

Operator Assisted Drive Test Report

Itanagar City 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 (2G & 4G), Block Call Rate (2G & 3G), Call Setup Success Rate (2G & 3G), Handover Success Rate (2G & 3G), Rx Quality (2G, 3G & 4G).

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

VIL- Rx Quality in 2G, 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 Itanagar and surrounding areas on 09th November'21 and along National Highway 13 upto Old-Ziro town on 10th November'21 from 9:00 AM to 7:00 PM. The drive test covered drive route of 220 KMs over a period of 2 days. Approximately 180+ calls were made for each of the 9 networks: three 2G networks, two 3G network and Four 4G network covering four TSPs.

Overview

Itanagar is the capital and largest city of the Indian state of Arunachal Pradesh. Itanagar has a population of 59,490 as per latest census.

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.

Data: 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.

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

Overview

Voice & Dynamic Data Test Drive Route

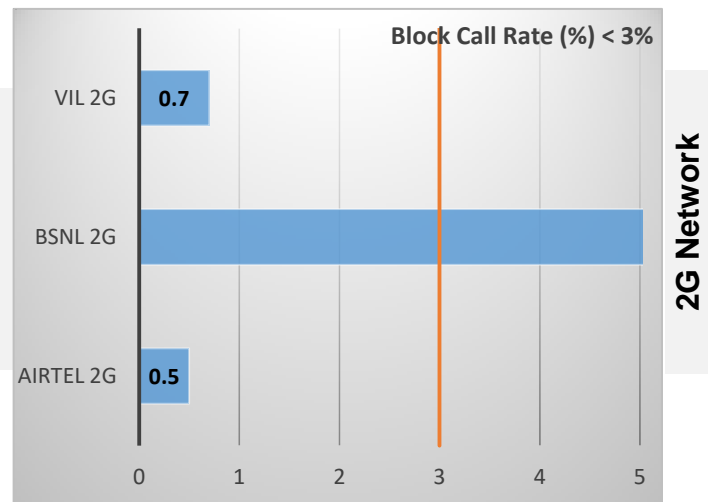
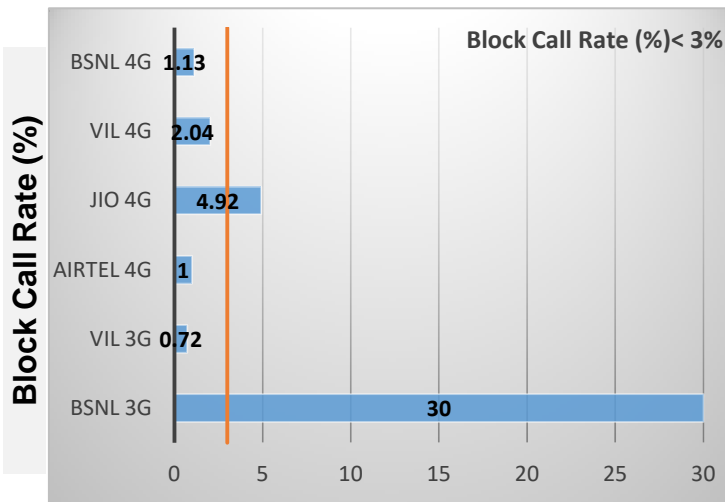
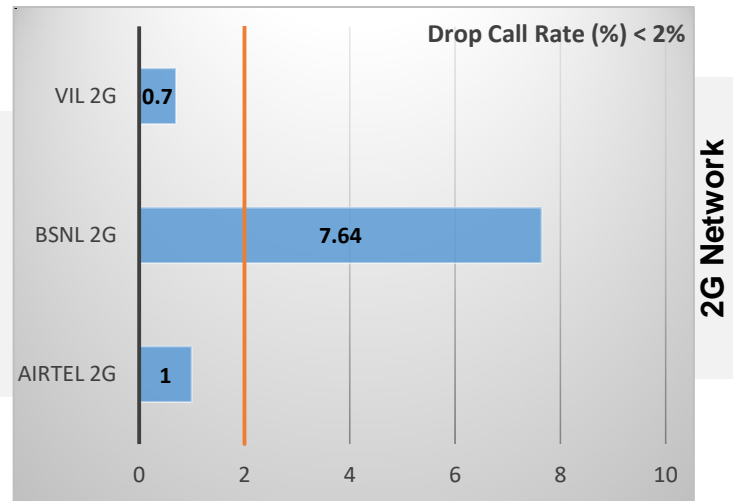
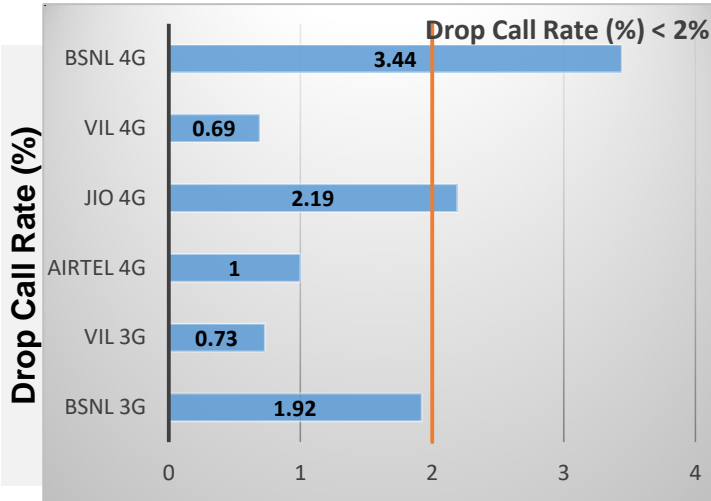


**Itanagar and surrounding areas and along
- National Highway 13 upto Old-Ziro town**

Voice Calls

Key Observations

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



KPIs	2G			3G		4G			
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	RJIO	VIL	BSNL
Drop Call Rate %	1	7.64	0.7	1.92	0.73	1.00	2.19	0.69	3.44
Block Call Rate %	0.50	28.33	0.7	30	0.72	1.00	4.92	2.04	1.13

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

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	95.56	94.98	76.27

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

TSPs	3G		4G			
	BSNL	VIL	Airtel	JIO	VIL	BSNL
Coverage %	59.00	83.36	96.00	86.57	85.73	97.00

Data Services Dynamic

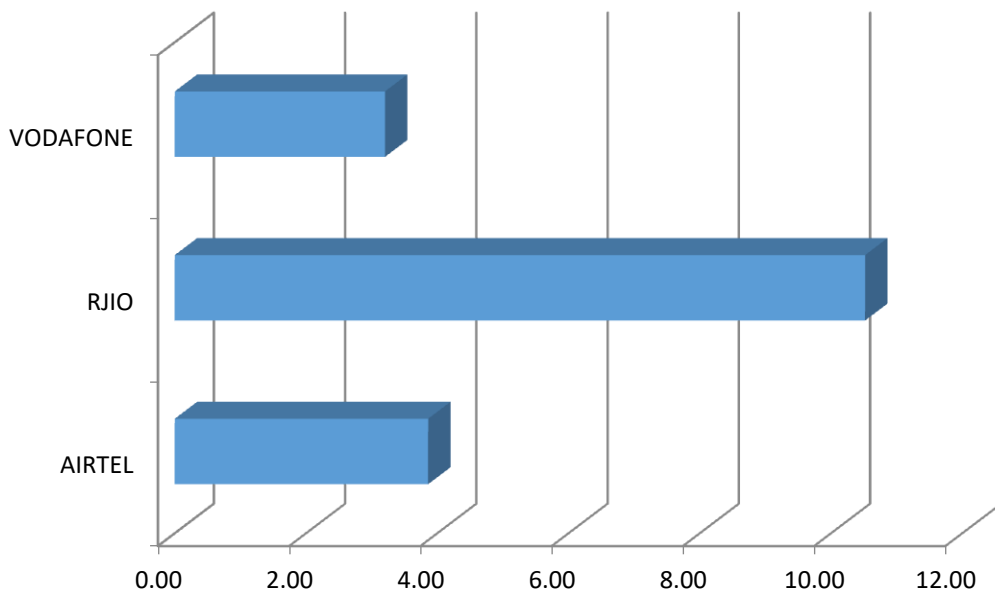
Key Observations

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

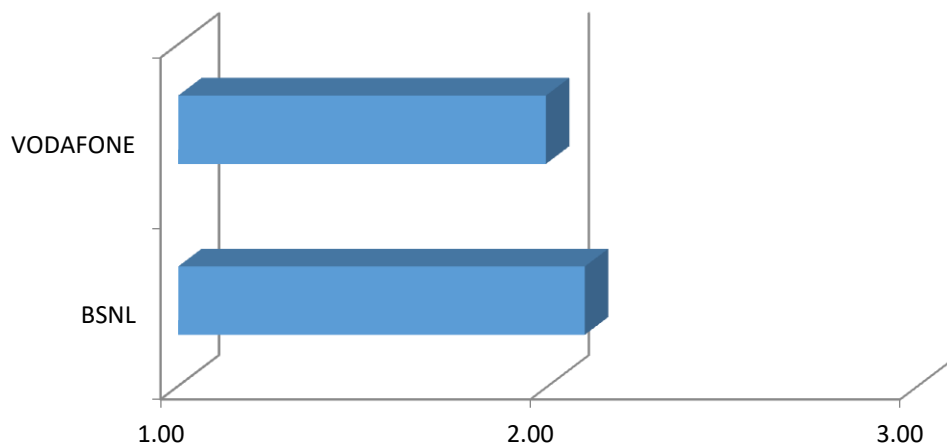
Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

4G/3G/ Network:

4G-Dynamic Download Throuhput (Mbps)



3G-Dynamic Download Throuhput (Mbps)



Summary

City Level Summary- Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	184	240	142
Blocked Call Rate (%)	0.50	28.33	0.7
CSSR% (Accessibility)	99	70.83	99.29
Drop Call Rate (%)	1.0	7.64	0.7
Mobility HOSR (%)	98.84	84.78	98.95
Rx Quality (%)	95.97	78.98	85.62

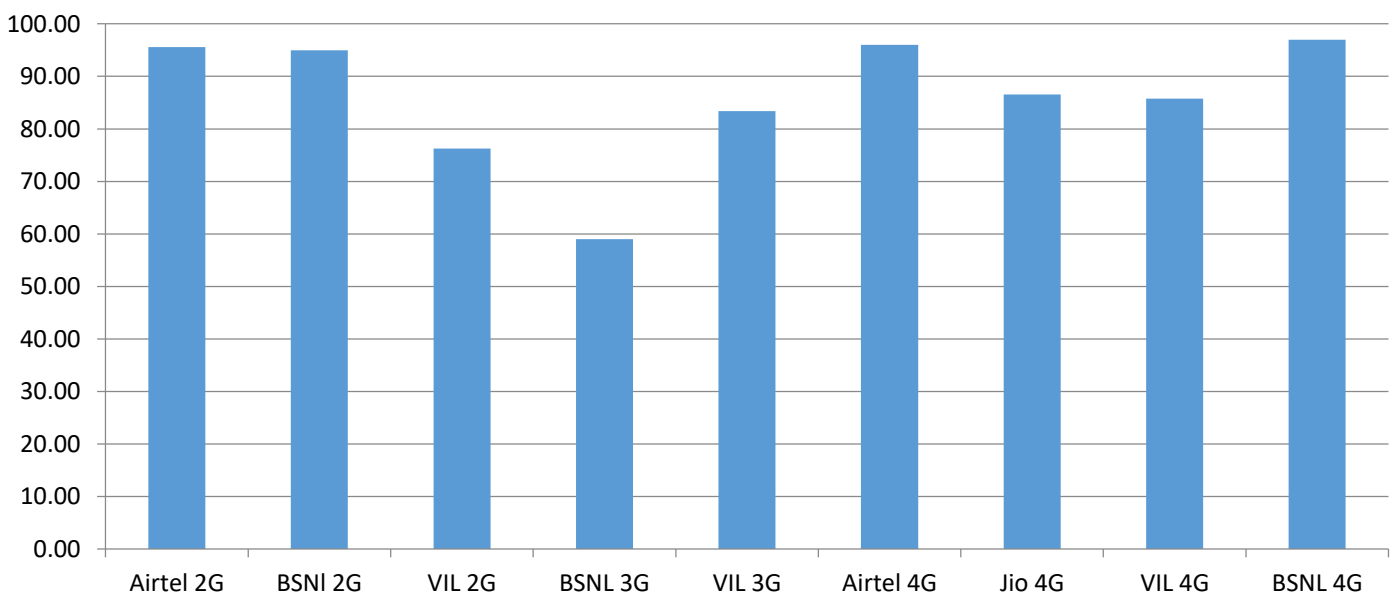
Voice Call	3G/4G					
	BSNL 3G	VIL 3G	Airtel 4G	JIO 4G	VIL 4G	BSNL 4G
Call Attempt	130	137	188	183	147	88
Blocked Call Rate (%)	30	0.72	1.00	4.92	2.04	1.13
CSSR% (Accessibility)	40	99.27	99.50	95.08	97.95	98.86
Drop Call Rate (%)	1.92	0.73	1.00	2.19	0.69	3.44
Mobility HOSR (%)	72.72	100	100	97.61	100	98.75
Rx Quality (%)	72.00	86.51	88.98	82.77	84.00	85.99

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	95.56
BSNI 2G	94.98
VIL 2G	76.27
BSNL 3G	59.00
VIL 3G	83.36
Airtel 4G	96.00
Jio 4G	86.57
VIL 4G	85.73
BSNL 4G	97.00

Coverage Rate %

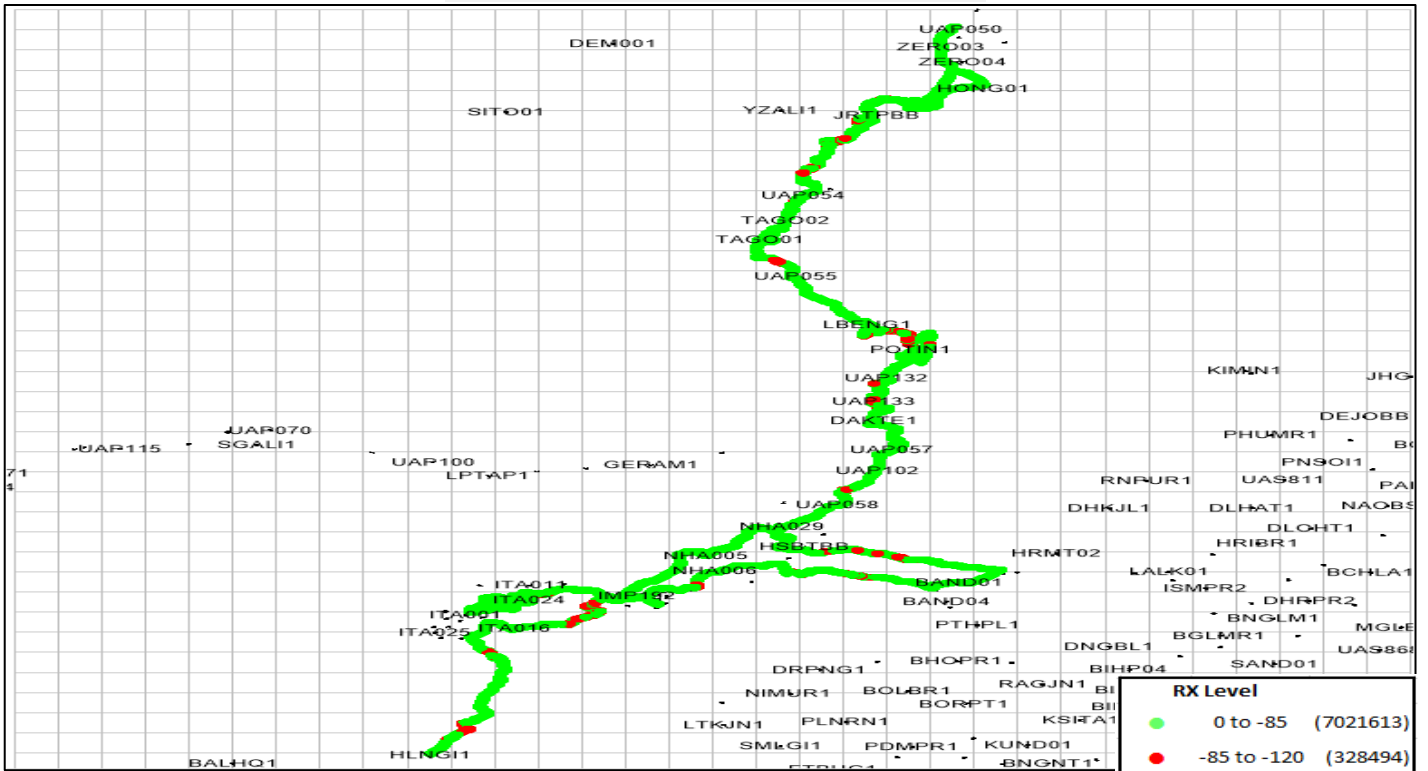


I. Coverage Details

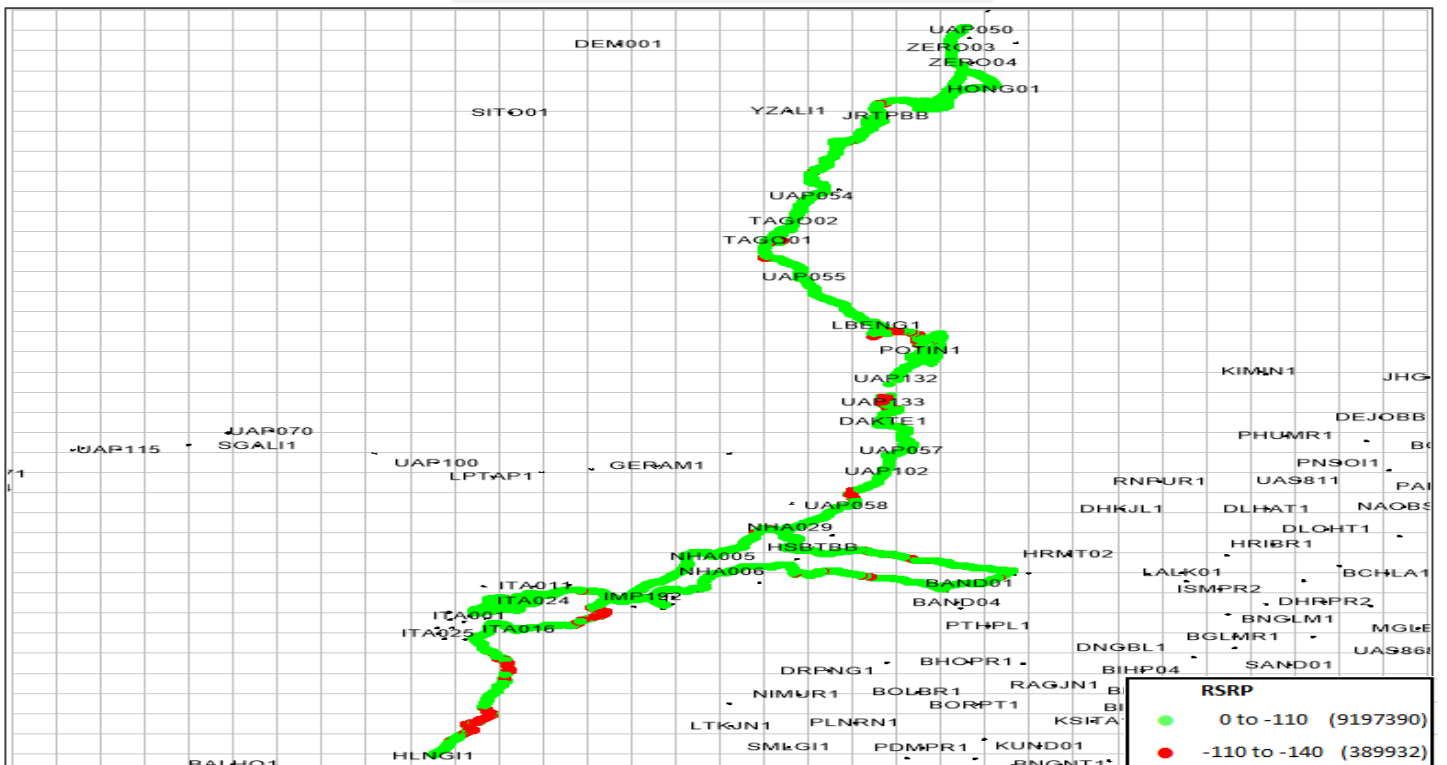
AIRTEL

Technology	Coverage Rate %
2G	95.56
4G	96.00

2G



4G

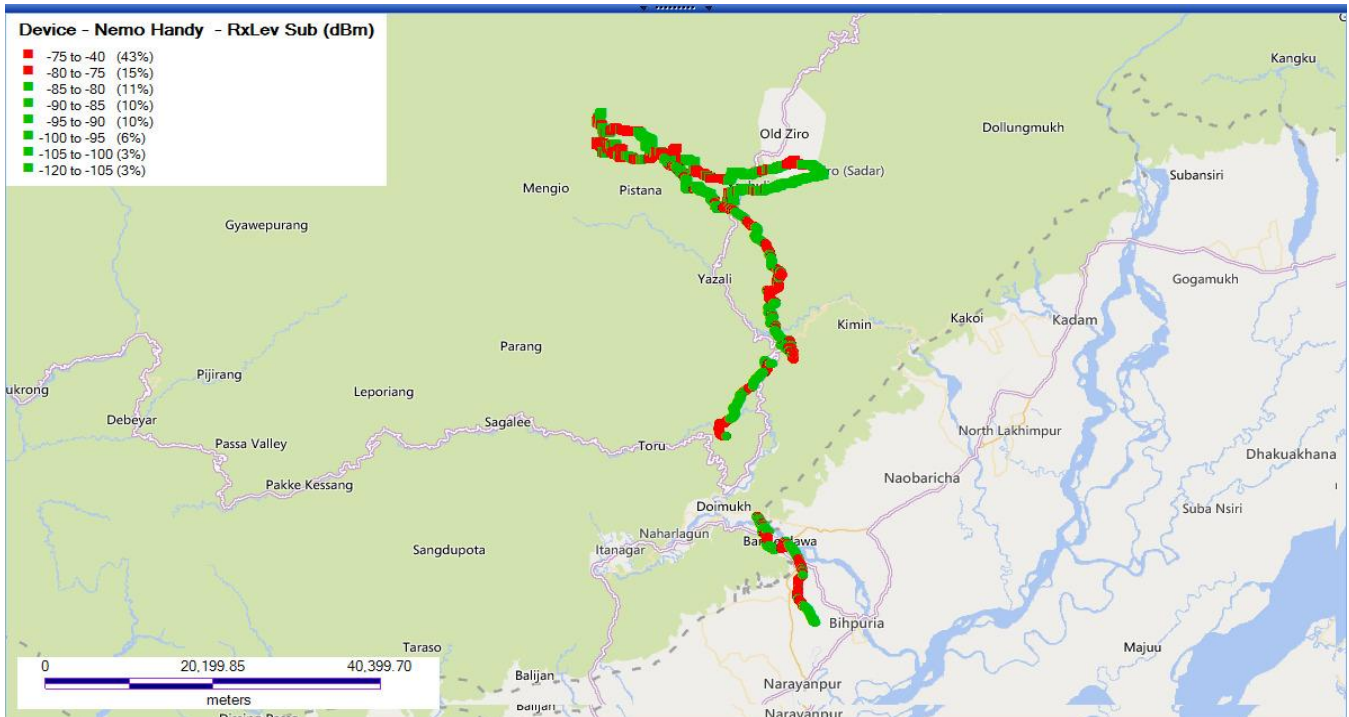


I. Coverage Details

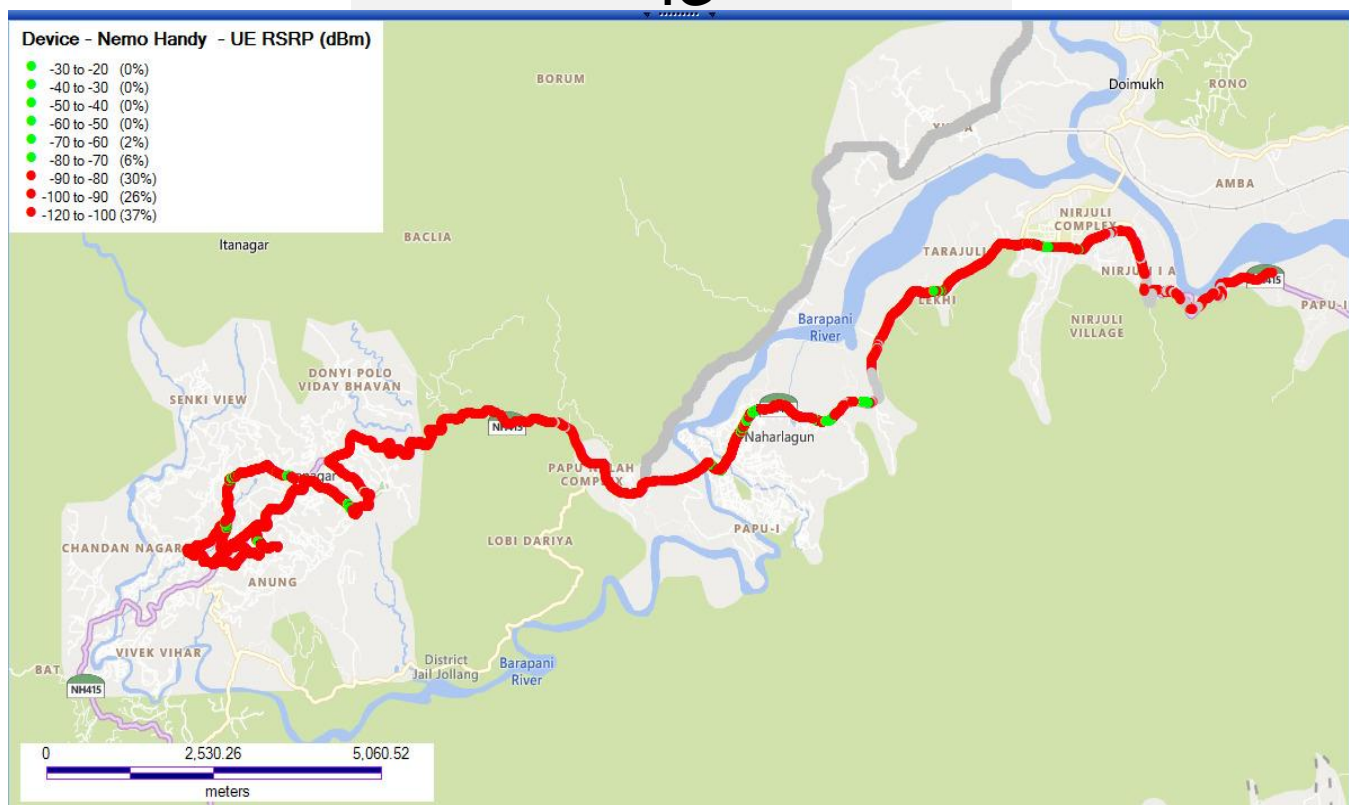
BSNL

Technology	Coverage Rate %
2G	94.98
3G	97.00

2G



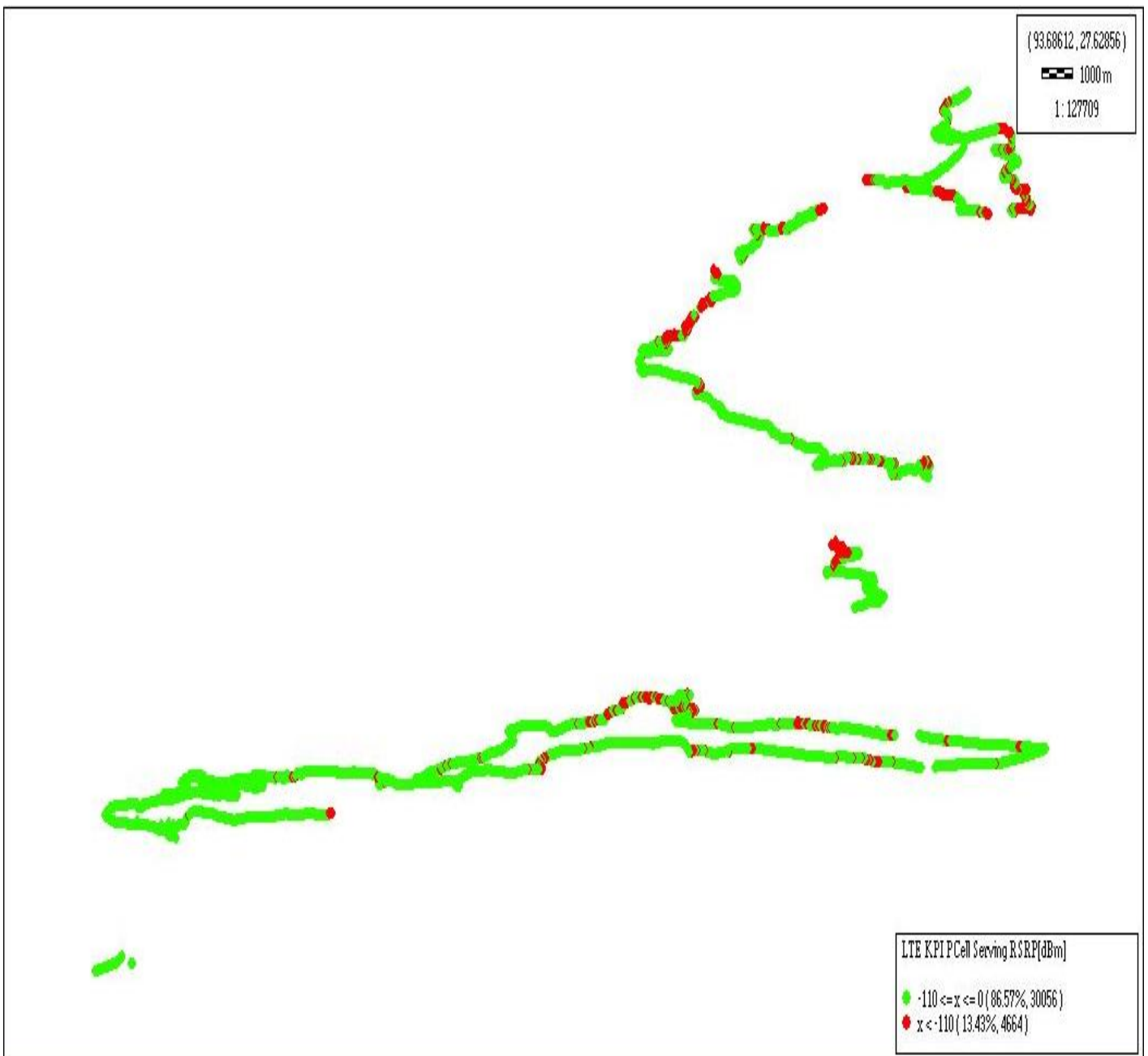
4G



I. Coverage Details

JIO

Technology	Coverage Rate %
4G	86.57

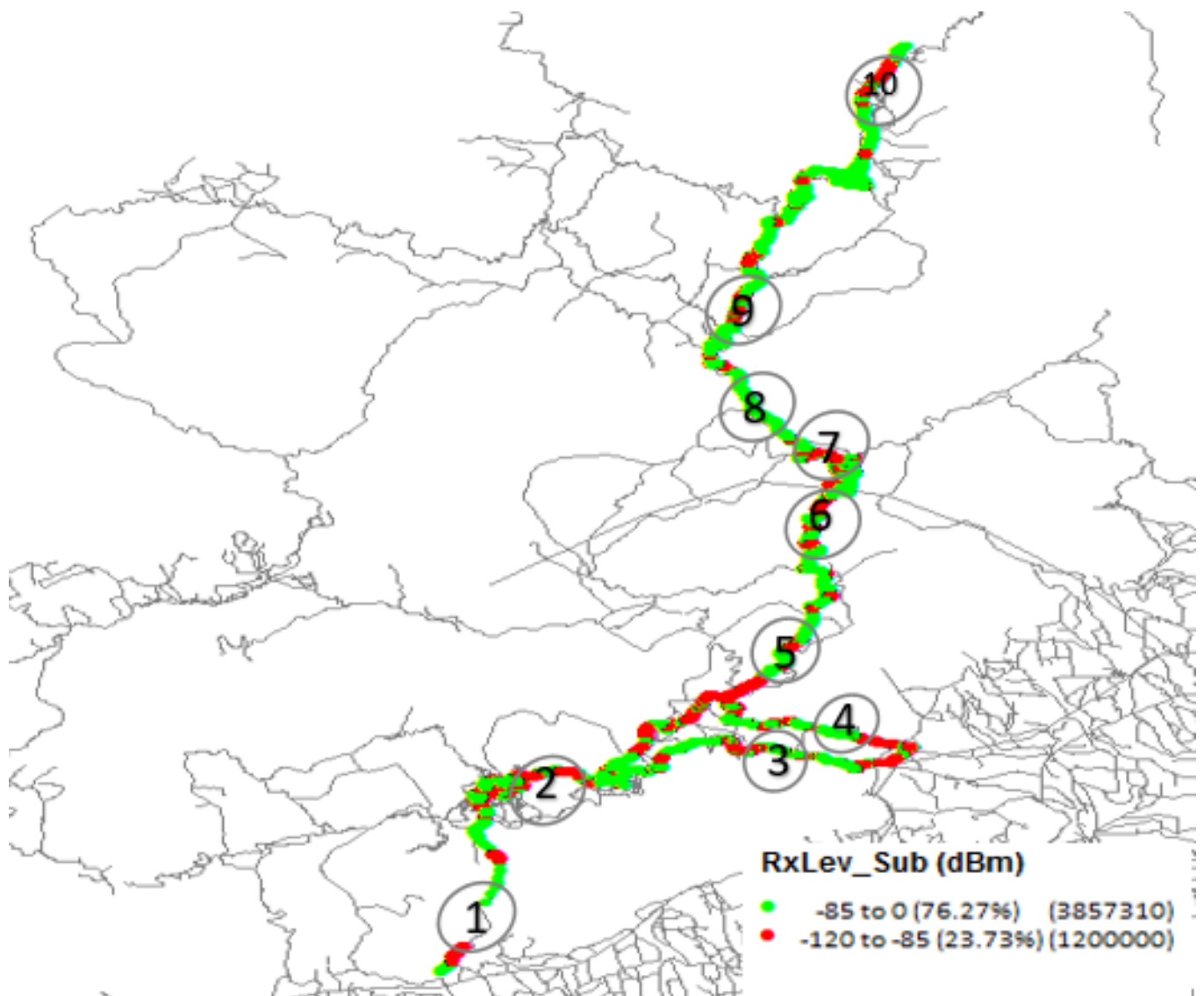


I. Coverage Details

VIL

Technology	Coverage Rate %
2G	76.27

2G

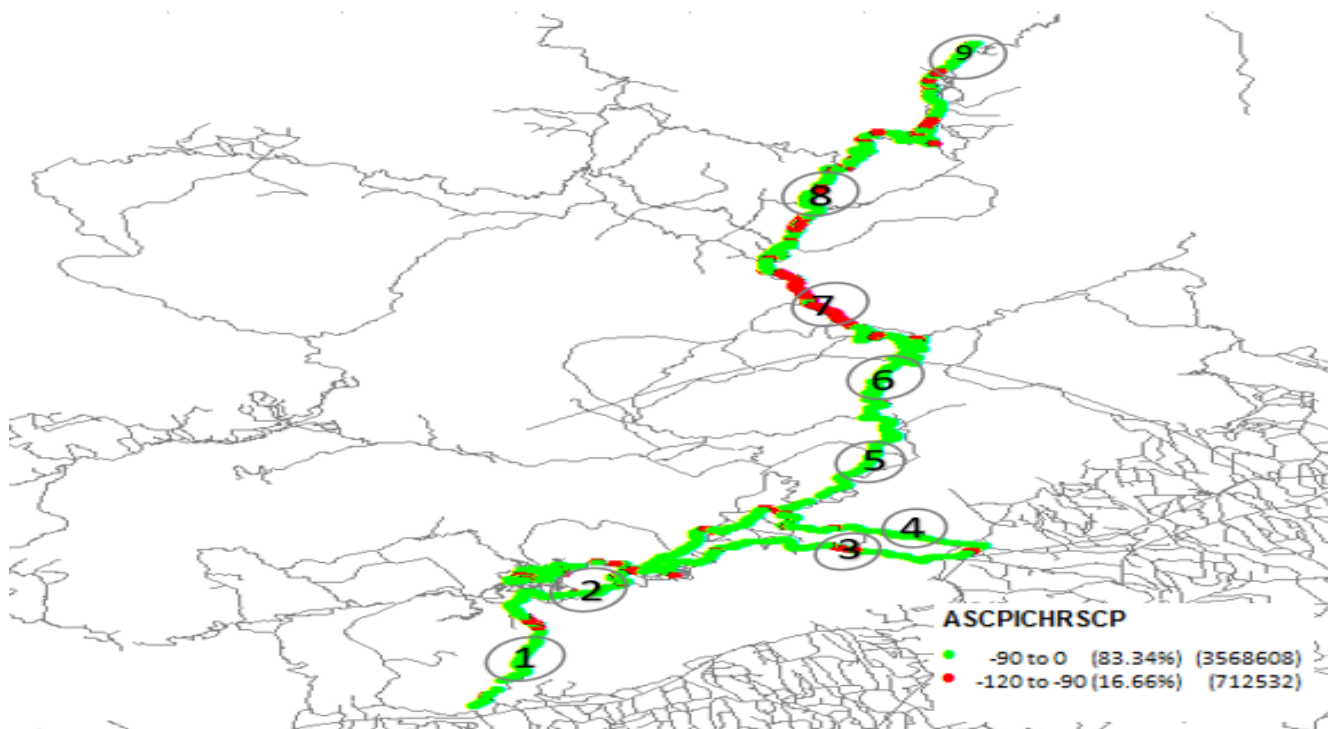


I. Coverage Details

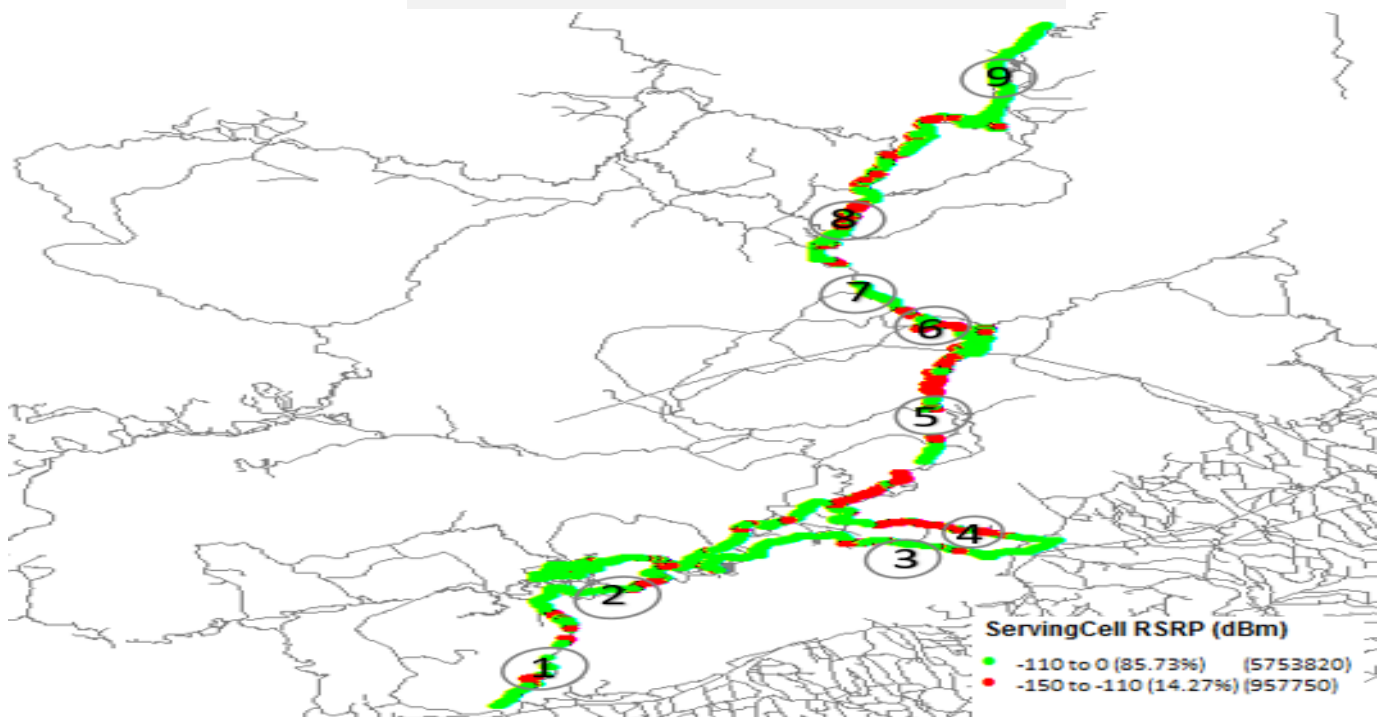
VIL

Technology	Coverage Rate %
3G	83.36
4G	85.73

3G



4G

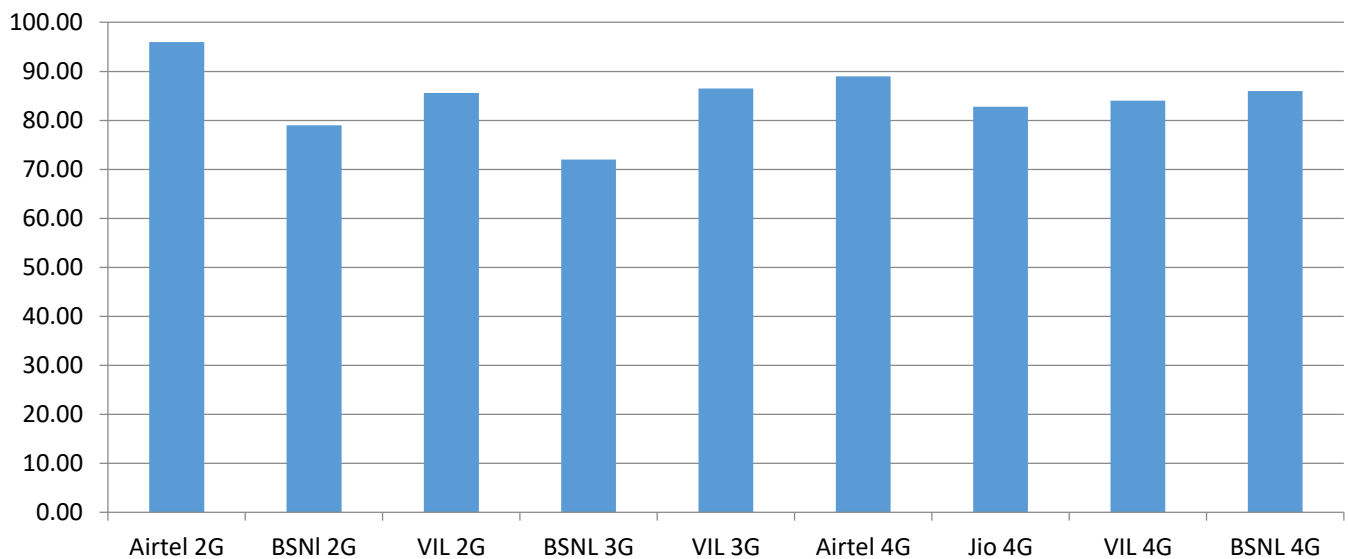


II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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 $\geq 95\%$.

TSP	Rx Quality %
Airtel 2G	95.97
BSNI 2G	78.98
VIL 2G	85.62
BSNL 3G	72.00
VIL 3G	86.51
Airtel 4G	88.98
Jio 4G	82.77
VIL 4G	84.00
BSNL 4G	85.99

Rx Quality %

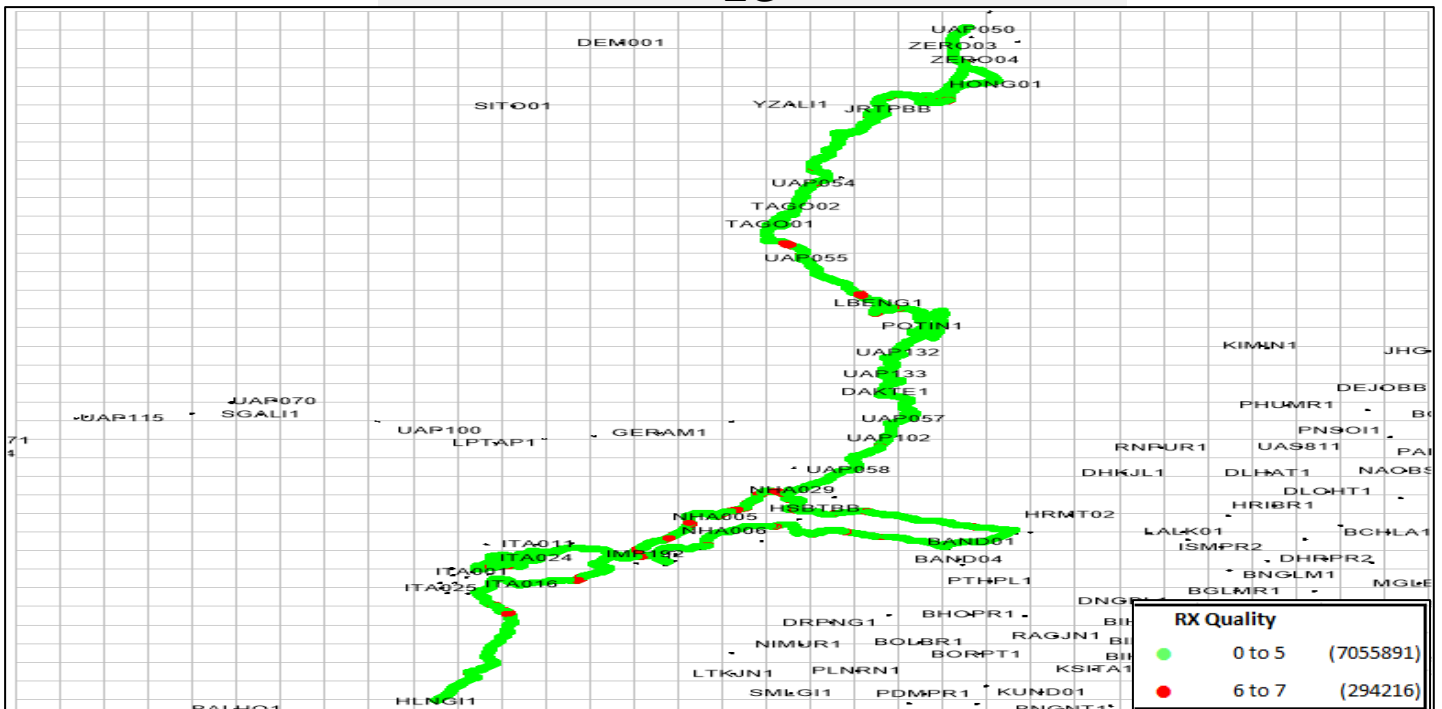


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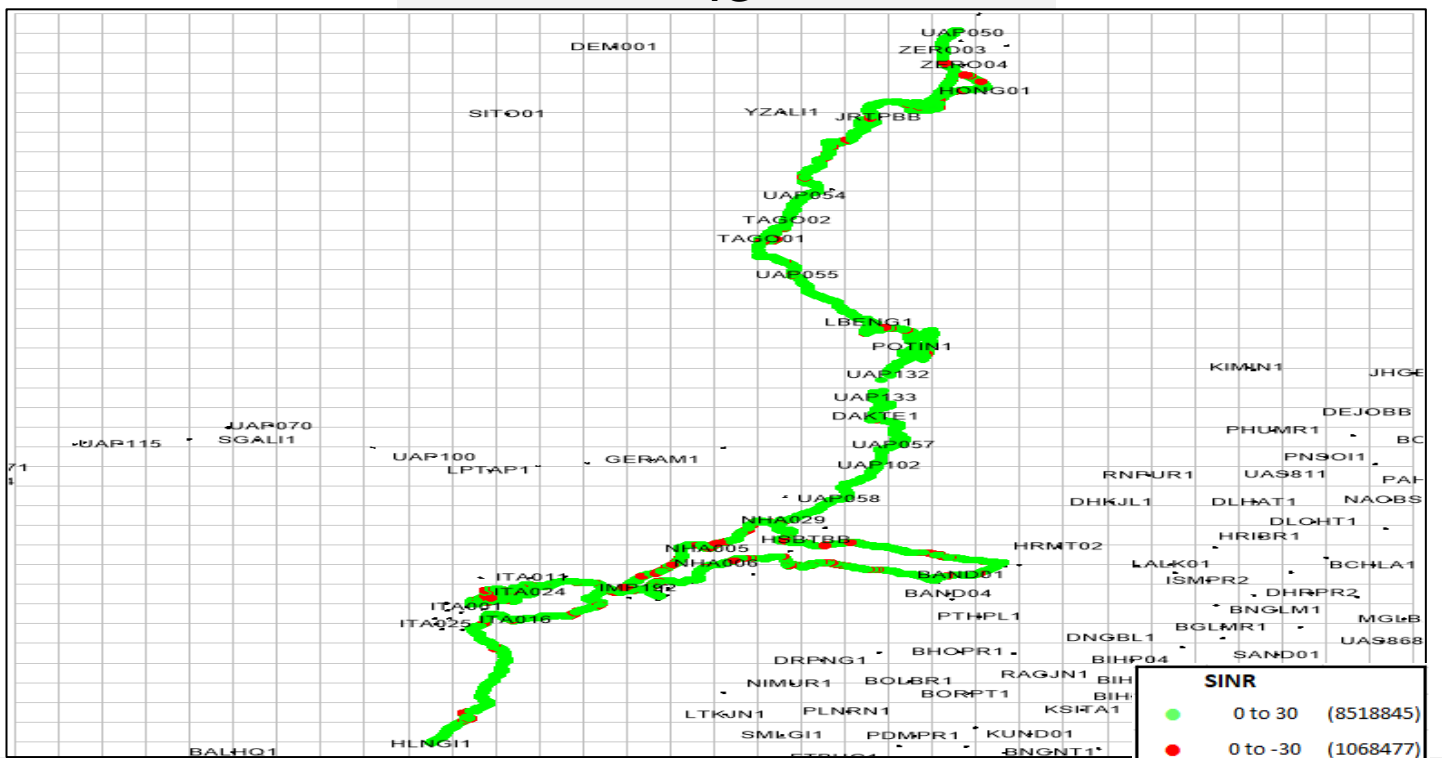
Airtel

Technology	Rx Quality %
2G	95.97
4G	88.98

2G



4G

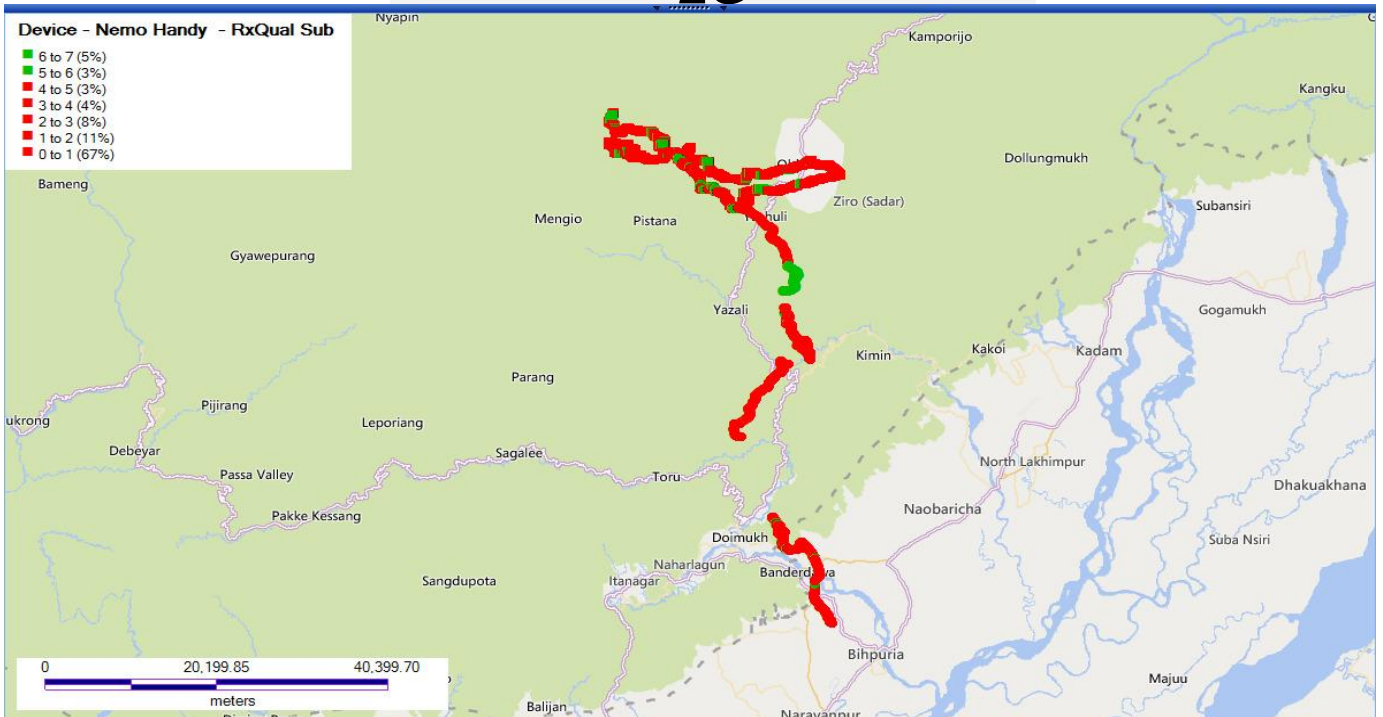


II. Quality Details

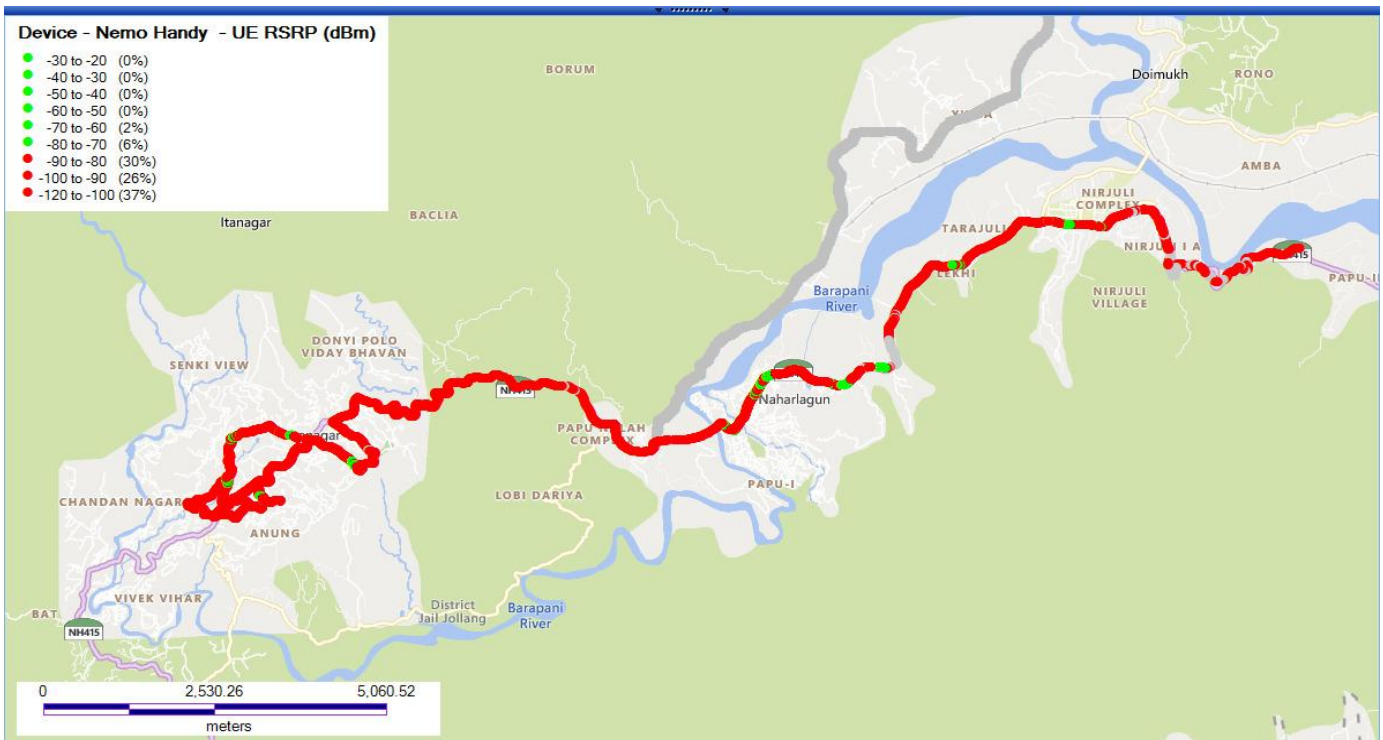
BSNL

Technology	Rx Quality %
2G	78.98
4G	85.99

2G



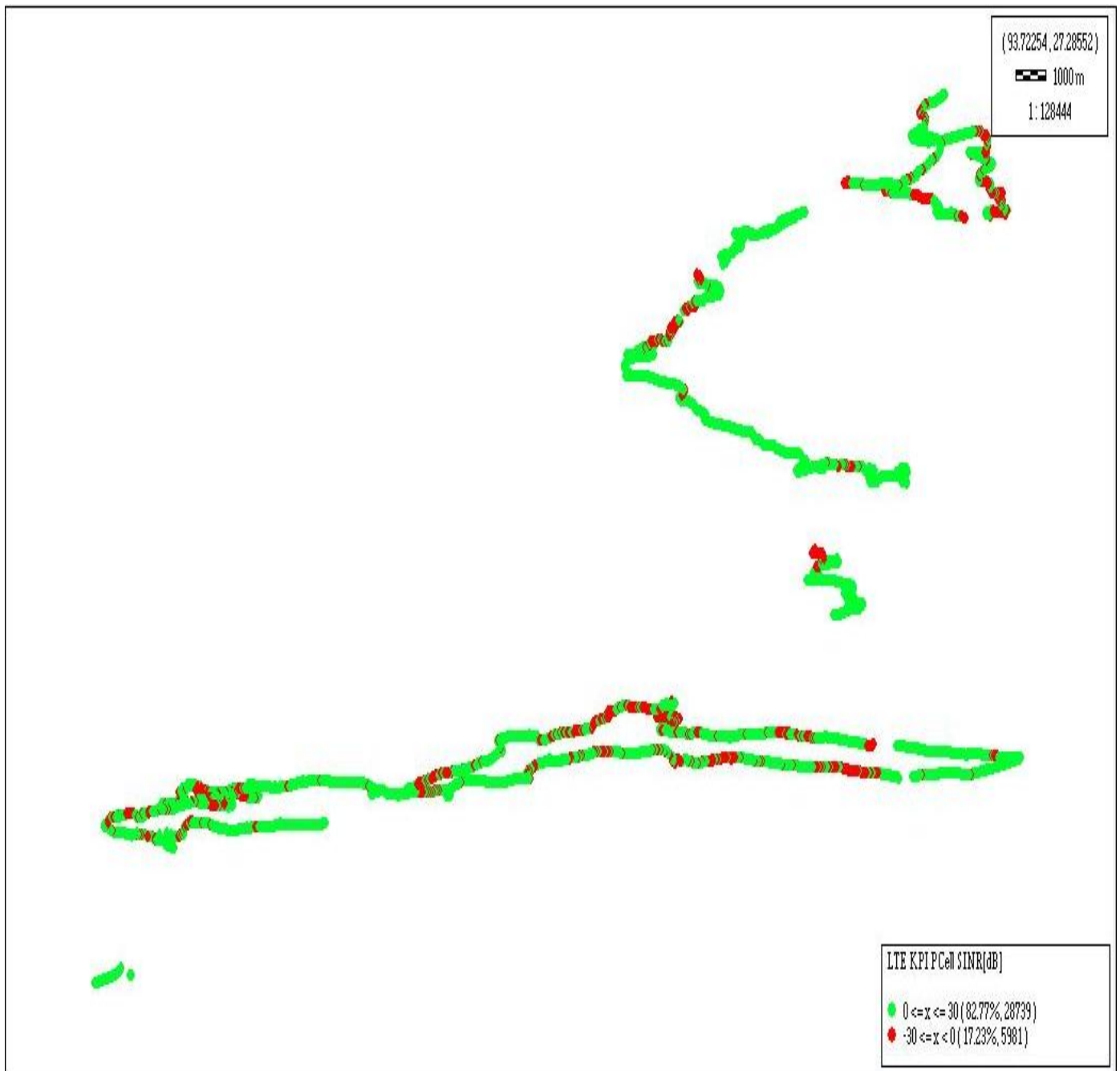
4G



II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	82.77

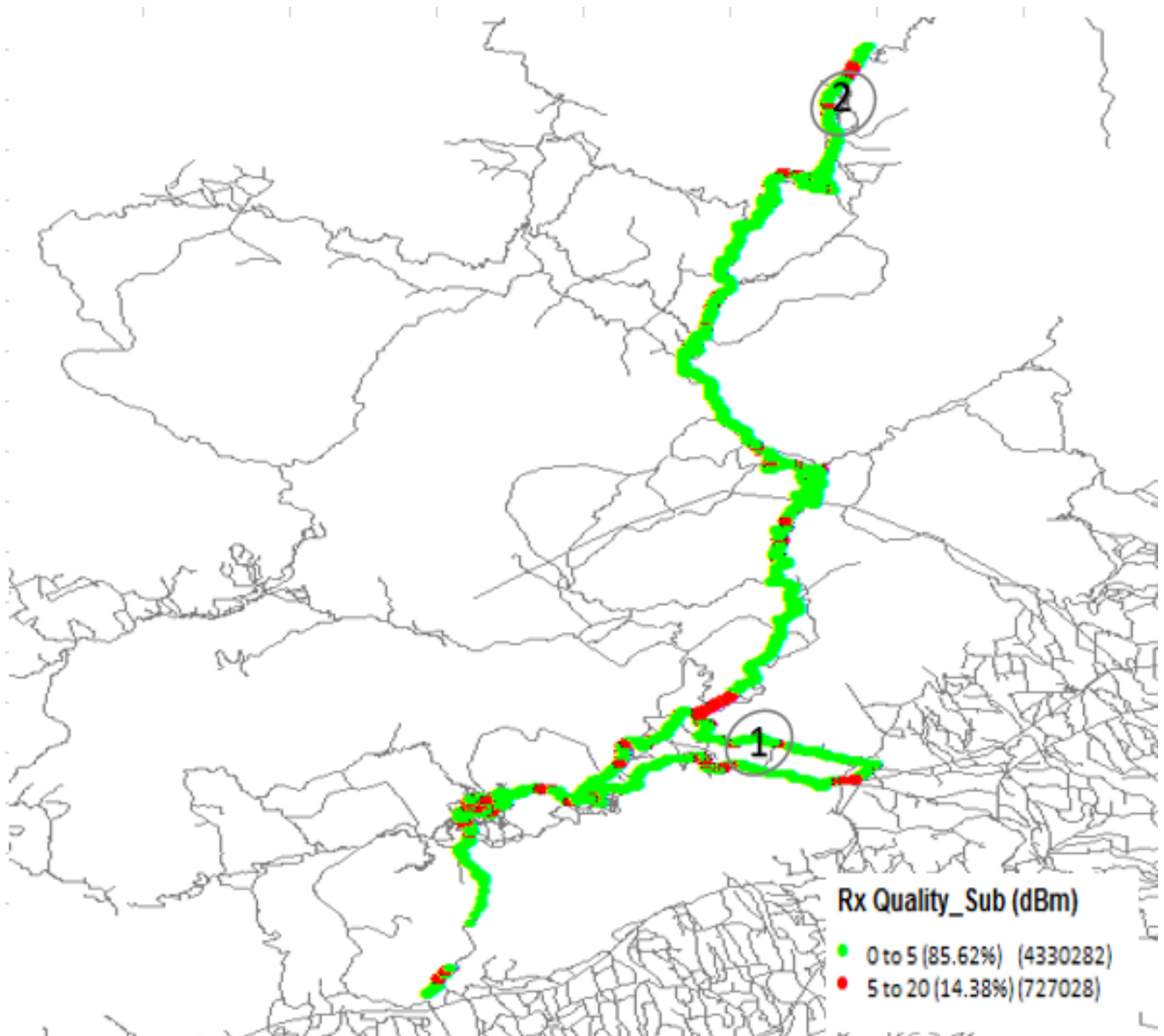


II. Quality Details

VIL

Technology	Rx Quality %
2G	85.62

2G

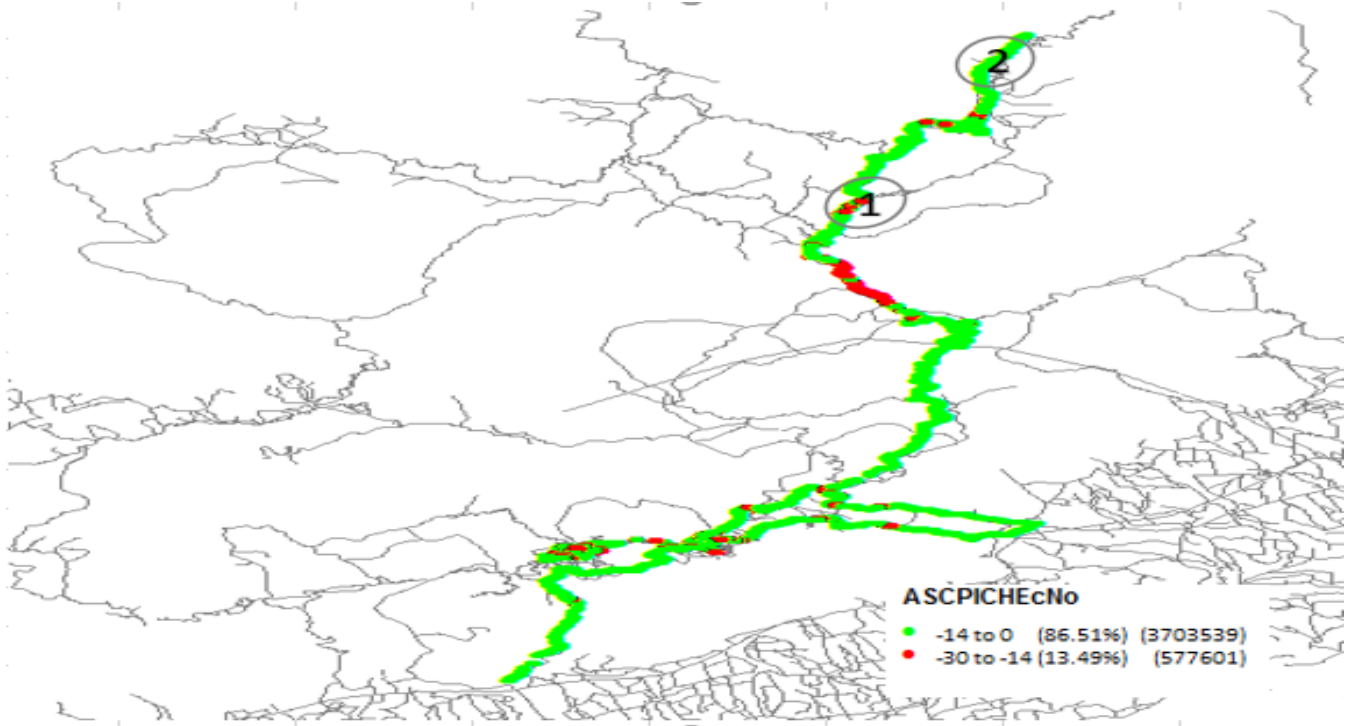


II. Quality Details

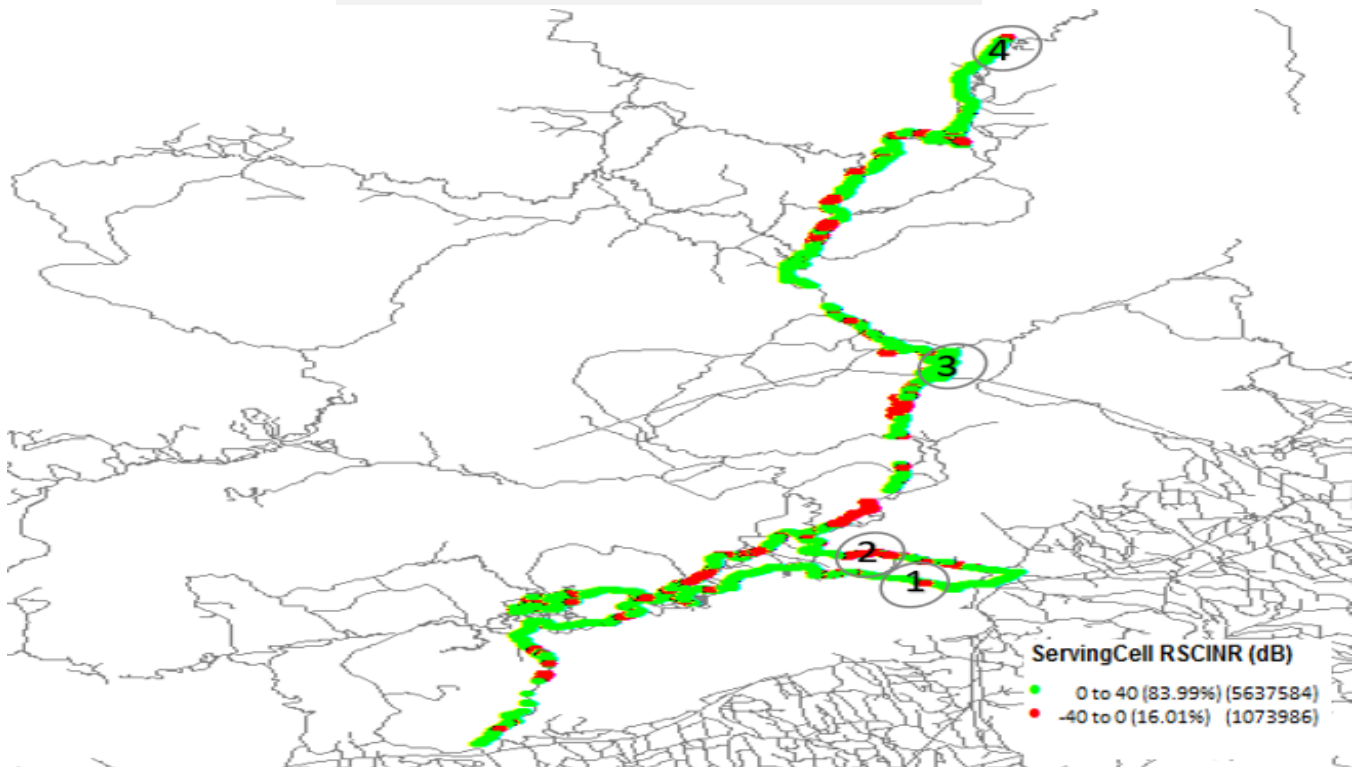
VIL

Technology	Rx Quality %
3G	86.51
4G	84.00

3G



4G

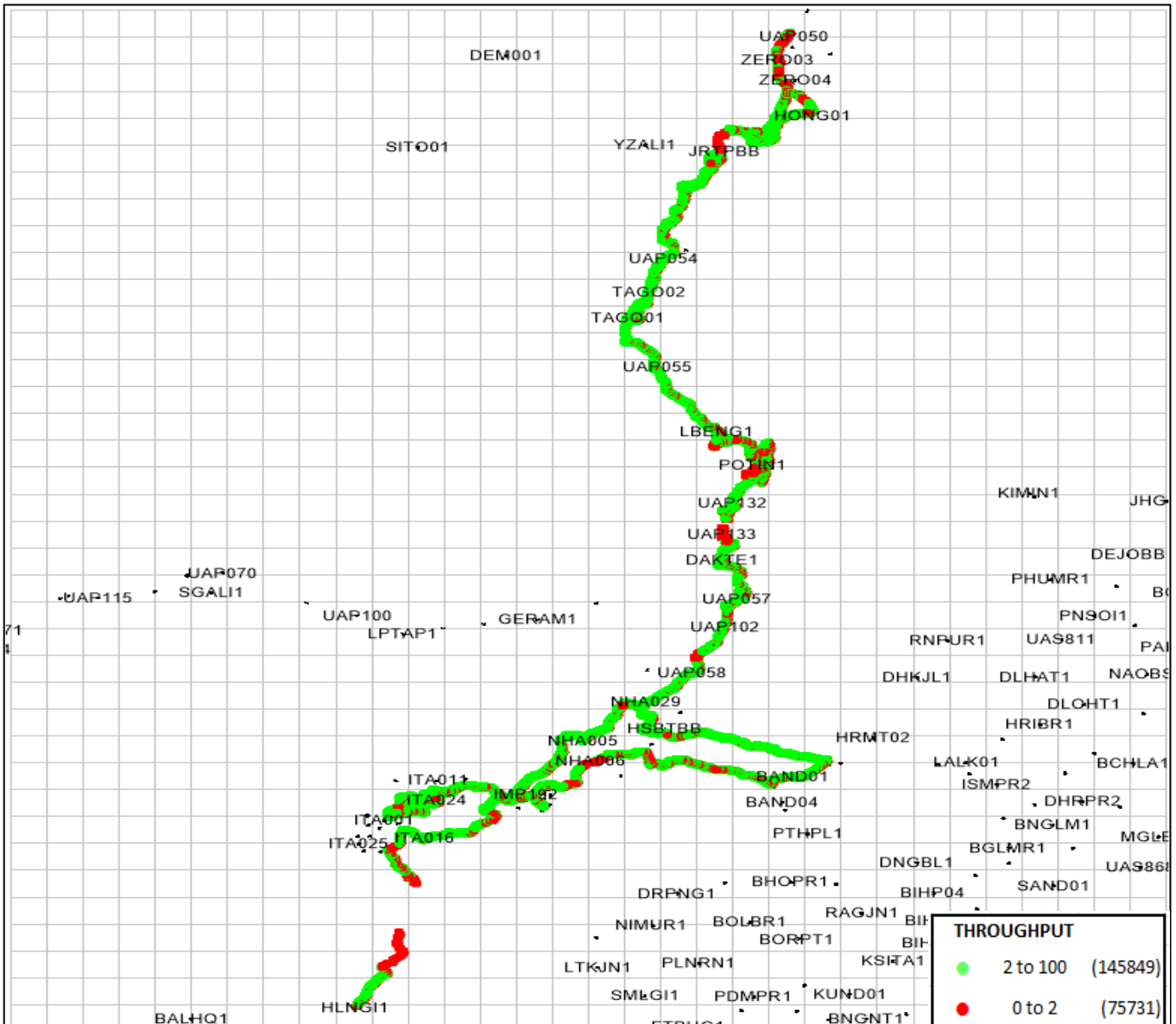


IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	3.86



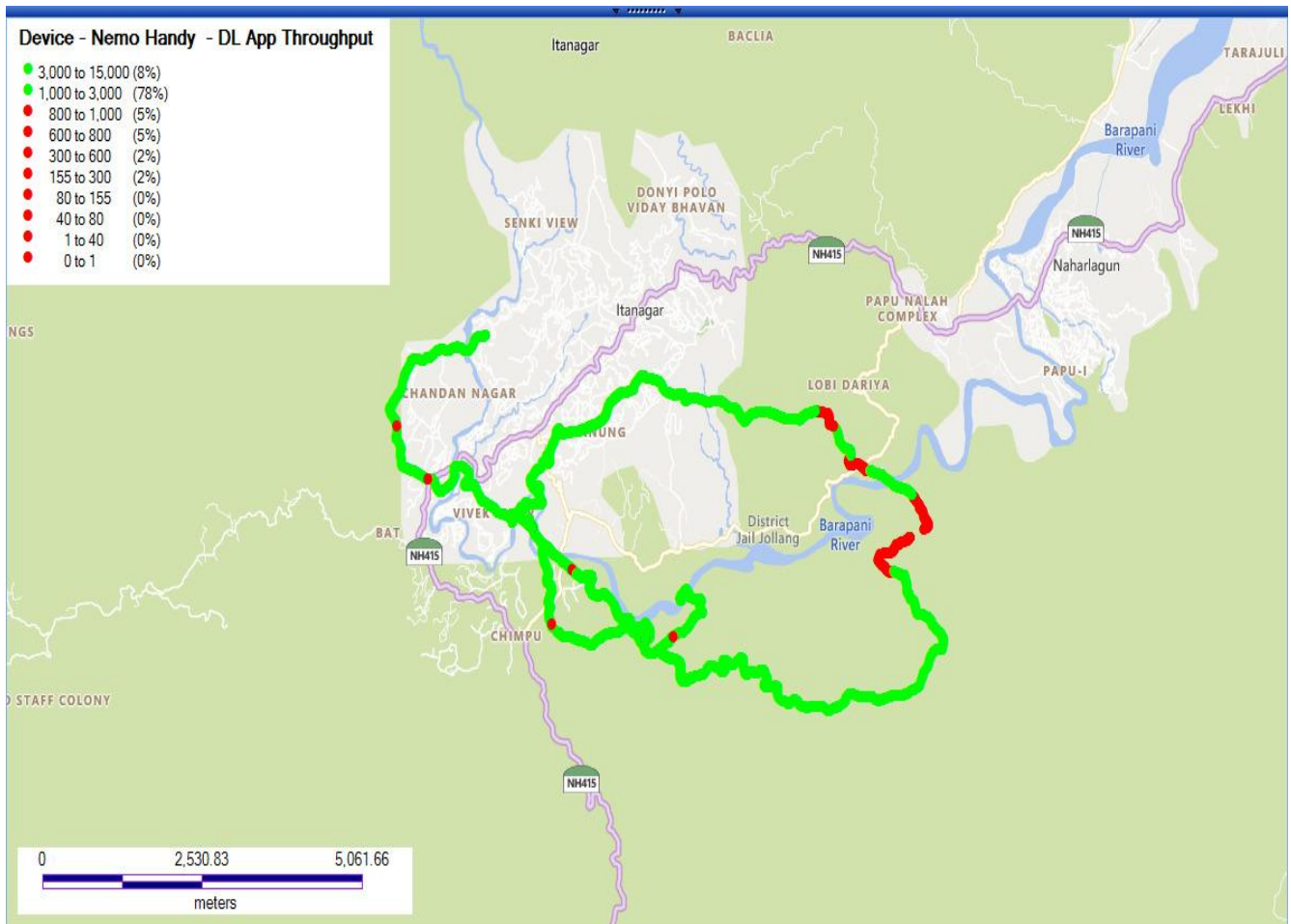
TSPS	AIRTEL
AVG. SPEED Mbps	3.86
NO. OF SAMPLES > 2 Mbps%	65.82
FILE DOWNLOAD SUCCESS RATE%	50.98

IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	2.10



TSPS	BSNL
AVG. SPEED Mbps	2.10
NO. OF SAMPLES > 1 Mbps%	57.99
FILE DOWNLOAD SUCCESS RATE%	**

Report not submitted - **

IV. Dynamic Data Test- 4G DL Details

Jio

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	10.52

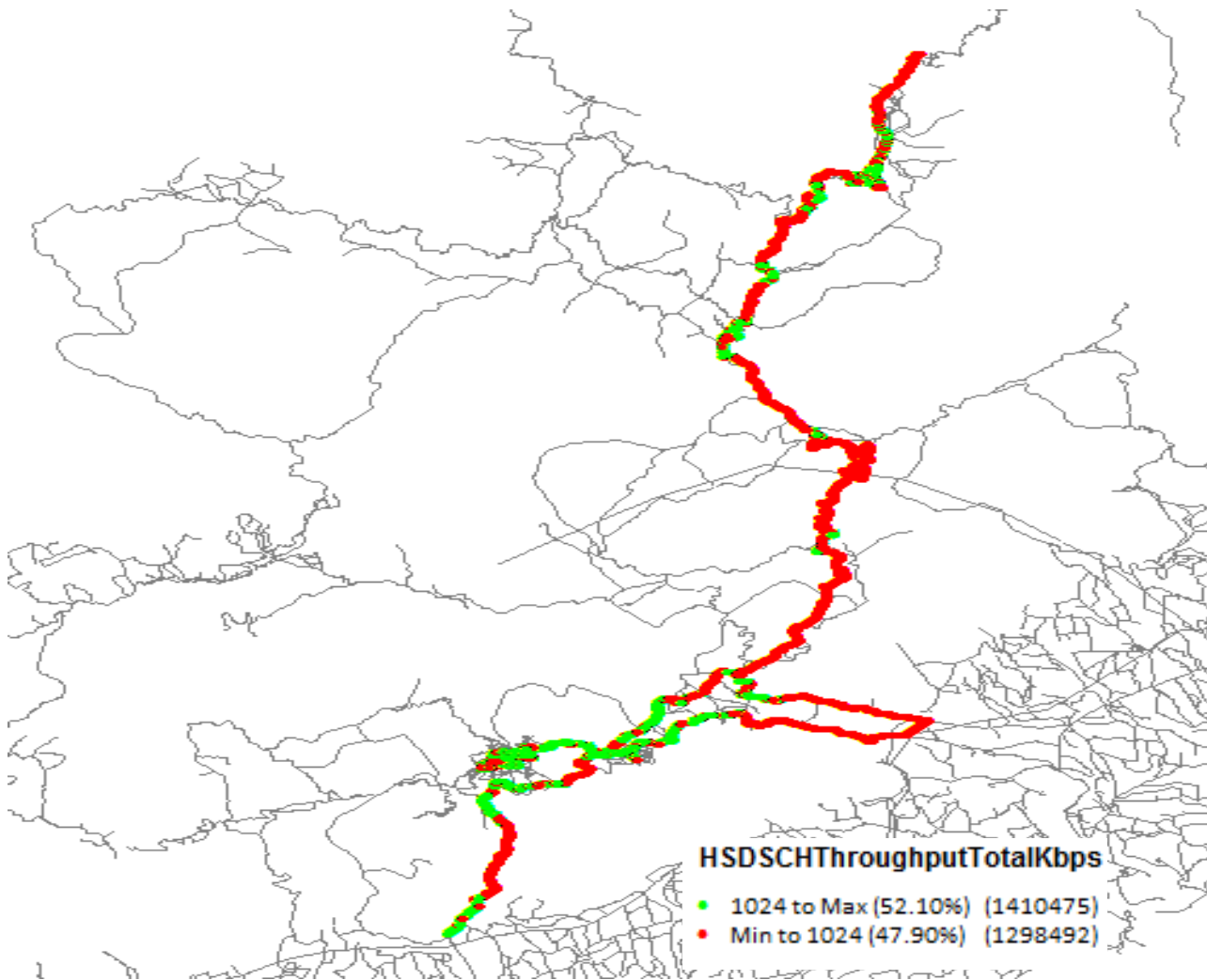


TSPS	JIO
AVG. SPEED Mbps	10.52
NO. OF SAMPLES > 2 Mbps%	56.05
FILE DOWNLOAD SUCCESS RATE%	82.44

VIL

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	1.99



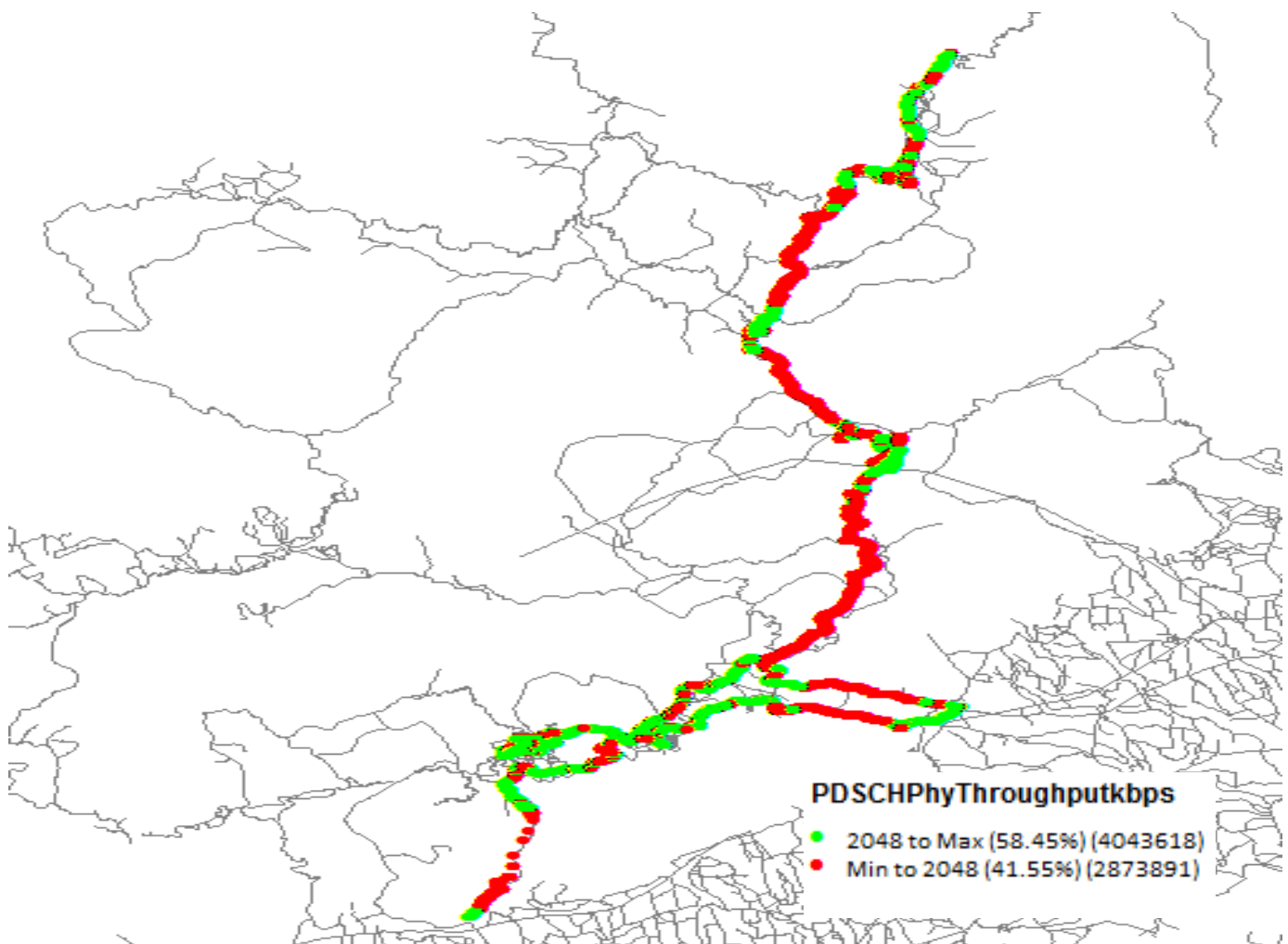
TSPS	VIL
AVG. SPEED Mbps	1.99
NO. OF SAMPLES > 1 Mbps%	52.07
FILE DOWNLOAD SUCCESS RATE%	99.35

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete 220 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	3.20



TSPS	VIL
AVG. SPEED Mbps	3.20
NO. OF SAMPLES > 2 Mbps%	58.45
FILE DOWNLOAD SUCCESS RATE%	99.71

V. TRAI MySpeed App

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)
JULI ROAD	09.11.2021	10.50	VI	105	3.77	15.11
PAPU NALA	09.11.2021	11.12	VI	98	7.02	12.37
ARUNACHAL_ASSAM BOUNDARY	09.11.2021	12.10	BSNL	108	0.58	1.50
ARUNACHAL_ASSAM BOUNDARY	09.11.2021	12.17	VI	101	3.62	7.63
ARUNACHAL_ASSAM BOUNDARY	09.11.2021	12.26	JIO	84	5.66	2.47
BANDERDAWA ENTRY GATE	09.11.2021	12.36	BSNL	109	5.33	0.82
COLLEGE	09.11.2021	12.52	VI	78	1.66	4.16
COLLEGE	09.11.2021	12.54	BSNL	68	0.95	7.33
NEAR BRIDGE	09.11.2021	1.57	BSNL	89	0.87	6.52
NEAR BRIDGE	09.11.2021	2.00	JIO	104	4.53	4.31
NEAR BRIDGE	09.11.2021	2.20	VI	92	1.42	11.18
BANK_COLONY ITANAGAR	09.11.2021	3.50	BSNL	86	1.27	4.50
GANGA MARKET	09.11.2021	3.50	VI	69	8.06	10.89
GANGA MARKET	09.11.2021	3.41	AIRTEL	98	7.14	0.87
POST OFFICE	09.11.2021	4.04	VI	91	8.56	5.93
BANK TINALI	09.11.2021	4.14	JIO	72	5.05	0.97
BANK TINALI	09.11.2021	4.03	VI	62	6.29	2.69
SECTRAIT OFFICE	09.11.2021	4.36	VI	110	6.05	7.57
ASSEMBLY	09.11.2021	4.41	JIO	95	9.63	2.23
ASSEMBLY	09.11.2021	4.44	VI	101	7.07	17.65
ASSEMBLY	09.11.2021	4.42	AIRTEL	105	5.85	0.43
AKASHDEEP MARKET	09.11.2021	4.52	VI	71	4.55	8.09
AKASHDEEP MARKET	09.11.2021	4.57	BSNL	86	1.91	4.84
AKASHDEEP MARKET	09.11.2021	4.59	AIRTEL	82	9.45	0.37
PAPPU NALLAH	10.11.2021	9.20	VI	84	1.45	0.18
PAPPU NALLAH	10.11.2021	9.25	BSNL	100	1.88	2.19
NEEPCO GUEST HOUSE	10.11.2021	12.39	BSNL	51	1.14	1.24
YAZALI	10.11.2021	1.09	VI	95	4.82	14.14
YAZHILI	10.11.2021	1.48	VI	78	2.14	3.94
AFTER OLD ZIRO	10.11.2021	4.52	JIO	94	8.68	13.88
ZERO	10.11.2021	5.00	BSNL	101	0.03	0.01
ZERO	10.11.2021	5.10	AIRTEL	90	8.97	8.05

VI. Video Call Observations

•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 and poor Video quality/ Video freeze were observed is provided below --

Observations of Video Calls on Day 1 (09.11.2021)

DATE	TIME	TSP NAME	Remarks
09.11.2021	10.00	BSNL	No Data Service -No 4G Signal
09.11.2021	10.10	VI	Video freeze and disconnect
09.11.2021	10.10 - 10.20	AIRTEL	Video call Disconnect
09.11.2021	10.10 - 10.20	RJIO	Video call Disconnect
09.11.2021	10.30	AIRTEL	Video freeze Poor quality
09.11.2021	10.30	RJIO	Video freeze Poor quality
09.11.2021	10.30	VI	Video freeze Poor quality
09.11.2021	10.51 - 10.54	AIRTEL	Video call Disconnect
09.11.2021	10.51 - 10.56	VI	Video call Disconnect
09.11.2021	11.01 - 11.06	VI	Video call Disconnect
09.11.2021	11.19	VI	Video call Disconnect
09.11.2021	11.21	AIRTEL	Video freeze Poor quality
09.11.2021	11.21	VI	Video freeze Poor quality
09.11.2021	11.37 - 11.42	BSNL	Video freeze Poor quality
09.11.2021	12.26 - 12.40	BSNL	Video call Disconnect
09.11.2021	13.10 - 13.16	BSNL	Video call Disconnect
09.11.2021	13.22 - 13.26	BSNL	Video call Disconnect
09.11.2021	13.27 - 13.31	BSNL	Video call Disconnect
09.11.2021	13.37 - 13.46	BSNL	Video call Disconnect
09.11.2021	15.20	RJIO	Video freeze Poor quality
09.11.2021	15.21	VI	Video freeze Poor quality
09.11.2021	15.45	VI	Video freeze Poor quality
09.11.2021	15.40 - 15.57	BSNL	Video freeze Poor quality
09.11.2021	15.57 - 15.59	BSNL	Video call Disconnect
09.11.2021	15.59	VI	Video freeze Poor quality
09.11.2021	16.27	BSNL	Video freeze Poor quality
09.11.2021	16.30	BSNL	Video freeze Poor quality
09.11.2021	16.41	VI	Video freeze Poor quality

VI. Video Call Observations

•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 and poor Video quality/ Video freeze were observed is provided below --

Observations of Video Calls on Day 2 (10.11.2021)

DATE	TIME	TSP NAME	Remarks
10.11.2021	09.00 - 09.25	BSNL	No 3G Signal-OFC Cut-Papu Nalah
10.11.2021	09.10 - 09.20	VI	Video freeze and poor quality
10.11.2021	9.15	AIRTEL	Video freeze and poor Network
10.11.2021	9.35	BSNL	Video freeze and poor Network
10.11.2021	9.35	VI	Video freeze and poor Network
10.11.2021	9.40	BSNL	Video call Disconnect
10.11.2021	9.45	AIRTEL	Video call Disconnect
10.11.2021	09.52 - 10.05	RJIO	Video call Disconnect
10.11.2021	10.00 - 10.04	BSNL	Video call Disconnect
10.11.2021	10.00 - 10.18	VI	Video freeze and disconnect
10.11.2021	10.06 - 10.11	BSNL	Video call Disconnect
10.11.2021	10.16	AIRTEL	Video freeze and poor Network
10.11.2021	10.16	RJIO	Video freeze and poor Network
10.11.2021	10.16	BSNL	Video freeze and poor Network
10.11.2021	10.17 - 10.23	AIRTEL	Video call Disconnect
10.11.2021	10.20 - 10.22	BSNL	Video call Disconnect
10.11.2021	10.25	AIRTEL	Video freeze and poor Network
10.11.2021	10.26 - 10.27	BSNL	Video call Disconnect
10.11.2021	10.34 - 10.46	VI	Video call Disconnect
10.11.2021	10.38	RJIO	Video call Disconnect
10.11.2021	10.41 - 10.54	BSNL	Video call Disconnect
10.11.2021	10.43 - 10.46	AIRTEL	Video call Disconnect
10.11.2021	10.49	RJIO	Video call Disconnect
10.11.2021	10.30 - 10.40	VI	Video call Disconnect
10.11.2021	12.51	BSNL	Video freeze and poor Network
10.11.2021	12.55	VI	Video call Disconnect
10.11.2021	13.32	BSNL	Video call Disconnect
10.11.2021	13.58	RJIO	Video freeze and poor Network
10.11.2021	14.09	VI	Video call Disconnect
10.11.2021	14.18	AIRTEL	Video freeze and poor Network
10.11.2021	14.38 - 14.54	RJIO	Video call Disconnect
10.11.2021	14.41 - 14.46	VI	Video call Disconnect
10.11.2021	15.30	RJIO	Video call Disconnect
10.11.2021	15.34	BSNL	Video freeze and poor Network
10.11.2021	15.34	VI	Video freeze and poor Network
10.11.2021	15.39 - 15.42	BSNL	Video call Disconnect
10.11.2021	15.40	AIRTEL	Video freeze and poor Network
10.11.2021	15:45	VI	Video call Disconnect
10.11.2021	15:45	VI & BSNL	Very poor Network
10.11.2021	15:58	BSNL	Very poor Network
10.11.2021	16:04	BSNL	Video call Disconnect

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-

AIRTEL

SINR (88.98%) in 4G network does not meet the benchmark (95%).

Average download data speed (4G network- Locked mode) is 3.86 Mbps throughout the drive test route.

Airtel network quality is not good from Joram to Ziro. Airtel Video got freezed near Yachuli town.

Airtel has been asked to take necessary action including software/ hardware optimization to improve the Rx Quality (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 10.12.2021.

BSNL

Drop Call Rate (2G-7.64% & 4G-3.44%), Block Call Rate (2G-28.33% & 3G-30.0%), Call Setup Success Rate (2G-70.83% & 3G-40.0%), Handover Success Rate (2G-84.78% & 3G-72.72%), Rx Quality (2G-78.98%, 3G-72.0% & 4G-85.99%) do not meet the benchmarks.

4G signal is extremely poor/ no signal at Diphu Camp (Starting point of Day1). For this reason, BSNL could not join through video calls. So, new sites or tower sharing may improve the coverage on the above areas.

On day 2, BSNL 3G is disconnected between Yachuli town and Joram. Total Data service (3G) of BSNL was stopped on 10.11.21 from 09.00 Hrs at Papu Nalah due to OFC cut. BSNL has been asked to ensure redundant path for improving availability and QoS of Data Services. BSNL has very less no of sites after old Ziro and therefore they were asked to continue DT till the last sites near old-Ziro.

BSNL could not meet the above parameters benchmarks in 2G/ 3G/ 4G network and BSNL has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the above KPIs, Video calls disconnections, poor Video quality and poor coverage/ download throughputs on the drive test route and at all important locations.

An action taken report is to be submitted by 10.12.2021.

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

Drop Call Rate(2.19)% , Block Call Rate(4.92%) & Rx Quality (SINR-82.77%) in 4G network do not meet the benchmarks.

Jio got disconnected frequently between Yachuli town and Joram. Jio got disconnected frequently between Joram and Ziro. Jio has very less no of sites after old Ziro and therefore it was asked to continue (Day-2) Drive Test till the last sites near old-Ziro

RJIO could not meet the Drop Call Rate , Block Call Rate & Rx Quality benchmarks and RJIO has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the above KPIs, Video calls disconnections, poor Video quality and poor coverage/ download throughputs on the drive test route and at all important locations.

An action taken report is to be submitted by 10.12.2021.

VIL

SINR (87.73%) in 4G, Ec/No (93.21%) in 3G , Rx Quality(85.62) in 2G do not meet the benchmarks (95%).

Average download data speed (4G network- Locked mode) is 3.20 Mbps throughout the drive test route.

VI was disconnected in between Yachuli town and Joram, inter site distance is very high, VI got disconnected frequently between Joram to Ziro. VI has very less no of sites after old Ziro and therefore they were asked to continue Drive Test on Day-2 till the last sites near old-Ziro. VI does not have 4G sites at Yazali.

VI could not meet the Rx Quality in 2G, 3G & 4G benchmark. VI has been asked to take necessary action including software/ hardware optimization and installing new sites to improve the Rx Quality in 2G, 3G & 4G, 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 10.12.2021.