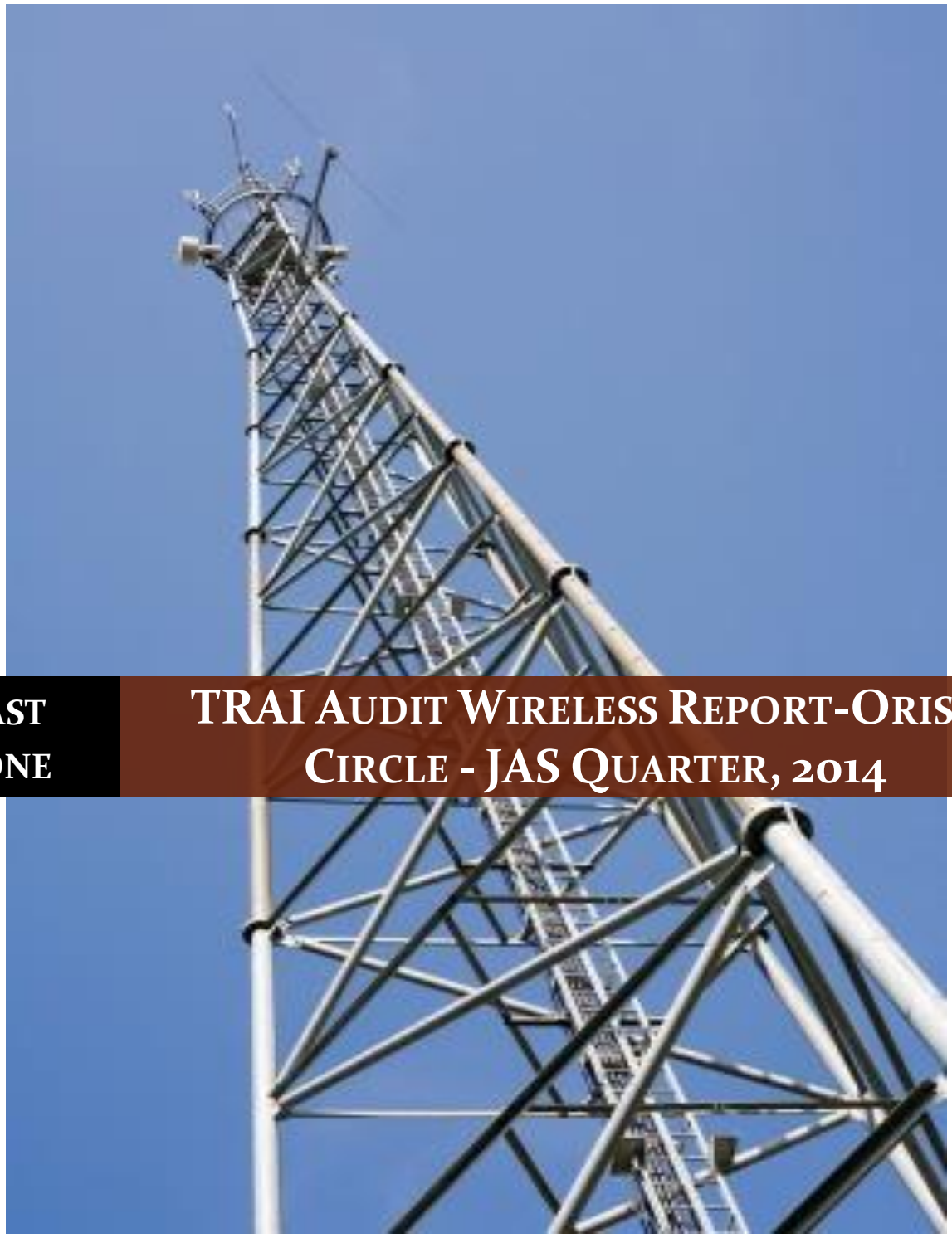

EAST ZONE

TRAI AUDIT WIRELESS REPORT-ORISSA CIRCLE - JAS QUARTER, 2014

Prepared By -

IMRB International | eTech

Prepared For-

TRAI

सत्यमेव जयते

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

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

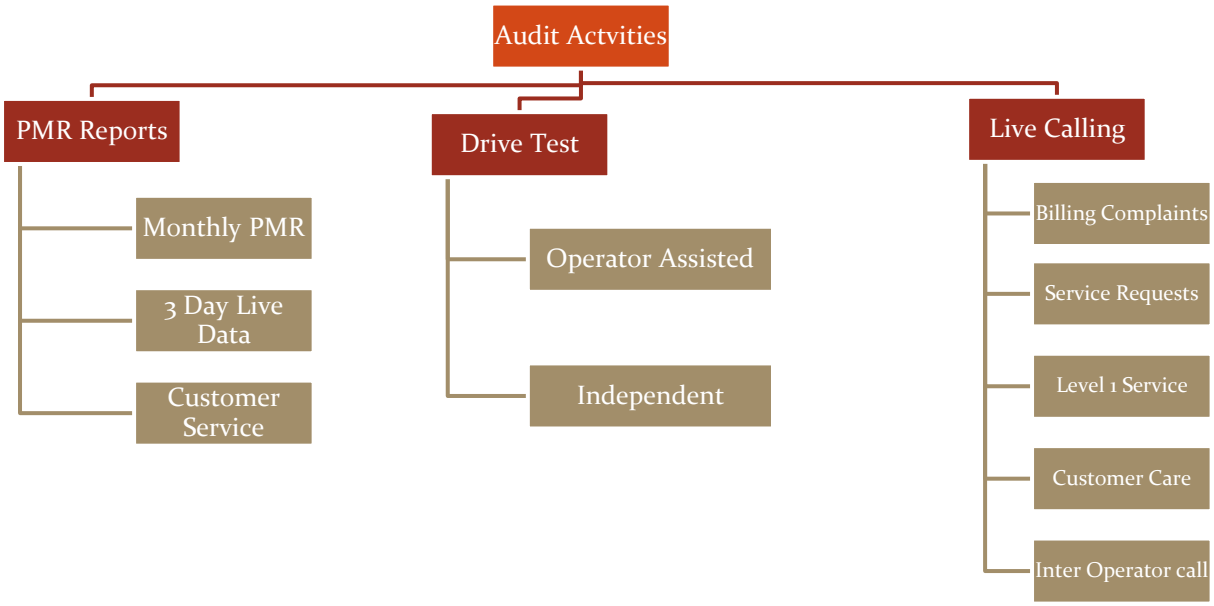
- Airtel
- BSNL
- Reliance CDMA
- Reliance GSM
- Tata CDMA
- Tata GSM
- Vodafone

2.4 COVERAGE

The audit was conducted in Orissa 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

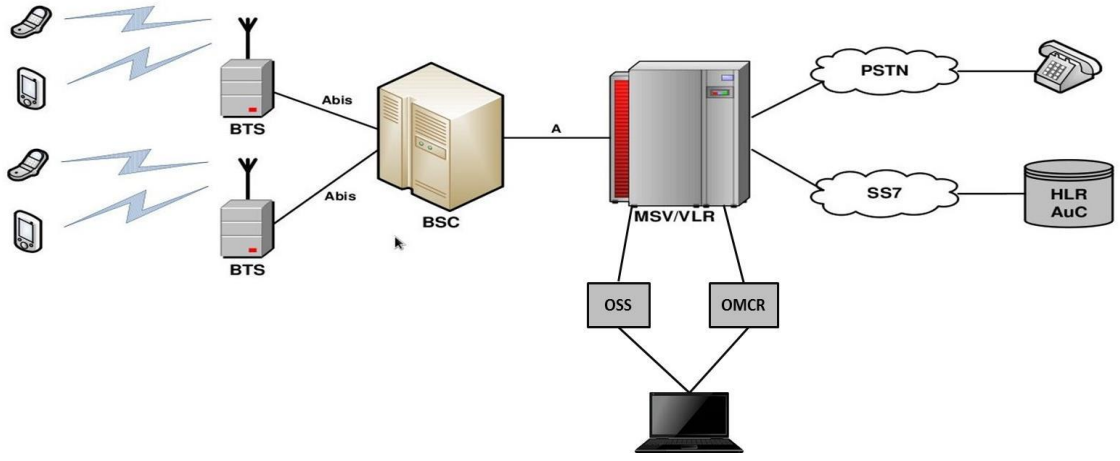
Let us now look at the various parameters involved in the audit reports.

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%

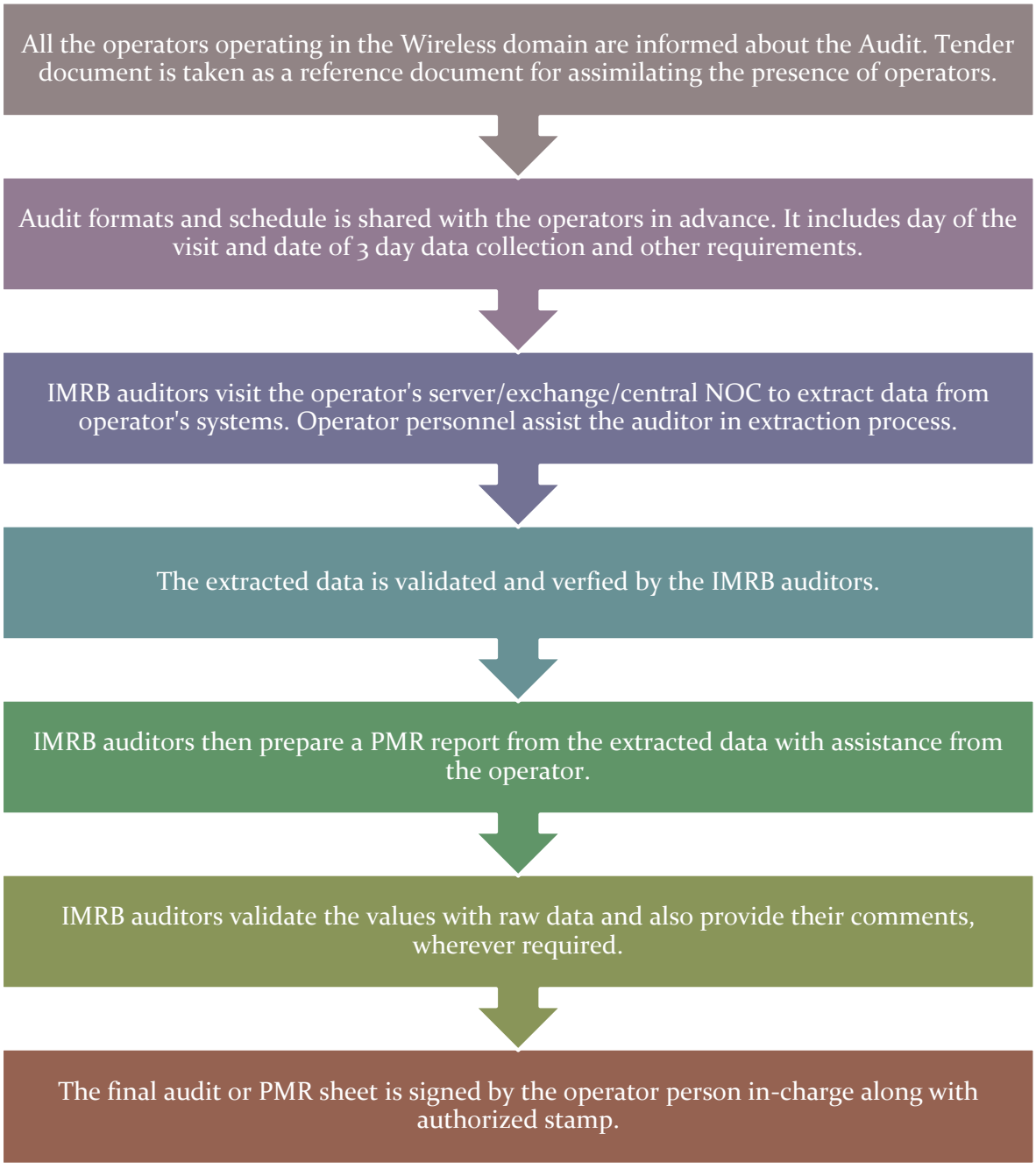
2.5.1.4 POINT OF DATA EXTRACTION

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
20:00 - 21:00	20:00 - 21:00	19:00 - 20:00	20:00 - 21:00	19:00 - 20:00	20:00 - 21:00	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.

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

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

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

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

Live calling activity was carried out during the period of 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
Operator 1	Aircel(DWL)	2302056
Operator 2	Airtel	7947383
Operator 3	BSNL	4021874
Operator 4	Idea	1112753
Operator 5	Reliance CDMA	264965
Operator 6	Reliance GSM	3247702
Operator 7	TATA CDMA	136008
Operator 8	TATA GSM	1329478
Operator 9	Vodafone	3056341

Sep'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 Orissa 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)	1.14%	1.92%	99.07%	0.39%	0.66%	1.47%	2.94%	95.05%
Airtel	0.18%	0.61%	97.67%	0.28%	1.61%	1.19%	1.97%	96.12%
BSNL	0.26%	0.83%	98.86%	0.48%	1.57%	1.48%	1.71%	96.89%
Idea	0.30%	0.97%	99.22%	0.38%	0.06%	0.47%	1.32%	95.91%
Reliance CDMA	0.27%	0.63%	99.40%	0.00%	0.00%	0.38%	2.72%	99.78%
Reliance GSM	0.10%	0.32%	97.60%	0.22%	0.75%	0.54%	0.26%	98.12%
TATA CDMA	0.08%	0.00%	98.53%	0.00%	0.08%	0.85%	4.19%	98.25%
TATA GSM	0.03%	0.07%	98.03%	0.07%	0.39%	2.09%	2.19%	97.58%
Vodafone	0.15%	0.63%	99.59%	0.20%	0.41%	0.77%	2.59%	98.14%

It can be seen that most of the operators have met the TRAI benchmark for the different criteria, some performing exceedingly well than the others. Following are the parameter wise observations for Wireless Operators for Orissa circle:

BTSs Accumulated Downtime

All the operators have met the TRAI specified criteria for the outage due to downtime of the base transceiver stations (BTS). TATA GSM performed the best with 0.03% BTS downtime reported.

Worst Affected BTSs Due to Downtime

All the operators met the TRAI benchmark for the parameter. 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 99.59% 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:

In terms of network congestion parameters, all the operators had a congestion ratio within the TRAI specified limits. For the SDCCH/Paging channel congestion, the best performance was recorded for Reliance CDMA and Tata CDMA with 0.00% congestion. For TCH congestion, Reliance CDMA was the best performer by recording 0.00% TCH congestion.

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

Call Drop Rate

Tata GSM failed to meet the benchmark for call drop rate while Reliance CDMA was the best performer with 0.38% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Tata CDMA failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.26% worst affected cells having more than 3% TCH drop.

Voice Quality

All the operators ensured an appropriate amount of voice quality, above the benchmark. Reliance CDMA reported the best performance at 99.78%.

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

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	1.02%	0.28%	99.06%	0.43%	0.67%	1.44%	2.92%	95.10%
Airtel	0.20%	0.02%	98.75%	0.23%	1.38%	1.24%	2.33%	96.13%
BSNL	0.36%	0.19%	98.90%	0.41%	1.51%	1.49%	1.37%	96.98%
Idea	0.24%	0.00%	99.27%	0.38%	0.06%	0.49%	1.30%	95.86%
Reliance CDMA	0.26%	0.00%	99.19%	0.00%	0.17%	0.30%	2.62%	99.79%
Reliance GSM	0.08%	0.00%	98.59%	0.25%	0.48%	0.50%	0.24%	98.30%
TATA CDMA	0.09%	0.00%	98.68%	0.00%	0.07%	0.55%	3.65%	98.26%
TATA GSM	0.05%	0.00%	98.03%	0.04%	0.41%	0.43%	2.19%	97.75%
Vodafone	0.16%	0.04%	99.70%	0.22%	0.30%	0.73%	2.61%	98.14%

Following is a parameter wise review of the performance of the operators:

BTSs Accumulated Downtime

All operators met the benchmark for BTS Accumulated downtime during live measurements. Tata GSM was the top performer by reporting 0.05% downtime.

Worst Affected BTSs Due to Downtime

All operators met the benchmark. Idea, Reliance CDMA, Reliance GSM, Tata CDMA and Tata GSM reported 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR)

All operators met the benchmark for CSSR. Vodafone has the best CSSR at 99.7%.

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

In terms of network congestion parameters, all the operators had a congestion ratio within the TRAI specified limits.

For the SDCCH/Paging channel congestion, the best performance was recorded for Reliance CDMA and Tata CDMA with 0.00% congestion. For the TCH congestions, Idea was the best performer with 0.06% 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 TRAI benchmark. Reliance CDMA was the best performer with 0.3% call drop rate for the live measurement period.

Worst Affected Cells Having More than 3% TCH Drop

Tata CDMA failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.24% worst affected cells having more than 3% TCH drop.

Voice Quality

All operators met the TRAI benchmark for voice quality. Reliance CDMA was the best performer with 99.79%.

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	%age complaints resolved within 6weeks	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	98%	100%		≥ 95%	≥ 95%	≥ 90%
Aircel(DWL)	100.00%	100.00%	99.00%	40.00%	100.00%	100.00%
Airtel	99.00%	100.00%	99.00%	66.67%	100.00%	100.00%
BSNL	99.00%	100.00%	98.00%	80.00%	100.00%	100.00%
Idea	99.00%	100.00%	98.00%	60.00%	100.00%	100.00%
Reliance CDMA	96.67%	100.00%	100.00%	40.00%	100.00%	100.00%
Reliance GSM	98.00%	100.00%	99.00%	40.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	86.67%	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	86.67%	100.00%	100.00%
Vodafone	100.00%	100.00%	99.00%	73.33%	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.

Complaints Resolved within 4 weeks

Reliance CDMA failed to meet the TRAI benchmark of resolution of billing complaints within 4 weeks. Aircel, Tata CDMA, Tata GSM and Vodafone were top performers with 100% complaints getting resolved within 4 weeks.

Complaint/Request Attended to Satisfaction

All the operators performed satisfactorily in terms of satisfaction of the customers for service requests. Reliance CDMA, TATA CDMA and TATA GSM showed complete satisfaction for the customers with regards to their requests being attended.

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 meet 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

It was seen that the all operators exceeded the TRAI benchmark of 90% of calls answered by the centres 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%	0.04%	100.00%	100.00%	100.00%	57.44%	93.53%	NA
Airtel	0.09%	0.02%	100.00%	100.00%	100.00%	100.00%	NA	98.27%
BSNL	0.00%	0.09%	99.66%	100.00%	100.00%	96.63%	NA	96.23%
Idea	0.00%	0.10%	100.00%	100.00%	100.00%	99.16%	97.70%	NA
Reliance CDMA	0.13%	0.04%	100.00%	100.00%	100.00%	98.95%	NA	90.14%
Reliance GSM	0.12%	0.10%	100.00%	100.00%	100.00%	98.89%	NA	93.68%
TATA CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	98.12%	NA	95.36%
TATA GSM	0.00%	0.02%	100.00%	100.00%	100.00%	96.08%	NA	86.37%
Vodafone	0.06%	0.09%	100.00%	100.00%	100.00%	99.98%	NA	98.72%

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.

Billing Disputes – Postpaid Subscribers

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

Billing/Charging Disputes – Prepaid Subscribers

For the billing/charging disputes of the prepaid subscribers, Reliance GSM did not the benchmark. Tata CDMA reported 0.00% billing complaints.

Resolution of Billing Complaints

It was seen that that all the operators met the TRAI criteria of resolving the billing complaints.

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

It was seen that 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

Aircel, which recorded very low performance when compared to other operators, failed to meet the benchmark for calls answered by IVR. Airtel performed the best by connecting 100% IVR calls within 60 seconds.

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

Aircel and Idea provided the data as per old benchmark while all other operators provided the data as per new benchmark.

Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark while Vodafone was the best performer with 98.72% 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	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%
Airtel	99.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%
BSNL	99.00%	100.00%	NA	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%
Reliance CDMA	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%	NA	100.00%	99.00%	99.00%
TATA CDMA	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%	NA	100.00%
Vodafone	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.

None of the operators faced any problem in connecting to other operators as per live calling done for inter-operator call assessment.

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.

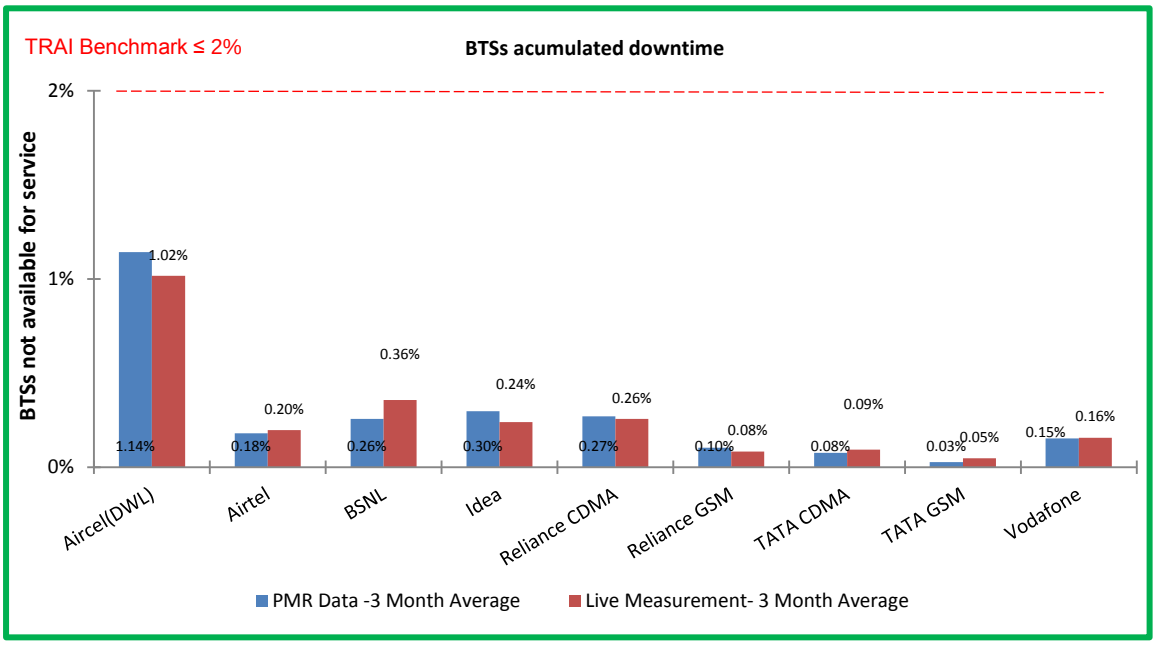
   ➲ Any outage as a result of force majeure were not considered at the time of calculation

   ➲ 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.

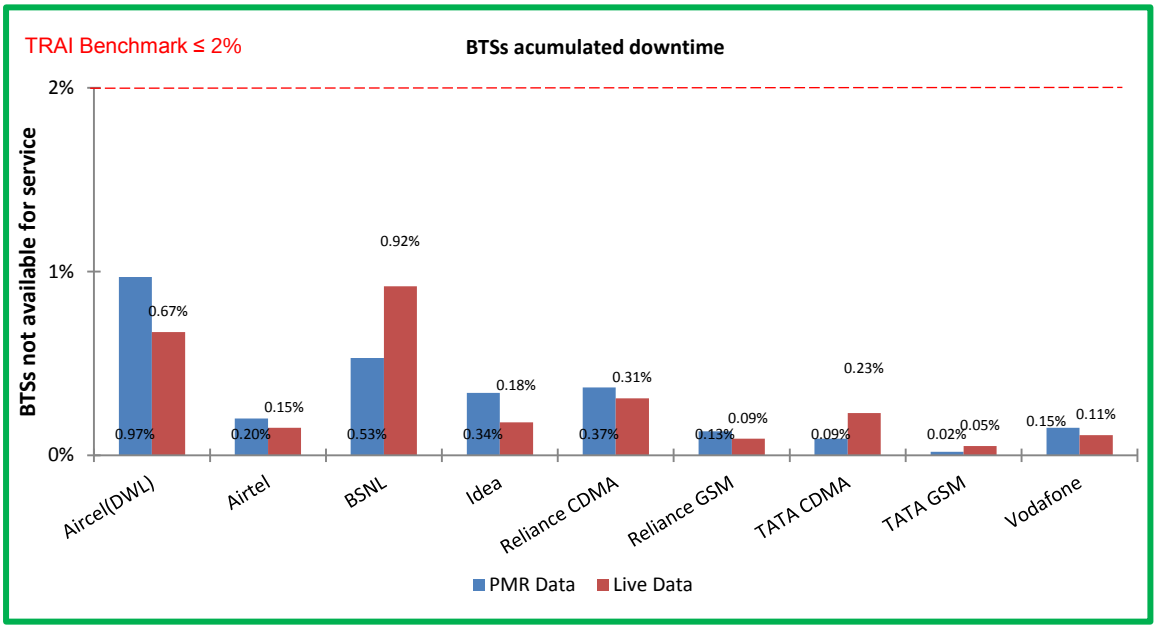
   ➲ When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

4.1.2 KEY FINDINGS – CONSOLIDATED

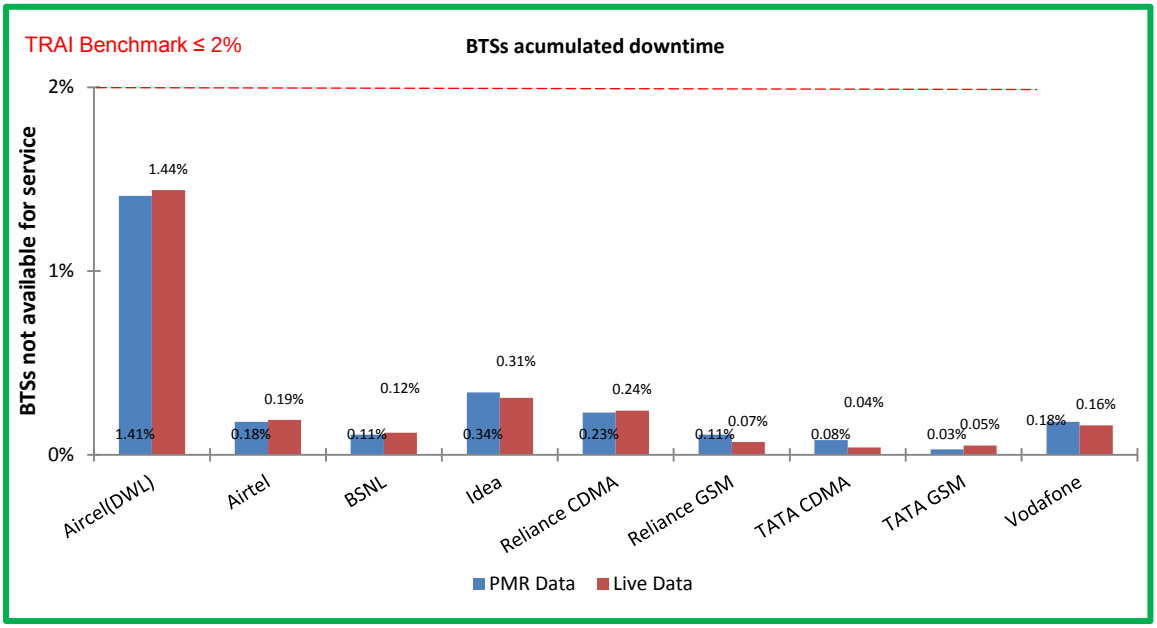


All operators met the TRAI benchmark for the parameter.

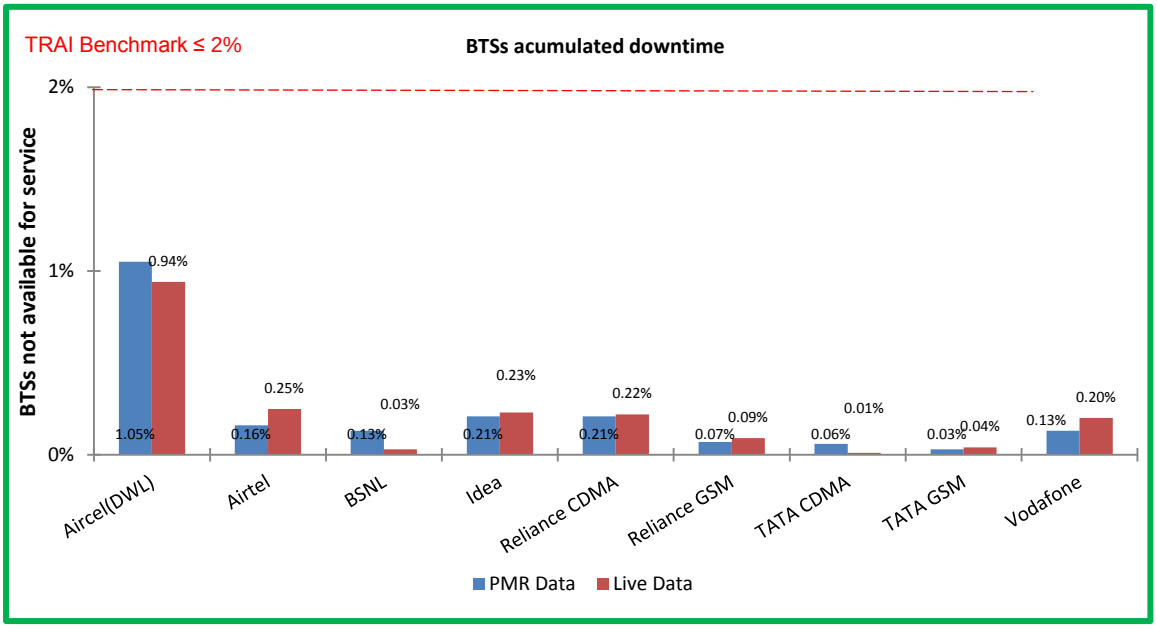
4.1.2.1 KEY FINDINGS – MONTH 1



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.

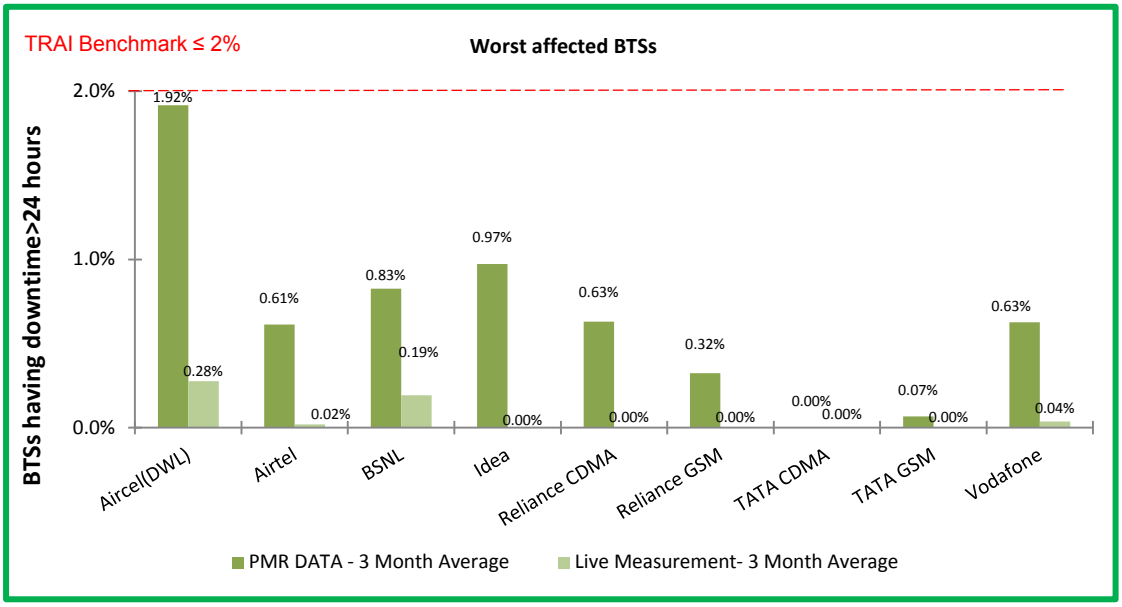
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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.

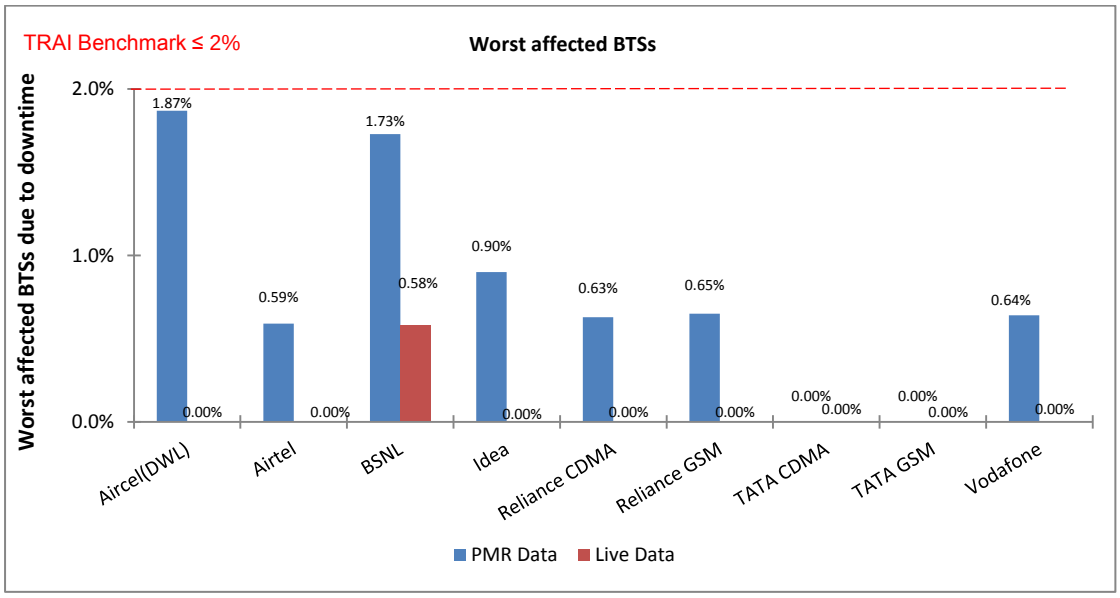
4.2.2 KEY FINDINGS – CONSOLIDATED



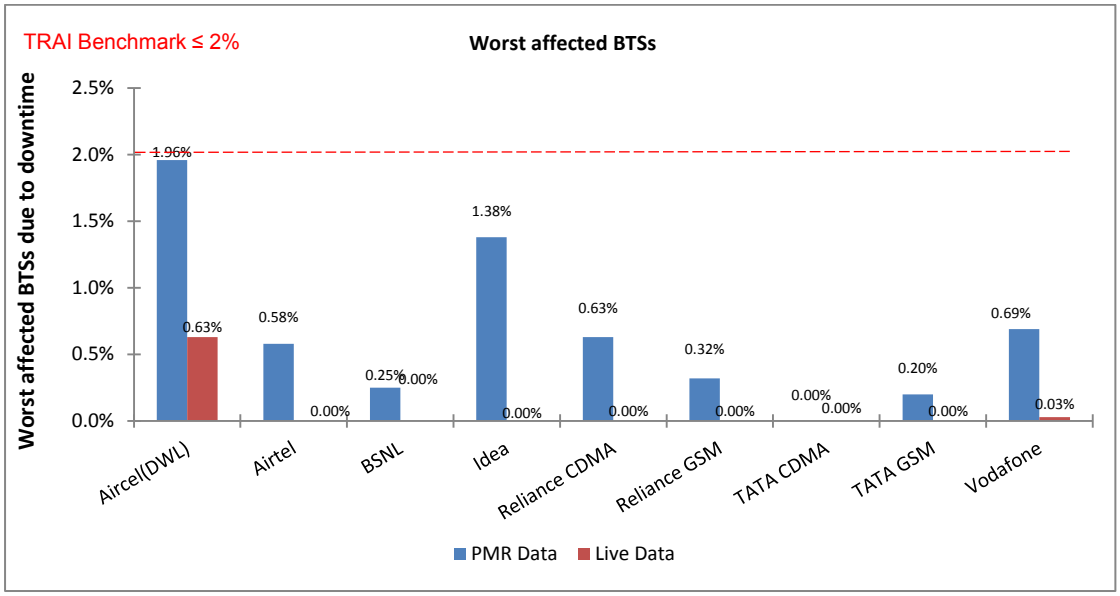
All the operators meet the benchmark for the worst affected BTS due to downtime.

Significant difference was observed between PMR & live measurement data for the above mentioned operators. 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.

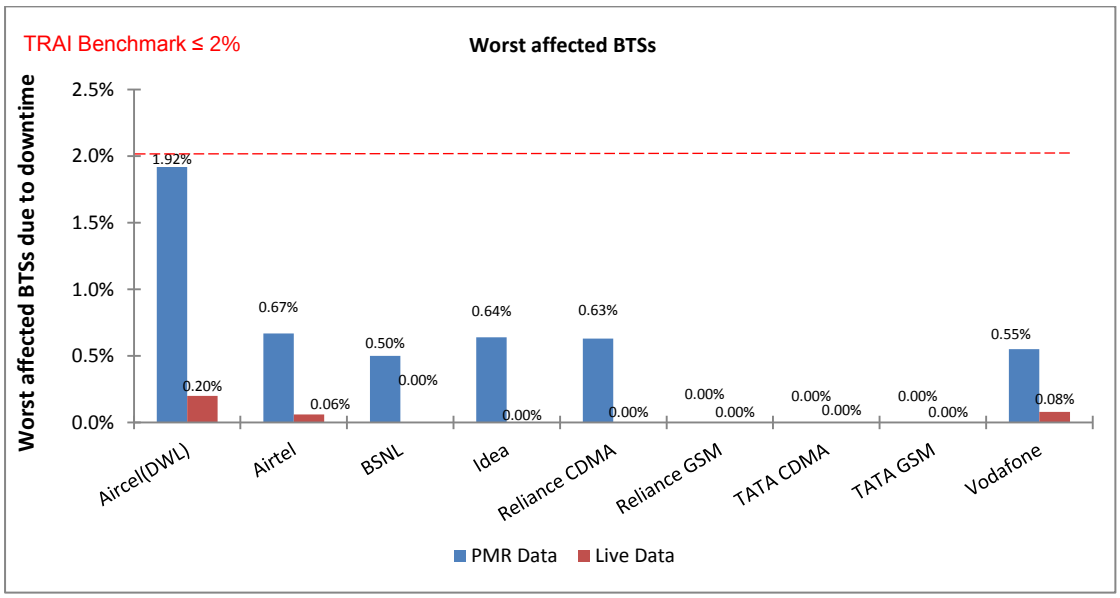
4.2.2.1 KEY FINDINGS – MONTH 1



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

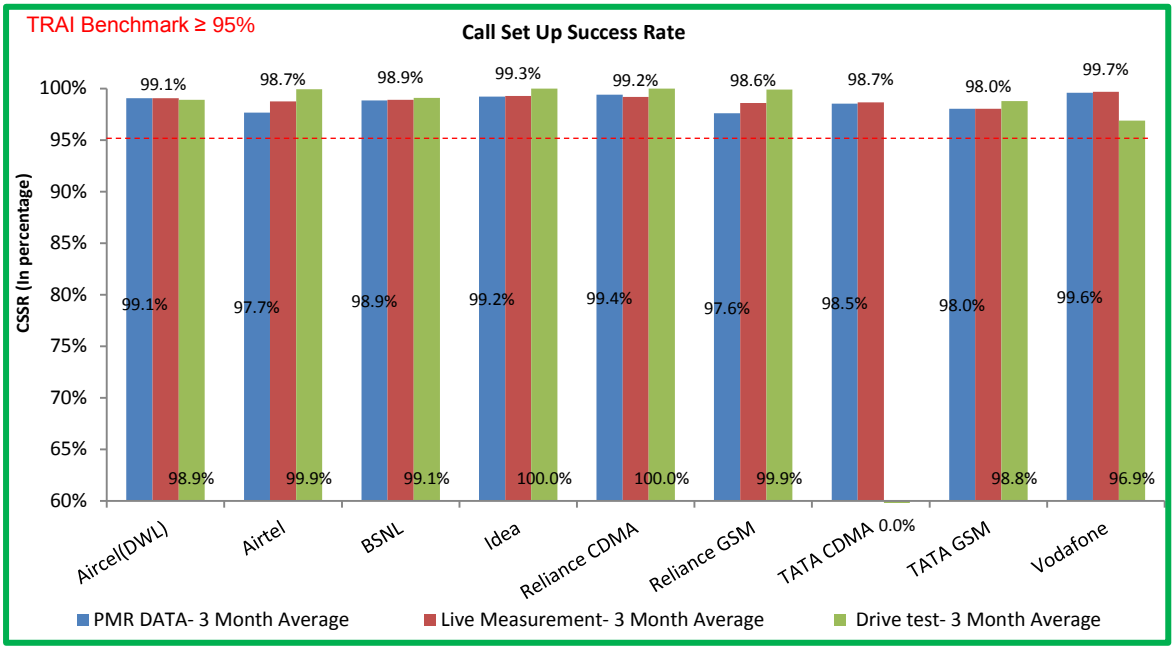
   Call Established means the following events have happened in call setup:-

   - 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 –**

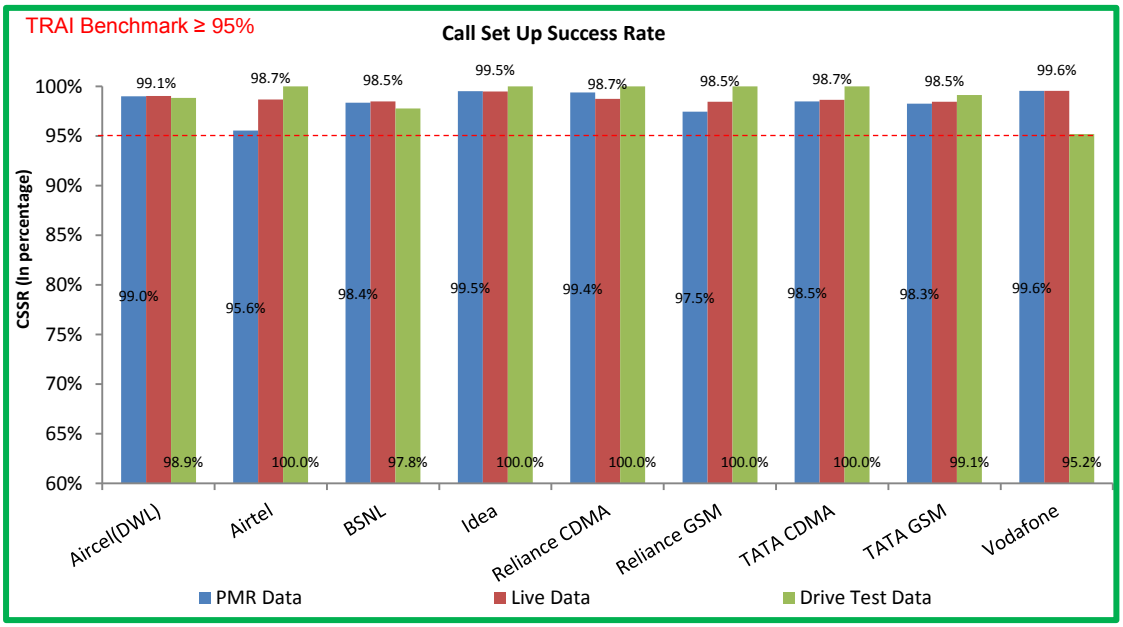
   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
   - CSSR calculation should be measured using OMC generated data only
   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
   - Counter data is extracted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

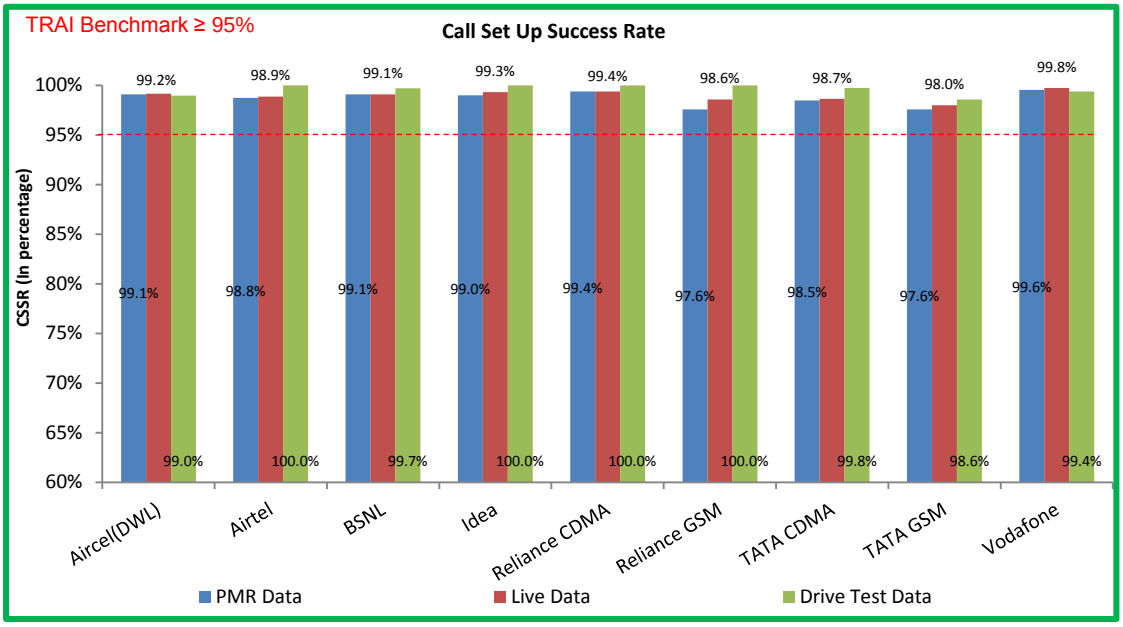


All the operators met the benchmark for CSSR as per PMR data.

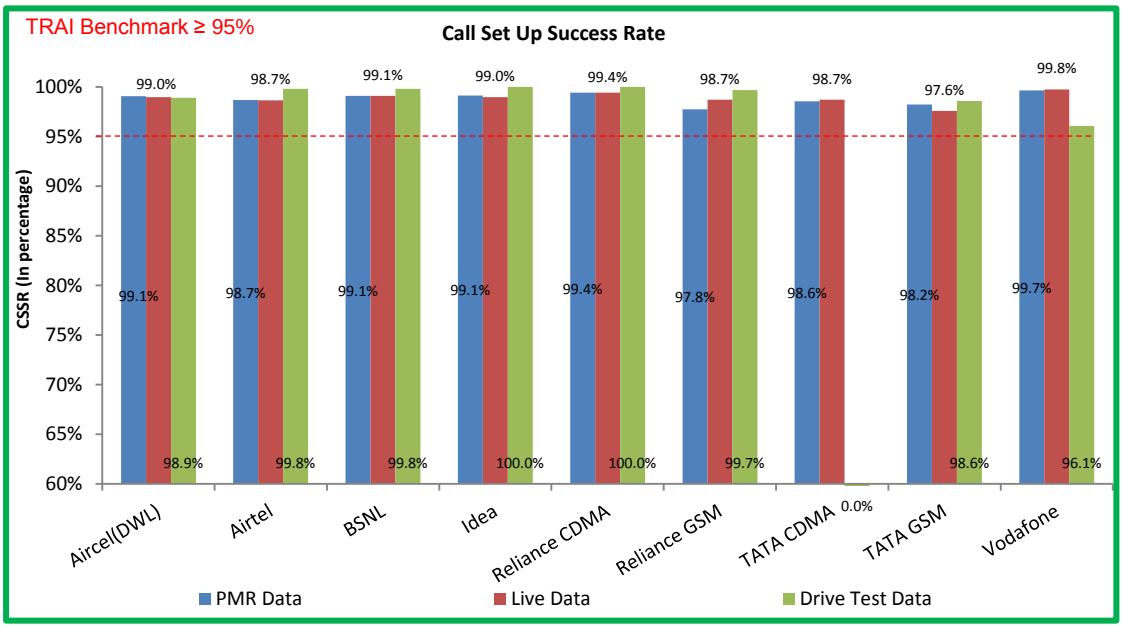
4.3.2.1 KEY FINDINGS – MONTH 1



4.3.2.2 KEY FINDINGS – MONTH 2



4.3.2.3 KEY FINDINGS – MONTH 3

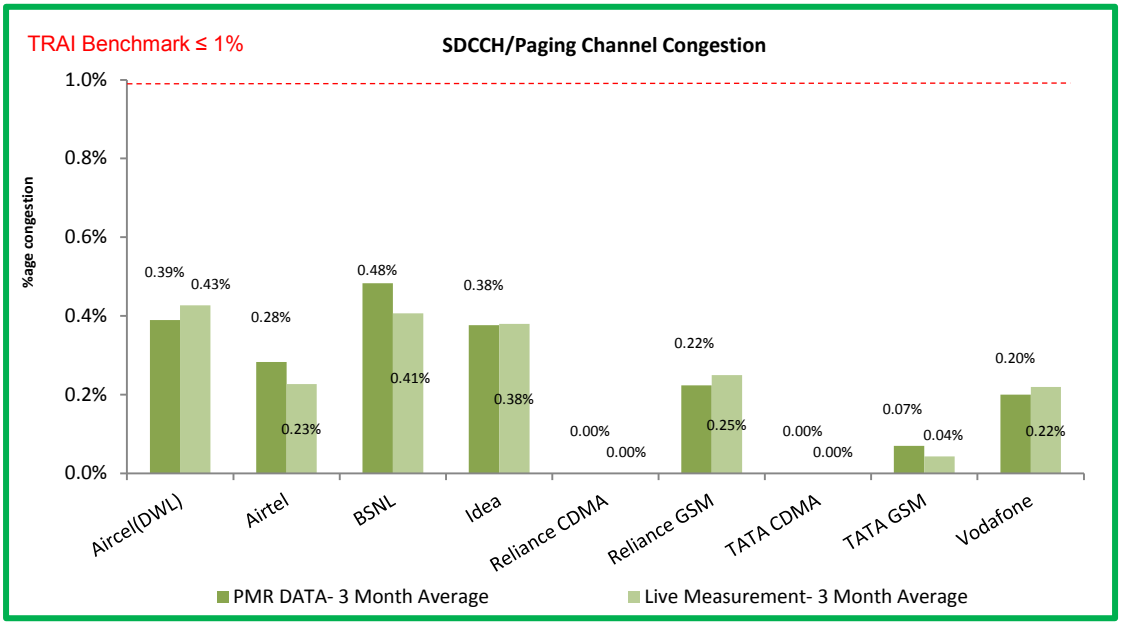


4.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

4.4.1 PARAMETER DESCRIPTION

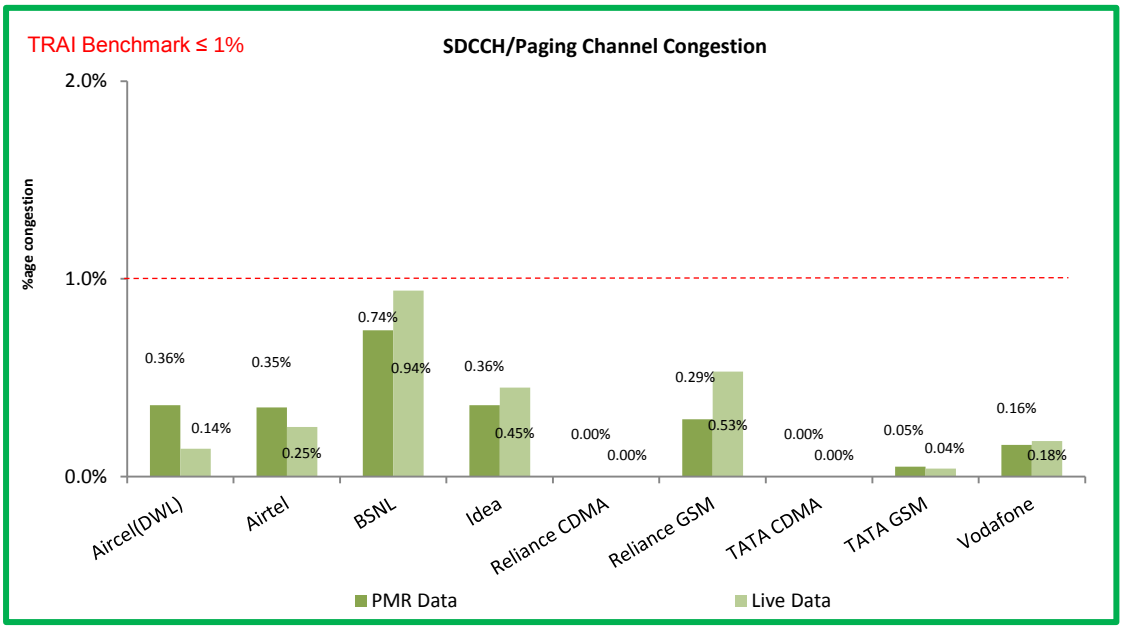
1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:
   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point 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 (CONSOLIDATED)

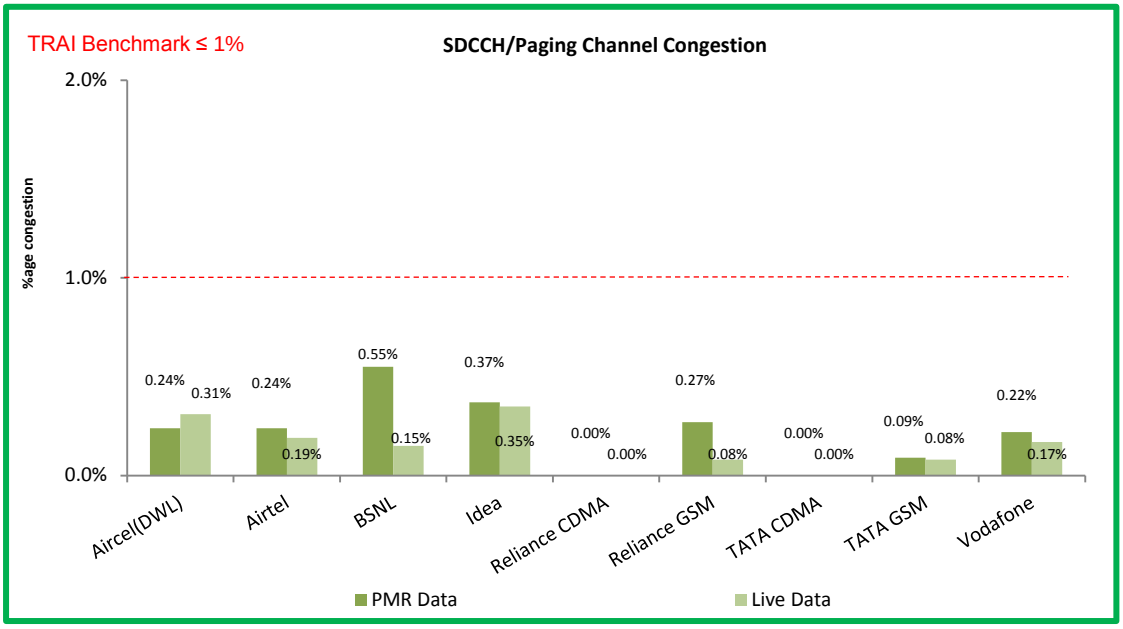


All the operators met the TRAI benchmark for the parameter.

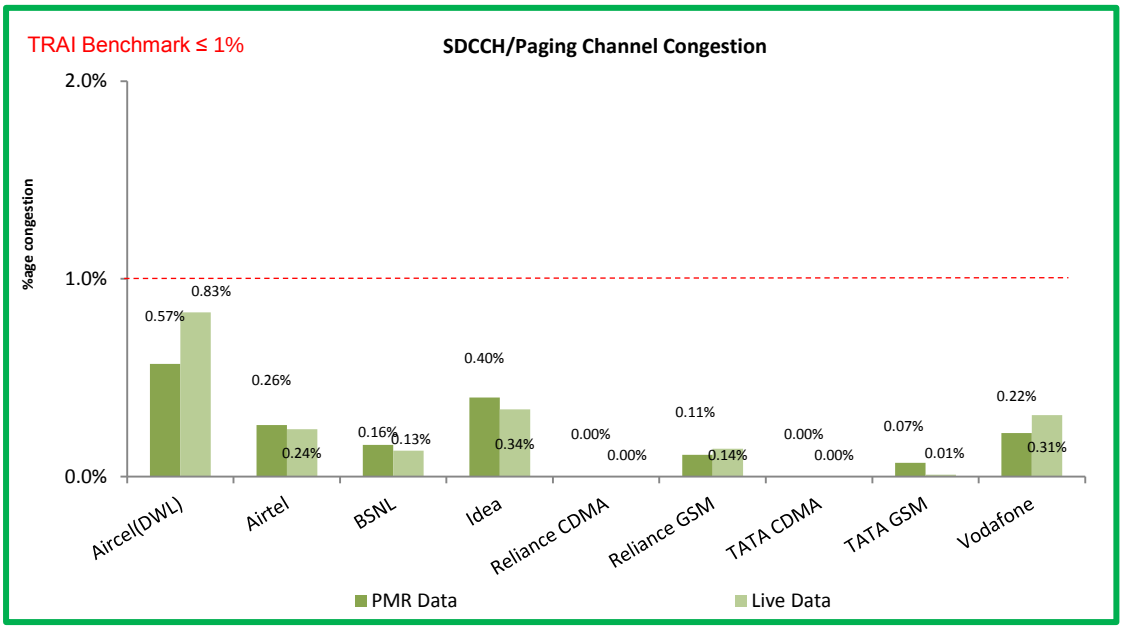
4.4.2.1 KEY FINDINGS – MONTH 1



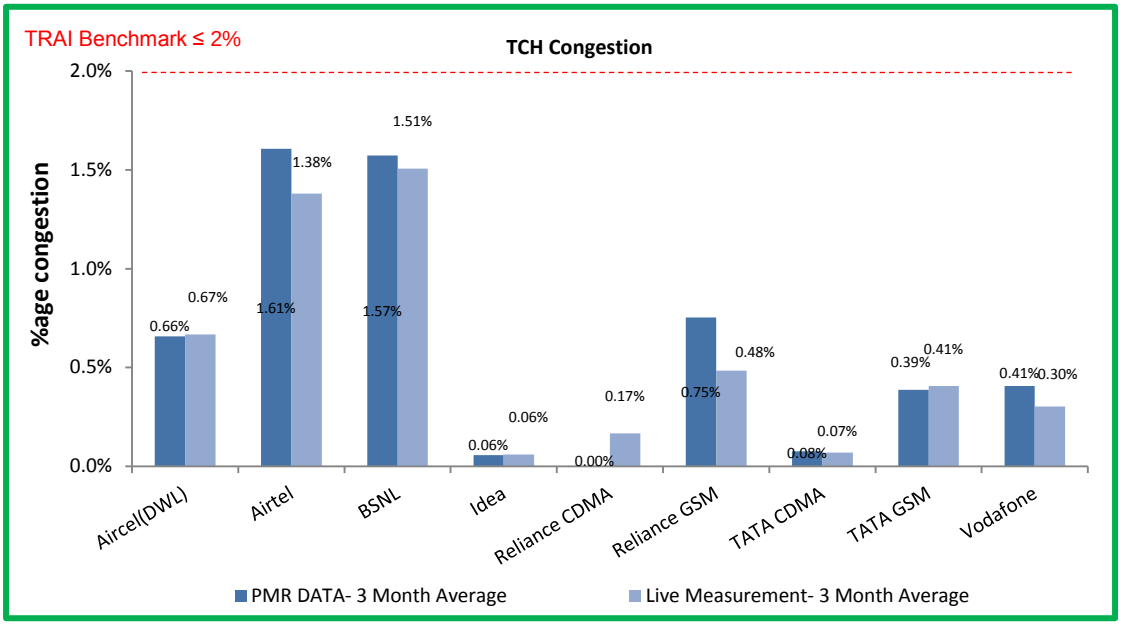
4.4.2.2 KEY FINDINGS – MONTH 2



4.4.2.3 KEY FINDINGS – MONTH 3

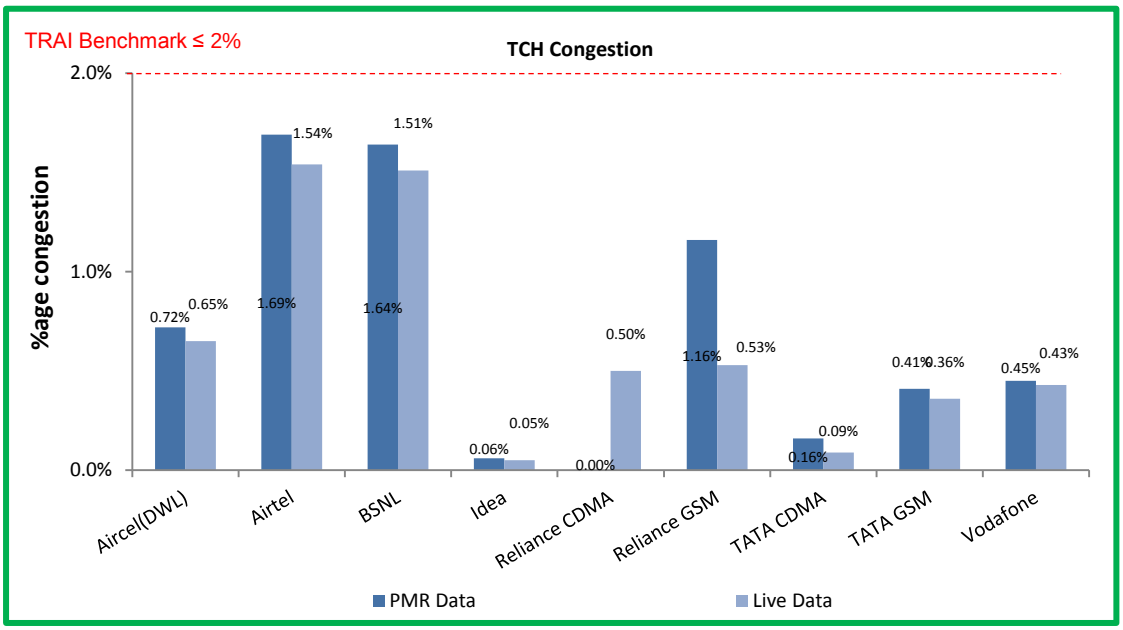


4.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

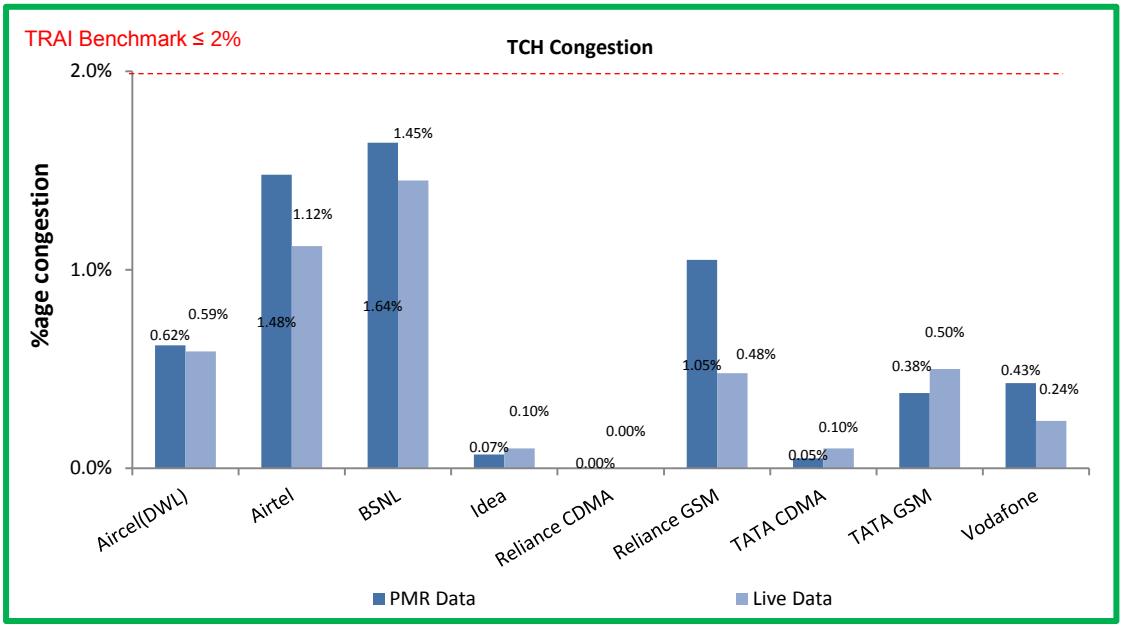


All the operators met the TRAI benchmark for TCH congestion.

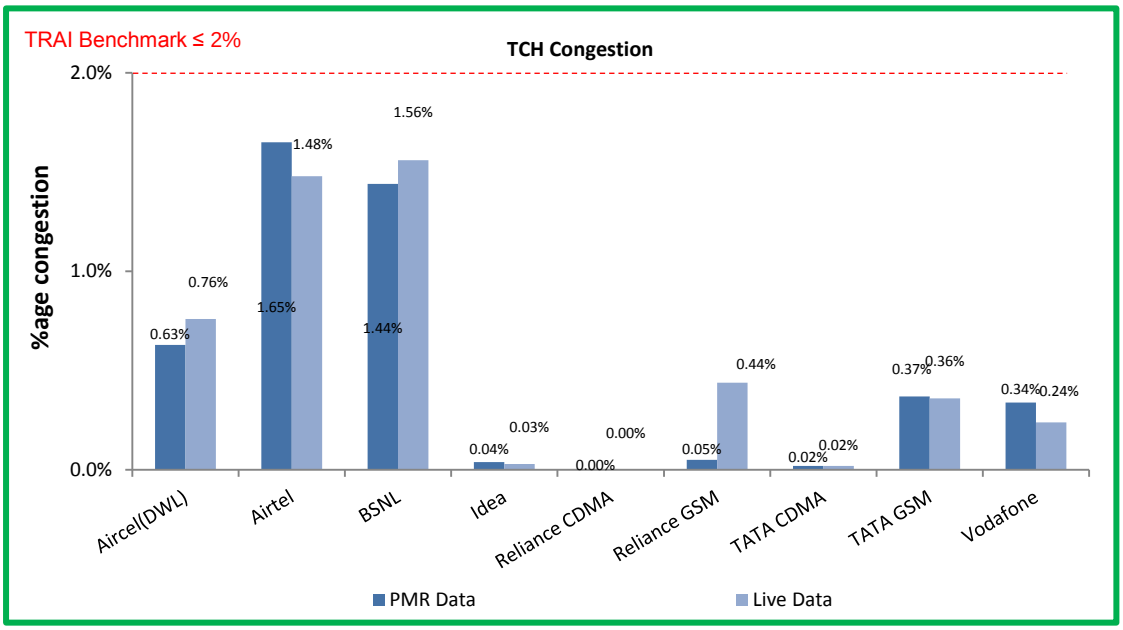
4.4.3.1 KEY FINDINGS – MONTH 1



4.4.3.2 KEY FINDINGS – MONTH 2



4.4.3.3 KEY FINDINGS – MONTH 3



4.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED)

Audit Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	52	64	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65397	110559	25000	37872	10972	27597	13856	346729	1008888
Traffic served for all POIs (B)- in erlangs		41963	57970	24396	21730	3486	16647	6517	185676	620571
POI congestion	≤ 0.5%	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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	64	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65493	110083	25000	1337358	10966	27597	13857	33907	152862
Traffic served for all POIs (B)- in erlangs		43077	58870	22208	22120	3271	16632	6746	18787	74995
POI congestion	≤ 0.5%	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 PMR Data.

4.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	130	65	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65362	111202	25000	39184	10984	27598	13818	350376	2843230
Traffic served for all POIs (B)- in erlangs		42729	57903	24338	21454	4003	17140	6441	180251	1384943
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	65	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65348	109890	25000	3937314	10966	27598	13817	33907	275151
Traffic served for all POIs (B)- in erlangs		43653	60601	22628	21783	3240	17138	6693	17821	136291
POI congestion	≤ 0.5%	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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65285	109075	25000	37117	10966	27598	13817	350376	91717
Traffic served for all POIs (B)- in erlangs		40619	56890	24545	21635	3248	16430	6543	185138	43415
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65247	109007	25000	37246	10966	27598	13817	33907	91717
Traffic served for all POIs (B)- in erlangs		41918	56890	21887	22152	3187	16430	6559	18625	44602
POI congestion	≤ 0.5%	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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65543	111400	25000	37317	10966	27597	13934	339434	91717
Traffic served for all POIs (B)- in erlangs		42542	59119	24305	22102	3207	16370	6566	191640	433356
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

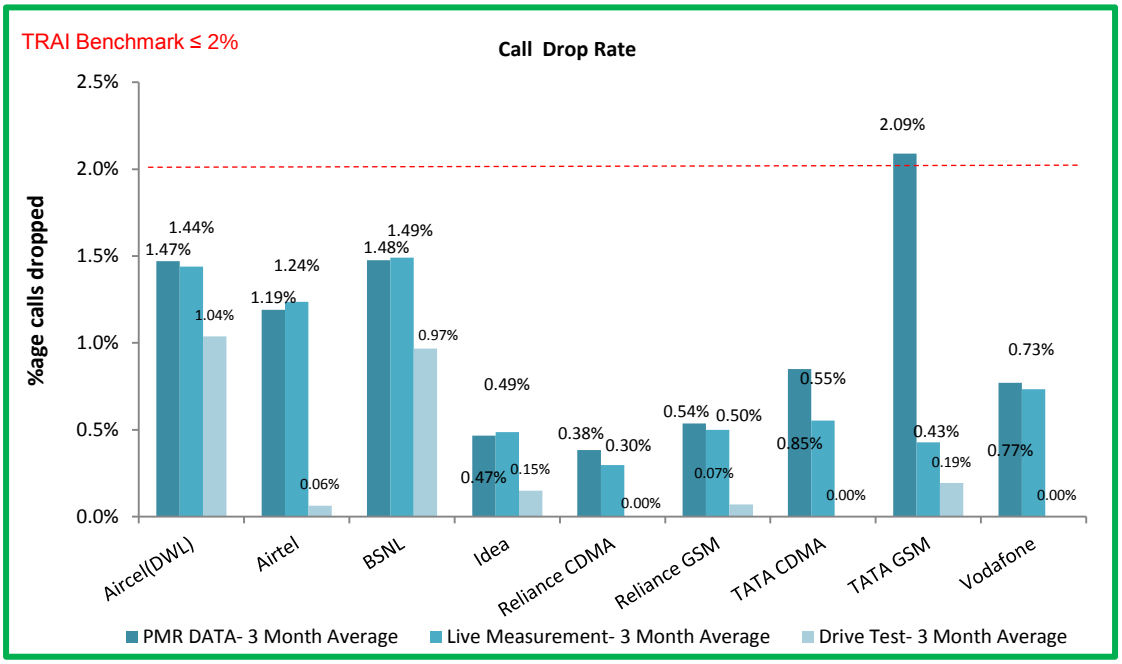
Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65883	111353	25000	37515	10966	27597	13937	33907	91717
Traffic served for all POIs (B)- in erlangs		43662	59119	22110	22426	3386	16328	6987	19914	44092
POI congestion	≤ 0.5%	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

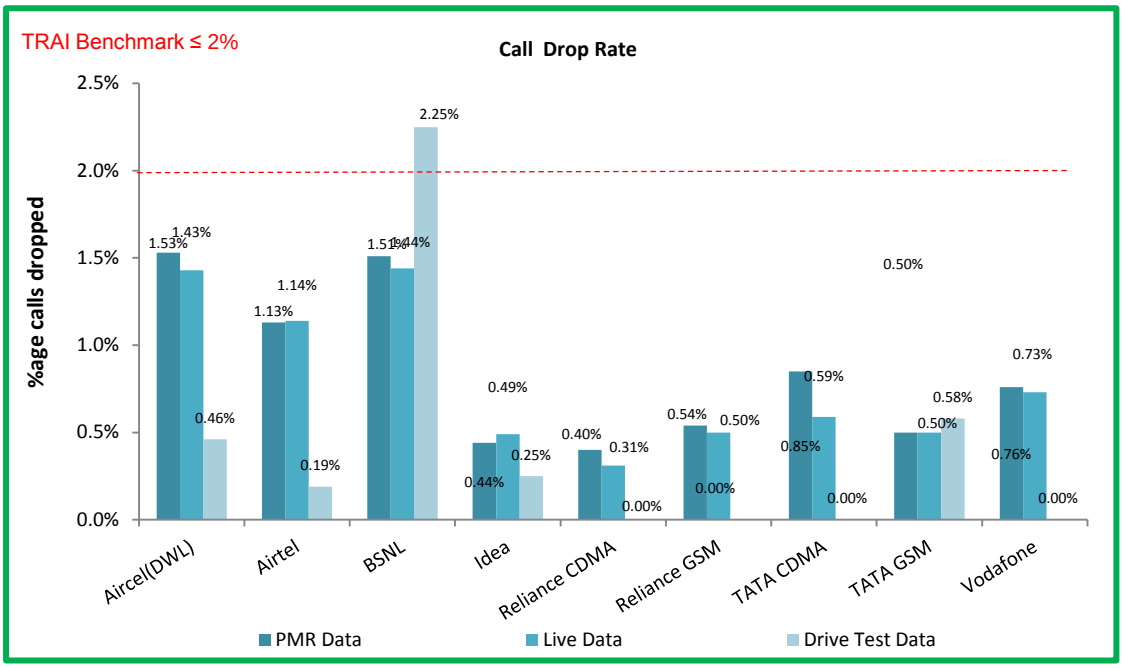
1. **Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
   - **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
  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

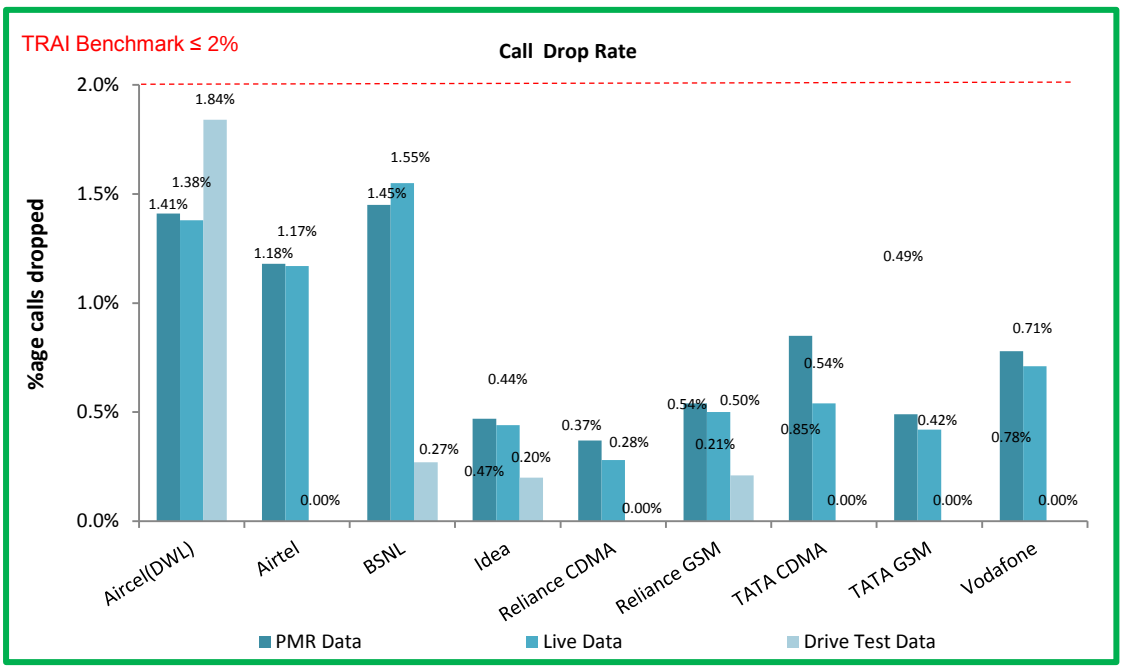


Tata GSM failed to meet the benchmark for call drop rate during audit. Significant difference was observed between PMR & live measurement data for Tata GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

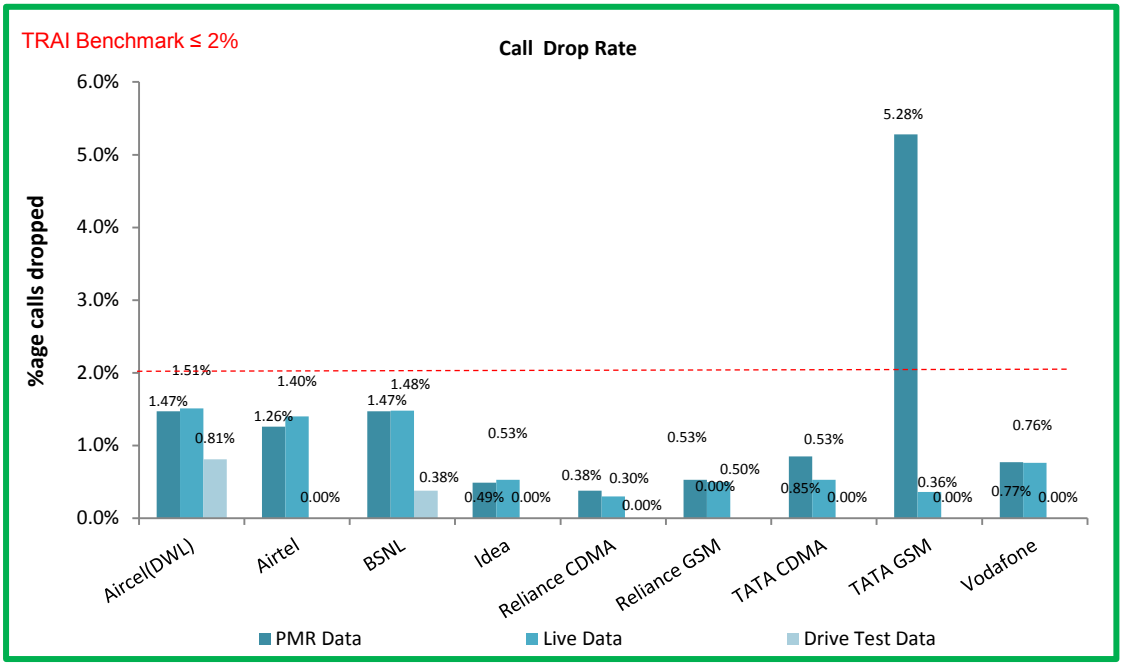
4.5.2.1 KEY FINDINGS – MONTH 1



4.5.2.2 KEY FINDINGS – MONTH 2



4.5.2.3 KEY FINDINGS – MONTH 3



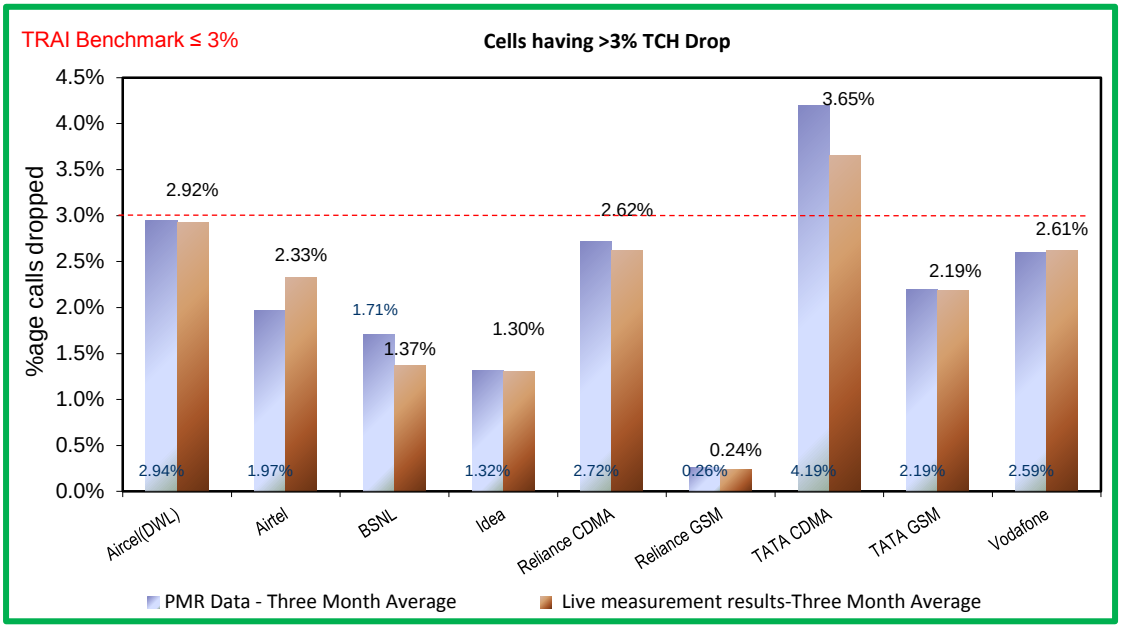
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

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.

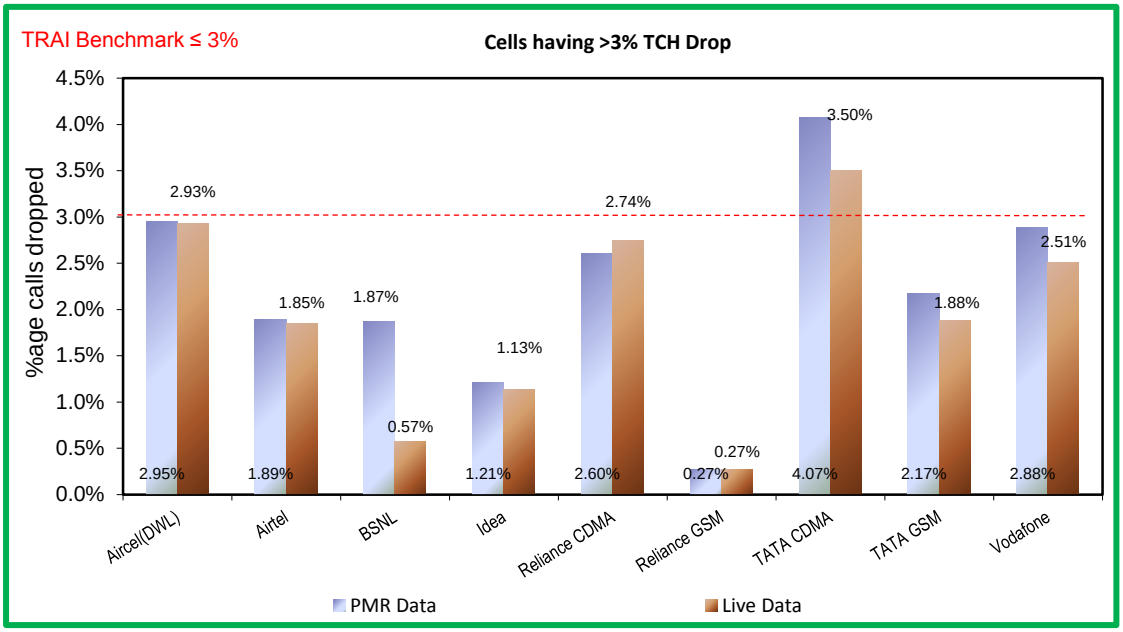
The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

4.6.2 KEY FINDINGS – CONSOLIDATED

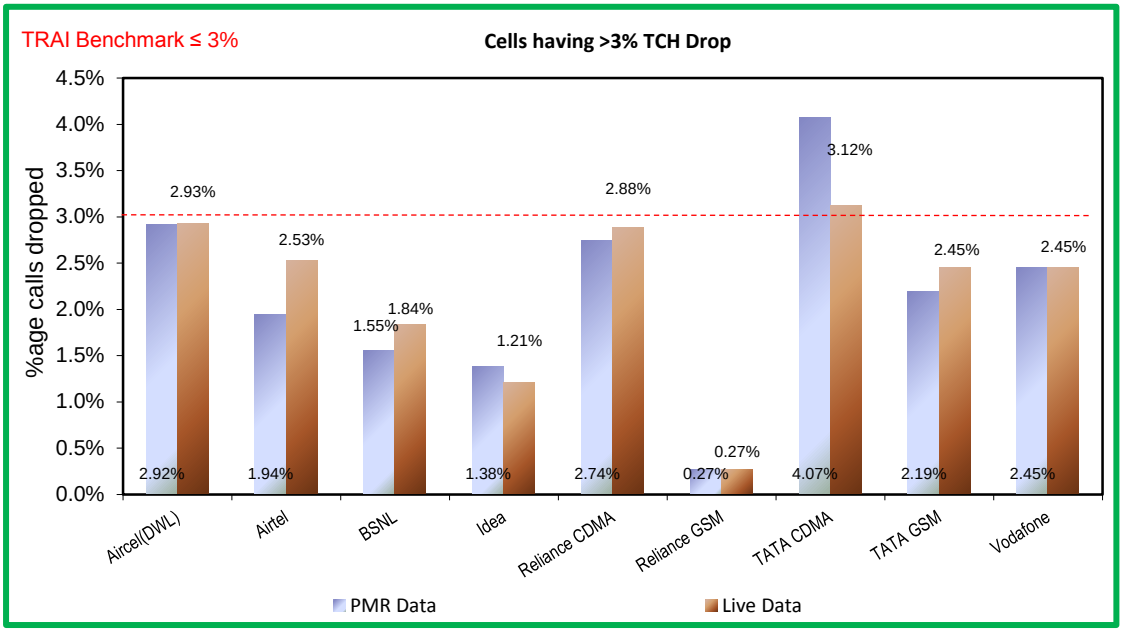


Tata CDMA failed to meet the benchmark for the parameter as per PMR data.

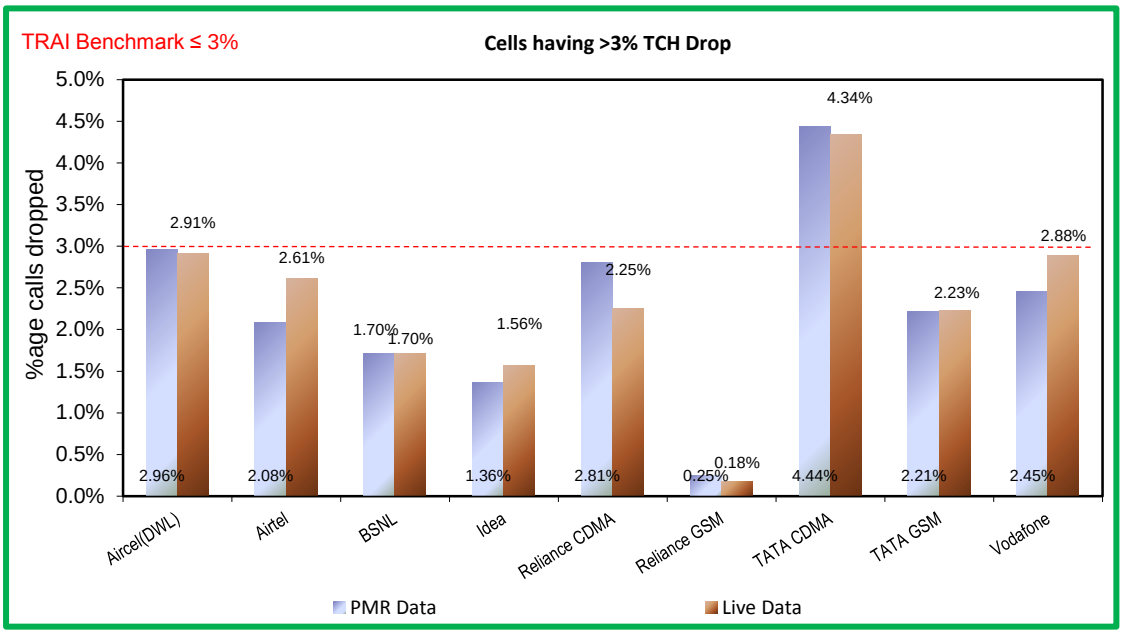
4.6.2.1 KEY FINDINGS – MONTH 1



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**

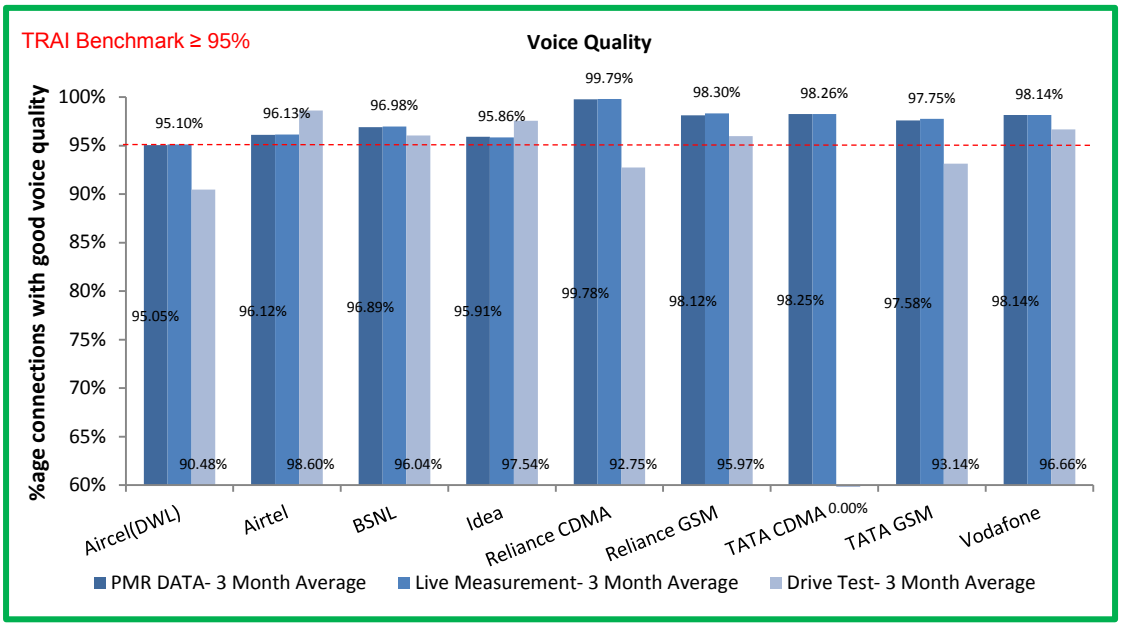
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

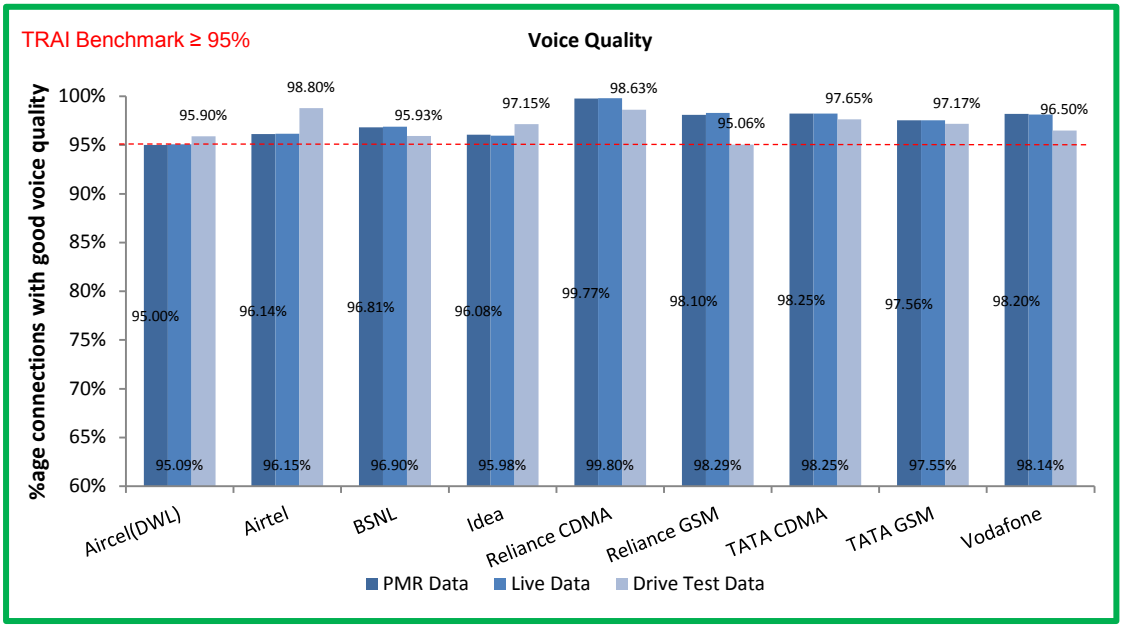
   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

4.7.2 KEY FINDINGS – CONSOLIDATED

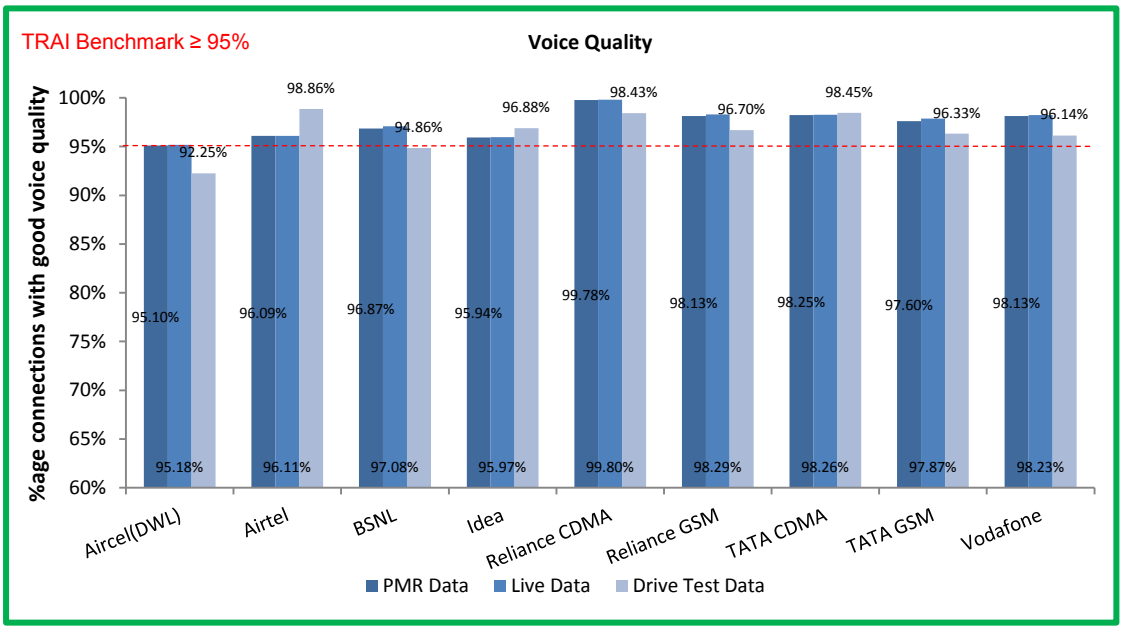


All the operators met the benchmark for Voice Quality with comparable levels among all three methods of data collection.

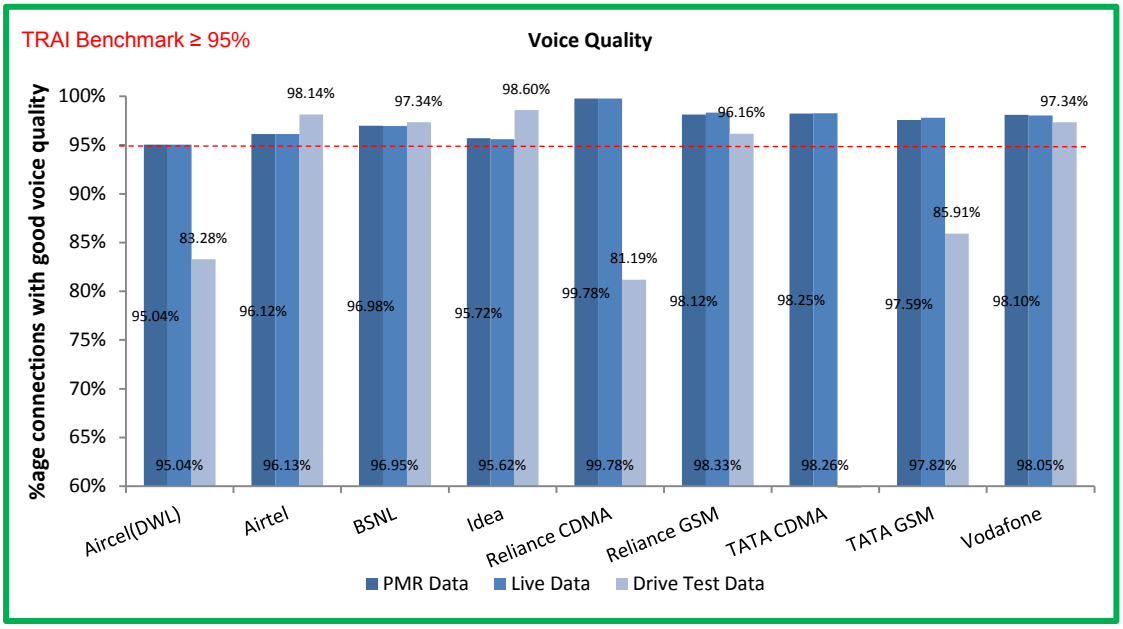
4.7.2.1 KEY FINDINGS – MONTH 1



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.

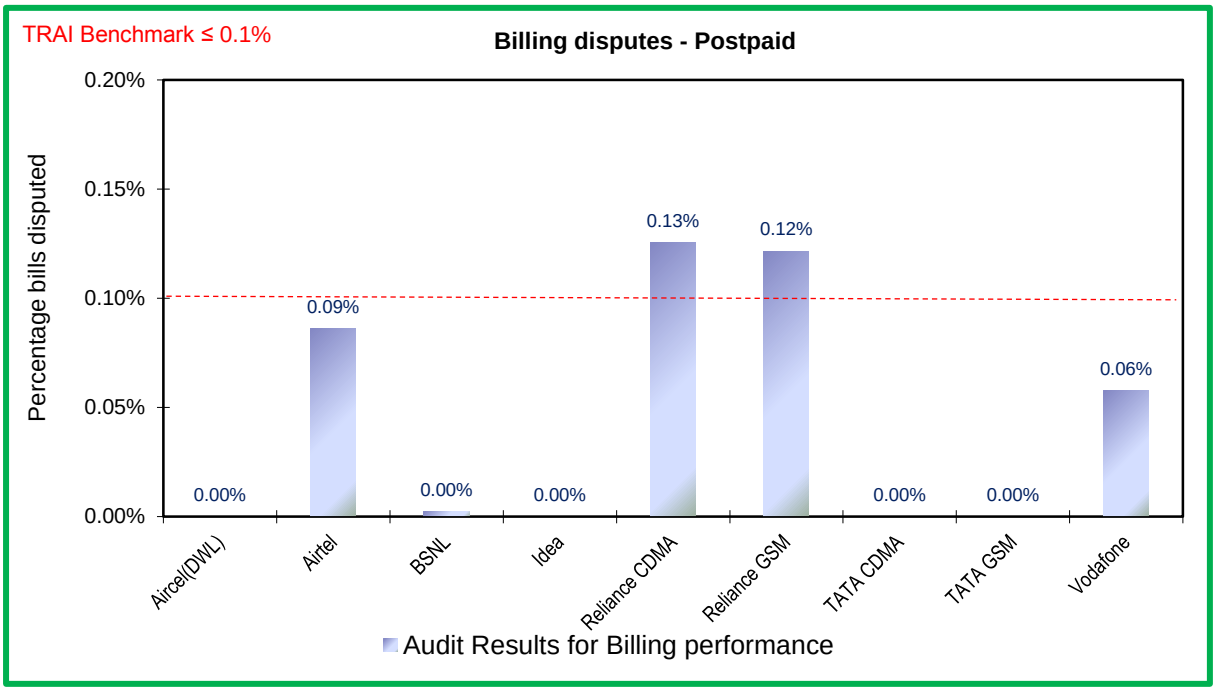
➲ Computational Methodology:

- **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

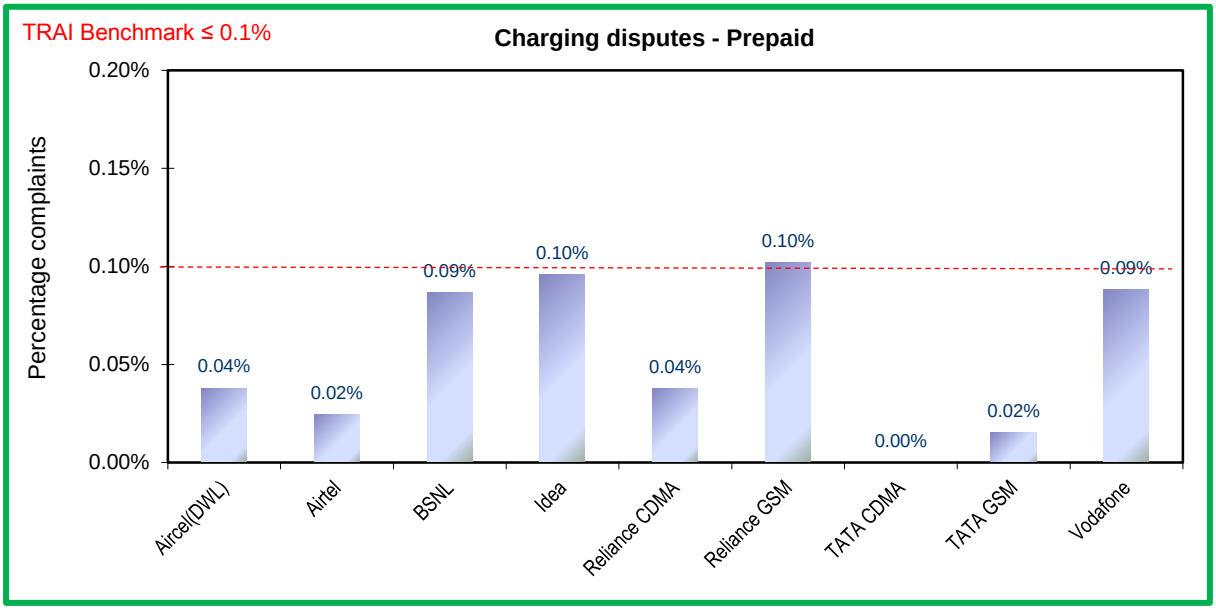
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles 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, Reliance CDMA and Reliance GSM failed to meet the TRAI benchmark.

5.1.3 KEY FINDINGS - PREPAID CHARGING DISPUTES



For the prepaid customers, Reliance GSM failed to meet the TRAI benchmark.

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%	99.00%
BSNL	99.66%	100.00%	99.00%
Idea	100.00%	100.00%	99.00%
Reliance CDMA	100.00%	100.00%	96.67%
Reliance GSM	100.00%	100.00%	98.00%
TATA CDMA	100.00%	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%
Vodafone	100.00%	100.00%	100.00%

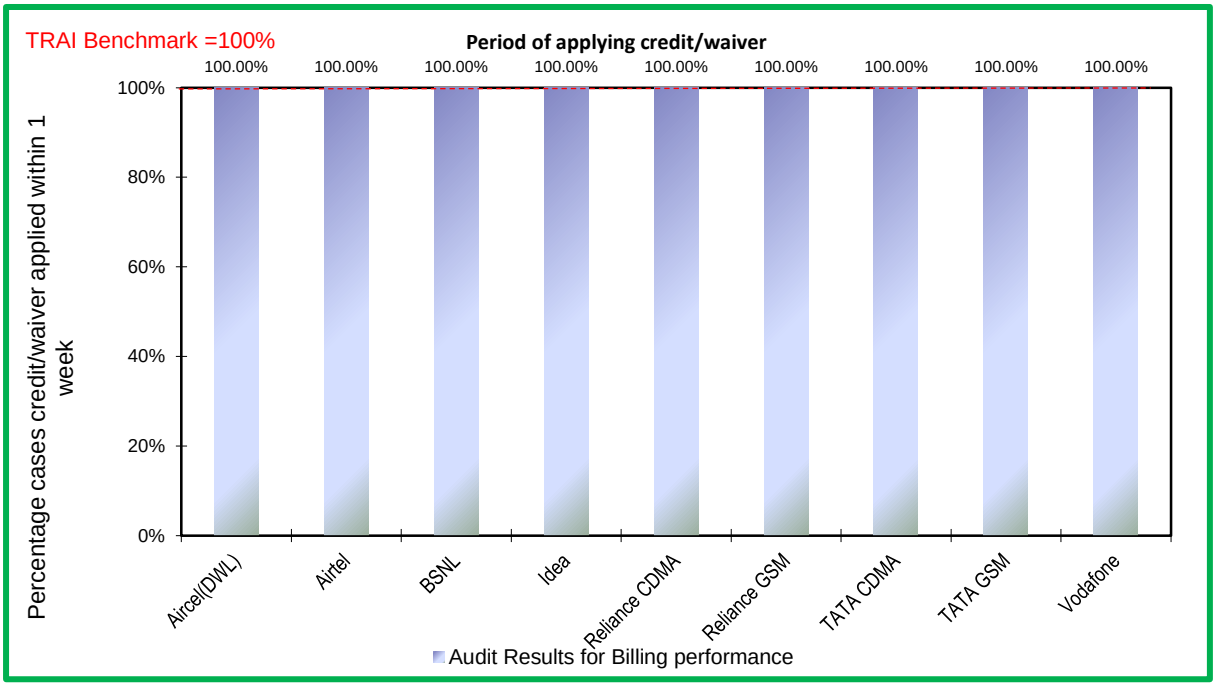
The audit results showed that all the operators met the TRAI benchmark for resolution of complaints. However, as per live calling done to customers, the performance of Airtel, BSNL, Idea, Reliance CDMA and Reliance GSM was below the benchmark level.

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



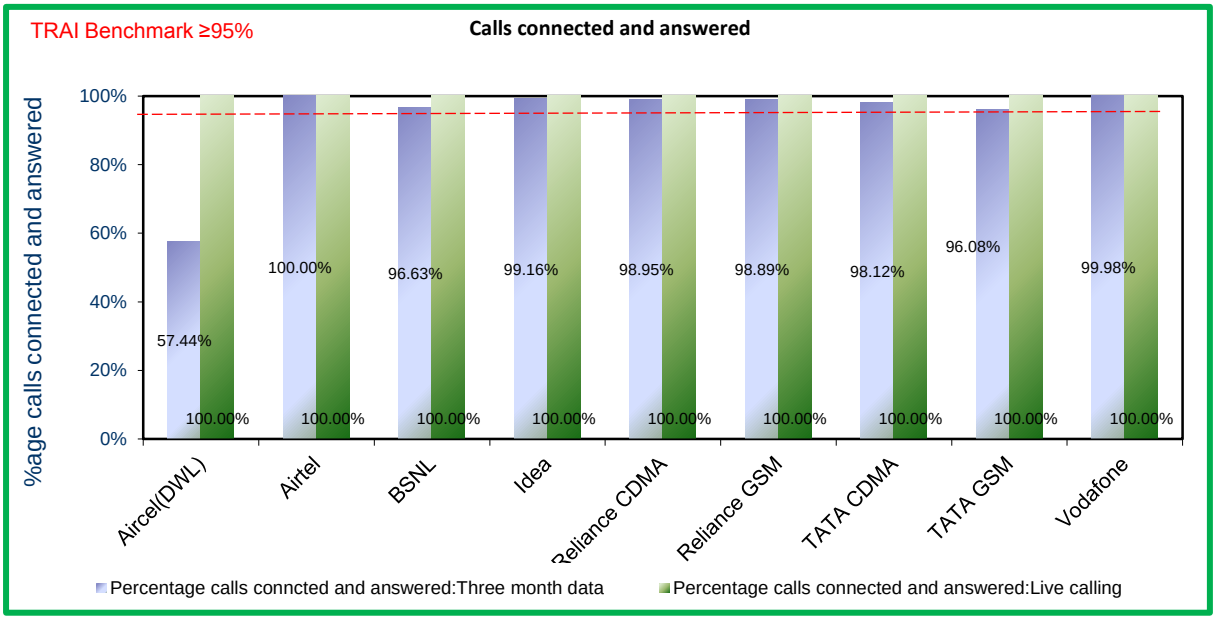
All the operators meet the benchmark.

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



The audit result showed that the operator Aircel did not meet the benchmark, while Airtel has 100% performance. Excluding Aircel, audit and live calling results comparable for all operators.

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)	93.53%	NA	100.00%
Airtel	NA	98.27%	100.00%
BSNL	NA	96.23%	100.00%
Idea	97.70%	NA	100.00%
Reliance CDMA	NA	90.14%	100.00%
Reliance GSM	NA	93.68%	100.00%
TATA CDMA	NA	95.36%	100.00%
TATA GSM	NA	86.37%	100.00%
Vodafone	NA	98.72%	100.00%

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

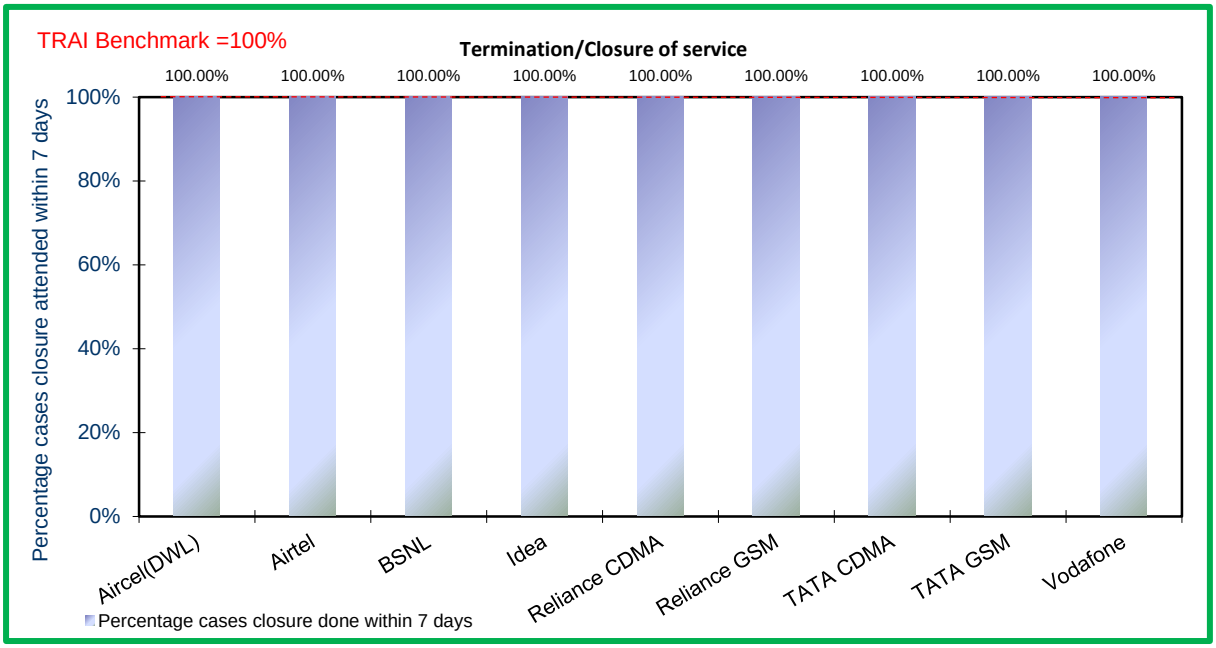
Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark of calls being answered within 90 seconds.

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 the operators met the benchmark of 100%.

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 the operators met the benchmark of 100%.

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 Orissa 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 post discussion with TRAI advisors. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality 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 inappropriate. 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 for outdoor routes.

The schedule and the operators covered in operator assisted drive test are given below.

Month	Name of SSA Covered	Date of Drive Test
July	Berhampur	23/7/2014 TO 25/7/2014
August	Balasore	26/8/2014 TO 28/8/2014
September	Bhawanipatna	17/9/2014 TO 19/9/2014

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

6.1.1 JULY – BERHAMPUR SSA

Month	Name of SSA Covered	Date of Drive Test
July	Berhampur	23/7/2014 TO 25/7/2014

6.1.1.1 ROUTE DETAILS – BERHAMPUR SSA

Category	Type of location	Orissa-July Berhampur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	B anjanagar, Belaguntha, Aska	Digapahandi, nuagaon	Berhampur, Gopalpur
	Highways	Berhampur, Bhanjanagar	Berhampur, Paralakhemundi	Berhampur, INS chilka
	With in the City	Berhampur city	Paralakhemundi city	Chhatrapur
Indoor	Shopping complex	Sri Sai complex, Berhampur	Sameswar Market complex, Paralakhemundi	NAC market complex , Gopalpur
	Office complex	Telephone Bhawan,Berhampur	Telephone Bhawan,Paralakhemundi	Telephone Bhawan, Chhatrapur

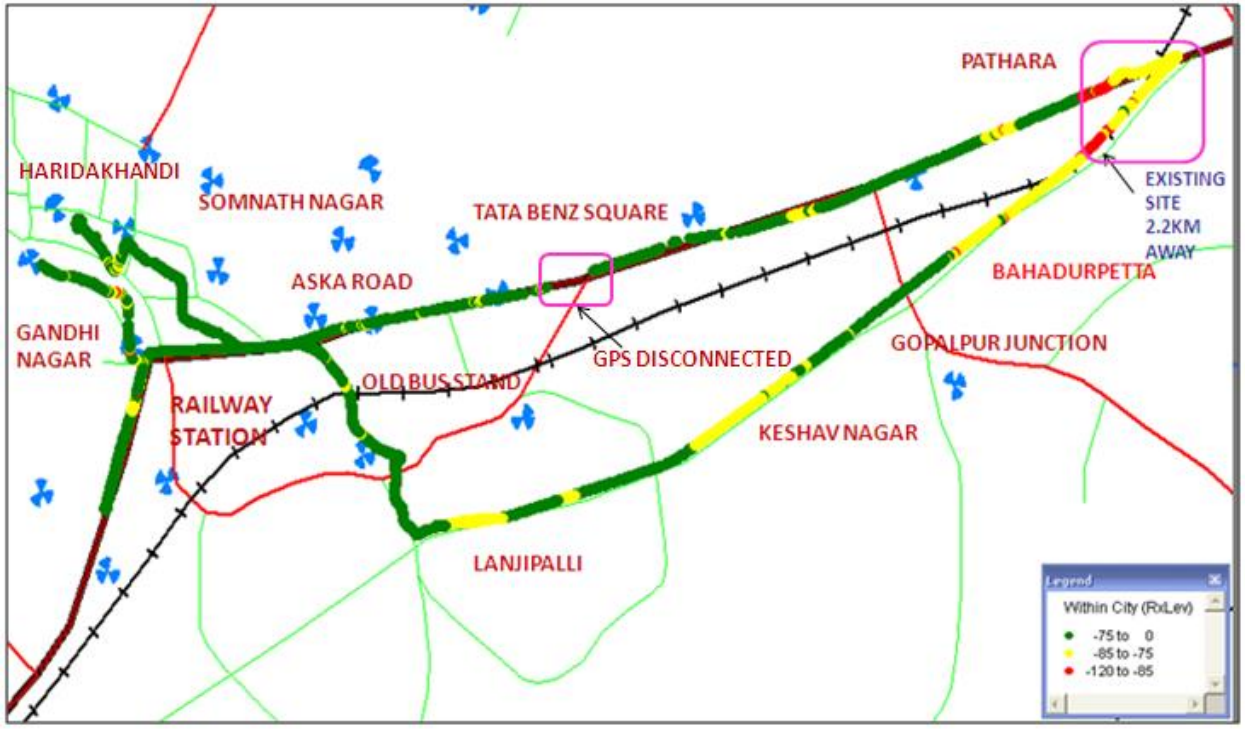
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.1.2 KILOMETERS TRAVELLED – BERHAMPUR SSA

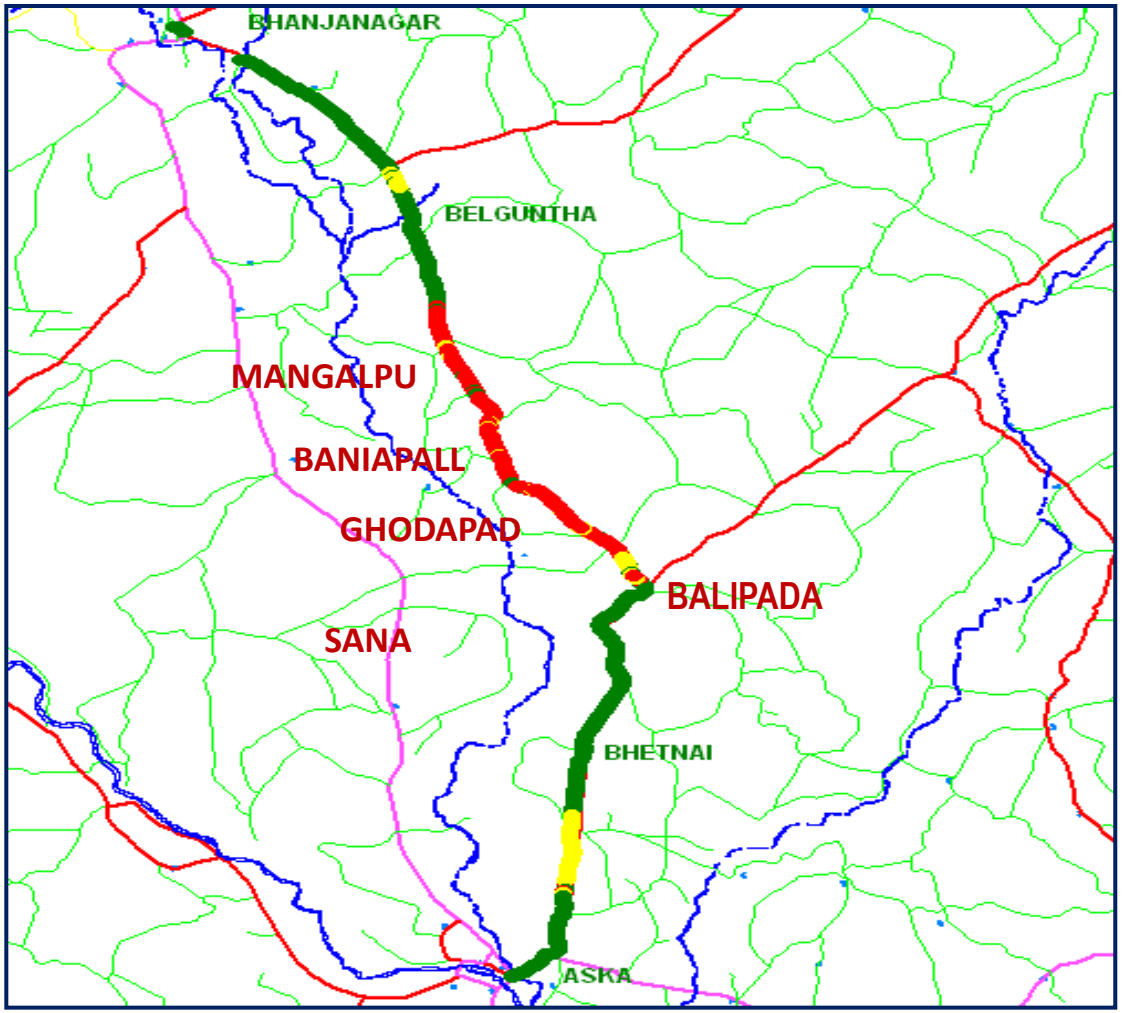
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Berhampur	104	121	112	337

6.1.1.3 ROUTE MAP BERHAMPUR DAY 1

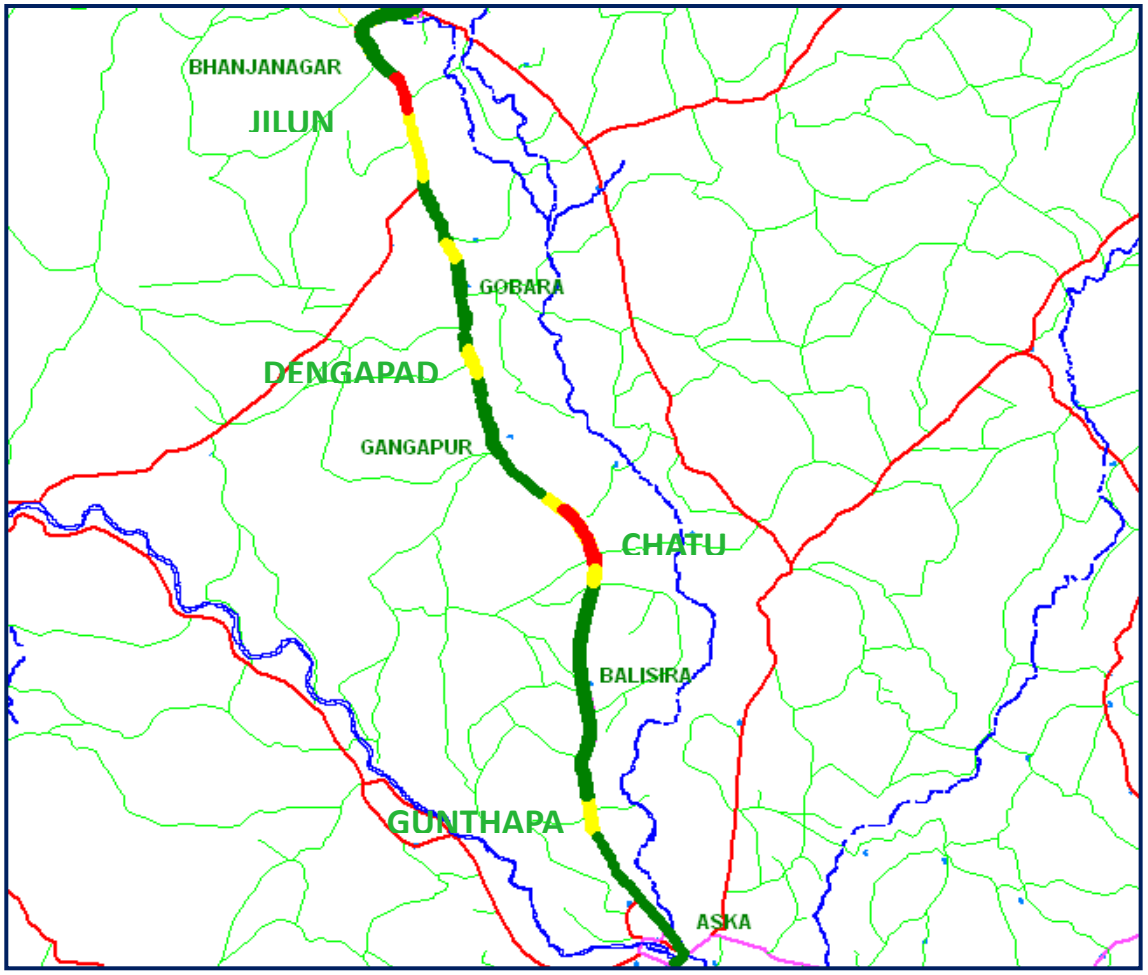
Day 1 – Within City



Day 1 – Major Roads

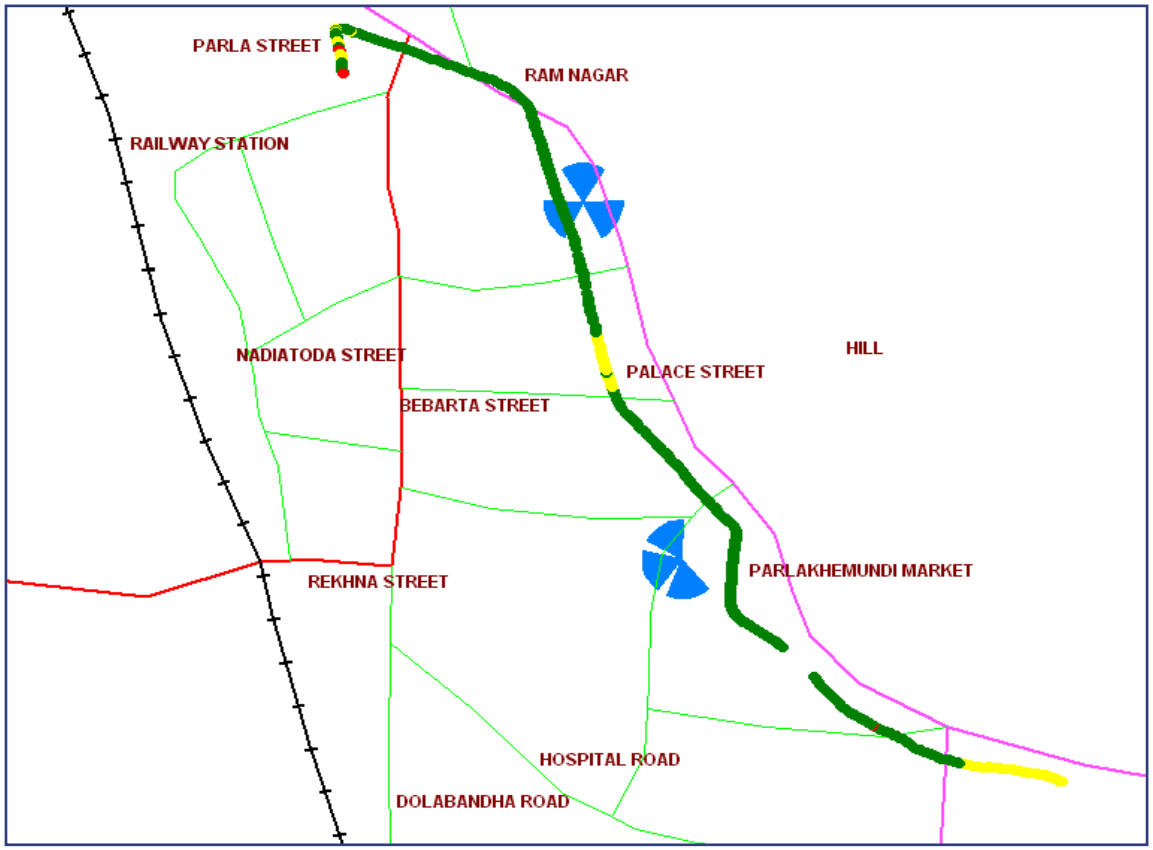


Day 1 – Highways

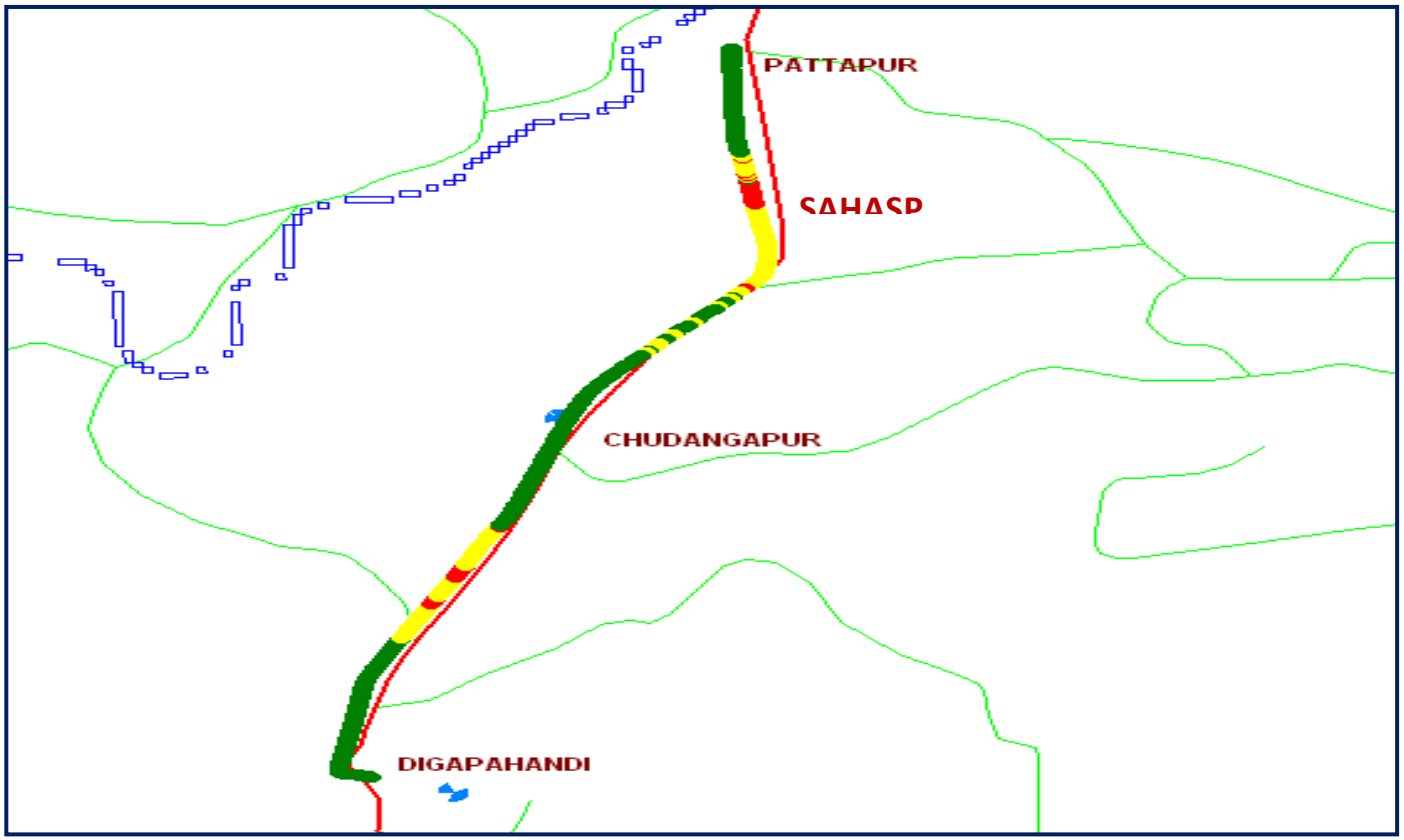


6.1.1.4 ROUTE MAP BERHAMPUR DAY 2

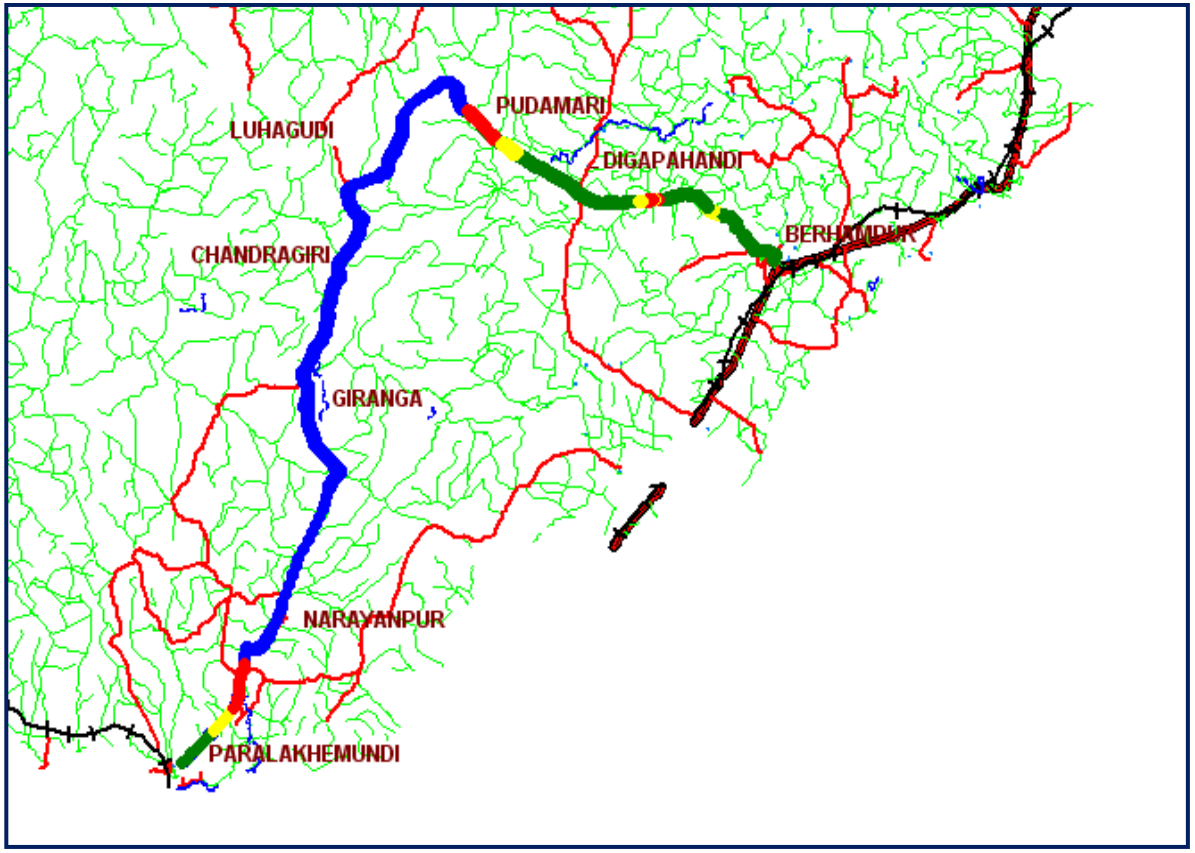
Day 2 – Within City



Day 2 – Major Roads

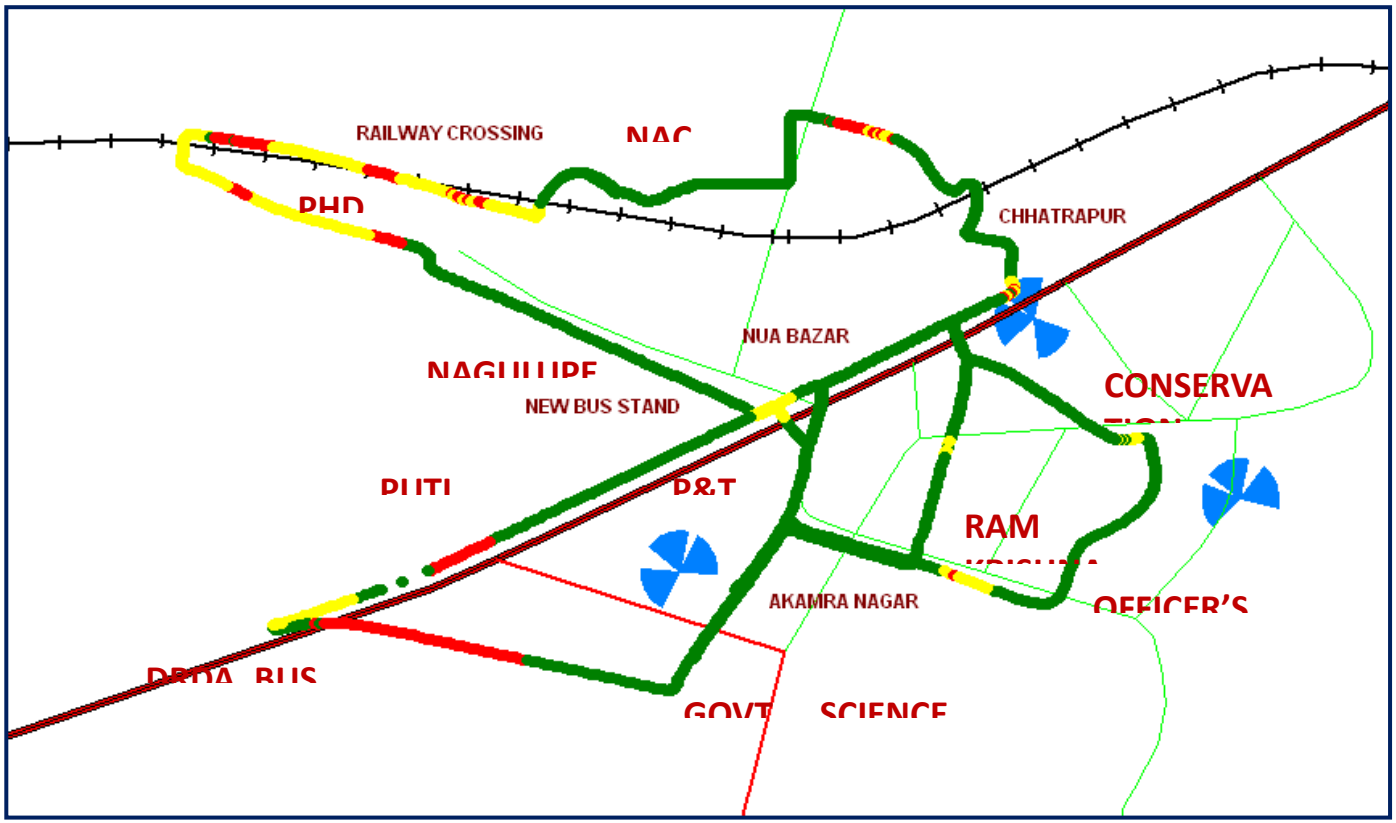


Day 2 – Highways

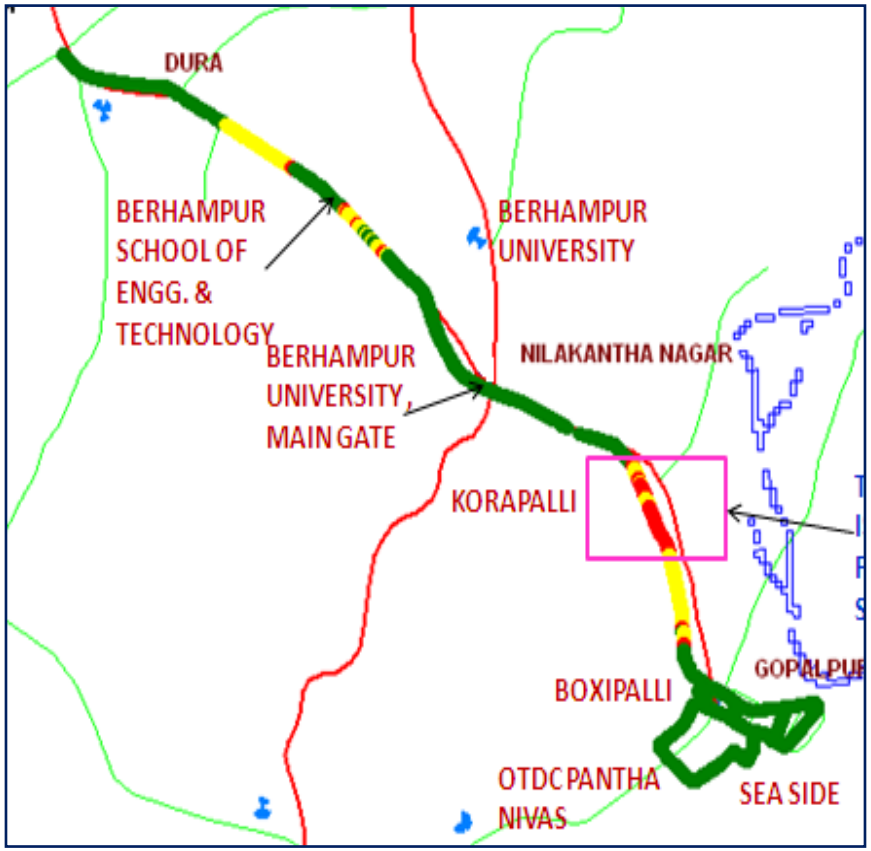


6.1.1.5 ROUTE MAP BERHAMPUR DAY 3

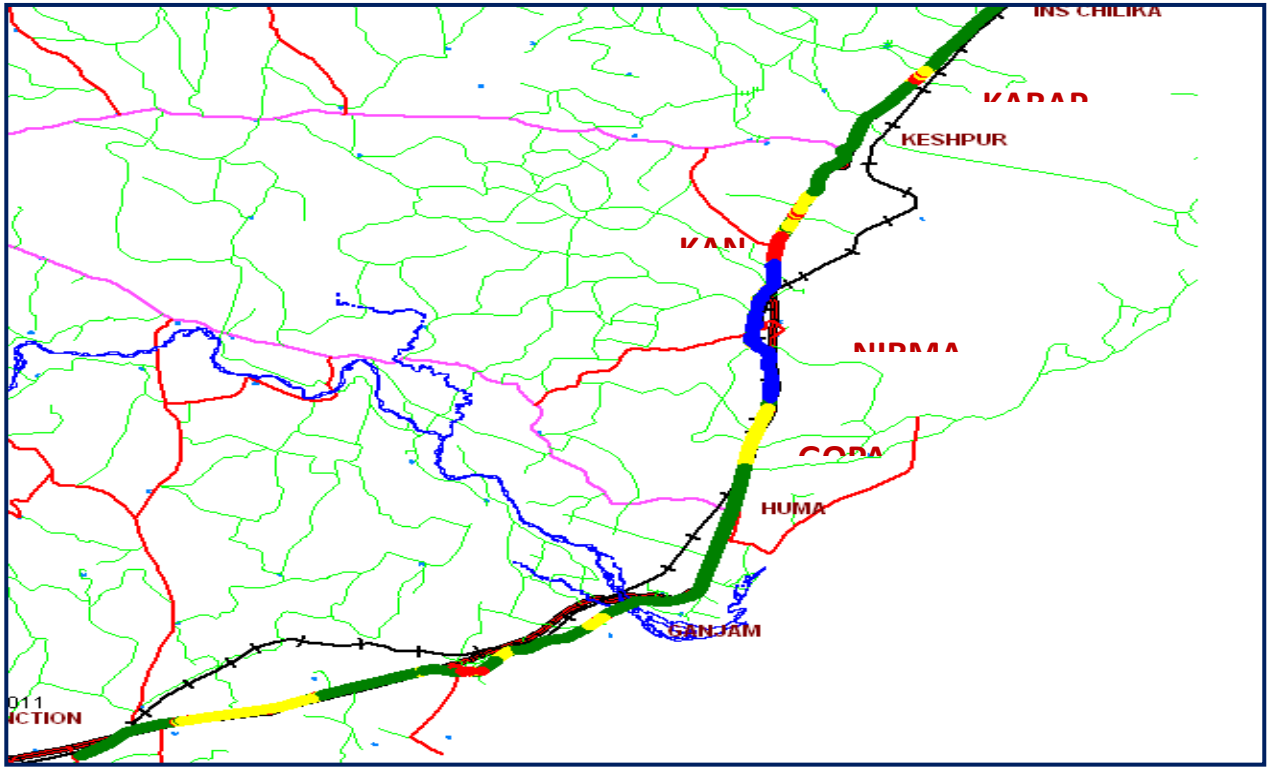
Day 3 – Within City



Day 3 – Major Roads



Day 3 – Highways



6.1.1.6 DRIVE TEST RESULTS – BERHAMPUR SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		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
0 to -75 dBm		95.53%	92.90%	80.18%	65.76%	63.50%	57.98%	66.66%	44.24%	40.43%	34.94%	49.25%	61.72%	75.13%	45.96%	67.46%	67.25%	37.76%	39.78%
0 to -85 dBm		99.67%	97.17%	93.38%	93.96%	91.41%	83.79%	99.99%	78.59%	43.18%	67.34%	100.00%	94.91%	79.62%	79.67%	98.69%	96.14%	85.40%	80.78%
0 to -95 dBm		100.00%	100.00%	99.79%	99.48%	99.89%	96.79%	99.99%	99.99%	86.16%	93.12%	100.00%	99.21%	99.95%	97.42%	99.96%	99.77%	99.25%	96.56%
Voice quality	≥ 95%	95.84%	95.84%	99.40%	98.80%	99.67%	96.24%	98.77%	96.21%	99.42%	98.37%	96.22%	94.50%	97.11%	97.87%	97.73%	97.75%	97.87%	96.30%
CSSR	≥ 95%	100.00%	98.82%	100.00%	100.00%	100.00%	97.83%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.31%	99.39%	99.29%	90.40%
%age Blocked calls		0.00%	1.20%	0.00%	0.00%	0.00%	1.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.69%	0.61%	0.71%	5.51%
Call drop rate	≤ 2%	0.00%	0.51%	0.00%	0.11%	0.00%	1.82%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.04%	0.00%	0.00%
Hands off success rate		100.00%	99.56%	100.00%	99.68%	100.00%	99.07%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%	99.69%	98.31%	100.00%	99.60%

Voice Quality

Reliance GSM did not meet the benchmark in outdoor locations while all other operators met the benchmark in outdoor as well as indoor locations.

Call Set Success Rate (CSSR)

Vodafone did not meet the benchmark for CSSR in outdoor locations while all other operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

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

6.1.2 AUGUST – BALASORE SSA

Month	Name of SSA Covered	Date of Drive Test
August	Balasore	26/8/2014 TO 28/8/2014

6.1.2.1 ROUTE DETAILS – BALASORE SSA

Category	Type of location	Orissa-August Balasore		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Basta,Jamusulia	Basudevpur, Ichhapur	Ichhapur, aredi
	Highways	Remuna, Basta, Bhadrak	Day2Bhadrak, dhamara	bhadrak, Dhamnagar, Akhuapada
	With in the City	Balasore city	Basudevpur city	Bhdrak City
Indoor	Shopping complex	New Market Complex, Balasore	Bhagawan Market Complex, Basudevpur	New Bus stand, Bhadrak
	Office complex	Door Sanchar Bhawan, Balasore	BSNL Exchange Basudevpur	Telephone Bhawan, Bhadrak

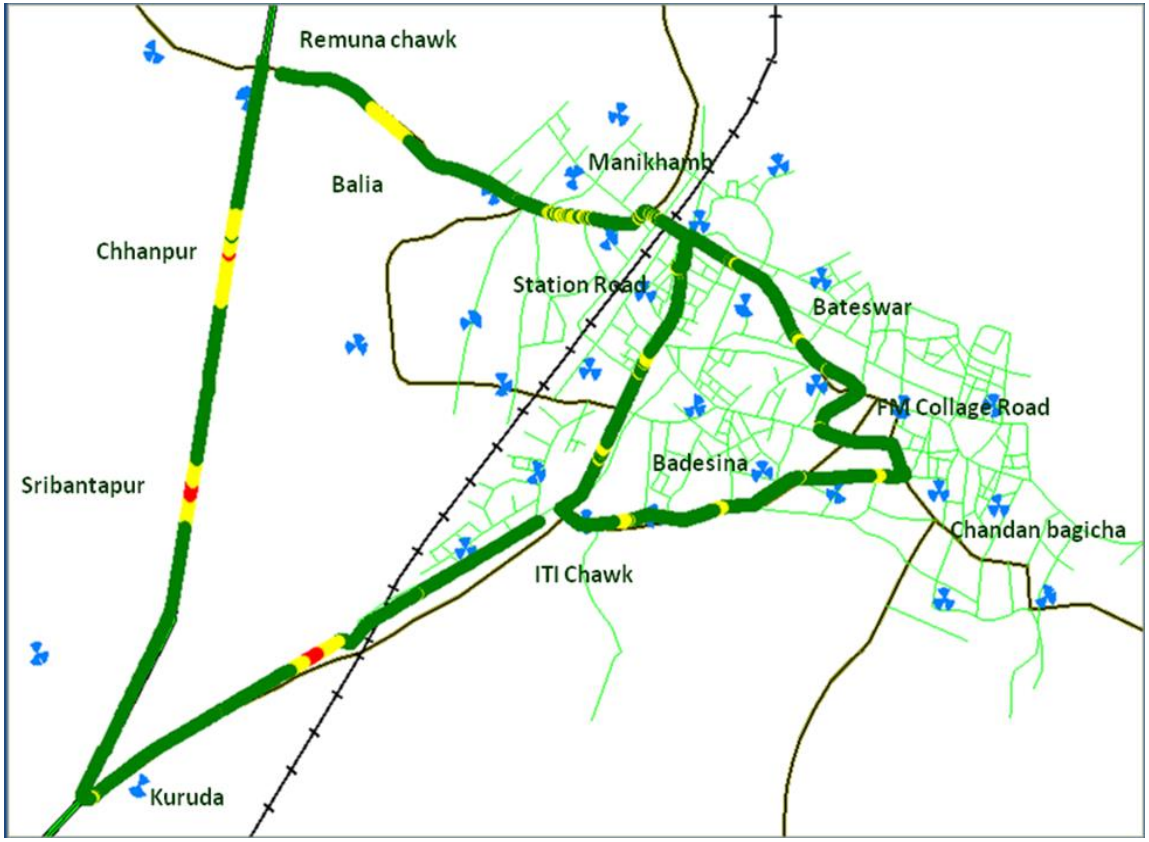
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.2.2 KILOMETERS TRAVELLED – BALASORE SSA

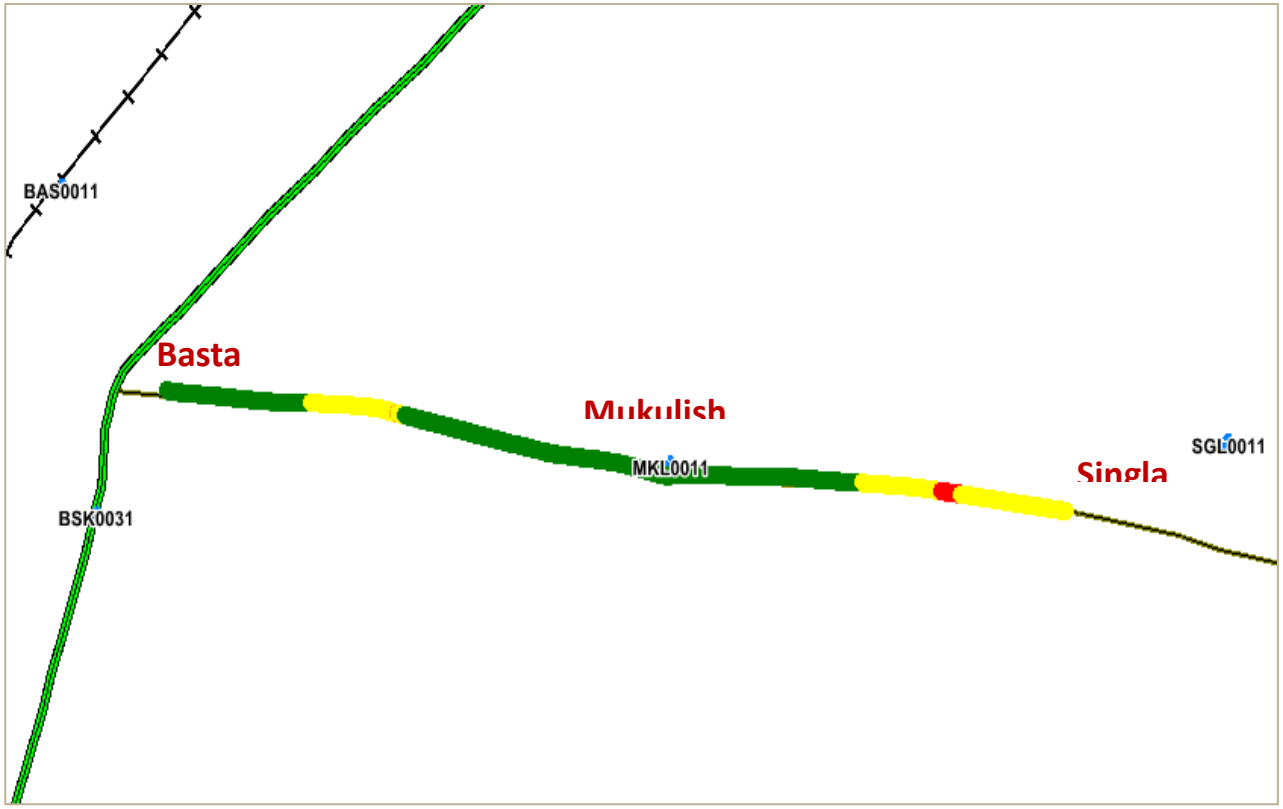
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Balasore	95	108	124	327

6.1.2.3 ROUTE MAP BALASORE DAY 1

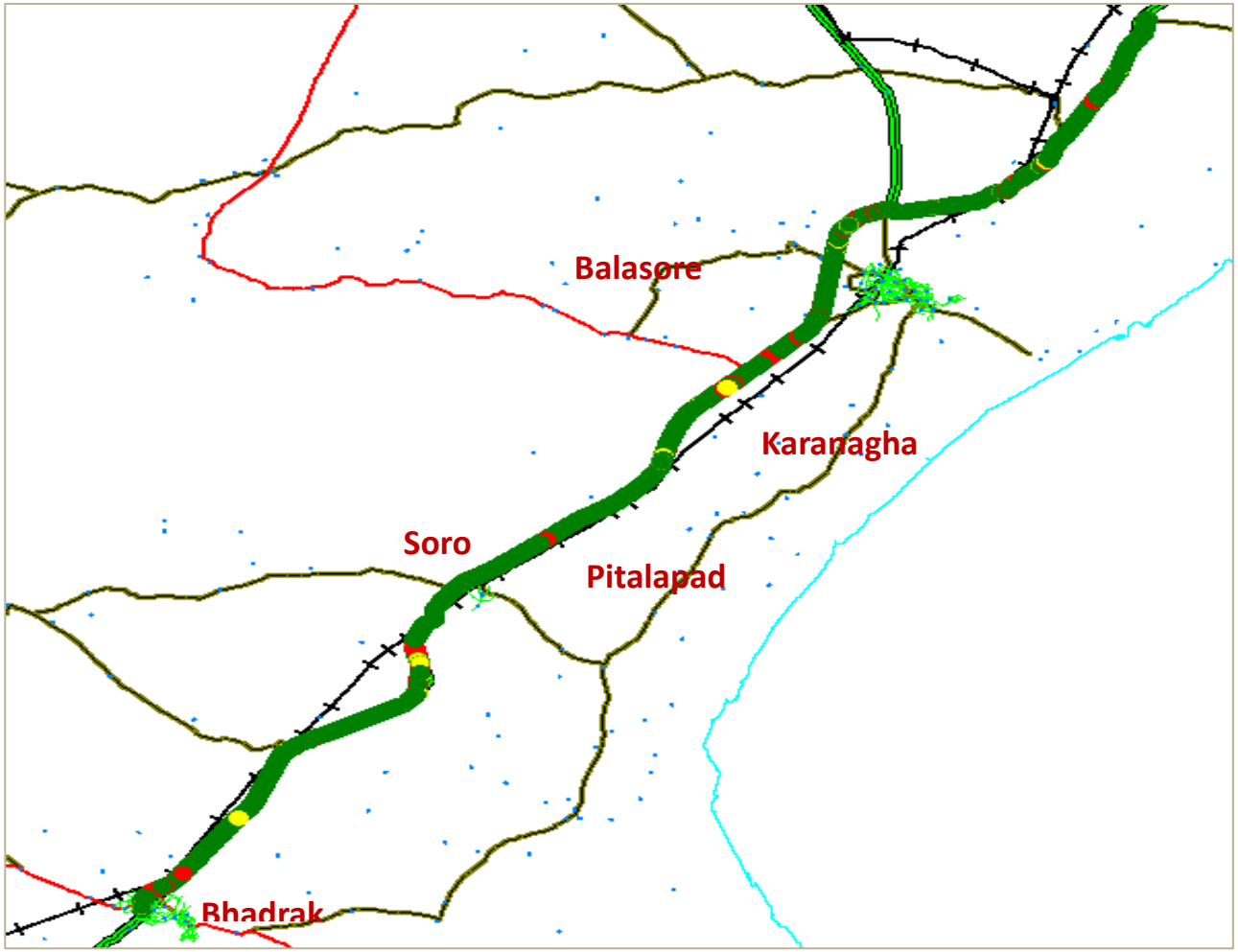
Day 1 – Within City



Day 1 – Major Roads

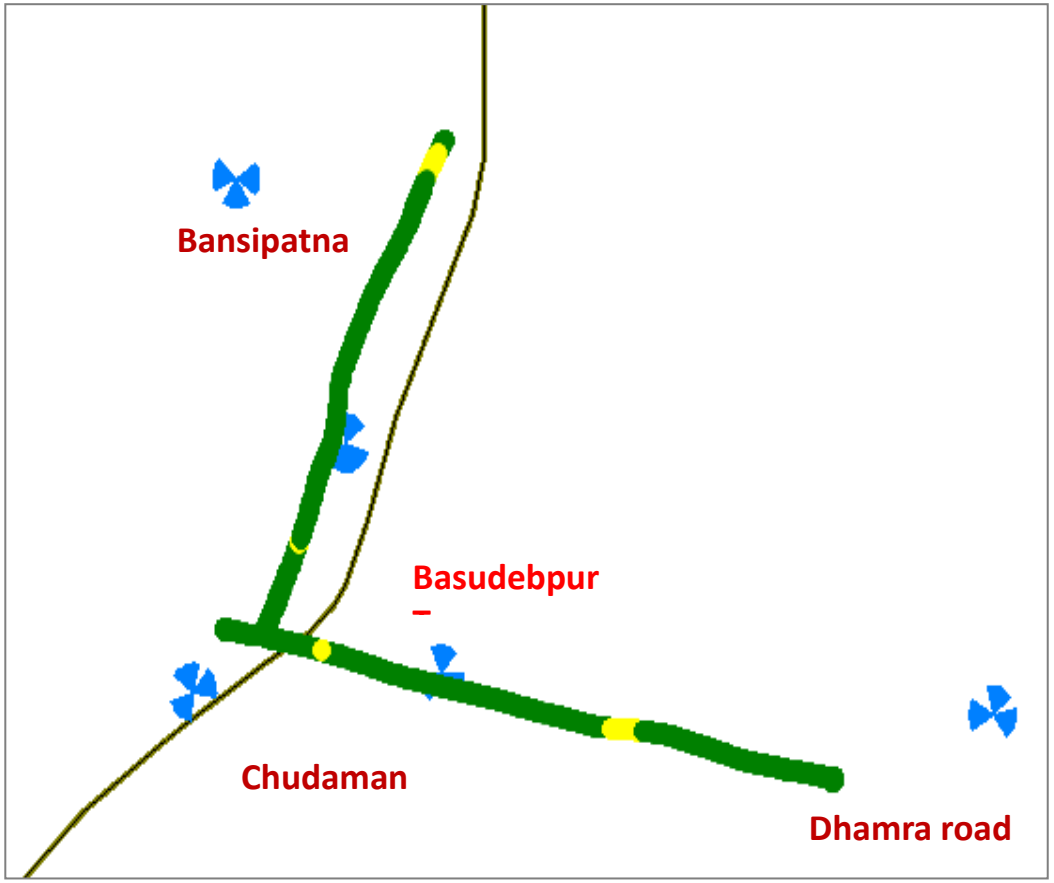


Day 1 – Highways

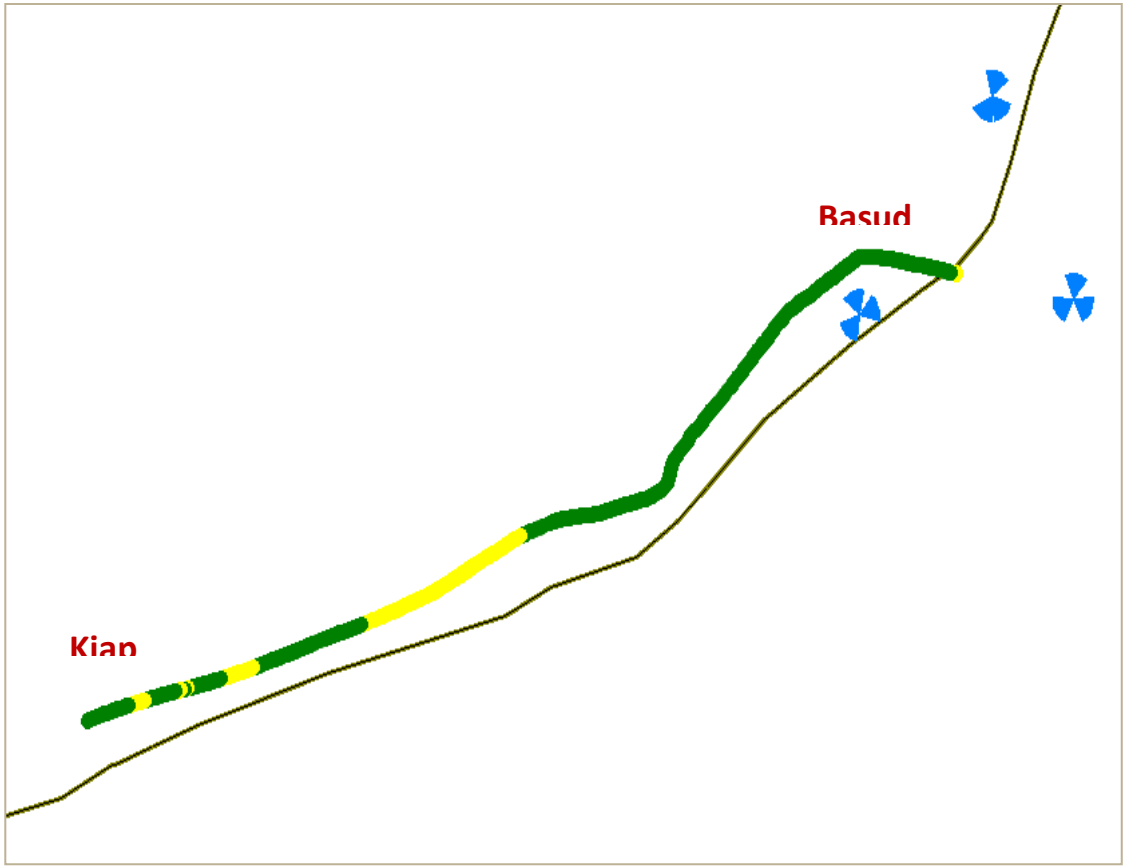


6.1.2.4 ROUTE MAP BALASORE DAY 2

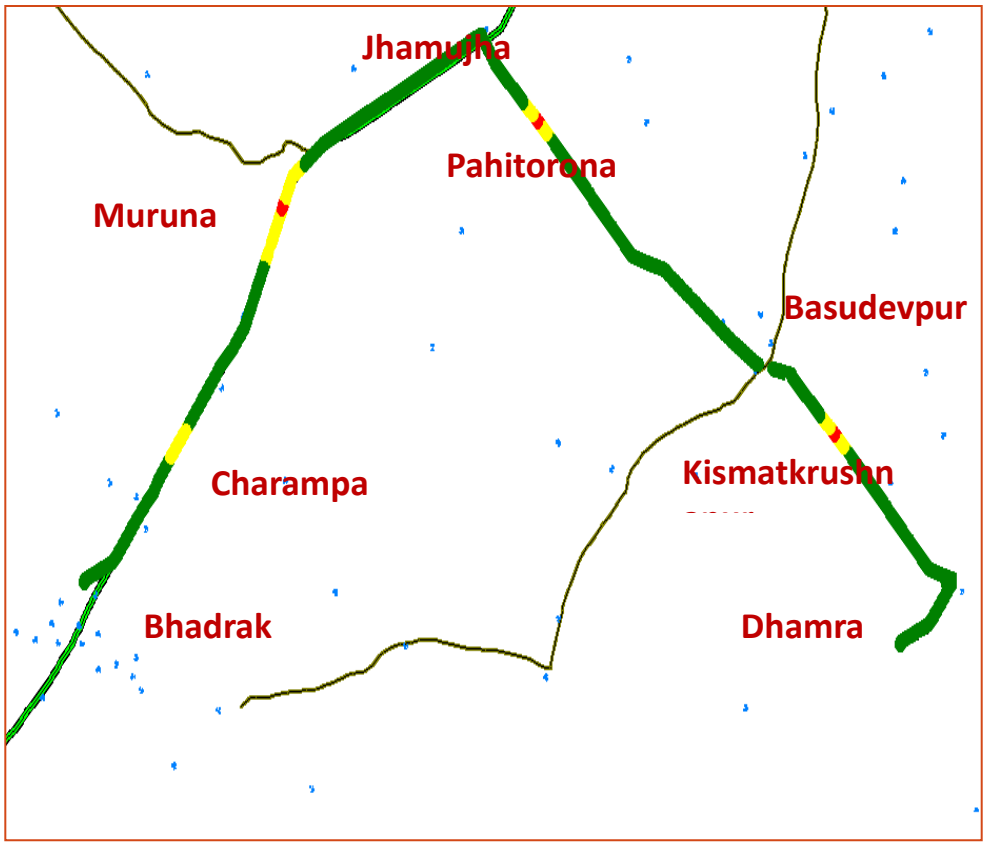
Day 2 – Within City



Day 2 – Major Roads

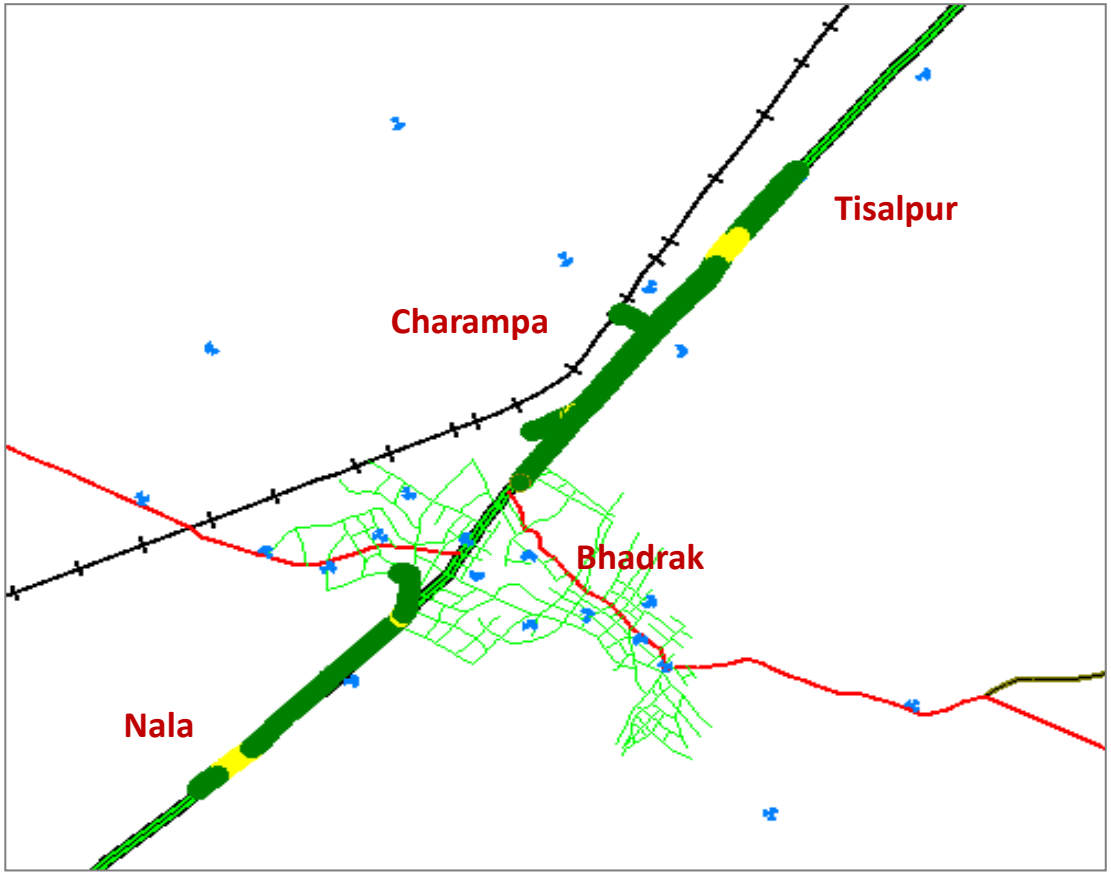


Day 2 – Highways

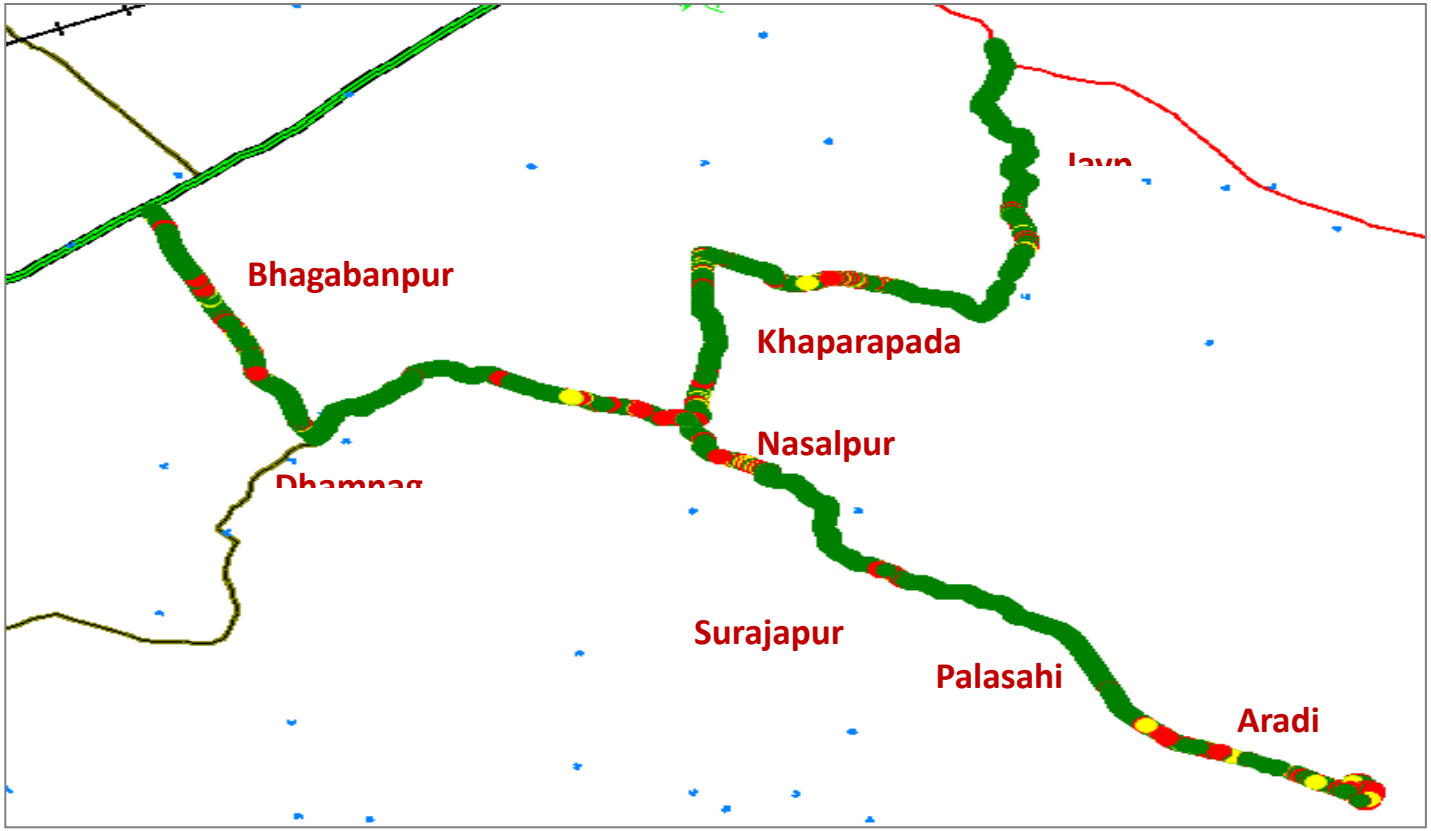


6.1.2.5 ROUTE MAP BALASORE DAY 3

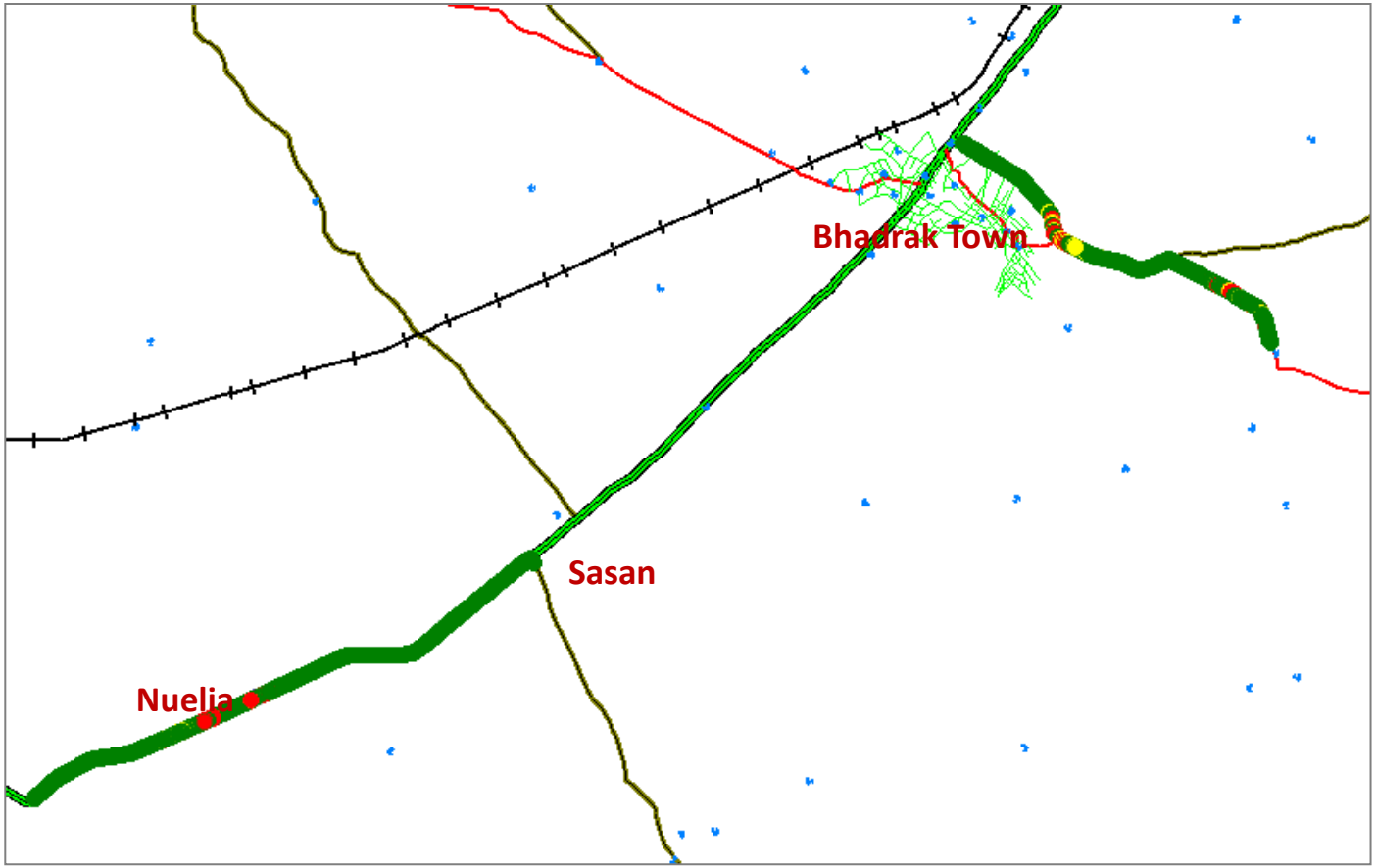
Day 3 – Within City



Day 3 – Major Roads



Day 3 – Highways



6.1.2.6 DRIVE TEST RESULTS – BALASORE SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		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
0 to -75 dBm		96.71%	79.74%	83.39%	69.51%	89.33%	35.97%	77.28%	31.86%	44.90%	45.06%	74.72%	58.18%	59.23%	38.84%	61.59%	67.68%	21.37%	51.00%
0 to -85 dBm		99.34%	94.19%	99.08%	96.41%	99.00%	75.52%	99.99%	78.84%	93.19%	78.64%	98.24%	86.26%	90.11%	76.59%	97.80%	94.11%	91.69%	91.89%
0 to -95 dBm		100.00%	99.48%	100.00%	99.97%	100.00%	97.46%	99.99%	99.99%	100.00%	97.64%	100.00%	97.36%	100.00%	98.70%	99.91%	99.33%	99.85%	99.32%
Voice quality	≥ 95%	97.08%	93.04%	98.87%	98.74%	95.85%	94.18%	98.64%	96.59%	99.49%	98.07%	99.58%	97.02%	99.61%	98.07%	98.64%	94.95%	98.46%	95.66%
CSSR	≥ 95%	100.00%	99.18%	100.00%	100.00%	100.00%	99.83%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.84%	100.00%	98.45%	100.00%	98.67%
%age Blocked calls		0.00%	1.15%	0.00%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%	0.00%	1.55%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	1.60%	0.00%	0.00%	0.00%	0.18%	0.00%	0.19%	0.00%	0.00%	0.00%	0.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	88.98%	100.00%	99.94%	70.00%	97.89%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	88.33%	100.00%	99.61%

VOICE QUALITY

Aircel, BSNL and Tata GSM failed to meet the voice quality benchmark in outdoor locations.

CALL SET SUCCESS RATE (CSSR)

All operators met the benchmark for the parameter in both indoor and outdoor locations.

CALL DROP RATE

All operators met the benchmark for the parameter in both indoor and outdoor locations.

6.1.3 SEPTEMBER – BHAWANIPATNA SSA

Month	Name of SSA Covered	Date of Drive Test
September	Bhawanipatna	17th to 19th, September 2014

6.1.3.1 ROUTE DETAILS – BHAWANIPATNA SSA

Category	Type of location	Orissa-September		
		Bhawanipatna		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Mote to Mukhiguda- No Network coverage	Khariar, Areda, Bhalumunda	M. Rampur, Narla, Chatiguda,Bhawanipatna
	Highways	Bhawanipatna, Junagarh, Moter, Koksara	Bhawanipatna, khariar, komna, Nuapada	Bhawanipatna, Kesinga, Amatha, M.Rampur
	With in the City	Bhawanipatna city	Nuapada city	Kesinga city
Indoor	Shopping complex	Bus stand market complex, Bhawanipatna	Guru Nanak Market Complex, Khariar	Manjit Market complex, kesinga
	Office complex	Telephone Bhawan, Bhawanipatna	Telephone Bhawan Khariar	Telephone Exchange,Kesinga

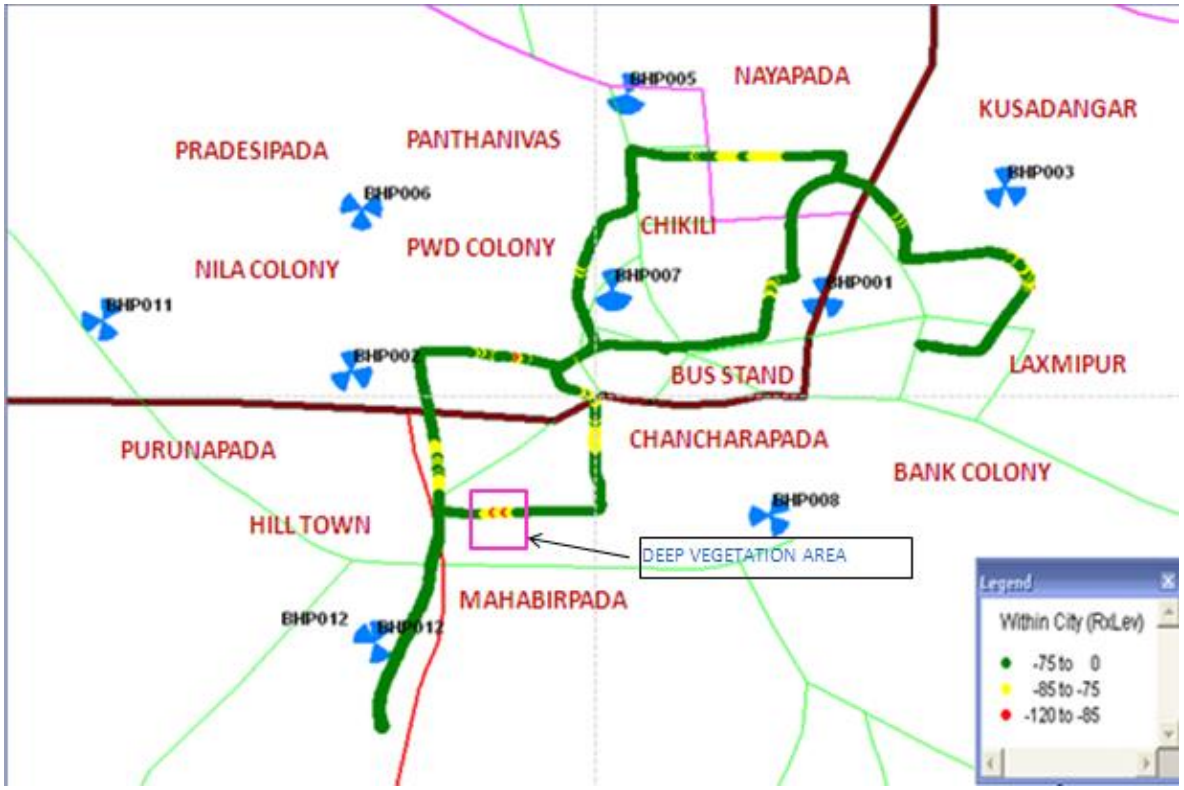
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.3.2 KILOMETERS TRAVELLED – BHAWANIPATNA SSA

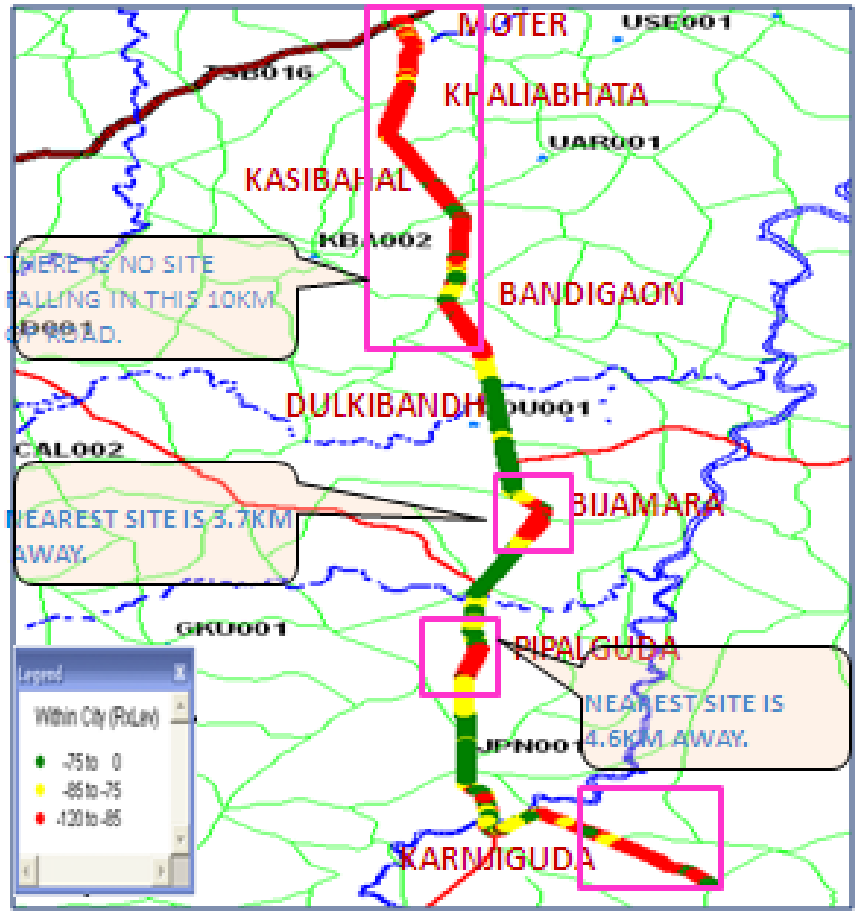
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Bhawanipatna	86	99	119	304

6.1.3.3 ROUTE MAP BHAWANIPATNA DAY 1

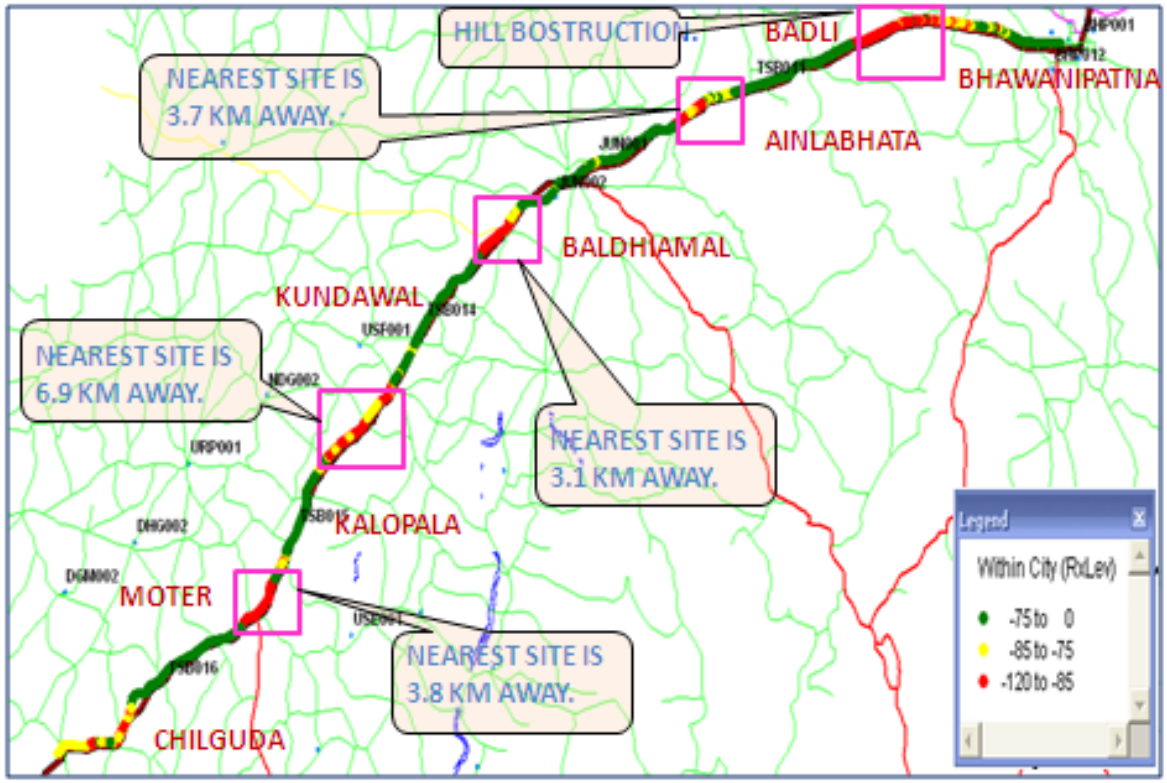
Day 1 – Within City



Day 1 – Major Roads

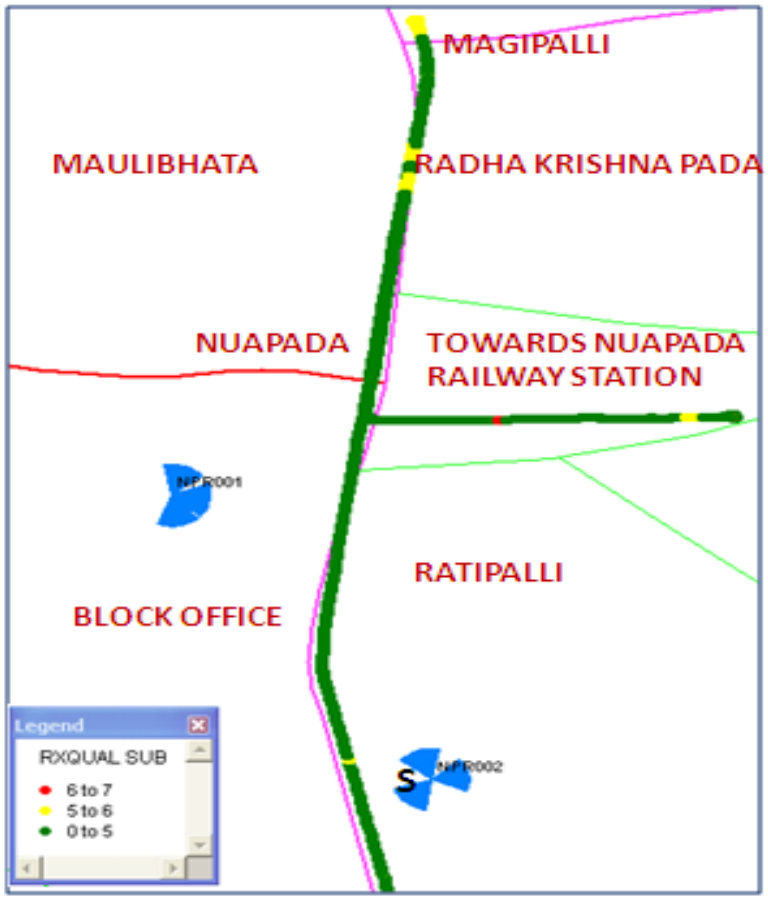


Day 1 – Highways

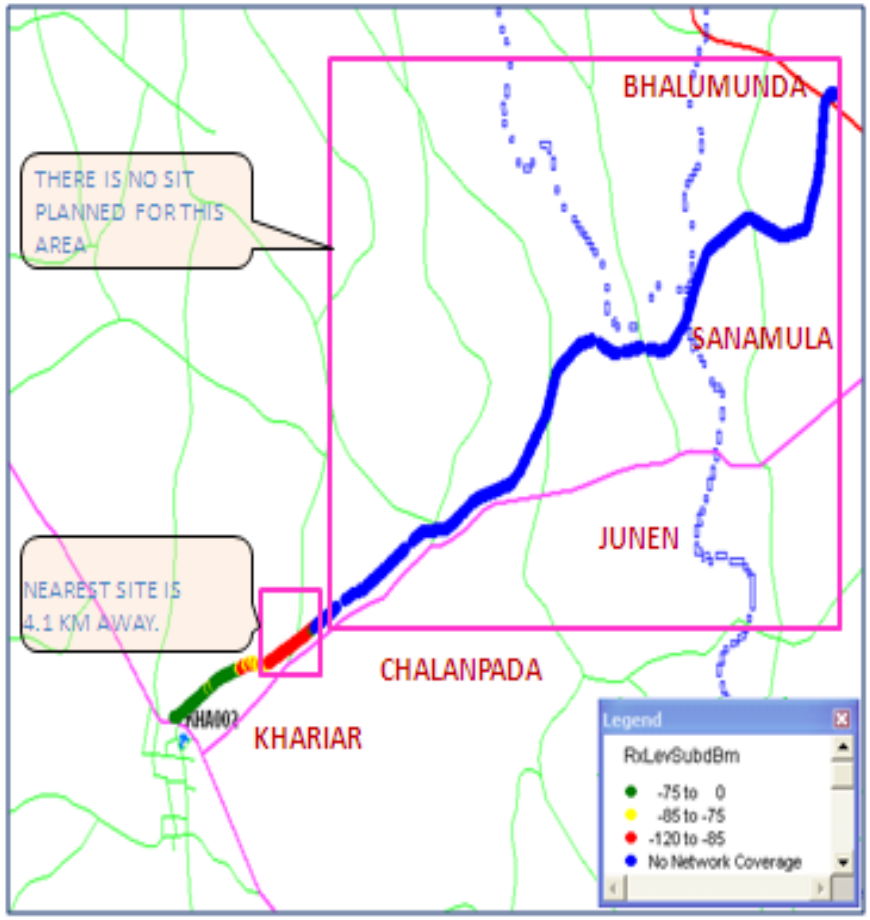


6.1.3.4 ROUTE MAP BHAWANIPATNA DAY 2

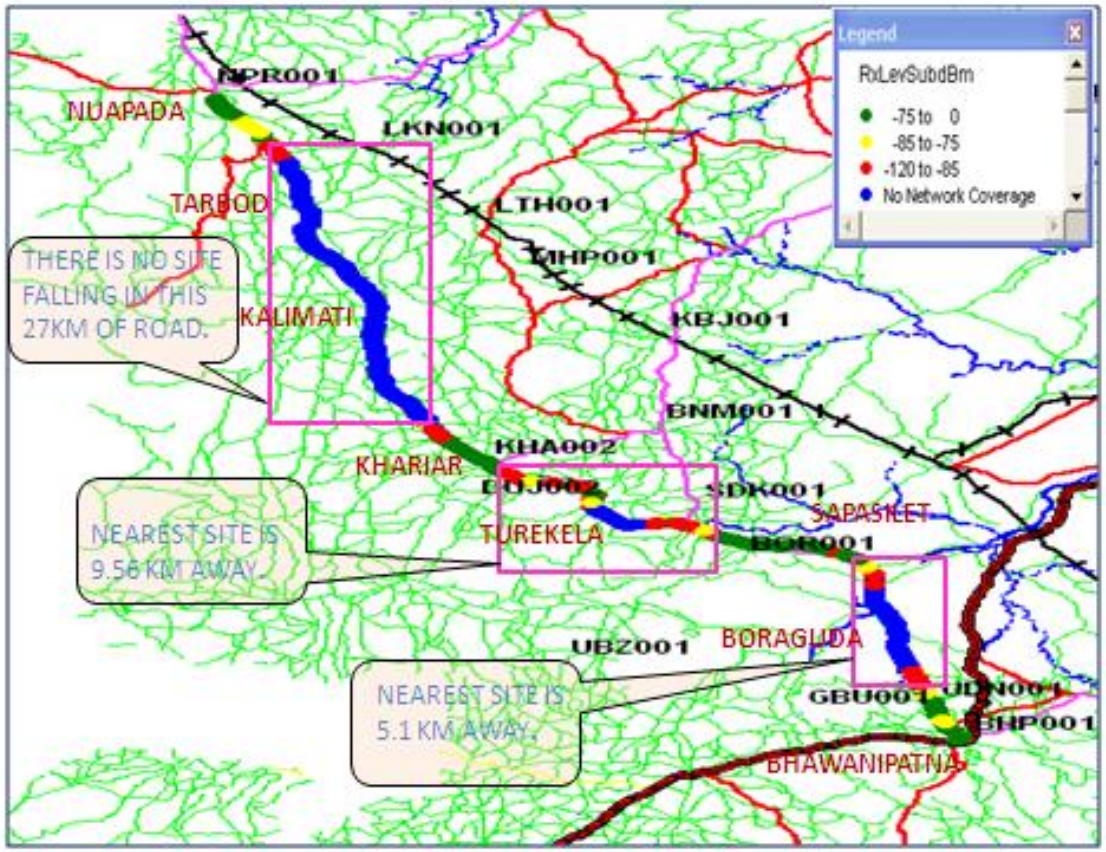
Day 2 – Within City



Day 2 – Major Roads

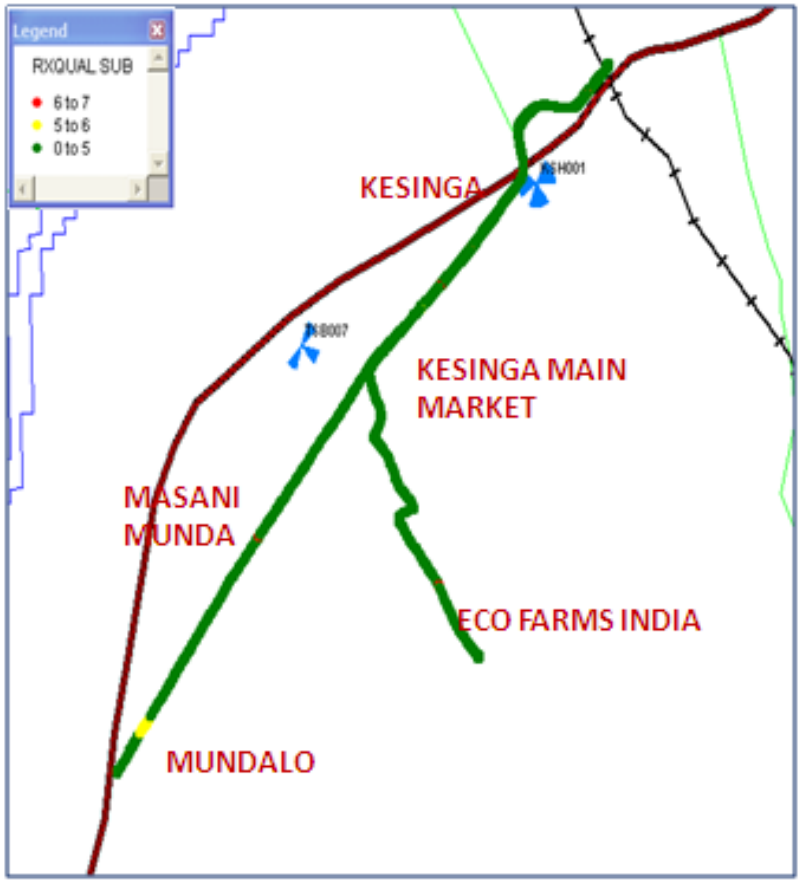


Day 2 – Highways

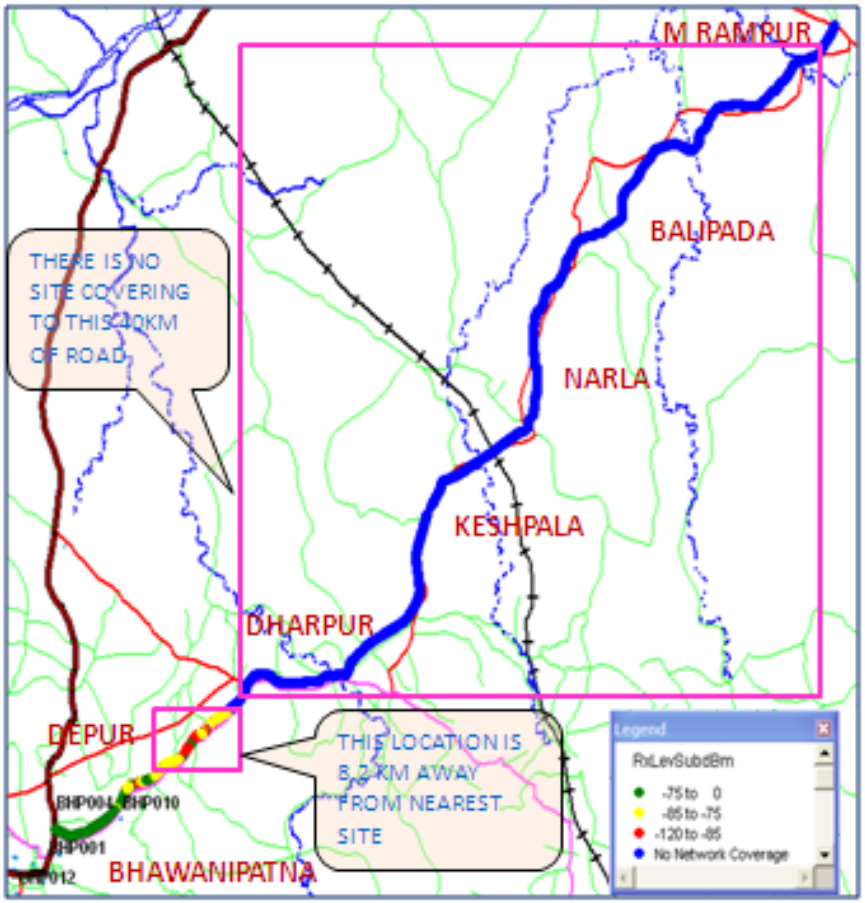


6.1.3.5 ROUTE MAP BHAWANIPATNA DAY 3

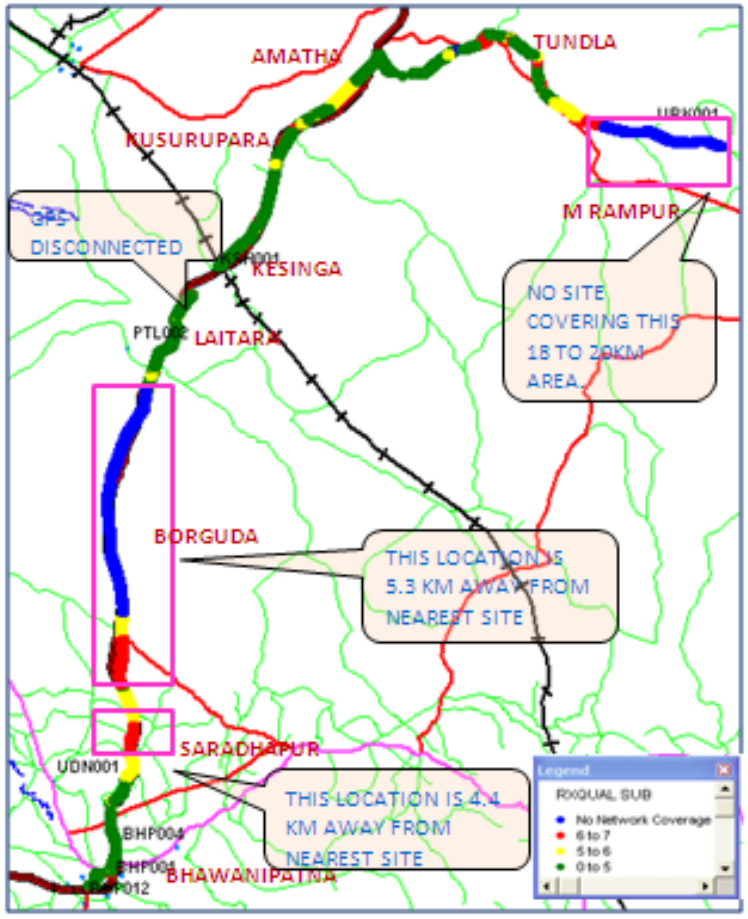
Day 3 – Within City



Day 3 – Major Roads



Day 3 – Highways



6.1.3.6 DRIVE TEST RESULTS – BHAWANIPATNA SSA

Executive Summary																			
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		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
0 to -75 dBm		54.43%	75.04%	98.15%	75.21%	73.78%	49.25%	81.22%	32.88%	20.53%	30.77%	38.33%	26.95%	NA		61.59%	56.64%	57.69%	44.22%
0 to -85 dBm		97.66%	86.66%	99.79%	94.29%	98.21%	70.58%	99.99%	78.68%	53.68%	50.52%	86.87%	64.22%			97.80%	86.39%	97.05%	78.89%
0 to -95 dBm		100.00%	100.00%	100.00%	99.33%	99.99%	88.85%	99.99%	99.99%	84.12%	71.14%	100.00%	86.19%			99.91%	96.37%	99.87%	94.11%
Voice quality	≥ 95%	98.21%	83.62%	98.86%	98.38%	99.22%	97.55%	98.88%	98.36%	99.96%	77.02%	99.31%	94.04%			98.64%	68.52%	98.94%	96.98%
CSSR	≥ 95%	100.00%	99.12%	100.00%	99.91%	100.00%	99.56%	100.00%	100.00%	100.00%	100.00%	100.00%	99.67%			100.00%	98.45%	100.00%	93.95%
%age Blocked calls		0.00%	0.88%	0.00%	0.09%	0.76%	0.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.33%			0.00%	1.55%	0.00%	1.77%
Call drop rate	≤ 2%	0.00%	0.68%	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	99.11%	100.00%	99.83%	100.00%	99.25%	100.00%	100.00%	100.00%	100.00%	100.00%	99.77%			100.00%	99.44%	100.00%	97.62%

Note: Tata CDMA did not participate in the drive test as the operator did not have any coverage/ BTS site available in the area.

VOICE QUALITY

Aircel, Reliance CDMA, Reliance GSM and Tata GSM did not meet the benchmark for voice quality in outdoor locations.

CALL SET SUCCESS RATE (CSSR)

Vodafone failed to meet the benchmark for CSSR in outdoor locations.

CALL DROP RATE

All operators met the TRAI benchmark for call drop rate.

6.2 INDEPENDENT DRIVE TEST

No independent drive test was conducted in Orissa during the period of JAS'14.

7 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Excluding Tata GSM on call drop rate and Tata CDMA on worst affected cells having more than 3% TCH drop, all operators met the benchmark for all network parameters

3 Day Live Measurement (Network Parameters)

Excluding Tata CDMA on worst affected cells having more than 3% TCH drop, all operators met the benchmark for all network parameters

Live Calling

Reliance CDMA failed to meet the benchmark for billing complaints resolved within 4 weeks.

None of the operators met the benchmark for Level 1 services.

Billing and Customer Care

For the postpaid customers, Reliance CDMA and Reliance GSM failed to meet the TRAI benchmark. For the prepaid customers, Reliance GSM failed to meet the TRAI benchmark.

Aircel, which recorded very low performance when compared to other operators, failed to meet the benchmark for calls answered by IVR.

Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark for calls answered by the operators (Voice to Voice) within 90 seconds.

Drive Test (Operator Assisted)

Reliance GSM did not meet the benchmark in outdoor locations in Berhampur SSA.

Aircel, BSNL and Tata GSM failed to meet the voice quality benchmark in outdoor locations in Balasore SSA.

Aircel, Reliance CDMA, Reliance GSM and Tata GSM did not meet the benchmark for voice quality in outdoor locations in Bhawanipatna SSA.

8 ANNEXURE

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability										
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2557	4618	380	1880	475	1861	345	1532	3595
Sum of downtime of BTSs in a month (in hours)		21719	6108	690	4126	967	1421	191	312	4117
BTSs accumulated downtime (not available for service)	≤ 2%	1.14%	0.18%	0.26%	0.30%	0.27%	0.10%	0.08%	0.03%	0.15%
Number of BTSs having accumulated downtime >24 hours		49	28	3	18	3	6	0	1	23
Worst affected BTSs due to downtime	≤ 2%	1.92%	0.61%	0.83%	0.97%	0.63%	0.32%	0.00%	0.07%	0.63%

Live Measurement- BTSs accumulated downtime										
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2557	4624	379	1880	475	1861	345	1532	3595
Sum of downtime of BTSs in a month (in hours)		1869	653	91	323	88	113	23	52	409
(not available for service)	≤ 2%	1.02%	0.20%	0.36%	0.24%	0.26%	0.08%	0.09%	0.05%	0.16%
Number of BTSs having accumulated downtime >24 hours		7	1	1	0	0	0	0	0	1
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	0.28%	0.02%	0.19%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	99.07%	97.67%	98.86%	99.22%	99.40%	97.60%	98.53%	98.03%	99.59%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.39%	0.28%	0.48%	0.38%	0.00%	0.22%	0.00%	0.07%	0.20%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	0.66%	1.61%	1.57%	0.06%	0.00%	0.75%	0.08%	0.39%	0.41%

Live measurement results for CSSR, SDCCH and TCH congestion										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	99.06%	98.75%	98.90%	99.27%	99.19%	98.59%	98.68%	98.03%	99.70%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.43%	0.23%	0.41%	0.38%	0.00%	0.25%	0.00%	0.04%	0.22%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	0.67%	1.38%	1.51%	0.06%	0.17%	0.48%	0.07%	0.41%	0.30%

Drive test results for CSSR (Average of three drive tests) and blocked calls										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		435	513	465	382	352	435	309	400	460
Total number of successful calls established		431	512	461	382	352	435	308	395	446
CSSR	≥ 95%	98.93%	99.94%	99.11%	100.00%	100.00%	99.90%	99.89%	98.78%	96.89%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		1.07%	0.06%	0.89%	0.00%	0.00%	0.10%	0.12%	1.22%	3.11%

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		88454797	330393851	197691448	38523486	6555370	60817631	7081681	32489776	108167756
Total number of calls dropped		1303102	3919200	2915553	179960	25197	327946	60277	231750	834664
Call drop rate	≤ 2%	1.47%	1.19%	1.48%	0.47%	0.38%	0.54%	0.85%	2.09%	0.77%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7504	14643	1095	5642	1425	5594	1058	4619	10729
Total number of cells having more than 3% TCH		221	289	19	74	39	15	44	101	278
Worst affected cells having more than 3% TCH	≤ 3%	2.94%	1.97%	1.71%	1.32%	2.72%	0.26%	4.19%	2.19%	2.59%

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		9037934	32839963	20008969	3942759	8748026	71020231	968070	45550635	10766450
Total number of calls dropped		129873	405051	298623	19280	25944	356710	5397	178890	78778
Call drop rate	≤ 2%	1.44%	1.24%	1.49%	0.49%	0.30%	0.50%	0.55%	0.43%	0.73%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7505	14663	1121	5642	1425	5594	1058	4619	10729
Total number of cells having more than 3% TCH		219	342	16	73	37	13	39	101	280
Worst affected cells having more than 3% TCH	≤ 3%	2.92%	2.33%	1.37%	1.30%	2.62%	0.24%	3.65%	2.19%	2.61%

Drive test results for Call drop rate (Average of three drive tests)										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		431	512	461	382	352	435	308	395	446
Total number of calls dropped		5	0	5	1	0	0	0	1	0
Call drop rate	≤ 2%	1.04%	0.06%	0.97%	0.15%	0.00%	0.07%	0.00%	0.19%	0.00%

8.4 VOICE QUALITY

Audit Results for Voice quality										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		11403155372	54615826923	39196332534	5092437333	NA	2030058321	11530191959	9570611539	19308906315
Total number of calls with good voice quality		10838323892	52496209688	37975058208	4884093897	NA	1991872016	11328702675	9339179774	18950665798
%age calls with good voice quality	≥ 95%	95.05%	96.12%	96.89%	95.91%	99.78%	98.12%	98.25%	97.58%	98.14%

Live measurement results for Voice quality										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1125639890	5415891598	3926384903	517413217	NA	2528814500	1105718855	8589356973	1914367652
Total number of calls with good voice quality		1070492440	5206462240	3807584686	495939308	NA	2485967336	1086419304	8403469293	1878741998
%age calls with good voice quality	≥ 95%	95.10%	96.13%	96.98%	95.86%	99.79%	98.30%	98.26%	97.75%	98.14%

Drive test results for Voice quality (Average of three drive tests)										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		435271	61397	278232	209319	NA	43005	NA	540169	809463
Total number of calls with good voice quality		397701	60536	265663	203253	NA	41230	NA	503467	782264
%age calls with good voice quality	≥ 95%	90.48%	98.60%	96.04%	97.54%	92.75%	95.97%	98.05%	93.14%	96.66%

NA: Reliance CDMA does not provide the Numerator and denominator values for any of the month hence it is Not Applicable. As per the operator it is not feasible to generate the values in their current system.

8.5 POI CONGESTION

Audit Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	52	64	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65397	110559	25000	37872	10972	27597	13856	346729	1008888
Traffic served for all POIs (B)- in erlangs		41963	57970	24396	21730	3486	16647	6517	185676	620571
POI congestion	≤ 0.5%	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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	64	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65493	110083	25000	1337358	10966	27597	13857	33907	152862
Traffic served for all POIs (B)- in erlangs		43077	58870	22208	22120	3271	16632	6746	18787	74995
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

July									
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	446001	61803	53948	93913	NA	52496	NA	370031	713184
August									
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	550190	60098	595381	466831	NA	37801	NA	734416	924130
September									
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	309623	62291	185367	67212	NA	38718	NP	516060	791075

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

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance										
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Billing disputes - Postpaid										
Total bills generated during the period		7873	98695	178479	2566	50231	86374	4855	15128	119607
Total number of bills disputed		0	85	4	0	63	105	0	0	69
Percentage bills disputed	≤ 0.1%	0.00%	0.09%	0.00%	0.00%	0.13%	0.12%	0.00%	0.00%	0.06%
Billing disputes - Prepaid										
Number of complaints related to charging, credit & validity		1455	5896	8510	3357	316	10380	0	345	9298
Total number of prepaid customers in that period		3847651	24390936	9831097	3507366	843375	10204659	174879	2296223	10573671
Percentage of complaints	≤ 0.1%	0.04%	0.02%	0.09%	0.10%	0.04%	0.10%	0.00%	0.02%	0.09%

Resolution of billing complaints										
Total number of billing/charging complaints		1455	5981	8514	3357	379	10485	0	345	9367
Total complaints considered invalid		1432	5720	2394	2425	124	2632	0	345	789
Number of complaints resolved in 4 weeks		1455	5981	8485	3357	379	10485	0	345	9367
Percentage complaints resolved within 4 weeks	98.00%	100.00%	100.00%	99.66%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		23	261	6120	932	255	7853	0	0	8578
Percentage cases in which credit/waiver was received within 1 week	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made		100	100	100	100	30	100	4	56	100
Number of cases resolved in 4 weeks		100	99	99	99	29	98	4	56	100
Percentage cases resolved in four weeks	98.00%	100.00%	99.00%	99.00%	99.00%	96.67%	98.00%	100.00%	100.00%	100.00%
Percentage cases resolved in four weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		19697830	3279430	2176998	3528156	296343	5449641	371268	6551521	7682727
Number of calls getting connected and answered (electronically)		11314545	3279430	2103649	3498519	293223	5389360	364301	6294743	7681541
Percentage calls getting connected and answered	≥ 95%	57.44%	100.00%	96.63%	99.16%	98.95%	98.89%	98.12%	96.08%	99.98%
Total number of call attempts to callecenter during TCBH		2617371	3279430	180815	3528156	296343	5449641	34693	619154	252681
No. of calls connected and answered successfully during TCBH		791632	3279430	172430	3498519	293223	5389360	34150	592332	242185
Number of calls getting transferred to the operator (voice to voice)		2923388	NA	NA	1228369	NA	NA	NA	NA	NA
Number of calls answered by operator (voice to voice) within 60 seconds		2734183	NA	NA	1200065	NA	NA	NA	NA	NA
Percentage calls answered within 60 seconds (V2V)	≥ 90%	93.53%	NA	NA	97.70%	NA	NA	NA	NA	NA
Number of calls getting transferred to the operator (voice to voice)		NA	5364532	1065078	NA	41751	1649581	24146	751133	2813474
Number of calls answered by operator (voice to voice) within 90 seconds		NA	5271620	1024932	NA	37636	1545398	23025	648745	2777567
Percentage calls answered within 90 seconds (V2V)	≥ 95%	NA	98.27%	96.23%	NA	90.14%	93.68%	95.36%	86.37%	98.72%

Live calling results for customer care (IVR)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	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
Number of calls getting connected and answered (electronically)		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%

Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	100	100	100
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%

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service										
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		428	160	254	50	83	263	167	681	175
Number of requests attended within 7 days		428	160	254	50	83	263	167	681	175
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits										
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		128	180	213	76	235	145	78	161	44
Total number of cases where refund was made within 60 days		128	180	213	76	235	145	78	161	44
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang									
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Eqipped capacity of the network	126349	302133	40000	49124	53000	92000	65272	82658	111788
Total taffic handled in erlang during TCBH	67974	255610	14167	32099	8303	57132	8195	38515	88391
Total no. of customers served (as per VLR)	2302056	7947383	421874	1112753	264965	3247702	136008	1329478	3056341

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made	100	100	100	100	22	100	100	100	100
Number of cases resolved to satisfaction	99	99	98	98	22	99	100	100	99
Percentage cases resolved in four weeks	99.00%	99.00%	98.00%	98.00%	100.00%	99.00%	100.00%	100.00%	99.00%

8.13 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services										
Level 1 services	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		60	100	120	90	60	60	130	130	110
% of calls connected in 60 seconds	≥ 95%	40.00%	66.67%	80.00%	60.00%	40.00%	40.00%	86.67%	86.67%	73.33%

8.14 LEVEL 1 SERVICES CALLS MADE

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

Airtel			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	10	0
103	10	0	10
104	10	10	0
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	0	10
1098	10	10	0

BSNL			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	10	10	0
101	10	10	0
102	10	10	0
103	10	0	10
104	10	10	0
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	10	0
1096	10	0	10
1098	10	10	0

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	10	0
103	10	0	10
104	10	10	0
1056	10	0	10
1070	10	10	0
1071	10	0	10
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

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

Reliance 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	10	0
103	10	0	10
104	10	0	10
1056	10	0	10
1070	10	10	0
1071	10	0	10
1072	10	10	0
1073	10	0	10
1076	10	0	10
1091	10	0	10
1095	10	0	10
1096	10	0	10
1098	10	10	0

TATA CDMA				TATA GSM				Vodafone			
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	10	0
101	10	10	0	101	10	10	0	101	10	10	0
102	10	10	0	102	10	10	0	102	10	10	0
103	10	10	0	103	10	10	0	103	10	10	0
104	10	10	0	104	10	10	0	104	10	10	0
1056	10	10	0	1056	10	10	0	1056	10	10	0
1070	10	10	0	1070	10	10	0	1070	10	10	0
1071	10	0	10	1071	10	0	10	1071	10	0	10
1072	10	10	0	1072	10	10	0	1072	10	10	0
1073	10	10	0	1073	10	10	0	1073	10	10	0
1076	10	10	0	1076	10	10	0	1076	10	0	10
1091	10	10	0	1091	10	10	0	1091	10	10	0
1095	10	10	0	1095	10	10	0	1095	10	0	10
1096	10	0	10	1096	10	0	10	1096	10	0	10
1098	10	10	0	1098	10	10	0	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 in the circle.

1. Connection Establishment (Accessibility)

A. CALL SETUP SUCCESS RATE:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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

B. SDCCH BLOCKING:

KPI is calculated as Average over the month at TCBH

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

Where,

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

C. TCH BLOCKING:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

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

Where,

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

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 – JUL'14

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2562	4583	347	1880	475	1856	345	1531	3568
Sum of downtime of BTSs in a month (in hours)		18482	6713	1373	4715	1325	1824	219	176	3993
BTSs accumulated downtime (not available for service)	≤ 2%	0.97%	0.20%	0.53%	0.34%	0.37%	0.13%	0.09%	0.02%	0.15%
Number of BTSs having		48	27	6	17	3	12	0	0	23

accumulated downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	1.87%	0.59%	1.73%	0.90%	0.63%	0.65%	0.00%	0.00%	0.64%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2562	4595	346	1880	475	1856	345	1531	3568
Sum of downtime of BTSs in a month (in hours)		1238	481	230	246	106	115	57	57	293
BTSs accumulated downtime (not available for service)	≤ 2%	0.67%	0.15%	0.92%	0.18%	0.31%	0.09%	0.23%	0.05%	0.11%
Number of BTSs having accumulated		0	0	2	0	0	0	0	0	0

downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.58%	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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	99.01%	95.56%	98.36%	99.52%	99.39%	97.45%	98.51%	98.28%	99.55%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.36%	0.35%	0.74%	0.36%	0.00%	0.29%	0.00%	0.05%	0.16%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	0.72%	1.69%	1.64%	0.06%	0.00%	1.16%	0.16%	0.41%	0.45%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance	Reliance	TATA CDMA	TATA GSM	Vodafone

						CDMA	GSM			
CSSR	≥ 95%	99.05%	98.69%	98.49%	99.49%	98.74%	98.45%	98.65%	98.46%	99.57%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.14%	0.25%	0.94%	0.45%	0.00%	0.53%	0.00%	0.04%	0.18%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	0.65%	1.54%	1.51%	0.05%	0.50%	0.53%	0.09%	0.36%	0.43%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		439	519	500	393	360	482	180	345	417
Total number of successful calls established		434	519	489	393	360	482	180	342	397
CSSR	≥ 95%	98.86%	100.00%	97.80%	100.00%	100.00%	100.00%	100.00%	99.13%	95.20%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

%age blocked calls		1.14%	0.00%	2.20%	0.00%	0.00%	0.00%	0.00%	0.87%	4.80%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		90785963	349371413	199028704	37149440	6926854	62316608	7434685	47107766	110472950
Total number of calls dropped		1389693	3939723	3001955	164142	27522	336853	63091	234779	844634
Call drop rate	≤ 2%	1.53%	1.13%	1.51%	0.44%	0.40%	0.54%	0.85%	0.50%	0.76%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7517	14525	1017	5640	1425	5568	1057	4617	10647
Total number of		222	275	19	68	37	15	43	100	307

cells having more than 3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	2.95%	1.89%	1.87%	1.21%	2.60%	0.27%	4.07%	2.17%	2.88%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		8930587	34476904	19524871	3556598	8672636	69640985	1075575	4663020	10615300
Total number of calls dropped		127564	391641	281506	17426	26607	349521	6365	23428	77301
Call drop rate	≤ 2%	1.43%	1.14%	1.44%	0.49%	0.31%	0.50%	0.59%	0.50%	0.73%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7519	14568	1051	5640	1425	5568	1057	4617	10647

Total number of cells having more than 3% TCH		220	270	6	64	39	15	37	87	267
Worst affected cells having more than 3% TCH	≤ 3%	2.93%	1.85%	0.57%	1.13%	2.74%	0.27%	3.50%	1.88%	2.51%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		434	519	489	393	360	482	180	342	397
Total number of calls dropped		2	1	11	1	0	0	0	2	0
Call drop rate	≤ 2%	0.46%	0.19%	2.25%	0.25%	0.00%	0.00%	0.00%	0.58%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		11855175173	55262196708	38914465286	48728813083	NA	2052099441	11951569038	9691095563	19904416162
Total number of calls with good voice quality		11262734193	53130198135	37673175100	46816492567	NA	2013190547	11742635671	9454446979	19546413955
%age calls with good voice quality	≥ 95%	95.00%	96.14%	96.81%	96.08%	99.77%	98.10%	98.25%	97.56%	98.20%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1200537111	5477475019	3881005206	498460646	NA	2566896654	1129333793	970494198	1953784405
Total number of calls with good voice quality		1141574644	5266711312	3760536843	478404528	NA	2523000965	1109552467	946725903	1917491429
%age calls with good voice quality	≥ 95%	95.09%	96.15%	96.90%	95.98%	99.80%	98.29%	98.25%	97.55%	98.14%

Drive test results for Voice quality (Average of three drive tests) - DT data										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		446001	61803	53948	93913	NA	52496	NA	370031	713184
Total number of calls with good voice quality		427707	61062	51753	91237	NA	49903	NA	359563	688244
%age calls with good voice quality	≥ 95%	95.90%	98.80%	95.93%	97.15%	98.63%	95.06%	97.65%	97.17%	96.50%

5. POI Congestion

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	130	65	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total		65362	111202	25000	39184	10984	27598	13818	350376	2843230

Capacity of all POIs (A) - in erlangs										
Traffic served for all POIs (B)- in erlangs		42729	57903	24338	21454	4003	17140	6441	180251	1384943
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	65	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65348	109890	25000	3937314	10966	27598	13817	33907	275151
Traffic served for all POIs (B)- in erlangs		43653	60601	22628	21783	3240	17138	6693	17821	136291
POI	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

congestion										

10 ANNEXURE – AUG'14

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2557	4622	395	1880	475	1862	345	1532	3600
Sum of downtime of BTSs in a month (in hours)		26811	6172	324	4747	822	1488	211	395	4801
BTSs accumulated downtime (not available for service)	≤ 2%	1.41%	0.18%	0.11%	0.34%	0.23%	0.11%	0.08%	0.03%	0.18%
Number of BTSs having		50	27	1	26	3	6	0	3	25

accumulated downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	1.96%	0.58%	0.25%	1.38%	0.63%	0.32%	0.00%	0.20%	0.69%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2557	4623	395	1880	475	1862	345	1532	3600
Sum of downtime of BTSs in a month (in hours)		2651	636	35	415	82	98	9	57	411
BTSs accumulated downtime (not available for service)	≤ 2%	1.44%	0.19%	0.12%	0.31%	0.24%	0.07%	0.04%	0.05%	0.16%
Number of BTSs having accumulated		16	0	0	0	0	0	0	0	1

downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR		99.12%	98.75%	99.12%	99.02%	99.39%	97.59%	98.51%	97.58%	99.57%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion		0.24%	0.24%	0.55%	0.37%	0.00%	0.27%	0.00%	0.09%	0.22%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion		0.62%	1.48%	1.64%	0.07%	0.00%	1.05%	0.05%	0.38%	0.43%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance	Reliance	TATA CDMA	TATA GSM	Vodafone

						CDMA	GSM			
CSSR		99.17%	98.90%	99.12%	99.33%	99.39%	98.59%	98.65%	98.03%	99.76%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion		0.31%	0.19%	0.15%	0.35%	0.00%	0.08%	0.00%	0.08%	0.17%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion		0.59%	1.12%	1.45%	0.10%	0.00%	0.48%	0.10%	0.50%	0.24%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		494	505	373	496	494	485	437	428	504
Total number of successful calls established		489	505	372	496	494	485	436	422	501
CSSR	≥ 95%	98.99%	100.00%	99.73%	100.00%	100.00%	100.00%	99.77%	98.60%	99.40%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

%age blocked calls		1.01%	0.00%	0.27%	0.00%	0.00%	0.00%	0.23%	1.40%	0.60%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		84375802	331223623	199144695	38842376	6474607	60160545	6905179	45881339	109133942
Total number of calls dropped		1193826	3899085	2881979	183330	24272	326620	58870	223822	853599
Call drop rate	≤ 2%	1.41%	1.18%	1.45%	0.47%	0.37%	0.54%	0.85%	0.49%	0.78%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7506	14660	1094	5642	1425	5586	1057	4620	10743
Total number of		219	284	17	78	39	15	43	101	263

cells having more than 3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	2.92%	1.94%	1.55%	1.38%	2.74%	0.27%	4.07%	2.19%	2.45%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		9482639	31873315	20279958	4130453	8813843	70804847	1010705	64663644	11101271
Total number of calls dropped		130651	373038	314373	18324	24587	356686	5506	271432	78629
Call drop rate	≤ 2%	1.38%	1.17%	1.55%	0.44%	0.28%	0.50%	0.54%	0.42%	0.71%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7506	14665	1139	5642	1425	5586	1057	4620	10743

Total number of cells having more than 3% TCH		220	371	21	68	41	15	33	113	263
Worst affected cells having more than 3% TCH	≤ 3%	2.93%	2.53%	1.84%	1.21%	2.88%	0.27%	3.12%	2.45%	2.45%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		489	505	372	496	494	485	436	422	501
Total number of calls dropped		9	0	1	1	0	1	0	0	0
Call drop rate	≤ 2%	1.84%	0.00%	0.27%	0.20%	0.00%	0.21%	0.00%	0.00%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		11344642154	55105846806	39678064897	5154727603	NA	2008020734	11562253215	9555335399	19252558083
Total number of calls with good voice quality		10788785487	52952118000	38434575750	4945552963	NA	1970507989	11360162576	9325703802	18892365659
%age calls with good voice quality	≥ 95%	95.10%	96.09%	96.87%	95.94%	99.78%	98.13%	98.25%	97.60%	98.13%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1067835121	5217050774	3918315004	511735809	NA	2404882067	1091280503	12196376599	1877665619
Total number of calls with good voice quality		1016356853	5014191188	3803742551	491132679	NA	2363800524	1072265970	11937019831	1844411602
%age calls with good voice quality	≥ 95%	95.18%	96.11%	97.08%	95.97%	99.80%	98.29%	98.26%	97.87%	98.23%

Drive test results for Voice quality (Average of three drive tests) - DT data										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		550190	60098	595381	466831	NA	37801	NA	734416	924130
Total number of calls with good voice quality		507554	59411	564799	452249	NA	36555	NA	707493	888500
%age calls with good voice quality	≥ 95%	92.25%	98.86%	94.86%	96.88%	98.43%	96.70%	98.45%	96.33%	96.14%

5. POI Congestion

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total		65285	109075	25000	37117	10966	27598	13817	350376	91717

Capacity of all POIs (A) - in erlangs										
Traffic served for all POIs (B)- in erlangs		40619	56890	24545	21635	3248	16430	6543	185138	43415
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65247	109007	25000	37246	10966	27598	13817	33907	91717
Traffic served for all POIs (B)- in erlangs		41918	56890	21887	22152	3187	16430	6559	18625	44602
POI	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

congestion										

11 ANNEXURE – SEP'14

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2552	4650	397	1880	475	1864	345	1532	3618
Sum of downtime of BTSs in a month (in hours)		19863	5439	374	2915	756	952	143	367	3557
BTSs accumulated downtime (not available for service)	≤ 2%	1.05%	0.16%	0.13%	0.21%	0.21%	0.07%	0.06%	0.03%	0.13%
Number of BTSs having		49	31	2	12	3	0	0	0	20

accumulated downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	1.92%	0.67%	0.50%	0.64%	0.63%	0.00%	0.00%	0.00%	0.55%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2552	4653	397	1880	475	1864	345	1532	3618
Sum of downtime of BTSs in a month (in hours)		1718	843	9	309	76	126	1	43	524
BTSs accumulated downtime (not available for service)	≤ 2%	0.94%	0.25%	0.03%	0.23%	0.22%	0.09%	0.01%	0.04%	0.20%
Number of BTSs having accumulated		5	3	0	0	0	0	0	0	3

downtime >24 hours										
Worst affected BTSs due to downtime	≤ 2%	0.20%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR		99.08%	98.69%	99.11%	99.13%	99.43%	97.77%	98.57%	98.24%	99.66%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion		0.57%	0.26%	0.16%	0.40%	0.00%	0.11%	0.00%	0.07%	0.22%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion		0.63%	1.65%	1.44%	0.04%	0.00%	0.05%	0.02%	0.37%	0.34%

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

CSSR	Benchmar	Aircel(DWL)	Airtel	BSNL	Idea	Reliance	Reliance	TATA CDMA	TATA GSM	Vodafone

	k					CDMA	GSM			
CSSR		98.97%	98.65%	99.10%	98.99%	99.44%	98.72%	98.73%	97.61%	99.76%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion		0.83%	0.24%	0.13%	0.34%	0.00%	0.14%	0.00%	0.01%	0.31%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion		0.76%	1.48%	1.56%	0.03%	0.00%	0.44%	0.02%	0.36%	0.24%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		373	514	523	256	201	338	NP	428	459
Total number of successful calls established		369	513	522	256	201	337	NP	422	441
CSSR	≥ 95%	98.93%	99.81%	99.81%	100.00%	100.00%	99.70%	NP	98.60%	96.08%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

%age blocked calls		1.07%	0.19%	0.19%	0.00%	0.00%	0.30%	NP	1.40%	3.92%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		90202626	310586517	194900945	39578641	6264650	59975739	6905179	4480224	104896375
Total number of calls dropped		1325787	3918792	2862724	192407	23798	320365	58870	236650	805760
Call drop rate	≤ 2%	1.47%	1.26%	1.47%	0.49%	0.38%	0.53%	0.85%	5.28%	0.77%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7490	14743	1174	5643	1425	5629	1059	4620	10797
Total number of cells having		222	307	20	77	40	14	47	102	265

more than 3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	2.96%	2.08%	1.70%	1.36%	2.81%	0.25%	4.44%	2.21%	2.45%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		8700576	32169669	20222079	4141226	8757599	72614860	817930	67325241	10582779
Total number of calls dropped		131405	450475	299991	22091	26637	363924	4321	241809	80405
Call drop rate	≤ 2%	1.51%	1.40%	1.48%	0.53%	0.30%	0.50%	0.53%	0.36%	0.76%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7490	14755	1174	5643	1425	5629	1059	4620	10797
Total number of		218	385	20	88	32	10	46	103	311

cells having more than 3% TCH										
Worst affected cells having more than 3% TCH	≤ 3%	2.91%	2.61%	1.70%	1.56%	2.25%	0.18%	4.34%	2.23%	2.88%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		369	513	522	256	201	337	NP	422	441
Total number of calls dropped		3	0	2	0	0	0	NP	0	0
Call drop rate	≤ 2%	0.81%	0.00%	0.38%	0.00%	0.00%	0.00%	NP	0.00%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total		1100964878	5347943725	3899646742	524970309	NA	203005478	1107675362	9465403654	1876974470

number of sample calls		8	5	0	2		7	4		0
Total number of calls with good voice quality		10463451996	51406312929	37817423774	5025079471	NA	1991917513	10883309777	9237388541	18413217779
%age calls with good voice quality	≥ 95%	95.04%	96.12%	96.98%	95.72%	99.78%	98.12%	98.25%	97.59%	98.10%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1108547437	5553149001	3979834498	542043197	NA	2614664779	1096542268	12601200123	1911652931
Total number of calls with good voice quality		1053545822	5338484219	3858474663	518280717	NA	2571100520	1077439475	12326662144	1874322962
%age calls with good voice quality	≥ 95%	95.04%	96.13%	96.95%	95.62%	99.78%	98.33%	98.26%	97.82%	98.05%

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

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

Total number of sample calls		309623	62291	185367	67212	NA	38718	NP	516060	791075
Total number of calls with good voice quality		257842	61134	180438	66272	NA	37232	NP	443346	770047
%age calls with good voice quality	≥ 95%	83.28%	98.14%	97.34%	98.60%	81.19%	96.16%	NP	85.91%	97.34%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65543	111400	25000	37317	10966	27597	13934	339434	91717

Traffic served for all POIs (B)- in erlangs		42542	59119	24305	22102	3207	16370	6566	191640	433356
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		100	22	13	63	8	8	44	11	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		65883	111353	25000	37515	10966	27597	13937	33907	91717
Traffic served for all POIs (B)- in erlangs		43662	59119	22110	22426	3386	16328	6987	19914	44092
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

+91 (124) 4217300

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