

Operator Assisted Drive Test Report

Guwahati-Bongaigaon May, 2023

(RO, Kolkata)

Key Performance Indicators (KPIs):

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

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

BSNL-Drop call in 2G network, Rx Quality in 2G & 3G (Ec/Io) network.

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

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

It is observed that 2G, 3G & 4G coverage of VIL and 3G coverage of BSNL on some portions of the OADT routes are inadequate.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Guwahati-Bongaigaon and surrounding areas including National Highways (17, 27 and 127) **on 18th May 2023 and 19th May 2023** from 08.30 AM to 08.30 PM. The drive test covered drive route of 671 KMs over a period of 2 days. Approximately 447+ 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

Guwahati is the biggest city of the Indian state of Assam and also the largest metropolis in northeastern India. A major riverine port city along with hills, and one of the fastest growing cities in India, Guwahati is situated on the south bank of the Brahmaputra. The city is known as the "gateway to North East India".

Bongaigaon is a major city in the Indian state of Assam. Its urban area spans across Bongaigaon and Chirang district. The city also serves as the gateway of the North-East Frontier Railway Zone with its New Bongaigaon Junction railway station, the second biggest railway station in North-East India. It also acts as the district headquarters of Bongaigaon district and commercial and industrial hub of the west part of the state of Assam.

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 call in all technologies. Three 2G networks, Two 3G networks, three 4G networks covering 4 unique TSPs were tested.

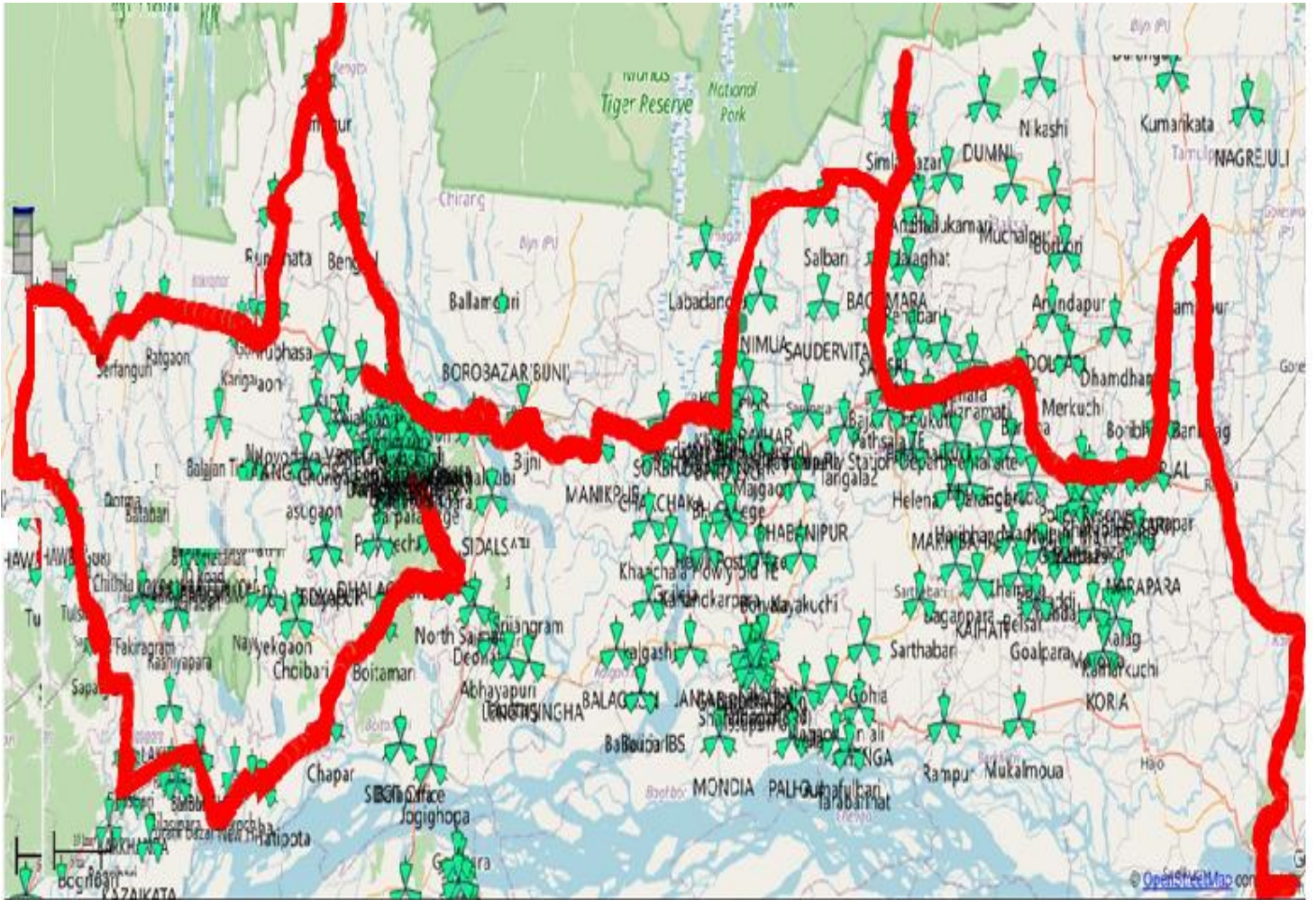
Data Tests: Dynamic Data Service Testing was performed along same route in all technologies. 500 KB file for 2G, 20MB file for 3G and 40MB file for 4G were downloaded from FTTP server in TSP's own server. Static Data Service Testing was also performed. Three 2G (Lock Mode) networks, Two 3G (Lock Mode) networks, Three LTE (Lock Mode) networks covering 4 unique TSPs were tested.

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 Steaming	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

Overview

Voice & Dynamic Data Test Drive Route



Drive Routes: Guwahati-Bongaigaon, Assam

DAY-1—Kamakhya Railway Station—Narayana Hospital—Changsari—Dora Kahara—Baihata Chariali—Jawaharjyoti HS School—Rangia Society Chowk—Pathalikuchi—Tamulpur Police Station—Kalakuchi—Dhamdhama—Nalbari SMK Civil Hospital—Haripur Chowk—Kathalbari—Bhutan Road—Barma Police Station—Patacharkuchi—Pathasala—Kenduguri—Baghmara Bazaar—Anchali Bazar—Hajua— Simla Bazar—Daodhara Market—Lakkhi Bazar—Check post of Assam forest department—Salbari HS School—Gobardhana—Kalpana Bazar—Barpeta road police station, Simlaguri Police Point, Simlaguri Barpata Road, Shorbhong Bridge, Chapaguri Police point, Sapaguri Bongaigaon, Bongaigaon Chapaguri Traffic Police point.

DAY-2—DC office Chirang—Hatipota Bazar—Bengtol—Indo Bhutan Border Gelephu—Deosri—Santipur High School—Ranikhata—Garubhasa—Karigaon—Serfanguri Police Station—Kalabari—Kachugaon Bazaar—Boshgaon—Kashibari Market—Assam West Bengal Border—Srirampur post office—Gaurang Botanical Garden—Florican Garden, Dhubri—Salkocha Out Post—Chapar—Bahalpur Bridge—Salbari—Khagarpur Market—Bongaigaon Civil Hospital.

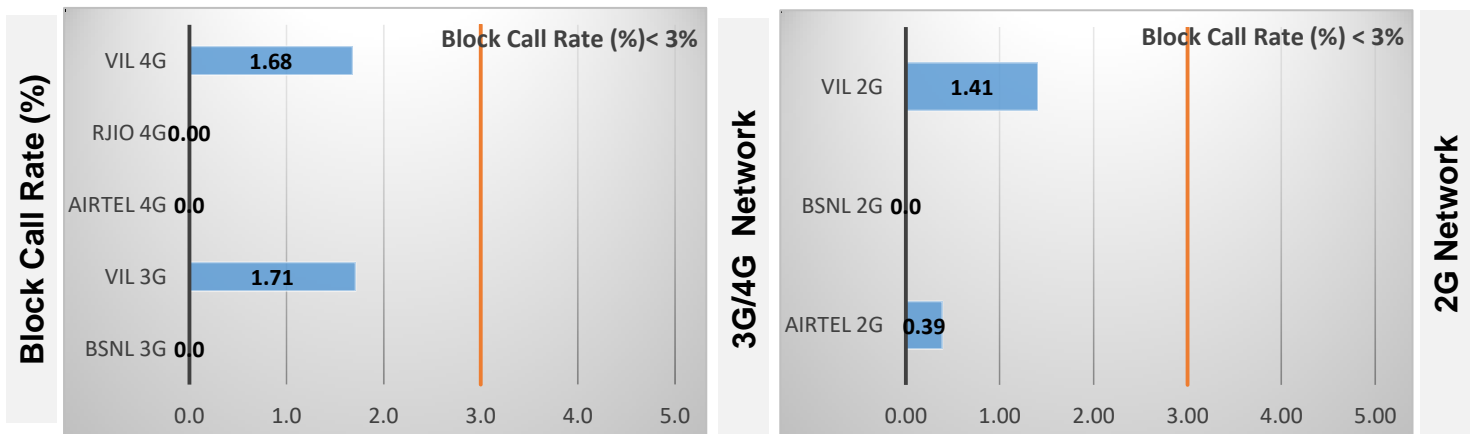
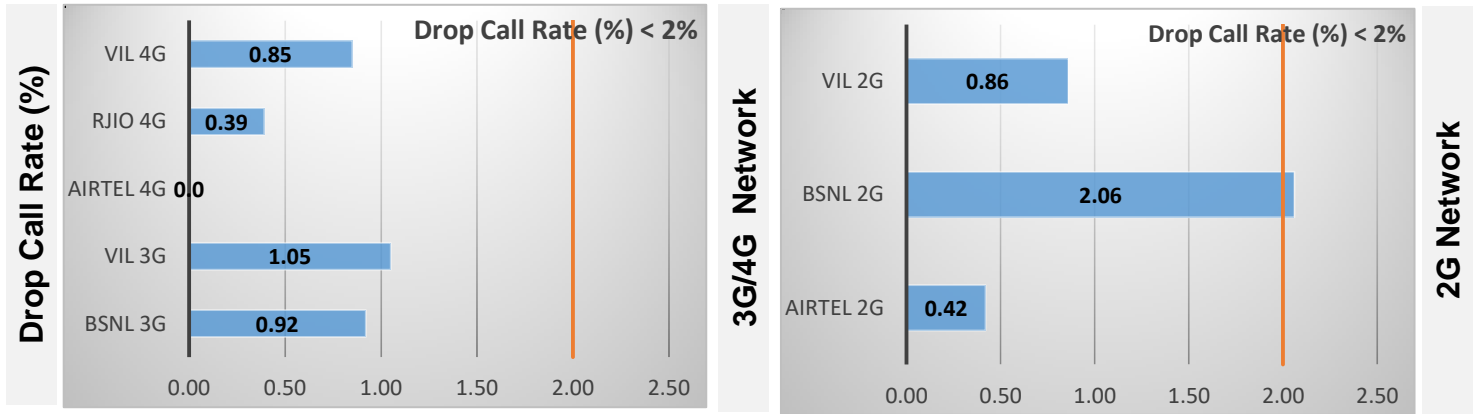
Data Service Test- Static Locations

Static Locations
Kamakhya Railway Station, Guwahati
Bongaigaon DC office

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 %	0.42	2.06	0.86	0.92	1.05	0.0	0.39	0.85
Block Call Rate %	0.39	0.0	1.41	0.0	1.71	0.0	0.0	1.68

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

Coverage

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

TSPs	2G		
	AIRTEL	BSNL	VIL
Coverage %	79.87	40.22	96.18

b) Percentage of coverage samples for 3G \geq -90 dBm & 4G \geq -110 dBm.

TSPs	3G		4G		
	BSNL	VIL	AIRTEL	RJIO	VIL
Coverage	53.50	88.96	96.40	91.60	81.94

Summary

City Level Summary- Voice

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	511	568	355
Blocked Call Rate (%)	0.39	0.0	1.41
CSSR% (Accessibility)	99.60	95.95	98.59
Drop Call Rate (%)	0.42	2.06	0.86
Mobility HOSR (%)	99.20	95.74	100
Rx Quality (%)	95.86	93.44	95.07

Voice Call	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Call Attempt	564	292	512	539	238
Blocked Call Rate (%)	0.0	1.71	0.0	0.0	1.68
CSSR% (Accessibility)	96.45	98.29	100	98.14	98.32
Drop Call Rate (%)	0.92	1.05	0.0	0.39	0.85
Mobility HOSR (%)	99.06	100	100	98.52	100
Rx Quality (%)	81.71	93.51	88.18	88.44	92.83

Summary-Data Services Dynamic

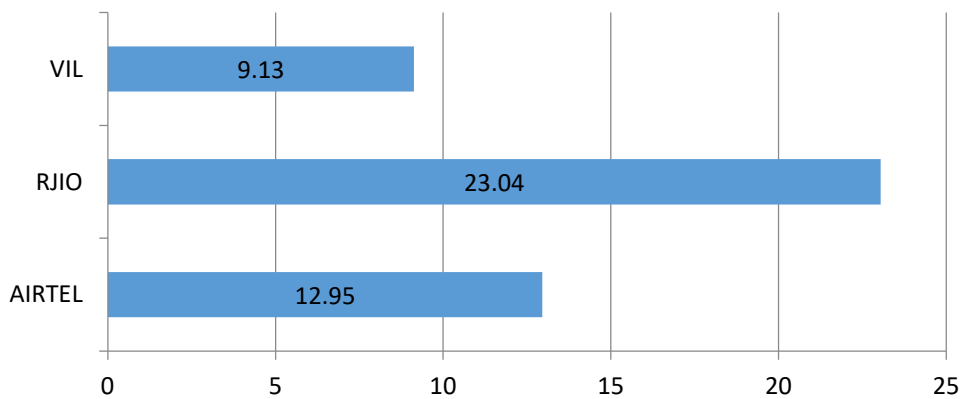
Key Observations

Dynamic Data was tested for 671 Kms. Download Throughput was tested.

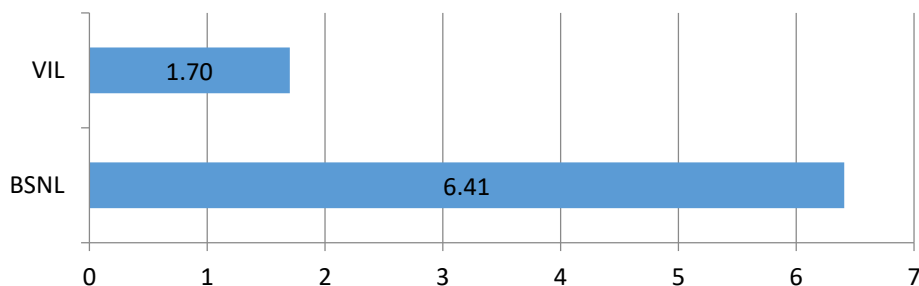
Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

4G/3G Network:

4G-Dynamic Download Average Throughput (Mbps)



3G-Dynamic Download Average Throughput (Mbps)



Summary-Data Services Static

City Level Summary-

Average Data Services Static	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	106.03	302	112.6
Upload Throughput (kbps)	96.94	55.5	68.24
Web Browsing Delay (sec)	***	***	1.07
Latency (msec)	194	***	294

Average Data Services Static	3G/ 4G					
	BSNL 3G	VIL 3G	AIRTEL 4G	BSNL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.95	4.26	16.37	40.61	6.56	37.71
Upload Throughput in Mbps	9.15	1.32	5.29	12.24	3.89	14.75
Video streaming delay (secs)	***	0.92	***	***	0.0	02.0
Web Browsing Delay (secs)	***	1.12	4.22	***	5.62	03.0
Latency (msec)	81	142	115.5	***	67	22

*** TSPs did not submit the Reports.

Summary-Data Services Static

Location Level Summary-

Location:-Kamakhya Railway Station	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	102.28	314	112.60
Upload Throughput (kbps)	97.35	43.0	68.24
Web Browsing Delay (sec)	***	***	1.07
Latency (msec)	187	***	294

Location:-Kamakhya Railway Station	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.95	4.26	9.88	5.77	37.71
Upload Throughput in Mbps	9.15	1.32	6.33	4.09	14.75
Video streaming delay (secs)	***	0.92	***	0.0	02
Web Browsing Delay (secs)	***	1.12	4.25	7.79	03
Latency (msec)	81	142	128	52	22

Location:-Bongaigaon DC office	2G		
	AIRTEL	BSNL	VIL
Download throughput in(kbps)	109.78	291.26	***
Upload Throughput in (kbps)	96.54	68	***
Web Browsing Delay (secs)	***	***	***
Latency (msec)	201	***	***

Location:-Bongaigaon DC office	4G				
	VIL 3G	AIRTEL 4G	BSNL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	***	22.86	40.61	7.35	***
Upload Throughput in (mbps)	***	4.26	12.24	3.68	***
Video streaming delay (secs)	***	***	***	0.0	***
Web Browsing Delay (secs)	***	4.20	***	3.46	***
Latency (msec)	***	103	***	82	***

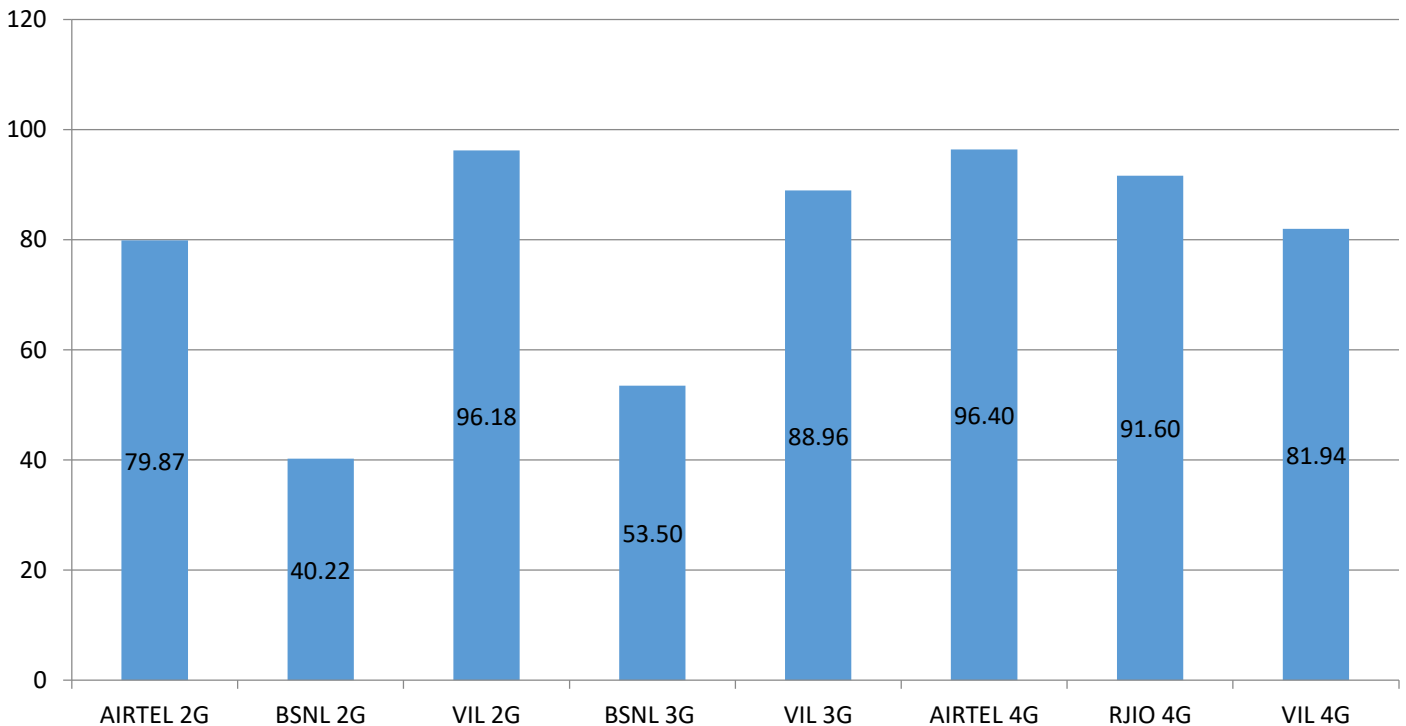
*** TSPs did not submit the Reports.

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	79.87
BSNL 2G	40.22
VIL 2G	96.18
BSNL 3G	53.50
VIL 3G	88.96
AIRTEL 4G	96.40
RJIO 4G	91.60
VIL 4G	81.94

Coverage Rate %



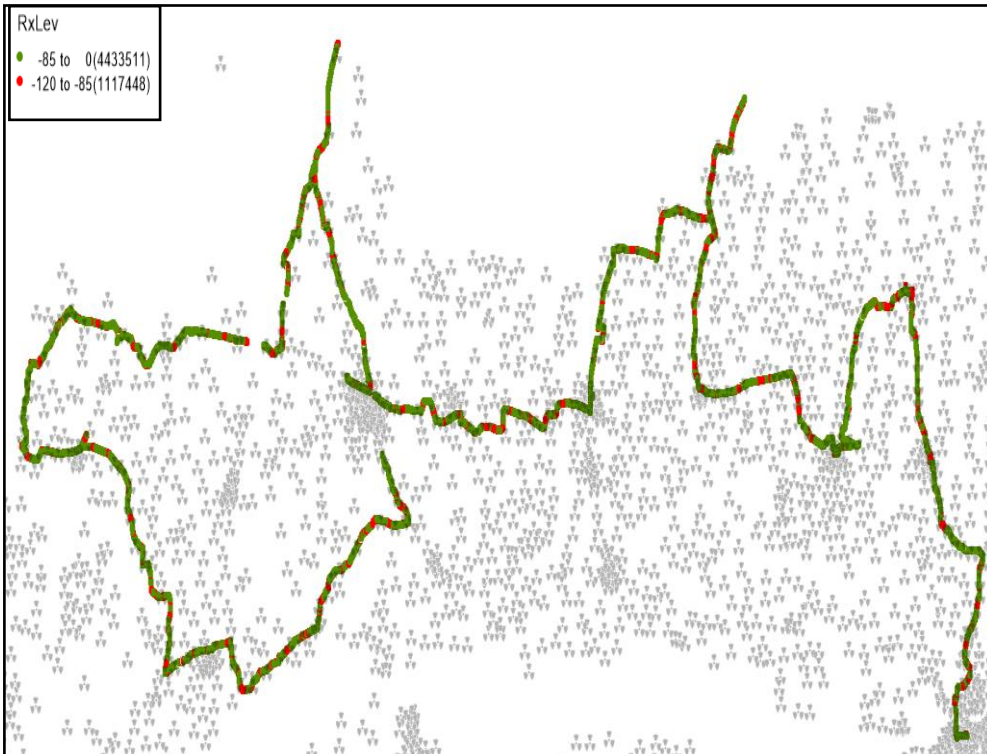
Note- Coverage is the percentage of samples having signal strength more than the threshold value (2G ≥ -85 dbm, 3G ≥ -90 dbm and 4G ≥ -110 dbm). However, these samples are only for the portion of the OADT routes where TSPs have coverage i.e 'no coverage' routes have been excluded.

I. Coverage Details

AIRTEL

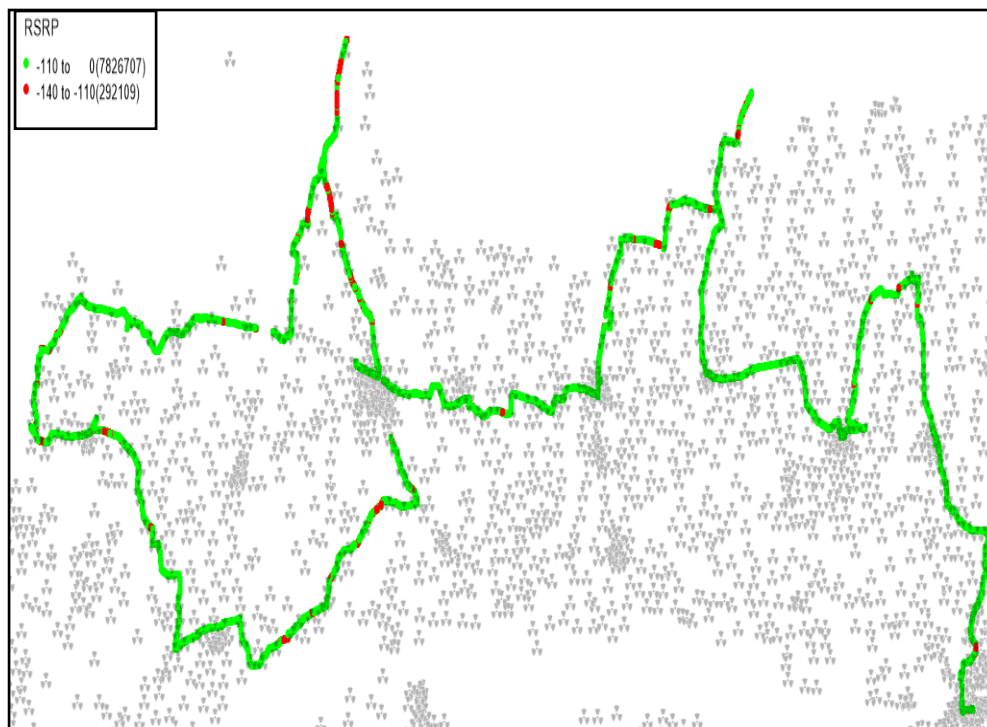
Technology	Coverage Rate %
2G	79.87
4G	96.40

2G



Overall Rx Level	Sample %
[Max >=-75]	41.97
[-75 >=-85)	37.90
[-85 >=-95)	18.28
[-95 >=Min)	1.85
Total	100

4G



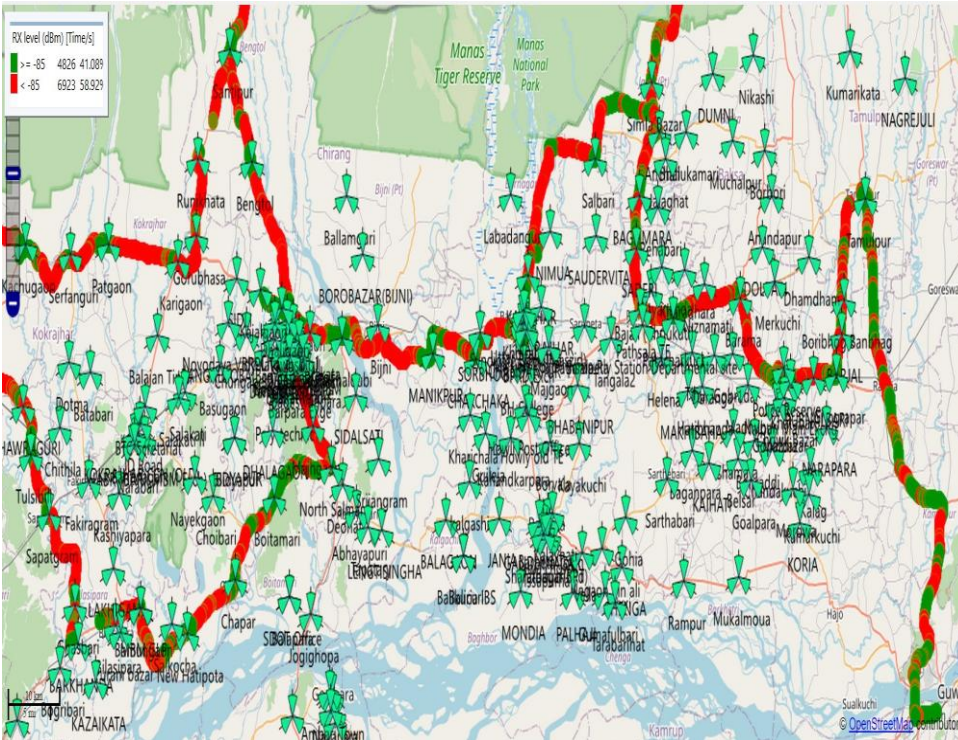
Overall RSRP	Sample %
[Max >=-80]	27
[-80 >=-90)	31
[-90 >=-110)	39
[-110 >=Min)	4
Total	100

I. Coverage Details

BSNL

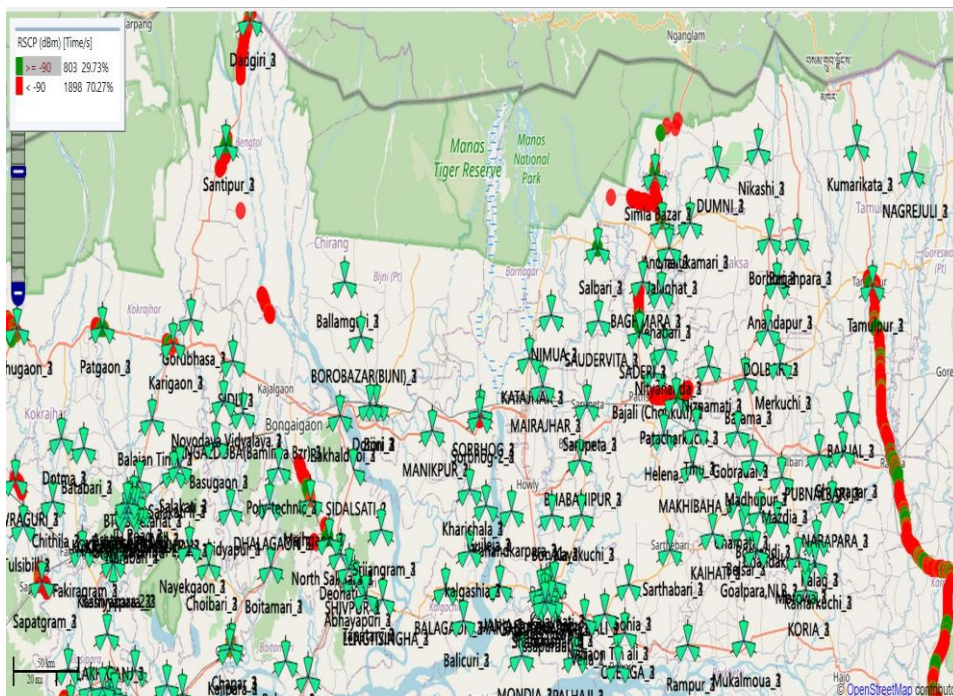
Technology	Coverage Rate %
2G	40.22
3G	53.50

2G



Overall RxLevel	Sample %
[Max >=-75]	18.80
[-75 >=-85]	21.42
[-85 >=-95]	30.72
[-95 >=Min]	29.06
Total	100

3G



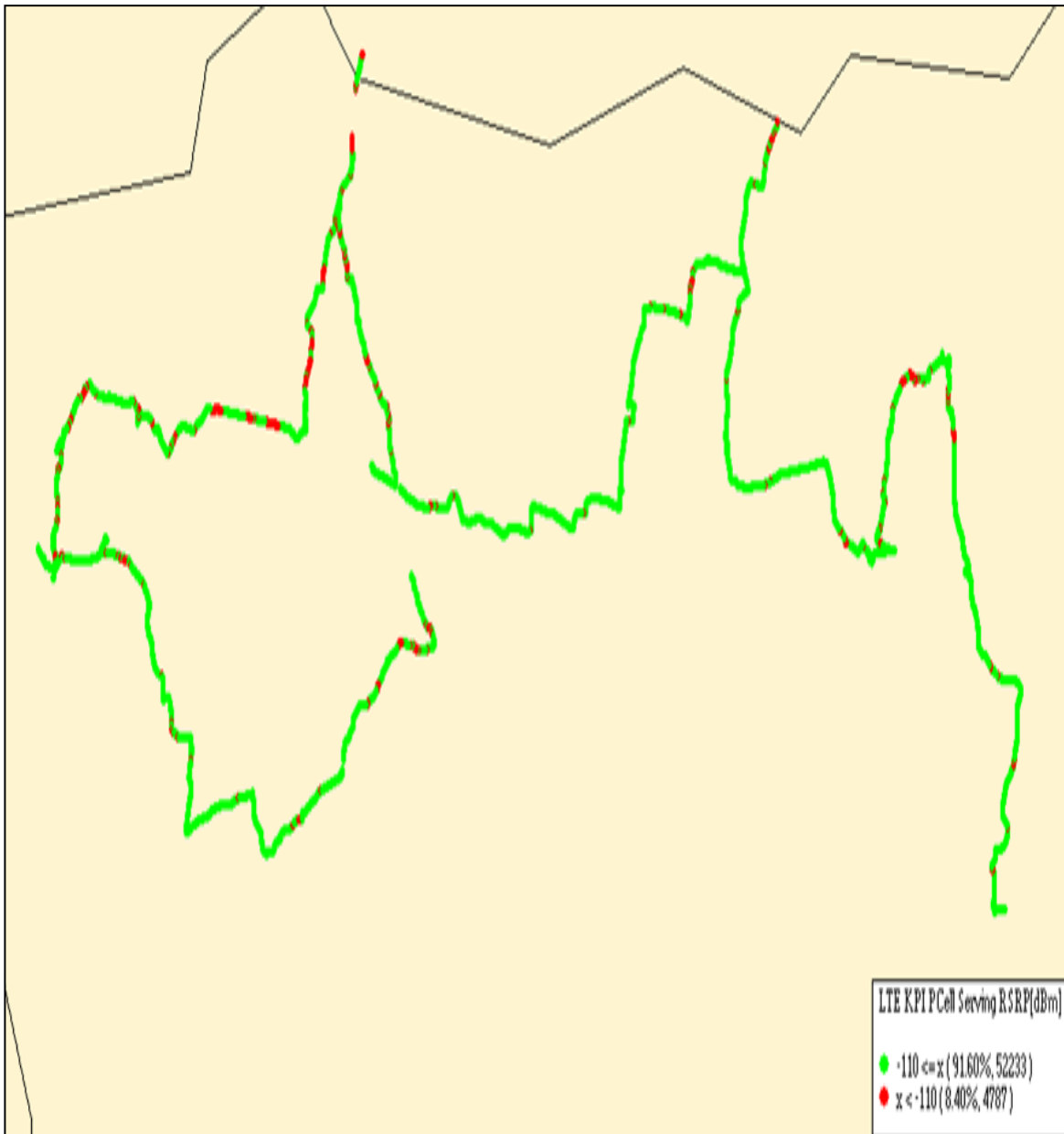
Overall RSCP	Sample %
[Max >=-70]	2.89
[-70 >=-80]	9.96
[-80 >=-90]	16.88
[-90 >=Min]	70.27
Total	100

I. Coverage Details

RJIO

Technology	Coverage Rate %
4G	91.60

4G



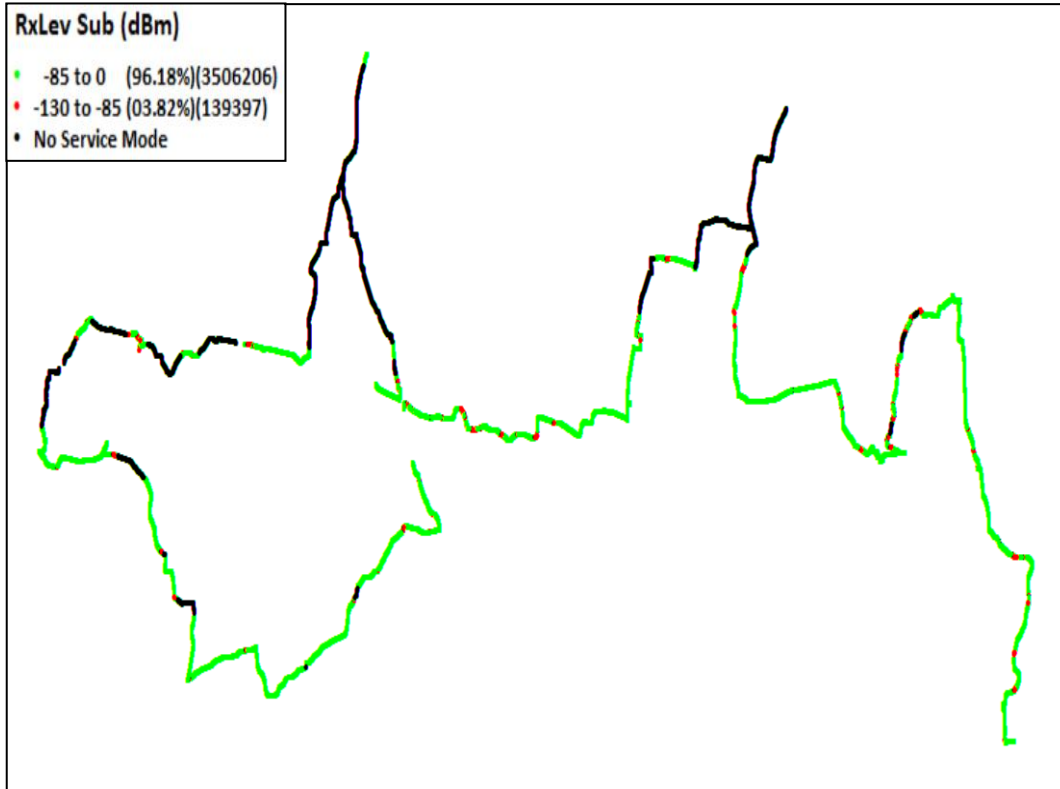
Overall RSRP	Sample %
[Max >=-80]	21.90
[-80 >=-90)	22.67
[-90 >=-110)	47.03
[-110 >=Min)	8.40
Total	100

I. Coverage Details

VIL

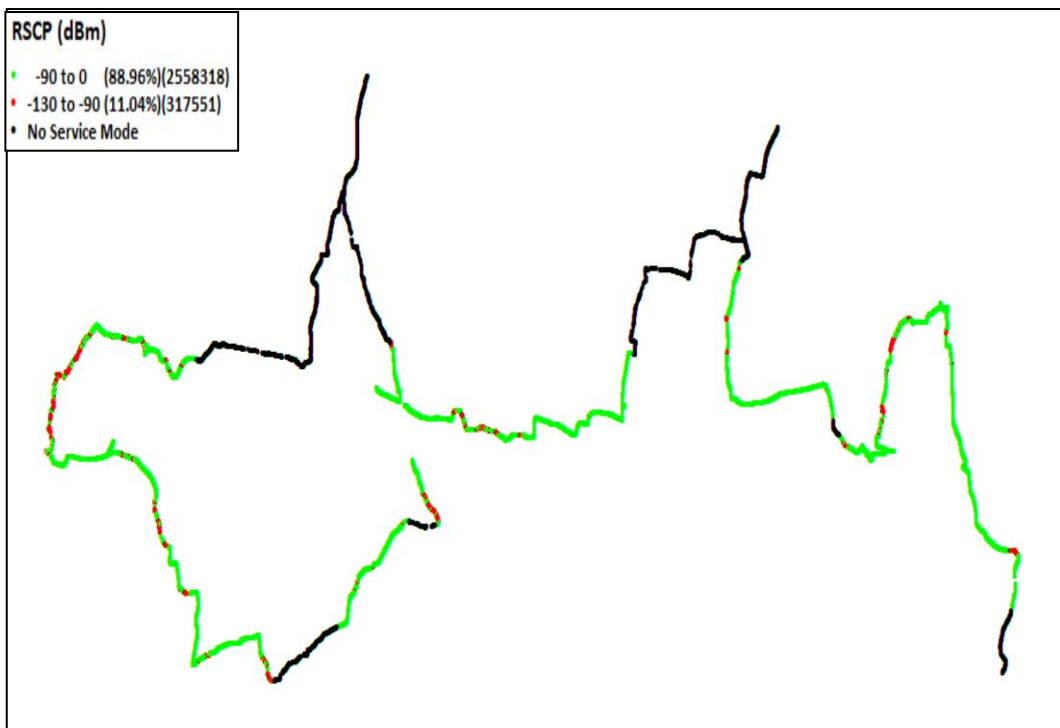
Technology	Coverage Rate %
2G	96.18
3G	88.96

2G



Overall RxLevel	Sample %
[Max >=-75]	46.70
[-75 >=-85]	49.48
[-85 >=-95]	2.08
[-95 =Min]	1.74
Total	100

3G

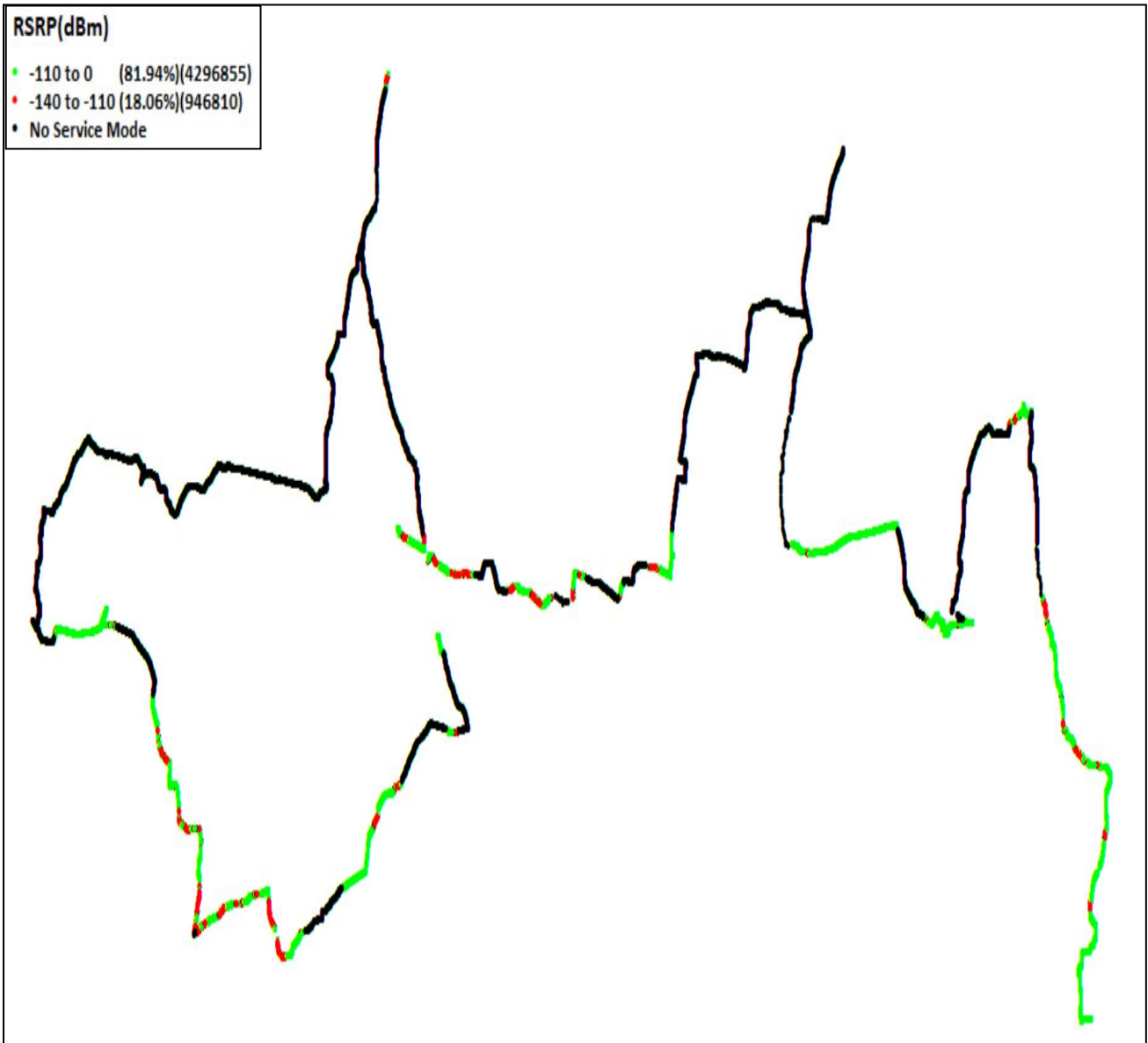


Overall RSCP	Sample %
[Max >=-70]	32.91
[-70 >=-80]	27.58
[-80 >=-90]	28.47
[-90 >=Min]	11.04
Total	100

I. Coverage Details

VIL

Technology	Coverage Rate %
4G	81.94
4G	



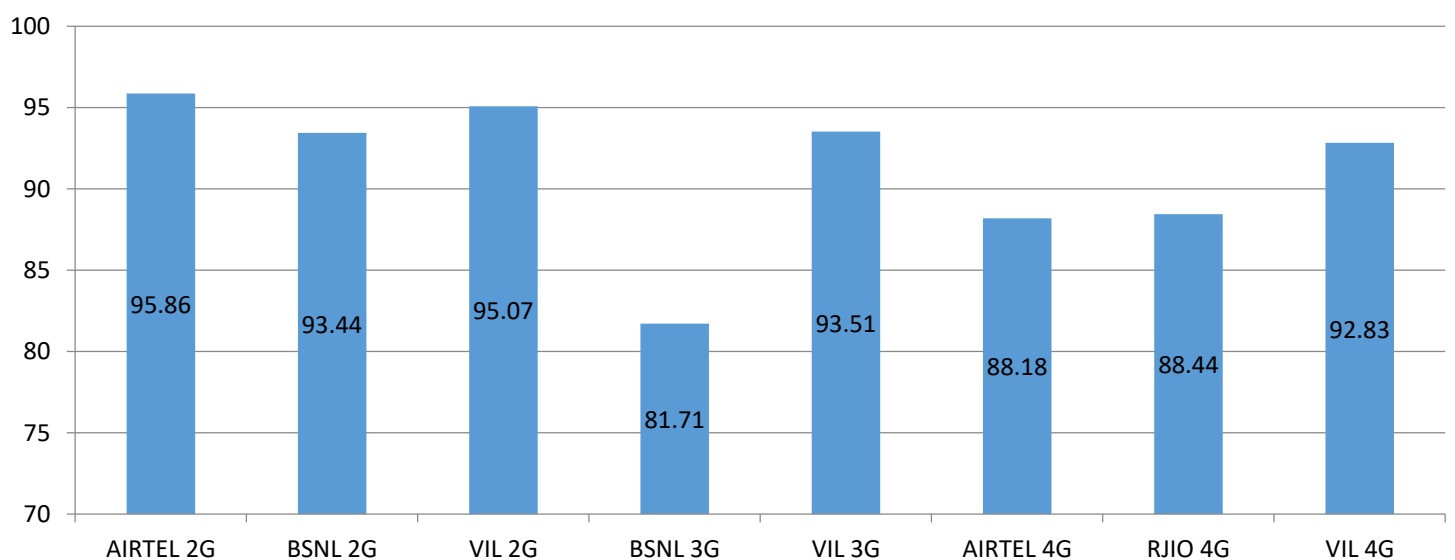
Overall RSRP	Sample %
[Max >=-80]	29.50
[-80 >=-90)	35.24
[-90 >=-110)	17.21
[-110 >=Min)	18.06
Total	100

II. Quality Details

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 $\geq 95\%$.

TSP	Rx Quality %
AIRTEL 2G	95.86
BSNL 2G	93.44
VIL 2G	95.07
BSNL 3G	81.71
VIL 3G	93.51
AIRTEL 4G	88.18
RJIO 4G	88.44
VIL 4G	92.83

Rx Quality %

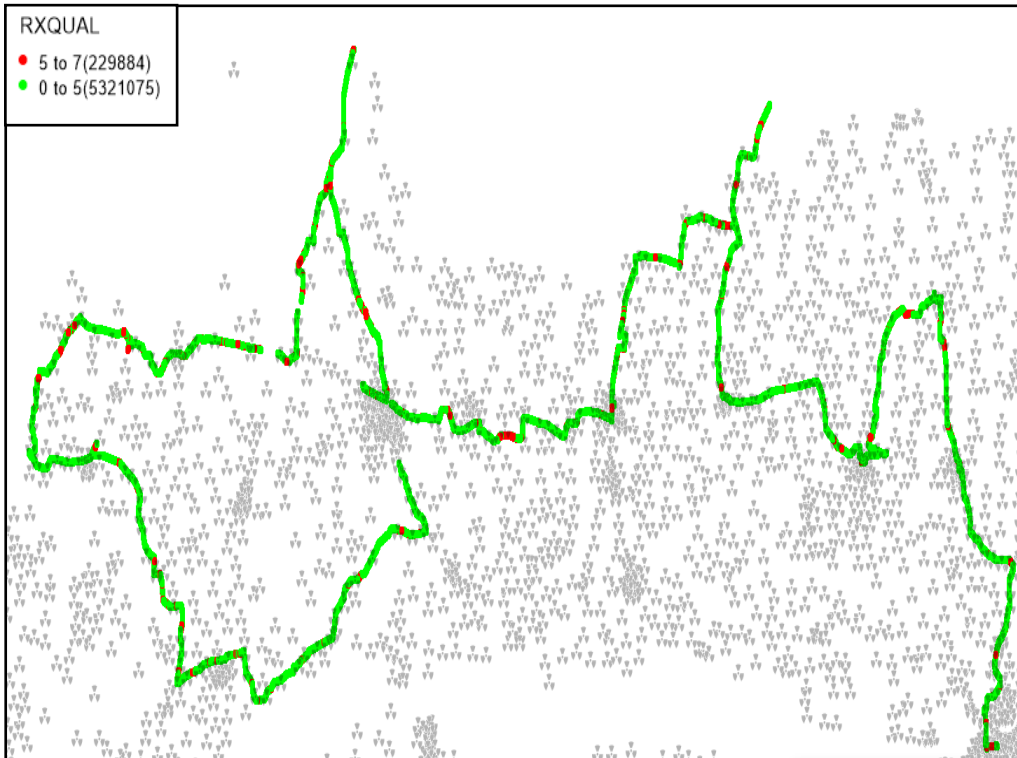


II. Quality Details

AIRTEL

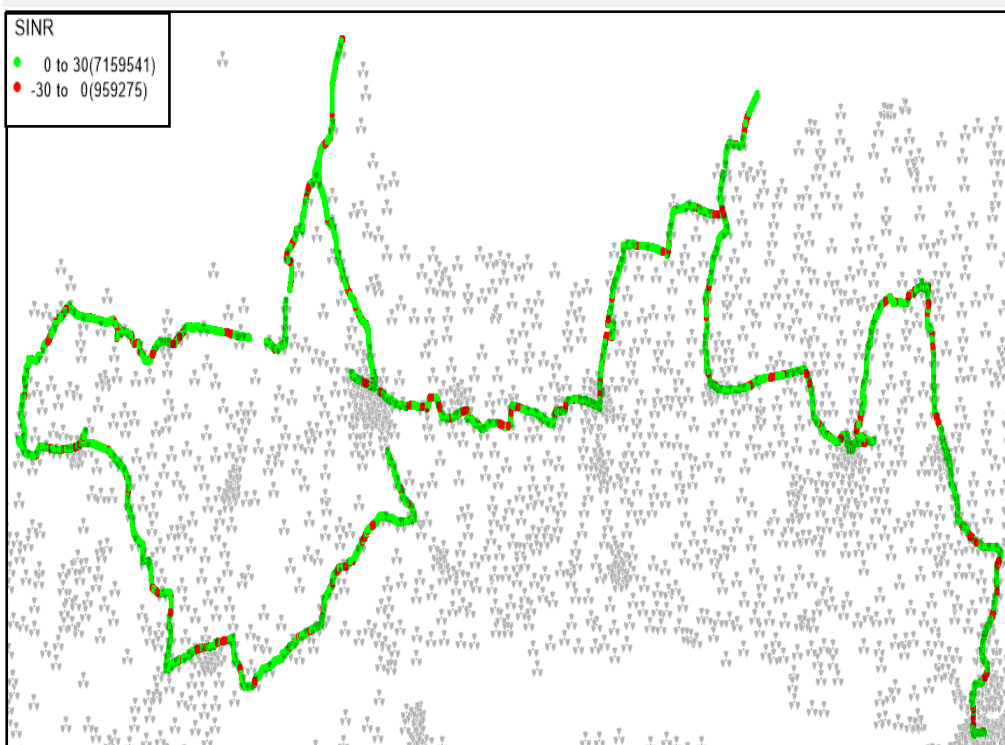
Technology	Rx Quality %
2G	95.86
4G	88.18

2G



Overall Rx Quality	Sample %
(Min <=2)	83.88
(2 <=3)	4.11
(3 <=4)	4.24
(4 <=5)	3.61
(5 <=Max)	4.14
Total	100

4G



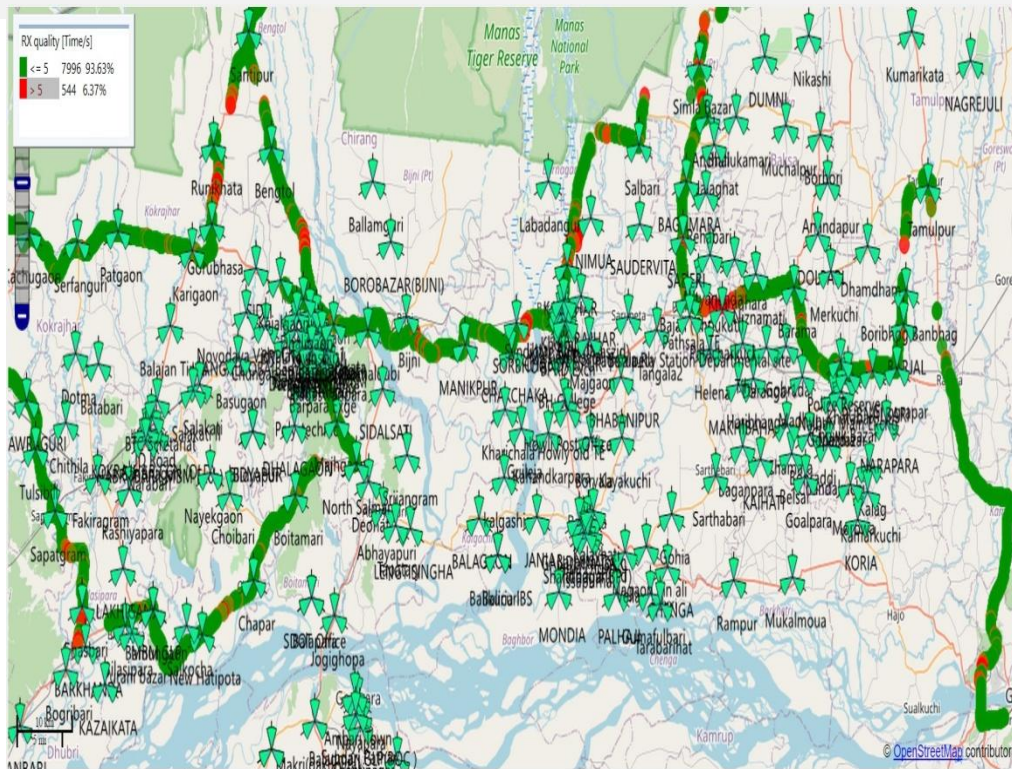
Overall SINR	Sample %
(Min <=0)	11.8
(0 <=5)	26.8
(5 <=10)	21.9
(10 <=15)	18.1
(15 <=Max)	21.3
Total	100

II. Quality Details

BSNL

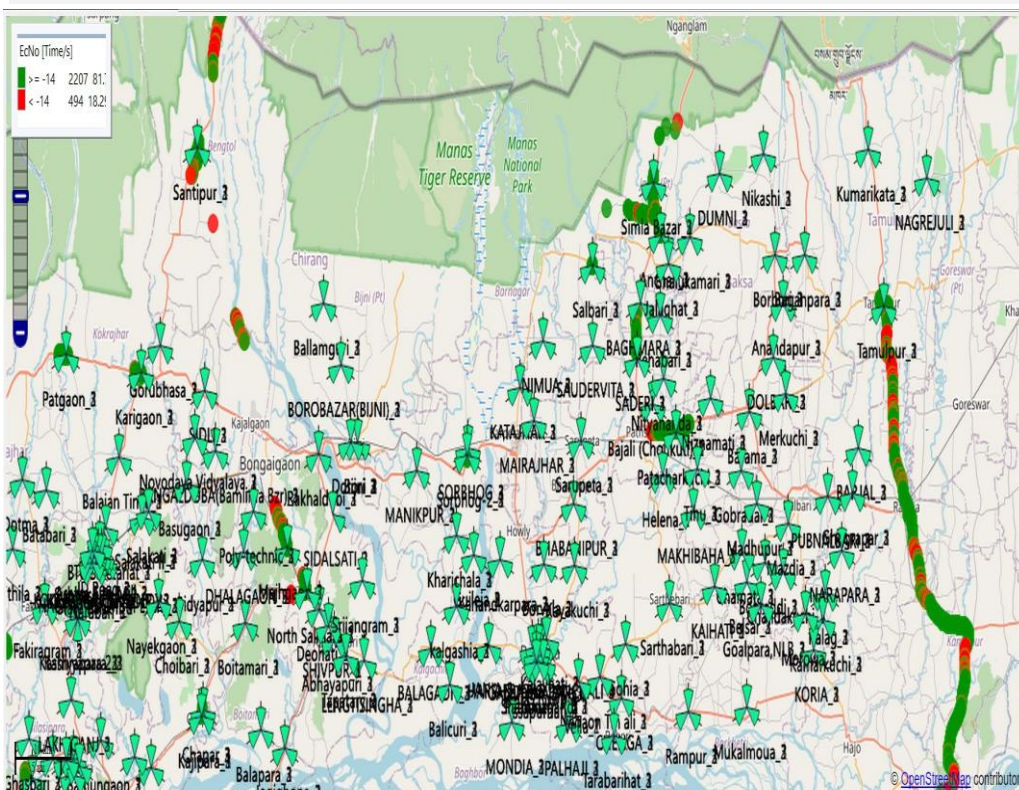
Technology	Rx Quality %
2G	93.44
3G	81.71

2G



Overall Rx Quality	Sample %
(Min <=2)	79.89
(2 <=3)	5.61
(3 <=4)	4.39
(4 <=5)	3.55
(5 <=Max)	6.56
Total	100

3G

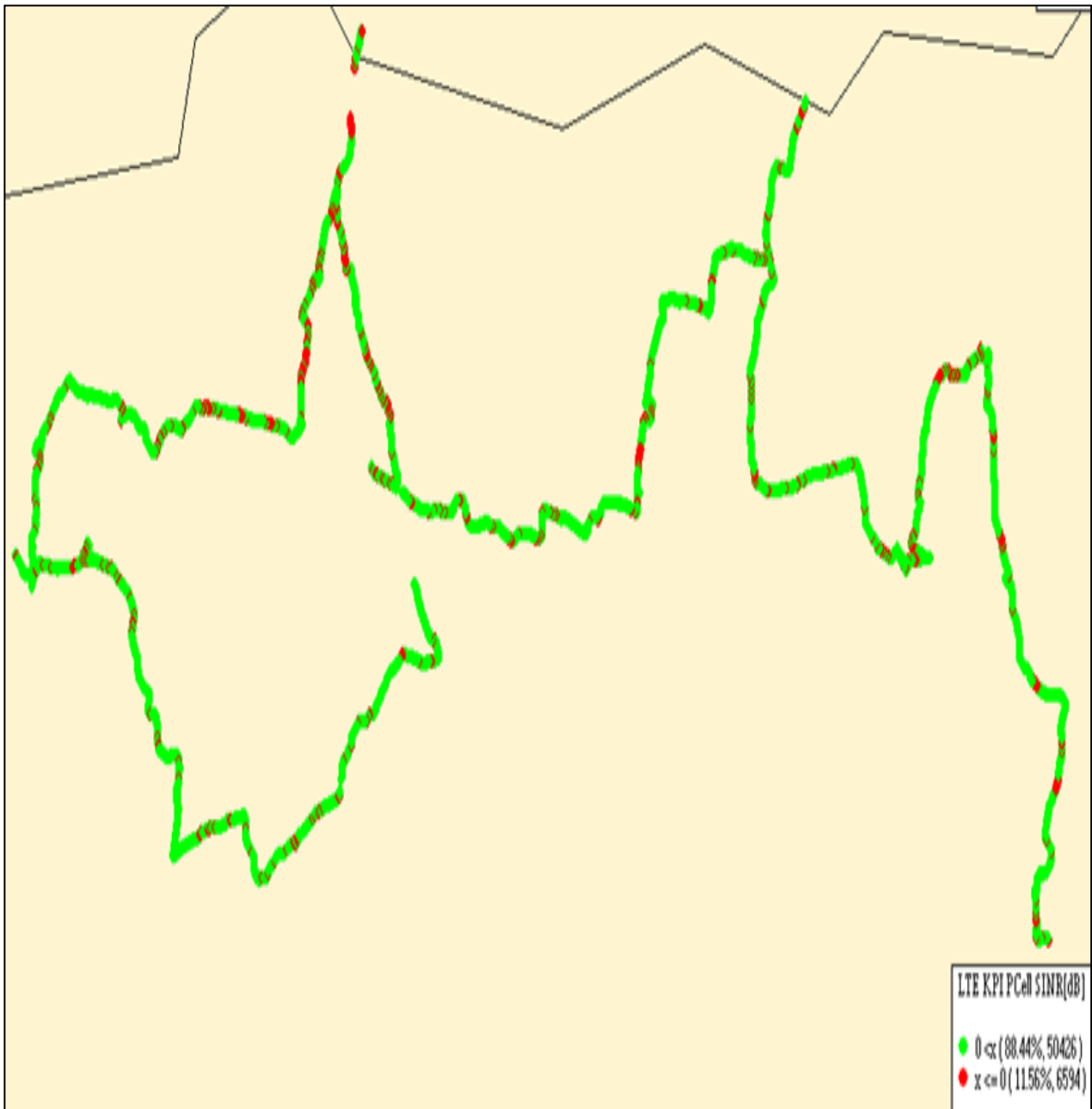


Overall EcNo	Sample %
(Max <=-6)	20.97
(-6 <=-9)	32.07
(-9 <=-11)	20.97
(-11 <=-14)	25.95
(-14 <= Min)	0.05
Total	100

II. Quality Details

RJIO

Technology	Rx Quality %
4G	88.44



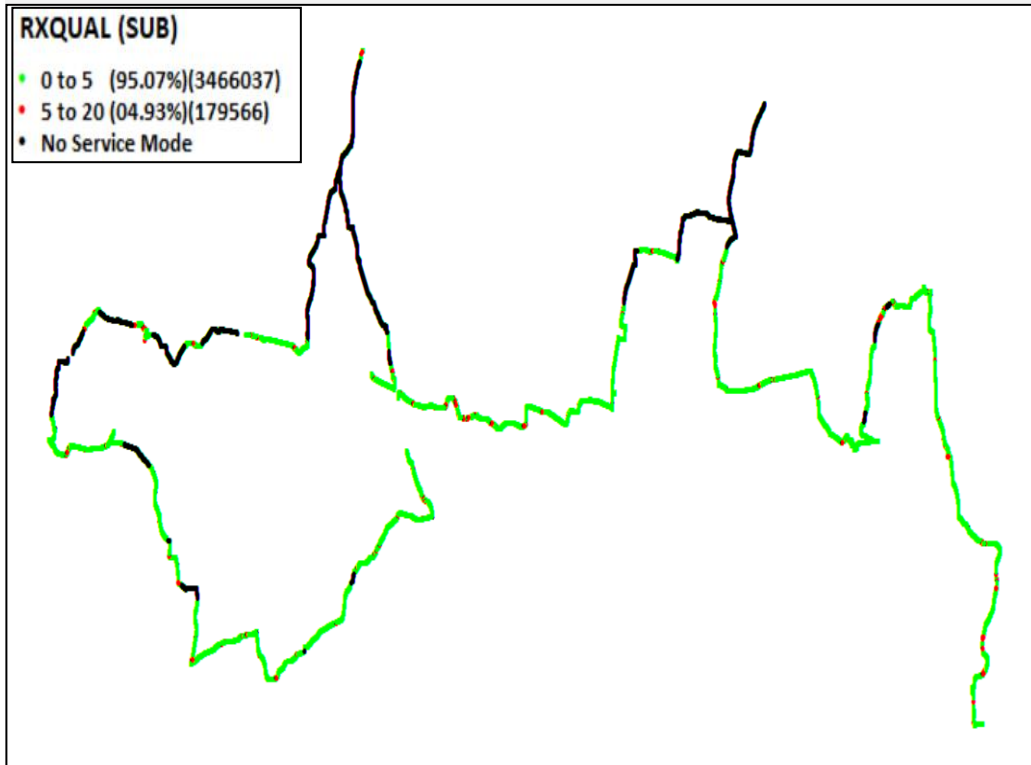
Overall SINR	Sample %
(Min ≤ 0)	11.56
(0 ≤ 5)	20.59
(5 ≤ 10)	25.92
(10 ≤ 15)	20.27
(15 \leq Max)	21.65
Total	100

II. Quality Details

VIL

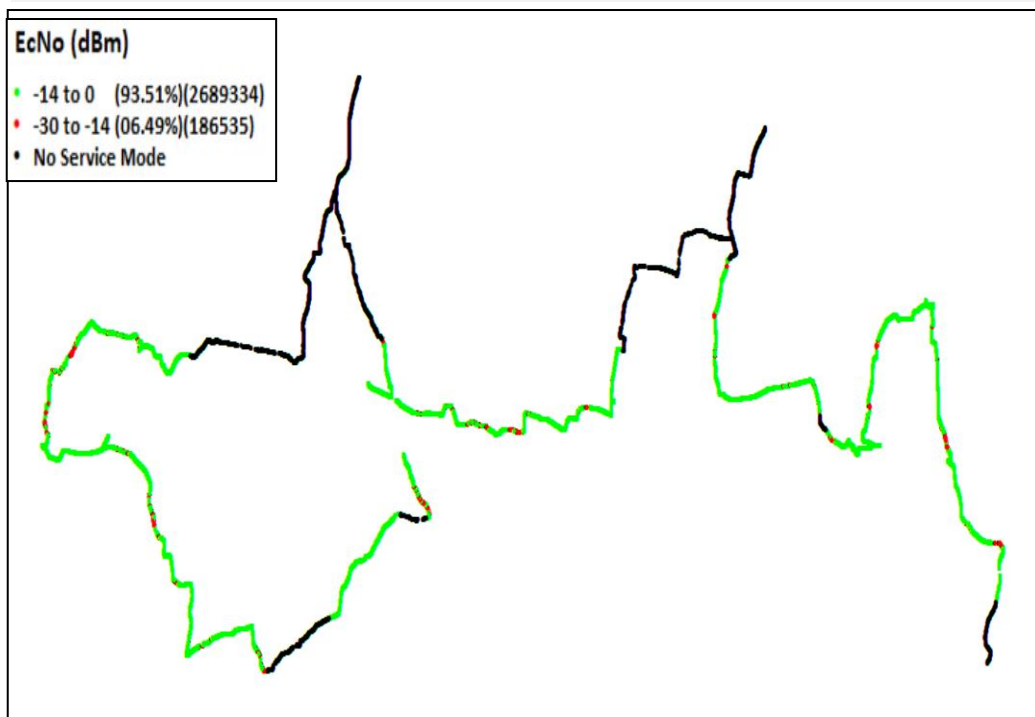
Technology	Rx Quality %
2G	95.07
3G	93.51

2G



Overall Rx Quality	Sample %
(Min <=2)	58.95
(2 <=3)	14.26
(3 <=4)	17.11
(4 <=5)	4.75
(5 <=Max)	4.93
Total	100

3G



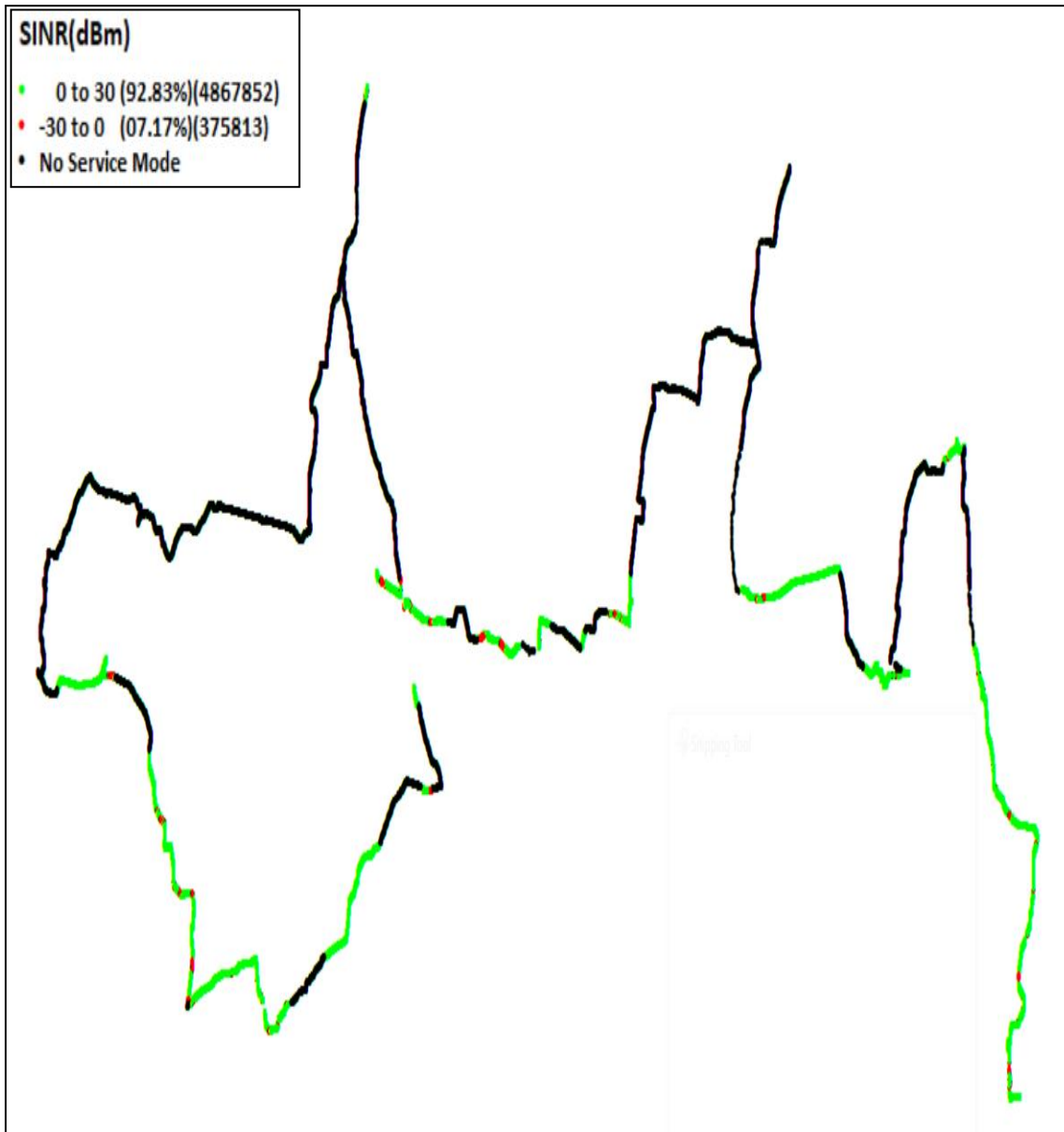
Overall EcNo	Sample %
(Max <=-6)	33.66
(-6 <=-9)	25.25
(-9 <=-11)	28.05
(-11 <=-14)	6.55
(-14 <= Min)	6.49
Total	100

II. Quality Details

VIL

Technology	Rx Quality %
4G	92.83

4G



Overall SINR	Sample %
(Min <=0)	7.17
(0 <=5)	25.99
(5 <=10)	20.42
(10 <=15)	29.71
(15 <=Max)	16.71
Total	100

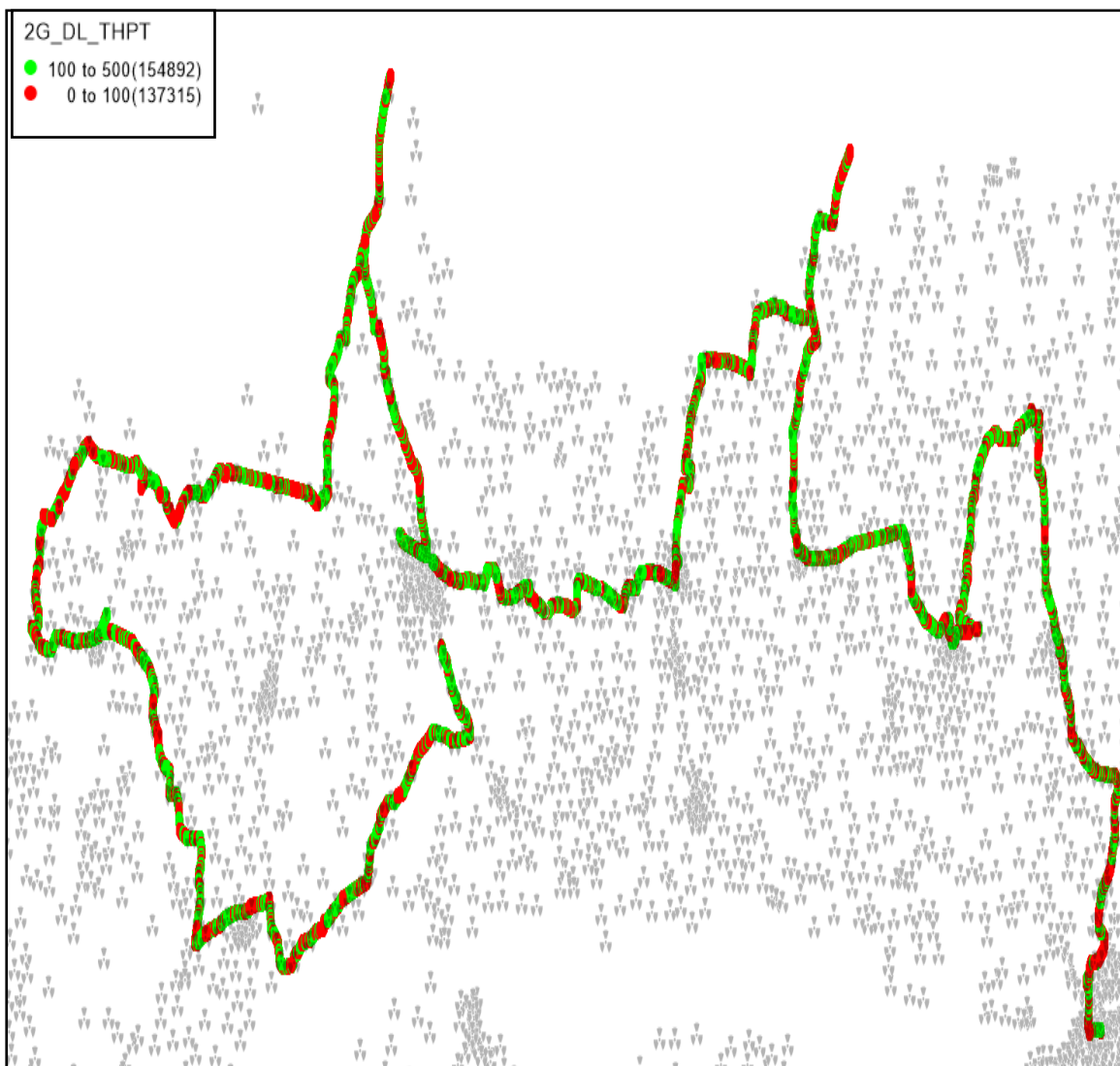
IV. Dynamic Data Test- 2G DL Details

AIRTEL

Dynamic Data Testing Complete 671 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	75.52

2G



AVG. DOWNLOAD SPEED (Kbps)	75.52
% FILE TRANSFER COMPLETE	72.99
DL throughput	Sample %
0 to 50 Kbps	0.3
50 to 100 Kbps	47
100 to 200 Kbps	49
200 to 300 Kbps	4
>300 Kbps	0.3
Total	100

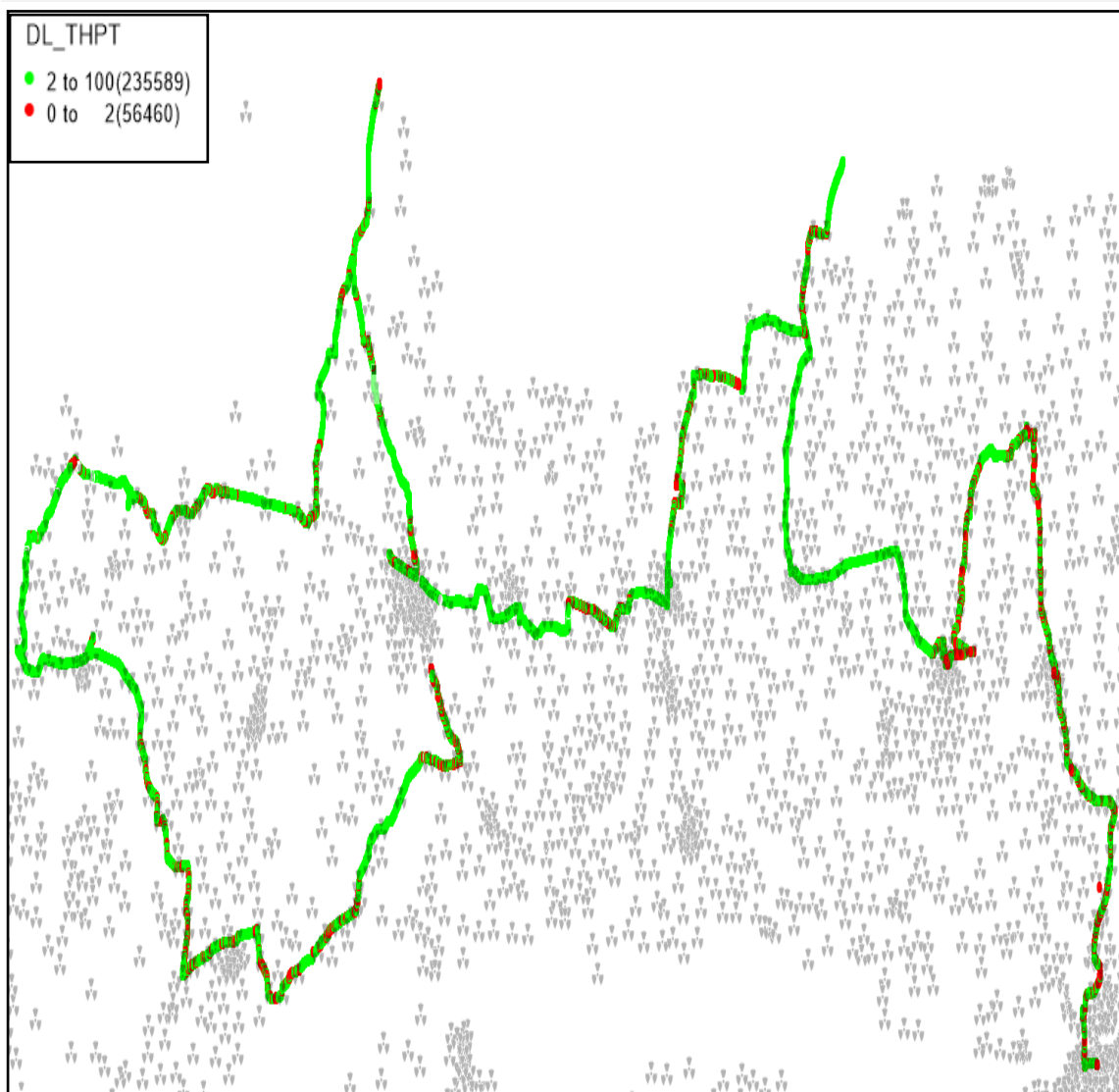
IV. Dynamic Data Test- 4G DL Details

AIRTEL

Dynamic Data Testing Complete 671 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	12.95

4G



AVG. DOWNLOAD SPEED (Mbps)	12.95
% FILE TRANSFER COMPLETE	79.07
DL throughput	Sample %
0 to 1 Mbps	7
1 to 2 Mbps	12
2 to 5 Mbps	32
5 to 10 Mbps	19
>10 Mbps	30
Total	100

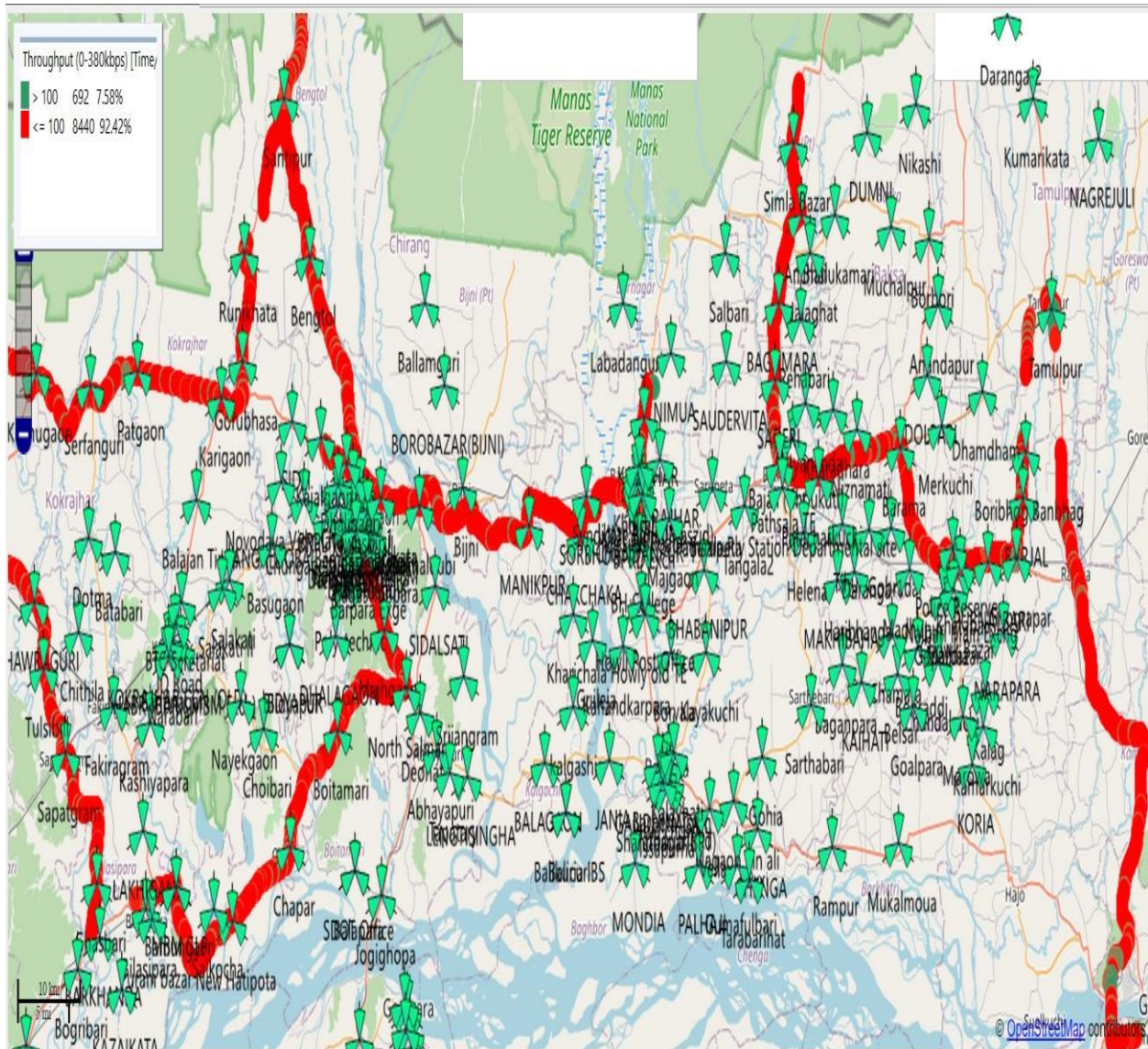
IV. Dynamic Data Test- 2G DL Details

BSNL

Dynamic Data Testing Complete 671 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	66.79

2G



AVG. DOWNLOAD SPEED (Kbps)	66.79
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 50 Kbps	59.24
50 to 100 Kbps	0.38
100 to 200 Kbps	0.66
200 to 300 Kbps	1.23
>300 Kbps	38.48
Total	100

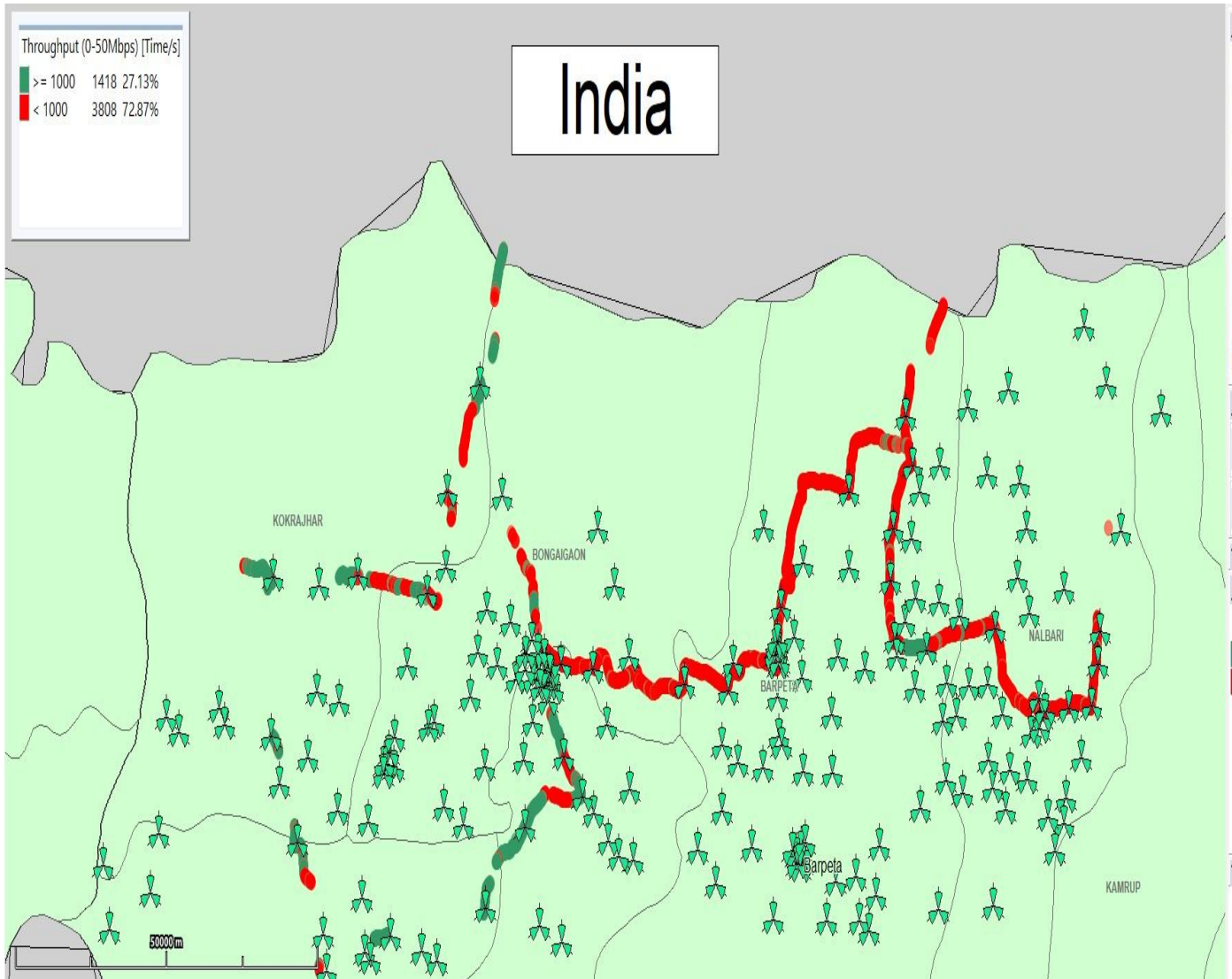
IV. Dynamic Data Test- 3G DL Details

BSNL

Dynamic Data Testing Complete 671 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	6.41

3G



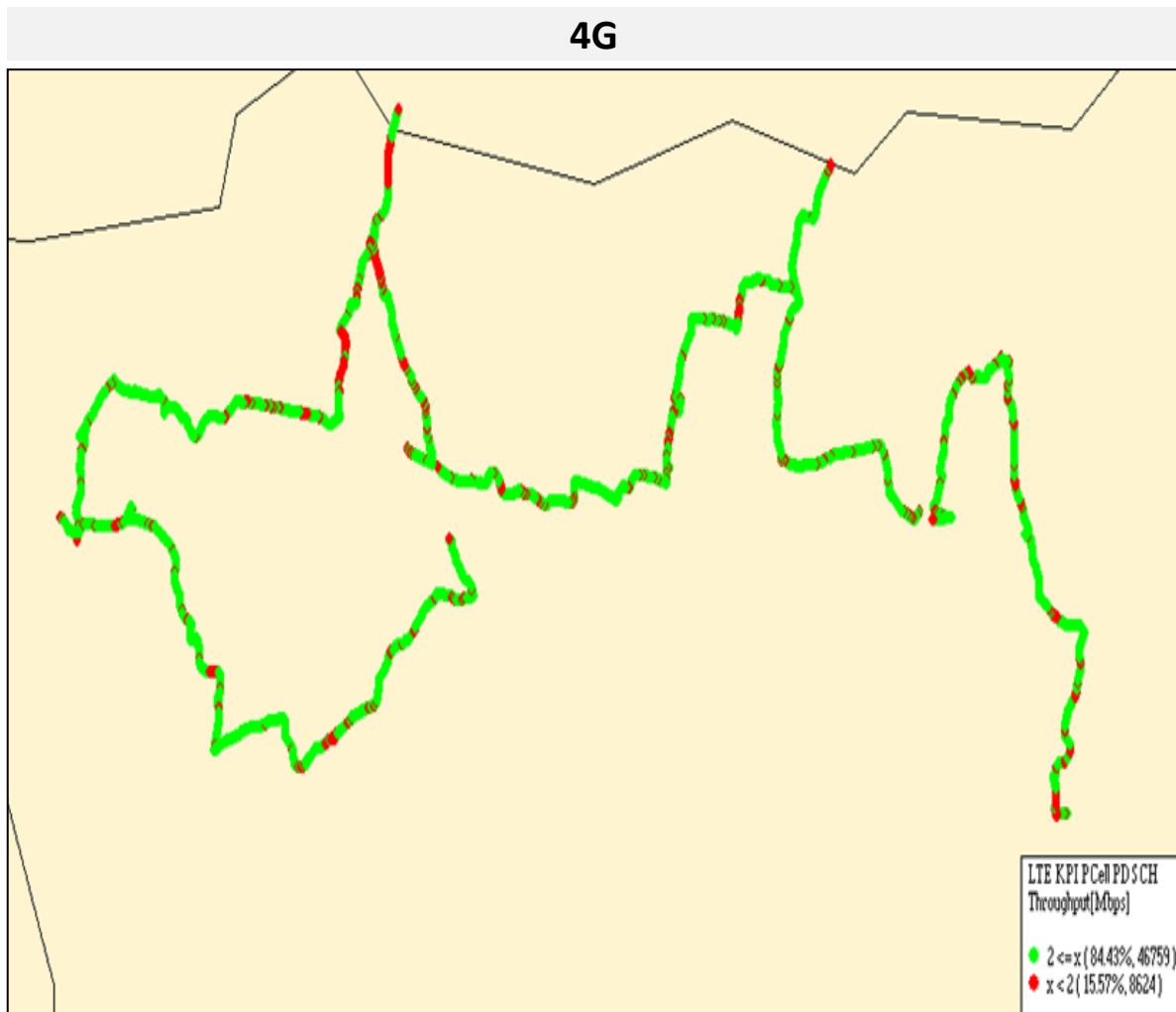
AVG. DOWNLOAD SPEED (Mbps)	6.41
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 0.5 Mbps	0.42
0.5 to 1 Mbps	0.13
1 to 2 Mbps	0.17
2 to 5 Mbps	0.67
>5 Mbps	98.62
Total	100

IV. Dynamic Data Test- 4G DL Details

RJIO

Dynamic Data Testing Complete 671 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	23.04



AVG. DOWNLOAD SPEED (Mbps)	23.04
% FILE TRANSFER COMPLETE	99.44
DL throughput	Sample %
0 to 1 Mbps	9.85
1 to 2 Mbps	5.73
2 to 5 Mbps	15.25
5 to 10 Mbps	17.74
>10 Mbps	51.43
Total	100

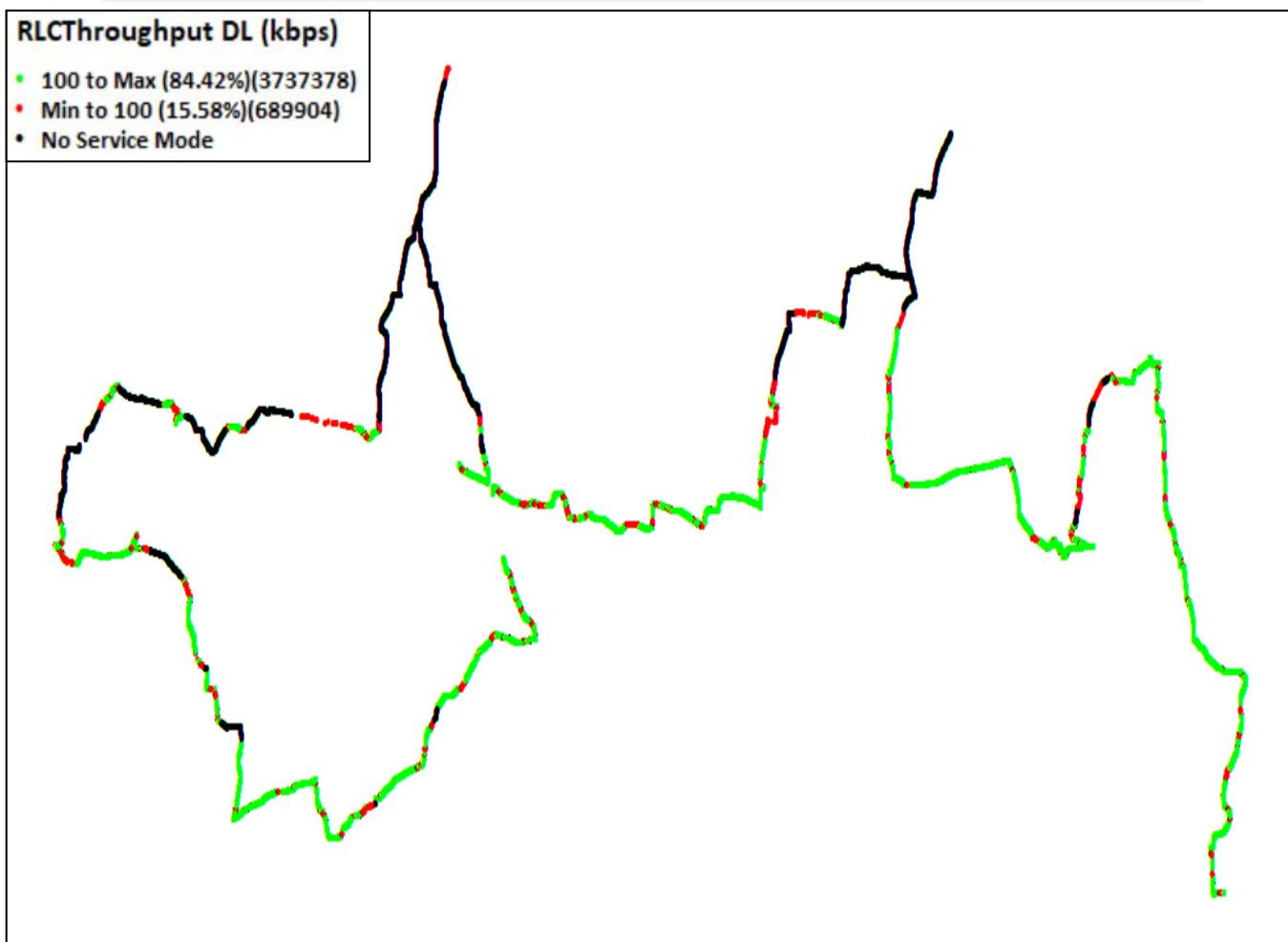
IV. Dynamic Data Test-2G DL Details

VIL

Dynamic Data Testing Complete 671 Kms

Data KPIs – Overall	2G
Average Download Throughput (Kbps)	112.46

2G



AVG. DOWNLOAD SPEED (Kbps)	112.46
% FILE TRANSFER COMPLETE	93.18
DL throughput	Sample %
0 to 50 Kbps	7.01
50 to 100 Kbps	8.57
100 to 200 Kbps	29.55
200 to 300 Kbps	30.39
>300 Kbps	24.48
Total	100

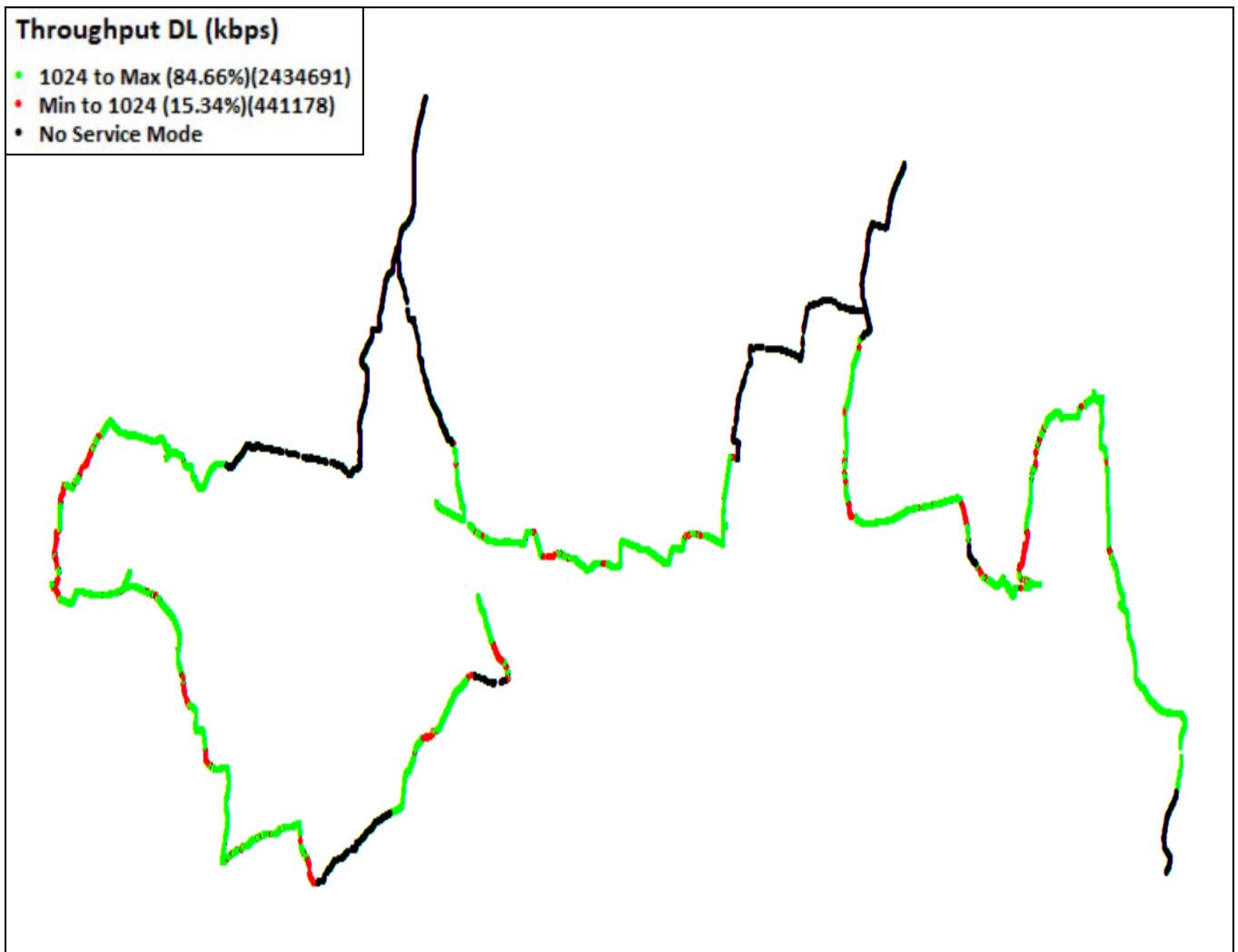
IV. Dynamic Data Test- 3G DL Details

VIL

Dynamic Data Testing Complete 671 Kms

Data KPIs - Overall	3G
Average Download Throughput (mbps)	1.70

3G



AVG. DOWNLOAD SPEED (mbps)	1.70
% FILE TRANSFER COMPLETE	96.20
DL throughput	Sample %
0 to 0.5 Mbps	7.36
0.5 to 1 Mbps	7.98
1 to 2 Mbps	29.63
2 to 5 Mbps	33.02
>5 Mbps	22.01
Total	100

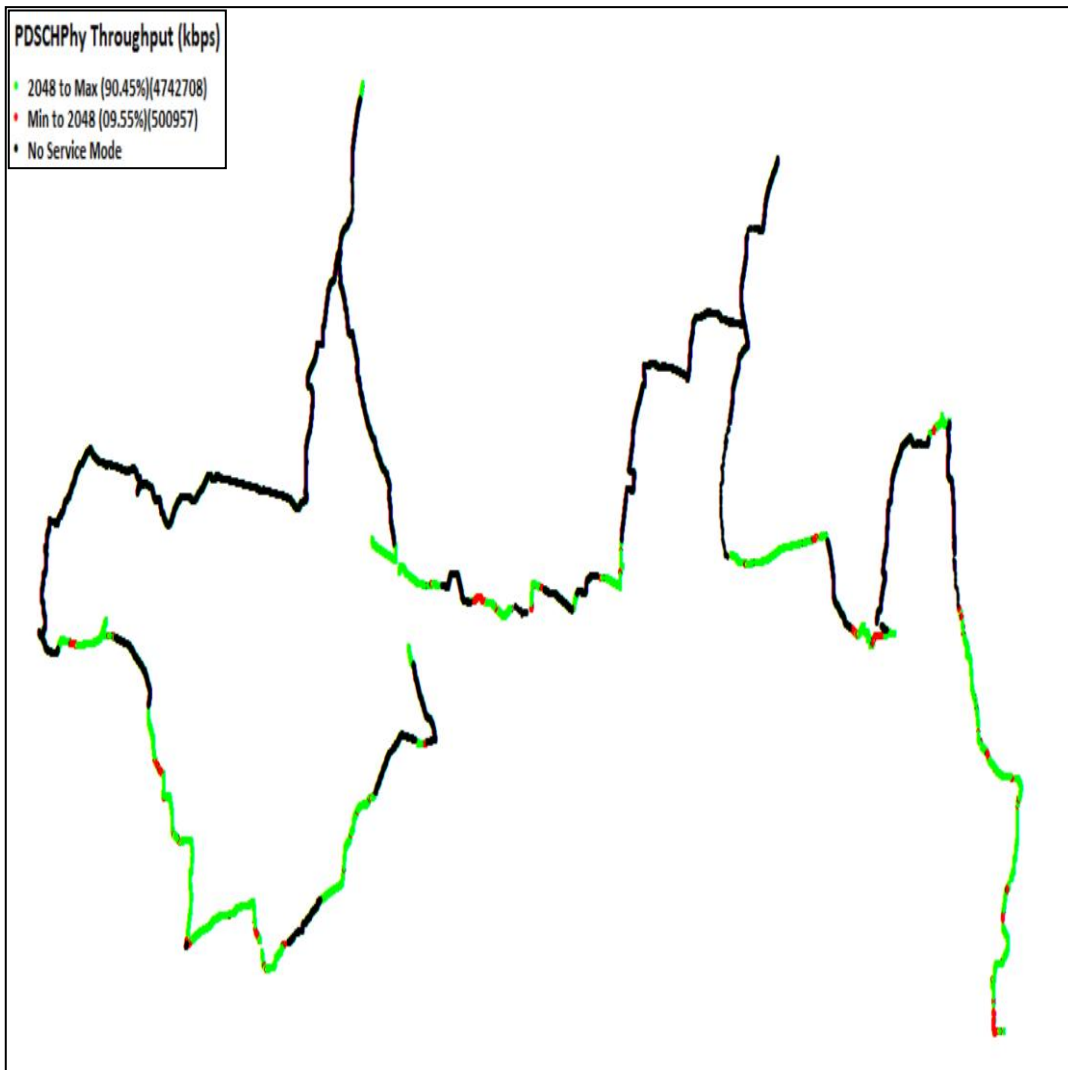
IV. Dynamic Data Test- 4G DL Details

VIL

Dynamic Data Testing Complete 671 Kms

Data KPIs – Overall	4G
Average Download Throughput (Mbps)	9.13

4G



AVG. DOWNLOAD SPEED (Mbps)	9.13
% FILE TRANSFER COMPLETE	94.46
DL throughput	Sample %
0 to 1 Mbps	4.30
1 to 2 Mbps	5.25
2 to 5 Mbps	18.09
5 to 10 Mbps	32.56
>10 Mbps	39.80
Total	100