Operator Assisted Drive Test Report
Gangtok City, Sikkim
January 2023
(RO, Kolkata)

Key Performance Indicators (KPIs):
The following TSPs could not meet the KPIs benchmark as stated below—
AIRTEL- Rx Quality in 2G & 4G (SINR) network.
BSNL-Drop Call Rate in 3G & 4G network, Call Set up Success Rate (CSSR) in 3G network, Hand Over Success Rate (HOSR) in 2G & 4G network and Rx Quality in 2G, 3G (E/Io) & 4G (SINR) network.
RJIO-Rx Quality in 4G (SINR) network.
VIL-Rx Quality in 3G (E/Io) & 4G (SINR) network.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Gangtok City and surrounding areas including National Highways-10 & 717A on 19th January & 20th January 2023 from 08.00 AM to 08.00 PM. The drive test covered drive route of 247 KMs (approx) over a period of 2 days. Approximately 311+ calls were made for each of the 9 networks: three 2G networks, two 3G network and four 4G network covering four TSPs.

Overview

Voice Summary

Data Summary

Overview

Gangtok city is the capital of Sikkim state, north-eastern India. It lies on a tributary of the Tista River in the southeast-central part of the state at an elevation of about 5,600 feet (1,700 metres). The city's name means "Top of the Hill." Gangtok rises over slopes extensively terraced in corn (maize). It was the governmental seat of the kingdom of Sikkim until the monarchy was abolished (1975) and Sikkim was annexed by India (1976). The city's population includes Nepalese, Tibetans, Lepchas, and Indians. In the early 21st century a number of communities surrounding Gangtok were amalgamated administratively under the Gangtok Municipal Corporation, which significantly increased the area of the city and its population.

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, Drop Call Rate, Block Call Rate, Call Setup Success Rate and Handover Success Rate.

Data: Download Throughputs and Data File Success Rate.

Voice Tests: Calls were made for 90 secs duration with wait time of 5 secs between calls in all technologies. Three 2G networks, two 3G network, four 4G networks covering 4 unique TSPs were tested.

Data Tests: Dynamic Data Service Testing was performed along same route in all technologies. 500 KB 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) network, four 4G (Lock Mode) networks covering 4 unique TSPs were tested.

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	X-CAL	TEMS

Service	Static Data Service Testing- Specifications
Download	2G (Locked) - 500KB, 3G (Locked) - 20 MB, 4G (Locked) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Locked) - 5 MB, 4G (Locked) - 10 MB
Web Browsing	3 links of e-commerce website www.amazon.in, www.flipkart.com and PayTm
Video Steaming	130 secs Clip
Latency	32 Bytes on www.google.com

Voice & Dynamic Data Test Drive Route
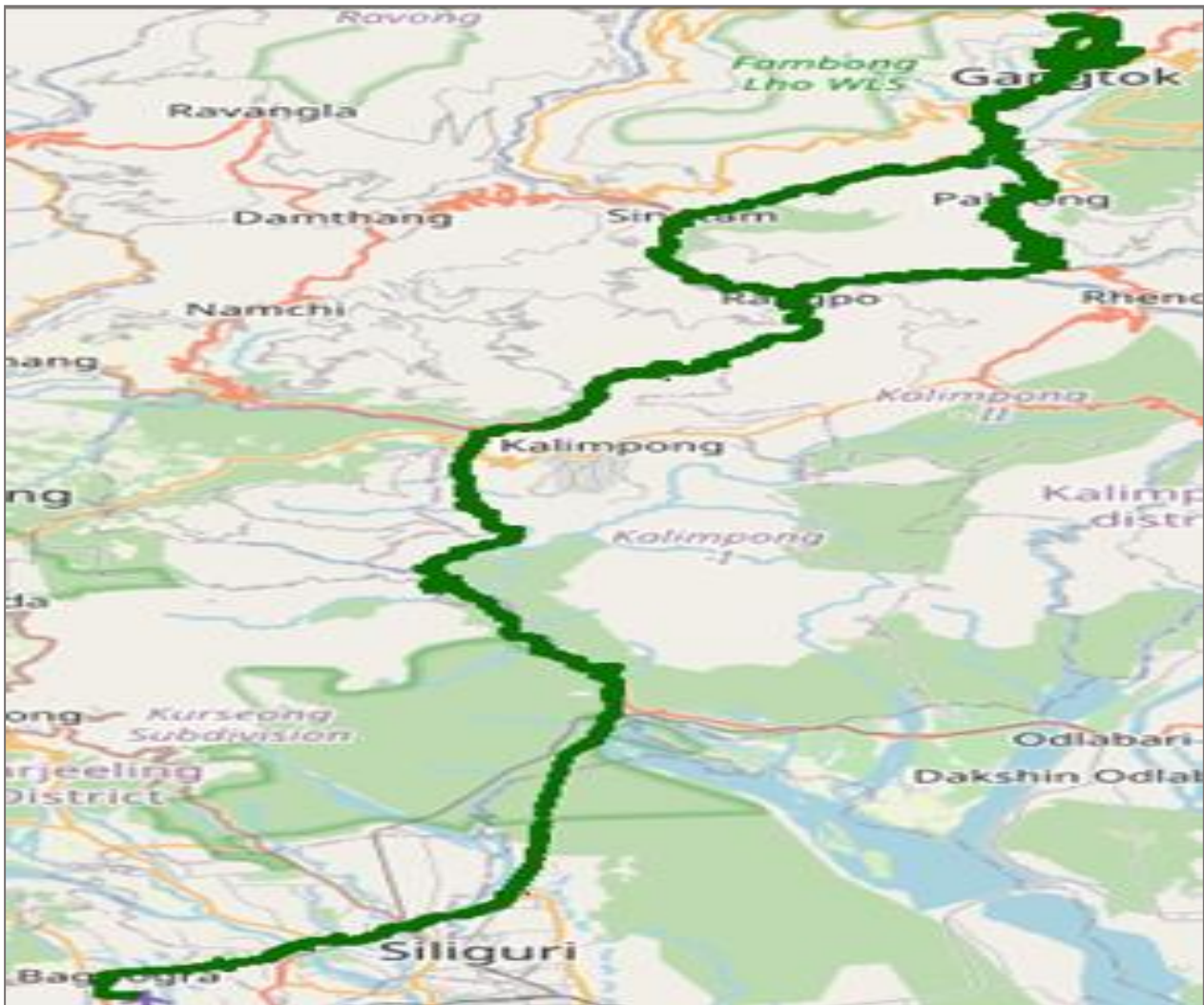
DRIVE ROUTES OF GANGTOK CITY, SIKKIM & NH-10, 717A

DAY-1–Bagdogra–Palpara–Matigara–Siliguri–Malaguri–Bengal safary-Sevok-Kalijhora-Hanuman Jhora-Suntalay-Rambi Bazar-Geil Khola-Tista-Bazar-Melli-Kirney-Bhalukhop–Rangpo–Marjitar–Singtam–Sangkhola–Martam–Namli–Ranipool–Tadong–Deorali Bazar –Gantok.

DAY-2– Vajara Taxi Stand–Hotel Denzong–Lemon Tree Hotel–Tahi Vies Point-Bulbuli Nursery-Junction of Upper Burtuk-Ganesh tok-Hanuman Temple-VIP Colony-Raj Bhawan-Ranka-Barbing-Rumtek Drama Chakra Centre-Mayfair Hotel-Ranipool-Govt. Secondary School, Aho Pul Kishan-Namcheybong-Food Security & Agriculture Office of Pakyong-Panchayat Bhawan Pacheykhani-Rorathang Bridge-Rangpo Rorathang Road-Lupin Ltd-Kumrek-Rangpo Post office.
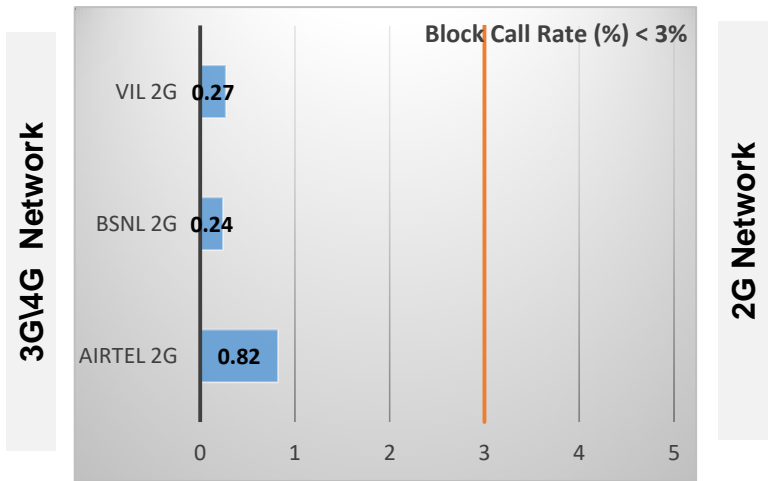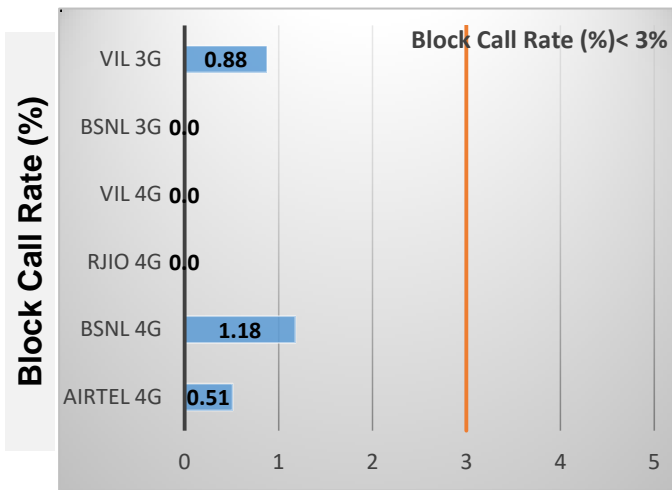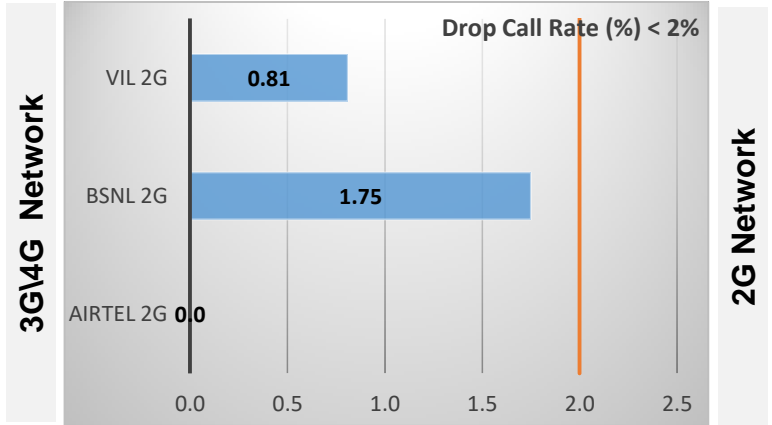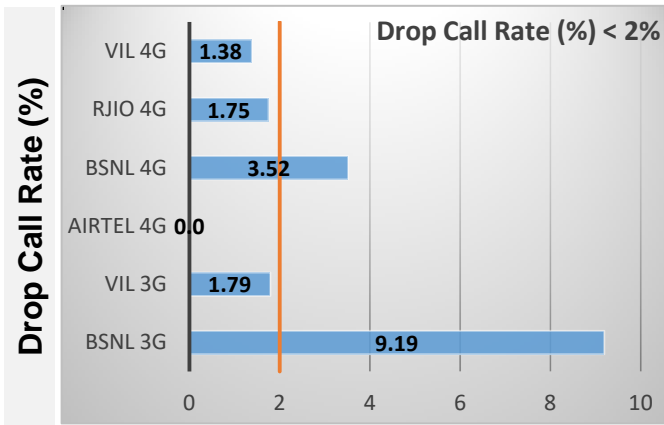
Data Service Test- Static Locations

Static Locations
BAGDOGRA AIRPORT
CENTRAL GOVT. HOLIDAY HOME, GANGTOK

Key Observations

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

KPIs	2G			3G		4G-VoLTE			
	AIRTEL	BSNL	VIL	BSNL	VIL	AIRTEL	BSNL	RJIO	VIL
Drop Call Rate %	0.0	1.75	0.81	9.19	1.79	0.0	3.52	1.75	1.38
Block Call Rate %	0.82	0.24	0.27	0.0	0.88	0.51	1.18	0.0	0.0

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

Voice Calls

Coverage

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

TSPs	2G		
	AIRTEL	**BSNL**	**VIL**
Coverage %	91.0	62.52	80.87

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

TSPs	3G		4G			
	BSNL	**VIL**	**AIRTEL**	**BSNL**	**RJIO**	**VIL**
Coverage %	43.38	78.47	93.60	72.71	94.18	87.52

Summary

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	365	297	373
Blocked Call Rate (%)	0.82	0.24	0.27
CSSR% (Accessibility)	99.10	96.30	99.73
Drop Call Rate (%)	0.0	1.75	0.81
Mobility HOSR (%)	98.80	85.63	99.25
Rx Quality (%)	92.40	85.08	95.71

Voice Call	3G/4G					
	BSNL 3G	VIL 3G	AIRTEL 4G	BSNL 4G	RJIO 4G	VIL 4G
Call Attempt	164	341	386	170	342	363
Blocked Call Rate(%)	0.0	0.88	0.51	1.18	0.0	0.0
CSSR% (Accessibility)	68.18	98.53	99.40	100	95.91	100.0
Drop Call Rate (%)	9.19	1.79	0.0	3.52	1.75	1.38
Mobility HOSR (%)	100.0	99.98	98.10	75.0	97.50	99.29
Rx Quality (%)	73.73	90.41	85.50	70.94	72.17	89.42

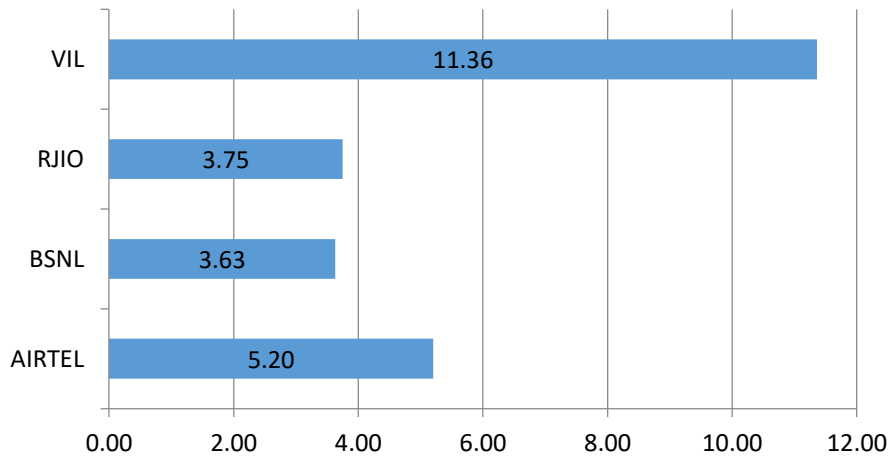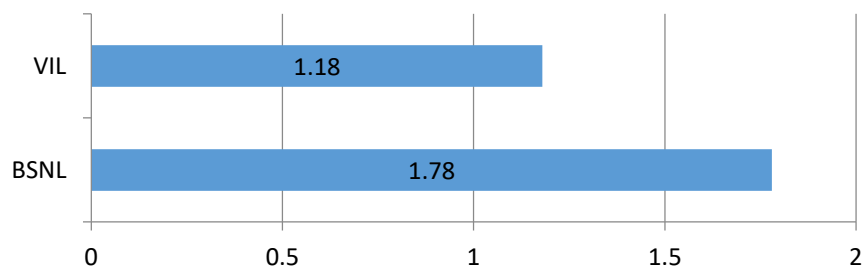## Key Observations

Dynamic Data was tested for 247 Kms. Download Throughput was tested.

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

4G-Dynamic Download Average Throuhput (Mbps)

Operator	Mbps
VIL	11.36
RJIO	3.75
BSNL	3.63
AIRTEL	5.20

3G-Dynamic Download Average Throuhput (Mbps)

Operator	Mbps
VIL	1.18
BSNL	1.78

Summary-Data Services Static

Average Data Services Static	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	***	198.53	89.12
Upload Throughput (kbps)	***	43.11	31.23
Web Browsing Delay (sec)	***	30.03	4.12
Latency (msec)	***	2.23	158.1

*** AIRTEL did not submit the average Data Services Static in 2G Network

Average Data Services Static	3G/ 4G					
	BSNL 3G	VIL 3G	AIRTEL 4G	BSNL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.79	11.41	28.0	8.95	12.60	9.24
Upload Throughput in Mbps	0.43	1.41	11.50	3.46	6.84	9.62
Video streaming delay (secs)	10.30	0.66	0.06	1.23	77.0	0.64
Web Browsing Delay (secs)	6.23	0.23	0.08	1.01	19.69	0.22
Latency (msec)	1.38	87	80	1.03	82.16	92.75

Summary-Data Services Static

Location:- Bagdogra Airport	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	***	209.10	89.12
Upload Throughput (kbps)	***	64.86	31.23
Web Browsing Delay (sec)	***	52.50	4.12
Latency (msec)	***	2.12	158.1

Location:- Bagdogra Airport	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.79	28.80	12.55	10.79
Upload Throughput in Mbps	0.43	11.0	9.05	7.48
Video streaming delay (secs)	10.3	0.05	77.0	0.57
Web Browsing Delay (secs)	6.23	0.11	18.95	0.23
Latency (msec)	1.38	80.0	80.10	87.0

Location:- CENTRAL GOVT. HOLIDAY HOME, GANGTOK	2G		
	AIRTEL	BSNL	VIL
Download throughput in(kbps)	***	187.96	87.32
Upload Throughput in (kbps)	***	21.36	37.45
Web Browsing Delay (secs)	***	7.56	4.34
Latency (msec)	***	2.34	176.4

| Location:- CENTRAL GOVT. HOLIDAY HOME, GANGTOK	4G				
	VIL 3G	AIRTEL 4G	BSNL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	11.41	27.20	8.95	12.65	7.70
Upload Throughput in (mbps)	1.41	12 .0	3.46	4.63	11.76
Video streaming delay (secs)	0.66	0.06	1.23	77	0.72
Web Browsing Delay (secs)	0.23	0.06	1.012	20.44	0.22
Latency (msec)	87	80	1.034	84.23	98.5

*** AIRTEL did not submit 2G Data Services Static Summary

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	91.0
BSNL 2G	62.52
VIL 2G	80.87
BSNL 3G	43.38
VIL 3G	78.47
AIRTEL 4G	93.60
BSNL 4G	72.71
RJIO 4G	94.18
VIL 4G	87.52

Coverage Rate %
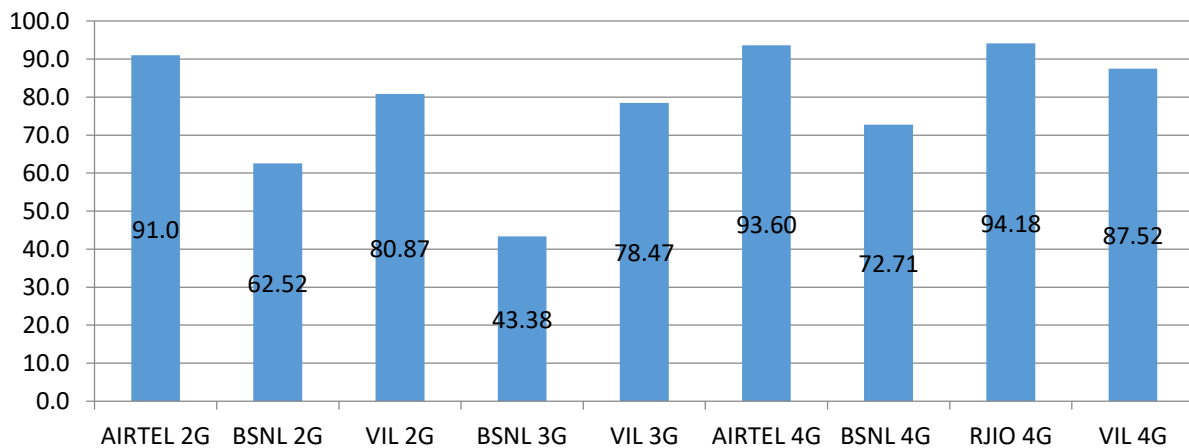
AIRTEL

Technology	Coverage Rate %
2G	91.0
4G	93.60

2G
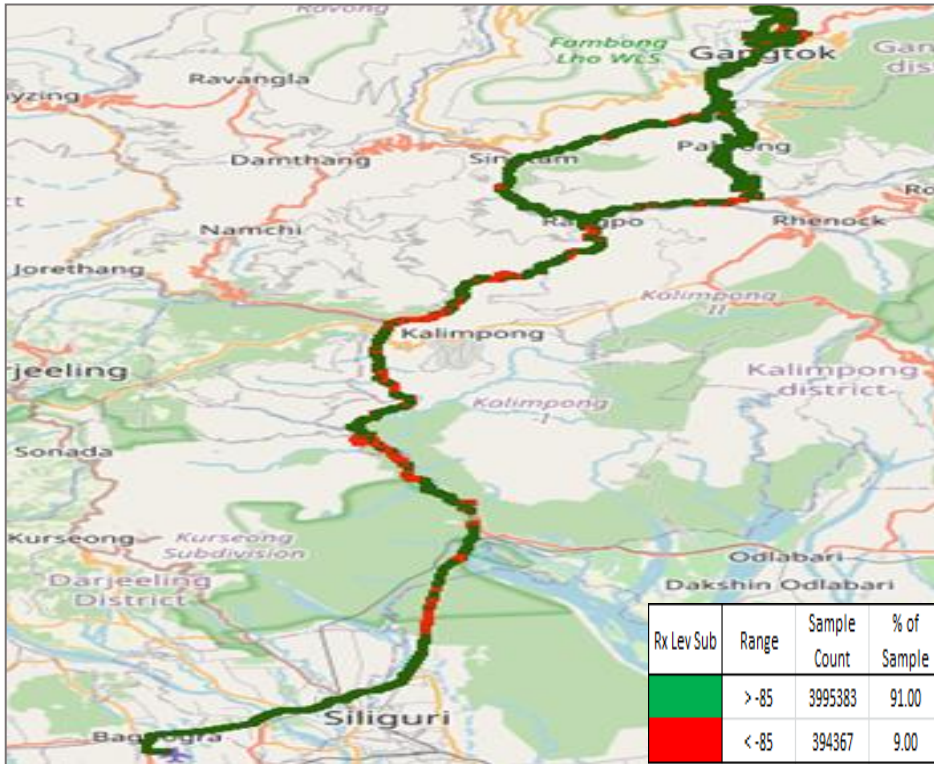
Overall RxLevel	Sample %
[Max >=-75]	49.4
[-75 >=-85)	41.6
[-85 >=-95)	6.5
[-95 >=Min)	2.5
Total	**100%**

Rx Lev Sub	Range	Sample Count	% of Sample
(green)	>-85	3995383	91.00
(red)	<-85	394367	9.00

4G
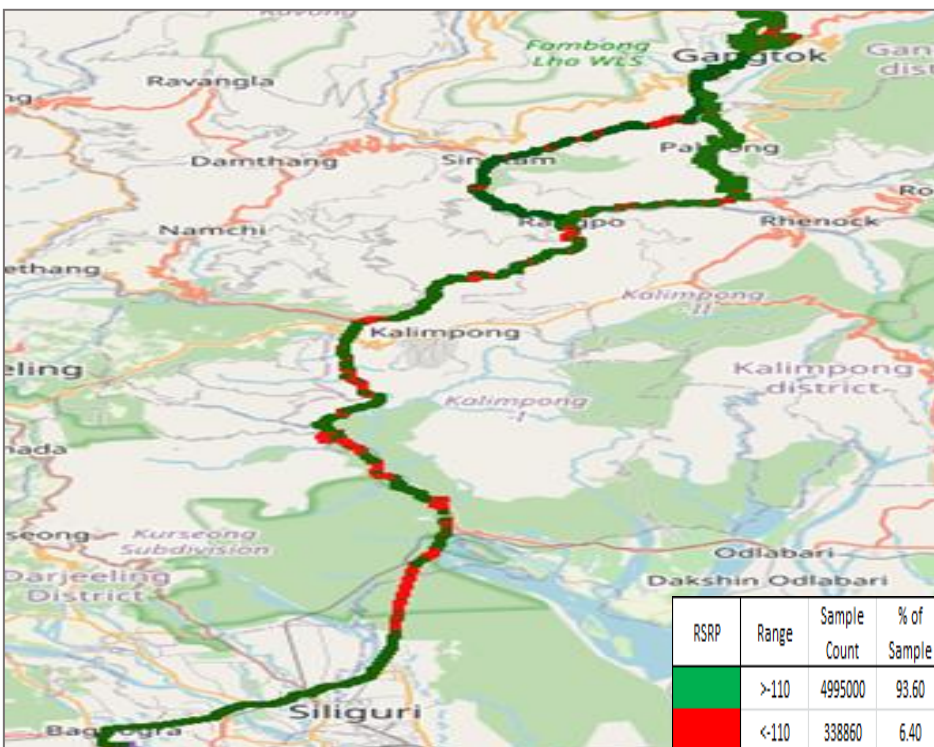
Overall RSRP	Sample %
[Max >=-80]	11.5
[-80 >=-90)	20
[-90 >=-110)	62.1
[-110 >=Min)	6.4
Total	**100%**

RSRP	Range	Sample Count	% of Sample
(green)	>-110	4995000	93.60
(red)	<-110	338860	6.40

BSNL

Technology	Coverage Rate %
2G	62.52
3G	43.38

2G

Overall RxLevel	Sample %
[Max >=-75]	37.93
[-75 >=-85)	26.09
[-85 >=-95)	28.86
[-95 >=Min)	7.12
Total	100

3G
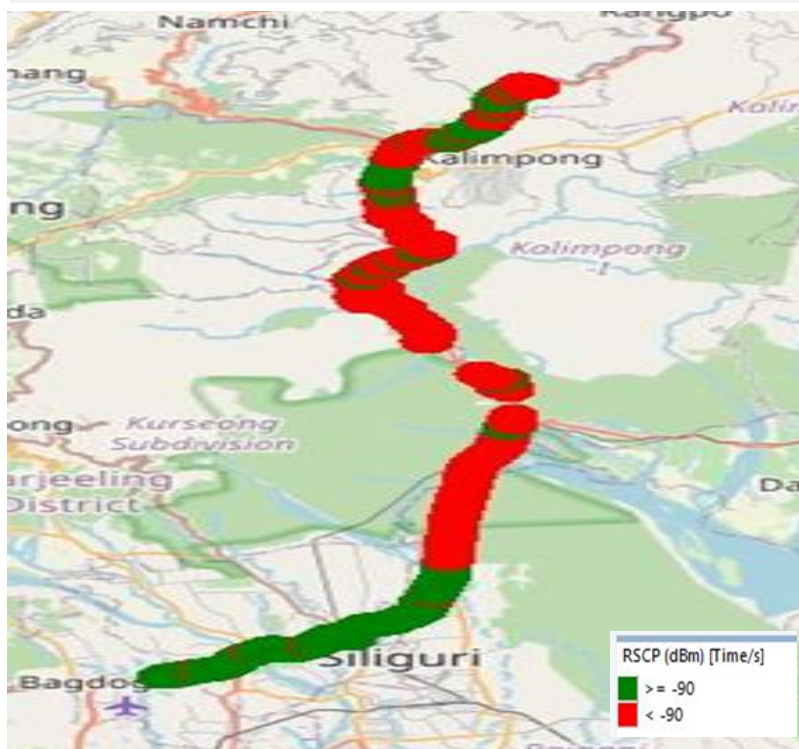
Overall RSCP	Sample %
[Max >=-70]	12.70
[-70 >=-80)	14.22
[-80 >=-90)	16.46
[-90 >=Min)	56.62
Total	100

BSNL

Technology	Coverage Rate %
4G	72.71

4G

Legend:
- -105 to -100 (12%) (11411)
- -120 to -105 (39%) (4187)
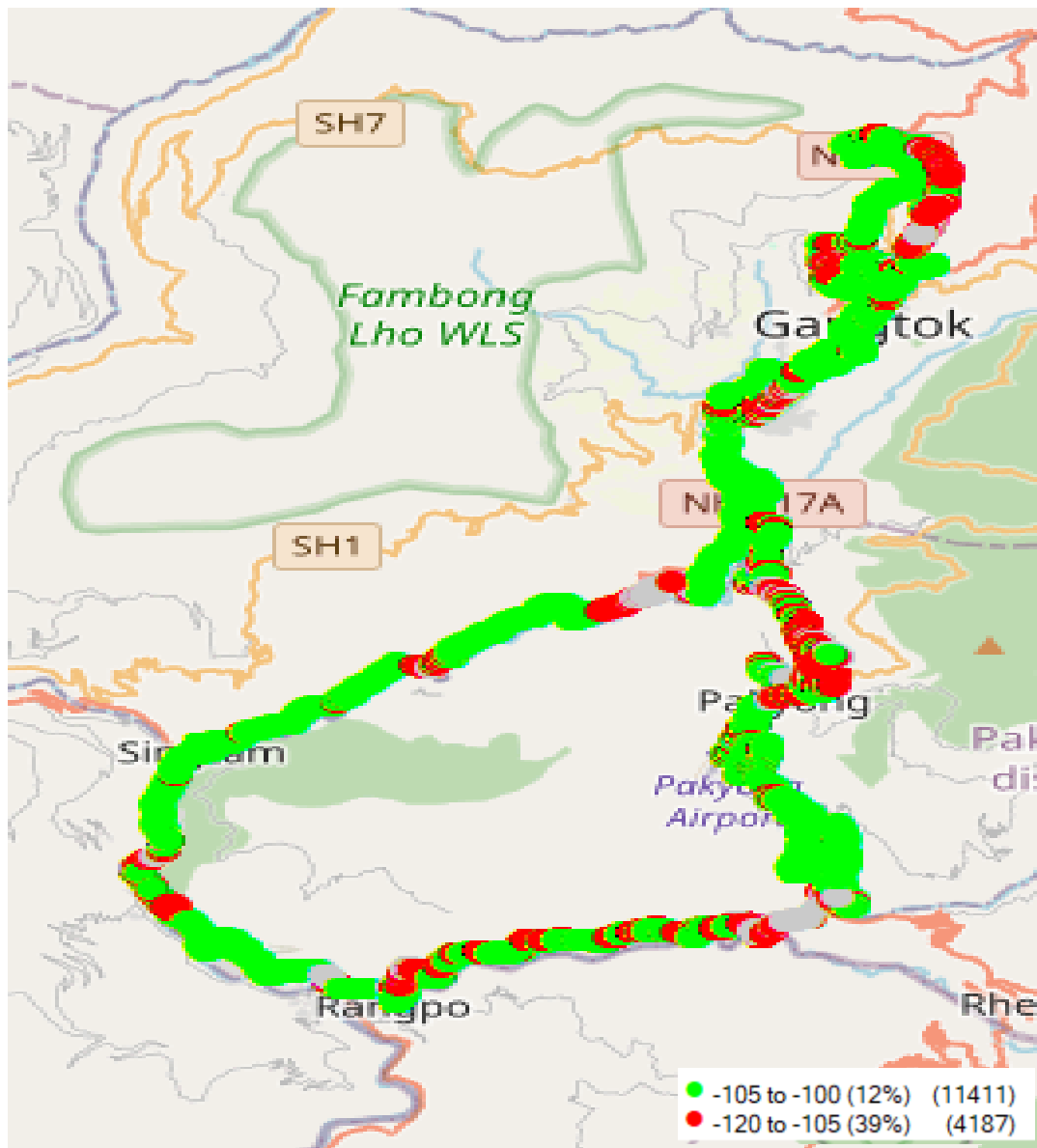
Overall RSRP	Sample %
[Max >=-80]	4.29
[-80 >=-90)	10.20
[-90 >=-110)	58.20
[-110 >=Min)	27.29
Total	**100**

RJIO

Technology	Coverage Rate %
4G	94.18

4G

Qualcomm Lte/LteAdv Intrafreq Measure
PCell Serving Cell Serving RSRP RSRP[dBm]

● -110 <= x (94.18%, 33388)
● x < -110 (5.82%, 2063)
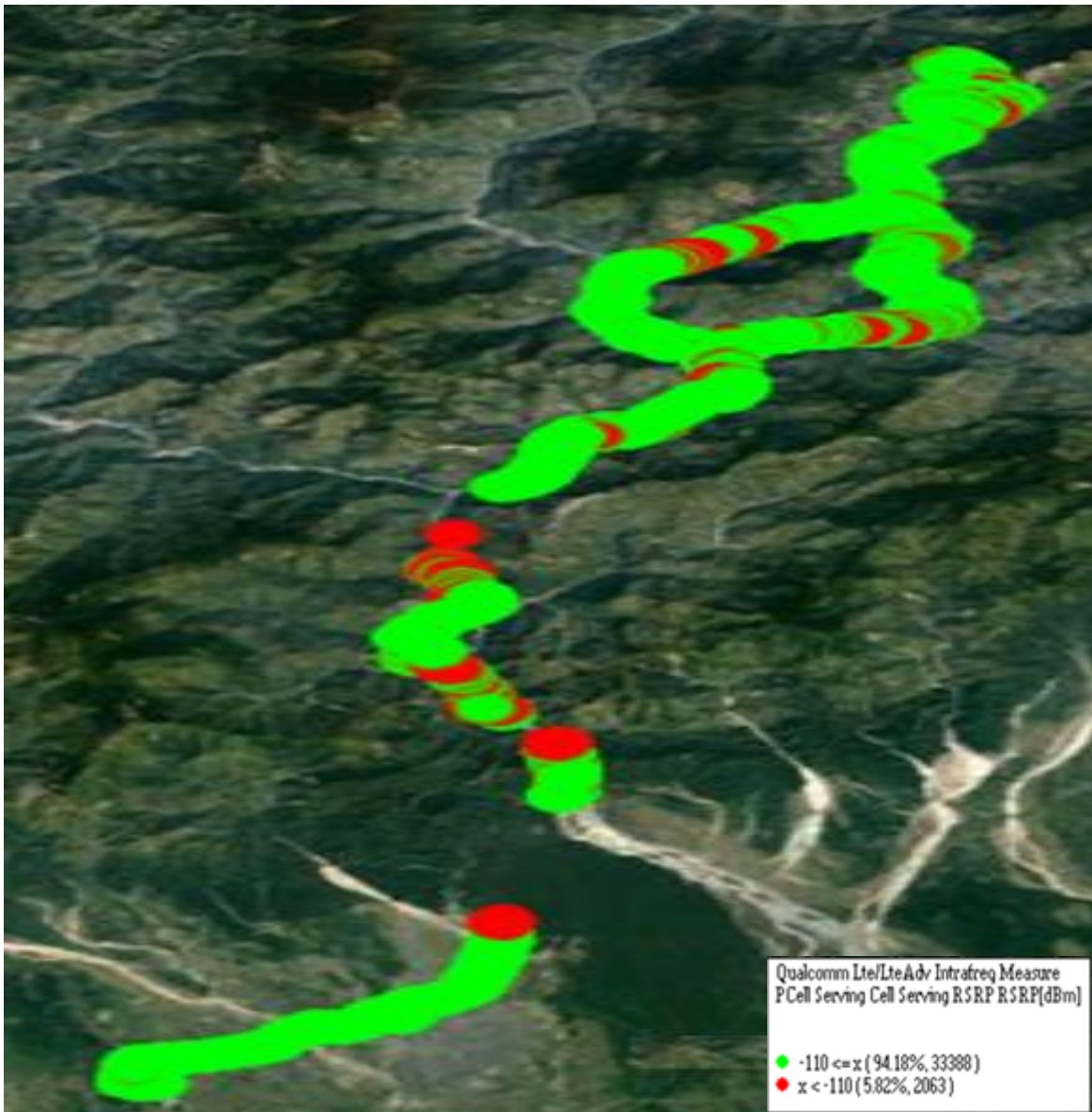
Overall RSRP	Sample %
[Max >=-80]	22.14
[-80 >=-90)	27.97
[-90 >=-110)	44.07
[-110 >=Min)	5.82
Total	**100%**

VIL

Technology	Coverage Rate %
2G	80.87
3G	78.47

2G

RXLEV_SubdBm
- 🔴 -120 to -85 (9386983) (19.13%)
- 🟢 -85 to 0 (39682451) (80.87%)
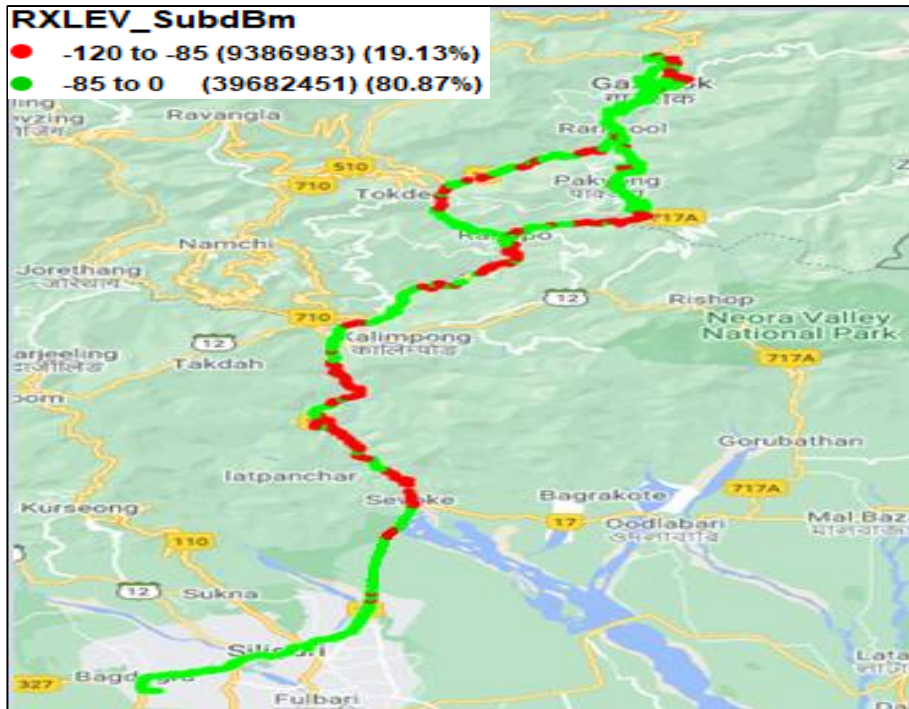
Overall RxLevel	Sample %
[Max >=-75]	52.74
[-75 >=-85)	28.13
[-85 >=-95)	15.50
[-95 >=Min)	3.63
Total	**100%**

3G

Agg. Active RSCP (dBm)
- 🔴 -120 to -90 (10148551) (21.53%)
- 🟢 -90 to 0 (36988240) (78.47%)
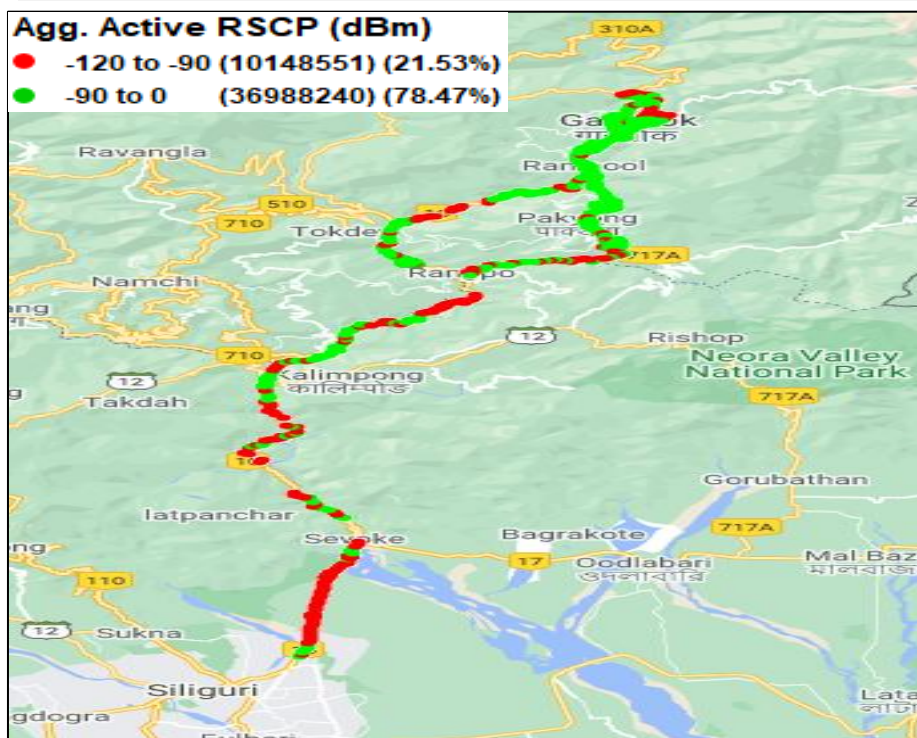
Overall RSCP	Sample %
[Max >=-70]	20.42
[-70 >=-80)	28.51
[-80 >=-90)	29.54
[-90 >=Min)	21.53
Total	**100%**

VIL

Technology	Coverage Rate %
4G	87.52

4G

Serving Cell RSRP (dBm)
- -120 to -110 (7913732) (12.48%)
- -110 to 0   (55497584) (87.52%)
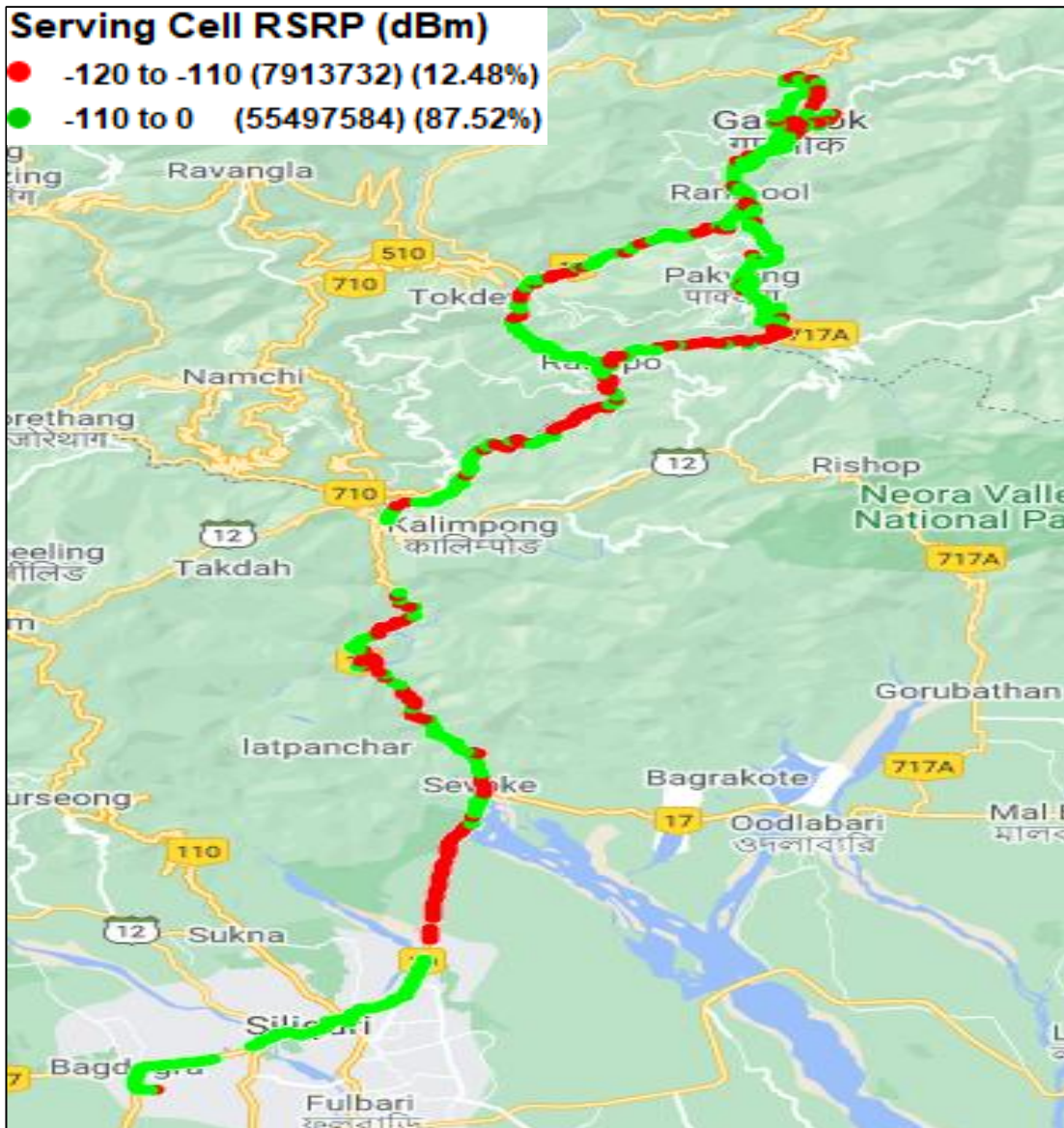
Overall RSRP	Sample %
[Max >=-80]	12.96
[-80 >=-90)	19.25
[-90 >=-110)	55.31
[-110 >=Min)	12.48
Total	**100%**

For measuring voice quality, as per the QoS norms, Rx Quality<=5 for GSM , Ec/No >= -14 dBm for 3G 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 ≥ 95%.

TSP	Rx Quality %
AIRTEL 2G	92.40
BSNL 2G	85.08
VIL 2G	95.71
BSNL 3G	73.73
VIL 3G	90.41
AIRTEL 4G	85.50
BSNL 4G	70.94
RJIO 4G	72.17
VIL 4G	89.42

Rx Quality %
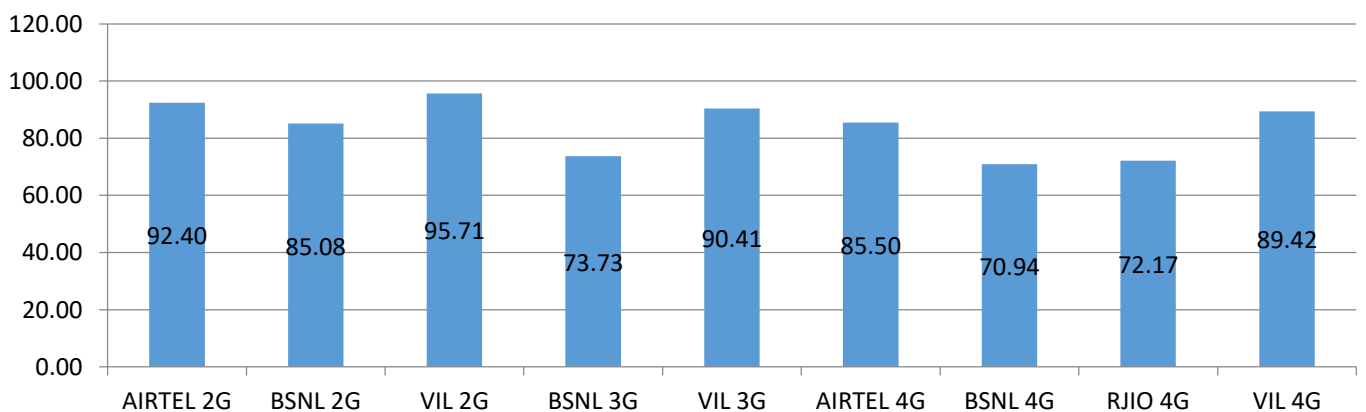
AIRTEL

Technology	Rx Quality %
2G	92.40
4G	85.50

2G

Rx Qual Sub	Range	Sample Count	% of Sample
🟩	< 5	4055730	92.40
🟥	> 5	334020	7.60
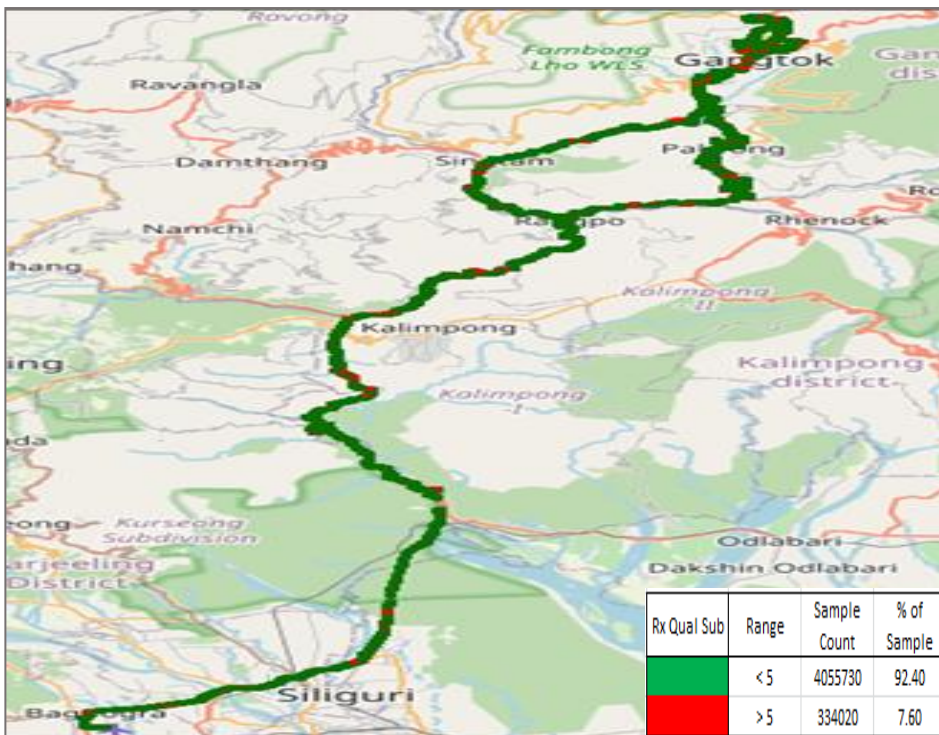
Overall Rx Quality	Sample %
(Min <=2)	84.3
(2 <=3)	2.8
(3 <=4)	2.7
(4 <=5)	2.6
(5 <=Max)	**7.6**
Total	**100**

4G

SINR	Range	Sample Count	% of Sample
🟩	> 0	4561415	85.50
🟥	< 0	772445	14.50
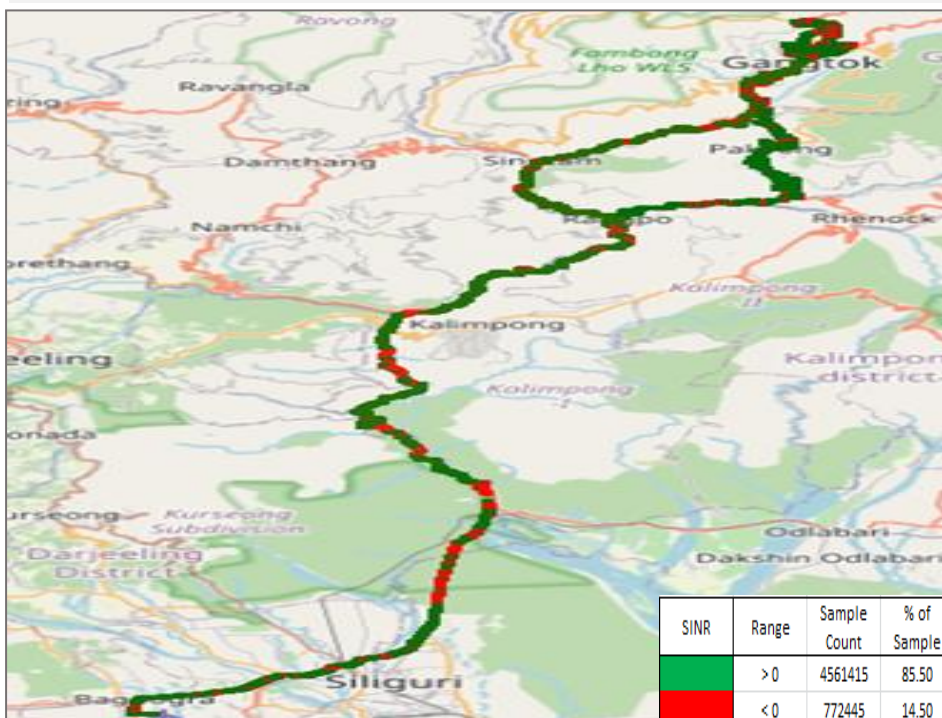
Overall SINR	Sample %
(Min <=0)	14.5
(0 <=5)	40.7
(5 <=10)	18.5
(10 <=15)	12.3
(15 <=Max)	**14**
Total	**100**

BSNL

Technology	Rx Quality %
2G	85.08
3G	73.73

2G
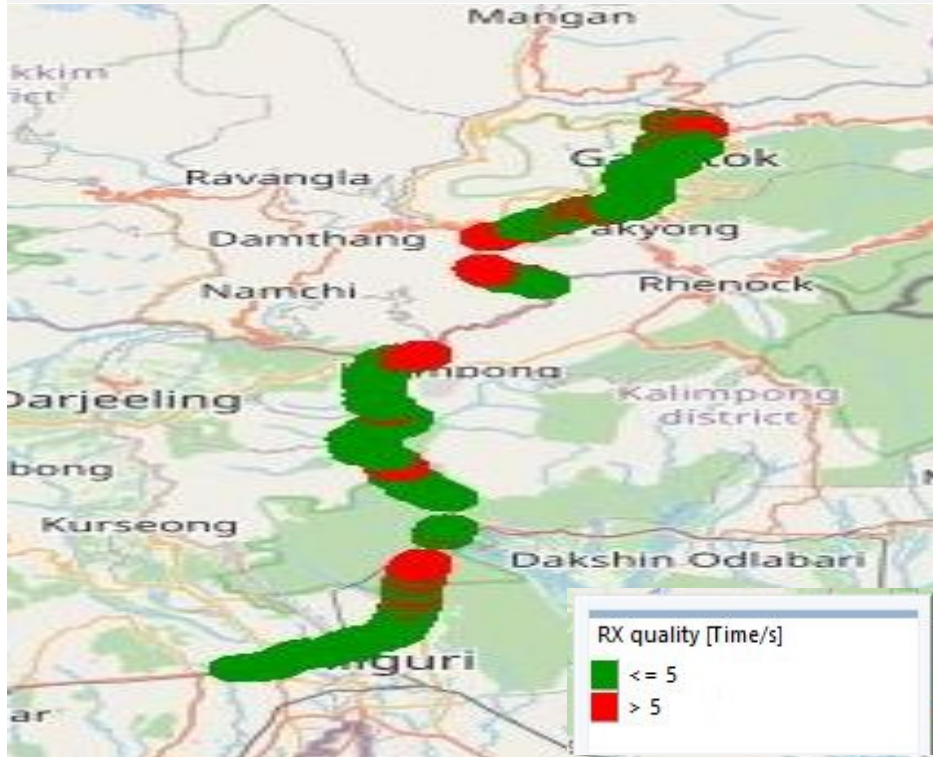
Overall Rx Quality	Sample %
(Min <=2)	79.43
(2 <=3)	2.11
(3 <=4)	1.83
(4 <=5)	1.72
(5 <=Max)	14.92
Total	100

3G
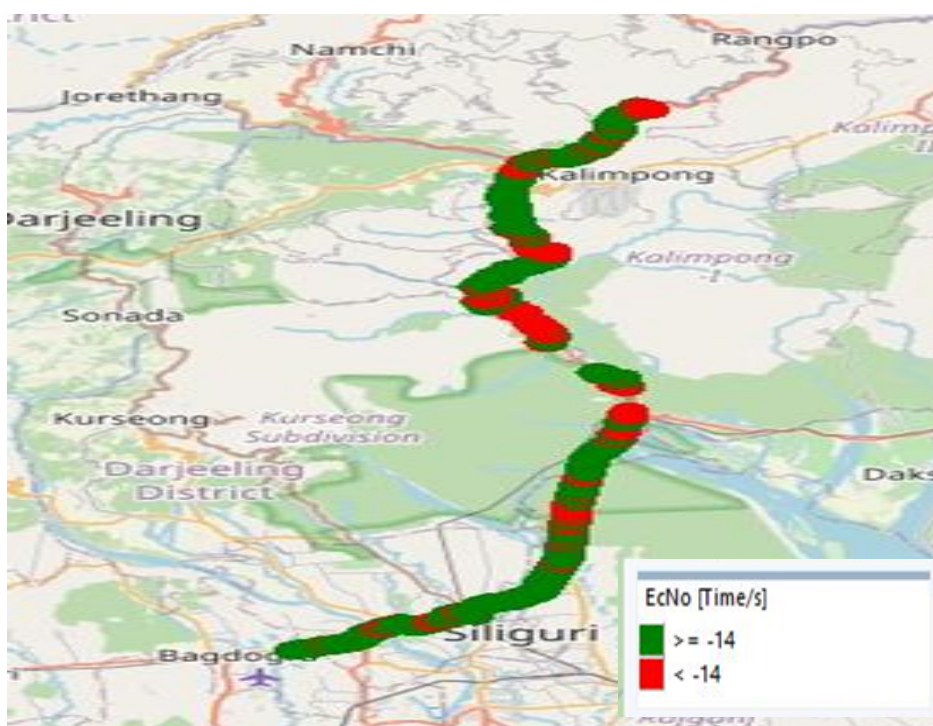
Overall EcNo	Sample %
(Max <=-6)	10.82%
(-6 <=-9)	11.88%
(-9 <=-11)	23.77%
(-11 <=-14)	27.25%
(-14 <= Min)	26.27%
Total	100.00%

BSNL

Technology	Rx Quality %
4G	70.94

4G
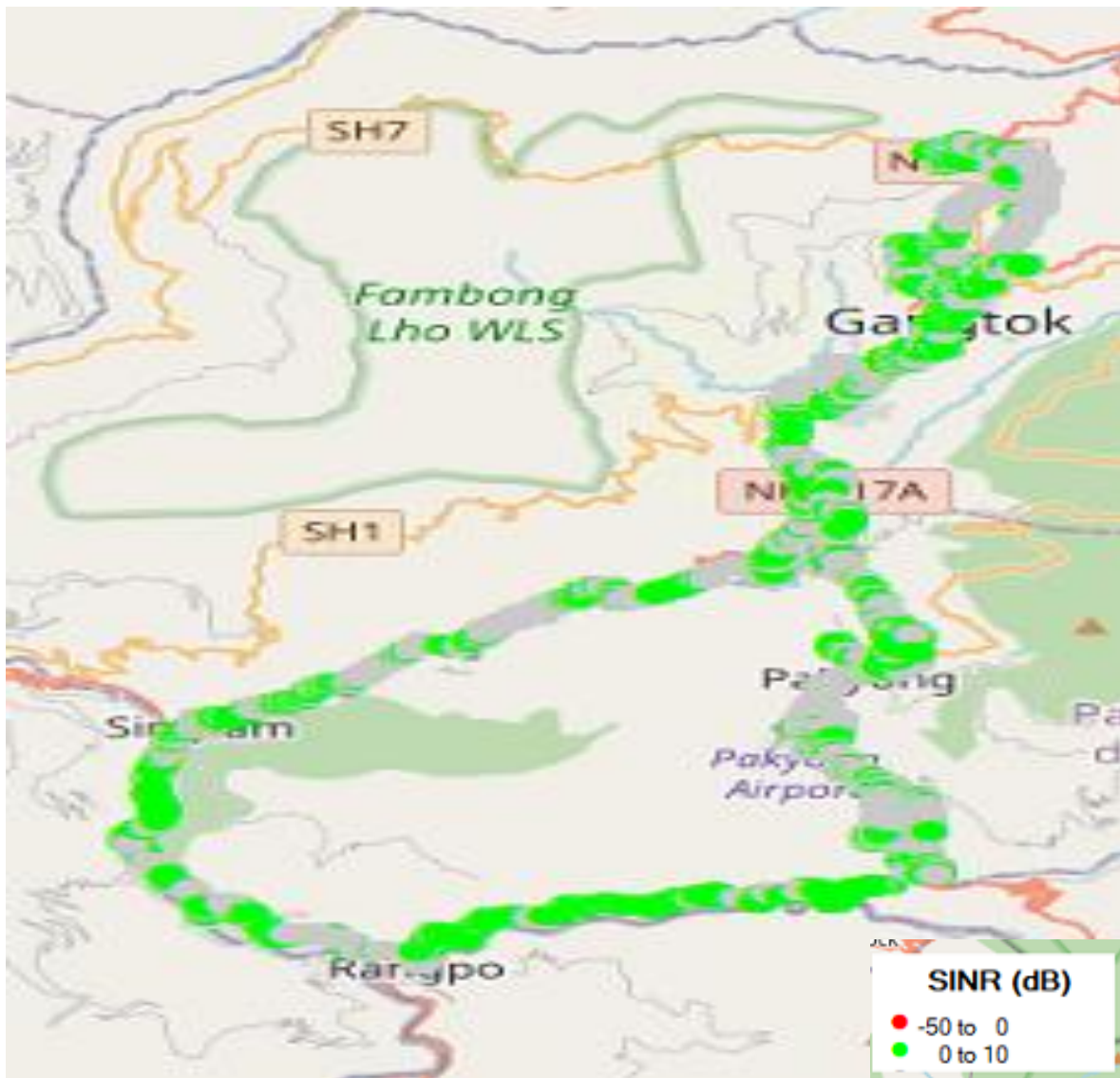
Overall SINR	Sample %
(Min <=0)	29.06
(0 <=5)	33.93
(5 <=10)	13.77
(10 <=15)	11.32
(15 <=Max)	11.89
Total	**100**

RJIO

Technology	Rx Quality %
4G	72.17

4G

Qualcomm Lte/LteAdv Intrafreq Measure
PCell Serving Cell Serving SINR
SINR[dB]

● 0 <=x (72.17%, 25585)
● x < 0 (27.83%, 9866)
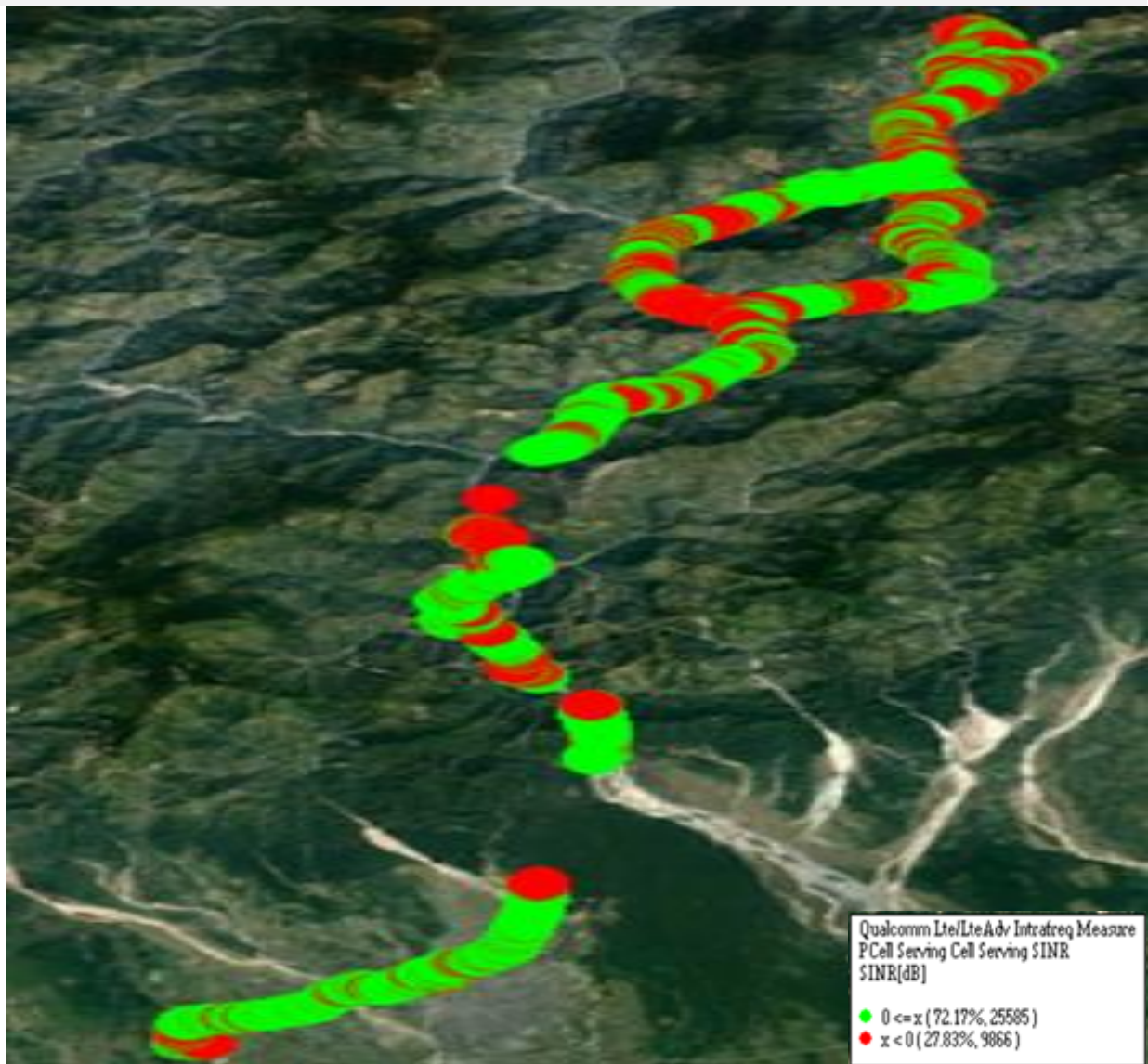
Overall SINR	Sample %
(Min <=0)	27.83
(0 <=5)	28.09
(5 <=10)	20.74
(10 <=15)	12.86
(15 <=Max)	**10.48**
Total	**100%**

VIL

Technology	Rx Quality %
2G	95.71
3G	90.41

2G
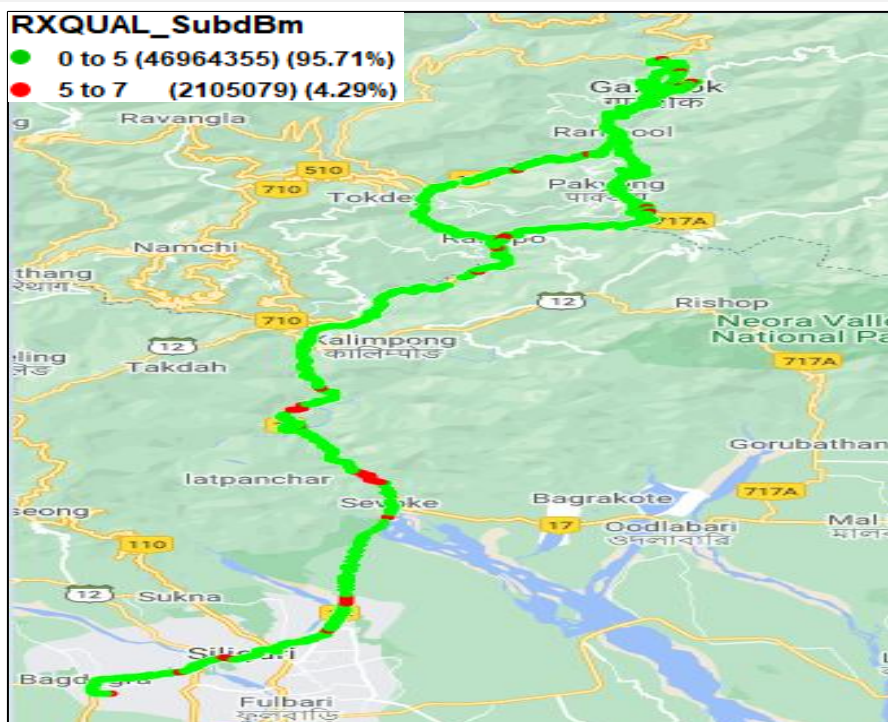
Overall Rx Quality	Sample %
(Min <=2)	85.28
(2 <=3)	3.81
(3 <=4)	2.97
(4 <=5)	3.65
(5 <=Max)	4.29
Total	**100%**

3G
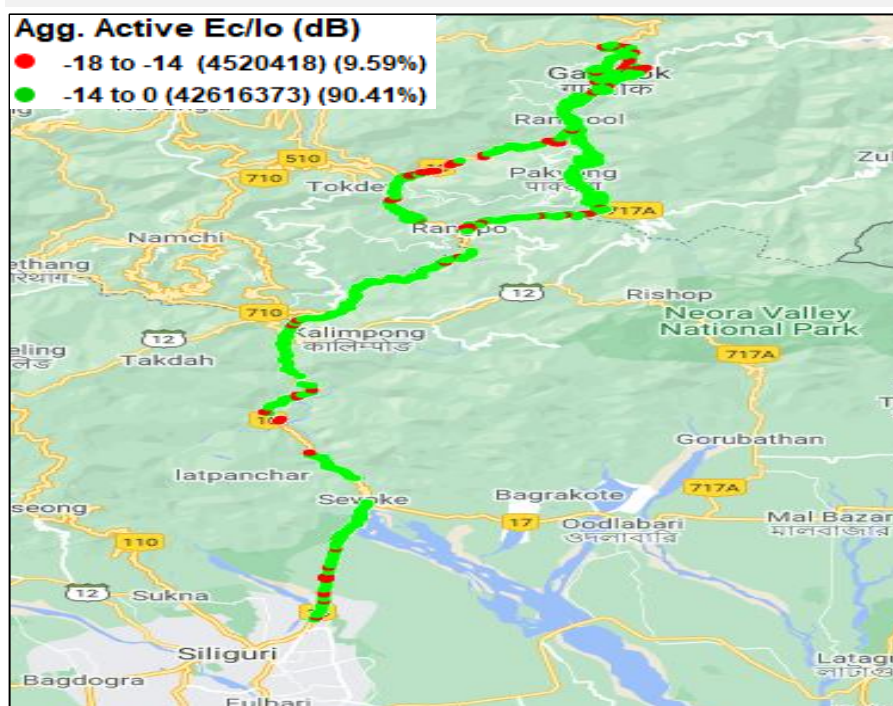
Overall EcNo	Sample %
(Max <=-6)	23.20
(-6 <=-9)	29.41
(-9 <=-11)	21.93
(-11<=-14)	15.87
(-14 <= Min)	9.59
Total	**100%**

VIL

Technology	Rx Quality %
4G	89.42

4G

RS SINR Carrier 1 (dB)
- 🔴 -40 to 0 (6708917) (10.58%)
- 🟢 0 to 40 (56702399) (89.42%)
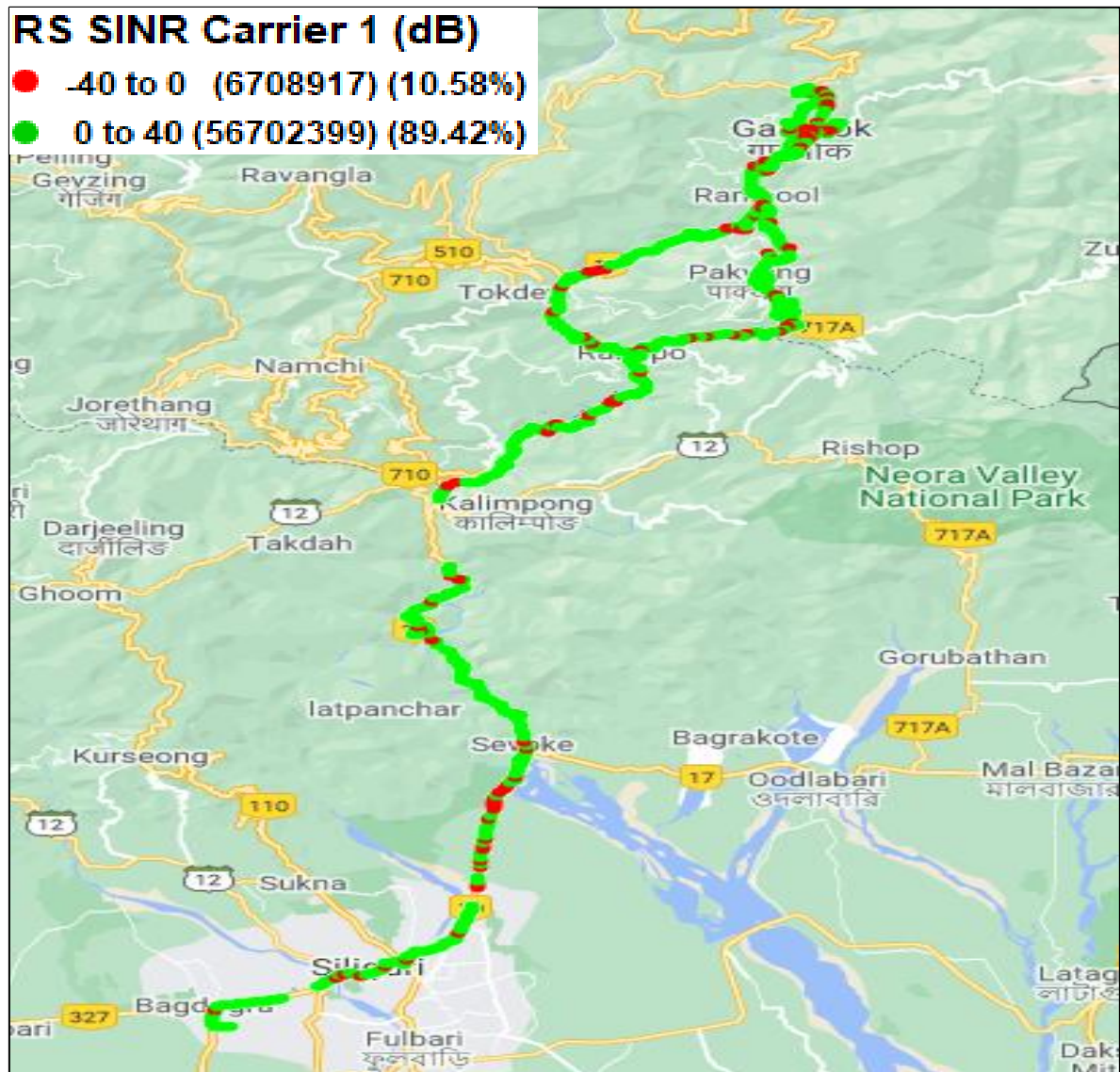
Overall SINR	Sample %
(Min <=0)	10.58
(0 <=5)	30.13
(5 <=10)	22.52
(10 <=15)	20.71
(15 <=Max)	16.06
Total	**100%**

AIRTEL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	152

2G

2G Data	Range	Sample Count	% of Sample
(green)	>100 Kbps	2308309	71.80
(red)	< 100 Kbps	908791	28.20
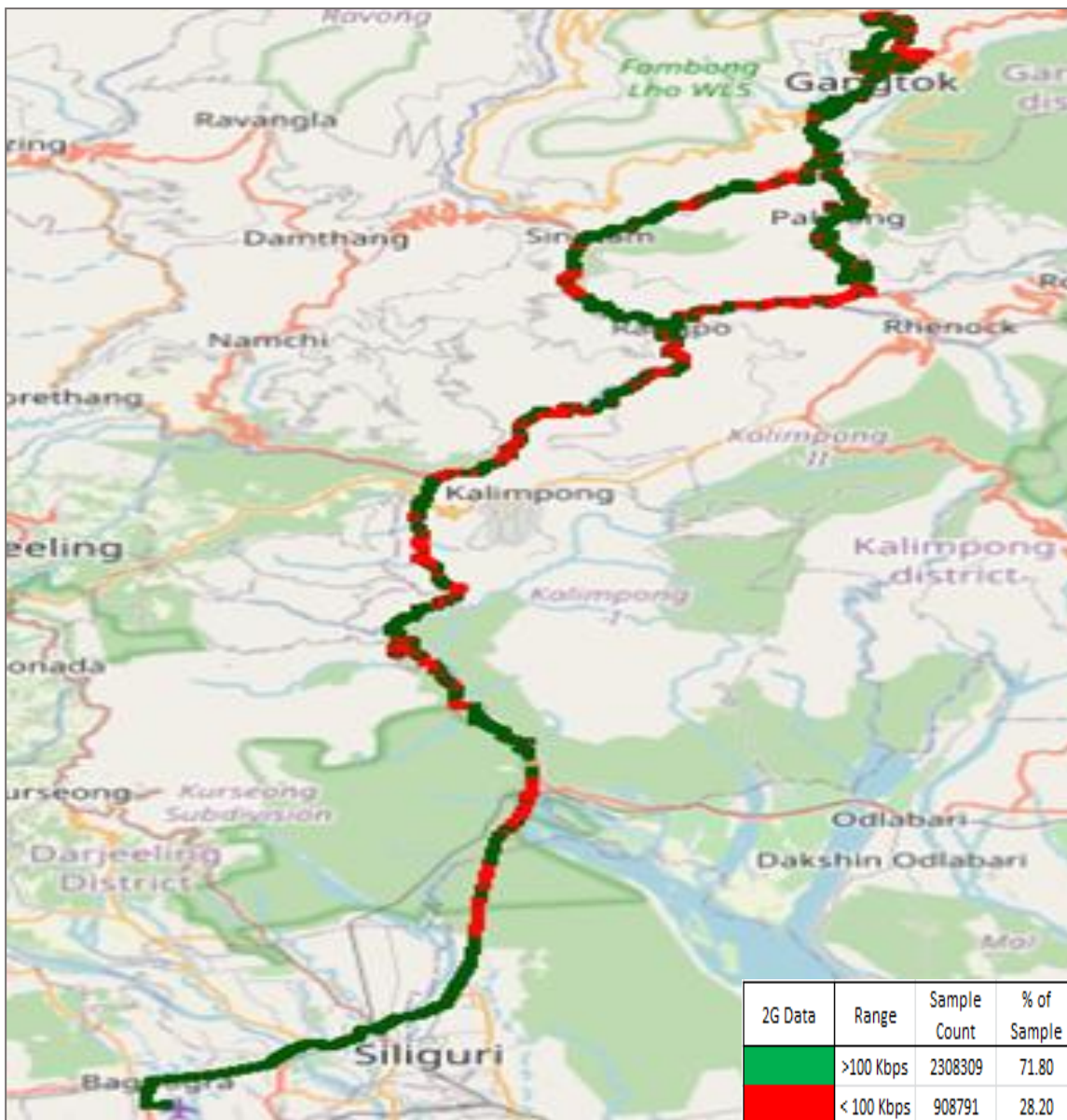
AVG. DOWNLOAD SPEED (Kbps)	152 Kbps
% FILE TRANSFER COMPLETE	100%
DL throughput	Sample %
0 to 50 Kbps	12.6
50 to 100 Kbps	15.6
100 to 200 Kbps	66.9
200 to 300 Kbps	2.3
>300 Kbps	2.6
Total	100%

AIRTEL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	5.20

4G

4G Data	Range	Sample Count	% of Sample
(green)	>2 Mbps	5154553	82.10
(red)	<2 Mbps	1125110	17.90
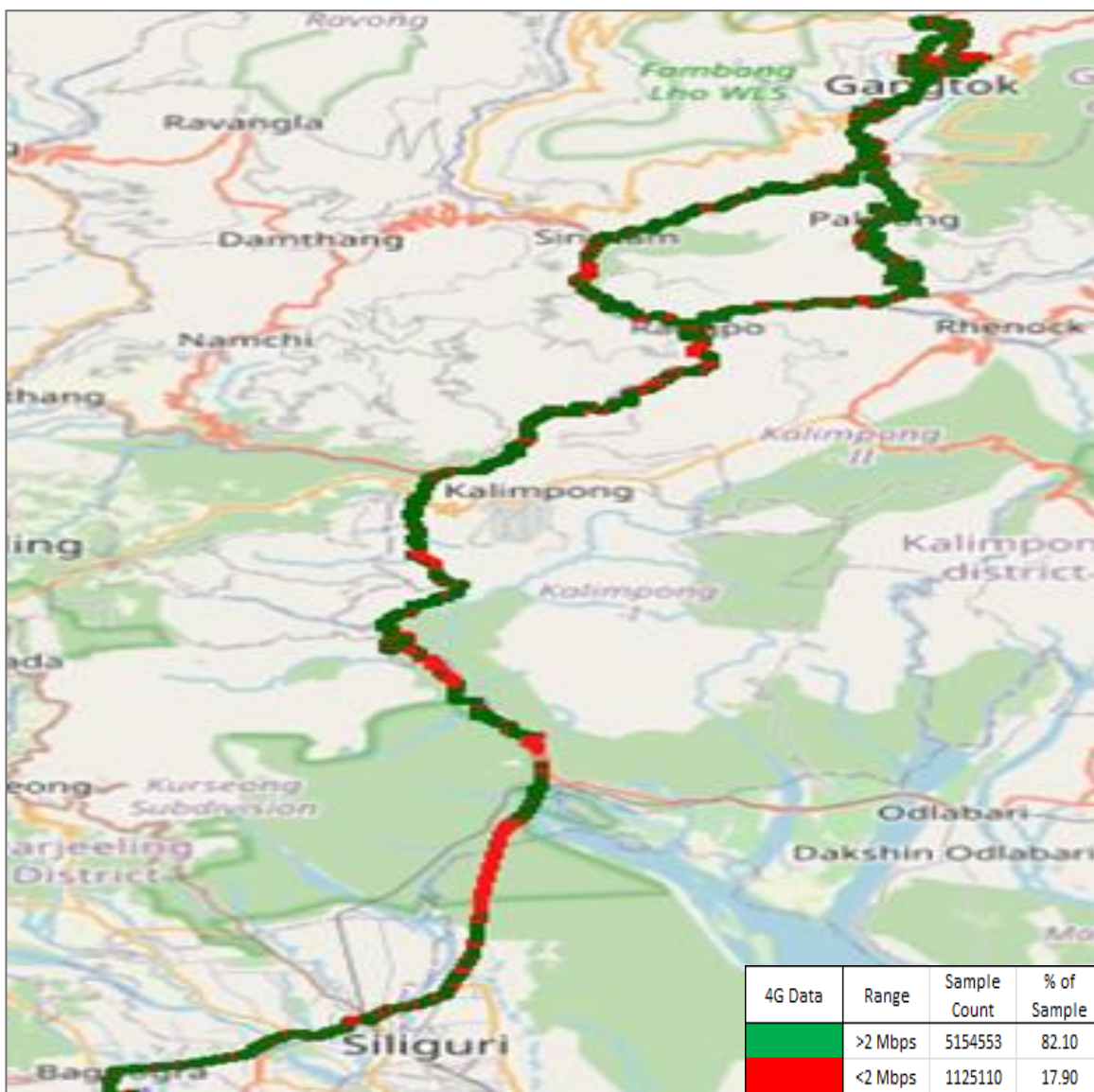
AVG. DOWNLOAD SPEED (Mbps)	5.20
% FILE TRANSFER COMPLETE	100%
DL throughput	Sample %
0 to 1 Mbps	9
1 to 2 Mbps	8.9
2 to 5 Mbps	41.9
5 to 10 Mbps	30.2
>10 Mbps	10
Total	**100%**

BSNL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	121.52

2G
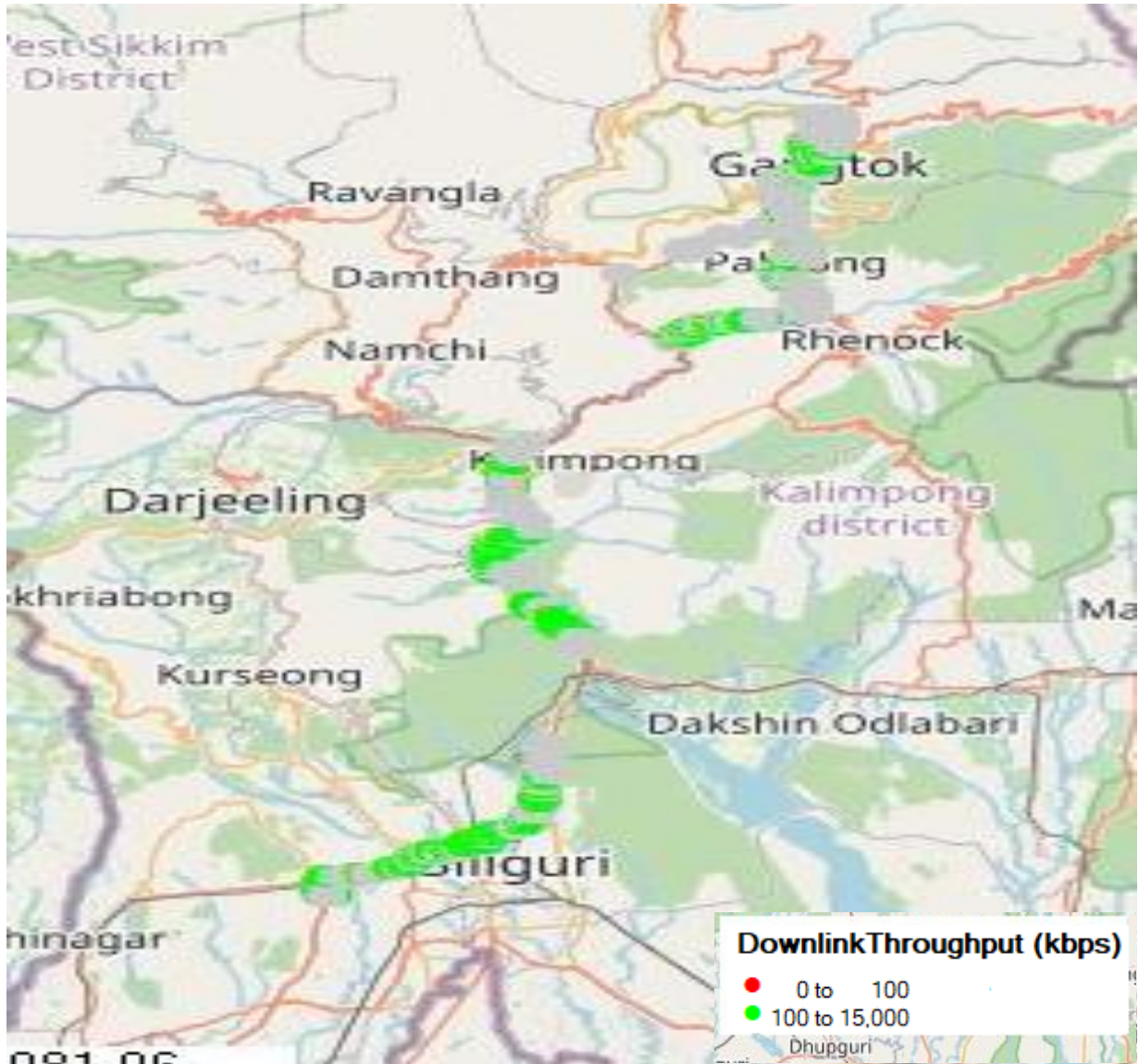
AVG. DOWNLOAD SPEED (Kbps)	121.52
% FILE TRANSFER COMPLETE	80.625
DL throughput	Sample %
0 to 50 Kbps	25.15%
50 to 100 Kbps	23.67%
100 to 200 Kbps	22.87%
200 to 300 Kbps	5.45%
>300 Kbps	22.87%
Total	100.00%

BSNL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	1.78

3G
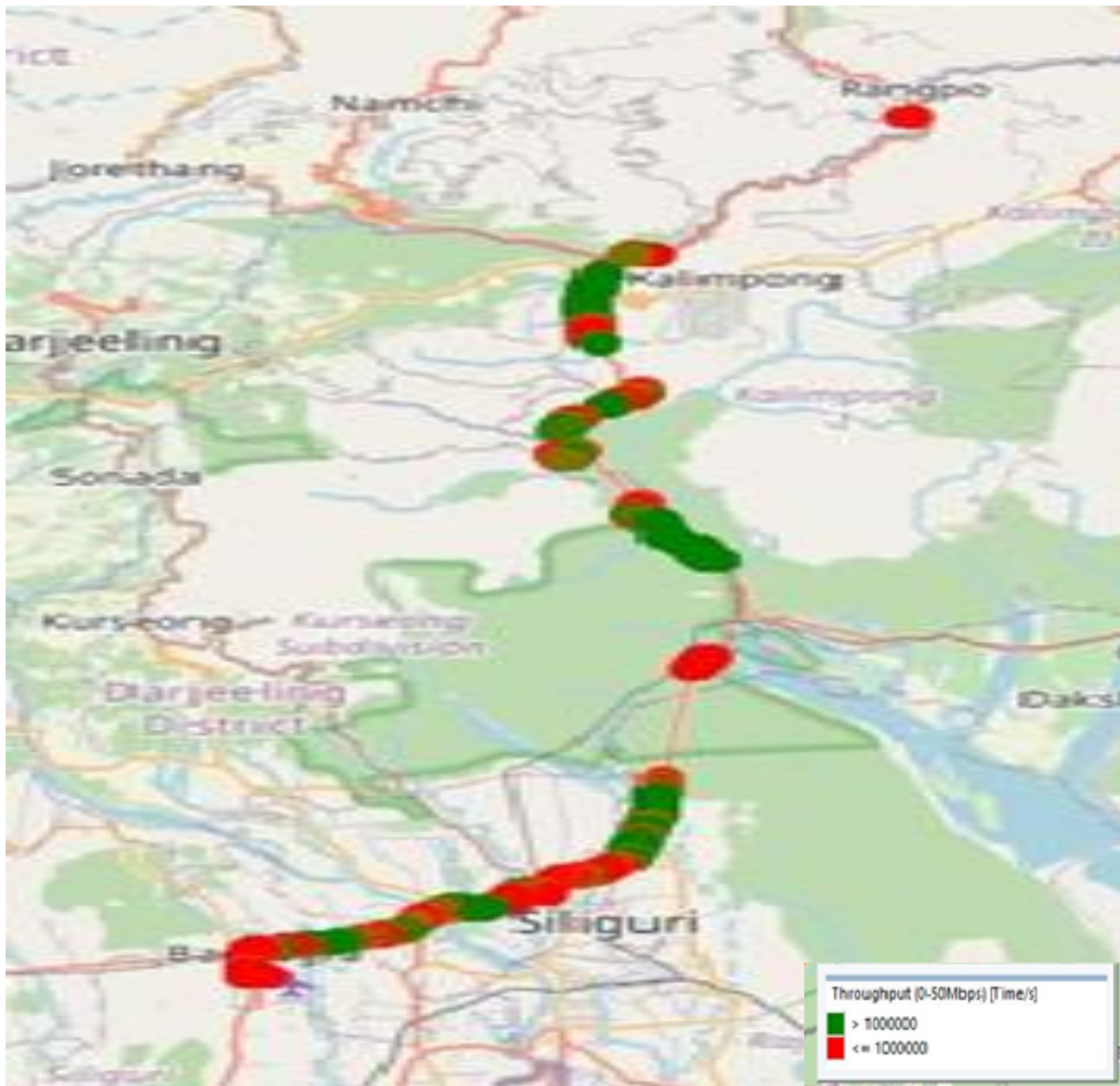
AVG. DOWNLOAD SPEED (Mbps)	1.78
% FILE TRANSFER COMPLETE	71.59
DL throughput	Sample %
0 to 0.5 Mbps	23.07%
0.5 to 1 Mbps	13.81%
1 to 2 Mbps	16.54%
2 to 5 Mbps	43.10%
>5 Mbps	3.49%
Total	100.00%

BSNL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	3.63
4G	

RLC DL Throughput(kbps)
- 2,000 to 20,000
- 0 to 2,000
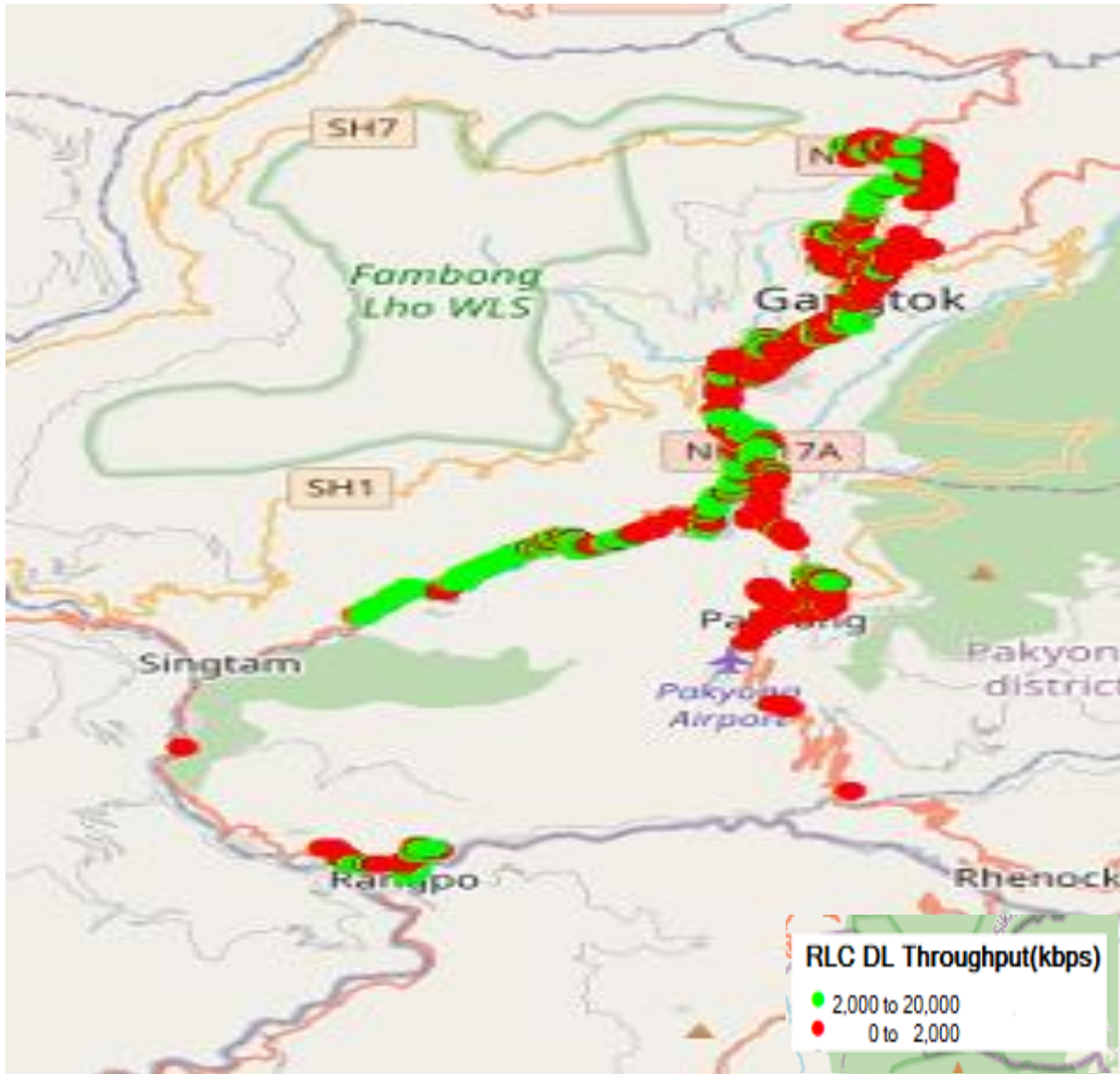
AVG. DOWNLOAD SPEED (Mbps)	3.63
% FILE TRANSFER COMPLETE	91.88
DL throughput	**Sample %**
0 to 1 Mbps	38.24
1 to 2 Mbps	21.55
2 to 5 Mbps	26.11
5 to 10 Mbps	13.65
>10 Mbps	0.42
Total	**100%**

RJIO

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	3.75

4G
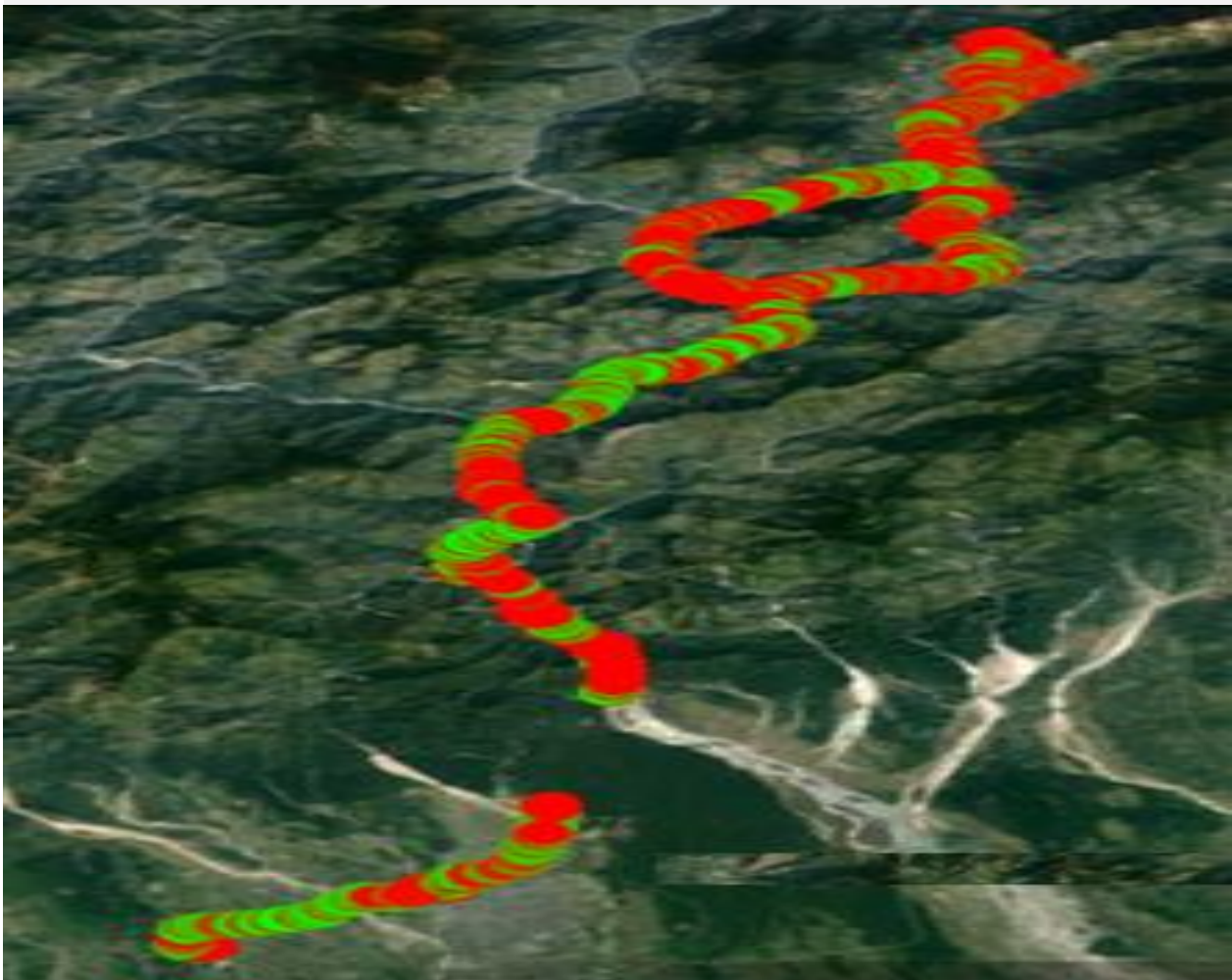
AVG. DOWNLOAD SPEED (Mbps)	3.75
% FILE TRANSFER COMPLETE	99.82
DL throughput	Sample %
0 to 1 Mbps	39.25
1 to 2 Mbps	13.88
2 to 5 Mbps	21.68
5 to 10 Mbps	14.74
>10 Mbps	10.44
Total	100%

VIL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	96.24

2G

AVG. DOWNLOAD SPEED (Kbps)	96.24
% FILE TRANSFER COMPLETE	74.11
DL throughput	**Sample %**
0 to 50 Kbps	68.77
50 to 100 Kbps	4.67
100 to 200 Kbps	21.81
200 to 300 Kbps	4.32
>300 Kbps	0.43
Total	**100%**

VIL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	1.18

3G
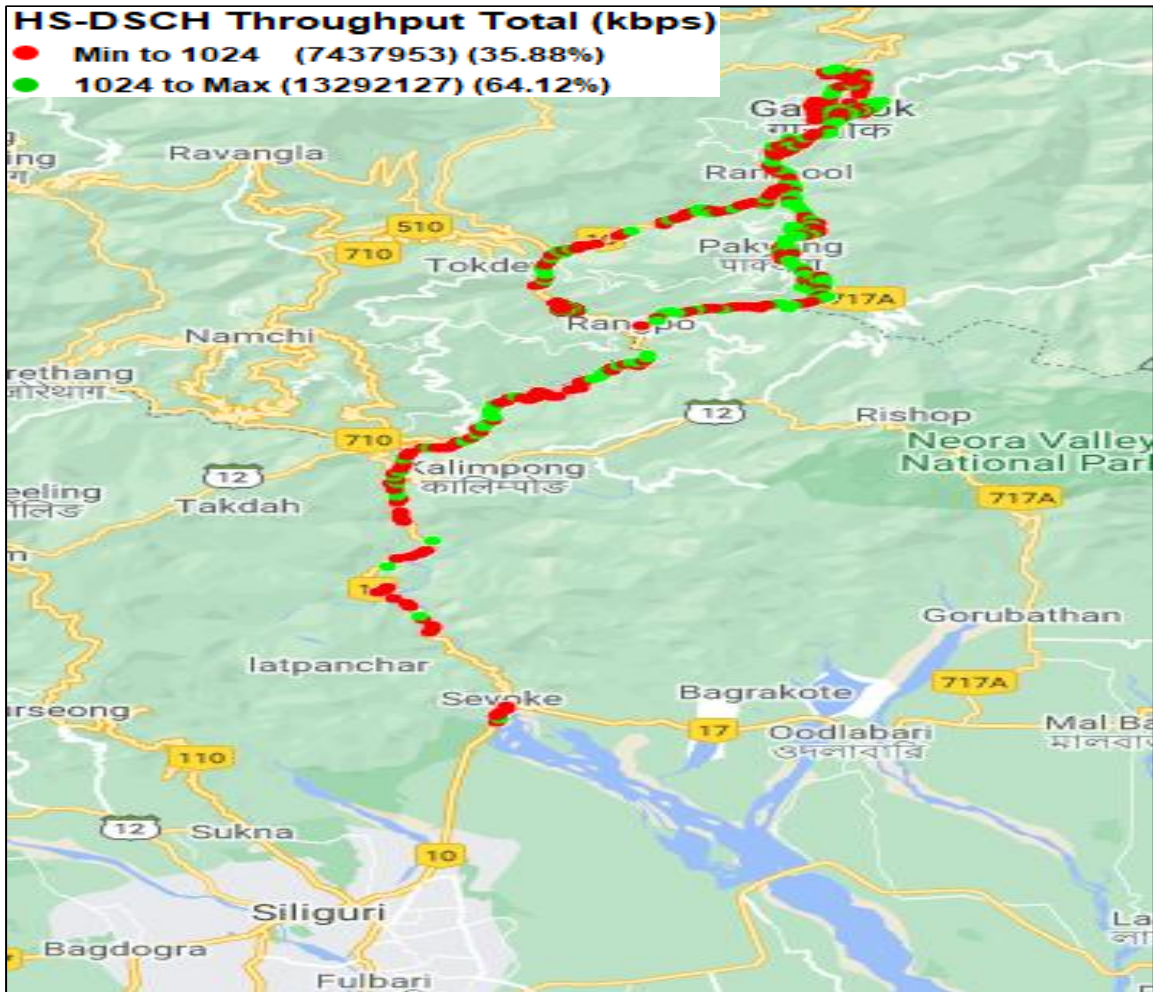
AVG. DOWNLOAD SPEED (Mbps)	1.18
% FILE TRANSFER COMPLETE	89.69
DL throughput	Sample %
0 to 0.5 Mbps	25.07
0.5 to 1 Mbps	10.81
1 to 2 Mbps	23.79
2 to 5 Mbps	32.01
>5 Mbps	8.32
Total	100%

VIL

Dynamic Data Testing Complete 247 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	11.36

4G
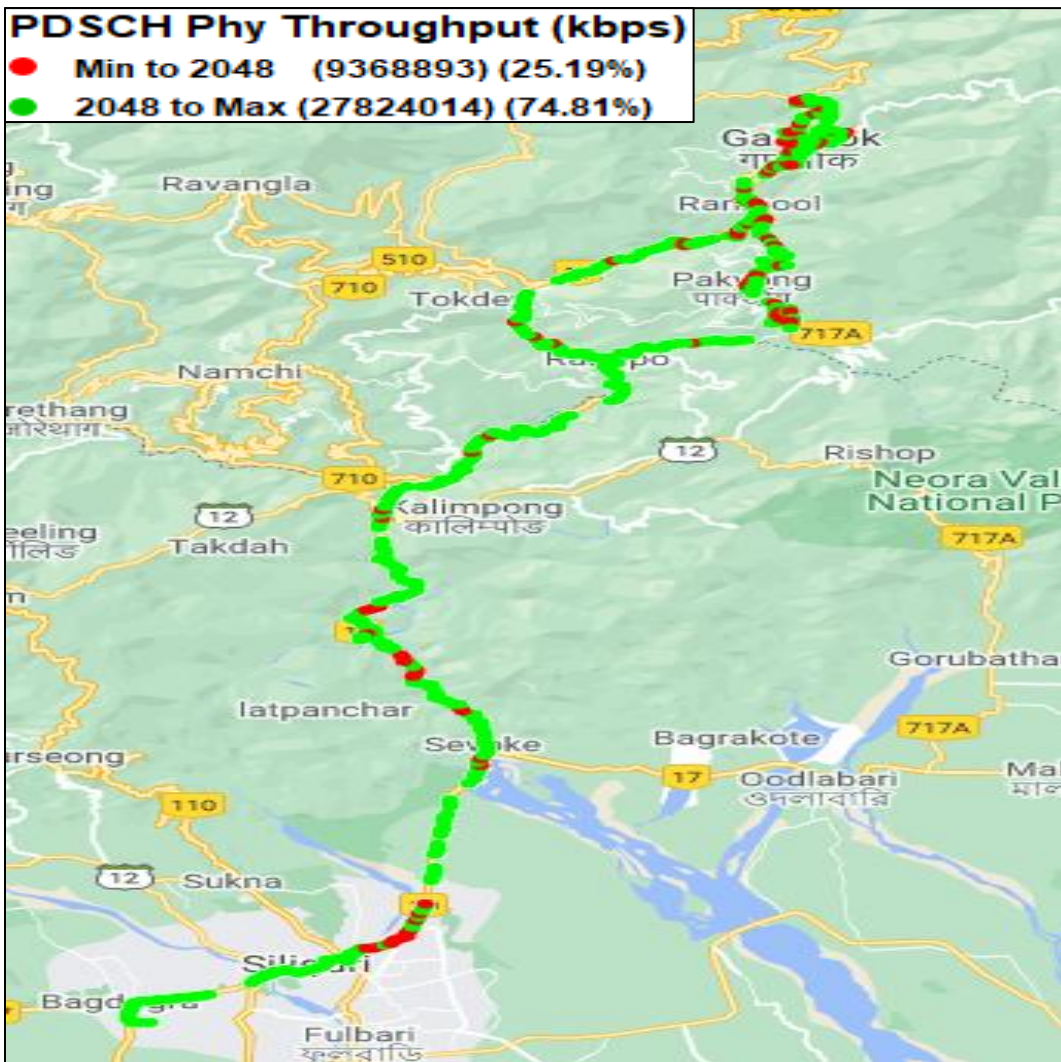
AVG. DOWNLOAD SPEED (Mbps)	11.36
% FILE TRANSFER COMPLETE	96.20
DL throughput	Sample %
0 to 1 Mbps	14.05
1 to 2 Mbps	11.14
2 to 5 Mbps	34.61
5 to 10 Mbps	22.91
>10 Mbps	17.29
Total	100%