

# Operator Assisted Drive Test Report

## Shillong, Meghalaya

### February 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 (2G & 3G) network, Block Call Rate (2G & 3G) network, Call Setup Success Rate (CSSR) in 3G network, Handover Success Rate (HOSR) in 3G network and 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.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Shillong and surrounding areas including National Highways (6 & 206) on 22<sup>th</sup> February 2023 & 23<sup>th</sup> February 2023 from 08.30 AM to 08.00 PM. The drive test covered drive route of 286 KMs over a period of 2 days. Approximately 249+ 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

**Shillong** is a hill station and the capital of Meghalaya, a state in northeastern India. It is the headquarters of the East Khasi Hills district. Shillong is the 330th most populous city in India with a population of 143,229 according to the 2011 census. It is said that the rolling hills around the town reminded the British of Scotland. Hence, they would also refer to it as the "Scotland of the East".

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 SHILLONG

**DAY-1**—Police Bazar centre point-Shillong General post office-Meghalaya High Court-Meghalaya State Secretariat—Civil Hospital Shillong-Soldier Statue Point-Bara Bazar-Jhalpara Taxi Stand-GS Road, Garikhana-Wankhar Entomology Museum-Golf club-Transport Commissioner Office-Wireless Monitoring, Shillong, Nongrimaw-IIM Shillong, NIT Meghalaya-Malki Point-Shillong Cantt.-District Sericulture officer-Napongshai Cabin-Oxford Taxi Stand-Rabindranath Tagore’s House, Rilbong-ISBT Shillong-Umiam Lake Viewpoint-Meghalaya Fisheries Research & Trg. Inst-Umeit community Hall-Umroi Umdoh Village-Shillong Airport-Umrynjah-Nongkohlew-Gate No 2 Nehu-Hotel Polo Towers, Shillong-State Convention Centre- Hotel Vivanta , Shillong.

**Day-2**—Police centre point, Spread Eagle falls-Supercare Hospital-Kendriya Vidyalaya Happy Valley-Mawlynrei falls-Woodland Institute of Nursing-shillong View point, Laitkor Peak-Primary Health Sub Center Liewlong-Primary health sub center Mawpynthih-Wah Bnoh Fall View Point-Presbyterian Church Mawkyrnot-Roba Singh Syiem SSA UP School Mawkliaw-Nongri Rana Government LP School-Tishang-Nongri-Sohbar bridge-BholagonjSada Pathor –Dharambasti-Ichamati-Khliehmawlong-Mawlong Village-Mawmluh-Ling Dak Post Office-Cherrapunji-view point of Cherrapunji-Sohra Plaza-Umstew View point-Wah-kaba Falls-Mawmihthied RMSA Secondary School-Sohrarim-Khatarshnong PHC-Mawkdok Dympep Valley View Point-Mylliem-Rhino Heritage Museum.

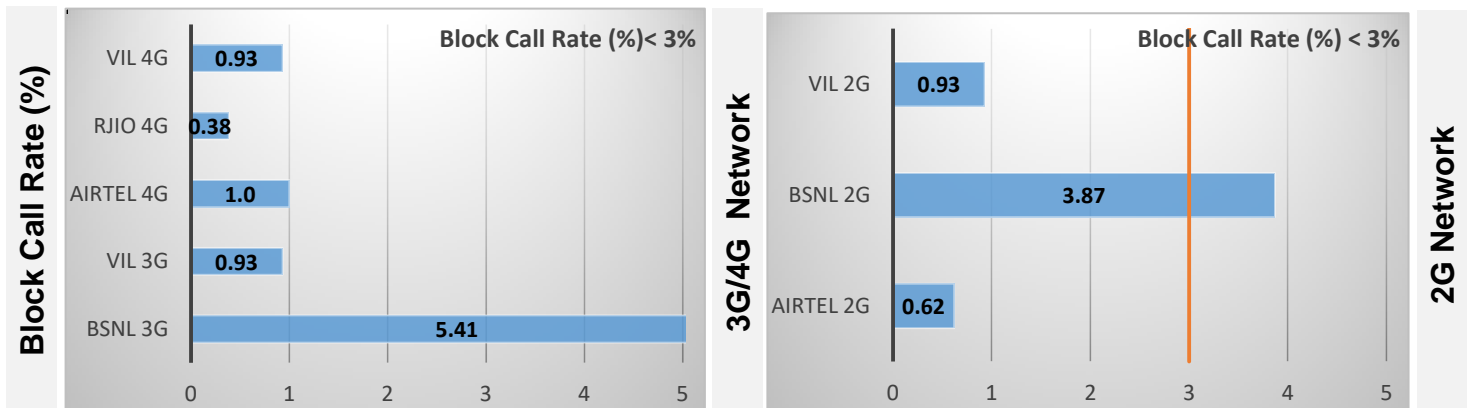
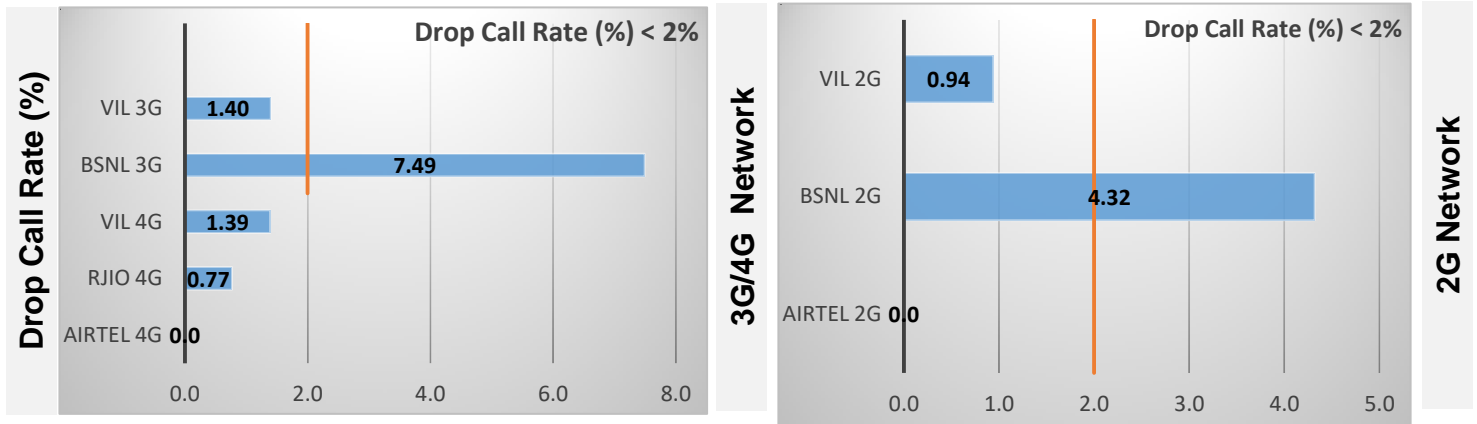
### Data Service Test- Static Locations

<b>Eldorado Guest House, Shillong</b>
<b>Shillong Airport</b>
<b>Meghalaya Legislative Assembly</b>

# 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 %	0.0	4.32	0.94	7.49	1.40	0.0	0.77	1.39
Block Call Rate %	0.62	3.87	0.93	5.41	0.93	1.0	0.38	0.93

- 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 (DCR%) except BSNL (2G) & (3G).

### Coverage

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

TSPs	2G		
	AIRTEL	BSNL	VIL
Coverage %	86.0	70.58	96.36

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

TSPs	3G		4G		
	BSNL	VIL	AIRTEL	RJIO	VIL
Coverage	41.14	95.07	92.0	87.75	83.96

# Summary

## City Level Summary- Voice

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	242	361	83.96
Blocked Call Rate (%)	0.62	3.87	0.93
CSSR% (Accessibility)	99.69	96.12	99.07
Drop Call Rate (%)	0.0	4.32	0.94
Mobility HOSR (%)	99.62	95.41	100.0
Rx Quality (%)	94.0	92.81	95.85

Voice Call	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Call Attempt	240	215	242	261	216
Blocked Call Rate (%)	5.41	0.93	1.0	0.38	0.93
CSSR% (Accessibility)	94.58	99.07	99.0	99.62	99.07
Drop Call Rate (%)	7.49	1.40	0.0	0.77	1.39
Mobility HOSR (%)	94.76	100	99.60	96.53	100
Rx Quality (%)	69.07	94.76	91.0	76.19	80.71

# Summary-Data Services Dynamic

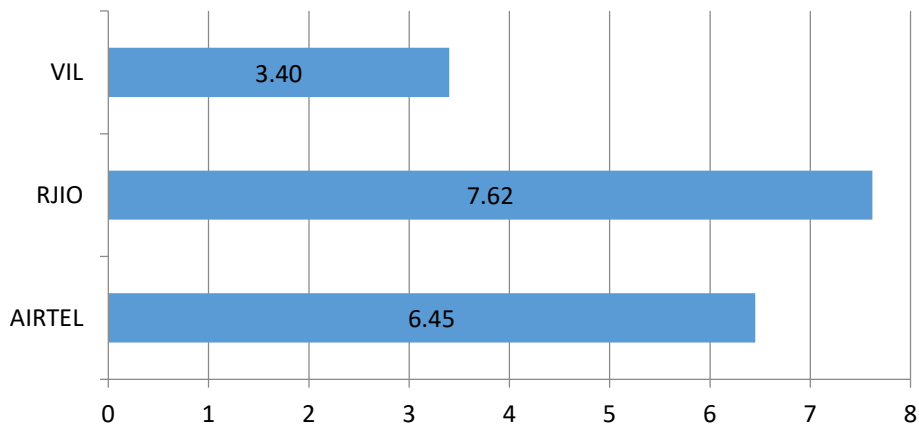
## Key Observations

Dynamic Data was tested for 286 Kms. Download Throughput was tested.

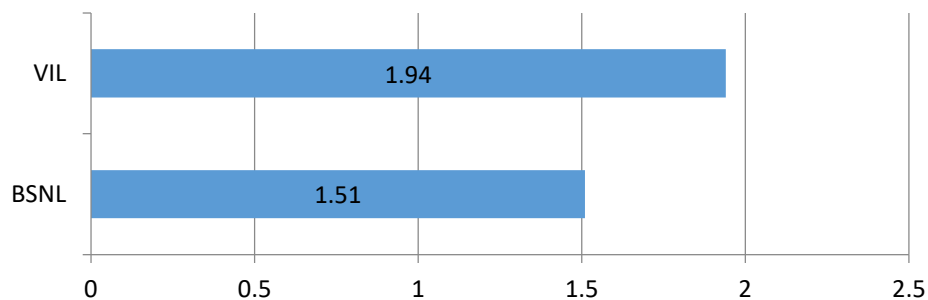
### Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

#### 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)	130.25	133.94	110.85
Upload Throughput (kbps)	305.20	23.19	65.03
Web Browsing Delay (sec)	2.64	56.03	1.11
Latency (msec)	313.44	333.72	309

Average Data Services Static	3G/ 4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.11	5.32	5.98	34.13	13.13
Upload Throughput in Mbps	0.30	1.11	4.29	11.85	7.74
Video streaming delay (secs)	1.63	1.14	0.0	0.00	0.56
Web Browsing Delay (secs)	10.65	1.18	3.84	8.30	0.22
Latency (msec)	88.33	133	107.28	53.83	88



# Summary-Data Services Static

## Location Level Summary-

Location:-Eldorado Guest House, Shillong	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	135	111.0	105.62
Upload Throughput (kbps)	272.96	14.32	64.20
Web Browsing Delay (sec)	3.88	60.03	0.98
Latency (msec)	339	386.83	296

Location:-Eldorado Guest House, Shillong	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.71	5.25	7.80	35.03	18.60
Upload Throughput in Mbps	0.35	1.24	7.50	7.78	12.24
Video streaming delay (secs)	1.36	1.43	0.0	0	0.57
Web Browsing Delay (secs)	6.65	1.07	4.58	8.5	0.21
Latency (msec)	85	132	109	55.11	86

Location:- Shillong Airport	2G		
	AIRTEL	BSNL	VIL
Download throughput in(kbps)	121.51	78.99	112.34
Upload Throughput in (kbps)	256.94	33.21	58.24
Web Browsing Delay (secs)	0.07	57.90	1.20
Latency (msec)	282	263.4	324

Location:-Shillong Airport	4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	2.52	4.46	2.45	24.75	5.12
Upload Throughput in (mbps)	0.25	1.24	0.97	7.79	5.42
Video streaming delay (secs)	1.91	0.97	0.0	0	0.49
Web Browsing Delay (secs)	19.15	1.30	2.83	8.2	0.23
Latency (msec)	89	128	95.2	54.26	88

# Summary-Data Services Static

## Location Level Summary-

Location:-Meghalaya Legislative Assembly	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	134.26	211.84	114.60
Upload Throughput (kbps)	385.70	23.04	72.64
Web Browsing Delay (sec)	3.95	50.15	1.14
Latency (msec)	319.33	350.94	306

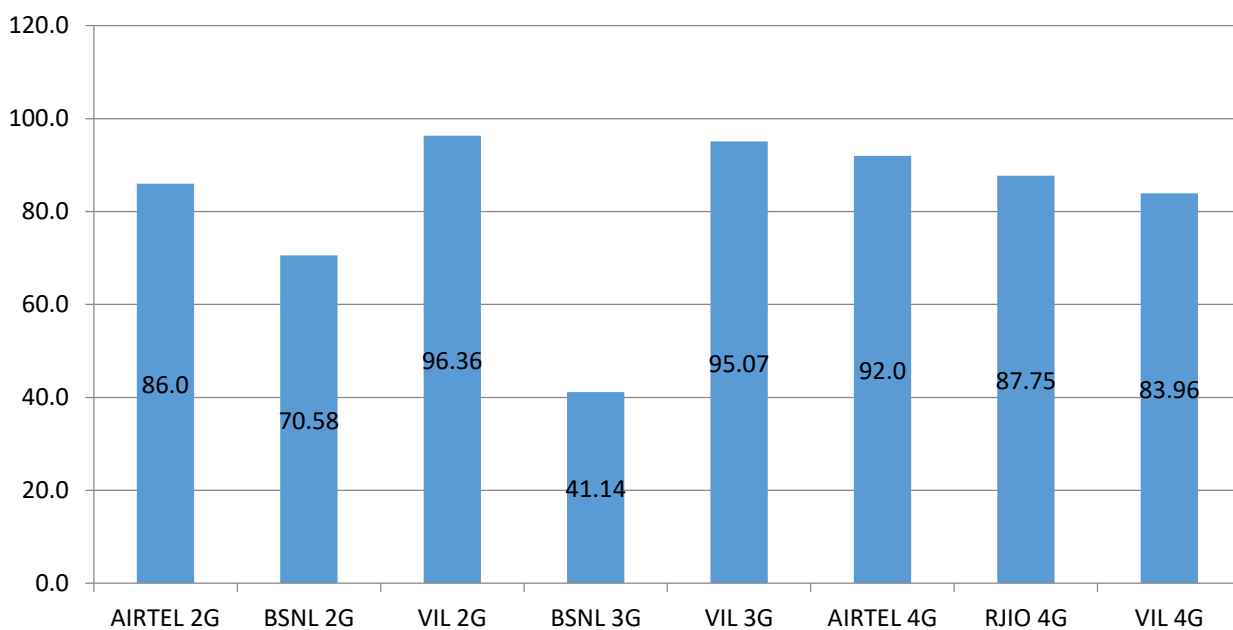
Location:-Meghalaya Legislative Assembly	3G/4G				
	BSNL 3G	VIL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	1.12	6.26	7.70	42.60	15.66
Upload Throughput in Mbps	0.31	0.84	4.40	19.98	5.56
Video streaming delay (secs)	1.62	0.99	0.0	0	0.61
Web Browsing Delay (secs)	6.14	1.17	4.11	8.2	0.23
Latency (msec)	91	138	117.66	52.12	89

# 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  $\geq -85$  dBm, RSCP is  $\geq -90$  dBm & RSRP  $\geq -110$ dBm. The details are as follows.

TSP	Coverage Rate %
AIRTEL 2G	86.0
BSNL 2G	70.58
VIL 2G	96.36
BSNL 3G	41.14
VIL 3G	95.07
AIRTEL 4G	92.0
RJIO 4G	87.75
VIL 4G	83.96

### Coverage Rate %

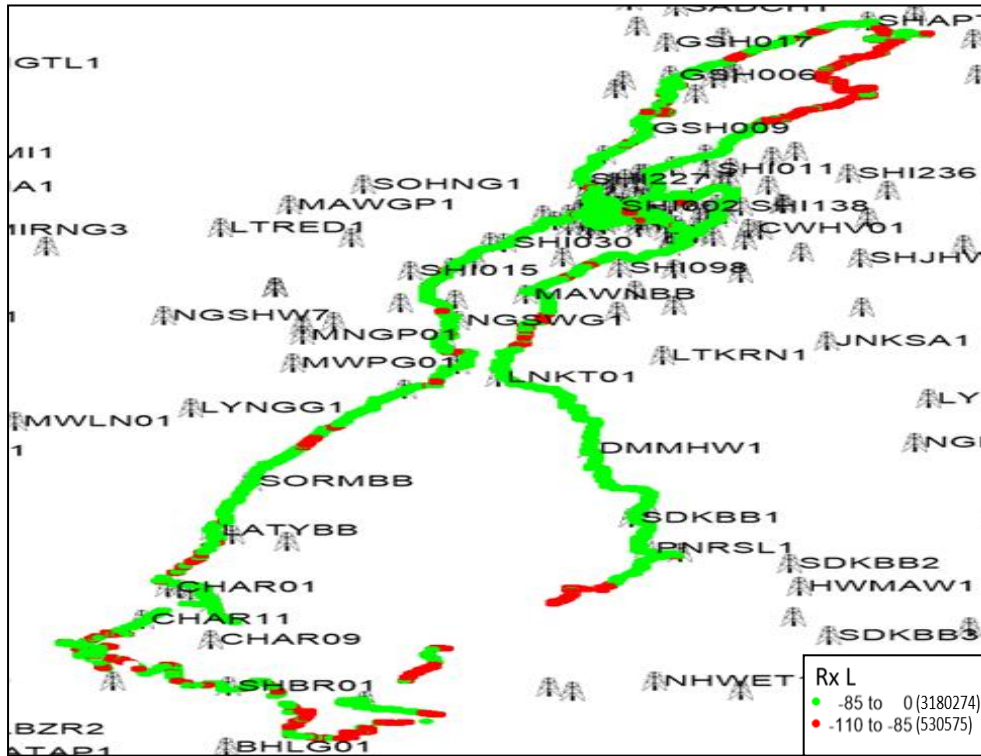


# I. Coverage Details

## AIRTEL

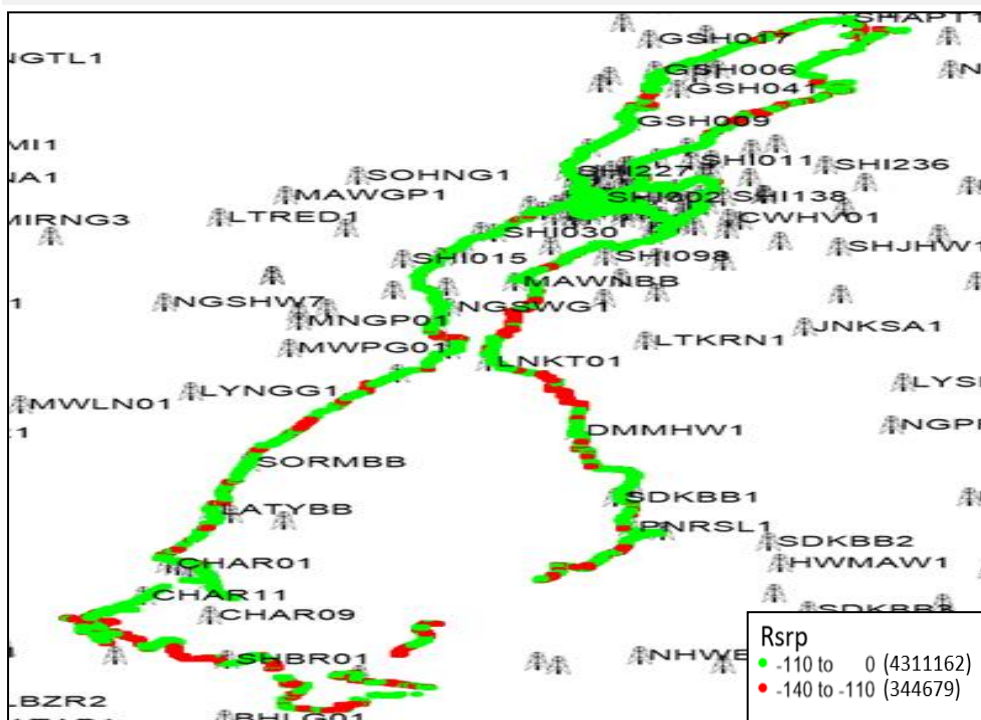
Technology	Coverage Rate %
2G	86.0
4G	92.0

### 2G



Overall Rx Level	Sample %
[Max >=-75]	22%
[-75 >=-85]	63%
[-85 >=-95]	7%
[-95 >=Min]	8%
<b>Total</b>	<b>100</b>

### 4G



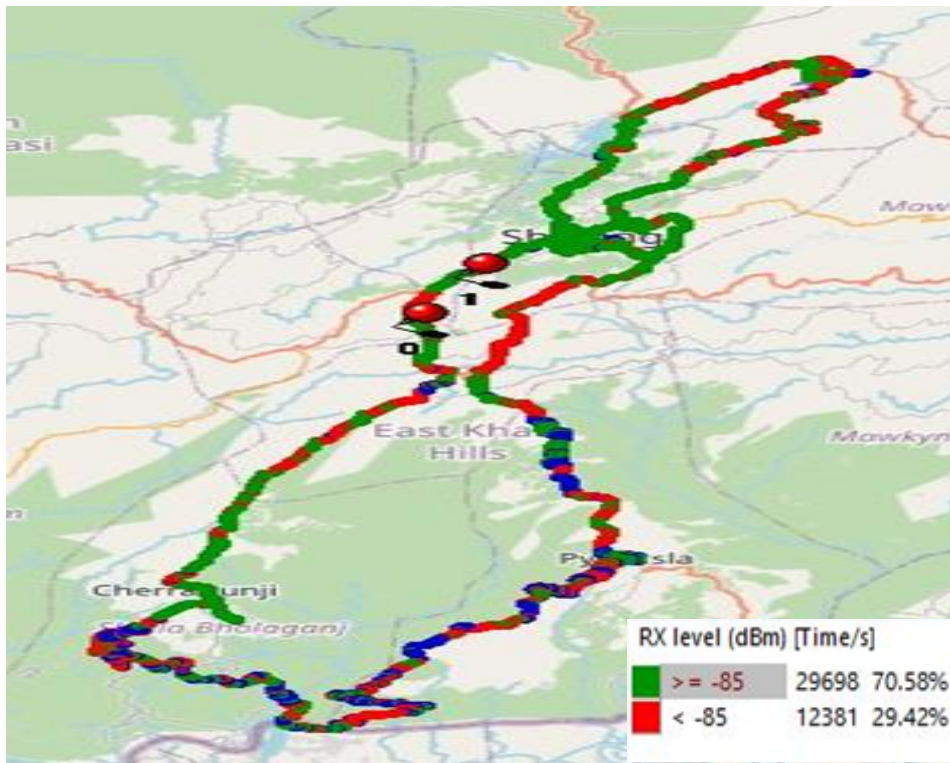
Overall RSRP	Sample %
[Max >=-80]	30%
[-80 >=-90]	24%
[-90 >=-110]	39%
[-110 >=Min]	7%
<b>Total</b>	<b>100</b>

# I. Coverage Details

## BSNL

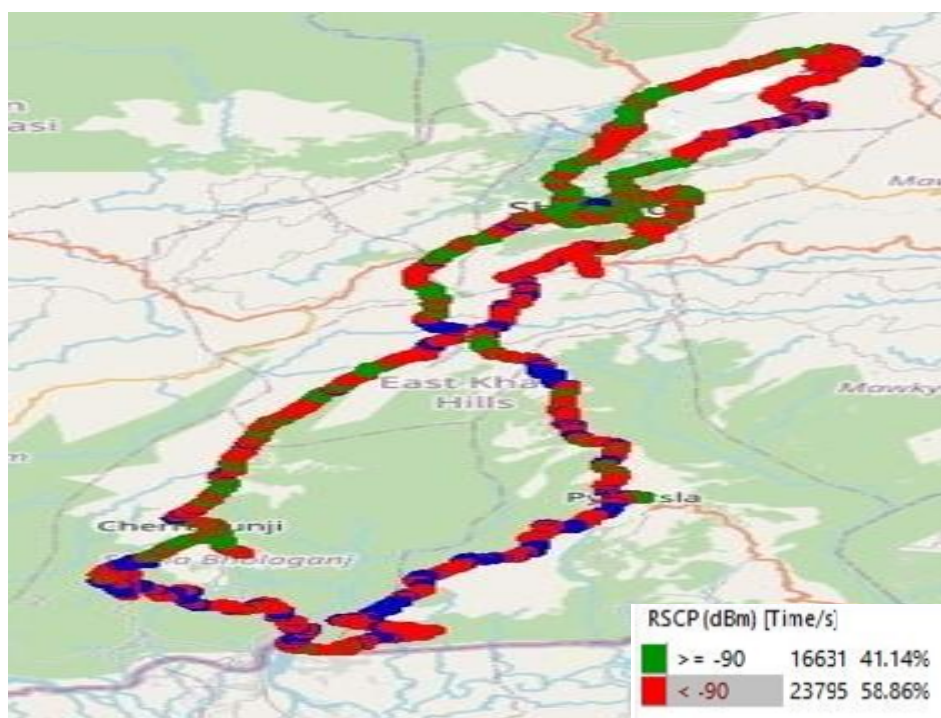
Technology	Coverage Rate %
2G	70.58
3G	41.14

### 2G



Overall RxLevel	Sample %
[Max $\geq$ -75]	46.86%
[-75 $\geq$ -85]	23.71%
[-85 $\geq$ -95]	18.16%
[-95 $\geq$ Min]	11.27%
<b>Total</b>	<b>100%</b>

### 3G



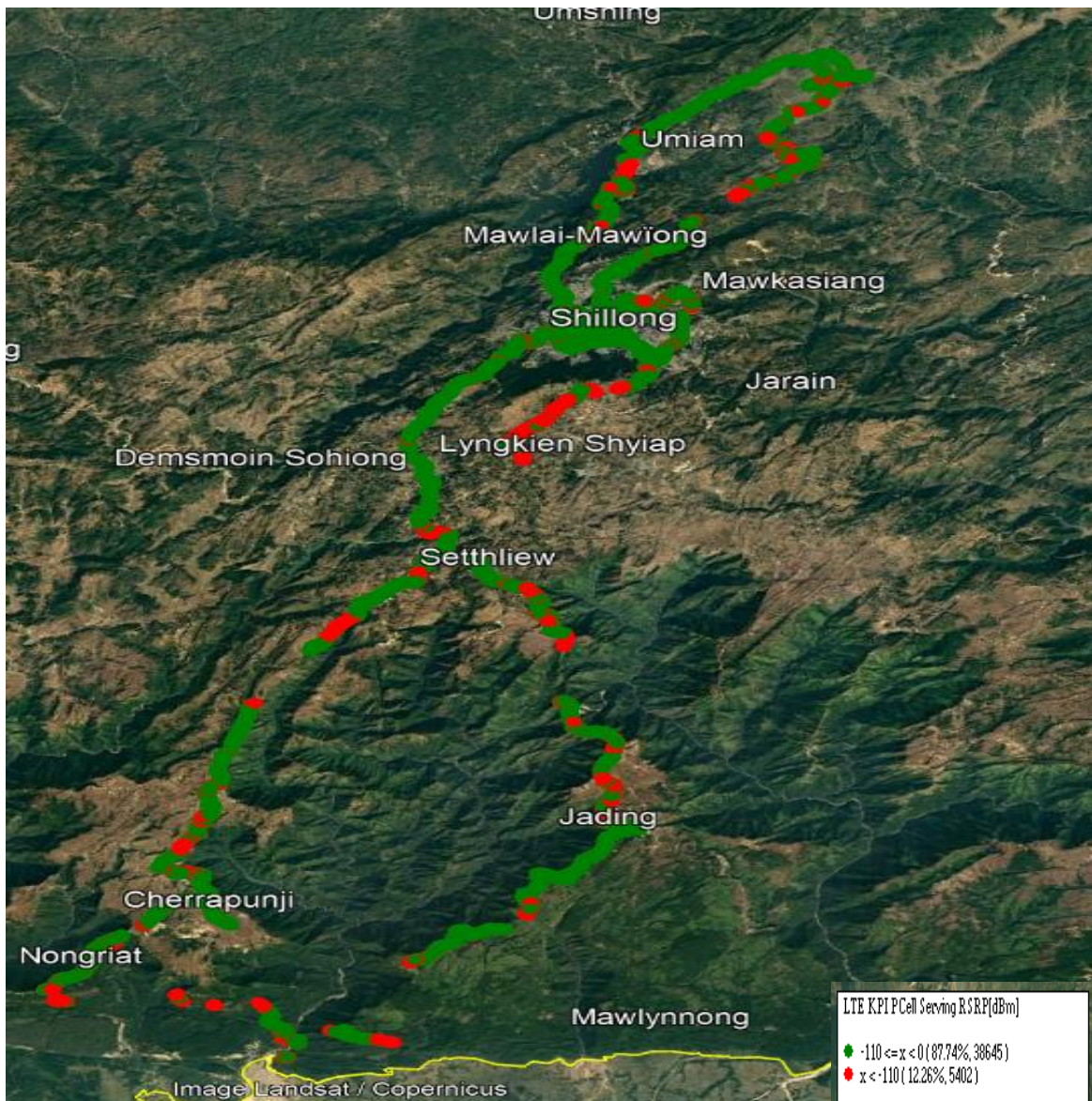
Overall RSCP	Sample %
[Max $\geq$ -70]	6.89%
[-70 $\geq$ -80]	13.38%
[-80 $\geq$ -90]	20.87%
[-90 $\geq$ Min]	58.86%
<b>Total</b>	<b>100%</b>

# I. Coverage Details

## RJIO

Technology	Coverage Rate %
4G	87.75

### 4G



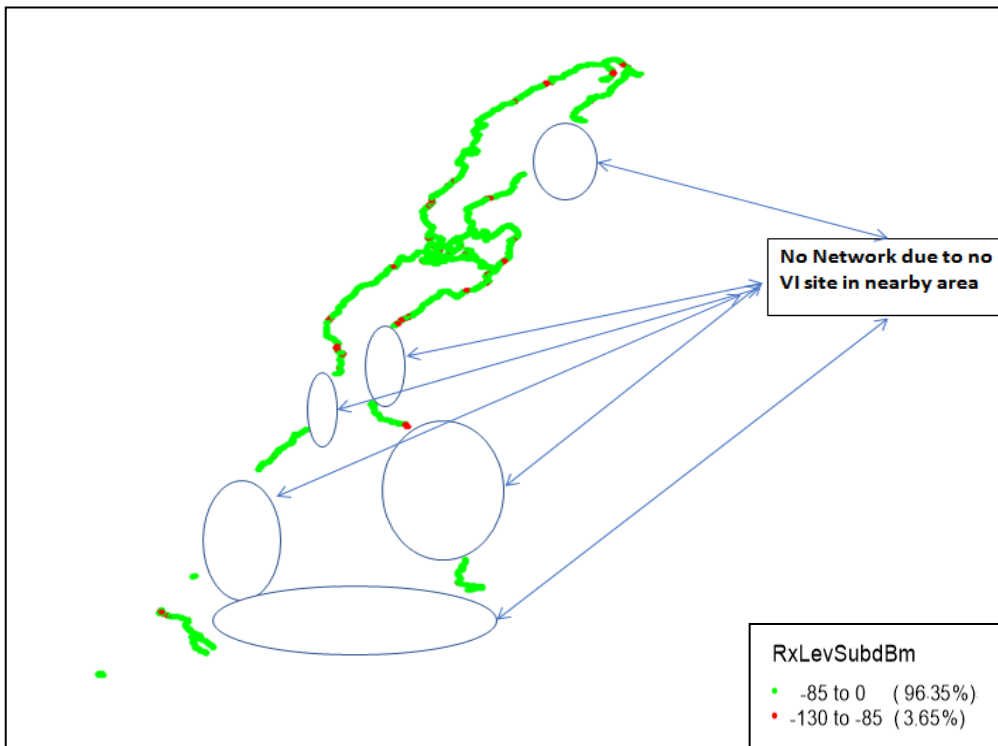
Overall RSRP	Sample %
[Max >=-80]	23%
[-80 >=-90)	15%
[-90 >=-110)	50%
[-110 >=Min)	12%
<b>Total</b>	<b>100%</b>

# I. Coverage Details

## VIL

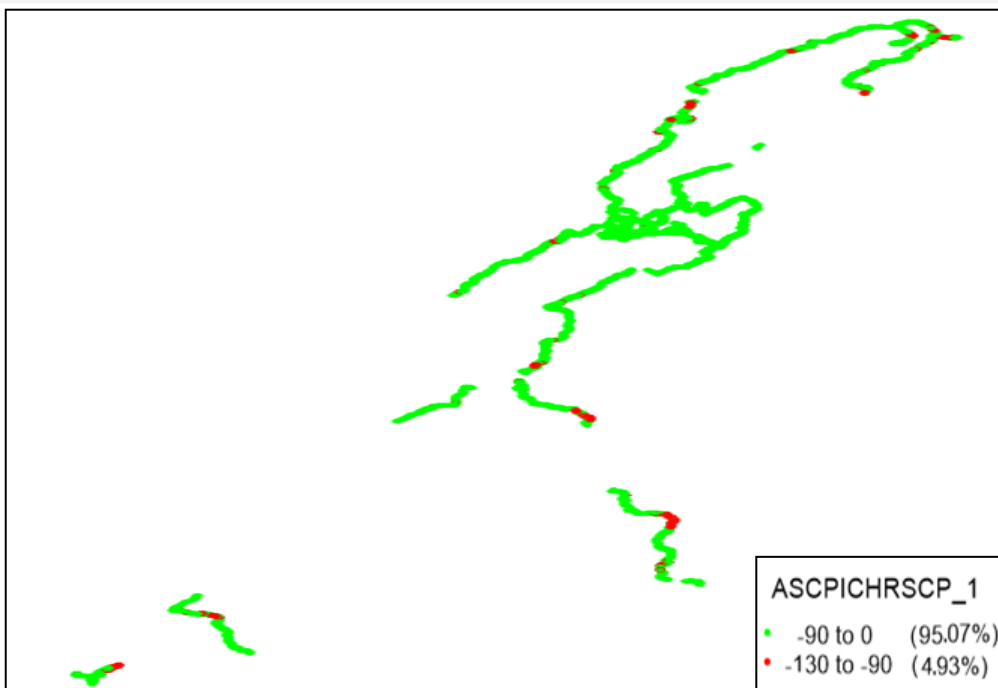
Technology	Coverage Rate %
2G	96.36
3G	95.07

### 2G



Overall RxLevel	Sample %
[Max >=-75]	37.51%
[-75 >=-85)	58.85%
[-85 >=-95)	2.19%
[-95 =Min)	1.45%
<b>Total</b>	<b>100.00%</b>

### 3G

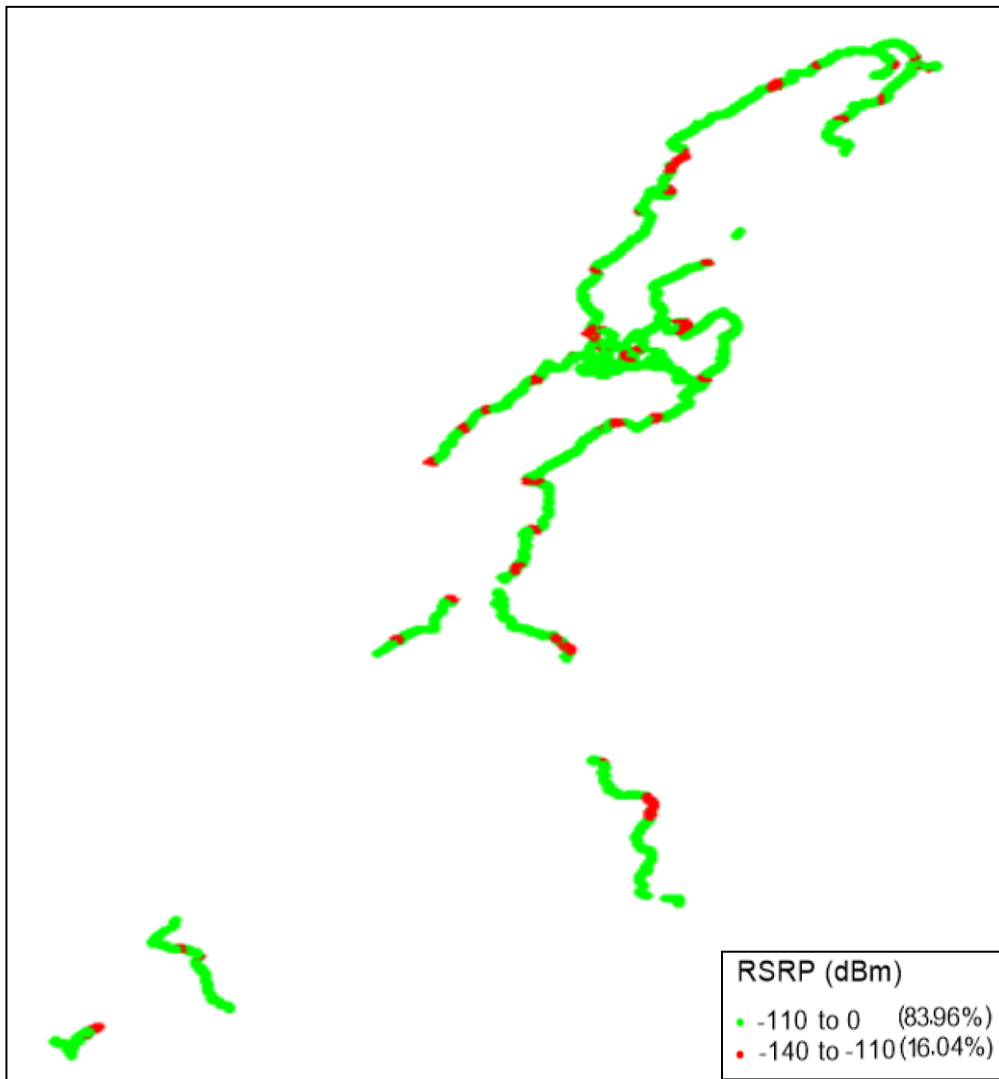


Overall RSCP	Sample %
[Max >=-70]	25.83%
[-70 >=-80)	32.33%
[-80 >=-90)	36.91%
[-90 >=Min)	4.93%
<b>Total</b>	<b>100%</b>

# I. Coverage Details

## VIL

Technology	Coverage Rate %
4G	83.96
<b>4G</b>	



Overall RSRP	Sample %
[Max >=-80]	27.99%
[-80 >=-90)	23.51%
[-90 >=-110)	32.46%
[-110 >=Min)	16.04%
<b>Total</b>	<b>100%</b>

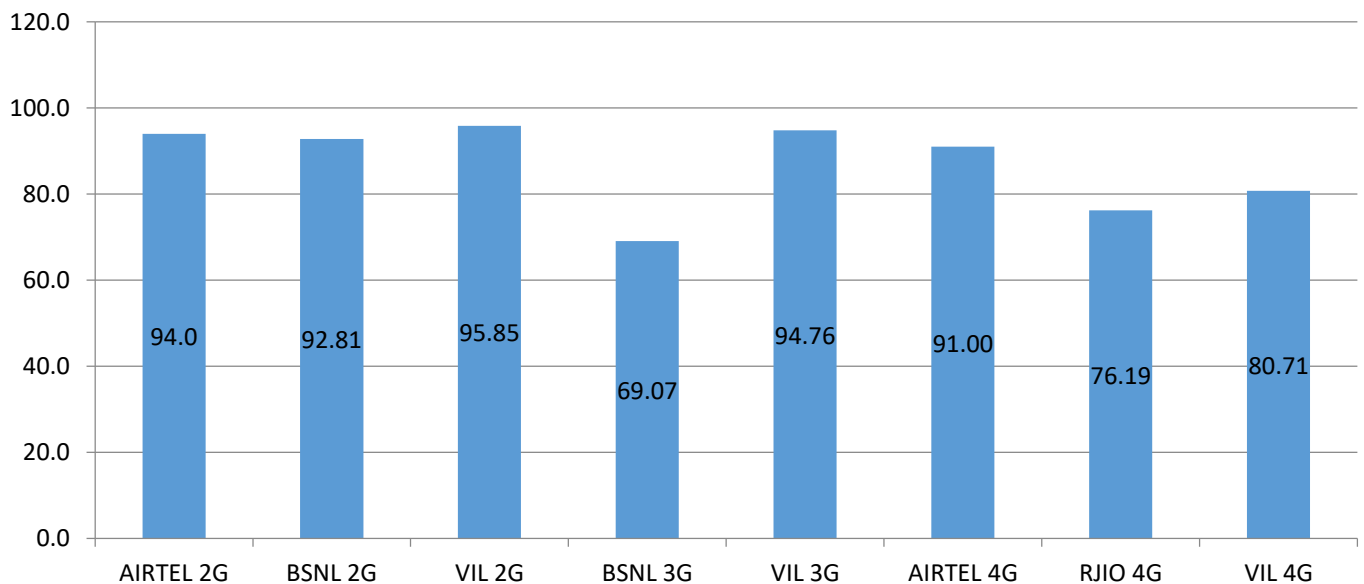


## II. Quality Details

For measuring voice quality, as per the QoS norms, Rx Quality  $\leq 5$  for GSM,  $E_c/N_0 \geq -14$  dBm for 3G and  $SINR > 0$  in case of VoLTE is considered to be good, whereas quality beyond this benchmark is considered to be bad. The benchmark should usually be  $\geq 95\%$ .

TSP	Rx Quality %
AIRTEL 2G	94.0
BSNL 2G	92.81
VIL 2G	95.85
BSNL 3G	69.07
VIL 3G	94.76
AIRTEL 4G	91.0
RJIO 4G	76.19
VIL 4G	80.71

**Rx Quality %**

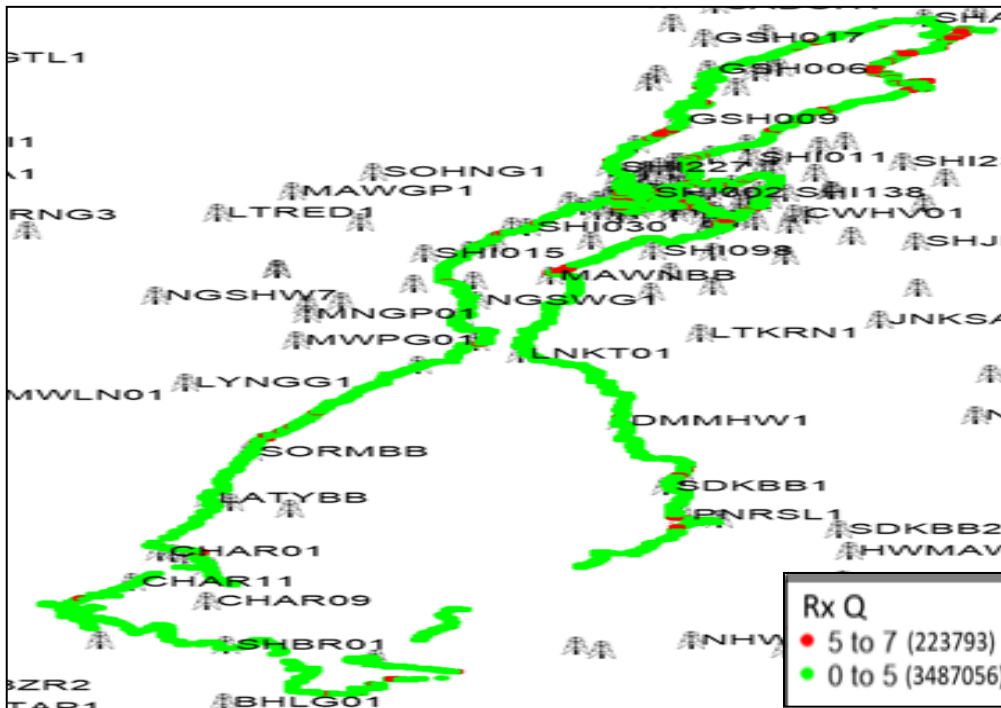


## II. Quality Details

### AIRTEL

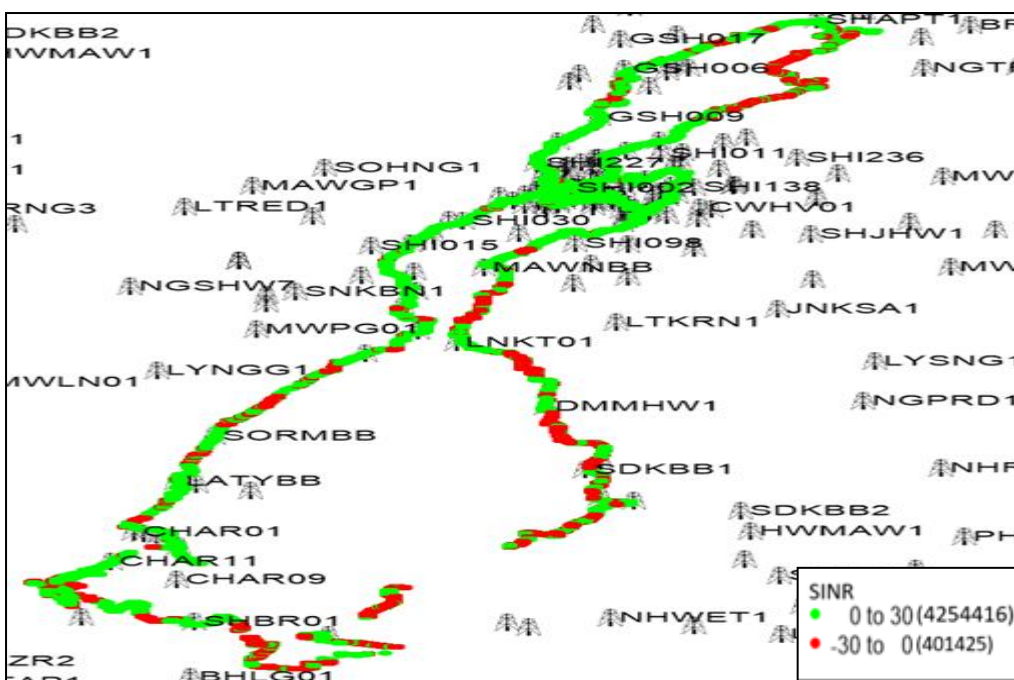
Technology	Rx Quality %
2G	94.0
4G	91.0

#### 2G



Overall Rx Quality	Sample %
(Min <=2)	83%
(2 <=3)	6%
(3 <=4)	2%
(4 <=5)	3%
(5 <=Max)	6%
<b>Total</b>	<b>100</b>

#### 4G



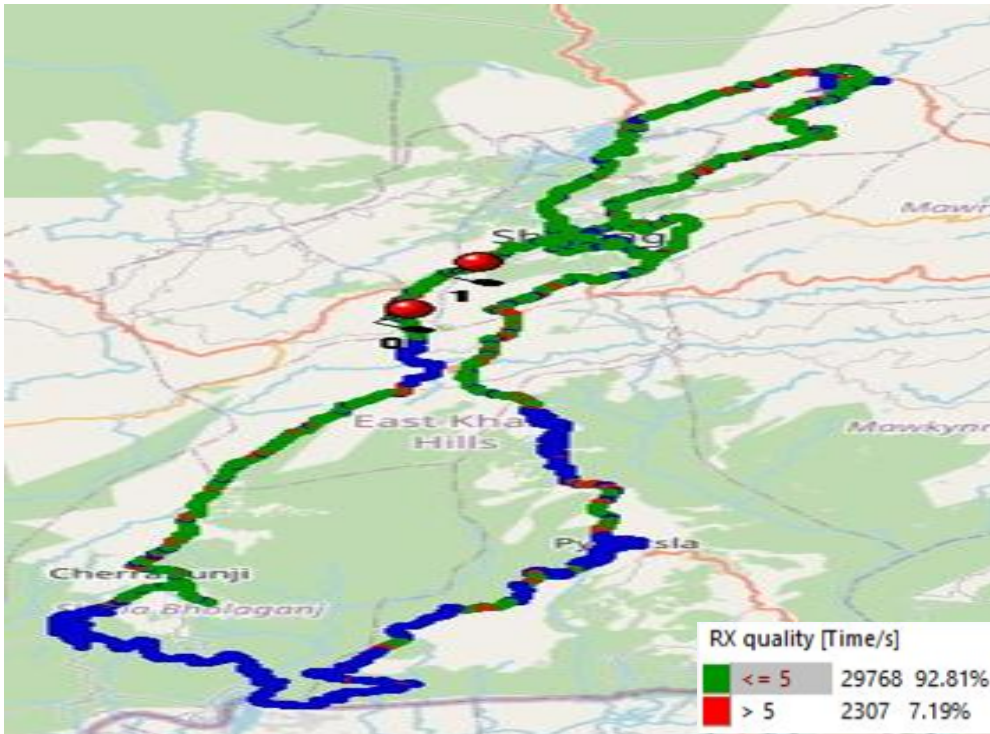
Overall SINR	Sample %
(Min <=0)	9%
(0 <=5)	50%
(5 <=10)	18%
(10 <=15)	10%
(15 <=Max)	13%
<b>Total</b>	<b>100</b>

## II. Quality Details

### BSNL

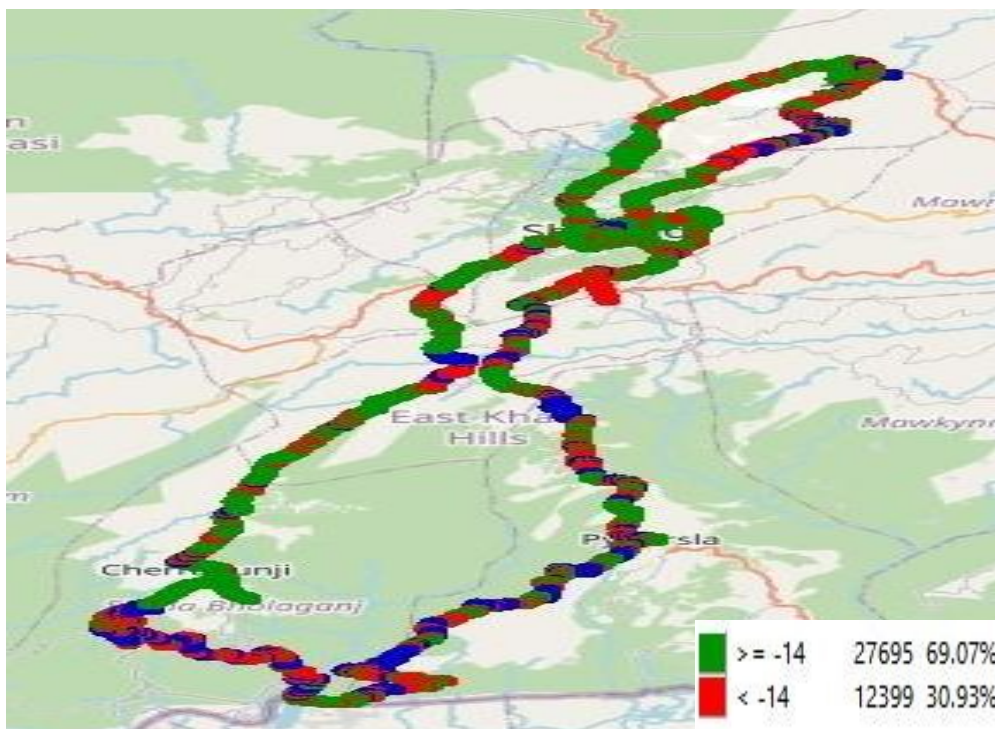
Technology	Rx Quality %
2G	92.81
3G	69.07

#### 2G



Overall Rx Quality	Sample %
(Min <=2)	84.62%
(2 <=3)	2.73%
(3 <=4)	2.88%
(4 <=5)	2.58%
(5 <=Max)	7.19%
<b>Total</b>	<b>100%</b>

#### 3G

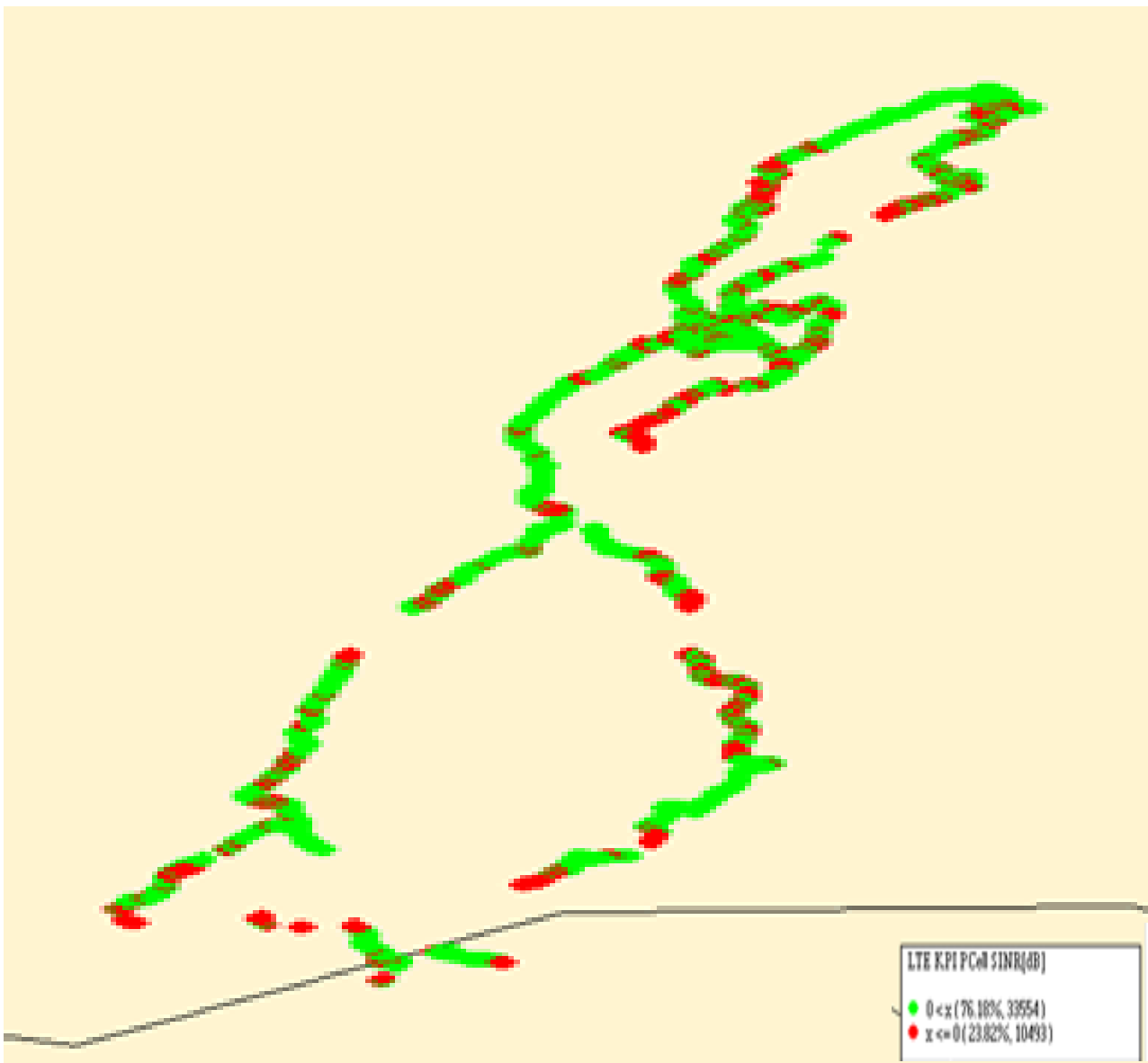


Overall EcNo	Sample %
(Max <=-6)	9.91%
(-6 <=-9)	11.17%
(-9 <=-11)	23.85%
(-11 <=-14)	24.14%
(-14 <= Min)	30.93%
<b>Total</b>	<b>100%</b>

## II. Quality Details

### RJIO

Technology	Rx Quality %
4G	76.19
<b>4G</b>	



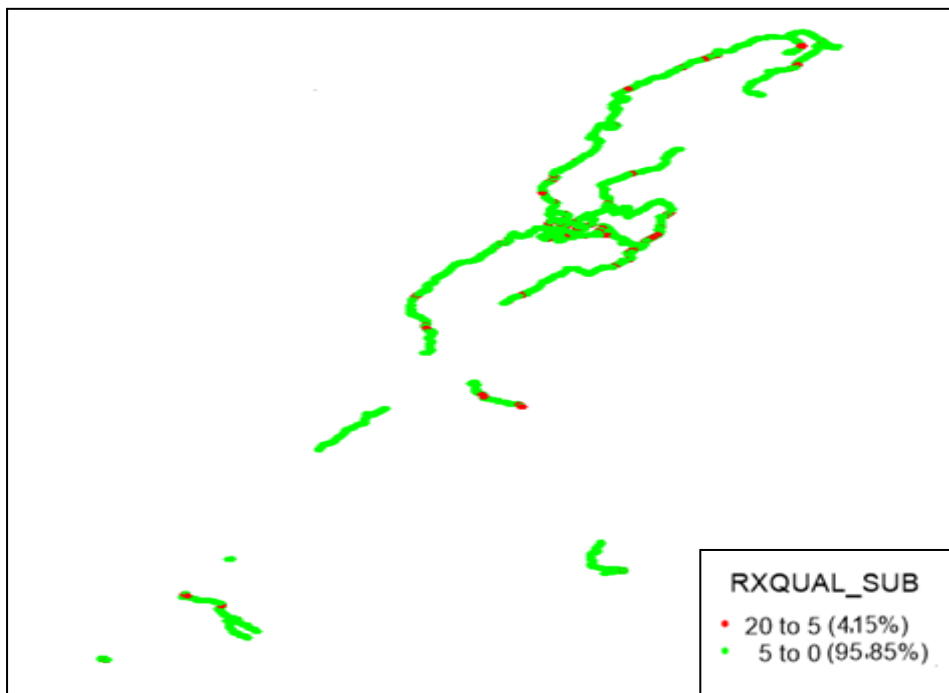
Overall SINR	Sample %
(Min $\leq 0$ )	24%
(0 $\leq 5$ )	24%
(5 $\leq 10$ )	20%
(10 $\leq 15$ )	14%
(15 $\leq$ Max)	19%
<b>Total</b>	<b>100%</b>

## II. Quality Details

### VIL

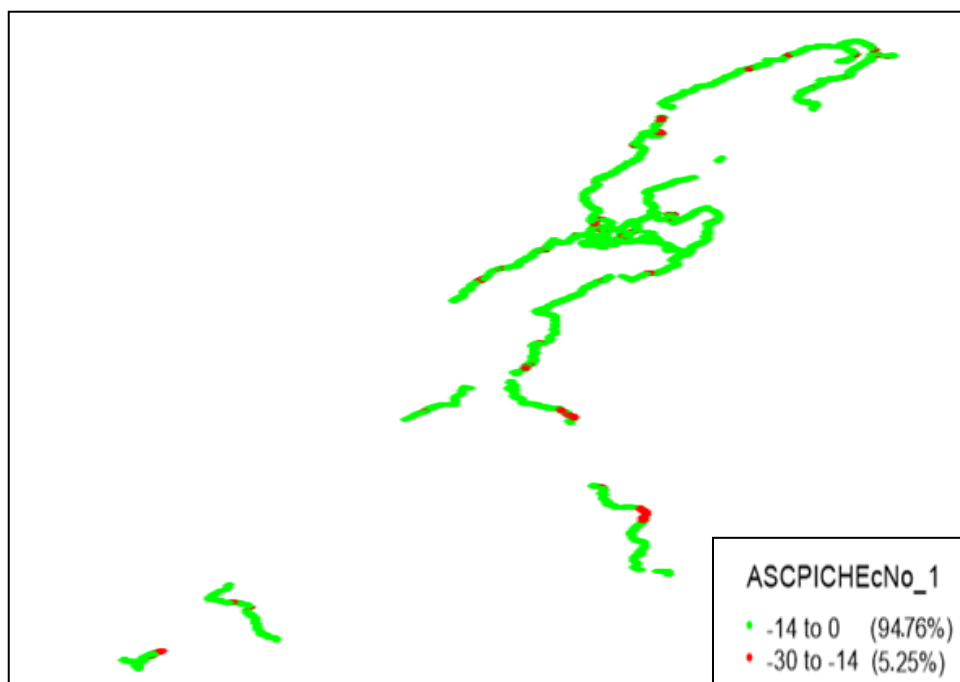
Technology	Rx Quality %
2G	95.85
3G	94.76

#### 2G



Overall Rx Quality	Sample %
(Min <=2)	19.97%
(2 <=3)	27.78%
(3 <=4)	22.92%
(4 <=5)	25.18%
<b>(5 &lt;=Max)</b>	<b>4.15%</b>
<b>Total</b>	<b>100%</b>

#### 3G



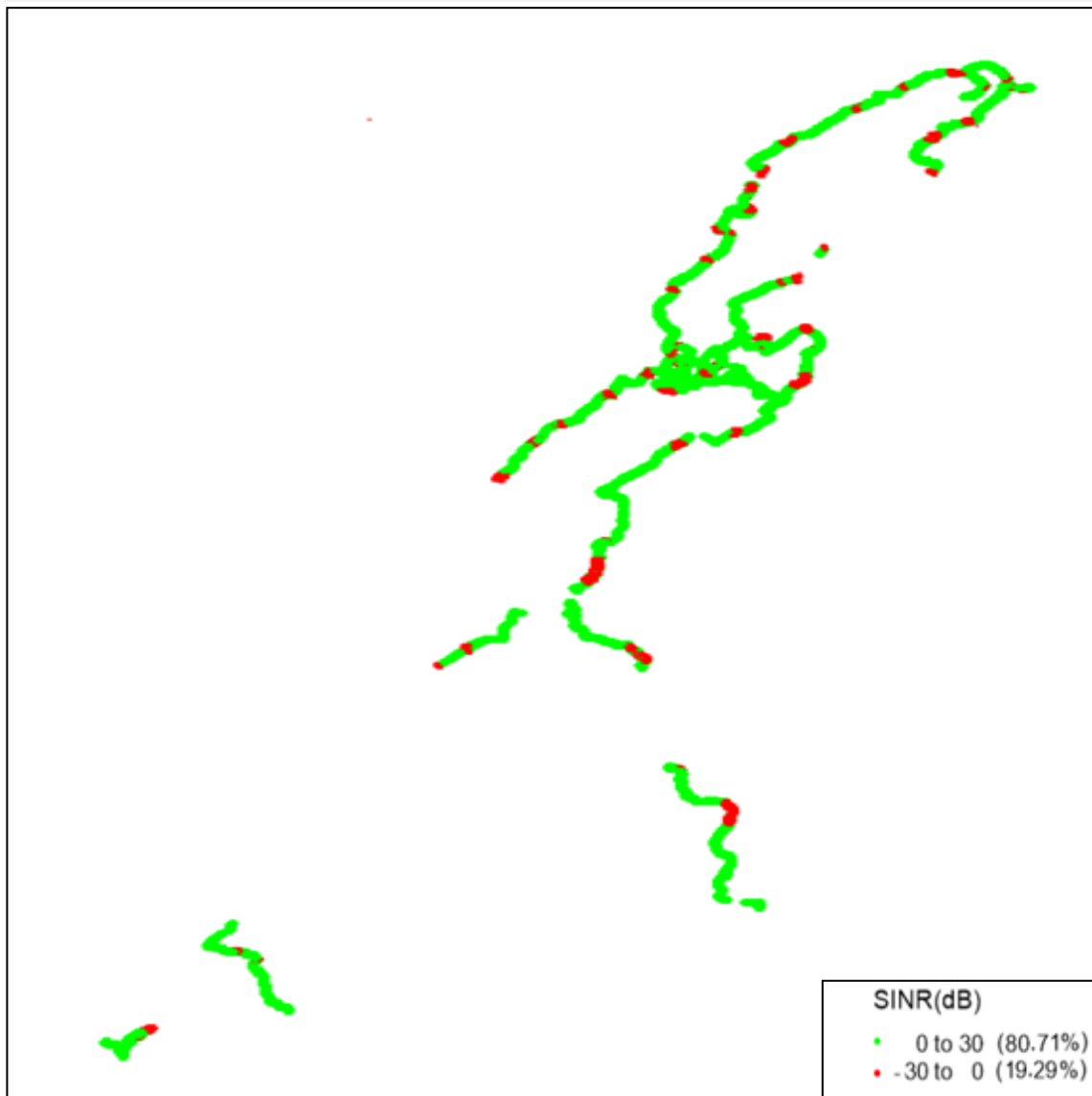
Overall EcNo	Sample %
(Max <=-6)	22.68%
(-6 <=-9)	21.16%
(-9 <=-11)	26.05%
(-11 <=-14)	24.86%
<b>(-14 &lt;= Min)</b>	<b>5.24%</b>
<b>Total</b>	<b>100%</b>

## II. Quality Details

### VIL

Technology	Rx Quality %
4G	80.71

### 4G



Overall SINR	Sample %
(Min <=0)	19.29%
(0 <=5)	19.37%
(5 <=10)	23.40%
(10 <=15)	33.09%
<b>(15 &lt;=Max)</b>	4.84%
<b>Total</b>	<b>100%</b>

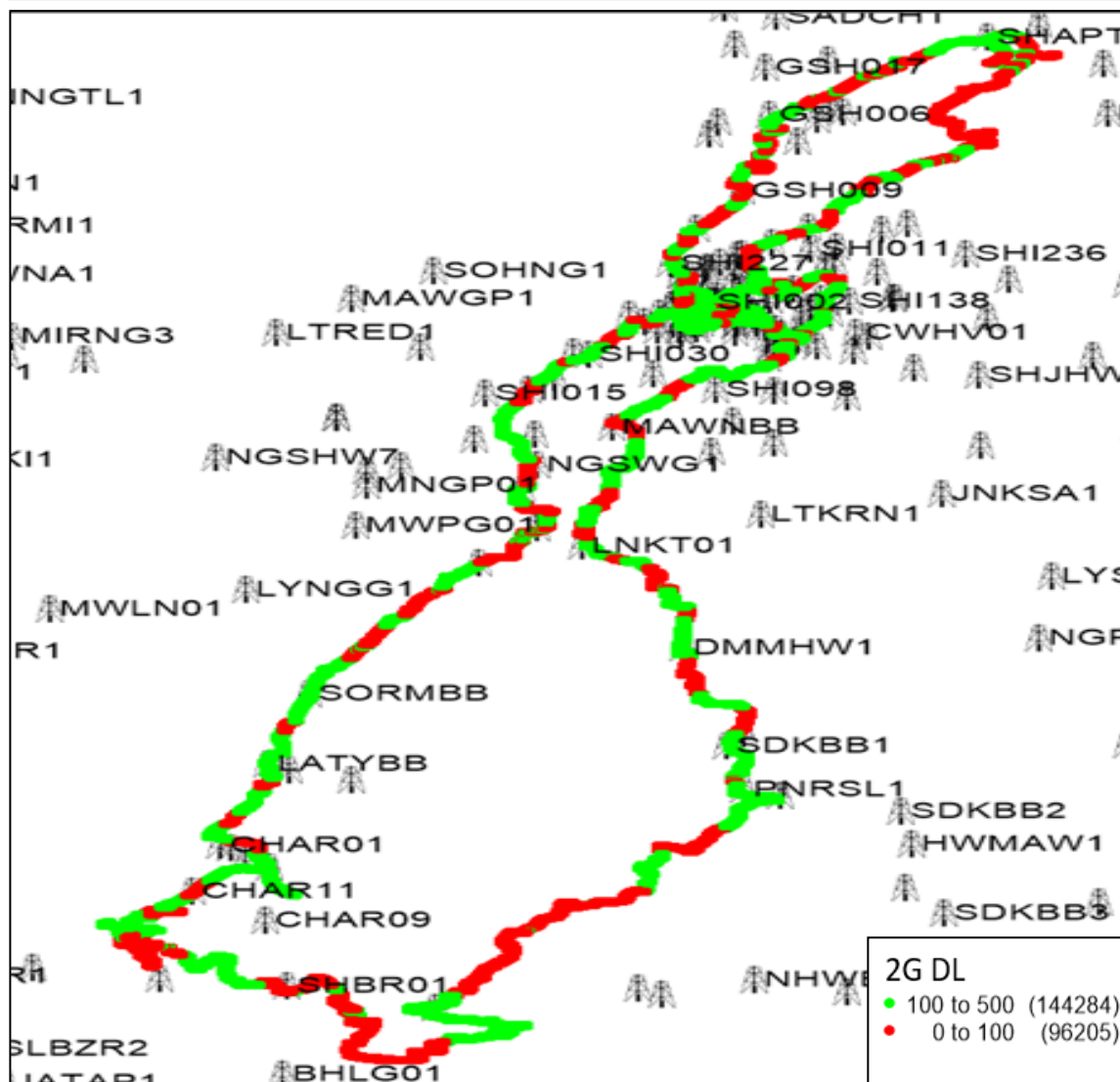
# IV. Dynamic Data Test- 2G DL Details

## AIRTEL

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	54.50

### 2G



AVG. DOWNLOAD SPEED (Kbps)	54.50
% FILE TRANSFER COMPLETE	73%
DL throughput	<b>Sample %</b>
0 to 50 Kbps	36%
50 to 100 Kbps	4%
100 to 200 Kbps	58%
200 to 300 Kbps	2%
>300 Kbps	0%
<b>Total</b>	<b>100</b>

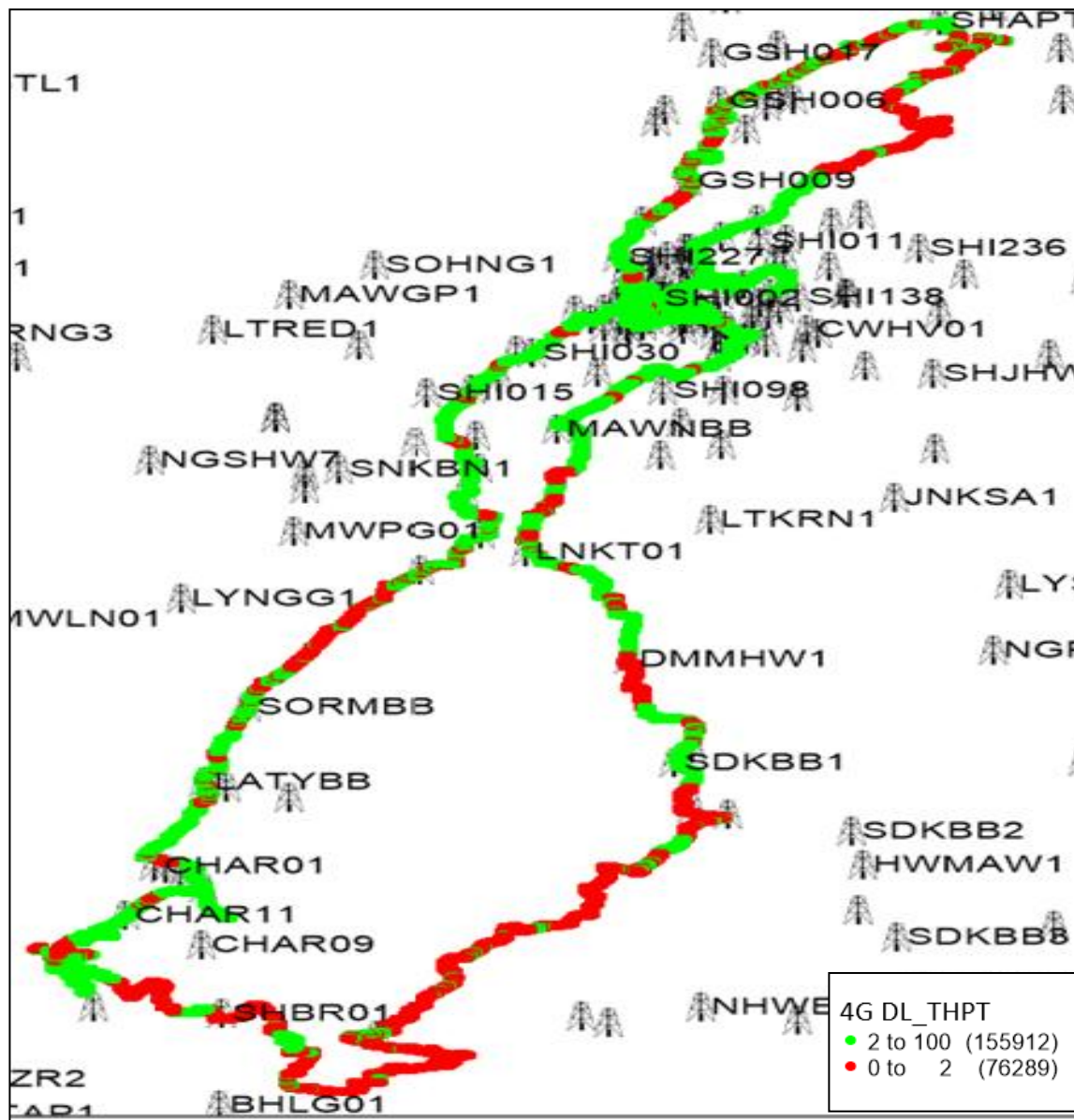
# IV. Dynamic Data Test- 4G DL Details

## AIRTEL

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	6.45

### 4G



AVG. DOWNLOAD SPEED (Kbps)	6.45
% FILE TRANSFER COMPLETE	76%
DL throughput	<b>Sample %</b>
0 to 1 Mbps	29%
1 to 2 Mbps	4%
2 to 5 Mbps	63%
5 to 10 Mbps	3%
>10 Mbps	2%
<b>Total</b>	<b>100</b>



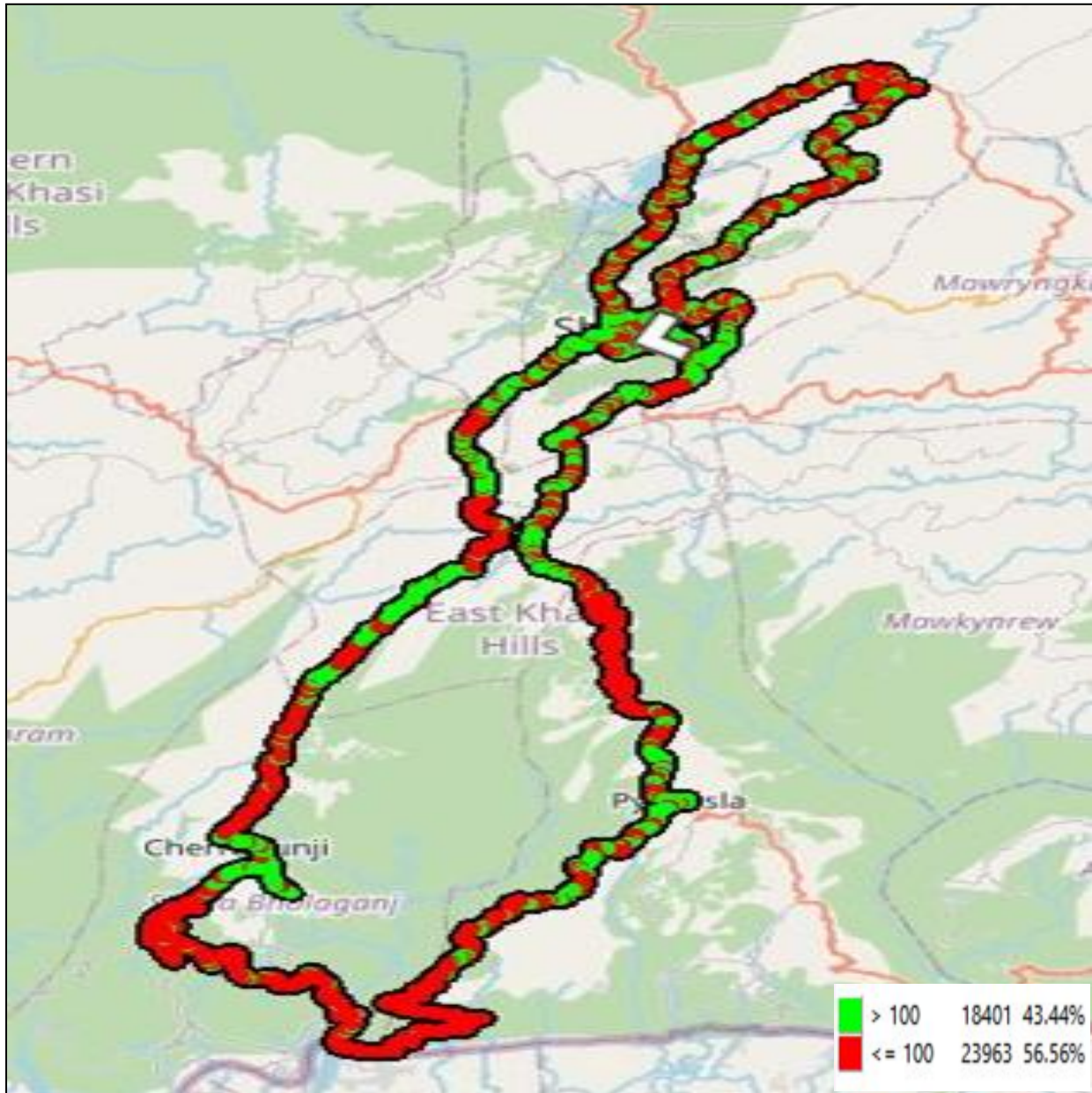
# IV. Dynamic Data Test- 2G DL Details

## BSNL

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	138.30

### 2G



AVG. DOWNLOAD SPEED (Kbps)	<b>138.30 Kbps</b>
% FILE TRANSFER COMPLETE	<b>79.11%</b>
DL throughput	<b>Sample %</b>
0 to 50 Kbps	0.25%
50 to 100 Kbps	0%
100 to 200 Kbps	1.72%
200 to 300 Kbps	1.05%
>300 Kbps	96.98%
<b>Total</b>	<b>100%</b>

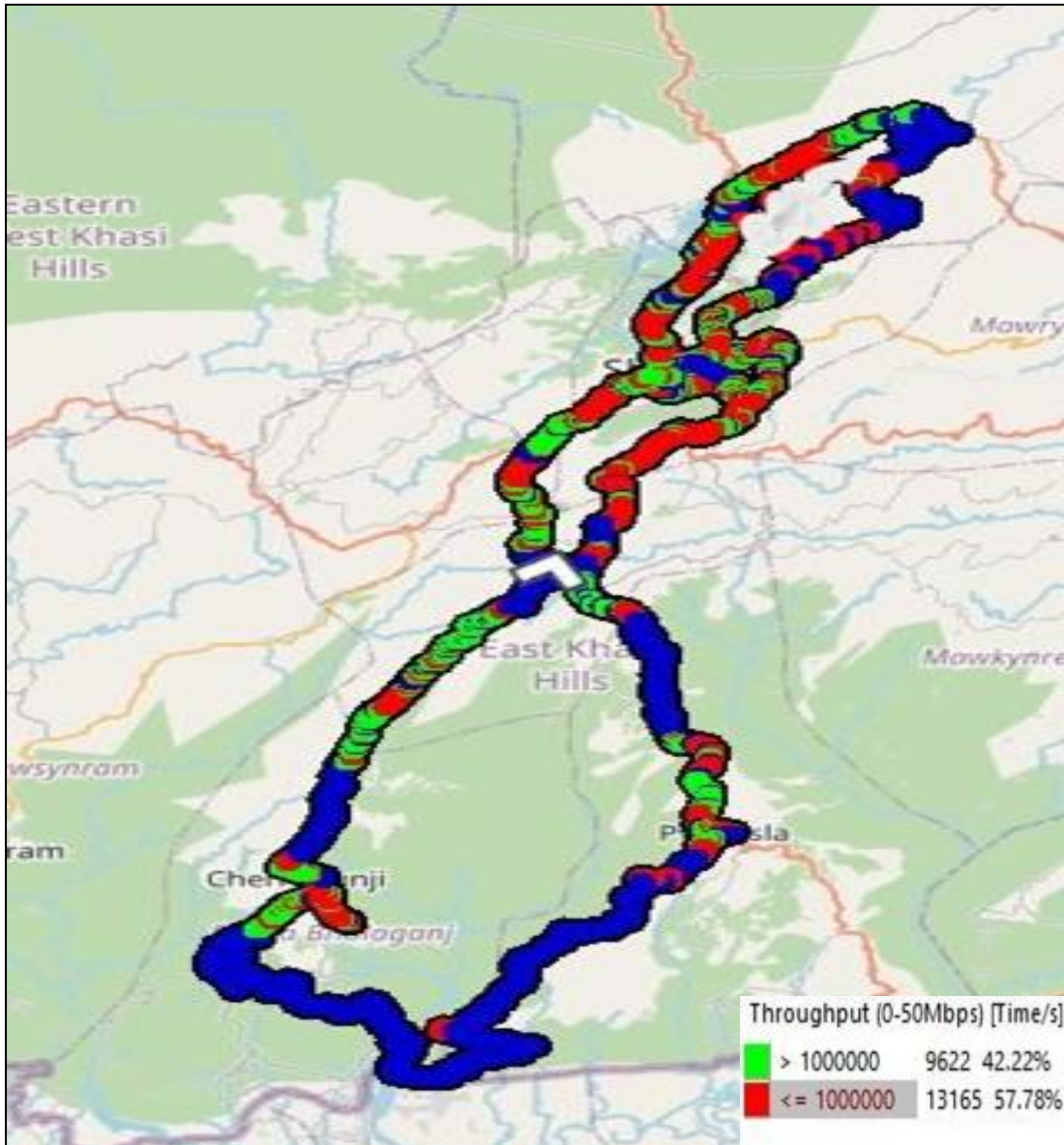
# IV. Dynamic Data Test- 3G DL Details

## BSNL

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	<b>3G</b>
Average Download Throughput (Mbps)	<b>1.51</b>

### 3G



AVG. DOWNLOAD SPEED (Mbps)	<b>1.51</b>
% FILE TRANSFER COMPLETE	<b>86.60%</b>
DL throughput	<b>Sample %</b>
0 to 0.5 Mbps	44.82%
0.5 to 1 Mbps	12.16%
1 to 2 Mbps	15.07%
2 to 5 Mbps	18.35%
>5 Mbps	9.60%
<b>Total</b>	<b>100%</b>

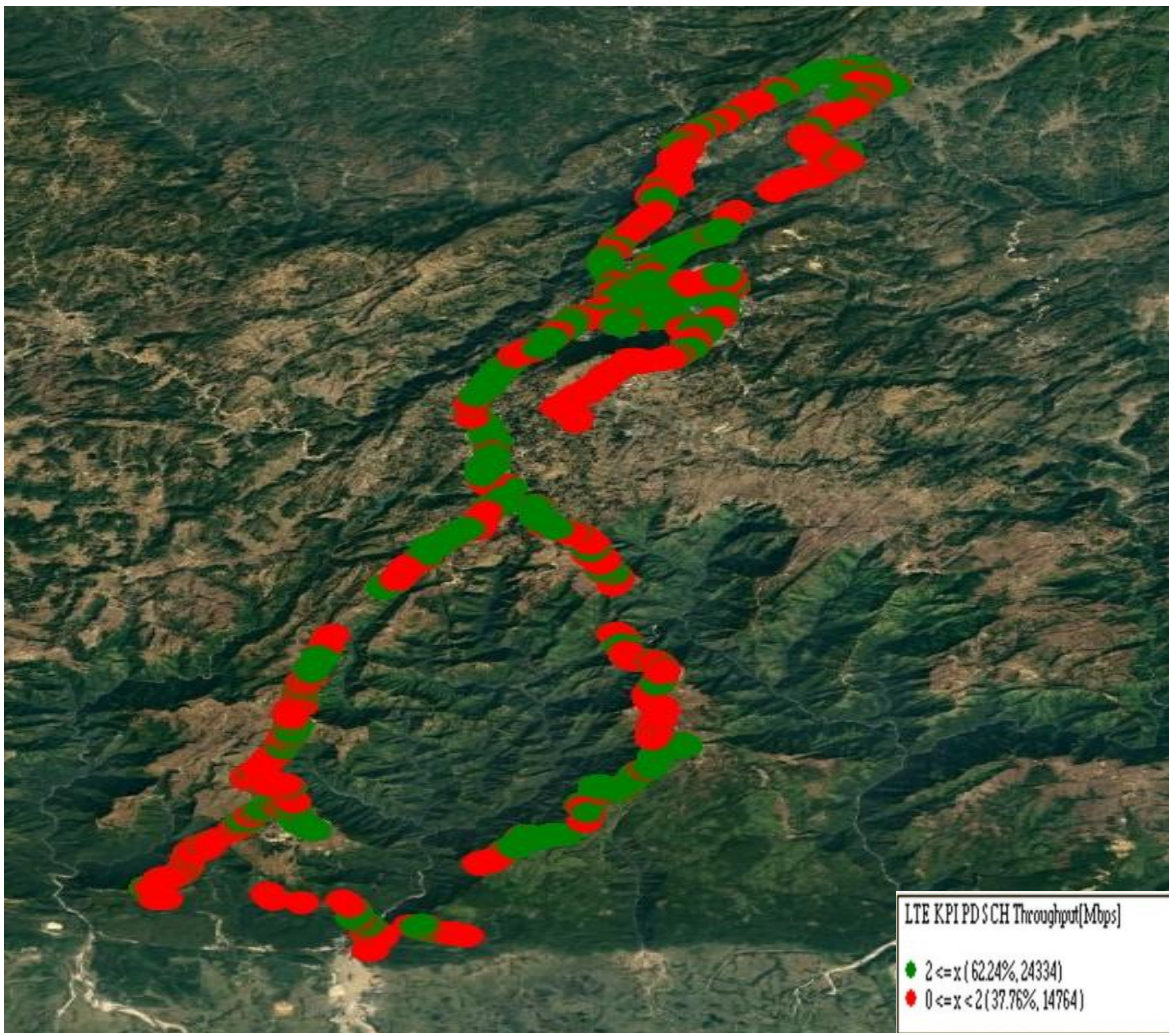
# IV. Dynamic Data Test- 4G DL Details

## RJIO

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	7.62

### 4G



AVG. DOWNLOAD SPEED (Mbps)	7.62
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 1 Mbps	18.56%
1 to 2 Mbps	19.20%
2 to 5 Mbps	23.83%
5 to 10 Mbps	19.13%
>10 Mbps	19.28%
<b>Total</b>	<b>100</b>

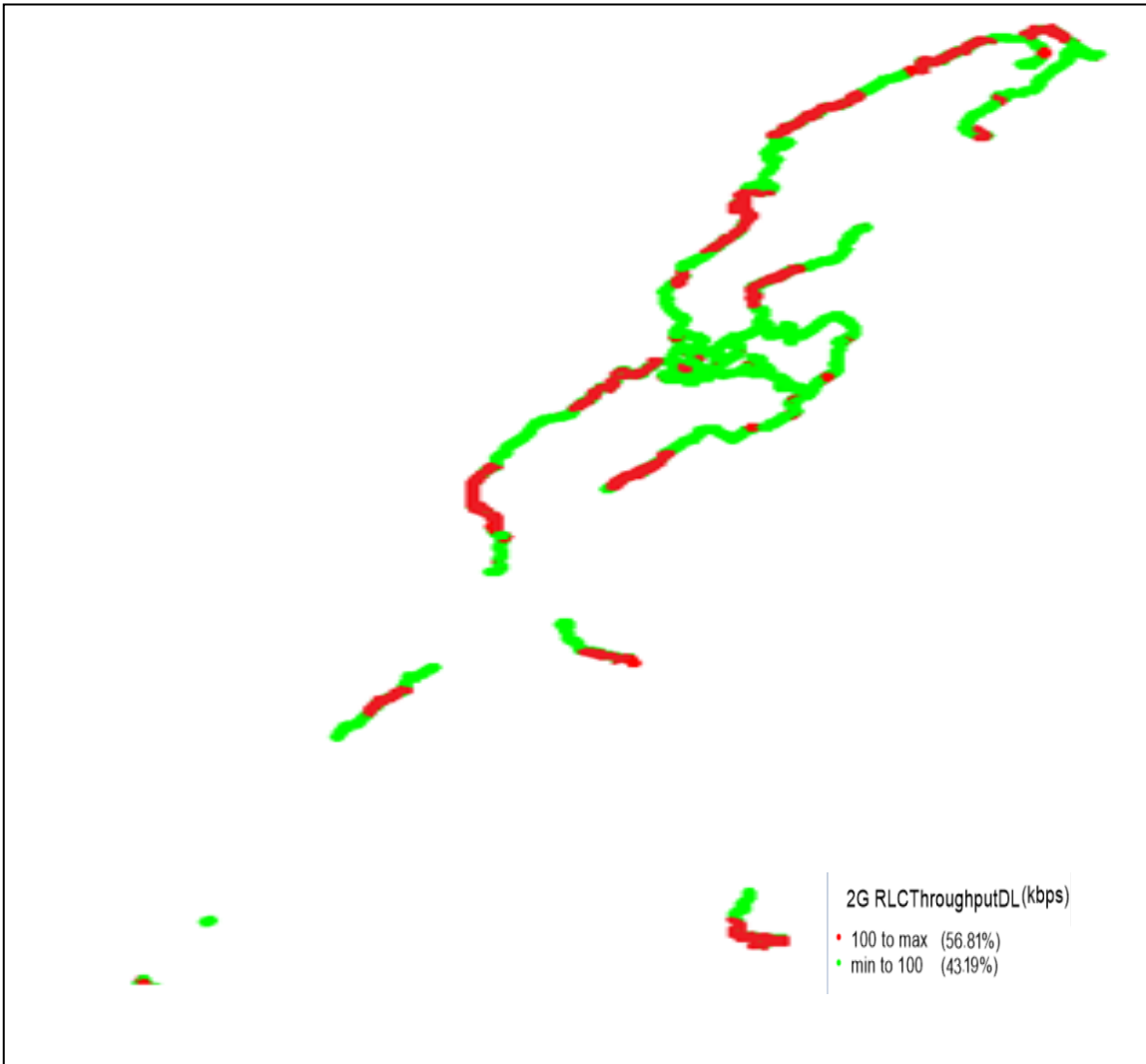
# IV. Dynamic Data Test-2G DL Details

## VIL

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	68.54

### 2G



AVG. DOWNLOAD SPEED (Kbps)	68.54
% FILE TRANSFER COMPLETE	96%
DL throughput	<b>Sample %</b>
0 to 50 Kbps	24.06%
50 to 100 Kbps	19.14%
100 to 200 Kbps	20.52%
200 to 300 Kbps	22.20%
>300 Kbps	14.09%
<b>Total</b>	<b>100%</b>

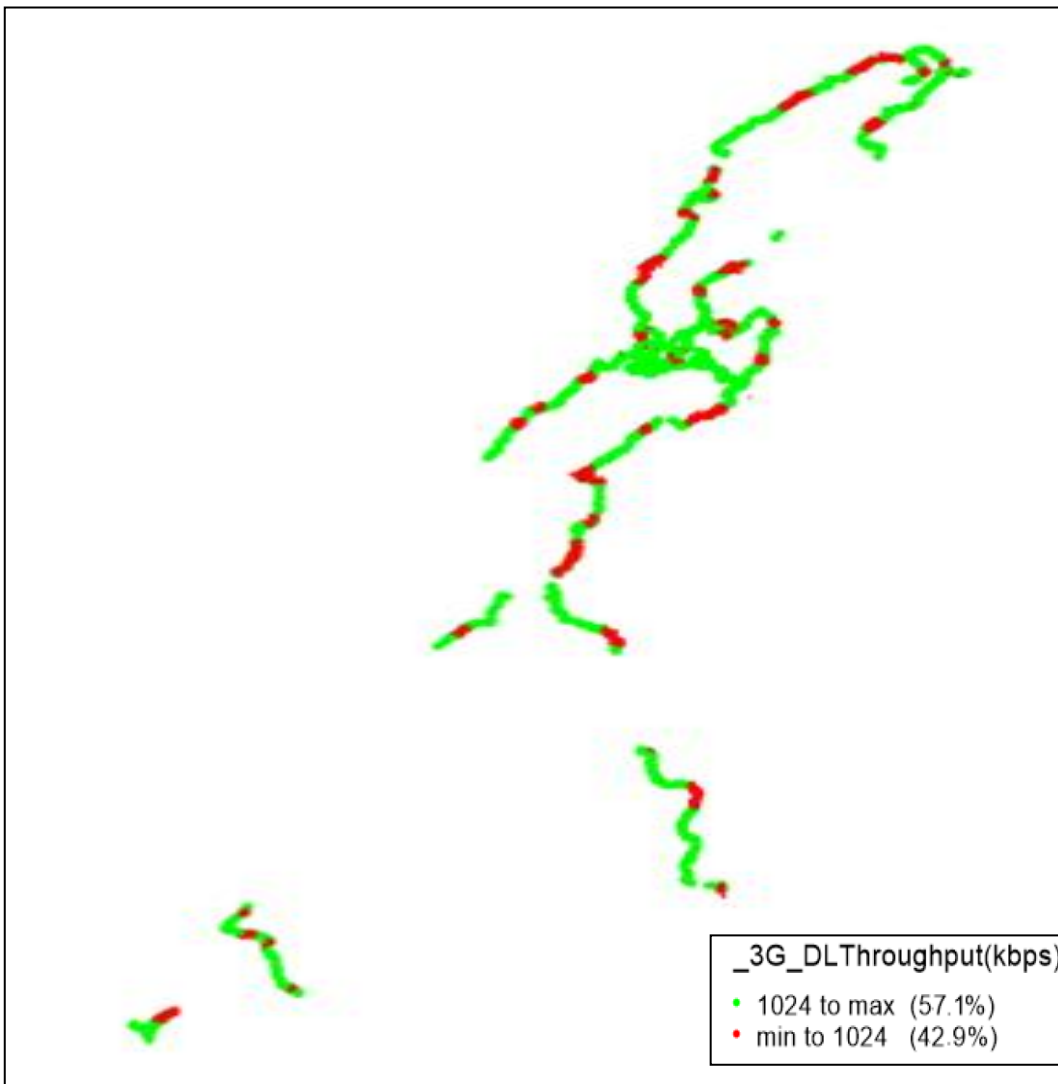
# IV. Dynamic Data Test- 3G DL Details

## VIL

### Dynamic Data Testing Complete 286 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	1.94

### 3G



AVG. DOWNLOAD SPEED (mbps)	1.94
% FILE TRANSFER COMPLETE	85.26%
DL throughput	<b>Sample %</b>
0 to 0.5 Mbps	24.79%
0.5 to 1 Mbps	18.10%
1 to 2 Mbps	20.43%
2 to 5 Mbps	23.64%
>5 Mbps	13.04%
<b>Total</b>	<b>100%</b>

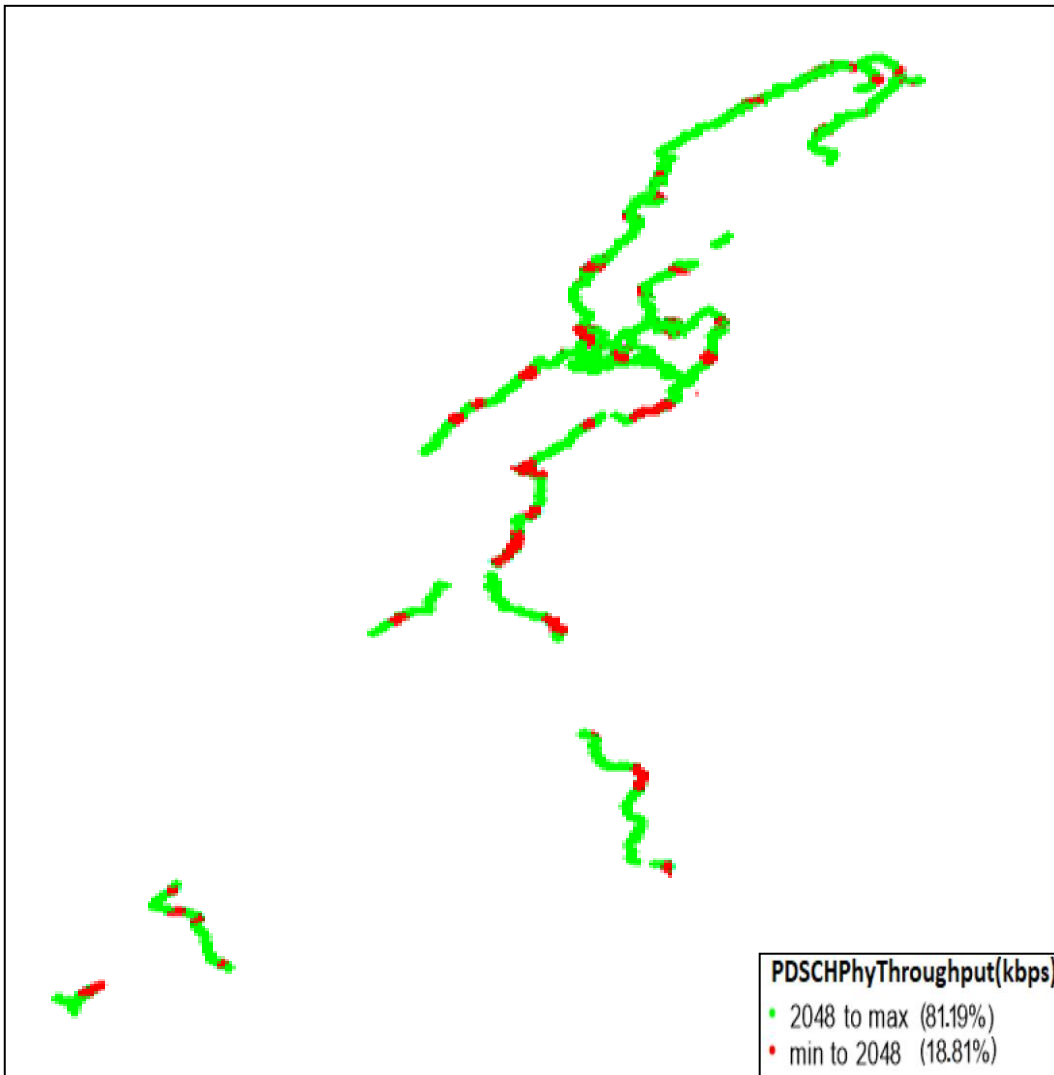
# IV. Dynamic Data Test- 4G DL Details

## VIL

### Dynamic Data Testing Complete 286 Kms

Data KPIs – Overall	4G
Average Download Throughput (Mbps)	3.40

### 4G



AVG. DOWNLOAD SPEED (Mbps)	3.40
% FILE TRANSFER COMPLETE	98.96%
DL throughput	<b>Sample %</b>
0 to 1 Mbps	9.03%
1 to 2 Mbps	9.78%
2 to 5 Mbps	30.85%
5 to 10 Mbps	25.98%
>10 Mbps	24.36%
<b>Total</b>	<b>100%</b>