



Operator Assisted Drive Test Report

Bhilwara City & Nearby Area

11th October to 12th October 2022

By

TRAI Regional office Jaipur

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2%. All TSPs have met the Call Setup Success Rate (CSSR) of 95%.

The Operator Assisted Drive Test has been carried out by Regional Office, Jaipur with the help of Service Providers in Bhilwara City & Nearby area from 9:00 AM to 8:00 PM during 11-10-2022. to 12-10-2022. The drive test covered drive route of 95 KMs & 6 no hotspots over a period of 2 days. Approximately 170 calls were made for each of the networks: three 2G networks, one 3G networks and three LTE networks covering four TSPs.

Overview

Voice Summary

Data Summary

Overview

Regional Office, TRAI Jaipur conducted Operator Assisted Drive Test from 11th October 2022 to 12th October 2022 covering Bhilwara City & Nearby Area. The performance of Airtel, BSNL, Vodafone Idea and Jio was monitored across various technologies (2G, 3G and 4G). The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services.

Voice: Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Data: Download Throughputs, Upload Throughputs, Web Browsing Delay and Latency.

Drive Test Details :

Voice Tests: Calls were made for 90 sec duration with a wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately **95** KMs. Approximately **170 calls** were made for each of the networks: three 2G (Lock Mode) networks, one 3G (Dual mode) networks and three VoLTE networks covering 4 unique TSPs.

Data Tests:

Dynamic data test was conducted for 95 kms for download throughput in all technologies.

2G – measurement – UE Locked in 2G file size- 500KB

3G – measurement – UE in 3G File Size- 20MB

4G – measurement – UE in LTE File Size- 40MB

Static data tests on 5 hotspots

Hotspot Locations	
1.	Satyam Complex- Gayatri Ashram, Bhilwara
2.	Roadways Bus Stand- Shree Guest House Chauraha, Bhilwara
3.	Railway Station, Bhilwara
4.	Suchna Kendra-Raja Juice, Bhilwara
5.	Soni Hospital, Bhilwara
6.	Pancel Chauraha, Bhilwara

Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Latency	32 Bytes on www.google.com

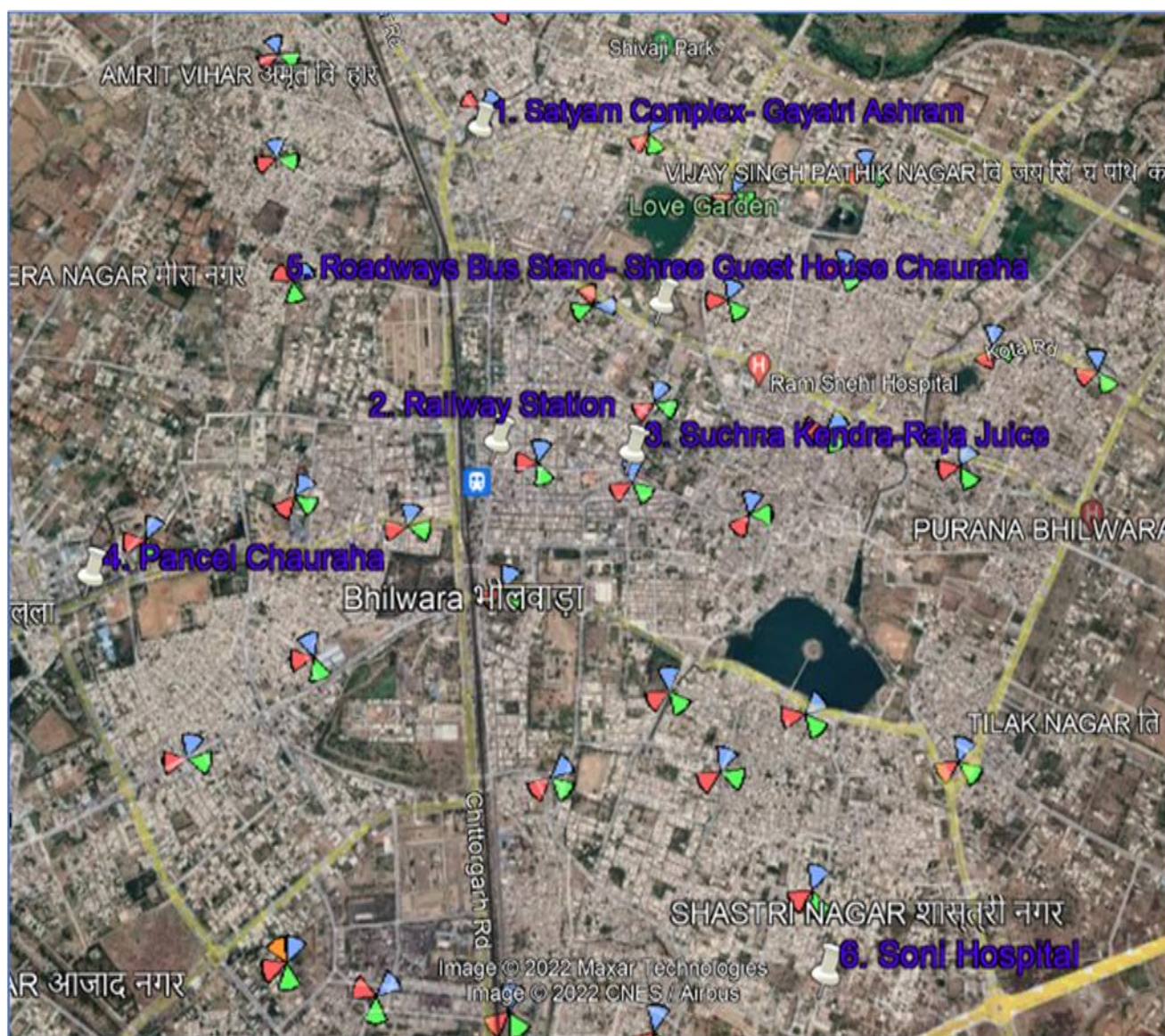
Overview

Voice & Dynamic Data Test Drive Route



Date	Test Scenario	Area to be Covered
11-Oct-22	2G/3G/4G Voice and 3G/4G Dynamic Data	Starting Point Saras Parlour-Ajmer Road at 9.00 AM Saras Parlour-Ajmer Road, Sukhadia Circle, Gayatri Ashram, RK Colony, RC Vyas Colony, Kota Road, Majdoor Churaha, Vijay Singh Pathik Nagar, Ahinsa Circle, Vardhaman Colony, Sanganer Road, Suwna Road, Tilak Nagar, Sindhu Nagar Main Market. Nagori Garden, Harni Mahadev Road, Pachwati, Nehru Road, Ashok Nagar, Collectorate, Sham ki Sabji Mandi, Veer Sawarkar Chowk, Gol Payau Chouraha, Kashi Puri, Ramdham, CSA Nagar, Transport Nagar, Kamla Vihar, Bapu Nagar, Biliyan, Pur Road, Gangapur Chouraha, Chaprasi Colony, Santosh Colony, Malola Chouraha
12-Oct-22	Hot Spots- 2G/3G/4G Static Data Tests	Starting Point Gayatri Ashram at 9.00 AM 1) Satyam Complex- Gayatri Ashram, 2) Roadways Bus Stand-Shree Guest House Chauraha 3) Railway Station- 4) Suchna Kendra-Raja Juice 5) Soni Hospital, 6) Pancel Chauraha,

Data Service Test- Static Locations



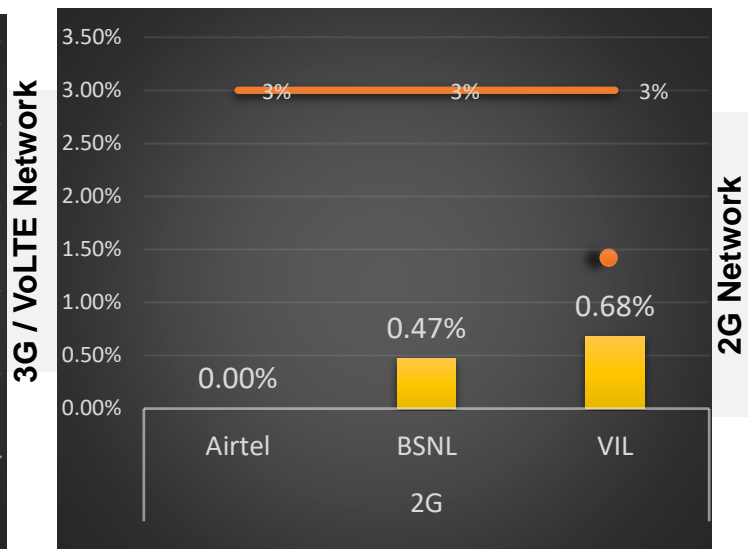
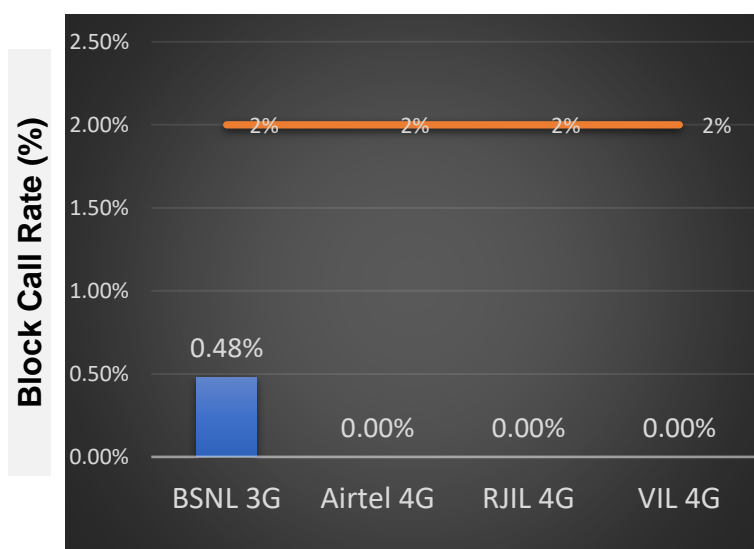
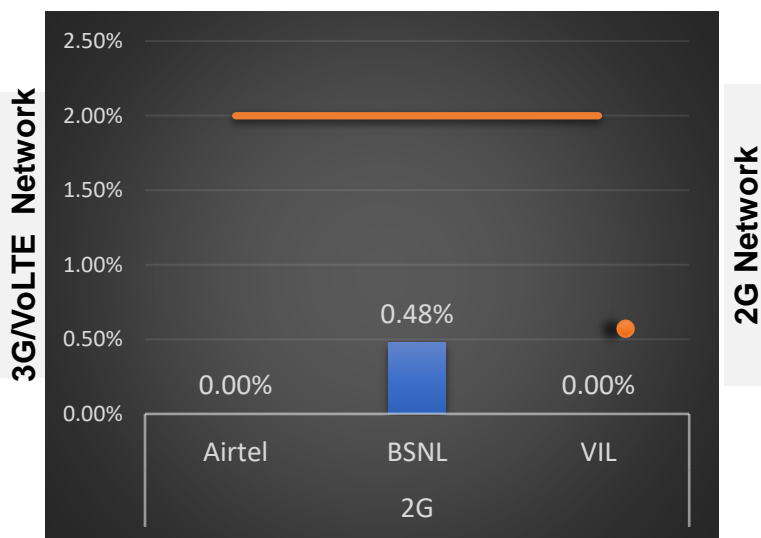
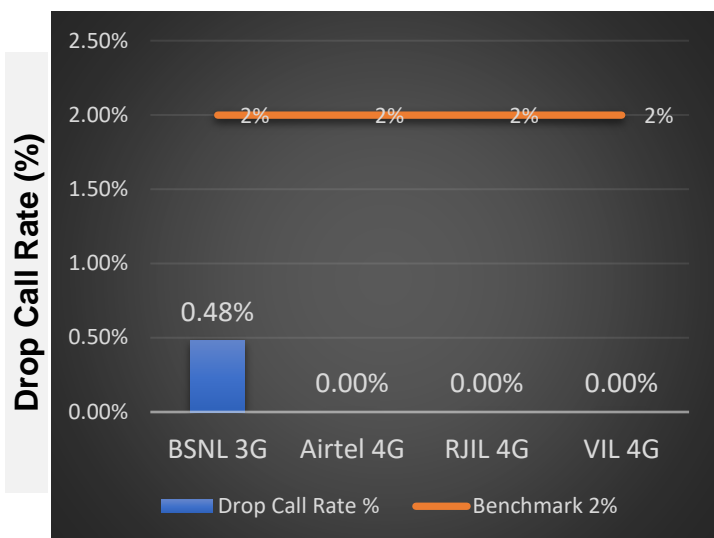
Hotspot Locations

- | |
|---|
| 1. Satyam Complex- Gayatri Ashram, Bhilwara |
| 2. Roadways Bus Stand- Shree Guest House Chauraha, Bhilwara |
| 3. Railway Station, Bhilwara |
| 4. Suchna Kendra-Raja Juice, Bhilwara |
| 5. Soni Hospital, Bhilwara |
| 6. Pancel Chauraha, Bhilwara |

Voice Calls

Key Observations

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



KPIs	2G			3G	4G		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.00%	0.48%	0.00%	0.48%	0.00%	0.00%	0.00%
Block Call Rate %	0.00%	0.47%	0.68%	0.48%	0.00%	0.00%	0.64%

- All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%).
- Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

Voice Calls

Key Observations

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	96.64%	99.55%	92.73%

b) Percentage of coverage samples for 3G \geq -90 dBm

TSPs	3G
	BSNL
Coverage %	98.91%

c) Percentage of coverage samples for LTE \geq -110 dBm.

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	97.93%	99.73%	99.54%

d) Percentage of time spent on 3G/4G network

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent on 3G/4G Network %	32.90%	100.00%	100.00%	100.00%

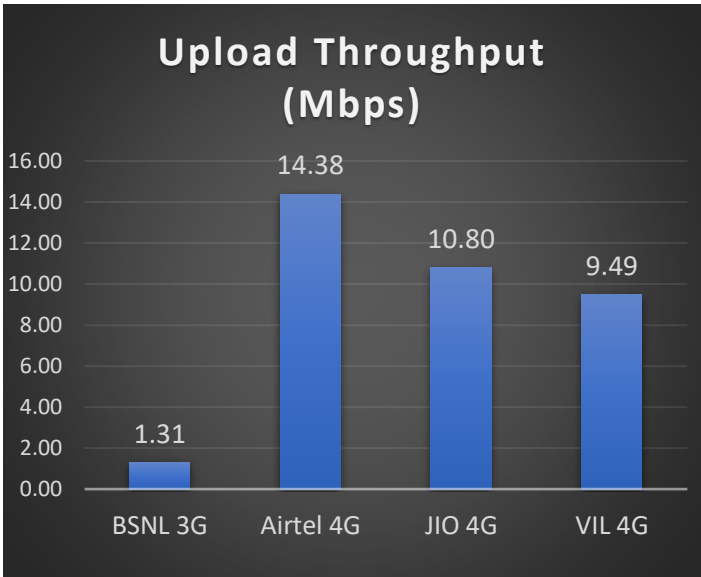
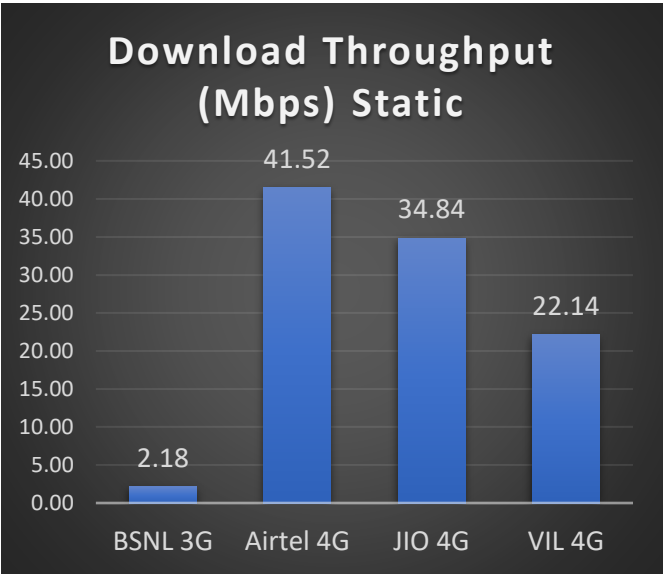
Data Services Static

Key Observations

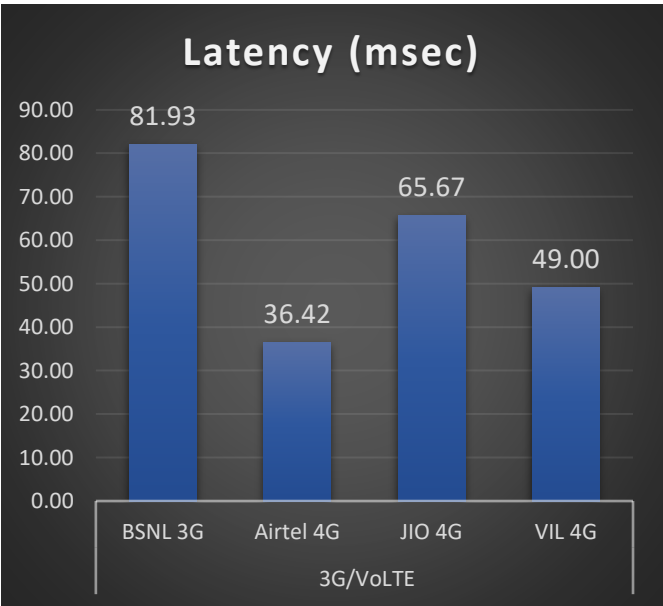
Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, Paytm)

Data Download and Upload Performance Static (Mbps)

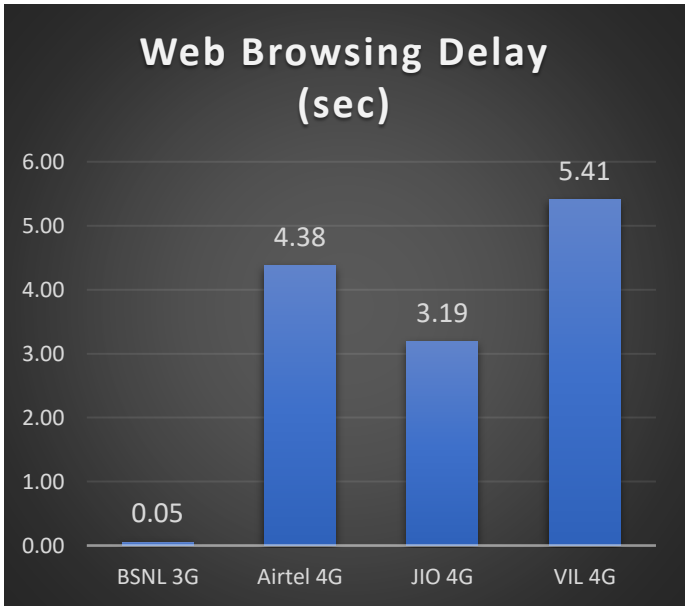
3G/4G/ Network:



Latency (ms)



Web Browsing (Sec)



Data Services Dynamic

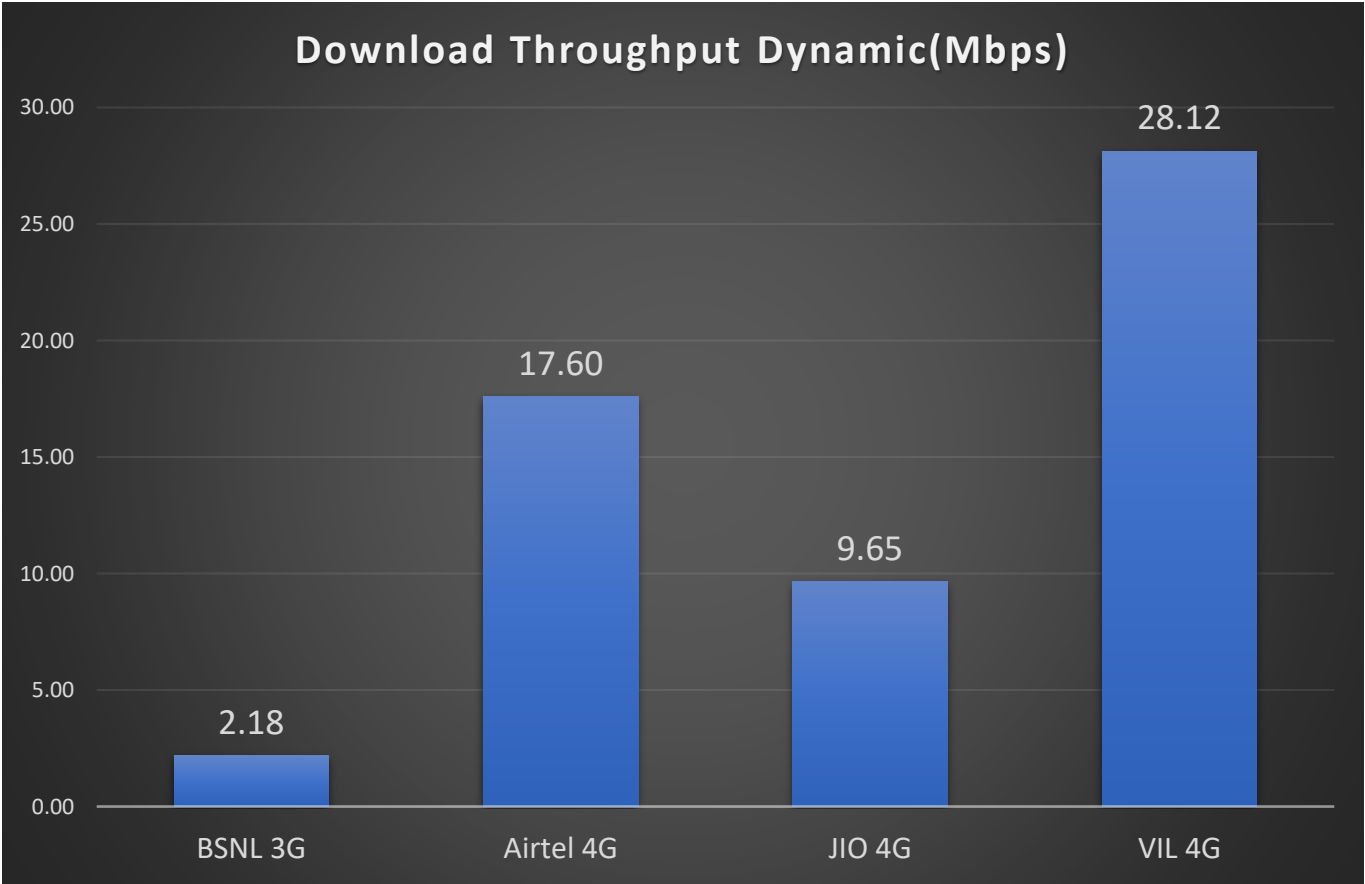
Key Observations

Dynamic Data was tested for whole voice route. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

Data Services Dynamic	3G/VoLTE			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	2.18	17.60	9.65	28.12



Summary

City Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	172	210	145
Blocked Call Rate (%)	0.00%	0.47%	0.68%
CSSR% (Accessibility)	100.00%	99.53%	99.32%
Drop Call Rate (%)	0.00%	0.48%	0.00%
Mobility HOSR (%)	100.00%	100.00%	99.32%
Rx Quality (%)	95.31%	95.44%	99.42%
Average CST Sec	2.80	3.44	3.34

Voice Call	3G/VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	208	172	183	154
Blocked Call Rate (%)	0.48%	0.00%	0.00%	0.64%
CSSR% (Accessibility)	99.52%	100.00%	100.00%	99.36%
Drop Call Rate (%)	0.48%	0.00%	0.00%	0.00%
Mobility HOSR (%)	100.00%	100.00%	98.98%	99.36%
Rx Quality (%)	95.11%	96.30%	92.46%	98.29%
Average CST Sec	3.75	0.50	0.51	0.56

Summary

City Level Summary- Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210.00	135.83	121.03
Upload Throughput (kbps)	190.00	79.33	95.19
Web Browsing Delay (sec)	12.66	0.13	49.19
Latency (msec)	188.60	154.26	191.00

Data Services Static	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	2.18	41.52	34.84	22.14
Upload Throughput(Mbps)	1.31	14.38	10.80	9.49
Video Streaming Delay (sec)	6.40	0.40	0.69	0.50
Web Browsing Delay (sec)	0.05	4.38	3.19	5.41
Latency (msec)	81.93	36.42	65.67	49.00

<u>Gaytri Ashram</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	190.00	114.00	110.00
Upload Throughput (kbps)	210.00	73.00	85.00
Web Browsing Delay (sec)	12.82	0.02	43.86
Latency (msec)	180.00	145.60	217.00

<u>Bus Stand Bhilwara</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210.00	127.00	189.31
Upload Throughput (kbps)	190.00	93.00	149.14
Web Browsing Delay (sec)	12.86	0.03	40.34
Latency (msec)	160.00	175.00	159.00

<u>Railway Station</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	200.00	161.00	91.10
Upload Throughput (kbps)	210.00	81.00	80.50
Web Browsing Delay (sec)	12.74	0.17	50.11
Latency (msec)	184.00	136.00	204.00

<u>Suchna Kendra</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210.00	188.00	90.41
Upload Throughput (kbps)	170.00	88.00	75.25
Web Browsing Delay (sec)	12.86	0.11	54.78
Latency (msec)	166.00	135.00	179.00

<u>Soni Hospital</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	200.00	75.00	130.40
Upload Throughput (kbps)	160.00	65.00	91.10
Web Browsing Delay (sec)	12.46	0.10	53.15
Latency (msec)	210.00	189.00	193.00

<u>Pancel Circle</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210.00	150.00	115.00
Upload Throughput (kbps)	200.00	76.00	90.00
Web Browsing Delay (sec)	12.32	0.33	53.85
Latency (msec)	220.00	145.00	192.00

<u>Gaytri Ashram</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	4.54	37.84	20.19	22.40
Upload Throughput (mbps)	1.70	15.70	16.67	7.30
Video Streaming Delay (Secs.)	3.37	0.32	0.65	0.51
Web Browsing Delay (sec)	0.01	5.00	2.63	5.80
Latency (msec)	78.30	38.00	63.00	51.00

<u>Bus Stand Bhilwara</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.70	46.58	14.70	20.15
Upload Throughput (mbps)	0.99	14.62	14.15	9.40
Video Streaming Delay (Secs.)	4.08	0.34	0.51	0.37
Web Browsing Delay (sec)	0.05	5.00	3.47	5.30
Latency (msec)	69.00	36.00	54.00	49.00

<u>Railway Station</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.10	58.16	25.91	27.57
Upload Throughput (mbps)	1.20	18.13	8.00	11.55
Video Streaming Delay (Secs.)	13.10	0.46	1.08	0.43
Web Browsing Delay (sec)	0.08	5.00	3.49	5.70
Latency (msec)	64.00	34.00	57.00	47.00

<u>Suchna Kendra</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.70	49.52	80.30	25.38
Upload Throughput (mbps)	1.30	12.48	9.25	15.12
Video Streaming Delay (Secs.)	7.60	0.49	0.50	0.57
Web Browsing Delay (sec)	0.04	5.00	2.73	5.90
Latency (msec)	69.00	36.00	64.00	46.00

Data Services static

City Level Summary(contd.)

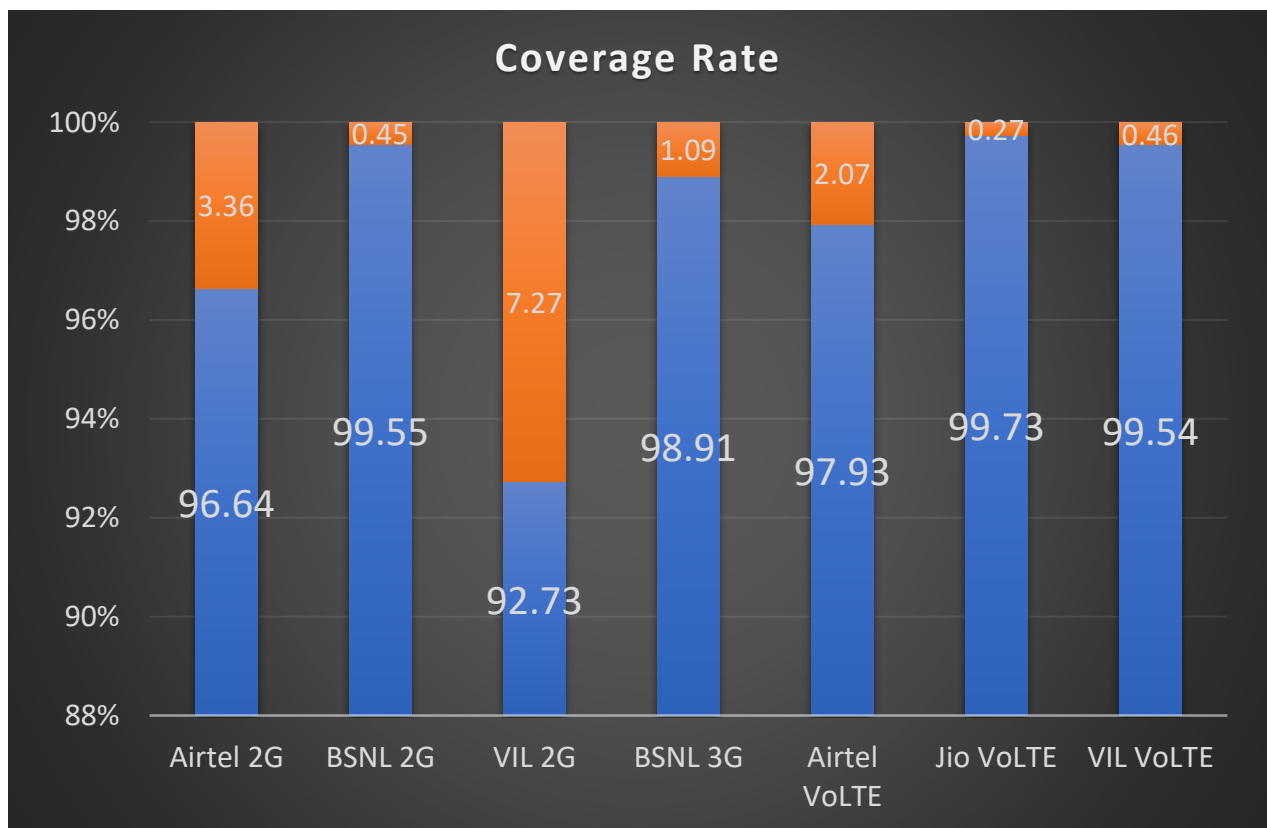
<u>Soni Hospital</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.20	35.69	43.66	16.70
Upload Throughput (mbps)	1.36	12.69	9.25	7.00
Video Streaming Delay (Secs.)	3.62	0.46	0.85	0.50
Web Browsing Delay (sec)	0.07	4.00	3.47	5.10
Latency (msec)	79.30	32.00	79.00	48.00

<u>Pancel Circle</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.26	35.78	24.24	20.77
Upload Throughput (mbps)	1.36	11.40	7.51	6.60
Video Streaming Delay (Secs.)	6.64	0.49	0.54	0.68
Web Browsing Delay (sec)	0.08	5.00	3.31	4.70
Latency (msec)	132.00	37.00	77.00	53.00

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 -110dBm. The details are as follows.

<u>TSP</u>	Coverage Rate %
Airtel 2G	96.64%
BSNL 2G	99.55%
VIL 2G	92.73%
BSNL 3G	98.91%
Airtel VoLTE	97.93%
Jio VoLTE	99.73%
VIL VoLTE	99.54%



TSP-AIRTEL

Technology	Coverage %
2G	96.64%
VoLTE	97.93%

2G



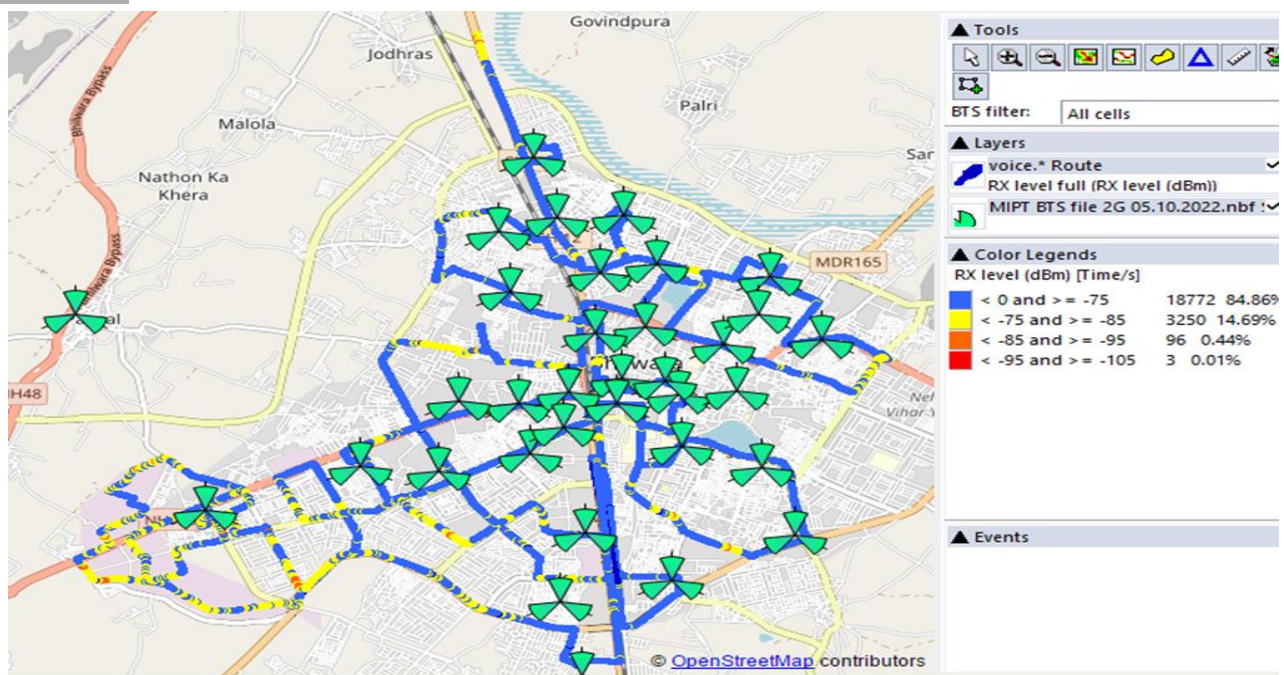
VoLTE



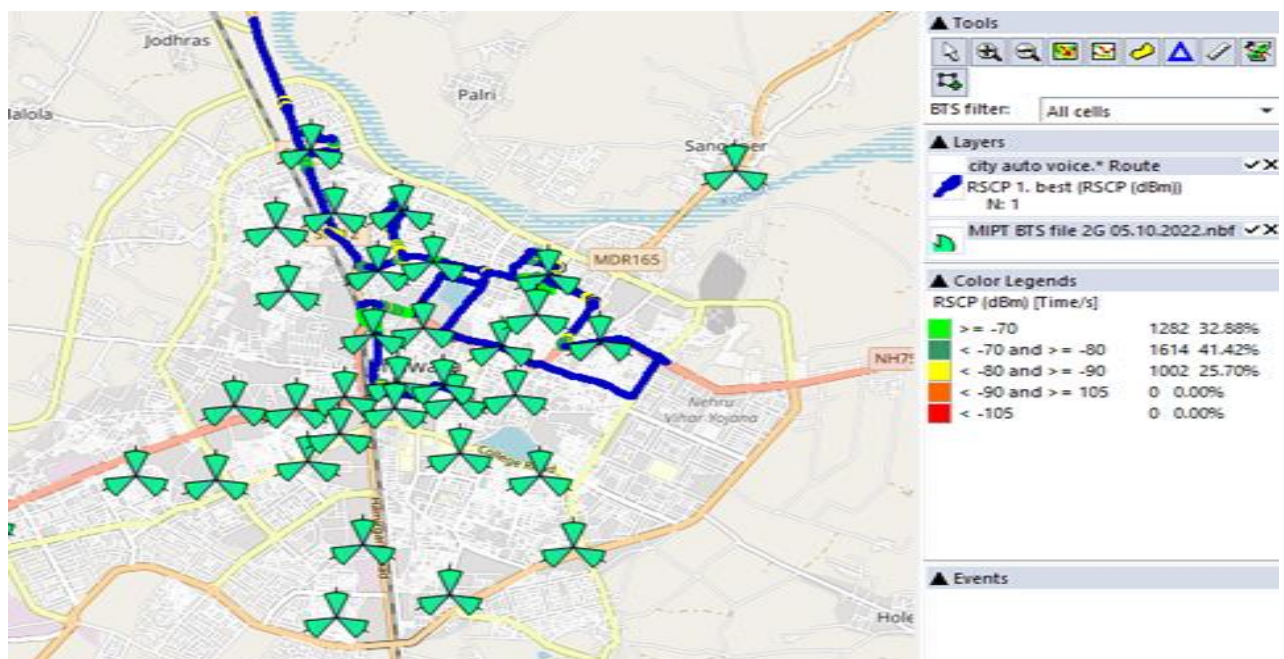
TSP- BSNL

Technology	Coverage %
2G	99.55%
3G	98.91%

2G

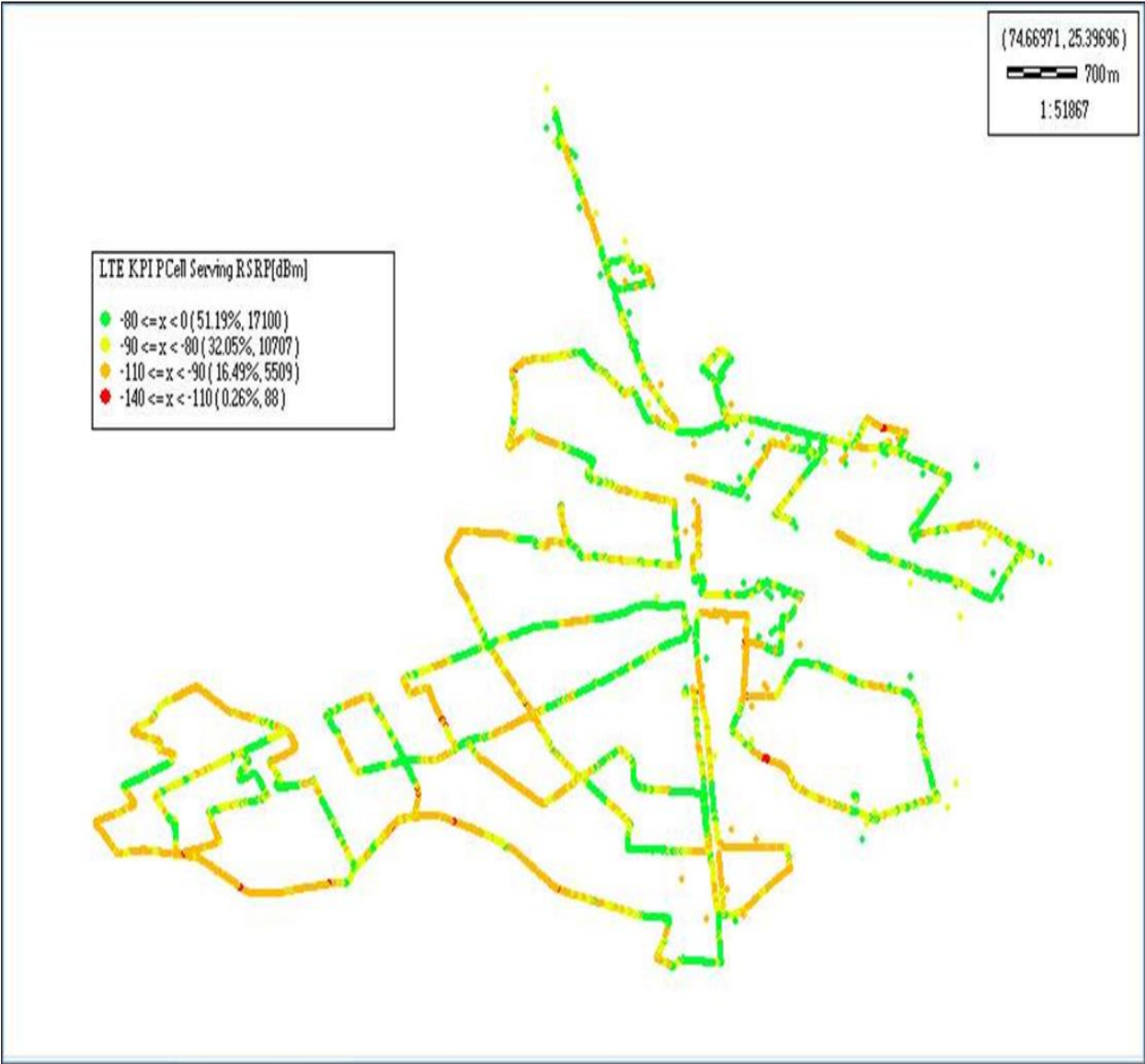


3G



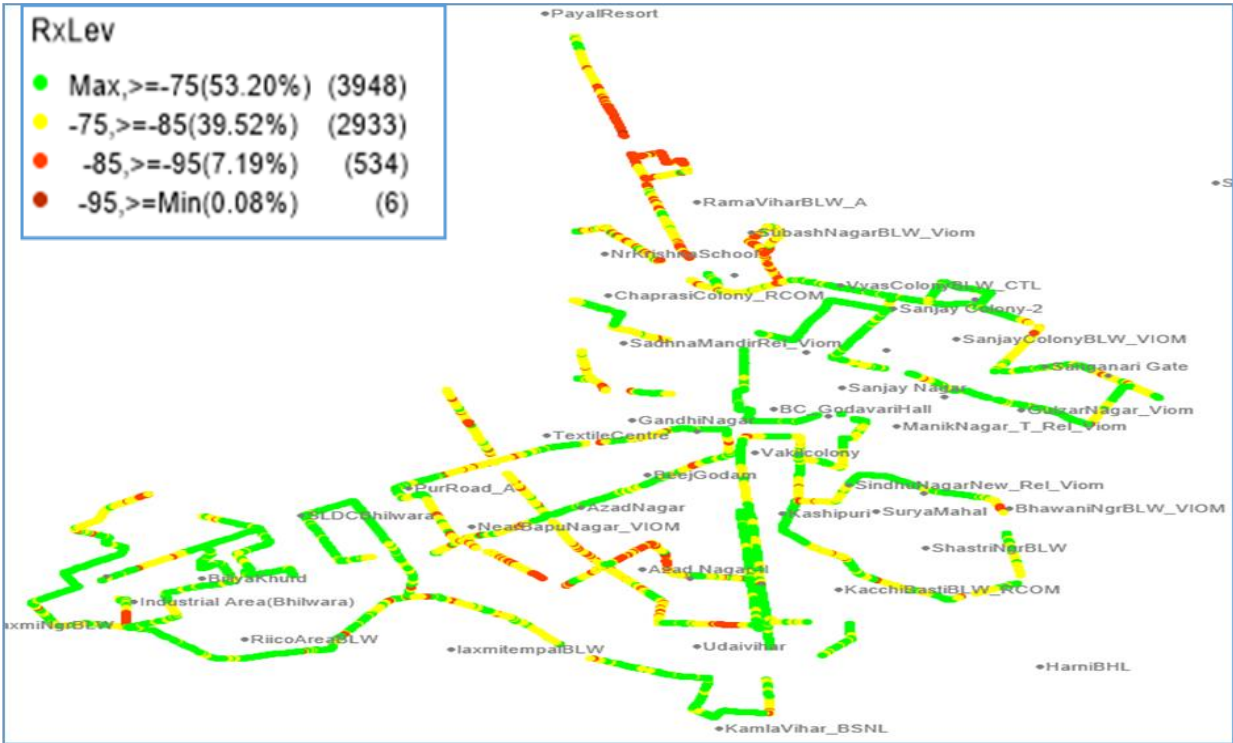
JIO

Technology	Coverage %
VoLTE	99.73%

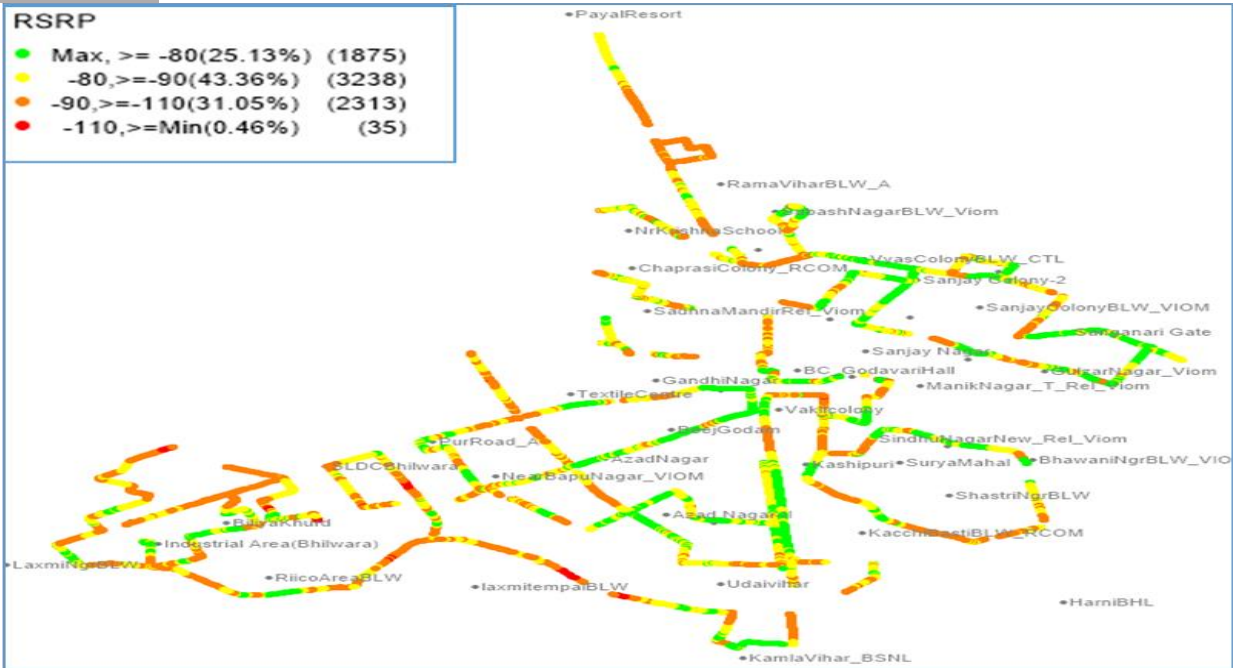


VIL

	Technology	Coverage Rate %
2G	2G	92.73%
	VoLTE	99.54%



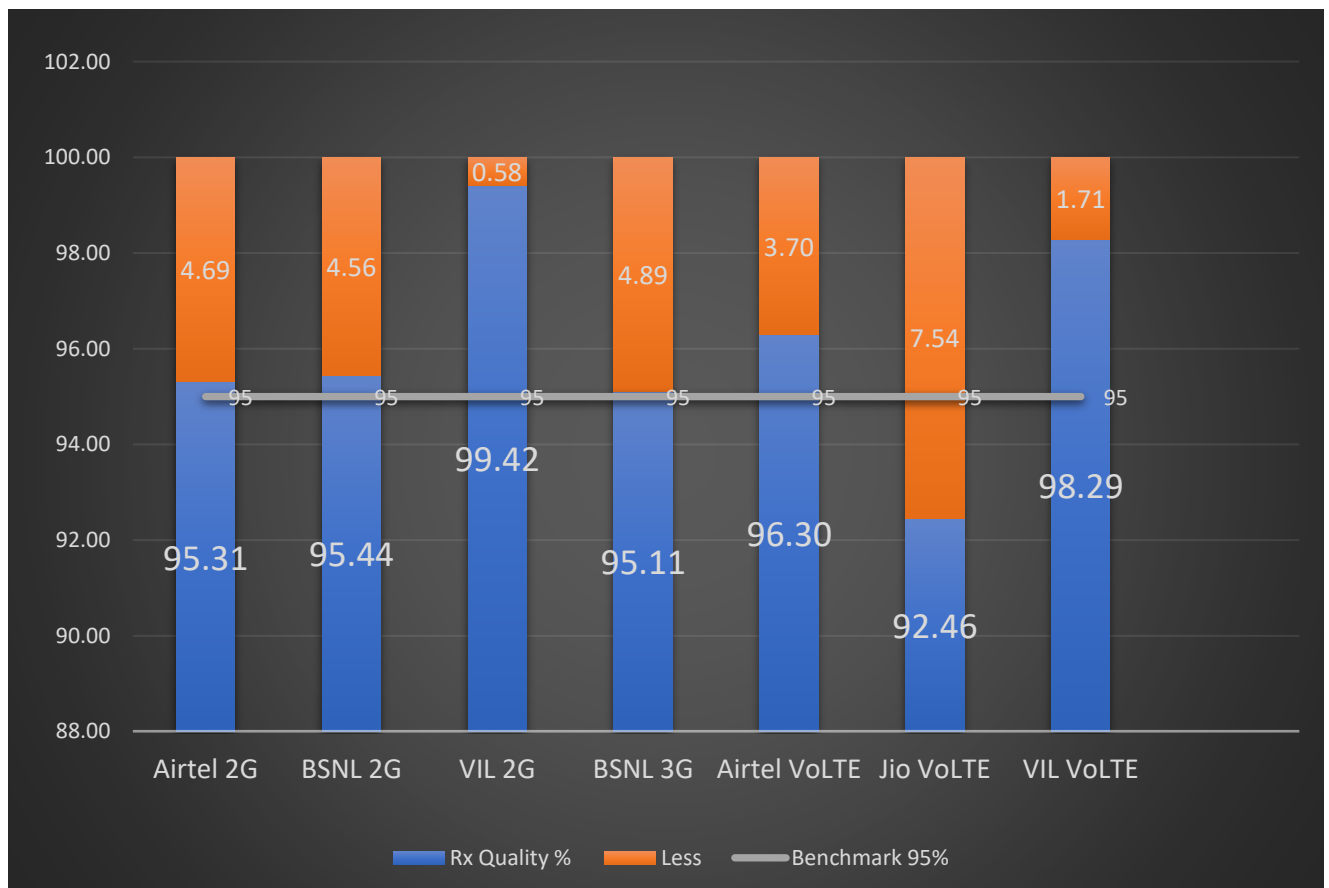
VoLTE



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 $\geq 95\%$.

<u>TSP</u>	<u>Rx Quality %</u>
Airtel 2G	95.31%
BSNL 2G	95.44%
VIL 2G	99.42%
BSNL 3G	95.11%
Airtel VoLTE	96.30%
Jio VoLTE	92.46%
VIL VoLTE	98.29%



Airtel

Technology	Rx Quality %
2G	95.31%
VoLTE	96.30%

2G



VoLTE



II. Quality Details

BSNL

2G

Technology

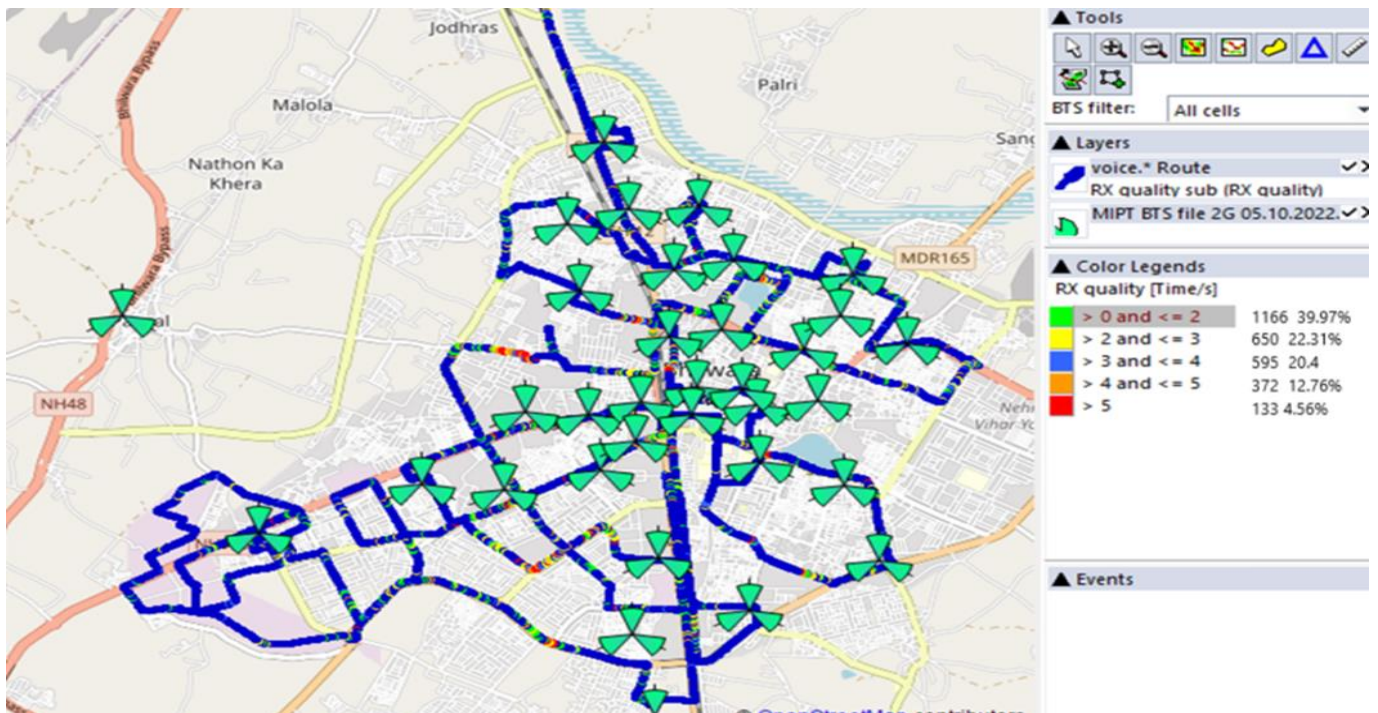
Rx Quality %

2G

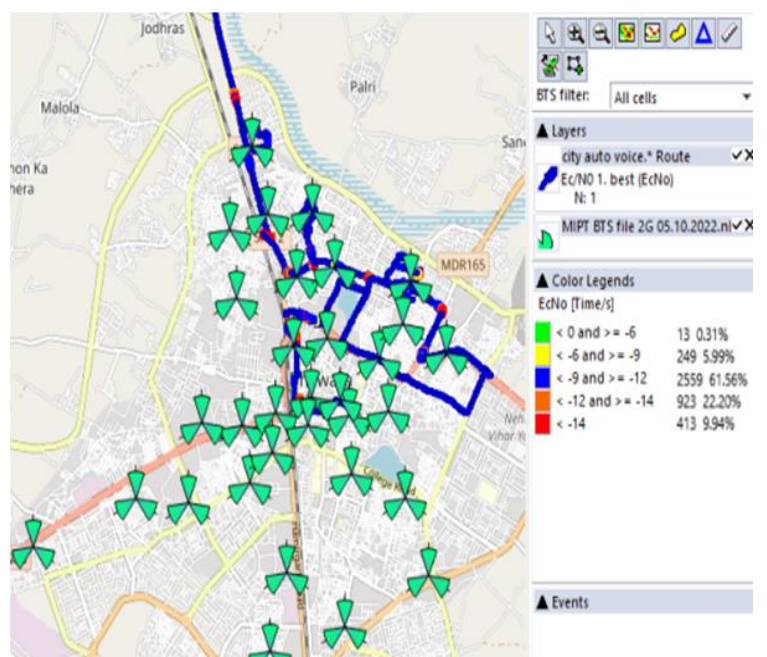
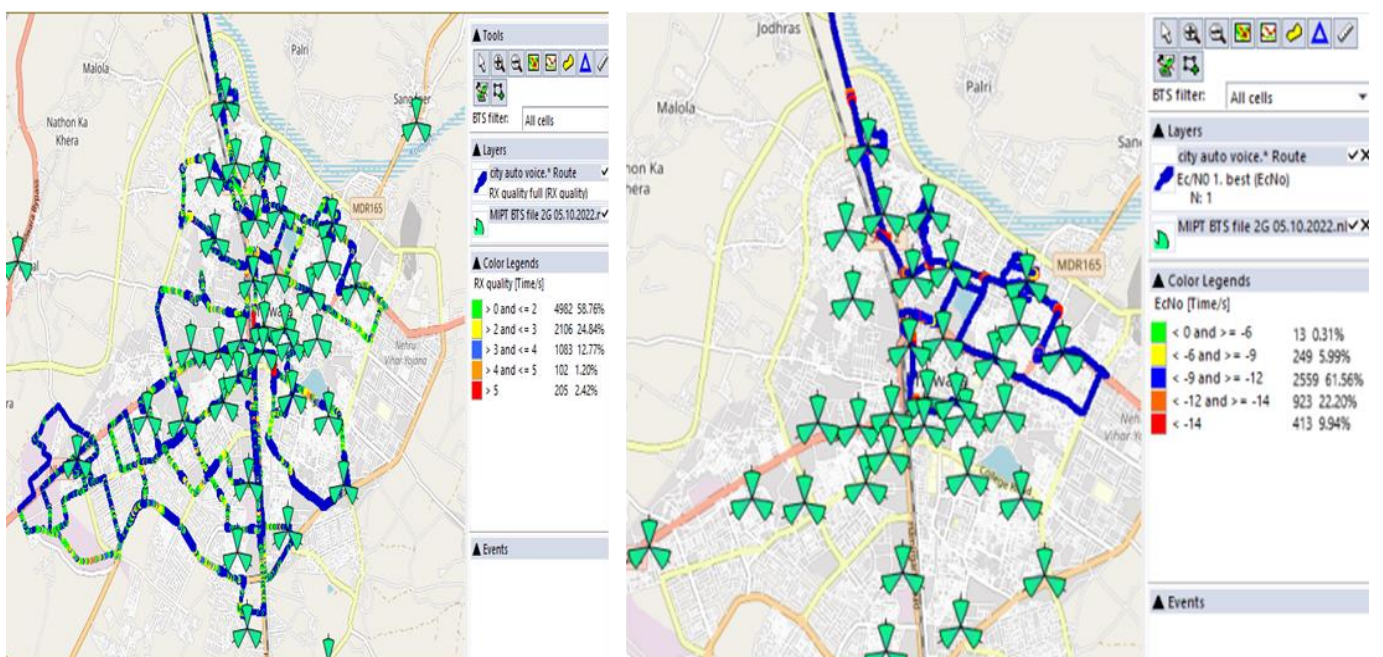
95.44%

3G

95.11%



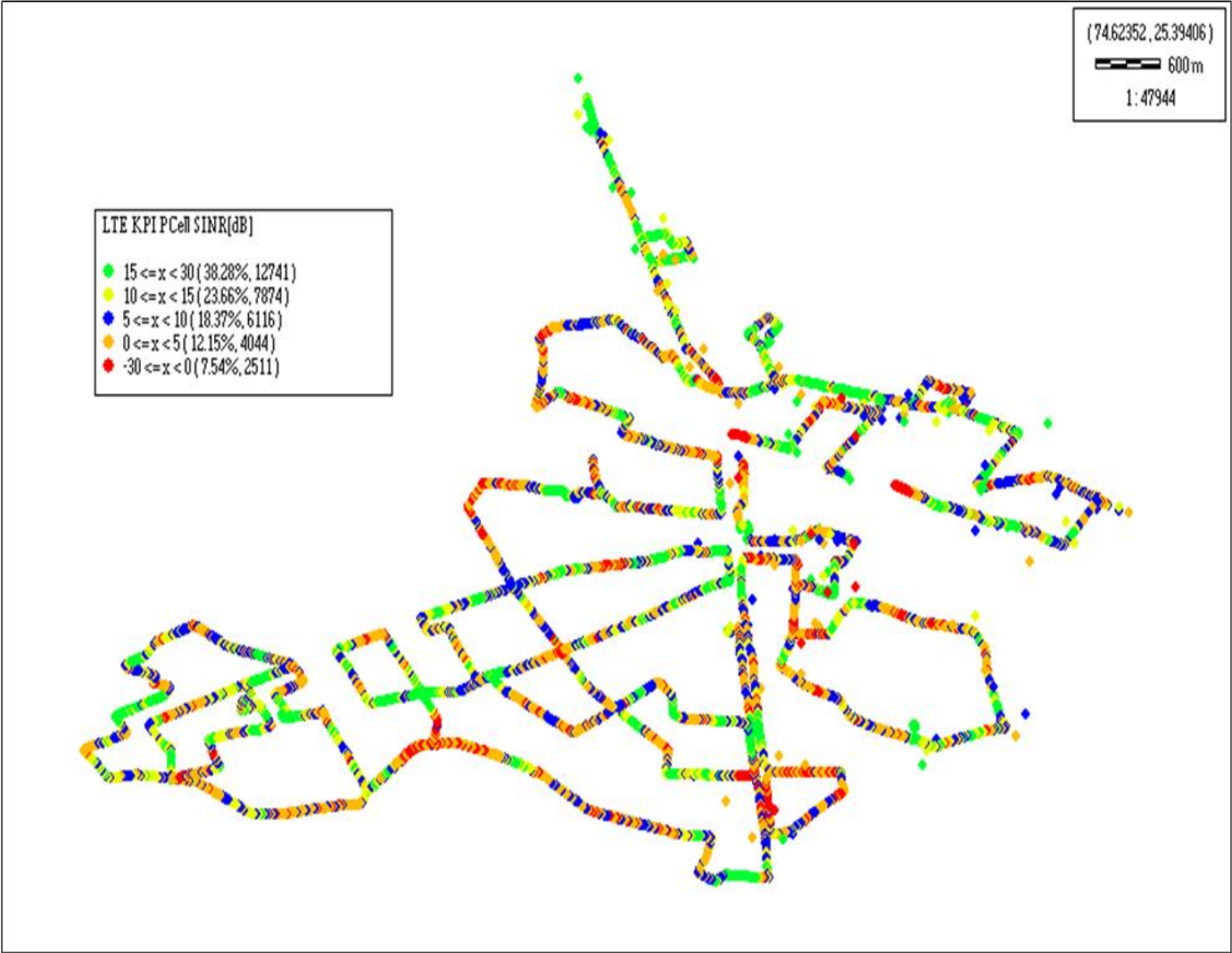
3G



For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand 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%.

JIO

Technology	Rx Quality %
VoLTE	92.46%



II. Quality Details

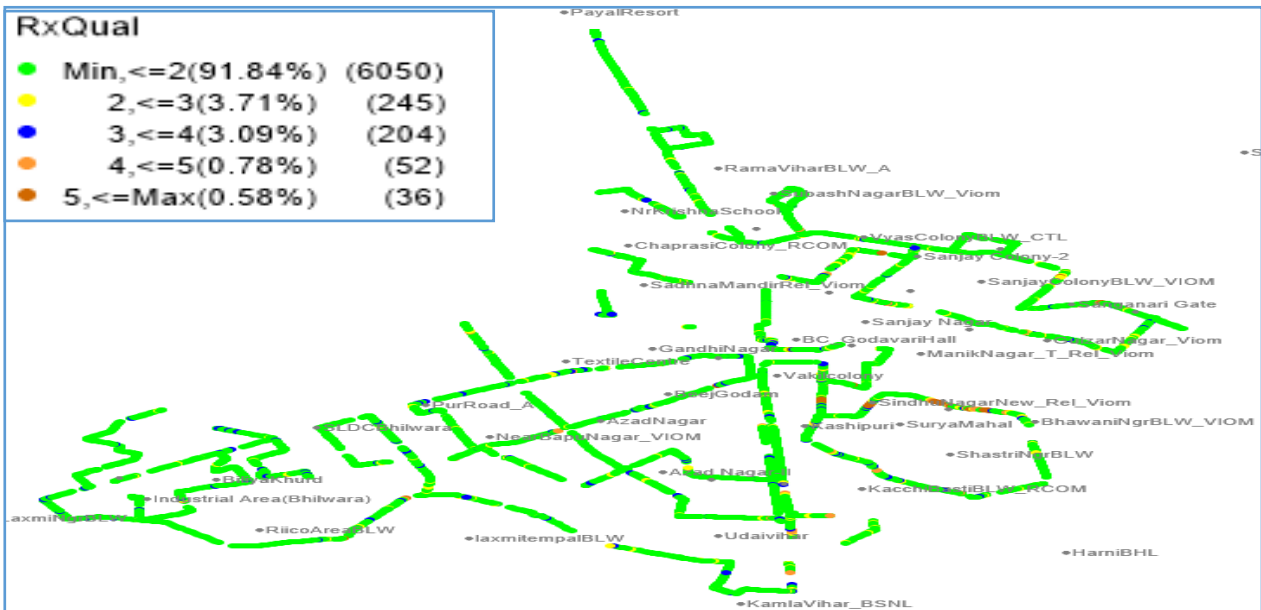
VIL

Technology	Rx Quality %
2G	99.42%
4G	98.29%

2G

RxQual

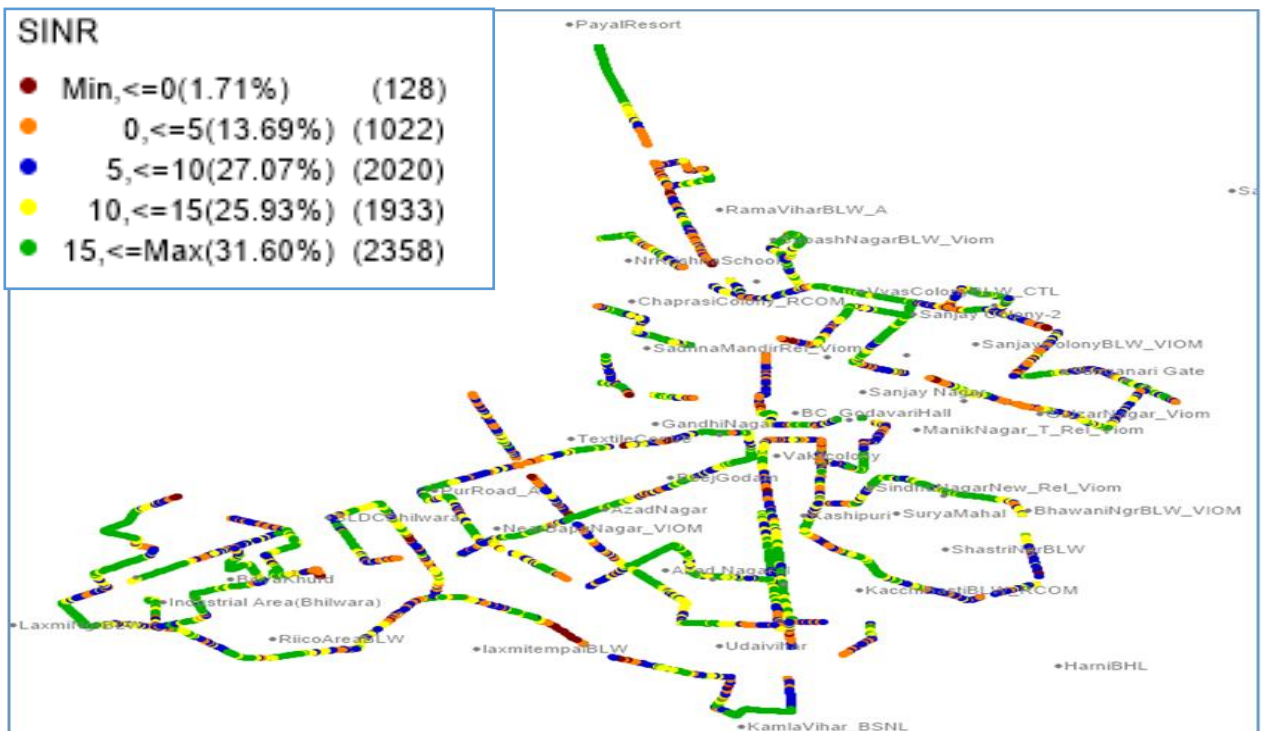
- Min, <=2(91.84%) (6050)
- 2, <=3(3.71%) (245)
- 3, <=4(3.09%) (204)
- 4, <=5(0.78%) (52)
- 5, <=Max(0.58%) (36)



VoLTE

SINR

- Min, <=0(1.71%) (128)
- 0, <=5(13.69%) (1022)
- 5, <=10(27.07%) (2020)
- 10, <=15(25.93%) (1933)
- 15, <=Max(31.60%) (2358)



III. Technology Details

<u>TSP</u>	<u>% of Time Spent on 3G/VoLTE</u>
BSNL 3G	32.90%
Airtel VoLTE	100.00%
Jio VoLTE	100.00%
VIL VoLTE	100.00%

