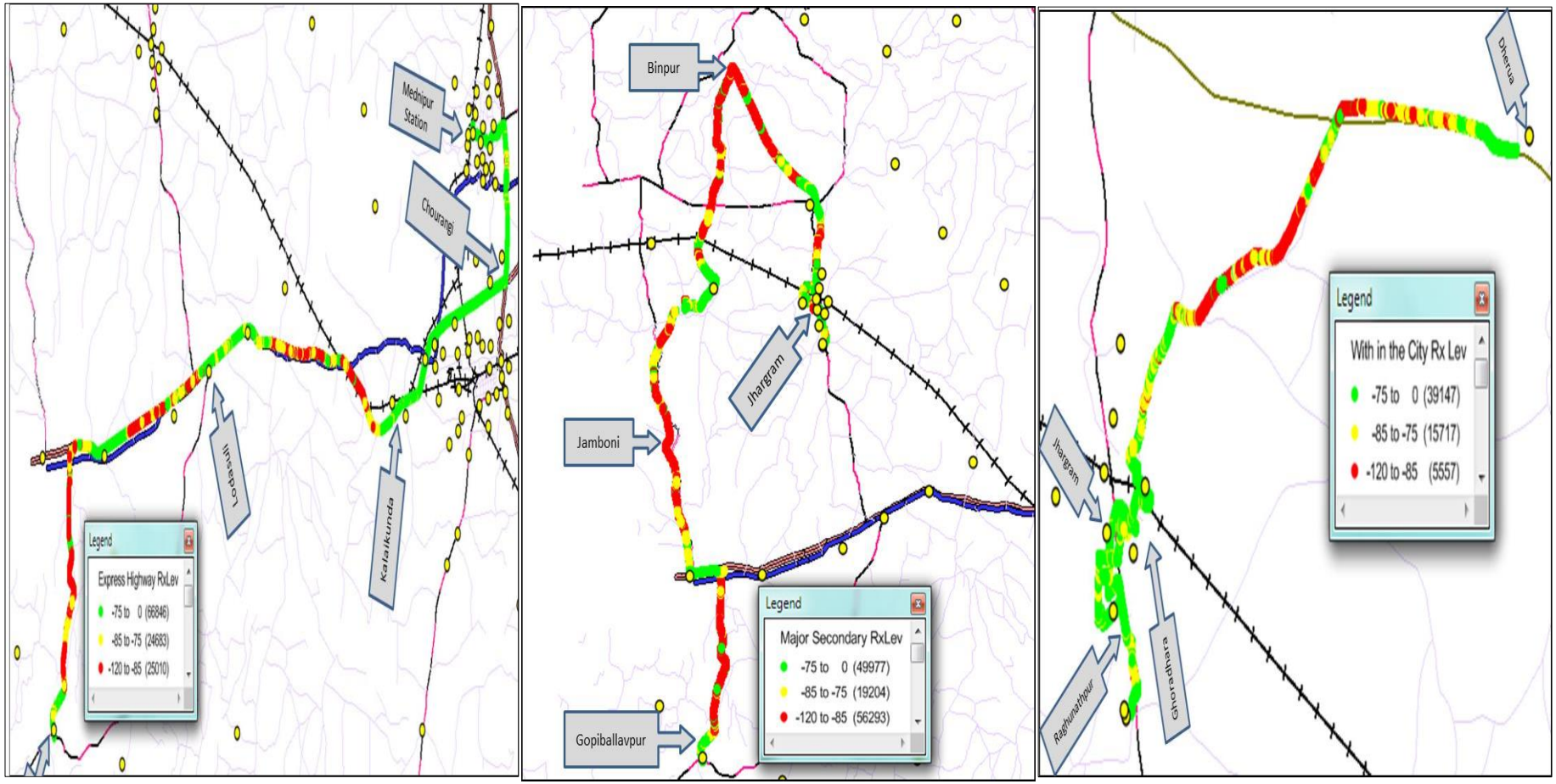
6.1.1.2 KILOMETERS TRAVELLED – MEDINIPUR SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Medinipur	102	113	105	320

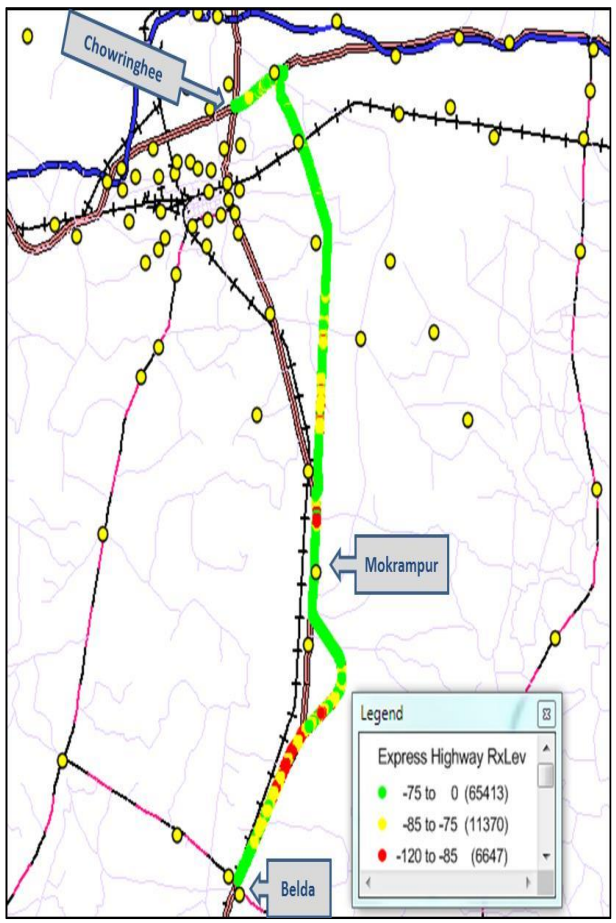
6.1.1.3 ROUTE MAP MEDINIPUR DAY 1

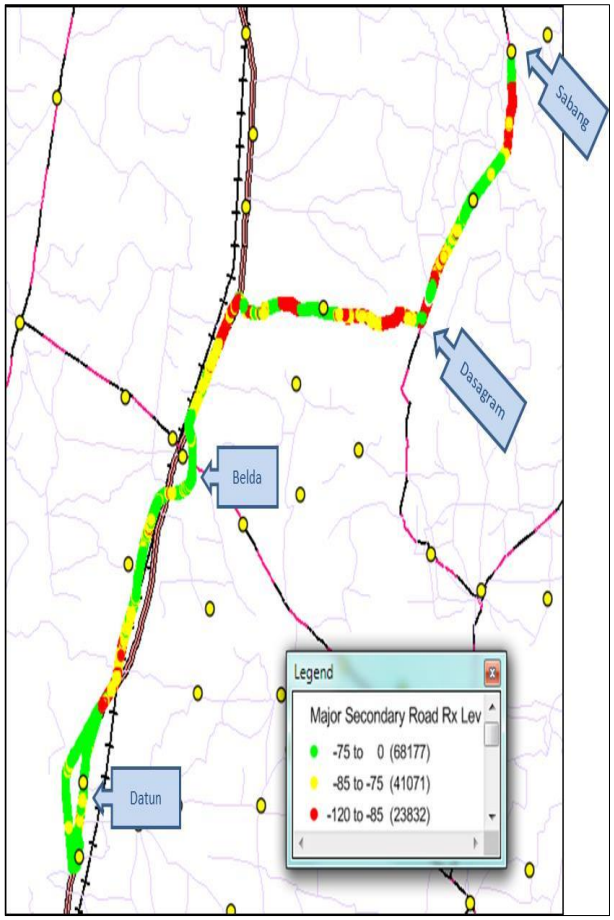


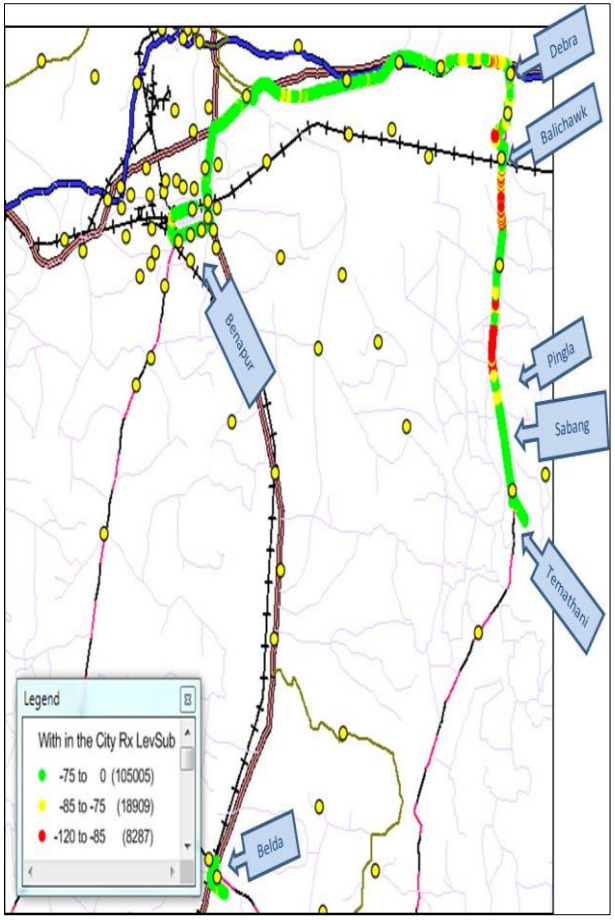
6.1.1.4 ROUTE MAP MEDINIPUR DAY 2



6.1.1.5 ROUTE MAP MEDINIPUR DAY 3


Chowringhee
Mokrampur
Belda
Legend
Express Highway RxLev
-75 to 0 (65413)
-85 to -75 (11370)
-120 to -85 (6647)


Sabang
Dasagram
Belda
Datun
Legend
Major Secondary Road Rx Lev
-75 to 0 (68177)
-85 to -75 (41071)
-120 to -85 (23832)


Debra
Balichawk
Beniapur
Pingla
Sabang
Tematthani
Belda
Legend
With in the City Rx LevSub
-75 to 0 (105005)
-85 to -75 (18909)
-120 to -85 (8287)

6.1.1.6 DRIVE TEST RESULTS – MEDINIPUR SSA

Executive Summary																					
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		18.65%	13.08%	100.00%	92.64%	15.39%	41.20%	18.50%	64.06%	32.14%	27.20%	80.19%	51.89%	21.95%	28.84%	39.72%	38.52%	29.86%	32.18%	19.91%	46.71%
0 to -85 dBm		30.10%	45.67%	100.00%	99.73%	67.58%	74.17%	70.15%	82.15%	33.38%	45.40%	82.23%	77.35%	90.09%	63.26%	89.33%	72.38%	70.73%	74.60%	80.23%	87.88%
0 to -95 dBm		69.69%	82.77%	100.00%	99.98%	96.94%	95.30%	100.00%	99.99%	78.31%	72.46%	88.90%	91.11%	99.66%	100.00%	99.92%	98.32%	99.25%	97.12%	97.40%	98.89%
Voice quality	≥ 95%	95.84%	93.99%	99.04%	96.13%	97.20%	94.39%	96.76%	90.86%	99.26%	88.45%	97.22%	95.67%	99.03%	91.15%	98.04%	96.50%	99.21%	96.82%	97.99%	94.99%
CSSR	≥ 95%	98.38%	96.10%	100.00%	100.00%	92.44%	90.70%	100.00%	96.33%	100.00%	93.11%	100.00%	97.26%	100.00%	91.36%	100.00%	100.00%	100.00%	99.63%	100.00%	100.00%
%age Blocked calls		0.00%	1.15%	0.00%	0.00%	7.56%	9.30%	0.00%	3.67%	0.00%	6.89%	0.00%	2.74%	0.00%	5.95%	0.00%	0.00%	0.00%	0.37%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	1.90%	0.00%	0.00%	0.00%	3.49%	0.00%	0.33%	0.00%	3.04%	0.00%	1.01%	0.00%	1.62%	0.00%	0.00%	0.00%	0.37%	0.00%	0.00%
Hands off success rate		100.00%	99.12%	100.00%	99.59%	100.00%	100.00%	100.00%	97.60%	100.00%	100.00%	100.00%	100.00%	100.00%	90.36%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

Aircel, BSNL, Idea, MTS, Reliance GSM and Vodafone did not meet the benchmark set by TRAI in outdoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

BSNL and MTS failed to meet the benchmark in outdoor areas.

6.1.2 AUGUST – ANDAMAN SSA

Month	Name of SSA Covered	Date of Drive Test
August	Andaman	20th to 22nd August, 2014

6.1.2.1 ROUTE DETAILS – ANDAMAN SSA

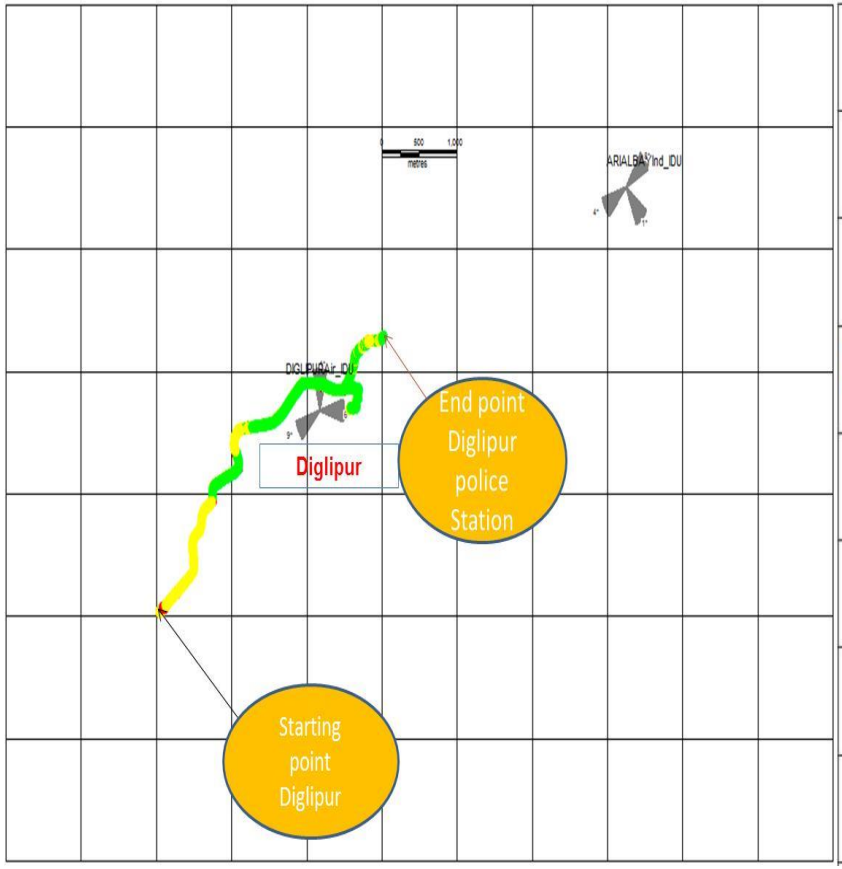
Category	Type of location	West Bengal-August		
		Andaman		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Diglipur Town	Mayabandar town-APWD-Locknow more	Haddo-phonixbay-Abadin-Batu basti-Garacharma-City ghat
	Highways	Diglipur Town	Locknow more-Chiping Ghat	Garacharma-Haddo
	With in the City	N/A	Mayabandar-APWD-Locknow more-Rangat more	City ghat-batu basti-Dolly gunj-Jangli ghat-Gol ghar
Indoor	Shopping complex/Office complex	Diglipur Police station & Diglipur Market	Mayabandar panchayet Office & Sea and Sand Hotel	APWD office & Draft Wood Hotel

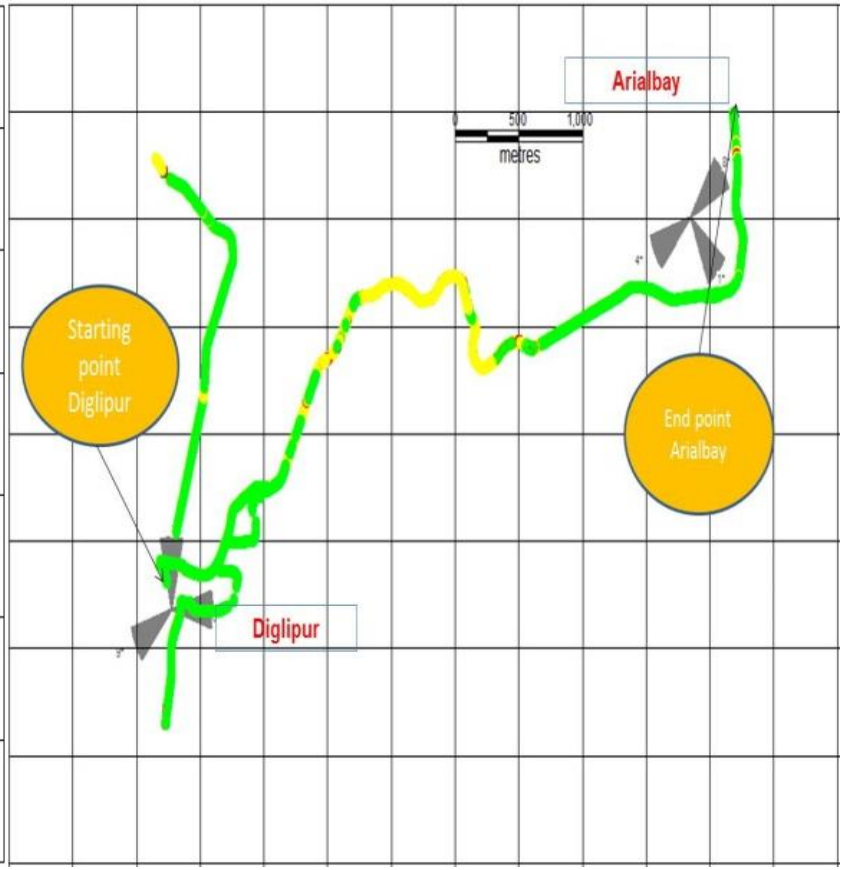
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.2.2 KILOMETERS TRAVELLED – ANDAMAN SSA

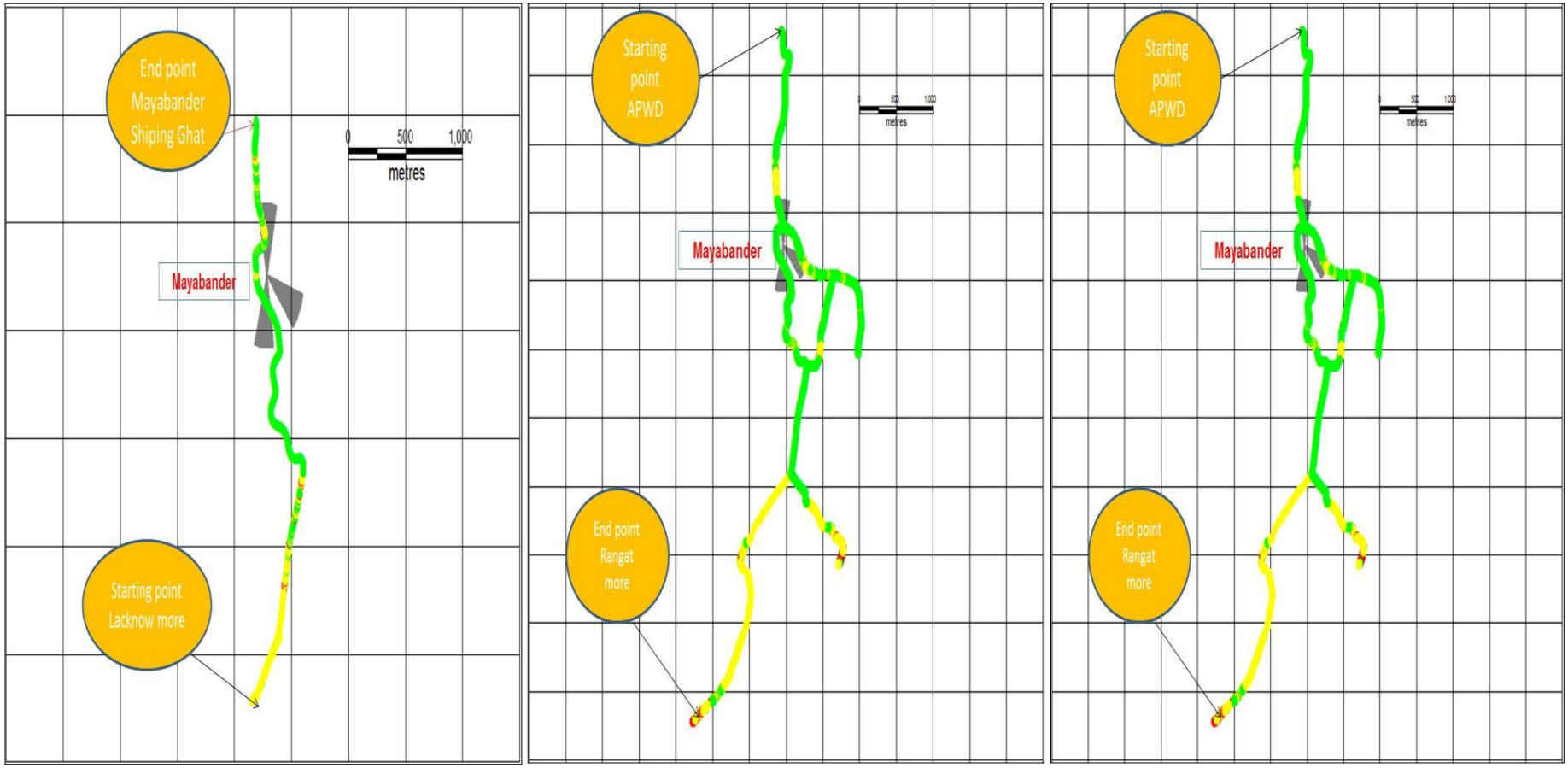
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Andaman	88	96	118	302

6.1.2.3 ROUTE MAP ANDAMAN DAY 1

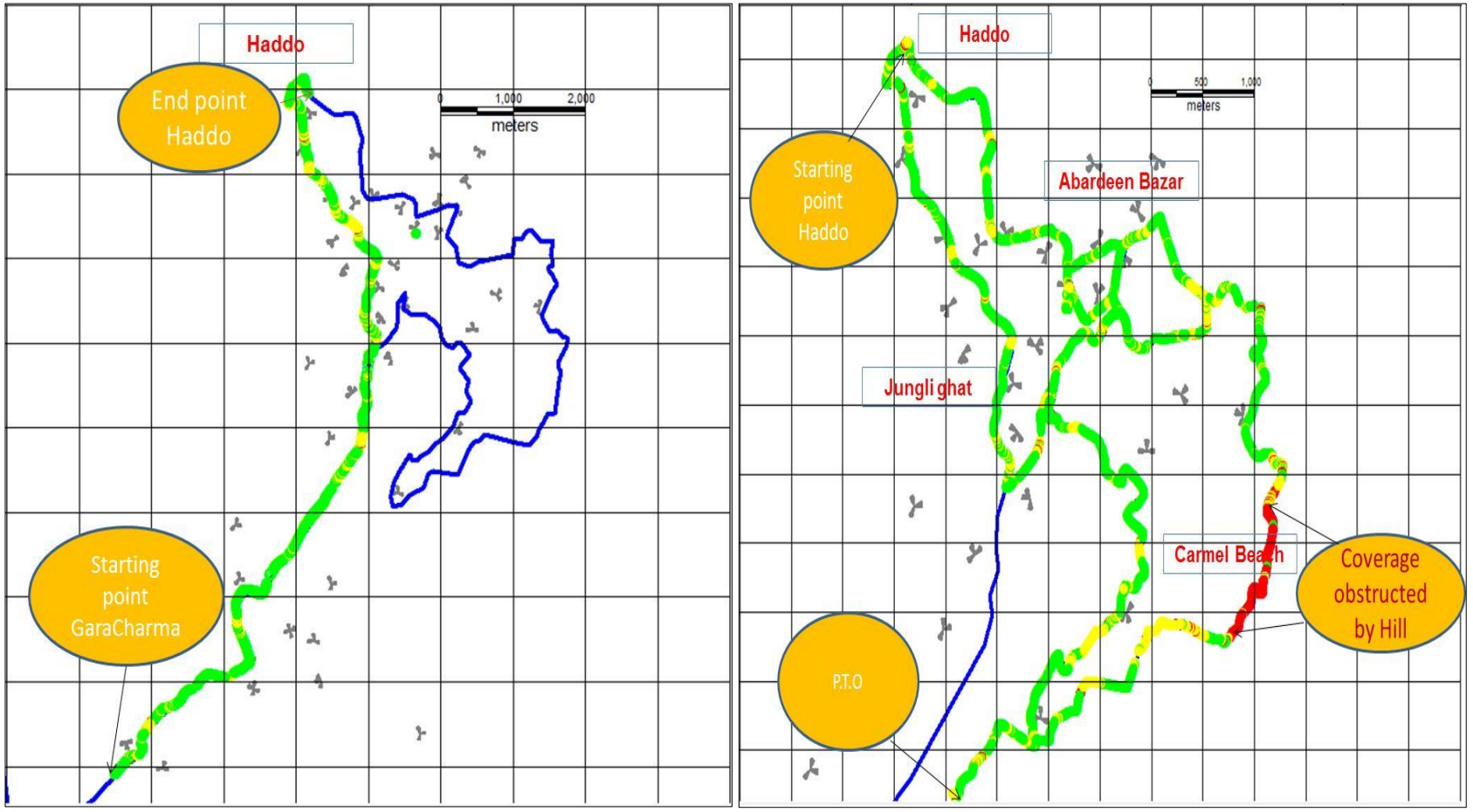




6.1.2.4 ROUTE MAP ANDAMAN DAY 2



6.1.2.5 ROUTE MAP ANDAMAN DAY 3



6.1.2.6 DRIVE TEST RESULTS – ANDAMAN SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Coverage		100.00%	79.87%	62.60%	55.72%	No Coverage		No Coverage		13.06%	62.54%	No Coverage		No Coverage		No Coverage		91.82%	60.06%
0 to -85 dBm				100.00%	99.79%	96.04%	84.04%					67.58%	88.69%							99.30%	94.81%
0 to -95 dBm				100.00%	100.00%	100.00%	100.00%					94.98%	96.04%							100.00%	99.88%
Voice quality	≥ 95%			99.29%	94.06%	96.46%	89.27%					93.28%	97.56%							98.99%	98.10%
CSSR	≥ 95%			100.00%	100.00%	92.61%	87.26%					100.00%	99.80%							100.00%	100.00%
%age Blocked calls				0.00%	0.00%	7.33%	12.88%					0.00%	0.20%							0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	1.96%	4.26%					0.00%	0.21%							0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	97.75%					100.00%	100.00%							100.00%	100.00%

Note: Aircel, Idea, MTS, Reliance GSM, Reliance CDMA, Tata GSM and Tata CDMA do not have coverage in Andaman SSA. Hence these operators did not participate in the drive test.

Voice Quality

Airtel and BSNL did not meet the benchmark set by TRAI in outdoor areas. Reliance CDMA missed the benchmark in indoor areas.

Call Set Success Rate (CSSR)

BSNL did not meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

BSNL failed to meet the benchmark in outdoor areas.

6.1.3 SEPTEMBER – BALURGHAT SSA

Month	Name of SSA Covered	Date of Drive Test
September	Balurghat	15th to 17th September 2014

6.1.3.1 ROUTE DETAILS – BALURGHAT SSA

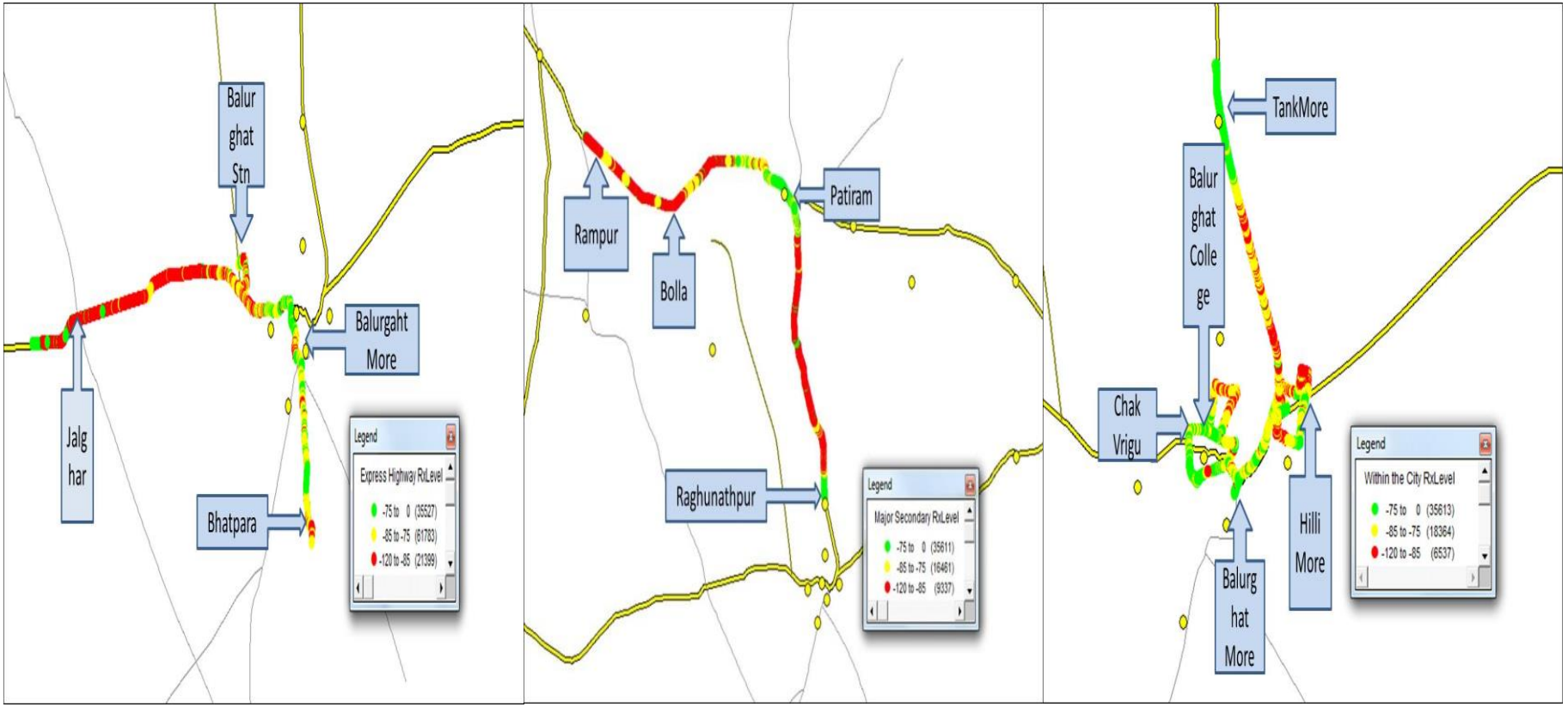
Category	Type of location	West Bengal-September		
		Balurghat		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Rampurhat-Bolla-Balurghat	Chingispur-	Tapan-Gangarampur-
	Highways	Railway stn-Jalghar-Bolla-Rampurhat	Railway station - Chingispur	Balurghat Court-Tapan
	With in the City	Balurghat Town	Balurghat Town	Balurghat Town
Indoor	Shopping complex	olive	Apsara	Paradise
	Office complex	Balurghat Court	Balurghat Railway Station	Zilla parisad balurghat

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.

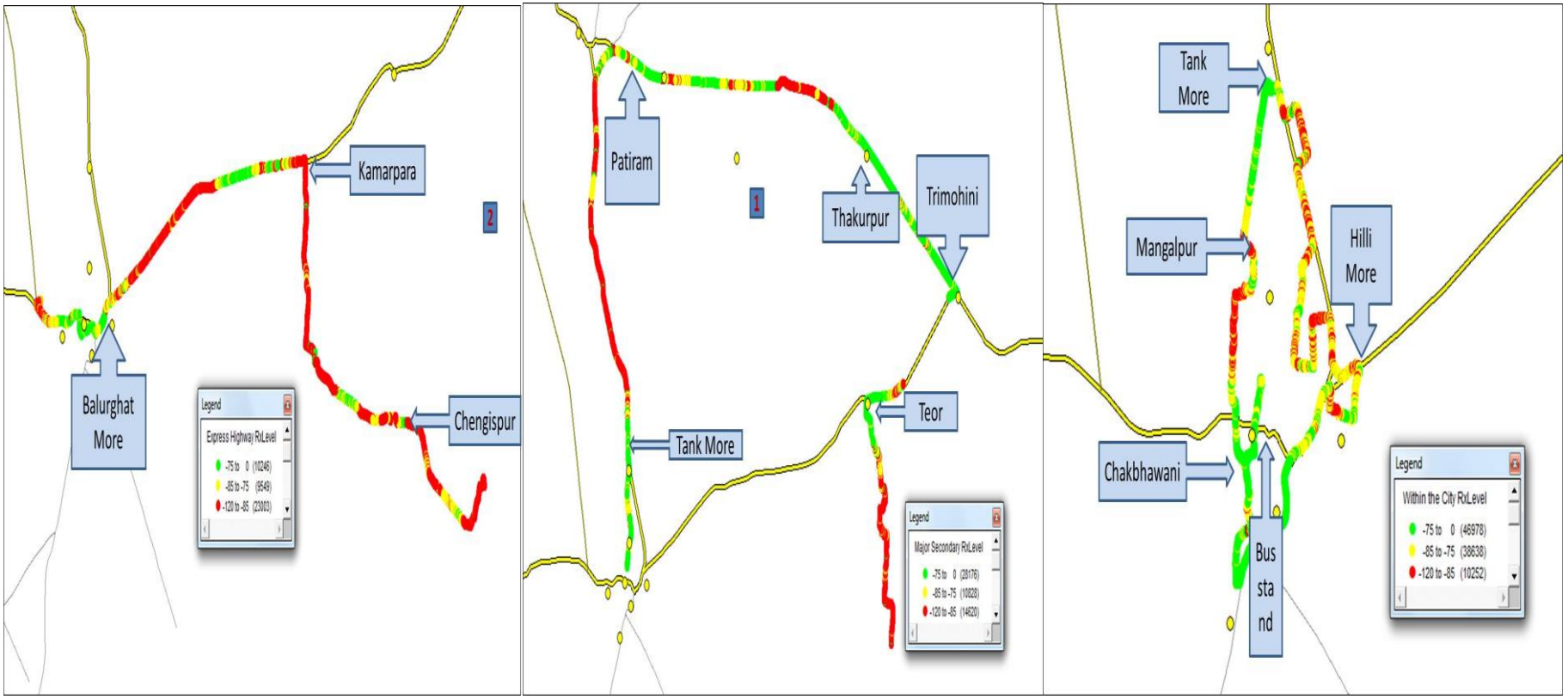
6.1.3.2 KILOMETERS TRAVELLED – ANDAMAN SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Balurghat	121	94	97	312

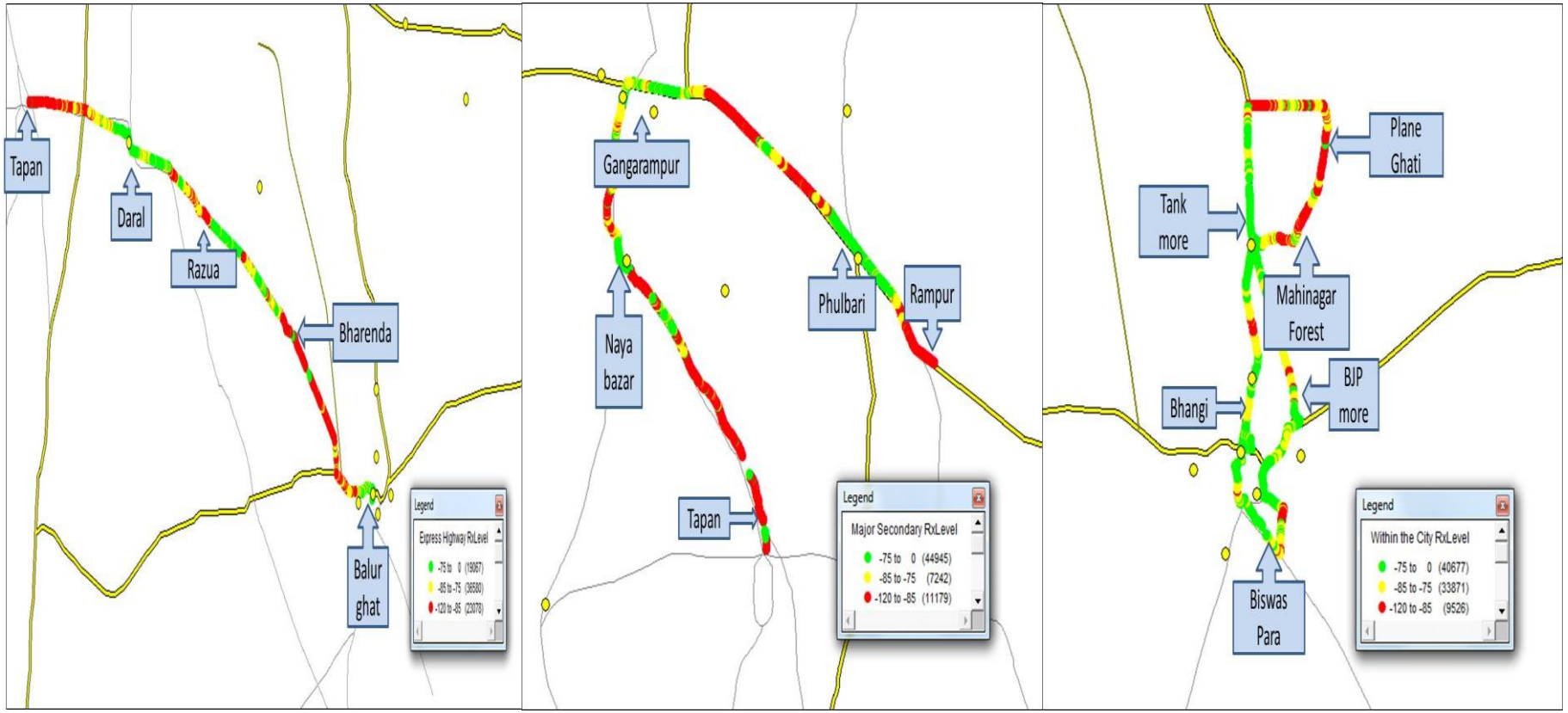
6.1.3.3 ROUTE MAP BALURGHAT DAY 1



6.1.3.4 ROUTE MAP BALURGHAT DAY 2



6.1.3.5 ROUTE MAP BALURGHAT DAY 3



6.1.3.6 DRIVE TEST RESULTS – BALURGHAT SSA

Executive Summary																					
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		29.69%	24.84%	100.00%	984.59%	50.58%	40.89%	48.99%	46.20%	0.00%	15.24%	99.59%	48.59%	93.14%	48.33%	0.00%	17.52%	48.45%	44.67%	86.58%	85.84%
0 to -85 dBm		76.14%	66.55%	100.00%	995.28%	94.61%	83.97%	95.01%	78.44%	0.01%	26.91%	100.00%	77.77%	100.00%	77.69%	28.85%	63.50%	92.57%	82.51%	99.17%	98.98%
0 to -95 dBm		99.41%	91.05%	100.00%	995.28%	99.90%	98.57%	100.00%	100.00%	59.25%	64.10%	100.00%	92.10%	100.00%	100.00%	99.98%	98.17%	99.94%	97.92%	100.00%	99.97%
Voice quality	≥ 95%	96.61%	92.66%	99.22%	96.02%	94.51%	85.21%	99.05%	95.36%	97.44%	92.06%	99.62%	94.50%	98.87%	88.29%	98.38%	96.93%	99.60%	95.83%	98.84%	95.42%
CSSR	≥ 95%	100.00%	94.18%	100.00%	100.00%	90.94%	90.27%	100.00%	97.74%	100.00%	96.69%	100.00%	99.23%	100.00%	95.44%	100.00%	100.00%	100.00%	99.57%	100.00%	100.00%
%age Blocked calls		0.00%	2.05%	0.00%	0.00%	9.06%	9.73%	0.00%	2.26%	0.00%	3.31%	0.00%	0.77%	0.00%	5.91%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	4.88%	0.00%	0.00%	0.00%	4.93%	0.00%	0.00%	0.00%	1.35%	0.00%	0.00%	0.00%	5.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	86.10%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	50.00%	100.00%	100.00%	100.00%	100.00%	96.30%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

BSNL did not meet the benchmark for Voice Quality in indoor as well as outdoor locations. Aircel, MTS, Reliance CDMA and Reliance GSM did not meet the benchmark set by TRAI in outdoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

Aircel, BSNL and Reliance GSM failed to meet the benchmark in outdoor areas.

6.2 INDEPENDENT DRIVE TEST

The independent drive test was conducted for all the operators present in the Assam circle. As per the new directive given by TRAI headquarters, drive test were conducted at a SSA level. A minimum of 100 kilometers were traversed in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI advisors. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

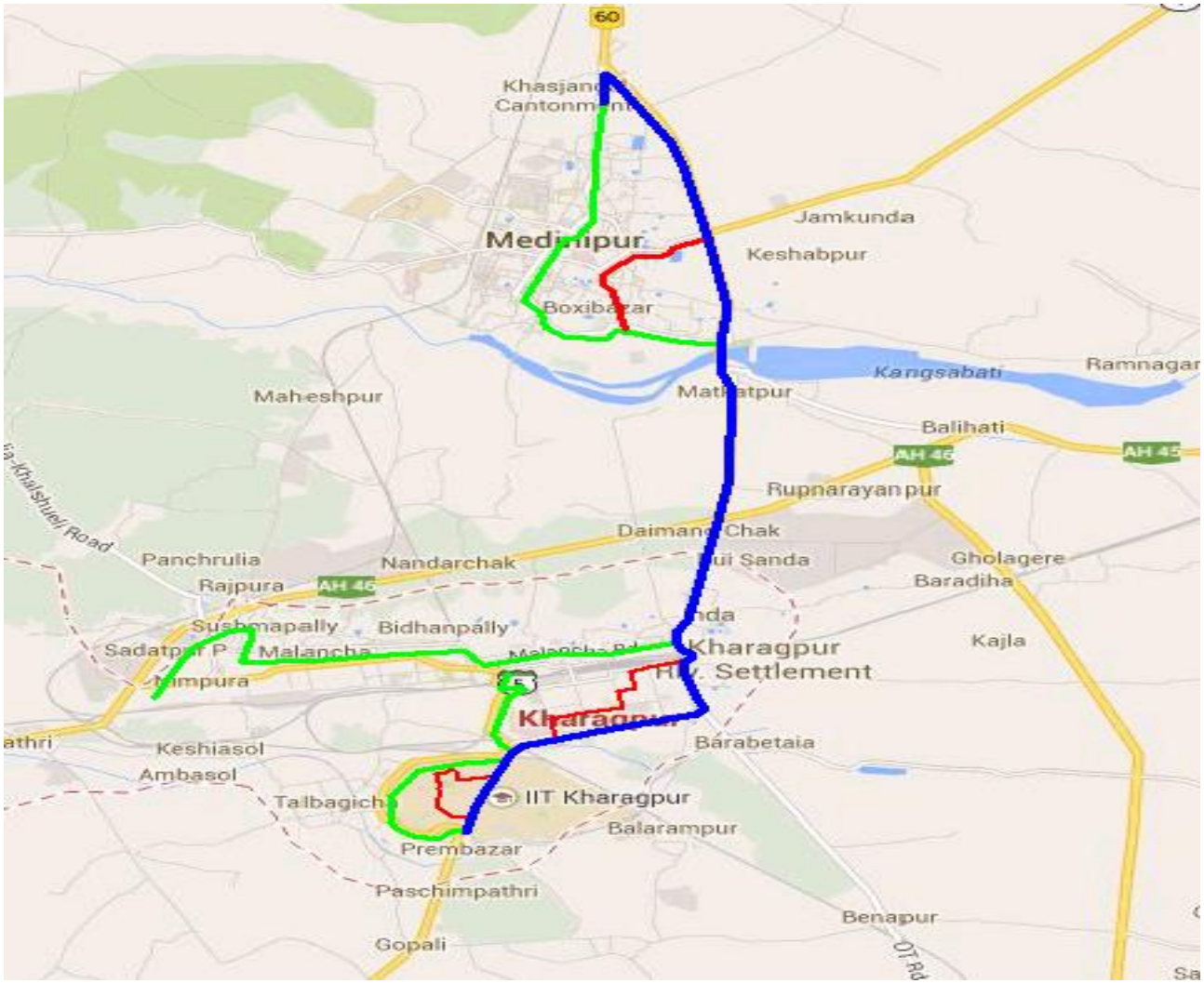
6.2.1 MEDINIPORE

Name of the City	Medinipore
Date of Drive Test	14th July' 14
Name of the circle	West Bengal

Independent Drive Test Route Details – Medinipore SSA

Medinipore	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	IIT Kharagpur-Puratan Bazar-Indra-NH60-Dharma Bus stop-Kuikotha 1	Dharma Bazar-Colonelgola Bus Stop-Battola Bus Stop-Jagannath Temple Bus Stop.IIT campus (Transit Hostel)-Chandmari Bus Stand-KGP Rly station-puratan bazar	IIT Campus-DRM Office-Golebazar-Malancha-Saha chowk.Kuikotha-LIC MORE-Court Stop-Patna Bazar-Nutan Bazar	IIT Kharagpur	Bigbazar

Kilometers travelled – Medinipore SSA: 107



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Results – MEDINIPORE SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		NA	NA	NA	NA	13.70%	41.80%	6.15%	40.53%	65.12%	70.27%	7.15%	37.50%	25.45%	38.07%	32.26%	63.50%	6.20%	36.93%	12.70%	40.70%
Signal Strength - 0 to -85 dBm		NA	NA	NA	NA	90.65%	90.03%	60.05%	79.87%	99.96%	98.71%	82.10%	81.31%	64.60%	86.50%	99.77%	99.83%	60.30%	83.47%	86.75%	92.00%
Signal Strength - 0 to -95 dBm		NA	NA	NA	NA	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	52.05%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	NA	NA	NA	NA	72.88%	82.09%	84.86%	84.09%	99.04%	98.08%	96.83%	93.50%	93.70%	92.30%	99.42%	98.96%	83.66%	91.22%	97.01%	94.64%
CSSR	≥ 95%	NA	NA	NA	NA	87.96%	82.25%	100.00%	99.51%	100.00%	97.52%	96.82%	96.05%	98.78%	96.68%	100.00%	98.92%	93.69%	97.72%	100.00%	95.46%
%age Blocked calls		NA	NA	NA	NA	12.04%	17.75%	0.00%	0.49%	0.00%	2.48%	3.18%	3.95%	1.22%	3.32%	0.00%	1.08%	6.31%	2.28%	0.00%	4.54%
Call drop rate	≤ 2%	NA	NA	NA	NA	5.17%	7.96%	4.70%	0.57%	0.00%	0.00%	0.00%	2.42%	0.00%	4.03%	0.00%	0.00%	0.00%	0.56%	0.00%	0.56%
Hands off success rate		NA	NA	NA	NA	91.85%	92.46%	100.00%	99.58%	100.00%	100.00%	100.00%	100.00%	100.00%	98.86%	100.00%	100.00%	88.85%	99.44%	100.00%	100.00%

NA: Airtel & Aircel switch numbers were not working during the drive test.

Voice Quality

BSNL, Idea, Reliance GSM and Tata GSM failed to meet the benchmark in indoor as well as outdoor areas. Reliance CDMA and Vodafone missed the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmark in indoor as well as outdoor areas. Tata GSM missed the benchmark in indoor areas.

Call Drop Rate

BSNL failed to meet the benchmark in indoor as well as outdoor areas. Idea missed the benchmark in indoor areas while Reliance CDMA and Reliance GSM missed the benchmark in outdoor areas.

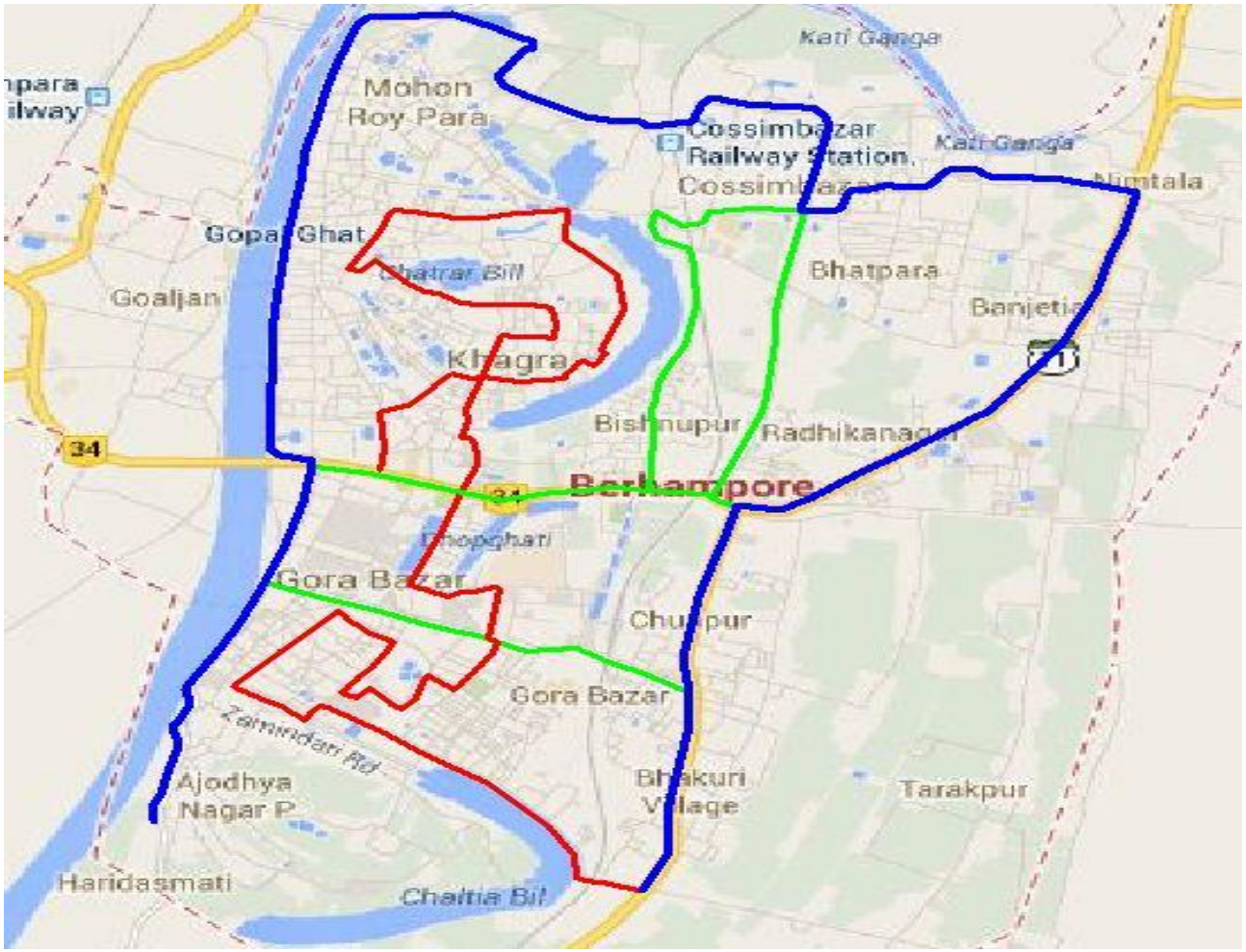
6.2.2 BERHAMPORE

Name of the City	Berhampore
Date of Drive Test	16th & 17th July 14
Name of the circle	West Bengal

Independent Drive Test Route Details – Berhampore SSA

Berhampore	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Bhakuri Bus Stop-Sangam Hotel-Mahendra Hotel-Cossimbazar Masjid-Hotel Rajnandini And Restaurant	New Blue wing-Abdus Samas Rd-Swapna Neert Police GH-Nirupama devi Rd	Chandra Commercial & Art Institute-P.W.D Guest House.Kalibari park-Bus Stand	Musidabad Medical Colege	Metro shopping Mall

Kilometers travelled – Berhampore SSA: 103



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Results – Berhampore SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		8.05%	32.37%	10.90%	39.63%	89.65%	70.87%	5.75%	44.67%	85.20%	88.30%	22.90%	30.60%	2.55%	40.10%	40.95%	88.77%	NA	NA	39.90%	51.93%
Signal Strength - 0 to -85 dBm		67.50%	69.47%	47.80%	78.63%	99.50%	93.87%	53.10%	87.70%	100.00%	100.00%	89.00%	85.27%	65.95%	87.67%	99.95%	100.00%	NA	NA	99.00%	94.30%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	68.83%	100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%
Voice quality	≥ 95%	87.28%	75.70%	81.41%	90.23%	90.10%	82.19%	84.60%	84.48%	99.83%	96.57%	98.18%	93.05%	97.23%	92.72%	98.74%	96.12%	NA	NA	95.86%	92.10%
CSSR	≥ 95%	89.74%	86.53%	0.00%	69.31%	100.00%	90.87%	100.00%	98.61%	98.48%	100.00%	98.39%	95.47%	100.00%	96.59%	98.61%	98.85%	NA	NA	100.00%	97.46%
%age Blocked calls		10.26%	13.47%	100.00%	30.69%	0.00%	9.13%	0.00%	1.39%	1.52%	0.00%	1.61%	4.53%	0.00%	3.41%	1.39%	1.15%	NA	NA	0.00%	2.54%
Call drop rate	≤ 2%	0.00%	4.78%	0.00%	3.27%	0.00%	2.81%	0.00%	2.13%	0.00%	0.00%	4.55%	4.09%	0.00%	2.45%	0.00%	0.00%	NA	NA	0.00%	0.67%
Hands off success rate		100.00%	96.08%	100.00%	65.83%	100.00%	86.55%	100.00%	99.39%	100.00%	100.00%	100.00%	100.00%	100.00%	98.62%	100.00%	100.00%	NA	NA	100.00%	99.37%

NA: Tata GSM SIM remained inactive during the drive test.

Note: Airtel switch number was working intermittently during the drive test. During the drive test activity in indoor locations, it remained inactive. Hence CSSR is reported very low for Airtel in outdoor and 0% in indoor locations.

Voice Quality

Aircel, Airtel, BSNL and Idea failed to meet the benchmark in indoor as well as outdoor areas. Reliance CDMA, Reliance GSM and Vodafone missed the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

Aircel failed to meet the benchmark in indoor as well as outdoor areas. BSNL missed the benchmark in outdoor areas.

Call Drop Rate

Reliance CDMA failed to meet the benchmark in indoor as well as outdoor areas. Aircel, BSNL, Idea and Reliance GSM missed the benchmark in outdoor areas.

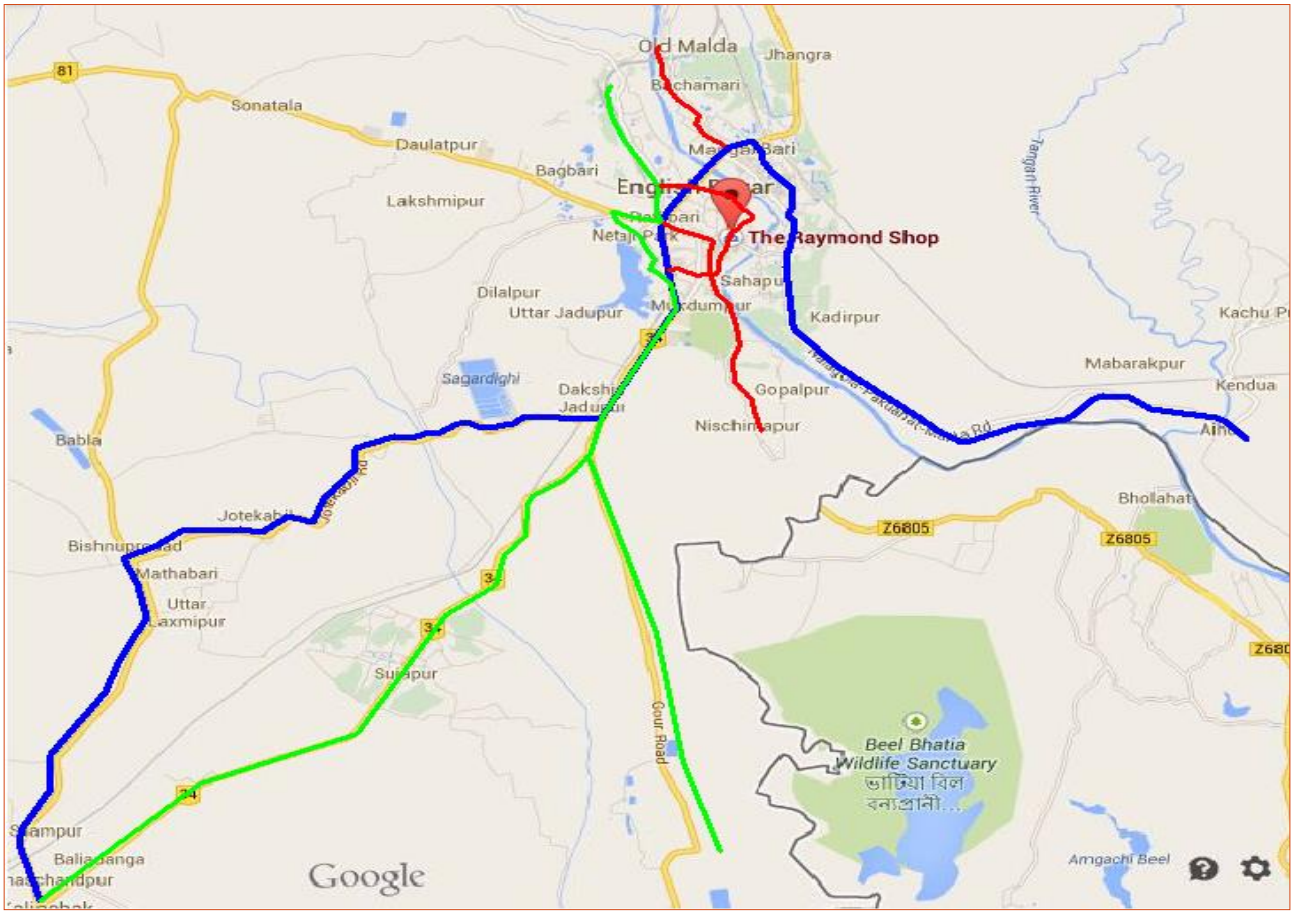
6.2.3 MALDA

Name of the City	Malda
Date of Drive Test	18th July' 14
Name of the circle	West Bengal

Independent Drive Test Route Details – Malda SSA

Malda	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Kaliachack BDO to Muthabari to Sudalpur to Makdumpur to Malda DM office toAdampur to Aiho	Malanchapally to Rathbarimore to Jhaljhalia to Gayaspur to 420 more to Durgabari to Netajee more to Malda DM office & Narayanpur kaluadighi to Nawabganj to Old malda to Mangalbari to Rath bari to Ghorapith to Malanchapally.	Malda Station to Sustanimore to Gour,Sustanimore to Kaliachack. Malda DM office	Turism Office	

Kilometers travelled – Malda SSA: 113



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Results – Malda SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		MTS		Reliance CDMA		TATA CDMA	
		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
Signal Strength - 0 to -75 dBm		76.85%	43.07%	98.90%	79.20%	76.55%	37.33%	88.85%	50.30%	58.00%	40.47%	64.55%	71.40%	NA	NA	87.95%	51.47%	19.95%	25.10%	99.80%	48.03%
Signal Strength - 0 to -85 dBm		99.45%	76.67%	100.00%	92.00%	99.35%	78.50%	99.90%	83.97%	98.50%	87.30%	99.55%	87.23%	NA	NA	100.00%	72.87%	97.30%	73.43%	100.00%	71.40%
Signal Strength - 0 to -95 dBm		99.95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	91.23%	79.32%	90.26%	78.10%	90.29%	83.74%	99.07%	86.41%	94.71%	93.07%	95.13%	87.15%	NA	NA	99.58%	80.62%	99.35%	82.99%	99.75%	81.96%
CSSR	≥ 95%	94.00%	94.57%	0.00%	0.00%	94.00%	65.18%	100.00%	97.71%	100.00%	98.45%	98.44%	100.00%	NA	NA	100.00%	100.00%	98.44%	83.37%	100.00%	98.91%
%age Blocked calls		6.00%	5.43%	100.00%	100.00%	6.00%	34.82%	0.00%	2.29%	0.00%	1.55%	1.56%	0.00%	NA	NA	0.00%	0.00%	1.56%	16.63%	0.00%	1.09%
Call drop rate	≤ 2%	2.61%	3.00%	0.00%	0.00%	1.61%	3.70%	0.00%	1.42%	0.00%	0.00%	0.00%	2.04%	NA	NA	0.00%	2.59%	4.08%	7.92%	0.00%	3.77%
Hands off success rate		100.00%	93.91%	0.00%	0.00%	98.08%	90.77%	100.00%	100.00%	100.00%	100.00%	100.00%	96.38%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

NA: Tata GSM SIM remained inactive during the drive test.

Note: Airtel switch number remained inactive during the drive test. Hence CSSR is reported 0% for Airtel.

Voice Quality

Aircel, Airtel, BSNL and Vodafone failed to meet the benchmark in indoor as well as outdoor areas. Idea, Reliance GSM, MTS, Reliance CDMA and Tata CDMA missed the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

Aircel and BSNL failed to meet the benchmark in indoor as well as outdoor areas. Reliance CDMA missed the benchmark in outdoor areas.

Call Drop Rate

Aircel and Reliance CDMA failed to meet the benchmark in indoor as well as outdoor areas. BSNL, Reliance GSM, MTS and Tata CDMA missed the benchmark in outdoor areas.

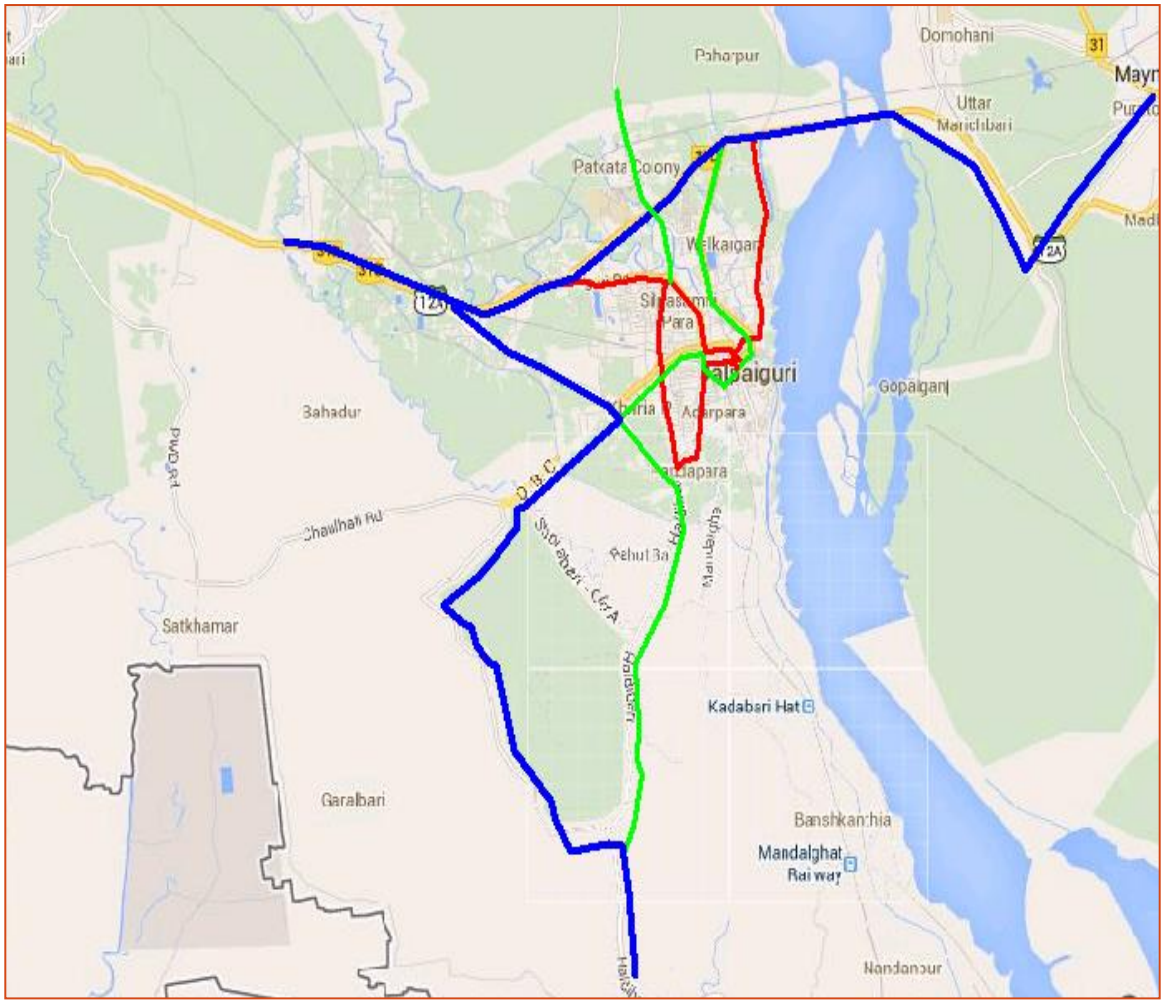
6.2.4 JALPAIGUDI

Name of the City	Jalpaigudi
Date of Drive Test	21st July' 14
Name of the circle	West Bengal

Independent Drive Test Route Details – Jalpaigudi SSA

Jalpaigudi	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Bandh Rd-NH 31D-Mainagudi.Mohit Nagar Railway Station-Raninagar Jalpaiguri Station.Mohit Nagar Railway Station-DB Rd-Haldibar Rd.	Bandha Rd-Sarojendra Deb Raikat Kala Kendra-Gumuti Bus Stop-Haldibari Rd-Dangapara Rd-Siligudi Rd	Haldibari rd-Jalpaiguri RailwayStation-Sarojendra DebRaikat Kala Kendra-Umagati Primary School-BDO OFFICE.Jalpaiguri Road Railway Station -Jalpaigudi law college-Ananda Chandra College of Commerce	BDO Office	Cosmos Arcade Market

Kilometers travelled – Jalpaigudi SSA: 118



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Results – Jalpaigudi SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		72.45%	40.83%	97.50%	77.47%	87.80%	47.73%	31.90%	25.03%	54.07%	29.80%	45.85%	26.13%	88.20%	64.07%	28.42%	15.33%	NA	NA	47.50%	36.90%
Signal Strength - 0 to -85 dBm		98.90%	80.17%	99.95%	96.87%	99.90%	89.03%	89.80%	68.20%	99.96%	64.90%	99.55%	69.03%	99.10%	94.47%	96.25%	49.77%	NA	NA	91.35%	84.47%
Signal Strength - 0 to -95 dBm		100.00%	99.97%	100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	100.00%	99.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%
Voice quality	≥ 95%	93.36%	83.65%	76.91%	72.80%	93.15%	91.52%	89.80%	86.11%	92.96%	88.55%	97.85%	82.11%	88.38%	89.50%	96.26%	90.91%	NA	NA	91.59%	87.44%
CSSR	≥ 95%	100.00%	100.00%	0.00%	0.00%	91.82%	94.08%	100.00%	98.81%	100.00%	100.00%	100.00%	98.79%	100.00%	99.42%	100.00%	88.93%	NA	NA	100.00%	99.36%
%age Blocked calls		0.00%	0.00%	100.00%	100.00%	8.18%	5.92%	0.00%	1.19%	0.00%	0.00%	0.00%	1.21%	0.00%	0.58%	0.00%	11.07%	NA	NA	0.00%	0.64%
Call drop rate	≤ 2%	0.00%	4.61%	0.00%	0.00%	0.00%	6.22%	0.00%	0.62%	3.13%	1.19%	0.00%	0.63%	1.61%	0.00%	0.00%	2.78%	NA	NA	1.52%	0.65%
Hands off success rate		0.00%	89.24%	0.00%	33.33%	50.00%	99.49%	100.00%	98.67%	100.00%	100.00%	100.00%	99.19%	99.07%	95.96%	100.00%	100.00%	NA	NA	100.00%	100.00%

NA: Tata GSM SIM remained inactive during the drive test.

Note: Airtel switch number remained inactive during the drive test. Hence CSSR is reported 0% for Airtel.

Voice Quality

All operators missed the benchmark in outdoor areas.

Reliance CDMA and Tata CDMA were the only two operators to have met the benchmark in indoor areas.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmark in indoor as well as outdoor areas. Vodafone missed the benchmark in outdoor areas.

Call Drop Rate

Aircel, BSNL and Vodafone failed to meet the benchmark in outdoor areas. MTS did not meet the benchmark in indoor areas.

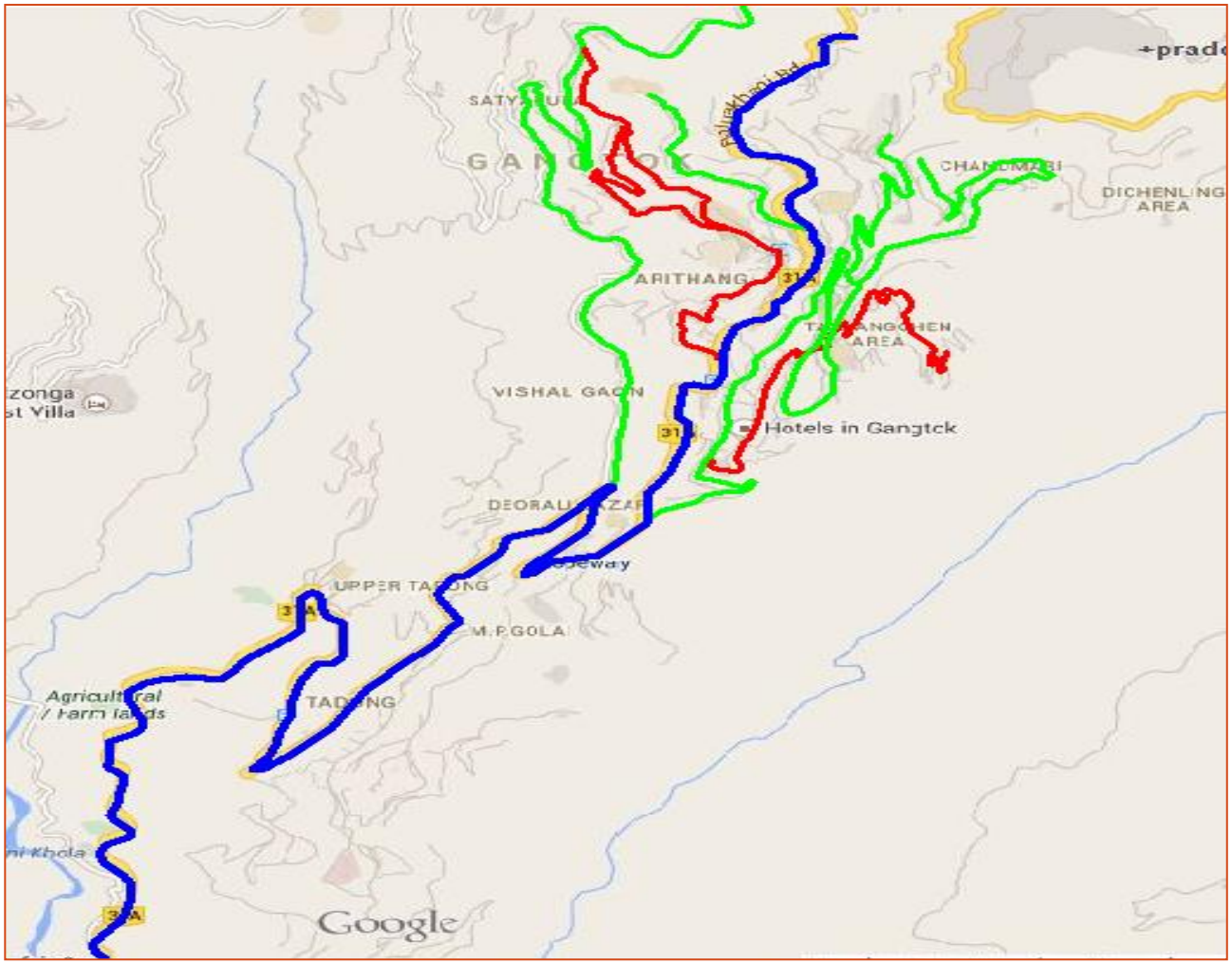
6.2.5 GANGTOK

Name of the City	Gangtok
Date of Drive Test	24th & 25th July' 14
Name of the circle	West Bengal

Independent Drive Test Route Details – Gangtok SSA

Gangtok	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Mayfair Spa Resort -SYPRAJ RESIDENCY-Sikkim Govt.College-Titanic Park-Hotel Bella Casa	Hotel Pineridge-HotelSoyang-Keepsa Residency.Hotel Tenancy-Rigz Residency-DPH rd-Himalayan Retreat-Lower sichey Rd	Aashishkhim Guest House-Suhim Portico Hotel-Indira Bypass.NH31A-Bigbazar-SukimGuest House-MG Marg-Bhanupath-Hotel Crystal Palace	Tourism Office	MG MARKET,KAZI ROAD

Kilometers travelled – Gangtok SSA: 128



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Results – Gangtok SSA

	B'mark	Aircel		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
Signal Strength - 0 to -75 dBm		83.35%	60.93%	99.90%	87.00%	52.75%	52.20%	51.65%	37.43%	55.70%	78.27%	75.10%	50.90%	71.70%	60.70%	99.95%	78.70%	NA	NA	99.60%	61.13%
Signal Strength - 0 to -85 dBm		99.70%	92.77%	99.95%	97.20%	98.30%	92.87%	97.70%	85.10%	100.00%	59.60%	94.10%	81.70%	99.70%	96.80%	100.00%	88.60%	NA	NA	100.00%	96.07%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.73%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%
Voice quality	≥ 95%	94.24%	81.19%	73.98%	73.16%	85.67%	85.54%	91.41%	86.67%	99.31%	92.09%	98.97%	81.29%	93.76%	87.52%	99.74%	96.18%	NA	NA	97.30%	86.13%
CSSR	≥ 95%	100.00%	95.92%	0.00%	0.00%	98.53%	96.06%	98.44%	98.20%	100.00%	97.78%	100.00%	99.38%	100.00%	97.63%	100.00%	100.00%	NA	NA	98.44%	93.58%
%age Blocked calls		0.00%	4.08%	100.00%	100.00%	1.47%	3.94%	1.56%	1.80%	0.00%	2.22%	0.00%	0.62%	0.00%	2.37%	0.00%	0.00%	NA	NA	1.56%	6.42%
Call drop rate	≤ 2%	0.00%	3.03%	0.00%	0.00%	0.00%	7.84%	0.00%	1.89%	0.00%	0.62%	0.00%	6.79%	0.00%	2.46%	0.00%	0.61%	NA	NA	0.00%	2.85%
Hands off success rate		100.00%	90.51%	100.00%	66.67%	98.44%	80.97%	100.00%	97.76%	100.00%	100.00%	100.00%	100.00%	100.00%	97.44%	100.00%	100.00%	NA	NA	100.00%	97.02%

NA: Tata GSM SIM remained inactive during the drive test.

Note: Airtel switch number remained inactive during the drive test. Hence CSSR is reported 0% for Airtel.

Voice Quality

Aircel, Airtel, BSNL, Idea and Reliance GSM failed to meet the benchmark in indoor as well as outdoor areas. MTS, Reliance CDMA and Vodafone missed the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

Vodafone missed the benchmark in outdoor areas.

Call Drop Rate

Aircel, BSNL, Reliance CDMA, Reliance GSM and Vodafone missed the benchmark in outdoor areas.

6.3 COMPARISON BETWEEN OPERATOR ASSISTED AND INDEPENDENT DRIVE TEST – MEDINIPORE SSA

The comparison has been made between operator assisted and independent drive tests respectively conducted in Medinipore SSA in the AMJ'14 quarter.

The operator assisted drive test happened for three days from 18th to 20th September 2014 covering majority of Medinipore SSA. However, the independent drive test was conducted with a focus on Medinipore city area and adjoining areas on 15th and 16th August 2014.

The results of the comparison between the two will be indicative and parameters for the two drive tests August not comply with each other due to following reasons.

- The distance covered in operator assisted drive test was a minimum of 300 kilometers over 3 days while the independent drive test was conducted for a minimum of 100 kilometers
- The route travelled was different for the two drive tests
- The drive tests were conducted on different days

Let us now look at the comparison between the two drive tests.

Note: Airtel and Aircel Switch numbers were not working during independent drive test in Medinipore SSA. Hence, these operators have not been reported as NA in the comparison charts.

6.3.1 ROUTE DETAILS

Route Details – Operator Assisted Drive Test – MEDINIPORE SSA

Category	Type of location	West Bengal-July		
		Medinapur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Garbeta-Goaltore-Rangamati – Chandrakona Road.	Gopiballavpur-Jamboni-Binpur	Danton-Sakrail-Dasagram-Sabang
	Highways	Midnapore-Salboni-Chandrakona Road-Garbeta	Midnapore-Salboni-Chandrakona Road-Garbeta	Chowringhee-Mokrampur-Belda
	With in the City	Radhanagar-Ghatal-Daspur, Chandrakona town-Gonsaibaazar-Kalikapur-Khirpai-Radhanagar	Jhargram-Raghunathpur, Raghunathpur-Ghoradhara	Sabang-Pingla-Benapur-Balichawk, Balichawk-Debra
Indoor	Shopping complex	Gitanjali Hotel, Chandrakona Road	Green Park Hotel, Jhargram.	Srijoni Hotel, Datun
	Office complex	Garbeta B.D.O. Office	Jhargram S.D. Office	Jhargram S.D. Office

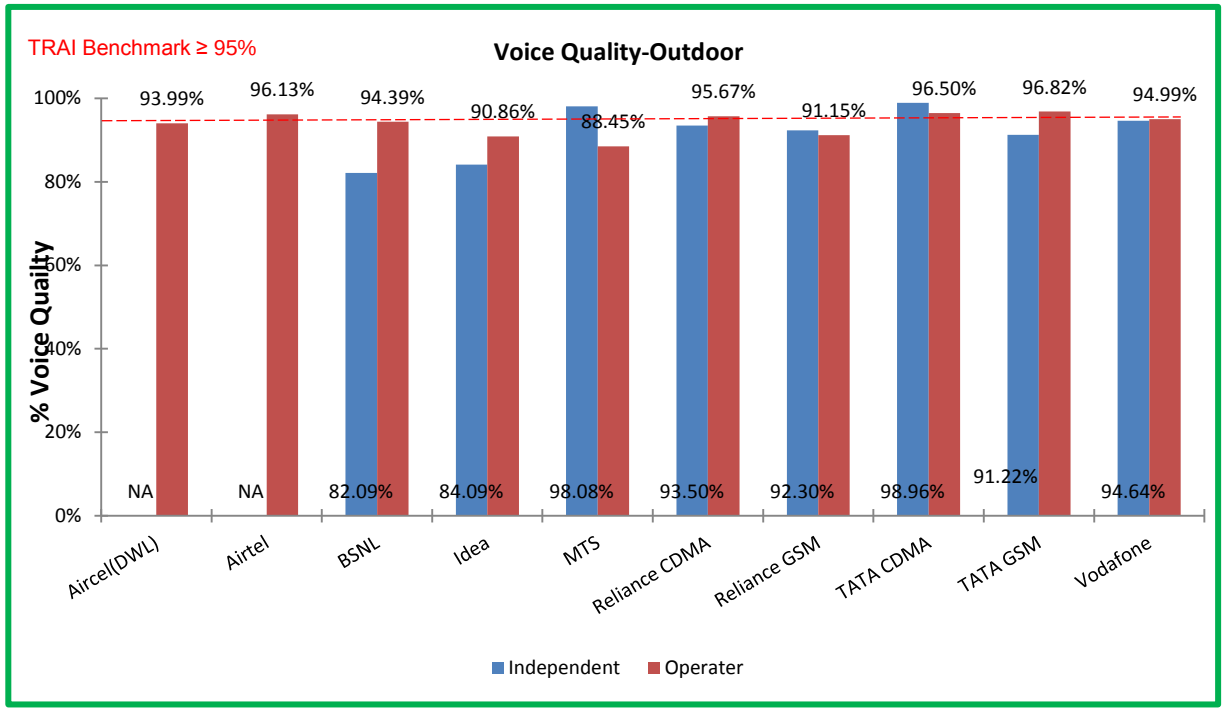
Route Details – Independent Drive Test – MEDINIPORE SSA

Medinipore	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	IIT Kharagpur-Puratan Bazar-Indra-NH60-Dharma Bus stop-Kuikotha 1	Dharma Bazar-Colonelgola Bus Stop-Battola Bus Stop-Jagannath Temple Bus Stop.IIT campus (Transit Hostel)-Chandmari Bus Stand-KGP Rly station-puratan bazar	IIT Campus-DRM Office-Golebazar-Malancha-Saha chowk.Kuikotha-LIC MORE-Court Stop-Patna Bazar-Nutan Bazar	IIT Kharagpur	Bigbazar

6.3.2 COMPARISON CHARTS AND ANALYSIS

6.3.2.1 VOICE QUALITY

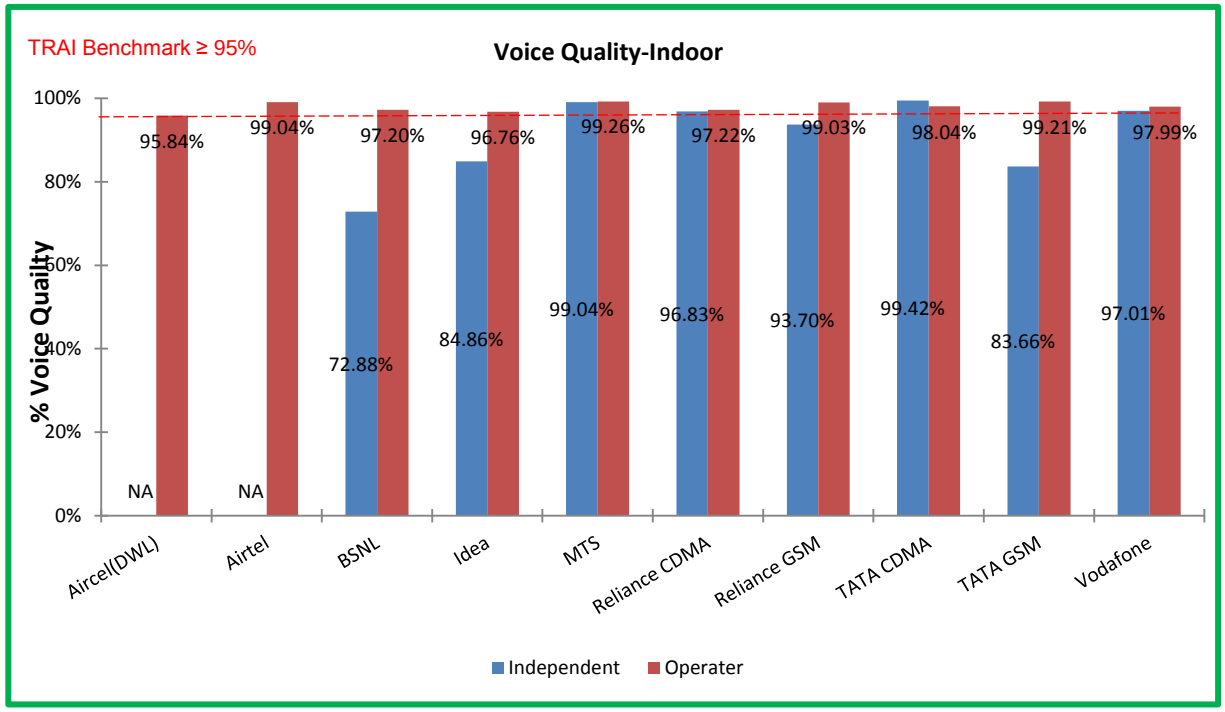
Outdoor Locations



In outdoor locations, BSNL, Idea and Reliance GSM failed to meet the benchmark in both the drive tests.

Reliance CDMA, Tata GSM and Vodafone missed the benchmark during independent drive test but were able to meet the benchmark during operator assisted drive test. On the contrary, MTS missed the benchmark during operator assisted drive test but met the benchmark during independent drive test.

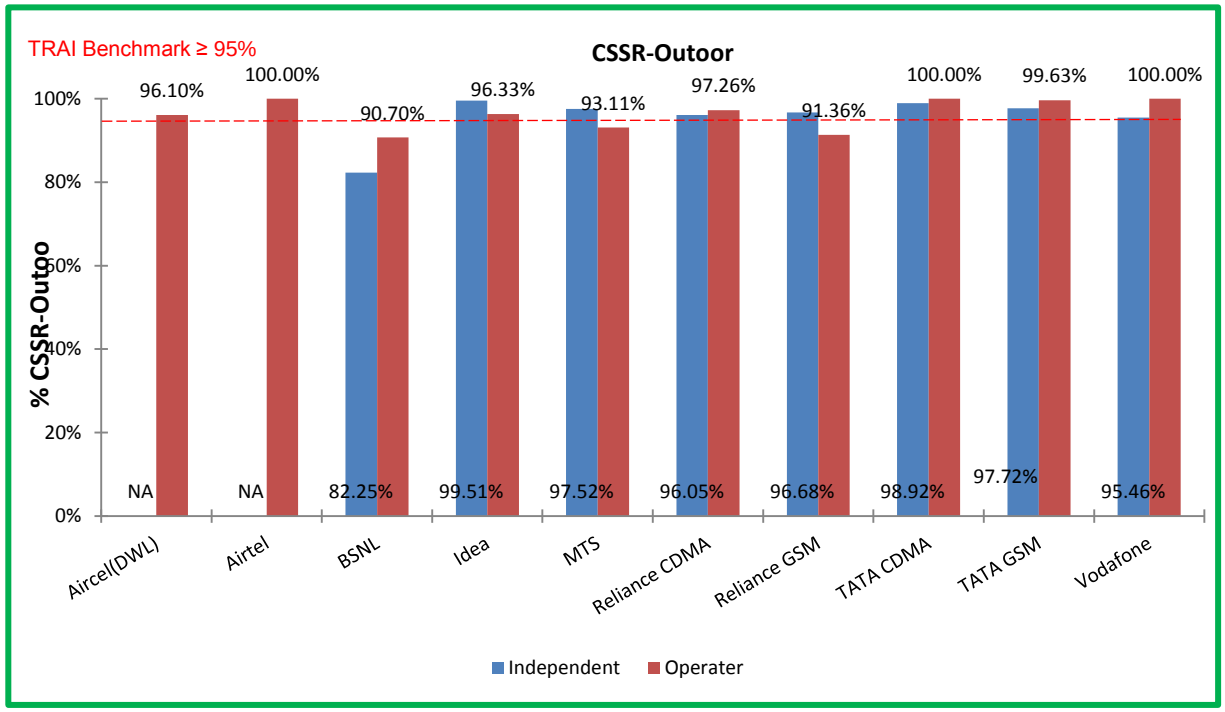
Indoor Locations



BSNL, Idea, Reliance GSM and Tata GSM missed the benchmark during independent drive test but were able to meet the benchmark during operator assisted drive test.

6.3.2.2 CALL SETUP SUCCESS RATE

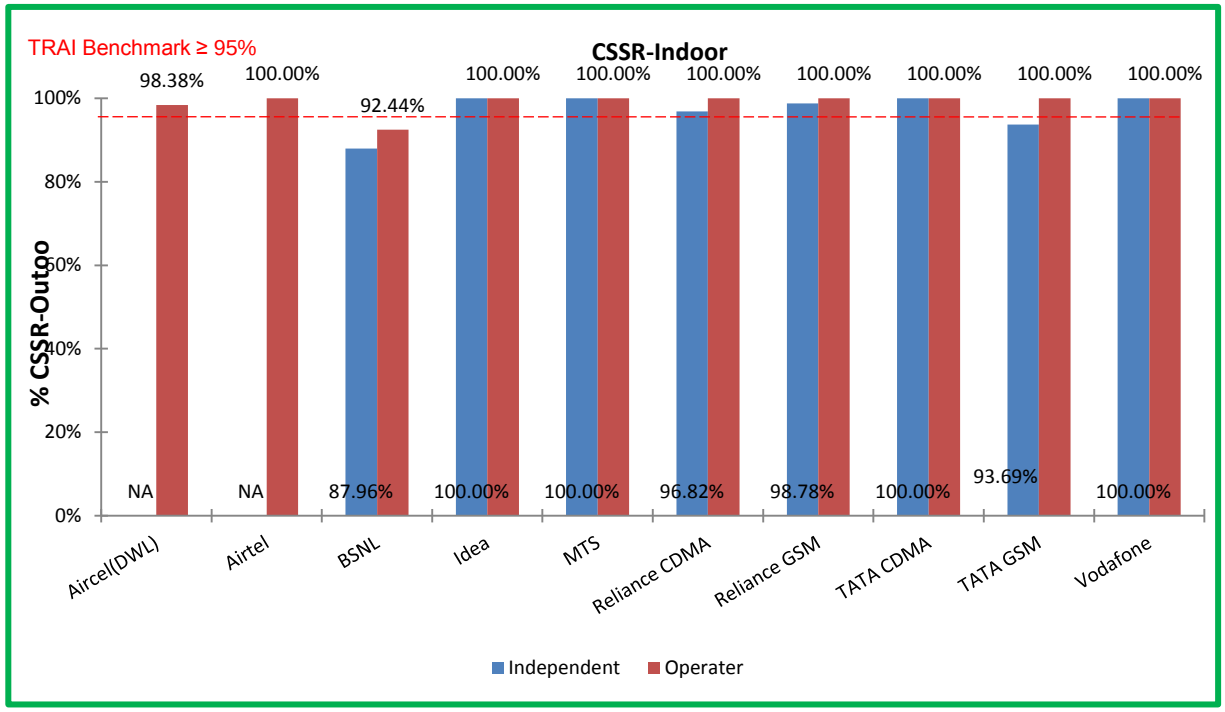
Outdoor Locations



In outdoor locations, BSNL failed to meet the benchmark in both the drive tests.

MTS and Reliance GSM missed the benchmark during operator assisted drive test but met the benchmark during independent drive test.

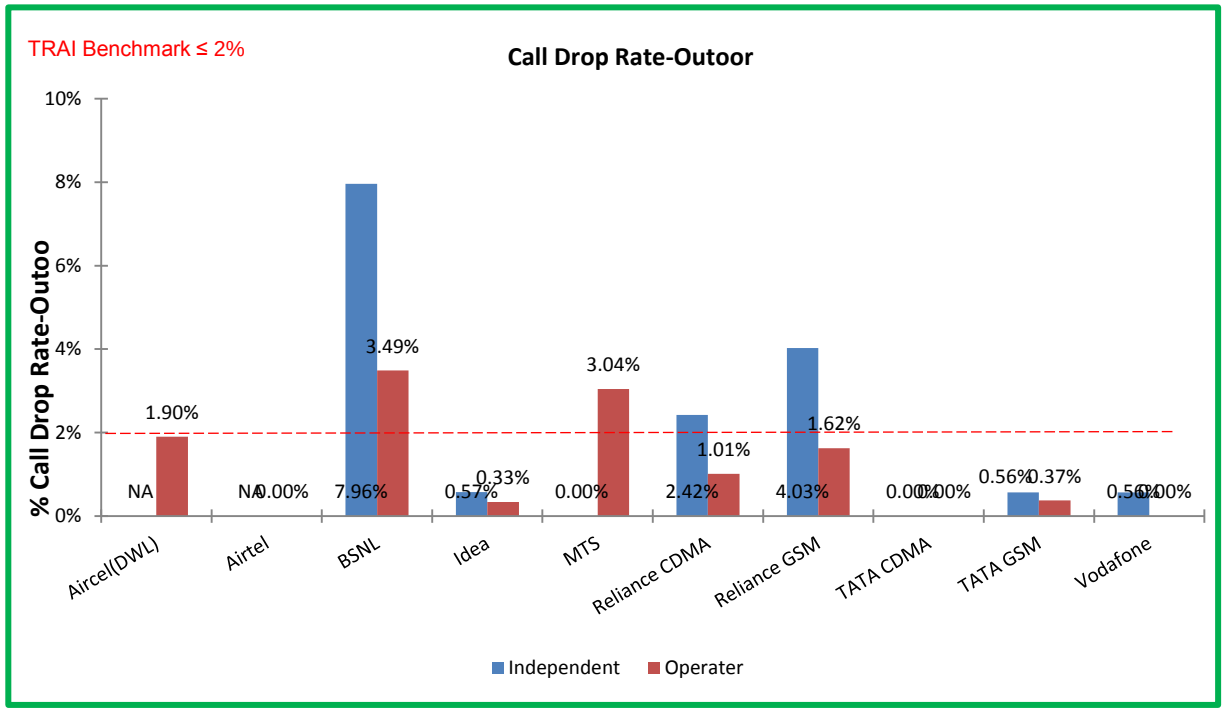
Indoor Locations



In indoor locations, BSNL failed to meet the benchmark during both the drive tests while Tata GSM missed the benchmark during independent drive test.

6.3.2.3 CALL DROP RATE

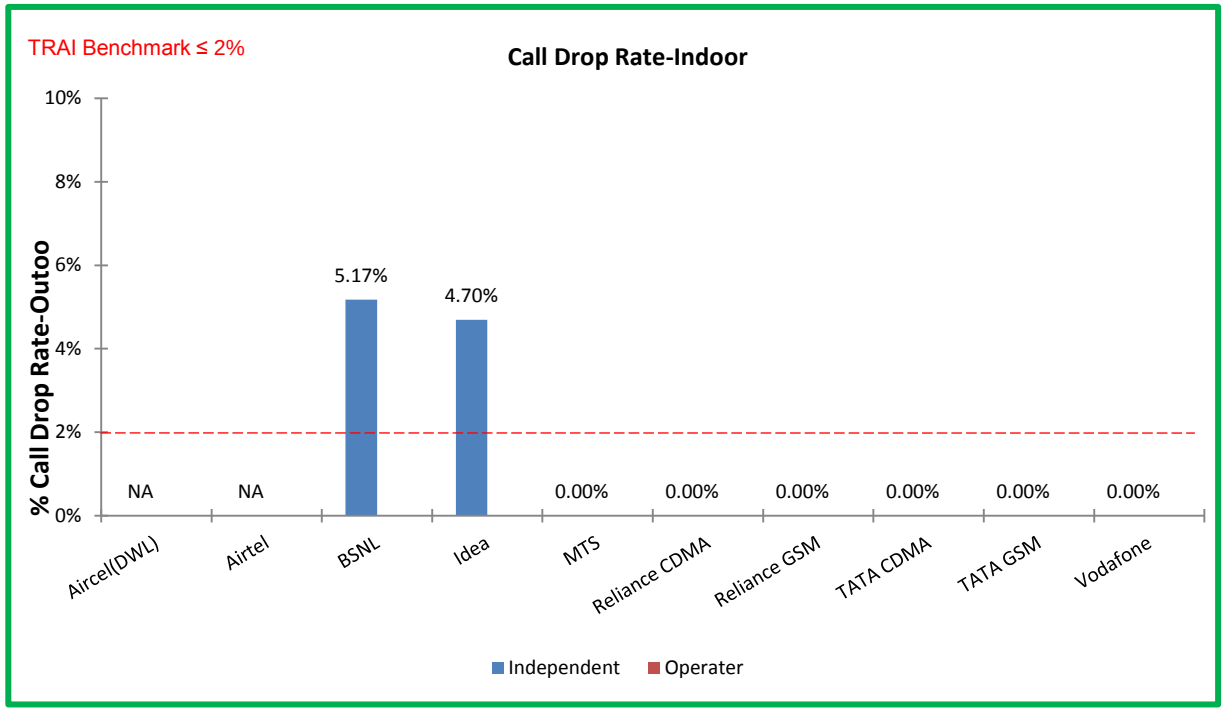
Outdoor Locations



In outdoor locations, BSNL failed to meet the benchmark in both the drive tests.

Reliance CDMA and Reliance GSM missed the benchmark during independent drive test but were able to meet the benchmark during operator assisted drive test. On the contrary, MTS missed the benchmark during operator assisted drive test but met the benchmark during independent drive test.

Indoor Locations



In indoor locations, BSNL failed to meet the benchmark during independent drive test but was able to meet the benchmark during operator assisted drive test.

7 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

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

Aircel did not meet the benchmark for Worst Affected BTS due to Downtime and Worst Affected Cells Having More than 3% TCH Drop.

Tata GSM and Tata GSM failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters)

BSNL did not meet the benchmark for BTS Accumulated Downtime, Worst Affected BTS due to Downtime, Call drop rate and Worst Affected Cells Having More than 3% TCH Drop.

Aircel did not meet the benchmark for BTS Accumulated Downtime, TCH Congestion and Worst Affected Cells Having More than 3% TCH Drop.

Tata GSM and Vodafone also failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

Live Calling

Airtel, BSNL, Idea, Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark for complaints resolved within 4 weeks.

None of the operators met the benchmark for Level 1 services. Tata GSM did not meet the benchmark for calls answered by operator (voice to voice) within stipulated time.

Billing and Customer Care

Airtel, Idea and Reliance CDMA did not meet the TRAI benchmark for postpaid billing disputes while Aircel, Idea, Reliance CDMA, Reliance GSM and Vodafone failed to meet the benchmark for prepaid charging complaints.

Calls answered by the operators (Voice to Voice) key concern for Tata GSM as it failed to meet the TRAI benchmark for this parameter.

NC: Auditors were not able to get billing and customer service data from BSNL as the operator did not have the required data available at its central billing and central customer service centers respectively. Hence it has been reported as non-compliance (NC) for the operator.

Drive Test (Operator Assisted)

BSNL failed to meet the benchmark for Voice Quality during all the drive tests in outdoor areas.

Drive Test (Independent)

During all the drive tests, it was observed that Voice Quality has remained below benchmark for most of the operators in all SSAs.

8 ANNEXURE

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		2452	5826	2418	3597	905	815	2554	26	533	6902
Sum of downtime of BTSs in a month (in hours)		31670	1060	140438	3394	1916	1810	4743	8	675	1994
BTSs accumulated downtime (not available for service)	≤ 2%	1.62%	0.02%	7.81%	0.13%	0.29%	0.30%	0.25%	0.04%	0.17%	0.04%
Number of BTSs having accumulated downtime >24 hours		223	2	820	24	0	7	18	0	4	16
Worst affected BTSs due to downtime	≤ 2%	8.44%	0.03%	33.90%	0.67%	0.00%	0.86%	0.70%	0.00%	0.81%	0.24%

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		2689	5806	2418	3591	903	815	2601	26	533	6834
Sum of downtime of BTSs in a month (in hours)		4440	115	12245	307	161	158	463	2	66	615
(not available for service)	≤ 2%	2.29%	0.03%	7.03%	0.12%	0.25%	0.27%	0.25%	0.12%	0.17%	0.13%
Number of BTSs having accumulated downtime >24 hours		50	0	65	2	0	0	0	0	0	3
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	1.87%	0.00%	2.67%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%

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%	97.45%	98.80%	98.57%	98.35%	99.35%	98.54%	98.69%	97.80%	98.17%	99.36%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.85%	0.21%	1.03%	0.09%	0.00%	0.00%	0.02%	0.00%	0.19%	0.15%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.92%	1.73%	0.86%	0.67%	0.34%	0.06%	0.15%	0.01%	0.82%	0.64%

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%	96.52%	98.89%	98.49%	99.50%	99.78%	98.54%	98.79%	98.10%	98.90%	99.65%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.59%	0.19%	0.97%	0.07%	0.00%	0.00%	0.95%	0.00%	0.09%	0.18%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	2.50%	1.44%	1.30%	0.20%	0.03%	0.07%	0.12%	0.01%	0.25%	0.35%

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		624	560	469	583	719	618	501	486	508	452
Total number of successful calls established		600	560	416	569	699	607	464	486	506	452
CSSR	≥ 95%	96.20%	100.00%	88.79%	97.72%	97.16%	98.77%	93.34%	100.00%	99.61%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		3.80%	0.00%	11.21%	2.29%	2.85%	1.23%	6.67%	0.00%	0.40%	0.00%

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		104863016	308970610	60675899	115442229	53853588	17788390	106351910	371437	14628966	466394221
Total number of calls dropped		1592313	3655886	1197637	507432	456596	57488	689394	2244	103164	4069849
Call drop rate	≤ 2%	1.48%	1.18%	1.93%	0.44%	0.85%	0.32%	0.65%	0.60%	0.71%	0.87%

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		7305	18606	7063	331953	3152	2447	7654	76	1600	20756
Total number of cells having more than 3% TCH		809	288	1059	6222	79	29	7	2	63	612
Worst affected cells having more than 3% TCH	≤ 3%	10.57%	1.55%	14.99%	1.87%	2.52%	1.19%	0.09%	3.09%	3.91%	2.95%

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		12050984	29812013	5570618	135036727	67063718	1974198	41021595	527510	18019895	486033151
Total number of calls dropped		203111	354215	117802	502524	408721	6150	214395	2489	115522	3616194
Call drop rate	≤ 2%	1.69%	1.19%	2.06%	0.37%	0.61%	0.31%	0.59%	0.47%	0.64%	0.75%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		8037	55604	7063	779280	3144	2448	7769	76	1599	20548
Total number of cells having more than 3% TCH		782	889	1137	544	82	40	12	2	66	676
Worst affected cells having more than 3% TCH	≤ 3%	9.72%	1.60%	16.09%	0.07%	2.61%	1.63%	0.15%	2.63%	4.10%	3.29%

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		601	560	400	569	699	607	469	486	506	452
Total number of calls dropped		13	0	14	1	9	4	11	0	1	0
Call drop rate	≤ 2%	2.25%	0.00%	3.44%	0.16%	1.18%	0.52%	2.81%	0.00%	0.19%	0.00%

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		19023468318	100671027522	6835	16758089058	53853588	NA	16712682472	41138165	2796195276	75404077758
Total number of calls with good voice quality		18205972297	96422123367	6495	16049364452	53778996	NA	16412333637	40324892	2733384856	71792020291
%age calls with good voice quality	≥ 95%	95.76%	95.78%	95.02%	95.77%	99.86%	99.67%	98.21%	98.02%	97.75%	95.21%

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		1981682371	9251262872	706	16762328829	67063718	NA	6339287442	22825536	3226751199	75042936279
Total number of calls with good voice quality		1883197490	8837223818	671	16175678597	66968446	NA	6214949292	22347242	3159182719	71990834334
%age calls with good voice quality	≥ 95%	95.04%	95.53%	95.04%	96.51%	99.86%	99.67%	98.21%	97.90%	97.90%	95.93%

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		959561	134918	679968	879493	51014	54112	148277	56024	439571	932512
Total number of calls with good voice quality		907338	129904	626884	823058	48116	51854	134102	54419	426666	898361
%age calls with good voice quality	≥ 95%	94.55%	96.07%	92.19%	93.87%	94.38%	95.92%	89.76%	97.14%	97.16%	96.49%

Note: Reliance CDMA has 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		49	37	78	110	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65665	134900	92439	102405	56316	7851	37316	13318	6038	323517
Traffic served for all POIs (B)- in erlangs		35900	79347	17855	59139	28076	3016	20212	3281	1436	178917
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		55	37	81	111	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		64730	402617	59106	103481	55923	7851	37316	13315	6038	318859
Traffic served for all POIs (B)- in erlangs		38984	236390	16813	60288	28611	2982	20385	3286	1495	184931
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

8.6 TOTAL CALLS MADE DURING DRIVE TEST – VOICE QUALITY

July										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	1050760	179282	695366	966386	49007	49007	228158	56543	68470	1183406
August										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	NA	87758	650063	NA	NA	25346	NA	NA	NA	849655
September										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	868362	137713	694475	792600	53021	87982	68395	55504	810671	764474

Note: - IMRB International, ensures minimum of 100 km is travelled on each day.

NA: Aircel, Idea, MTS, Reliance GSM, Reliance CDMA, Tata GSM and Tata CDMA do not have coverage in Andaman SSA. Hence these operators did not participate in the drive test conducted in the month of August 2014.

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Billing disputes - Postpaid											
Total bills generated during the period		994	164193	NC	7778	8110	29558	52934	NA	NA	795368
Total number of bills disputed		0	181	NC	15	2	35	46	NA	NA	380
Percentage bills disputed	≤ 0.1%	0.00%	0.11%	NC	0.19%	0.02%	0.12%	0.09%	NA	NA	0.05%
Billing disputes - Prepaid											
Number of complaints related to charging, credit & validity		22301	8275	NC	15549	200	2881	19225	0	19	19706
Total number of prepaid customers in that period		4354401	32614404	NC	10611122	1767426	2563578	18646605	107967	1044140	13868584
Percentage of complaints	≤ 0.1%	0.51%	0.03%	NC	0.15%	0.01%	0.11%	0.10%	0.00%	0.00%	0.14%

NC: Auditors were not able to get billing data from BSNL as the operator did not have the required data available at its central billing center. Hence it has been reported as non-compliance (NC) for the operator.

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

Resolution of billing complaints											
Total number of billing/charging complaints		22301	8456	NC	15564	202	2916	19271	0	19	20086
Number of complaints resolved in 4 weeks		22301	8456	NC	15564	202	2916	19271	0	19	20086
Percentage complaints resolved within 4 weeks	98.00%	100.00%	100.00%	NC	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	NC	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		8	887	NC	3447	103	1822	18431	0	0	11730
Percentage cases in which credit/waiver was received within 1 week	100.00%	100.00%	100.00%	NC	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made		100	100	66	100	100	100	100	No Complaints	14	100
Number of cases resolved in 4 weeks		100	97	23	98	100	98	97	No Complaints	12	100
Percentage cases resolved in four weeks	100.00%	100.00%	97.00%	34.85%	98.00%	100.00%	98.00%	97.00%	No Complaints	85.71%	100.00%

Tata CDMA did not report any billing/charging complaints. Hence, live calling activity to verify resolution of billing complaints was not conducted for the operator.

8.8 CUSTOMER CARE

Audit results for customer care (IVR and 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 call attempts to customer care for assistance		11995019	4529547	NC	16505918	2302027	1897219	13108615	14346	244245	24092738
Number of calls getting connected and answered (electronically)		11844852	4529511	NC	16344529	2211363	1883935	12975448	14264	236630	24092734
Percentage calls getting connected and answered	≥ 95%	98.75%	100.00%	NC	99.02%	96.06%	99.30%	98.98%	99.43%	96.88%	100.00%
Total number of call attempts to callecenter during TCBH		NA	4529547	NC	NA	215276	1897219	13108615	NA	NA	NA
No. of calls connected and answered successfully during TCBH		NA	4529511	NC	NA	208801	1883935	12975448	NA	NA	NA
Number of calls getting transferred to the operator (voice to voice)		3597326	NA	NC	NA	NA	NA	NA	10404	274702	NA
Number of calls answered by operator (voice to voice) within 60 seconds		3451208	NA	NC	NA	NA	NA	NA	9925	239641	NA
Percentage calls answered within 60 seconds (V2V)	≥ 90%	95.94%	NA	NC	NA	NA	NA	NA	95.40%	87.24%	NA
Number of calls getting transferred to the operator (voice to voice)		NA	9469841	NC	4763029	797556	999384	3076262	NA	NA	8390551
Number of calls answered by operator (voice to voice) within 90 seconds		NA	9403134	NC	4639185	770397	954652	2994507	NA	NA	8177550
Percentage calls answered within 90 seconds (V2V)	≥ 95%	NA	99.30%	NC	97.40%	96.59%	95.52%	97.34%	NA	NA	97.46%

Note: For Customer Care (voice to voice), there are two different benchmarks (old – within 60 seconds and new – within 90 seconds). In the above table, if data was audited as per old benchmark, NA is written in the column showing data as per new benchmark and vice versa.

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

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	100	100	100	100	100	100	91	84	100
Percentage calls getting connected and answered	≥ 90%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	91.00%	84.00%	100.00%

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		7	264	NC	309	66	104	324	NA	NA	6224
Number of requests attended within 7 days		7	264	NC	307	66	104	324	NA	NA	6224
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	NC	99.35%	100.00%	100.00%	100.00%	NA	NA	100.00%

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

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

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		2	212	NC	87	NA	104	324	NA	NA	2068
Total number of cases where refund was made within 60 days		2	212	NC	87	NA	104	324	NA	NA	2068
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	NC	100.00%	NA	100.00%	100.00%	NA	NA	100.00%

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

NA: Tata CDMA and GSM do not have postpaid service in the circle. Also, none of the MTS customers were 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	145390	284083	156000	112252	109200	56000	174000	5617	28905	356322
Total taffic handled in erlang during TCBH	97734	225409	72246	99118	45348	29607	81991	257	11693	340724
Total no. of customers served (as per VLR)	3235462.00	10667773.00	1398018.00	3657601.00	1174663.00	1025983	5969870.00	8105.00	515365.00	13610026.00

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	59	100	100	100	100	2	25	100
Number of cases resolved to satisfaction	100	98	44	100	100	95	95	2	13	100
Percentage cases resolved in four weeks	100.00%	98.00%	74.58%	100.00%	100.00%	95.00%	95.00%	100.00%	52.00%	100.00%

8.13 LEVEL 1 SERVICES CALLS MADE

Live calling for level 1 services											
Level 1 services	Benchmark	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 in 60 sec		50	80	51	80	90	44	39	90	80	80
% of calls connected in 60 seconds	≥ 95%	33.33%	53.33%	34.00%	53.33%	60.00%	29.33%	26.00%	60.00%	53.33%	53.33%

8.14 DETAILED LEVEL 1 SERVICES CALLS MADE

Aircel				Airtel				BSNL				Idea			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0	100	10	10	0	100	10	9	1	100	10	10	0
101	10	10	0	101	10	10	0	101	10	4	6	101	10	10	0
102	10	0	10	102	10	0	10	102	10	0	10	102	10	0	10
103	10	0	10	103	10	0	10	103	10	0	10	103	10	0	10
104	10	0	10	104	10	0	10	104	10	0	10	104	10	0	10
1056	10	0	10	1056	10	0	10	1056	10	0	10	1056	10	0	10
1070	10	0	10	1070	10	10	0	1070	10	9	1	1070	10	10	0
1071	10	10	0	1071	10	10	0	1071	10	0	10	1071	10	10	0
1072	10	0	10	1072	10	10	0	1072	10	0	10	1072	10	10	0
1073	10	10	0	1073	10	10	0	1073	10	10	0	1073	10	10	0
1076	10	0	10	1076	10	0	10	1076	10	0	10	1076	10	0	10
1091	10	10	0	1091	10	0	10	1091	10	10	0	1091	10	10	0
1095	10	0	10	1095	10	10	0	1095	10	0	10	1095	10	0	10
1096	10	0	10	1096	10	10	0	1096	10	0	10	1096	10	0	10
1098	10	0	10	1098	10	0	10	1098	10	9	1	1098	10	10	0
Reliance CDMA				Reliance GSM				TATA CDMA				TATA GSM			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	8	2	100	10	9	1	100	10	10	0	100	10	10	0
101	10	8	2	101	10	7	3	101	10	10	0	101	10	10	0
102	10	0	10	102	10	0	10	102	10	0	10	102	10	0	10
103	10	0	10	103	10	0	10	103	10	0	10	103	10	0	10
104	10	0	10	104	10	0	10	104	10	0	10	104	10	0	10
1056	10	0	10	1056	10	0	10	1056	10	10	0	1056	10	0	10
1070	10	0	10	1070	10	0	10	1070	10	10	0	1070	10	10	0
1071	10	2	8	1071	10	0	10	1071	10	10	0	1071	10	10	0
1072	10	0	10	1072	10	0	10	1072	10	0	10	1072	10	10	0
1073	10	8	2	1073	10	9	1	1073	10	10	0	1073	10	10	0
1076	10	0	10	1076	10	0	10	1076	10	10	0	1076	10	0	10
1091	10	10	0	1091	10	10	0	1091	10	10	0	1091	10	0	10
1095	10	0	10	1095	10	0	10	1095	10	0	10	1095	10	10	0
1096	10	0	10	1096	10	0	10	1096	10	0	10	1096	10	10	0
1098	10	8	2	1098	10	4	6	1098	10	10	0	1098	10	0	10

Idea			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	0	10
103	10	0	10
104	10	0	10
1056	10	0	10
1070	10	10	0
1071	10	10	0
1072	10	10	0
1073	10	10	0
1076	10	0	10
1091	10	10	0
1095	10	0	10
1096	10	0	10
1098	10	10	0

MTS			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	0	10
103	10	0	10
104	10	0	10
1056	10	0	10
1070	10	10	0
1071	10	10	0
1072	10	10	0
1073	10	10	0
1076	10	10	0
1091	10	10	0
1095	10	0	10
1096	10	0	10
1098	10	10	0

TATA GSM			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	0	10
103	10	0	10
104	10	0	10
1056	10	0	10
1070	10	10	0
1071	10	10	0
1072	10	10	0
1073	10	10	0
1076	10	0	10
1091	10	0	10
1095	10	10	0
1096	10	10	0
1098	10	0	10

Vodafone			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	0	10
103	10	0	10
104	10	0	10
1056	10	0	10
1070	10	10	0
1071	10	10	0
1072	10	10	0
1073	10	10	0
1076	10	0	10
1091	10	10	0
1095	10	0	10
1096	10	0	10
1098	10	10	0

8.15 COUNTER DETAILS

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

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

8.15.1 ERICSSON

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

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

Ericsson Counters

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

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

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 Reliance CDMA 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 MTS 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

9 ANNEXURE – JULY

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1969	5793	2418	3594	901	815	2648	26	533	6829
Sum of downtime of BTSs in a month (in hours)		6932	857	130966	3535	2045	1752	5432	8	13	2272
BTSs accumulated downtime (not	≤ 2%	0.47%	0.02%	7.28%	0.13%	0.31%	0.29%	0.28%	0.04%	0.00%	0.04%

available for service)										
Number of BTSs having accumulated downtime >24 hours		36	2	787	33	0	11	33	0	0	22
Worst affected BTSs due to downtime	≤ 2%	1.83%	0.03%	32.55%	0.92%	0.00%	1.35%	1.25%	0.00%	0.00%	0.32%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2689	5754	2418	3580	902	815	2649	26	533	6755
Sum of downtime of BTSs in a month (in hours)		4623	125	13843	502	203	148	815	0	11	84
BTSs accumulate	≤ 2%	2.39%	0.03%	7.95%	0.19%	0.31%	0.25%	0.43%	0.00%	0.03%	0.02%

d downtime (not available for service)											
Number of BTSs having accumulated downtime >24 hours		50	0	106	5	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	1.86%	0.00%	4.38%	0.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.57%	98.73%	98.93%	97.61%	99.43%	98.48%	98.70%	98.99%	98.25%	99.30%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel	≤ 1%	0.79%	0.22%	0.40%	0.08%	0.00%	0.00%	0.02%	0.00%	0.08%	0.16%

congestion											

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.11%	1.98%	0.74%	1.04%	0.34%	0.08%	0.15%	0.00%	0.77%	0.70%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	96.97%	98.92%	98.93%	99.43%	99.75%	97.82%	99.14%	97.85%	98.97%	99.74%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.76%	0.18%	0.33%	0.05%	0.00%	0.00%	0.22%	0.00%	0.02%	0.21%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	3.03%	1.37%	0.82%	0.33%	0.04%	0.18%	0.07%	0.01%	0.17%	0.26%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of		687	742	449	659	943	943	655	491	542	588

call attempts											
Total number of successful calls established		663	742	409	638	916	916	596	491	540	588
CSSR	≥ 95%	96.51%	100.00%	91.09%	96.81%	97.14%	97.14%	90.99%	100.00%	99.63%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		3.49%	0.00%	8.91%	3.19%	2.86%	2.86%	9.01%	0.00%	0.37%	0.00%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		86150153	325180140	59878917	111173367	56731161	18018160	111913389	420308	15440295	483637515
Total number of calls		976647	3779302	1314468	485483	480072	58664	729186	2498	111544	4194661

dropped											
Call drop rate	≤ 2%	1.13%	1.16%	2.20%	0.44%	0.85%	0.33%	0.65%	0.59%	0.72%	0.87%

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		5871	18504	7063	334606	3134	2448	7936	76	1602	20534
Total number of cells having more than 3% TCH		317	279	943	5930	75	26	7	2	74	603
Worst affected cells having more than 3% TCH	≤ 3%	5.40%	1.51%	13.35%	1.77%	2.39%	1.06%	0.09%	2.29%	4.62%	2.94%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls		12926088	31330175	4423375	128408402	67852365	2097654	105911997	559329	17897677	492790132

established											
Total number of calls dropped		219489	354630	96034	449399	403967	6779	534731	2555	118436	3470197
Call drop rate	≤ 2%	1.70%	1.13%	2.17%	0.35%	0.60%	0.32%	0.50%	0.46%	0.66%	0.70%

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		8024	55142	7063	776880	3137	2448	7942	76	1602	20312
Total number of cells having more than 3% TCH		239	843	1015	496	78	49	19	2	76	668
Worst affected cells having more than 3% TCH	≤ 3%	2.98%	1.53%	14.37%	0.06%	2.49%	2.00%	0.24%	3.07%	4.74%	3.29%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance	Reliance	TATA	TATA GSM	Vodafone

rate							CDMA	GSM	CDMA		
Total number of calls established		664	742	409	638	916	916	626	491	540	588
Total number of calls dropped		10	0	11	2	12	12	9	0	2	0
Call drop rate	≤ 2%	1.51%	0.00%	2.69%	0.31%	1.31%	1.31%	1.44%	0.00%	0.37%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		17458323960	99760312178	6723	16430324885	56731161	NA	17732952927	45419330	2944646520	77571235501
Total number of calls with good voice quality		16971653013	95400438586	6388	15771525993	56650788	NA	17405786418	44537340	2879168629	73859570780
%age calls	≥ 95%	97.21%	95.63%	95.02%	95.99%	99.86%	99.66%	98.16%	98.06%	97.78%	95.22%

with good voice quality											

Live measurement results for Voice quality-3 Day data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		2066448867	9253342479	712	15932726748	67852365	NA	16562722998	25345720	3276524228	75462676505
Total number of calls with good voice quality		1964994666	8827392706	677	15424006345	67779011	NA	16230633551	24829400	3208034299	72635438533
%age calls with good voice quality	≥ 95%	95.09%	95.40%	95.08%	96.81%	99.89%	99.66%	97.99%	97.96%	97.91%	96.25%

Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1050760	179282	695366	966386	49007	49007	228158	56543	68470	1183406

Total number of calls with good voice quality		994144	173355	662781	879547	46943	46943	207689	54717	66600	1126782
%age calls with good voice quality	≥ 95%	94.61%	96.69%	95.31%	91.01%	95.79%	95.79%	91.03%	96.77%	97.27%	95.22%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	37	81	111	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		54644	134221	92440	102784	55910	7851	37316	13325	6038	316840

Traffic served for all POIs (B)- in erlangs		30958	82298	18840	57864	29643	3052	21698	3400	1653	182337
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		54	37	81	111	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		62478	401276	82440	102675	55817	7851	37316	13319	6038	316394
Traffic served for all POIs (B)- in erlangs		40214	249567	14770	57216	30238	3171	22096	3444	1696	187598
POI	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

congestion											

10 ANNEXURE – AUGUST

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2690	5828	2418	3598	905	814	2507	26	533	6862
Sum of		39816	1394	155472	3418	1972	1811	4526	15	1329	1656

downtime of BTSs in a month (in hours)											
BTSs accumulated downtime (not available for service)	≤ 2%	1.99%	0.03%	8.64%	0.13%	0.29%	0.30%	0.24%	0.08%	0.34%	0.03%
Number of BTSs having accumulated downtime >24 hours		250	1	819	23	0	5	11	0	8	10
Worst affected BTSs due to downtime	≤ 2%	9.29%	0.02%	33.87%	0.64%	0.00%	0.61%	0.44%	0.00%	1.50%	0.15%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed		2689	5805	2418	3594	901	815	2649	26	533	6884

service area											
Sum of downtime of BTSs in a month (in hours)		4650	152	15514	256	162	109	311	7	174	104
BTSs accumulated downtime (not available for service)	≤ 2%	2.40%	0.04%	8.91%	0.10%	0.25%	0.18%	0.16%	0.36%	0.45%	0.02%
Number of BTSs having accumulated downtime >24 hours		51	0	59	1	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	1.90%	0.00%	2.44%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.32%	98.77%	98.97%	98.34%	99.08%	98.59%	98.69%	96.89%	98.09%	99.43%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.93%	0.22%	0.41%	0.13%	0.00%	0.00%	0.02%	0.00%	0.22%	0.16%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	2.77%	1.79%	0.64%	0.57%	0.52%	0.05%	0.16%	0.01%	0.89%	0.57%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	95.19%	98.84%	98.92%	99.56%	99.80%	98.93%	98.65%	98.16%	98.78%	99.77%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.50%	0.21%	0.50%	0.11%	0.00%	0.00%	2.60%	0.00%	0.23%	0.17%

TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance	Reliance	TATA	TATA GSM	Vodafone

congestion							CDMA	GSM	CDMA		
TCH congestion	≤ 2%	2.56%	1.67%	0.70%	0.18%	0.03%	0.02%	0.17%	0.01%	0.31%	0.23%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		NA	367	495	NA	NA	400	NA	NA	NA	300
Total number of successful calls established		NA	367	424	NA	NA	399	NA	NA	NA	300
CSSR	≥ 95%	NA	100.00%	85.66%	NA	NA	99.75%	NA	NA	NA	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		NA	0.00%	14.34%	NA	NA	0.25%	NA	NA	NA	0.00%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		115933919	316761811	69602033	111622558	54276866	18274873	107536297	372947	14803865	463336375
Total number of calls dropped		1939716	3688883	1574585	507329	455392	58553	703044	2288	102985	3937463
Call drop rate	≤ 2%	1.67%	1.16%	2.26%	0.45%	0.84%	0.32%	0.65%	0.61%	0.70%	0.85%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		8039	18612	7063	335872	3152	2445	7514	76	1599	20633
Total number of cells having more than 3% TCH		842	294	1089	6653	80	28	7	3	57	608
Worst affected	≤ 3%	10.47%	1.58%	15.42%	1.98%	2.54%	1.15%	0.09%	3.36%	3.57%	2.95%

cells having more than 3% TCH											

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		11068406	29252223	7367951	133839946	67492513	1960274	7966434	534135	17746575	501972947
Total number of calls dropped		186915	333651	181860	534430	405745	5902	51218	2545	112613	3440923
Call drop rate	≤ 2%	1.69%	1.14%	2.47%	0.40%	0.60%	0.30%	0.64%	0.48%	0.63%	0.69%

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		8033	55623	7063	780048	3139	2448	7855	76	1598	20699
Total number of cells having		795	830	1107	555	76	44	9	2	63	752

more than 3% TCH											
Worst affected cells having more than 3% TCH	≤ 3%	9.90%	1.49%	15.67%	0.07%	2.42%	1.80%	0.11%	2.63%	3.94%	3.63%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		NA	367	378	NA	NA	399	NA	NA	NA	300
Total number of calls dropped		NA	0	17	NA	NA	1	NA	NA	NA	0
Call drop rate	≤ 2%	NA	0.00%	4.50%	NA	NA	0.25%	NA	NA	NA	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

Total number of sample calls		19956337967	105272042305	6856	16962777996	54276866	NA	17022470080	40543436	2820286925	74534988941
Total number of calls with good voice quality		18983149248	100990236215	6514	16257213143	54209374	NA	16717559398	39735021	2757550180	71028227238
%age calls with good voice quality	≥ 95%	95.12%	95.93%	95.01%	95.84%	99.88%	99.67%	98.21%	98.01%	97.78%	95.30%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1825283749	9109279247	702	16620355576	67492513	NA	1166534995	22755235	3174265477	75131143391
Total number of calls with good voice quality		1737510017	8716523175	667	16044433965	67434280	NA	1145795351	22271455	3107748908	72308837230
%age calls with good	≥ 95%	95.19%	95.69%	95.01%	96.53%	99.91%	99.67%	98.22%	97.87%	97.90%	96.24%

voice quality											

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		NA	87758	650063	NA	NA	25346	NA	NA	NA	849655
Total number of calls with good voice quality		NA	83274	599762	NA	NA	24395	NA	NA	NA	831818
%age calls with good voice quality	≥ 95%	NA	94.89%	92.26%	NA	NA	96.25%	NA	NA	NA	97.90%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of		56	37	76	111	36	21	46	60	19	44

working POIs											
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		68690	134411	92439	103294	55978	7851	37316	13312	6038	323007
Traffic served for all POIs (B)- in erlangs		38941	80519	17406	59145	28274	3060	20209	3312	1138	187809
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		54	37	81	111	36	21	46	60	20	44
No. of POIs not meeting		0	0	0	0	0	0	0	0	0	0

benchmark											
Total Capacity of all POIs (A) - in erlangs		66981	402285	2440	103282	55998	7851	37316	13312	6038	317176
Traffic served for all POIs (B)- in erlangs		38434	234097	18769	60861	28579	2619	20449	3309	1259	179385
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE - SEPTEMBER

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2697	5858	2418	3598	908	816	2506	26	533	7015
Sum of downtime of BTSs in a month (in hours)		48263	930	134876	3229	1732	1866	4270	1	683	2053
BTSs accumulated downtime (not available for service)	≤ 2%	2.41%	0.02%	7.50%	0.12%	0.26%	0.31%	0.23%	0.01%	0.17%	0.04%
Number of BTSs having accumulated downtime >24 hours		383	2	853	16	0	5	10	0	5	17
Worst	≤ 2%	14.20%	0.03%	35.28%	0.44%	0.00%	0.61%	0.40%	0.00%	0.94%	0.24%

affected BTSs due to downtime											

Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2690	5860	2418	3598	906	815	2506	26	533	6862
Sum of downtime of BTSs in a month (in hours)		4047	69	7377	164	117	218	262	0	12	1656
BTSs accumulated downtime (not available for service)	≤ 2%	2.09%	0.02%	4.24%	0.06%	0.18%	0.37%	0.15%	0.00%	0.03%	0.34%
Number of BTSs having accumulated		50	0	29	1	0	0	0	0	0	10

downtime >24 hours											
Worst affected BTSs due to downtime	≤ 2%	1.86%	0.00%	1.20%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.15%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.46%	98.89%	97.82%	99.11%	99.53%	98.54%	98.67%	97.53%	98.16%	99.36%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.83%	0.20%	2.28%	0.07%	0.00%	0.00%	0.02%	0.00%	0.27%	0.14%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.88%	1.42%	1.20%	0.41%	0.17%	0.04%	0.13%	0.01%	0.81%	0.64%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.40%	98.91%	97.63%	99.52%	99.80%	98.86%	98.58%	98.29%	98.94%	99.43%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.52%	0.18%	2.08%	0.04%	0.00%	0.00%	0.02%	0.00%	0.03%	0.16%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.92%	1.29%	2.37%	0.10%	0.01%	0.02%	0.12%	0.01%	0.26%	0.57%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		560	571	462	507	495	510	347	481	474	467
Total number of successful calls established		537	571	414	500	481	507	332	481	472	467
CSSR	≥ 95%	95.89%	100.00%	89.61%	98.62%	97.17%	99.41%	95.68%	100.00%	99.58%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		4.11%	0.00%	10.39%	1.38%	2.83%	0.59%	4.32%	0.00%	0.42%	0.00%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		112504975	284969878	52546748	123530762	50552738	17072136	99606045	321055	13642738	452208773
Total number of calls dropped		1860576	3499473	703858	529483	434325	55247	635951	1945	94963	4077422
Call drop rate	≤ 2%	1.65%	1.23%	1.34%	0.43%	0.86%	0.32%	0.64%	0.61%	0.70%	0.90%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total		8005	18702	7063	325380	3169	2448	7511	76	1599	21100

number of cells in the network											
Total number of cells having more than 3% TCH		1269	290	1144	6084	83	33	7	3	56	625
Worst affected cells having more than 3% TCH	≤ 3%	15.85%	1.55%	16.20%	1.87%	2.62%	1.35%	0.09%	3.63%	3.53%	2.96%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		12158458	28853640	4920529	142861834	65846277	1864666	9186354	489065	18415432	463336375
Total number of calls dropped		202929	374363	75513	523742	416451	5770	57236	2368	115516	3937463
Call drop rate	≤ 2%	1.67%	1.30%	1.53%	0.37%	0.63%	0.31%	0.62%	0.48%	0.63%	0.85%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		8053	56047	7063	780912	3155	2448	7510	76	1597	20633
Total number of cells having more than 3% TCH		1312	993	1288	580	92	27	8	2	58	608
Worst affected cells having more than 3% TCH	≤ 3%	16.29%	1.77%	18.24%	0.07%	2.92%	1.10%	0.11%	2.19%	3.63%	2.95%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		537	571	414	500	481	507	312	481	472	467
Total number of calls		16	0	13	0	5	0	13	0	0	0

dropped											
Call drop rate	≤ 2%	2.98%	0.00%	3.14%	0.00%	1.04%	0.00%	4.17%	0.00%	0.00%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		19655743028	96980728084	6927	16881164293	50552738	NA	15382624409	37451728	2623652383	74106008833
Total number of calls with good voice quality		18663114629	92875695301	6583	16119354219	50476827	NA	15113655094	36702314	2563435760	70488262855
%age calls with good voice quality	≥ 95%	94.95%	95.77%	95.03%	95.49%	99.85%	99.67%	98.25%	98.00%	97.70%	95.12%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

Total number of sample calls		2053314498	9391166889	703	17733904162	65846277	NA	1288604332	20375654	3229463892	74534988941
Total number of calls with good voice quality		1947087787	8967755574	668	17058595480	65692046	NA	1268418973	19940872	3161764950	71028227238
%age calls with good voice quality	≥ 95%	94.83%	95.49%	95.02%	96.19%	99.77%	99.67%	98.43%	97.87%	97.90%	95.30%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		868362	137713	694475	792600	53021	87982	68395	55504	810671	764474
Total number of calls with good voice quality		820532	133082	618108	766569	49288	84225	60514	54121	786732	736482
%age calls with good	≥ 95%	94.49%	96.64%	89.00%	96.72%	92.96%	95.73%	88.48%	97.51%	97.05%	96.34%

voice quality											

5. POI Congestion

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	76	108	36	21	46	60	19	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		73660	136067	92439	101138	57059	7851	37316	13318	6038	330705
Traffic served for all POIs (B)- in erlangs		37802	75225	17320	60407	26310	2936	18730	3131	1518	166604
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		57	37	81	111	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74382..91	404291	92438	104485	55954	7851	37316	13312	6038	323007
Traffic served for all POIs (B)- in erlangs		38303	225507	16900	62788	27017	3155	18610	3105	1531	187809
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

12 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JAS'14 – Refers to the quarter of July, August and September 2014
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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