Operator Assisted Drive Test Report

Agartala City
September 2021
(RO, Kolkata)

Key Performance Indicators (KPIs):

The following TSPs could not meet the KPIs benchmark as stated below—

Airtel- Rx Quality (SINR) in 4G network.

BSNL- Drop Call Rate, Call Block Rate, Handover success Rate & Rx Quality in 2G network and Drop Call Rate, Call Block Rate & Rx Quality (Ec/No) in 3G network.

RJIO- Drop Call Rate & Rx Quality (SINR) in 4G network.

VIL-   Rx Quality(Ec/ Io) in 3G and Rx Quality (SINR) in 4G network.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Agartala City and surrounding area from 9:00 AM to 7:00 PM during 22nd Sep. to 23rd Sep. 2021. The drive test covered drive route of 210 KMs over a period of 2 days. Approximately 200+ calls were made for each of the 8 networks: three 2G networks, two 3G network and three 4G network covering four TSPs.

| Overview | Voice Summary | Data Summary |

Overview

Agartala is the capital city of the Indian state of Tripura, and is one of the largest cities in northeast India. The city is governed by the Agartala Municipal Corporation.

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.

STATIC DATA SERVICE TESTING (on Hotspot)-

| Service	Specifications
Data File Download	2G (Locked) - 500KB ,3G(Locked)- 20 MB, 4G (Locked)- 40MB
Data File Upload	2G (Locked) - 100KB ,3G(Locked)- 5 MB, 4G (Locked)- 10MB
Web browsing	3 links of e commerce websites https://www.amazon.in,https://www.flipkart.com, https://paytm.com.
Video Streaming	130 sec clip
Latency	32 Bytes ping test on www.google.com.

Overview

Voice & Dynamic Data Test Drive Route

Data Service Test- Static Locations

Static Locations	
1. AGARTALA AIRPORT	3. AGARTALA HIGH COURT
2. AGARTALA RAILWAY STATION	4. AGARTALA MEDICAL COLLEGE

Voice Calls

QoS compliance of the TSPs for Voice across technologies 2G/3G/4G-VoLTE:
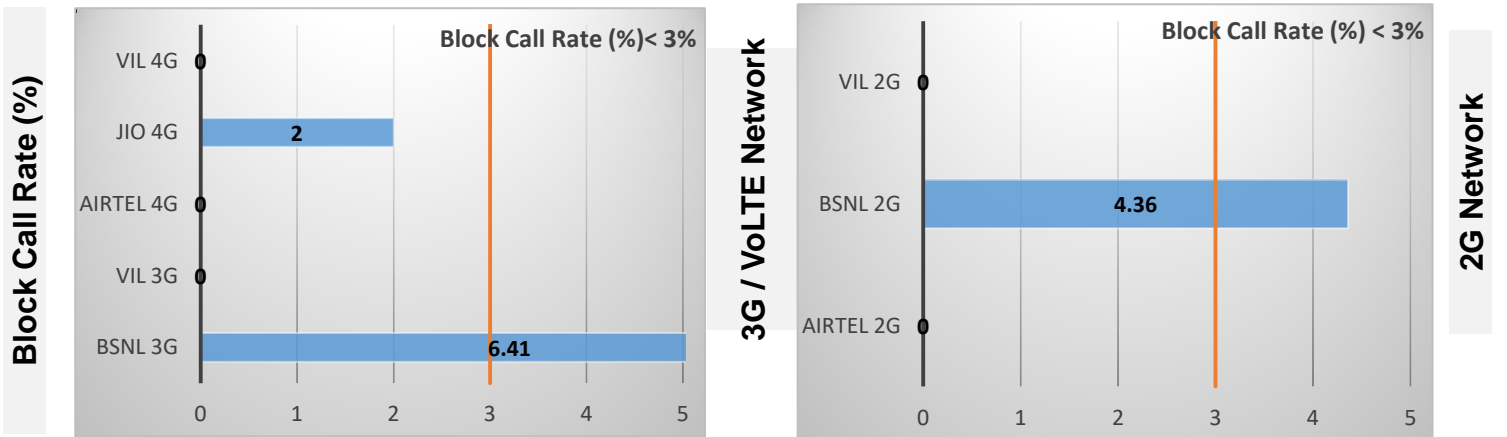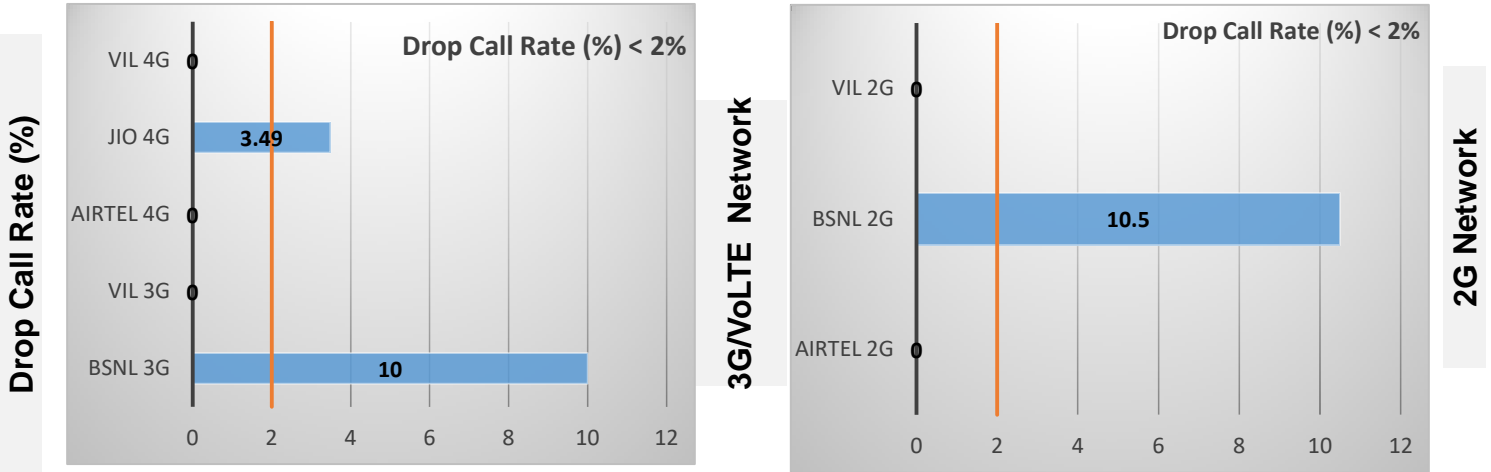
KPIs	2G			3G		VoLTE		
	Airtel	**BSNL**	**VIL**	**BSNL**	**VIL**	**Airtel**	**RJIO**	**VIL**
Drop Call Rate %	0	10.5	0	10	0	0	3.49	0
Block Call Rate %	0	4.36	0	6.41	0	0	2	0

a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) except RJIO(4G) and BSNL (2G & 3G)

b) All TSPs have met the Block Call Rate (BCR) of 3% except BSNL (2G & 3G)..

Voice Calls

Coverage

a) **Percentage of coverage samples for 2G ≥ -85 dBm.**

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	95.45	64	81.70

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

TSPs	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Coverage %	60.4	72.99	98.31	90.18	97.73

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

Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

4G/3G/ Network:
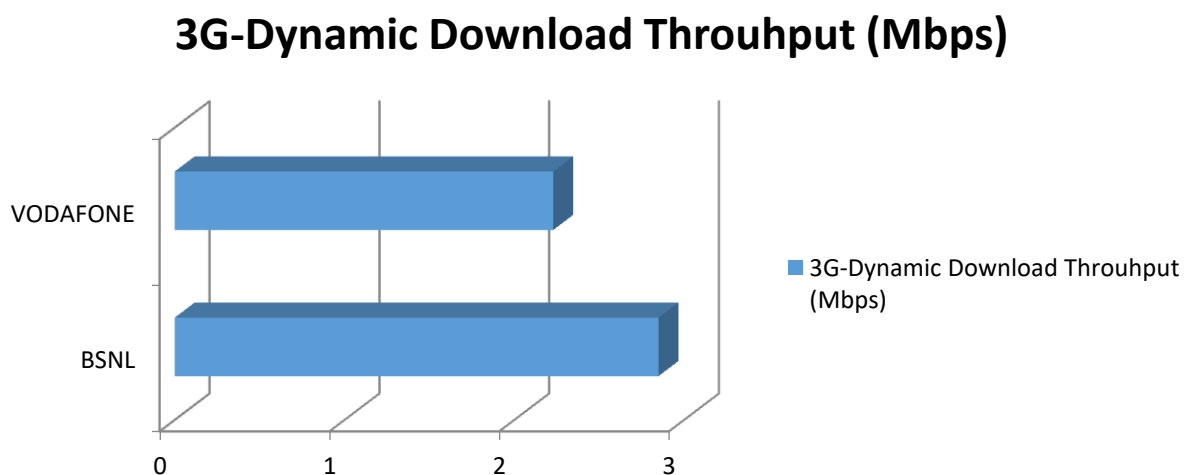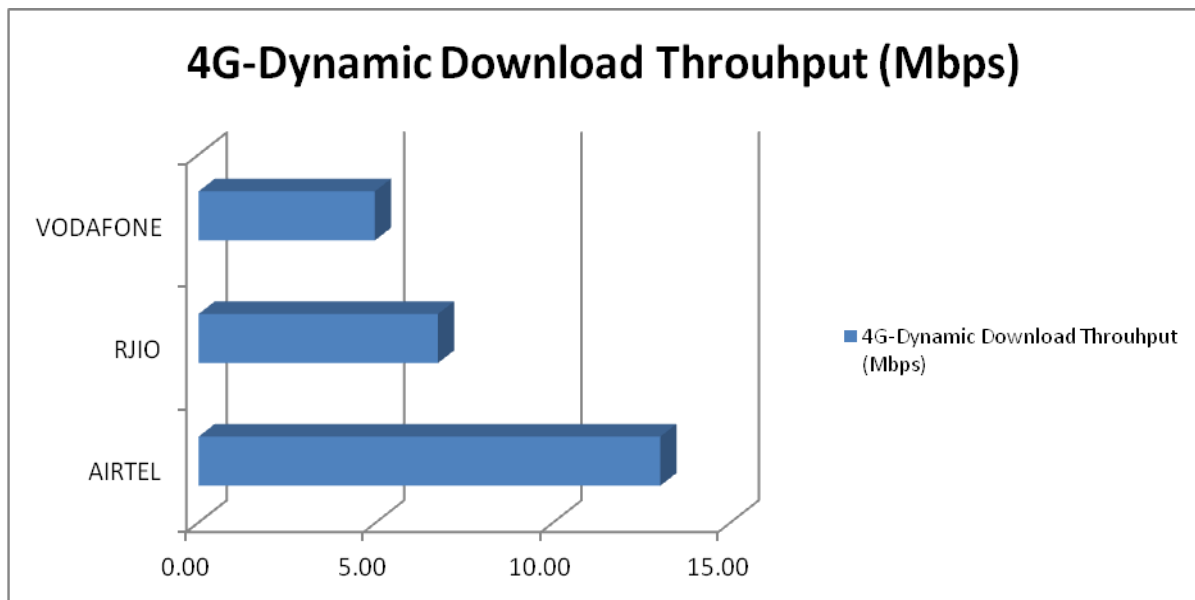
Agartala Railway Station-

2G GSM NETWORK--

TSP	AIRTEL	BSNL	VODAFONE-IDEA
Download throughput in Kbps	180.59	229.3	136.70
Upload Throughput in Kbps	162.94	178	62.10
Web browsing delay in secs	0	64.28	1.90
Latency in (msec)	337	276.83	279

3G UMTS NETWORK

TSP	BSNL	VODAFONE-IDEA
Download throughput in Mbps	6.08	1.47
Upload Throughput in Mbps	2.05	1.43
Video streaming delay in secs	1.16	1.41
Web browsing delay in secs	17.68	0.51
Latency in (msec)	79.17	**93**

4G LTE NETWORK

TSP	AIRTEL	RJIO	VODAFONE-IDEA
Download throughput in Mbps	16.70	13.64	6.36
Upload Throughput in Mbps	13.41	2.81	6.31
Video streaming delay in secs	0	140.67	0.50
Web browsing delay in secs	4.59	2.95	0.03
Latency in (msec)	235	113.44	**86**

Agartala Airport

2G GSM NETWORK--

TSP	AIRTEL	BSNL	VODAFONE-IDEA
Download throughput in Kbps	180.4	165.3	102.80
Upload Throughput in Kbps	113.04	117.7	52.30
Web browsing delay in secs	0	64.98	1.80
Latency in (msec)	996.8	265.4	327

3G UMTS NETWORK

TSP	BSNL	VODAFONE-IDEA
Download throughput in Mbps	5.37	1.98
Upload Throughput in Mbps	2.4	1.77
Video streaming delay in secs	1.13	2.58
Web browsing delay in secs	16.86	0.89
Latency in (msec)	88.78	**110**

4G LTE NETWORK

TSP	AIRTEL	RJIO	VODAFONE-IDEA
Download throughput in Mbps	45.05	15.37	8.85
Upload Throughput in Mbps	5.69	7.89	8.76
Video streaming delay in secs	0	139.08	0.71
Web browsing delay in secs	4.17	2.97	0.03
Latency in (msec)	230	133.76	**88**

Data Services Static

Agartala High Court-

2G GSM NETWORK--

TSP	AIRTEL	BSNL	VODAFONE-IDEA
Download throughput in Kbps	65.37	150.38	105.83
Upload Throughput in Kbps	62.82	122.09	68.70
Web browsing delay in secs	0	56.2	0.97
Latency in (msec)	790.2	337.47	252

3G UMTS NETWORK

TSP	BSNL	VODAFONE-IDEA
Download throughput in Mbps	5.27	1.46
Upload Throughput in Mbps	2.09	1.43
Video streaming delay in secs	1.7	1.57
Web browsing delay in secs	12.61	0.97
Latency in (msec)	86.44	**108**

4G LTE NETWORK

TSP	AIRTEL	RJIO	VODAFONE-IDEA
Download throughput in Mbps	27.04	10.58	20.52
Upload Throughput in Mbps	2.98	4.51	15.95
Video streaming delay in secs	0	139.59	0.44
Web browsing delay in secs	12.17	3.14	0.03
Latency in (msec)	129.04	129.64	**93**

Agartala Medical College-

2G GSM NETWORK--

TSP	AIRTEL	BSNL	VODAFONE-IDEA
Download throughput in Kbps	128.59	156.41	108.10
Upload Throughput in Kbps	123.39	163.36	55.20
Web browsing delay in secs	0	66.5	1.50
Latency in (msec)	401.5	425.94	349

3G UMTS NETWORK

TSP	BSNL	VODAFONE-IDEA
Download throughput in Mbps	3.21	2.11
Upload Throughput in Mbps	0.665	1.12
Video streaming delay in secs	1.52	0.98
Web browsing delay in secs	17.49	0.72
Latency in (msec)	79.56	**109**

4G LTE NETWORK

TSP	AIRTEL	RJIO	VODAFONE-IDEA
Download throughput in Mbps	31.45	10.25	45.07
Upload Throughput in Mbps	4.58	6.19	44.58
Video streaming delay in secs	0	139.75	0.58
Web browsing delay in secs	4.98	3.10	0.03
Latency in (msec)	130.62	169.88	**94**

Summary

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	203	229	193
Blocked Call Rate (%)	0	4.36	0
CSSR% (Accessibility)	100	95.63	100
Drop Call Rate (%)	0	10.5	1.93
Mobility HOSR (%)	98.77	84.1	96.42
Rx Quality (%)	95.00	91.00	95.97

Voice Call	3G/4G				
	BSNL 3G	VIL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	221	194	203	229	181
Blocked Call Rate (%)	6.41	0	0	2	0
CSSR% (Accessibility)	99.1	100	100	97.82	100
Drop Call Rate (%)	10	0	0	3.49	0
Mobility HOSR (%)	100	100	100	96.93	100
Rx Quality (%)	92.00	92.35	83.87	84.79	84.36

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 ≥ -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	95.45
BSNl 2G	64
VIL 2G	81.70
BSNL 3G	60.4
VIL 3G	72.99
Airtel 4G	98.31
Jio 4G	90.18
VIL 4G	97.73
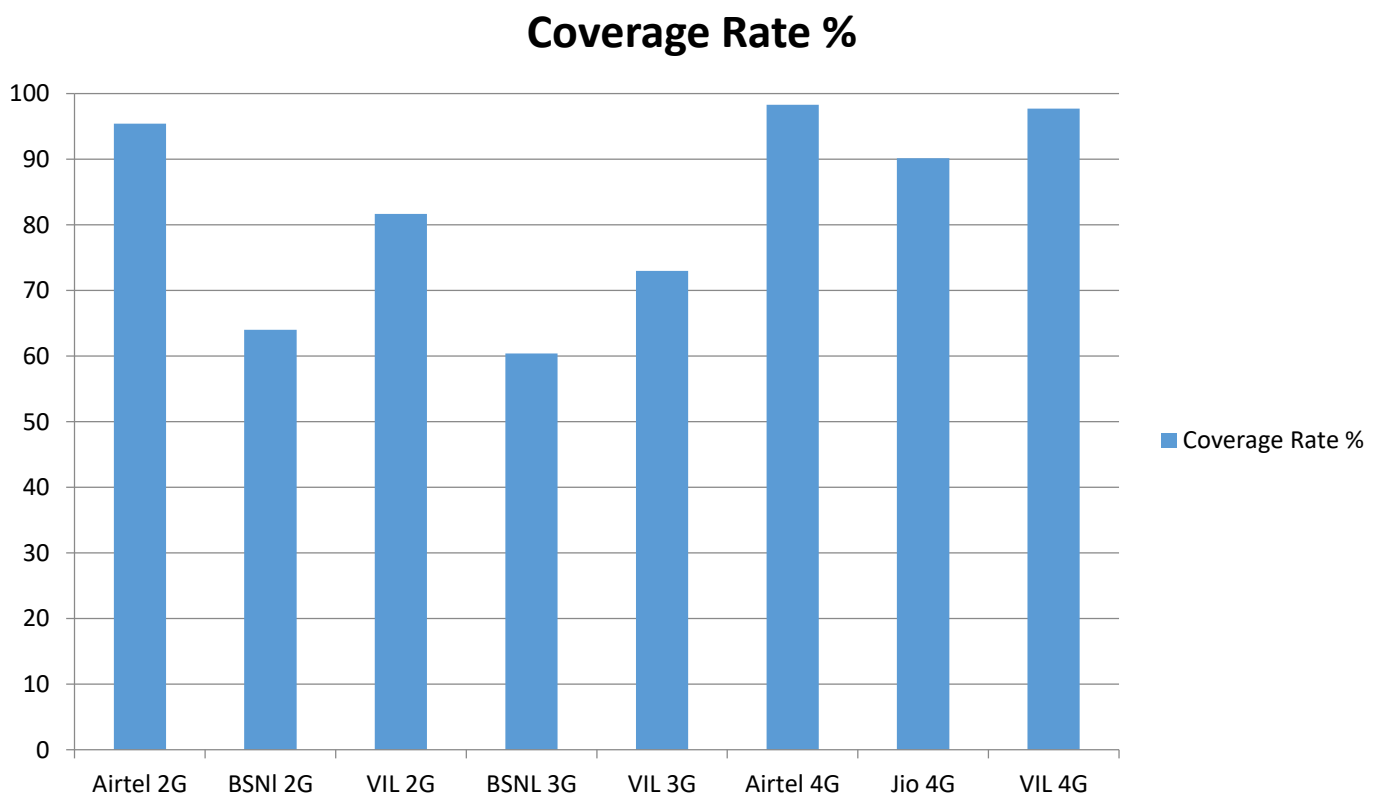
Coverage Rate %

AIRTEL

Technology	Coverage Rate %
2G	95.45
4G	98.31

2G

RX Level
- 0 to -85 (3719828)
- -85 to -120 (177610)

4G

RSRP
- 0 to -110 (5313349)
- -110 to -140 (91198)
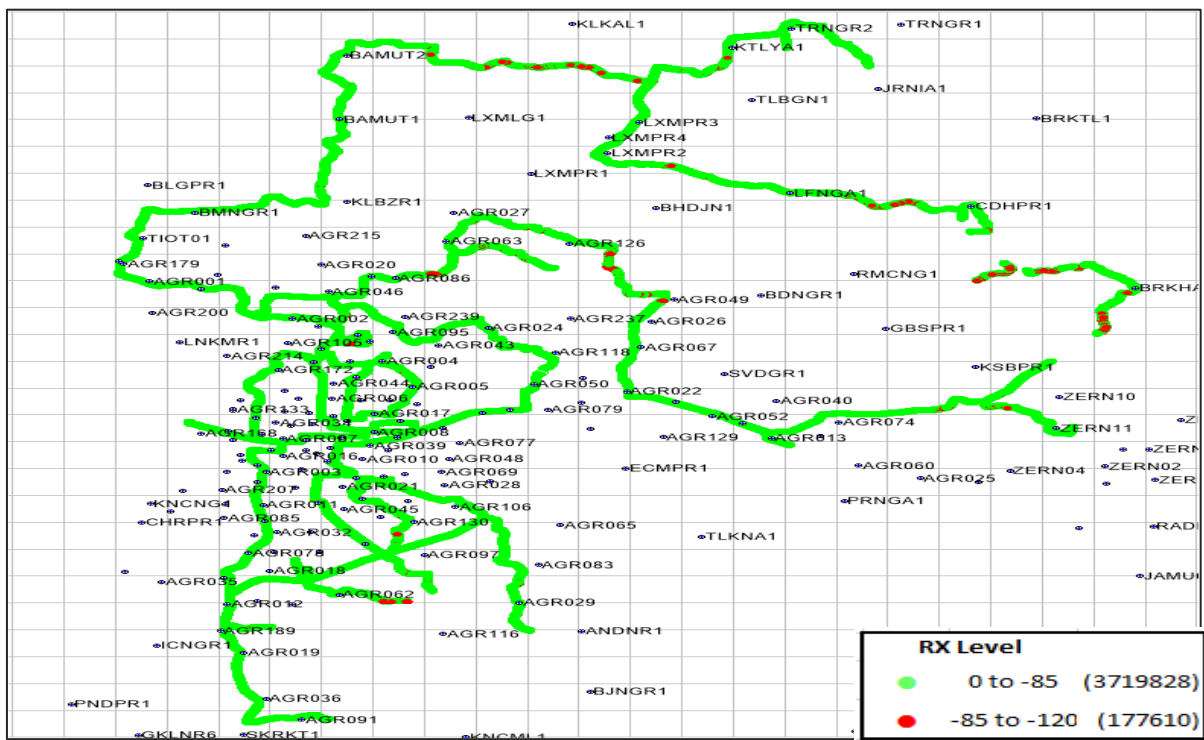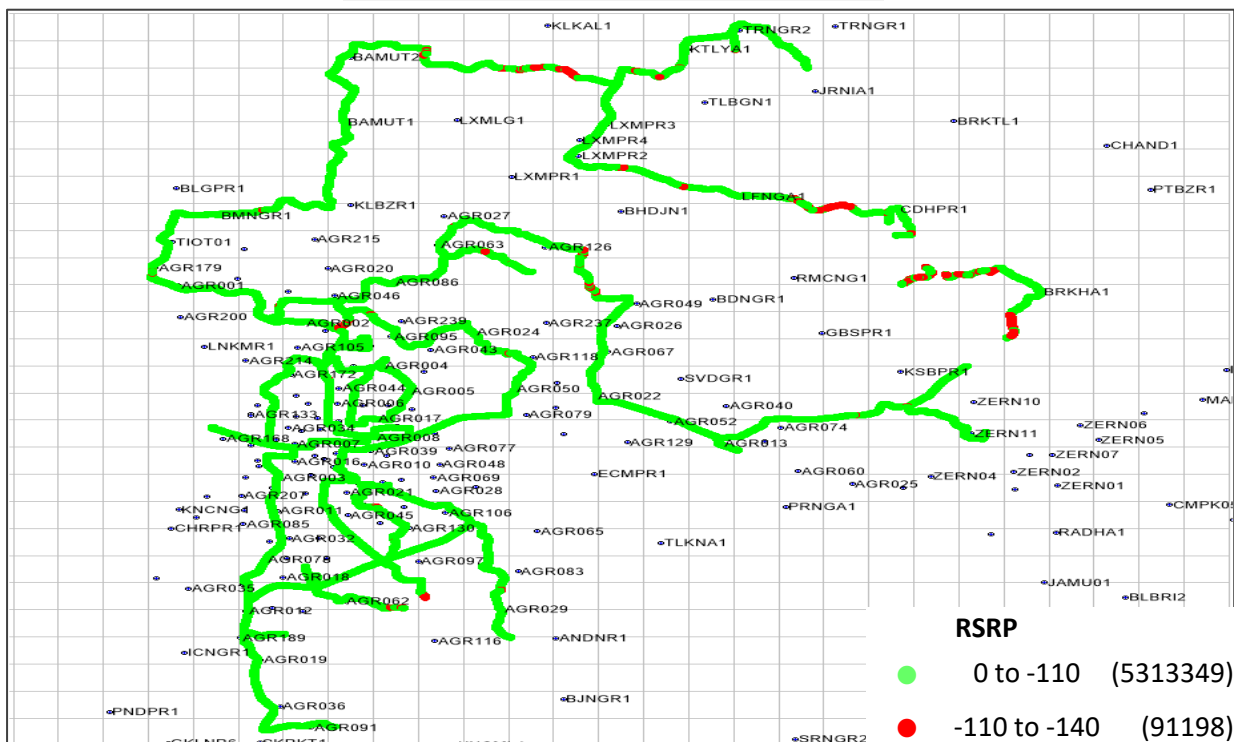
BSNL

Technology	Coverage Rate %
2G	64.0
3G	60.4

2G

3G
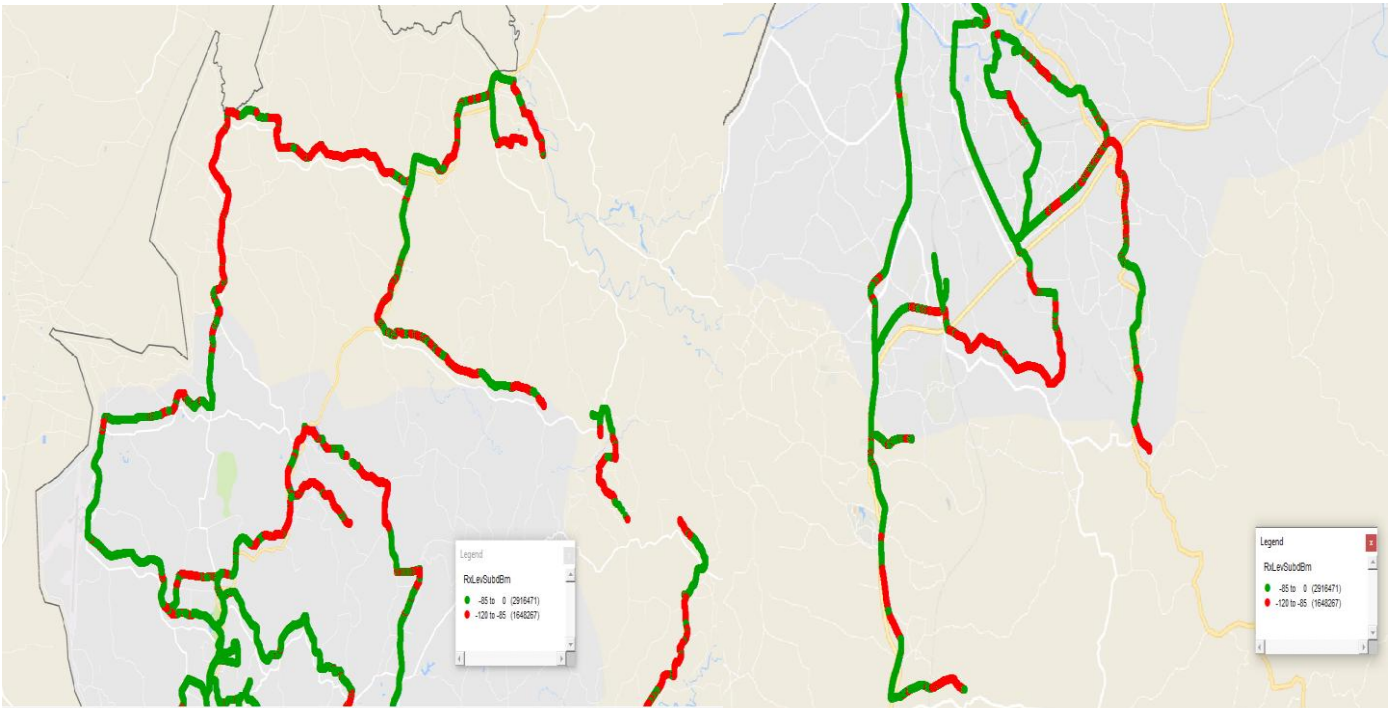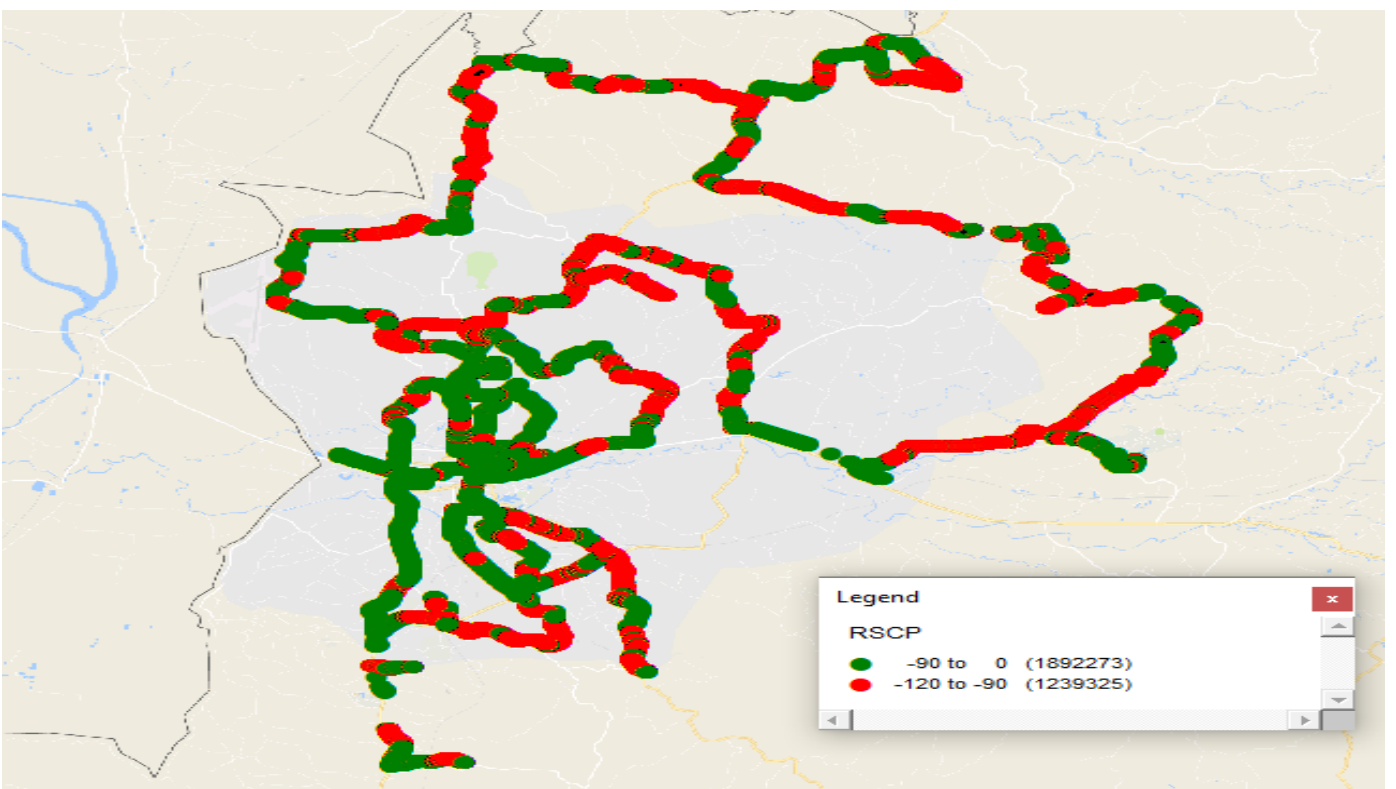
JIO

Technology	Coverage Rate %
4G	90.18

(91.34539 , 23.71487)

■■■ 1000 m

1 : 93641

LTE KPI PCell Serving RSRP[dBm]

● -110 <= x <= 0 (90.18%, 40371)
● x < -110 (9.82%, 4397)

VIL
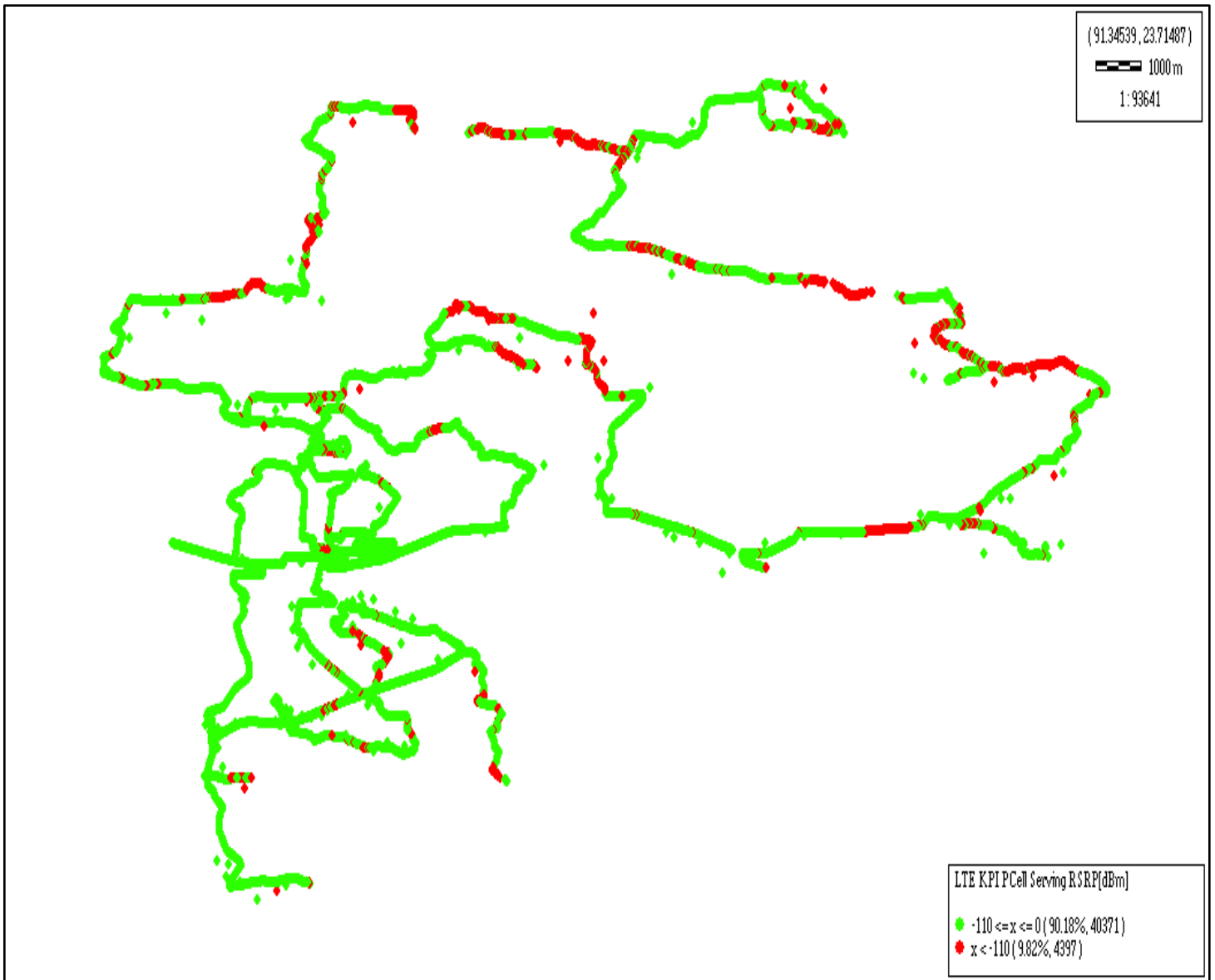
Technology	Coverage Rate %
2G	81.70

2G

RXLEV_SubdBm

- -85 to 0 (6718930) (81.7%)
- -120 to -85 (1504703) (18.3%)

VIL
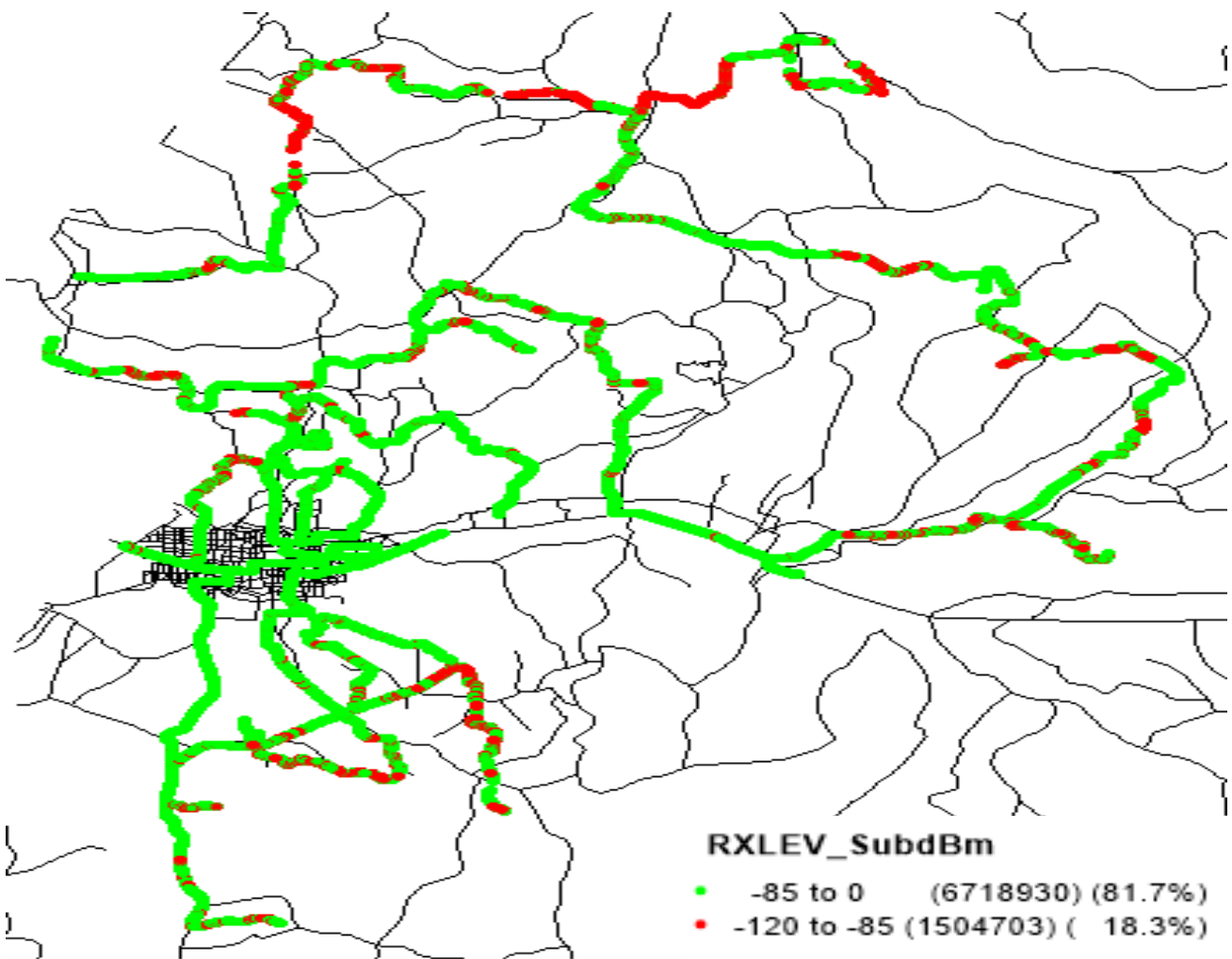
Technology	Coverage Rate %
3G	72.99
4G	97.73

3G

Agg. Active RSCP (dBm)
- -90 to 0 (4305550)　(72.99%)
- -120 to -90 (1593422) (27.01%)

4G

Serving Cell RSRP (dBm)
- -110 to 0 (5970034)　(97.73%)
- -120 to -110 (138459)　(2.27%)
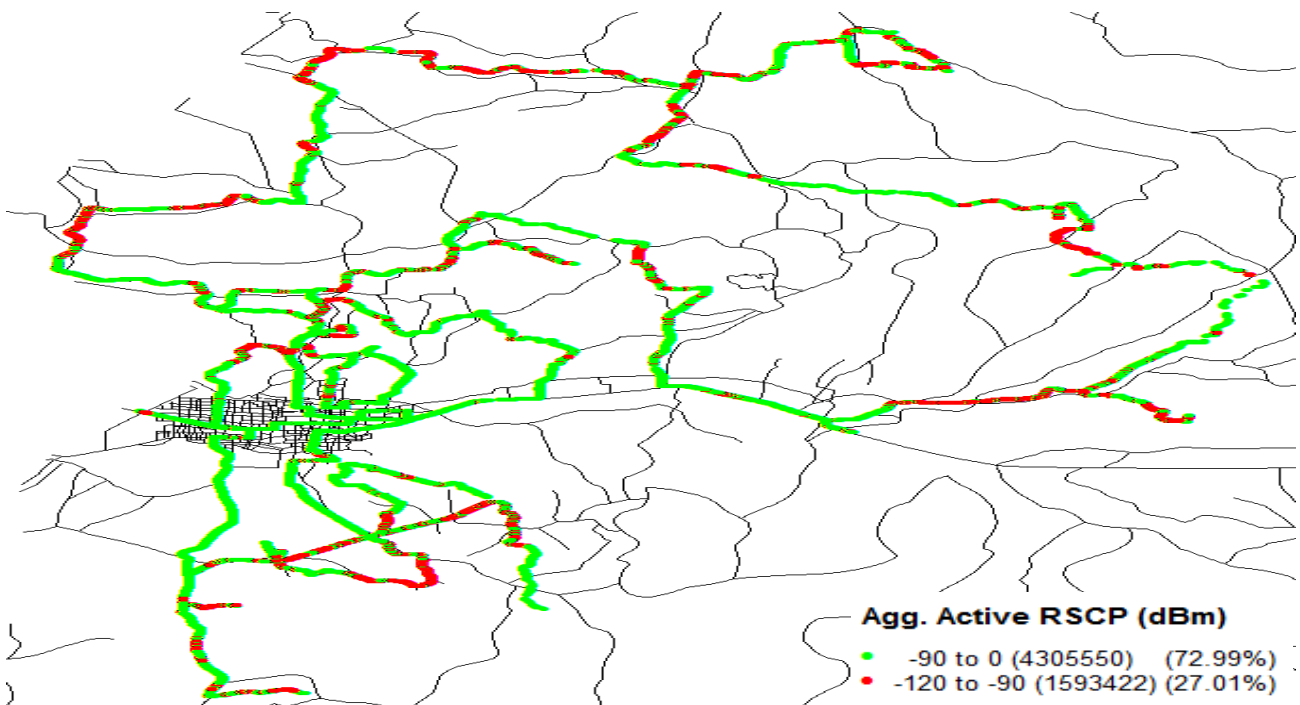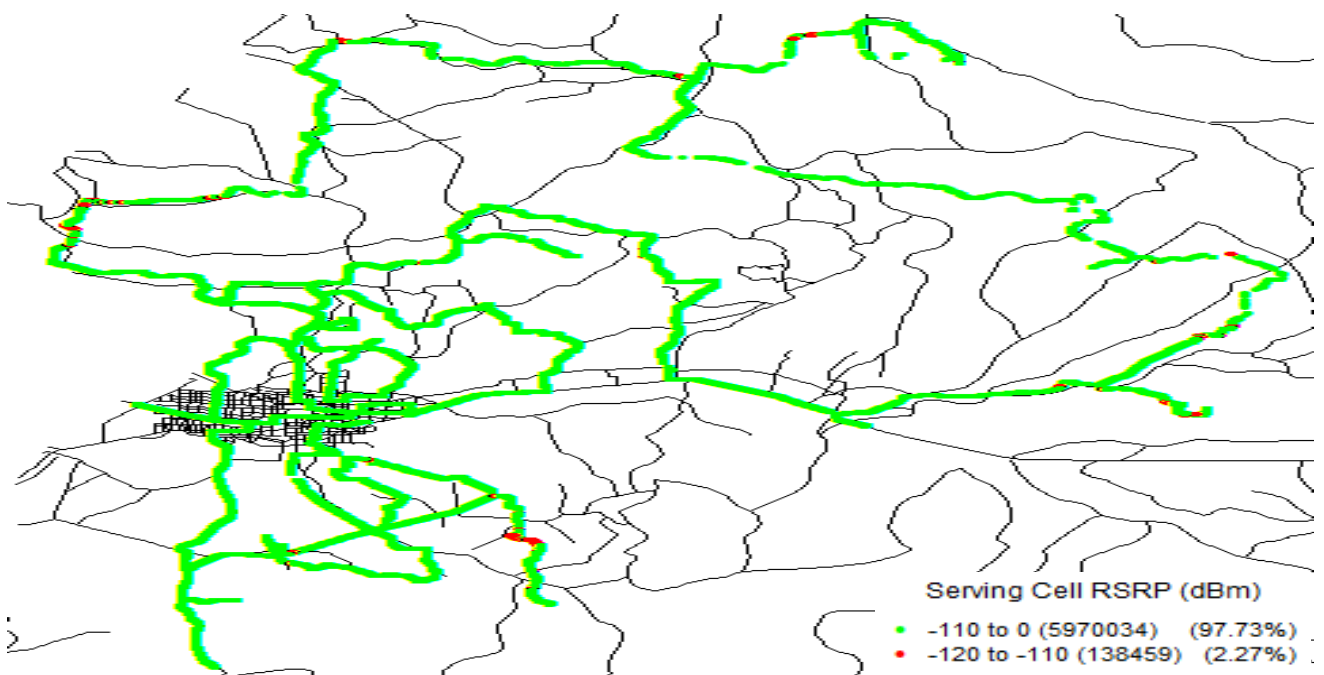
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP	Rx Quality %
Airtel 2G	95.00
BSNl 2G	91.00
VIL 2G	95.97
BSNL 3G	92.00
VIL 3G	92.35
Airtel 4G	83.87
Jio 4G	84.79
VIL 4G	84.36

Rx Quality %
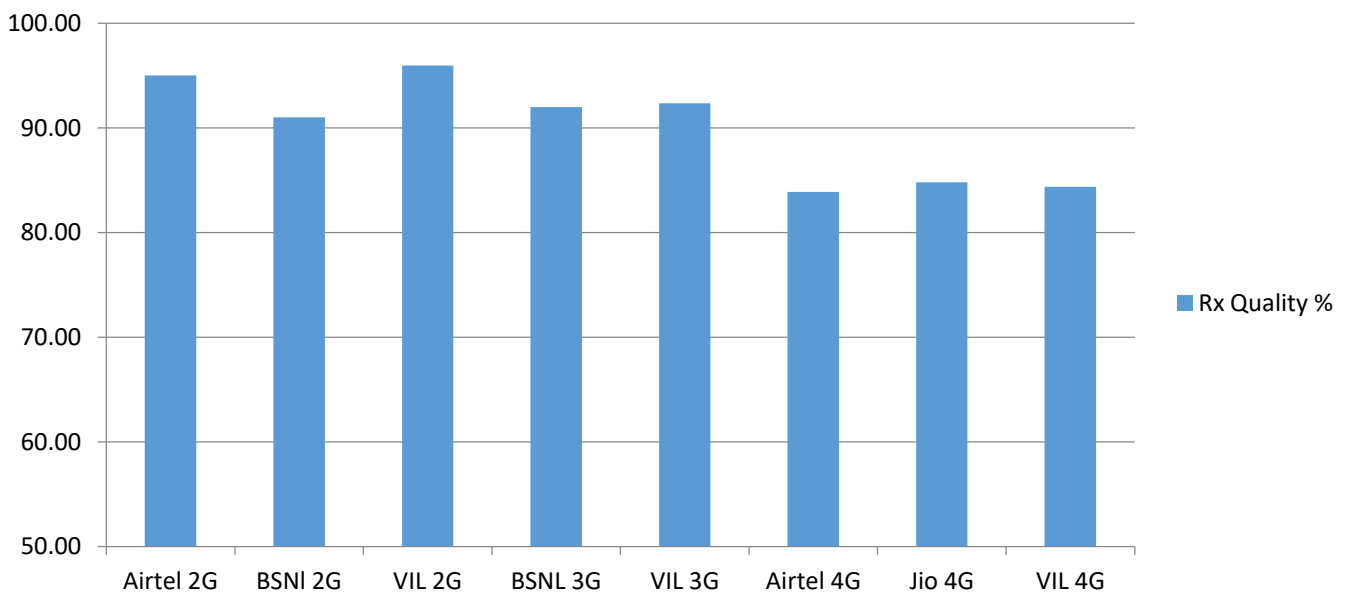
Airtel

Technology	Rx Quality %
2G	95.00
4G	83.87

2G

RX Quality
- 0 to 5   (3702636)
- 5 to 7   (194836)

4G
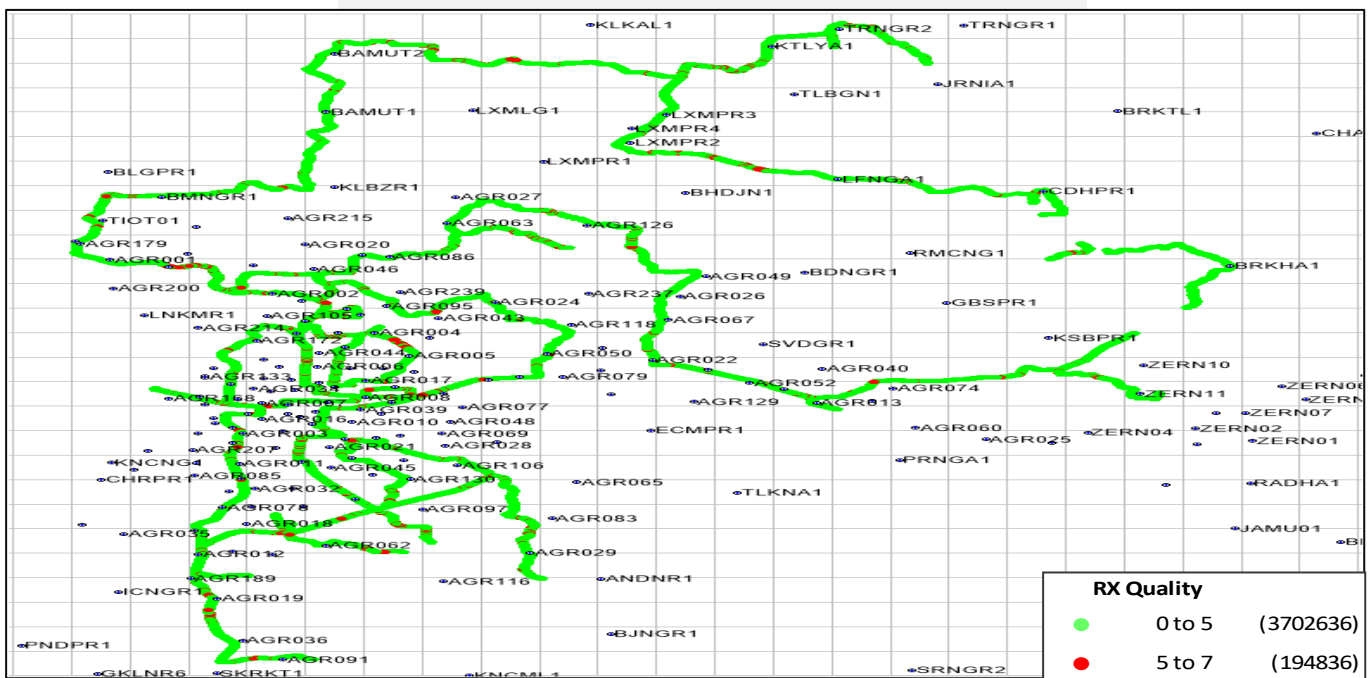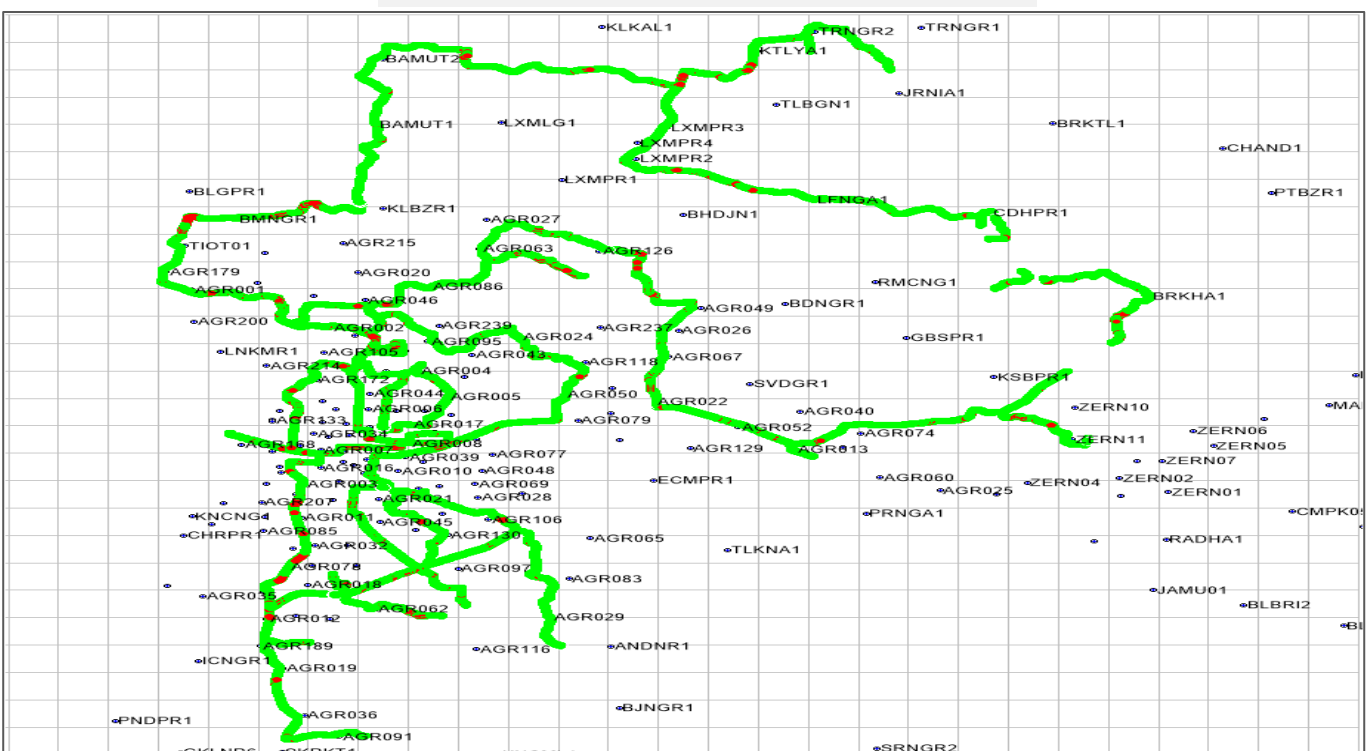
BSNL

Technology	Rx Quality %
2G	91.00
3G	92.00

2G

3G
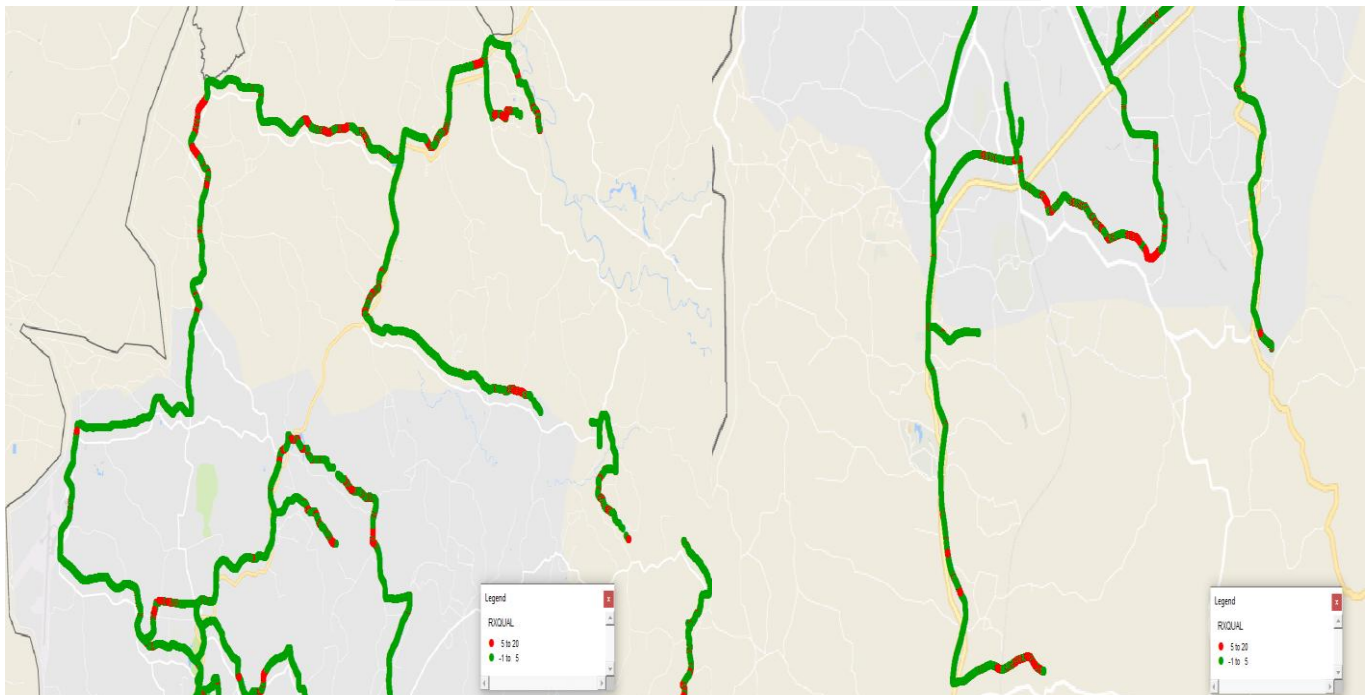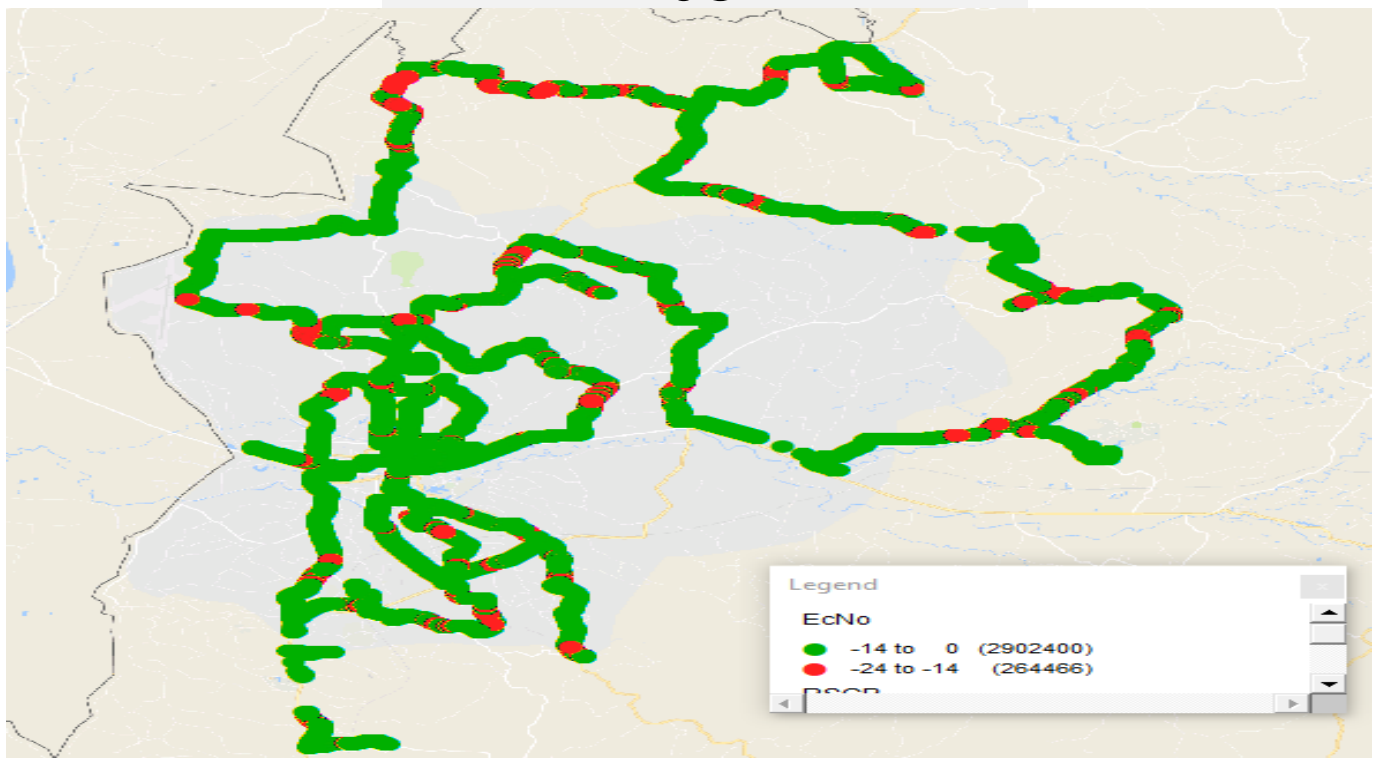
JIO

Technology	Rx Quality %
VoLTE	86.18

VIL
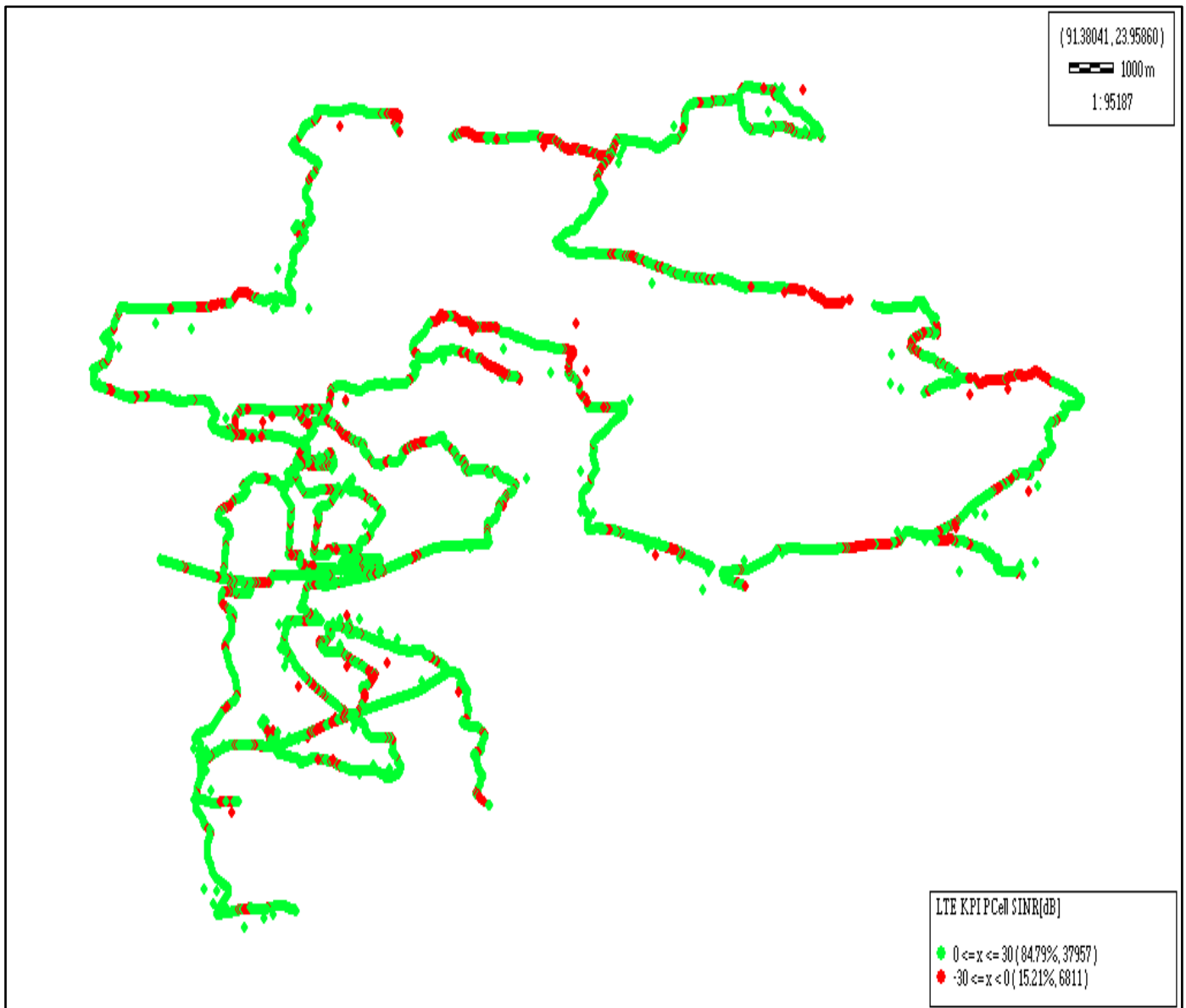
Technology	Rx Quality %
2G	95.97

2G

RXQUAL_SUB
- 0 to 5 (7892137) (96%)
- 5 to 20 (331496) (4%)

VIL
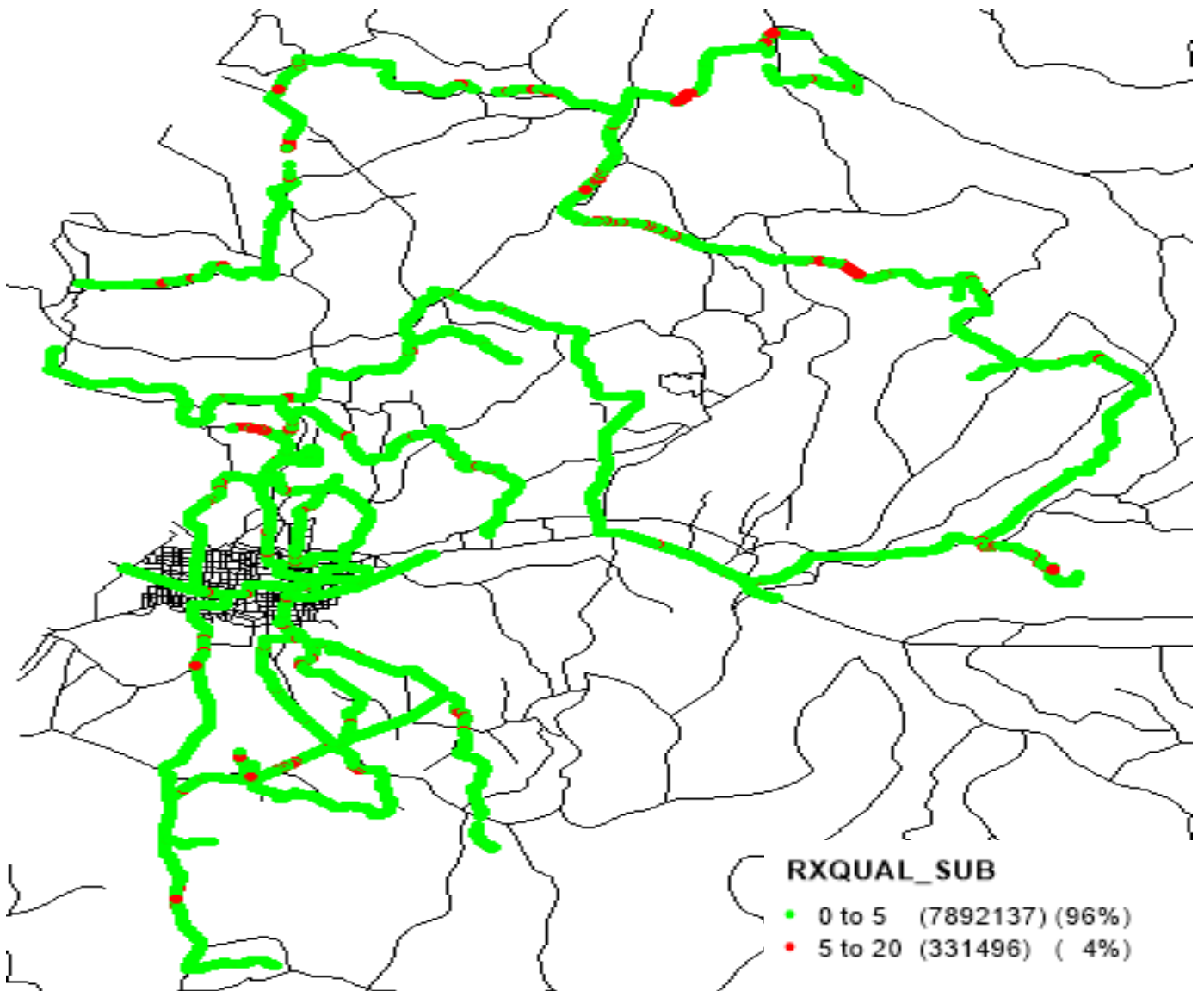
Technology	Rx Quality %
3G	92.35
4G	84.36

3G

Agg. Active Ec/Io (dB)
- -14 to 0 (5447686) (92.35%)
- -18 to -14 (451286) (7.65%)

4G

RS SINR (dB)
- 0 to 40 (5153050) (84.36%)
- 0 to -40 (955443) (15.64%)
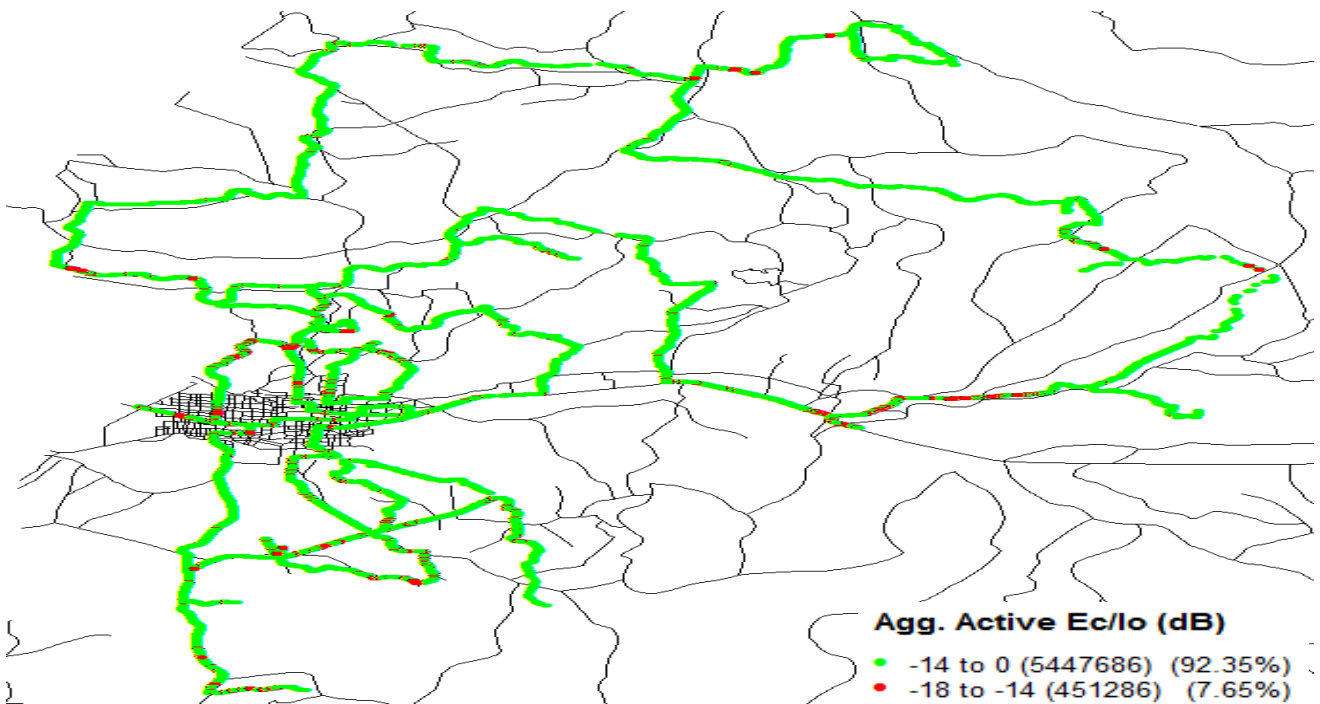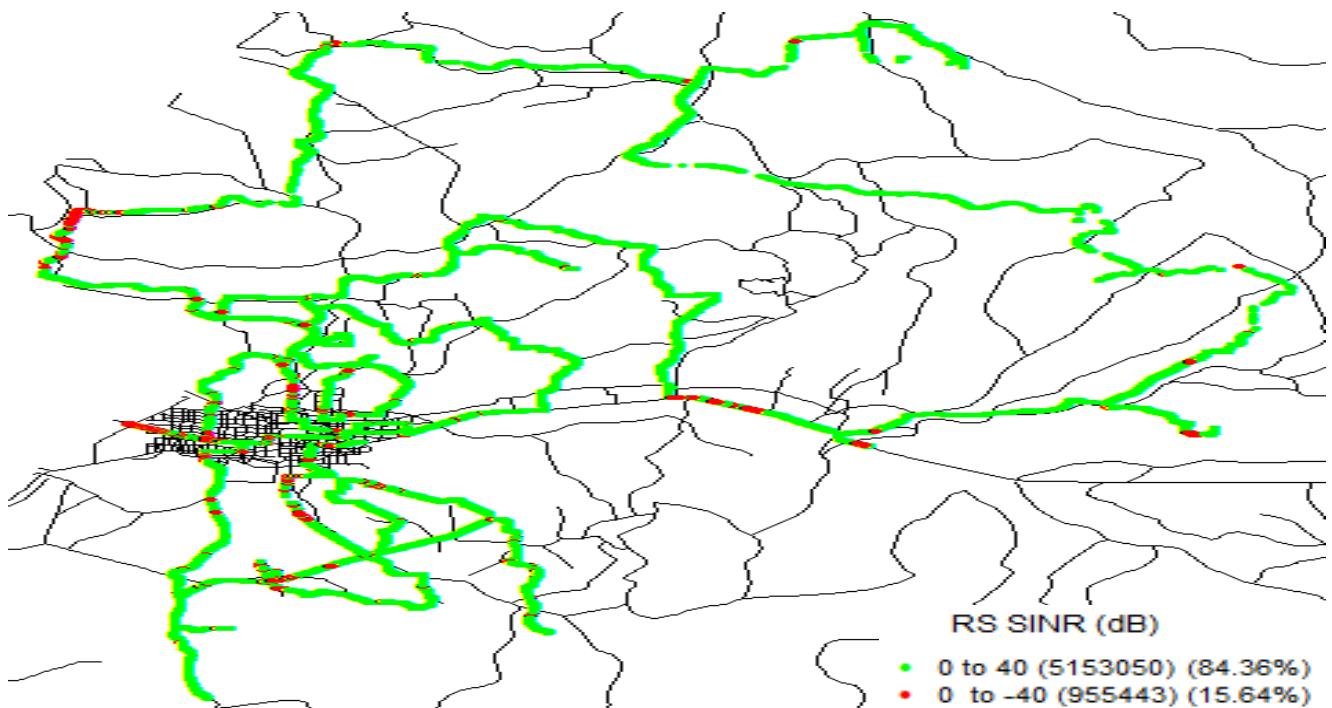
Airtel

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	13.02
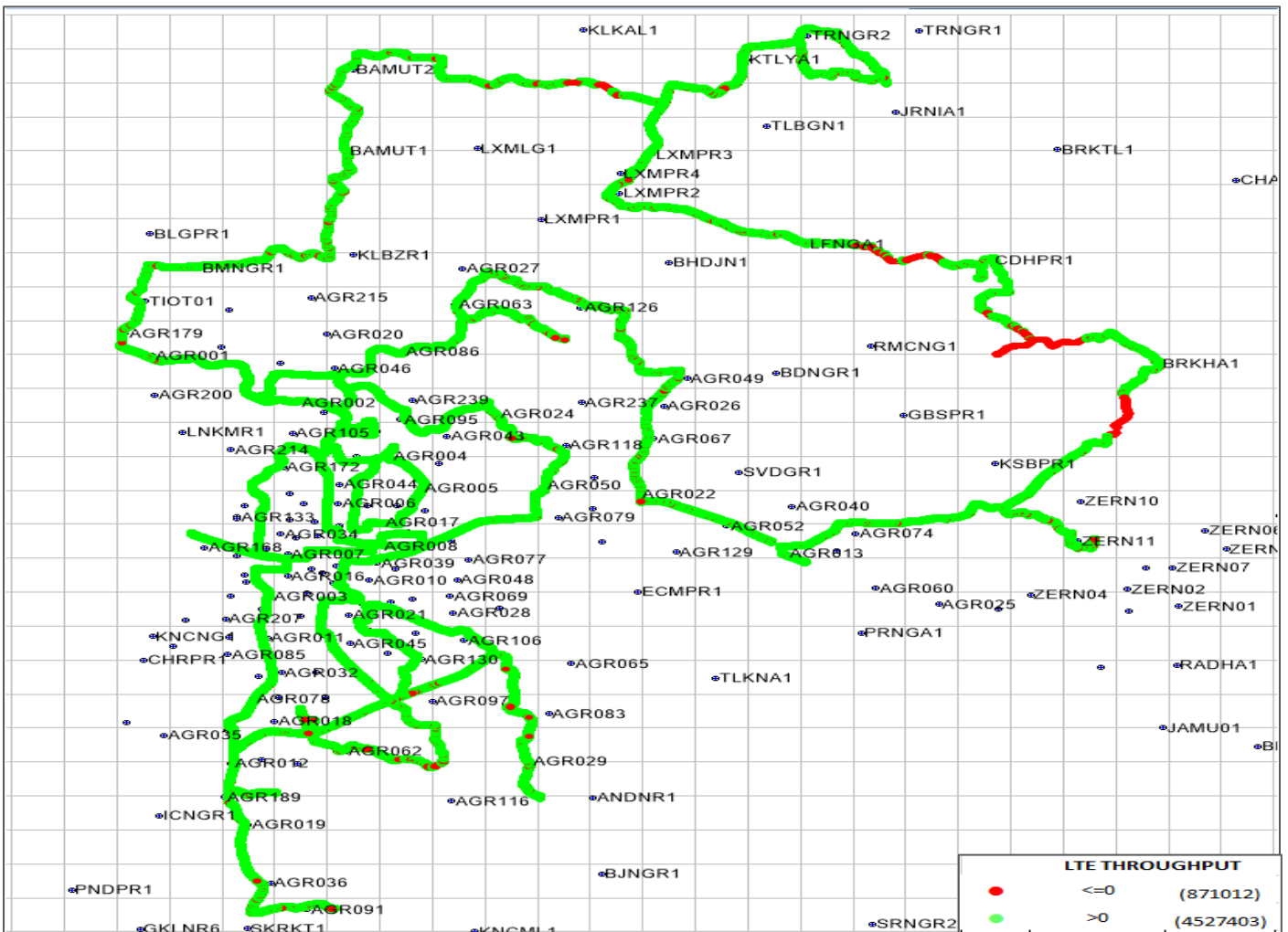
TSPS	AIRTEL
AVG. SPEED Mbps	13.02
NO. OF SAMPLES > 2 Mbps%	74
FILE DOWNLOAD SUCCESS RATE%	95

BSNL

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	2.85
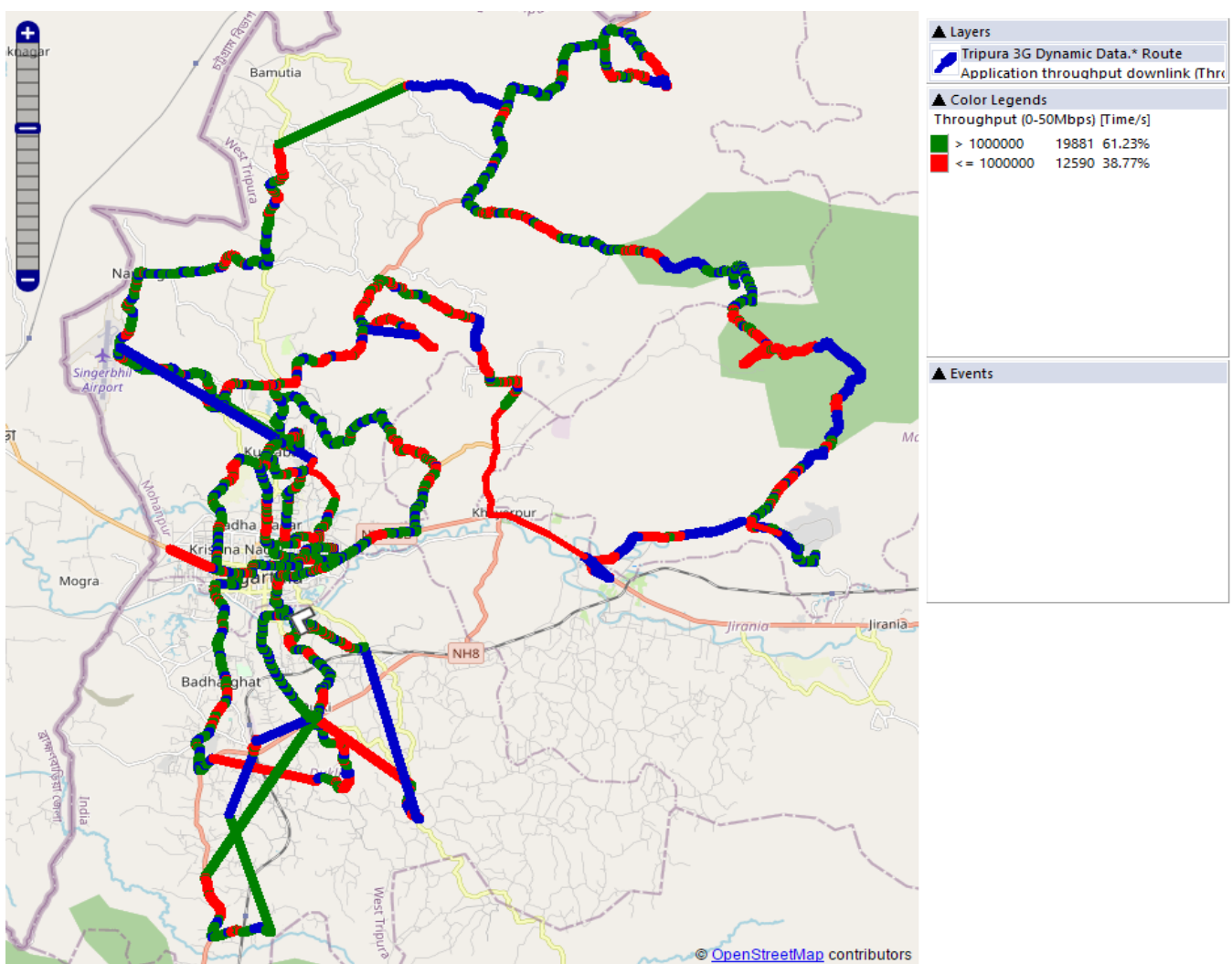
TSPS	BSNL
AVG. SPEED Mbps	2.85
NO. OF SAMPLES > 1 Mbps%	46
FILE DOWNLOAD SUCCESS RATE%	95

Jio

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	6.75

(91.23615 , 23.98119)
1000 m
1 : 104089

LTE KPI PDSCH Throughput[Mbps]
- 2 <= x < 100 (62.06%, 23067)
- 0 <= x < 2 (37.94%, 14103)
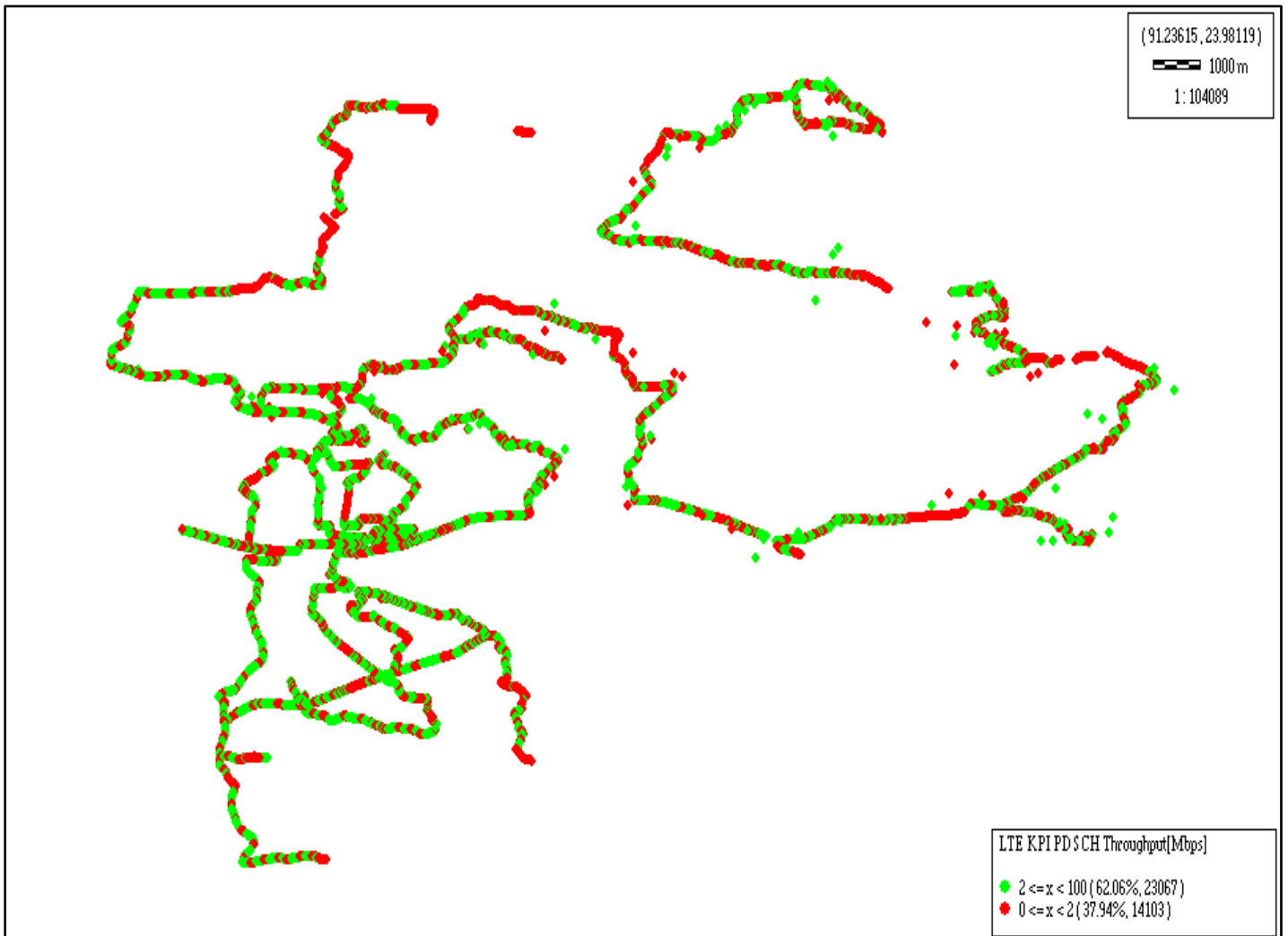
TSPS	JIO
AVG. SPEED Mbps	6.75
NO. OF SAMPLES > 2 Mbps%	62
FILE DOWNLOAD SUCCESS RATE%	91

VIL

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	2.23

HS-DSCH Throughput Total (kbps)
- [1,024 to Max] (4120502) (59.80%)
- [Min to 1,024] (2769523) (40.20%)
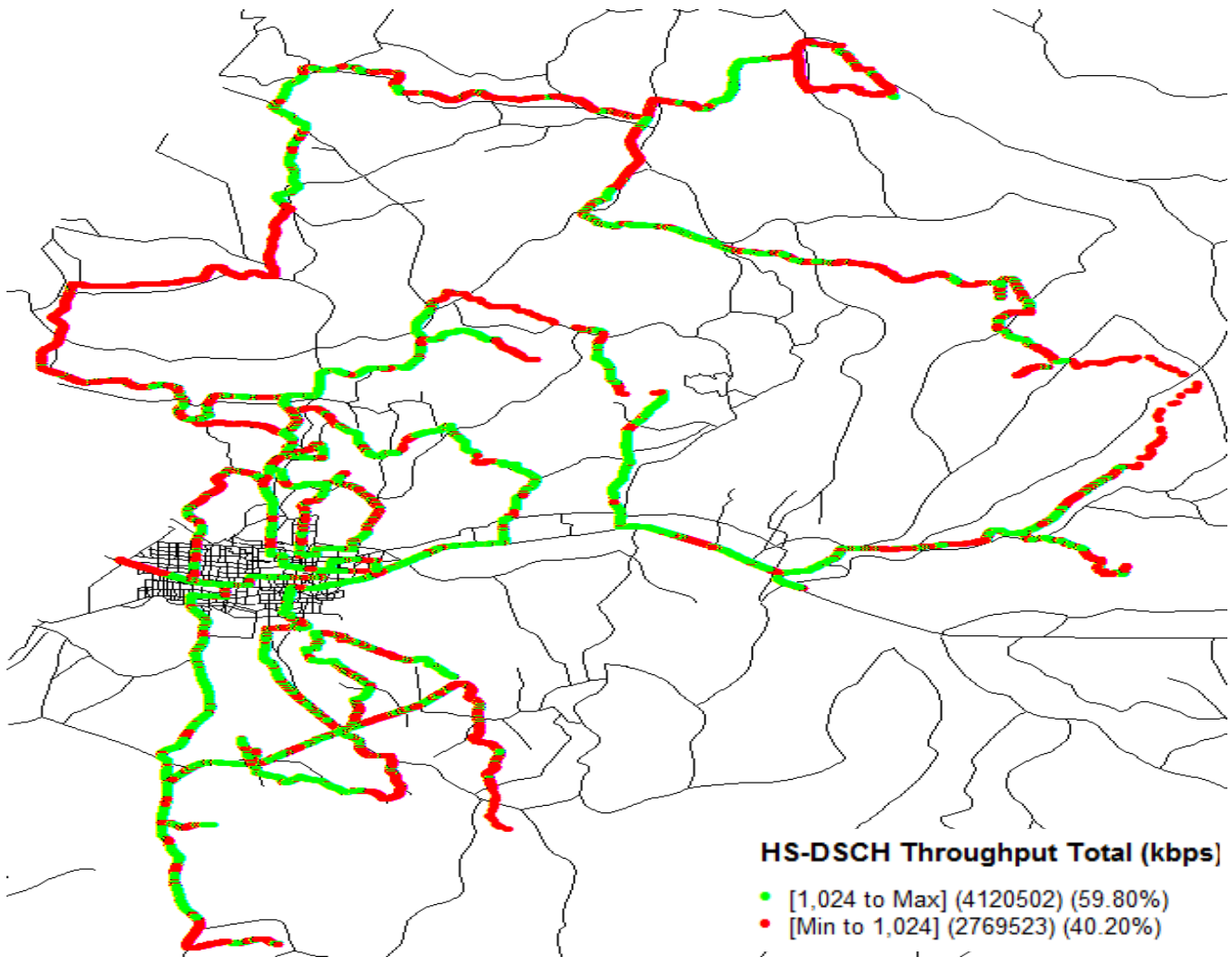
TSPS	VIL
AVG. SPEED Mbps	2.23
NO. OF SAMPLES > 1 Mbps%	59
FILE DOWNLOAD SUCCESS RATE%	97

VIL

Data Statistics - Dynamic Complete 210 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	4.97

PDSCH PhyThroughput(Kbps)
- 2.048 to Max(4347866)(71.18%)
- Min to 2.048(1760627) (28.82%)
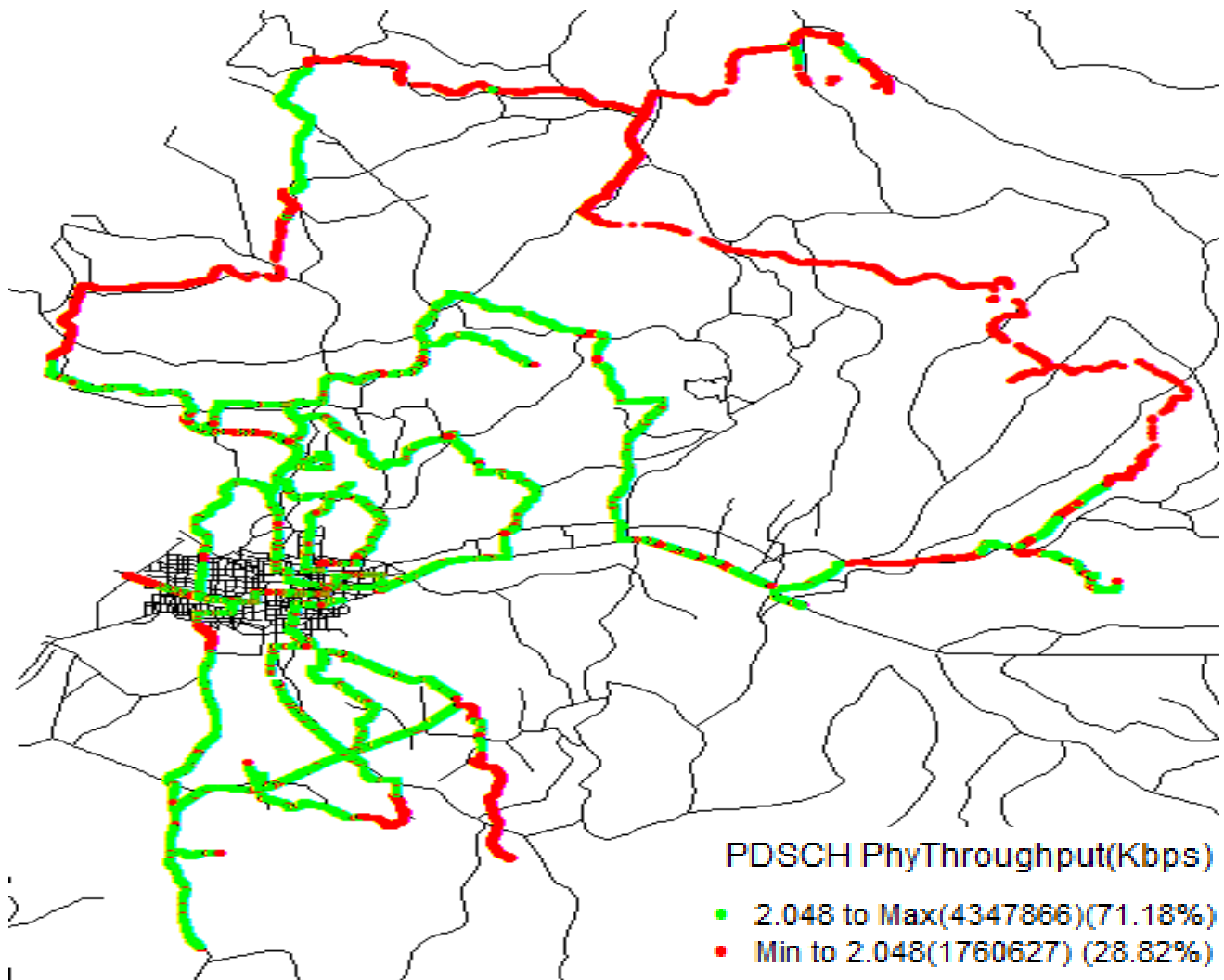
TSPS	VIL
AVG. SPEED Mbps	4.97
NO. OF SAMPLES > 2 Mbps%	71
FILE DOWNLOAD SUCCESS RATE%	100

DATA SPEED TESTING REPORT THROUGH TRAI MY SPEED APP is given below as Table-1.

LOCATION	DATE	TIME	TSP	SIGNAL STRENGTH (-dbm)	DOWNLOAD SPEED(Mbps)	UPLOAD SPEED(Mbps)
AGARTALA HIGH COURT	22.09.21	9.05AM	JIO	88	33.76	5.69
AGARTALA HIGH COURT	22.09.21	9.27AM	VI	91	17.26	37.07
AGARTALA HIGH COURT	22.09.21	9.22AM	BSNL	75	9.57	1.29
AGARTALA HIGH COURT	22.09.21	8.59AM	AIRTEL	99	13.92	4.99
AGARTALA HIGH COURT	22.09.21	9.39AM	JIO	82	77.04	8.68
MOHONPUR	22.09.21	11.43AM	JIO	96	39.69	20.83
MOHONPUR	22.09.21	12.05PM	VI	104	18.28	20.84
MOHONPUR	22.09.21	12.08PM	BSNL	85	5.85	1.42
MOHONPUR	22.09.21	12.07PM	AIRTEL	91	9.46	5.85
LEFUNGA BAZAR	22.09.21	1.00PM	JIO	74	45.76	6.76
LEFUNGA BAZAR	22.09.21	1.01PM	AIRTEL	94	51.21	5.33
BINAN KOBRA TSR CAMP	22.09.21	1.44PM	VI	78	2.77	3.56
BINAN KOBRA TSR CAMP	22.09.21	1.59PM	JIO	93	53.65	25.34
INSIDE THE NIT CAMPUS	22.09.21	3.06PM	JIO	93	34.39	6.29
INSIDE THE NIT CAMPUS	22.09.21	3.07PM	AIRTEL	91	75.60	5.36
INSIDE THE NIT CAMPUS	22.09.21	3.11PM	BSNL	71	7.58	3.29
INSIDE THE NIT CAMPUS	22.09.21	3.16PM	VI	90	46.71	28.44
LIMBUCHERRA	22.09.21	5.28PM	VI	99	16.78	13.85
LIMBUCHERRA	22.09.21	5.30PM	BSNL	92	2.21	1.18
LIMBUCHERRA	22.09.21	5.34PM	AIRTEL	97	17.46	5.28
AGARTALA AIRPORT	22.09.21	7.06PM	VI	100	17.00	24.25
AGARTALA AIRPORT	22.09.21	7.06	BSNL	57	7.20	2.87
AGARTALA AIRPORT	22.09.21	7.13PM	AIRTEL	57	45.31	24.01
AGARTALA AIRPORT	22.09.21	7.42PM	JIO	71	39.46	25.60
LEMBUCHARA	22.09.21	5.30PM	JIO	95	20.37	5.35
MEDICAL COLLEGE	23.09.21	10.40AM	BSNL	63	8.80	1.28
MEDICAL COLLEGE	23.09.21	9.59AM	AIRTEL	71	32.36	16.20
MEDICAL COLLEGE	23.09.21	10.29AM	JIO	58	88.98	14.55
GB HOSPITAL	23.09.21	10.57AM	VI	65	61.62	39.17
AGARTALA STATION	23.09.21	4.59PM	BSNL	79	7.26	1.17
AGARTALA STATION	23.09.21	5.39PM	VI	97	14.50	21.59
AGARTALA RAILWAY STATION	23.09.21	5.40PM	AIRTEL	80	44.39	23.60
AGARTALA RAILWAY STATION	23.09.21	5.38PM	JIO	62	66.92	55.83
RAILWAY COUNTER	23.09.21	6.26PM	JIO	68	68.15	41.68
MATH CHOWMONI BAZAR	23.09.21	8.08PM	JIO	80	64.20	24.16
MATH CHOWMONI BAZAR	23.09.21	8.10PM	BSNL	65	5.06	1.36
MATH CHOWMONI BAZAR	23.09.21	8.10PM	VI	79	14.11	25.72
MATH CHOWMONI	23.09.21	7.59PM	AIRTEL	87	23.58	3.41
AKHOURA BORDER	23.09.21	9.32PM	BSNL	63	5.30	1.71
AKHOURA ROAD (IPS) (INTEGRATED CHECK POST)	23.09.21	9.36PM	JIO	63	87.97	7.77
AKHOURA ROAD (IPS)	23.09.21	9.38PM	VI	94	12.55	9.65
AKHOURA ROAD	23.09.21	9.33PM	AIRTEL	88	60.65	19.69

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

Video Call Testing Report where Video Call disconnection was observed is provided below

TSP NAME	DATE	TIME	LAT/ LONG	VIDEO DISCONNECTION
VIL	22.09.2021	1.00	23.9163/ 91.3902	Video Disconnected
VIL	22.09.2021	1.50	23.8913/91.4301	Video Disconnected
VIL	22.09.2021	2.15	23.8819/91.4368	Video Disconnected
VIL	23.09.2021	4.55	23.7712/ 91.3142	Video Disconnected
VIL	23.09.2021	5.30	23.791/ 91.2779	Video Disconnected
BSNL	22.09.2021	12.15	23.95953611/91.38722222	Video Disconnected
BSNL	22.09.2021	12.28	Same Location	Video Disconnected
BSNL	22.09.2021	1.00	23.92103333/91.35638889	Video Disconnected
BSNL	22.09.2021	1.55	23.88941667/91.41500000	Video Disconnected
BSNL	22.09.2021	2.30	23.85708333/91.42944444	Video Disconnected
BSNL	22.09.2021	3.25	23.84161111/91.39277778	Video Disconnected
BSNL	22.09.2021	4.55	23.89004722/91.33833333	Video Disconnected
BSNL	22.09.2021	5.54	23.873522/91.277570	Video Disconnected
BSNL	23.09.2021	1.10	23.8023/91.3177	Video Disconnected
BSNL	23.09.2021	1.40	23.806334/91/315846	Video Disconnected
BSNL	23.09.2021	2.20	23.806412/91.29957	Video Disconnected
BSNL	23.09.2021	4.20	23.748278/91.2689	Video Disconnected
BSNL	23.09.2021	4.44	23.785904/91.278815	Video Disconnected
RJIO	22.09.2021	12.01	23.959514 / 91.317605	Video Disconnected
RJIO	22.09.2021	1.15	23.911821 / 91.396976	Video Disconnected
RJIO	22.09.2021	1.27	23.907772 / 91.387212	Video Disconnected
RJIO	23.09.2021	12.35	23.788489 / 91.264613	Video Disconnected
RJIO	23.09.2021	1.29	23.771692 / 91.37013	Video Disconnected
AIRTEL	22.09.2021	1.30	23.884798/ 91.437800	Video Disconnected

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

AIRTEL- The Video call was disconnected one time throughout the drive route and sometimes the Video picture quality was poor on the drive route.

BSNL- The Video call was disconnected many times throughout the drive route due to poor coverage/ no signal of 3G.

RJIO- - The Video call was disconnected five times throughout the drive route the drive route and sometimes the Video picture quality was poor on the drive route.

VIL- The Video call was disconnected five times throughout the drive route the drive route and sometimes the Video picture quality was poor on the drive route.

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

AIRTEL

SINR (83.87%) in 4G network does not meet the benchmarks (95%).

Airtel has been asked to take necessary action including software/ hardware optimization to improve the Rx Quality (SINR), Video calls disconnections and poor coverage/ download throughputs on the drive test routes and at all important locations.

An action taken report is to be submitted by 30.12.2021.

BSNL

Call Block Rate (4.36%), Drop Call Rate (10.5%), HOSR (84.1%), Rx Quality (91%) in 2G network and Call Block Rate (6.41%), Drop Call Rate (10%), Ec/No (92%) in 3G network do not meet the benchmarks.

BSNL could not meet Call Block Rate, Drop Call Rate , HOSR , Rx Quality in 2G network and Call Block Rate, Drop Call Rate, Ec/No in 3G network and BSNL has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the KPIs of 2G/ 3G, Video calls disconnections, poor Video quality and poor coverage/ download throughputs on the drive test route and at all important locations.

There was no signal/ very poor coverage of 3G at many locations. For new sites, sharing of other TSPs towers may be possible because it was observed that other TSPs towers are available in the nearby of the locations.

An action taken report is to be submitted by 30.12.2021.

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

RJIO

Drop Call Rate (3.49%) and SINR (84.79%) in 4G network do not meet the benchmark.
Average download data speed (4G network- Locked mode) is 6.75 Mbps throughout the drive test route.

RJIO could not meet DCR and SINR benchmark and RJIO has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the DCR and Rx Quality (SINR), Video calls disconnections and poor coverage/ download throughputs on the drive test route and at all important locations.

An action taken report is to be submitted by 30.12.2021.

VIL

SINR (84.36%) in 4G network and Ec/No (92.35%) in 3G network do not meet the benchmarks (95%).
Average download data speed (4G network- Locked mode) is 4.97 Mbps throughout the drive test route.

VIL could not meet the Ec/No in 3G and the SINR in 4G benchmark. VI has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the Ec/No in 3G & the SINR in 4G, Video calls disconnections and poor coverage/ download throughputs on the drive test routes.

An action taken report is to be submitted by 30.12.2021.