



Operator Assisted Drive Test Report

Dhanbad City

Aug. 2021

(RO, Kolkata)

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2% except BSNL 2G & 3G. All TSPs have met the Call Setup Success Rate (CSSR) of 95% except BSNL 2G & 3G.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Dhanbad City and surrounding area from 9:00 AM to 7:00 PM during 12th Aug. to 13th Aug 2021. The drive test covered drive route of 210 KMs & 5 hotspot over a period of 2 days. Approximately 180+ calls were made for each of the 8 networks: three 2G networks, two 3G network and three LTE network covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

Dhanbad is the second-most populated city in the Indian state of Jharkhand after Jamshedpur. It ranks as the 42nd largest city in India and is the 34th largest million-plus urban agglomeration in India. It is the 96th fastest growing city of the world by the City Mayors Foundation. The city is called **the 'Coal Capital of India'** for housing one of the largest coal mines of India. The prestigious institute, Indian School of Mines (**now IIT Dhanbad**) is situated in Dhanbad. Apart from coal, it has also grown in information technology.

The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services in terms of:

Voice: Coverage, Quality, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Date: Download Throughputs and Data File Success Rate.

Video Call: Video secession disconnection and poor Video quality.

Voice Tests: Calls were made for 180 secs duration with wait time of 10 sec between call in all technologies. Three 2G (Lock Mode) networks, two 3G (Lock Mode) networks, Three LTE (Lock Mode) networks covering 4 unique TSPs were tested.

Data Tests: Dynamic Data Service Testing was performed along same route in all technologies. 500KB File for 2G, 20MB file for 3G and 40MB file for 4G were downloaded from FTTP server in TSP's own server. Static Data Service Testing was also performed. Three 2G (Lock Mode) networks, Two 3G (Lock Mode) networks, Three LTE (Lock Mode) networks covering 4 unique TSPs were tested.

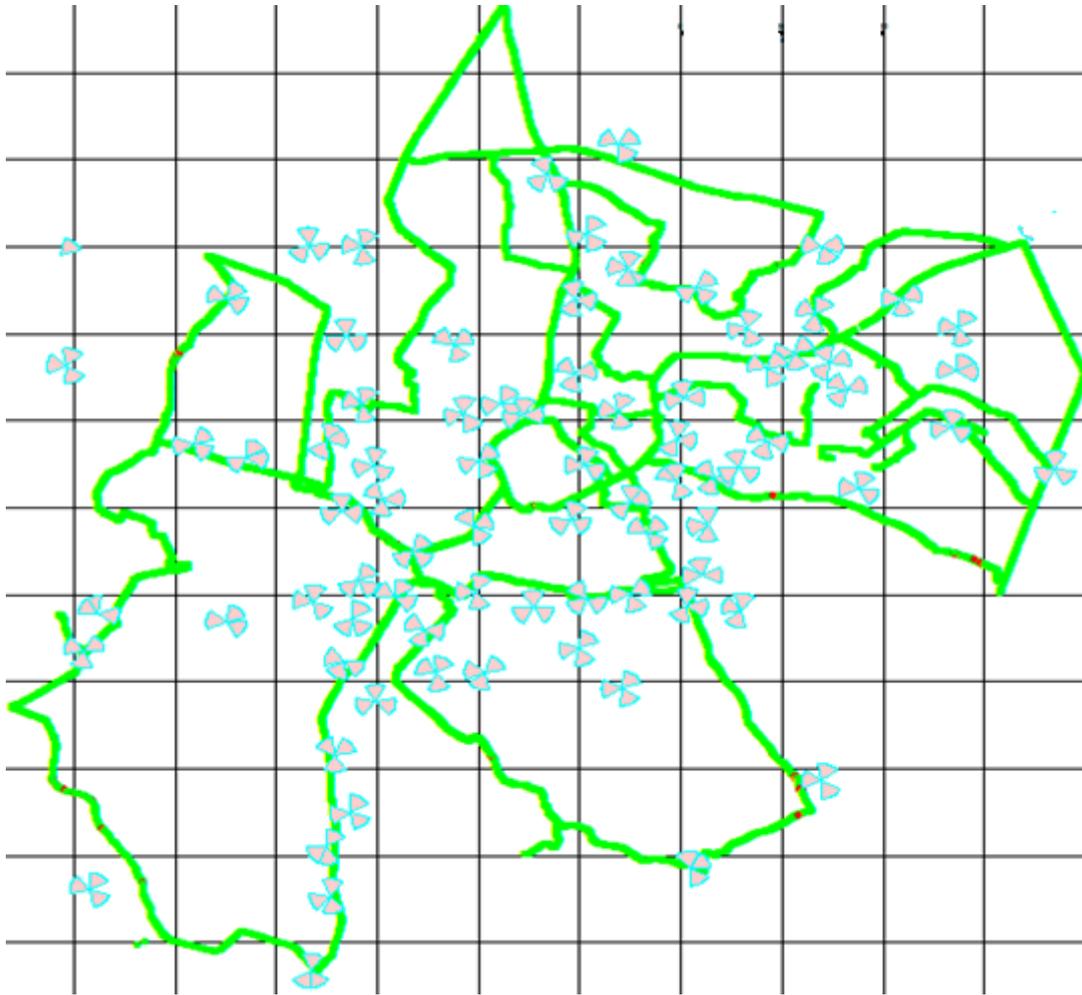
Video Call Tests: A Google meeting link was created for this OADT. All TSPs joined the Google meet link through their Handset and this online meeting was continued throughout the Drive Test. This online meeting was monitored by Advisor and other officials of RO Kolkata.

TRAI Myspeed App: Data download, Data Upload, Signal strength, Packet loss and Latency were measured through this App in the different locations on the drive test route.

Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route



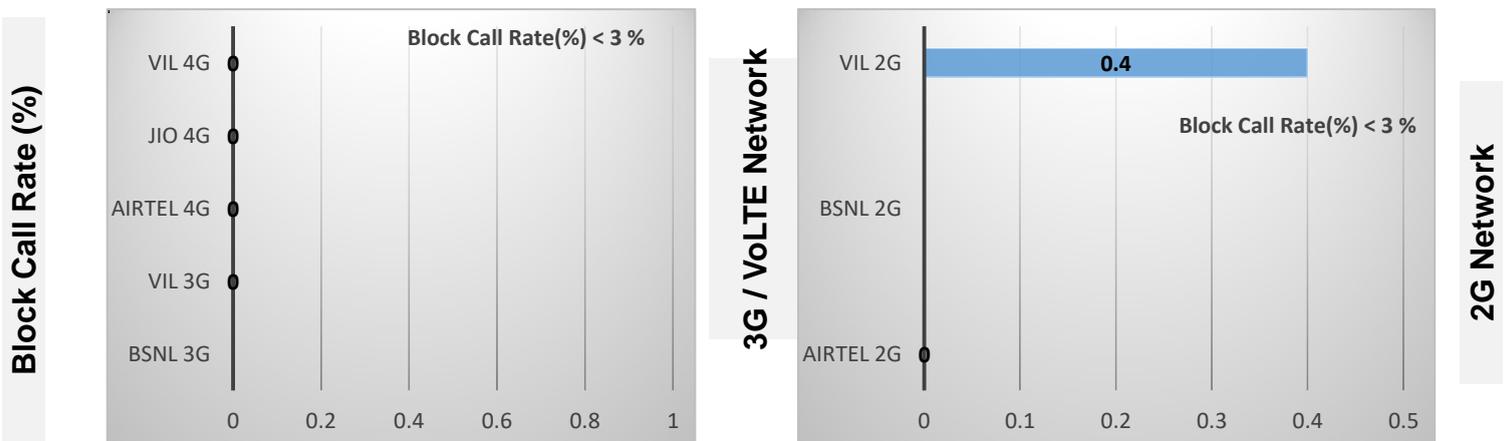
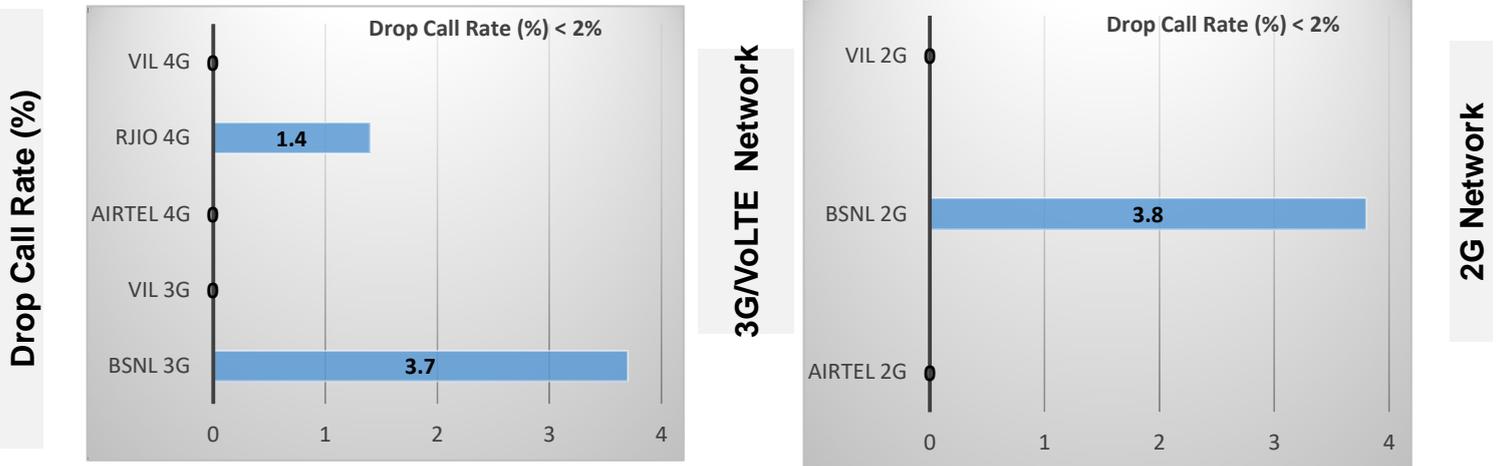
Data Service Test- Static Locations

Static Locations
1. City Center
2. ISM-IIT
3. Sadar Hospital
4. Railway Station
5. BCCL Guest House.

Voice Calls

Key Observations

QoS compliance of the TSPs for Voice across technologies 2G/3G/4G-VoLTE:



KPIs	2G			3G		VoLTE		
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	RJIO	VIL
Drop Call Rate %	0	3.68	0	3.7	0	0	1.4	0
Block Call Rate %	0	***	0.4	***	0	0	0	0

*** Report not submitted by TSP

- All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) except BSNL 2G & 3G..
- Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

Voice Calls

Key Observations

Coverage

a) Percentage of coverage samples for 2G \geq -85 dBm.

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	98.07	94.13	93.4

b) Percentage of coverage samples for 3G \geq -90 dBm & LTE \geq -110 dBm.

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Coverage %	60.01	83.79	99	99	98

Data Services Dynamic

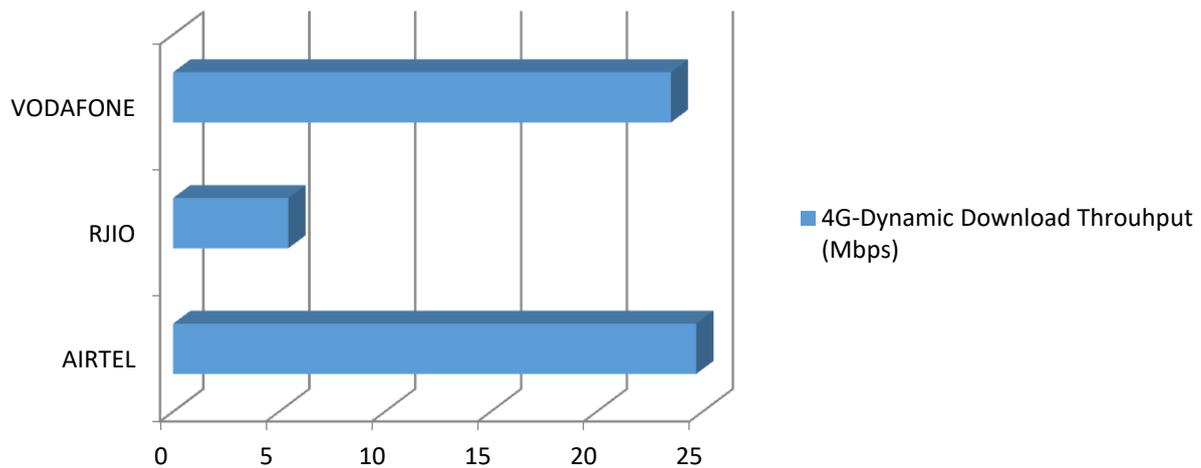
Key Observations

Dynamic Data was tested for 210 Kms. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic

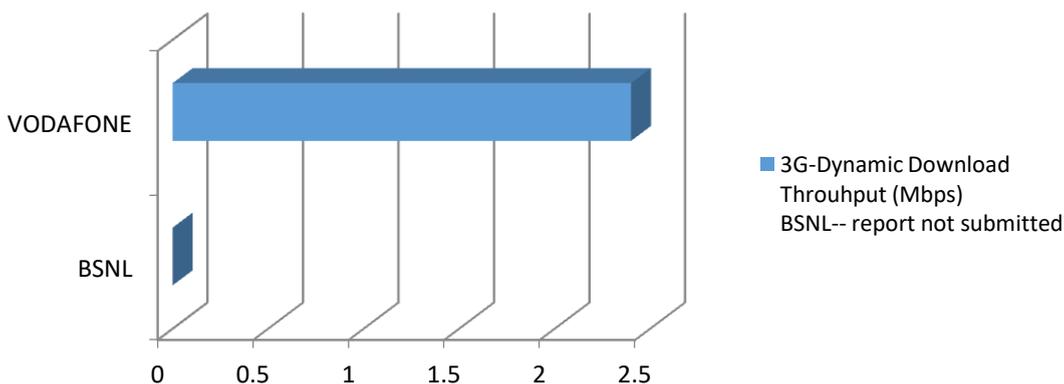
4G/3G/ Network:

4G-Dynamic Download Throuhput (Mbps)



3G-Dynamic Download Throuhput (Mbps)

BSNL-- report not submitted



Summary

City Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	180	175	231
Blocked Call Rate (%)	0	***	0.4
CSSR% (Accessibility)	100	93.14	99.6
Drop Call Rate (%)	0	3.68	0
Mobility HOSR (%)	99.33	96.13	98.9
Rx Quality (%)	98.14	97.85	96

Voice Call	3G/4G				
	BSNL 3G	VIL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	146	134	179	146	146
Blocked Call Rate (%)	***	0	0	0	0
CSSR% (Accessibility)	92.47	100	100	100	100
Drop Call Rate (%)	3.7	0	0	1.4	0
Mobility HOSR (%)	***	100	100	98	100
Rx Quality (%)	67.3	99.6	89.38	82	94

CITY CENTER	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	123.96	125	230
Upload Throughput (kbps)	104.16	41	198.9
Web Browsing Delay (sec)	1.3	29	3
Latency (msec)	228	841	93

ISM_IIT	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	111.3	139	240
Upload Throughput (kbps)	96.6	51	205
Web Browsing Delay (sec)	1.2	32	6.2
Latency (msec)	234	851	89

SADAR HOSPITAL	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	117.28	152	176
Upload Throughput (kbps)	93.56	49	208
Web Browsing Delay (sec)	1.3	27	5.3
Latency (msec)	225	760	90

BCCL GUEST HOUSE	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	116.78	130	138
Upload Throughput (kbps)	105.22	45	81
Web Browsing Delay (sec)	1.1	35	2.3
Latency (msec)	232	1191	88

RAILWAY STATION	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	125.38	113	202
Upload Throughput (kbps)	120.21	36	204
Web Browsing Delay (sec)	1.3	42	2.1
Latency (msec)	228	1036	78

Summary

City Level Summary(contd.)

CITY CENTER	3G	
	BSNL	VIL
Download Throughput (Mbps)	2.7	10.37
Upload Throughput (Mbps)	2.3	3.7
Video Streaming Delay (sec)	7	3.1
Web Browsing Delay (sec)	15	1.8
Latency (msec)	71	61

ISM_IIT	3G	
	BSNL	VIL
Download Throughput (Mbps)	2.9	8.3
Upload Throughput (Mbps)	2.5	2.6
Video Streaming Delay (sec)	7	38.1
Web Browsing Delay (sec)	13	2.1
Latency (msec)	73	44

SADAR HOSPITAL	3G	
	BSNL	VIL
Download Throughput (Mbps)	3.3	8.9
Upload Throughput (Mbps)	2.7	3
Video Streaming Delay (sec)	5	4.4
Web Browsing Delay (sec)	11	3.2
Latency (msec)	72	47

BCCL GUEST HOUSE	3G	
	BSNL	VIL
Download Throughput (Mbps)	2.9	3.1
Upload Throughput (Mbps)	2.4	2.9
Video Streaming Delay (sec)	6	2.7
Web Browsing Delay (sec)	12	1.9
Latency (msec)	74	132

RAILWAY STATION	3G	
	BSNL	VIL
Download Throughput (Mbps)	2.4	12.1
Upload Throughput (Mbps)	2.6	3.3
Video Streaming Delay (sec)	8	5
Web Browsing Delay (sec)	18	4.2
Latency (msec)	69	57

Data Services static

City Level Summary(contd.)

CITY CENTER	VoLTE		
	Airtel	JIO	VIL
Download Throughput (Mbps)	12.8	10.65	29
Upload Throughput (Mbps)	4.9	8.33	21
Video Streaming Delay (sec)	0.85	4.03	1.2
Web Browsing Delay (sec)	0.54	0.00	2
Latency (msec)	71.6	61.33	51

ISM_IIT	VoLTE		
	Airtel	JIO	VIL
Download Throughput (Mbps)	13.8	6.99	12.2
Upload Throughput (Mbps)	12.03	1.07	16.1
Video Streaming Delay (sec)	0.81	4.27	1
Web Browsing Delay (sec)	0.49	0.00	2.8
Latency (msec)	77	80.67	39

SADAR HOSPITAL	VoLTE		
	Airtel	JIO	VIL
Download Throughput (Mbps)	11.98	10.49	28
Upload Throughput (Mbps)	10.91	2.00	12.4
Video Streaming Delay (sec)	0.56	4.12	3.9
Web Browsing Delay (sec)	0.51	0.00	2.6
Latency (msec)	74	69.00	46.5

BCCL GUEST HOUSE	VoLTE		
	Airtel	JIO	VIL
Download Throughput (Mbps)	19.29	3.79	7.7
Upload Throughput (Mbps)	6.54	4.21	7.1
Video Streaming Delay (sec)	0.84	4.69	34.4
Web Browsing Delay (sec)	0.56	0.00	1.3
Latency (msec)	81.6	72.67	36

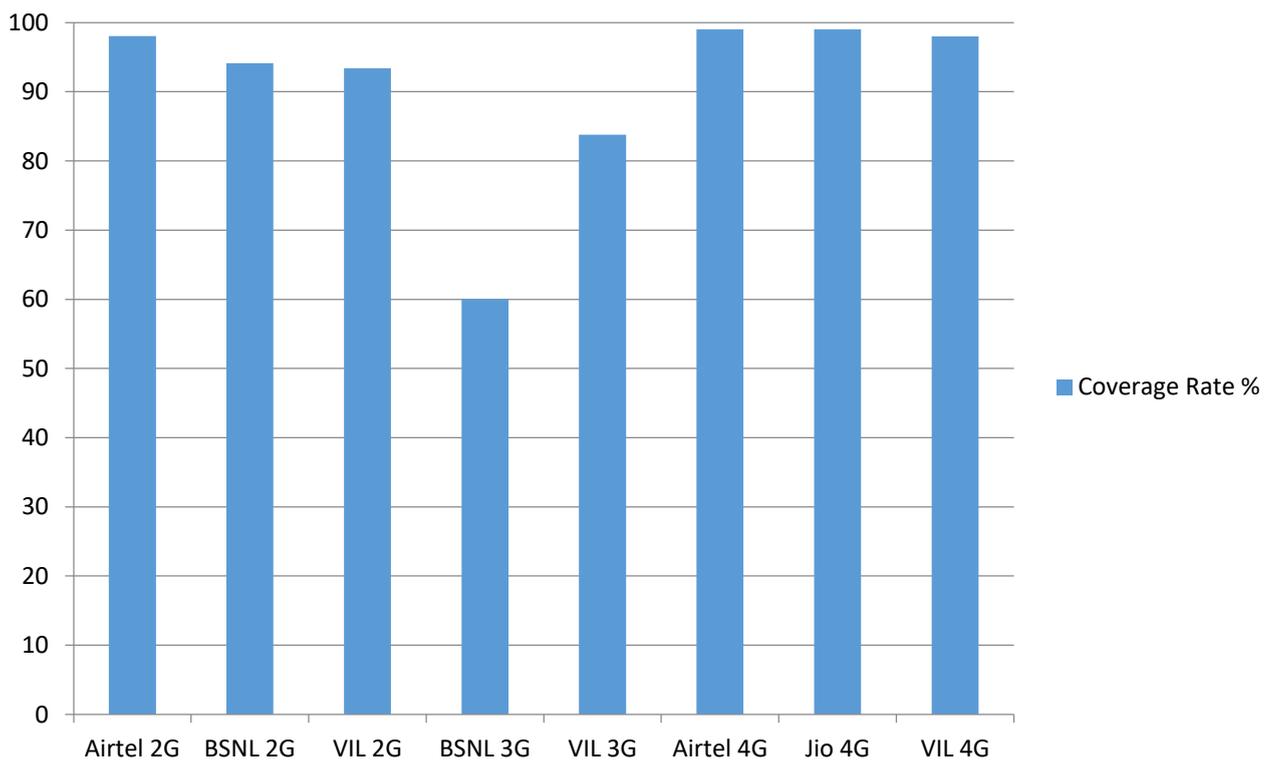
RAILWAY STATION	VoLTE		
	Airtel	JIO	VIL
Download Throughput (Mbps)	10.08	19.09	9.6
Upload Throughput (Mbps)	6.68	13.72	11.5
Video Streaming Delay (sec)	0.74	3.65	1.1
Web Browsing Delay (sec)	0.65	0.00	1,5
Latency (msec)	89.2	75.67	37

I. Coverage Details

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110 dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	98.07
BSNI 2G	94.13
VIL 2G	93.4
BSNL 3G	60.01
VIL 3G	83.79
Airtel VoLTE	99.12
Jio VoLTE	99.17
VIL VoLTE	98

Coverage Rate %

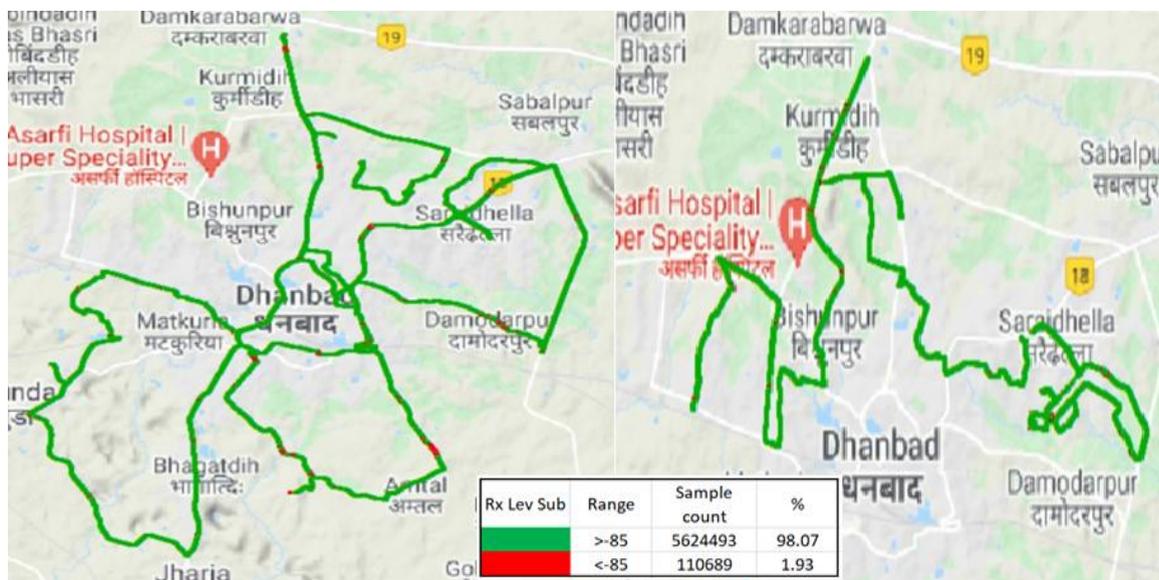


I. Coverage Details

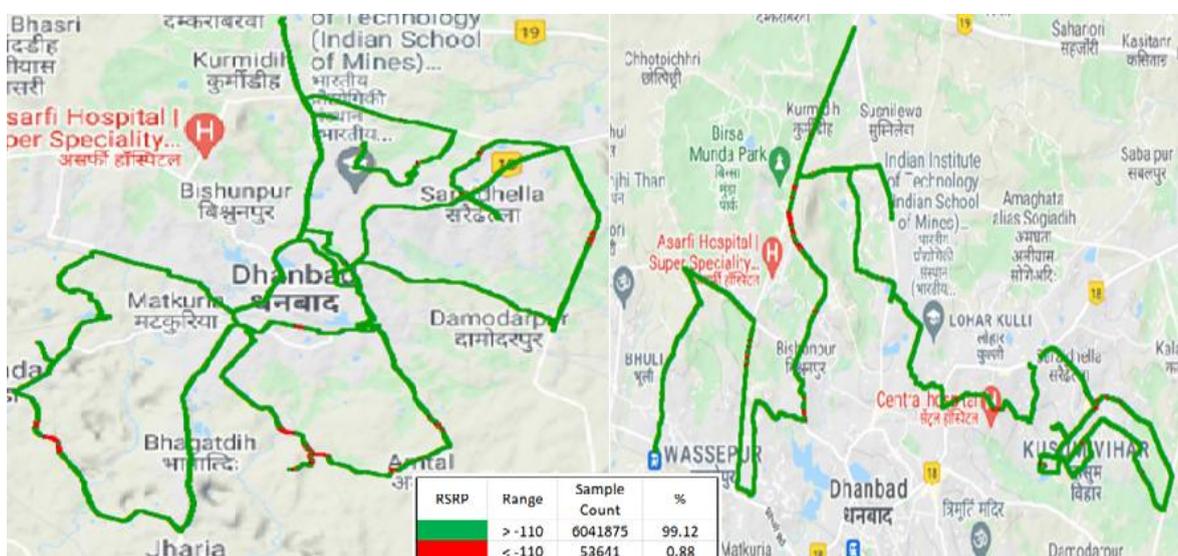
AIRTEL

Technology	Coverage Rate %
2G	98.07
VoLTE	99.12

2G



VoLTE

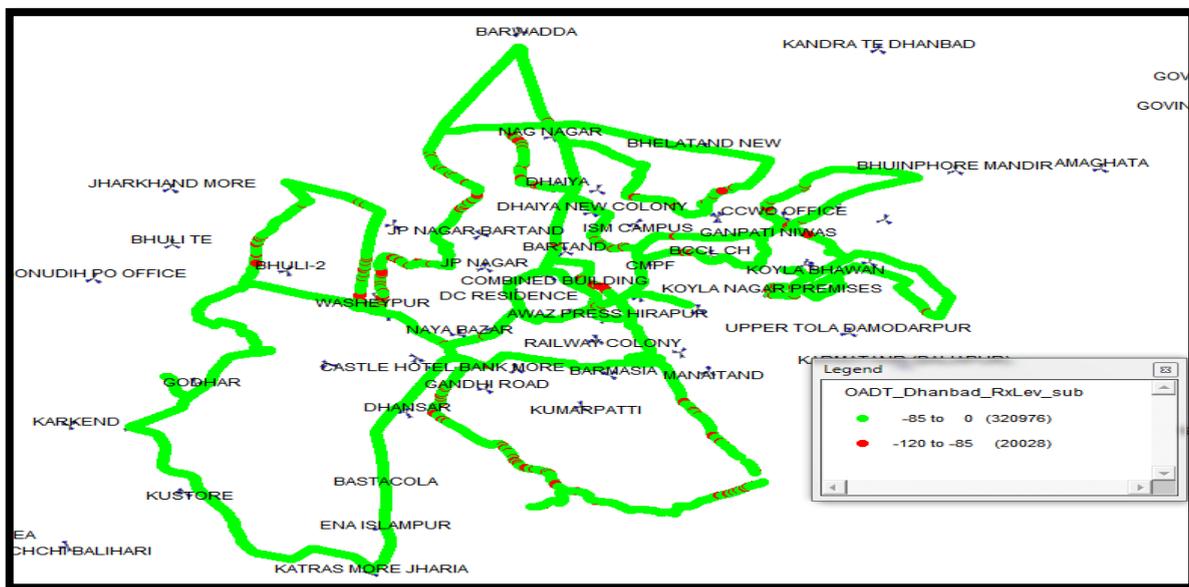


I. Coverage Details

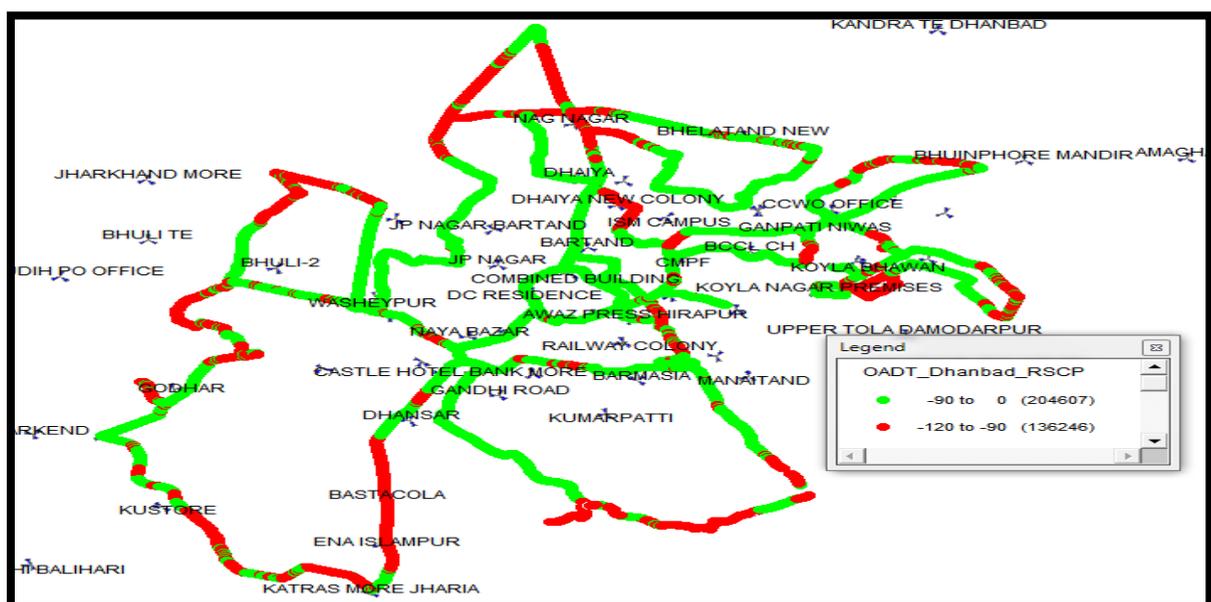
BSNL

Technology	Coverage Rate %
2G	94.13
3G	60.01

2G



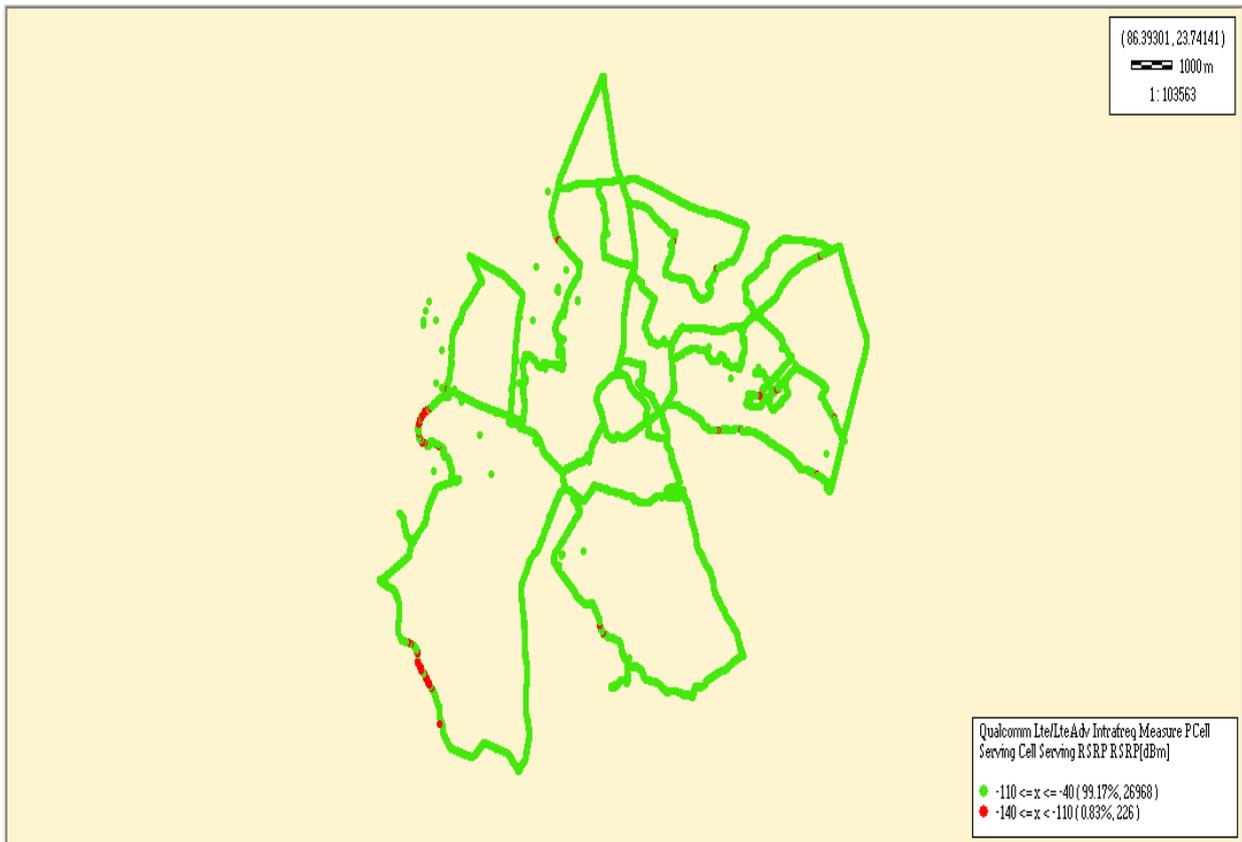
3G



I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	99.17

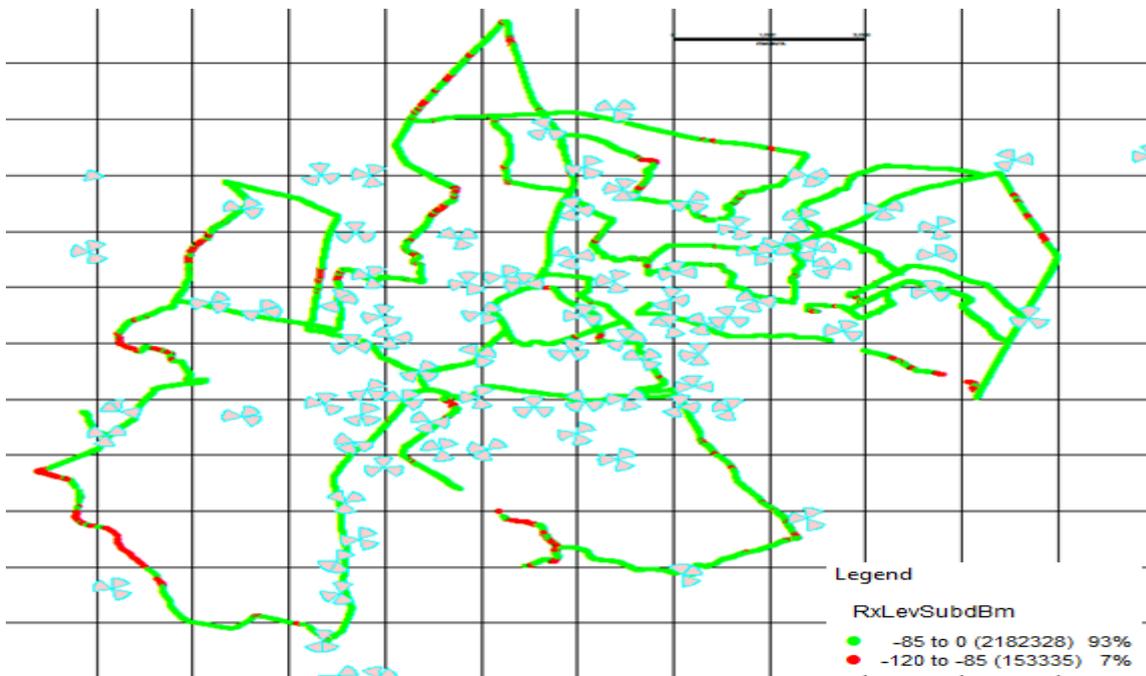


I. Coverage Details

VIL

Technology	Coverage Rate %
2G	93.4

2G

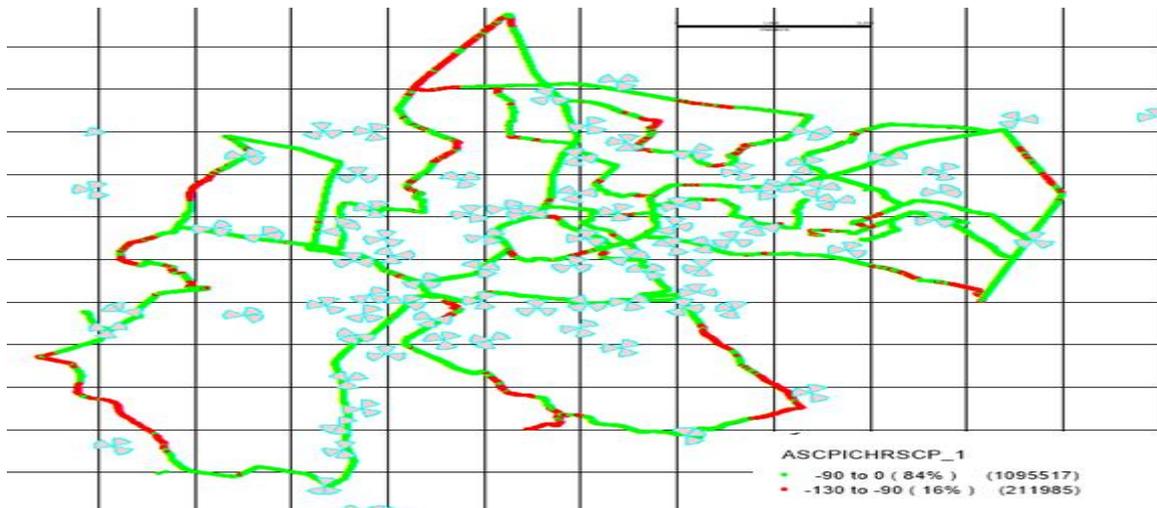


I. Coverage Details

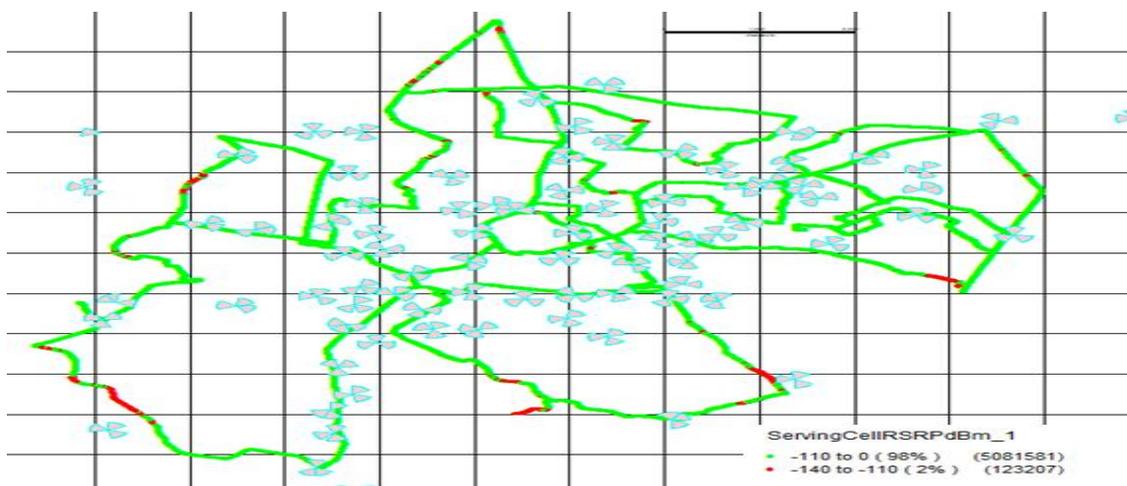
VIL

Technology	Coverage Rate %
3G	83.79
4G	98.0

3G



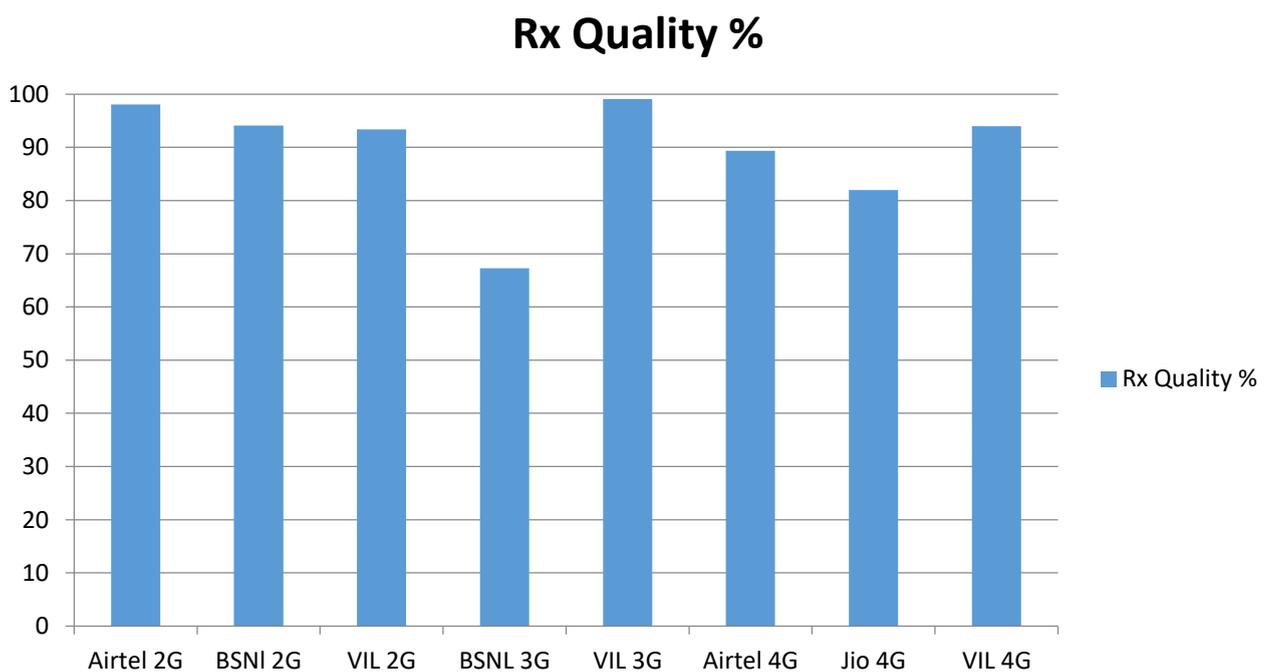
4G



II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.

TSP	Rx Quality %
Airtel 2G	98.07
BSNI 2G	94.13
VIL 2G	93.4
BSNL 3G	67.3
VIL 3G	99.06
Airtel VoLTE	89.38
Jio VoLTE	82
VIL VoLTE	94

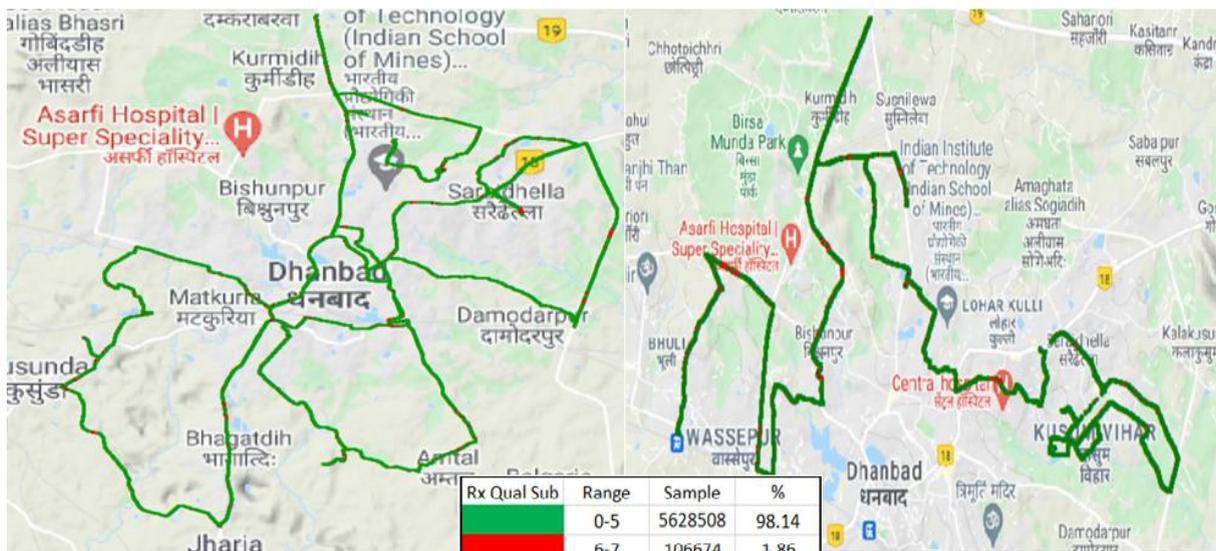


II. Quality Details

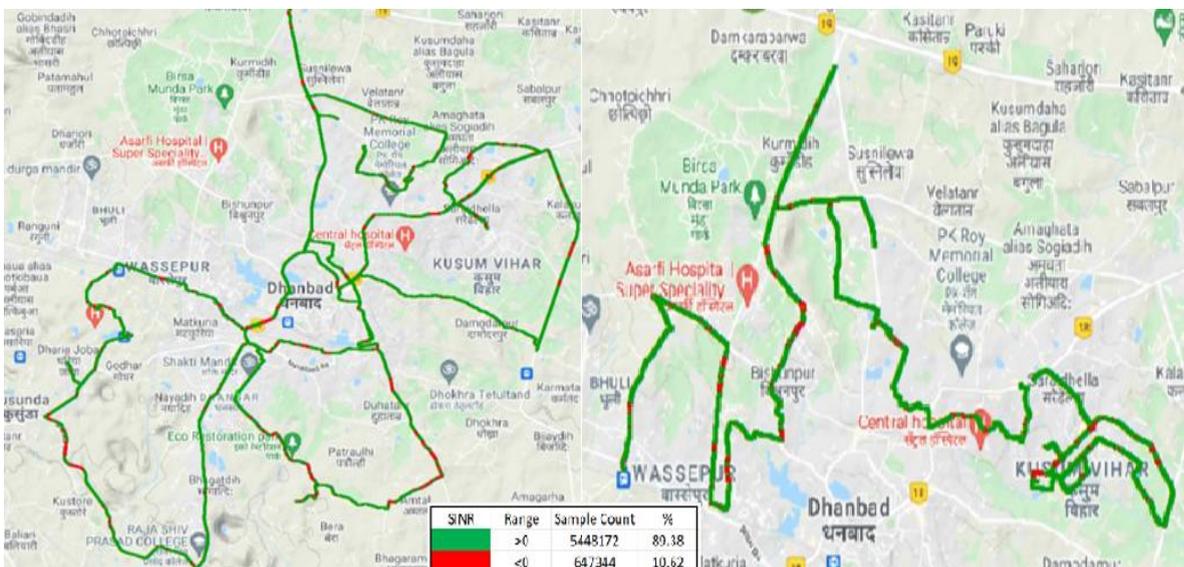
Airtel

Technology	Rx Quality %
2G	98.07
VoLTE	89.38

2G



VoLTE



II. Quality Details

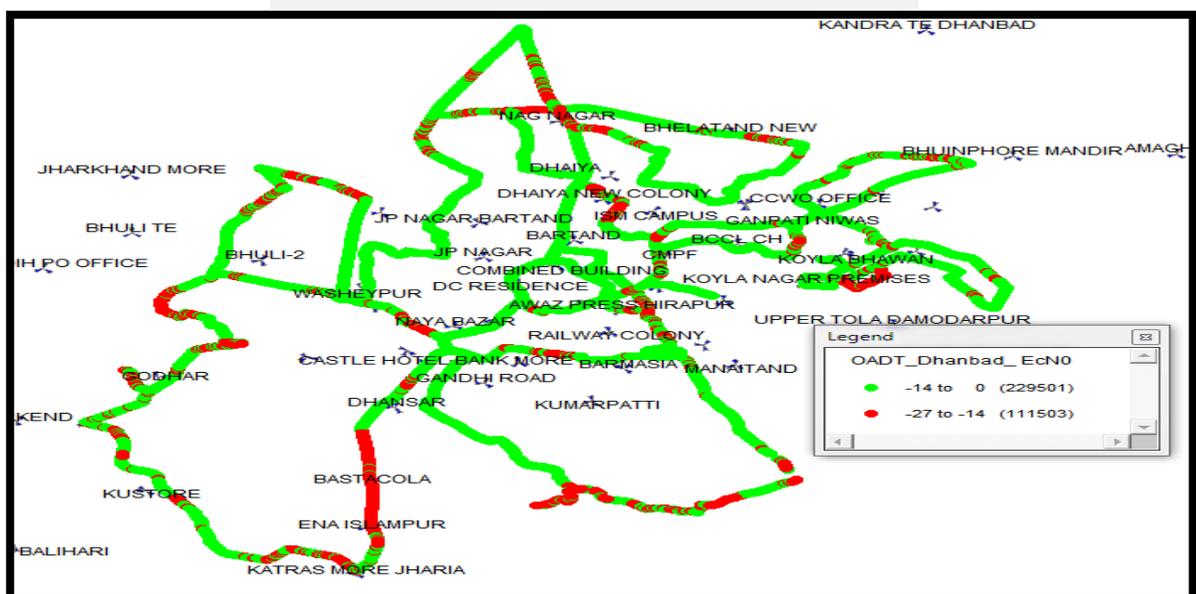
BSNL

Technology	Rx Quality %
2G	94.13
3G	67.3

2G



3G



II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	82



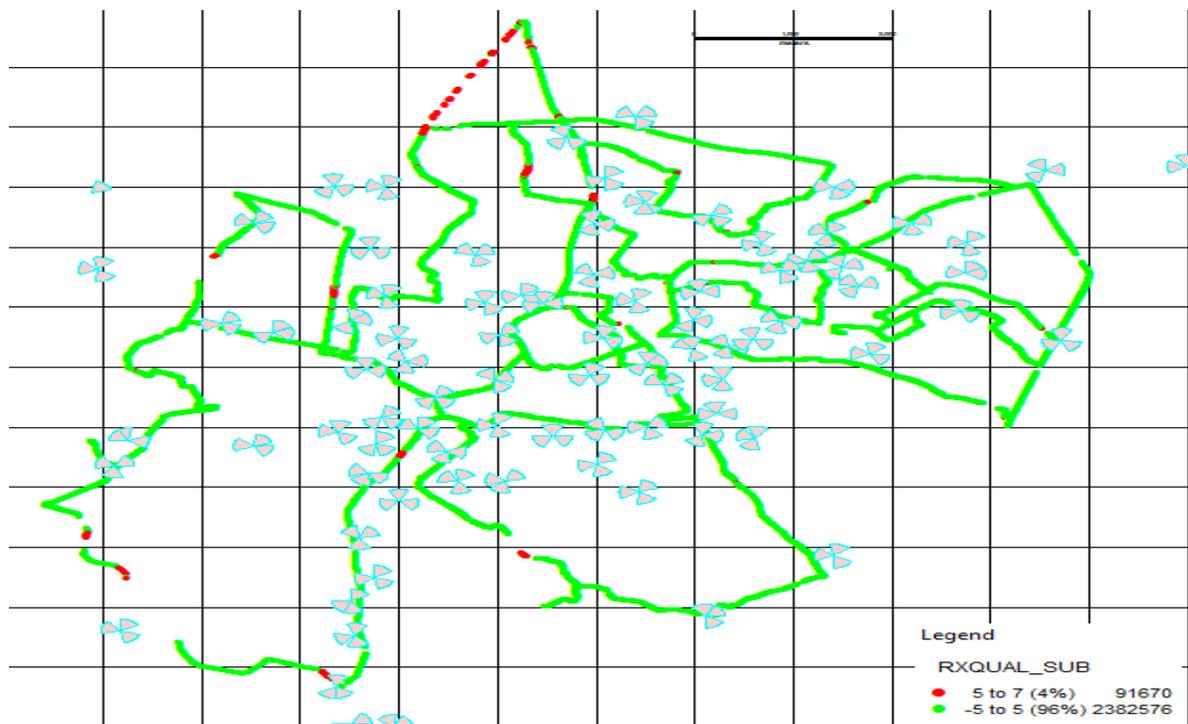
II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP and SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.

VIL

Technology	Rx Quality %
2G	96

2G

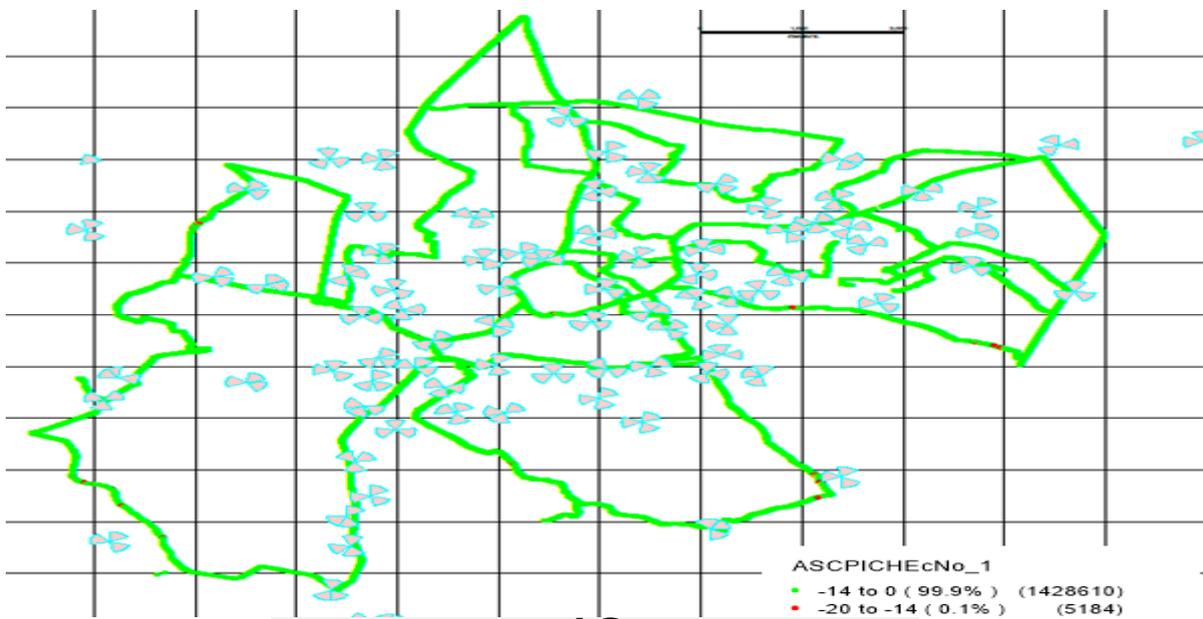


II. Quality Details

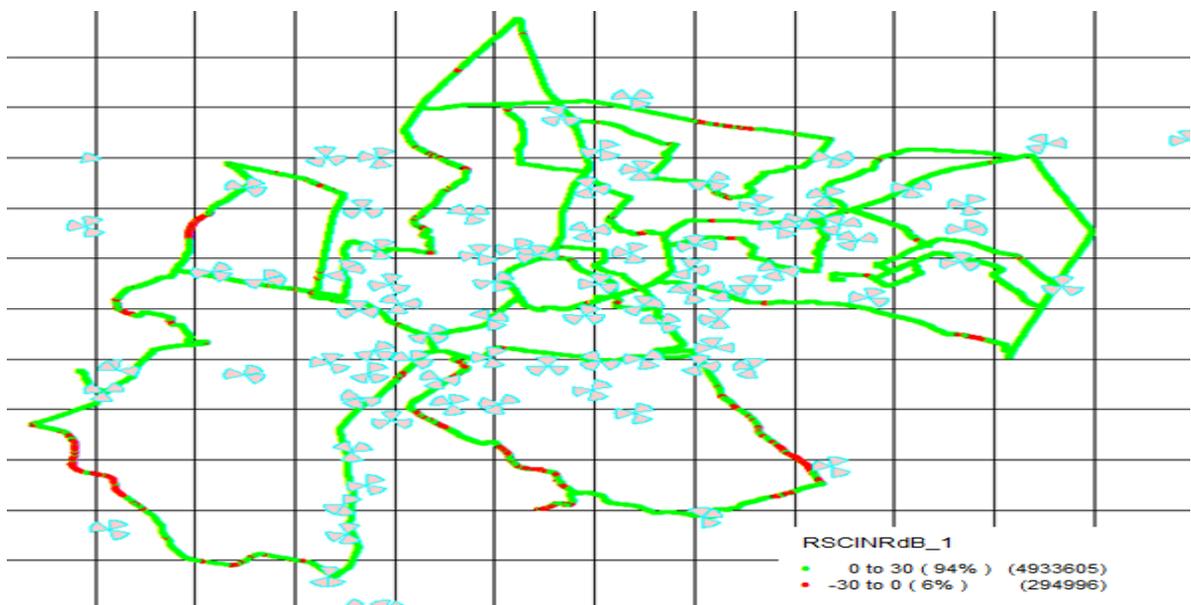
VIL

Technology	Rx Quality %
3G	99.6
4G	94

3G



4G

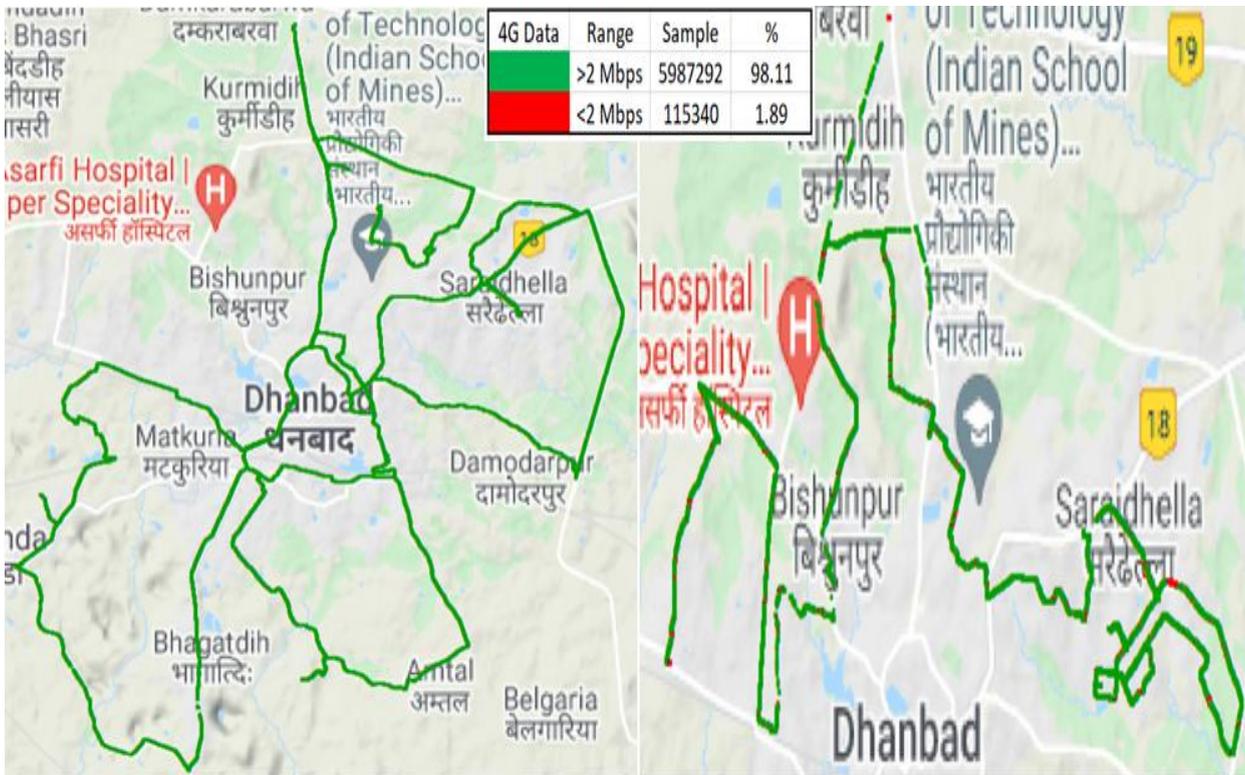


IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	24.7



TSPS	AIRTEL
AVG. SPEED Mbps	24.7
NO. OF SAMPLES =< 2 MBPS	115340
NO. OF SAMPLES > 2 MBPS	5987292
FILE DOWNLOAD SUCCESS RATE%	100

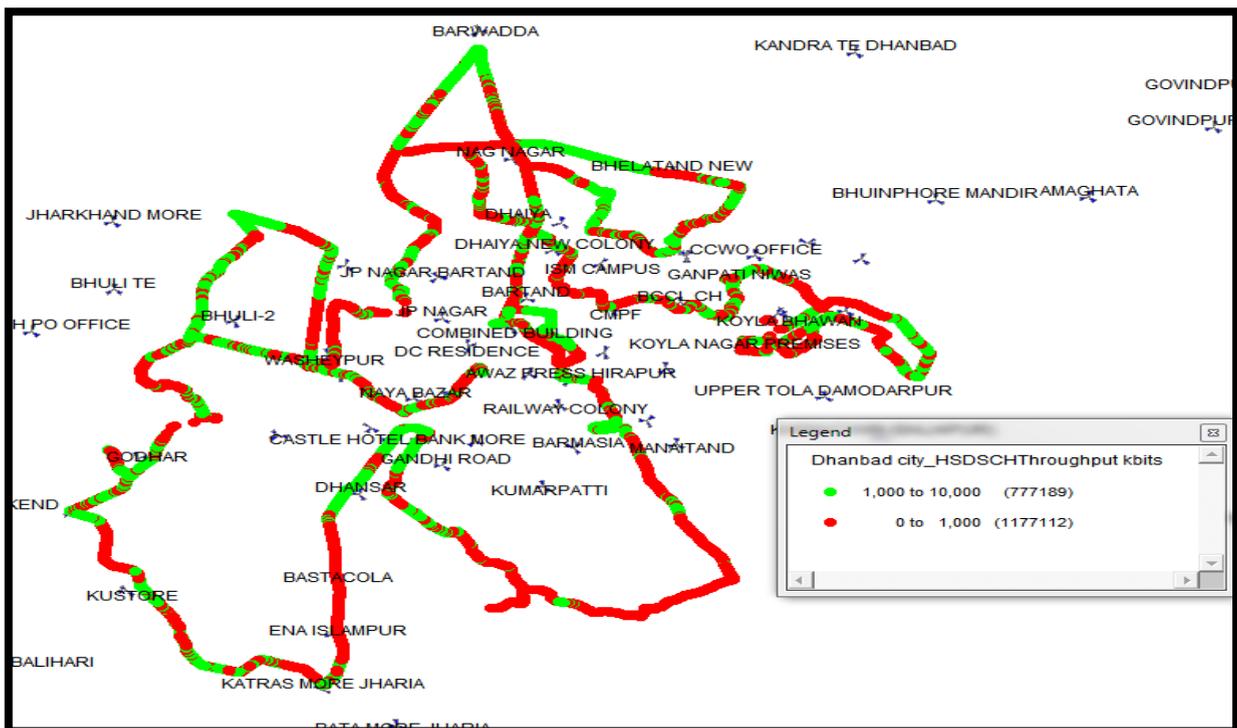
IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	3G
Download Throughput (Kbps)	***

*** Report not submitted



TSPS	BSNL
AVG. SPEED Mbps	***
NO. OF SAMPLES =< 1 MBPS	1177112
NO. OF SAMPLES > 1 MBPS	777189
FILE DOWNLOAD SUCCESS RATE%	***

IV. Dynamic Data Test- 4G DL Details

Jio

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	5.44



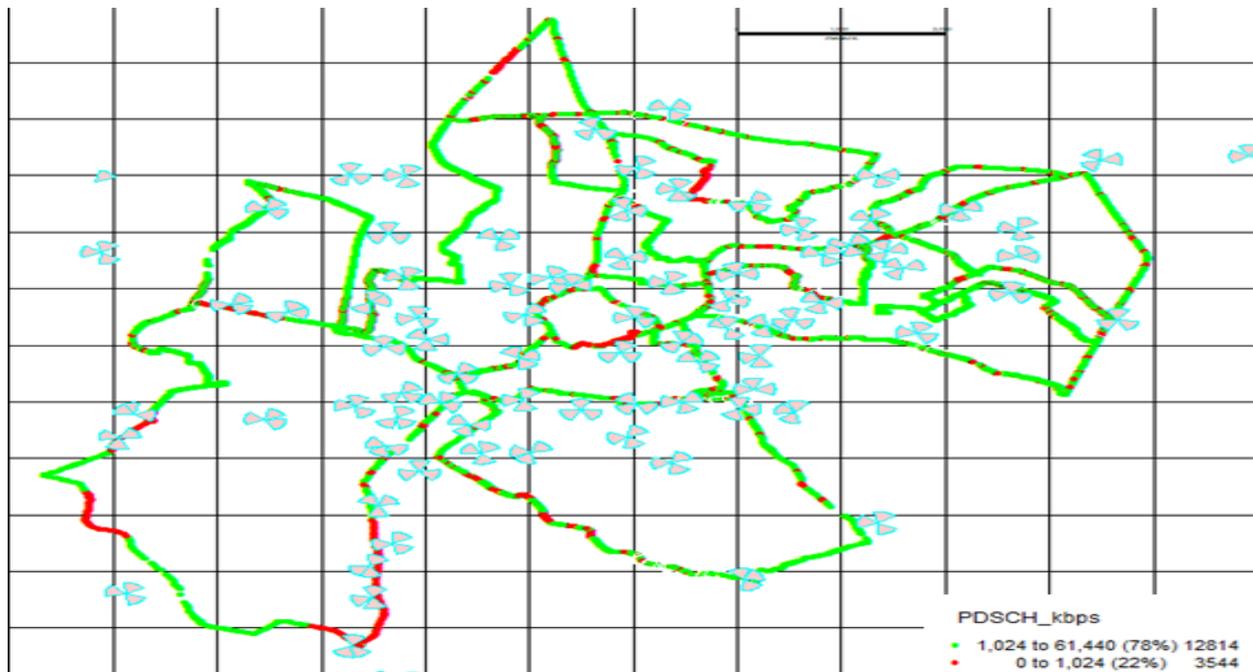
TSPS	JIO
AVG. SPEED Mbps	5.447
NO. OF SAMPLES =< 2 MBPS	8588
NO. OF SAMPLES > 2 MBPS	15981
FILE DOWNLOAD SUCCESS RATE%	99

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	23.5



TSPS	VIL
AVG. SPEED Mbps	23.5
NO. OF SAMPLES =< 2 MBPS	3544
NO. OF SAMPLES > 2 MBPS	12844
FILE DOWNLOAD SUCCESS RATE%	98

V. TRAI MySpeed App

•DATA SPEED TESTING REPORT THROUGH TRAI MY SPEED APP

The Snap Shots measurements of TRAI Myspeed App are furnished in Table-1.

DATE	TIME	TSP	SIGNAL STRENGTH (-dbm)	DOWNLOAD SPEED(Mbps)	UPLOAD SPEED(Mbps)
12.08.21	11.05 AM	VI	NA	28.51	8.52
12.08.21	11.13 AM	RJIO	51	16.82	8.59
13.08.21	1.12 PM	RJIO	51	5.2	6.95
13.08.21	1.13 PM	VI	NA	15.69	15.1
13.08.21	1.12 PM	AIRTEL	89	9.44	8.58
13.08.21	1.16 PM	BSNL	85	1.3	2.82
13.08.21	1.20PM	VI	NA	12.02	18.44
13.08.21	1.20PM	JIO	51	7.85	8.25
13.08.21	2.21PM	BSNL	85	2.52	2.62
13.08.21	1.22PM	AIRTEL	107	4.58	1.74
13.08.21	4.57PM	JIO	51	10.52	8.94
13.08.21	4.58PM	VI	NA	12.21	8.25
13.08.21	4.33PM	BSNL	85	2.22	3.43
13.08.21	4.58PM	AIRTEL	103	9.39	3.14
13.08.21	5.00PM	BSNL	85	2.48	2.46

•Observations of Regional Office, Kolkata on the Operator Assisted Drive Test and action to be taken by TSPs to improve the QoS-

AIRTEL

SINR% (89.38%) in 4G network does not meet the benchmark (95%).

Airtel has been asked to take necessary action to improve the above SINR and poor 4G download throughputs on the drive test route.

An action taken report is to be submitted by 20.12.2021.

BSNL

CSSR (93.14%), CDR (3.68%) in 2G network and CSSR (92.47%), Call Drop (3.7%) & Ec/No (67.30%) in 3G network do not meet the benchmarks.

3G coverage and download throughputs are poor in many locations. (RX LVL= >-90 dbm is 60% only)

BSNL did not submit the Reports of RRC Cong., RAB Cong., RAB block rate in 3G.

It was observed that the Video calls were disconnected in different locations due to poor 3G coverage (lat/ long- 23.832629/ 86.42348, 23.76390/ 86.433096 & 23.820735/ 86.422265)

BSNL has been asked to take necessary action to improve including software/hardware optimization to improve the above KPIs, Call drops (both 2G & 3G), Video calls disconnections and 3G coverage/download throughputs in the drive test route.

An action taken report is to be submitted by 20.12.2021.

VI. Observations of RO, Kolkata

•Observations of Regional Office, Kolkata on the Operator Assisted Drive Test and action to be taken by TSPs to improve the QoS-

RJIO

SINR% (82%) in 4G network does not meet the benchmark (95%).

Average download data speed (4G network- Locked mode) is 5.44 Mbps throughout the drive test.

RJIO has been asked to take necessary action including software/ hardware optimization to improve the SINR, call drops and submit an action taken report by 20.12.2021

VIL

SINR% (94%) in 4G network do not meet the benchmarks (95%).

VIL has been asked to take necessary action to improve the SINR. An action taken report is to be submitted by 20.12.2021.

VIDEO CALL TESTING --3G & 4G NETWORKS—

AIRTEL- The Video call was running without disconnection of data session throughout the drive route but sometimes the Video picture quality was poor on the drive route.

BSNL- The Video call was disconnected three times throughout the drive route.

RJIO-The Video call was running without disconnection of data session throughout the drive route but sometimes the Video picture quality was poor on the drive route.

VIL-The Video call was running without disconnection of data session throughout the drive route and the Video picture quality was good on the drive route.