

Operator Assisted Drive Test Report

Assam-Arunachal Pradesh October & November 2022 (RO, Kolkata)

Key Performance Indicators (KPIs):

The following Telecom Service Providers could not meet the KPIs benchmark as stated below—

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

BSNL- Drop Call Rate in 2G & 3G network, Hand Over Success Rate in 2G network, Call Setup Success Rate in 2G & 3G network and Rx Quality in 3G (Ec/Io) network.

RJIO-Rx Quality (SINR) in 4G network

VIL-Rx Quality in 2G, 3G (Ec/ Io) & 4G (SINR) network.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Assam and Arunachal Pradesh including National Highway-27, 127, 715, 15 & 13 from 29th October to 3rd November 22 from 8:00 AM to 8:30 PM. The drive test covered drive route of 815 KMs over a period of 6 days. Approximately 528+ calls were made for each of the 8 networks: Three 2G networks, Two 3G networks and Three 4G networks covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

Assam is a state in northeastern India south of the eastern Himalayas along the Brahmaputra and Barak River valleys. The state is bordered by Bhutan and Arunachal Pradesh to the north; Nagaland and Manipur to the east; Meghalaya, Tripura, Mizoram and Bangladesh to the south; and West Bengal to the west via the Siliguri Corridor.

Arunachal Pradesh is a state in Northeastern India. It borders the states of Assam and Nagaland to the south. It shares international borders with Bhutan in the west, Myanmar in the east, and China in the north at the McMahon Line. Itanagar is the state capital of Arunachal Pradesh. Arunachal Pradesh is the largest of the Seven Sister States of Northeast India by area.

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.

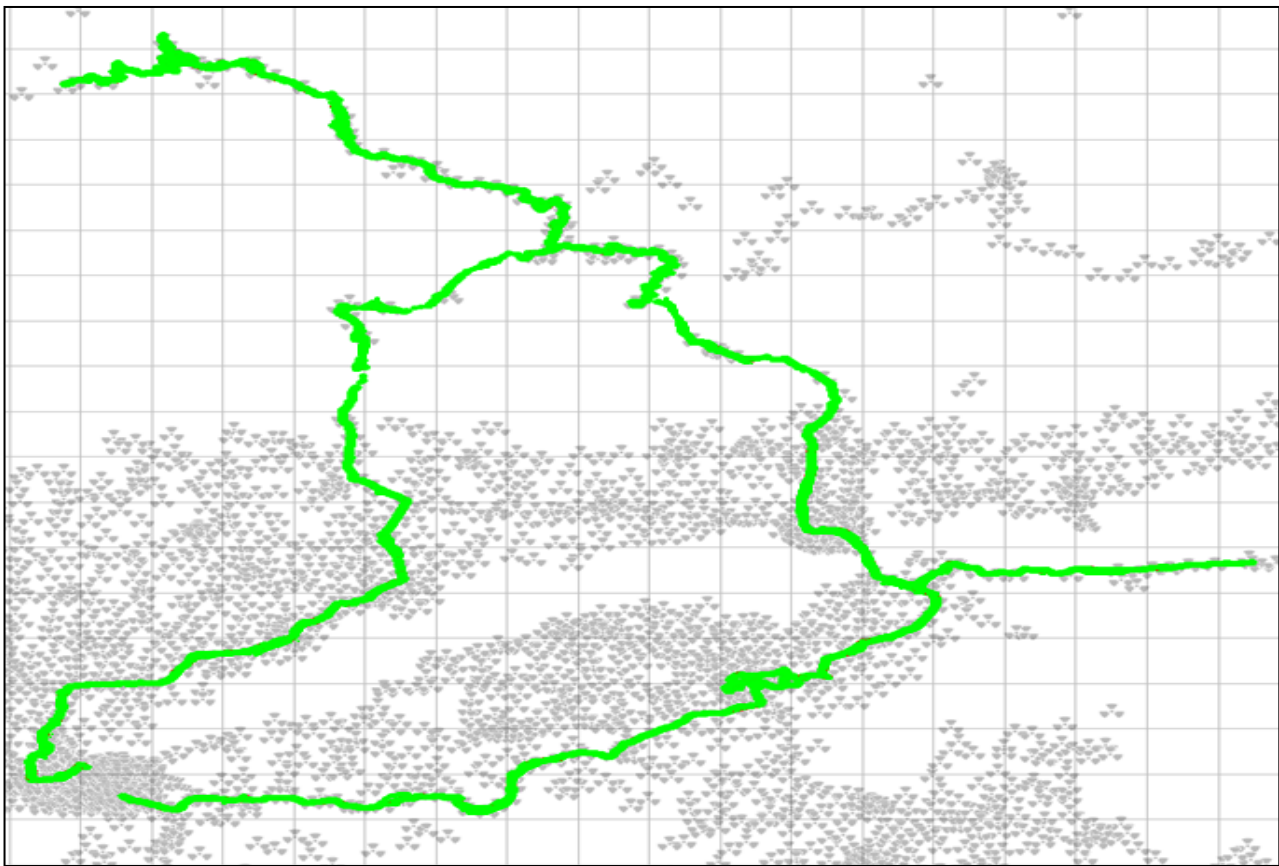
Voice Tests: Calls were made for 90 secs duration with wait time of 5 secs between calls in all technologies. Three 2G networks, Two 3G networks, Three 4G networks covering 4 unique TSPs were tested.

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

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/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Streaming	130 secs Clip
Latency	32 Bytes on www.google.com

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	X-CAL	TEMS

Voice & Dynamic Data Test Drive Route



DRIVE ROUTES OF ASSAM & ARUNACHAL PRADESH AREAS

- DAY-1**—Guwahati Railway Station—Khanapara—Jorabat—Gumoria Pathar—Khetri—Nakhula Gaon—Nellie—Dharamtul—Chaparmukh Gaon—Roha—Phulaguri—Uttar Petborha—Jamuguri—Nagaon Railway Station—Dimoruguri—Uriagaon Chowk—Karaiyani—Palasoni—Mohkhuli Hospital—Ranga Gara Huzz—Hill View Road—Sensuwa—Khutikatia—Granthalaya—Kuaritola—Jakhlabandha—Kanchanjuri—Kaziranga—Western Range(Elephant Safari Point).
- Day- 2**—Kaliabhomora Bridge—Bali Chapari—Tezpur—Goroi Mari--Balipara—Gamani Ban Gaon—Bhalukpong—Tappi Village—Sessa--Rupa—Tenga Village—Bomdila—Dirang Village.
- Day-3**—Kalachakra Gompa—Rama Camp--Senge—Jang—Tawang War Memorial—Giant Buddha Statue—Beghar—Tawang Monastery—Jaswant Singh Memorial—Khartoot—Lumla Market.
- Day-4**—Giant Buddha Statue—Y Junction—Bumla Pass—Kharman—Muchut—Lumpo—Muchut Bop SSB.
- Day-5**—Helipad—Shyro—Rho—Senge—Lish Village—Dhirang--Yewang—Rahung—Bomdila—Rupa—Tenga Market.
- Day-6**—Tenga Market—Rupa— Dikshipam—Mukuthing—Shergaon—Kalaktang Village—Samphung—Lungdur—Ankalin Village—Assam Arunachal Border Check Post—Bhairabkunda—Golma Gaon—Rowta—Kharupetia—Dhula—Mangaldoi—Sipajhar—Bezera—Baihata Chariali Police Station—Changsari—Kali Pahar—Kamakhya Temple—Guwahati Railway Station.

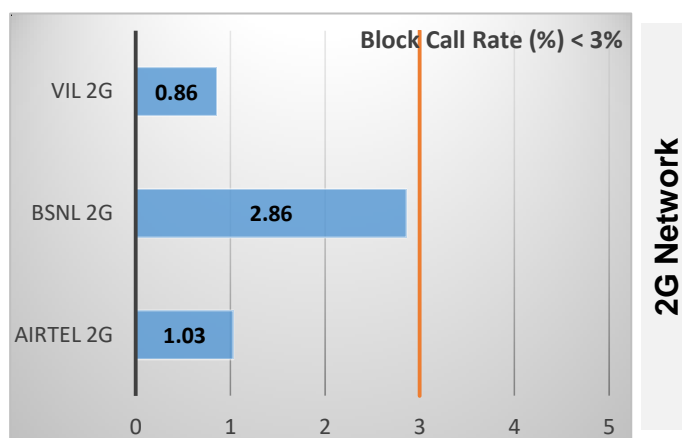
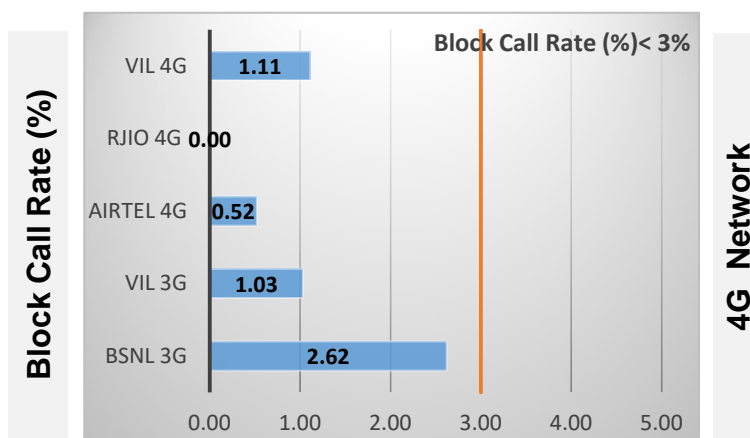
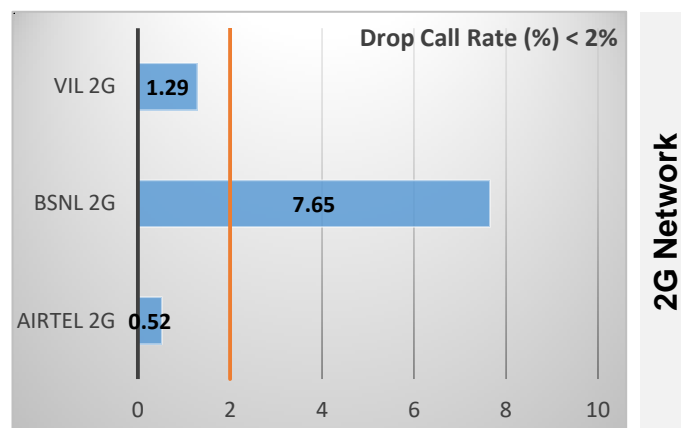
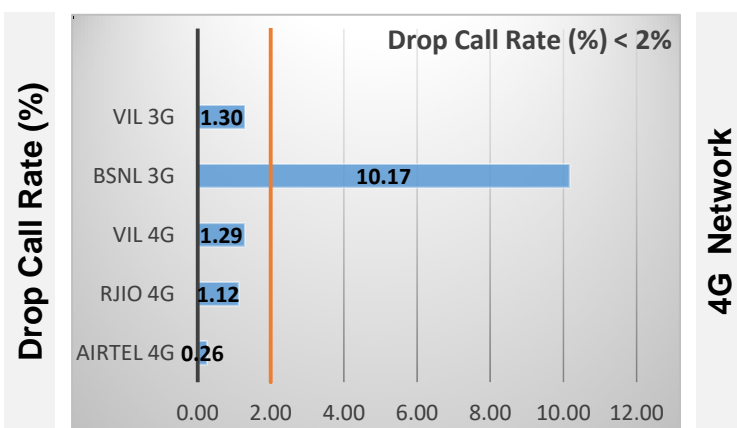
Data Service Test- Static Locations

Static Locations
LILY HOTEL,GUWAHATI
SSB,DIRANG
CIRCUIT HOUSE,TAWANG
SSB STADIUM,TAWANG

Voice Calls

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	RJIO	VIL
Drop Call Rate %	0.52	7.65	1.29	10.17	1.30	0.26	1.12	1.29
Block Call Rate %	1.03	2.86	0.86	2.62	1.03	0.52	0.00	1.11

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

Coverage

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

TSPs	2G		
	AIRTEL	BSNL	VIL
Coverage %	80.73	96.53	93.23

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

TSPs	3G		4G		
	BSNL	VIL	AIRTEL	RJIO	VIL
Coverage %	28.36	86.40	89.53	91.49	85.23

Summary

City Level Summary- Voice

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	388	629	696
Blocked Call Rate (%)	1.03	2.86	0.86
CSSR% (Accessibility)	98.97	91.41	99.14
Drop Call Rate (%)	0.52	7.65	1.29
Mobility HOSR (%)	99.65	91.31	98.08
Rx Quality (%)	95.57	95.48	91.23

Voice Call	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Call Attempt	391	387	385	724	628
Blocked Call Rate (%)	2.62	1.03	0.52	0.0	1.11
CSSR% (Accessibility)	60.36	99.22	99.49	98.48	98.89
Drop Call Rate (%)	10.17	1.30	0.26	1.12	1.29
Mobility HOSR (%)	100	99.91	99.60	98.57	99.91
Rx Quality (%)	74.01	83.40	88.79	86.64	82.10

Summary-Data Services Dynamic

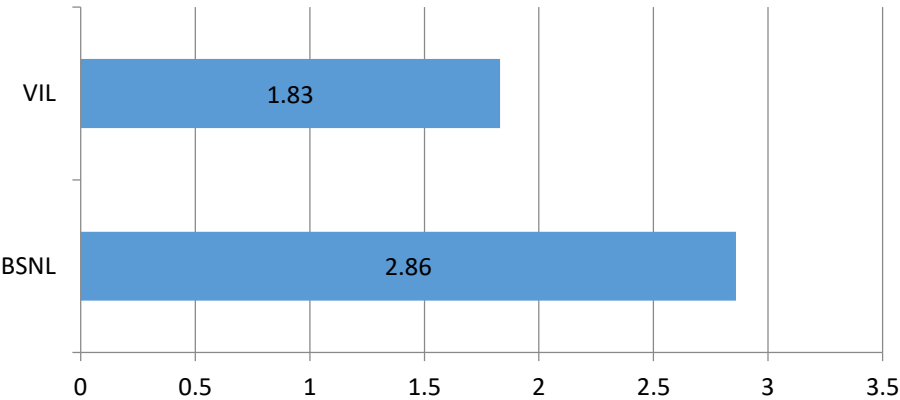
Key Observations

Dynamic Data was tested for 815 Kms. Download Throughput was tested.

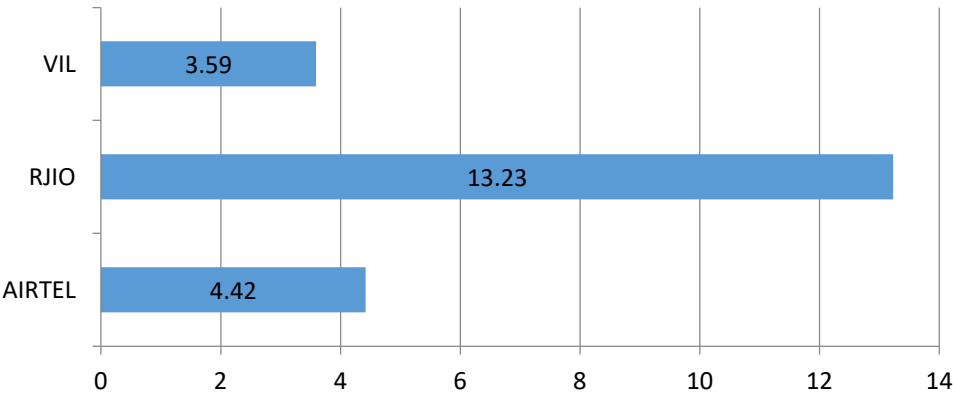
Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

3G/4G Network:

3G-Dynamic Download Average Throuhput (Mbps)



4G-Dynamic Download Average Throuhput (Mbps)



Summary-Data Services Static

City Level Summary-

Average Data Services Static	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	75.98	145.0	106.57
Upload Throughput (kbps)	40.56	52.0	60.26
Web Browsing Delay (sec)	0.0	***	1.09
Latency (msec)	174.5	271	300

*** BSNL did not submit the report on Web Browsing Delay

Average Data Services Static	3G/ 4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	***	5.98	12.40	14.53	14.0
Upload Throughput in Mbps	***	1.09	5.12	4.96	8.83
Video streaming delay (secs)	***	1.17	0.0	0.0	0.54
Web Browsing Delay (secs)	***	1.16	0.0	8.95	0.22
Latency (msec)	***	132.75	93.25	56.25	92

*** BSNL did not submit the 3G Data Service Static Testing report.

Summary-Data Services Static

Location Level Summary-

Location:- LILY HOTEL,GUWAHATI	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	87.77	145	107.20
Upload Throughput (kbps)	44.54	52	68.63
Web Browsing Delay (sec)	0.0	***	1.14
Latency (msec)	188	271	293

Location:- LILY HOTEL,GUWAHATI	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	***	8.40	11.50	10.77
Upload Throughput in Mbps	***	5.60	2.89	7.78
Video streaming delay (secs)	***	0.0	0.0	0.61
Web Browsing Delay (secs)	***	0.0	9.60	0.23
Latency (msec)	***	95	58	88

Location:- SSB, DIRANG	2G		
	AIRTEL	BSNL	VIL
Download throughput in(kbps)	65.43	***	104.55
Upload Throughput in (kbps)	37.20	***	57.80
Web Browsing Delay (secs)	0.0	***	1.02
Latency (msec)	163	***	307

Location:- SSB, DIRANG	4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	***	5.66	12.50	17.57	16.14
Upload Throughput in (mbps)	***	1.14	8.10	7.03	8.16
Video streaming delay (secs)	***	1.12	0.0	0.0	0.52
Web Browsing Delay (secs)	***	1.08	0.0	8.30	0.22
Latency (msec)	***	146	91	54.50	93

*** BSNL did not submit the 3G/ 2G Data Service Static Testing report.

Summary-Data Services Static

Location Level Summary-

Location:- CIRCUIT HOUSE,TAWANG	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	92.21	***	104.72
Upload Throughput (kbps)	47.80	***	55.40
Web Browsing Delay (sec)	0.0	***	0.98
Latency (msec)	152	***	286

Location:- CIRCUIT HOUSE,TAWANG	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	***	6.21	22.50	***	17.83
Upload Throughput in Mbps	***	1.03	4.90	***	10.50
Video streaming delay (secs)	***	1.43	0.0	***	0.57
Web Browsing Delay (secs)	***	1.07	0.0	***	0.21
Latency (msec)	***	124	89	***	89

Location:- SSB STADIUM,TAWANG	2G		
	AIRTEL	BSNL	VIL
Download throughput in(kbps)	58.50	***	109.80
Upload Throughput in (kbps)	32.70	***	59.20
Web Browsing Delay (secs)	0.0	***	1.20
Latency (msec)	195	***	314

Location:- SSB STADIUM,TAWANG	4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	***	4.88	6.20	***	11.26
Upload Throughput in (mbps)	***	1.23	1.90	***	8.89
Video streaming delay (secs)	***	0.97	0.0	***	0.49
Web Browsing Delay (secs)	***	1.30	0.0	***	0.23
Latency (msec)	***	139	98	***	98

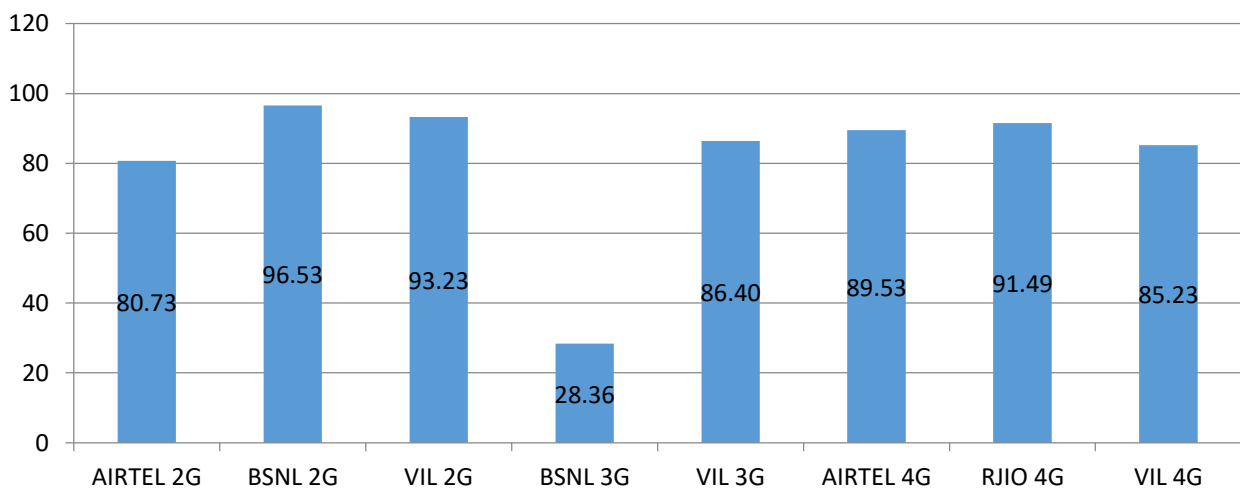
*** RJIO could not do the static data test because 4G service was not available at Tawang
*** BSNL did not submit the 3G/ 2G Data Service Static Testing report.

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	80.73
BSNL 2G	96.53
VIL 2G	93.23
BSNL 3G	28.36
VIL 3G	86.40
AIRTEL 4G	89.53
RJIO 4G	91.49
VIL 4G	85.23

Coverage Rate %

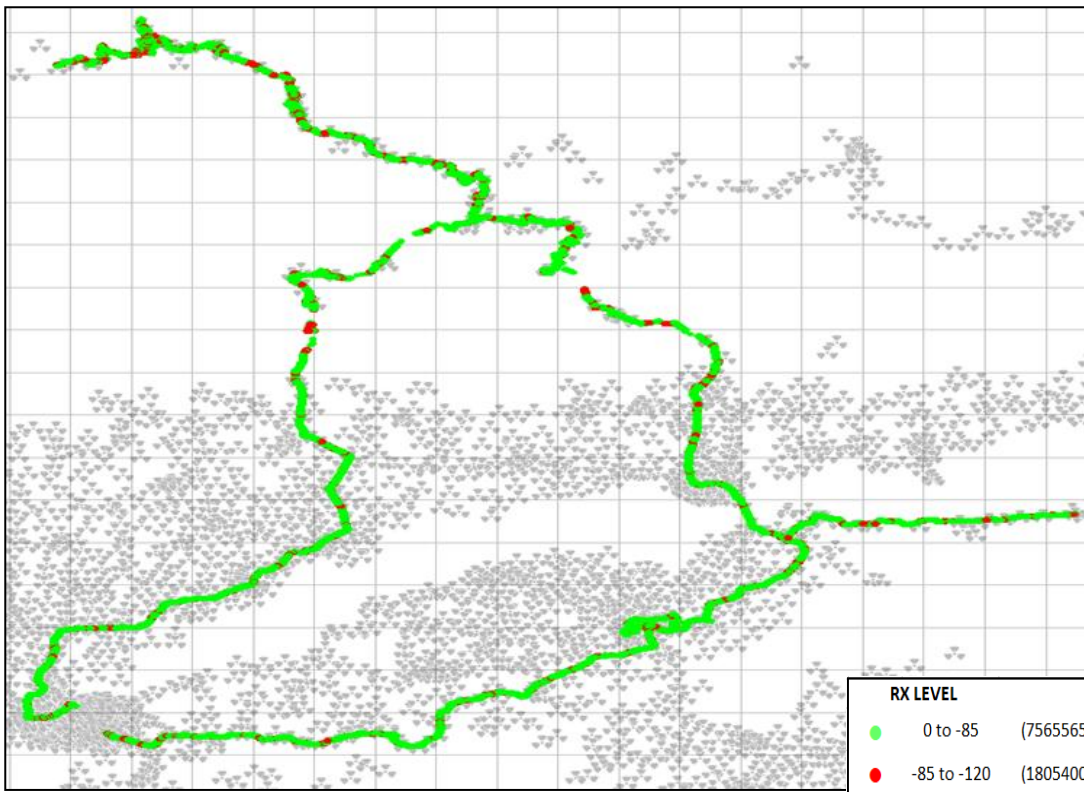


I. Coverage Details

AIRTEL

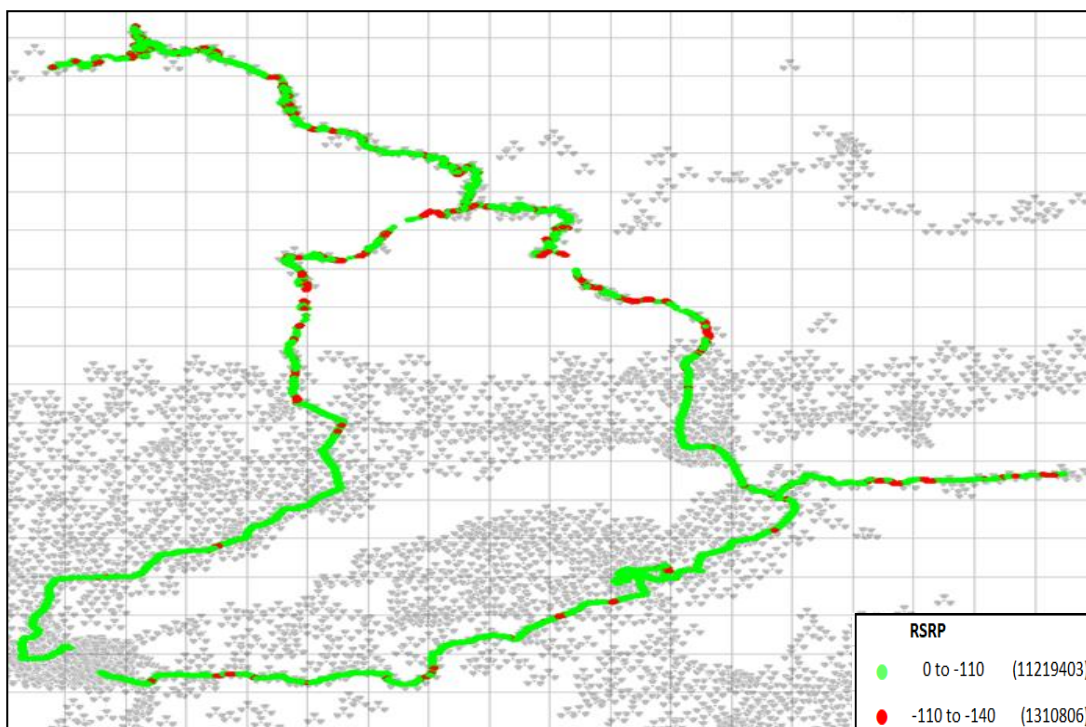
Technology	Coverage Rate %
2G	80.73
4G	89.53

2G



Overall RxLevel	Sample %
[Max >=-75]	42.10
[-75 >=-85)	38.63
[-85 >=-95)	13.51
[-95 >=Min)	5.76
Total	100

4G



Overall RSRP	Sample %
[Max >=-80]	19.01
[-80 >=-90)	27.15
[-90 >=-110)	43.38
[-110 >=Min)	10.46
Total	100

I. Coverage Details

BSNL

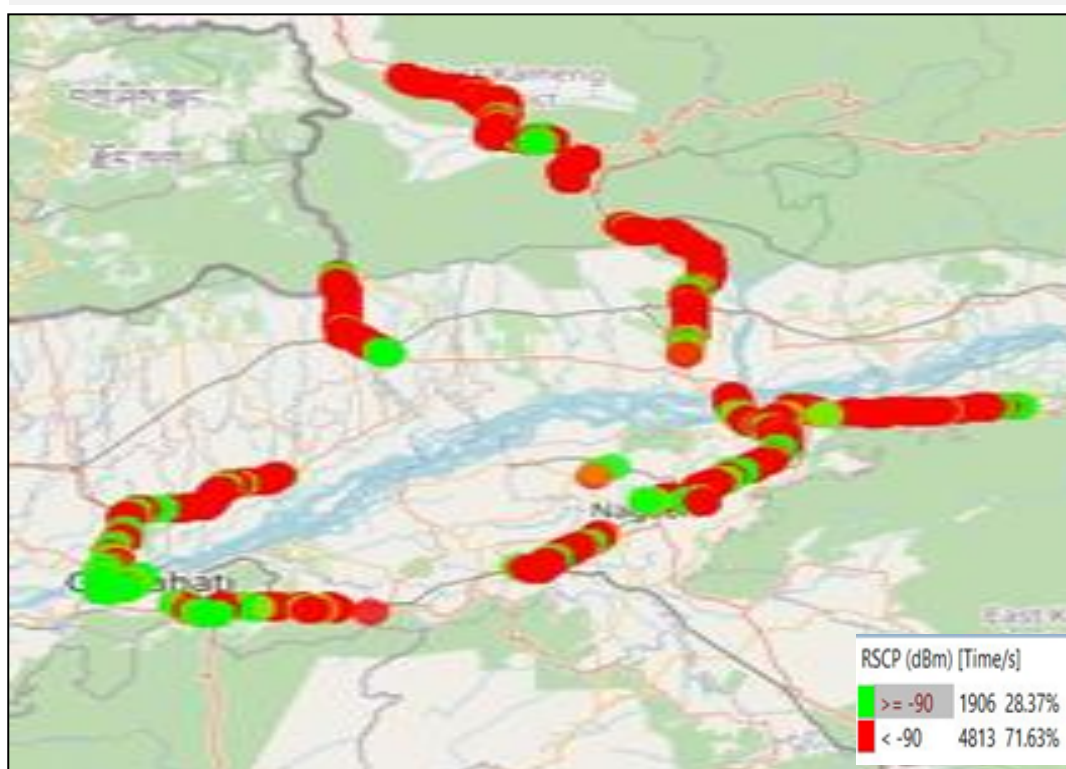
Technology	Coverage Rate %
2G	96.53
3G	28.36

2G



Overall RxLevel	Sample %
[Max >=-75]	27.91
[-75 >=-85]	29.57
[-85 >=-95]	39.94
[-95 >=Min)	2.58
Total	100%

3G



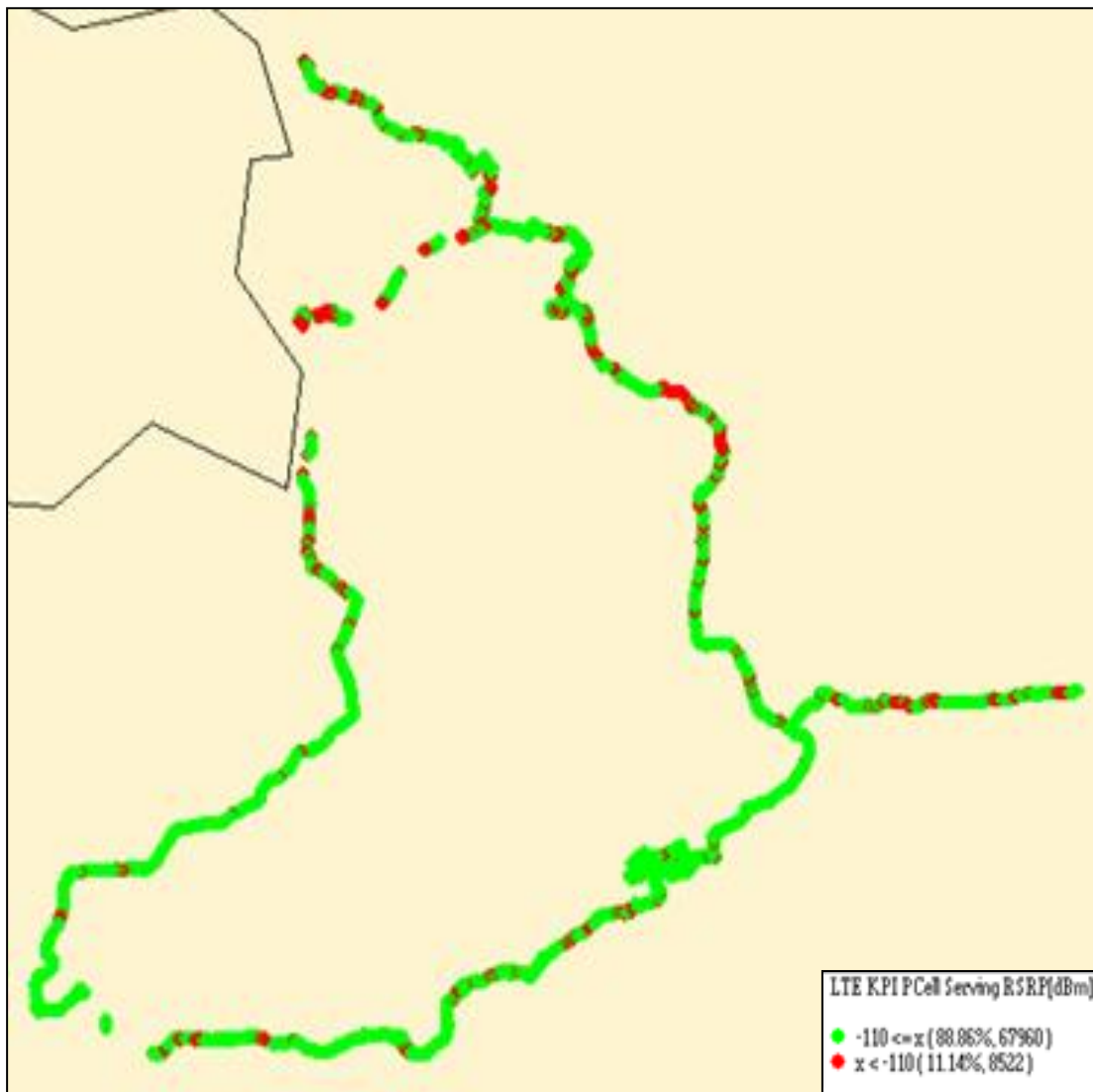
Overall RSCP	Sample %
[Max >=-70]	4.97
[-70 >=-80]	9.75
[-80 >=-90]	13.65
[-90 >=Min)	71.63
Total	100%

I. Coverage Details

RJIO

Technology	Coverage Rate %
4G	91.49

4G



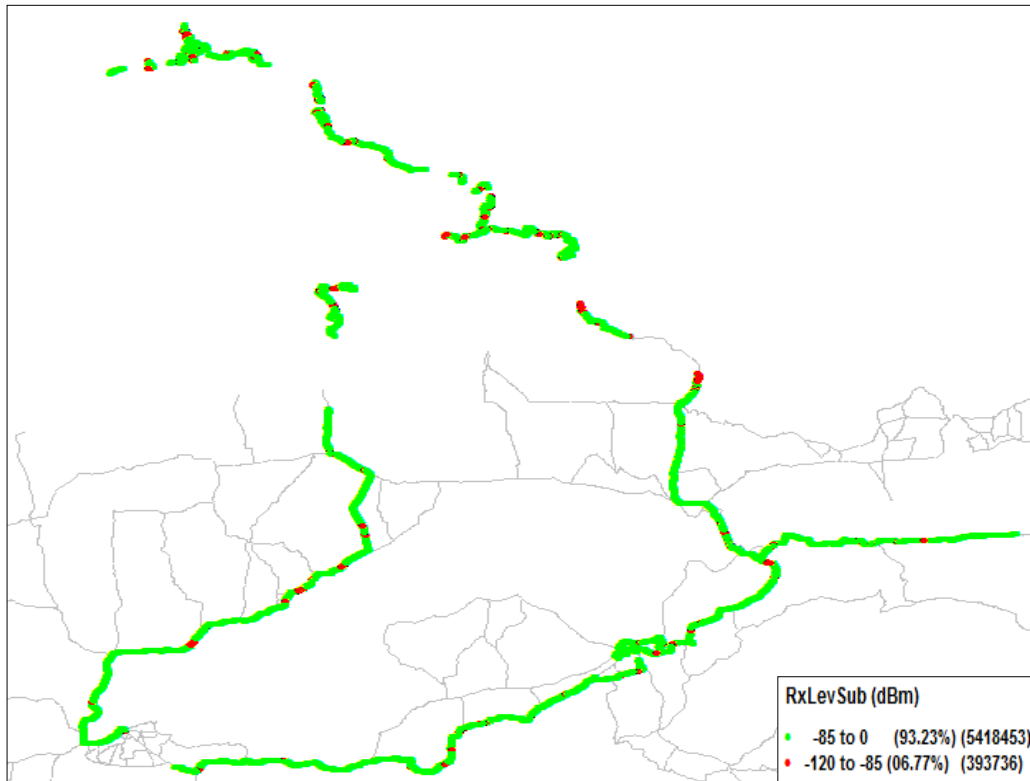
Overall RSRP	Sample %
[Max >=-80]	20.17
[-80 >=-90)	20.50
[-90 >=-110)	48.19
[-110 >=Min)	11.14
Total	100

I. Coverage Details

VIL

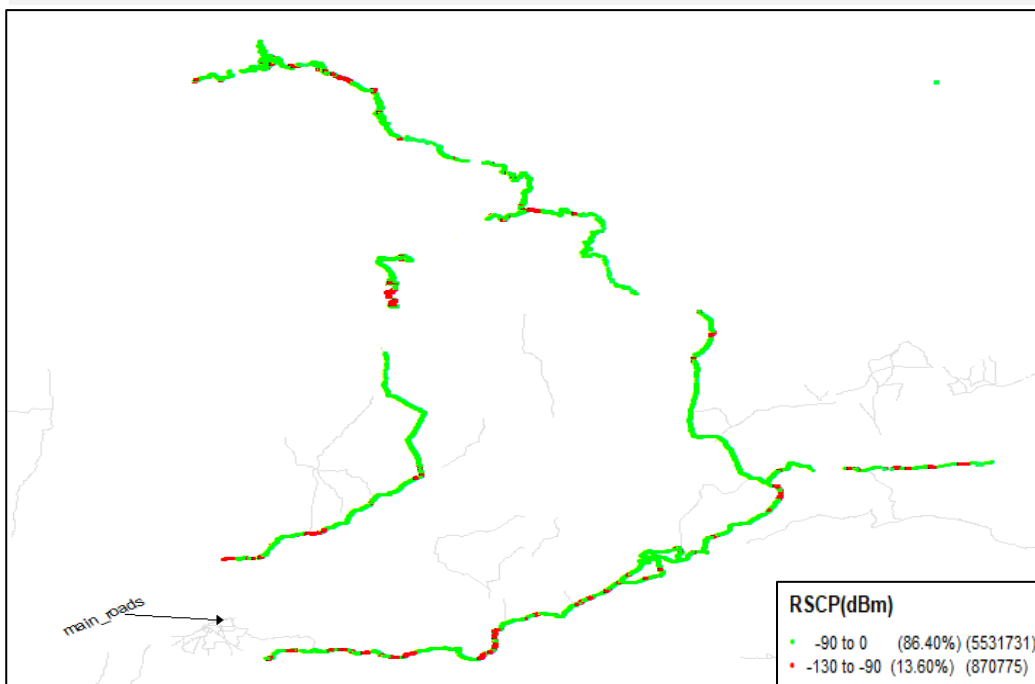
Technology	Coverage Rate %
2G	93.23
3G	86.40

2G



Overall RxLevel	Sample %
[Max >=-75]	41.58
[-75 >=-85)	51.65
[-85 >=-95)	4.19
[-95 >=Min)	2.58
Total	100

3G

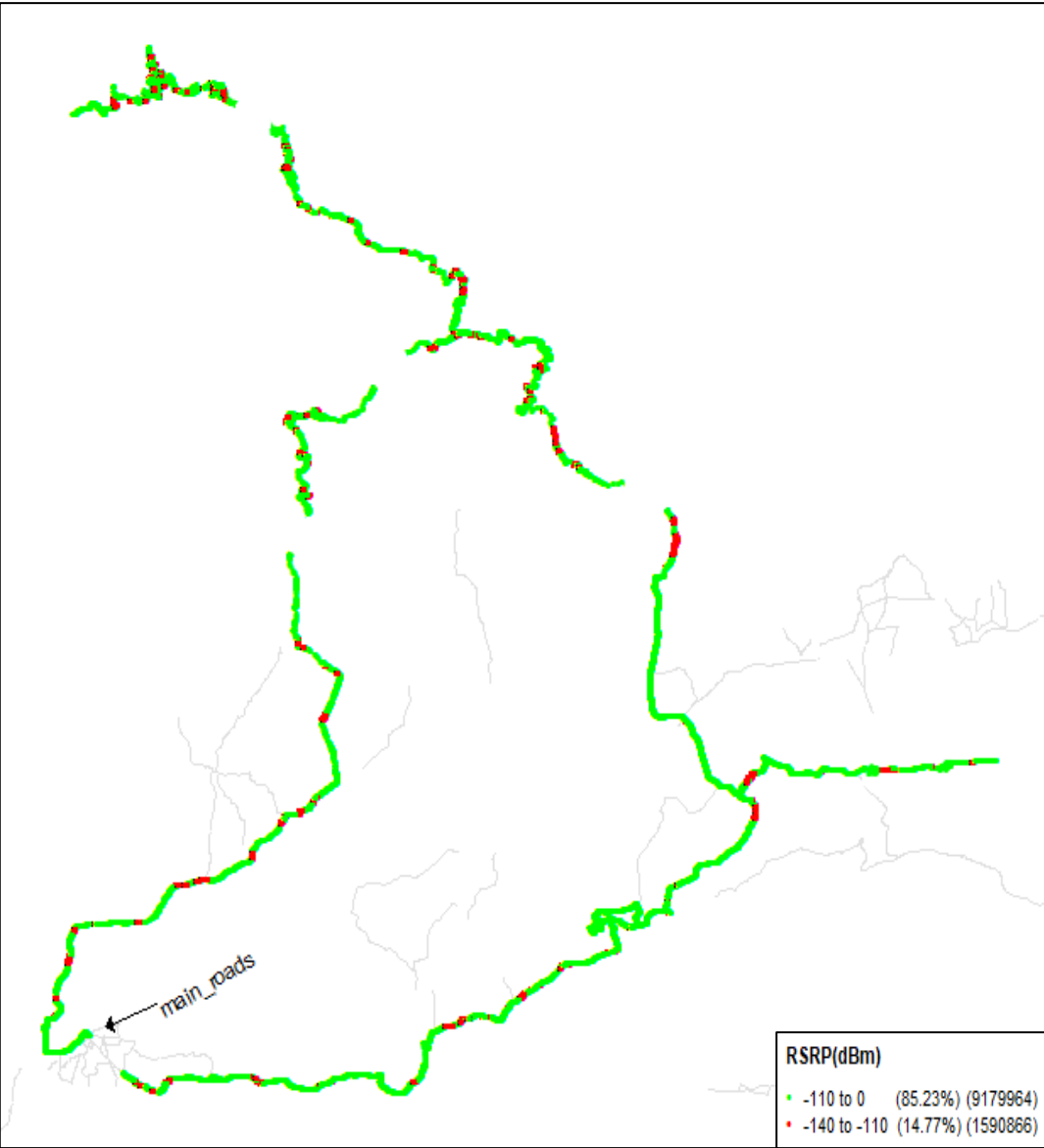


Overall RSCP	Sample %
[Max >=-70]	35.12
[-70 >=-80)	25.99
[-80 >=-90)	25.29
[-90 >=Min)	13.60
Total	100

I. Coverage Details

VIL

Technology	Coverage Rate %
4G	85.23
4G	



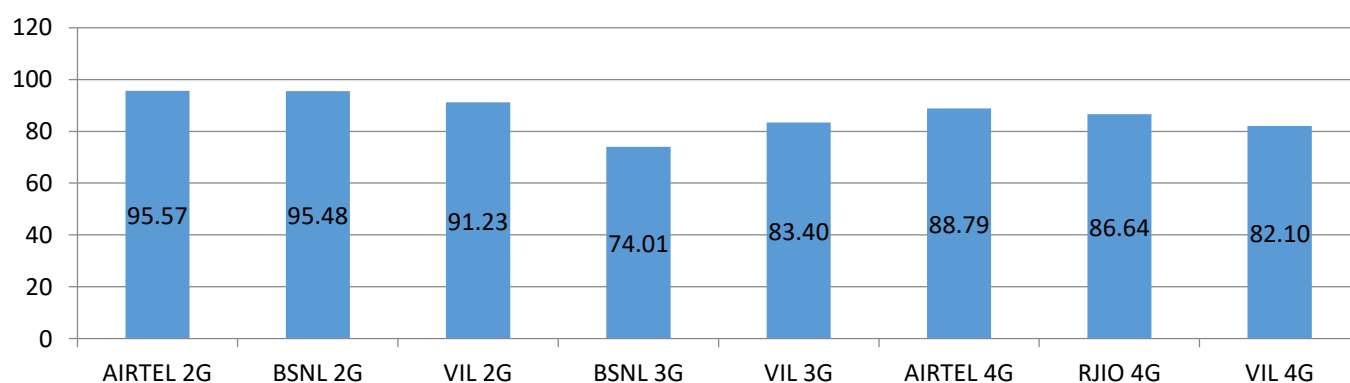
Overall RSRP	Sample %
[Max >=-80]	26.76
[-80 >=-90)	23.73
[-90 >=-110)	34.74
[-110 >=Min)	14.77
Total	100

II. Quality Details

For measuring voice quality, as per the QoS norms, Rx Quality ≤ 5 for GSM TSPs, $E_c/N_o \geq -14$ 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	95.57
BSNL 2G	95.48
VIL 2G	91.23
BSNL 3G	74.01
VIL 3G	83.40
AIRTEL 4G	88.79
RJIO 4G	86.64
VIL 4G	82.10

Rx Quality %

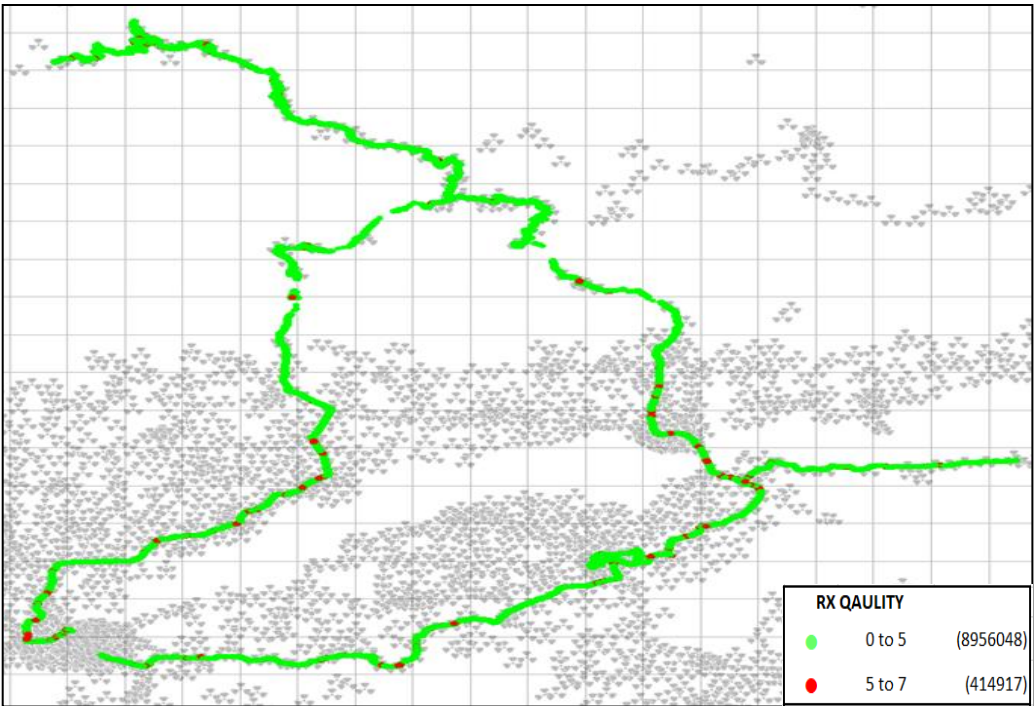


II. Quality Details

AIRTEL

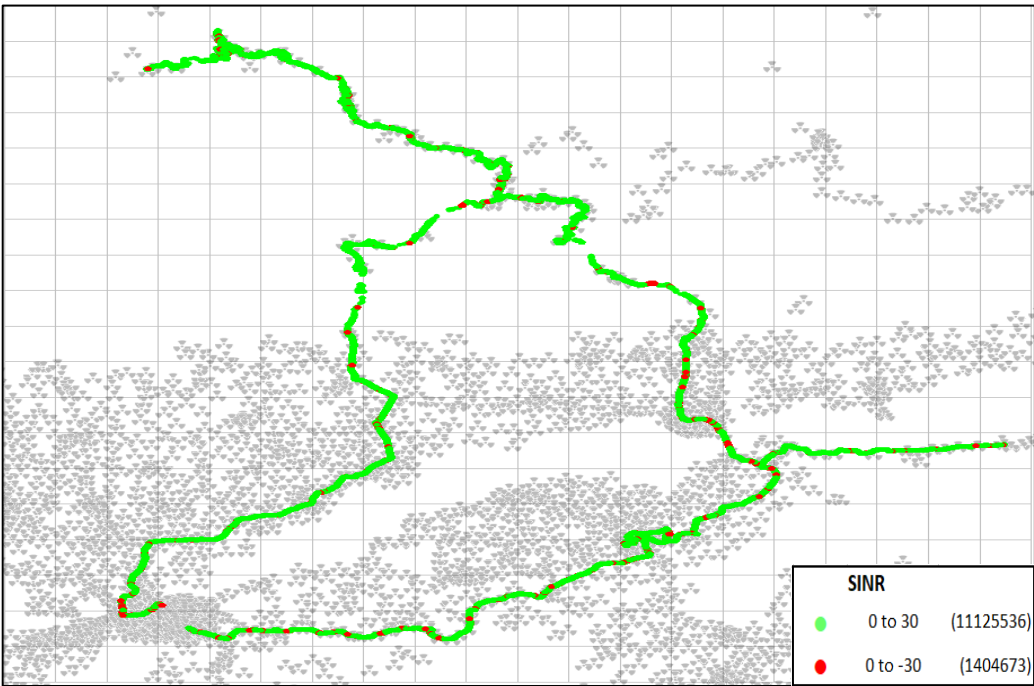
Technology	Rx Quality %
2G	95.57
4G	88.79

2G



Overall Rx Quality	Sample %
(Min <=2)	89.04
(2 <=3)	2.34
(3 <=4)	2.26
(4 <=5)	1.93
(5 <=Max)	4.43
Total	100

4G



Overall SINR	Sample %
(Min <=0)	11.21
(0 <=5)	32.43
(5 <=10)	20.00
(10 <=15)	16.81
(15 <=Max)	19.54
Total	100

II. Quality Details

BSNL

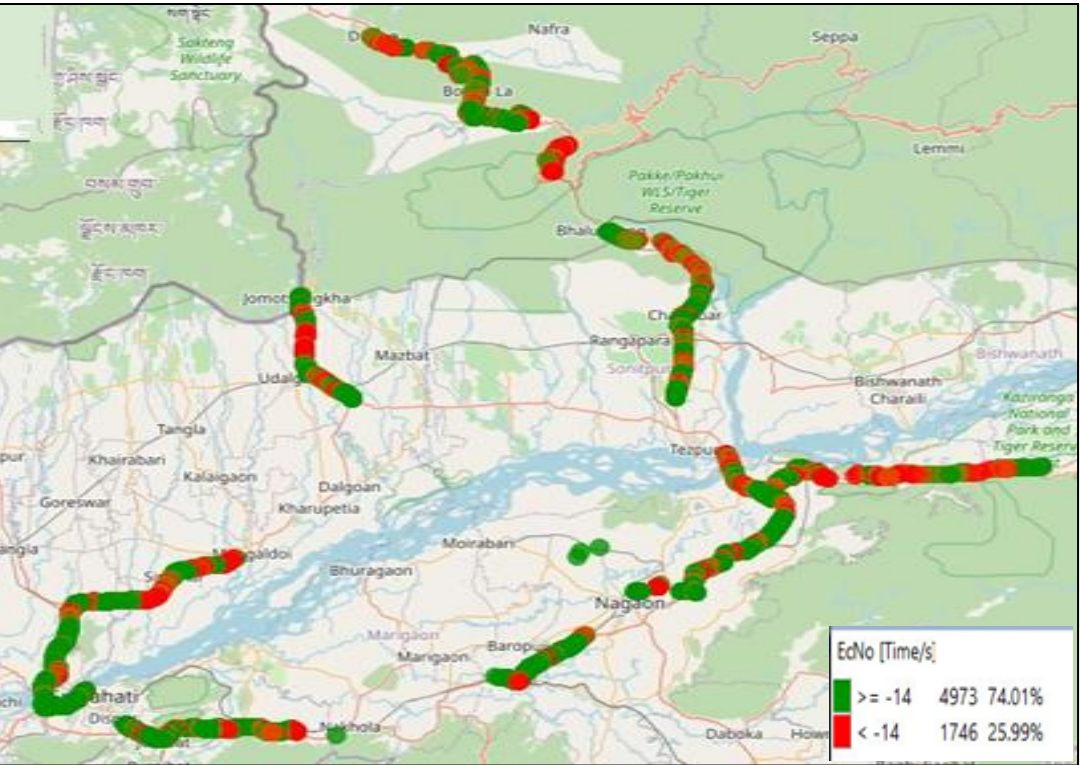
Technology	Rx Quality %
2G	95.48
3G	74.01

2G



Overall Rx Quality	Sample %
(Min <=2)	85.76
(2 <=3)	4.08
(3 <=4)	3.11
(4 <=5)	2.53
(5 <=Max)	4.52
Total	100%

3G



Overall EcNo	Sample %
(Max <=-6)	11.97
(-6 <=-9)	19.48
(-9 <=-11)	21.37
(-11 <=-14)	21.19
(-14 <= Min)	25.99
Total	100%

RJIO

Technology	Rx Quality %
4G	86.64

4G



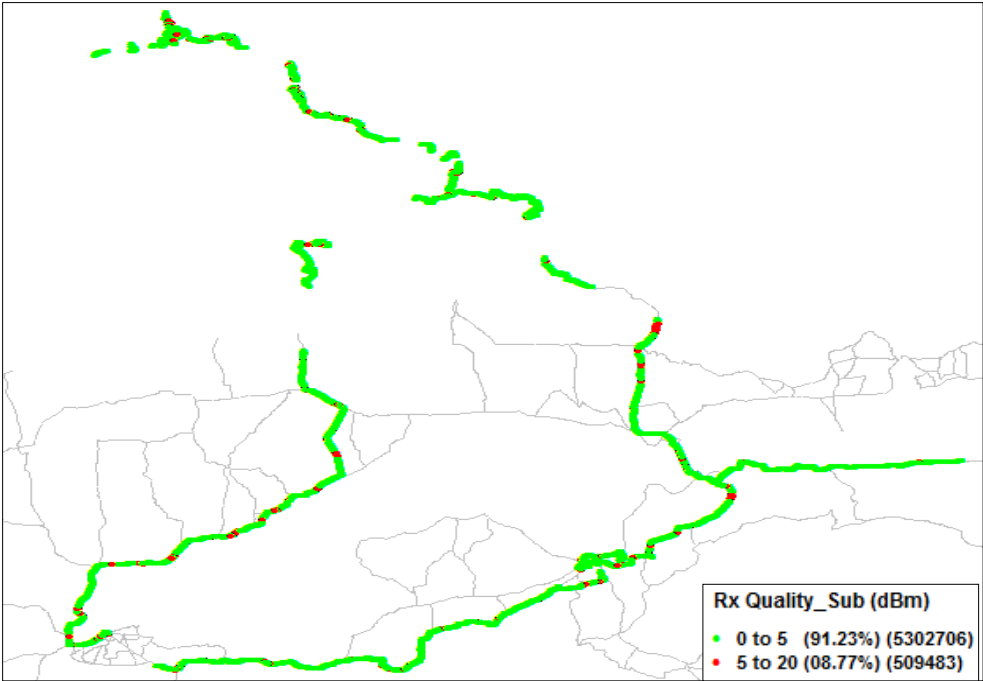
Overall SINR	Sample %
(Min <=0)	13.36
(0 <=5)	19.02
(5 <=10)	21.62
(10 <=15)	18.64
(15 <=Max)	27.36
Total	100

II. Quality Details

VIL

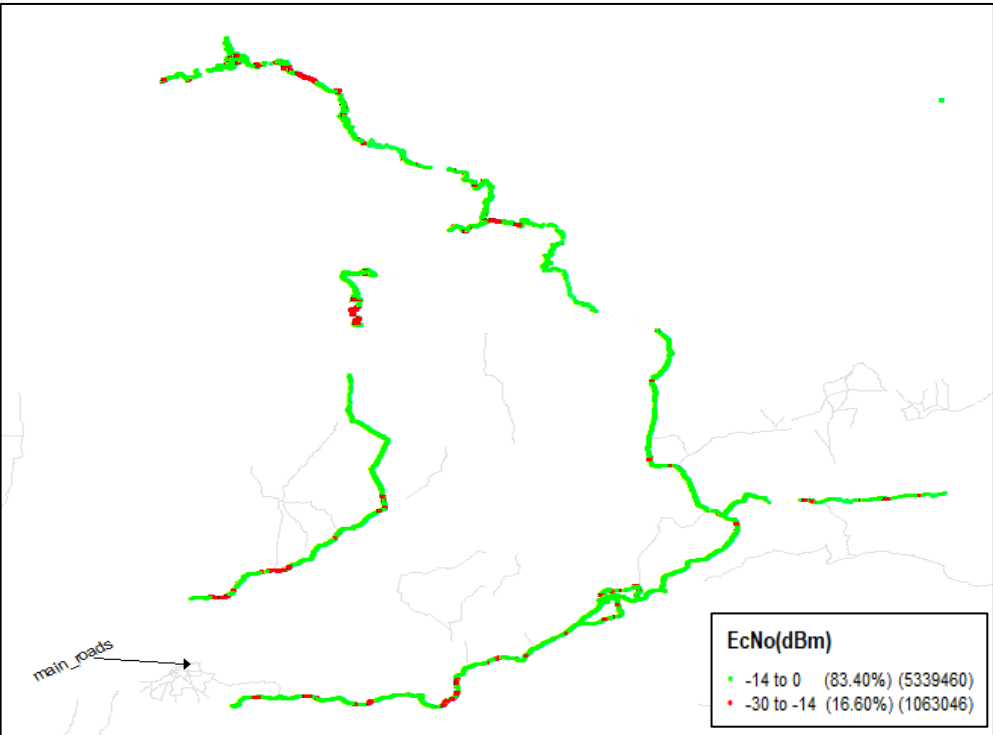
Technology	Rx Quality %
2G	91.23
3G	83.40

2G



Overall Rx Quality	Sample %
(Min <=2)	45.23
(2 <=3)	19.49
(3 <=4)	21.66
(4 <=5)	4.85
(5 <=Max)	8.77
Total	100

3G

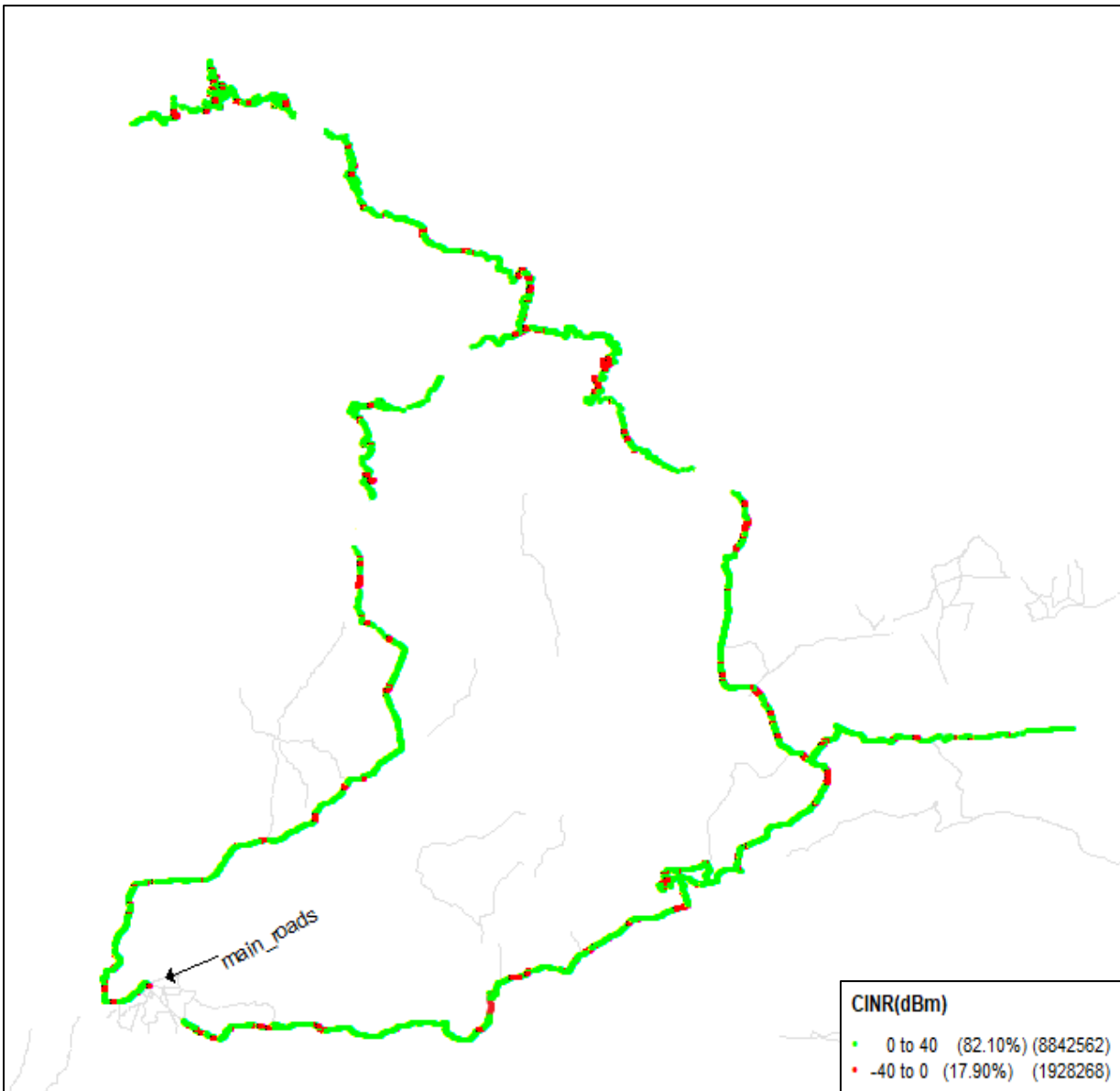


Overall EcNo	Sample %
(Max <=-6)	39.21%
(-6 <=-9)	10.58%
(-9 <=-11)	13.60%
(-11 <=-14)	20.01%
(-14 <= Min)	16.60%
Total	100%

II. Quality Details

VIL

Technology	Rx Quality %
4G	82.10
4G	



Overall SINR	Sample %
(Min <=0)	17.90
(0 <=5)	30.40
(5 <=10)	19.29
(10 <=15)	14.03
(15 <=Max)	18.38
Total	100

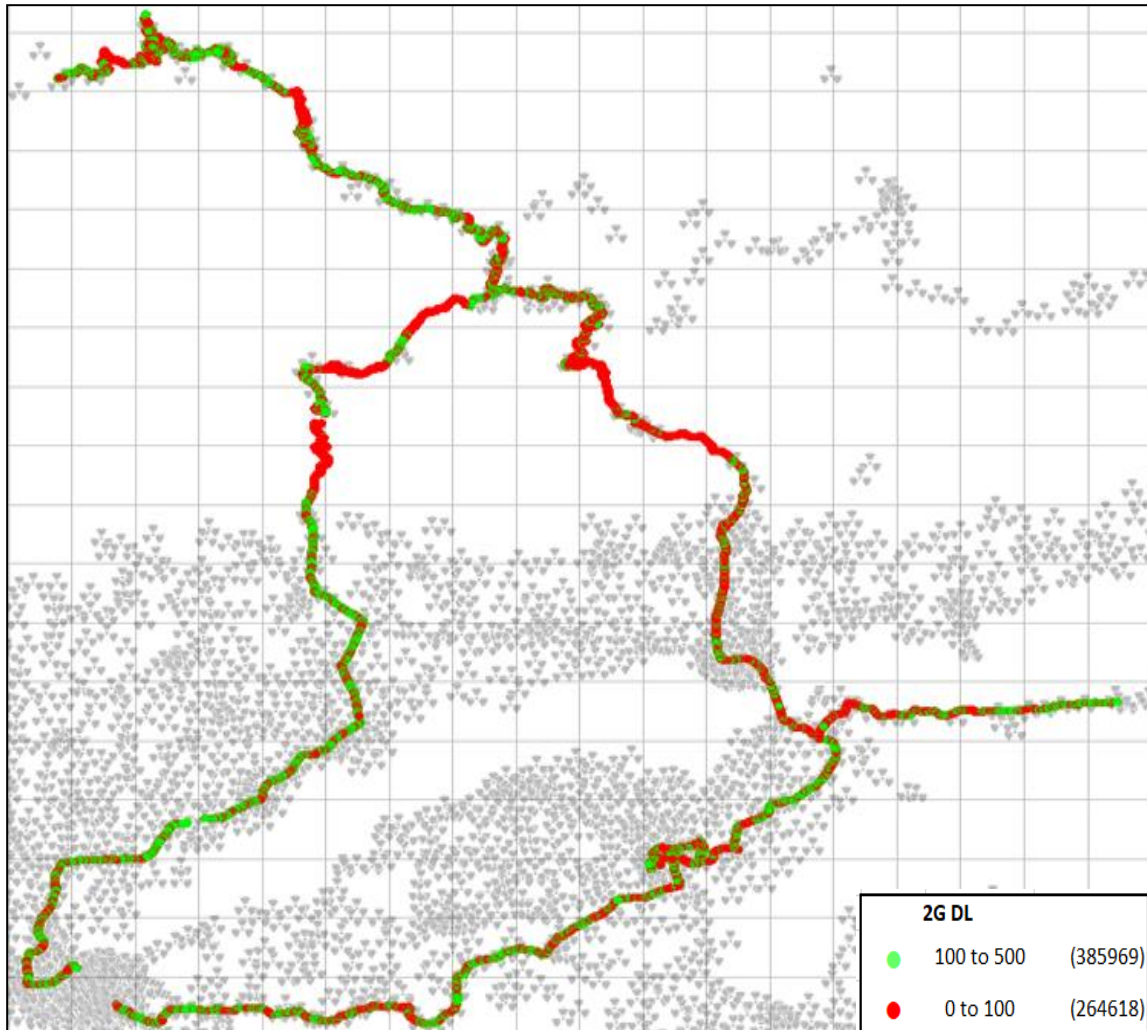
IV. Dynamic Data Test- 2G DL Details

AIRTEL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	39.95

2G



AVG. DOWNLOAD SPEED (Kbps)	39.95
% FILE TRANSFER COMPLETE	46.0
DL throughput	Sample %
0 to 50 Kbps	54.97
50 to 100 Kbps	4.36
100 to 200 Kbps	36.74
200 to 300 Kbps	3.77
>300 Kbps	0.17
Total	100

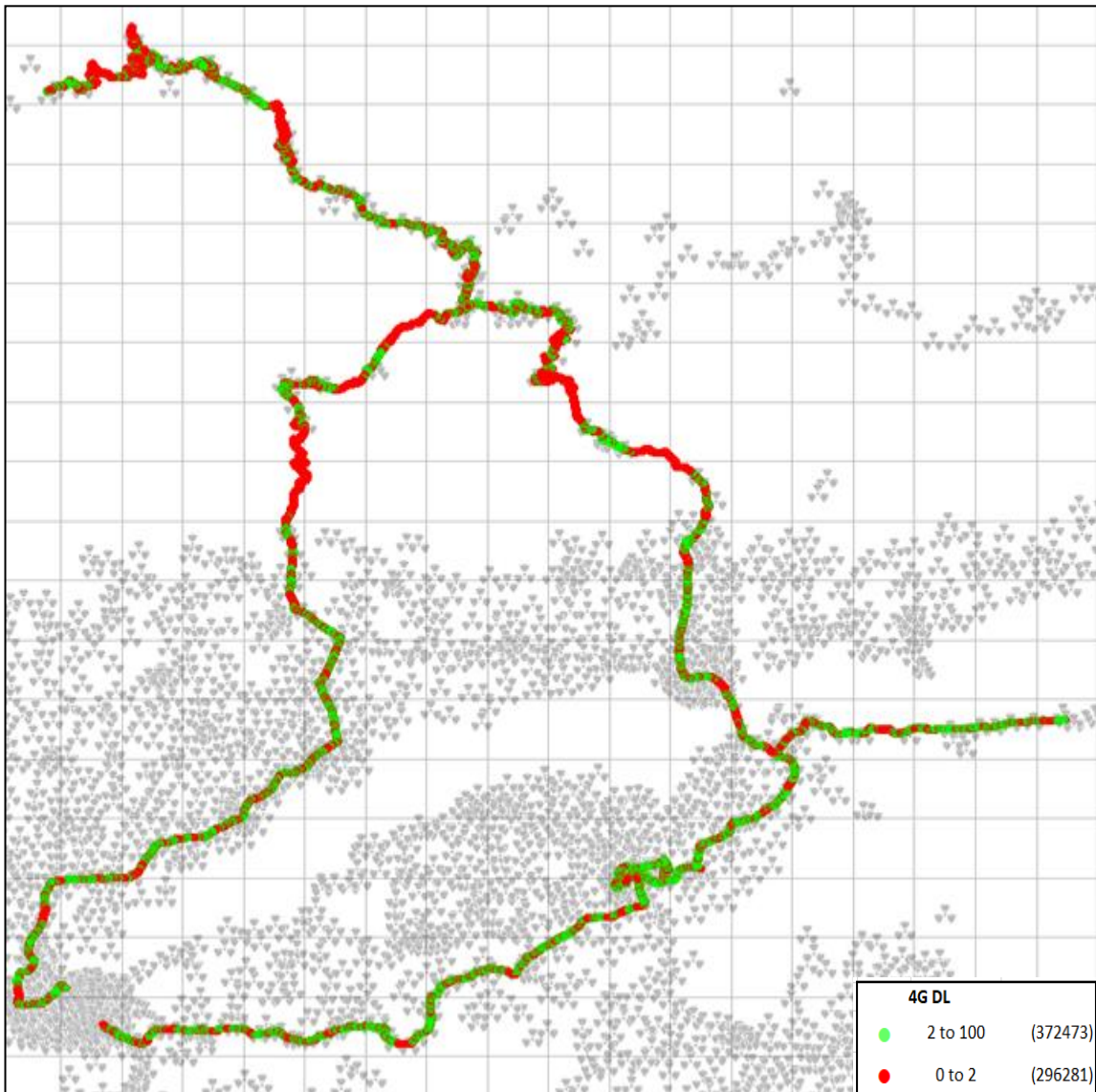
IV. Dynamic Data Test- 4G DL Details

AIRTEL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	4.42

4G



AVG. DOWNLOAD SPEED (Kbps)	4.42
% FILE TRANSFER COMPLETE	51.00
DL throughput	Sample %
0 to 1 Mbps	50.11
1 to 2 Mbps	5.58
2 to 5 Mbps	16.50
5 to 10 Mbps	10.58
>10 Mbps	17.23
Total	100

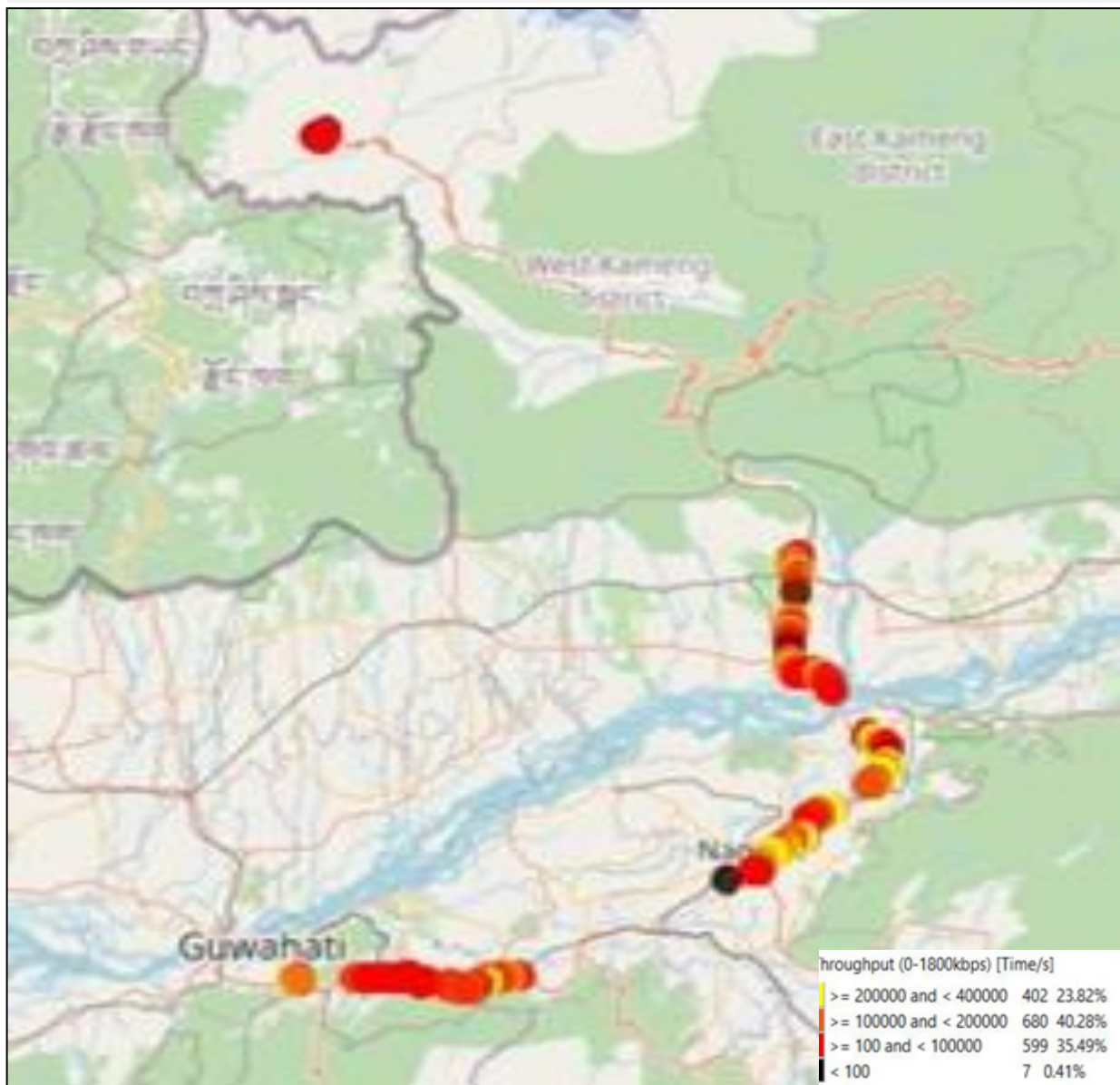
IV. Dynamic Data Test- 2G DL Details

BSNL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	126.0

2G



AVG. DOWNLOAD SPEED (Kbps)	126.0
% FILE TRANSFER COMPLETE	95.09
DL throughput	Sample %
0 to 50 Kbps	20.32
50 to 100 Kbps	16.41
100 to 200 Kbps	41.29
200 to 300 Kbps	21.8
>300 Kbps	0.18
Total	100

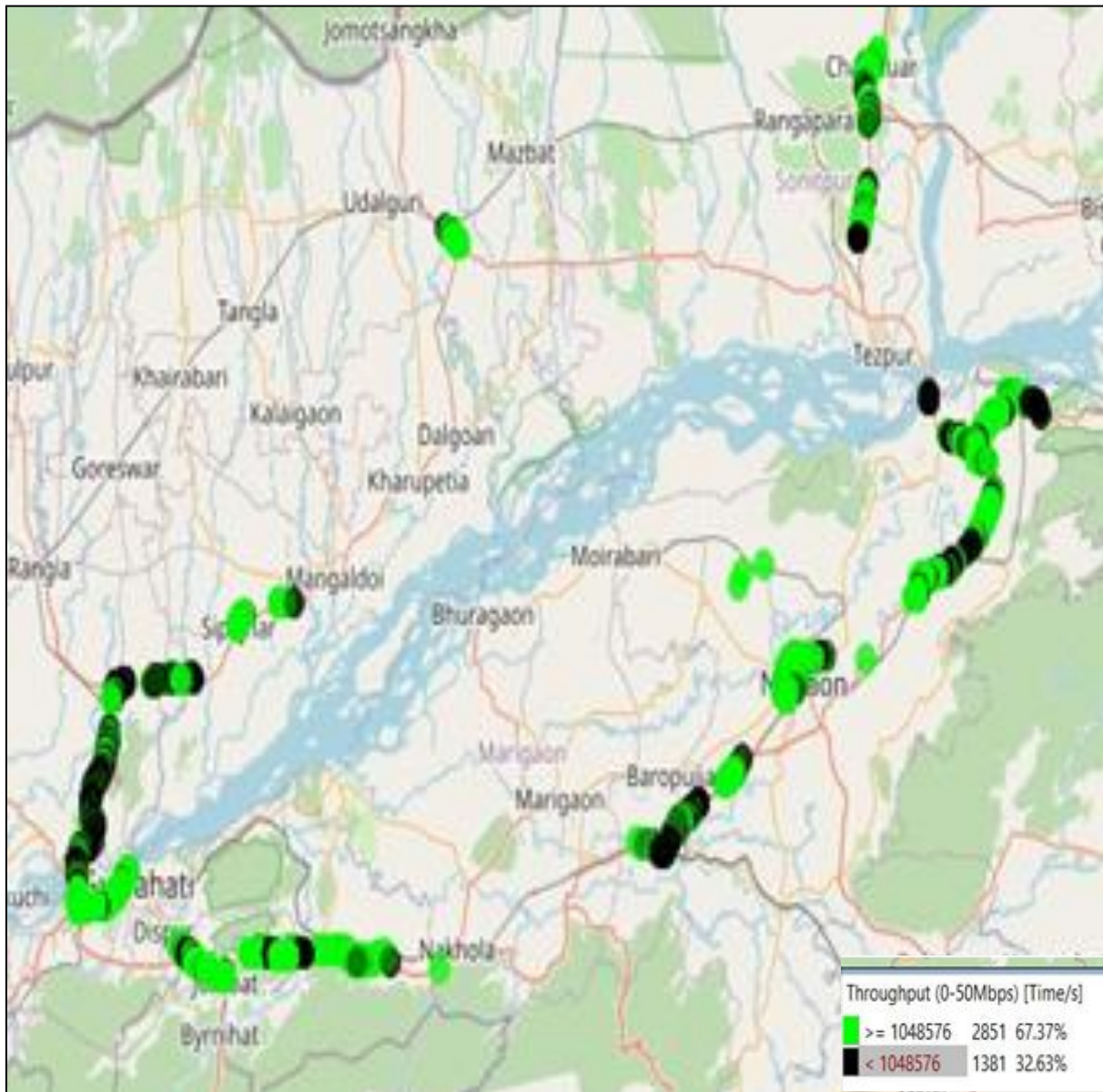
IV. Dynamic Data Test- 3G DL Details

BSNL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	2.86

3G



AVG. DOWNLOAD SPEED (Mbps)	2.86
% FILE TRANSFER COMPLETE	98.32
DL throughput	Sample %
0 to 0.5 Mbps	11.86
0.5 to 1 Mbps	20.77
1 to 2 Mbps	17.27
2 to 5 Mbps	40.41
>5 Mbps	9.69
Total	100

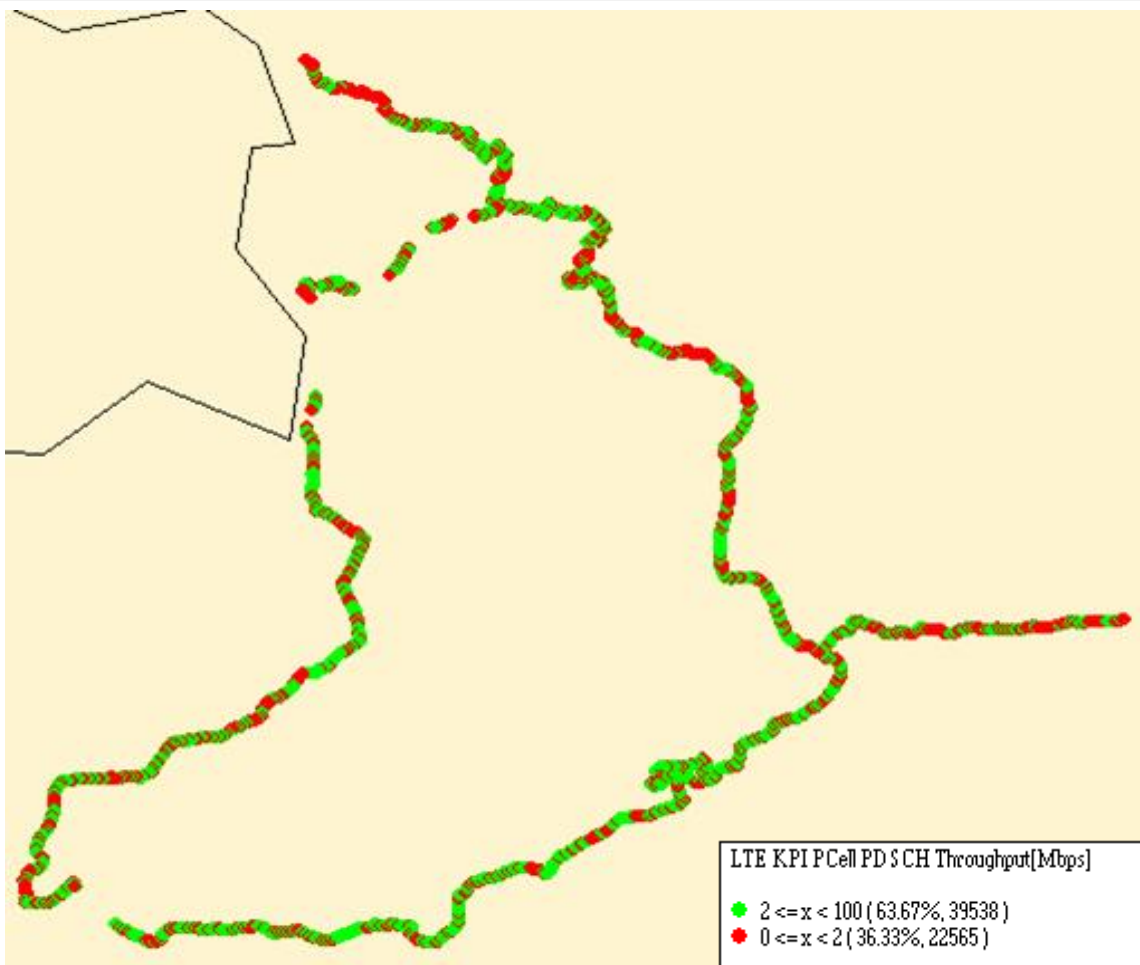
IV. Dynamic Data Test- 4G DL Details

RJIO

Dynamic Data Testing Complete 613 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	13.23

4G



AVG. DOWNLOAD SPEED (Mbps)	13.23
% FILE TRANSFER COMPLETE	100.00
DL throughput	Sample %
0 to 1 Mbps	29
1 to 2 Mbps	7
2 to 5 Mbps	18
5 to 10 Mbps	18
>10 Mbps	28
Total	100

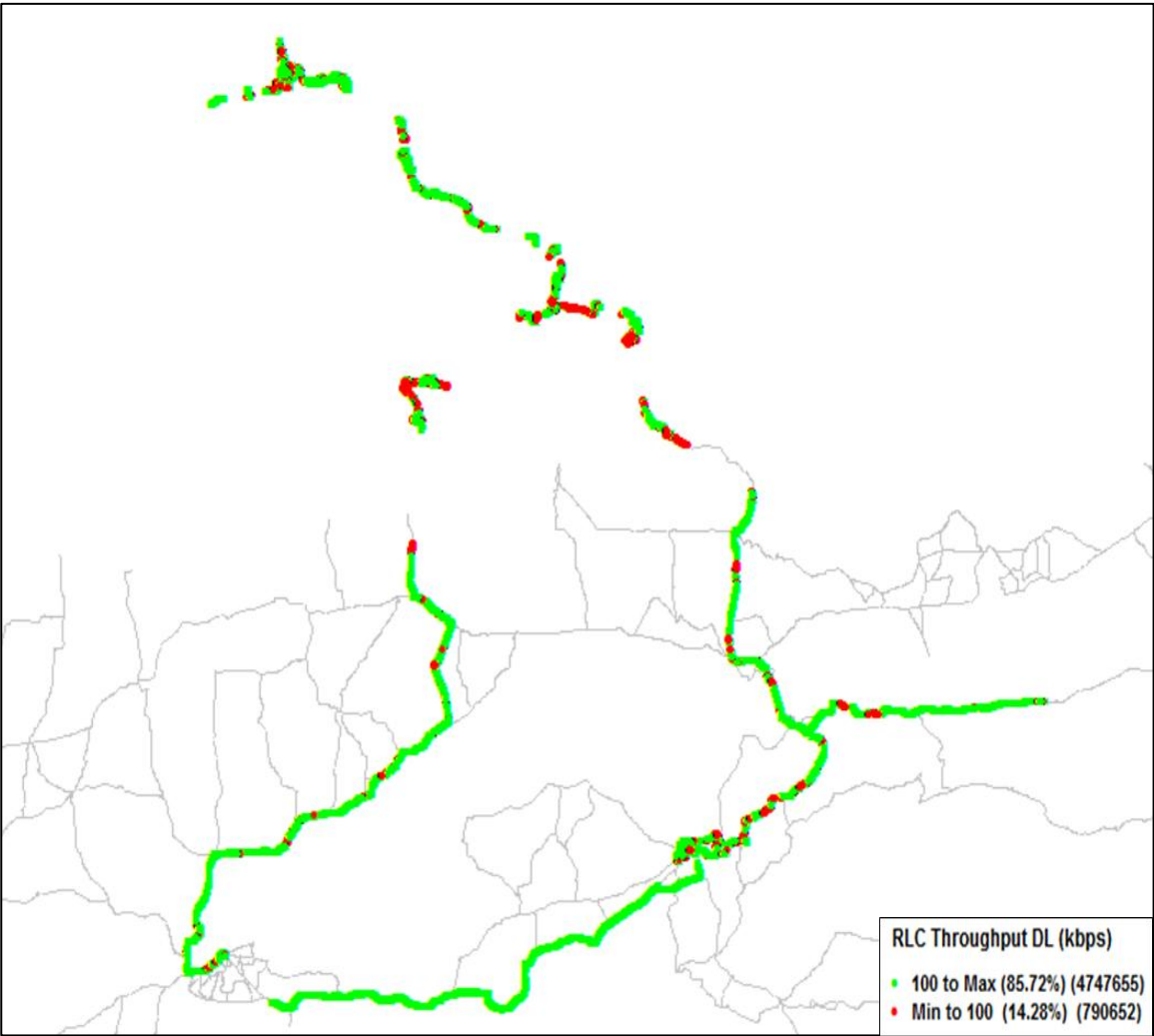
IV. Dynamic Data Test-2G DL Details

VIL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	78.64

2G



AVG. DOWNLOAD SPEED (Kbps)	78.64
% FILE TRANSFER COMPLETE	96.85%
DL throughput	Sample %
0 to 50 Kbps	4.72%
50 to 100 Kbps	9.56%
100 to 200 Kbps	42.18%
200 to 300 Kbps	23.35%
>300 Kbps	20.19%
Total	100%

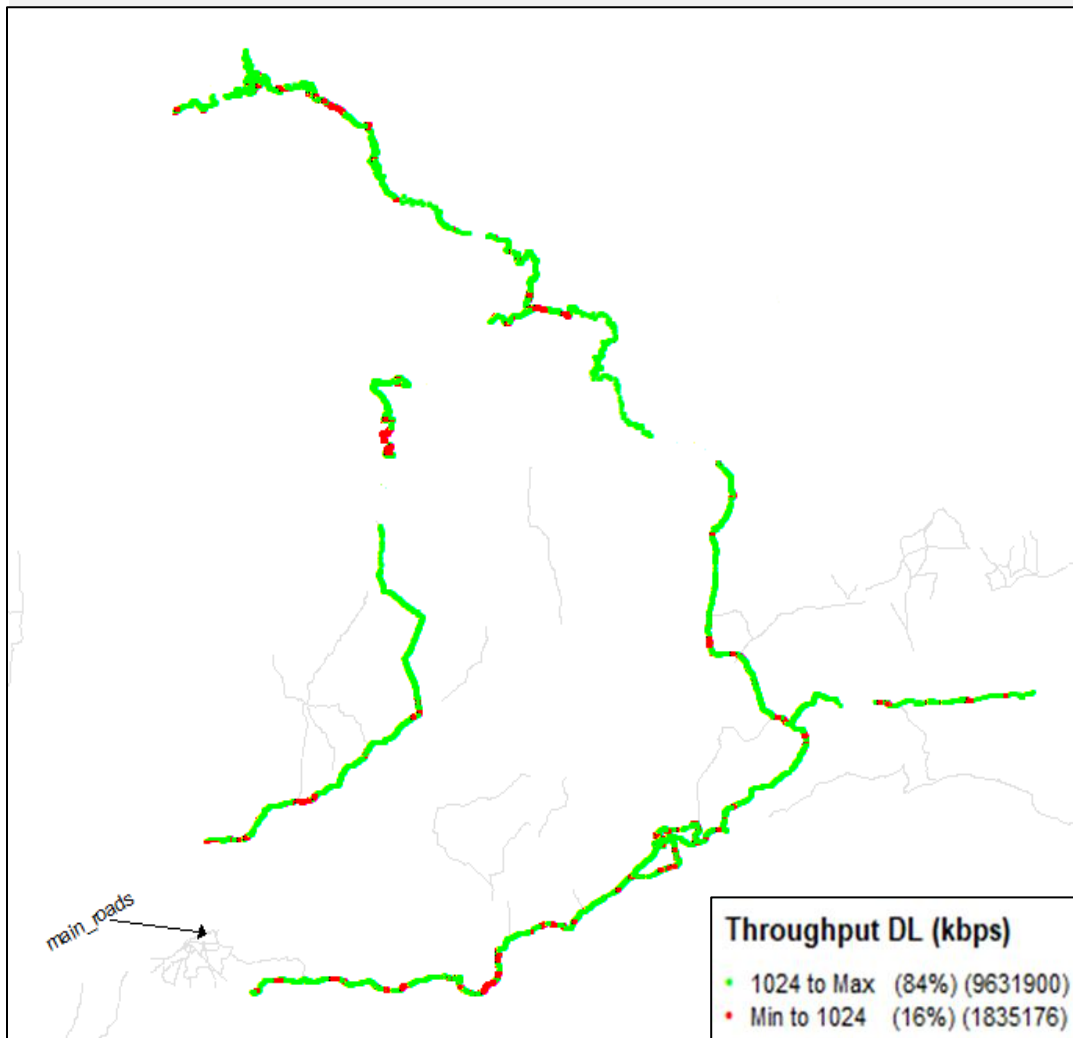
IV. Dynamic Data Test- 3G DL Details

VIL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	3G
Average Download Throughput (mbps)	1.83

3G



AVG. DOWNLOAD SPEED (mbps)	1.83
% FILE TRANSFER COMPLETE	90.45
DL throughput	Sample %
0 to 0.5 Mbps	9.45
0.5 to 1 Mbps	6.55
1 to 2 Mbps	28.90
2 to 5 Mbps	25.20
>5 Mbps	29.90
Total	100

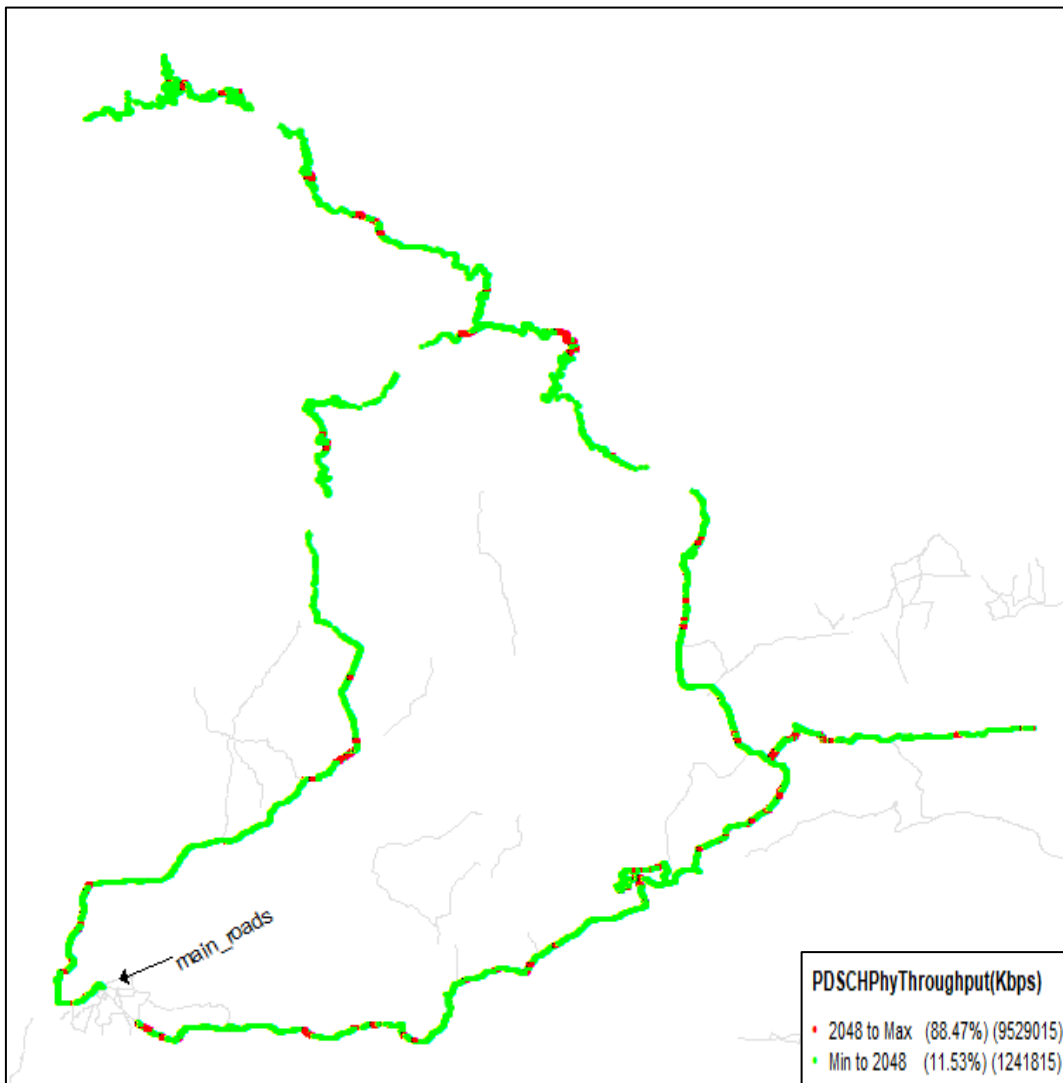
IV. Dynamic Data Test- 4G DL Details

VIL

Dynamic Data Testing Complete 815 Kms

Data KPIs - Overall	4G
Average Download Throughput (Kbps)	3.59

4G



AVG. DOWNLOAD SPEED (Mbps)	3.59
% FILE TRANSFER COMPLETE	99.59
DL throughput	Sample %
0 to 1 Mbps	5.08
1 to 2 Mbps	6.45
2 to 5 Mbps	33.15
5 to 10 Mbps	26.16
>10 Mbps	29.16
Total	100