



Operator Assisted Drive Test Report

Kanpur City and nearby Area

11/09/2024 to 13/09/2024

By

TRAI Regional Office Bhopal

The Operator Assisted Drive Test has been carried out by Regional Office, Bhopal with the help of Telecom Service Providers for Kanpur City and surrounding areas from 9:00 AM to 8:00 PM from - 11/09/2024 to 13/09/2024. The drive test covered drive route of around 315 KMs.

TSP	Network tested
Airtel	2G & VoLTE
BSNL	2G & 3G
JIO	VoLTE
VIL	2G, VoLTE

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	$\leq 3\%$	All TSPs achieved the benchmark
Drop call rate %	$\leq 2\%$	All TSPs achieved the benchmark
CSSR %	$\geq 95\%$	All TSPs achieved the benchmark
Mobility HOSR %	$\geq 95\%$	All TSPs achieved the benchmark
Good RX Quality %	$\geq 95\%$	All TSPs achieved the benchmark, except BSNL in 3G

Overview

Regional Office, TRAI Bhopal conducted Operator Assisted Drive Test. The performance of Airtel, BSNL, Vodafone Idea and Jio was monitored across various technologies (2G, 3G,4G & 5G). 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

Drive Test Details :

Voice Tests:

- i. 2G – measurement – UE Locked in 2G
- ii. 3G – measurement – UE in Dual mode (2G and 3G)
- iii. 4G – measurement – UE in Free mode

Calls were made for the **120-sec** duration with a wait time of **10 sec** between calls in all technologies.

Data Tests:

Dynamic data – repeat data file download (to check throughput on the entire route)

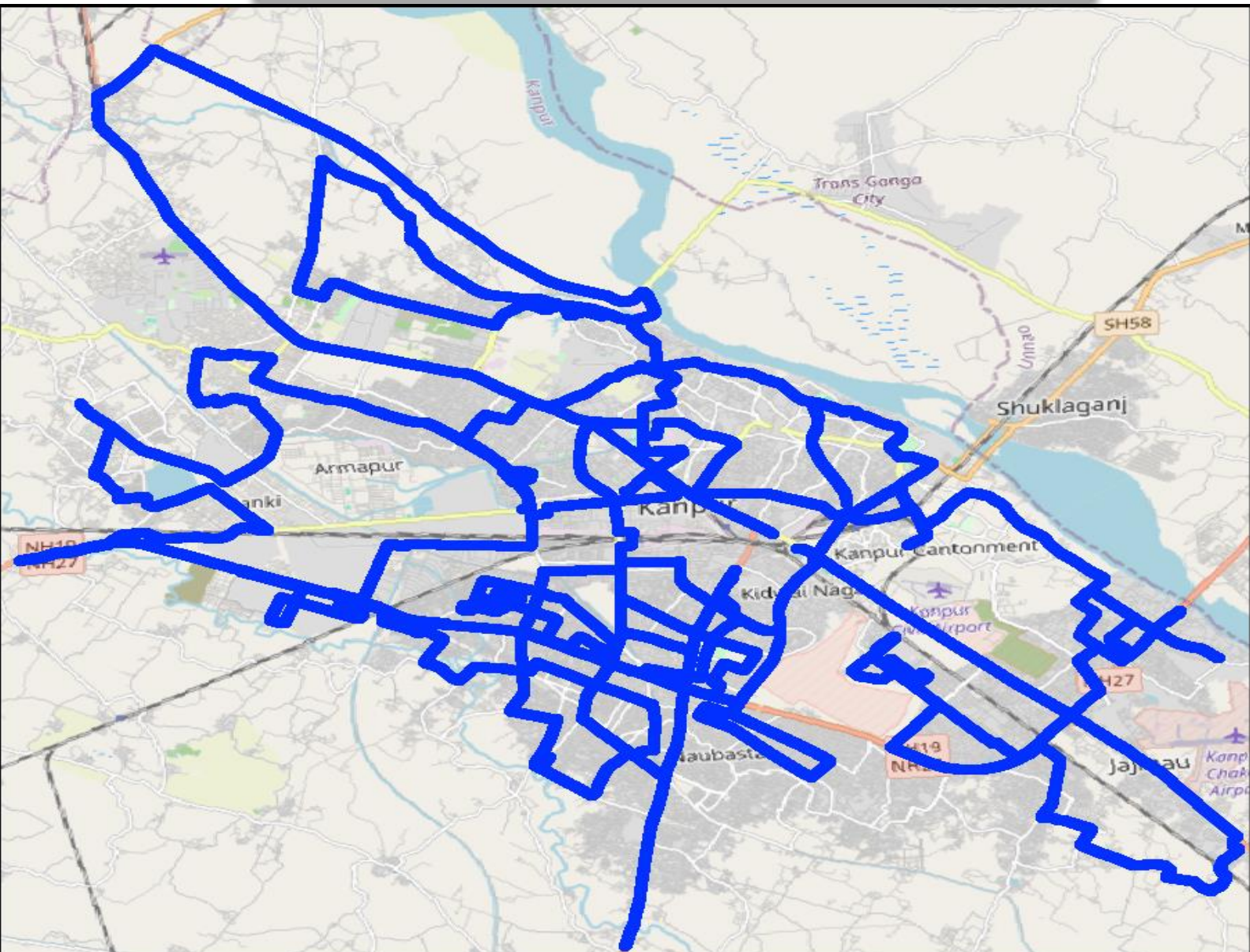
- i. 3G – measurement – UE in 3G File Size- 20MB
- ii. 4G – measurement – UE in LTE File Size- 40MB
- iii. 5G – measurement – UE in 5G File Size- 200MB

Static Data: Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay, and Latency

- i. Download- 3G - 20 MB, 4G - 40MB, 5G -200 MB
- ii. Upload - 3G - 5 MB, 4G - 10MB, 5G – 100 MB
- iii. Web browsing - 3 links of e-commerce websites <https://www.amazon.in>, <https://www.flipkart.com>, <https://paytm.com>.
- iv. Video Streaming – 130 sec clip
- v. Latency – 32 Bytes on www.google.com.

Overview

Voice & Dynamic Data Test Drive Route



List of important area covered during the drive test

IIT GATE KANPUR

Naveen Market

Bus stop gate

Cantonment

Ghantaghar Platform No 9 and all other near by areas of town

Old & New Kanpur

Overview

Data Service Test- Static Locations



Hotspot Locations

IIT KANPUR

Naveen Market

Bus stop gate

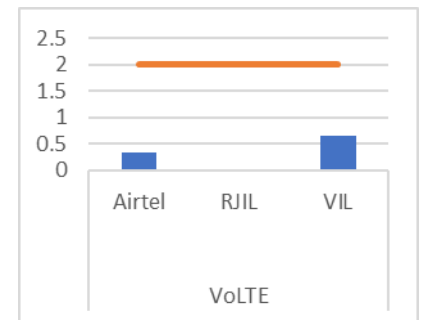
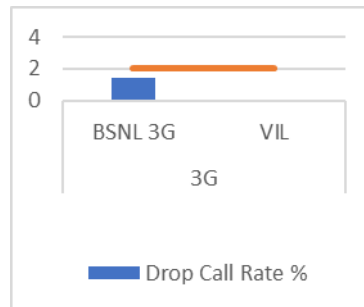
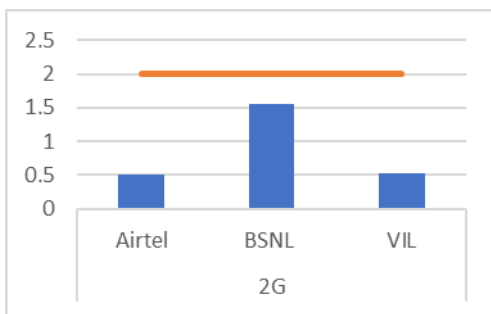
Kanpur central Railway station

Voice Calls

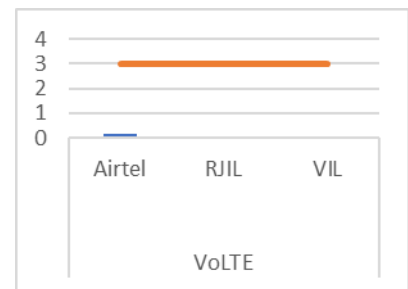
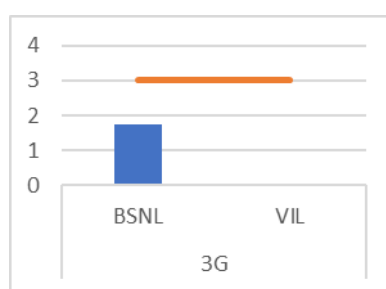
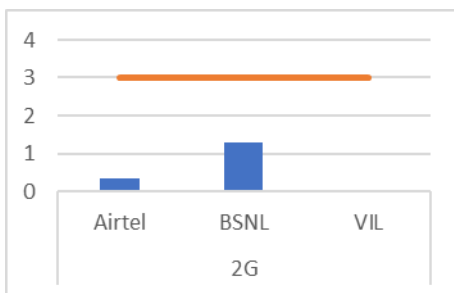
Key Observations

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

Drop Call Rate (%)



Block Call Rate (%)



KPIs	2G			3G		VoLTE		
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	RJIL	VIL
Drop Call Rate %	0.50	1.56	0.52	1.45	NA	0.33	0	0.66
Block Call Rate %	0.33	1.29	0	1.74	NA	0.16	0	0

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 %	96.40	90.06	79.21

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

TSPs	3G
	BSNL
Coverage %	62.92

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.29	99.64	96.65

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

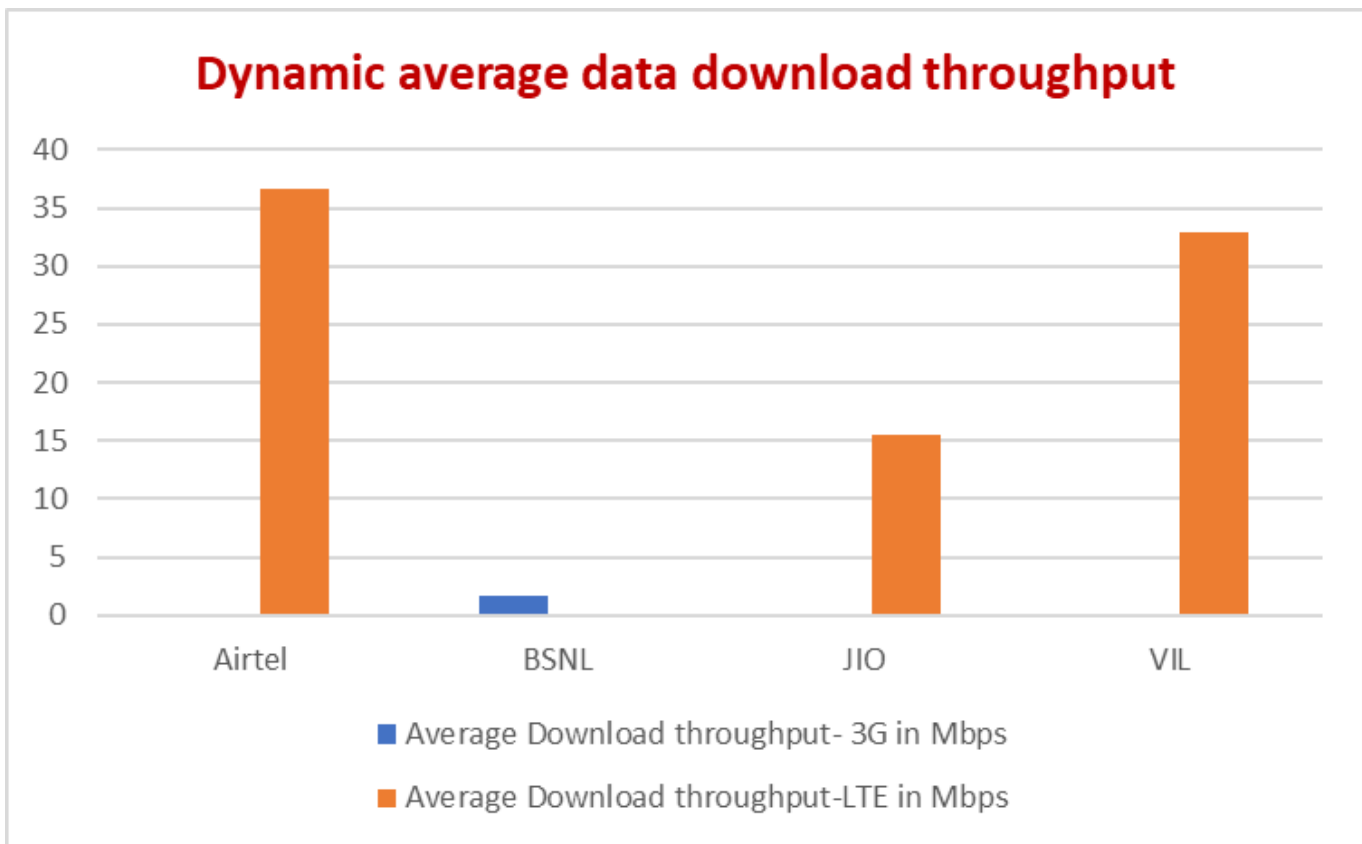
TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	62.92	NA	100	100	100

Data Services Dynamic

Key Observations

Dynamic Data -Download Throughput was tested.

Data Download Performance – Dynamic 3G/4G/ 5G Network



TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 3G In Mbps	NA	1.68	NA	NA
Average Download throughput-LTE in Mbps	36.67	NA	15.43	33
Average Download throughput- 5G in Mbps	NA	NA	NA	NA

Summary

City Level Summary- Voice

TSP (For 2G)	Airtel	BSNL	VIL
Call attempts	592	648	571
Block call rate %	0.50	1.23	0
CSSR %	99.49	98.77	100
Drop call rate %	0.33	1.56	0.52
Mobility HOSR %	99.12	97.75	97.03
RX Quality %	98.89	97.52	96.30
Average CST Sec	4	2.707	3.38

TSP (For 3G)	BSNL
Call attempts	631
Block call rate %	1.74
CSSR %	98.26
Drop call rate %	1.45
Mobility HOSR %	99.05
RX Quality %	80.16
Average CST (Sec)	2.062

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	592	NA	632	604
Block call rate %	0.33	NA	0	0
CSSR %	99.66	NA	100	100
Drop call rate %	0.16	NA	0	0.66
Mobility HOSR %	99.54	NA	100	100
RX Quality %	97.44	NA	99.55	95.30
Average CST(Sec)	2.5	NA	0.91	0.75

Summary

City Level Summary- Data Services -Static

TSP (For 3G)	BSNL
Download throughput in Mbps	2.53
Upload Throughput in Mbps	1.65
Video streaming delay in sec	1.43
Web browsing delay in second	0.29
Latency in (msec)	111

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	36.82	NA	34.97	49.15
Upload Throughput in Mbps	15.89	NA	8.51	16.25
Video streaming delay in sec	0.37	NA	0.7	2.46
Web browsing delay in second	0.27	NA	1.3	3.82
Latency in (msec)	53.93	NA	41.5	73.47

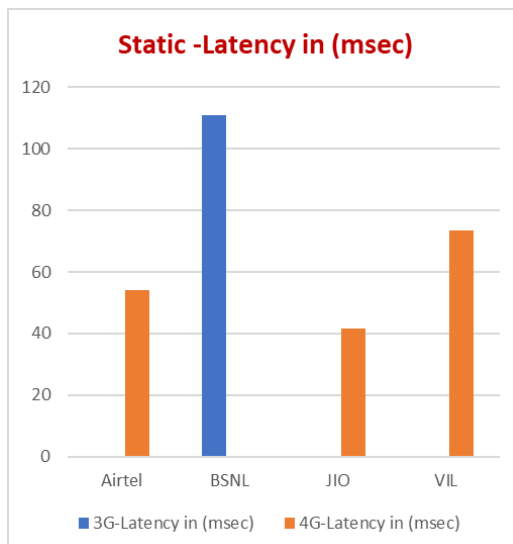
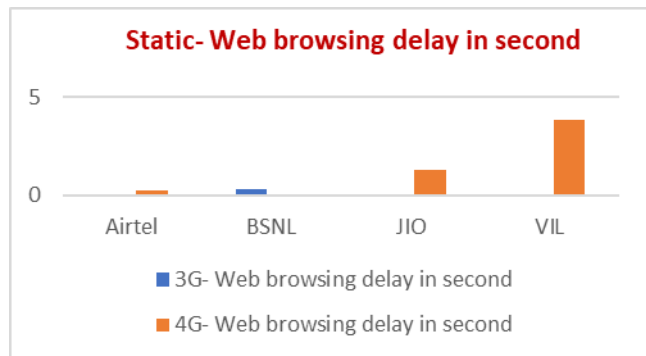
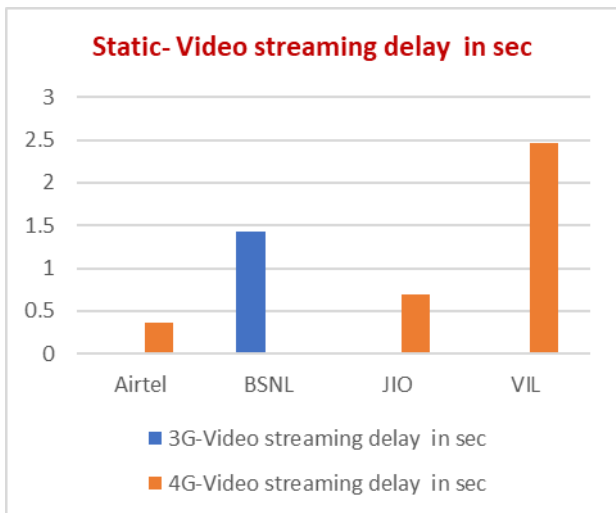
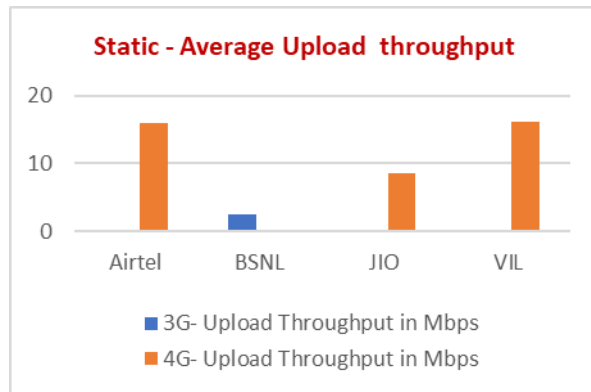
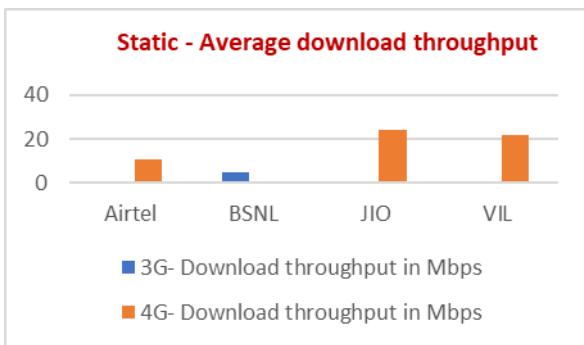
TSP (For 5G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	160.89	NA	367.50	NA
Upload Throughput in Mbps	53.06	NA	50.25	NA
Video streaming delay in sec	0.16	NA	0.40	NA
Web browsing delay in second	0.09	NA	1.05	NA
Latency in (msec)	55.06	NA	29.75	NA

Data Services Static

Key Observations

Data was tested at 4 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, PayTm)

3G/4G/ 5G Network



1. Hotspot Location- IIT Gate Kanpur

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	2	NA	NA
Upload Throughput in Mbps	NA	2.19	NA	NA
Video streaming delay in sec	NA	1.30	NA	NA
Web browsing delay in second	NA	0.23	NA	NA
Latency in (msec)	NA	81	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	44.99	NA	31.91	40.62
Upload Throughput in Mbps	16.65	NA	8.66	5
Video streaming delay in sec	0.31	NA	0.8	1.92
Web browsing delay in second	0.16	NA	1.3	1,99
Latency in (msec)	38	NA	42	71.33

	5G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	158	NA	189	NA
Upload Throughput in Mbps	15.65	NA	22	NA
Video streaming delay in sec	0.29	NA	0.5	NA
Web browsing delay in second	0.05	NA	1.1	NA
Latency in (msec)	34.3	NA	32	NA

2. Hotspot Location- Naveen Market Kanpur

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	1.44	NA	NA
Upload Throughput in Mbps	NA	1.17	NA	NA
Video streaming delay in sec	NA	1.4	NA	NA
Web browsing delay in second	NA	0.34	NA	NA
Latency in (msec)	NA	77	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	28.5	NA	35.44	29
Upload Throughput in Mbps	20.68	NA	7.77	18
Video streaming delay in sec	0.46	NA	0.6	4.16
Web browsing delay in second	0.30	NA	1.3	4.56
Latency in (msec)	50	NA	41	74.33

	5G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	140.78	NA	391	NA
Upload Throughput in Mbps	25.47	NA	41	NA
Video streaming delay in sec	0.30	NA	0.4	NA
Web browsing delay in second	0.12	NA	1	NA
Latency in (msec)	42.6	NA	30	NA

3. Hotspot Location- Kanpur Bus Stand Gate

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	5.51	NA	NA
Upload Throughput in Mbps	NA	1.76	NA	NA
Video streaming delay in sec	NA	1.49	NA	NA
Web browsing delay in second	NA	0.14	NA	NA
Latency in (msec)	NA	145	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	23.59	NA	NA	50
Upload Throughput in Mbps	10.79	NA	NA	19
Video streaming delay in sec	0.54	NA	NA	1.43
Web browsing delay in second	0.28	NA	NA	5.41
Latency in (msec)	35	NA	NA	74

	5G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	150.33	NA	NA	NA
Upload Throughput in Mbps	53.40	NA	NA	NA
Video streaming delay in sec	0.10	NA	NA	NA
Web browsing delay in second	0.06	NA	NA	NA
Latency in (msec)	68.1	NA	NA	NA

4. Hotspot Location- Railway Station Kanpur central

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	1.18	NA	NA
Upload Throughput in Mbps	NA	1.48	NA	NA
Video streaming delay in sec	NA	1.56	NA	NA
Web browsing delay in second	NA	0.44	NA	NA
Latency in (msec)	NA	139	NA	NA

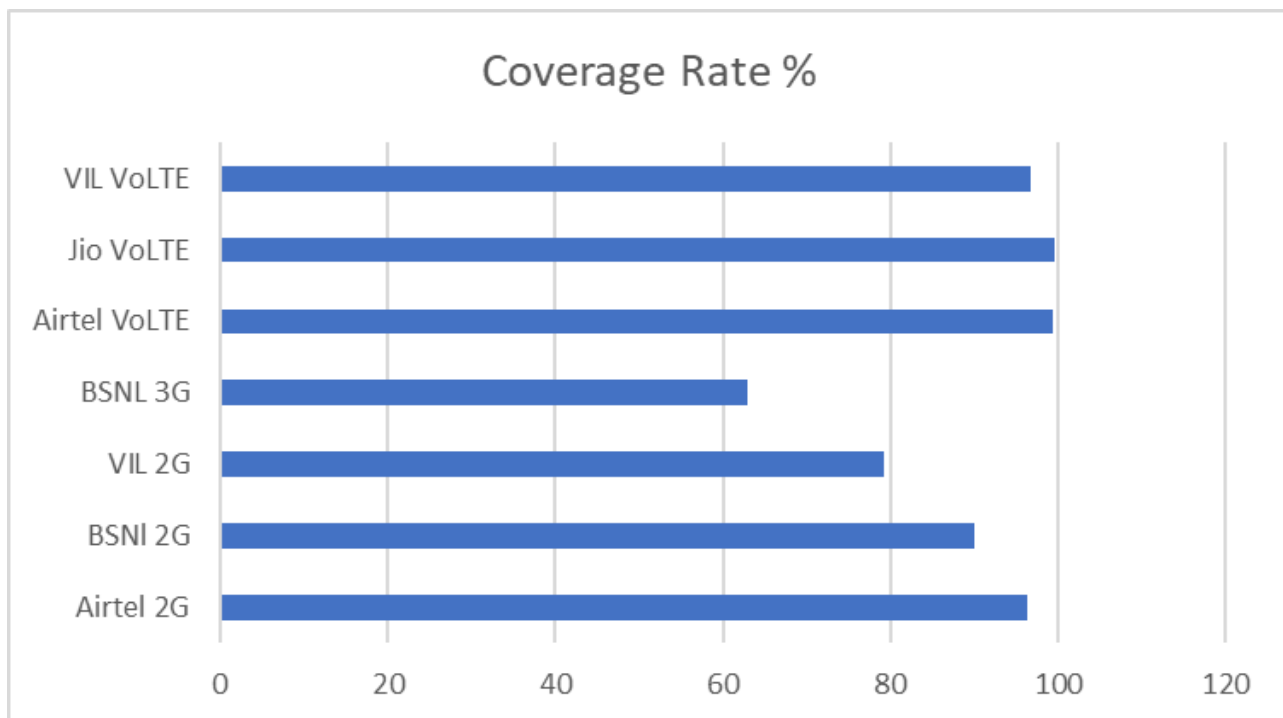
	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	69	NA	41.30	77
Upload Throughput in Mbps	17.36	NA	9.37	23
Video streaming delay in sec	0.25	NA	0.9	2.35
Web browsing delay in second	0.23	NA	1.4	3.32
Latency in (msec)	46	NA	43	74.23

	5G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	148.94	NA	389	NA
Upload Throughput in Mbps	77.38	NA	27	NA
Video streaming delay in sec	0.04	NA	0.3	NA
Web browsing delay in second	0.04	NA	1.1	NA
Latency in (msec)	56.2	NA	32	NA

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.

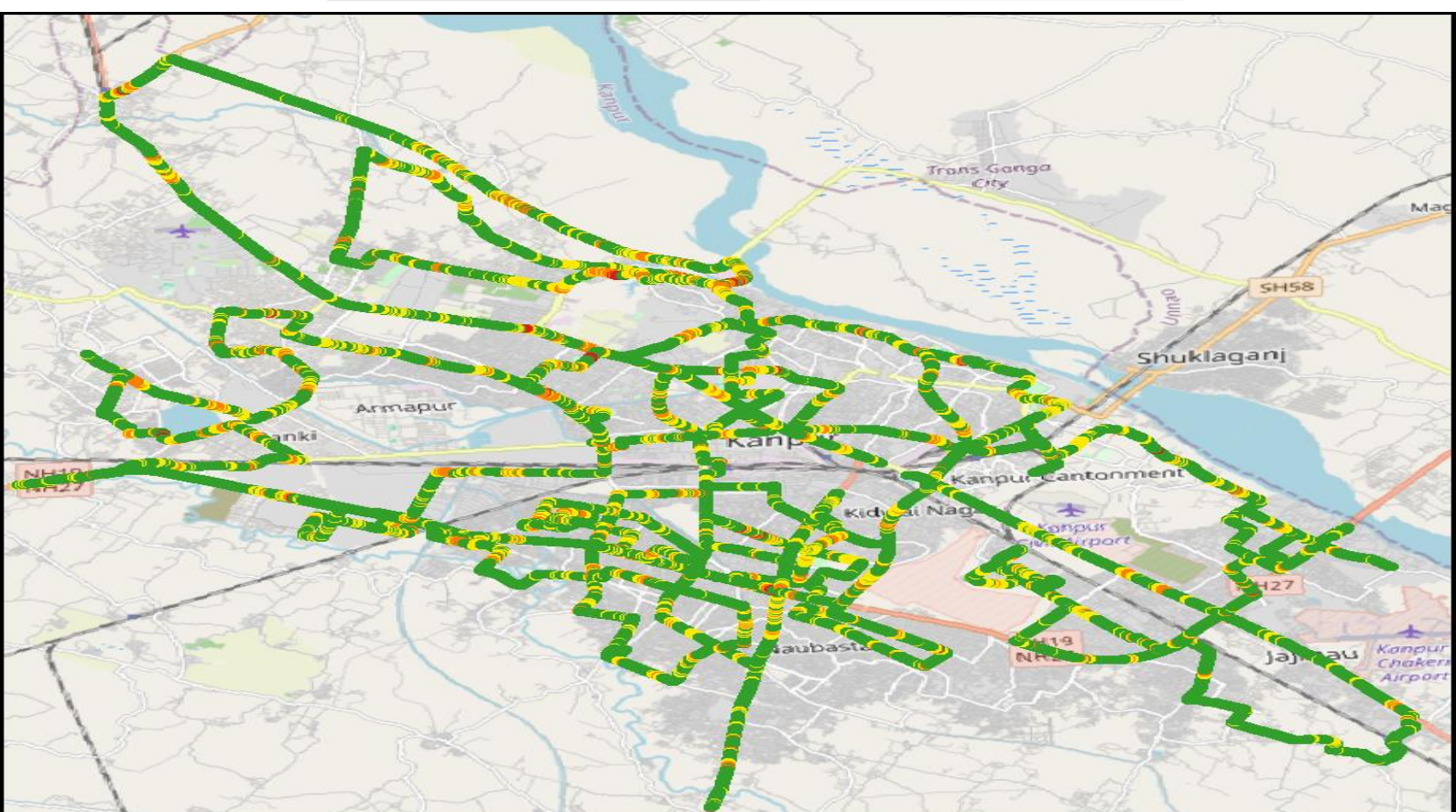
TSP	Coverage Rate %
Airtel 2G	96.40
BSNI 2G	90.06
VIL 2G	79.21
BSNL 3G	62.92
Airtel VoLTE	99.29
Jio VoLTE	99.64
VIL VoLTE	96.65



Coverage Details

TSP-AIRTEL

Technology	Coverage %
2G	96.40

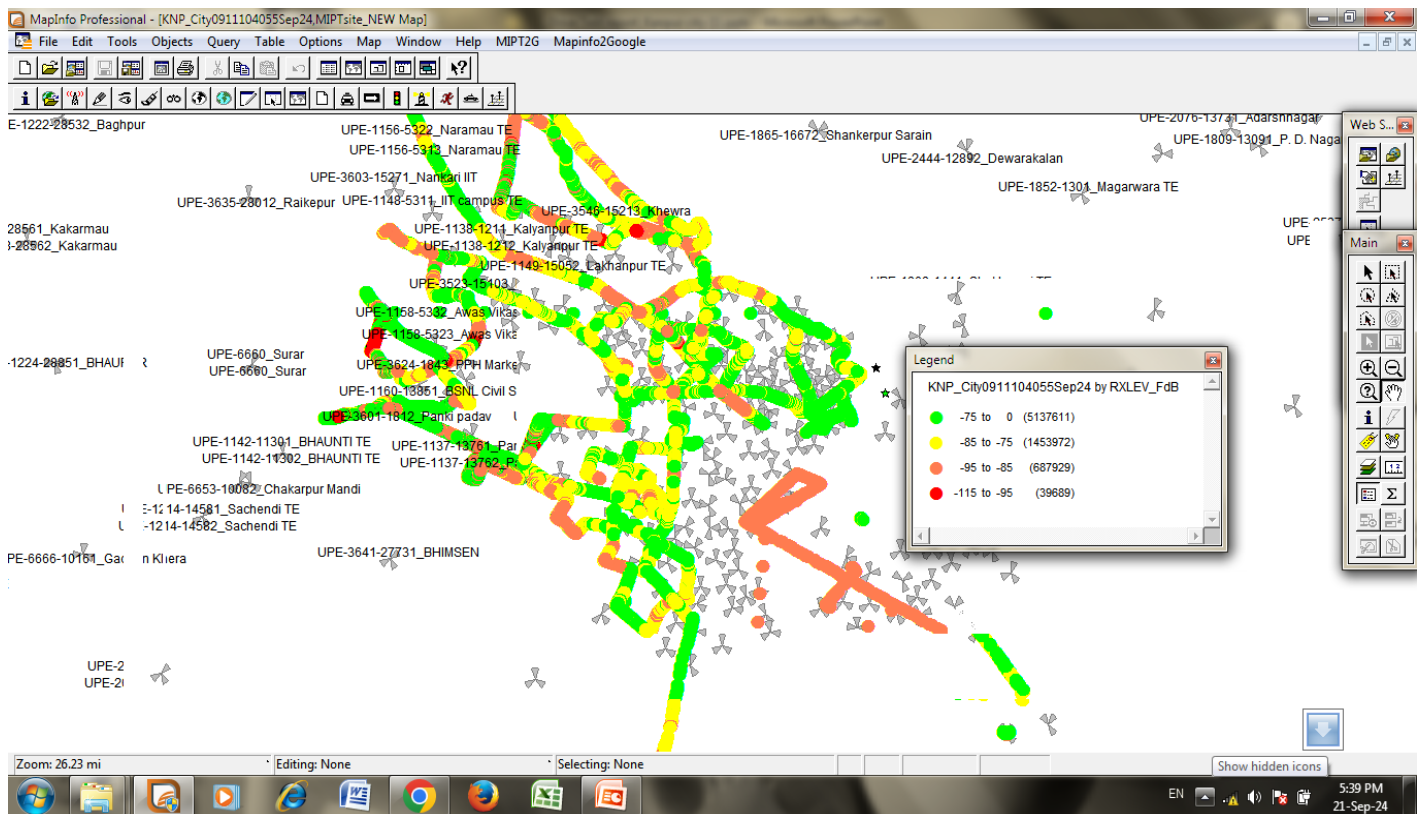


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	6663334	74.48	
[-75, >=-85)	1960152	21.91	
[-85, >=-95)	247654	2.77	
[-95, >=Min)	74156	0.83	
Total	8945296		





Coverage Details

TSP-BSNL

Technology	Coverage %
2G	90.06



2G

Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	5137611	70.19	
[-75, >=-85)	1453972	19.87	
[-85, >=-95)	687929	9.40	
[-95, >=Min)	39689	0.54	
Total	7319201	100.00	

Coverage Details

TSP- VIL

Technology	Coverage %
2G	79.21

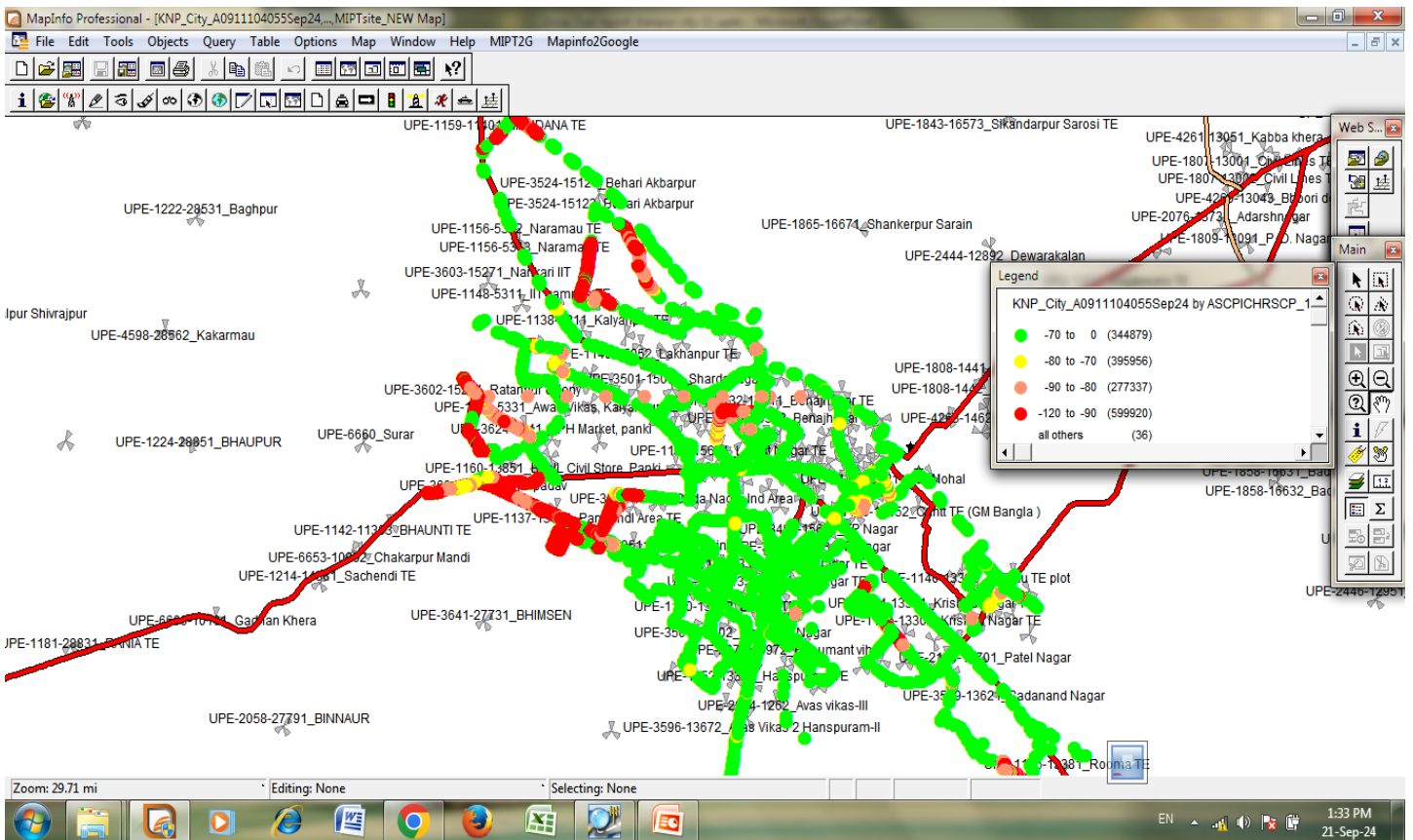


		2G	Legends	
Overall RxLevel	# Samples	% PDF		
[Max, >=-75]	12098	40.60%		
[-75, >=-85]	11504	38.61%		
[-85, >=-95]	5356	17.97%		
[-95, >=Min)	839	2.82%		
Total	29797	100.00%		

Coverage Details

TSP- BSNL.

Technology	Coverage %
3G	62.92

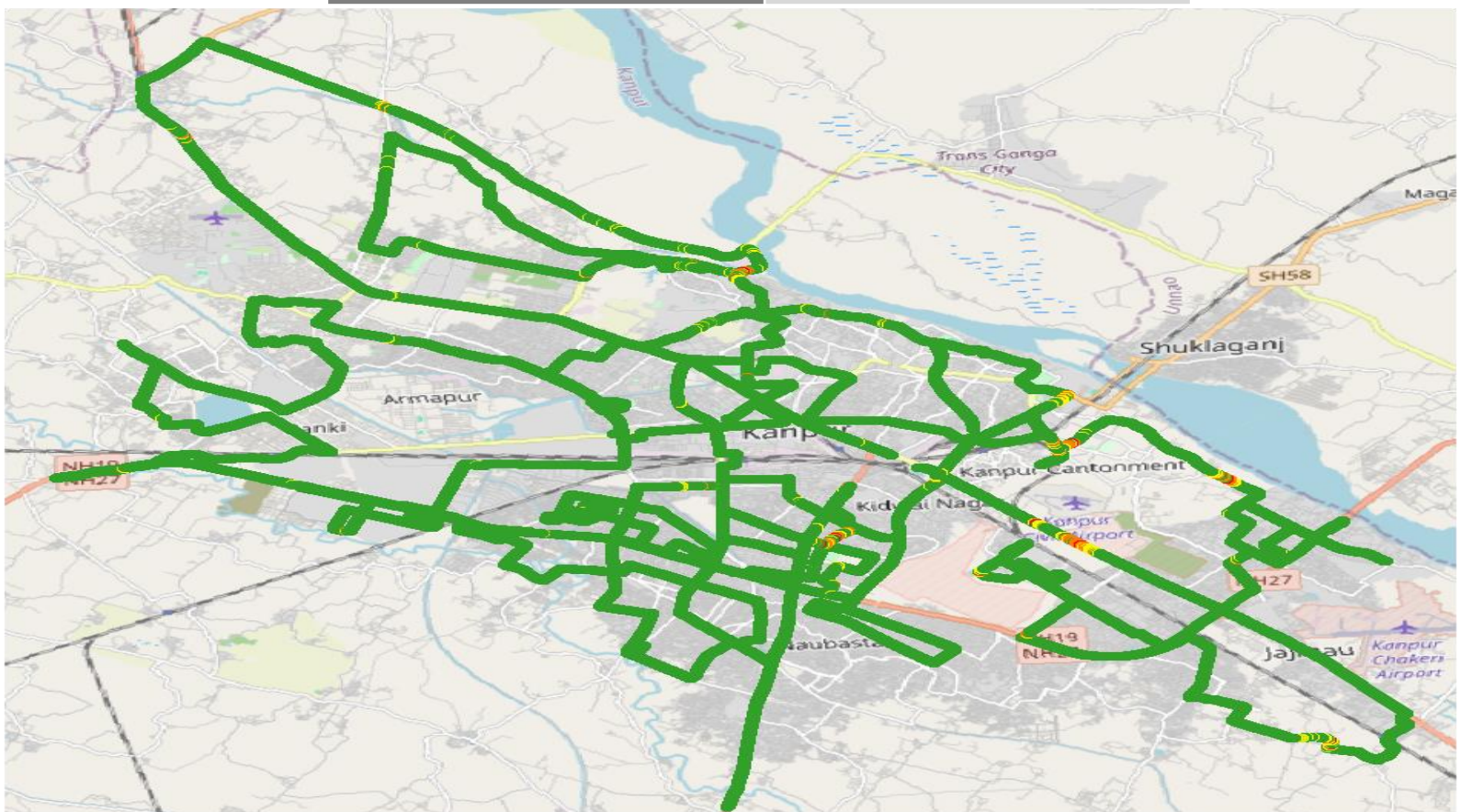


Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	344879	21.31	
[-70, >=-80)	395956	24.47	
[-80, >=-90)	277337	17.14	
[-90, >=Min)	599920	37.08	
Total	1618092	100.00	

Coverage Details

TSP-AIRTEL

Technology	Coverage %
VoLTE	99.29



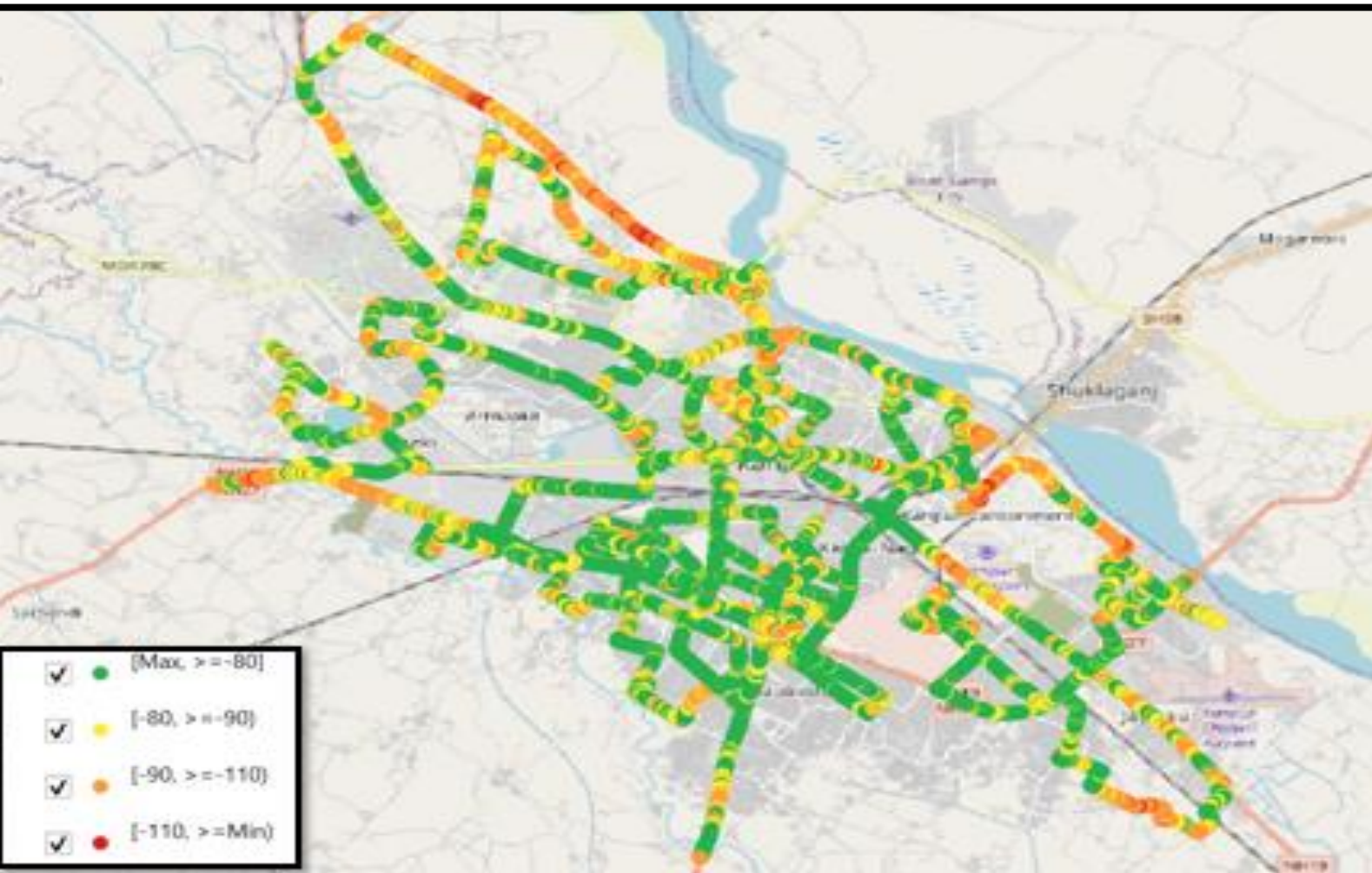
VoLTE

Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	10828176	65.84	Green
[-80, >=-90)	4196480	25.52	Yellow
[-90, >=-110)	1305377	7.93	Orange
[-110, >=Min)	116375	0.71	Red
Total	16446408		

Coverage Details

TSP-Jio

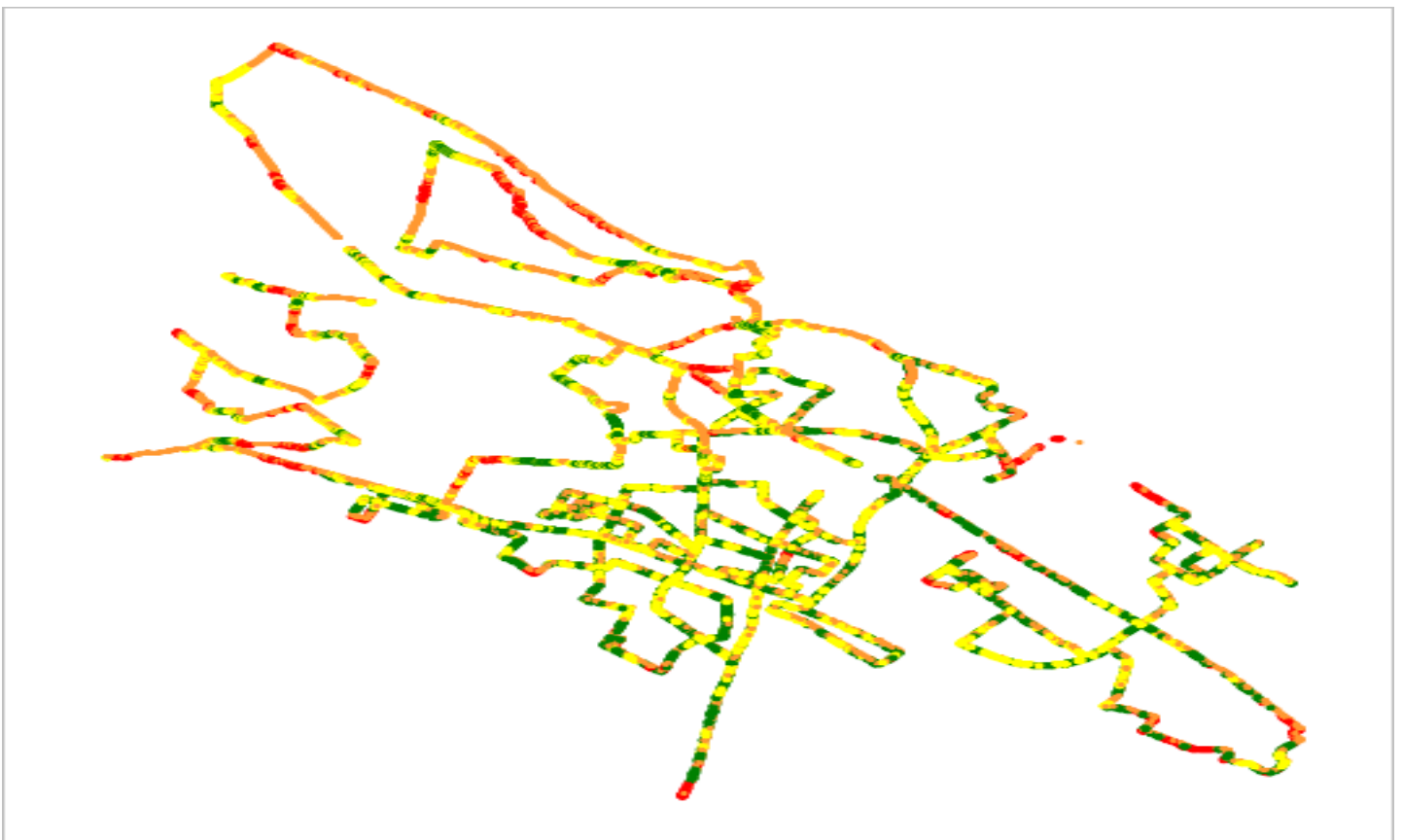
Technology	Coverage %
VoLTE	99.64



VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	38729	58.66	
[-80, >=-90)	17725	26.85	
[-90, >=-110)	9334	14.14	
[-110, >=Min)	235	0.36	
Total	66023	100	

TSP- VIL

Technology	Coverage %
VoLTE	96.65

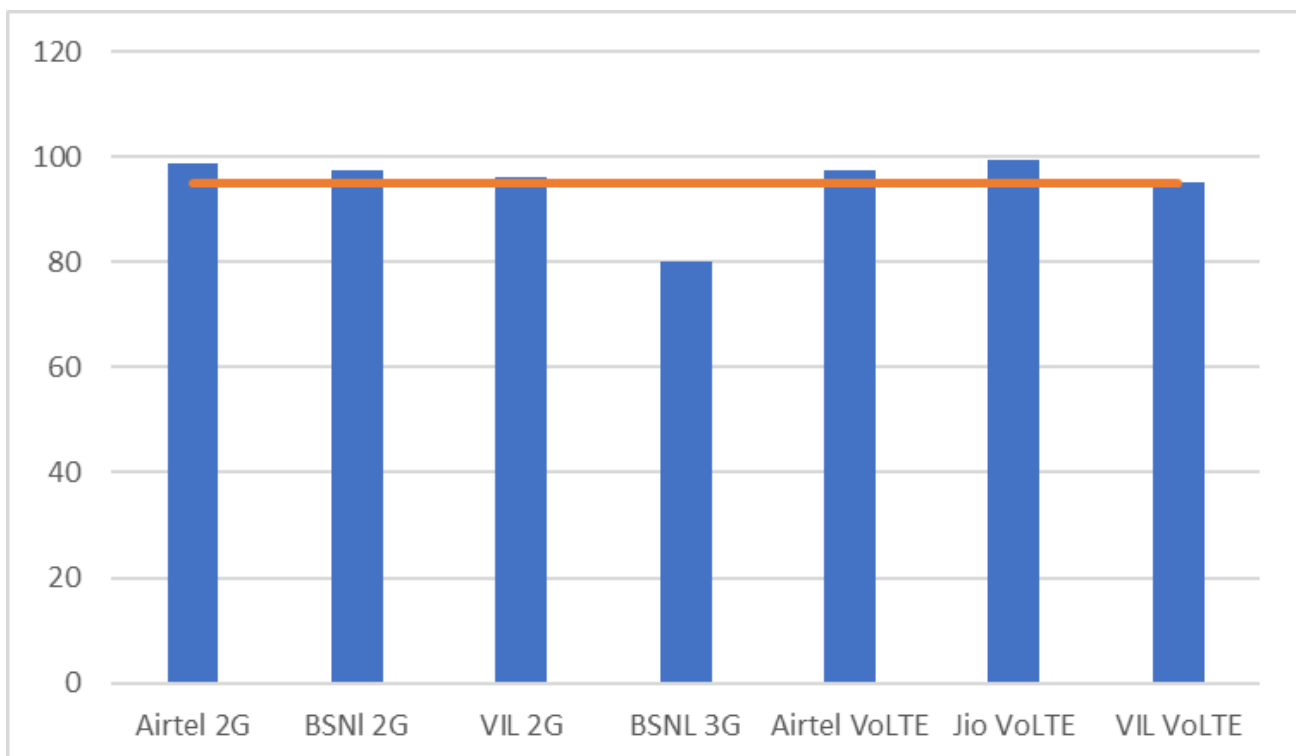


		VoLTE		
Overall RSRP	# Samples	% PDF	Legends	
[Max, >=-80]	9781	20.87%		
[-80, >=-90)	12156	25.93%		
[-90, >=-110)	23364	49.85%		
[-110, >=Min)	1572	3.35%		
Total	46873	100.00%		

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	98.89
BSNI 2G	97.52
VIL 2G	96.30
BSNL 3G	80.16
Airtel VoLTE	97.44
Jio VoLTE	99.55
VIL VoLTE	95.30

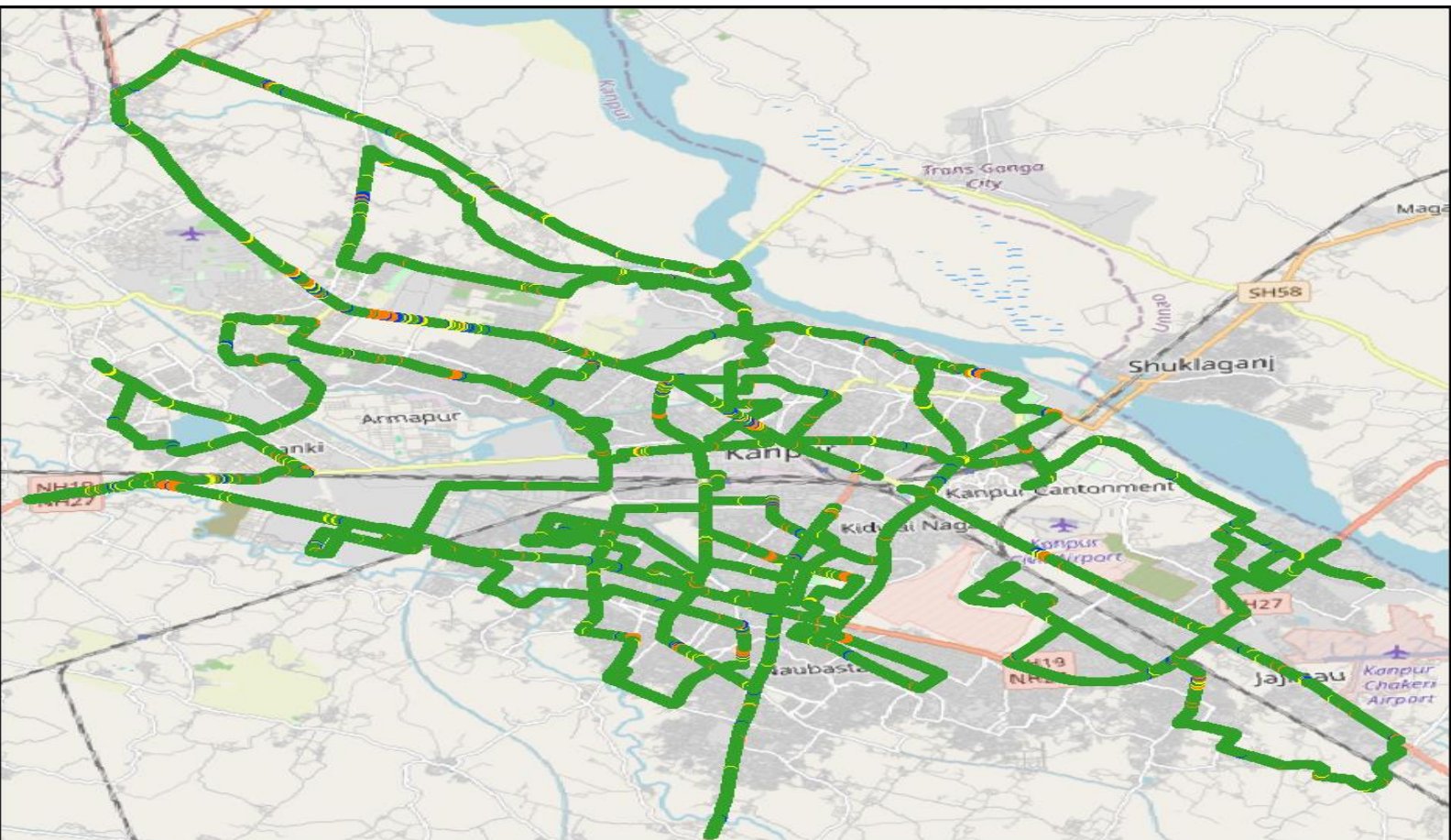


Quality Details

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 $\geq 95\%$.

TSP-AIRTEL.

Technology	Rx Quality %
2G	98.89



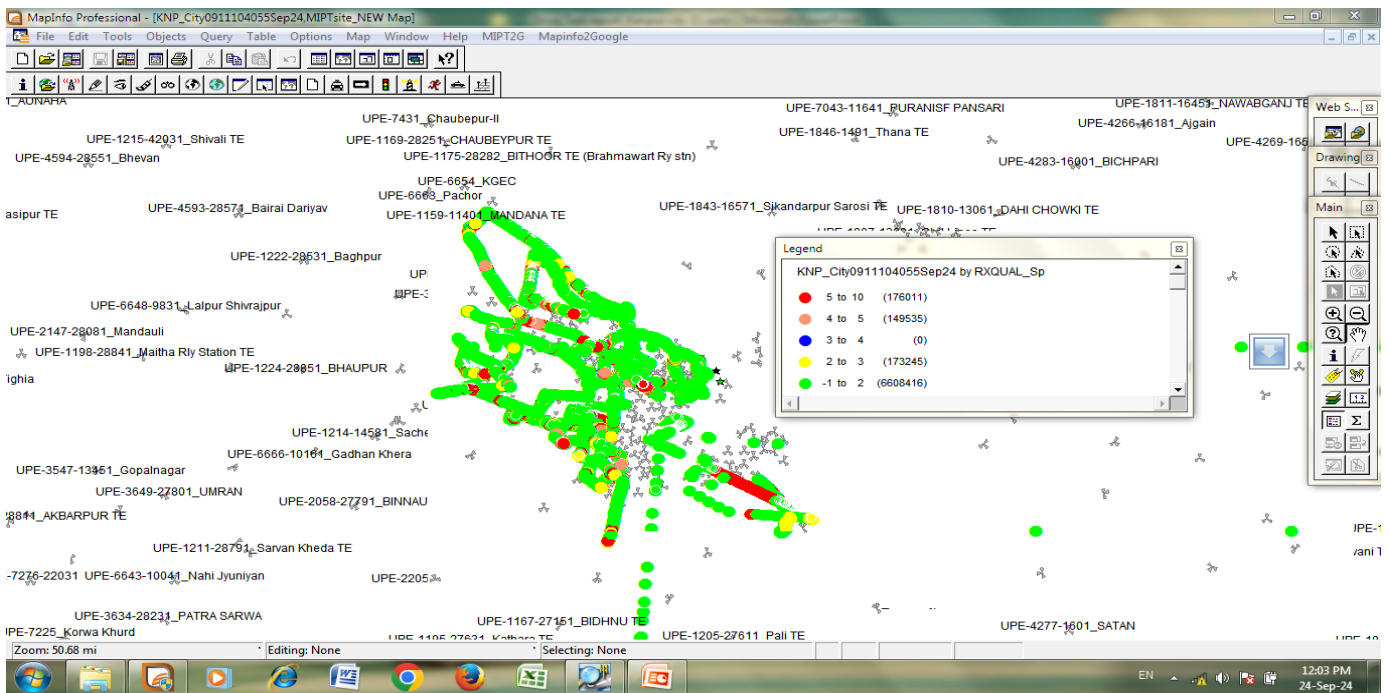
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	8100000	92.27	Green
(2, ≤ 3)	266486	3.04	Yellow
(3, ≤ 4)	220767	2.52	Blue
(4, ≤ 5)	92372	1.06	Orange
(5, \leq Max)	99671	1.14	Red
Total	8779296		

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 $\geq 95\%$.

TSP-BSNL

Technology	Rx Quality %
2G	97.52



Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	6608416	92.98	Green
(2, ≤ 3)	173245	2.44	Yellow
(3, ≤ 4)	0	0.00	Blue
(4, ≤ 5)	149535	2.10	Orange
(5, \leq Max)	176011	2.48	Red
Total	7107207	100	






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 $\geq 95\%$.

TSP- VIL

Technology	Rx Quality %
2G	96.30



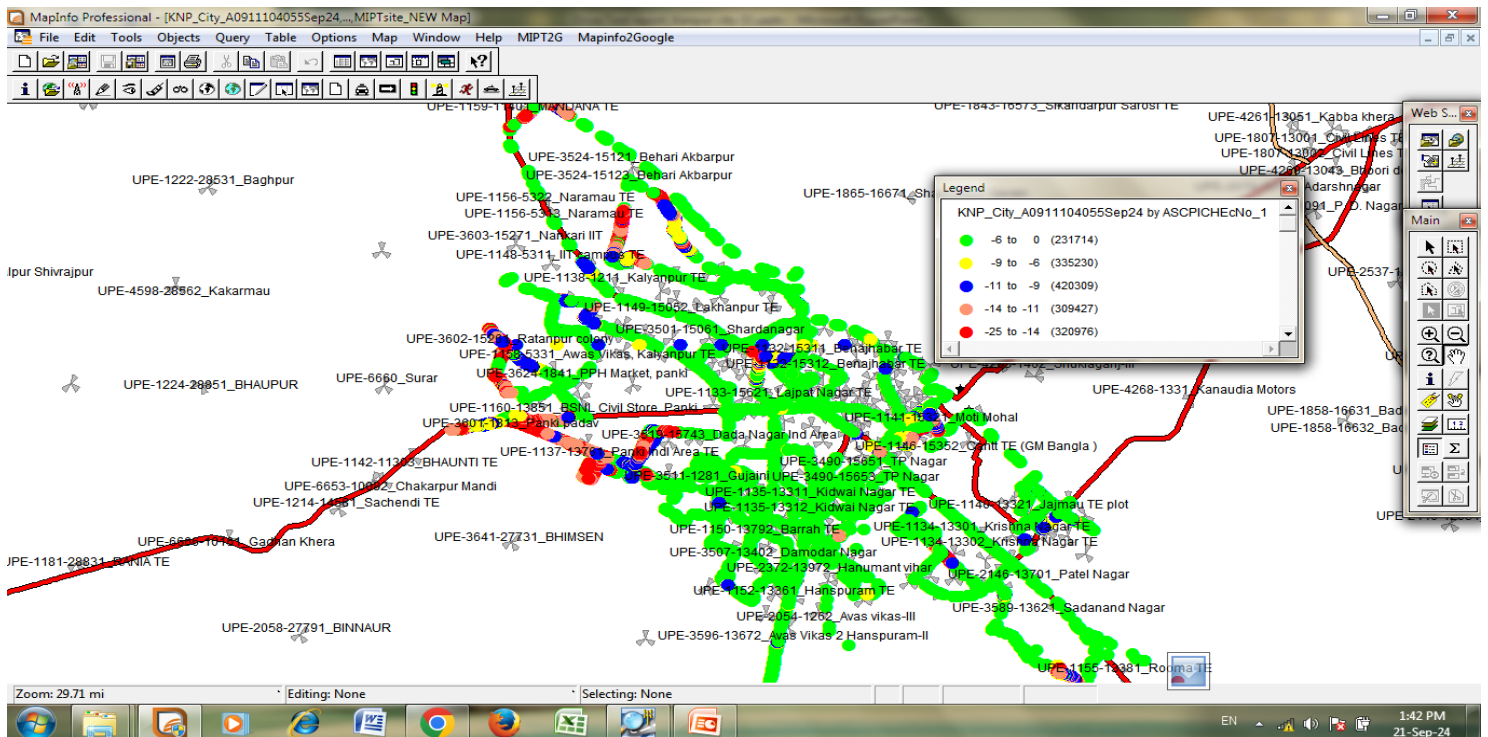
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	21109	78.96	
(2, ≤ 3)	1826	6.83	
(3, ≤ 4)	1790	6.70	
(4, ≤ 5)	1020	3.82	
(5, $\leq \text{Max}$)	989	3.70	
Total	26734	100%	

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 $\geq 95\%$.

TSP-BSNL.

Technology	Rx Quality %
3G	80.16



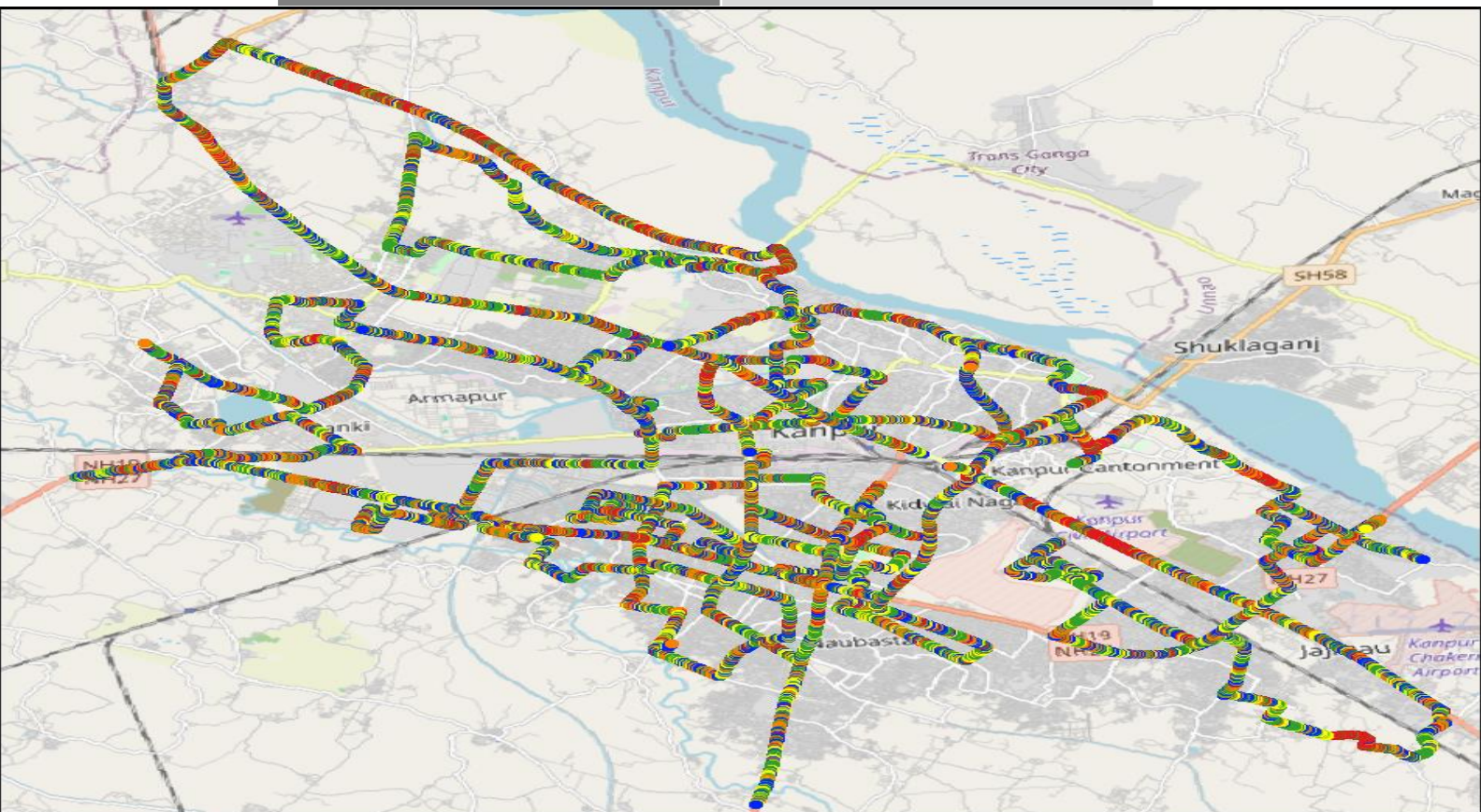
Overall Ec/No	# Samples	% PDF	Legends
(Max, ≤ -6)	231714	14.32	Green
(-6, ≤ -9)	335230	20.72	Yellow
(-9, ≤ -11)	420309	25.98	Blue
(-11, ≤ -14)	309427	19.13	Orange
(-14, \leq Min)	320976	19.84	Red
Total	1617656	100	



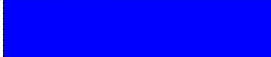


Quality Details

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-AIRTEL.

Technology	Rx Quality %
VoLTE	97.44



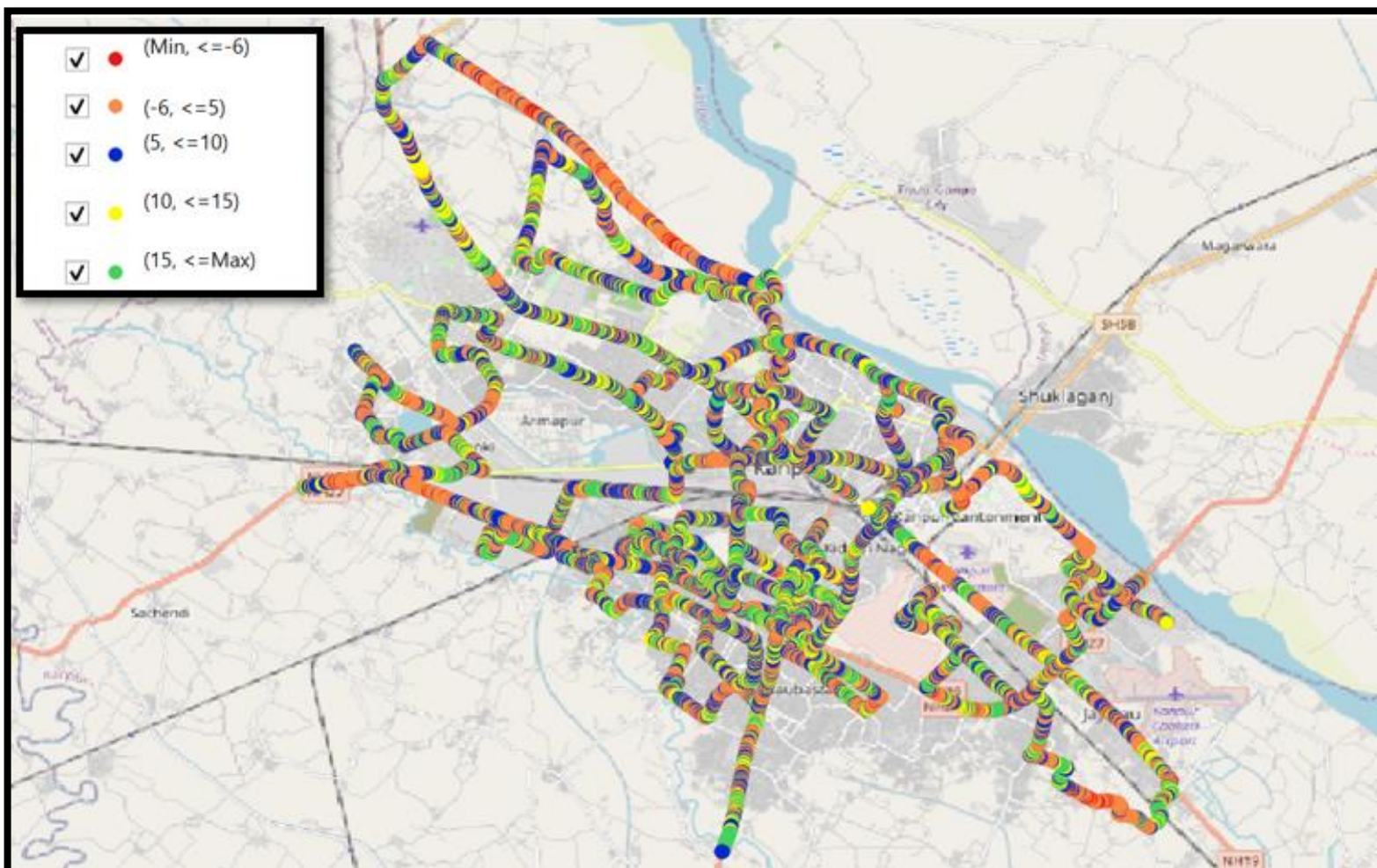
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	421935	2.6	
(0, ≤ 5)	3158007	19.4	
(5, ≤ 10)	3592687	22.07	
(10, ≤ 15)	3286772	20.19	
(15, $\leq \text{Max}$)	5826153	35.78	
Total	16285554		

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP and SINR > -6 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-Jio

Technology	Rx Quality %
VoLTE	99.55



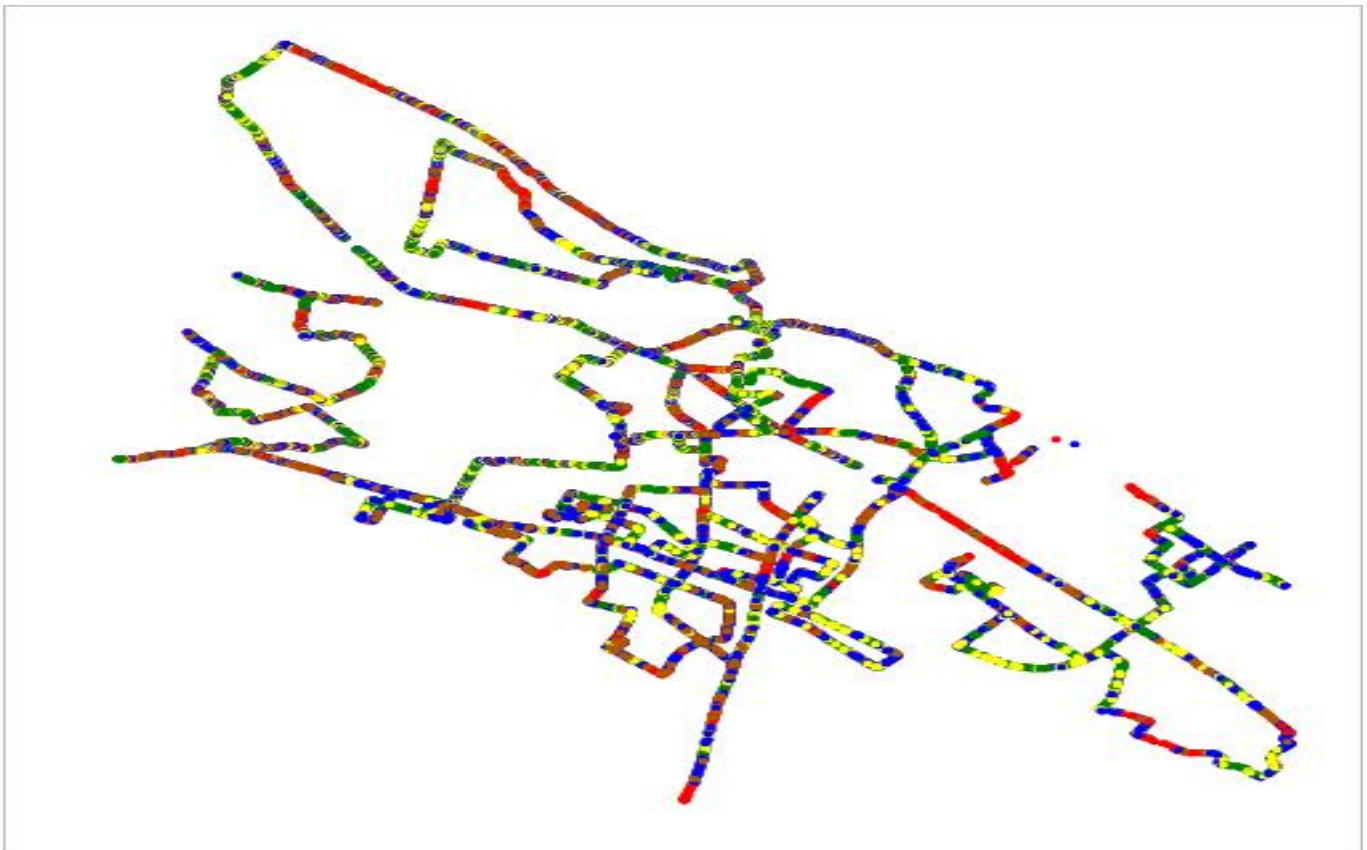
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ -6)	298	0.45	
(-6, ≤ 5)	21481	32.54	
(5, ≤ 10)	20906	31.66	
(10, ≤ 15)	14527	22.00	
(15, $\leq \text{Max}$)	8811	13.35	
Total	66023	100.00	

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- VIL

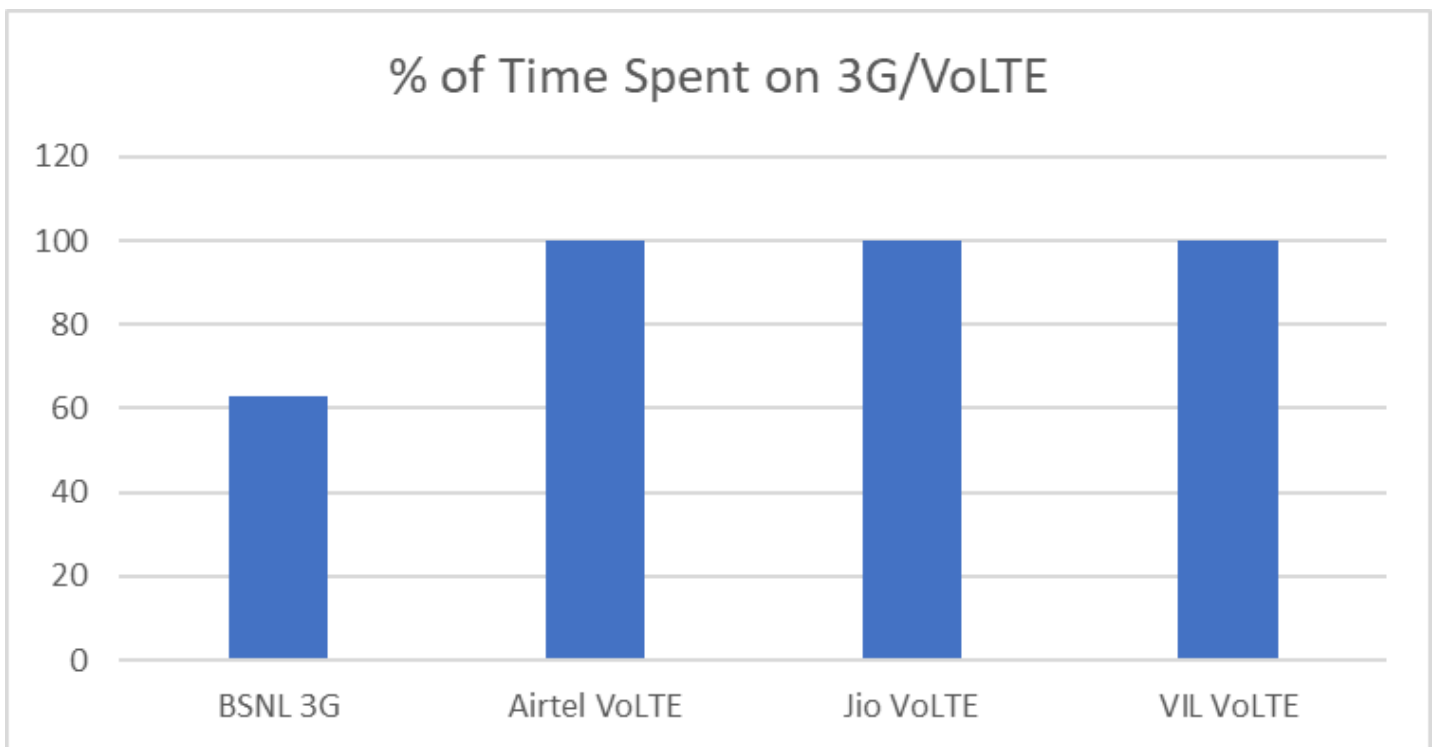
Technology	Rx Quality %
VoLTE	95.30



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	2100	4.70%	Red
(0, ≤ 5)	8524	19.10%	Orange
(5, ≤ 10)	11101	24.90%	Blue
(10, ≤ 15)	10220	22.90%	Yellow
(15, $\leq \text{Max}$)	12700	28.40%	Green
Total	44645	100%	

Technology Details

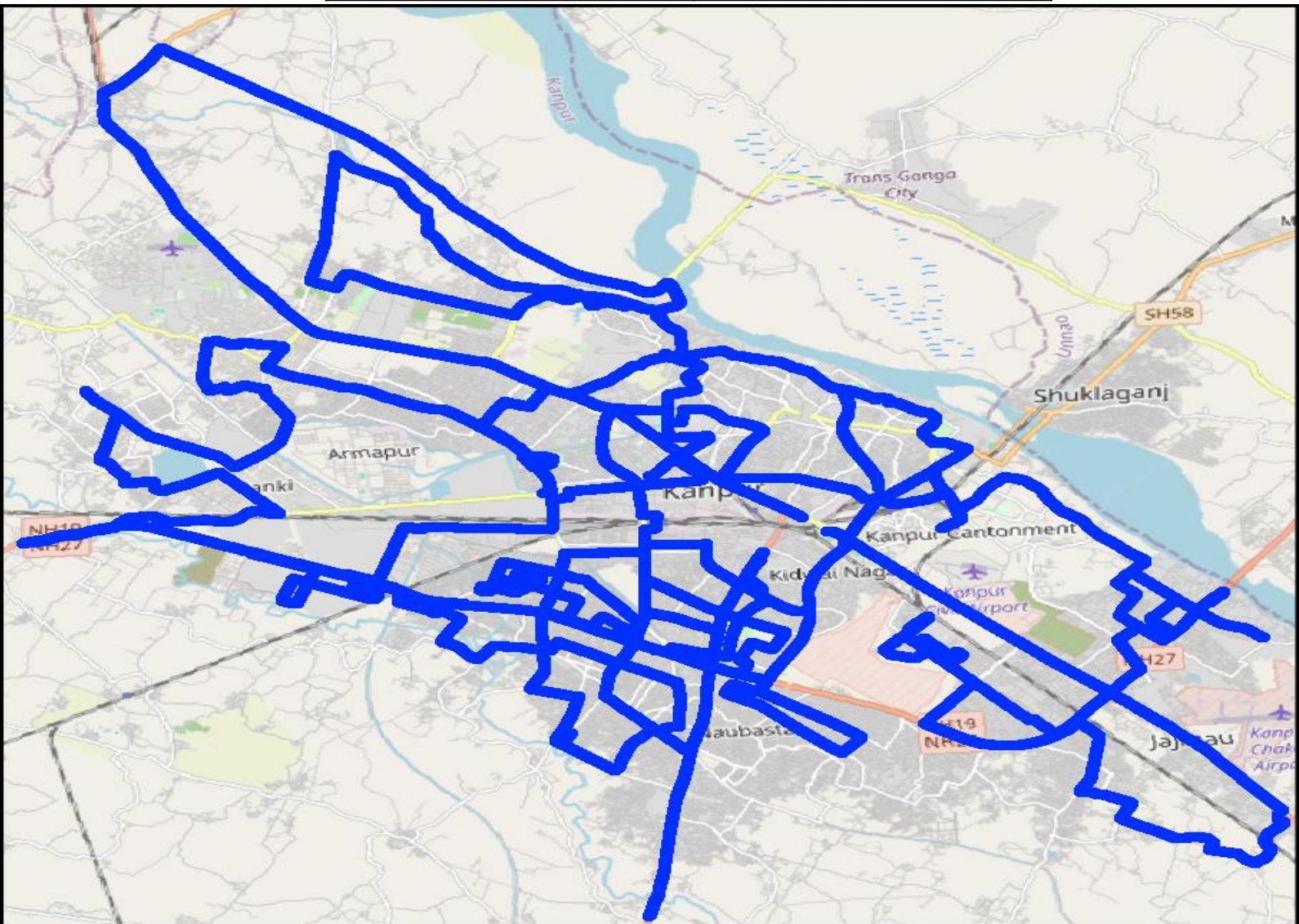
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	62.92
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	100



Technology Details

TSP-AIRTEL.

Technology	% of Time Spent on
3G	NA
VoLTE	100

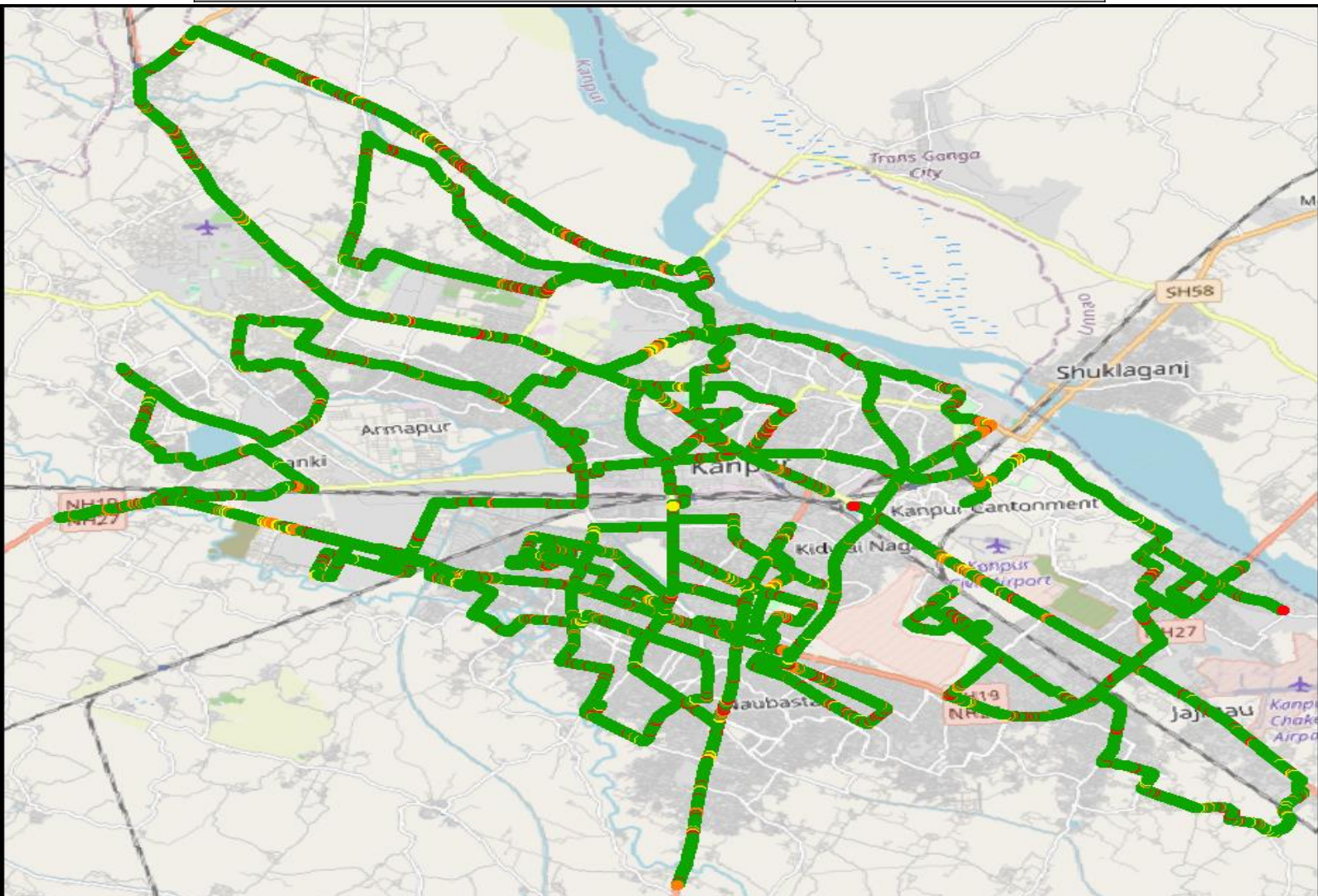


Dynamic Data Test

TSP-AIRTEL

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	98.03



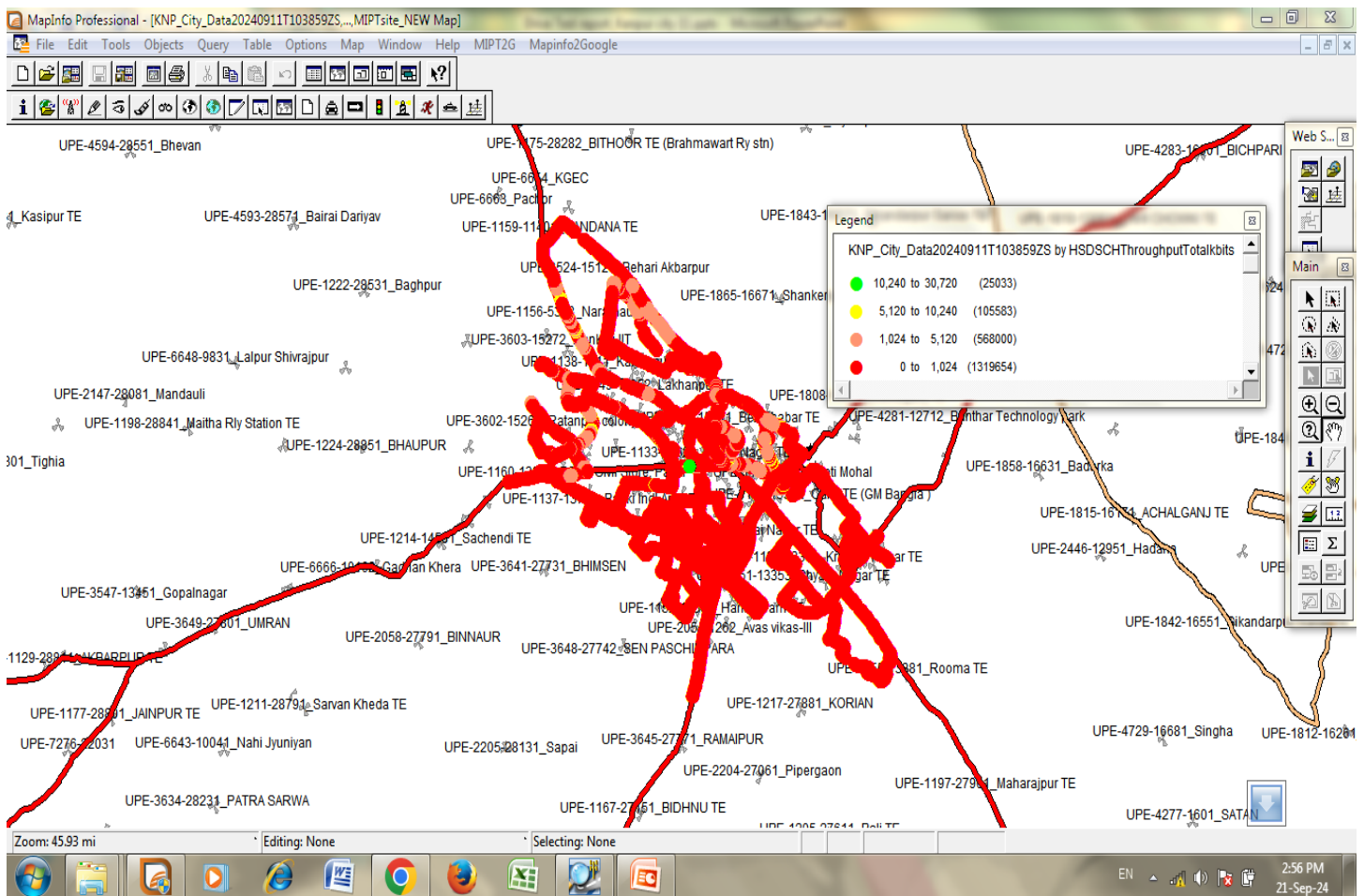
DL throughput	No of Sample	%	Legends
< 2Mbps	365249	1.96	Red
2-5 Mbps	605802	3.26	Orange
5-10 Mbps	605069	3.25	Yellow
>10Mbps	17000046	91.51	Green

Dynamic Data Test

TSP- BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	1.68



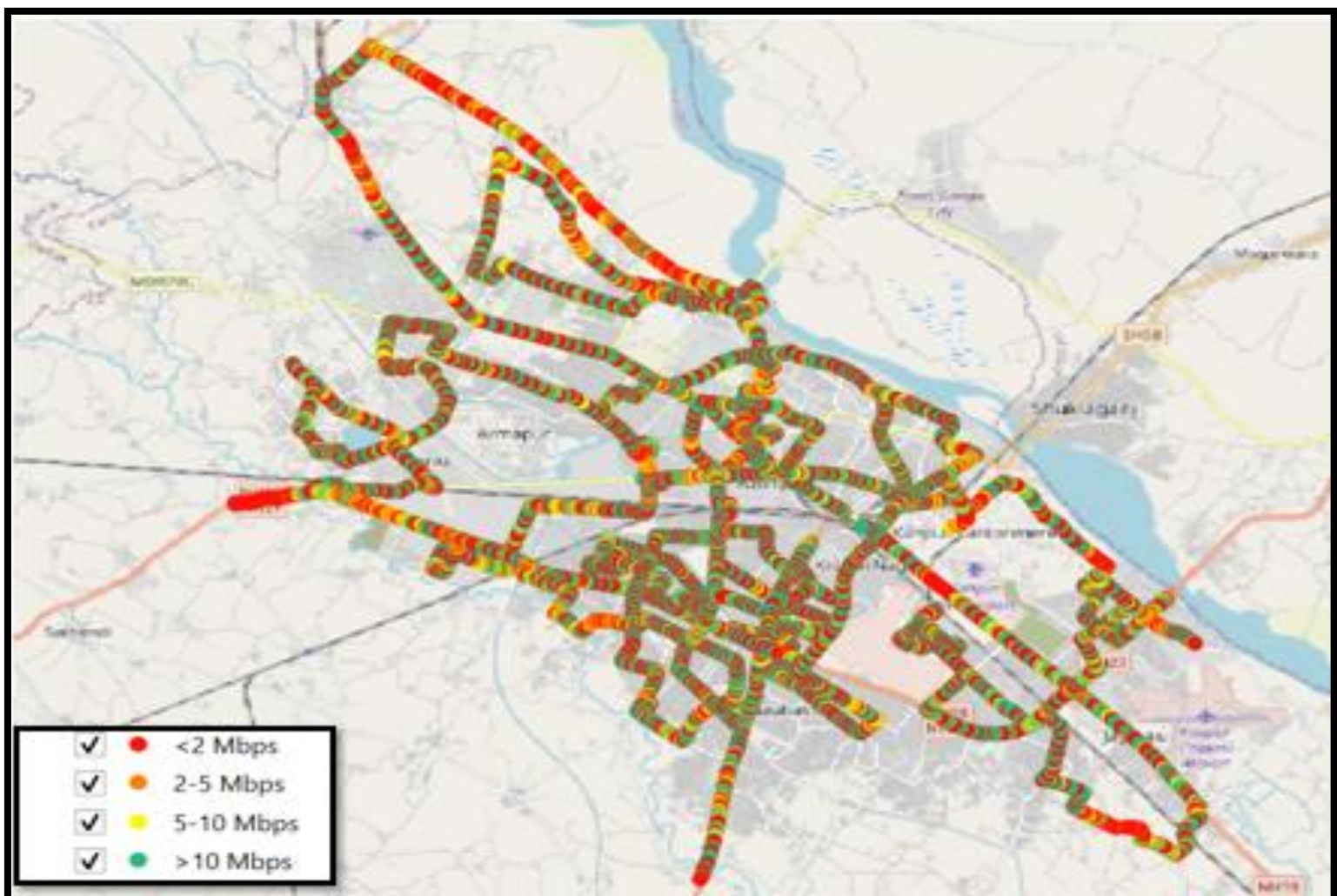
DL throughput	No of Sample	%	Legends
< 1 Mbps	1319654	65.39	Red
1-5 Mbps	568000	28.14	Orange
5-10 Mbps	105583	5.23	Yellow
>10Mbps	25033	1.24	Green

Dynamic Data Test

TSP-Jio

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	15.43



DL throughput	No of Sample	%	Legends
< 2Mbps	12492	26.38	■
2-5 Mbps	4336	9.16	■
5-10 Mbps	6278	13.26	■
>10Mbps	24254	51.21	■

TSP- VIL

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	77.25



DL throughput	No of Sample	%	Legends
< 2Mbps	10122	22.75%	Red
2-5 Mbps	770	1.73%	Orange
5-10 Mbps	1575	3.54%	Yellow
>10Mbps	32023	71.98%	Green
	44490	100%	