



Operator Assisted Drive Test Report

Durg- Bhilai City and nearby Area

13/05/2023 to 15/05/2023

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 Durg-Bhilai City and surrounding areas from 9:00 AM to 8:00 PM from 13/05/2024 to 15/05/2024. The drive test covered drive route of around 450 KMs.

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

Key Performance Indicators:

KPIAirtel	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 achieved except Airtel, JIO & VIL 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, 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)

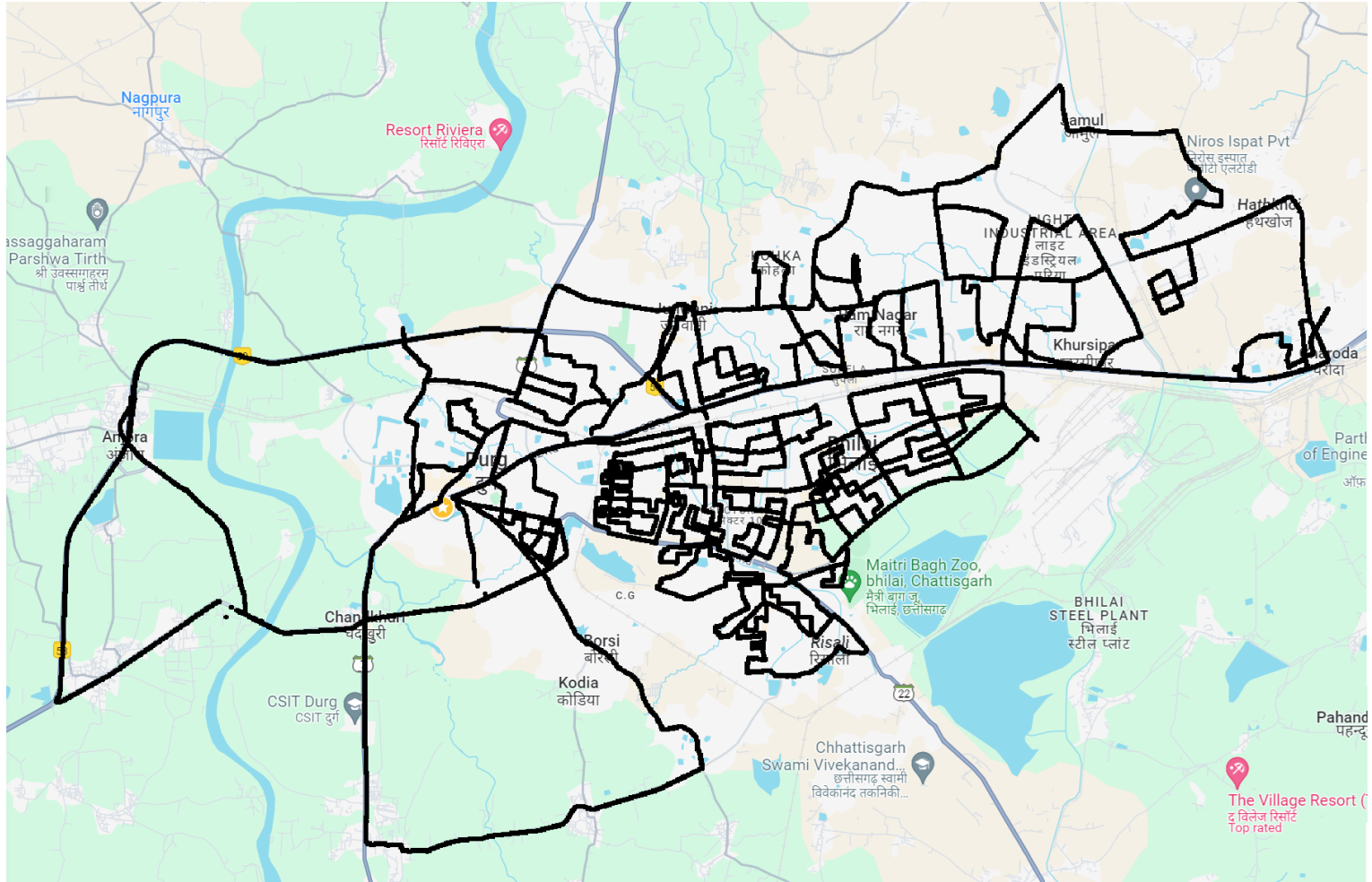
- i. 3G – measurement – UE in 3G File Size- 20MB
- ii. 4G – measurement – UE in LTE File Size- 40MB
- iii. 5G – measurement – UE in 5G File Size- 200MB

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

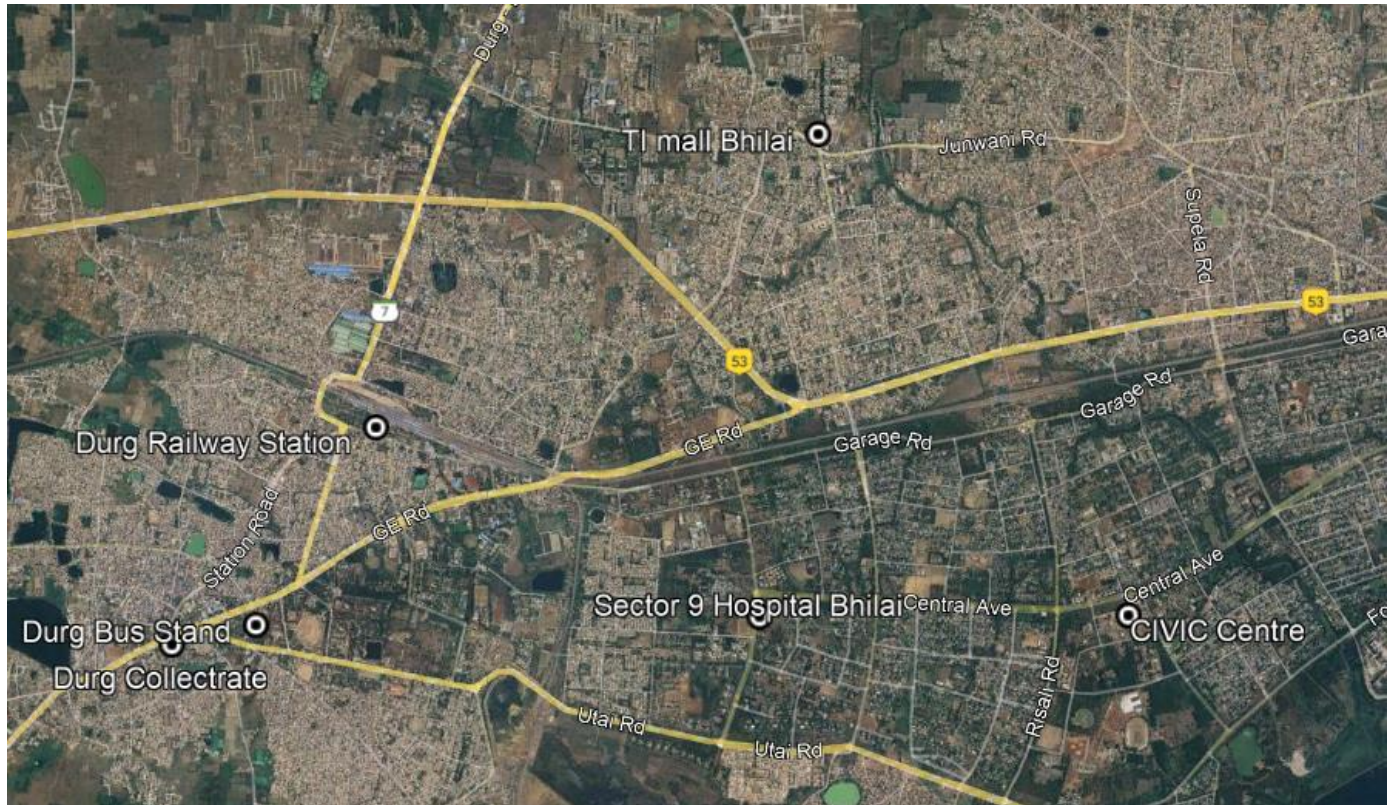


List of important area covered during the drive test

Nehru Nagar, Smriti Nagar, Risali, sector Areas of Bhilai,
Subhash Nagar, Jawahar Nagar, Station Road, Risali Town Area Bhilai
, Charoda & Bhilai-3 City, Light Industrial Area Hathkhoj
, Pulgaon Naka, Dhanora, Urla, Padmanabhpur, Gaya Nagar,
New Panchshil Nagar, Rasmada, Nahar Para, Baghera
camp area, Supela

Overview

Data Service Test- Static Locations



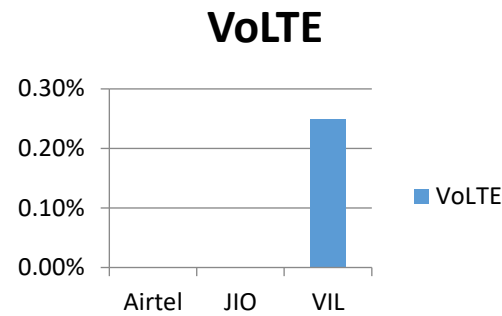
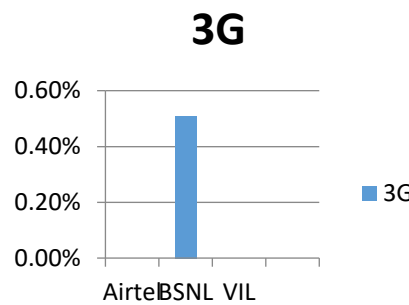
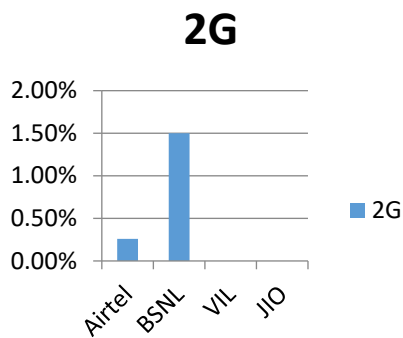
Hotspot Locations
CIVIC Centre Bhilai
Durg Bus Stand
Durg Railway Station
Sector 9 Hospital Bhilai
T.I. Mall Bhilai
Durg Collectorate

Voice Calls

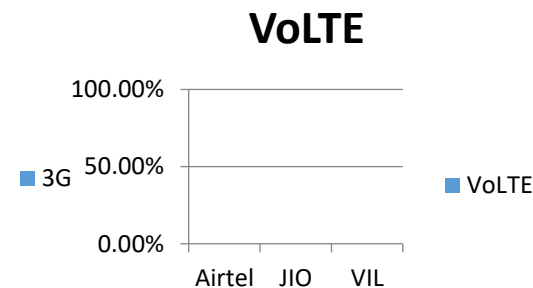
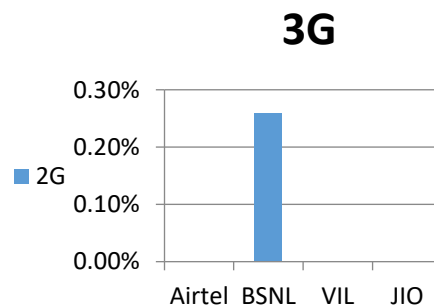
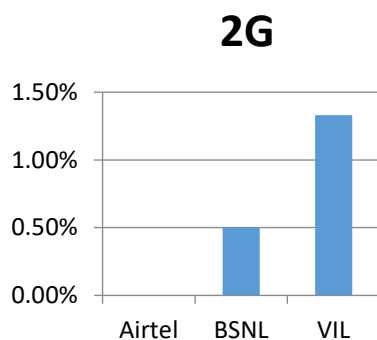
Key Observations

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 %	0.26	1.50	0%	0.51	NA	0	0%	0.25%
Block Call Rate %	0	0.50	1.33%	0.26	NA	0	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 %	63.57	97.24	94.48%

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

TSPs	3G
	BSNL
Coverage %	78.04

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	97.97	99.5	98.01%

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

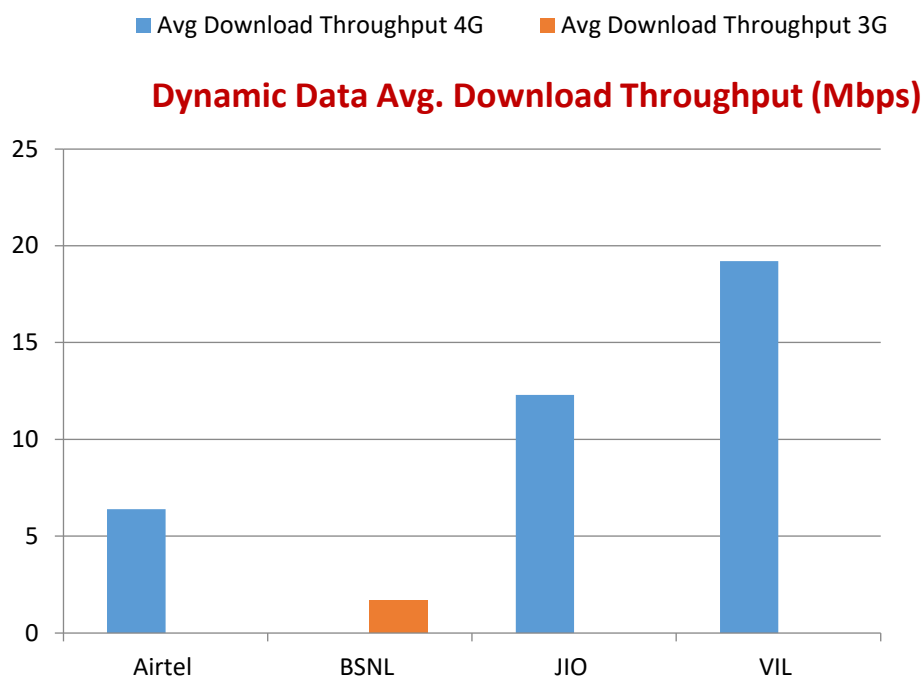
TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	57.96	NA	100%	100%	100%

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	6.4	NA	12.3	19.21

Summary

City Level Summary- Voice

TSP (For 2G)	Airtel	BSNL	VIL
Call attempts	379	403	375
Block call rate %	0.00	0.50	1.33
CSSR %	100	99	98.7
Drop call rate %	0.26	1.50	0
Mobility HOSR %	98.44	98.76	100
RX Quality %	97.91	95.42	96.14
Average CST Sec	2.94	3.842	2.03

TSP (For 3G)	BSNL
Call attempts	392
Block call rate %	0.26
CSSR %	99.74
Drop call rate %	0.51
Mobility HOSR %	99.84
RX Quality %	96.32
Average CST (Sec)	3.668

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	388	NA	417	388
Block call rate %	0.00	NA	0	0
CSSR %	100	NA	100	100
Drop call rate %	0.00	NA	0	0.25
Mobility HOSR %	99.83	NA	99.12	100
RX Quality %	86.49	NA	91.73	92.71
Average CST(Sec)	0.72	NA	0.68	0.04

Summary

City Level Summary- Data Services -Static

TSP (For 3G)	BSNL
Download throughput in Mbps	1.68
Upload Throughput in Mbps	NA
Video streaming delay in sec	NA
Web browsing delay in second	NA
Latency in (msec)	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	9.6	NA	70.41	18.7
Upload Throughput in Mbps	3.47	NA	34.06	8.4
Video streaming delay in sec	0.62	NA	0	0.63
Web browsing delay in second	2.5	NA	1.9	2.1
Latency in (msec)	58.9	NA	51.55	57

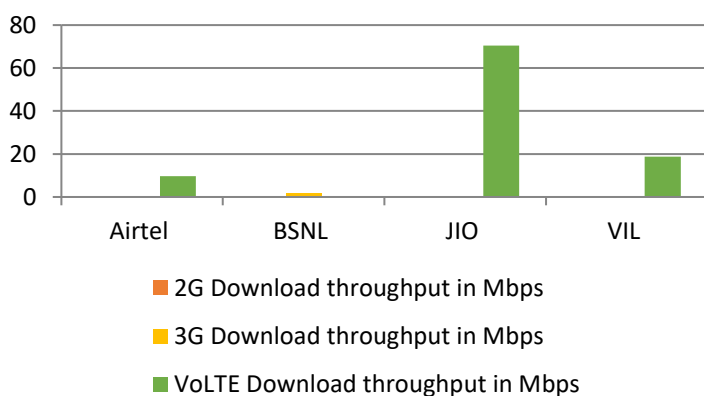
Data Services Static

Key Observations

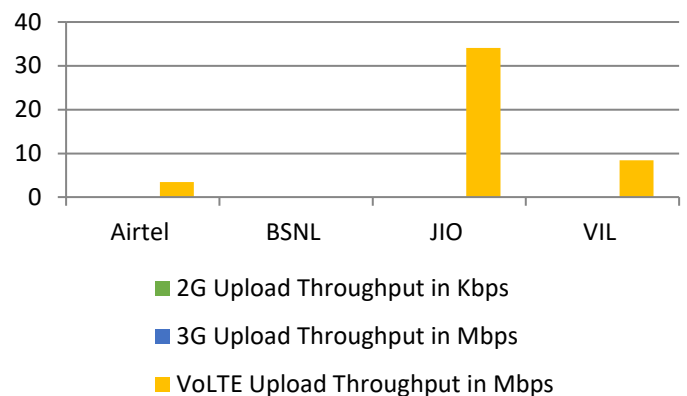
Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, PayTm)

3G/4G/ 5G Network

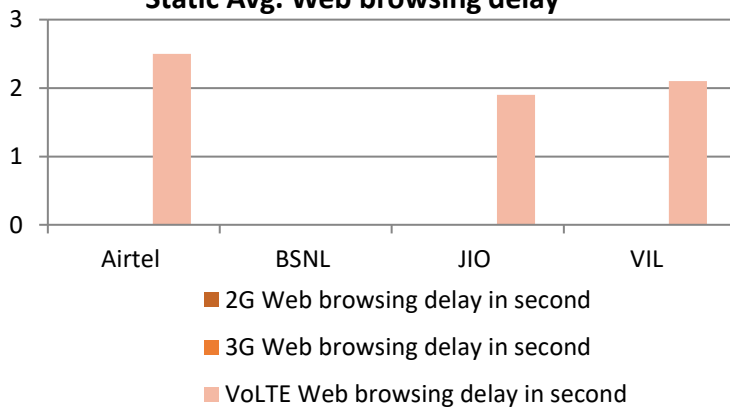
Static Avg. Data download throughput



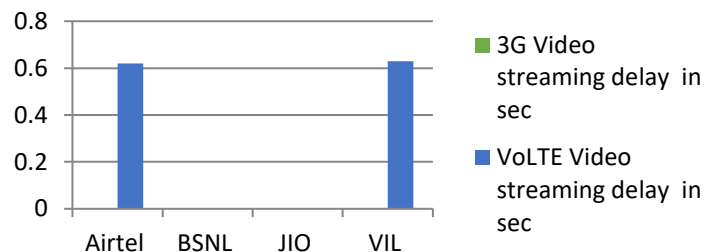
Static Avg. Data Upload Throughput



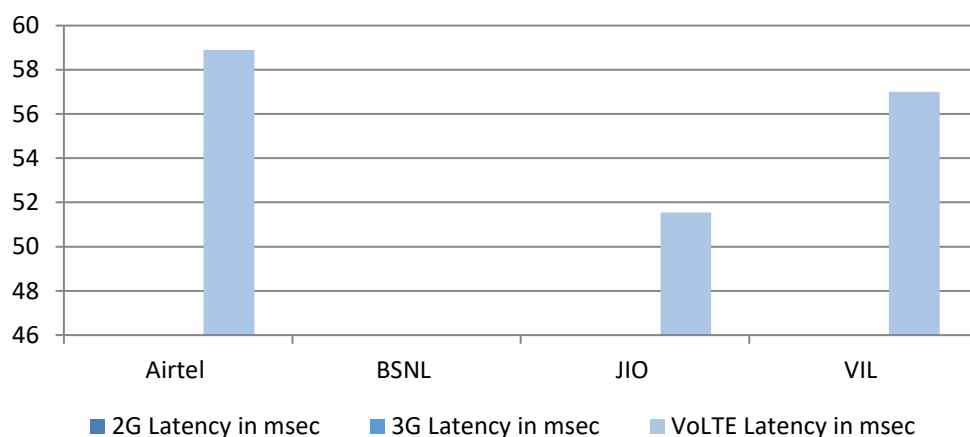
Static Avg. Web browsing delay



Static Avg. Video Streaming Delay



Static Latency in (msec)



1. Hotspot Location- Durg Railway Station.

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	4.119	NA	NA
Upload Throughput in Mbps	NA	0.563	NA	NA
Video streaming delay in sec	NA	--	NA	NA
Web browsing delay in second	NA	0.05	NA	NA
Latency in (msec)	NA	42.20	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	8.03	NA	78.25	12.24
Upload Throughput in Mbps	2.97	NA	40.46	7.26
Video streaming delay in sec	0.61	NA	0	0.49
Web browsing delay in second	1.98	NA	2.1	1.7
Latency in (msec)	59.83	NA	49.6	67

2. Hotspot Location- Durg Bus Stand.

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.011	NA	NA
Upload Throughput in Mbps	NA	0.695	NA	NA
Video streaming delay in sec	NA	--	NA	NA
Web browsing delay in second	NA	0.05	NA	NA
Latency in (msec)	NA	40.30	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	11.43	NA	58.93	10.02
Upload Throughput in Mbps	4.63	NA	5.98	6.18
Video streaming delay in sec	0.66	NA	0	0.39
Web browsing delay in second	2.86	NA	2	1.67
Latency in (msec)	55.65	NA	55.4	64

3. Hotspot Location- Durg Collectrate.

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	4.428	NA	NA
Upload Throughput in Mbps	NA	0.916	NA	NA
Video streaming delay in sec	NA	--	NA	NA
Web browsing delay in second	NA	0.06	NA	NA
Latency in (msec)	NA	44.6	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	13.67	NA	28.06	15.23
Upload Throughput in Mbps	5.56	NA	41.57	3.98
Video streaming delay in sec	0.52	NA	0	0.48
Web browsing delay in second	2.34	NA	1.9	2.43
Latency in (msec)	62.23	NA	49.6	57

4. Hotspot Location- Sector 9 Hospital

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.673	NA	NA
Upload Throughput in Mbps	NA	0.358	NA	NA
Video streaming delay in sec	NA	--	NA	NA
Web browsing delay in second	NA	0.14	NA	NA
Latency in (msec)	NA	47.065	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	9.13	NA	55.38	14.02
Upload Throughput in Mbps	4.52	NA	45.74	6.52
Video streaming delay in sec	0.61	NA	0	0.47
Web browsing delay in second	2.97	NA	2.1	2.04
Latency in (msec)	55.0	NA	48.1	83

5. Hotspot Location- Civic Centre Bhilai

	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	4.081	NA	NA
Upload Throughput in Mbps	NA	0.747	NA	NA
Video streaming delay in sec	NA	--	NA	NA
Web browsing delay in second	NA	0.23	NA	NA
Latency in (msec)	NA	41.835	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	5.67	NA	95.57	18.05
Upload Throughput in Mbps	1.56	NA	27.45	5.18
Video streaming delay in sec	0.58	NA	0	0.55
Web browsing delay in second	2.29	NA	2.1	1.8
Latency in (msec)	56.0	NA	51.2	72

6. Hotspot Location-Surya TI Mall

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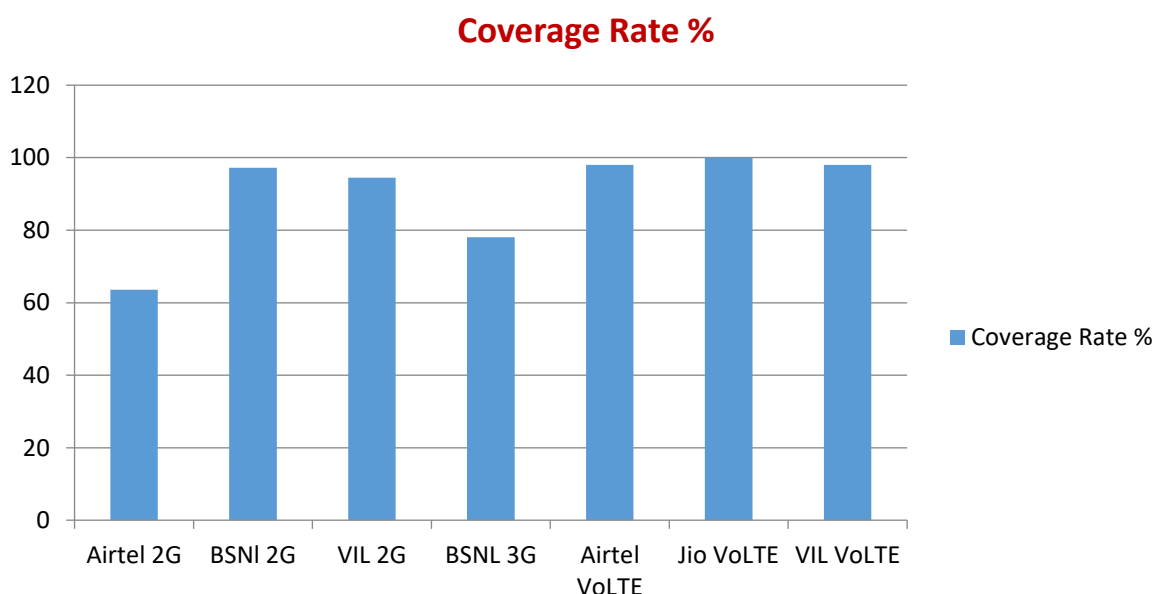
	3G			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	4.936	NA	NA
Upload Throughput in Mbps	NA	0.811	NA	NA
Video streaming delay in sec	NA	--	NA	NA
Web browsing delay in second	NA	0.22	NA	NA
Latency in (msec)	NA	102.1	NA	NA

	LTE			
	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	9.67	NA	106.28	13.12
Upload Throughput in Mbps	1.56	NA	43.16	7.28
Video streaming delay in sec	0.69	NA	0	0.61
Web browsing delay in second	2.54	NA	2	2.04
Latency in (msec)	64.65	NA	55.4	78

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.

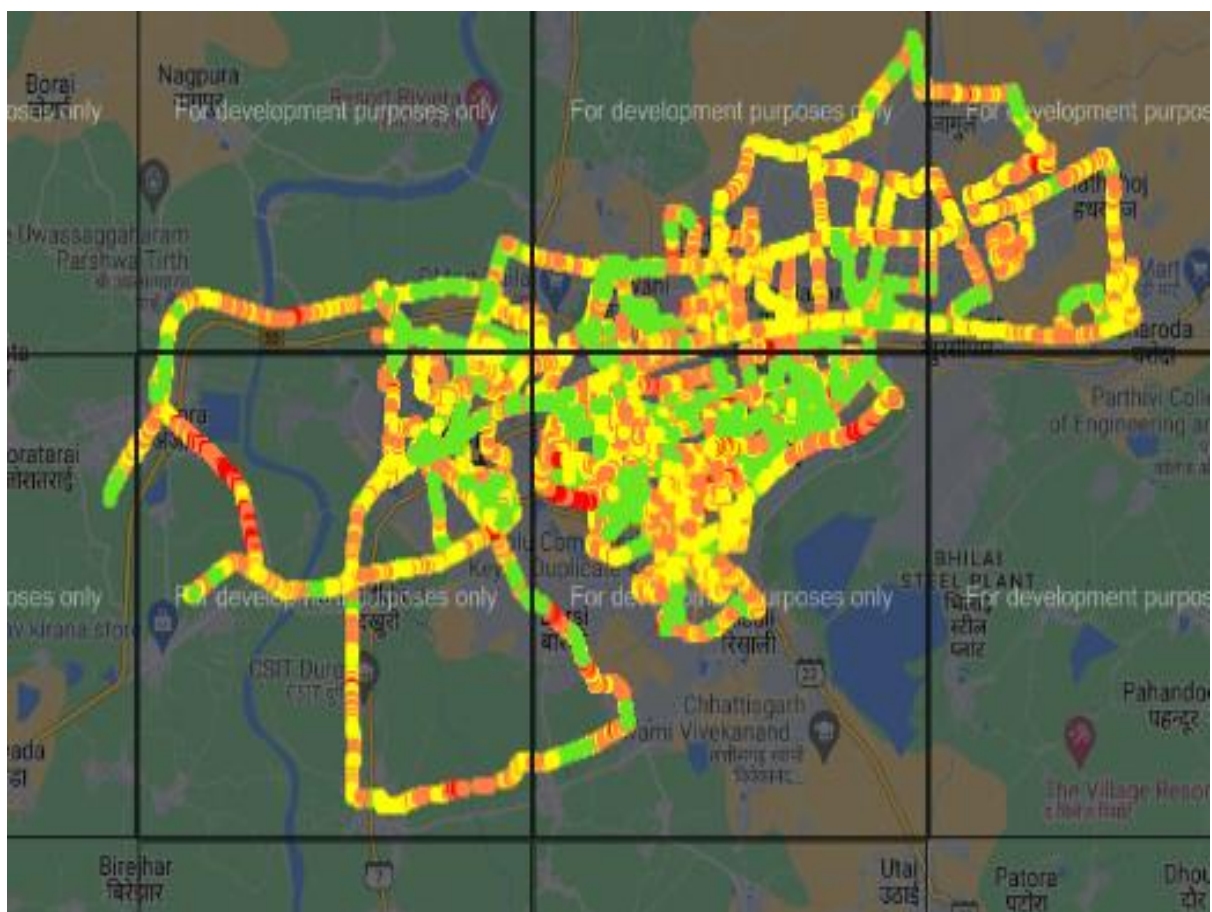
TSP	Coverage Rate %
Airtel 2G	63.57
BSNI 2G	97.24
VIL 2G	94.48
BSNL 3G	78.04
Airtel VoLTE	97.97
Jio VoLTE	100
VIL VoLTE	98.01



Coverage Details

TSP- Airtel 2G

Technology	Coverage %
2G	63.57

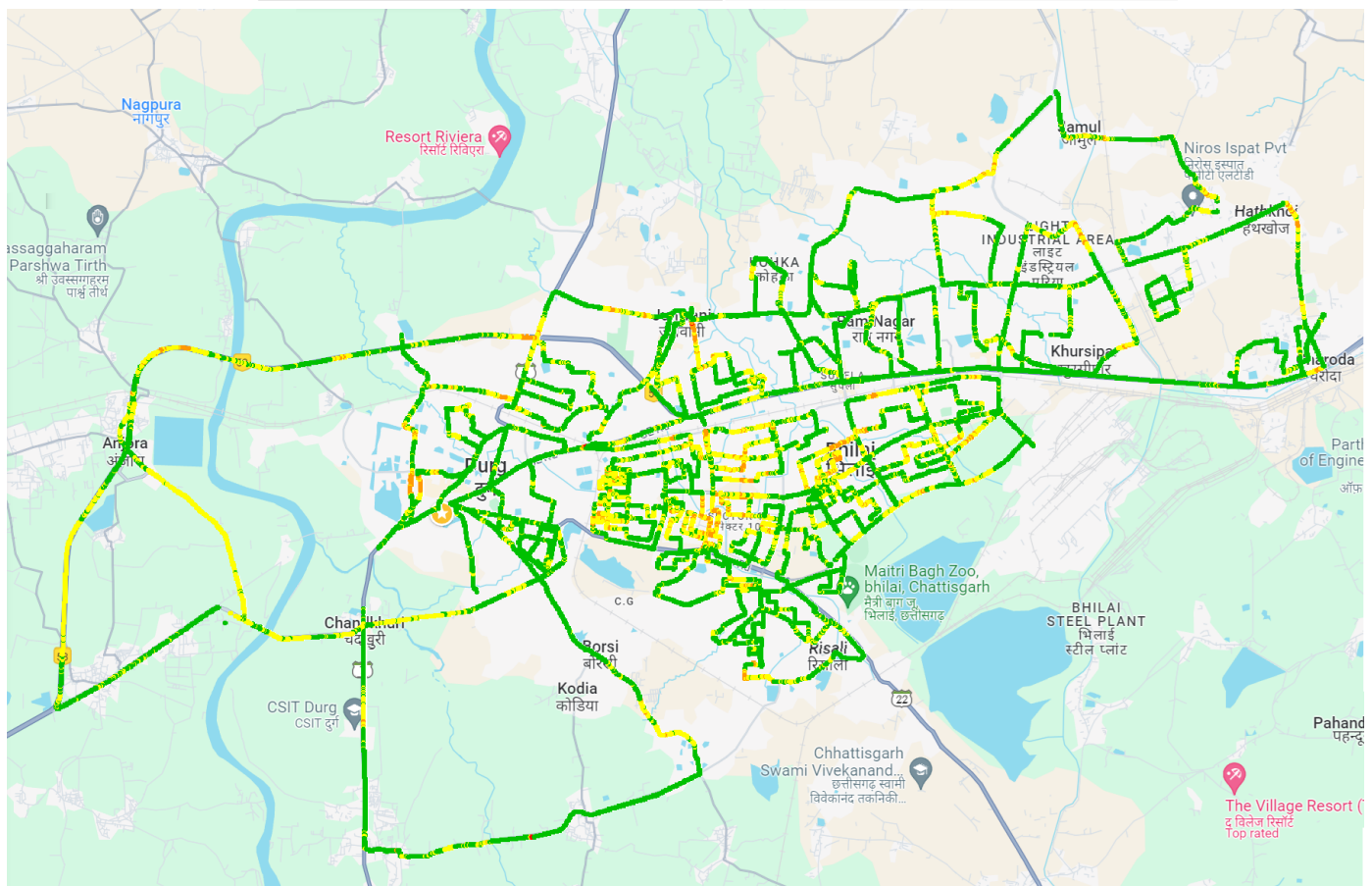


Color	Range	Count	Per
Red	[Min to -95]	(434)	(1.26%)
Orange	[-95 to -85]	(12148)	(35.17%)
Yellow	[-85 to -75]	(13522)	(39.15%)
Green	[-75 to -Max]	(8436)	(24.42%)

Coverage Details

TSP- BSNL 2G

Technology	Coverage %
2G	97.24



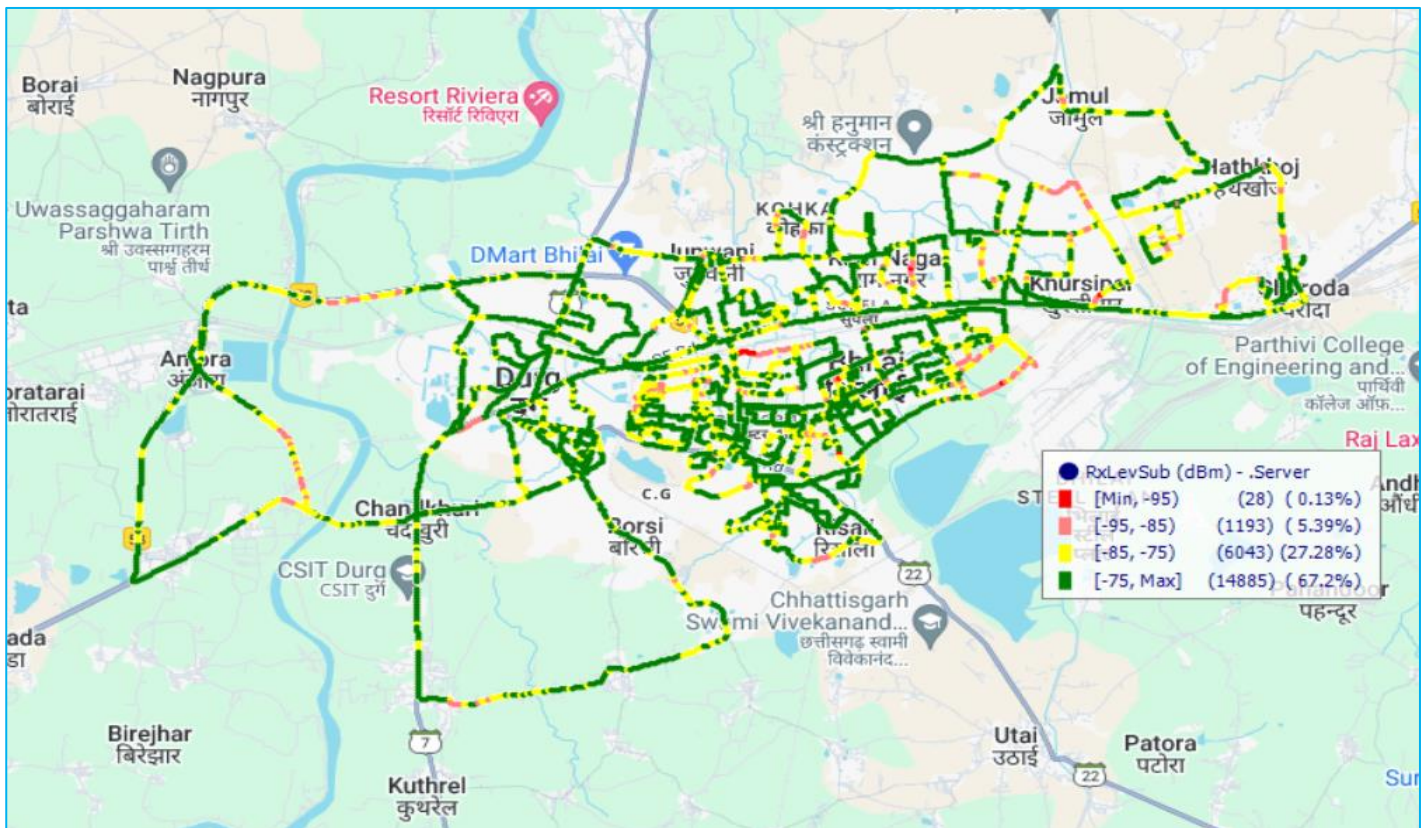
2G

Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	36976	74.28	
[-75, >=-85)	11431	22.96	
[-85, >=-95)	1355	2.72	
[-95, >=Min)	20	0.04	
Total	49782		

Coverage Details

TSP-VIL 2G

Technology	Coverage %
2G	94.48%



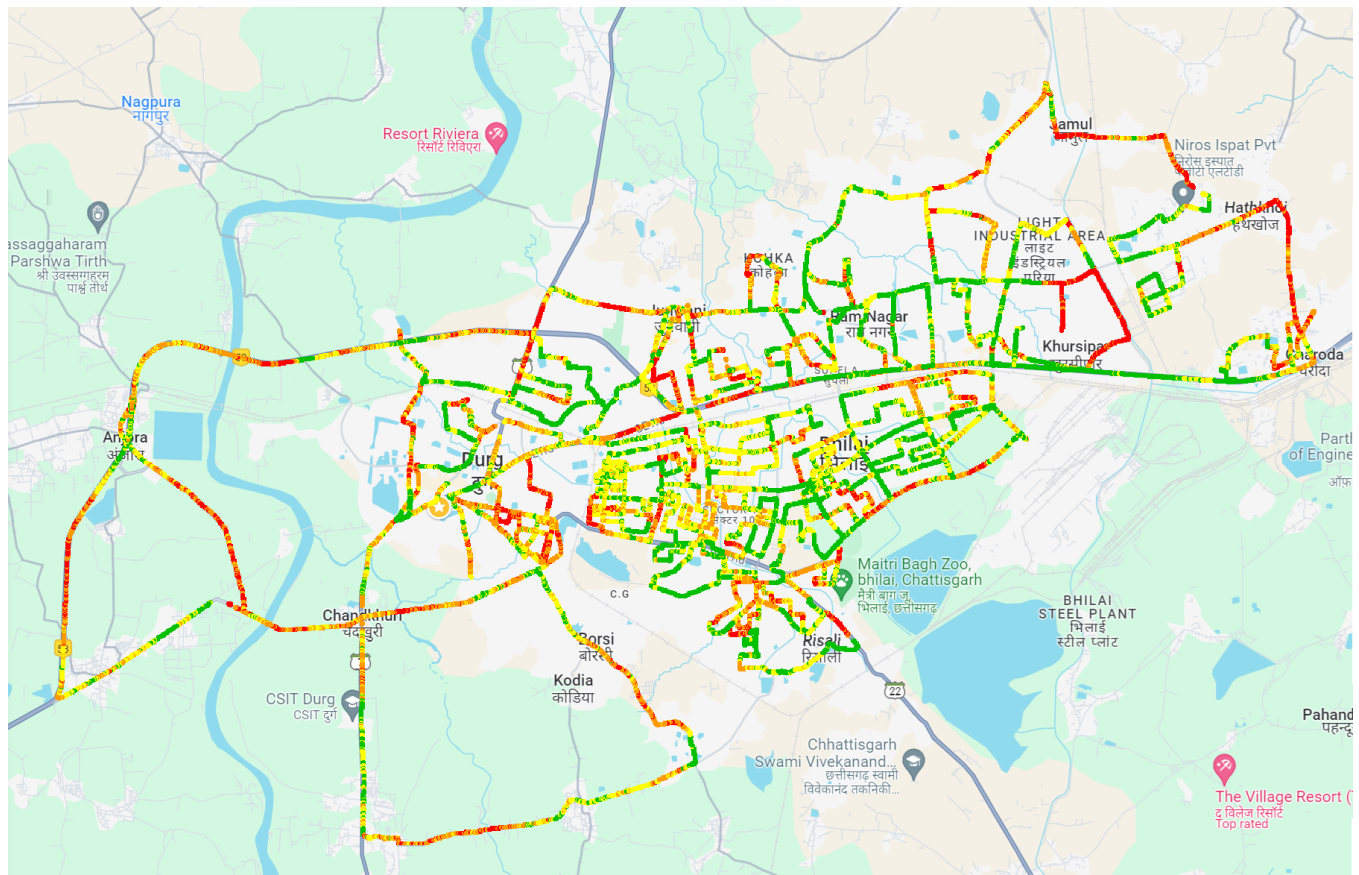
2G

Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	14885	67.20	
[-75, >=-85]	6043	27.28	
[-85, >=-95]	1193	5.39	
[-95, >=Min)	28	0.13	
Total	22149	100%	

Coverage Details

TSP- BSNL 3G

Technology	Coverage %
3G	78.04

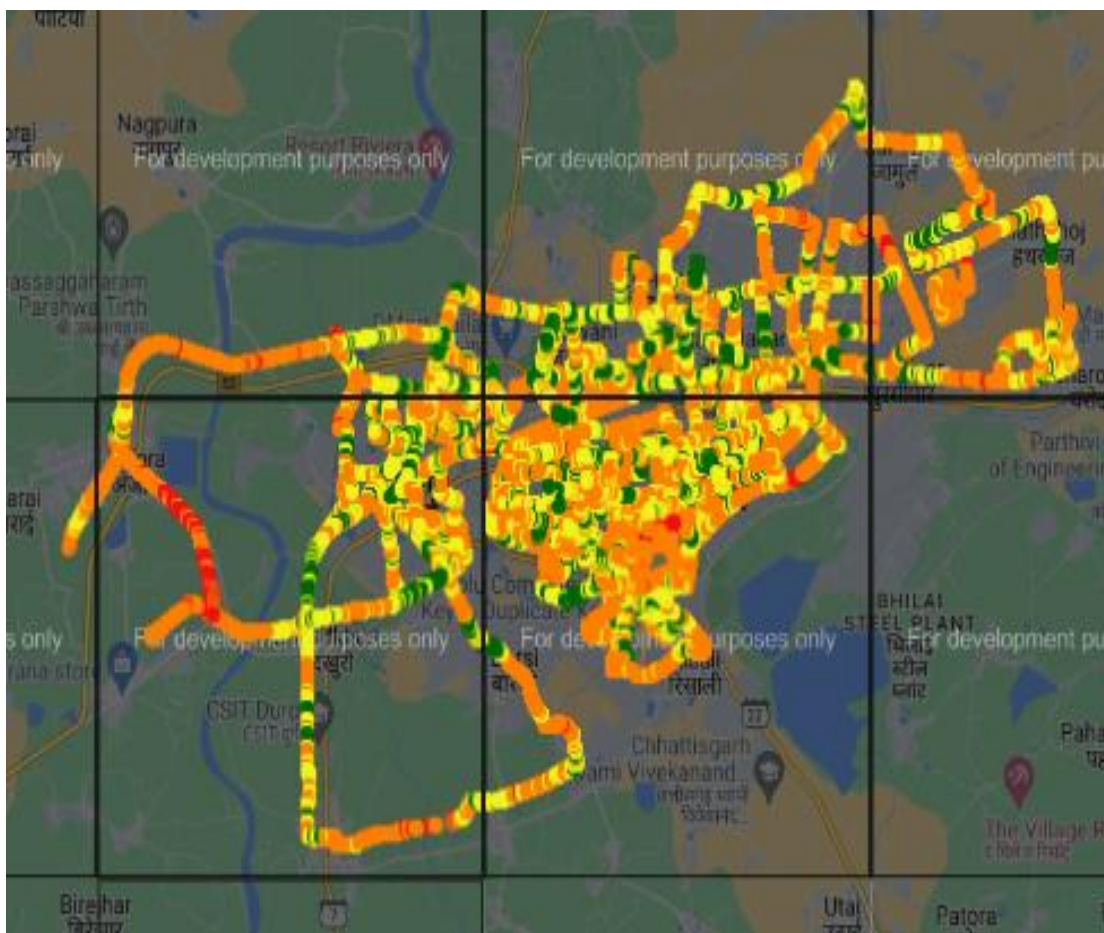


3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	3854	12.53	
[-70, >=-80)	8537	27.76	
[-80, >=-90)	11605	37.74	
[-90, >=Min)	6753	21.96	
Total	30749	100	

Coverage Details

TSP- Airtel

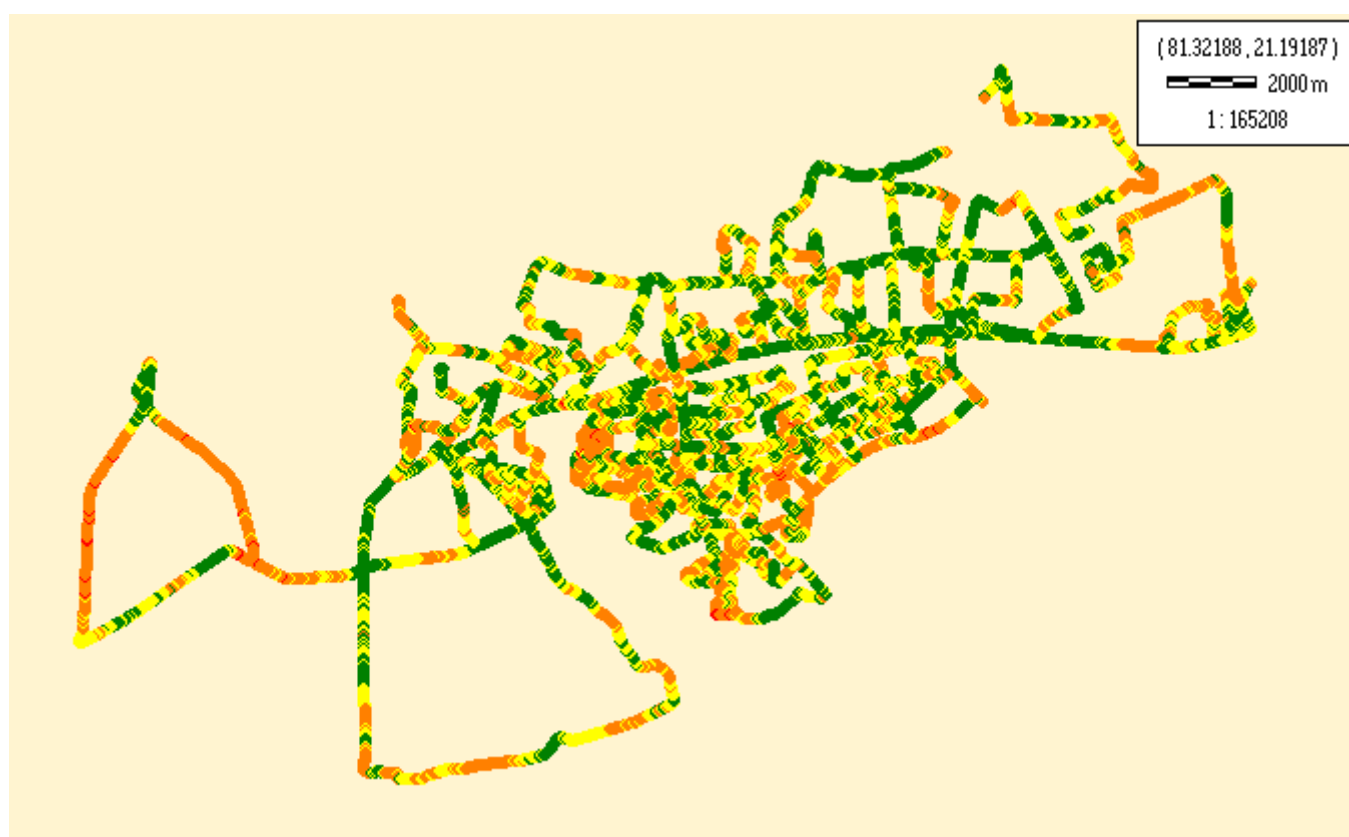
Technology	Coverage %
VoLTE	97.97



Color	Range	Count	Per
Red	[Min, -110]	(537)	(2.03%)
Orange	[-110, -90]	(12453)	(47.01%)
Yellow	[-90, -80]	(9504)	(35.87%)
Green	[-80, Max]	(3998)	(15.09%)

TSP-JIO VOLTE

Technology	Coverage %
VoLTE	100%

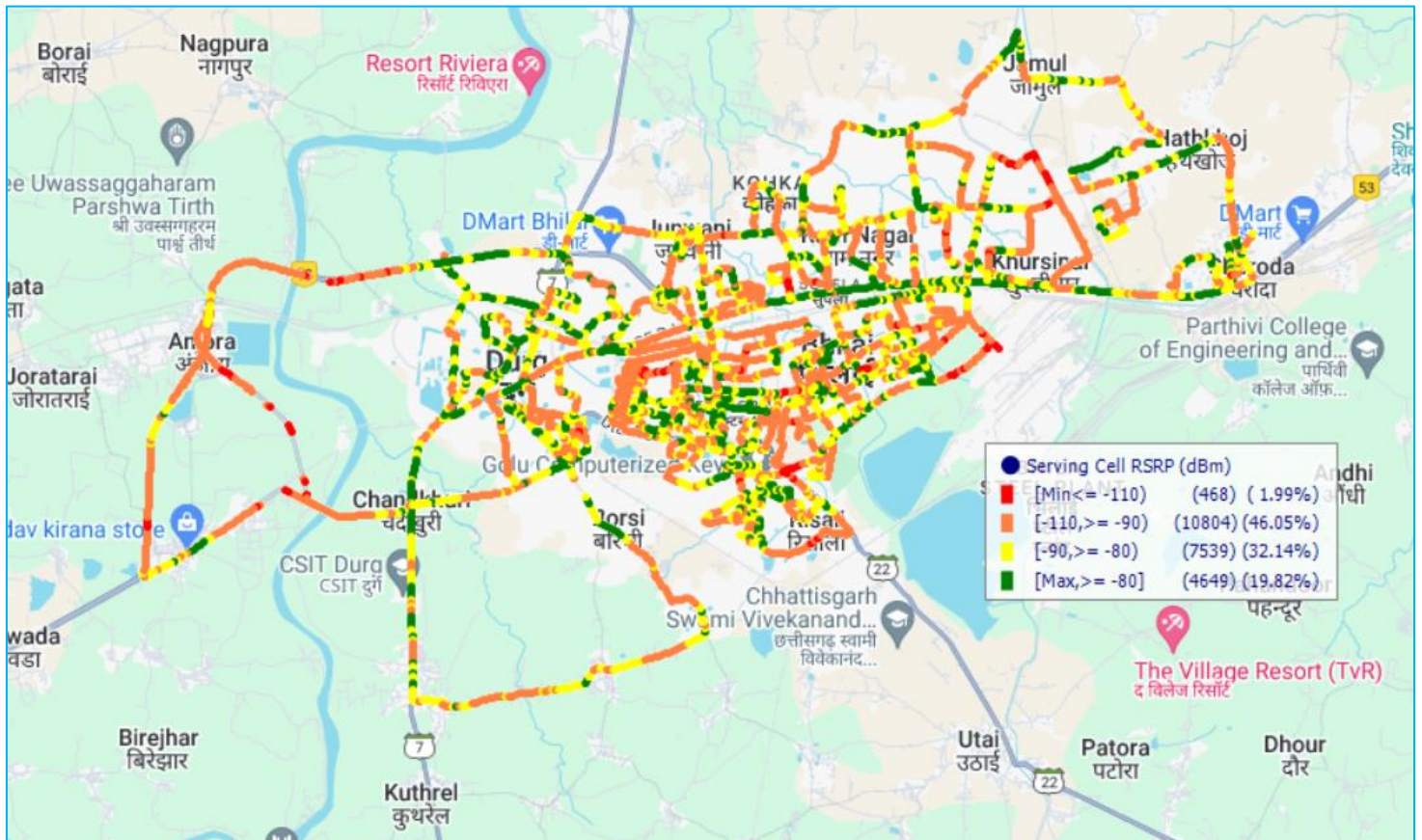


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	17715	36.8%	
[-80, >=-90)	17234	35.8%	
[-90, >=-110)	12886	26.8%	
[-110, >=Min)	241	0.50%	
Total	48076	100.0%	

Coverage Details

TSP-VIL VOLTE

Technology	Coverage %
VoLTE	98.01%

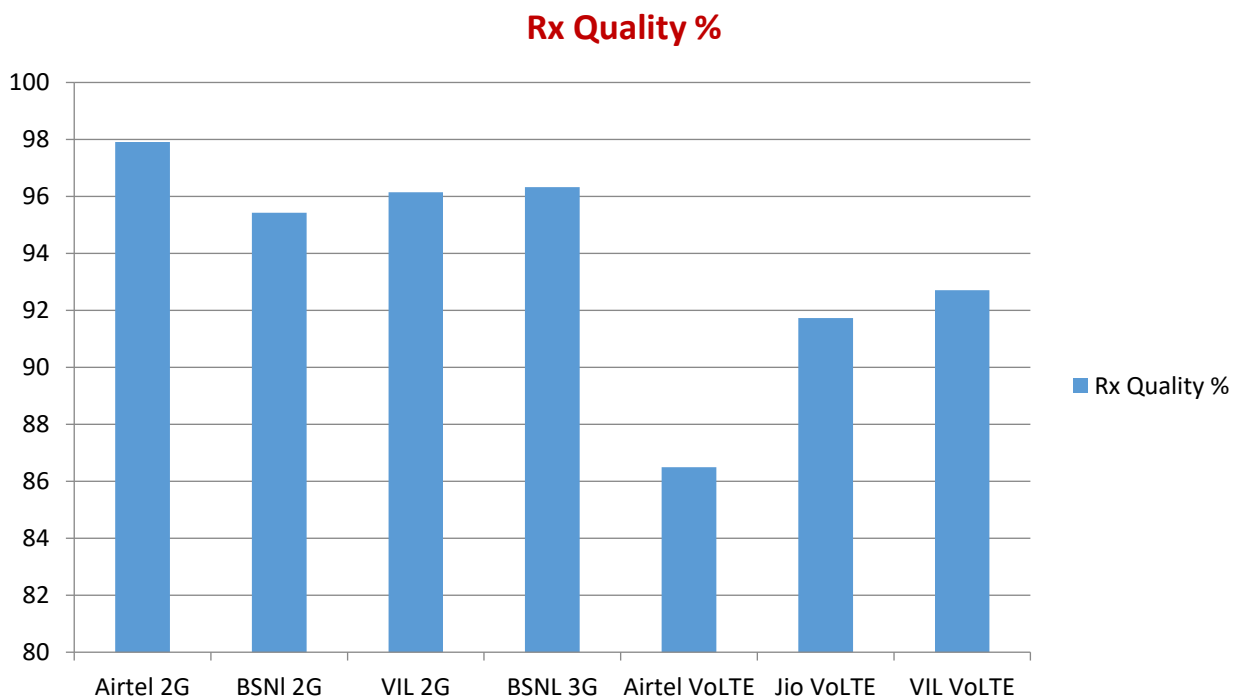


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >= -80]	4649	19.82	
[-80, >= -90]	7539	32.14	
[-90, >= -110]	10804	46.05	
[-110, >= Min]	468	1.99	
Total	23460	100%	

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	Rx Quality %
Airtel 2G	97.91
BSNI 2G	95.42
VIL 2G	96.14
BSNL 3G	96.32
Airtel VoLTE	86.49
Jio VoLTE	91.73
VIL VoLTE	92.71

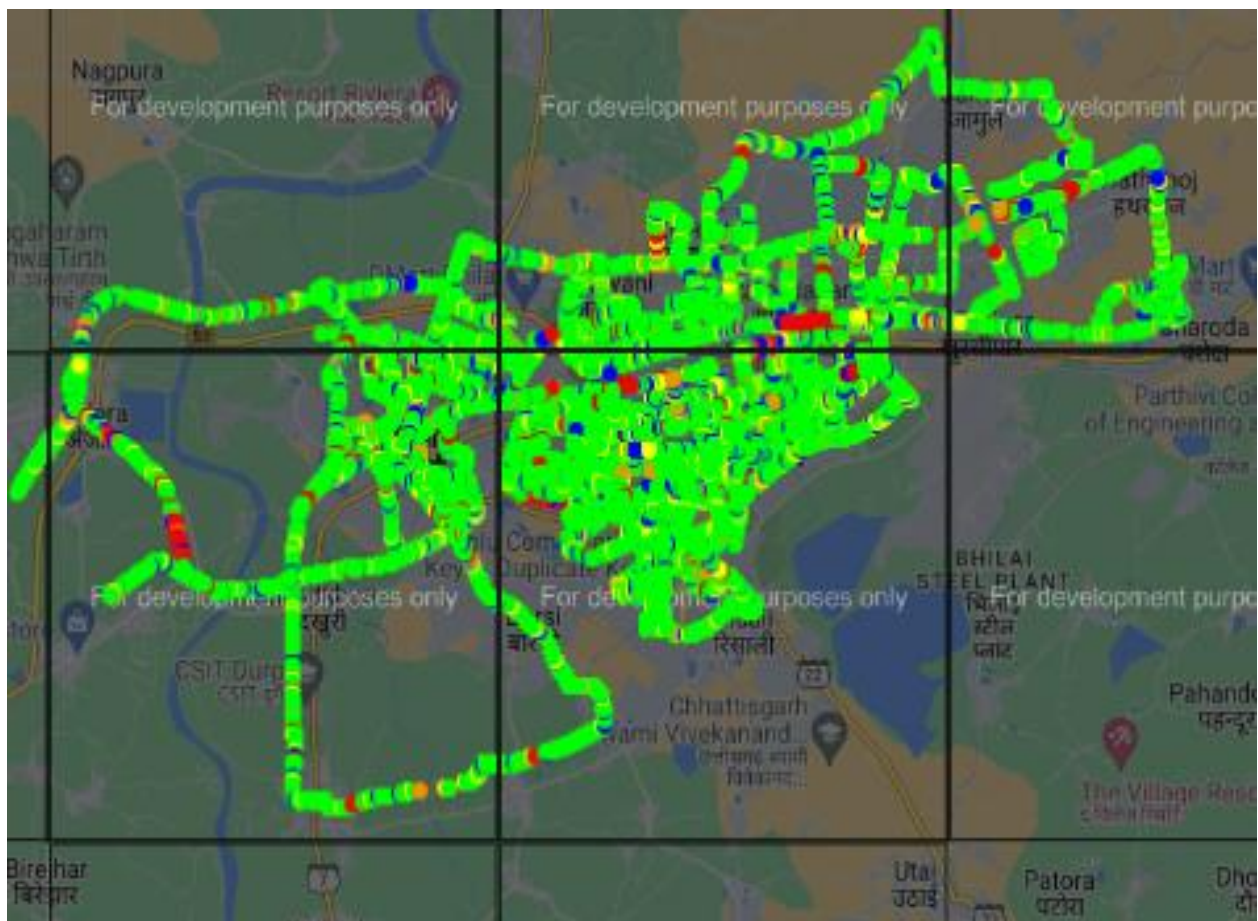


Quality Details

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 2G

Technology	Rx Quality %
2G	97.91



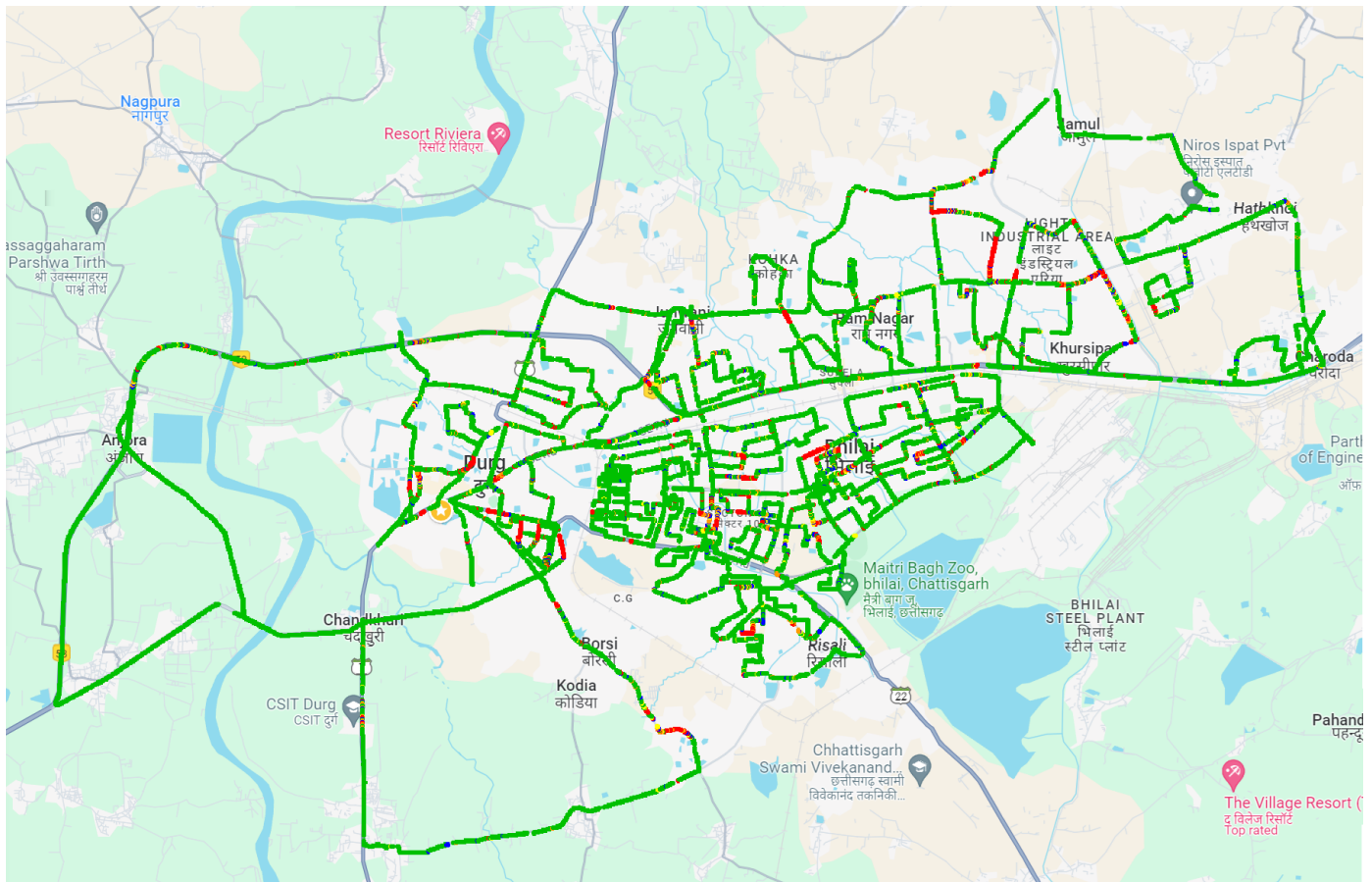
Color	Range	Count	Per
Green	[Min, 2]	(25496)	(83.37%)
Yellow	[2 , 3]	(2030)	(6.64%)
Blue	[3, 4]	(1736)	(5.68%)
Orange	[4, 5]	(680)	(2.22%)
Red	[6, Max]	(641)	(2.1%)

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 2G

Technology	Rx Quality %
2G	95.42



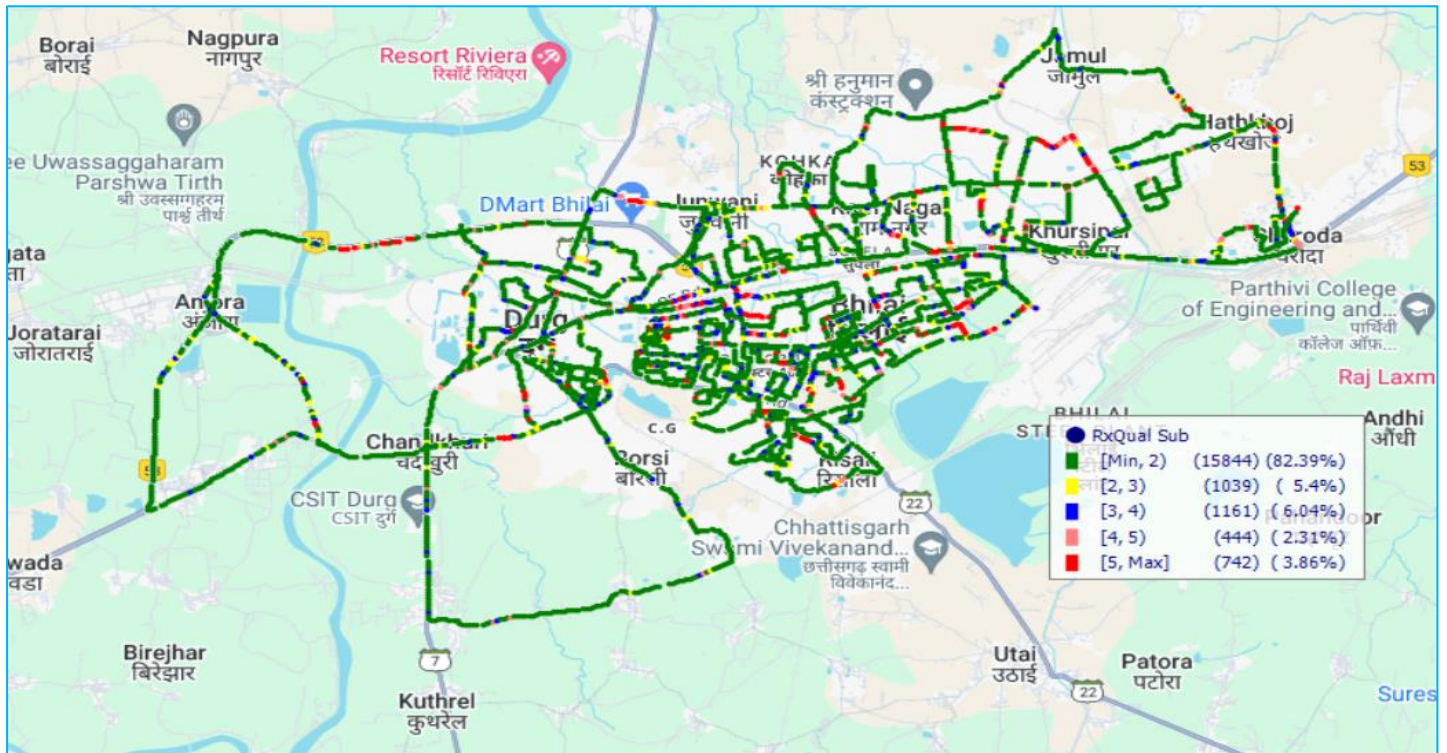
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	40944	89.65	
(2, ≤ 3)	846	1.85	
(3, ≤ 4)	973	2.13	
(4, ≤ 5)	819	1.79	
(5, $\leq \text{Max}$)	2094	4.58	
Total	45676		

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 2G

Technology	Rx Quality %
2G	96.14



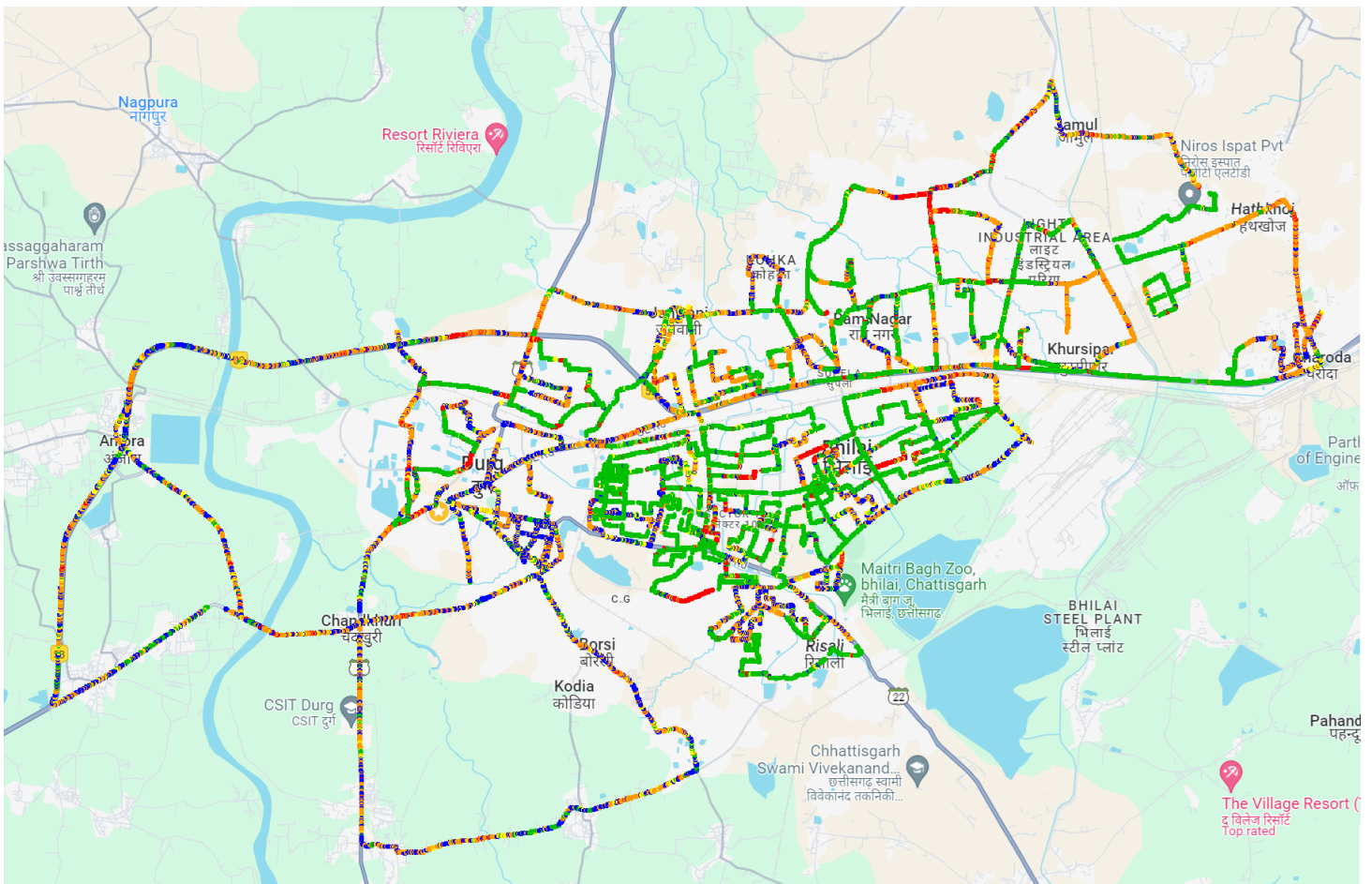
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	15844	82.39	
(2, ≤ 3)	1039	5.40	
(3, ≤ 4)	1161	6.04	
(4, ≤ 5)	444	2.31	
(5, $\leq \text{Max}$)	742	3.86	
Total	19230	100%	

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	96.32



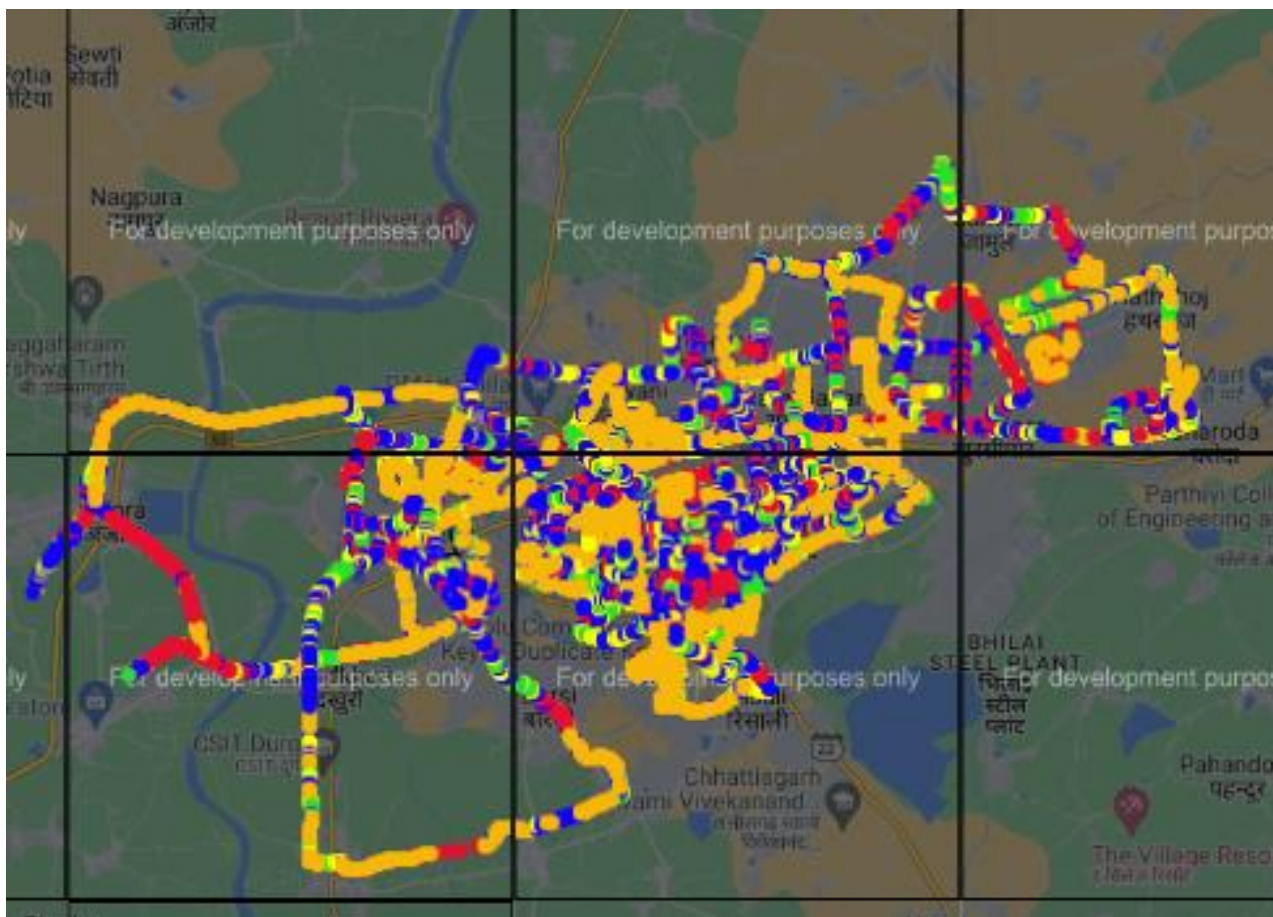
Overall Ec/No	# Samples	% PDF	Legends
(Max, ≤ -6)	2358	7.67	
(-6, ≤ -9)	3525	11.47	
(-9, ≤ -11)	9349	30.42	
(-11, ≤ -14)	14371	46.76	
(-14, \leq Min)	1131	3.68	
Total	30734	100	

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- Airtel VoLTE

Technology	Rx Quality %
VoLTE	86.49



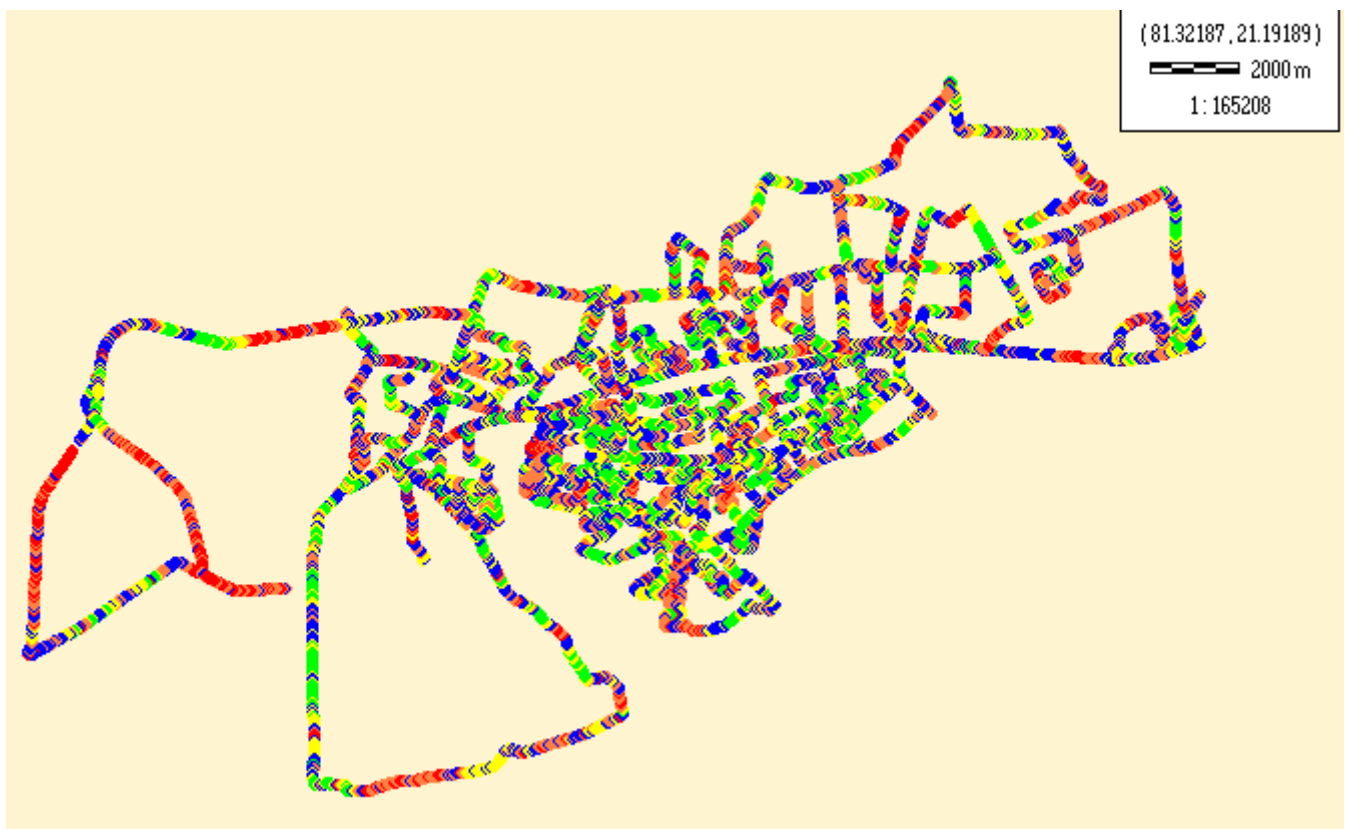
Color	Range	Count	Per
Red	(Min,0)	(3564)	(13.52%)
Orange	(0,5)	(7145)	(27.1%)
Blue	(5,10)	(8257)	(31.31%)
Yellow	(10,15)	(4917)	(18.65%)
Green	(15,Max)	(2486)	(9.43%)

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-JIO VoLTE

Technology	Rx Quality %
VoLTE	91.73



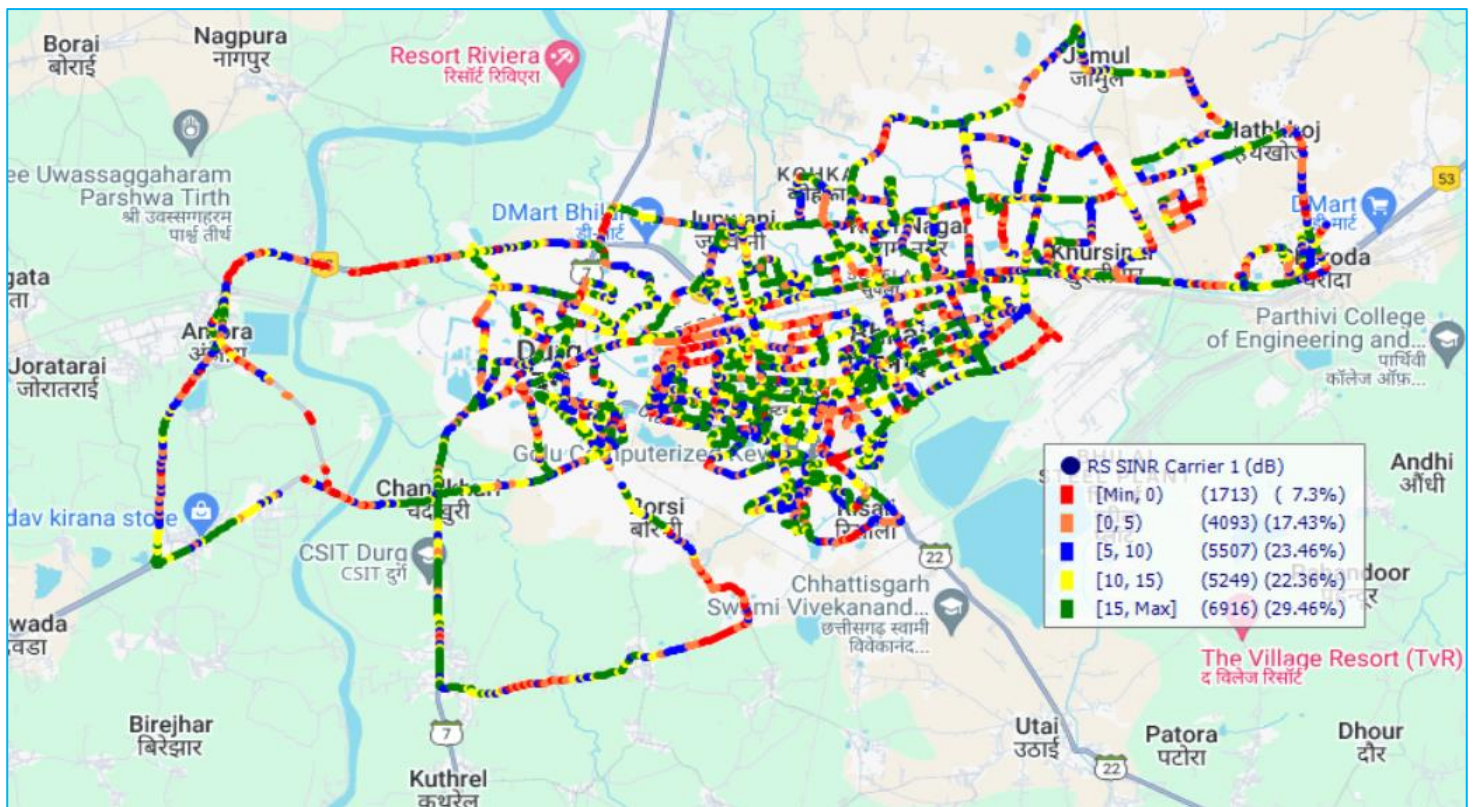
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	4417	8.27%	
(0, ≤ 5)	12294	23.01%	
(5, ≤ 10)	15616	29.23%	
(10, ≤ 15)	12137	22.72%	
(15, $\leq \text{Max}$)	8966	16.78%	
Total	52430	100%	

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 $\geq 95\%$.

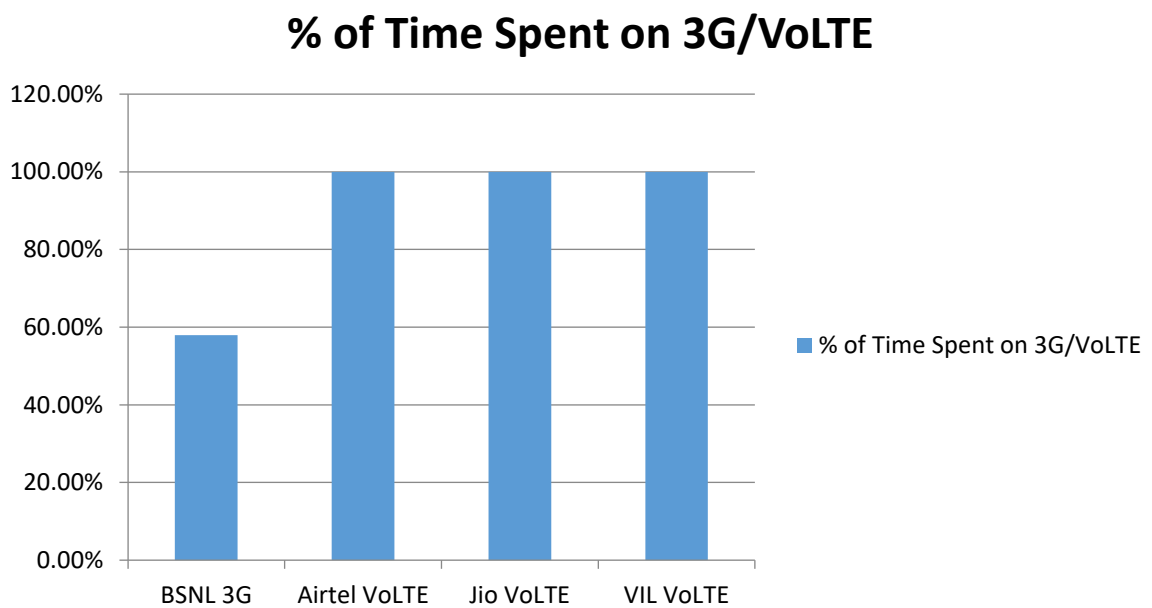
TSP-VIL VoLTE

Technology	Rx Quality %
VoLTE	92.71



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	1713	7.30%	
(0, ≤ 5)	4093	17.43%	
(5, ≤ 10)	5507	23.46%	
(10, ≤ 15)	5249	22.36%	
(15, $\leq \text{Max}$)	6916	29.46%	
Total	33677	100%	

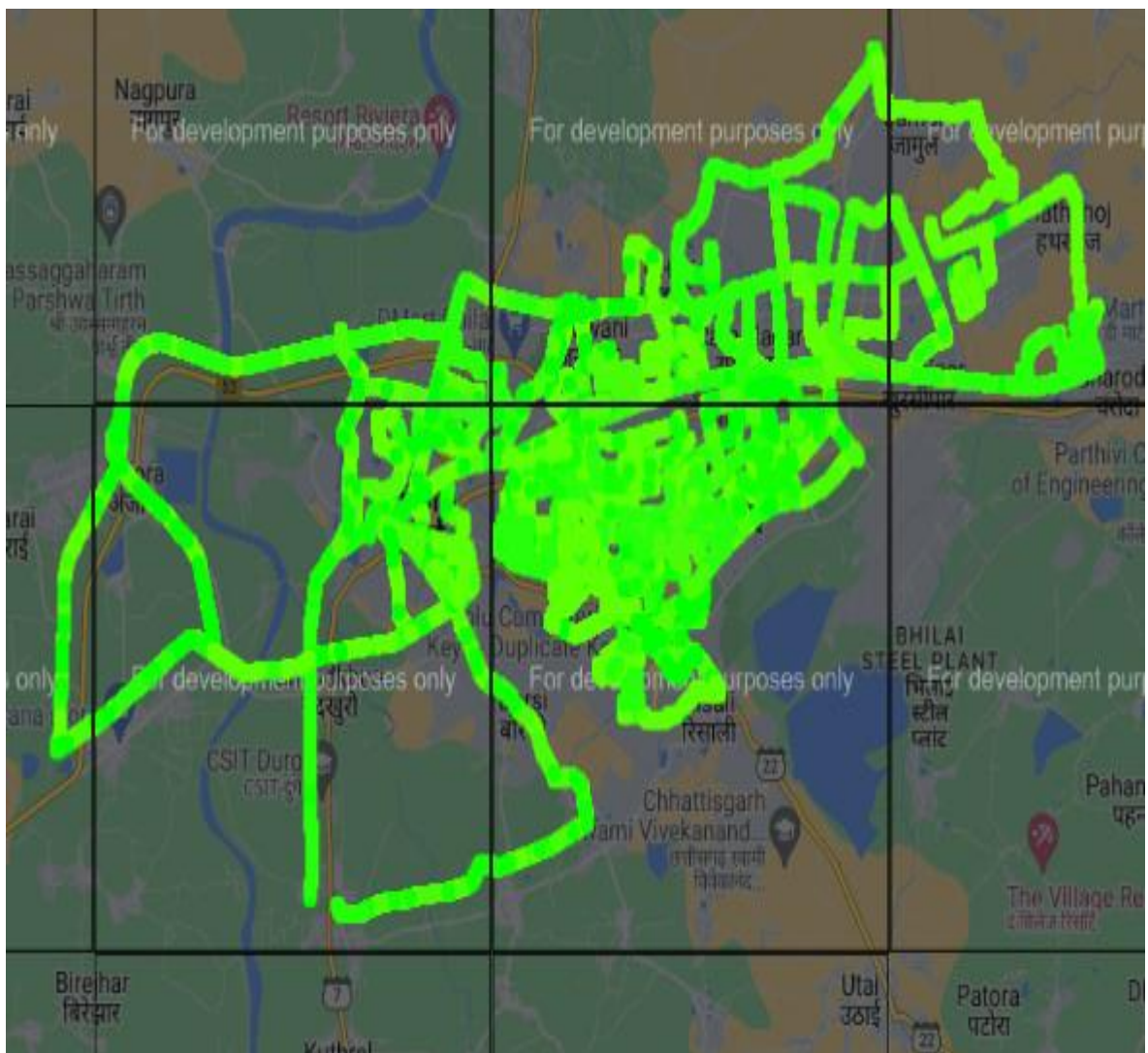
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	57.96
Airtel VoLTE	100%
Jio VoLTE	100%
VIL VoLTE	100%



Technology Details

TSP- Airtel

Technology	% of Time Spent on
3G	NA
VoLTE	100%



Technology Details

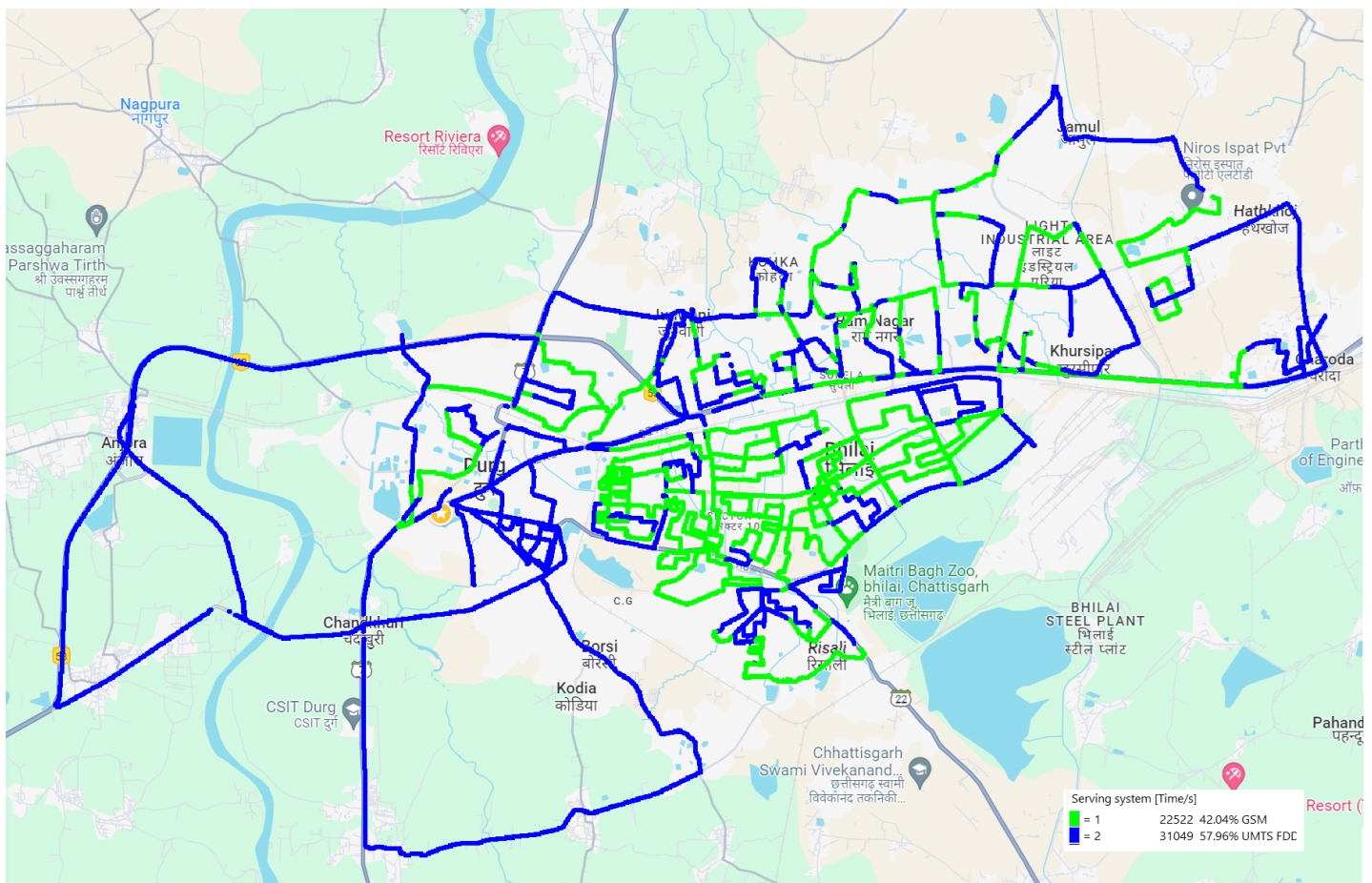
TSP-JIO

Technology	% of Time Spent on
3G	NA
VoLTE	100%

Technology Details

TSP-BSNL

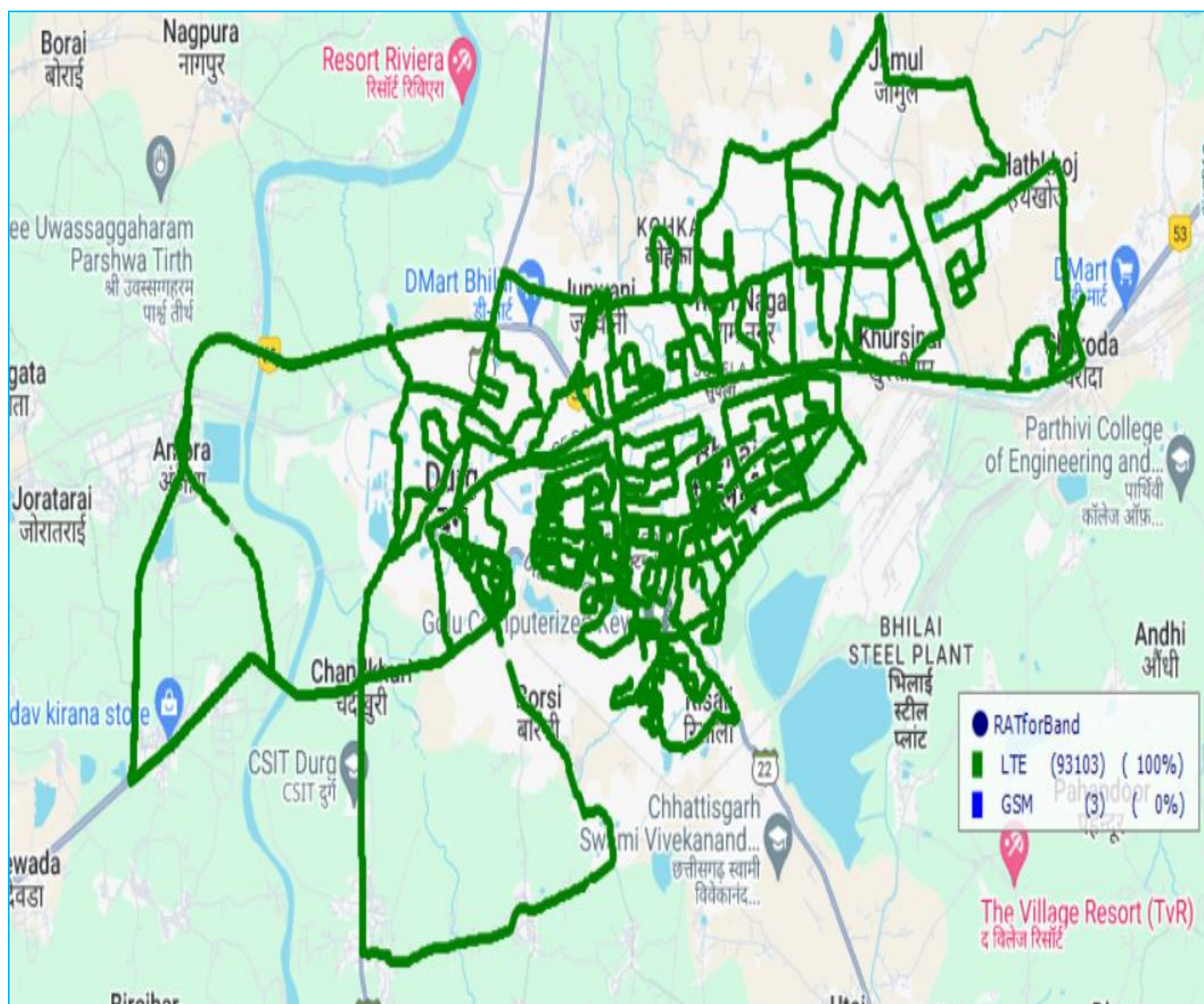
Technology	% of Time Spent on
3G	57.96
VoLTE	NA



Technology Details

TSP-VIL

Technology	% of Time Spent on
3G	NA
VoLTE	100%

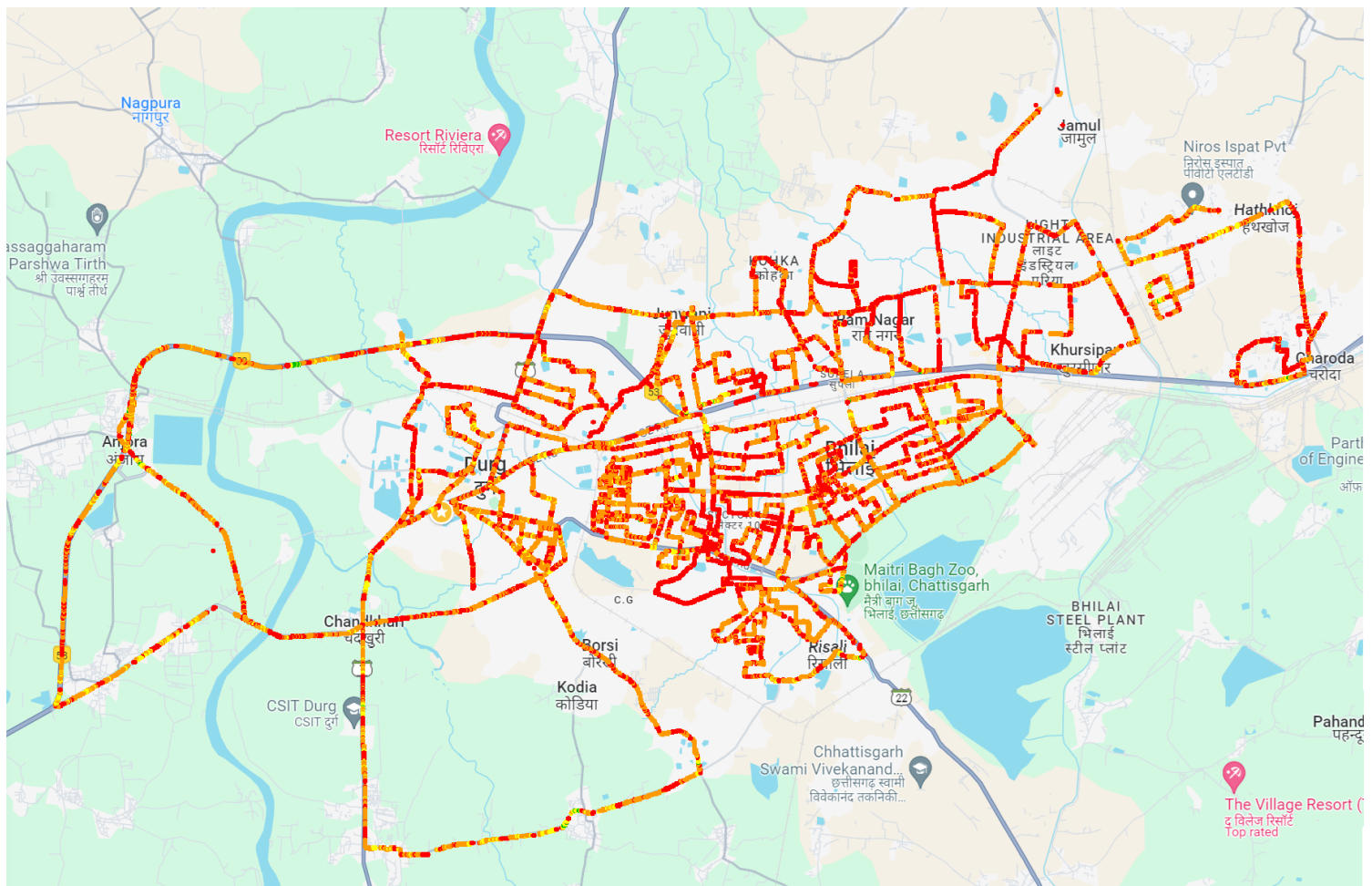


Dynamic Data Test

TSP- BSNL

Data Statistics - Dynamic data testing

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



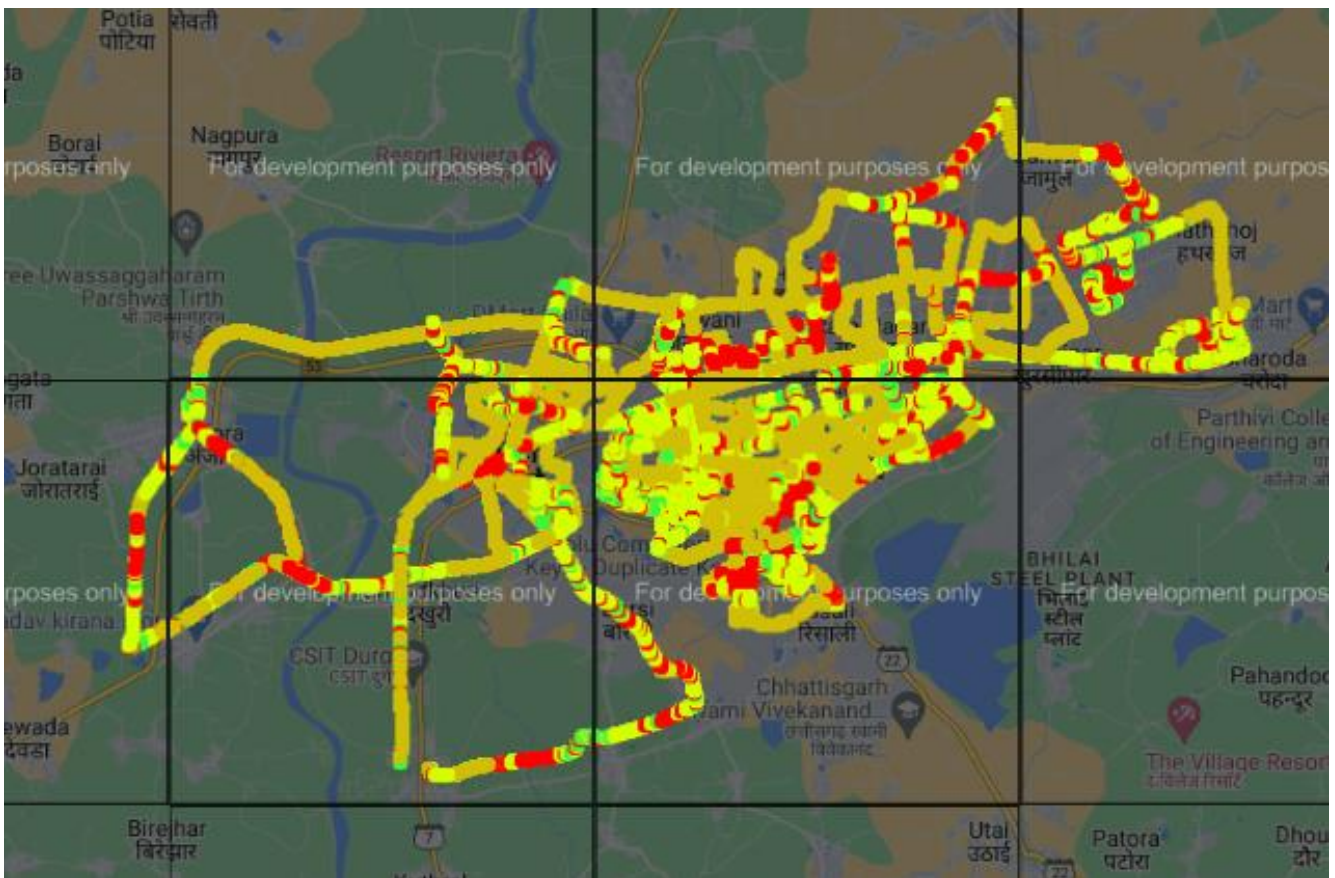
DL throughput	No of Sample	%	Legends
< 1 Mbps	25925	49.24	
1-5 Mbps	24537	46.60	
5-10 Mbps	2050	3.89	
>10Mbps	142	0.27	

Dynamic Data Test

TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	6.4

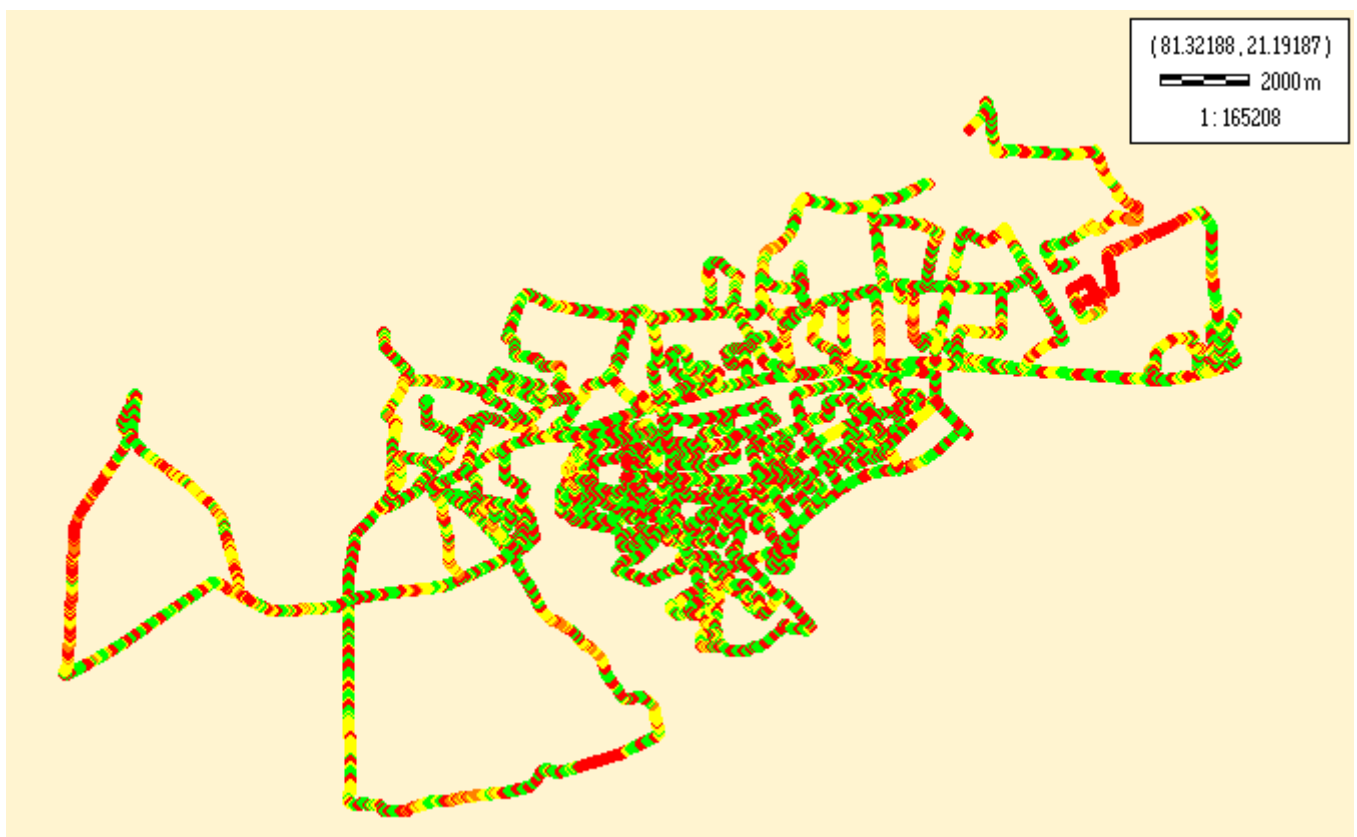


Color	Range	Count	Per
Red	(Min, 2000]	(5056)	(12.96%)
Yellow	(2000, 6000]	(17815)	(45.65%)
Green	(6000, 10000]	(12174)	(31.2%)
Blue	(10000, Max]	(3976)	(10.19%)

TSP-JIO

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	12.3

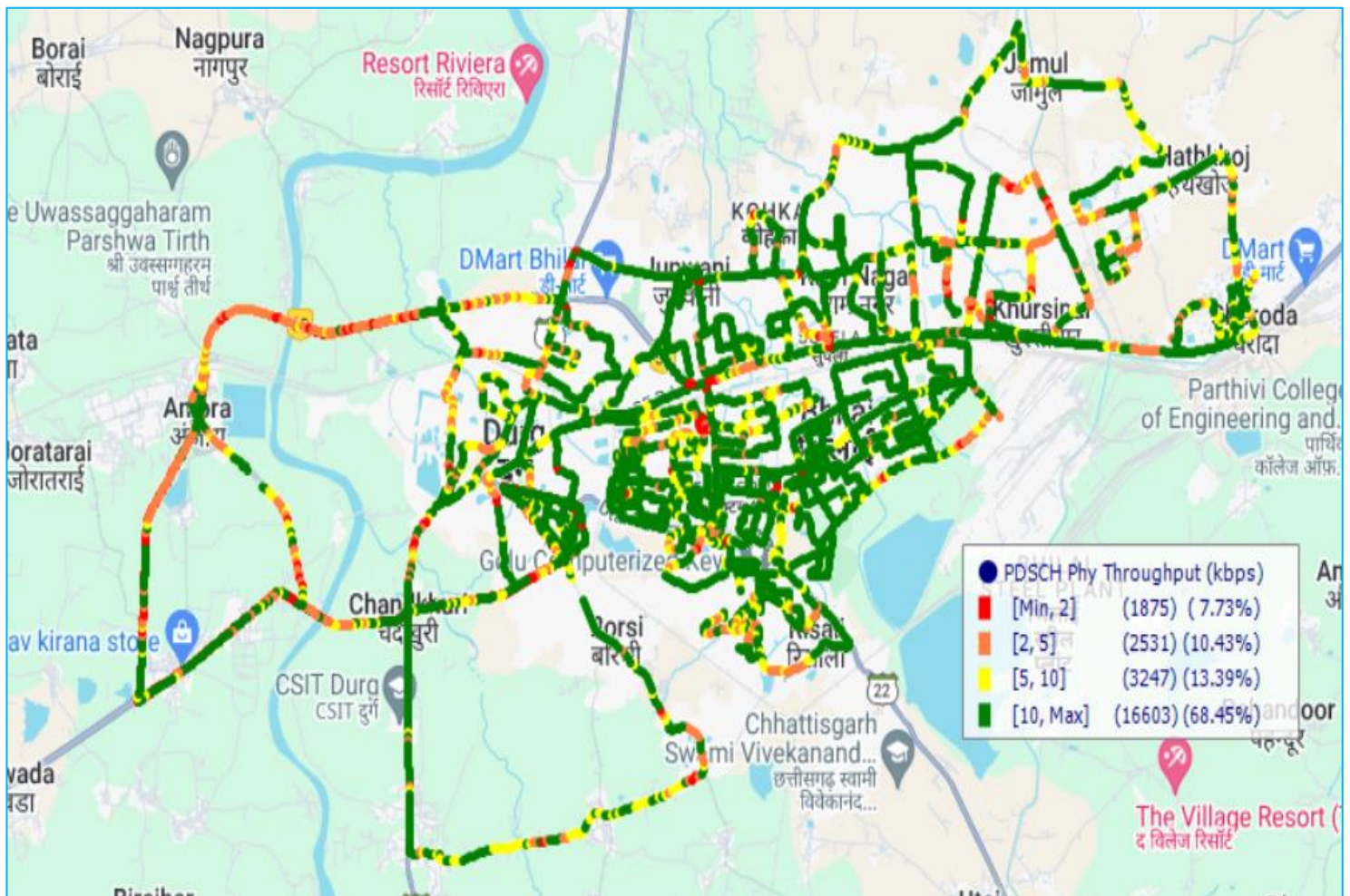


DL throughput	No of Sample	%	Legends
< 2Mbps	241	0.50	Red
2-5 Mbps	12886	26.82	Orange
5-10 Mbps	17234	35.87	Yellow
>10Mbps	17715	36.87	Green

TSP-VIL LTE DATA

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	19.21



DL throughput	No of Sample	% PDF	Legends
< 2Mbps	1875	7.73%	
2-5 Mbps	2531	10.43%	
5-10 Mbps	3247	13.39%	
>10Mbps	16603	68.45%	
Total	24256	100%	