



प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report Korba City and nearby Area

20/09/2023 to 22/09/2023

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 Korba areas from 9:00 AM to 8:00 PM from 20/09/2023 to 22/09/2023. The drive test covered drive route of around 257 KMs.

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

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	≤3%	All TSPs achieved the benchmark
Drop call rate %	≤2%	All TSPs achieved the benchmark
CSSR %	≥95 %	All TSPs achieved the benchmark
Mobility HOSR %	≥95%	All TSPs achieved the benchmark
Good RX Quality %	≥95%	All TSPs achieved the benchmark, Except Airtel & BSNL in VoLTE

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 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

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 **90-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)

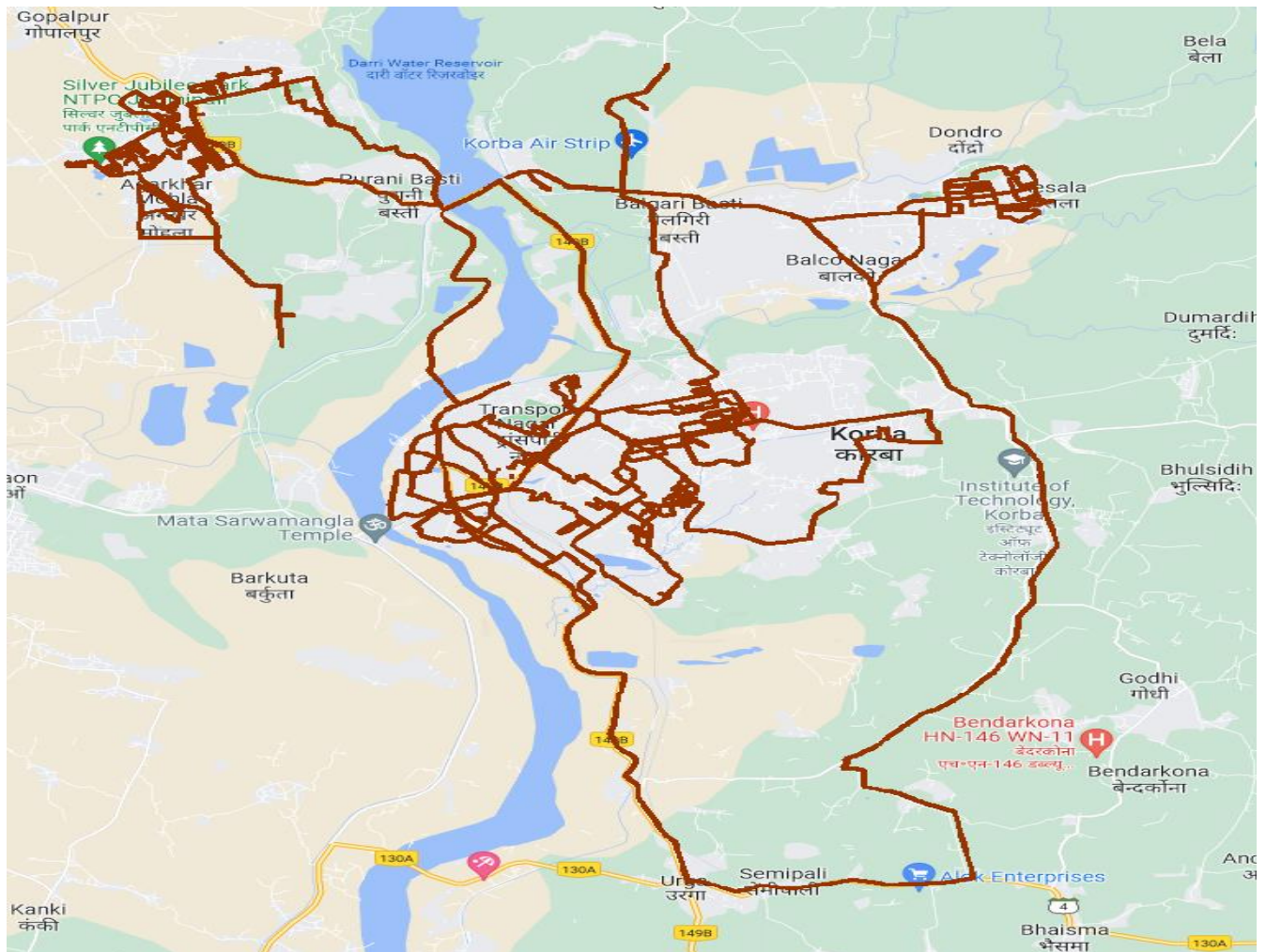
- i.2G – measurement – UE Locked in 2G file size- 500KB
- ii.3G – measurement – UE in 3G File Size- 20MB
- iii.4G – measurement – UE in LTE File Size- 40MB

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

- i.Download- 2G - 500KB ,3G - 20 MB, 4G - 40MB
- ii.Upload - 2G -100KB ,3G - 5 MB, 4G - 10MB
- 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 (only in 3G and LTE)
- v.Latency – 32 Bytes on www.google.com.

Overview

Voice & Dynamic Data Test Drive Route



List of important area covered during the drive test

Balco Plant

The Palm Mall

NTPC Korba

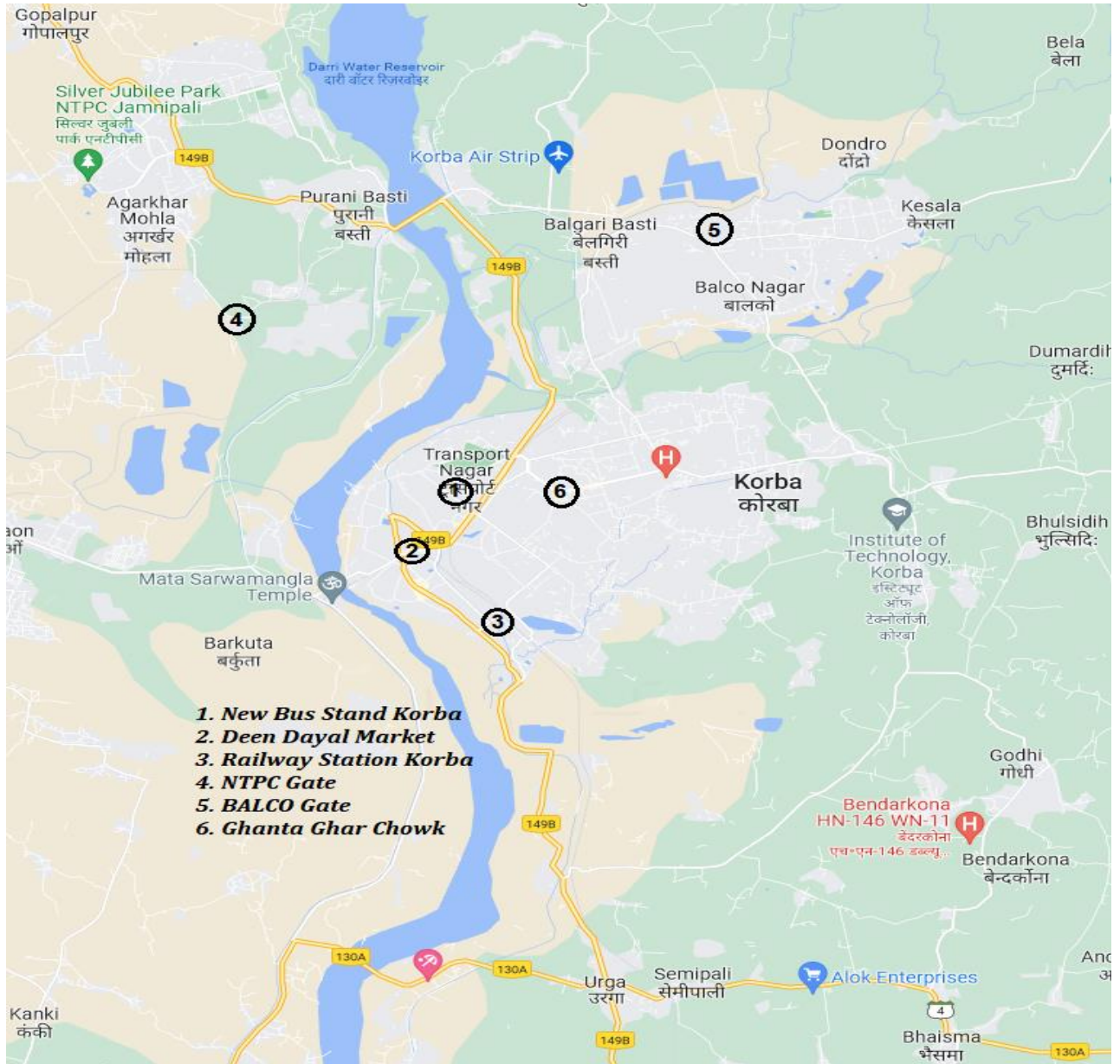
Railway Station

HTPS Town Ship

Government Engineer college

Thermal Power station

Data Service Test- Static Locations



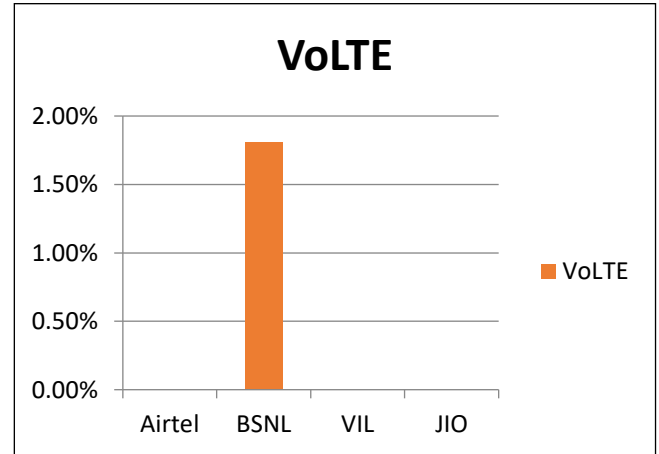
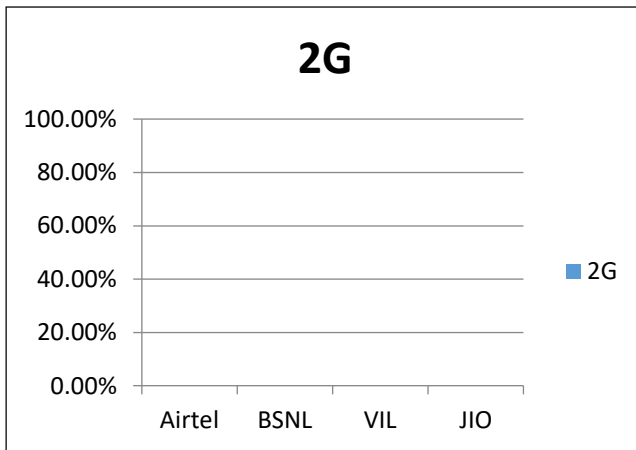
Hotspot Locations
1. New Bus Stand Korba
2. Deen Dayal Market
3. Railway Station Korba
4. NTPC Gate
5. BALCO Gate
6. Ghanta Ghar Chowk

Voice Calls

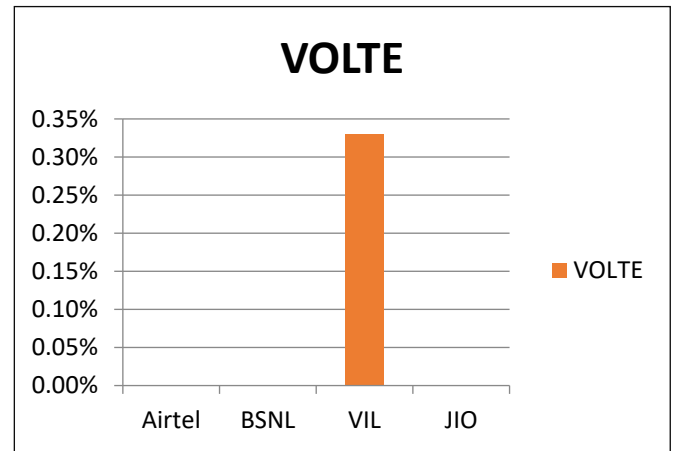
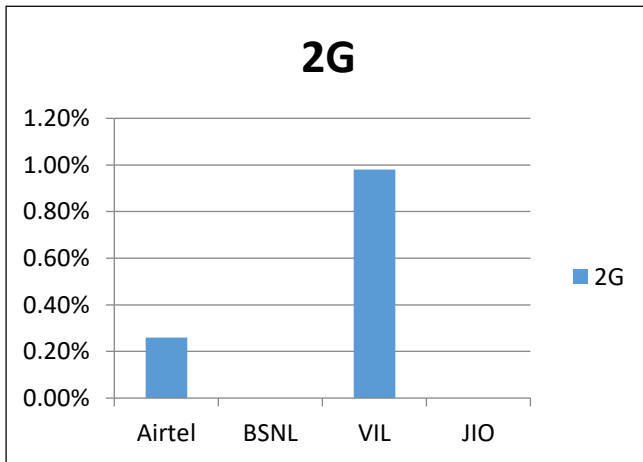
Key Observations

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	BSNL	RJIL	VIL
Drop Call Rate %	0	0	0	NA	NA	0	1.81	0	0
Block Call Rate %	0.26	0	0.98	NA	NA	0	0	0	0.33

- 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 %	41.04	95.80	60.66

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

TSPs	3G	
	BSNL	VIL
Coverage %	NA	NA

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

TSPs	VoLTE			
	Airtel	BSNL	JIO	VIL
Coverage %	93.29	97.90	99.61	96.72

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

TSPs	VoLTE			
	Airtel	BSNL	JIO	VIL
Time Spent on 3G/4G %	100	92.15	100	87.11

Data Services Dynamic

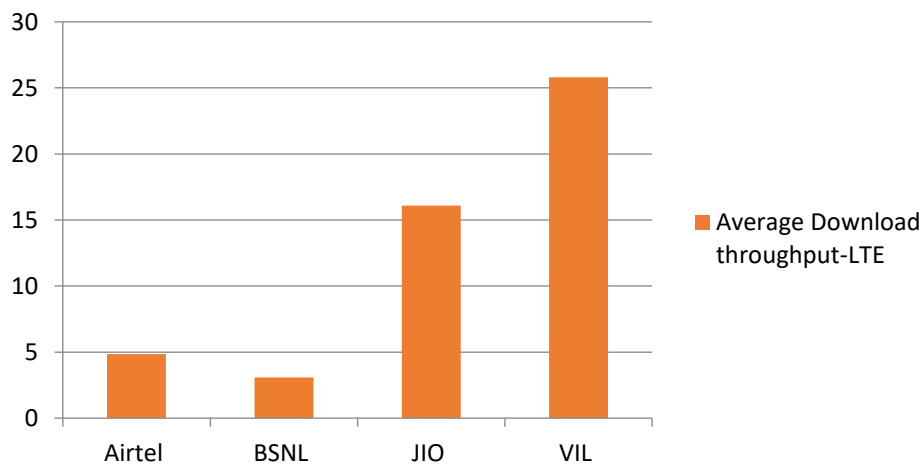
Key Observations

Dynamic Data -Download Throughput was tested.

Data Download Performance - Dynamic

3G/4G/ Network:

Average Download throughput-LTE



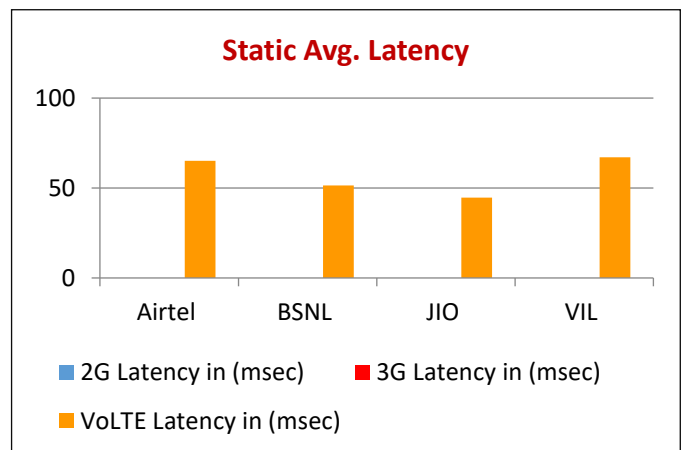
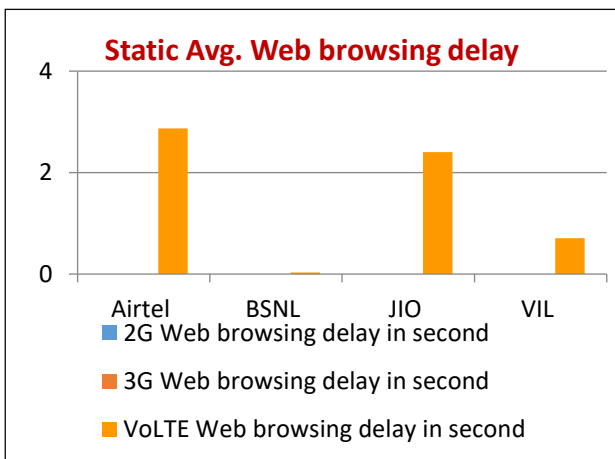
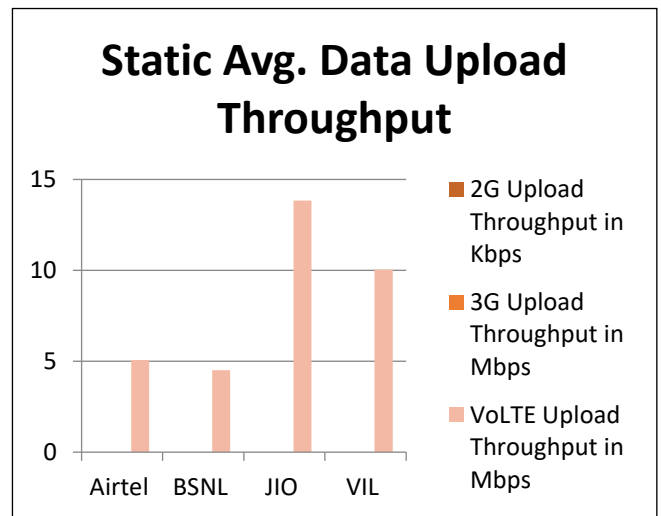
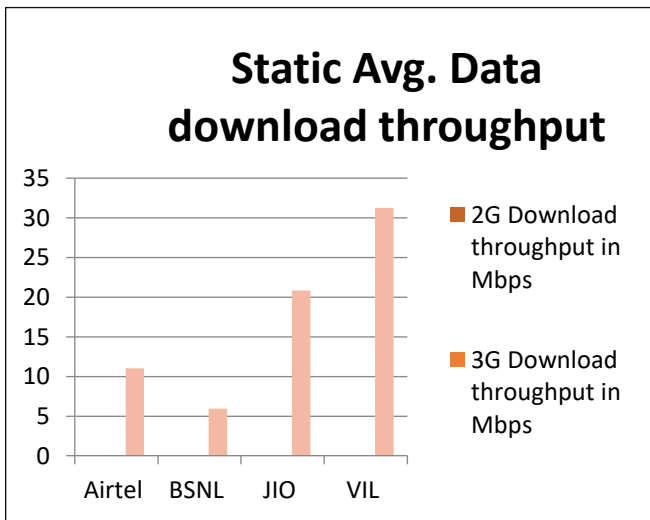
TSP (For 2G)	Airtel	BSNL	JIO	VIL
Average Download throughput- 2G in Kbps	NA	NA	NA	NA
Average Download throughput- 3G In Mbps	NA	NA	NA	NA
Average Download throughput-LTE in Mbps	4.85	3.086	16.1	25.82

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)

3G/4G/ Network:



Summary

City Level Summary- Voice

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	390	406	NA	305
Block call rate %	0.26	0.00	NA	0.98
CSSR %	99.74	99.26	NA	99.02
Drop call rate %	0	0.00	NA	0.00
Mobility HOSR %	99.55	99.67	NA	96.53
RX Quality %	97.97	99.52	NA	97.67
Average CST Sec	3.1	4.58	NA	2.366

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	NA	NA	NA
Block call rate %	NA	NA	NA	NA
CSSR %	NA	NA	NA	NA
Drop call rate %	NA	NA	NA	NA
Mobility HOSR %	NA	NA	NA	NA
RX Quality %	NA	NA	NA	NA
Average CST (Sec)	NA	NA	NA	NA

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	385	395	410	302
Block call rate %	0	0.00	0	0.33
CSSR %	100	97.47	100	99.67
Drop call rate %	0	1.81	0	0.00
Mobility HOSR %	99.91	98.17	98.79	98.01
RX Quality %	86.56	88.58	97.18	95.11
Average CST(Sec)	0.77	2.85	0.69	0.873

Summary

City Level Summary- Data Services -Static

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	NA	NA	NA
Upload Throughput in Mbps	NA	NA	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	11.06	5.968	20.87	31.27
Upload Throughput in Mbps	5.07	4.504	13.83	10.03
Video streaming delay in sec	0.67	NA	0	0.908
Web browsing delay in second	2.87	0.028	2.4	0.708
Latency in (msec)	65.09	51.46	44.67	67

1. Hotspot Location- BALCO

	2G			
	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	7.98	3.945	18.23	28.42
Upload Throughput in Mbps	2.37	2.199	4.34	8.13
Video streaming delay in sec	0.64	NA	0	1.02
Web browsing delay in second	2.98	0.03	2.7	0.78
Latency in (msec)	59.67	51.00	41	85

2. Hotspot Location-NTPC

	2G			
	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	13.96	3.292	35.05	33.32
Upload Throughput in Mbps	12.59	7.414	9.91	10.62
Video streaming delay in sec	0.68	NA	0	0.09
Web browsing delay in second	2.61	0.04	2.1	1.16
Latency in (msec)	59.86	55.92	45	77

3. Hotspot Location-Ghantaghar Chowk

	2G			
	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	13.01	2.260	20.03	24.82
Upload Throughput in Mbps	4.36	2.147	34.04	10.96
Video streaming delay in sec	0.71	NA	0	0.96
Web browsing delay in second	2.56	0.02	2.3	0.51
Latency in (msec)	55.62	48.59	40	63

4. Hotspot Location-main Bust Stand

	2G			
	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	10.96	6.098	13.10	32,41
Upload Throughput in Mbps	5.27	3.818	3.57	12.21
Video streaming delay in sec	0.66	NA	0	1.58
Web browsing delay in second	3.17	0.03	2.4	0.86
Latency in (msec)	68.24	51.5	49	61

5. Hotspot Location-Railway Station Korba

	2G			
	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	8.24	5.372	16.83	29.02
Upload Throughput in Mbps	1.51	2.337	04.05	8.62
Video streaming delay in sec	0.54	NA	0	1.01
Web browsing delay in second	3.03	0.02	2.9	0.52
Latency in (msec)	68.91	50.84	46	63

6. Hotspot Location-Deen Dayal Market

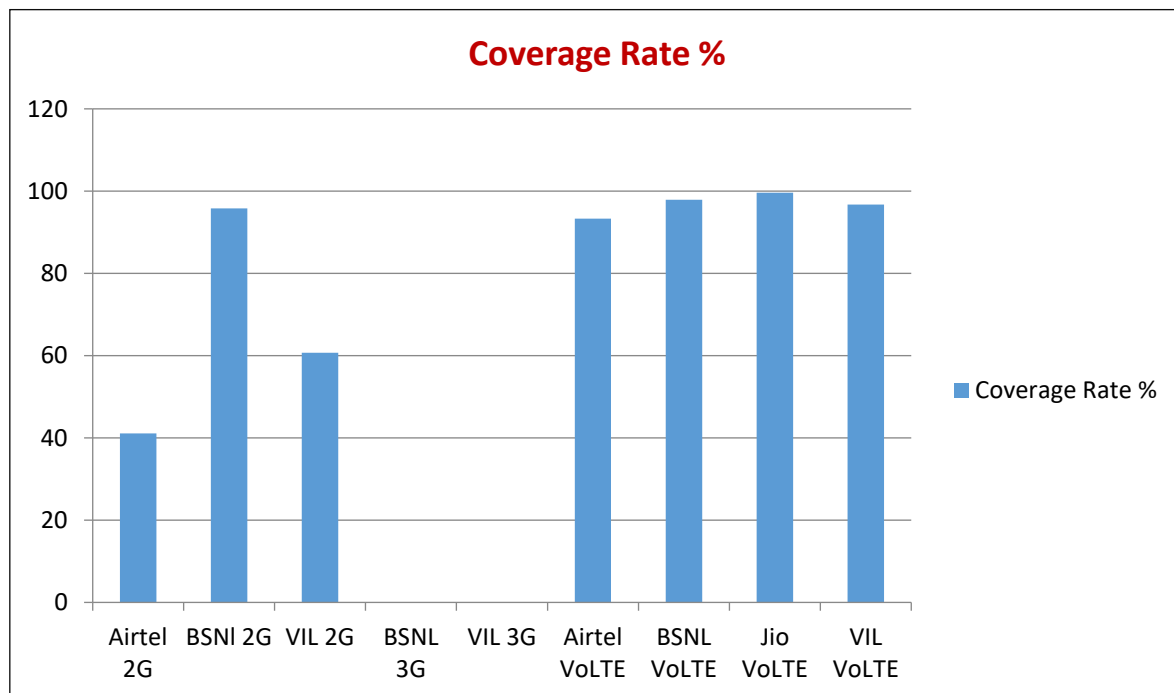
	2G			
	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	NA	NA	NA	NA
Upload Throughput in Kbps	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	15.64	14.841	22	40.78
Upload Throughput in Mbps	4.32	9.114	27.07	9.68
Video streaming delay in sec	0.77	NA	0	0.78
Web browsing delay in second	2.92	0.03	2.0	0.42
Latency in (msec)	78.28	50.92	47	58

Coverage Details

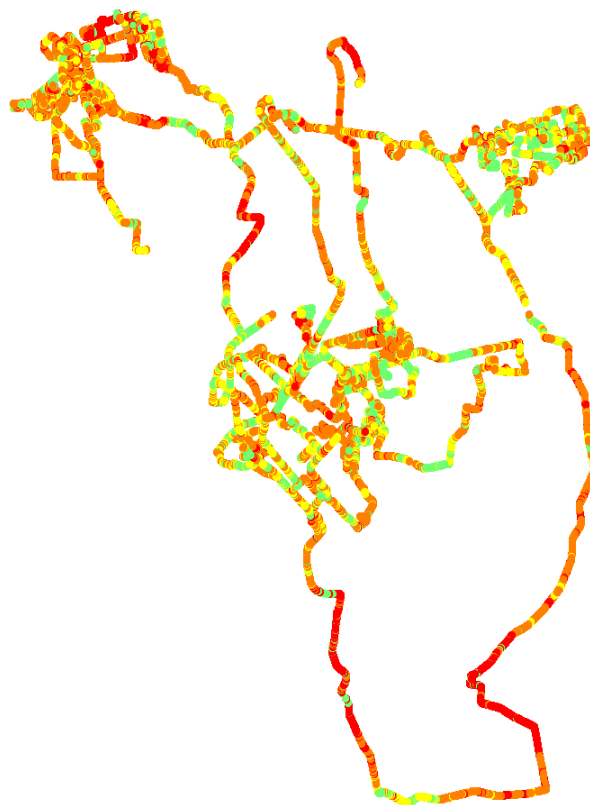
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level \geq -85 dBm, RSCP is \geq -90 dBm & RSRP \geq -110dBm. The details are as follows.


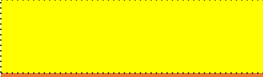


TSP	Coverage Rate %
Airtel 2G	41.04
BSNI 2G	95.8
VIL 2G	60.66
Airtel VoLTE	93.29
BSNL VoLTE	97.9
Jio VoLTE	99.61
VIL VoLTE	96.72



TSP- Airtel

Technology	Coverage %
2G	41.04

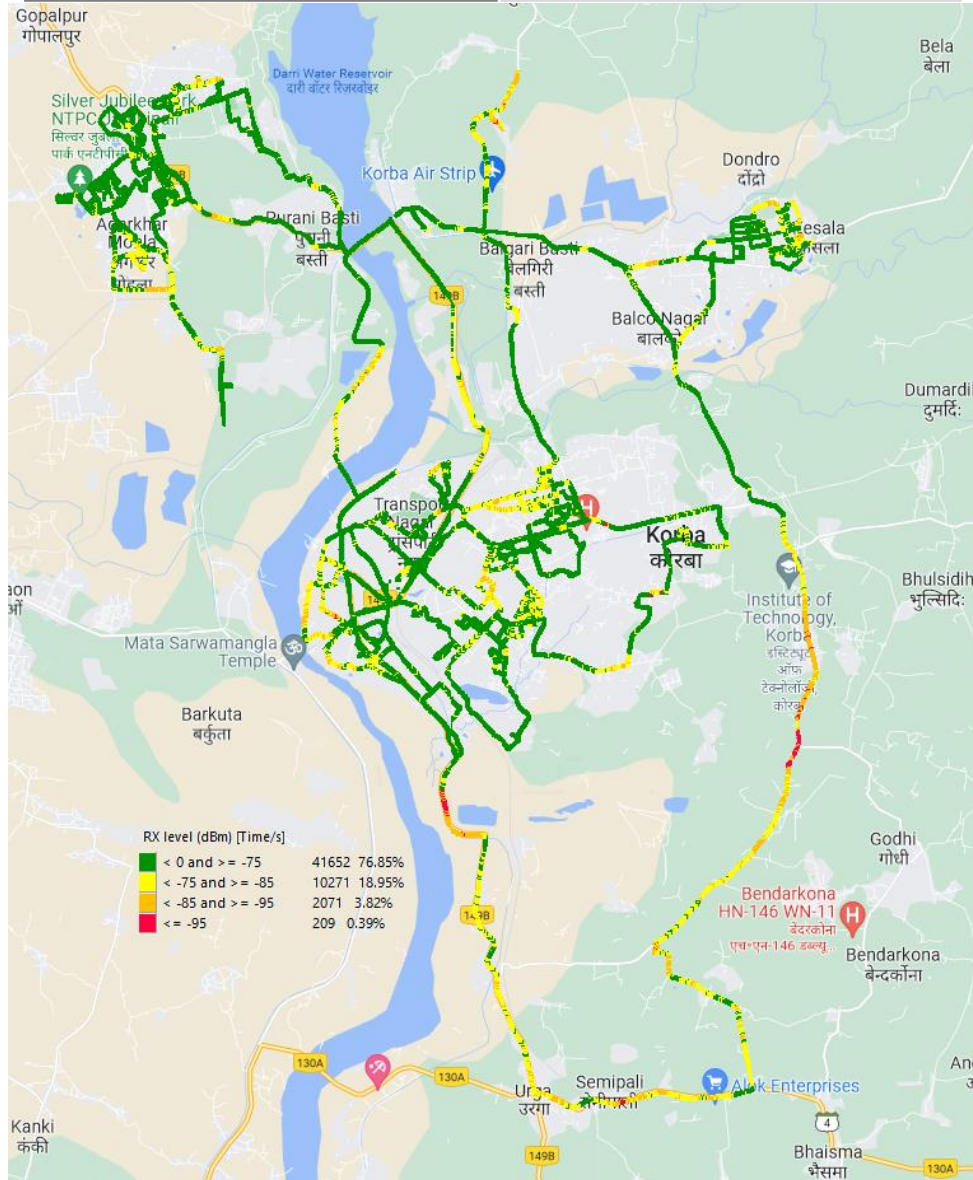


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	989329	16.98	
[-75, >=-85)	1399818	24.03	
[-85, >=-95)	2391719	50.32	
[-95, >=Min)	505266	8.67	
Total	5826132	100	

Coverage Details

TSP-BSNL

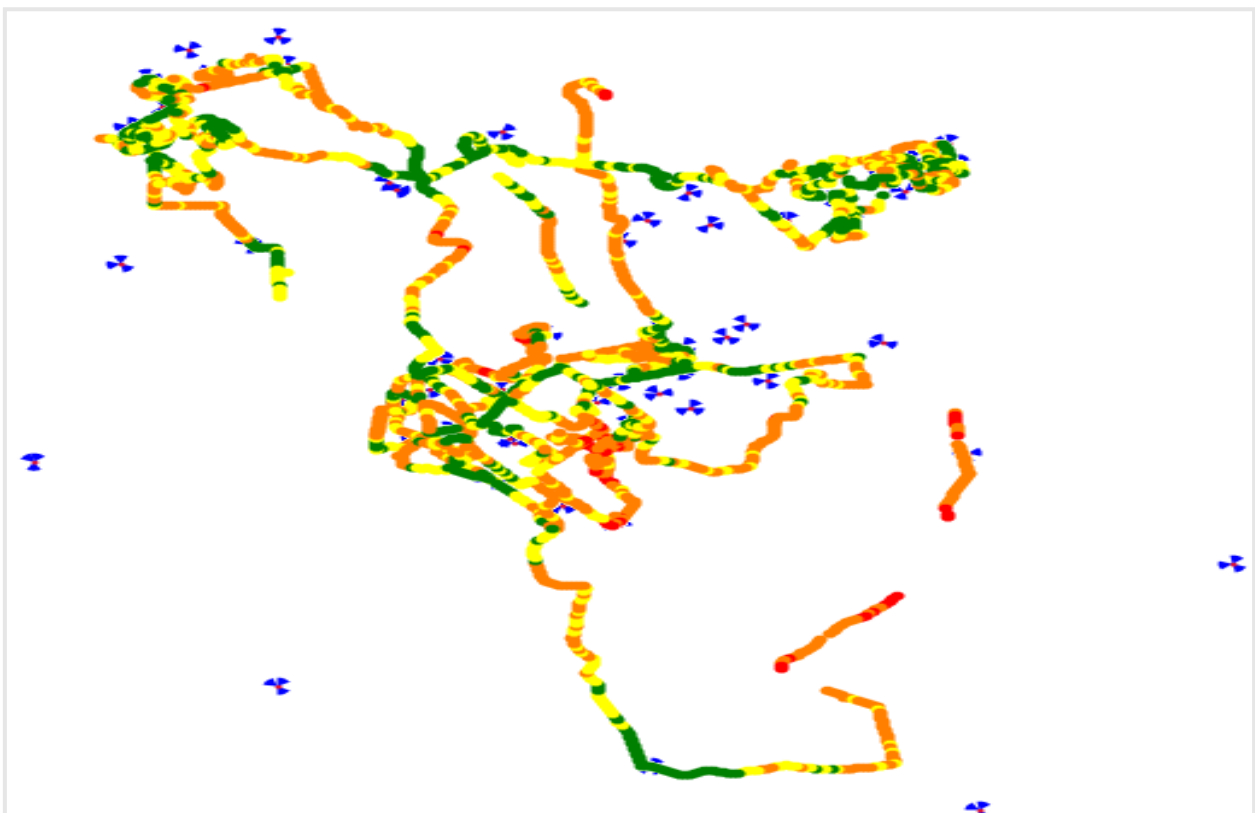
Technology	Coverage %
2G	95.80%







2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >= -75]	41652	76.85%	
[-75, >= -85)	10271	18.95%	
[-85, >= -95)	2071	3.82%	
[-95, >= Min)	209	0.38%	
Total	54203	100.00%	

TSP-VI

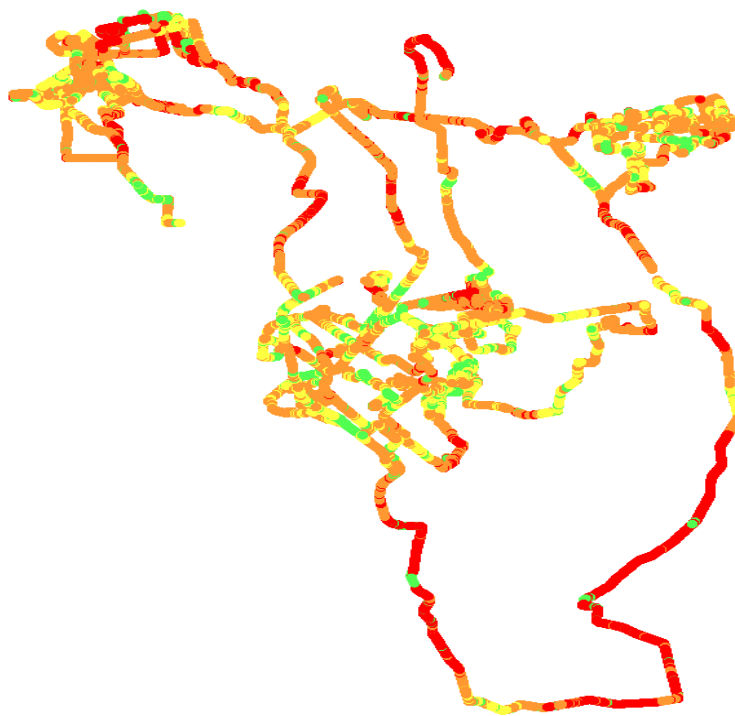
Technology	Coverage %
2G	60.66







2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	5004	26.84	
[-75, >=-85)	6304	33.82	
[-85, >=-95)	6969	37.39	
[-95, >=Min)	364	1.95	
Total	18641	100	

TSP- Airtel

Technology	Coverage %
VoLTE	93.29

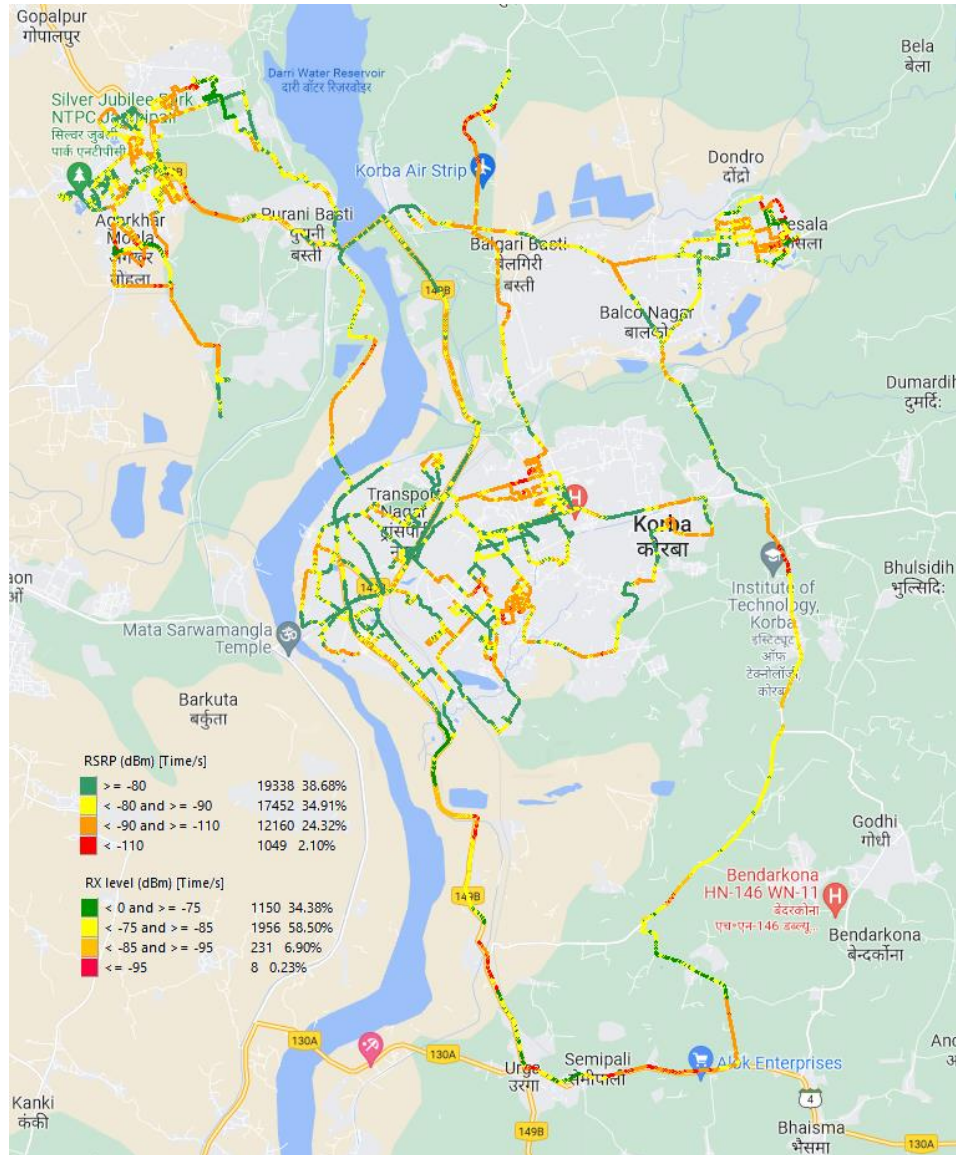


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1423412	10.73	
[-80, >=-90)	3691998	27.82	
[-90, >=-110)	7265958	54.75	
[-110, >=Min)	890431	6.71	
Total	13271799	100	

Coverage Details

TSP- BSNL

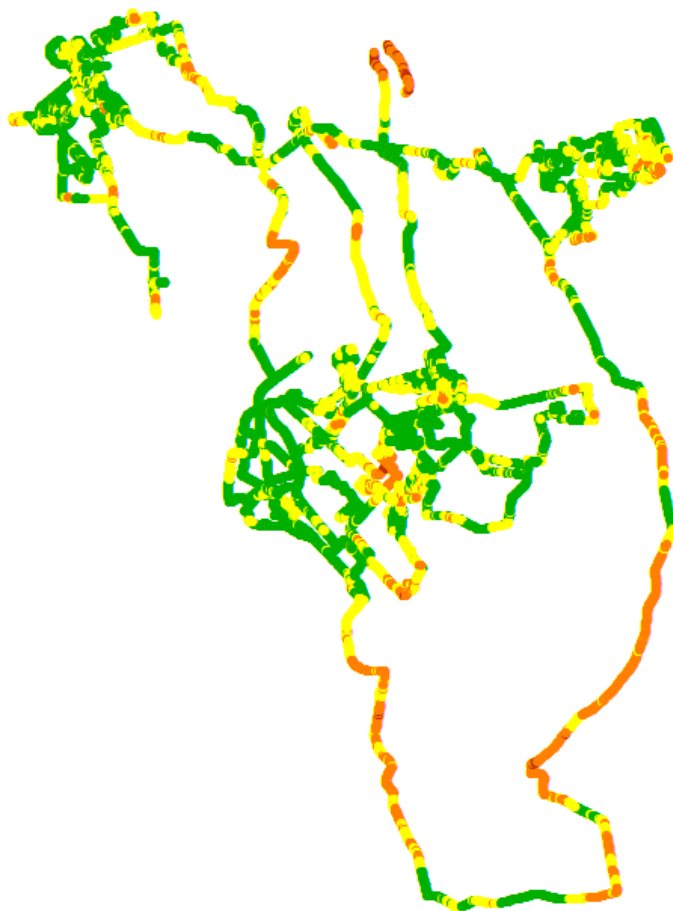
Technology	Coverage %
VoLTE	97.90 %







VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	19338	38.68%	
[-80, >=-90)	17452	34.91%	
[-90, >=-110)	12160	24.31%	
[-110, >=Min)	1049	2.10%	
Total	49999	100%	

TSP- Jio

Technology	Coverage %
VoLTE	99.61%

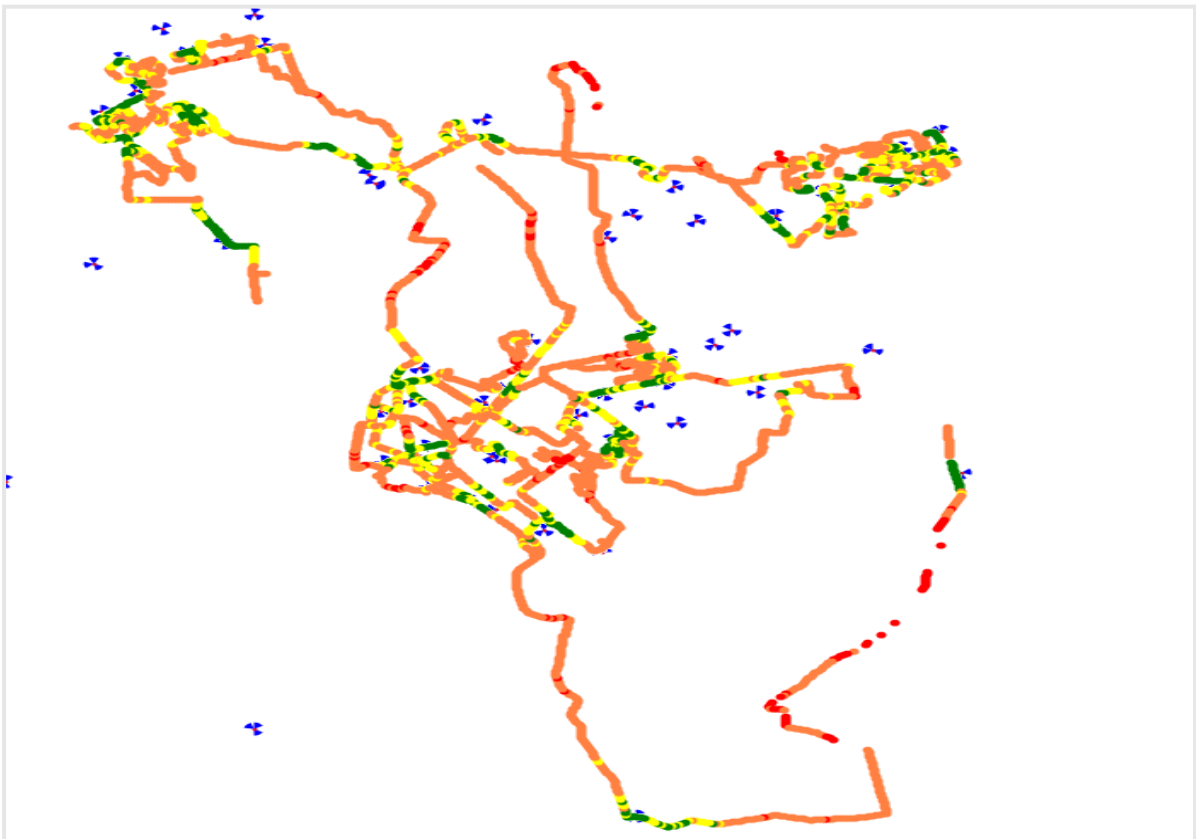






VoLTE

Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	20912	59.97%	
[-80, >=-90)	11081	31.78%	
[-90, >=-110)	2745	7.87%	
[-110, >=Min)	135	0.39%	
Total	34873	100%	

TSP-VI

Technology	Coverage %
VoLTE	96.72

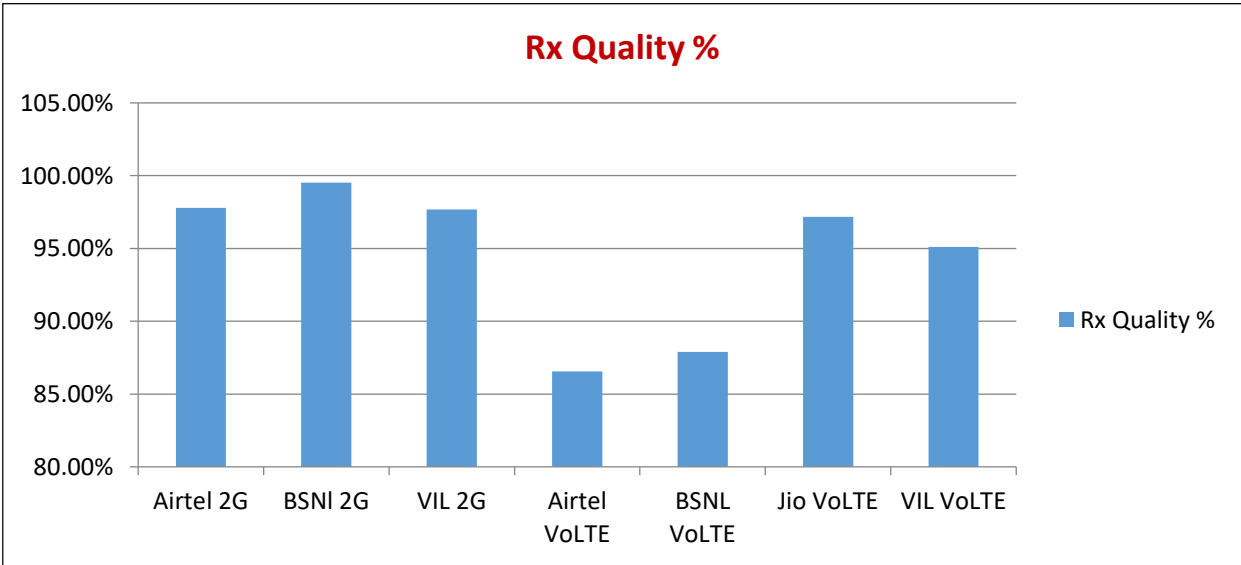


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	2303	11.92	
[-80, >=-90)	3982	20.6	
[-90, >=-110)	12407	64.2	
[-110, >=Min)	635	3.28	
Total	19327	100.00	

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	97.79%
BSNI 2G	99.52%
VIL 2G	97.67%
Airtel VoLTE	86.56%
BSNL VoLTE	87.90%
Jio VoLTE	97.18%
VIL VoLTE	95.11%



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	97.79

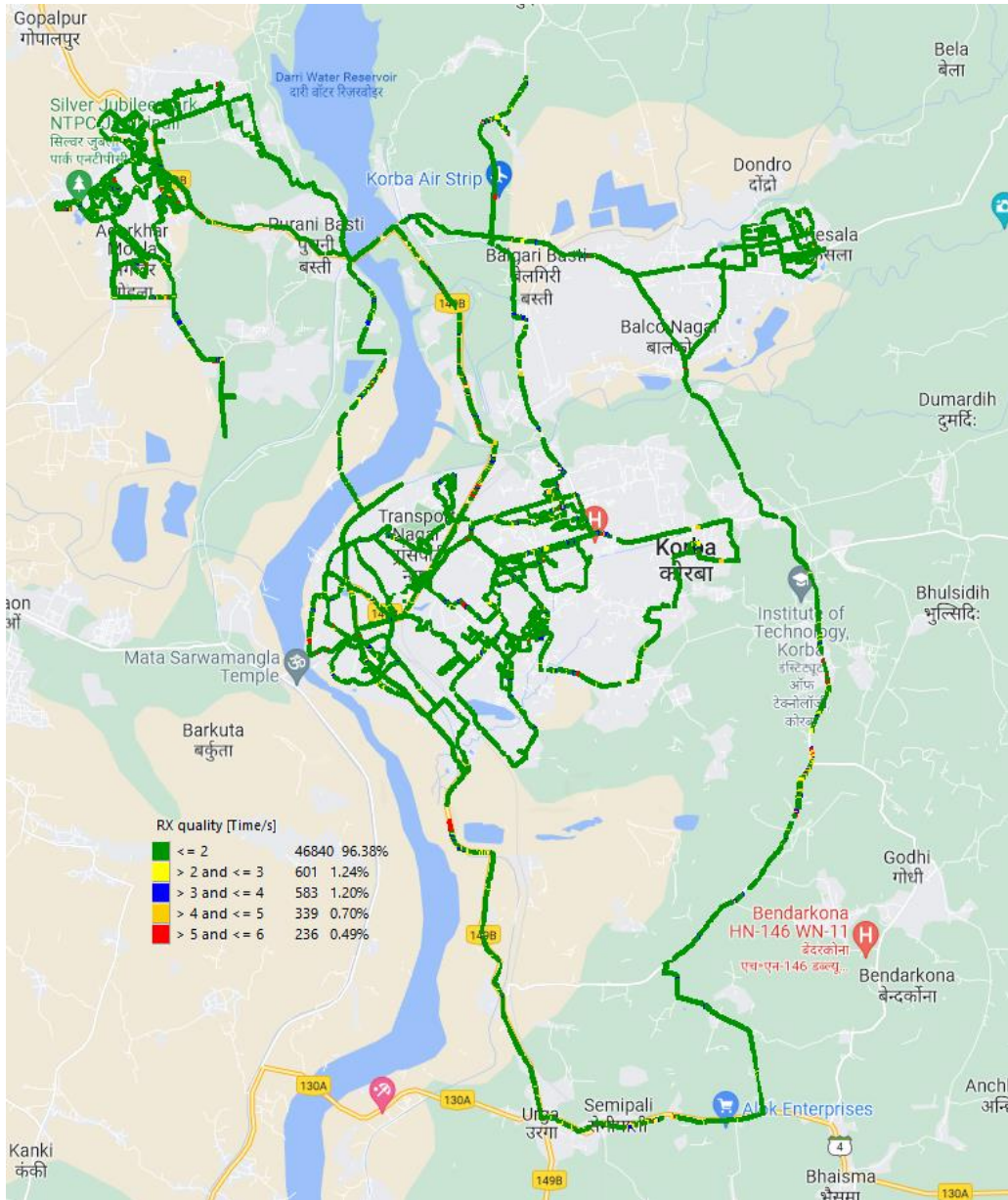


Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	4997518	82.81	
(2, ≤ 3)	306793	5.08	
(3, ≤ 4)	249143	4.13	
(4, ≤ 5)	348161	5.77	
(5, \leq Max)	133528	2.21	
Total	6631593	100	

Quality Details

TSP-BSNL

Technology	Rx Quality %
2G	99.52 %



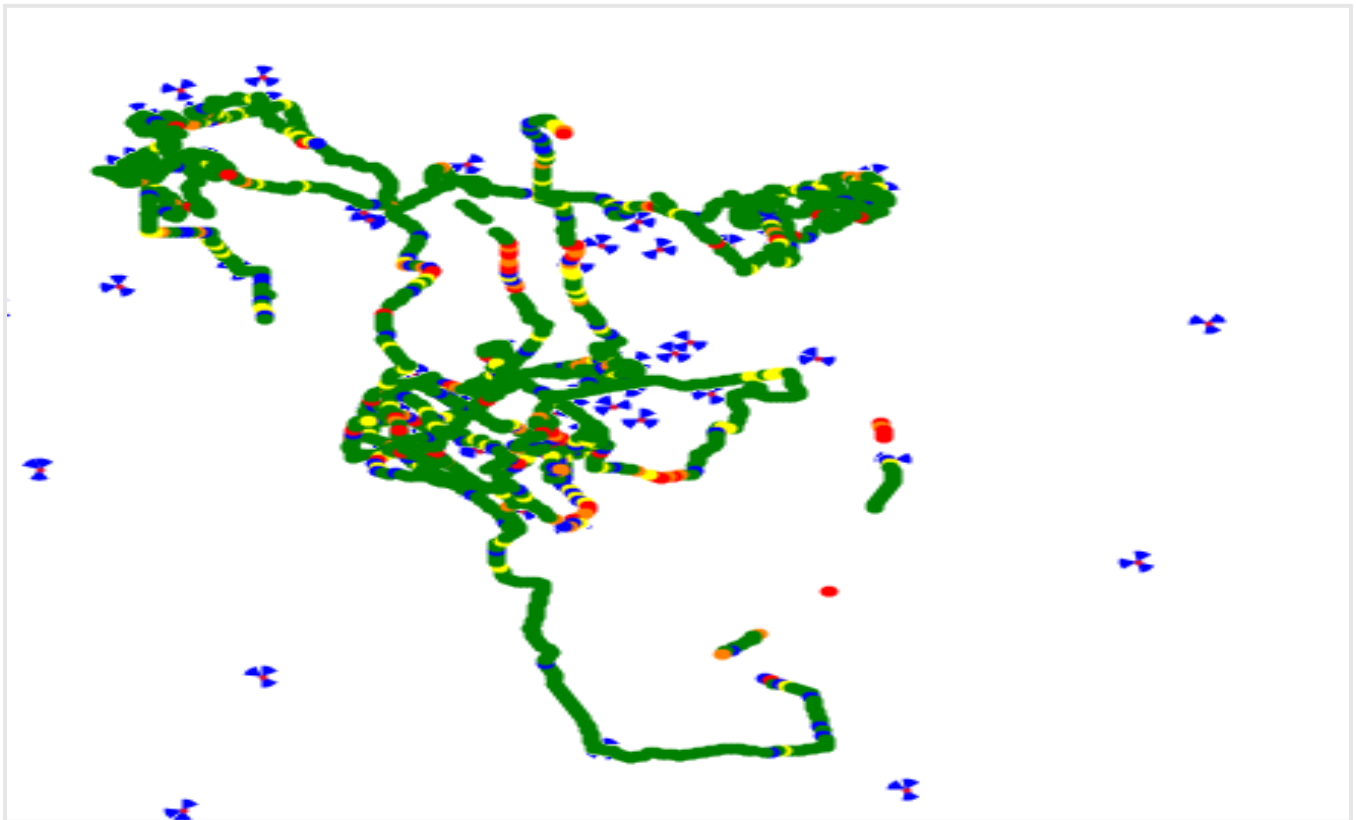
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	46840	96.38%	
(2, <=3)	601	1.24%	
(3, <=4)	583	1.20%	
(4, <=5)	339	0.70%	
(5, <=Max)	236	0.48%	
Total	48599	100.00%	






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-VI

Technology	Rx Quality %
2G	97.67



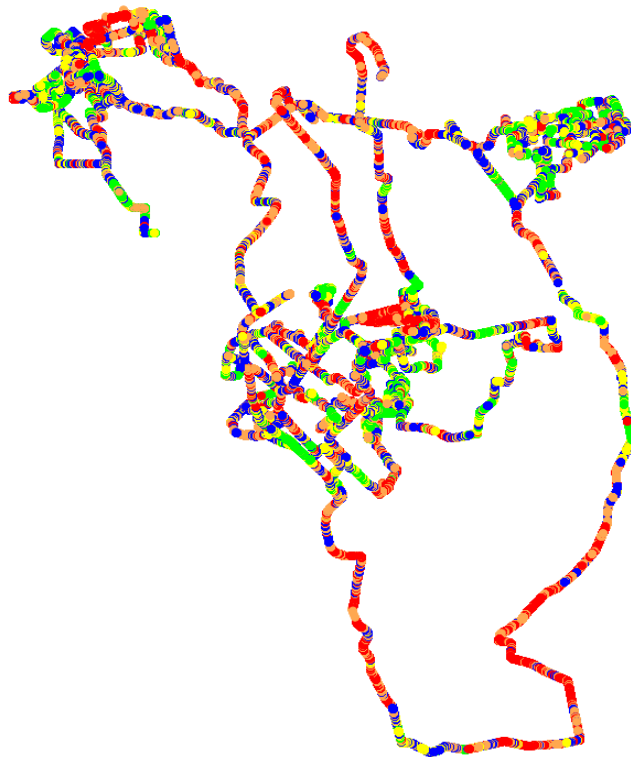
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	14043	84.83	
(2, ≤ 3)	1020	6.16	
(3, ≤ 4)	753	4.55	
(4, ≤ 5)	353	2.13	
(5, $\leq \text{Max}$)	385	2.33	
Total	16554	100	






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	86.56

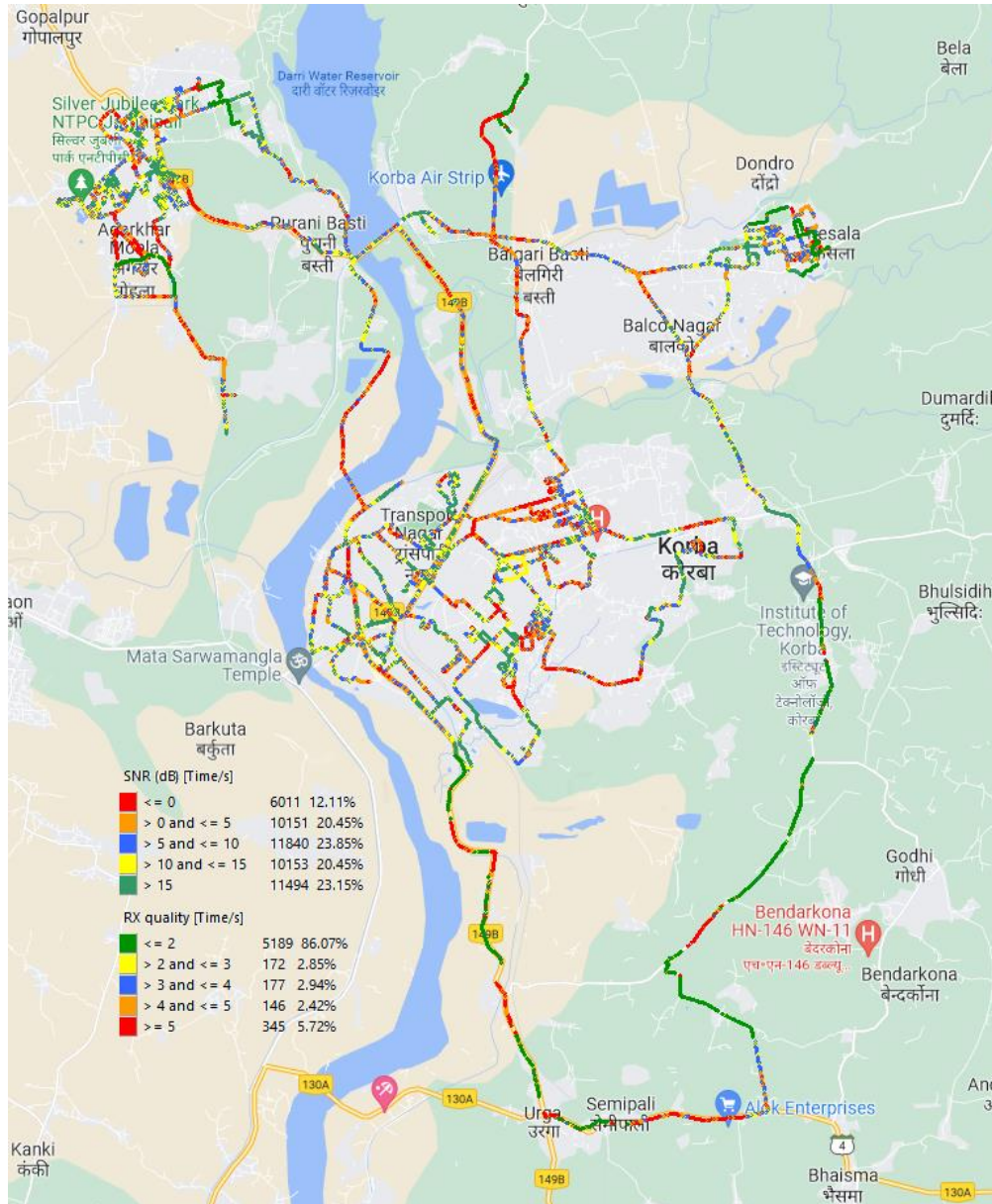


Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	1784178	13.44	
(0, ≤ 5)	3427070	25.82	
(5, ≤ 10)	3725339	28.07	
(10, ≤ 15)	2495682	18.80	
(15, $\leq \text{Max}$)	1839530	13.86	
Total	13271799	100	

Quality Details

TSP- BSNL

Technology	Rx Quality %
VoLTE	87.90 %



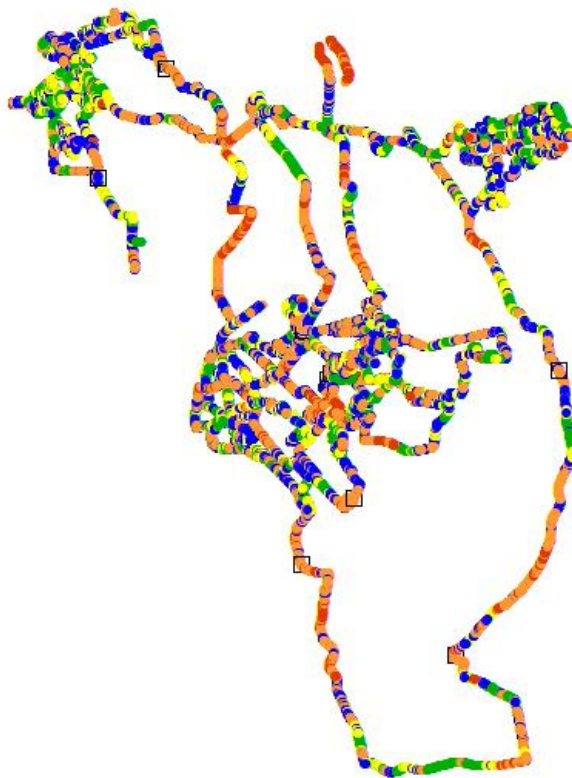
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	6011	12.10%	
(0, <=5)	10151	20.45%	
(5, <=10)	11840	23.85%	
(10, <=15)	10153	20.45%	
(15, <=Max)	11494	23.15%	
Total	49649	100%	

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-...JIO....

Technology	Rx Quality %
VoLTE	97.18



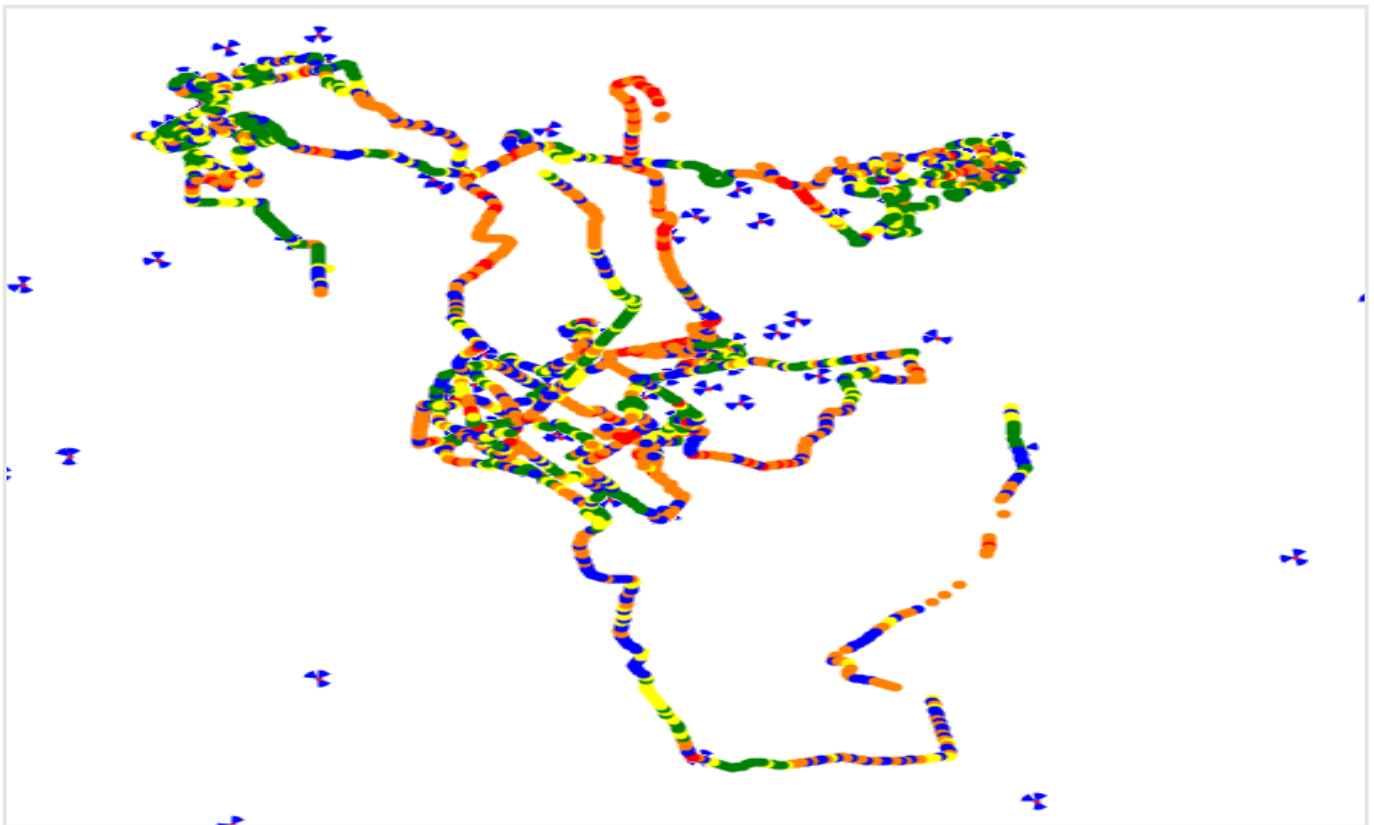
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	985	2.82	Red
(0, ≤ 5)	7131	20.44	Orange
(5, ≤ 10)	10624	30.45	Blue
(10, ≤ 15)	7272	20.84	Yellow
(15, $\leq \text{Max}$)	8875	25.44	Green
Total	34887		






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 $\geq 95\%$.

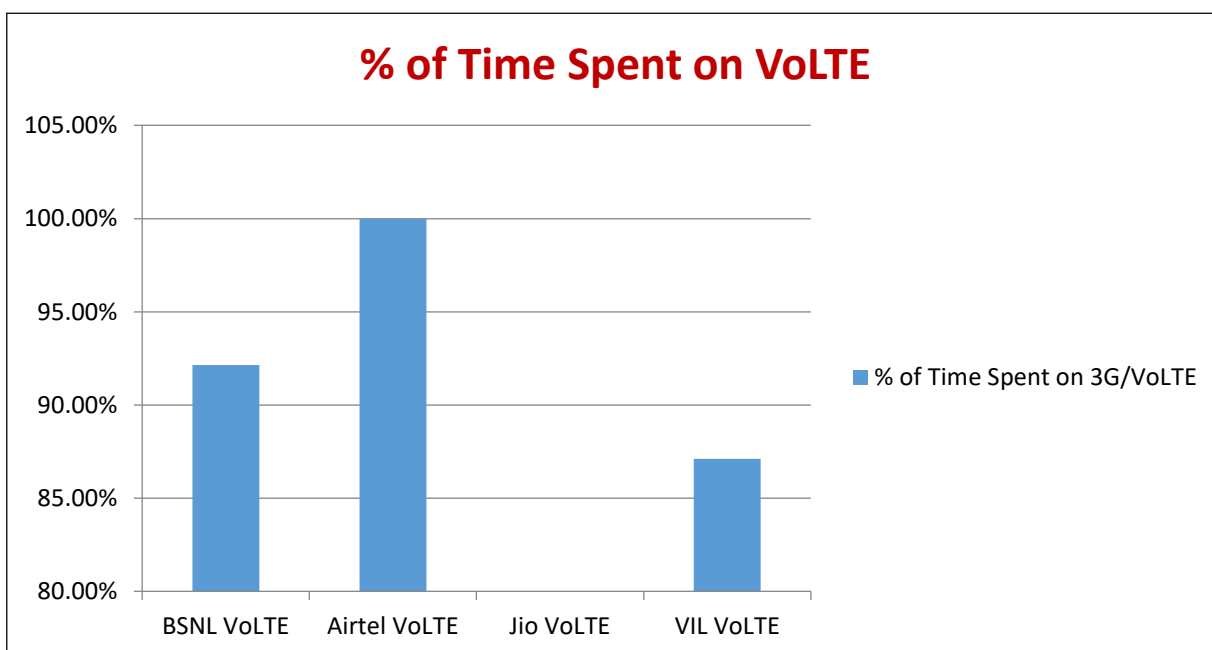
TSP-VI

Technology	Rx Quality %
VoLTE	95.11



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	944	4.89	
(0, ≤ 5)	5577	28.89	
(5, ≤ 10)	4146	21.48	
(10, ≤ 15)	3459	17.92	
(15, $\leq \text{Max}$)	5173	26.82	
Total	19299	100	

TSP	% of time spent
Airtel VoLTE	100
BSNL VoLTE	92.15
Jio VoLTE	100
VIL VoLTE	87.11



TSP-Airtel

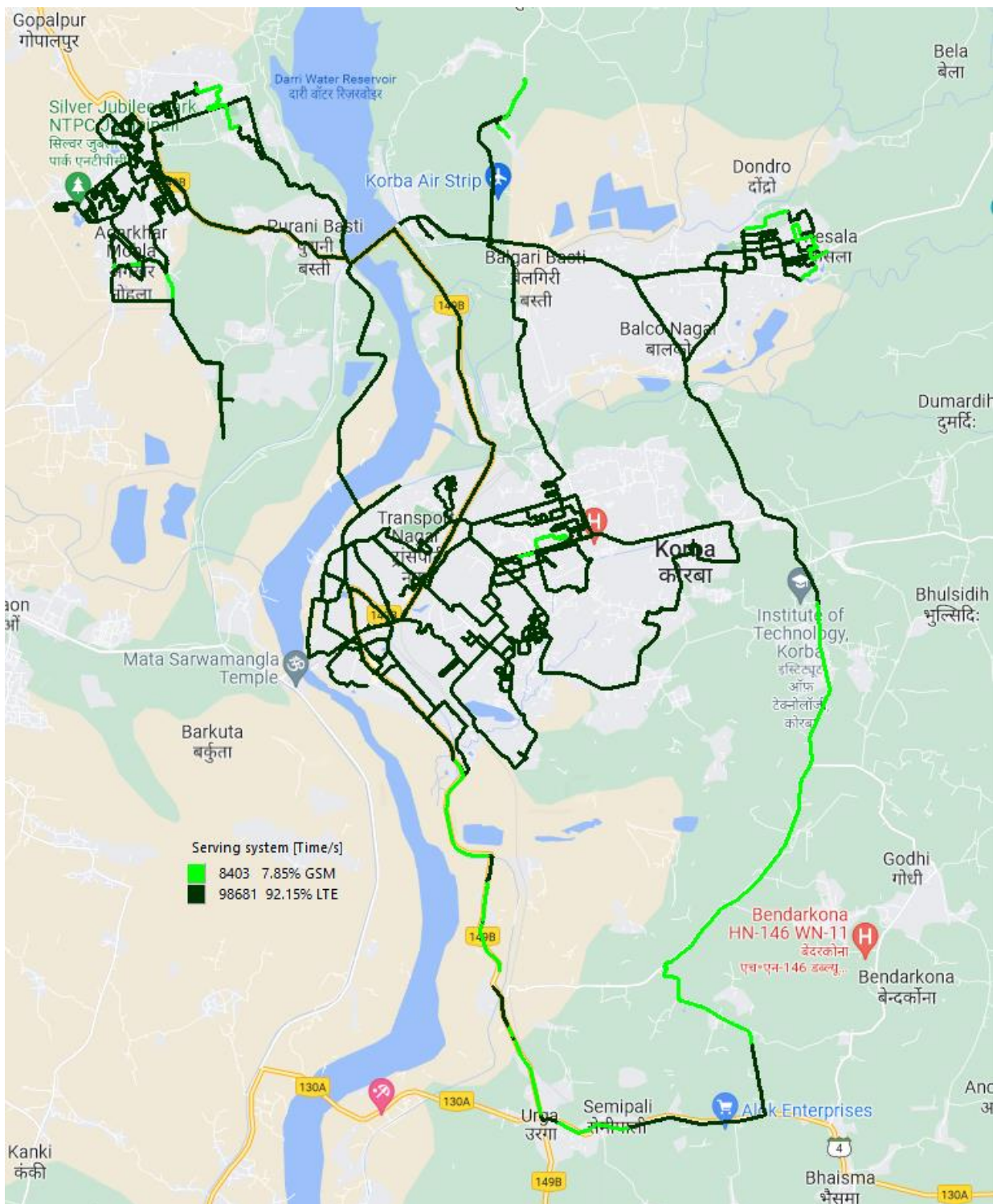
Technology	% of Time Spent on
VoLTE	100%



Technology Details

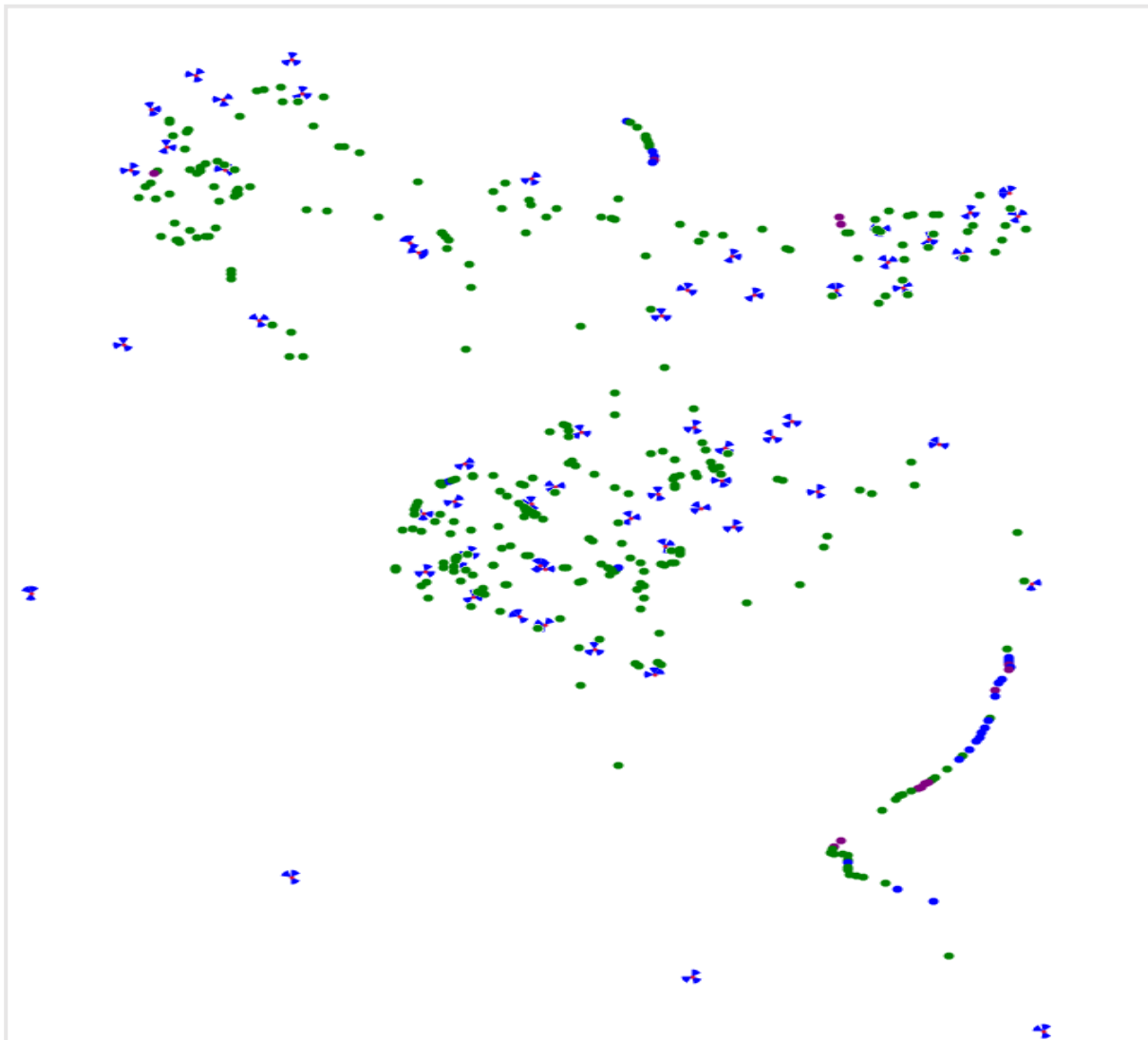
TSP- BSNL

Technology	% of Time Spent on
2G	7.85 %
VoLTE	92.15 %



TSP-VI

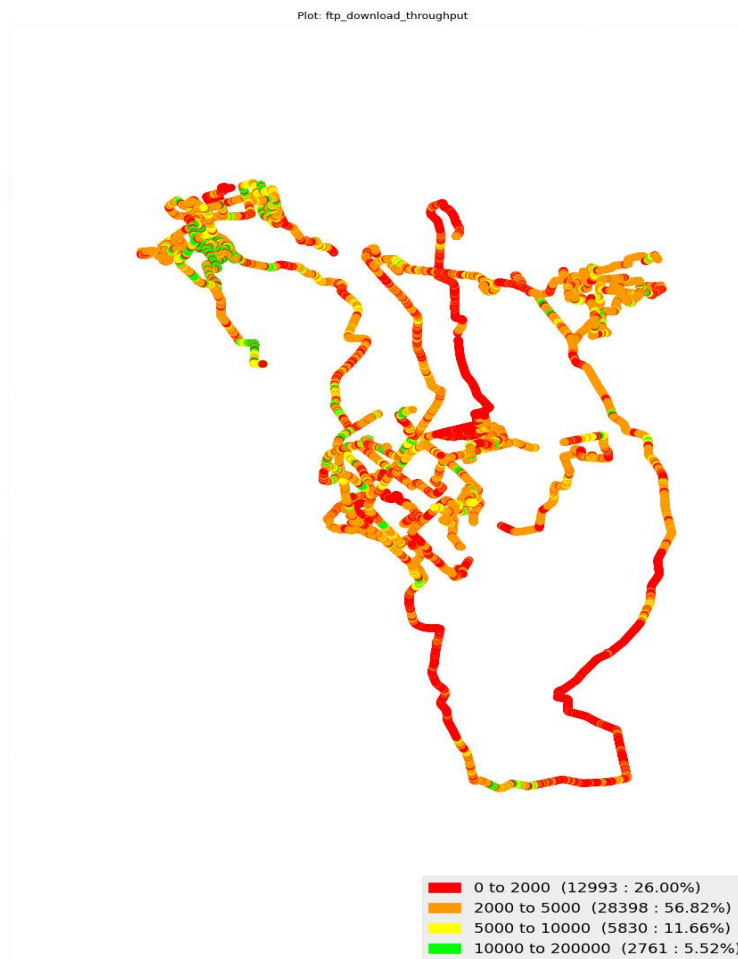
Technology	% of Time Spent on
VoLTE	87.11



TSP-Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	4.85



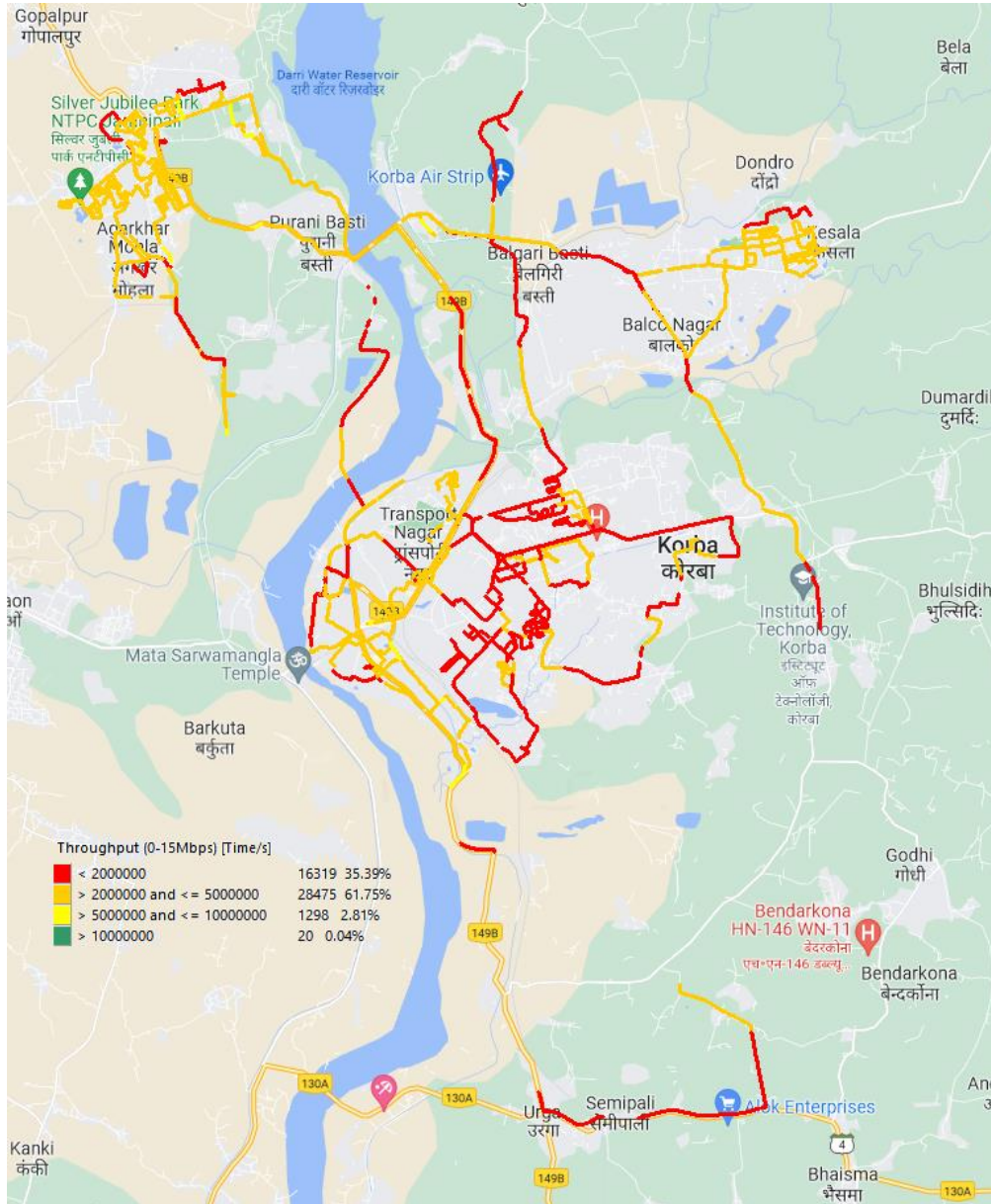
DL throughput	No of Sample	%	Legends
< 2Mbps	12993	26.00	
2-5 Mbps	28398	56.82	
5-10 Mbps	5830	11.66	
>10Mbps	2761	5.52	

Dynamic Data Test

TSP-BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	3.086

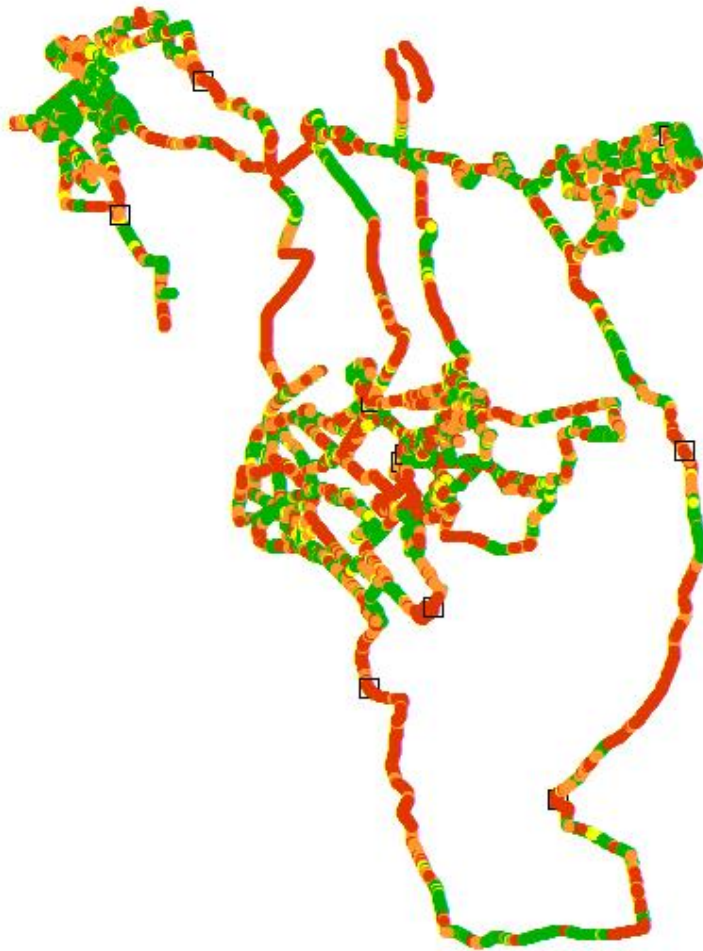


DL throughput	No of Sample	%	Legends
< 2Mbps	16319	35.39%	
2-5 Mbps	28475	61.75%	
5-10 Mbps	1298	2.81%	
>10Mbps	20	0.04%	

TSP JIO

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	16.1

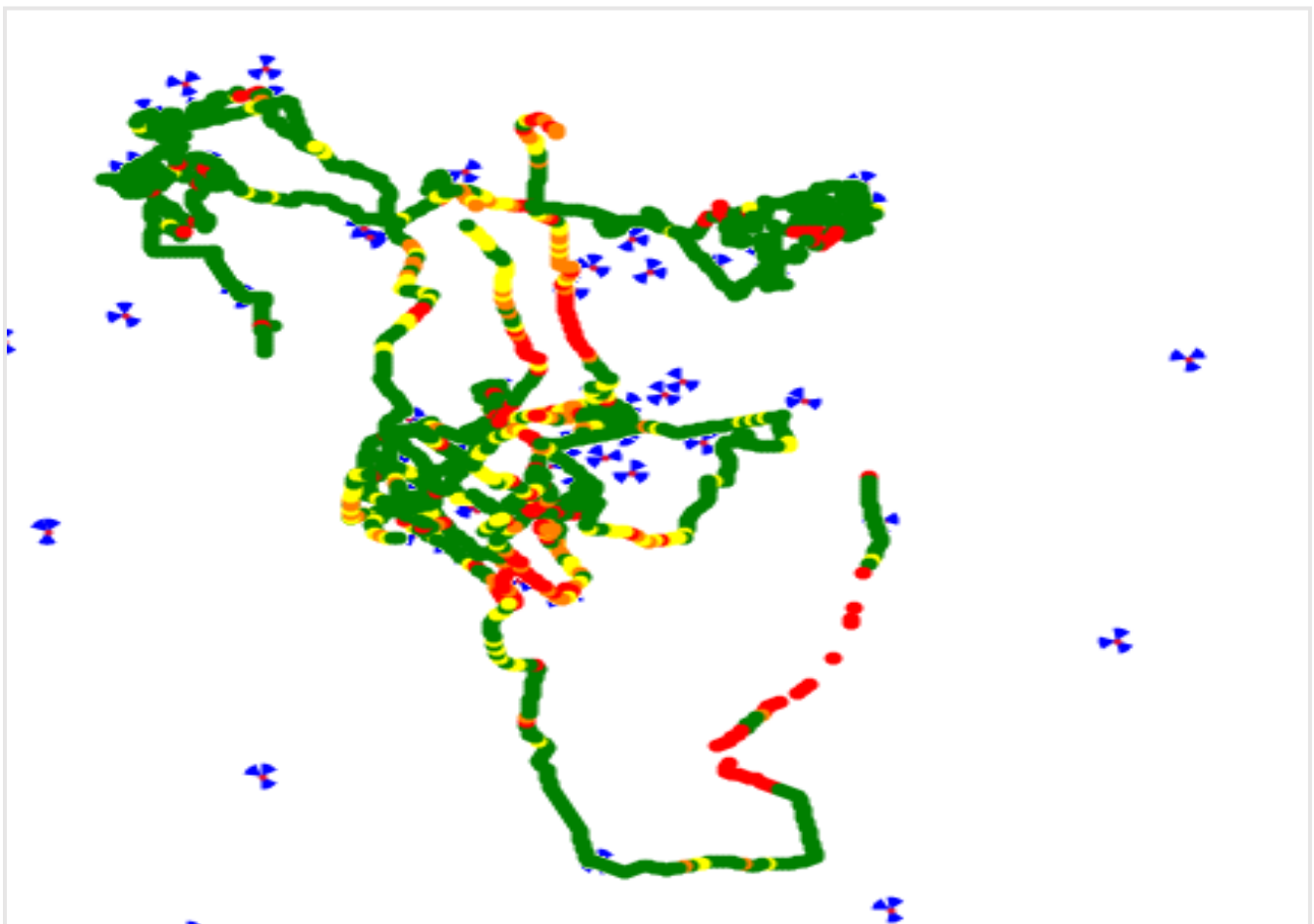


DL throughput	No of Sample	%	Legends
< 2Mbps	6337	18.16	Red
2-5 Mbps	8253	23.66	Orange
5-10 Mbps	4150	11.90	Yellow
>10Mbps	16147	46.28	Green

TSP-VI

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	25.82



DL throughput	No of Sample	%	Legends
< 2Mbps	1369	7.18	
2-5 Mbps	1054	5.53	
5-10 Mbps	1744	9.15	
>10Mbps	14898	78.14	