Operator Assisted Drive Test Report

Dimapur & Kohima
November 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 & Handover success Rate in 2G network and Drop Call Rate, Call Setup Success Rate , & Rx Quality (Ec/No) in 3G network.

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

VIL-   Rx Quality in 2G 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 Dimapur & Kohima Cities and surrounding area from 9:00 AM to 7:00 PM during 29th Nov. to 30th Nov. 2021. The drive test covered drive route of 220 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 LTE network covering four TSPs.

| Overview | Voice Summary | Data Summary |

Overview

Dimapur is the largest city in Nagaland, India. As of 2011, the municipality had a population of 122,834. The city is the main gateway and commercial centre of Nagaland.

Kohima is the capital city of India's north eastern state of Nagaland. With a resident population of almost 100,000, it is the second largest city in Nagaland

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. 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.

Technology/ TSP	AIRTEL	BSNL	RJIO	VODAFONE-IDEA
2G	YES	YES	NO	YES
3G	NO	YES	NO	YES
4G	YES	NO	YES	YES
TOOL USED	TEMS	NIMO & TEMS	X-CAL	TEMS

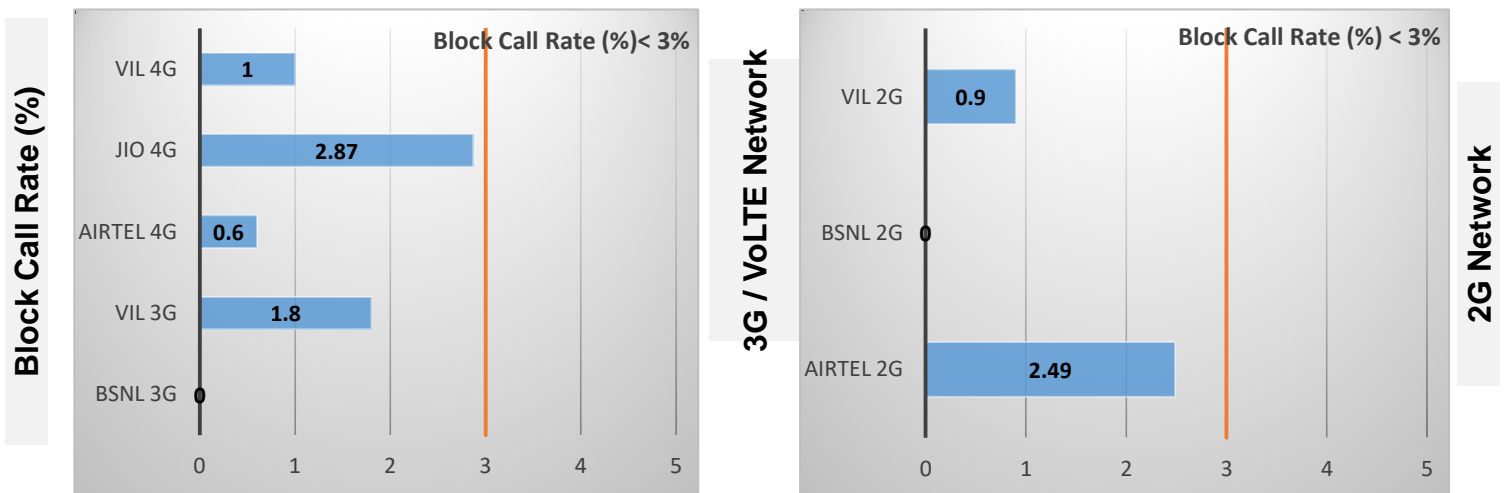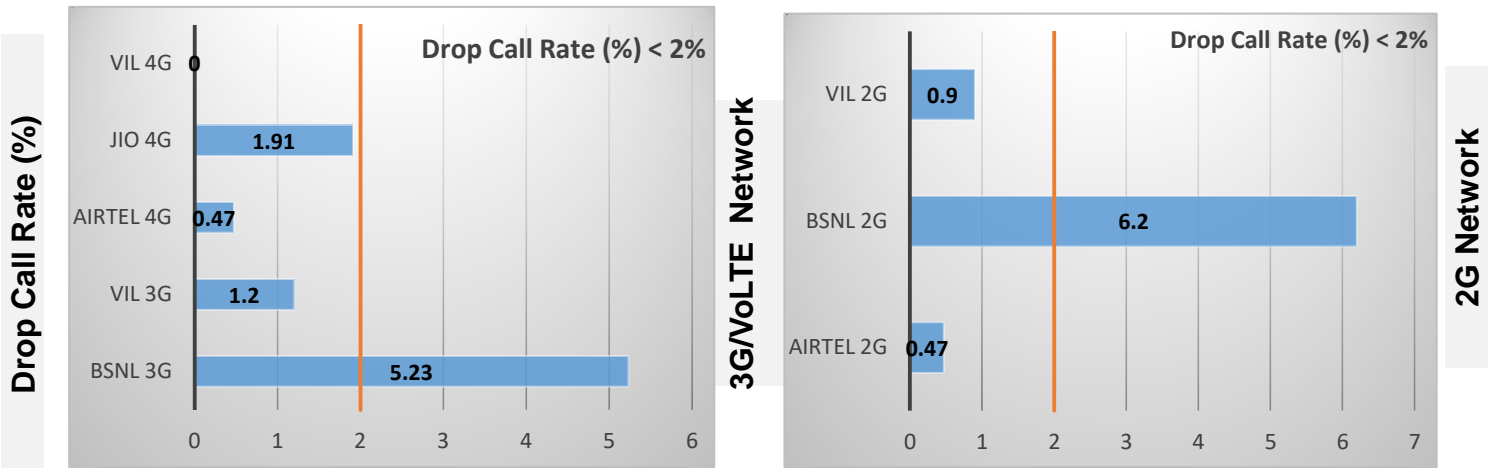## Voice & Dynamic Data Test Drive Route
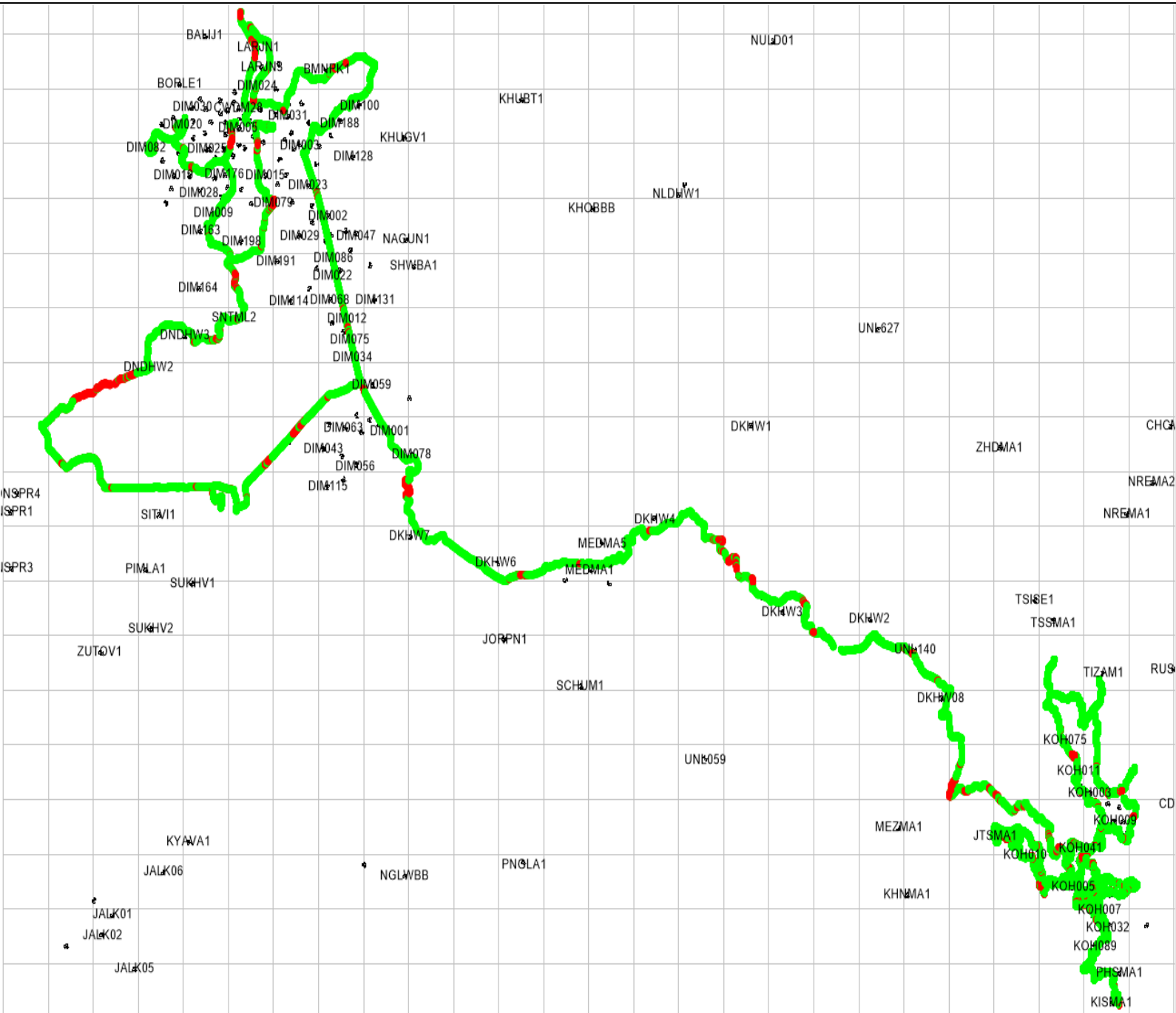
Voice Calls

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 %	0.47	6.2	0.9	5.23	1.2	0.47	1.91	0
Block Call Rate %	2.49	0	0.9	0	1.8	0.6	2.87	1

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

b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

Voice Calls

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	94.92	63.14	88.33

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

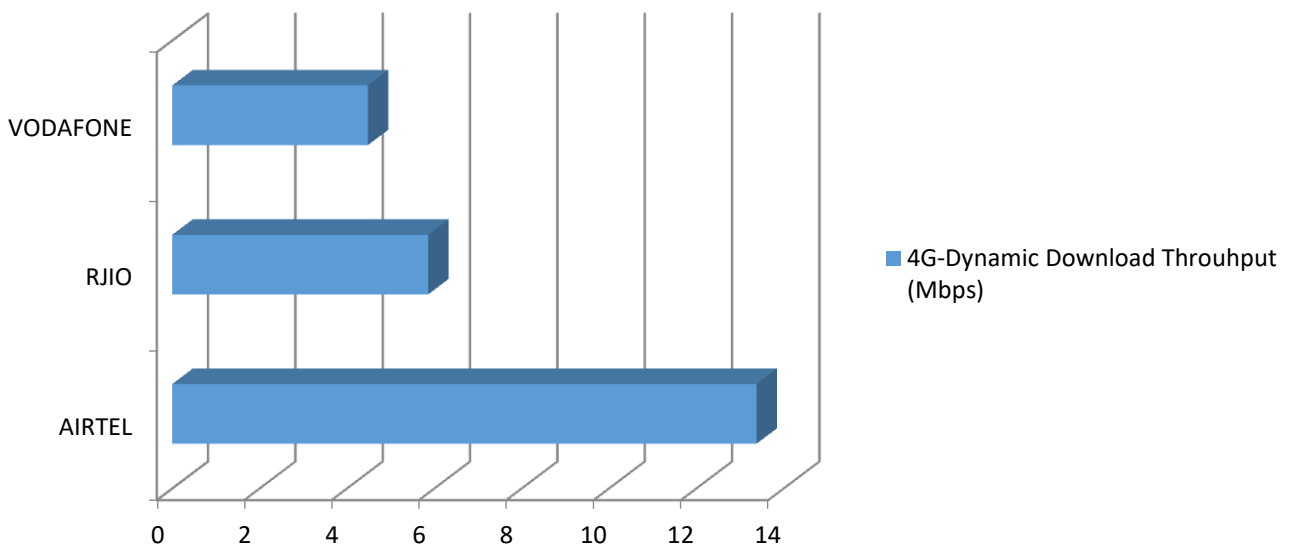| TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Coverage %	74.93	91.94	95.68	96.42	92.5

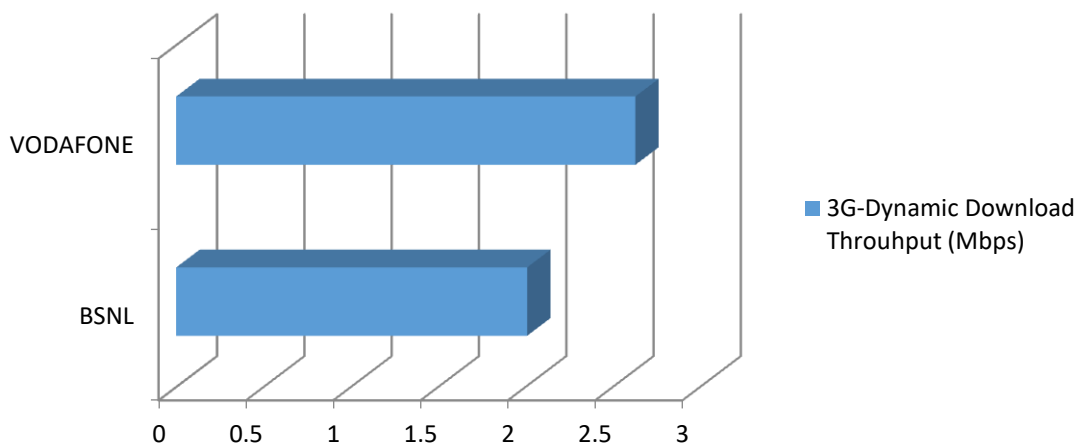Dynamic Data was tested for 220 Kms. Download Throughput was tested.

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

4G/3G/ Network:

4G-Dynamic Download Throuhput (Mbps)

3G-Dynamic Download Throuhput (Mbps)

Summary

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	217	285	222
Blocked Call Rate (%)	2.49	0	0.9
CSSR% (Accessibility)	99.08	**96.14**	99.09
Drop Call Rate (%)	0.47	**6.2**	0.90%
Mobility HOSR (%)	**94.86**	**86.97**	99.64
Rx Quality (%)	95.4	96.67	**94.08**

Voice Call	3G/4G				
	BSNL 3G	VIL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	204	167	214	209	204
Blocked Call Rate (%)	0	1.8	0.6	2.87	1.00
CSSR% (Accessibility)	**84.31**	98.8	99.53	97.13	98.88
Drop Call Rate (%)	**5.23**	1.2	0.47	1.91	0
Mobility HOSR (%)	100	100	99.87	99.57	100
Rx Quality (%)	**88.22**	96.2	**87.33**	**93.88**	**88.39**

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	94.92
BSNl 2G	63.14
VIL 2G	88.33
BSNL 3G	74.93
VIL 3G	91.94
Airtel 4G	95.68
RJIO 4G	96.42
VIL 4G	92.5

Coverage Rate %
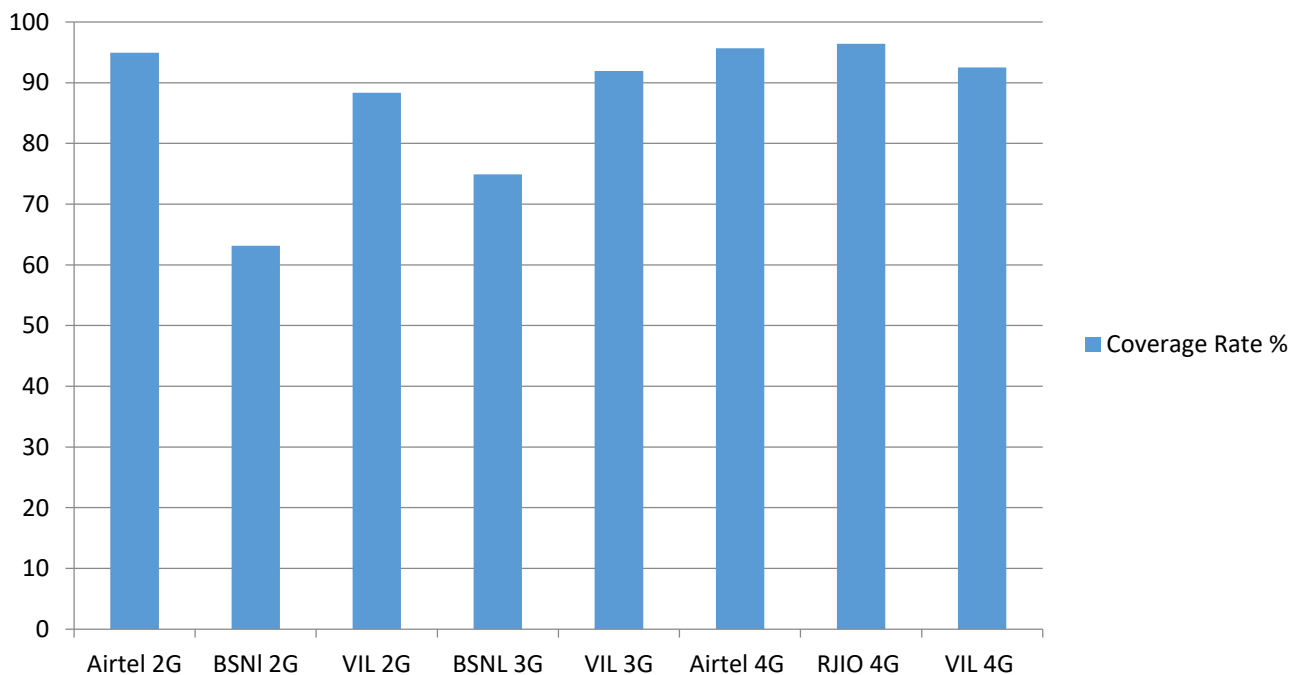
AIRTEL

Technology	Coverage Rate %
2G	94.92
VoLTE	91.94

2G
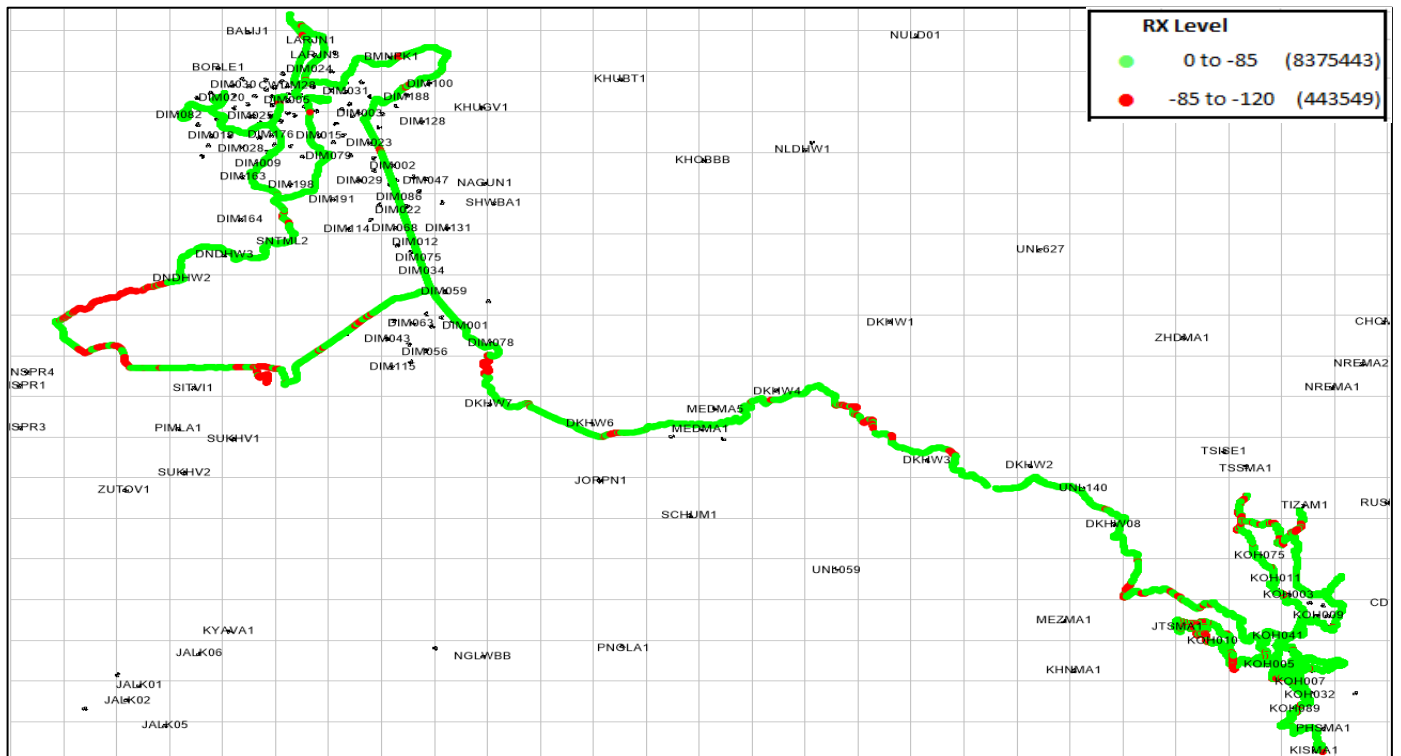
VoLTE
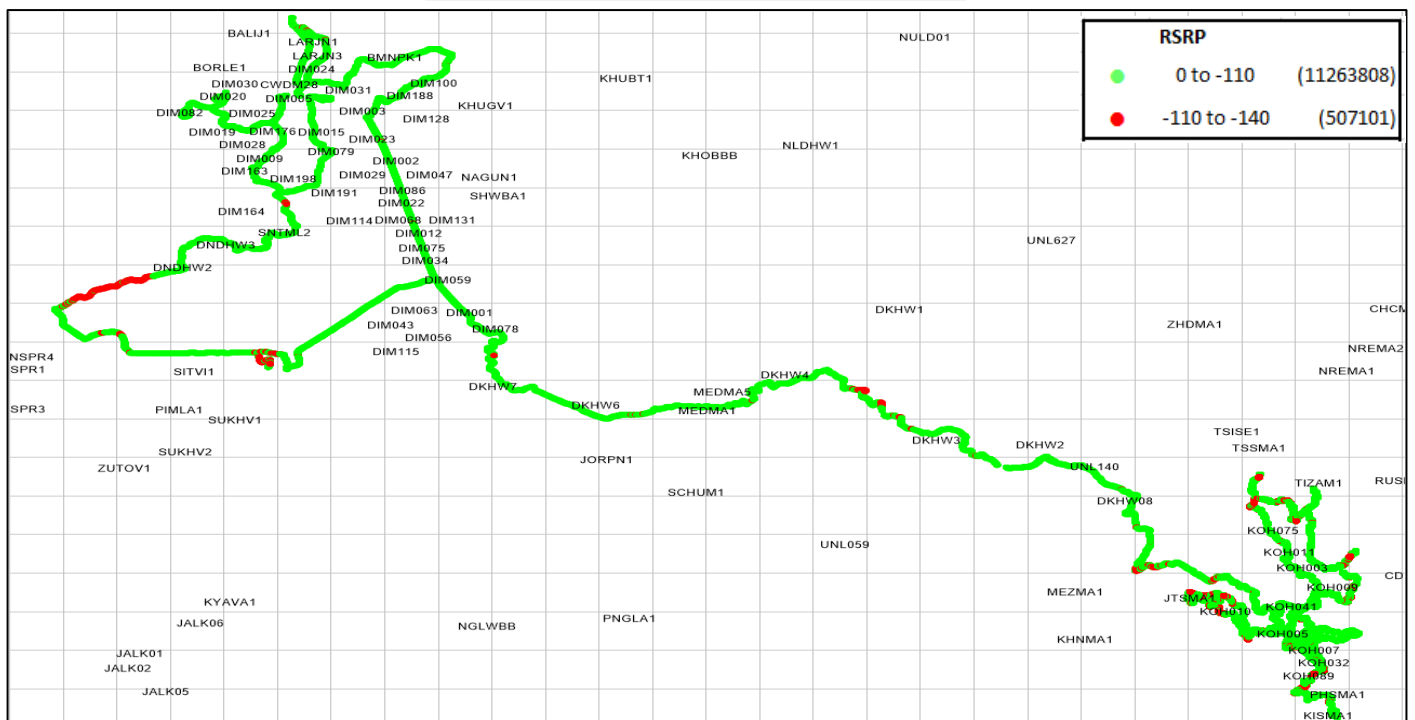
BSNL

Technology	Coverage Rate %
2G	63.14
3G	74.93

2G

3G
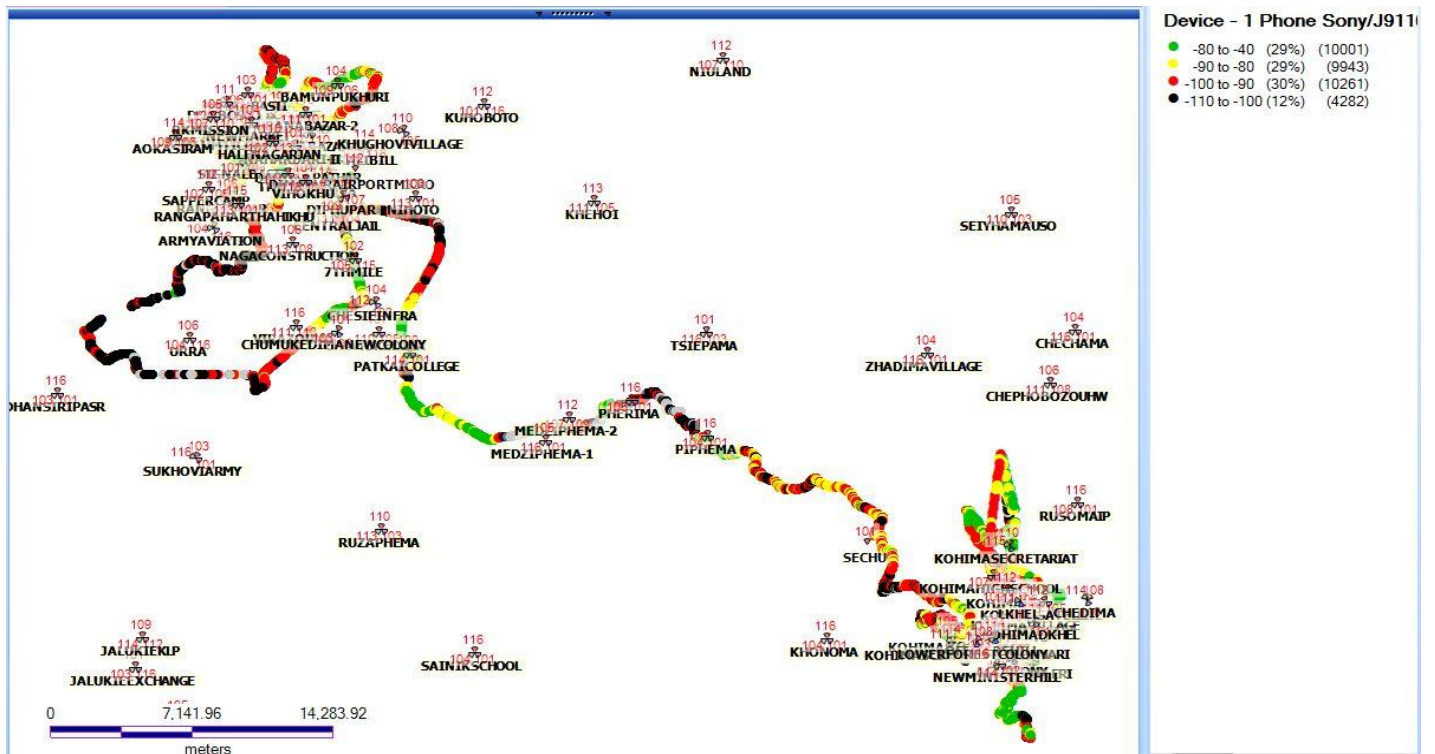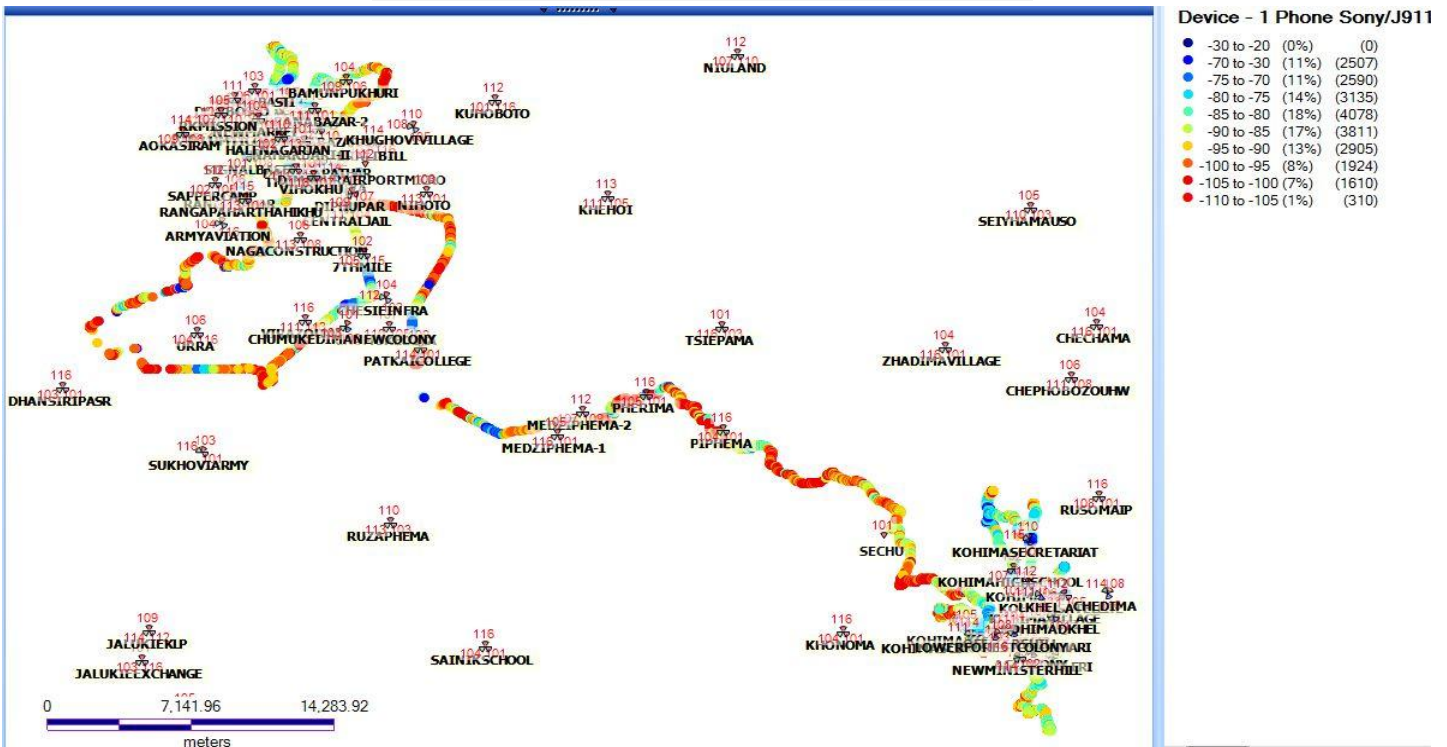
JIO

Technology	Coverage Rate %
VoLTE	96.42

(93.94846 , 25.73140)
6000 m
1 : 467006

LTE KPI PCell Serving RSRP[dBm]

- -110 <= x <= 0 (96.42%, 41179)
- x < -110 (3.58%, 1529)

VIL
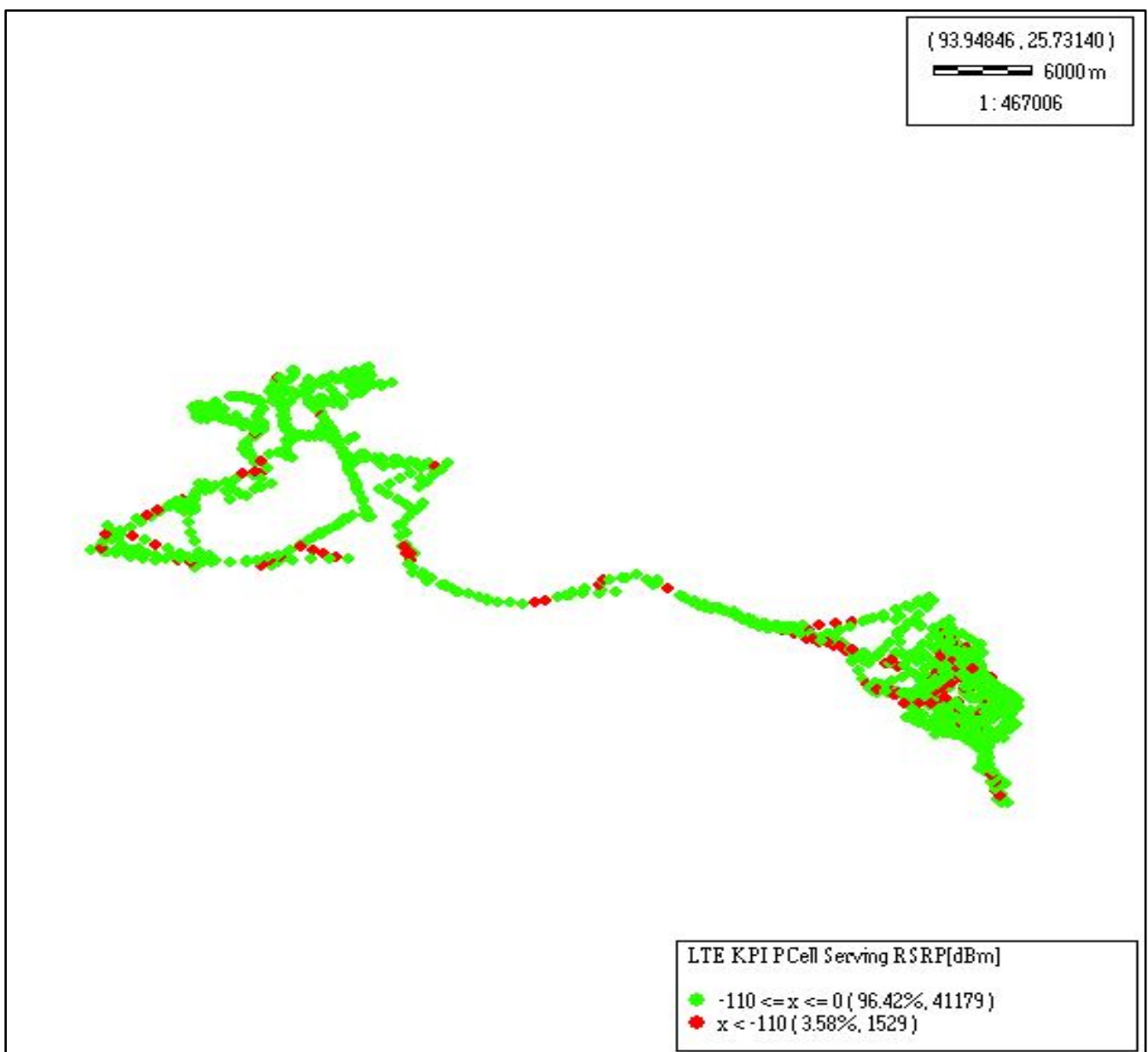
Technology	Coverage Rate %
2G	88.33

2G

VIL
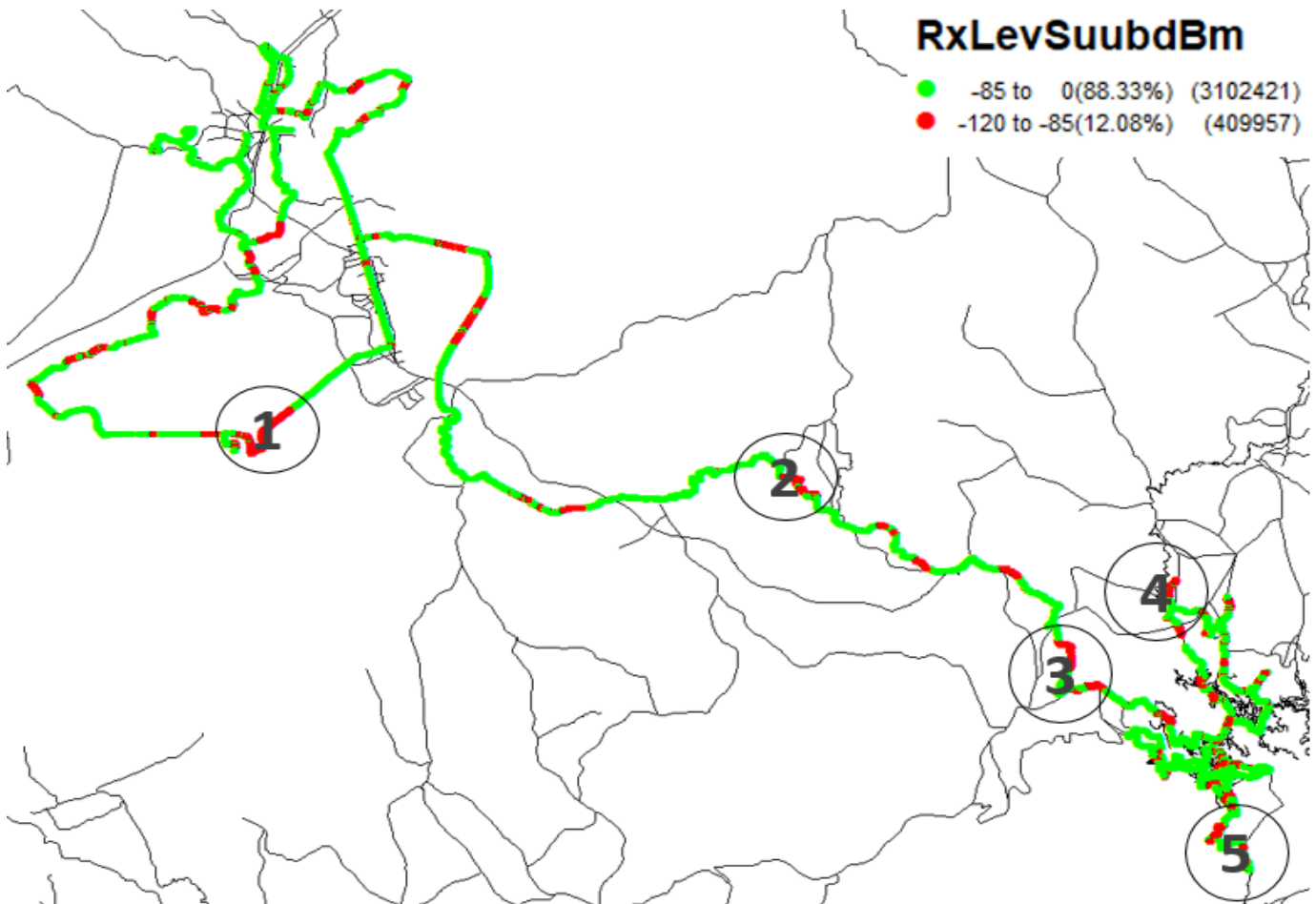
Technology	Coverage Rate %
3G	91.94
4G	92.50

3G

ASCPICHRSCP
- ● -90 to 0(91.94%) (6690894)
- ● -120 to -90(8.06%) (586829)

4G

RSRP
- ● -110 to   0(92.50%) (8025909)
- ● -140 to -110(7.50%)   (650438)
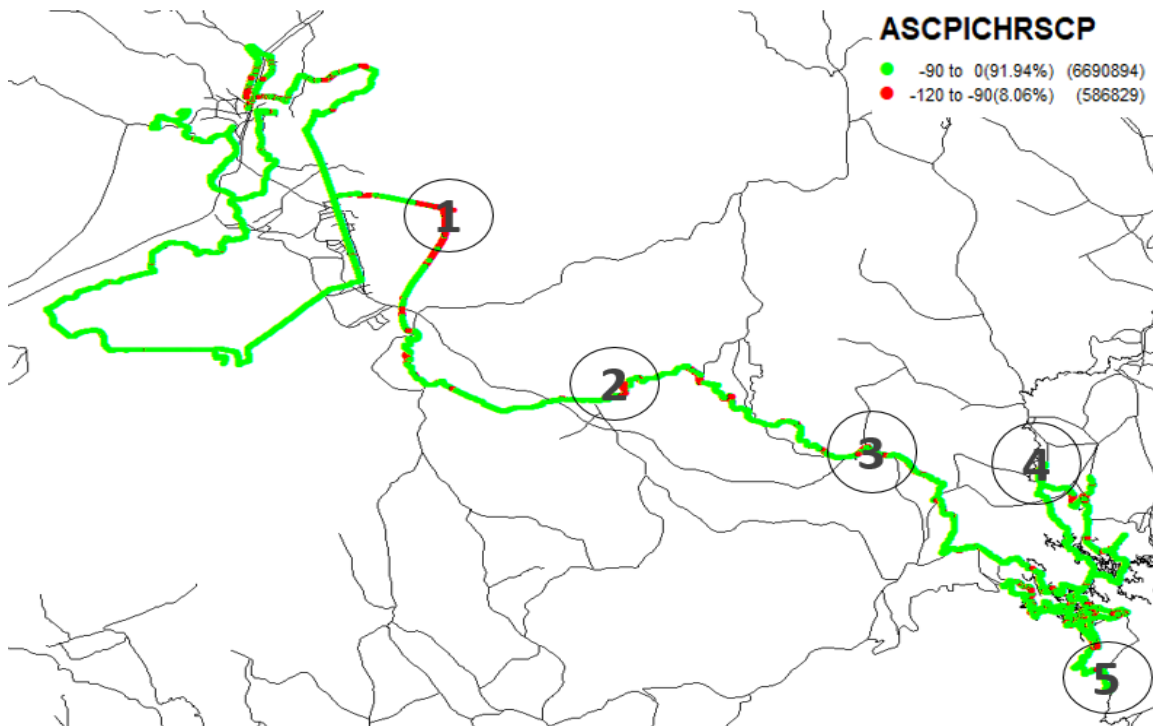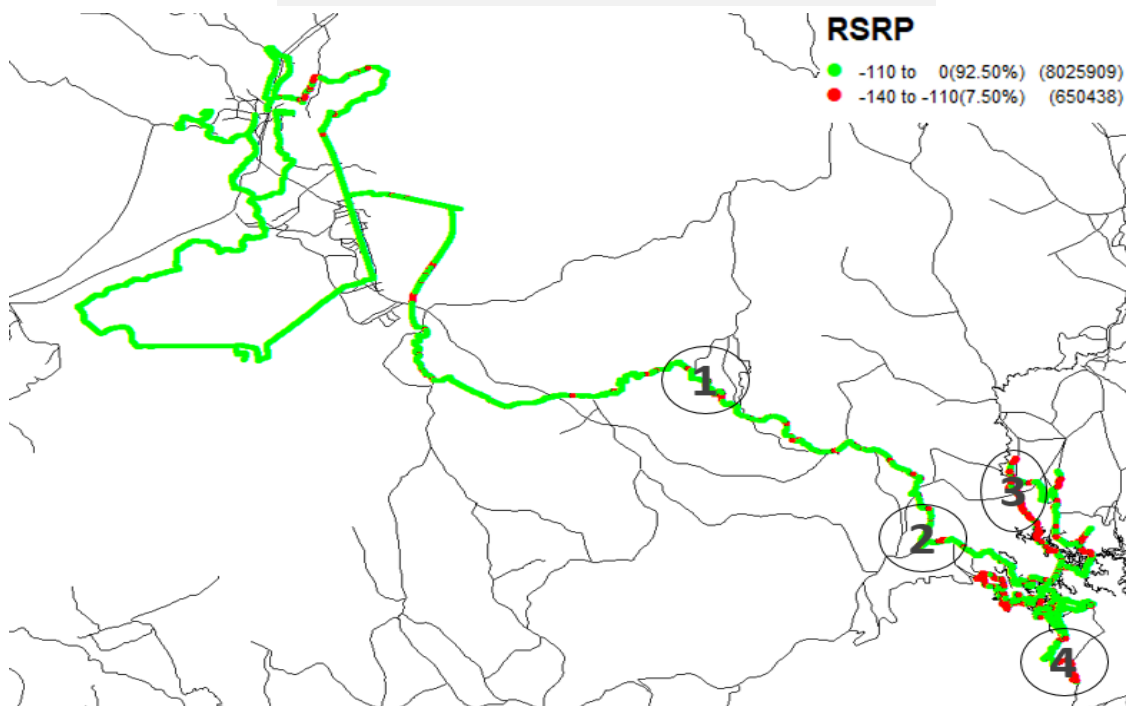
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP	Rx Quality %
Airtel 2G	95.4
BSNl 2G	96.67
VIL 2G	**94.08**
BSNL 3G	**88.22**
VIL 3G	96.2
Airtel 4G	**87.33**
Jio 4G	**93.88**
VIL 4G	**88.39**

Rx Quality %
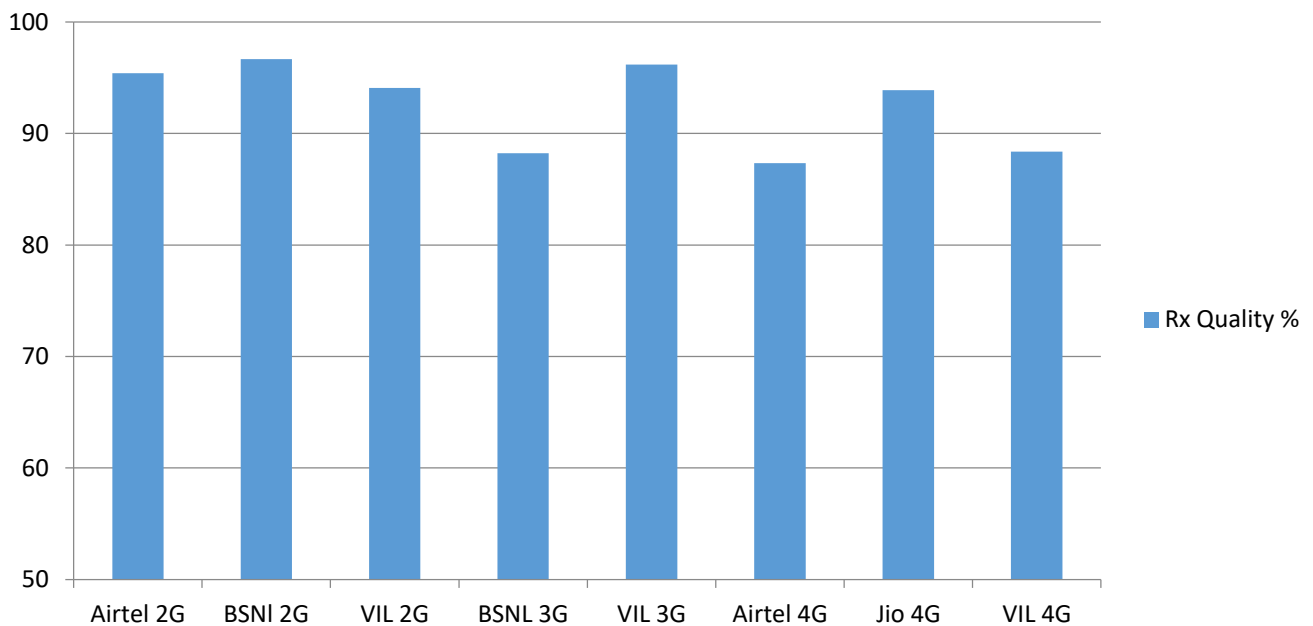
Airtel

Technology	Rx Quality %
2G	95.4
VoLTE	87.33

2G
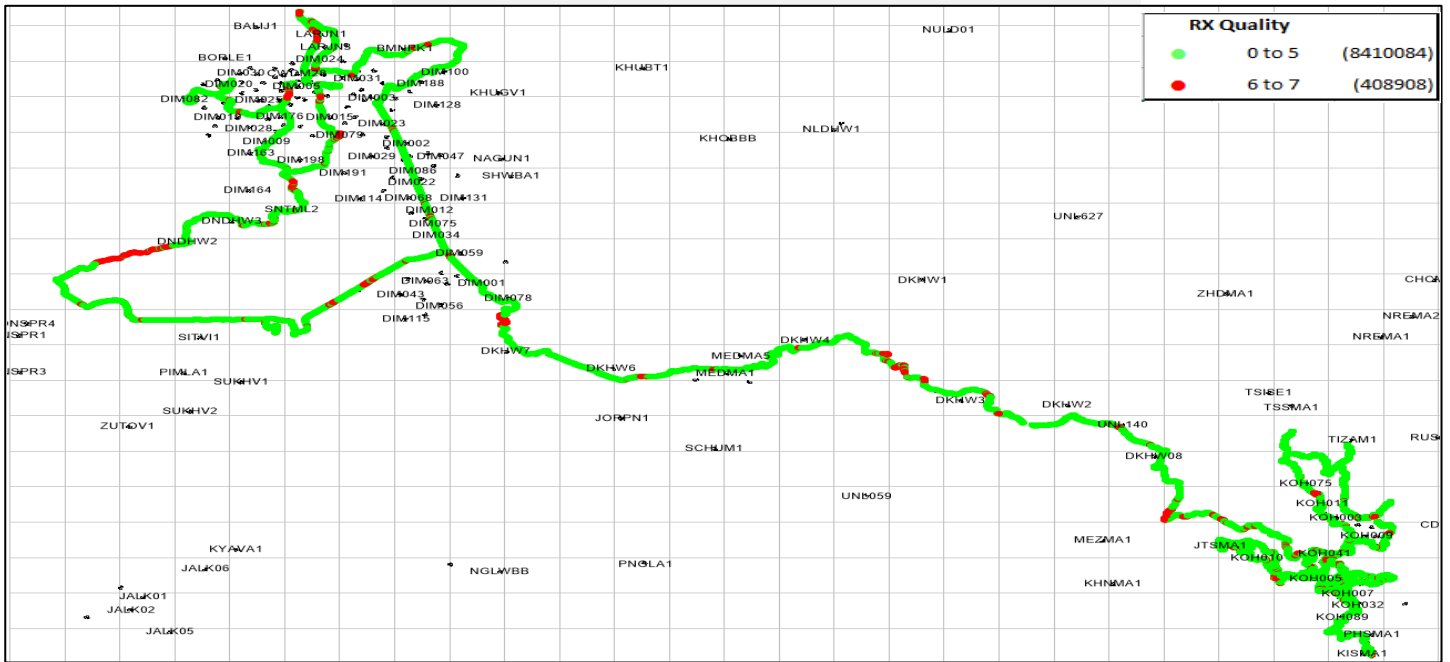
VoLTE
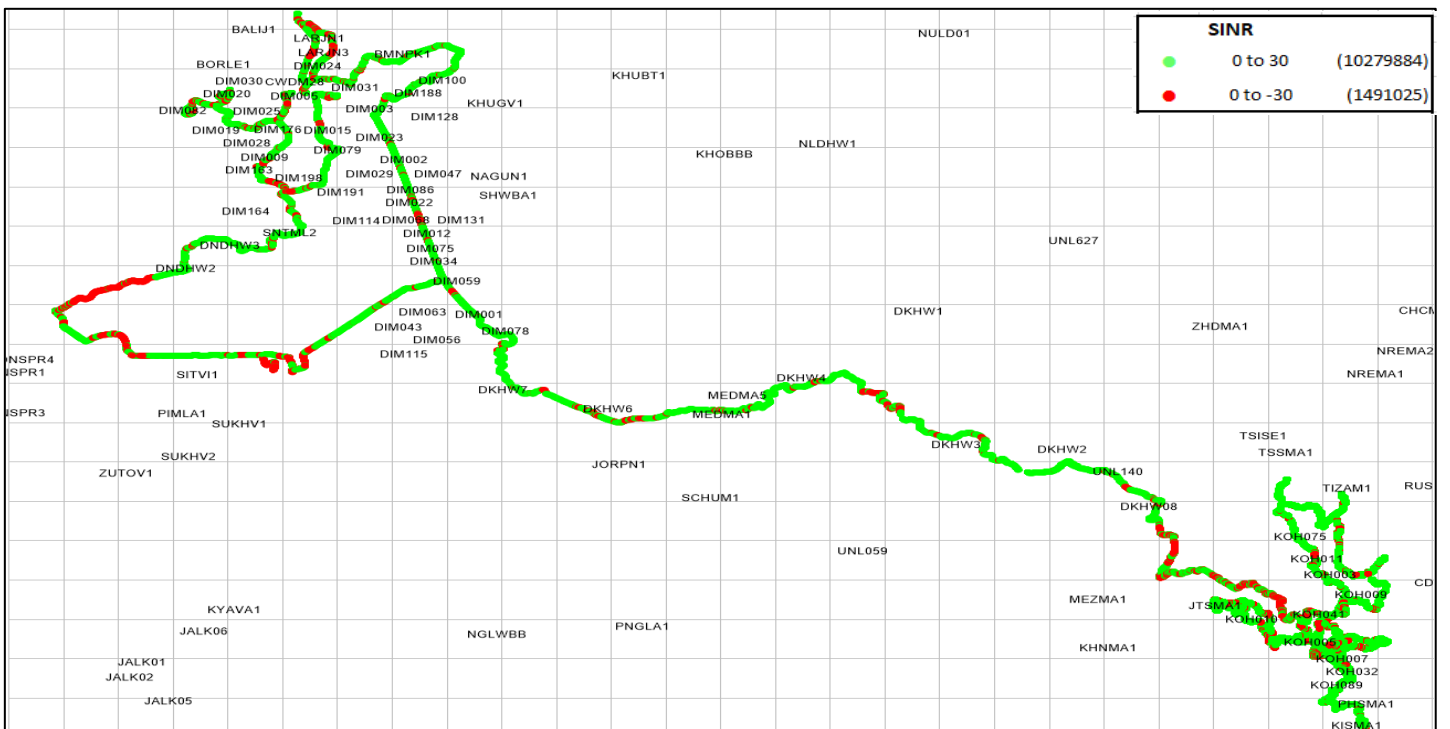
BSNL

Technology	Rx Quality %
2G	96.67
3G	88.22

2G

3G
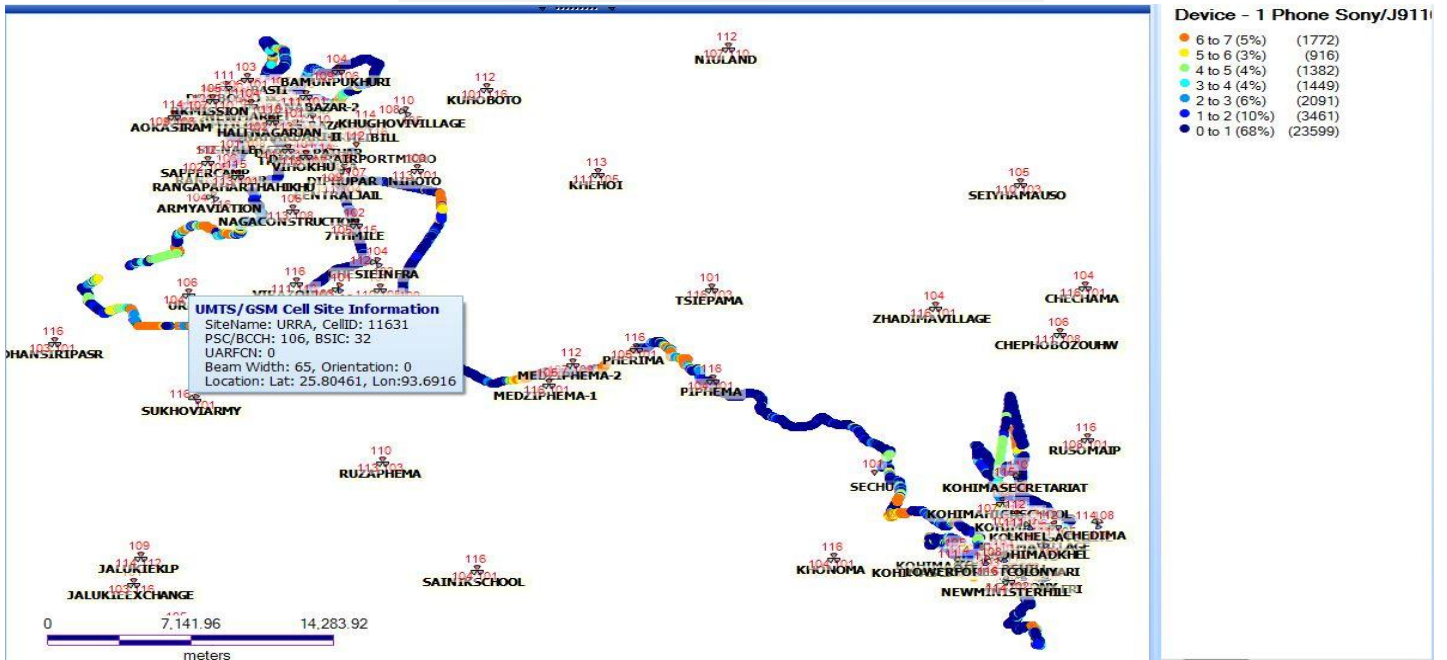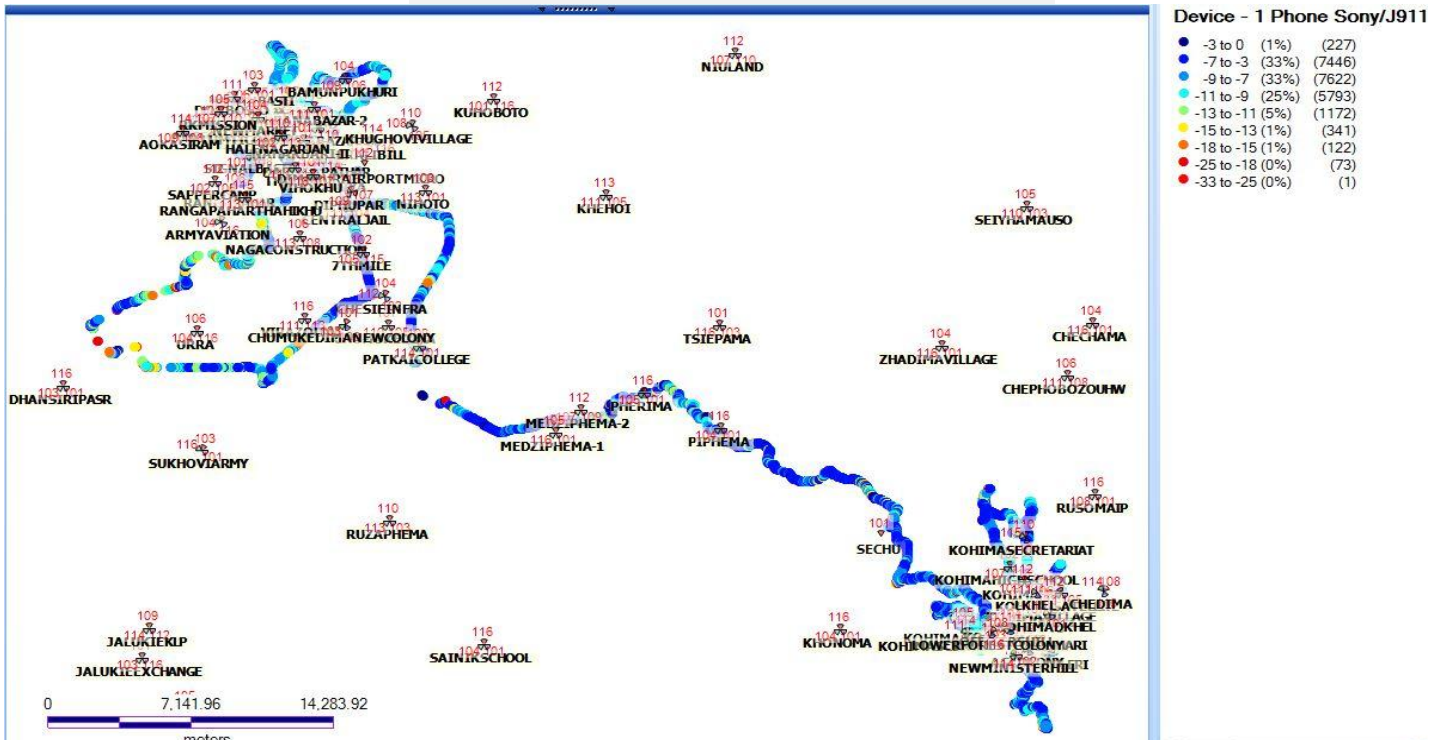
JIO

Technology	Rx Quality %
VoLTE	93.88

(94.02006 , 25.76021)

6000 m

1 : 467006

LTE KPI PCell SINR[dB]

- 0 <= x <= 30 (93.88%, 40094)
- -30 <= x < 0 (6.12%, 2614)

VIL
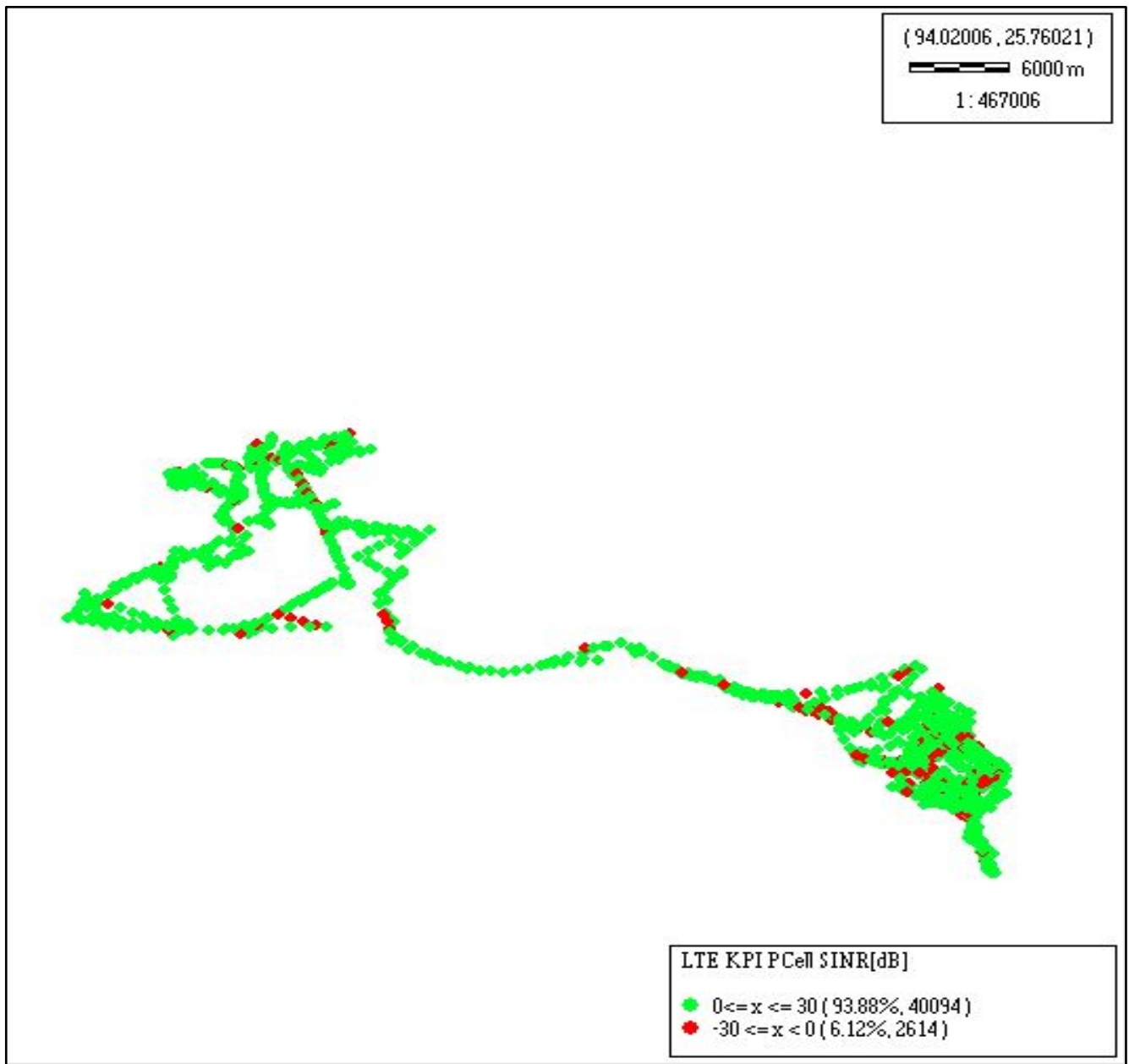
Technology	Rx Quality %
2G	94.08

2G

VIL
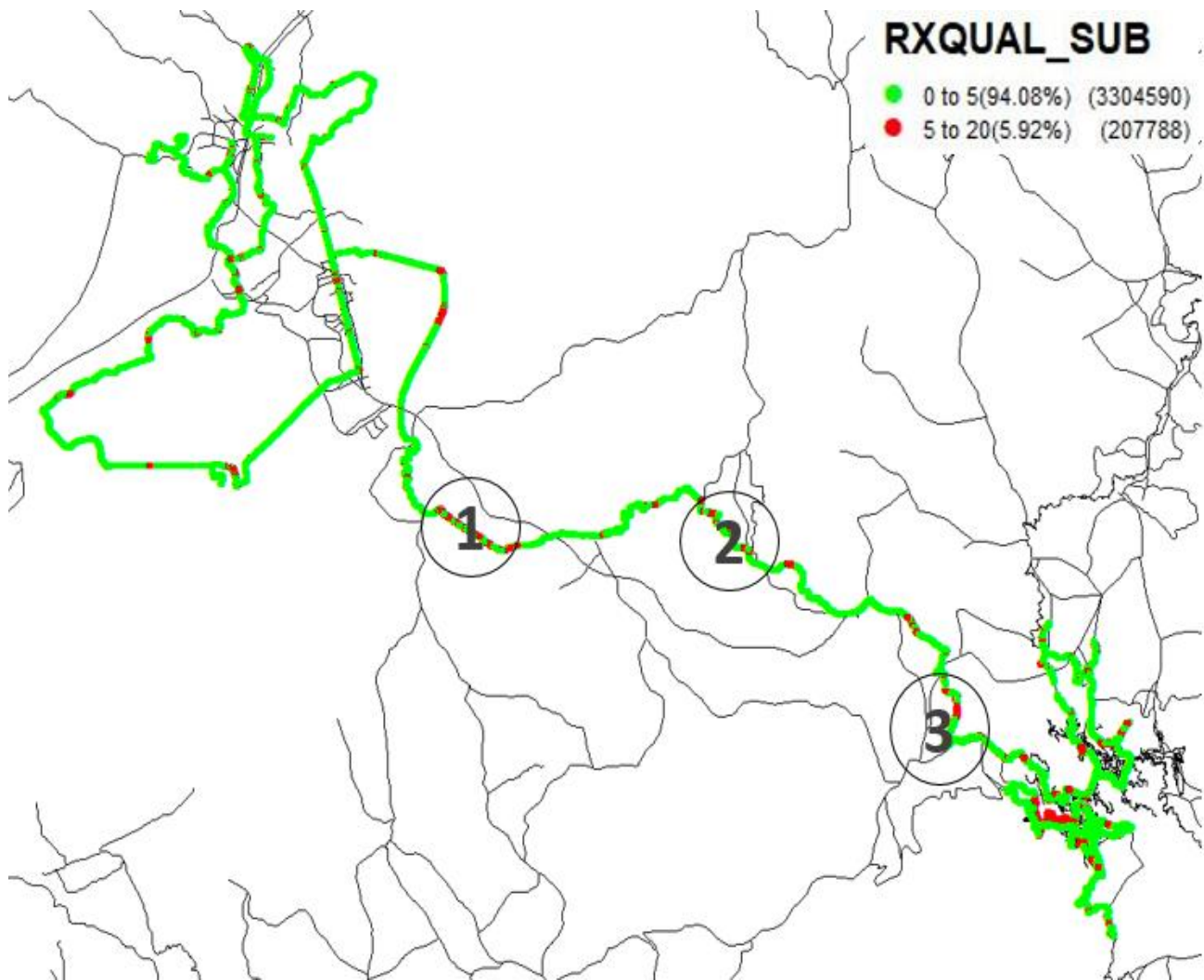
Technology	Rx Quality %
3G	96.2
4G	88.39

3G

CPICHEcNo
- -14 to 0(96.20%) (7001037)
- -30 to -14(3.80%)   (276686)

4G

CINR
- 0 to 30(88.39%) (7668399)
- -16 to 0(11.61)   (1006895)
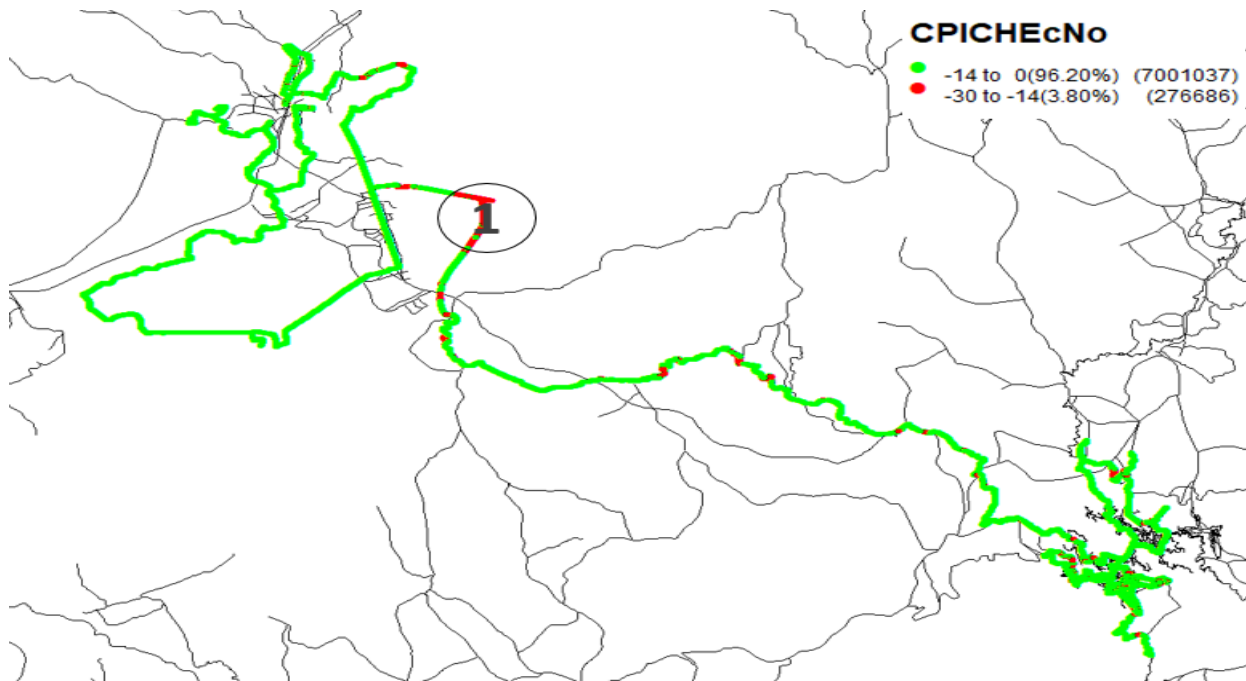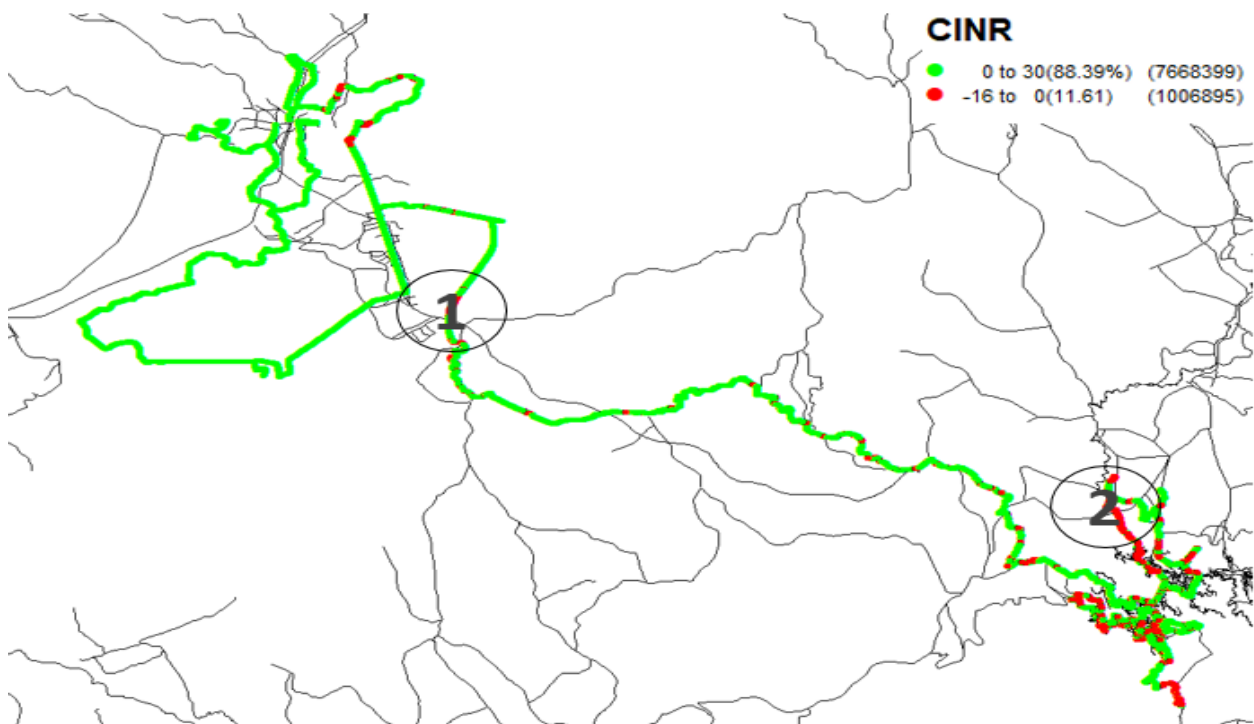
Airtel

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	13.38
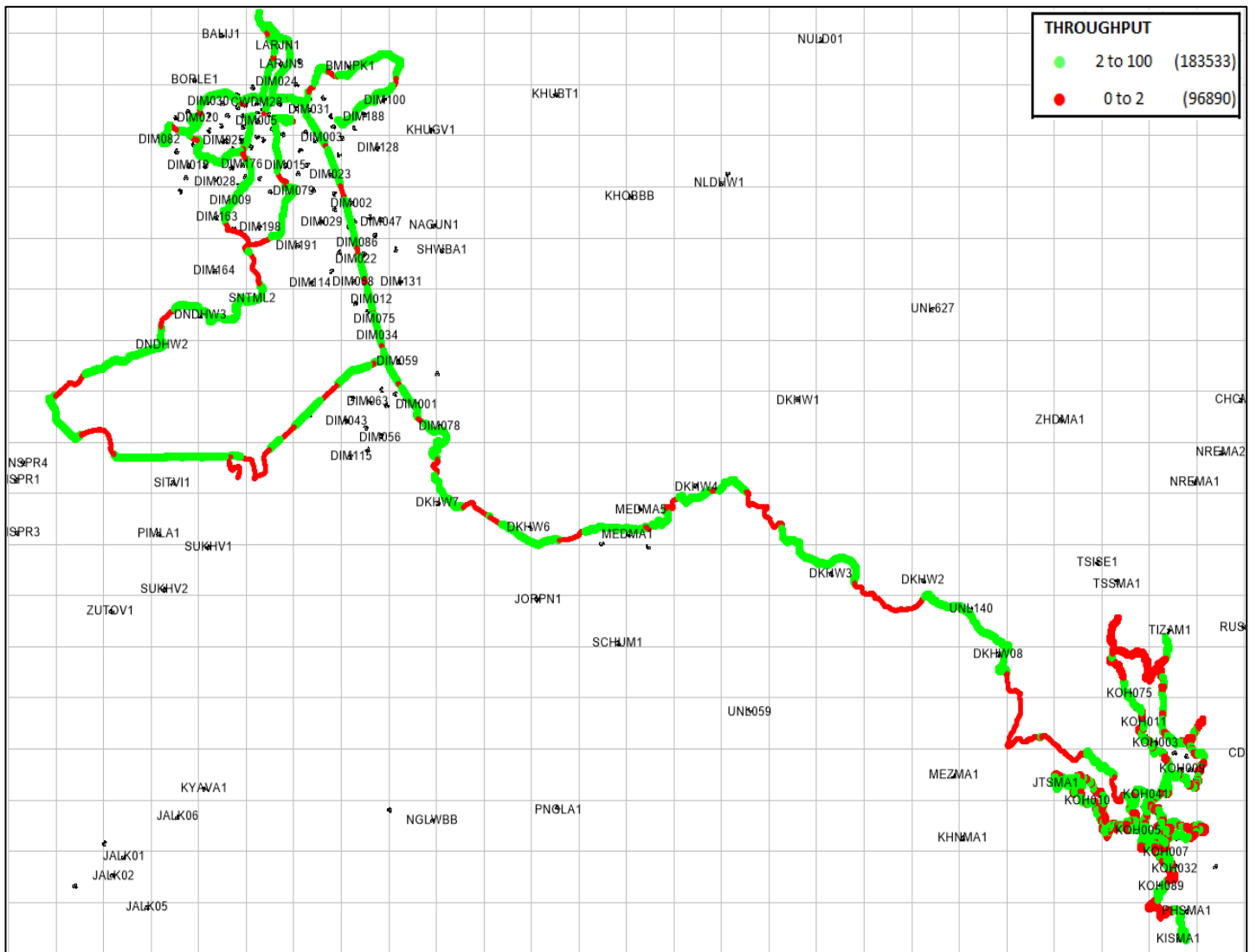
TSPS	AIRTEL
AVG. SPEED Mbps	13.38
NO. OF SAMPLES > 2 Mbps%	65.45
FILE DOWNLOAD SUCCESS RATE%	95.92

BSNL

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	2.01
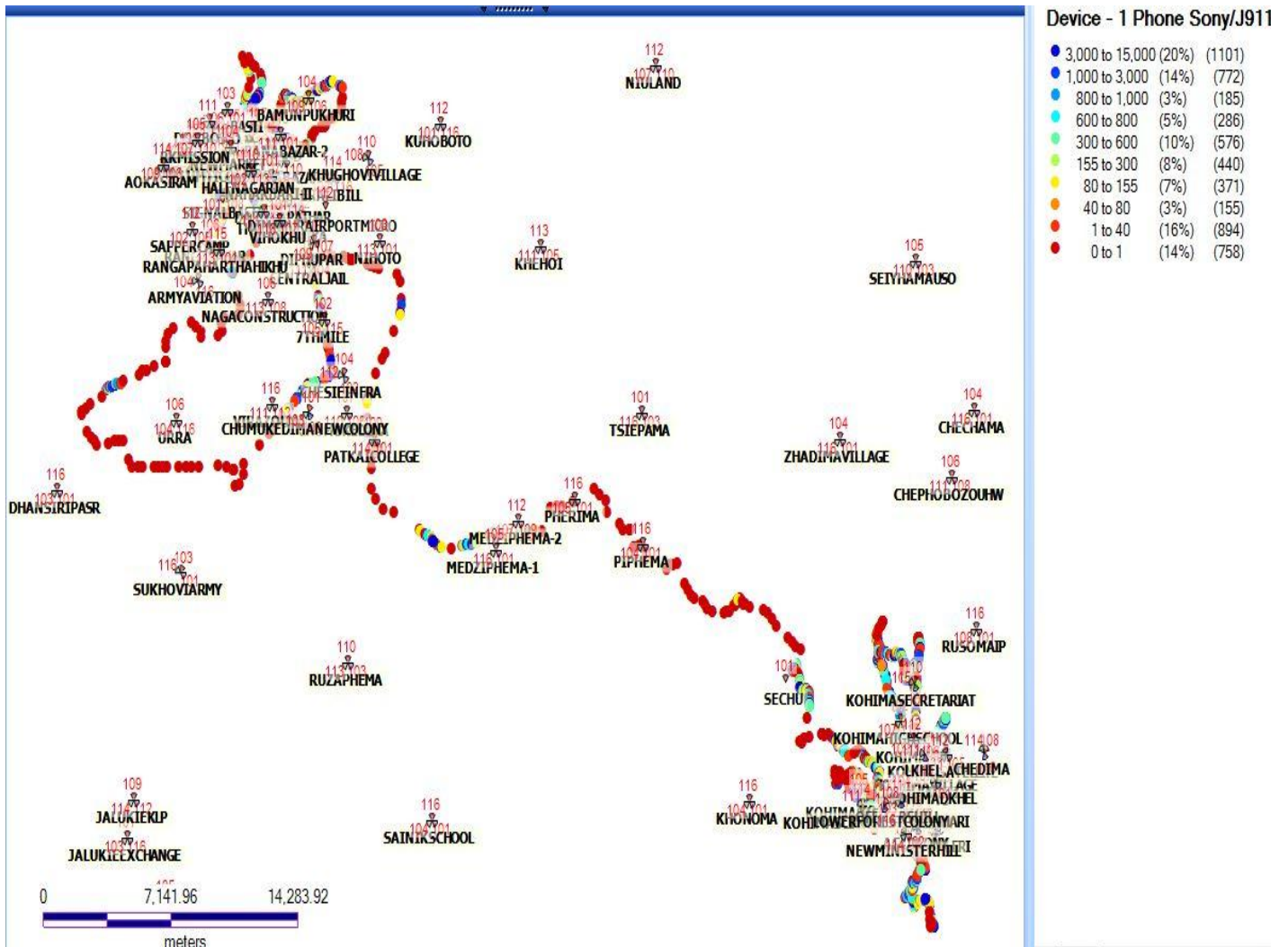
TSPS	BSNL
AVG. SPEED Mbps	2.01
NO. OF SAMPLES > 1 Mbps%	74.71
FILE DOWNLOAD SUCCESS RATE%	***

Jio

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	5.86

(93.91264 , 25.78185)
7000 m
1 : 481776

LTE KPI PDSCH Throughput[Mbps]
● 2 <= x < 100 (74.43%, 18136)
● 0 <= x < 2 (25.57%, 6232)
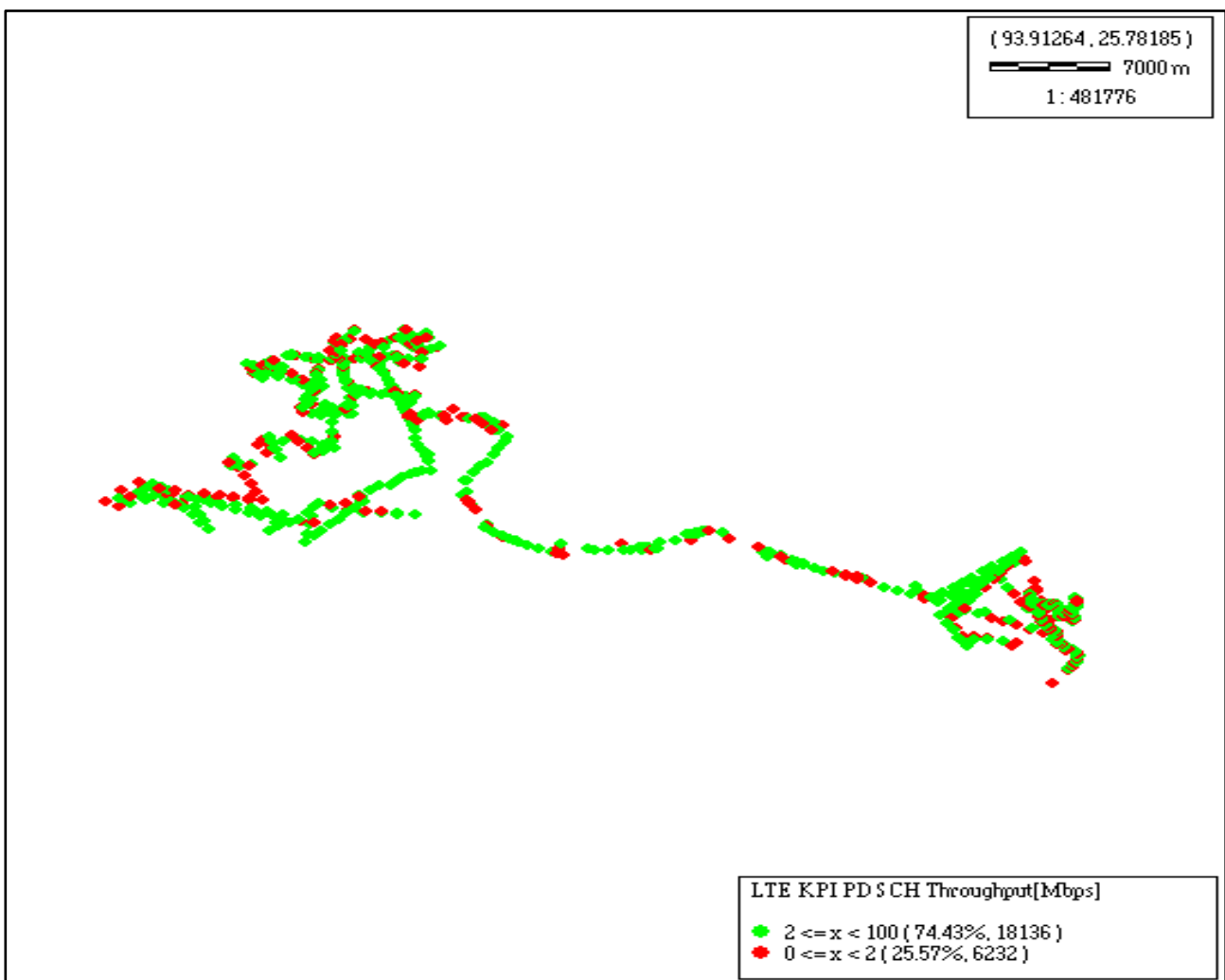
TSPS	JIO
AVG. SPEED Mbps	5.86
NO. OF SAMPLES > 2 Mbps%	74.43
FILE DOWNLOAD SUCCESS RATE%	99.72

VIL

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	2.63

HSDSCHThroughputTotalkbits

- 1,024 to Max(69.87%) (3982542)
- Min to 1,024(30.13) (1717010)
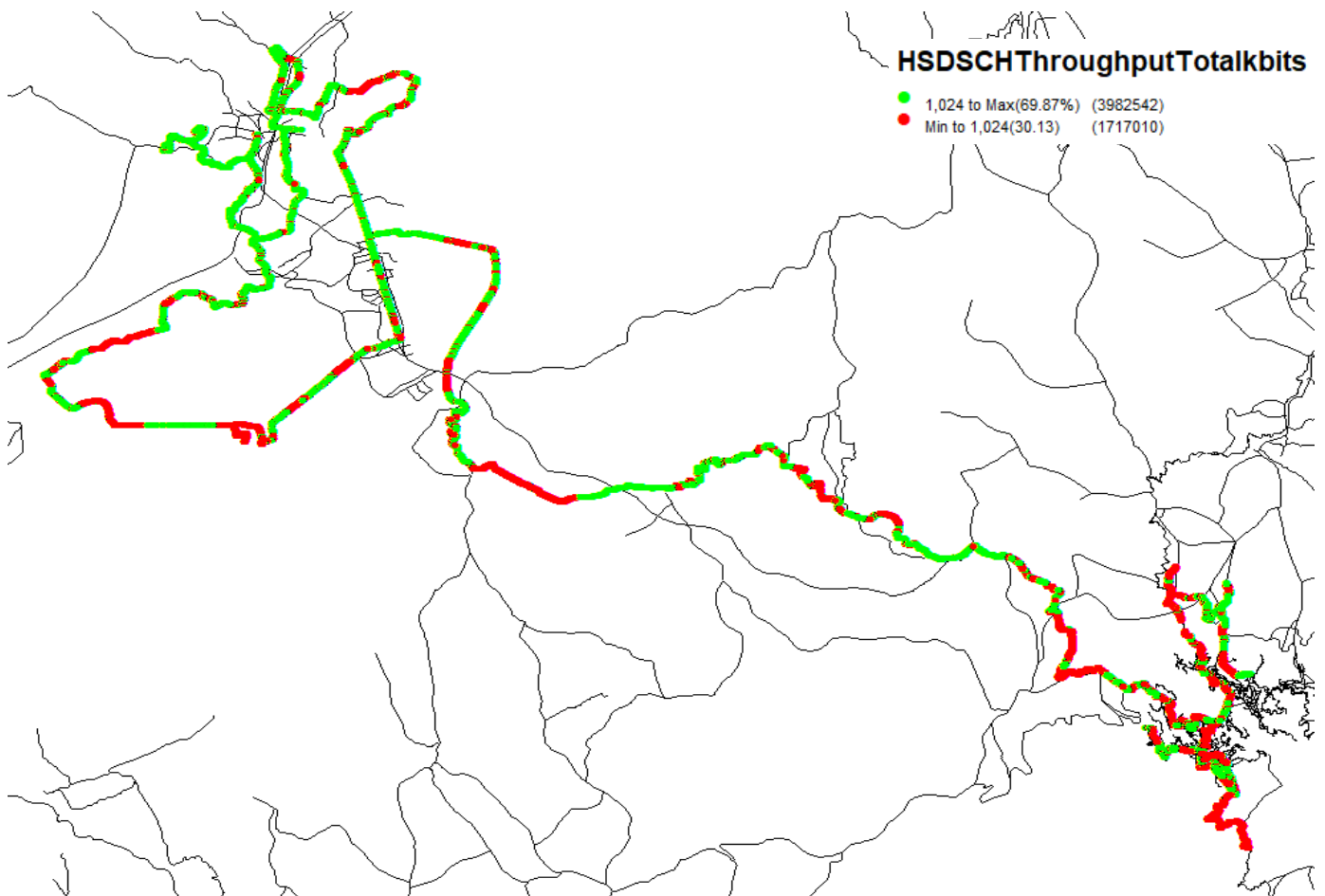
TSPS	VIL
AVG. SPEED Mbps	2.63
NO. OF SAMPLES > 1 Mbps%	69.87
FILE DOWNLOAD SUCCESS RATE%	99.9

VIL

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	4.48
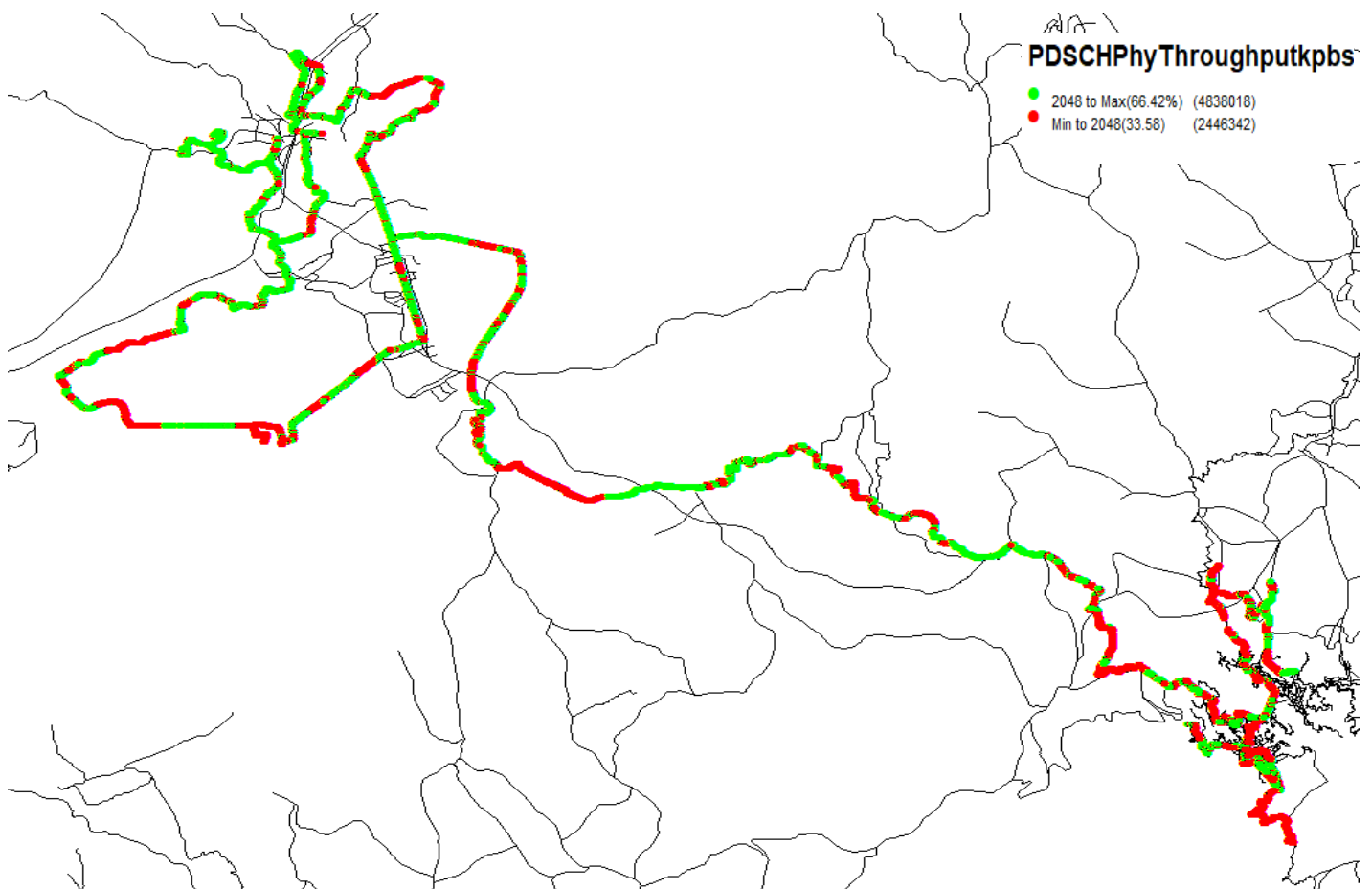
TSPS	VIL
AVG. SPEED Mbps	4.48
NO. OF SAMPLES > 2 Mbps%	66.42
FILE DOWNLOAD SUCCESS RATE%	99.84

DATA SPEED TESTING REPORT THROUGH TRAI MY SPEED APP is given below as Table-1. Only those Snap Shots measurements of TRAI Myspeed App where download speed in 4G network is less than 10 Mbps and in 3G network is less than 2 Mbps is furnished in Table-1.

LOCATION	DATE	TIME	TSP	SIGNAL STRENGTH (-dbm)	DOWNLOAD SPEED(Mbps)	UPLOAD SPEED(Mbps)
DIMAPUR JUNCTION POINT	29-11-2021	09.07 AM	AIRTEL	93	8.03	2.98
DIMAPUR JUNCTION POINT	29-11-2021	09.09 AM	BSNL	3G	1.37	7.31
RANGAPHAR	29-11-2021	09.39 AM	JIO	98	8.22	6.10
SIGNAL	29-11-2021	10.09 AM	AIRTEL	104	8.24	1.14
KASHIRAM	29-11-2021	10.24 AM	AIRTEL	87	6.85	4.84
LENGRIJAN	29-11-2021	10.28 AM	BSNL	3G	0.63	6.87
INDISEN	29-11-2021	10.31 AM	AIRTEL	112	5.61	0.38
NUTAN BASTI	29-11-2021	10.36 AM	BSNL	3G	1.73	7.43
CITY TOWER	29-11-2021	10.38 AM	BSNL	3G	1.64	6.50
TENJAM AO ROAD	29-11-2021	10.39 AM	JIO	113	8.97	3.04
DC OFFICE	29-11-2021	10.44 AM	VI	93	9.21	3.52
DC OFFICE	29-11-2021	10.44 AM	AIRTEL	99	8.71	1.32
KHERMAHAL	29-11-2021	10.45 AM	JIO	70	6.47	6.07
GOLAGHAT ROAD	29-11-2021	10.48 AM	BSNL	3G	0.61	7.96
BURMA CAMP	29-11-2021	10.54 AM	BSNL	3G	1.69	5.65
BURMA CAMP	29-11-2021	11.18 AM	AIRTEL	90	3.75	2.71
URA VILLAGE	29-11-2021	12.47 PM	VI	93	5.62	3.29
URA VILLAGE	29-11-2021	12.49 PM	VI	93	4.02	2.42
RAILWAY STATION	29-11-2021	01.08 PM	BSNL	3G	1.42	7.07
RAILWAY STATION	29-11-2021	01.26 PM	JIO	89	5.95	1.98
BURMA CAMP	29-11-2021	02.48 PM	AIRTEL	84	5.30	1.65
ZION HOSPITAL GATE	29-11-2021	02.49 PM	JIO	97	7.15	9.14
ZION HOSPITAL	29-11-2021	02.50 PM	BSNL	3G	1.84	4.77
ZION HOSPITAL	29-11-2021	03.24 PM	AIRTEL	93	5.22	7.94
TCP GATE KOHIMA	29-11-2021	06.03 PM	BSNL	3G	0.62	5.00
TCP GATE KOHIMA	29-11-2021	06.02 PM	JIO	90	5.93	5.17
TCP MAIN GATE KOHIMA	29-11-2021	06.25 PM	VI	95	1.13	5.94
TCP GATE KOHIMA	29-11-2021	07.03 PM	AIRTEL	112	2.14	0.33
PR HILL JUNCTION	30-11-2021	08.42 AM	BSNL	3G	1.89	5.98
TCP GATE	30-11-2021	08.58 AM	BSNL	3G	1.38	6.48
TCP GATE	30-11-2021	09.01 AM	AIRTEL	89	1.56	9.32
TCP GATE	30-11-2021	09.02 AM	JIO	102	5.23	4.04
NST	30-11-2021	09.09 AM	BSNL	3G	1.74	1.89
TAXI STAND	30-11-2021	09.18 AM	AIRTEL	104	3.75	1.82
FANCY MARKET	30-11-2021	09.21 AM	VI	75	6.39	20.98
RAZHU POINT	30-11-2021	09.23 AM	VI	75	6.32	9.31
RAJHU POINT	30-11-2021	09.24 AM	AIRTEL	110	6.62	2.28
HIGH SCHOOL JUNCTION	30-11-2021	09.25 AM	BSNL	3G	1.46	6.52
HIGH SCHOOL JUNCTION	30-11-2021	09.40 AM	VI	75	4.27	18.68
IG STADIUM	30-11-2021	09.48 AM	BSNL	3G	1.35	3.13
NEW HIGH COURT	30-11-2021	10.04 AM	BSNL	3G	0	0
NEW HIGH COURT	30-11-2021	10.04 AM	AIRTEL	123	0	0
NEW HIGH COURT	30-11-2021	10.04 AM	VI	116	0	0
SECRETARIAT	30-11-2021	10.29 AM	VI	89	8.45	23.13
SECRETARIAT MAIN GATE	30-11-2021	10.30 AM	AIRTEL	98	9.47	3.51
CM HOUSE	30-11-2021	10.44 AM	VI	99	3.23	26.50
CM OFFICE AND RESIDENCE	30-11-2021	10.46 AM	BSNL	3G	1.91	0
CMO RESIDENCE	30-11-2021	10.44 AM	BSNL	3G	1.91	0
CHANDMARI TAXI STAND	30-11-2021	01.02 PM	JIO	91	1.48	1.43
CHANDMARI TAXI STAND	30-11-2021	01.03 PM	AIRTEL	94	4.44	2.29
CHANDMARI TAXI STAND	30-11-2021	01.02 PM	BSNL	3G	0.16	8.53
SCIENCE COLLEGE	30-11-2021	02.35 PM	BSNL	3G	1.65	6.13
GUWAHATI HIGH COURT KOHIMA BENCH	30-11-2021	02.53 PM	AIRTEL	103	2.11	0.89
HIGH COURT	30-11-2021	02.56 PM	VI	91	0.35	4.86
HIGH COURT	30-11-2021	02.52 PM	JIO	108	4.74	1.88
HIGH COURT KOHIMA	30-11-2021	02.55 PM	AIRTEL	101	3.01	0.61
HIGH COURT	30-11-2021	02.58 PM	BSNL	3G	1.50	2.75
HIGH COURT MAIN GATE	30-11-2021	03.10 PM	VI	89	1.87	17.95
NAGA HERITAGE VILLAGE,HORNBILL	30-11-2021	04.47 PM	AIRTEL	109	5.29	1.52
RAJ BHAVAN	30-11-2021	05.44 PM	VI	98	3.28	6.03
RAJBHAVAN	30-11-2021	05.51 PM	BSNL	3G	0.37	3.40
RAJBHAVAN	30-11-2021	05.57 PM	AIRTEL	79	3.19	21.48

•**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 -- Statistics

No. of Locations where Poor Video Quality & Video Freeze Observed				
DAY ROUTE DETAILS/ TSP	AIRTEL	BSNL	RJIO	VI
DAY-1 (29.11.2021) Dimapur	6	3	7	10
DAY-2 (30.11.2021)Kohima	7	10	15	5

No. of Location where Video Call Disconnected				
DAY ROUTE DETAILS/ TSP	AIRTEL	BSNL	RJIO	VI
DAY-1 (29.11.2021) Dimapur	3	13	5	10
DAY-2 (30.11.2021)Kohima	1	12	3	2

Network Coverage[2G/3G/4G]

•New Medical College is being constructed in Nagaland where the coverage of all TSPs was poor.
•New High Court is being constructed in Nagaland where the coverage of all TSPs was poor.

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

AIRTEL- Video calls were disconnected several times and the Video picture quality was poor many times throughout the drive routes.

BSNL- Video calls were disconnected several times and the Video picture quality was poor many times throughout the drive routes. There are many routes where coverage is very poor or nil.

RJIO- - Video calls were disconnected several times and the Video picture quality was poor many times throughout the drive routes.

VIL- Video calls were disconnected several times and the Video picture quality was poor many times throughout the drive routes. Data service discontinued due to major OFC routes failure on Day 2.

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

AIRTEL

SINR% (87.33%) in 4G network does not meet the benchmark (95%)

Video call disconnection & poor Video quality were observed as mentioned below--

Day1- Route-1 (Railway Colony-Senjum-Kacharigon-Autostand)-Video got freezed few times, **Route-2-**(7th Mile Village-Dhansiripar-Nagarjan junction)-- Video got freezed near Razaphe Village, Video got disconnected after Razaphe, **Route-3-**(Purna Bazaar Rd-Lahorijan-Darogajan)- Video got freezed near Lahorijan masjid, and disconnected.

Day2- Route-1–(Kohima Meluri Rd-NH 2-Merima- Tinpati traffic Point) Video picture quality was not very good, Video got freezed few times towards Nagaland Medical college, **Route-3** (Jail Coloany-Upper Agri-Kohima Sc. College Rd)**--**Speed of Airtel was very poor at High Court, **Route-4 (**NH 2-Aradurah Hill-NH 39-Lerie colony- New reserve Colony-BOC RD)**--**Video got freezed before Hornbill festival area, speed of 4G was very poor in Hornbill village and also got disconnected while returning from Hornbill village, Data speed was very poor at Raj Bhawan area.
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Airtel has been asked to take necessary action including software/ hardware optimization to improve the above SINR, Video calls disconnections, poor Video quality and poor coverage/ download throughputs on the drive test routes and at all important locations.

An action taken report is to be submitted by 10.03.2022.

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

BSNL

DCR (6.2%) & HOSR (86.97%) in 2G network and DCR (5.23%), CSSR (84.31%), & Ec/No (88.22%) in 3G network do not meet the benchmarks.

3G coverage and download throughputs are poor in many locations.

Video call disconnection & poor video quality were observed as mentioned below—

Day1- Route-1(Railway Colony-Senjum-Kacharigon-Autostand)--Video got freezed, and disconnected, **Route-2**(7th Mile Village-Dhansiripar-Nagarjan junction)- Video got disconnected before Chumukdima and after Chumukdima, No Video call made after Chumukdima, **Route-3**-(Purna Bazaar Rd-Lahorijan-Darogajan)-Video got freezed many times.
Day2- Route-1--(Kohima Meluri Rd-NH 2-Merima- Tinpati traffic Point) Video got freezed many times towards Nagaland Medical college (under construction), **Route-3**(Jail Coloany-Upper Agri-Kohima Sc. College Rd)—Video call disconnected near High Court, **Route-4**-(NH 2-Aradurah Hill-NH 39-Lerie colony- New reserve Colony-BOC RD)-Video got disconnected, getting freezed frequently.

BSNL does not have BTS near the area of Hornbill festival.

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

An action taken report is to be submitted by 10.03.2022.

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

RJIO

SINR% (93.88%) in 4G network do not meet the benchmark (95%).

Video call disconnection and/or poor video quality were observed as mentioned below—

Day1- Route-1-(Railway Colony-Senjum-Kacharigon-Autostand)--Video Call got freezed, **Route-2-**(7th Mile village-Dhansiripar-Nagarjan junction)-Video was getting freezed near Razaphe and after Razaphe, D/L speed is very poor at Railway Station, **Route-3-**-(Purana Bazaar Rd-Lahorijan-Darogajan)- Video was getting freezed near Lahorijan Masjid, and at few places before Purana Bazar, Video was freezing near Airport on the NH.

Day2- Route-1--—(Kohima Meluri Rd-NH 2-Merima- Tinpati traffic Point) - Picture quality was not very good, Video got freezed few times towards Nagaland Medical college (under construction), got disconnected, **Route-2-**(Lerie Colony-Down Rd-AG Colony-Candmari)- Video getting freezed frequently, **Route-3**(Jail Coloany-Upper Agri- Kohima Sc. College Rd)— Video call disconnected near High Court, phone hanged, **Route-4-(**NH 2-Aradurah Hill-NH 39-Lerie colony- New reserve Colony-BOC RD)-- Video is getting freezed frequently.

RJIO has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the above SINR, Video calls disconnections, poor Video quality and poor coverage/ download throughputs on the drive test route.

An action taken report is to be submitted by 10.03.2022.

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

VIL

Rx Quality (94.08%) in 2G and SINR% (88.39%) in 4G network do not meet the benchmark (95%)

Video call disconnection and/or poor video quality were observed as mentioned below—

Day1- Route-1--(Railway Colony-Senjum-Kacharigon-Autostand)-- -Video Call got freezed, **Route-2–-**(7th Mile village-Dhansiripar-Nagarjan junction) Video picture quality was not very good, Video got disconnected after Razaphe village **Route-3–-**-(Purna Bazaar Rd-Lahorijan-Darogajan)- Video picture quality was not very good, Video got freezed few times near Lahorijan Masjid, **Route-4**—(Nuiland Dimapur Rd- NH 29-Kohima)Video call disconnected 5-7 km before Kohima.

Day2- Route-1-–(Kohima Meluri Rd-NH 2-Merima- Tinpati traffic Point) **--**Video picture quality is not very good, Video got freezed few times towards Nagaland Medical college, Data service disconnected due **to major OFC routes failure at around 11.10am**, **Route-2**—-(Lerie Colony-Down Rd-AG Colony-Candmari)- Data service discontinued due to major OFC routes failure, **Route-3**—(Jail Coloany-Upper Agri-Kohima Sc. College Rd)— **VIL OFC network restored at 14.40hrs after remaining down from 11.10am to 14.40 hrs**. VI should plan for alternative transmission routes to avoid major failure on data service and VI was asked to ensure alternate route for Data connectivity, **Route-4--(**NH 2-Aradurah Hill-NH 39-Lerie colony- New reserve Colony-BOC RD)-Video was getting freezed frequently, and got disconnected before Hornbill festival area, no 4G coverage in Hornbill area.
VI does not have BTS near the area of Hornbill festival.

VI has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the above SINR, Video calls disconnections, poor Video quality and poor coverage/ download throughputs on the drive test routes.

An action taken report is to be submitted by 10.03.2022.