



**EAST
ZONE**

TRAI AUDIT WIRELESS REPORT-KOLKATA CIRCLE- AMJ QUARTER, 2014

Prepared By -



Prepared For-



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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 the 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 the March 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated the October 6, 2006 provide for 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

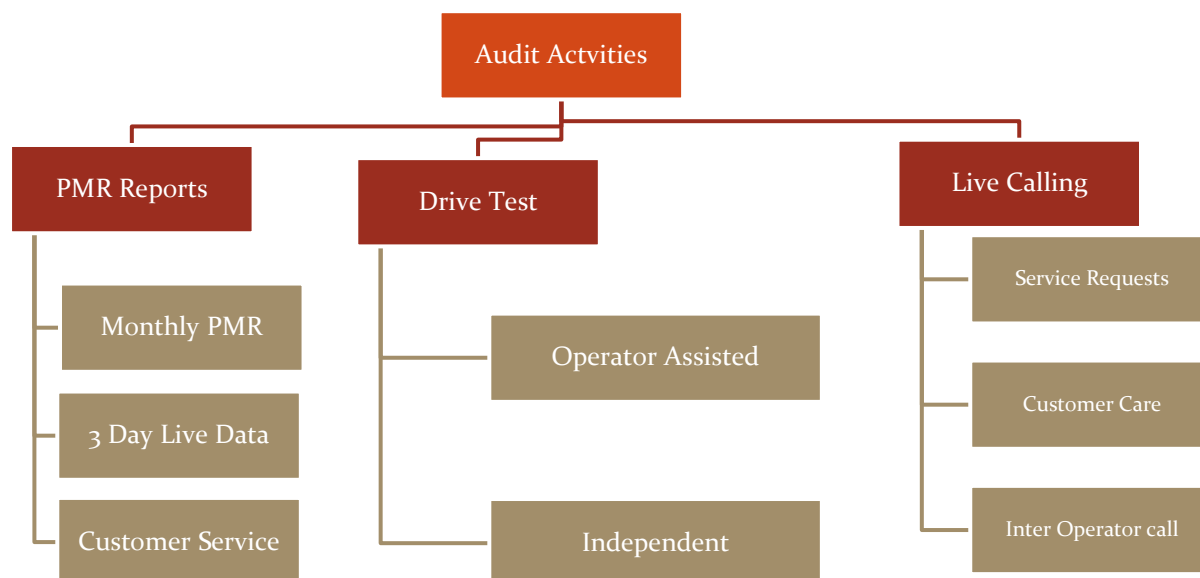
The primary objective of the Audit module is to-

- 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).

2.3 COVERAGE

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

2.4 FRAMEWORK USED



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

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated 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 PMR is extracted in the following three formats.

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

During audit, PMR is extracted from the server/NOC/exchange etc. in the presence of the auditor. All the calculations are done during the audit by the operators and IMRB auditors verify the calculations done by the operators.

The verified PMR reports are then submitted in hard copy by the operators to the auditor with authorized signatures of the operator personnel. Sometimes, operators also submit a soft copy of the same report along with hard copy for the sake of convenience.

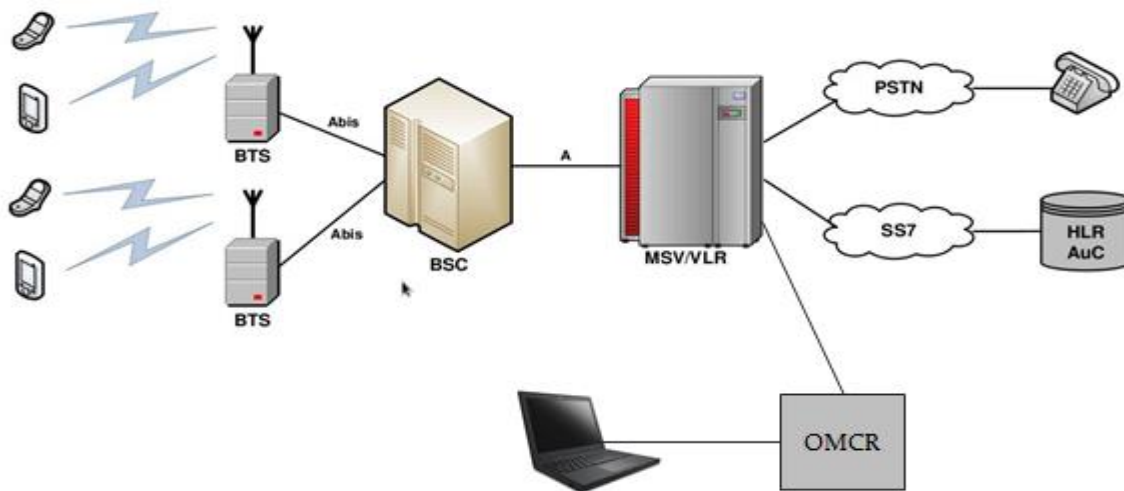
The PMR report for network parameters is taken for each month of the audit quarter and is generally extracted and verified in the first week of the subsequent month of the audit month. For example, June 2014 audit data was collected in the month of July 2014.

The PMR report for customer service parameters is extracted and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2014 (AMJ'14) was collected in the month of July 2014.

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

2.4.1.2 POINT OF DATA EXTRACTION

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



2.4.1.3 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.

2.4.1.4 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR's). The PMR reports were extracted in presence of IMRB representative from the operator's premises for the month of April, May and June. 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 parameter in section 4.

2.4.1.5 AUDIT PARAMETERS

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%

Customer Service Quality-

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	≥ 90%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.6 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 day end values, the 3 day live data is created by taking dump of network parameters on hourly basis. All the calculations are then done on the basis of that dump 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 at the end of the 3rd day. The extracted data was analyzed to assess the various QoS parameters.

2.4.1.7 CUSTOMER SERVICE PARAMETERS

The PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2014 (AMJ'14) was collected in the month of July 2014.

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

The Customer Service Quality Parameters response time to the customer for assistance, termination/closure of service and time taken for refund of security deposit after closures. All the customer service parameters were calculated on the quarterly basis.

All the parameters have been described in detail along with key findings of the parameter in section 5.

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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

The IMRB auditor visits each operator premises to do live calling. The operators provide the data dump of customer service complaints 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 dump provided to verify the resolution of complaints.

The auditors also verify the performance of call center. 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 July 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 June'14 was considered for live calling activity conducted in July 2014.

A detailed explanation of each parameter is explained below.

2.4.2.2 SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.3 CUSTOMER CARE

Overall sample size is 2*50 calls per service provider per circle at different points of time, to be evenly distributed across the selected exchanges – 50 calls between 10:00 hours to 13:00 hours and 50 calls between 15:00 hours to 17:00 hours.

The time taken to answer the call through IVR and Customer Care is recorded by the audit agency.

TRAI Benchmark- Response time to the customer for assistance:

- (a) Accessibility of call center/customer care/IVR >= 95%
- (b) % age of calls answered by the operator (voice to voice): within 60 seconds = 90%

2.4.2.4 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 DRIVE TEST

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as its name suggests, is conducted to measure the outdoor coverage in a moving vehicle in a specified network coverage area.

The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

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

IMRB conducted two types of drive tests as mentioned below.

- ↵ Operator Assisted Drive Test
- ↵ Independent Drive Test

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

A detailed explanation of the two methodologies has been provided below.

2.4.3.2 OPERATOR ASSISTED DRIVE TEST

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

- ↵ 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- ↵ On an average, a minimum of 100 kilometers were covered each day
- ↵ Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- ↵ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ↵ The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads and we can start from the point from where we had left last day (if possible).
- ↵ The route was classified as-
 - With In city
 - Major Roads
 - Highways
 - Shopping complex/ Mall & Office Complex/ Government Building
- ↵ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- ↵ The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- ↵ The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- ↵ The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- ↵ The speed of the vehicle was kept at around 30 km/hr.
- ↵ The holding period of each test call was 120 seconds.
- ↵ A test call was generated 10 seconds after the previous test call is completed.
- ↵ Height of the antenna was kept uniform in case of all service providers.

2.4.3.3 INDEPENDENT DRIVE TEST

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

- ↪ A minimum of 100 kilometers was traversed during the independent drive test in a SSA. The SSA would be defined as per BSNL and SSA list will be finalized by regional TRAI office.
- ↪ Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- ↪ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ↪ The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- ↪ The route was classified as-
 - With In city
 - Major Roads
 - Highways
 - Shopping complex/ Mall & Office Complex/ Government Building
- ↪ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
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- ↪ The speed of the vehicle was kept at around 30 km/hr.
- ↪ The holding period of each test call was 120 seconds.
- ↪ A test call was generated 10 seconds after the previous test call is completed.
- ↪ Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING DRIVE TEST

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

- ↪ Coverage-Signal strength (GSM)
 - ✓ Total calls made (A)
 - ✓ Number of calls with signal strength between 0 to -75 dBm
 - ✓ Number of calls with signal strength between 0 to -85 dBm
 - ✓ Number of calls with signal strength between 0 to -95 dBm
- ↪ Coverage-Signal strength (CDMA)
 - ✓ Total Ec/Io BINS (A)
 - ✓ Total Ec/Io BINS with less than -15 (B)
 - ✓ Low Interference = $[1 - (B/A)] \times 100$
- ↪ Voice quality (GSM)

- ✓ Total RxQual Samples- A
- ✓ RxQual samples with 0-5 value - B
- ✓ %age samples with good voice quality = $B/A \times 100$
- ✚ 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) = $B/A \times 100$
 - ✓ %age samples with FER bins having 0-4 value (forward FER) = $C/A \times 100$
 - ✓ 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) = $(B/A) \times 100$
- ✚ 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) = $(B/A) \times 100$

2.5 OPERATORS COVERED

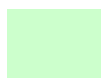
June'14 VLR data was considered for the number of subscribers.

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	2323504
Airtel	3712997
BSNL	722577
Idea	1298591
MTS	617690
Reliance CDMA	1056435
Reliance GSM	2671410
TATA CDMA	97951
TATA GSM	1810031
Vodafone	4448589

2.6 COLOUR CODES TO READ THE REPORT



Not Meeting the benchmark



Best Performing Operator

3 EXECUTIVE SUMMARY

3.1 PMR DATA - CONSOLIDATED

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.60%	1.90%	97.97%	0.75%	1.09%	0.82%	2.93%	97.38%
Airtel	0.03%	0.00%	99.66%	0.04%	0.12%	0.72%	0.36%	96.22%
BSNL	0.40%	1.97%	98.16%	0.46%	1.10%	1.93%	2.72%	99.75%
Idea	0.22%	0.53%	99.64%	0.06%	0.03%	0.34%	0.94%	97.06%
MTS	0.18%	0.00%	99.81%	0.00%	0.01%	0.51%	0.83%	99.95%
Reliance CDMA	0.19%	0.62%	99.13%	0.00%	0.01%	0.16%	0.51%	99.75%
Reliance GSM	0.17%	0.39%	99.22%	0.02%	0.05%	0.45%	0.05%	98.13%
TATA CDMA	0.11%	0.23%	98.92%	0.00%	0.05%	0.77%	3.10%	99.18%
TATA GSM	0.02%	0.04%	98.63%	0.05%	0.04%	0.68%	2.77%	98.07%
Vodafone	0.03%	0.05%	99.65%	0.04%	0.35%	0.77%	2.40%	97.34%

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

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

BTs Accumulated Downtime:

The audit results showed that on the whole, all the operators met the TRAI specified criteria for the outage due to downtime of the base transceiver stations (BTS). TATA GSM performed the best of the lot with 0.02% downtime reported, followed by Airtel and Vodafone with 0.03%.

Worst Affected BTs Due to Downtime:

During the audit it was found that all the operators met the benchmark specified by TRAI. Airtel & MTS performed the best as they did not have any downtime due to worst affected BTS.

Call Set-up Success Rate (CSSR):

All the operators comfortably met the TRAI benchmark. The best performance was recorded for the operator MTS at 99.81% CSSR, followed by Airtel at 99.66%, Vodafone at 99.65% and Idea at 99.64%. All the operators were found to be calculating the parameter as per the norm specified by TRAI.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators met the TRAI specified benchmarks on the congestion parameters. Reliance GSM performed the best with 0.02% on SDCCH congestion parameter and MTS with 0.01% on TCH congestion parameter.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. All of service providers were found to be meeting the TRAI specified benchmark with Reliance CDMA (0.16%) performing the best.

Worst Affected Cells Having More than 3% TCH Drop:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. All the operators met the benchmark on this parameter except TATA CDMA which recorded at 3.10%. Reliance GSM performed the best with 0.05% when compared to other service providers.

Voice Quality:

During the audit it was found that all the service providers met the benchmark specified by TRAI. MTS is the top performer with 99.95% voice quality.

3.2 3 DAY DATA - CONSOLIDATED

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.66%	0.45%	97.80%	0.72%	1.14%	0.87%	3.66%	97.35%
Airtel	0.03%	0.00%	99.65%	0.05%	0.12%	0.74%	0.63%	96.19%
BSNL	0.84%	0.05%	98.31%	0.03%	1.27%	1.82%	1.76%	96.90%
Idea	0.23%	0.19%	99.75%	0.05%	0.02%	0.28%	0.04%	97.58%
MTS	0.35%	0.00%	99.85%	0.00%	0.01%	0.35%	0.76%	NA
Reliance CDMA	0.13%	0.00%	98.93%	0.00%	0.01%	0.13%	0.23%	99.76%
Reliance GSM	0.16%	0.00%	99.38%	0.01%	0.02%	0.39%	0.00%	98.33%
TATA CDMA	0.08%	0.00%	98.97%	0.00%	0.00%	0.65%	5.84%	99.24%
TATA GSM	0.02%	0.12%	98.69%	0.06%	0.02%	0.66%	4.05%	98.28%
Vodafone	0.02%	0.00%	99.70%	0.05%	0.30%	0.69%	NA	97.62%

BTSS Accumulated Downtime:

The audit results showed that on the whole, all the operators met the TRAI specified criteria for the outage due to downtime of the base transceiver stations (BTS). TATA GSM performed the best of the lot with near negligible downtime reported and was followed by the Airtel.

Worst Affected BTSS Due to Downtime:

During the audit it was found that all the operators met the benchmark specified by TRAI. Most of the operators recorded 0.00%.

Call Set-up Success Rate (CSSR):

All the operators comfortably met the TRAI benchmark. The best performance was recorded for the operator MTS at 99.85% CSSR, followed by Idea at 99.75%, Vodafone at 99.70% and Airtel at 99.65%. All the operators were found to be calculating the parameter as per the norm specified by TRAI.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified benchmarks on the congestion parameters. Reliance GSM

was the best on SDCCH congestion parameter at 0.01% and Tata CDMA is the best performer in TCH congestion parameter at 0.00%.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. All service providers were found to be meeting the TRAI specified benchmark with Reliance CDMA performing the best with 0.13% drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. TATA CDMA 5.84%, TATA GSM 4.05% and Aircel 3.66% missed the benchmark while Reliance GSM was the best performer with 0.00%.

Voice Quality:

During the audit it was found that all the service providers were meeting the benchmark specified by TRAI with Reliance CDMA performing the best at 99.76% when compared to others.

Note: - MTS did not submit FER data for any of the month during this quarter even after repeated mails.

3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Service Requests	Response time to customer for assistance	
	Complaint /Request attended to Satisfaction	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark		≥ 95%	≥ 90%
Aircel(DWL)	96.00%	100.00%	98.00%
Airtel	93.00%	100.00%	100.00%
BSNL	97.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%
MTS	98.00%	100.00%	100.00%
Reliance CDMA	95.00%	100.00%	100.00%
Reliance GSM	95.00%	100.00%	100.00%
TATA CDMA	0.00%	100.00%	100.00%
TATA GSM	98.00%	100.00%	100.00%
Vodafone	100.00%	100.00%	100.00%

Complaint/Request Attended to Satisfaction

All the operators performed satisfactorily in terms of satisfaction of the customers for service requests. The operators Vodafone & Idea showed complete satisfaction for the customers with regards to their requests being attended.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect all the service providers meet the TRAI benchmark with 100% connectivity.

Customer Care / Helpline Assessment

It was seen all operators comfortably met the TRAI benchmark of 90% of calls answered within 60 seconds

3.4 CUSTOMER CARE – CONSOLIDATED

Name of Service Provider	Customer care	
	Percentage of calls answered by the operators IVR within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 95%	≥ 90%
Aircel(DWL)	94.15%	79.76%
Airtel	100.00%	86.97%
BSNL	79.89%	69.68%
Idea	99.58%	91.25%
MTS	99.35%	90.43%
Reliance CDMA	99.20%	85.33%
Reliance GSM	98.93%	85.33%
TATA CDMA	99.06%	95.43%
TATA GSM	97.05%	86.52%
Vodafone	100.00%	82.17%

Customer Care Percentage of calls answered by the operators IVR within 60 seconds

From the audit it was observed that except BSNL 79.89% and Aircel 94.15%, all other operators met the TRAI benchmark of IVR call being attended within 60 seconds. Airtel and Vodafone were leaders with all IVR calls answered within 60 seconds.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 60 seconds

For voice to voice calls, only TATA CDMA, Idea and MTS met the benchmark while all other operators failed to do so. Reliance CDMA was the bottom performer with just 21.95% calls being answered within 60 seconds.

3.5 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Aircel(DWL)	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MTS	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA

None of the operators faced any issues in connecting to other operators.



Maximum Problem faced by the calling operator to other operator

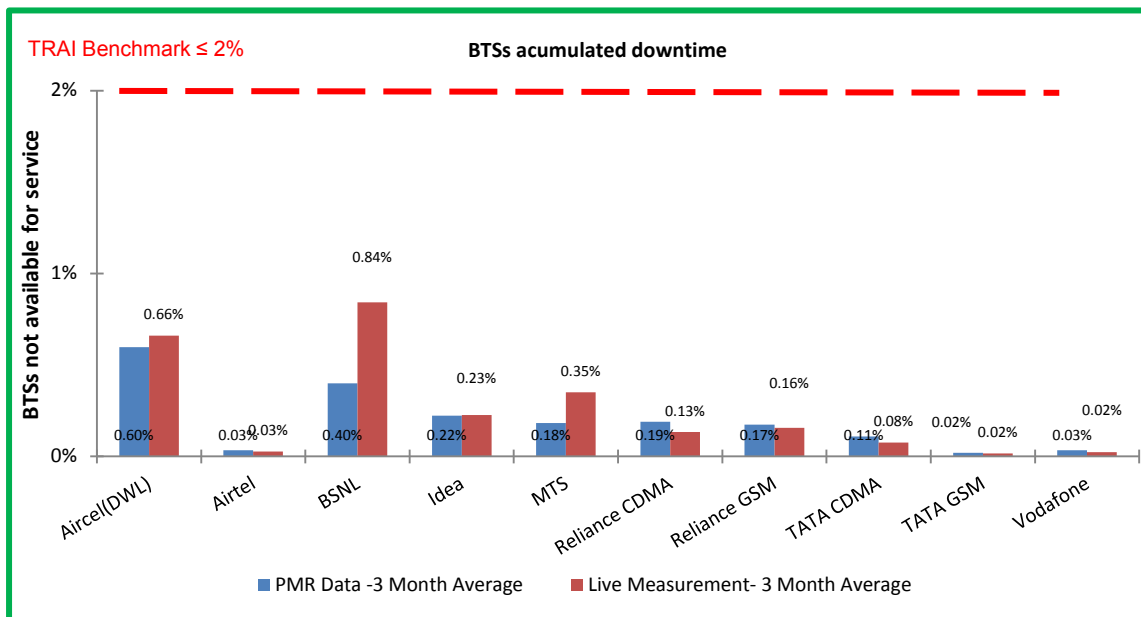
4 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA

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 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) = $\frac{\text{Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month}}{(24 \times \text{Number of days in a month} \times \text{Number of BTSs in the network in licensed service area})} \times 100$
- 3. **TRAI Benchmark -**
 - a. BTSs Accumulated downtime (not available for service) $\leq 2\%$
- 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



All operators met the TRAI benchmark of having BTS downtime less than 2%. Both PMR and Live measurement data are similar for almost all the operators, except for BSNL & MTS.

4.2 WORST AFFECTED BTS DUE TO DOWNTIME

4.2.1 PARAMETER DESCRIPTION

- Definition – Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

For measuring the parameter “Percentage of worst affected BTSs due to downtime” the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

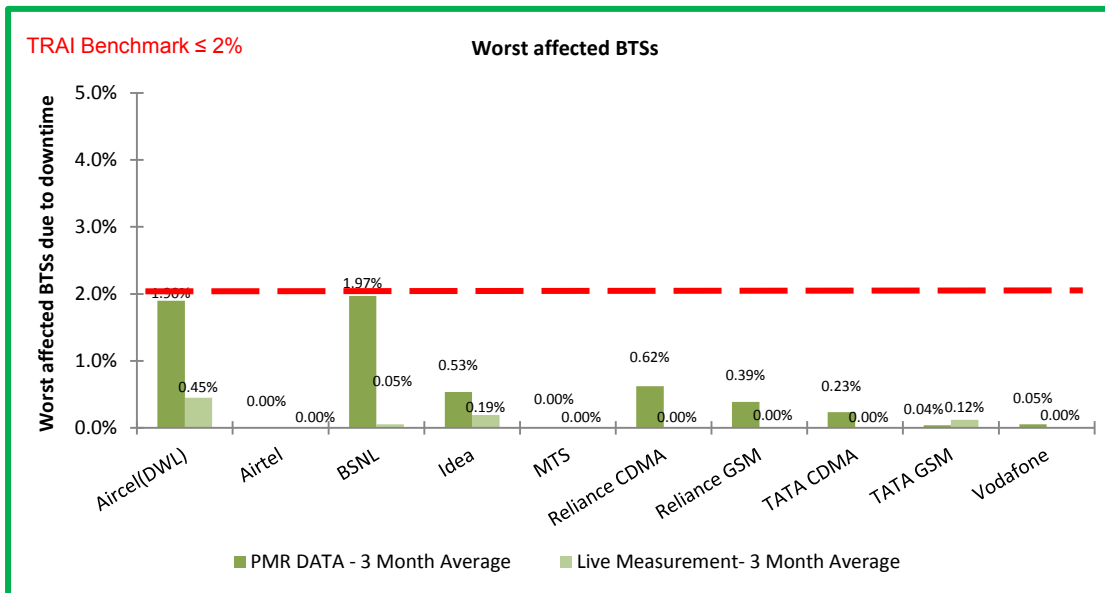
- Computation Methodology –**

$$\text{Worst affected BTSs due to downtime} = \left(\frac{\text{Number of BTSs having accumulated downtime greater than 24 hours in a month}}{\text{Number of BTS in Licensed Service Area}} \right) * 100$$

- TRAI Benchmark –**
 - Worst affected BTSs due to downtime ≤ 2%
- Audit Procedure –**

- i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
- ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.
- iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- iv. Any outage as a result of force majeure was not considered at the time of calculation.
- v. List of operating sites with cell details and ids are taken from the operator.
- vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

4.2.2 KEY FINDINGS



All operators met the benchmark for the worst affected BTS due to downtime. Although BSNL and Airtel met the benchmark on PMR data, their performance was much weaker than other operators and there was a significant difference between PMR and live measurement data for the same.

4.3 CALL SET UP SUCCESS RATE

4.3.1 PARAMETER DESCRIPTION

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

$$\text{(Calls Established / Total Call Attempts)} * 100$$

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

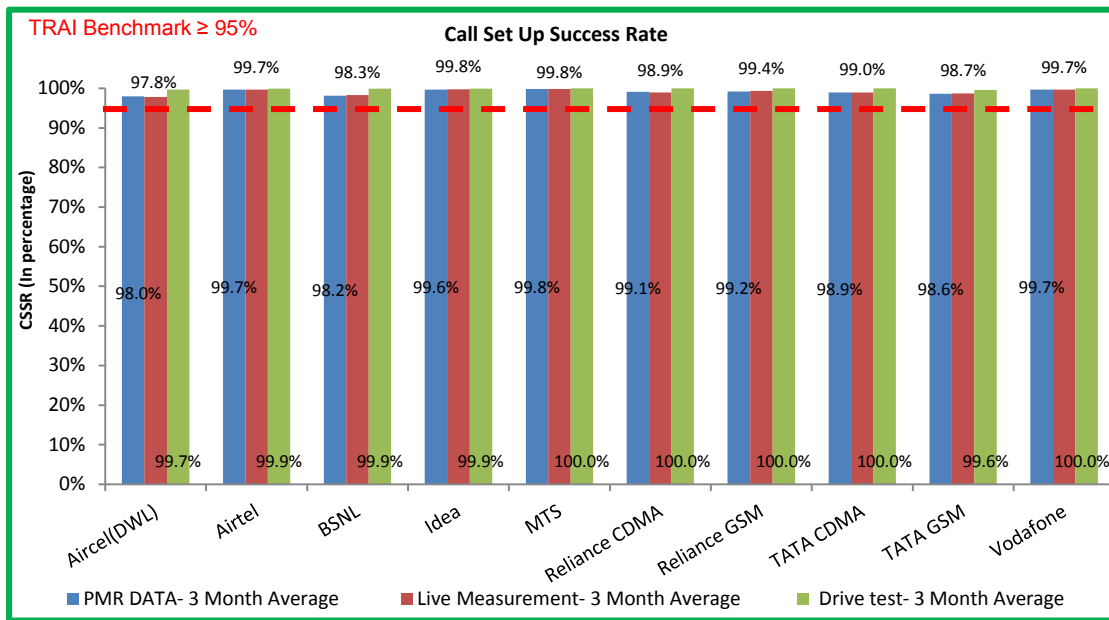
- ↳ call attempt is made
- ↳ the TCH is allocated
- ↳ the call is routed to the outward path of the concerned MSC

3. TRAI Benchmark $\geq 95\%$

4. Audit Procedure -

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

4.3.2 KEY FINDINGS



All operators met the benchmark for CSSR.

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

- Where:- A_1 = Number of attempts to establish SDCCH / TCH made on day 1
- C_1 = Average SDCCH / TCH Congestion % on day 1
- A_2 = Number of attempts to establish SDCCH / TCH made on day 2
- C_2 = Average SDCCH / TCH Congestion % on day 2
- A_n = Number of attempts to establish SDCCH / TCH made on day n
- C_n = Average SDCCH / TCH Congestion % on day n

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

- Where:- A_1 = POI traffic offered on all POIs (no. of calls) on day 1
- C_1 = Average POI Congestion % on day 1
- A_2 = POI traffic offered on all POIs (no. of calls) on day 2
- C_2 = Average POI Congestion % on day 2
- A_n = POI traffic offered on all POIs (no. of calls) on day n
- C_n = Average POI Congestion % on day n

- 3. Benchmark:**

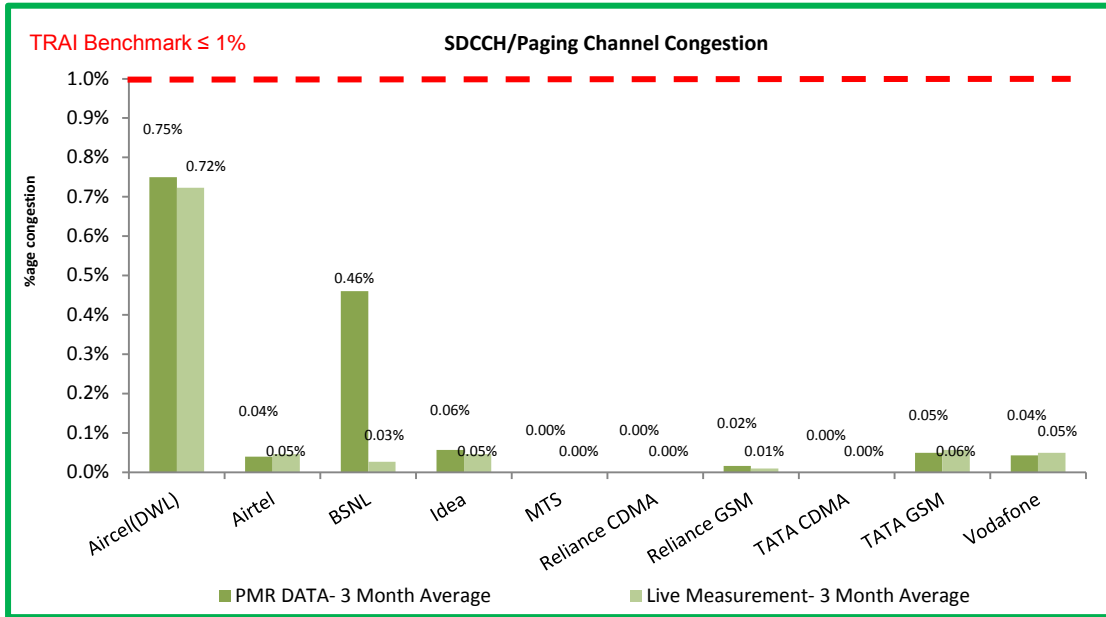
- ↳ SDCCH Congestion: $\leq 1\%$
- ↳ TCH Congestion: $\leq 2\%$
- ↳ POI Congestion: $\leq 0.5\%$

- 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

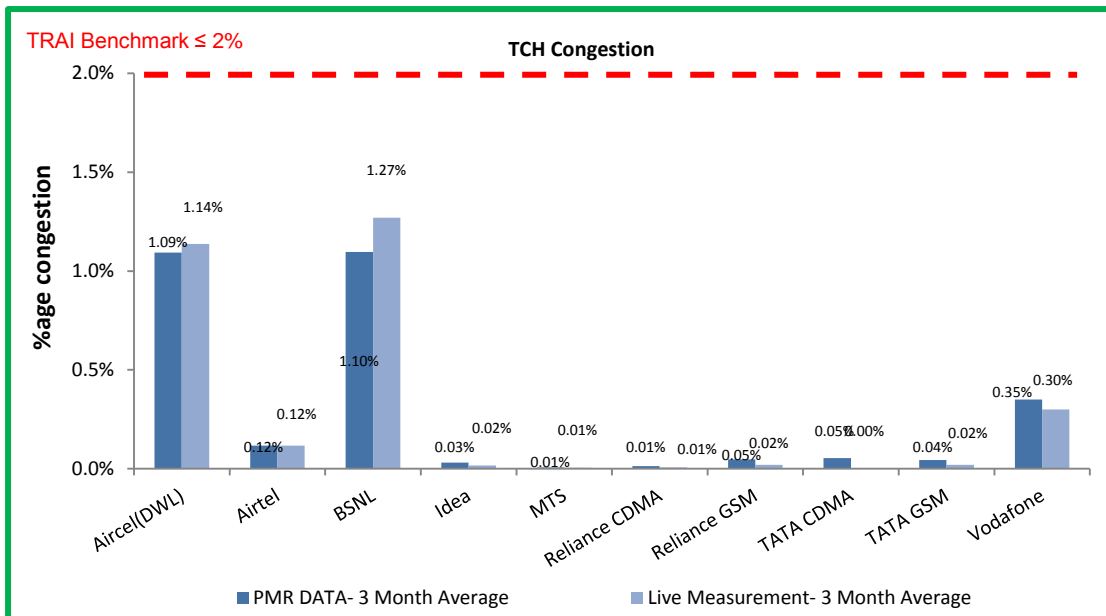
↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION



All operators met the benchmark with almost similar results for the PMR data and the live measurement, except for BSNL where PMR data reported higher congestion. Aircel and BSNL had the maximum SDCCH/ paging channel congestion.

4.4.3 KEY FINDINGS – TCH CONGESTION



All the operators met the benchmark with almost similar level of TCH congestion in PMR Data and Live measurement.

4.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	28	47	40	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		53965	76112	575103	55500	36871	8153	11358	25733	20708	182469
Traffic served for all POIs (B)- in erlangs		29972	38117	13670	24666	12459	3770	7009	11334	11368	90967
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	17	27	48	40	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		53849	228516	578639	55458	36852	9150	11089	26533	19836	181283
Traffic served for all POIs (B)- in erlangs		31436	115967	14079	24611	12734	4979	6998	11531	11410	92233
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

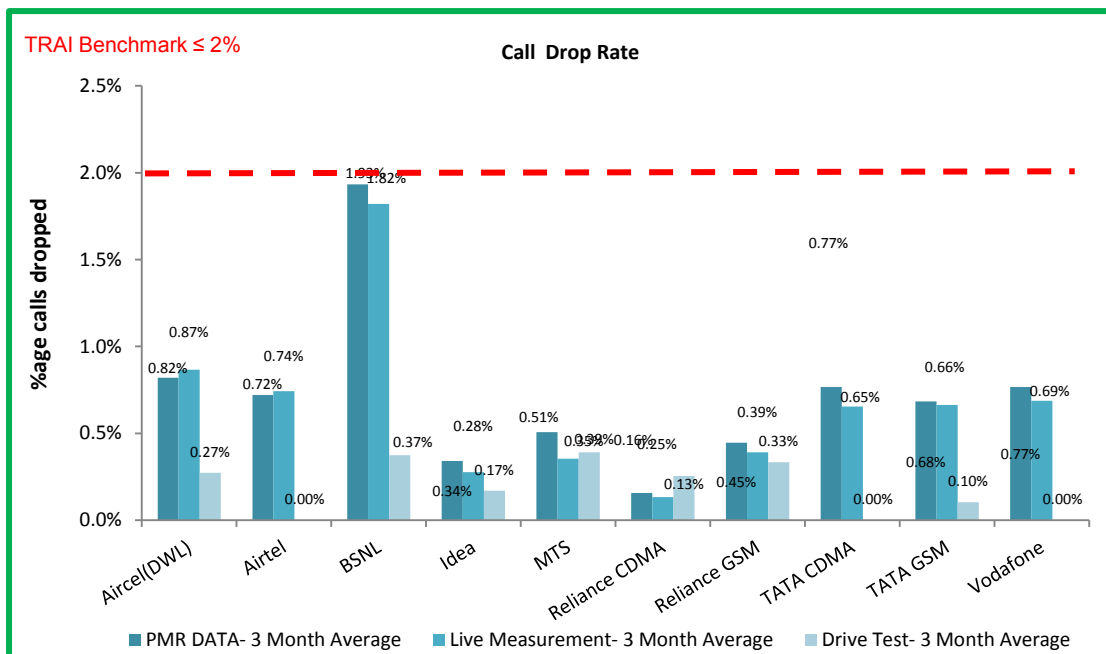
All the operators met the benchmark with 0% POI congestion as per PMR Data and Live measurement.

4.5 CALL DROP RATE

4.5.1 PARAMETER DESCRIPTION

- 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
- Computational Methodology:** $(\text{Total Calls Dropped} / \text{Total Calls Established}) \times 100$
- TRAI Benchmark** -
 - ✦ Call drop rate $\leq 2\%$
- Audit Procedure** -
 - ✦ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
 - ✦ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

4.5.2 KEY FINDINGS



All the operators met the benchmark specified by TRAI. BSNL had a call drop rate much higher than other operators which is close to the benchmark level in PMR & live measurement data. There is a variance in Drive Test data from PMR & live measurement for almost all operators.

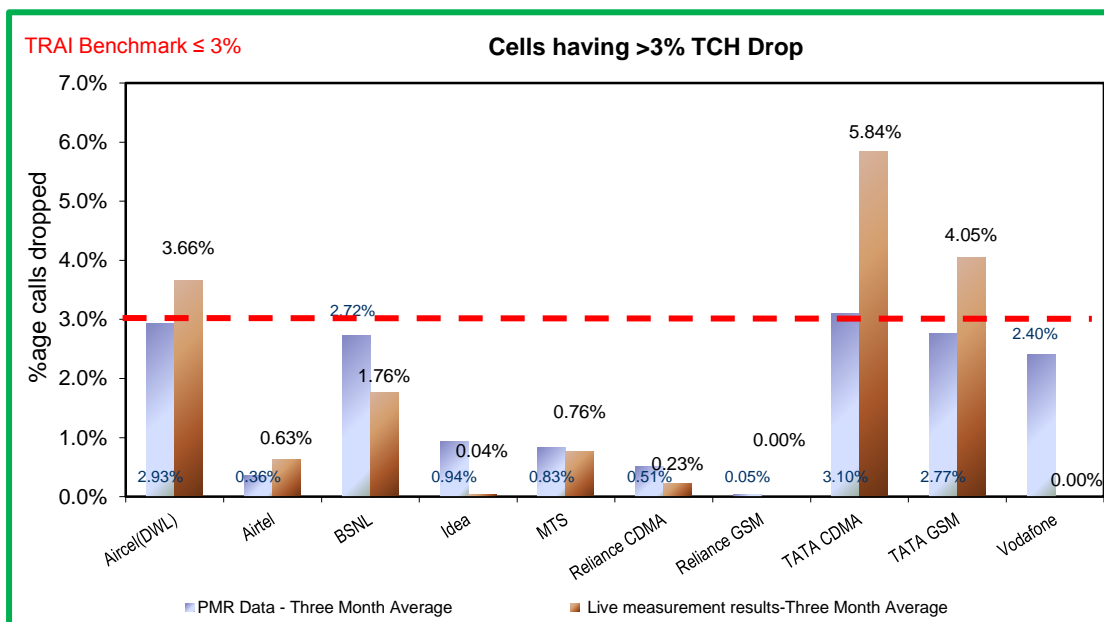
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

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:** $(\text{Total number of cells having more than 3\% TCH drop} / \text{Total number of cells in the network}) \times 100$
3. **TRAI Benchmark –**
 - ↳ Worst affected cells having more than 3% TCH drop rate $\leq 3\%$
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



Barring TATA CDMA, all the operators met the benchmark for cells having more than 3% TCH drop as per PMR data. There was a considerable difference in PMR and live measurement data for almost all the operators especially for TATA CDMA, TATA GSM and Aircel.

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 its FER value lies between 0 – 4 %

2. Computational Methodology:

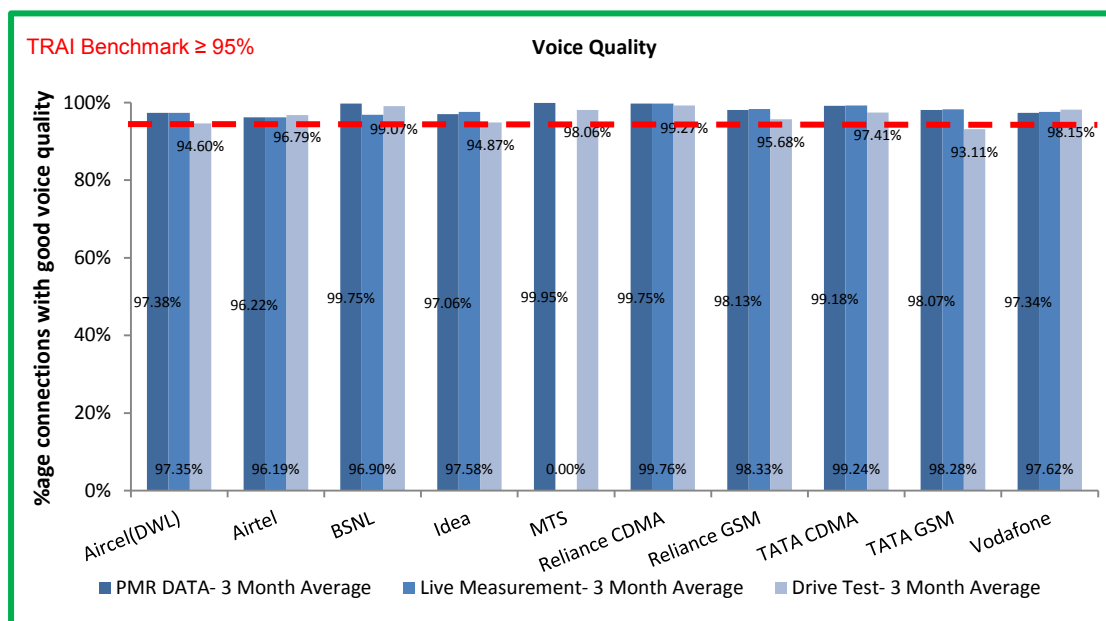
- ↳ **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

3. TRAI Benchmark: $\geq 95\%$

4. Audit Procedure –

- a. A sample of calls would be taken randomly from the total calls established.
- b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality

4.7.2 KEY FINDINGS



All the operators met the benchmark during audit. The voice quality live measurement data for MTS was not available.

5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON NETWORK PARAMETERS

5.1 CALL CENTRE PERFORMANCE-IVR

5.1.1 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%

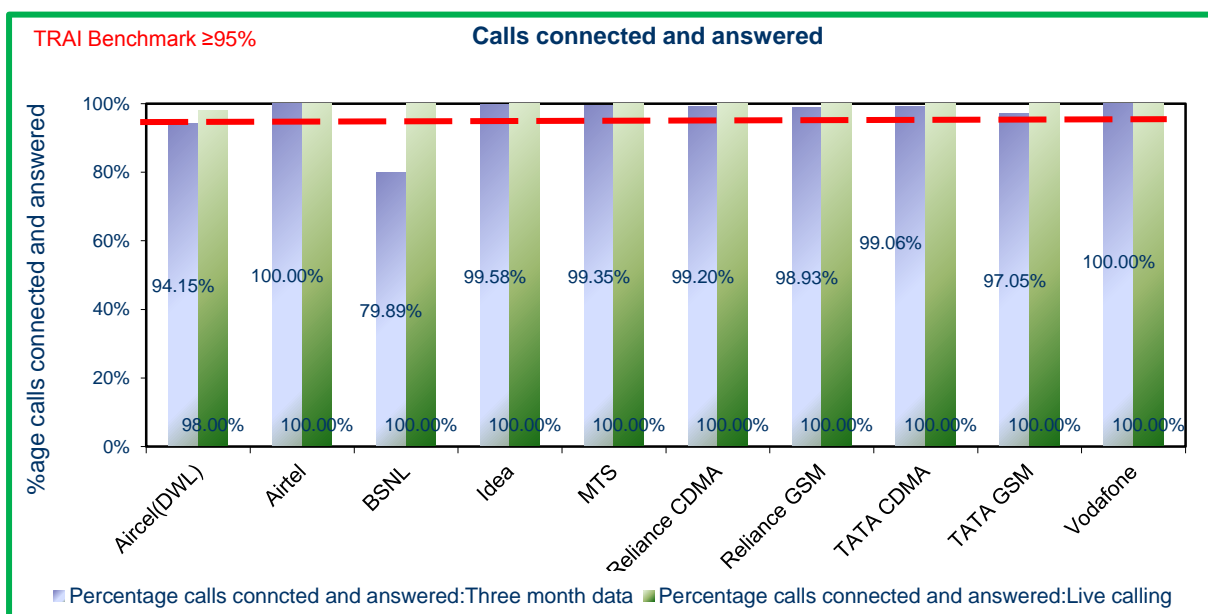
➤ Audit Procedure:

↳ Operator to provide details of:-

- 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

5.1.2 KEY FINDINGS



As per PMR, except BSNL 79.89% and Airtel 94.15%, all other operators met the TRAI benchmark.

5.2 CALL CENTRE PERFORMANCE-VOICE TO VOICE

5.2.1 PARAMETER DESCRIPTION

➤ Computational Methodology:

↪ **Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) * 100**

↪ The calculation excludes the calls dropped before 60 seconds

➤ TRAI Benchmark: >= 90%

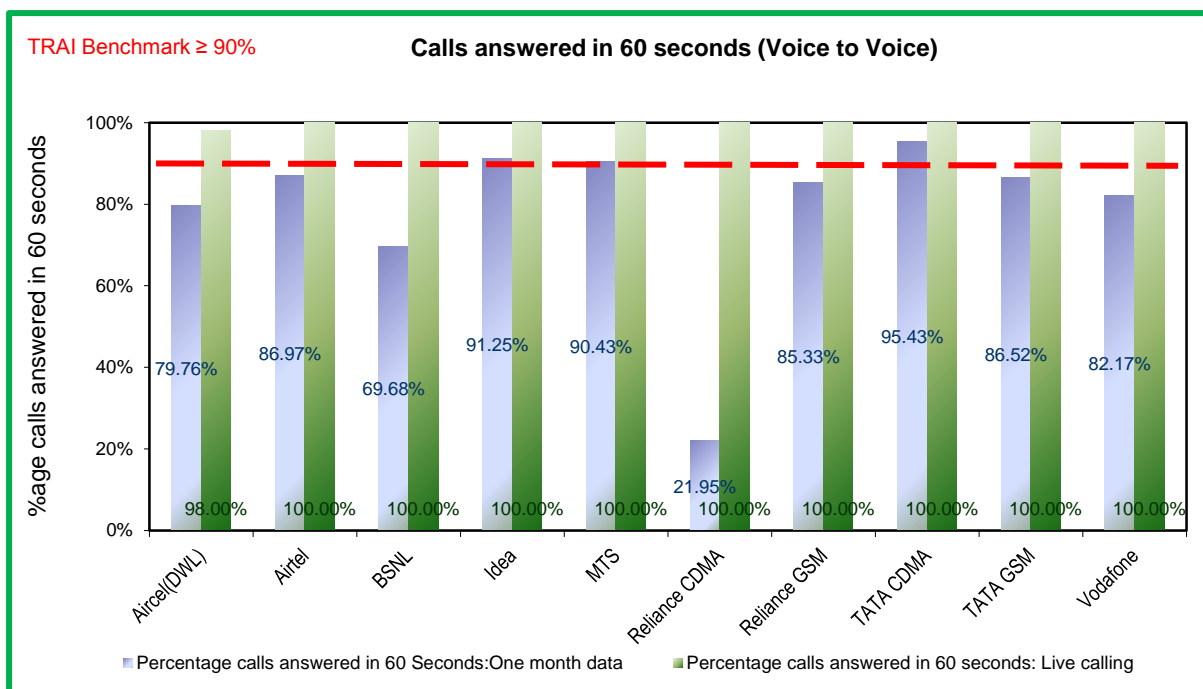
➤ Audit Procedure:

↪ Operator to provide details of:-

- ▶ Total calls connected and answered by operator within 60 seconds
- ▶ Total calls attempted to connect to the operator

↪ Also live calling is done to test the calls answered within 60 seconds by the operator

5.2.2 KEY FINDINGS



As per PMR, only TATA CDMA, Idea and MTS met the benchmark while all other operators failed to do so. Reliance CDMA was the bottom performer with just 21.95%.

5.3 TERMINATION/CLOSURE OF SERVICE

5.3.1 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:

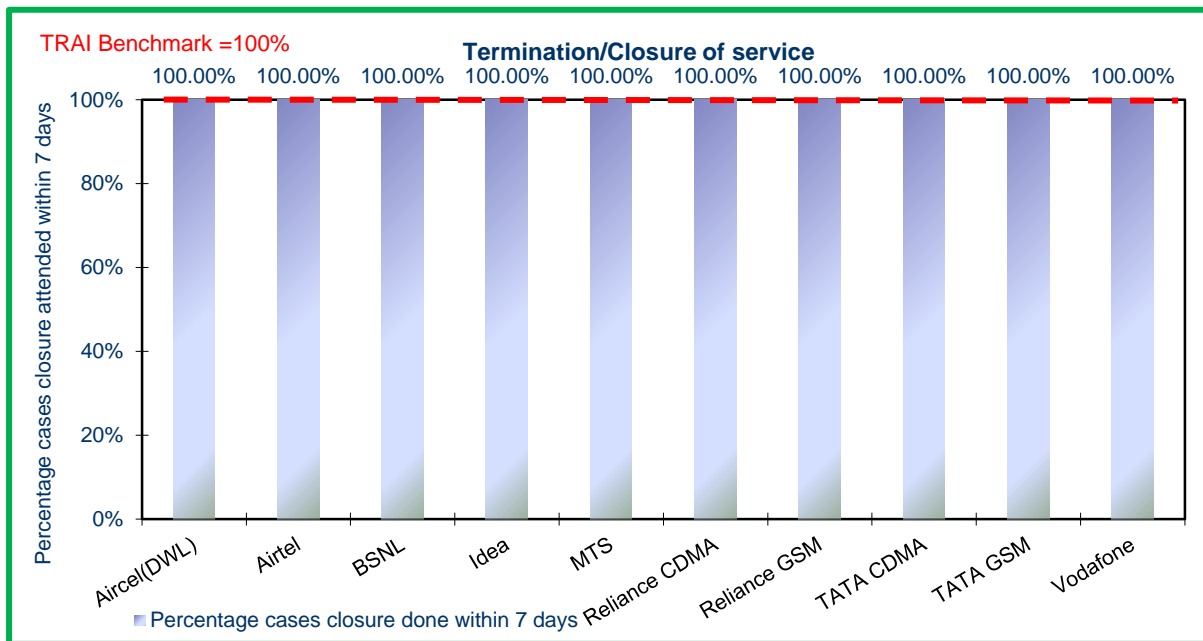
↳ Termination/Closure of Service: <=7 days

➤ Audit Procedure:

↳ Operator to provide details of:-

- Dates of lodging of all closure requests
- Dates of closure of service

5.3.2 KEY FINDINGS



All operators met the TRAI benchmark.

5.4 REFUND OF DEPOSITS AFTER CLOSURE

5.4.1 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:

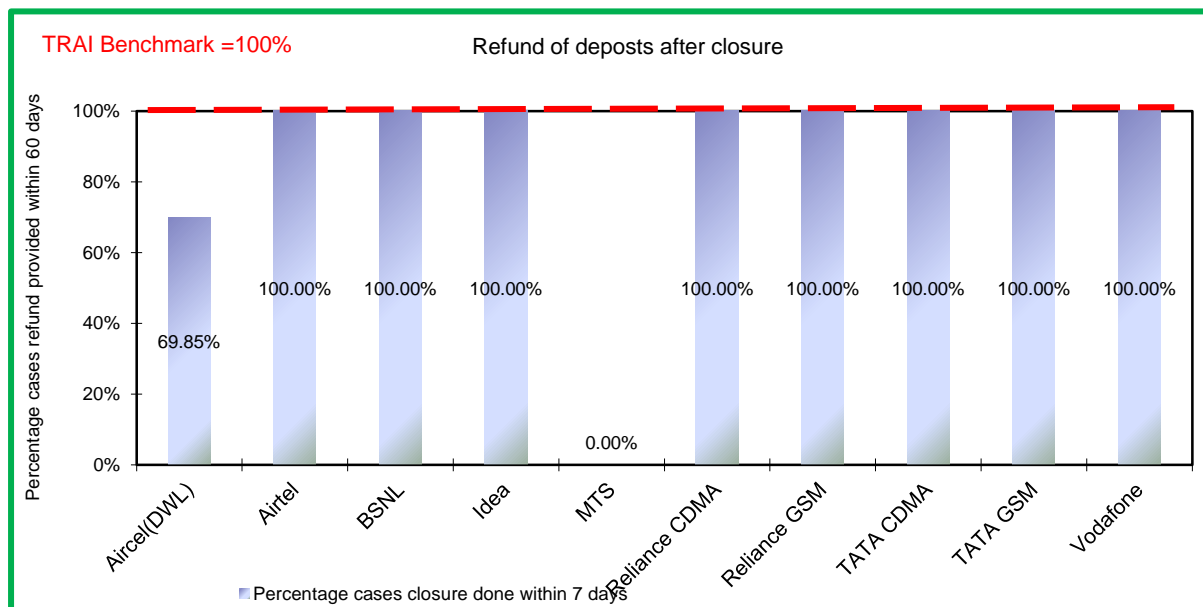
↳ Time taken for refund for deposit after closures: 100% within 60 days

➤ Audit Procedure:

↳ Operator to provide details of:-

- ▶ Dates of lodging of all closure request resolved resulting in requirement of a refund by the operator.
- ▶ Dates of refund pertaining to all closure request received during the relevant quarter

5.4.2 KEY FINDINGS



Excluding Aircel, all other operators met the benchmark of 100%. The parameter is not applicable for MTS as it is a prepaid service.

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 Kolkata circle. As per the new directive given by TRAI headquarters, drive test for the month of April, May and June 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 bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75 dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

Below is the schedule of the operator assisted drive test for the Kolkata circle-

Month	Name of SSA Covered	Date of Drive Test
April	WEST KOLKATA	22nd to 24th April 2014
May	EAST KOLKATA	27th May to 29th May 2014
June	North Kolkata	25th June to 27th June 2014
Year	2014	

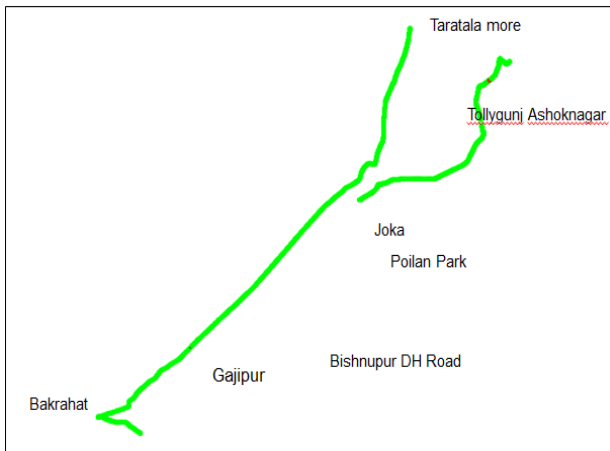
6.1.1 APRIL - WEST KOLKATA

6.1.1.1 ROUTE DETAILS – WEST KOLKATA SSA

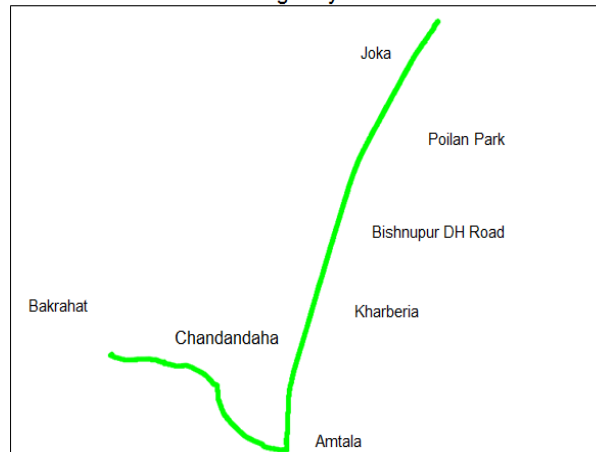
		April		
		WEST KOLKATA		
	Type of location	Day 1	Day 2	Day 3
Outdoor	Major Roads	Tollygunge Metro –Vidyanagar - Behala Chowrasta	Santoshpur – Akra – Metiabruz – Purty - Taratalla Mint	Tollygunge Circular Road – Behala - New Alipur.
	Highways	Joka-Sodepur - Behala Sakherbazar –Thakurpukur – Amtala – Moukhali.	Maheshtalla - M.G. Road – Rabindranagar – Akra – Santoshpur – Bata – Budgebudge	Tollygunge – Behala – Parnashree – Pallishree – khidirpur.
	Within the City	James Long Sarani - Raja Rammohan Roy Sarani – Taratalla - Behala Thakurpukur	Mollargate - Akra – Santoshpur – Paharpur – BudgeBudge - Jhijira Bazaar – Taratalla	: New Aipur Residential Area - Hyde Road - Karl Marx Sarani – Watgunge - Dr.Sudhir Bose Rd
Indoor	Office complex	Behala Punjab Dhaba	Purty Dhaba	Zyka Multicuisine Restaurant,New Alipur
	Shopping complex	Vidyanagar Zilla Parishad	Mahestalla Municipality	New Alipur Police Station

6.1.1.2 ROUTE MAP WEST KOLKATA DAY 1

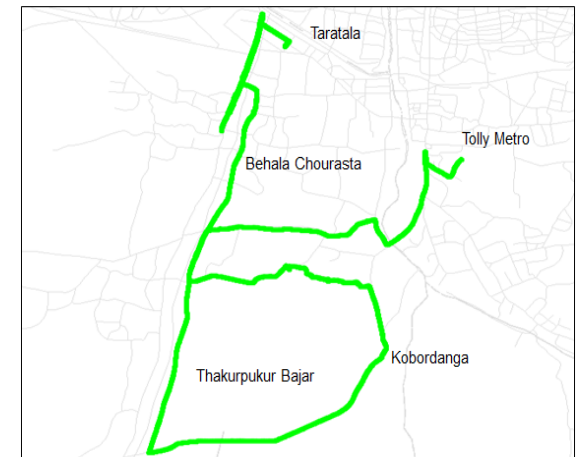
Major Road



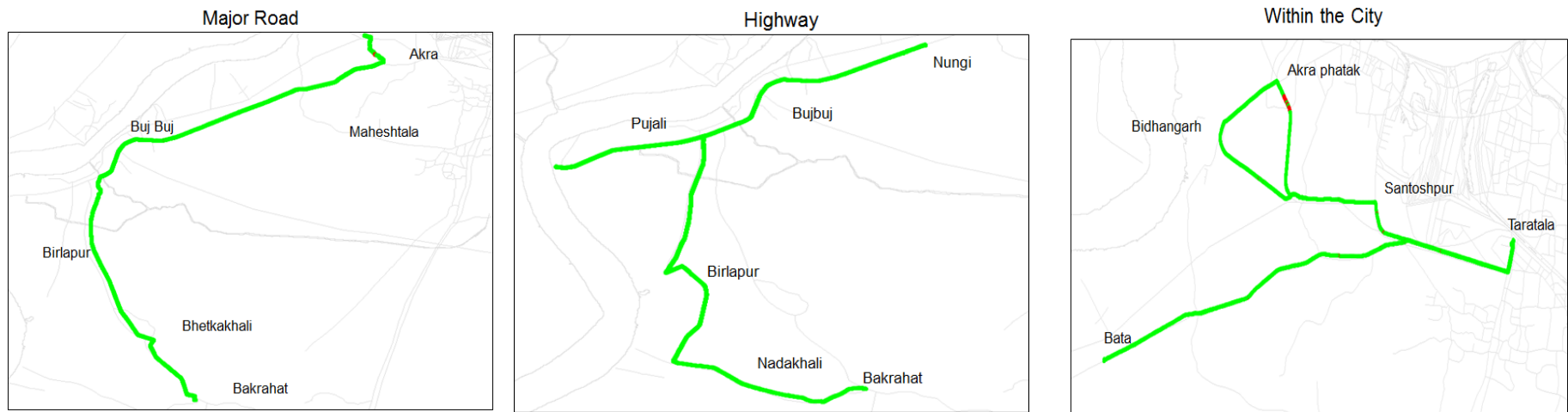
Highway



Within the City

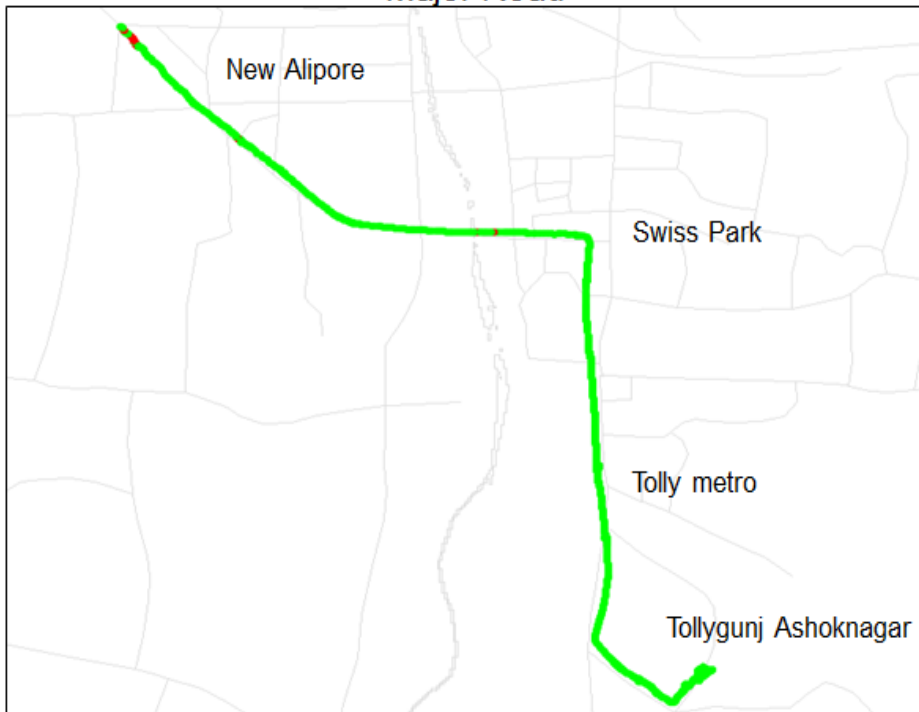


6.1.1.3 ROUTE MAP WEST KOLKATA DAY 2

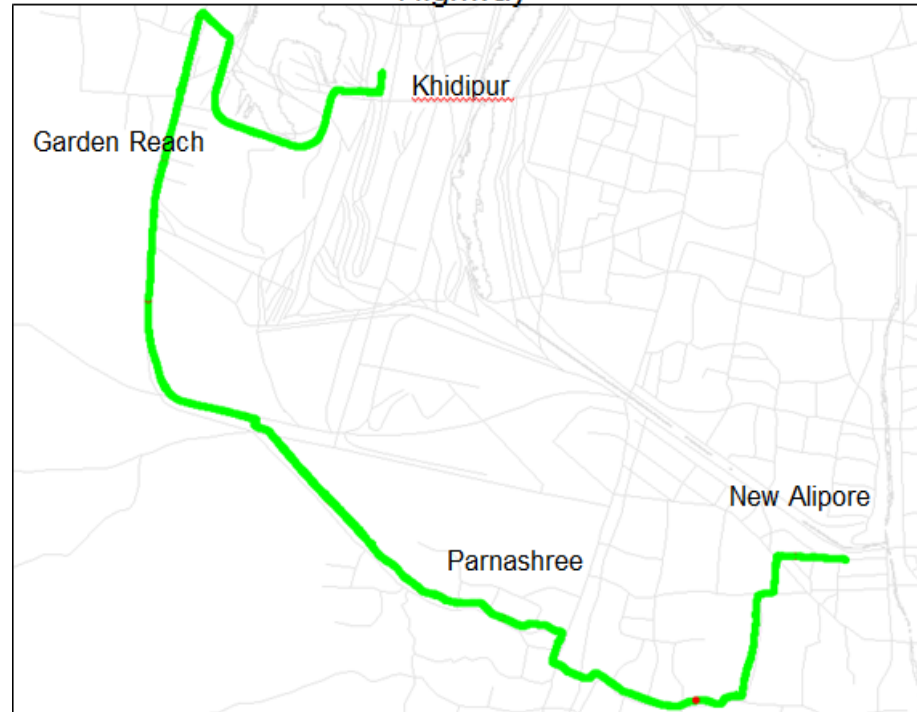


6.1.1.4 ROUTE MAP WEST KOLKATA DAY 3

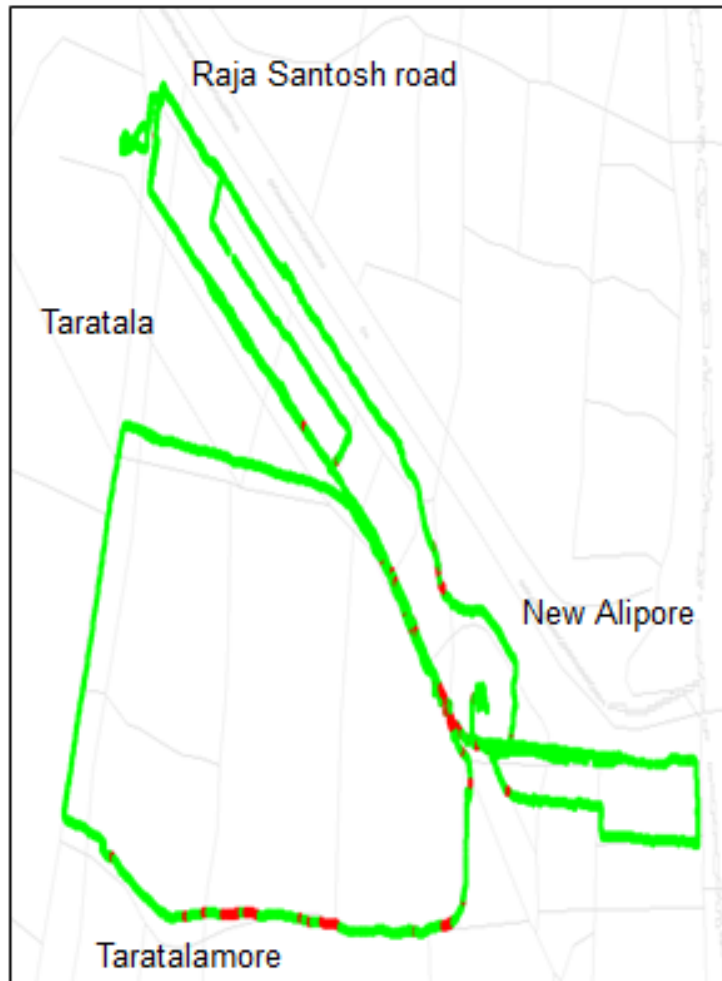
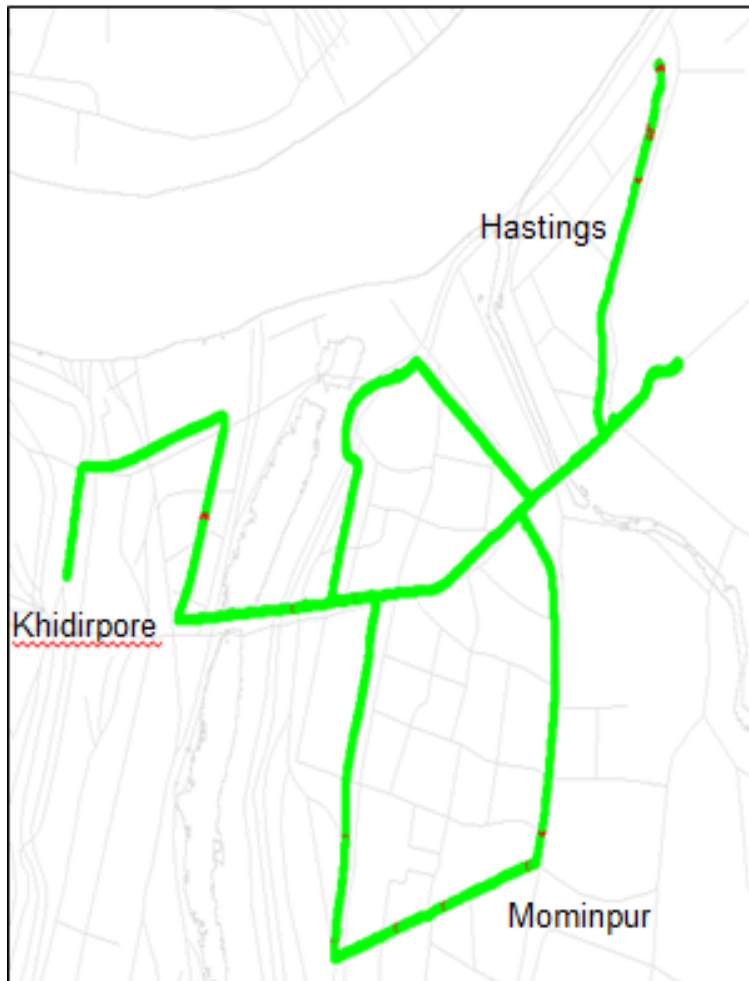
Major Road



Highway



Within the City



6.1.1.5 DRIVE TEST RESULTS – WEST KOLKATA SSA

Name of SSA	WEST KOLKATA	Month	April	Consolidated																	
	B*mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
>= -75dBm		78.26%	93.39%	99.94%	99.42%	100.00%	98.15%	86.67%	98.99%	57.47%	76.19%	17.74%	66.96%	81.38%	83.58%	65.40%	72.89%	83.41%	82.78%	100.00%	99.58%
>= -85dBm		97.97%	98.92%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	82.32%	98.15%	67.64%	89.63%	99.00%	98.38%	66.67%	98.73%	99.94%	97.71%	100.00%	100.00%
>= -95dBm		99.93%	99.87%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.90%	100.00%	98.56%	99.38%	99.96%	99.99%	100.00%	100.00%	100.00%	99.70%	100.00%	100.00%
Voice quality	≥ 95%	99.20%	95.03%	98.95%	96.38%	99.76%	99.83%	97.30%	96.51%	99.39%	97.06%	98.58%	99.31%	97.65%	96.98%	97.84%	97.55%	98.97%	97.13%	98.88%	97.98%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.82%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.18%	0.00%	0.00%
Call drop rate	≤ 2%	0.76%	0.21%	0.00%	0.00%	0.00%	0.14%	0.00%	0.00%	0.00%	0.72%	0.00%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.18%	0.00%	0.00%
Hands off success rate		100.00%	99.72%	100.00%	98.45%	100.00%	100.00%	98.46%	99.50%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.17%	100.00%	100.00%

Voice Quality

All operators met the benchmark set by TRAI in both indoor and outdoor areas.

Call Set Success Rate (CSSR)

All operators met the benchmark set by TRAI.

Call Drop Rate

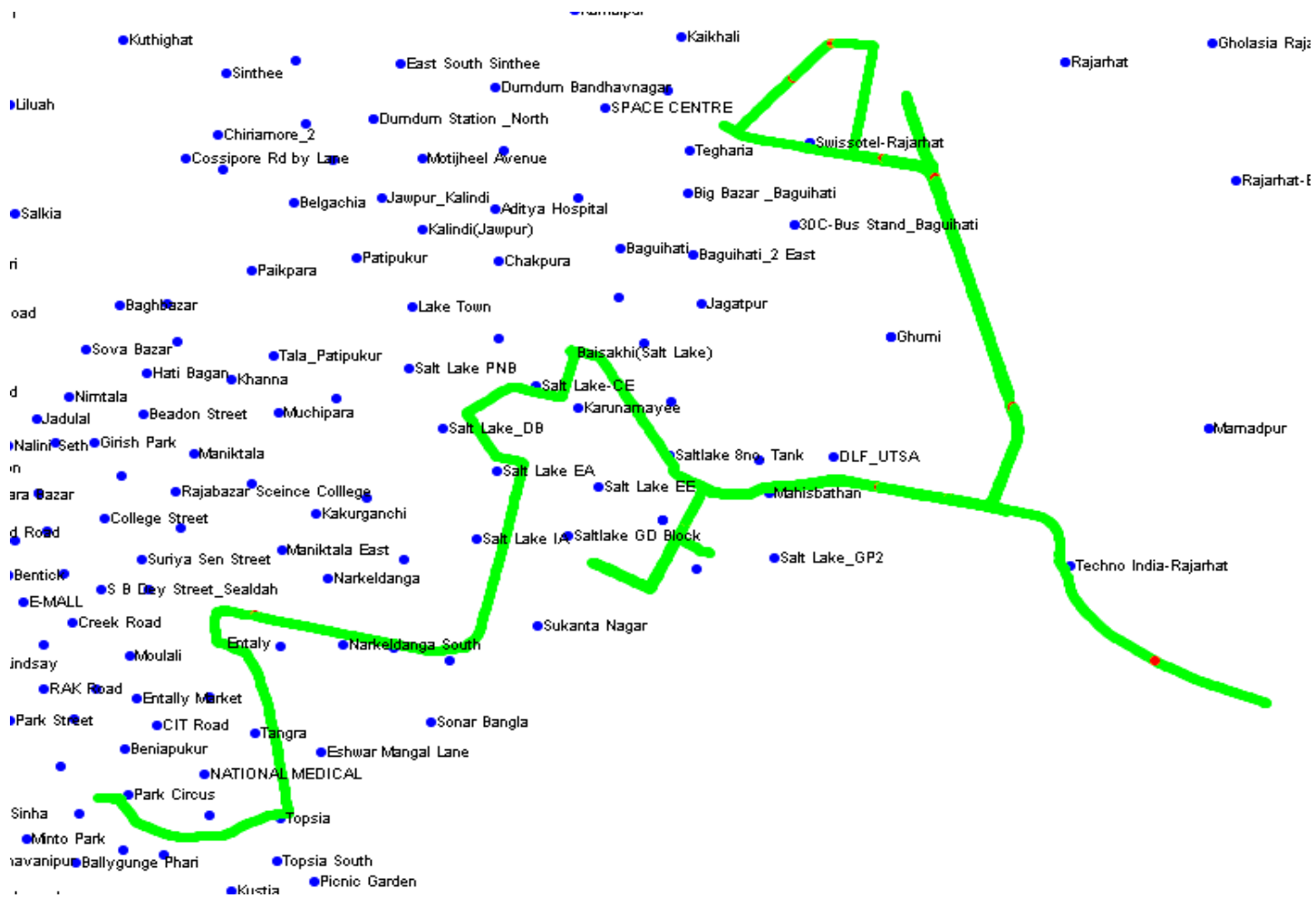
All operators met the benchmark set by TRAI.

6.1.2 MAY - EAST KOLKATA

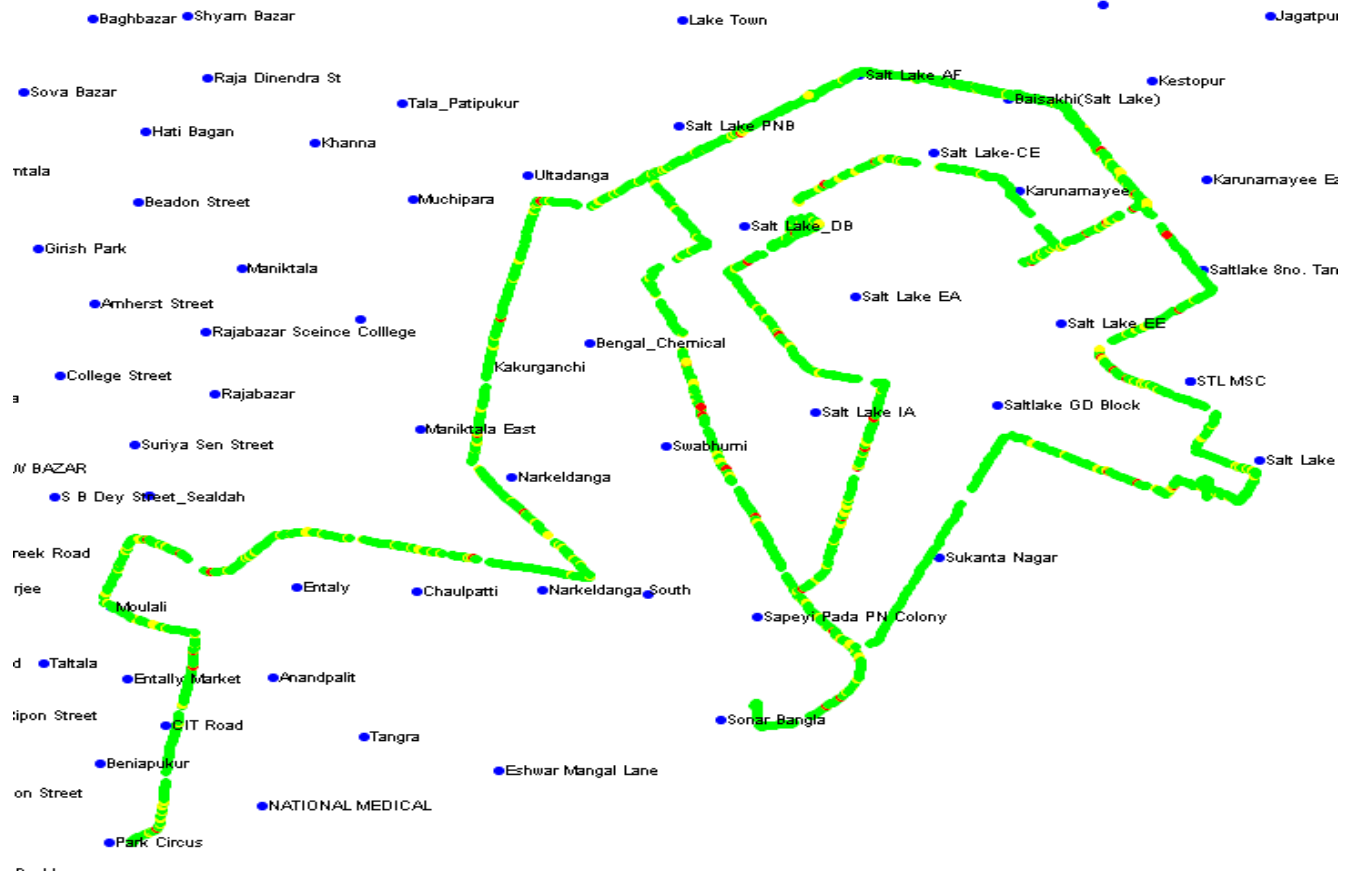
6.1.2.1 ROUTE DETAILS – EAST KOLKATA SSA

		May		
		EAST KOLKATA		
	Type of location	Day 1	Day 2	Day 3
Outdoor	Major Roads	Maherali Road-Park Circus-Topsia More-Tangra-Beliaghata Main Road-Kadapara EM Bypass. City Center-2-Old Rajarhat Road - Akhanksha More-Narkelbagan Via New Town Main Road -Bengal Unitech-DLF .	Metropolitan-Chingrighata-Uladanga Via EM Bypass.	Highland Park-Patuli More-Garia Dhalai Bridge Via EM Bypass-Garia Station-Peerless Hospital.
	Highways	Techno polis-New Town Main Road-City Center-2	Park Circus-Moulali Via CIT Road-Sealdah-Beliaghaa Main Road-Sallake Gate-Sallake PNB More-Sallake 4 No Island-Sallake Baisakhi-Midland Park.	Metropolion-Science city-Ruby Xing-Kalikapur-Highland Park Via EM Bypass.
	Within the City	Beliagha Bypass-Sallake Central Park-City Center-Saltlake PNB-8 No Tank-Narkelbagan-Tecnopolis Via New Town Main Road-Saltlake Sec-5.	Beliaghata CIT More-Phoolbagan-Kankurgachi-Ultadanga-PNB-Sallake 4 No Island-Baisakhi-8 No Island-Karunamayee-City Cener-Laboni Island-Saltlake Sadium-Cenral Park-Chingrighata-Nicco Park-Sallake Secor-5.	Garia Dhalai Bridge-Pauli-Kalikapr-Jadavpur Jhil Road-Garfa Main Road-Mukundapur RN Tagore Hospital-Ruby-Science City-Metropolion Via EM Bypass.
Indoor	Office complex	Godrej Waterside	Infinity Benchmark	Pauli Soil Testing Office.
	Shopping complex	City Center 2	City Center 1	Sanjha Culha.

6.1.2.2 ROUTE MAP EAST KOLKATA DAY 1



6.1.2.3 ROUTE MAP EAST KOLKATA DAY 2



6.1.2.4 ROUTE MAP EAST KOLKATA DAY 3



6.1.2.5 DRIVE TEST RESULTS – EAST KOLKATA SSA

Name of SSA	EAST KOLKATA	Month	May	Consolidated																	
	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
>= -75dBm		72.65%	95.16%	91.57%	99.91%	99.48%	99.00%	75.36%	91.07%	94.73%	98.85%	38.10%	76.15%	61.97%	88.43%	74.18%	77.28%	95.99%	91.07%	88.95%	80.40%
>= -85dBm		99.42%	99.89%	99.99%	100.00%	100.00%	99.98%	98.62%	99.52%	99.94%	99.97%	81.38%	97.48%	96.94%	99.20%	91.34%	99.64%	99.86%	99.65%	99.63%	99.01%
>= -95dBm		99.90%	99.99%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	86.23%	99.95%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.07%
Voice quality	≥ 95%	96.90%	95.13%	98.69%	96.16%	99.33%	99.22%	94.99%	94.44%	99.76%	96.18%	99.75%	99.50%	94.28%	94.45%	97.40%	97.82%	98.71%	86.07%	98.55%	98.12%
CSSR	≥ 95%	99.28%	99.74%	100.00%	99.83%	100.00%	99.86%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.05%	100.00%	100.00%
%age Blocked calls		0.73%	0.26%	0.00%	0.17%	0.00%	0.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.95%	0.00%	0.00%
Call drop rate	≤ 2%	0.76%	0.53%	0.00%	0.00%	0.00%	0.45%	0.00%	0.73%	0.00%	0.42%	0.00%	0.15%	0.00%	0.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		97.62%	99.55%	100.00%	99.46%	100.00%	99.82%	100.00%	98.82%	100.00%	100.00%	100.00%	100.00%	100.00%	99.62%	100.00%	100.00%	100.00%	99.35%	100.00%	98.48%

Voice Quality

In the indoor areas in East Kolkata, Idea and Reliance GSM failed to meet the benchmark while all other operators met the TRAI Benchmark. In the outdoor areas, Idea, Reliance GSM and Tata GSM failed to meet the TRAI benchmark of 95% for voice quality.

Call Set Success Rate (CSSR)

All operators met the TRAI benchmark for CSSR.

Call Drop Rate

All operators met the TRAI benchmark for call drop rate.

6.1.3 JUNE - NORTH KOLKATA

6.1.3.1 ROUTE DETAILS – NORTH KOLKATA SSA

		June		
		North Kolkata		
Type of location		Day 1	Day 2	Day 3
Outdoor	Major Roads	Barrackpur-Nilgunge- Barasat colony More- Madhyamgram.	Kalyani Express Crossing- Sodpur-Kachrapara-Kalyani- - Barrackpur	Kaikhali- Tegharia- Baguihati – Saltlake PNB- Ultadanga
	Highways	Baghbazar- BT Road- Barrackpur.	Barasat colony More- Airport- Nager Bazar	Saltlake PNB- Ultadanga- Saltlake GD- Axis Mall- Swissotel
	Within the City	1Madhyamgra-Badu- Kaikhali	Kalyani- Barrackpur	RS Software- TRAI office saltlake- Saltlake Area
Indoor	Office complex	Barasat City Court .	Kalyani Municipality	TRAI Office Saltlake.
	Shopping complex	Barasat City Mall	Tan Hotel	Rang De Basanti Dhaba

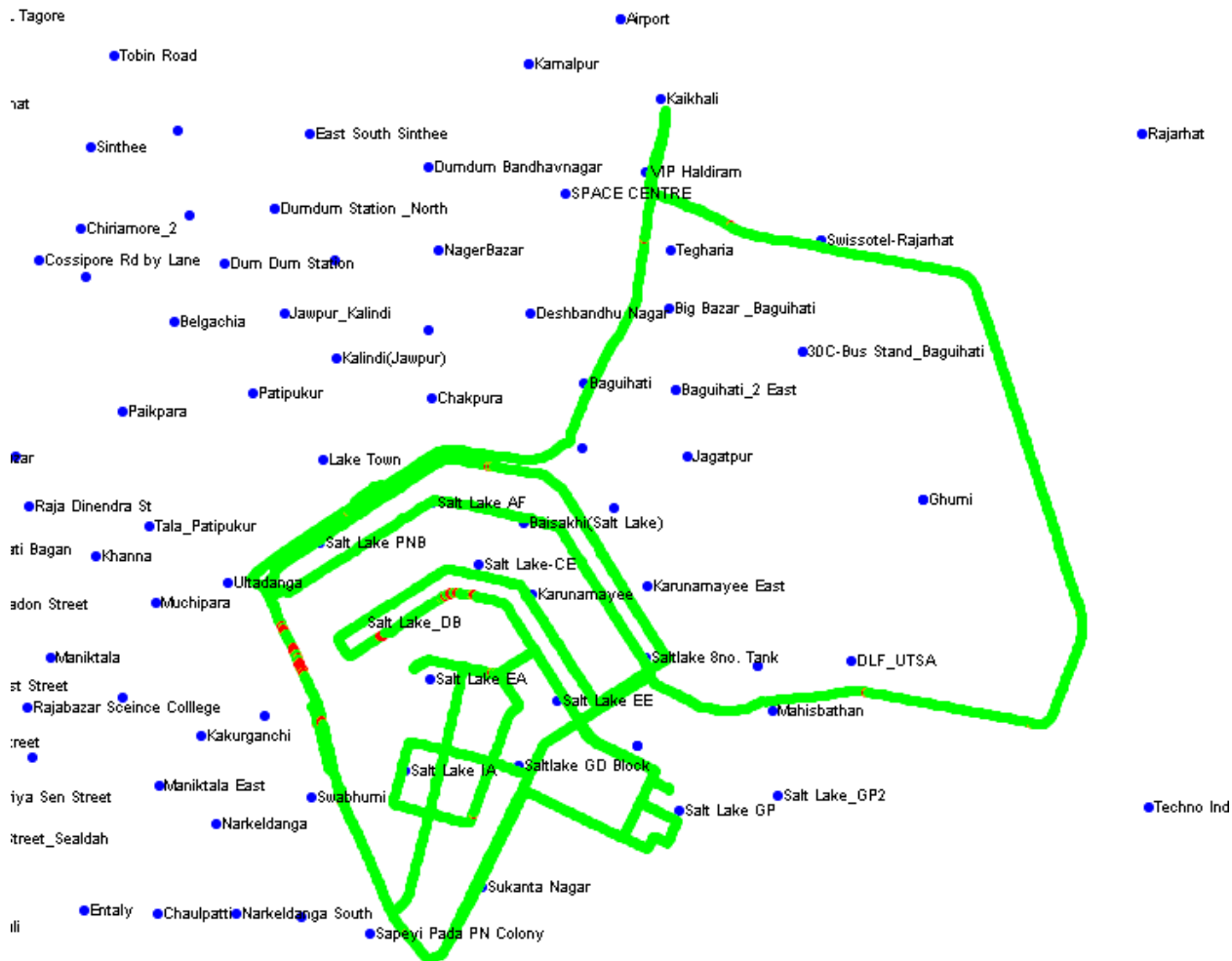
6.1.3.2 ROUTE MAP NORTH KOLKATA DAY 1



6.1.3.3 ROUTE MAP NORTH KOLKATA DAY 2



6.1.3.4 ROUTE MAP NORTH KOLKATA DAY 3



6.1.3.5 DRIVE TEST RESULTS – NORTH KOLKATA SSA

Name of SSA	North Kolkata	Month	June	Consolidated																	
	B*mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength -0 to -75 dBm		15.56%	58.70%	98.04%	99.35%	98.81%	98.79%	57.09%	72.19%	58.43%	93.04%	55.09%	66.63%	66.24%	85.75%	35.43%	71.59%	37.80%	89.48%	90.43%	99.12%
Signal Strength -75 to -85 dBm		80.36%	95.53%	99.88%	100.00%	100.00%	100.00%	96.22%	98.02%	96.61%	99.92%	98.23%	96.45%	88.95%	99.32%	77.74%	98.78%	86.45%	99.56%	99.92%	99.82%
Signal Strength -85 to -120 dBm		100.01%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	97.64%	91.60%	98.98%	96.69%	99.36%	99.07%	98.51%	93.48%	100.00%	100.00%	99.99%	98.74%	96.07%	95.34%	96.53%	96.98%	98.60%	96.22%	99.18%	97.86%
CSSR	≥ 95%	100.00%	99.35%	100.00%	100.00%	100.00%	99.86%	100.00%	99.82%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.37%	100.00%	100.00%
Spice Blocked calls		0.00%	0.42%	0.00%	0.00%	0.00%	0.14%	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.24%	0.00%	0.00%	0.00%	0.41%	0.00%	0.19%	0.00%	0.22%	0.00%	0.70%	0.00%	0.58%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%
Hands off success rate		100.00%	96.79%	100.00%	98.97%	100.00%	99.92%	100.00%	98.37%	83.96%	66.67%	100.00%	100.00%	100.00%	99.87%	100.00%	100.00%	100.00%	99.10%	100.00%	99.70%

Voice Quality

In the indoor areas in North Kolkata, all operators met the TRAI Benchmark. In the outdoor areas, Aircel and Idea failed to meet the TRAI benchmark of 95% for voice quality.

Call Set Success Rate (CSSR)

All operators met the TRAI benchmark for CSSR.

Call Drop Rate

All operators met the TRAI benchmark for call drop rate.

6.2 INDEPENDENT DRIVE TEST

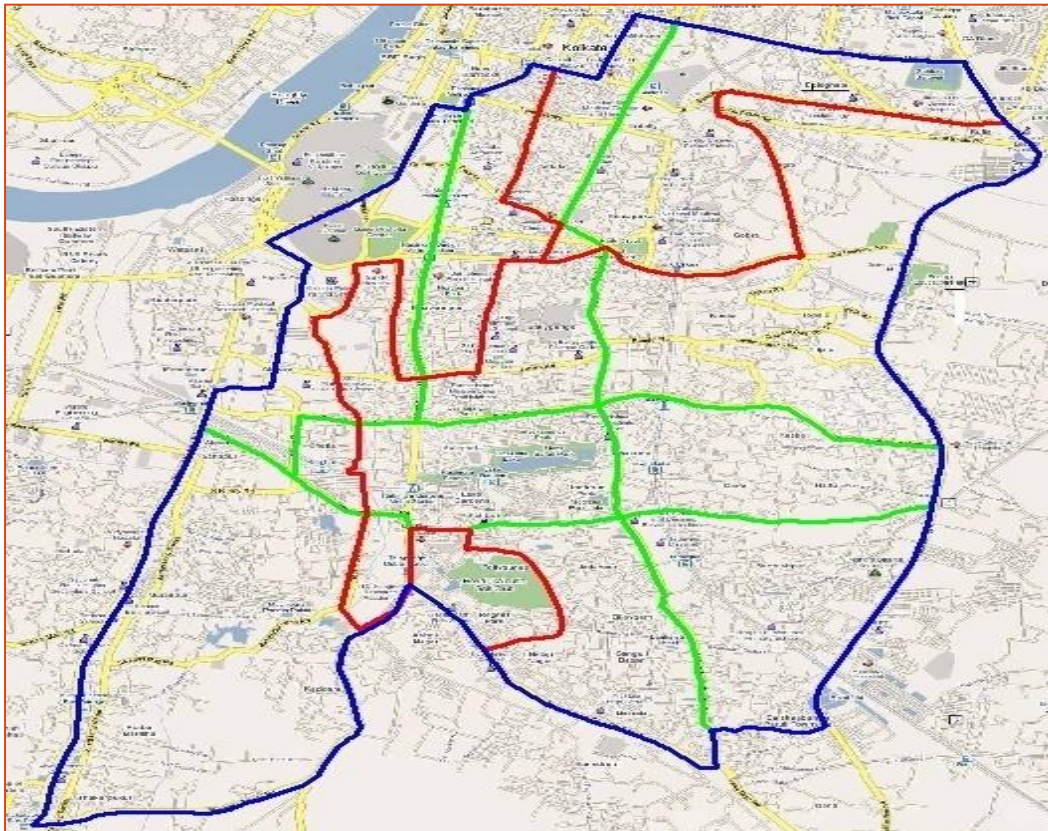
The independent drive test was conducted for all the operators present in the Kolkata circle. As per the new directive given by TRAI headquarters, drive test were conducted at a SSA level. A minimum of 100 kilometers were traversed in each SSA and the selection of routes ensured that the maximum towns,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

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

6.2.1 SOUTH KOLKATA

Name of the City	South Kolkata
Date of Drive Test	27th & 28th June' 14
Name of the circle	Kolkata

Independent Drive Test Route Details – South Kolkata SSA



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

South Kolkata	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Esplaned Metro Station-Indira Gandhi Sarani-Victoria-Alipur-Alipore Xing-Behala Chowrasta -Thakurpukur-M.G.Road-Pashim Putiary-N.S Road-Shahid khudiram Metro Staion-Jadavpur-Ruby Hospital -Narkeldanga -Raja Bazar Junction-Sealdah	Abhijit Math-Udaya sankr Sarani-Harpriya datta lane-Mannar Kabar Bus stop-PAS Rd-Bangur hospital-Mahanaya Uttam kumar Metro-Siriti More Bus Stop-BL Saha Rd-Chetala Rd-Bijay basu Rd-AJC Rd-Rabindra sadan Bus Stop-Harish Mukharjee Rd-Harish MukharjeeBus stop-Hazra S P Mukherjee Crossing Bus Stop-Beltala Bus Stop -Lansdown Hazr Crossing Bus Stop-Sarat Bose Rd-Minto Park Sarat bose AJC Crossing Bus Stop	Esplaned Metro Station-Jawaharlal Neheru Rd-RabindaSan Metro station-Kalighat-Raja shontosh Rd-Alipur Rd-Tollygunge Circular Rd- MR Bangur Hospital-kalikapu Rd. Garia-Kishore Chakra Ground-Jadavpur University-Gariahat-old BallygungeRd-Park circus 7 point Xing -mallik Bazar-AJC Boss RD-Moulali-Sealdah	Director of land record & surve	Highland Park Bigbazar

Independent Drive Test Result – South Kolkata SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		MTS		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		48.55%	51.00%	NA	NA	79.75%	39.67%	54.75%	70.50%	37.35%	65.57%	49.60%	36.67%	45.40%	25.00%	93.45%	88.07%	52.35%	48.30%	91.10%	81.97%
Signal Strength - 0 to -85 dBm		91.45%	93.67%	NA	NA	93.55%	79.33%	97.40%	96.33%	95.70%	95.53%	87.85%	83.00%	70.20%	69.00%	100.00%	99.30%	88.30%	86.47%	99.85%	98.40%
Signal Strength - 0 to -95 dBm		100.00%	99.67%	NA	NA	100.00%	95.63%	100.00%	100.00%	100.00%	100.00%	99.90%	98.67%	99.70%	96.33%	100.00%	100.00%	100.00%	69.67%	100.00%	100.00%
Voice quality	≥ 95%	66.39%	87.57%	NA	NA	79.01%	85.05%	84.64%	86.59%	94.17%	92.70%	97.02%	92.29%	83.58%	97.27%	98.79%	95.68%	100.00%	97.88%	97.88%	94.86%
CSSR	≥ 95%	96.67%	96.49%	NA	NA	85.00%	89.60%	97.14%	99.19%	100.00%	98.82%	100.00%	95.59%	96.67%	93.66%	100.00%	98.15%	100.00%	95.26%	98.57%	98.72%
%age Blocked calls		3.33%	3.51%	NA	NA	15.00%	10.40%	2.86%	0.81%	0.00%	1.18%	0.00%	4.41%	3.33%	6.34%	0.00%	1.85%	0.00%	4.74%	1.43%	1.28%
Call drop rate	≤ 2%	0.00%	0.93%	NA	NA	38.10%	22.15%	0.00%	2.07%	0.00%	1.16%	0.00%	1.66%	3.70%	2.14%	0.00%	2.41%	0.00%	0.43%	0.00%	2.16%
Hands off success rate		86.42%	95.70%	NA	NA	84.62%	83.19%	100.00%	99.01%	100.00%	98.13%	98.78%	97.85%	100.00%	98.43%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Airtel Switch Number was not working during the drive test

Voice Quality

Aircel, BSNL, Idea and Vodafone failed to meet the benchmark in indoor as well as outdoor areas. Reliance GSM and Tata CDMA failed to meet the benchmark in outdoor areas while Tata GSM did not meet the benchmark in indoor areas.

Call Set Success Rate (CSSR)

BSNL failed to meet the TRAI benchmark for CSSR in indoor as well as outdoor areas while Tata BSM missed the benchmark in outdoor areas.

Call Drop Rate

BSNL and Tata GSM failed to meet the benchmark in indoor as well as outdoor areas while Idea, MTS & Tata CDMA failed to meet the benchmark in outdoor areas.

6.2.2 CENTRAL KOLKATA

Name of the City	Central Kolkata
Date of Drive Test	30th June & 1st July' 14
Name of the circle	Kolkata

Independent Drive Test Route Details – Central Kolkata SSA



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

Central Kolkata	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Shyambazar-APC Rd- Maniktala Main Rd-EM Bypass-Sealdah-Mallik Bazar- Dharmatala-EdenGarden Rd- Babughat-BaraBazar-Nimtala Ghat St-Sovabazar Sutanuti Metro Station-ShyamBazar	Saltake Stadium Metro Station- Narkeldanga Main Rd-Raja Bazar-Mahatma Gandhi Road Metro Station-Cental Metro Station, Maniktala Post office-Raja dinendra St-N sealdah Rd- KaiserSt	Shyam Bazar-Hati Bagan- Bidhan Sarani-Waw Bazar- Bata,Nutan Bazar-Girish Park- Manik Tala-kankurgachhi- Bengal Chemical Bus Stop,Bara bazar-MG Rd-Raja Bazar-Hati Bagan	Kolkata municpalty corporation	Pantaloon,Hatibagan

Independent Drive Test Result – Central Kolkata SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		TATA GSM		MTS		Reliance CDMA		TATA CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		15.40%	53.87%	NA	NA	14.70%	59.87%	18.75%	60.30%	12.85%	60.63%	21.05%	53.20%	9.05%	34.37%	53.85%	87.93%	42.35%	64.83%	55.20%	94.47%
Signal Strength - 0 to -85 dBm		50.45%	94.90%	NA	NA	88.90%	93.17%	62.00%	92.73%	60.30%	93.60%	61.15%	93.63%	72.15%	81.17%	94.65%	99.87%	54.25%	95.70%	67.55%	99.97%
Signal Strength - 0 to -95 dBm		99.95%	100.00%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	82.07%	85.82%	NA	NA	77.70%	86.23%	72.06%	86.66%	78.73%	93.53%	95.82%	89.74%	98.46%	89.57%	97.34%	95.67%	98.84%	96.79%	97.09%	94.77%
CSSR	≥ 95%	98.48%	98.23%	NA	NA	90.63%	92.48%	100.00%	97.95%	100.00%	98.99%	100.00%	98.31%	100.00%	96.10%	100.00%	98.99%	98.44%	99.12%	97.00%	98.62%
%age Blocked calls		1.52%	1.77%	NA	NA	9.38%	7.52%	0.00%	2.05%	0.00%	1.01%	0.00%	1.69%	0.00%	3.90%	0.00%	1.01%	1.56%	0.88%	3.00%	1.38%
Call drop rate	≤ 2%	0.00%	0.50%	NA	NA	36.54%	17.24%	0.00%	0.00%	1.56%	2.62%	0.00%	1.20%	1.56%	4.19%	0.00%	0.00%	0.00%	0.63%	0.00%	0.72%
Hands off success rate		100.00%	97.12%	NA	NA	56.67%	82.72%	100.00%	99.53%	100.00%	99.25%	100.00%	99.21%	100.00%	98.12%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Airtel Switch Number was not working during the drive test

Voice Quality

Aircel, BSNL, Idea and Vodafone failed to meet the benchmark in indoor as well as outdoor areas. Reliance GSM and Tata CDMA failed to meet the benchmark in outdoor areas while Tata GSM did not meet the benchmark in indoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

BSNL failed to meet the benchmark in indoor as well as outdoor areas while Vodafone & Tata CDMA failed to meet the benchmark in outdoor areas.

7 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Most of the operators met the benchmark for various network parameters in Kolkata. Tata CDMA failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters)

Most of the operators met the benchmark for various network parameters in Kolkata. Aircel, Tata CDMA and Tata GSM failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

PMR (Customer Service Parameters)

BSNL performing the worst among operators on customer service parameters as it failed to meet the benchmark for almost every parameter.

Calls answered by the operators (Voice to Voice) within 60 seconds key concern in the circle as most of the operators have failed to meet the TRAI benchmark for this parameter.

Drive Test (Operator Assisted)

Idea, Reliance GSM and Tata GSM failed to meet the benchmark for Voice Quality in East Kolkata.

Aircel and Idea failed to meet the benchmark for Voice Quality in North Kolkata.

Drive Test (Independent)

During all the drive tests, it was observed that Voice Quality has remained below benchmark for most of the operators in all SSAs. Only Vodafone and MTS met the TRAI benchmark for this parameter in both the independent drive tests.

8 ANNEXURE

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1950	2251	1217	1931	542	483	1646	142	1699	2424
Sum of downtime of BTSs in a month (in hours)		8678	554	8209	3210	726	678	2095	119	264	580
BTSs accumulated downtime (not available for service)	≤ 2%	0.60%	0.03%	0.40%	0.22%	0.18%	0.19%	0.17%	0.11%	0.02%	0.03%
Number of BTSs having accumulated downtime >24 hours		37.00	0.00	24.00	10.33	0.00	3.00	6.33	0.33	0.67	1.33
Worst affected BTSs due to downtime	≤ 2%	1.90%	0.00%	1.97%	0.53%	0.00%	0.62%	0.39%	0.23%	0.04%	0.05%
Live Measurement- BTSs accumulated downtime											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1947	2259	1217	1928	540	483	1646	142	1699	2419
Sum of downtime of BTSs in a month (in hours)		922	39	737	314	137	48	185	8	20	37
(not available for service)	≤ 2%	0.66%	0.03%	0.84%	0.23%	0.35%	0.13%	0.16%	0.08%	0.02%	0.02%
Number of BTSs having accumulated downtime >24 hours		8.67	0.00	0.67	3.67	0.00	0.00	0.00	0.00	2.00	0.00
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	0.45%	0.00%	0.05%	0.19%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%

8.2 NETWORK CHANNEL CONGESTION

Audit Results for CSSR, SDCCH and TCH congestion											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.97%	99.66%	98.16%	99.64%	99.81%	99.13%	99.22%	98.92%	98.63%	99.65%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.75%	0.04%	0.46%	0.06%	0.00%	0.00%	0.02%	0.00%	0.05%	0.04%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.09%	0.12%	1.10%	0.03%	0.01%	0.01%	0.05%	0.05%	0.04%	0.35%

Live measurement results for CSSR, SDCCH and TCH congestion											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.80%	99.65%	98.31%	99.75%	99.85%	98.93%	99.38%	98.97%	98.69%	99.70%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.72%	0.05%	0.03%	0.05%	0.00%	0.00%	0.01%	0.00%	0.06%	0.05%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.14%	0.12%	1.27%	0.02%	0.01%	0.01%	0.02%	0.00%	0.02%	0.30%

Drive test results for CSSR (Average of three drive tests) and blocked calls											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		597	613	626	612	518	652	600	576	625	599
Total number of successful calls established		595	612	626	611	518	652	600	576	623	599
CSSR	≥ 95%	99.70%	99.94%	99.89%	99.95%	100.00%	100.00%	100.00%	100.00%	99.62%	100.00%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		0.30%	0.06%	0.11%	0.05%	0.00%	0.00%	0.00%	0.00%	0.38%	0.00%

8.3 CALL DROP RATE

Audit Results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		77576384	108755859	505967	42123837	20938132	22979771	37698685	2987807	52749501	125433289
Total number of calls dropped		640710	783930	9768	144289	105966	35333	169327	22866	358569	963129
Call drop rate	≤ 2%	0.82%	0.72%	1.93%	0.34%	0.51%	0.16%	0.45%	0.77%	0.68%	0.77%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		5829	6418	3393	173707	1804	1449	4939	462	4976	6141
Total number of cells having more than 3% TCH		171	23	92	1641	15	7	2	14	138	147
Worst affected cells having more than 3% TCH	≤ 3%	2.93%	0.36%	2.72%	0.94%	0.83%	0.51%	0.05%	3.10%	2.77%	2.40%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		8293848	10924504	518242	53627952	29366663	20557930	34707230	3725591	68841866	173998673
Total number of calls dropped		71883	81234	9458	148257	103603	25840	123480	24353	455341	1194932
Call drop rate	≤ 2%	0.87%	0.74%	1.82%	0.28%	0.35%	0.13%	0.39%	0.65%	0.66%	0.69%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		9680	19241	3390	412392	1798	1448	4938	462	4916	NA
Total number of cells having more than 3% TCH		361	121	60	156	14	3	0	27	199	NA
Worst affected cells having more than 3% TCH	≤ 3%	3.66%	0.63%	1.76%	0.04%	0.76%	0.23%	0.00%	5.84%	4.05%	NA

Drive test results for Call drop rate (Average of three drive tests)											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		595	612	626	611	518	652	600	576	623	599
Total number of calls dropped		2	0	2	1	2	2	2	0	1	0
Call drop rate	≤ 2%	0.27%	0.00%	0.37%	0.17%	0.39%	0.25%	0.33%	0.00%	0.10%	0.00%

8.4 VOICE QUALITY

Audit Results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		15746454999	18194269572	7000	5531216709	20938132	NA	5531530221	232118240	7576606061	16834928897
Total number of calls with good voice quality		15333232192	17506459291	6982	5368788603	20928208	NA	5428091781	230217768	7430359194	16387088287
%age calls with good voice quality	≥ 95%	97.38%	96.22%	99.75%	97.06%	99.95%	99.75%	98.13%	99.18%	98.07%	97.34%
Live measurement results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1703568041	1832480257	700	6388272192	NA	NA	5311176117	225256958	10130316644	21723842789
Total number of calls with good voice quality		1658436817	1762635574	678	6233362153	NA	NA	5226887712	223545602	9956404753	21206763135
%age calls with good voice quality	≥ 95%	97.35%	96.19%	96.90%	97.58%	NA	99.76%	98.33%	99.24%	98.28%	97.62%
Drive test results for Voice quality (Average of three drive tests)											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1106029	152643	908062	860473	16637	61501	80185	67704	136302	156700
Total number of calls with good voice quality		1049226	147752	899456	815891	16296	61043	77088	65943	127229	153801
%age calls with good voice quality	≥ 95%	94.60%	96.79%	99.07%	94.87%	98.06%	99.27%	95.68%	97.41%	93.11%	98.15%

Note: -Reliance CDMA is not sharing the bases for calculating the voice quality. It is same across all the circles. MTS is also not sharing the data for voice quality for live measurement. A supporting document for the same has been provided in the annexure.

8.5 POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	28	47	40	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - In erlangs		53965	76112	575103	55500	36871	8153	11358	25733	20708	182469
Traffic served for all POIs (B)- In erlangs		29972	38117	13670	24666	12459	3770	7009	11334	11368	90967
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	17	27	48	40	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - In erlangs		53849	228516	578639	55458	36852	9150	11089	26533	19836	181283
Traffic served for all POIs (B)- in erlangs		31436	115967	14079	24611	12734	4979	6998	11531	11410	92233
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

April										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	1273054	152023	1000225	815565	16704	63720	120950	62368	149078	153615
May										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	1321584	145851	836202	849797	12988	56991	53015	70356	128944	152946
June										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	723448	160056	887758	916056	20220	63791	66589	70387	130884	163538

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

8.7 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		9322480.00	791488.00	536858.00	379665.00	1927829.00	2014168.00	6856591.00	81013.00	758151.00	9931131.00
Number of calls getting connected and answered (electronically)		8777039.00	791488.00	422005.00	378069.00	1915264.00	1997966.00	6783332.00	80251.00	735782.00	9931131.00
Percentage calls getting connected and answered	≥ 95%	94.15%	100.00%	79.89%	99.58%	99.35%	99.20%	98.93%	99.06%	97.05%	100.00%
Number of calls getting transferred to the operator (voice to voice)		3179765.00	2311000.00	297064.00	1404070.00	807466.00	209382.00	1996855.00	69464.00	883315.00	2296301.00
Number of calls answered by operator (voice to voice) within 60 seconds		2536270.00	2009960.00	201821.00	1281277.00	730191.00	45949.00	1703862.00	66292.00	764266.00	1886939.00
Percentage calls answered within 60 seconds (V2V)	≥ 90%	79.76%	86.97%	69.68%	91.25%	90.43%	21.95%	85.33%	95.43%	86.52%	82.17%
Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Number of calls getting connected and answered (electronically)		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total Number of calls getting connected and answered		98.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Percentage calls getting connected and answered	≥ 95%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

8.8 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		162.00	6103.00	3684.00	4900.00	1158.00	1603.00	4045.00	553.00	1188.00	17684.00
Number of requests attended within 7 days		162.00	6103.00	3684.00	4900.00	1158.00	1603.00	4045.00	553.00	1188.00	17684.00
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%	100.00%

8.9 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		136.00	490.00	69.00	587.00	NA	1020.00	915.00	182.00	397.00	11959.00
Total number of cases where refund was made within 60 days		95.00	490.00	69.00	587.00	NA	1020.00	915.00	182.00	397.00	11959.00
Percentage cases in which refund was receive within 60 days	100.00%	69.85%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%

8.10 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang											
Traffic in Erlang		Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Equipped capacity of the network		78857.00	118710.57	112000.00	49494.00	50400.00	56000.00	88000.00	18942.00	97464.73	129150.00
Total traffic handled in erlang during TCBH		75865.00	87740.53	51974.00	33056.00	19687.00	30292.00	52140.00	3830.34	42932.31	102425.00
Total number of customers as per VLR											
		Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of customers served (as per VLR)		2323504.00	3712997.00	722577.00	1298591.00	617690.00	1056435.00	2671410.00	97951.00	1810031.00	4448589.00
Live calling results for resolution of service requests											
Resolution of service requests	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Number of cases resolved to satisfaction		96.00	93.00	97.00	96.00	98.00	95.00	95.00	95.00	98.00	100.00
Percentage cases resolved in four weeks		96.00%	93.00%	97.00%	96.00%	98.00%	95.00%	95.00%	95.00%	98.00%	100.00%

8.11 COMPARISON OF IMRB & OPERATOR PMR REPORTS – NETWORK RELATED PARAMETERS

Name of Service Area	Name of Service Provider	Network Related Parameters																	
		Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
BTSs Accumulated downtime (not available for service) (%age)	BTSs Accumulated downtime (not available for service) (%age)	Worst affected BTSs due to downtime (%age)	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	Connection with good voice quality	Connection with good voice quality	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)		
≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%		
Kolkata	Aircel	0.61	0.60	1.90	1.90	97.97	97.97	0.75	0.75	1.09	1.09	0.82	0.82	2.93	2.93	97.38	97.38	0	0.00
	Airtel	0.03	0.03	0.00	0.00	99.66	99.66	0.04	0.04	0.12	0.12	0.72	0.72	0.50	0.36	96.22	96.22	0	0.00
	BSNL	1.03	0.40	2.00	1.97	99.00	98.16	0.50	0.46	0.90	1.10	0.60	1.93	2.73	2.72	99.79	99.75	0	0.00
	Idea	0.23	0.22	0.53	0.53	99.64	99.64	0.06	0.06	0.03	0.03	0.34	0.34	0.94	0.94	97.06	97.06	0	0.00
	MTS	0.18	0.18	0.00	0.00	99.81	99.81	0.00	0.00	0.01	0.01	0.51	0.51	0.83	0.83	99.95	99.95	0	0.00
	RCOM CDMA	0.19	0.19	0.62	0.62	99.13	99.13	0.00	0.00	0.01	0.01	0.15	0.16	0.51	0.51	99.75	99.75	0	0.00
	RTL	0.17	0.17	0.38	0.39	99.22	99.22	0.02	0.02	0.05	0.05	0.45	0.45	0.05	0.05	98.13	98.13	0	0.00
	TATA CDMA	0.11	0.11	0.23	0.23	98.93	98.92	0.00	0.00	0.05	0.05	0.77	0.77	1.23	3.10	99.18	99.18	0	0.00
	TATA GSM	0.02	0.02	0.04	0.04	98.63	98.63	0.05	0.05	0.04	0.04	0.68	0.68	1.49	2.77	98.07	98.07	0	0.00
Vodafone	0.03	0.03	0.05	0.05	99.65	99.65	0.04	0.04	0.35	0.35	0.77	0.77	2.75	2.40	97.34	97.34	0	0.00	

Value calculated by Operators and IMRB match		Value calculated by Operators and IMRB do not match	
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8.12 COMPARISON OF IMRB & OPERATOR PMR REPORTS – CUSTOMER SERVICE QUALITY PARAMETERS

Name of Service Area	Name of Service Provider	Customer Service Quality Parameters							
		Response time to the customer for assistance				Termination / closure of service			
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
		Accessibility of call centre/ customer care	Accessibility of call centre/ 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 60 seconds	%age requests for Termination / Closure of service	%age requests for Termination / Closure of service	Time taken for refund of deposits after closures	Time taken for refund of deposits after closures
		≥ 95%	≥ 95%	≥ 90%	≥ 90%	100% within 7 days	100% within 7 days	100% within 60 days	100% within 60 days
Kolkata	Aircel	94.15	94.15	79.76	79.76	100.00	100.00	69.85	69.85
	Airtel	100.00	100.00	87.00	86.97	100.00	100.00	100.00	100.00
	BSNL	79.00	79.89	69.68	69.68	100.00	100.00	100.00	100.00
	Idea	99.58	99.58	91.25	91.25	100.00	100.00	100.00	100.00
	MTS	99.35	99.35	90.43	90.43	100.00	100.00	100.00	NA
	RCOM CDMA	99.17	99.20	21.95	21.95	100.00	100.00	100.00	100.00
	RTL	98.93	98.93	85.33	85.33	100.00	100.00	100.00	100.00
	TATA CDMA	99.06	99.06	95.43	95.43	100.00	100.00	100.00	100.00
	TATA GSM	97.05	97.05	86.52	86.52	100.00	100.00	100.00	100.00
Vodafone	100.00	100.00	82.17	82.17	100.00	100.00	100.00	100.00	

Value calculated by Operators and IMRB match		Value calculated by Operators and IMRB do not match	
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8.13 SUPPORTING DOCUMENTS

8.13.1 RELIANCE CDMA –VOICE QUALITY OPERATOR COMMENTS

- In CDMA system, there is no Numerator and Denominator for calculation of Voice quality.

FER for voice quality is directly derived in CDMA System and same has been explained to TRAI.

9 ANNEXURE – APRIL

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1940	2259	1217	1923	537	484	1649	142	1697	2417
Sum of downtime of BTSs in a month (in hours)		8999	320	8466	1277	460	453	1471	65	40	362
BTSs accumulated downtime (not available for service)	≤ 2%	0.62%	0.02%	0.94%	0.09%	0.12%	0.13%	0.12%	0.06%	0.00%	0.02%
Number of BTSs having accumulated downtime >24 hours		37	0	24	7	0	1	4	0	0	1
Worst affected BTSs due to downtime	≤ 2%	1.91%	0.00%	1.97%	0.36%	0.00%	0.21%	0.24%	0.00%	0.00%	0.04%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1934	2260	1218	1930	536	484	1649	142	1698	2417
Sum of downtime of BTSs in a		913	28	655	121	62	47	258	3	1	44

month (in hours)											
BTSs accumulated downtime (not available for service)	≤ 2%	0.66%	0.02%	0.75%	0.09%	0.16%	0.13%	0.22%	0.03%	0.00%	0.03%
Number of BTSs having accumulated downtime >24 hours		9	0	0	1	0	0	0	0	3	0
Worst affected BTSs due to downtime	≤ 2%	0.47%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.18%	0.00%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.98%	99.67%	97.91%	99.69%	99.85%	99.32%	99.27%	98.87%	98.60%	99.66%

SDCCH congestion	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.52%	0.03%	0.75%	0.05%	0.00%	0.00%	0.01%	0.00%	0.04%	0.03%

TCH congestion	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.01%	0.08%	1.59%	0.03%	0.01%	0.01%	0.02%	0.00%	0.04%	0.34%

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

CSSR	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.73%	99.63%	97.65%	99.77%	99.89%	99.38%	99.47%	98.98%	98.62%	99.69%

SDCCH congestion	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.55%	0.05%	0.00%	0.05%	0.00%	0.00%	0.01%	0.00%	0.04%	0.07%

TCH congestion	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.14%	0.09%	2.00%	0.01%	0.01%	0.00%	0.01%	0.00%	0.03%	0.31%

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

CSSR	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		632	610	647	629	541	660	608	557	649	581
Total number of successful calls established		632	610	647	629	541	660	608	557	649	581
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Blocked calls	Benchmark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
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%age blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
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3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		74549209	108749032	521942	42924763	21411705	22631866	33427113	3081447	54835179	125357399
Total number of calls dropped		554141	751878	8946	139303	105830	21628	137212	25527	344059	945298
Call drop rate	≤ 2%	0.74%	0.69%	1.71%	0.32%	0.49%	0.10%	0.41%	0.83%	0.63%	0.75%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		5796	6410	3390	171827	1788	1452	4947	462	4977	6125
Total number of cells having more than 3% TCH		169	13	89	1549	14	6	2	15	127	151
Worst affected cells having more than 3% TCH	≤ 3%	2.92%	0.20%	2.63%	0.90%	0.78%	0.41%	0.04%	3.25%	2.55%	2.47%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		8302119	11107658	556280	5499876	303914	329574	5142810	391942	70367018	17718586

					0	66	32	8	4		0
Total number of calls dropped		68779	82338	10832	150819	108613	22727	173213	20139	444782	1210744
Call drop rate	≤ 2%	0.83%	0.74%	1.95%	0.27%	0.36%	0.07%	0.34%	0.51%	0.63%	0.68%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		17348	19226	3390	412776	1783	1451	4946	462	4899	
Total number of cells having more than 3% TCH		665	147	46	158	14	2	0	26	181	
Worst affected cells having more than 3% TCH	≤ 3%	3.83%	0.76%	1.36%	0.04%	0.79%	0.14%	0.00%	5.63%	3.69%	#DIV/0!

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		632	610	647	629	541	660	608	557	649	581
Total number of calls dropped		0	0	1	0	3	0	1	0	1	0
Call drop rate	≤ 2%	0.00%	0.00%	0.15%	0.00%	0.55%	0.00%	0.16%	0.00%	0.15%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
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Total number of sample calls		14987669 729	18203204 875	7000	5609964 743	214117 05		4948763 531	192026 951	75139415 25	16688887 919
Total number of calls with good voice quality		14614134 653	17513226 347	6977	5456492 349	214045 48		4860675 296	190485 572	73748799 78	16246763 529
%age calls with good voice quality	≥ 95%	97.51%	96.21%	99.67%	97.26%	99.97%	99.75%	98.22%	99.20%	98.15%	97.35%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchm ark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Relianc e CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		17071766 38	18665396 52	700	6655424 493			7972315 547	231186 962	10413154 754	22037708 897
Total number of calls with good voice quality		16635547 38	17943714 07	673	6512610 244			7853721 483	229478 108	10265610 873	21518341 618
%age calls with good voice quality	≥ 95%	97.44%	96.13%	96.14%	97.85%	#DIV/0 !	99.77%	98.51%	99.26%	98.58%	97.64%

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

Voice quality	Benchm ark	Aircel(DW L)	Airtel	BSNL	Idea	MTS	Relianc e CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1273054	152023	100022 5	815565	16704	63720	120950	62368	149078	153615
Total number of calls with good voice quality		1215280	147339	988580	787526	16376	63185	117774	60876	145368	150766
%age calls with good voice quality	≥ 95%	95.46%	96.92%	98.84%	96.56%	98.04%	99.16%	97.37%	97.61%	97.51%	98.15%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	27	50	46	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		53911.53	76244.95	568304.00	55295.00	36915.98	8153.00	11144.00	27726.90	26704.00	179651.00
Traffic served for all POIs (B)- in erlangs		29714	38021	13798	25096	12819	3835	6836	11991	14967	89949
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	27	27	50	46	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		53777.00	228719.80	542932.00	55295.00	36858.10	11144.74	11144.74	27713.39	26581.00	175689.00
Traffic served for all POIs (B)- in erlangs		32114	117256	13986	25518	13444	7104	7104	12227	15048	92046
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – MAY

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1953	2245	1217	1930	542	484	1649	142	1700	2424
Sum of downtime of BTSs in a month (in hours)		8232	546	1217	3668	1039	841	2310	204	429	498
BTSs accumulated downtime (not available for service)	≤ 2%	0.57%	0.03%	0.13%	0.26%	0.26%	0.23%	0.19%	0.19%	0.03%	0.03%
Number of BTSs having accumulated downtime >24 hours		36	0	24	10	0	7	9	0	0	2

Worst affected BTSs due to downtime	≤ 2%	1.84%	0.00%	1.97%	0.52%	0.00%	1.45%	0.55%	0.00%	0.00%	0.08%
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Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1953	2258	1217	1923	540	484	1649	142	1697	2417
Sum of downtime of BTSs in a month (in hours)		622	13	761	314	272	50	124	20	2	11
BTSs accumulated downtime (not available for service)	≤ 2%	0.44%	0.01%	0.87%	0.23%	0.70%	0.14%	0.10%	0.19%	0.00%	0.01%
Number of BTSs having accumulated downtime >24 hours		8	0	0	4	0	0	0	0	1	0
Worst affected	≤ 2%	0.41%	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.06%	0.00%

BTSs due to downtime											
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2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.22%	99.68%	98.23%	99.66%	99.82%	99.12%	99.20%	98.95%	98.65%	99.68%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.84%	0.04%	0.63%	0.07%	0.00%	0.00%	0.02%	0.00%	0.04%	0.06%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.06%	0.10%	1.14%	0.03%	0.01%	0.01%	0.07%	0.03%	0.04%	0.32%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.24%	99.68%	98.76%	99.80%	99.88%	99.00%	99.41%	98.73%	98.74%	99.75%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

SDCCH/Paging channel congestion	≤ 1%	0.80%	0.05%	0.00%	0.05%	0.00%	0.00%	0.01%	0.00%	0.03%	0.04%
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TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.06%	0.08%	0.79%	0.02%	0.00%	0.02%	0.02%	0.00%	0.02%	0.25%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		640	588	609	578	441	629	586	575	590	585
Total number of successful calls established		638	587	608	578	441	629	586	575	586	585
CSSR	≥ 95%	99.69%	99.83%	99.84%	100.00%	100.00%	100.00%	100.00%	100.00%	99.32%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		0.31%	0.17%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.68%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		75771257	109419799	516963	41483930	21466411	23825825	40057712	3019621	55208268	126654570
Total number of calls dropped		564592	747006	10701	137510	100139	27613	182945	20991	358067	906946
Call drop rate	≤ 2%	0.75%	0.68%	2.07%	0.33%	0.47%	0.12%	0.46%	0.70%	0.65%	0.72%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		5844	6413	3396	177156	1804	1451	4947	462	4973	6141
Total number of cells having more than 3% TCH		169	12	91	1650	14	11	2	12	126	108
Worst affected cells having more than 3% TCH	≤ 3%	2.89%	0.19%	2.68%	0.93%	0.78%	0.76%	0.04%	2.60%	2.53%	1.76%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		8258205	10777890	504060	51080500	28417660	26322820	49333878	3653761	67855688	168873717
Total number of calls dropped		59769	72981	8224	131461	90899	51661	181807	29384	418636	1040699
Call drop rate	≤ 2%	0.72%	0.68%	1.63%	0.26%	0.32%	0.20%	0.37%	0.80%	0.62%	0.62%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		5846	19277	3390	411408	1797	1451	4946	462	4943	
Total number of cells having more than 3% TCH		140	92	55	144	15	5	0	30	180	
Worst affected cells having more than 3% TCH	≤ 3%	2.39%	0.48%	1.62%	0.04%	0.83%	0.34%	0.00%	6.49%	3.64%	#DIV/0!

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
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Total number of calls established		638	587	608	578	441	629	586	575	586	585
Total number of calls dropped		4	0	3	2	2	1	2	0	0	0
Call drop rate	≤ 2%	0.63%	0.00%	0.49%	0.35%	0.45%	0.16%	0.34%	0.00%	0.00%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1554250536 1	1830834628 5	7000	551628451 3	2146641 1		583904648 6	31257915 7	761437038 7	1700547990 1
Total number of calls with good voice quality		1514198090 5	1762787324 2	6986	535865429 5	2144998 0		572752760 9	31004138 1	747122576 3	1656452509 6
%age calls with good voice quality	≥ 95%	97.42%	96.28%	99.80%	97.14%	99.92%	99.76%	98.09%	99.19%	98.12%	97.41%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1688712143	1776442454	700	6089569329			7471654731	231186962	9986551000	21144401668
Total number of calls with good voice quality		1645994970	1710749621	684	5957142002			7346409132	229478108	9772107426	20662953950
%age calls with good voice quality	≥ 95%	97.47%	96.30%	97.71%	97.83%	#DIV/0!	99.77%	98.32%	99.26%	97.85%	97.72%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1321584	145851	836202	849797	12988	56991	53015	70356	128944	152946
Total number of calls with good voice quality		1259229	140948	830076	802208	12841	56780	50024	68724	109610	150101
%age calls with good voice quality	≥ 95%	95.28%	96.64%	99.27%	94.40%	98.87%	99.63%	94.36%	97.68%	85.01%	98.14%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	28	45	46	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		53696.18	76058.44	580955.00	55475.00	36848.88	8153.00	11264.44	24776.40	26794.00	183827.00
Traffic served for all POIs (B)- in erlangs		29654	37290	13692	24125	12235	3736	6965	10858	14658	90299
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	27	50	46	40

No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		53569.28	228734.84	617373.00	55510.00	36849.11	8153.00	10799.00	27143.89	24302.00	184014.00
Traffic served for all POIs (B)- in erlangs		30804	111704	14229	23811	12191	3899	6650	10961	14454	90417
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE – JUNE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1956	2249	1218	1940	546	481	1641	142	1701	2431
Sum of		8804	794	1218	4686	679	739	2505	87	324	879

downtime of BTSs in a month (in hours)											
BTSs accumulated downtime (not available for service)	≤ 2%	0.60%	0.05%	0.13%	0.32%	0.17%	0.21%	0.21%	0.08%	0.03%	0.05%
Number of BTSs having accumulated downtime >24 hours		38	0	24	14	0	1	6	1	2	1
Worst affected BTSs due to downtime	≤ 2%	1.94%	0.00%	1.97%	0.72%	0.00%	0.21%	0.37%	0.70%	0.12%	0.04%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1954	2260	1217	1930	545	481	1641	142	1701	2424
Sum of downtime of BTSs in a		1232	75	796	507	75	47	174	1	56	58

month (in hours)											
BTSs accumulated downtime (not available for service)	≤ 2%	0.88%	0.05%	0.91%	0.36%	0.19%	0.13%	0.15%	0.01%	0.05%	0.03%
Number of BTSs having accumulated downtime >24 hours		9	0	2	6	0	0	0	0	2	0
Worst affected BTSs due to downtime	≤ 2%	0.46%	0.00%	0.16%	0.31%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.71%	99.64%	98.34%	99.57%	99.77%	98.94%	99.20%	98.95%	98.65%	99.61%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel	≤ 1%	0.89%	0.05%	0.00%	0.05%	0.00%	0.00%	0.02%	0.00%	0.07%	0.04%

congestion											
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.21%	0.17%	0.56%	0.03%	0.00%	0.02%	0.05%	0.13%	0.05%	0.39%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.43%	99.64%	98.51%	99.68%	99.77%	98.40%	99.25%	99.21%	98.72%	99.66%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.82%	0.04%	0.08%	0.04%	0.00%	0.00%	0.01%	0.00%	0.10%	0.04%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.21%	0.18%	1.02%	0.02%	0.01%	0.00%	0.03%	0.00%	0.01%	0.34%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		519	640	623	628	572	668	606	596	636	631
Total		516	640	622	627	572	668	606	596	633	631

number of successful calls established											
CSSR	≥ 95%	99.42%	100.00%	99.84%	99.84%	100.00%	100.00%	100.00%	100.00%	99.53%	100.00%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		0.58%	0.00%	0.16%	0.16%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		82408685	108098745	478995	41962819	19936279	22481621	39611230	2862353	48205057	124287898
Total number of calls dropped		803398	852907	9658	156055	111929	56757	187823	22080	373580	1037142
Call drop rate	≤ 2%	0.97%	0.79%	2.02%	0.37%	0.56%	0.25%	0.47%	0.77%	0.77%	0.83%
Cells having more than	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

3% TCH											
Total number of cells in the network		5846	6430	3393	172139	1819	1443	4923	462	4978	6158
Total number of cells having more than 3% TCH		175	45	97	1725	17	5	3	16	161	183
Worst affected cells having more than 3% TCH	≤ 3%	2.99%	0.70%	2.86%	1.00%	0.93%	0.35%	0.06%	3.46%	3.23%	2.97%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		8321221	10887964	494387	54804596	29290863	2393539	3359705	3603588	68302891	175936443
Total number of calls dropped		87101	88382	9317	162492	111297	3132	15419	23536	502605	1333352
Call drop rate	≤ 2%	1.05%	0.81%	1.88%	0.30%	0.38%	0.13%	0.46%	0.65%	0.74%	0.76%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the		5846	19221	3390	412992	1813	1443	4922	462	4907	NA

network											
Total number of cells having more than 3% TCH		279	125	78	167	12	3	0	25	237	NA
Worst affected cells having more than 3% TCH	≤ 3%	4.77%	0.65%	2.30%	0.04%	0.66%	0.21%	0.00%	5.41%	4.83%	NA

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		516	640	622	627	572	668	606	596	633	631
Total number of calls dropped		1	0	3	1	1	4	3	0	1	0
Call drop rate	≤ 2%	0.19%	0.00%	0.48%	0.16%	0.17%	0.60%	0.50%	0.00%	0.16%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance	Reliance	TATA	TATA GSM	Vodafone
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	k						CDMA	GSM	CDMA		
Total number of sample calls		1670918990 6	1807125755 7	7000	546740087 2	1993627 9		580678064 7	19174861 3	760150627 1	1681041887 1
Total number of calls with good voice quality		1624358101 9	1737827828 3	6984	529121916 5	1993009 5		569607243 9	19012635 2	744497184 1	1634997623 7
%age calls with good voice quality	≥ 95%	97.21%	96.17%	99.77%	96.78%	99.97%	99.74%	98.09%	99.15%	97.94%	97.26%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1714815341	1854458664	700	641982275 4	2929086 3		489558073	21339695 1	999124417 7	2198941780 1
Total number of calls with good voice quality		1665760742	1782785693	678	623033421 3	2927250 4		480532520	21168058 9	983149596 1	2143899383 6
%age calls with good voice quality	≥ 95%	97.14%	96.14%	96.86%	97.05%	99.94%	99.74%	98.16%	99.20%	98.40%	97.50%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance	Reliance	TATA	TATA GSM	Vodafone
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	k						CDMA	GSM	CDMA		
Total number of sample calls		723448	160056	887758	916056	20220	63791	66589	70387	130884	163538
Total number of calls with good voice quality		673170	154970	879711	857939	19670	63163	63467	68228	126709	160537
%age calls with good voice quality	≥ 95%	93.05%	96.82%	99.09%	93.66%	97.28%	99.02%	95.31%	96.93%	96.81%	98.16%

5. POI Congestion

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	28	45	28	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		54288.30	76031.29	576050.00	55729.00	36847.70	8153.00	11667.00	24696.60	8625.00	183929.00
Traffic		30547	39040	13520	24776	12324	3739	7227	11154	4479	92652

served for all POIs (B)- in erlangs											
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		32	31	91	81	45	12	28	45	28	40
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		54202.00	228093.88	575611.00	55570.00	36847.70	8153.00	11324.00	24741.00	8625.00	184147.00
Traffic served for all POIs (B)- in erlangs		31389	118940	14021	24504	12568	3935	7239	11407	4728	94235
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%



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