



Operator Assisted Drive Test Report

Amritsar City & Nearby Area

01st March to 03rd March 2023

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 Amritsar City & Nearby area from 9:00 AM to 8:00 PM during 01-03-2023. to 03-03-2023. The drive test covered drive route of 150 KMs & 5 no hotspots over a period of 3 days. Approximately 300 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 1st March 2023 to 3rd March 2023 covering Amritsar 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 **150** KMs. Approximately **300 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

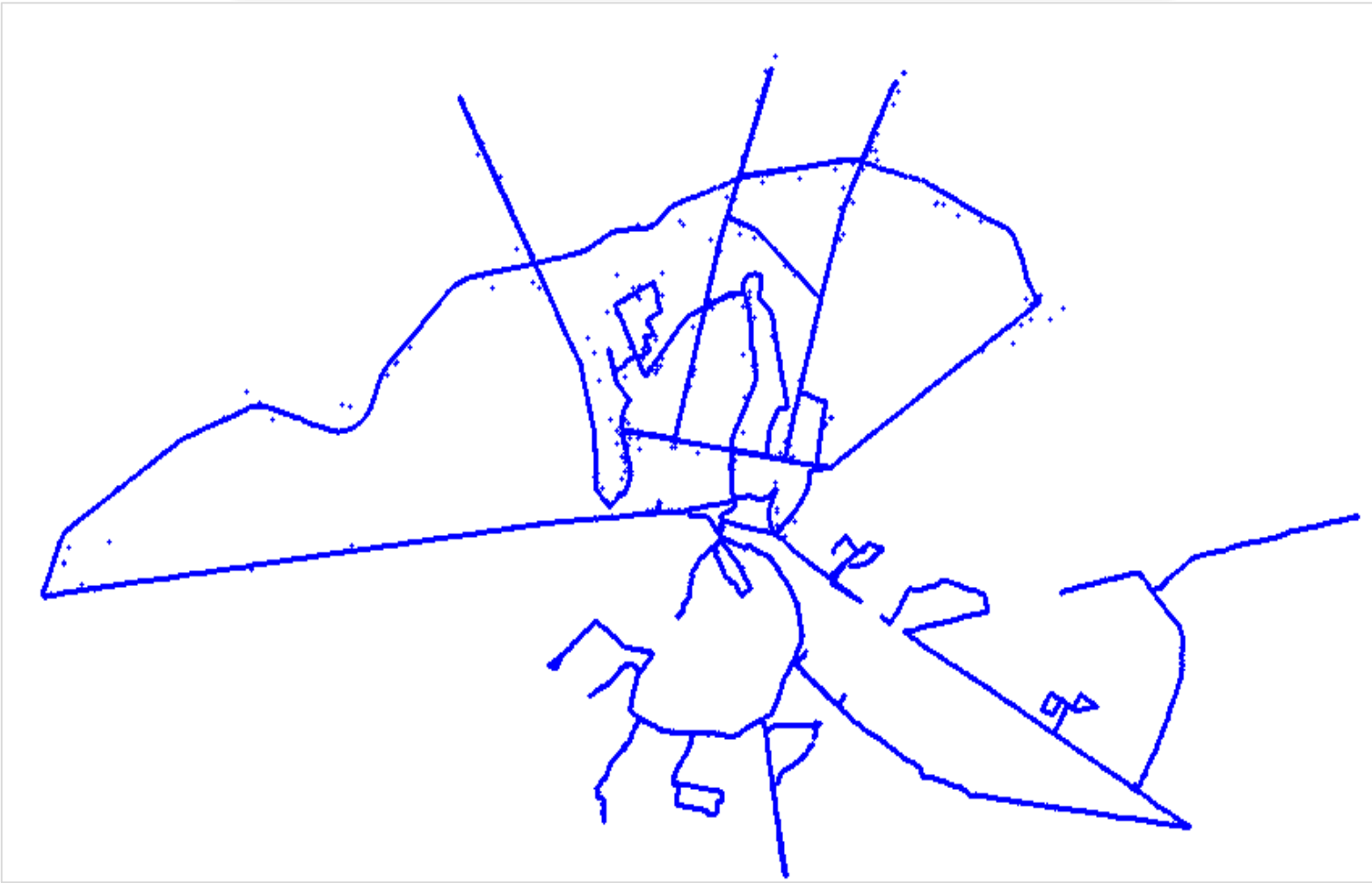
Static data tests on 5 hotspots

Hotspot Locations
1. Trillium Mall
2. Railway Station
3. Civil Hospital
4. Regenta Hotel
5. Guru Nanak Dev University

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

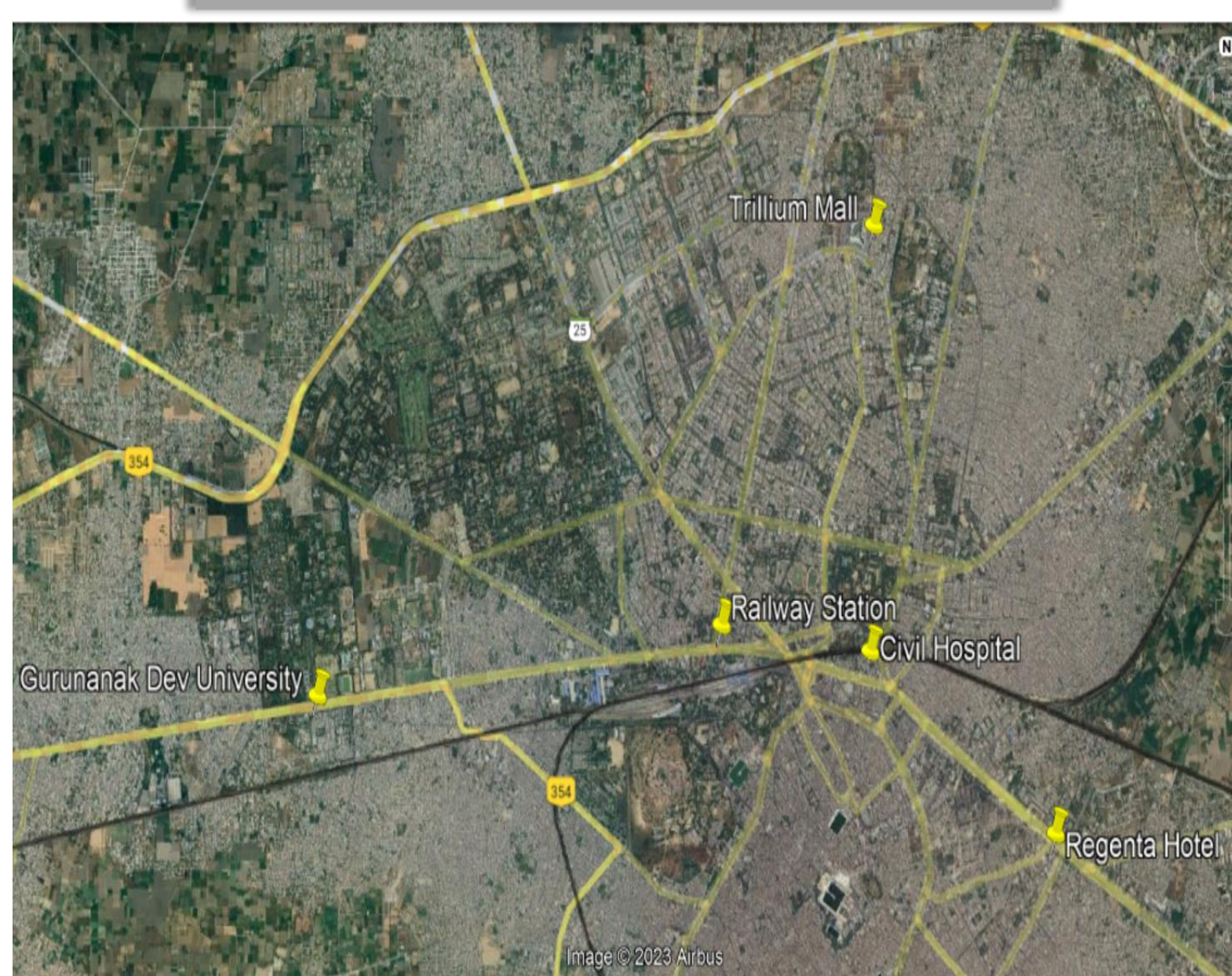
Voice & Dynamic Data Test Drive Route



Date	Test Scenario	Area to be Covered
01-Mar-23	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	Starting Point Holiday INN hotel near Ranjit Avenue at 9:30AM covering Ranjit avenue area, Majitha road, Batala road, Fatehgarh Churian road, India Gate, Chehartta, Mall road, Lawrence road, Ajnala road.
02-Mar-23	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	Starting Point Crystal chowk at 9:30AM covering Outdoor of Wall city, Tarn Taran road, Sultanwind road, Golden gate, Daburji, Chabbal road, Mehta road, Hall bazar area, Saufuti road, Chamrang road, Bus stand area, Transport Nagar.
03-Mar-23	Hot Spots- 2G/3G/4G/5G Static Data Tests	Starting Point Trillium Mall at 9:30AM, All 5 Hot Spot Locations as finalized

Overview

Data Service Test- Static Locations



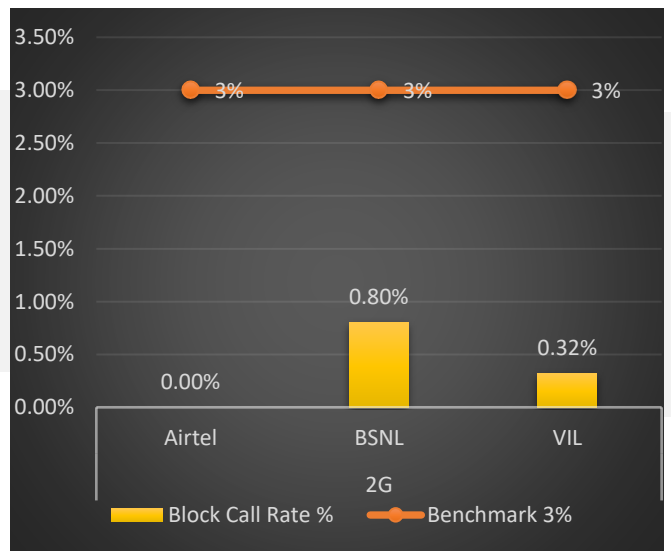
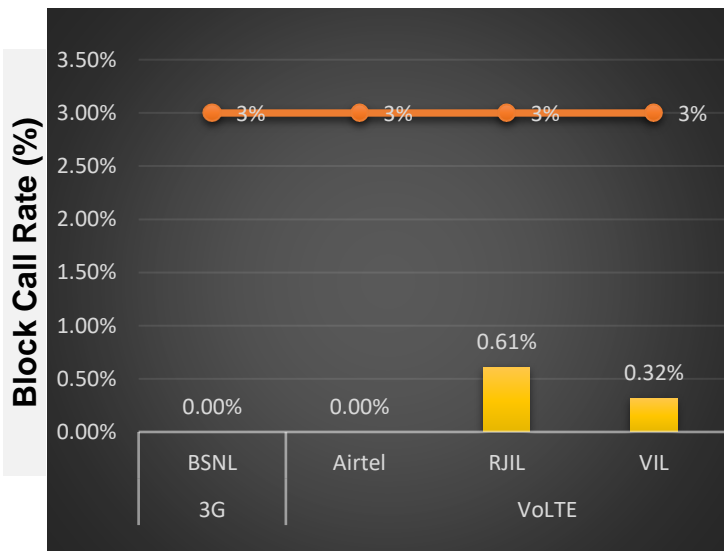
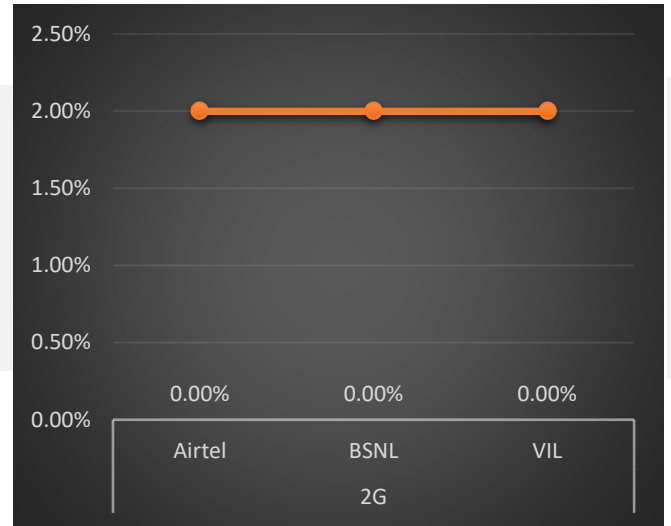
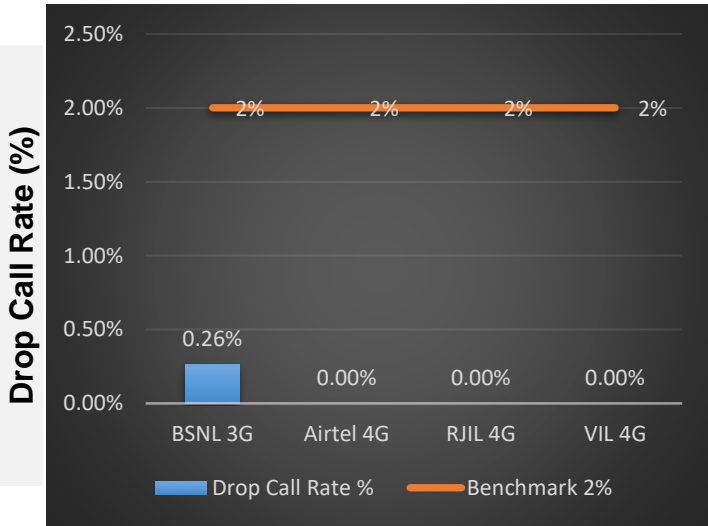
Hotspot Locations

1. Trillium Mall, Amritsar
2. Railway Station, Amritsar
3. Civil Hospital, Amritsar
4. Hotel Regenta, Amritsar
5. Guru Nanak Dev University (GNDU), Amritsar

Voice Calls

Key Observations

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



KPIs	2G			3G	4G		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.00%	0.00%	0.00%	0.26%	0.00%	0.00%	0.00%
Block Call Rate %	0.00%	0.80%	0.32%	0.00%	0.00%	0.61%	0.32%

- a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%).
- b) 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 %	99.14%	99.15%	96.00%

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

TSPs	3G
	BSNL
Coverage %	96.12%

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.84%	99.90%	100.00%

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent on 3G/4G Network %	87.60%	100.00%	100.00%	100.00%

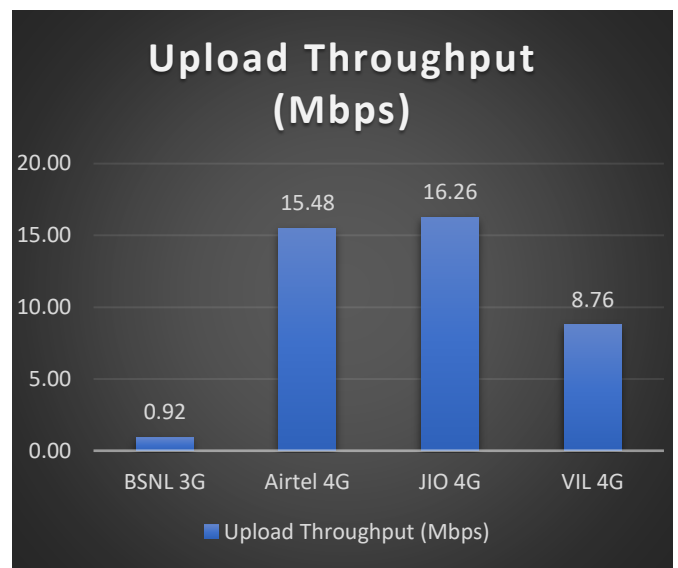
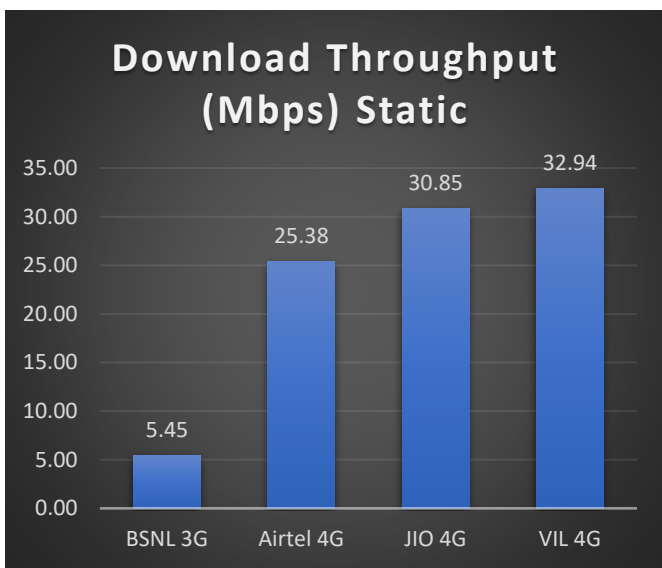
Data Services Static

Key Observations

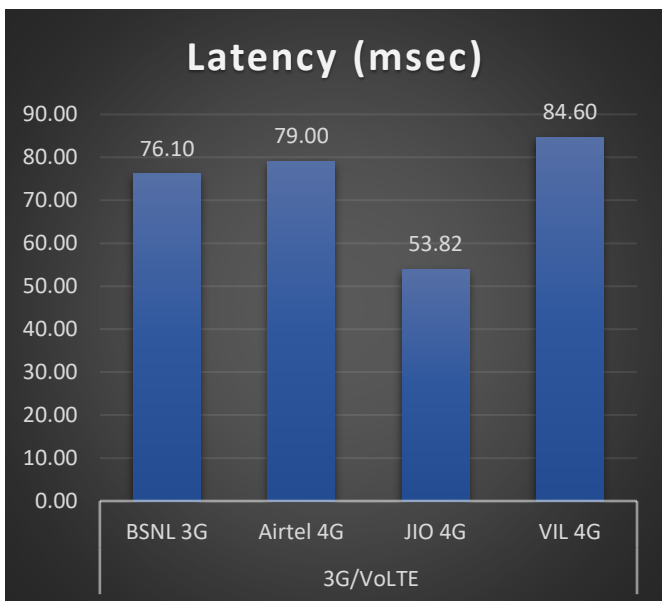
Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, Paytm)

Data Download and Upload Performance Static (Mbps)

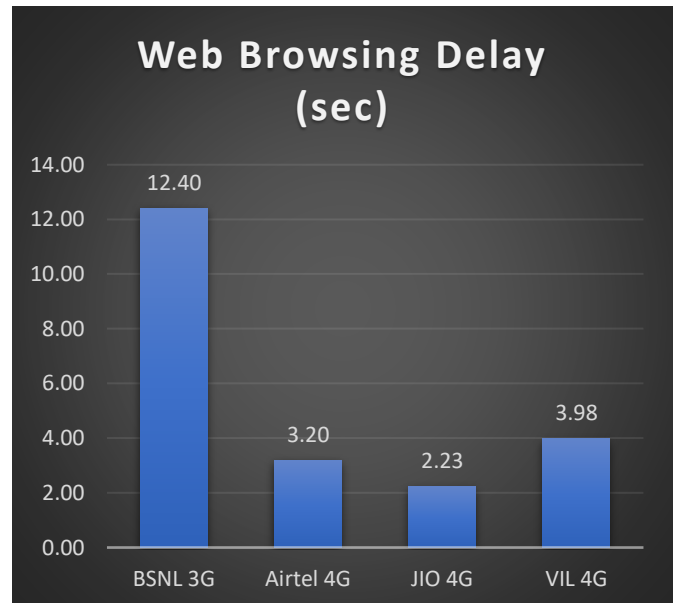
3G/4G/ Network:



Latency (ms)



Web Browsing (Sec)



Data Services Dynamic

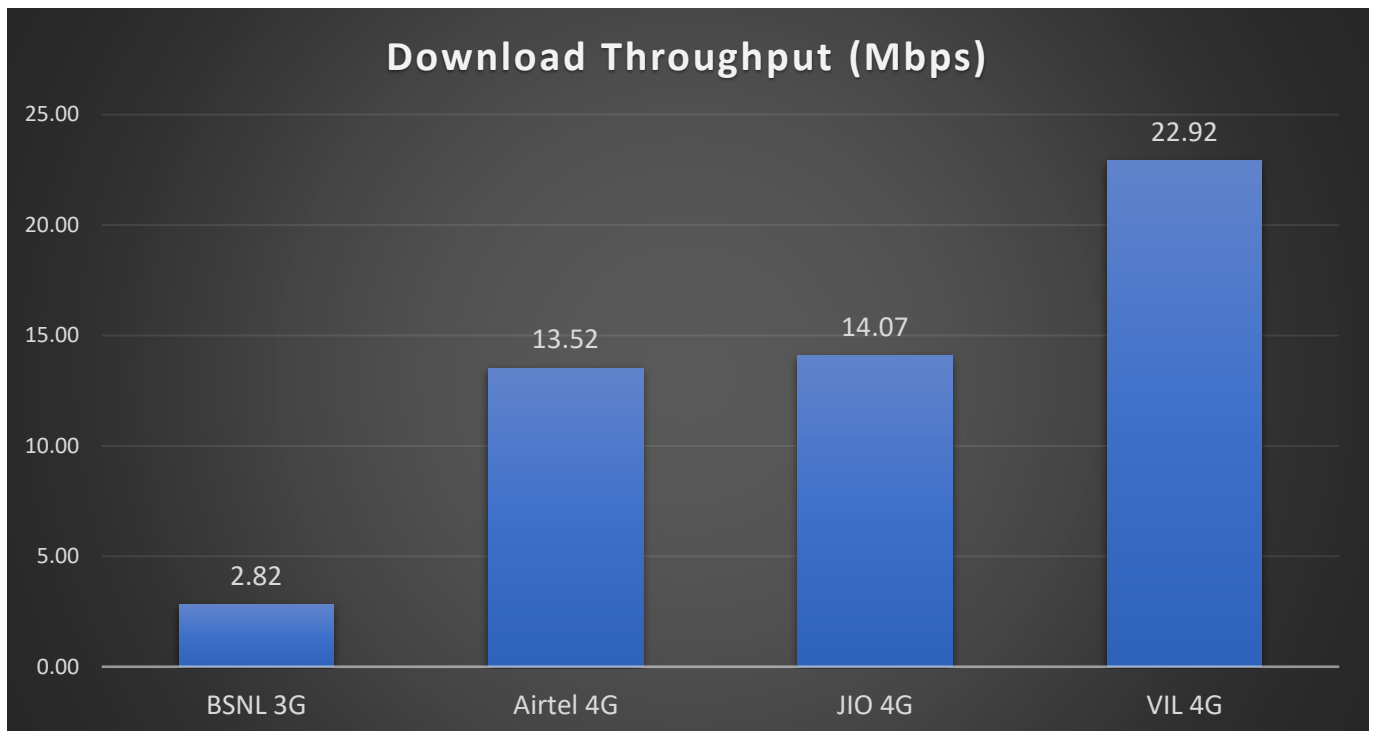
Key Observations

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)	2.82	13.52	14.07	22.92



Summary

City Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	301	377	306
Blocked Call Rate (%)	0.00%	0.80%	0.32%
CSSR% (Accessibility)	100.00%	99.20%	99.68%
Drop Call Rate (%)	0.00%	0.00%	0.00%
Mobility HOSR (%)	97.51%	99.99%	99.32%
Rx Quality (%)	96.55%	98.30%	96.00%
Average CST Sec	3.79	2.53	5.32

Voice Call	3G/VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	385	296	327	307
Blocked Call Rate (%)	0.00%	0.00%	0.61%	0.32%
CSSR% (Accessibility)	100.00%	100.00%	99.39%	99.70%
Drop Call Rate (%)	0.26%	0.00%	0.00%	0.00%
Mobility HOSR (%)	100.00%	99.59%	99.65%	100.00%
Rx Quality (%)	88.72%	91.20%	93.65%	91.00%
Average CST Sec	2.95	1.39	0.74	2.48

Summary

City Level Summary- Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	197.48	32.55	150.28
Upload Throughput (kbps)	89.48	9.20	17.08
Web Browsing Delay (sec)	10.10	113.94	87.58
Latency (msec)	435.00	196.40	463.50

Data Services Static	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	5.45	25.38	30.85	32.94
Upload Throughput(Mbps)	0.92	15.48	16.26	8.76
Video Streaming Delay (sec)	8.42	1.80	0.05	0.72
Web Browsing Delay (sec)	12.40	3.20	2.23	3.98
Latency (msec)	76.10	79.00	53.82	84.60

<u>Railway Station</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	197.48	31.74	87.60
Upload Throughput (kbps)	85.00	12.06	14.51
Web Browsing Delay (sec)	11.30	119.57	153.09
Latency (msec)	449.00	198.00	488.00

<u>Trillium Mall</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210.00	23.00	156.73
Upload Throughput (kbps)	80.80	8.42	19.08
Web Browsing Delay (sec)	9.80	161.00	73.19
Latency (msec)	430.00	197.00	405.00

<u>Civil Hospital</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	160.10	20.00	119.30
Upload Throughput (kbps)	75.20	12.00	15.14
Web Browsing Delay (sec)	9.20	92.11	81.40
Latency (msec)	410.00	197.00	366.00

<u>Guru Nanak Dev University</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	189.30	67.00	198.60
Upload Throughput (kbps)	116.80	10.00	15.94
Web Browsing Delay (sec)	9.60	74.00	120.50
Latency (msec)	410.00	192.00	712.00

<u>Regenta Hotel</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210.00	21.00	165.35
Upload Throughput (kbps)	89.60	3.50	21.41
Web Browsing Delay (sec)	10.60	123.00	52.60
Latency (msec)	477.00	198.00	389.00

Data Services static

<u>Railway Station</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	5.36	23.50	26.13	25.59
Upload Throughput (mbps)	1.03	16.90	15.33	3.08
Video Streaming Delay (Secs.)	8.45	1.60	0.05	1.19
Web Browsing Delay (sec)	6.99	4.20	2.24	4.69
Latency (msec)	71.00	57.00	51.80	97.00

<u>Trillium Mall</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.18	30.70	17.70	20.92
Upload Throughput (mbps)	1.07	16.00	15.94	5.90
Video Streaming Delay (Secs.)	9.45	2.20	0.04	0.71
Web Browsing Delay (sec)	7.90	2.10	2.30	3.95
Latency (msec)	69.50	60.00	45.30	57.00

<u>Civil Hospital</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	5.00	20.60	25.94	55.68
Upload Throughput (mbps)	1.01	15.40	17.69	6.04
Video Streaming Delay (Secs.)	8.43	2.16	0.08	0.03
Web Browsing Delay (sec)	29.30	3.89	1.76	3.69
Latency (msec)	79.00	89.00	58.60	98.00

Data Services static

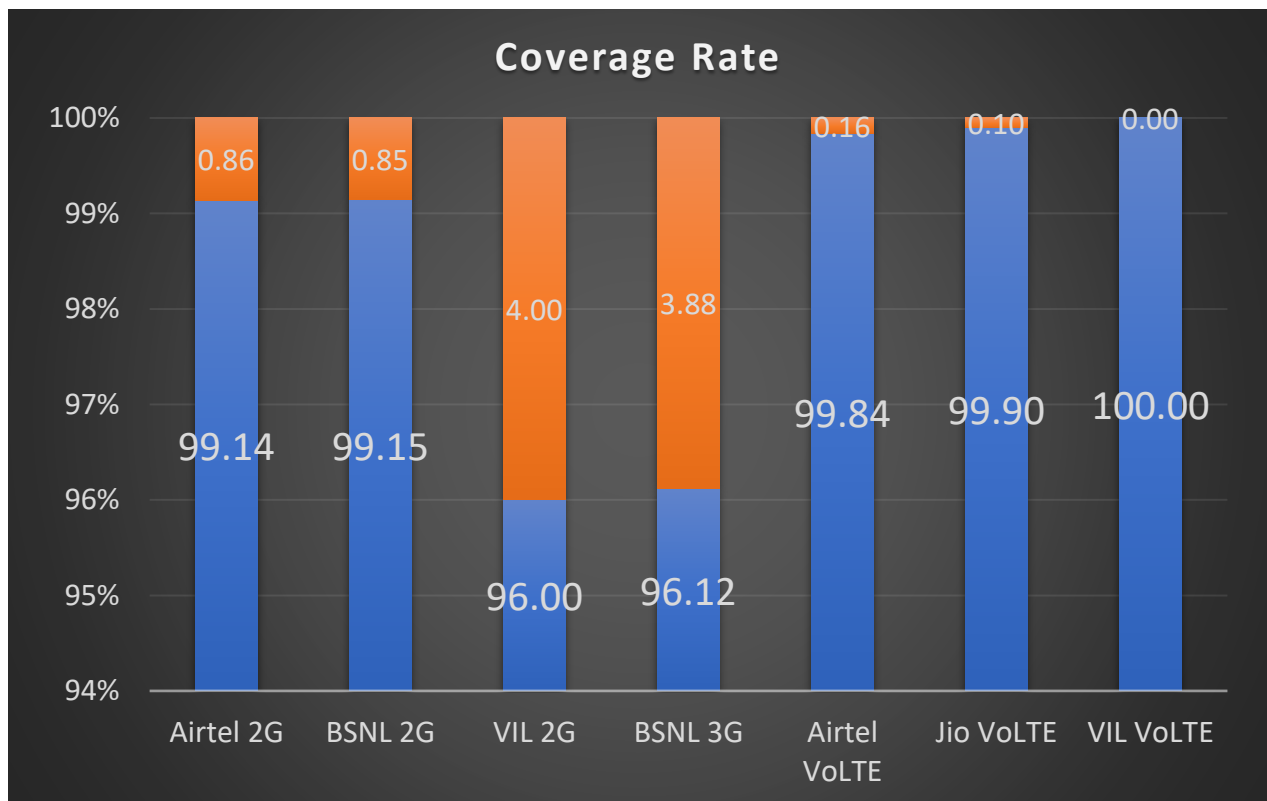
<u>Guru Nanak Dev University</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	7.02	25.30	49.67	43.77
Upload Throughput (mbps)	1.10	13.70	18.37	6.32
Video Streaming Delay (Secs.)	7.56	1.17	0.03	1.20
Web Browsing Delay (sec)	11.28	2.88	1.98	5.37
Latency (msec)	78.00	96.00	56.40	95.00

<u>Regenta Hotel</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	6.69	26.80	34.82	18.82
Upload Throughput (mbps)	0.40	15.40	13.98	7.93
Video Streaming Delay (Secs.)	8.21	1.90	0.04	0.60
Web Browsing Delay (sec)	13.53	2.89	2.89	3.12
Latency (msec)	83.00	93.00	57.00	96.00

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>	<u>Coverage Rate %</u>
Airtel 2G	99.14%
BSNL 2G	99.15%
VIL 2G	96.00%
BSNL 3G	96.12%
Airtel VoLTE	99.84%
Jio VoLTE	99.90%
VIL VoLTE	100.00%



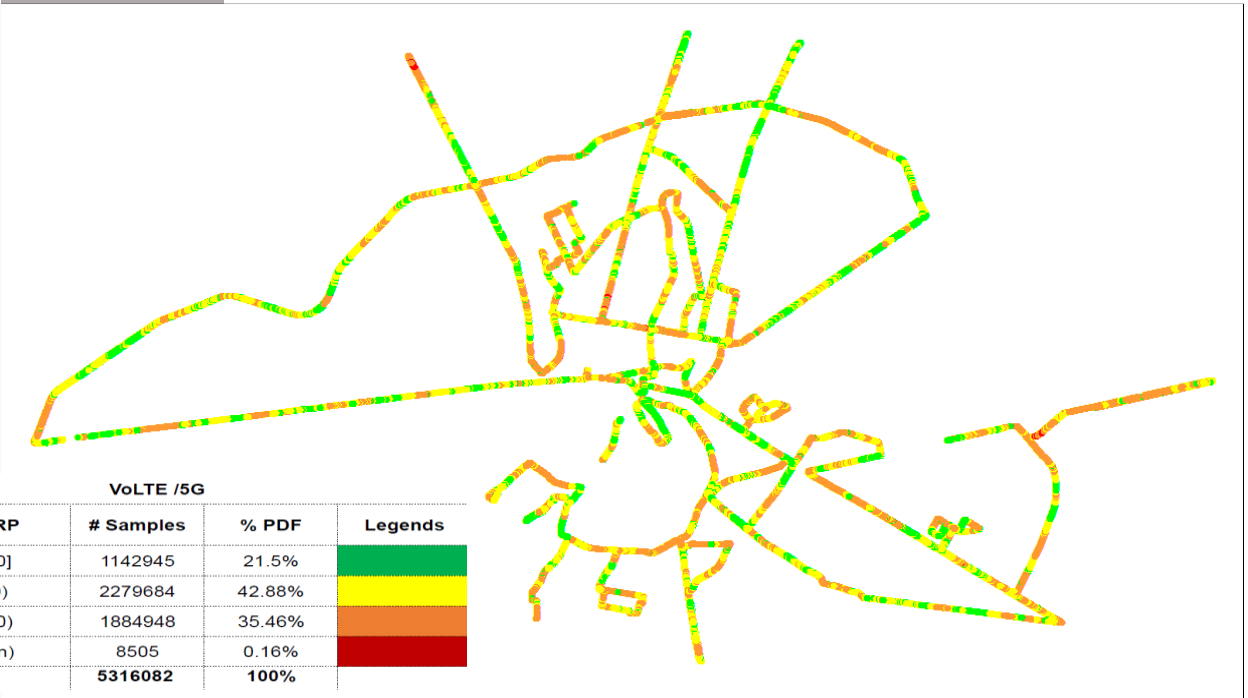
TSP-AIRTEL

Technology	Coverage %
2G	99.14%
VoLTE	99.84%

2G



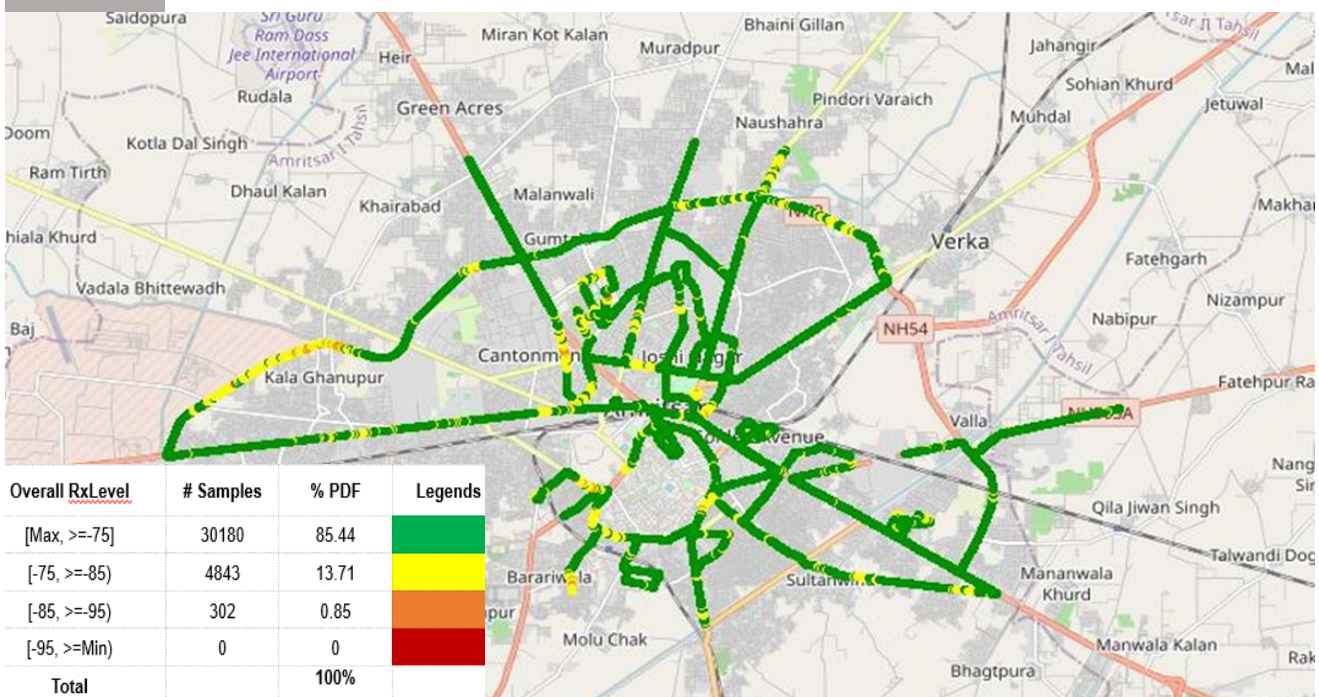
VoLTE



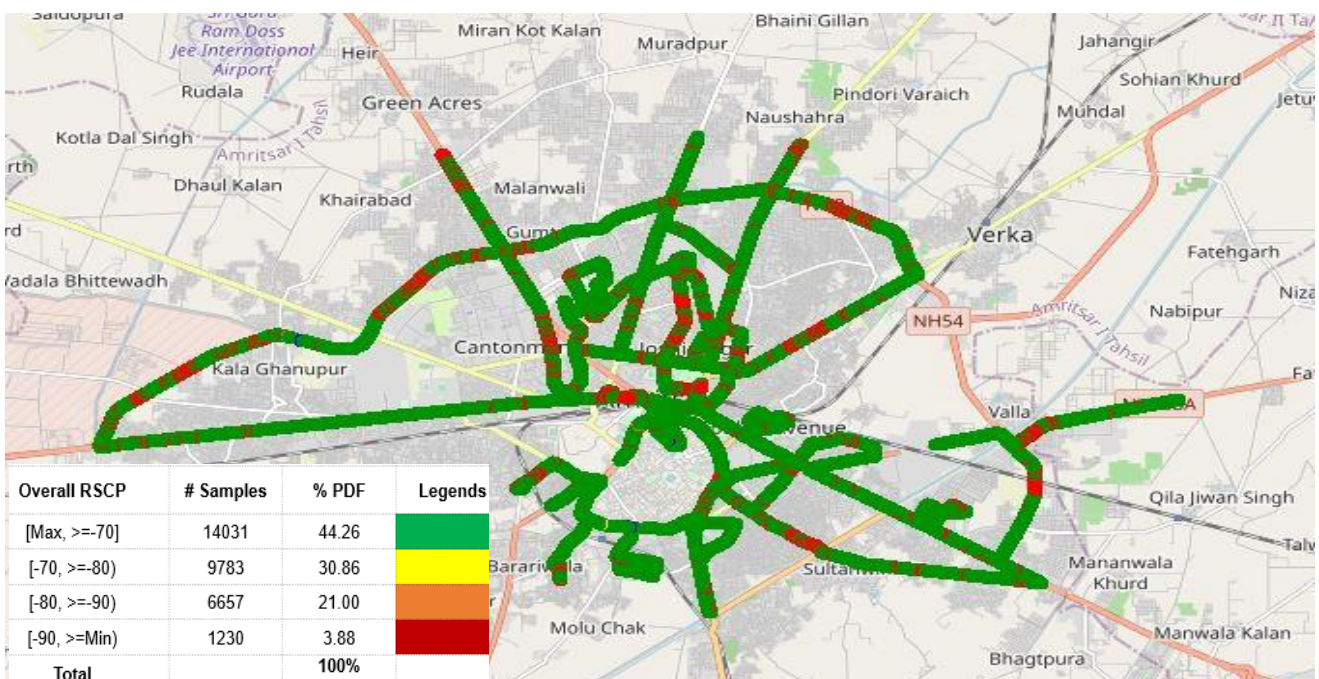
TSP- BSNL

Technology	Coverage %
2G	99.15%
3G	96.12%

2G

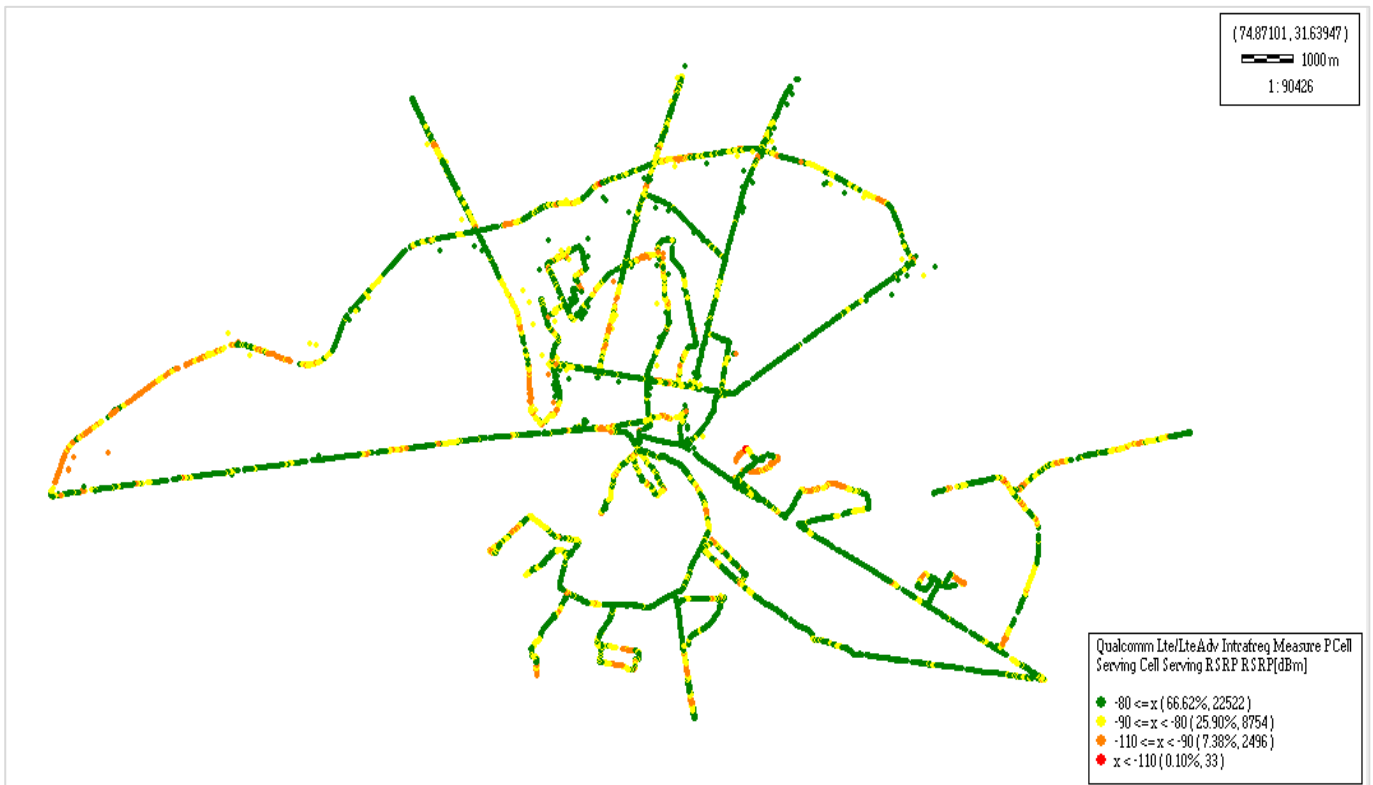


3G



JIO

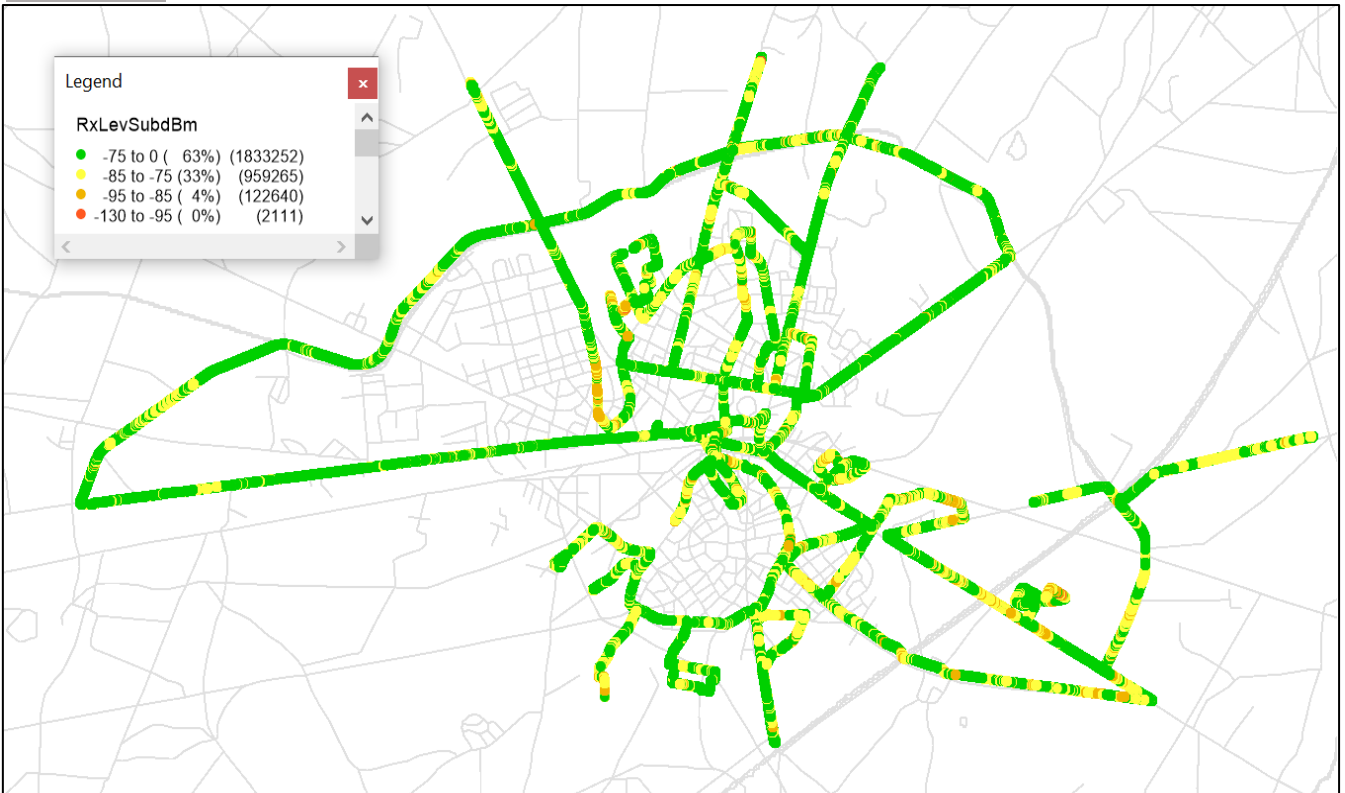
Technology	Coverage %
VoLTE	99.90%



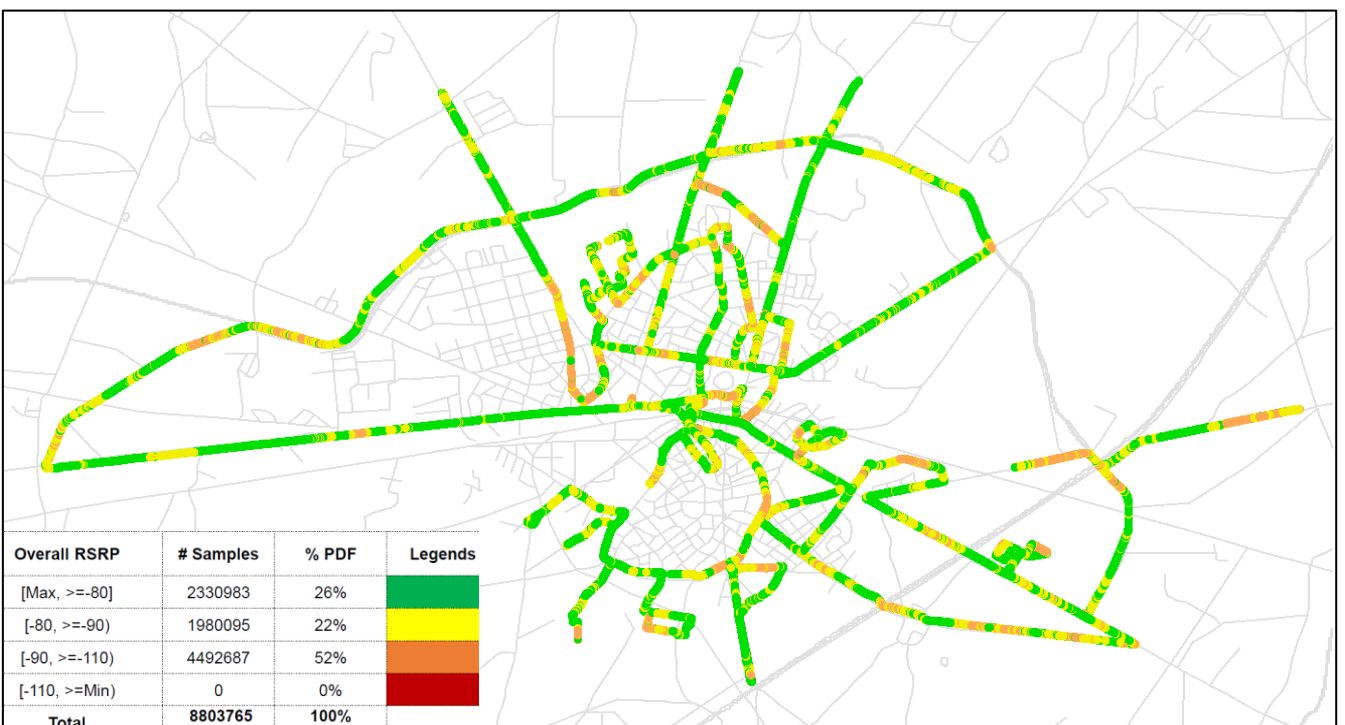
VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	22522	66.62	
[-80, >=-90)	8754	25.90	
[-90, >=-110)	2496	7.38	
[-110, >=Min)	33	0.10	
Total	33805	100%	

VIL

	Technology	Coverage Rate %
2G	2G	96.00%
	VoLTE	100.00%



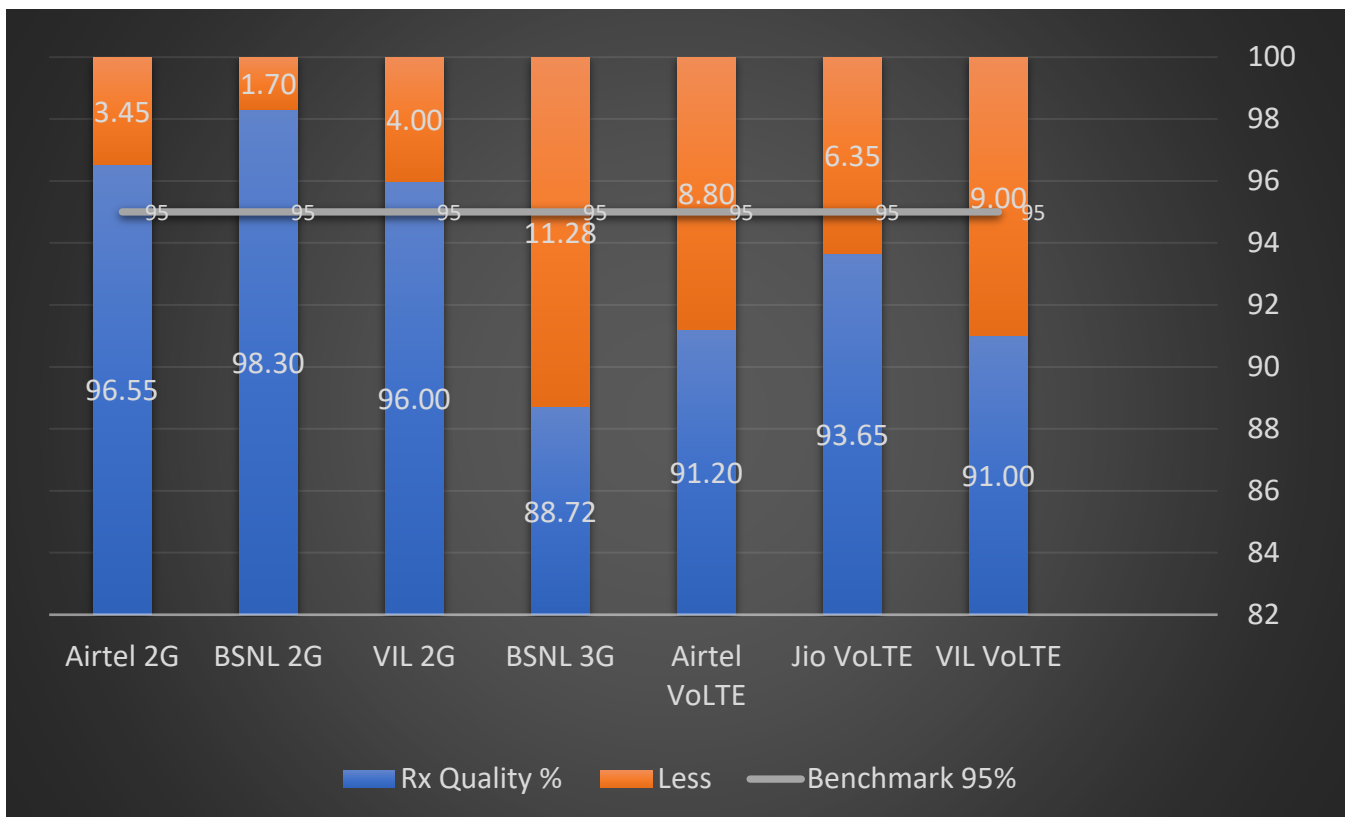
VoLTE



II. Quality Details

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 $\geq 95\%$.

TSP	Rx Quality %
Airtel 2G	96.55%
BSNL 2G	98.30%
VIL 2G	96.00%
BSNL 3G	88.72%
Airtel VoLTE	91.20%
Jio VoLTE	93.65%
VIL VoLTE	91.00%



II. Quality Details

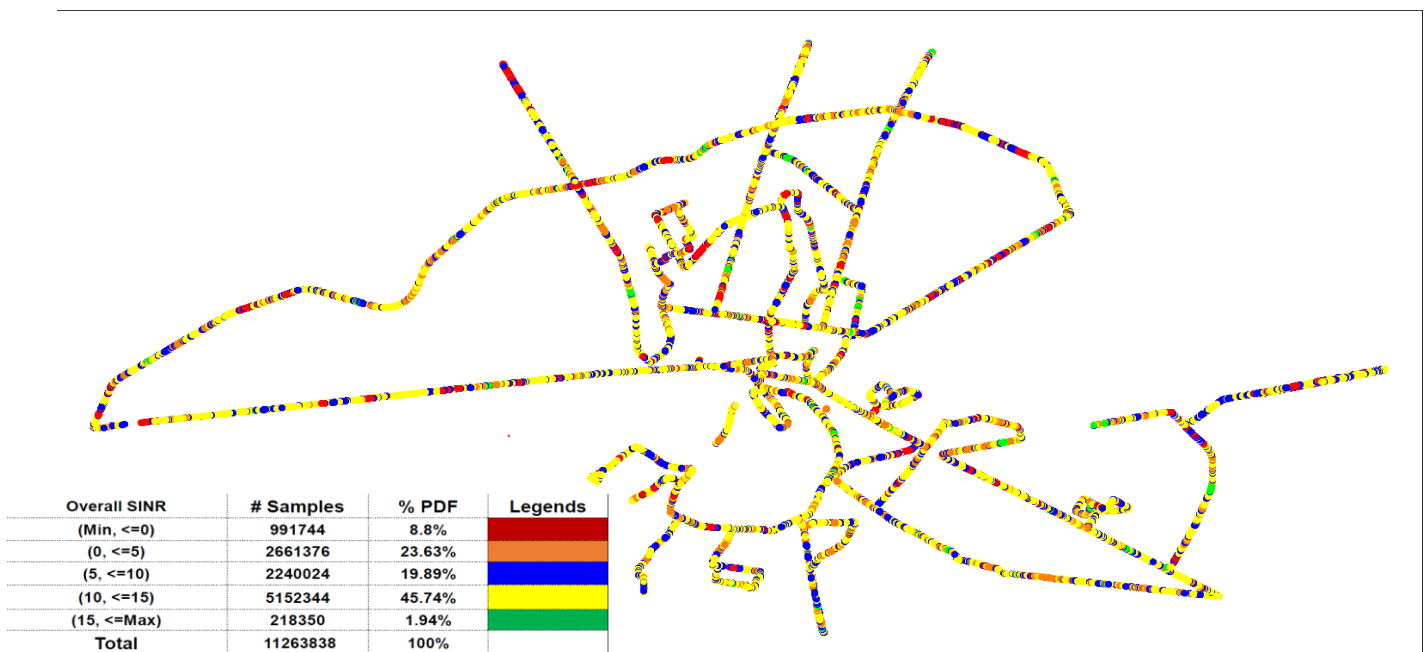
Airtel

Technology	Rx Quality %
2G	96.55%
VoLTE	91.20%

2G



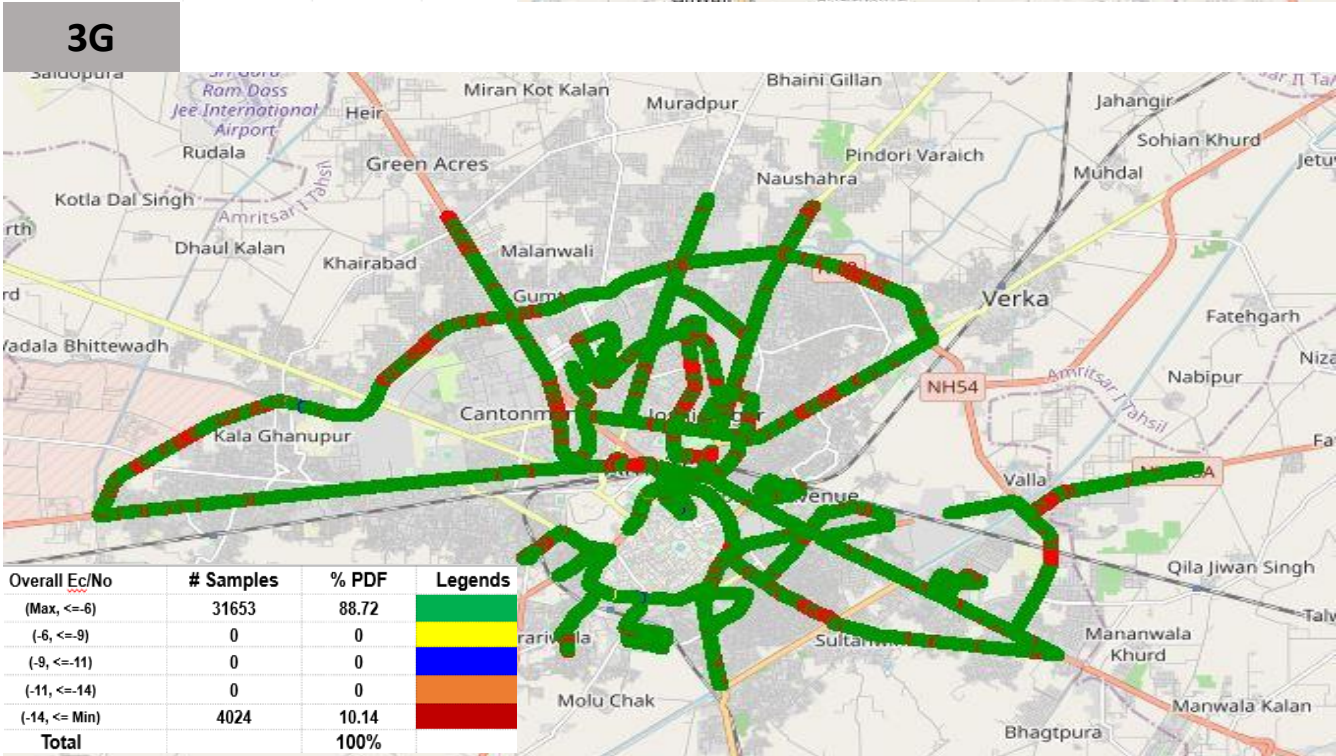
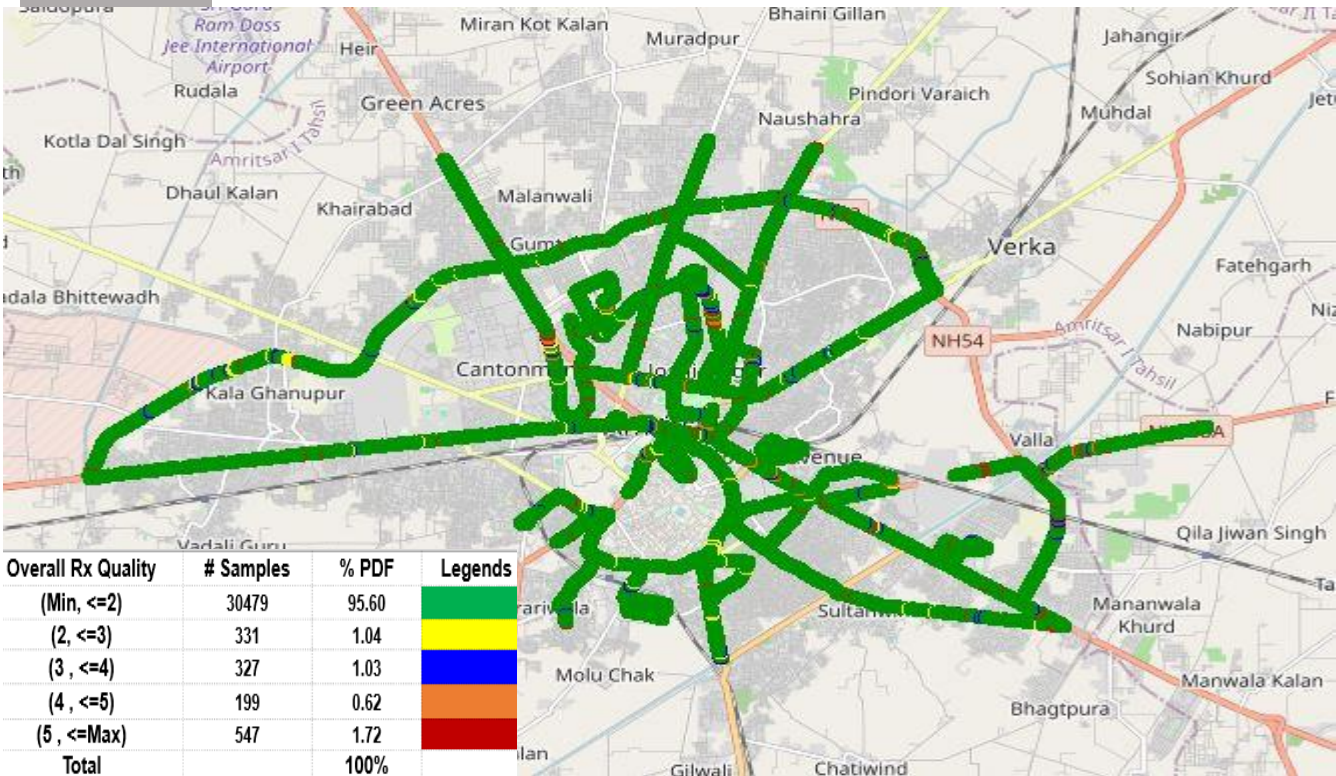
VoLTE



II. Quality Details

BSNL

Technology	Rx Quality %
2G	98.30%
3G	88.72%

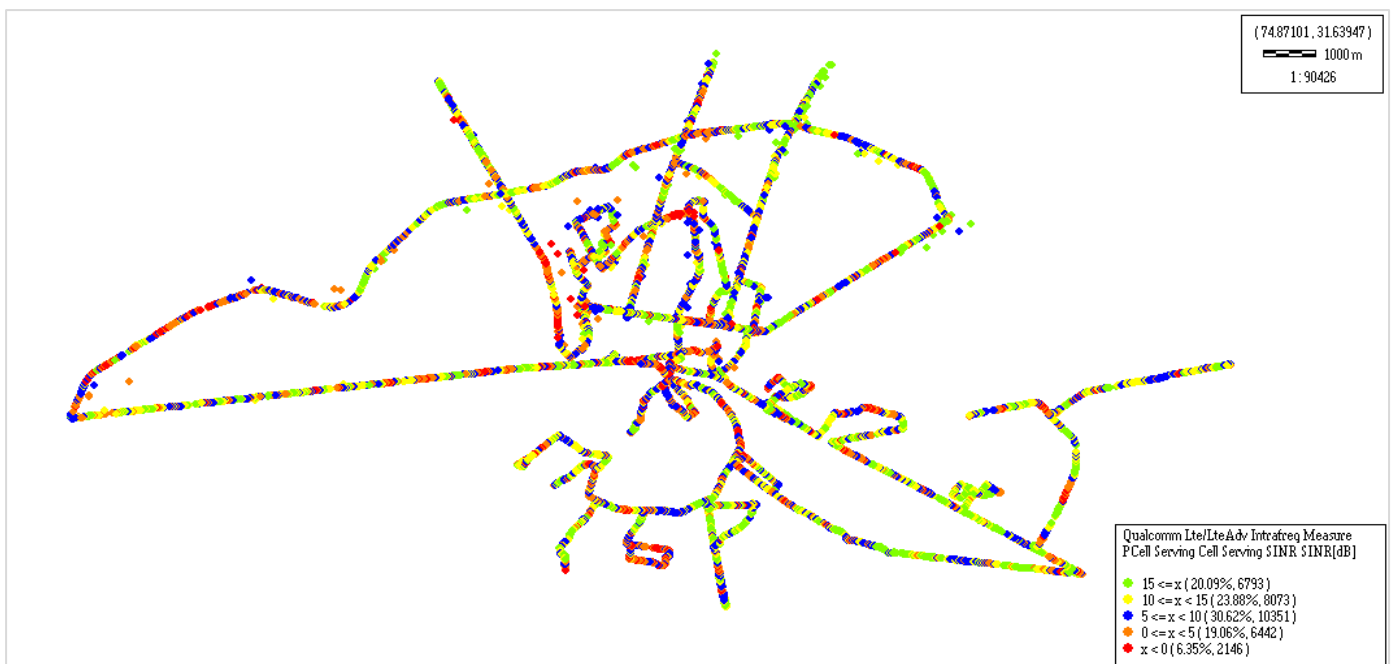


Quality Details

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JIO

Technology	Rx Quality %
VoLTE	93.65%



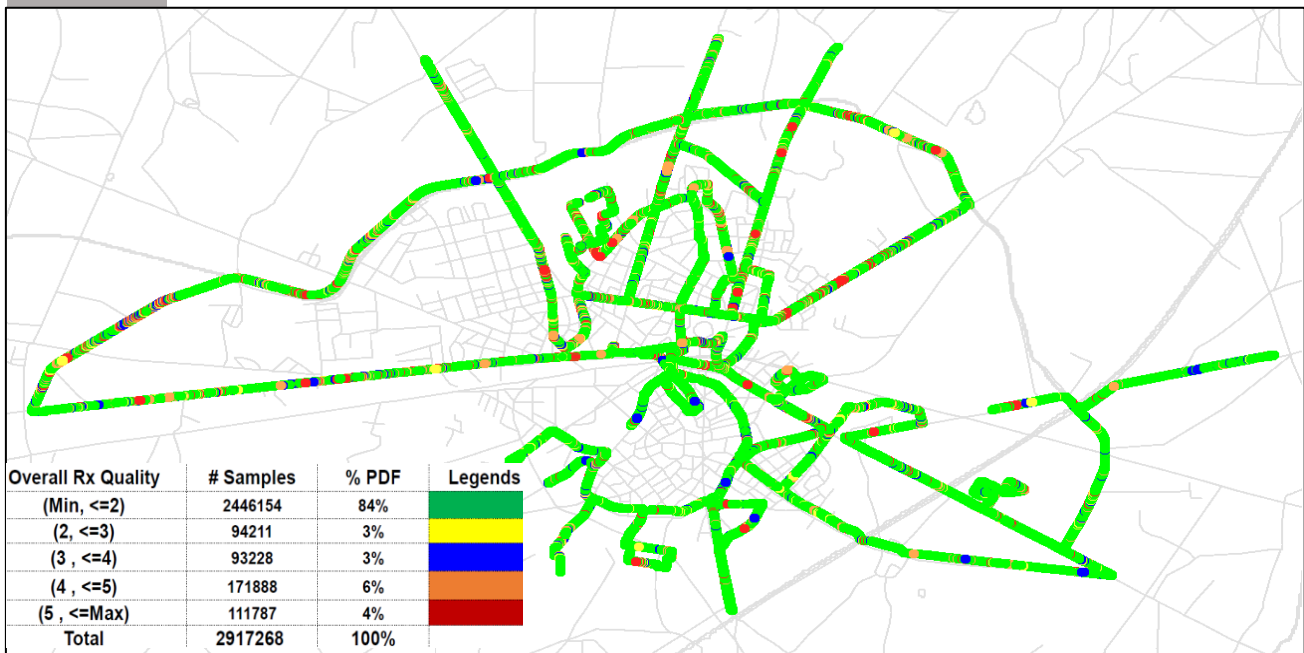
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	2146	6.35	
(0, ≤ 5)	6442	19.06	
(5, ≤ 10)	10351	30.62	
(10, ≤ 15)	8073	23.88	
(15, \leq Max)	6793	20.09	
Total	33805	100%	

II. Quality Details

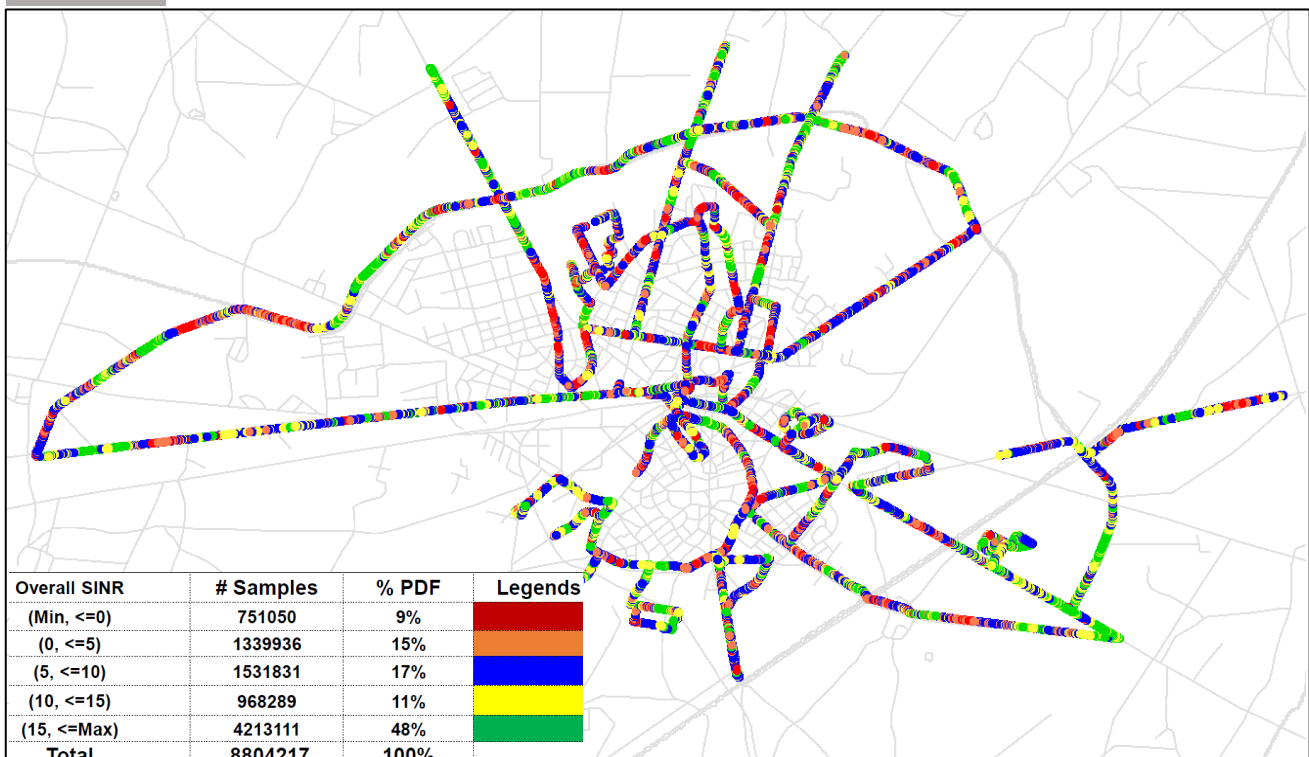
VIL

Technology	Rx Quality %
2G	96.00%
4G	91.00%

2G



VoLTE



III. Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	87.60%
Airtel VoLTE	100.00%
Jio VoLTE	100.00%
VIL VoLTE	100.00%

