

Operator Assisted Drive Test Report

KADAPA SSA SEPTEMBER 2023 (RO, HYDERABAD)

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 (OADT) has been carried out by TRAI RO Hyderabad with the help of Service Providers in Kadapa City and surrounding areas Prodduturu, mydukuru RLY Koduru from 9:00 AM to 8:00 PM during 12th Sep 2023 to 15th Sep 2023. The drive test covered drive route of 670 KMs & 6 hotspots over a period of 4 days. Approximately 720 calls were made for each of the 7 networks: Three 2G networks, One 3G network and Three LTE network covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

TRAI Hyderabad conducted Operator Assisted Drive Test from 12th Sep 2023 to 15th Sep 2023 covering various locations in Kadapa City & surrounding regions Prodduturu, Mydkuru & Railways Koduru. The performance of Airtel, BSNL, Jio and Vodafone Idea Limited were 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 in terms of

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

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

Drive Test Details :

Voice Tests: Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately 670 KMs over a period of 4 days from 12th Sep 2023 to 15th Sep 2023. Approximately 720 calls were made for each of the 7 networks: three 2G (Lock Mode) networks, one 3G (Dual mode) networks and three VoLTE network covering 4 unique TSP's.

Data Tests:

1. Dynamic data test was conducted for 670 kms over a period of 3 days for download throughput for 3G & 4G technologies.

Data Tests were performed at 6 static locations for 2G, 3G & 4G technologies of five iterations at each location.

2. For Voice and Data KPI's, 2G measurement is done with UE locked mode, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.

* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

Service	Specifications
Download	2G (Locked) - 500KB, 3G(Locked) 20MB ,4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G(Locked) 5Mb ,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

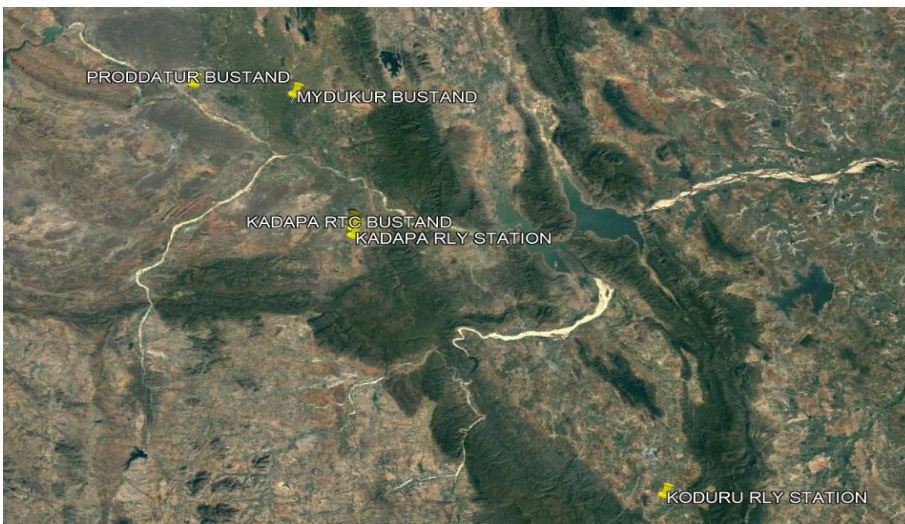
Overview

Voice & Dynamic Data Test Drive Route



Areas Covered - KADAPA

Kadapa bus stand	Nirmala Collage Road
NGO Colony	Chudappa Cetral Jail Road
Rama Krishna Nagar	RTC Colony
Chinna Chowk	SBI Colony
Bhagya nagar	RLY Station Road
Mariyapuram	Ravindra nagar
Vinayaka nagar	Apsara circle
Areas Covered- Prodduturu	Areas Covered – Mydkur
Mydkuru Road	Kadapa main road
Main road, TB road	Govt Collage Road
Bhaghath Singh Colony	Josef peta road
Areas Covered- LRY Kodutu	Areas Covered- Rayachoty
RLY station Road	Sundupalli road
Bus stop area	Bus stand area
Renigunta Road	Galiveedu road
Koduru East	



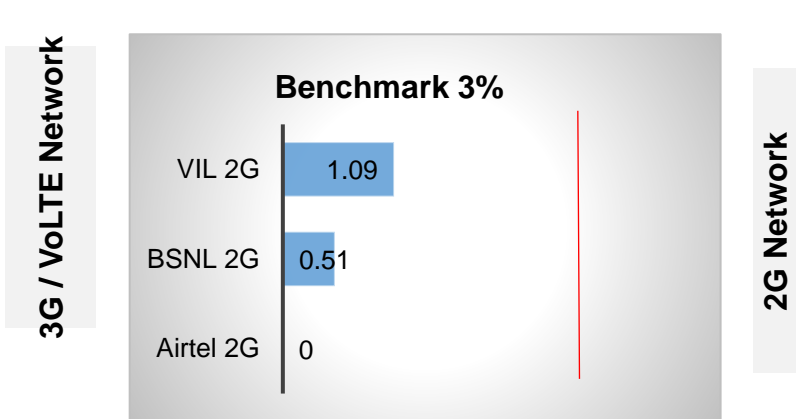
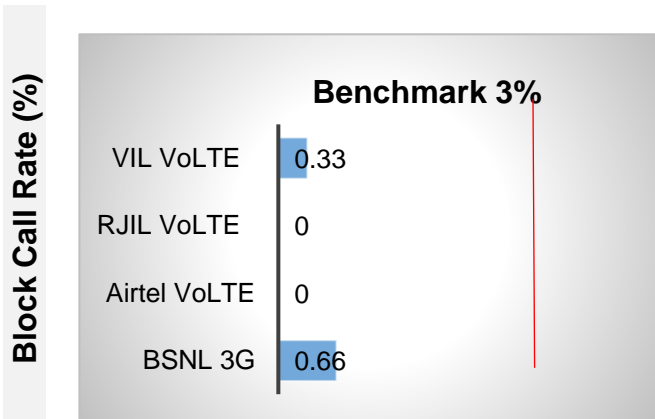
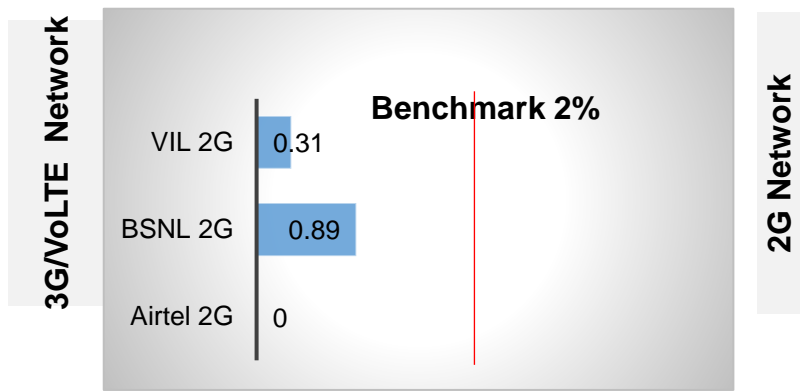
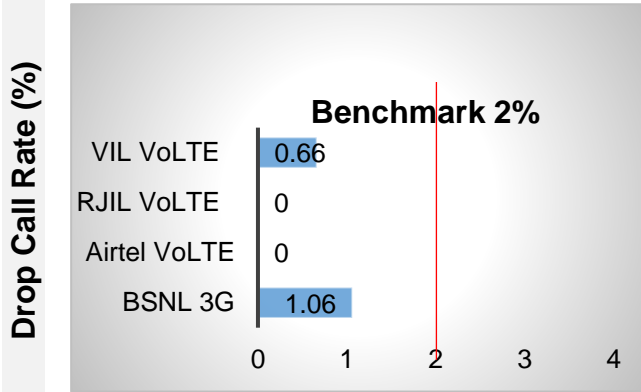
6 Static Locations

Prodduturu bus stop
Mydkuru Bus stop
RLY Koduru RLY station
Kadapa bus stop
Kadapa Rly station
Kadapa Old Rims Hospital

Voice Calls

Key Observations

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



KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	0.89	0.31	1.06	0	0	0.66
Block Call Rate %	0	0.51	1.09	0.66	0	0	0.33

- 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 %	96.72	92.3	75.27

b) Percentage of coverage samples for 3G \geq -90 dBm & LTE \geq -110 dBm

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Coverage %	82.6	97	97.14	89.74

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time Spent on 3G/4G %	88.2	100	100	99.36

Data Services Static

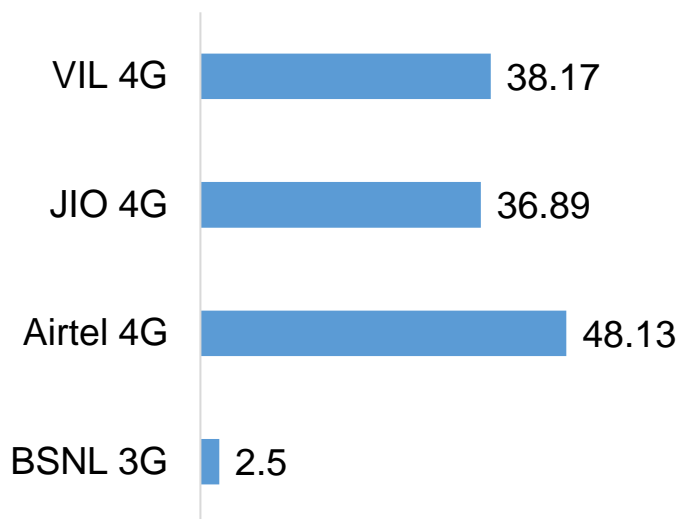
**Key Observations
(Average of 6
Hotspots)**

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

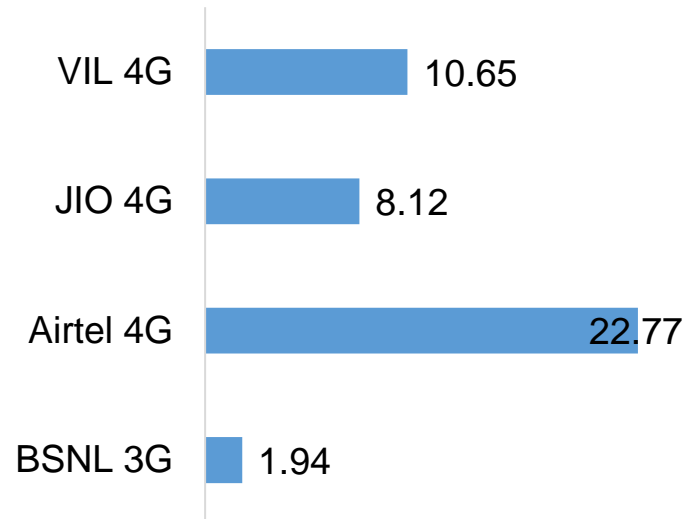
Data Download and Upload Performance (Mbps)

3G/4G Network:

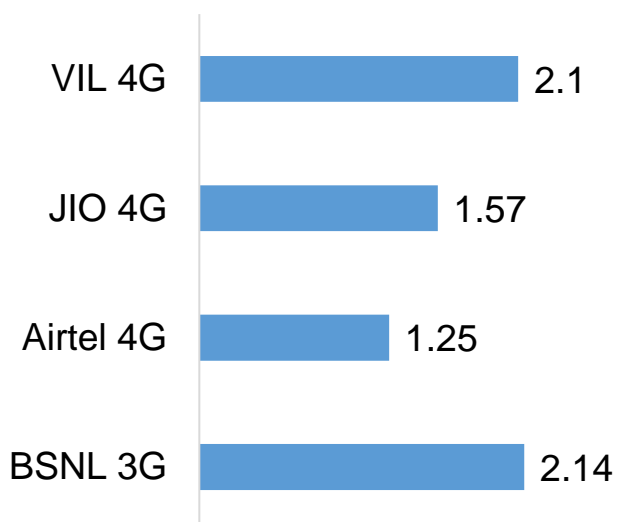
Download Throughput (Mbps)



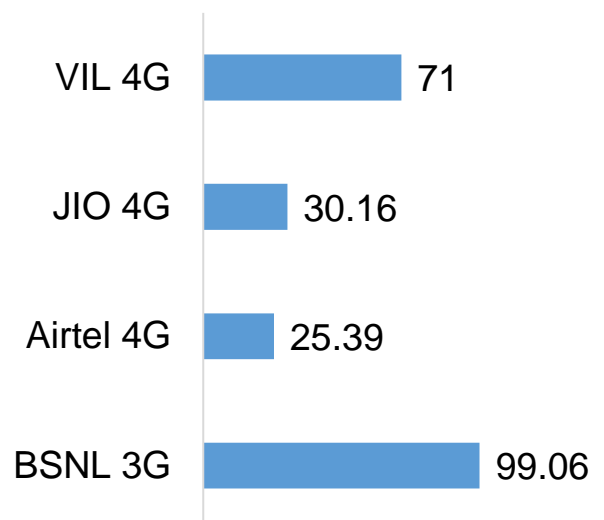
Upload Throughput (Mbps)



Web Browsing delay (Sec)



Latency (ms)



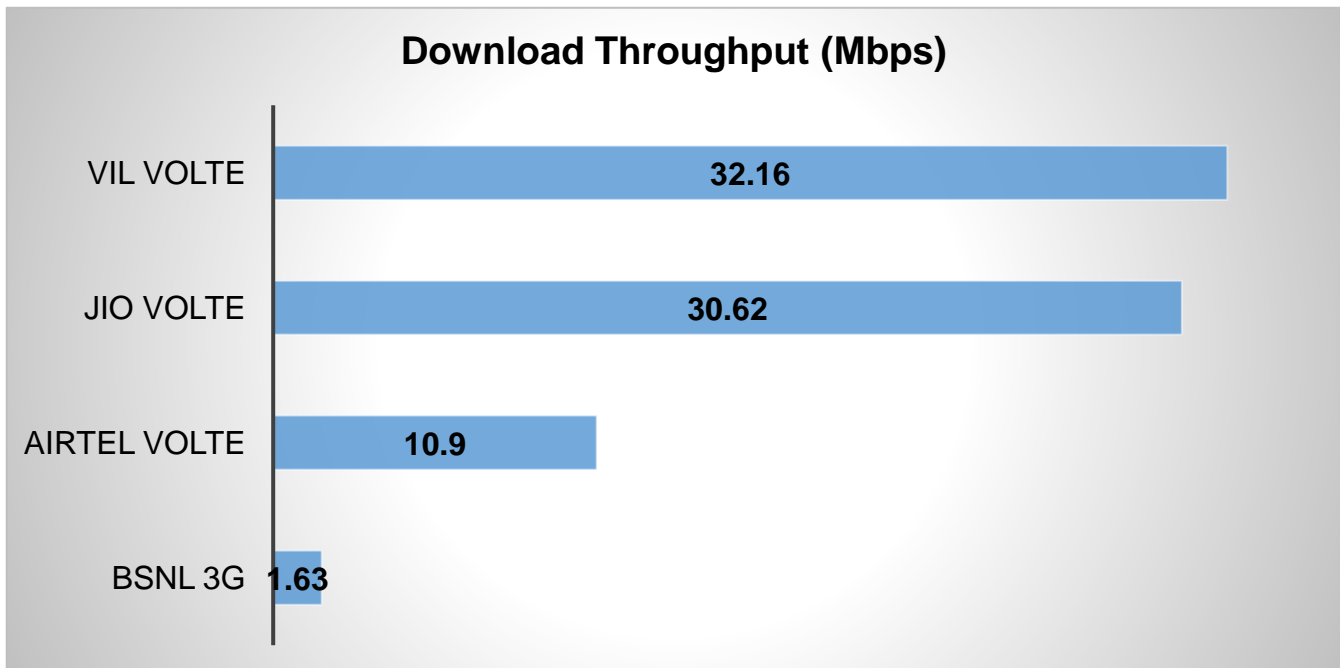
Data Services Dynamic

Key Observations

Dynamic Data was tested for 670 Kms. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G Network:



Data Services Dynamic	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.63	10.9	30.62	32.16

Summary

SSA Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	708	783	642
Blocked Call Rate (%)	0	0.51	1.09
CSSR% (Accessibility)	100	99.48	98.90
Drop Call Rate (%)	0	0.89	0.31
Mobility HOSR (%)	97.59	97.3	99.05
Rx Quality (%)	96.28	95.6	95.46

Voice Call	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Call Attempt	754	729	571	606
Blocked Call Rate (%)	0.66	0	0	0.33
CSSR% (Accessibility)	99.3	100	100	99.66
Drop Call Rate (%)	1.06	0	0	0.66
Mobility HOSR (%)	99.14	100	100	99.95
Rx Quality (%)	95.1	96.43	95.81	95.20

Summary

SSA Level Summary- (Average of 6 hotspots)- Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (Kbps)	202.43	135.47	68.58
Upload Throughput (Kbps)	69.18	82.90	51.81
Web Browsing Delay (sec)	4.64	11.91	13.12
Latency (msec)	129.15	310.54	149.83

Data Services Static	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.50	48.13	36.89	38.17
Upload Throughput (Mbps)	1.94	22.77	8.12	10.65
Web Browsing Delay (sec)	2.14	1.25	1.57	2.10
Latency (msec)	99.06	25.39	30.16	71

Produtur Bus stand0	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	155.42	176.44	68.2
Upload Throughput (kbps)	68.01	93.86	48.2
Web Browsing Delay (sec)	3.38	6.7	13.6
Latency (msec)	176	215.7	152

Mydkuru Bus stop	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	280.32	168.67	61.6
Upload Throughput (kbps)	68.3	121.99	57.8
Web Browsing Delay (sec)	6.8	7.24	12.76
Latency (msec)	129.1	341.45	170

RLY Koduru railway station	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	244.9	86.70	71.4
Upload Throughput (kbps)	35.85	64.38	43.5
Web Browsing Delay (sec)	6.50	8.30	14.5
Latency (msec)	183.32	413	146

Kadapa bus stop	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	180.70	106.5	65.7
Upload Throughput (kbps)	82.35	66.1	48.4
Web Browsing Delay (sec)	3.83	23	13.3
Latency (msec)	93.59	325.13	172

Kadapa railway station	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	184.7	190.7	68
Upload Throughput (kbps)	78.92	92.55	52
Web Browsing Delay (sec)	3.71	13.23	12.9
Latency (msec)	83.70	191.92	123

Kadapa Govt. Hospital	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	169.18	83.83	76.6
Upload Throughput (kbps)	81.63	58.53	61
Web Browsing Delay (sec)	3.63	13.00	11.7
Latency (msec)	109.19	376.04	136

Data Services static

SSA Level Summary(contd.)

Produtur Bus Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.72	62.32	59.59	39.4
Upload Throughput (Mbps)	2.49	28.3	5.13	7.6
Web Browsing Delay (sec)	3.1	1.92	1.72	2.12
Latency (msec)	96	22.23	31.5	65

Mydkuru Bus Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	3.51	40.76	29.80	46.75
Upload Throughput (Mbps)	2.49	15.75	14.17	12.42
Web Browsing Delay (sec)	2.56	1.03	1.83	2.17
Latency (msec)	94.02	23.57	37.5	71

Rly Koduru Railway Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.87	27.79	25.78	26.73
Upload Throughput (Mbps)	1.35	15.75	4.34	9.43
Web Browsing Delay (sec)	1.60	1.00	1.79	2.87
Latency (msec)	96.92	28	31.50	74

Kadapa Bus Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	3.34	53.95	32.80	32.4
Upload Throughput (Mbps)	1.51	25.15	9.31	11.3
Web Browsing Delay (sec)	1.40	1.21	1.69	2.06
Latency (msec)	94.37	26.8	24	78

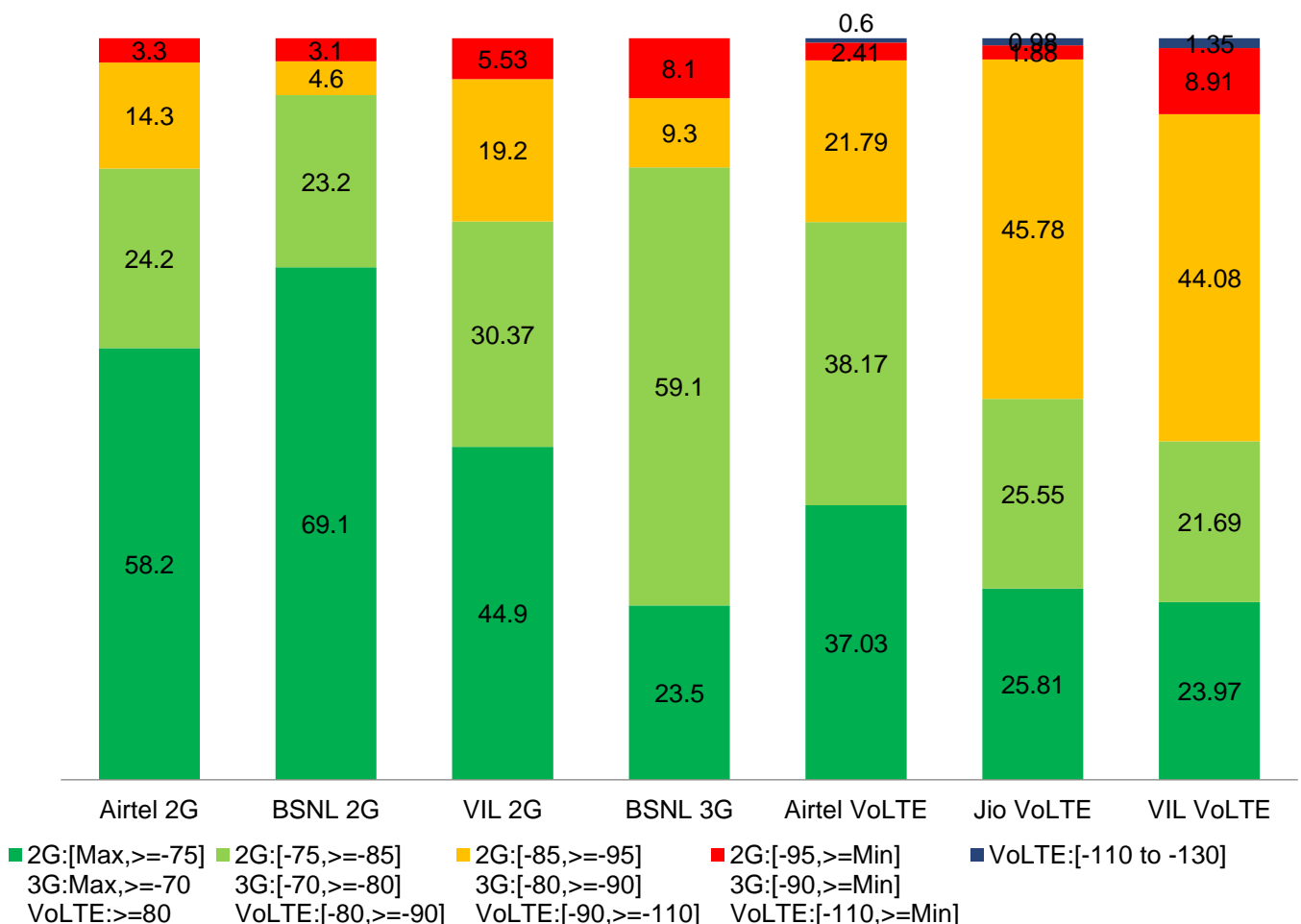
Kadapa railway Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.25	57.02	27.93	36.13
Upload Throughput (Mbps)	1.60	35.09	5.41	8.51
Web Browsing Delay (sec)	1.58	1.20	1.19	1.47
Latency (msec)	87.08	29.47	33	75

Kadapa Govt. Hospital	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.30	46.99	41.16	47.63
Upload Throughput (Mbps)	2.20	16.62	9.83	14.65
Web Browsing Delay (sec)	2.61	1.19	1.21	1.93
Latency (msec)	126	22.31	24	63

I. 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 ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110 dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	96.72
BSNL 2G	92.30
VIL 2G	75.27
BSNL 3G	82.60
Airtel VoLTE	97.00
Jio VoLTE	97.14
VIL VoLTE	89.74



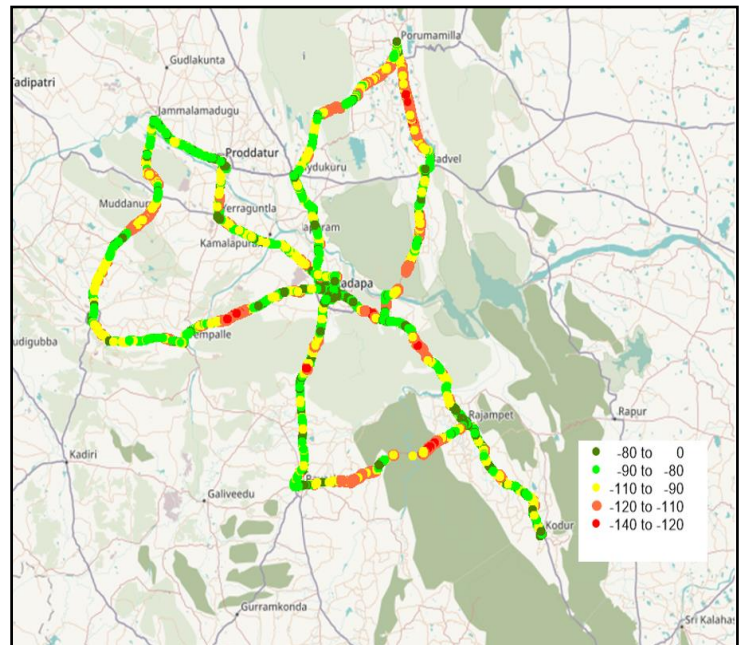
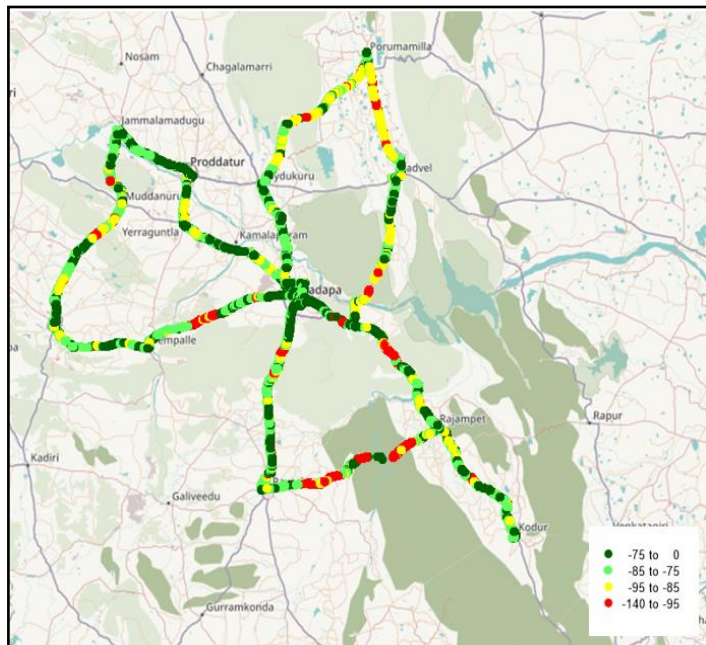
I. Coverage Details

AIRTEL

TSP	Coverage Rate %
2G	96.72
VoLTE	97

2G

VoLTE



Overall Rx Level	# Samples	%
[Max, >=-75]	3620731	58.2
[-75, >=-85)	1506951	24.2
[-85, >=-95)	891632	14.3
[-95, >=Min)	203837	3.3
Total	7318206	100

Overall RSRP	# Samples	%
[Max, >=-80]	4931317	37.03
[-80, >=-90)	5082705	38.17
[-90, >=-110)	2901539	21.79
[-110, >=-120]	320707	2.41
[-120, >=Min]	79289	0.60
Total	13315557	100

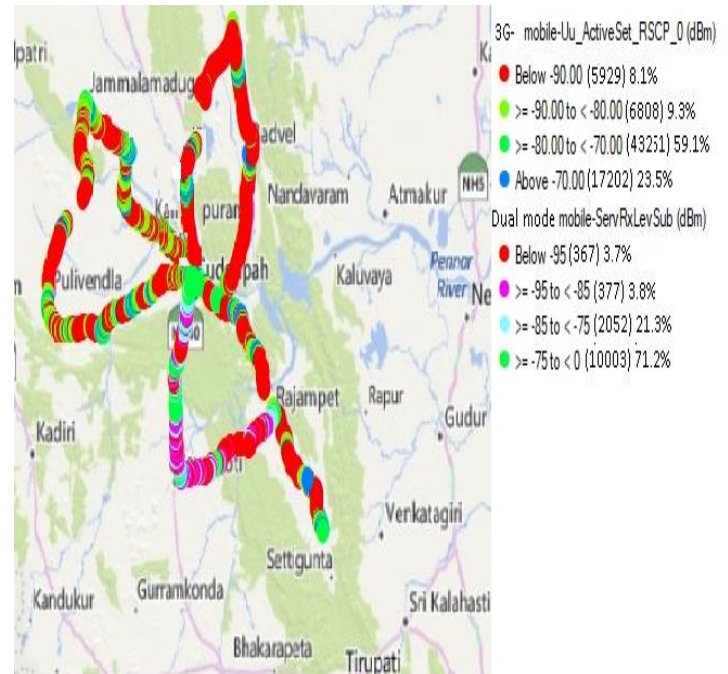
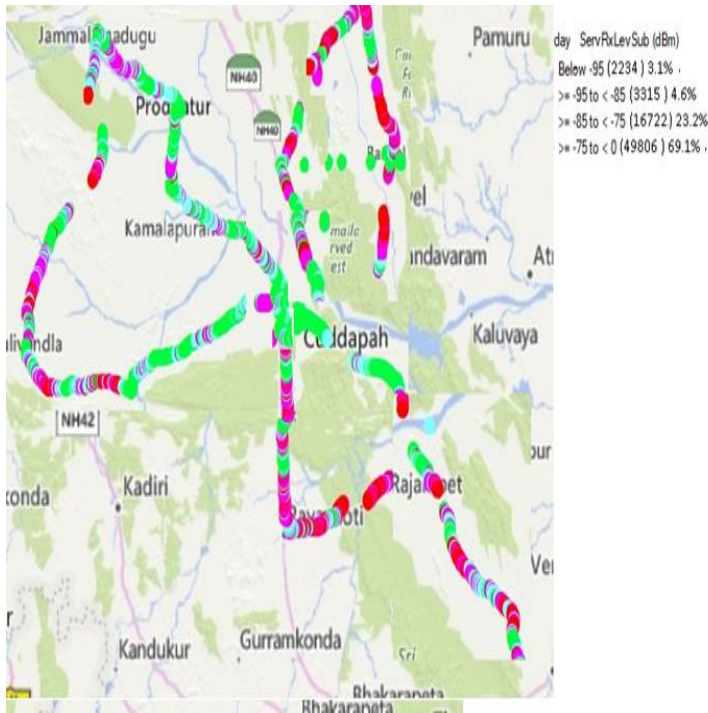
I. Coverage Details

BSNL

Technology	Coverage Rate %
2G	92.30
3G	82.60

2G

3G



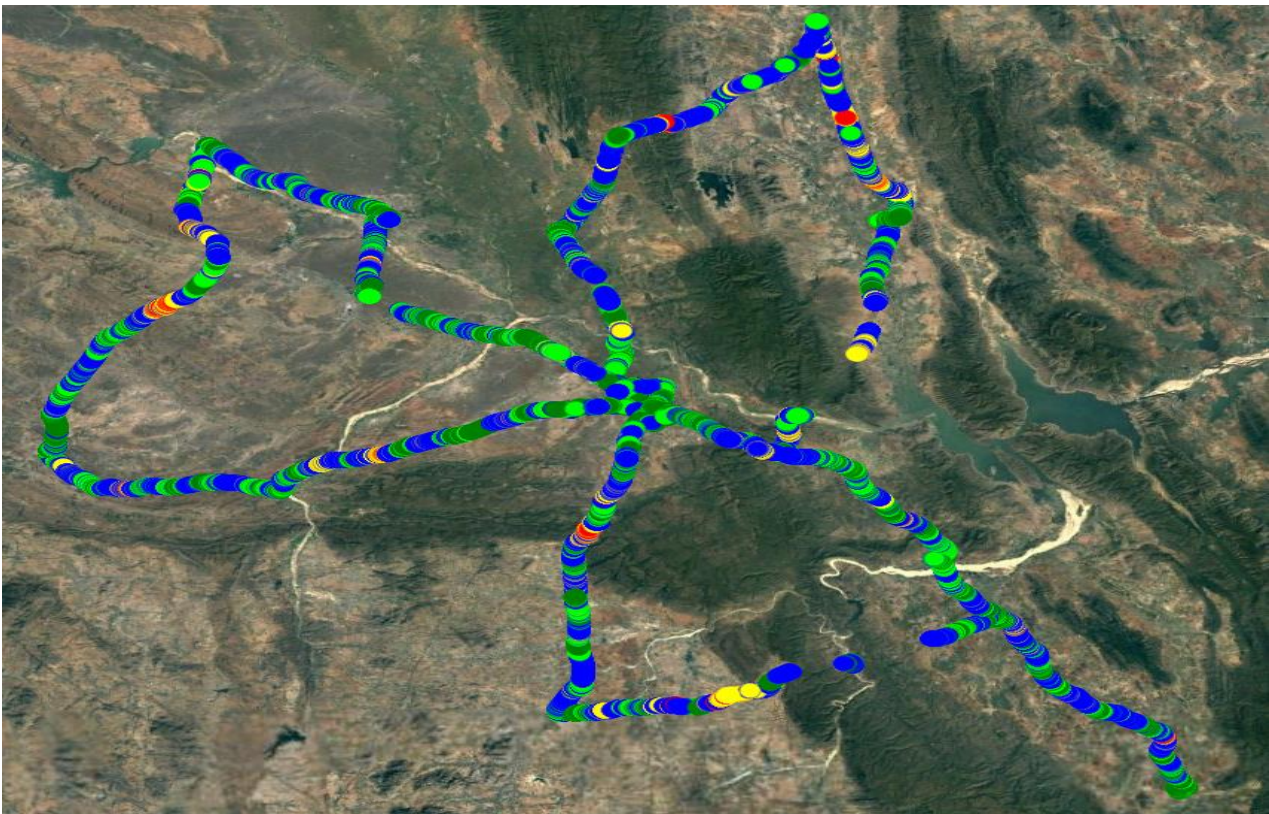
2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	49806	69.1
[-75, >=-85)	16722	23.2
[-85, >=-95)	3315	4.6
[-95, >=Min)	2234	3.1
Total	72079	100

3G		
Overall RSCP	# Samples	%
[Max, >=-70]	17202	23.5
[-70, >=-80)	43251	59.1
[-80, >=-90)	6808	9.3
[-90, >=Min)	5929	8.1
Total	73190	100

I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	97.14



Overall RSRP	# Samples	%
[Max, >=-80]	17020	25.81
[-80, >=-90]	16844	25.55
[-90, >=-110]	30183	45.78
[-110, >=-120]	1240	1.88
[-120, >=Min]	645	0.98
Total	65932	100

I. Coverage Details

VIL

Technology

Coverage Rate %

2G

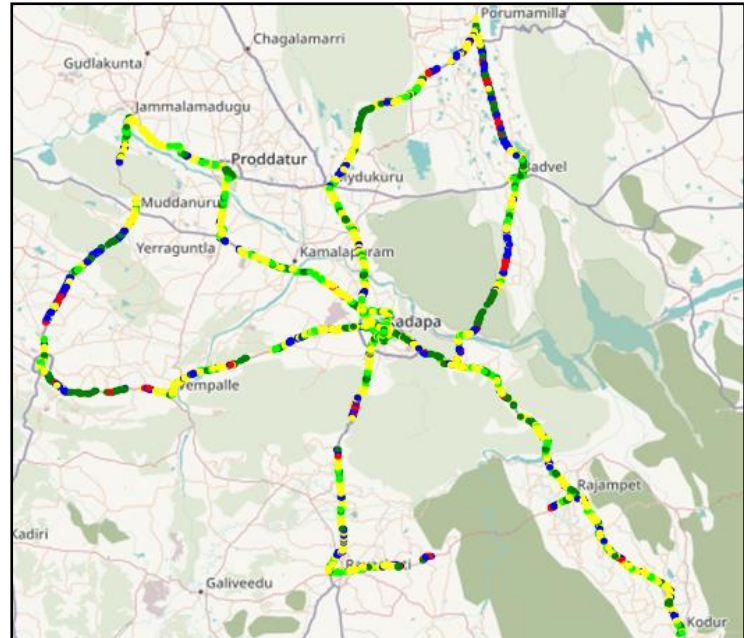
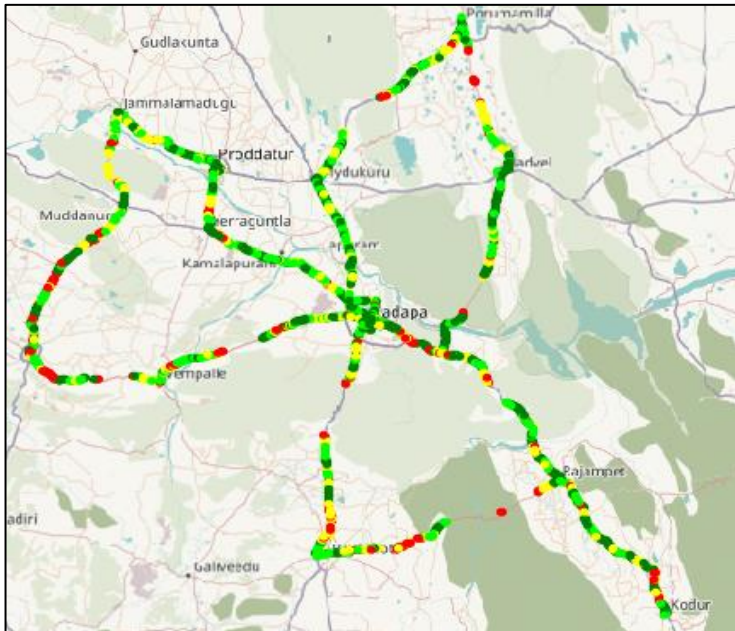
75.27

4G

89.74

2G

4G



Overall Rx Level

Samples

%

[Max, >=-75]

2455606

44.90

[-75, >=-85)

1660635

30.37

[-85, >=-95)

1050194

19.20

[-95, >=Min)

302397

5.53

Total

5468832

100

Overall RSRP

Samples

%

[Max, >=-80]

2398836

23.97

[-80, >=-90]

2171404

21.69

[-90, >=-110]

4412439

44.08

[-110, >=-120]

891846

8.91

[-120, >=Min]

135172

1.35

Total

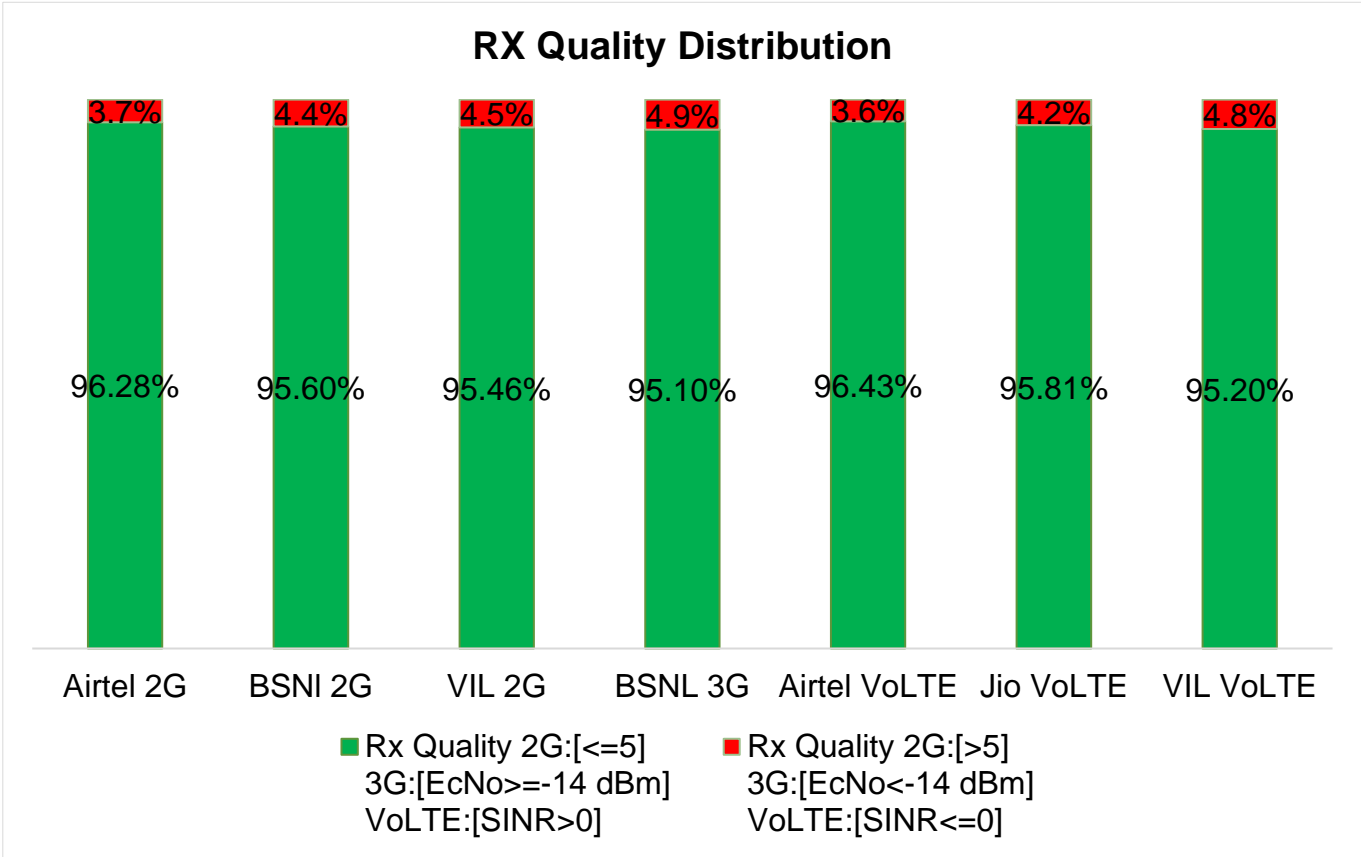
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100

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, whereas quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.

TSP	Rx Quality %
Airtel 2G	96.28
BSNL 2G	95.60
VIL 2G	95.46
BSNL 3G	95.10
Airtel VoLTE	96.43
Jio VoLTE	95.81
VIL VoLTE	95.20

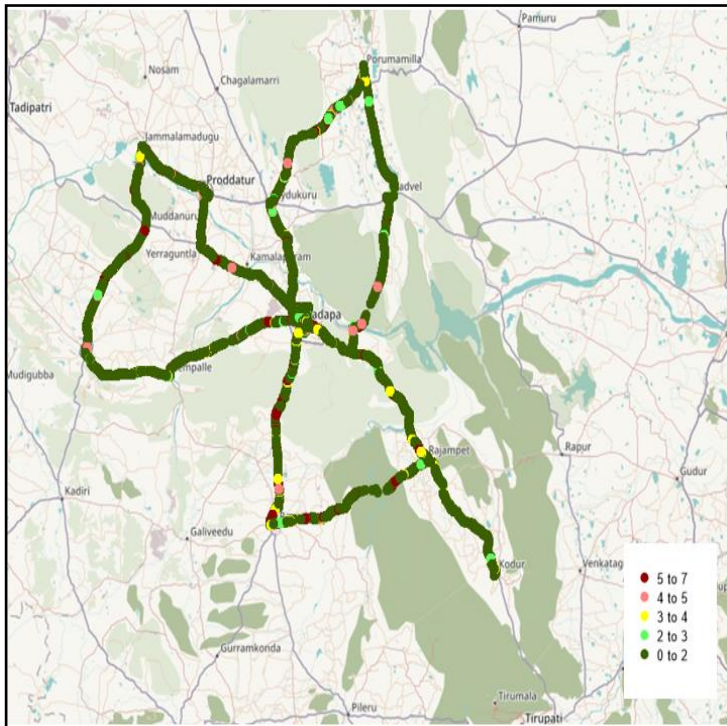


II. Quality Details

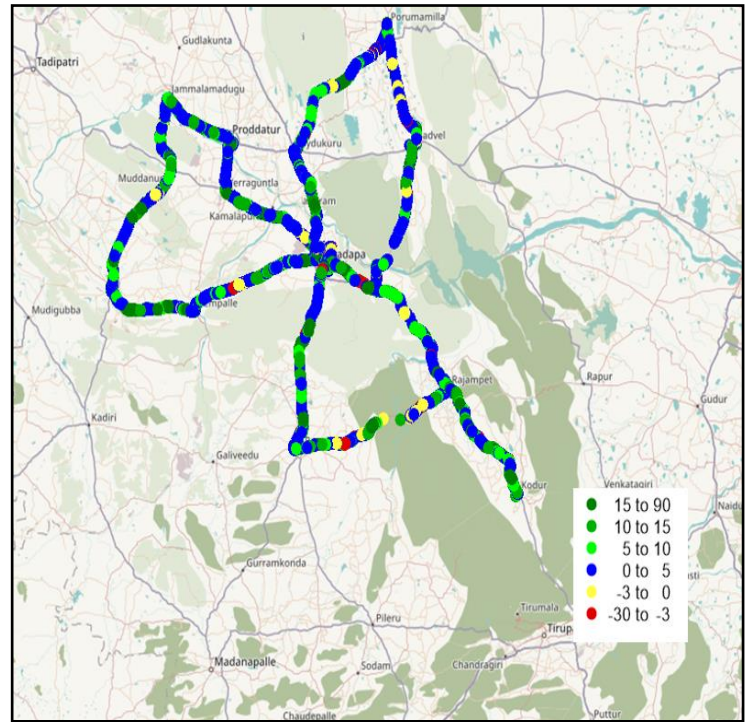
Airtel

Technology	Rx Quality %
2G	96.28
VoLTE	96.43

2G



VoLTE



Overall Rx Quality	# Samples	%
(Min, <=2)	4567791	87.02
(2, <=3)	184387	3.51
(3, <=4)	236829	4.51
(4, <=5)	64693	1.23
(5, <=Max)	195388	3.72
Total	5249088	100

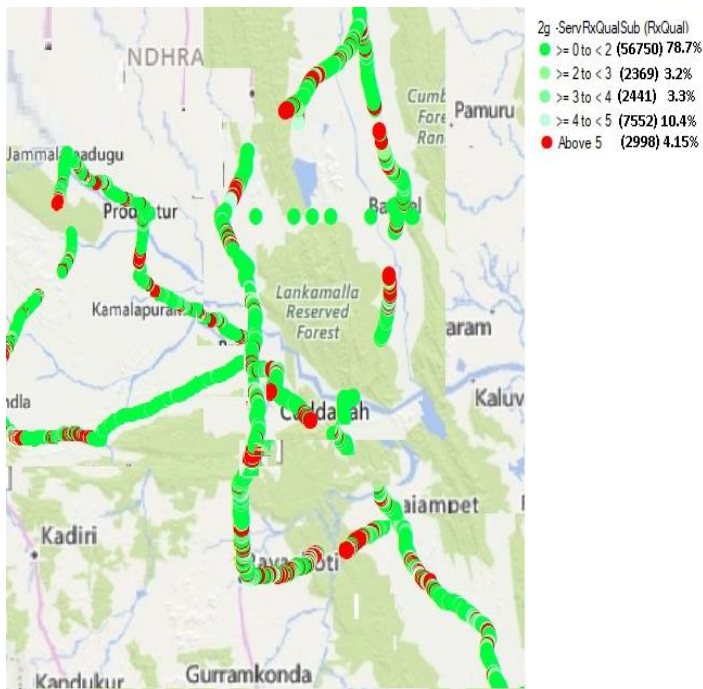
Overall SINR	# Samples	%
(Min, <=-3)	117528	0.89
(-3, <=0)	356192	2.69
(0, <=5)	6263626	47.24
(5, <=10)	1407608	10.62
(10, <=15)	1786656	13.47
(15, <=Max)	3328826	25.10
Total	13261436	100

II. Quality Details

BSNL

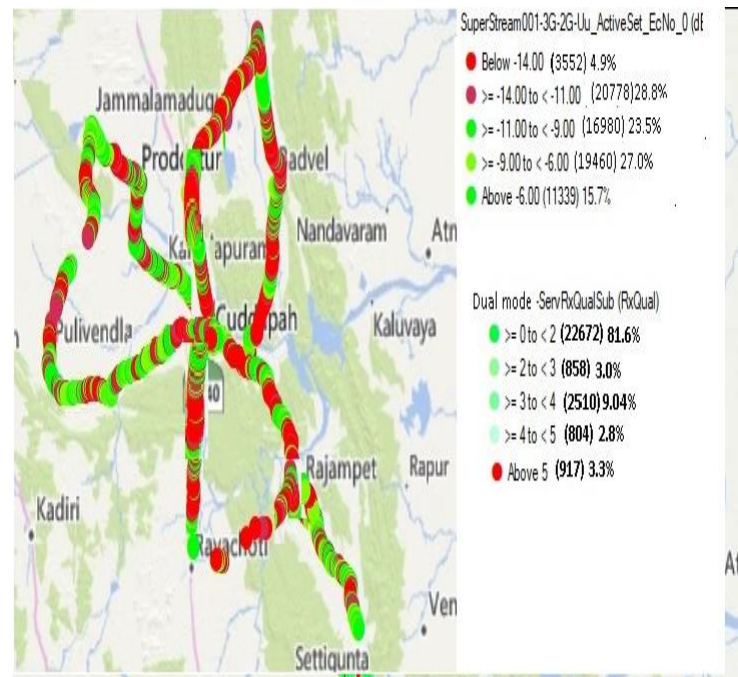
Technology	Rx Quality %
2G	95.6
3G	95.1

2G



Overall Rx Quality	# Samples	%
(Min, <=2)	56750	78.7
(2, <=3)	2369	3.2
(3, <=4)	2441	3.3
(4, <=5)	7552	10.4
(5, <=Max)	2998	4.35
Total	72110	100

3G

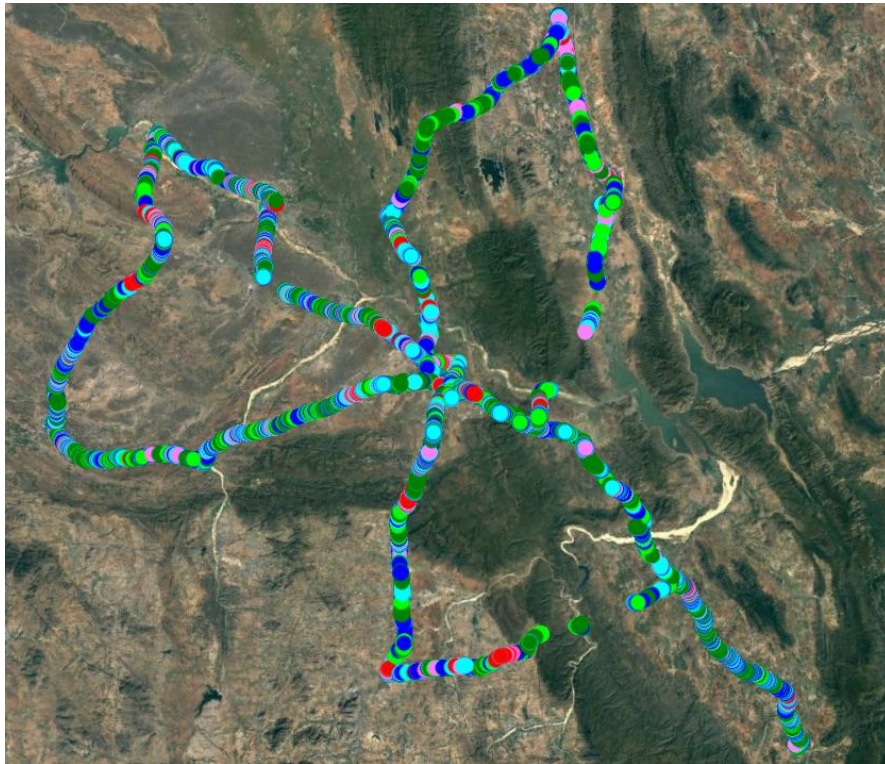


Overall EcNo	# Samples	%
(Max, <=-6)	11339	15.7
(-6, <=-9)	19460	27
(-9, <=-11)	16980	23.5
(-11, <=-14)	20778	28.8
(-14, <= Min)	3552	4.9
Total	72098	100

II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	95.81



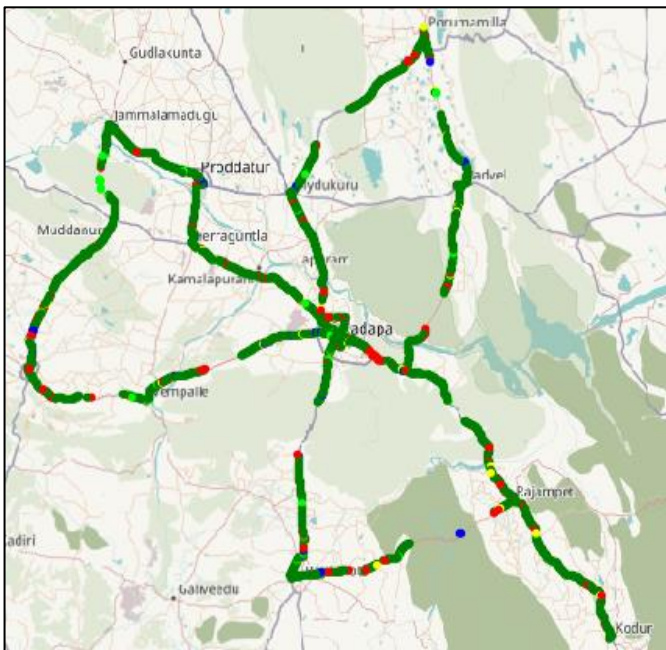
VoLTE		
Overall SINR	# Samples	%
(Min, <=-3)	1007	1.52
(-3, <=0)	1762	2.67
(0, <=5)	17200	26.09
(5, <=10)	17622	26.73
(10, <=15)	13942	21.15
(15, <=Max)	14399	21.84
Total	65932	100

II. Quality Details

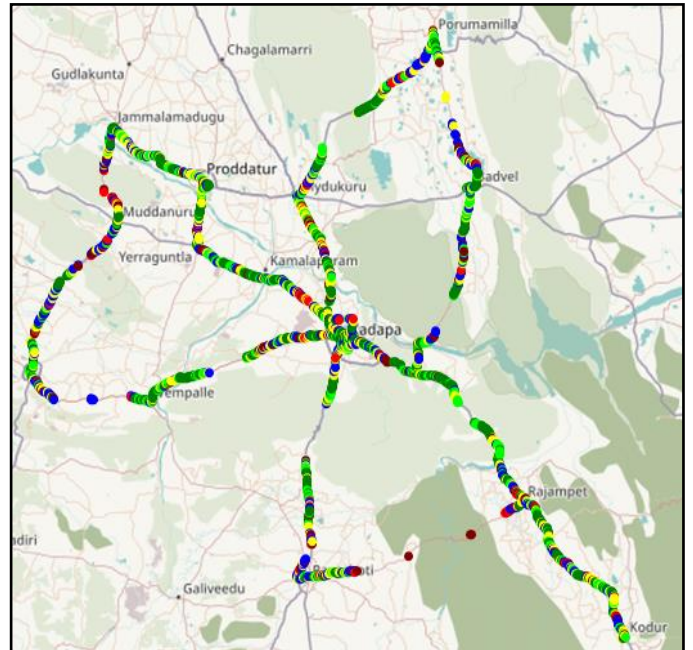
VIL

Technology	Rx Quality %
2G	95.46
VoLTE	95.20

2G



4G

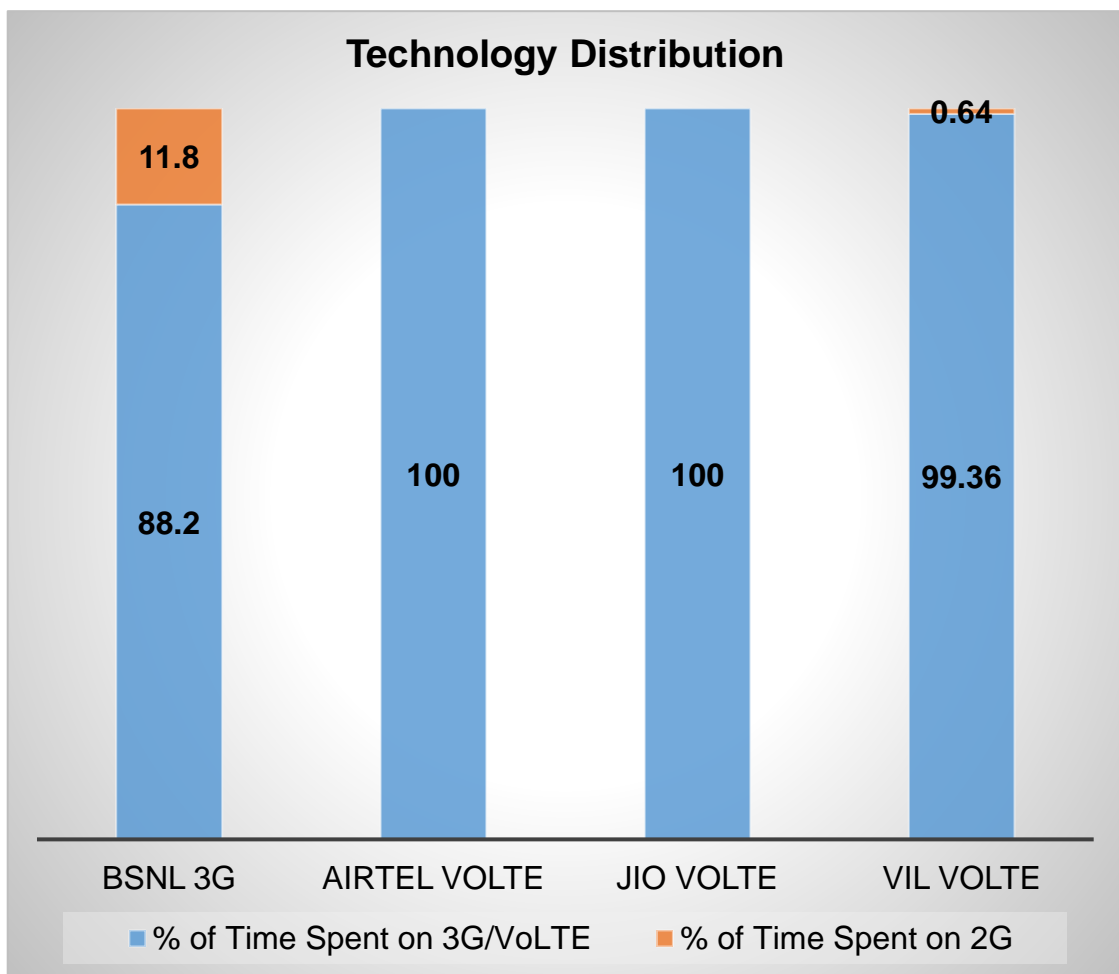


Overall Rx Quality	# Samples	%
(Min, <=2)	4943561	90.40
(2, <=3)	97093	1.78
(3, <=4)	88849	1.62
(4, <=5)	91280	1.67
(5, <=Max)	248049	4.53
Total	5468832	100

Overall SINR	# Samples	%
(Min, <=-3)	480158	4.79
(-3, <=0)	662421	6.62
(0, <=5)	1635087	16.34
(5, <=10)	1956838	19.55
(10, <=15)	1909706	19.08
(15, <=Max)	3365487	33.62
Total	6644210	100

III. Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	88.2
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	99.36



III. Technology Details

Airtel

Technology	Time Spent on 4G
4G	100%

BSNL

Technology	Time Spent n 3G
3G	88.2%

JIO

Technology	Time Spent on 4G
4G	100%

VIL

Technology	Time Spent on 4G
4G	99.36%

III. Technology Details

Airtel

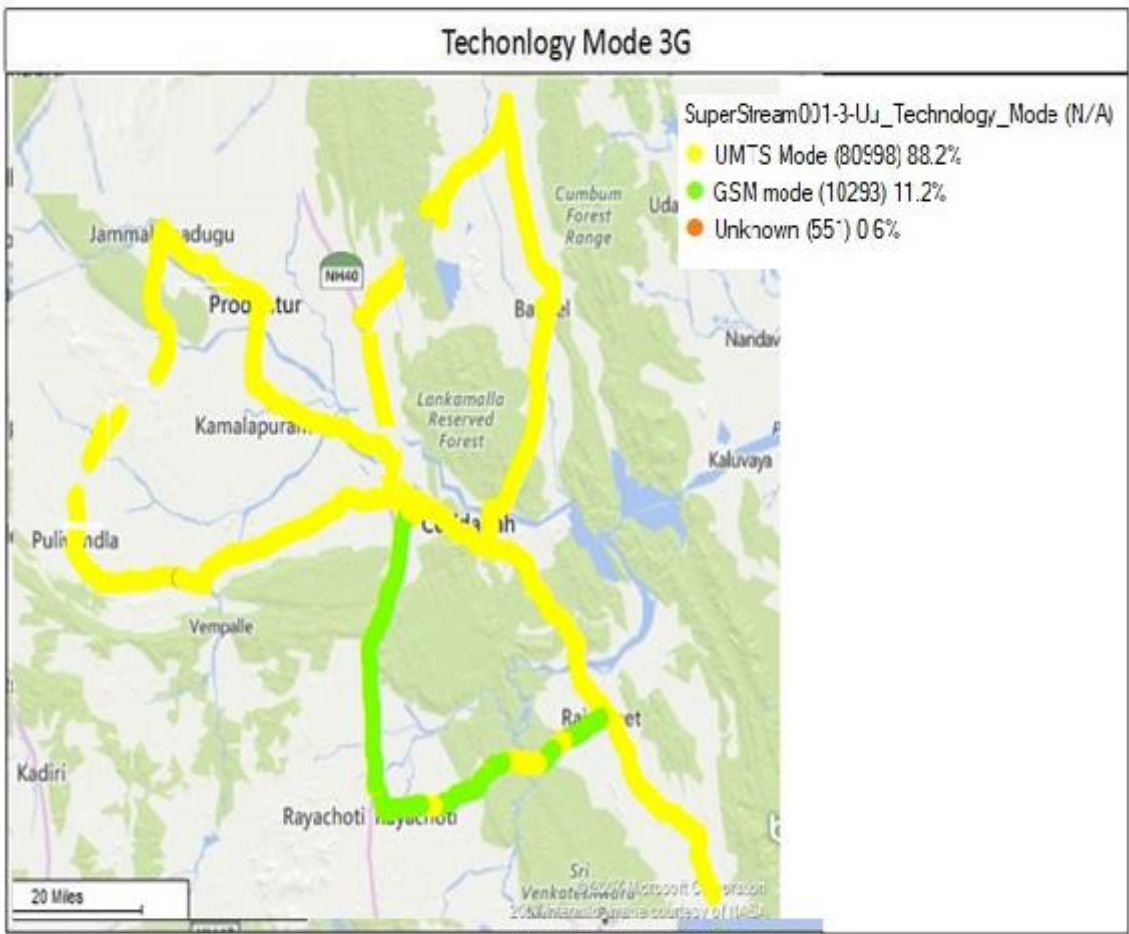
Technology	Time Spent on 4G
4G	100%



III. Technology Details

BSNL

Technology	Time Spent on 3G
3G	88.2



JIO

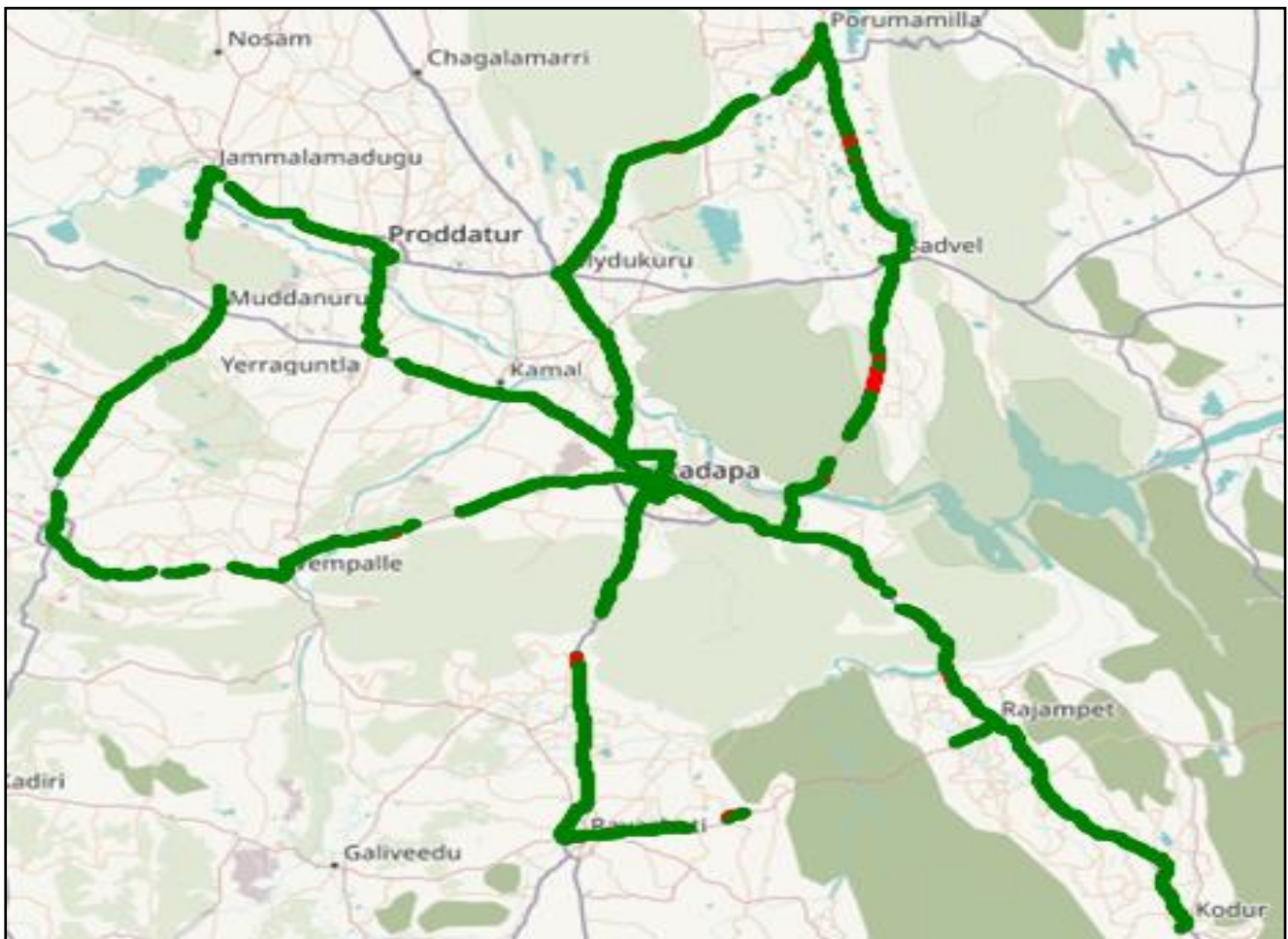
Technology	Time Spent on 4G
4G	100%



III. Technology Details

VIL

Technology	Time Spent on 4G
4G	99.36

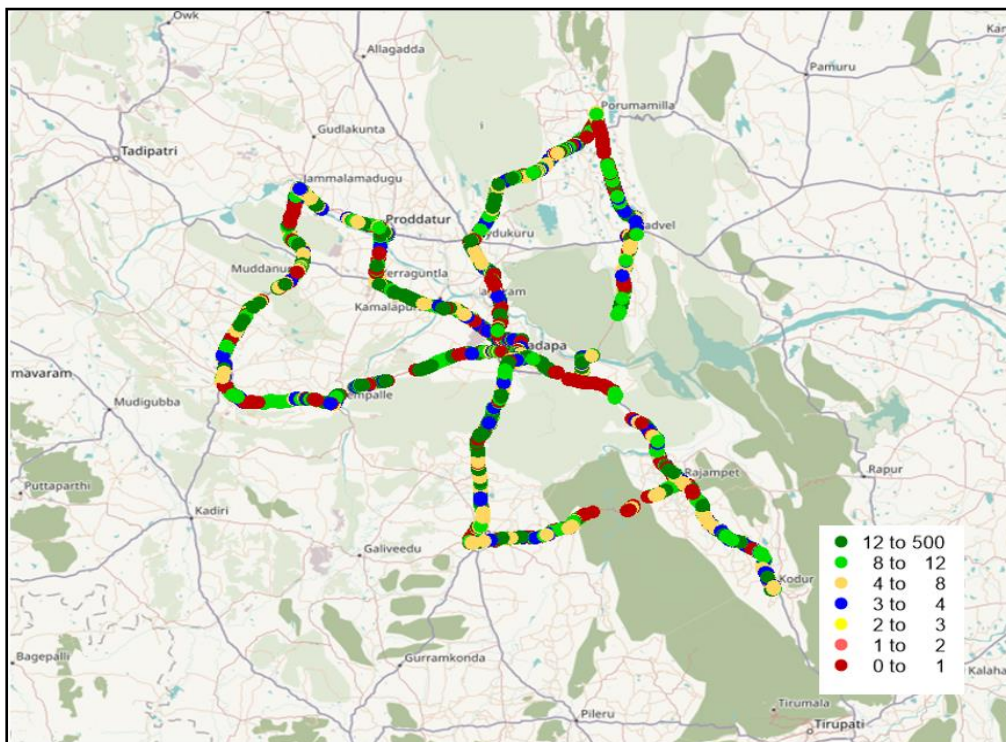


IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete SSA

Data KPIs – Overall	4G
Download Throughput (Mbps)	10.9



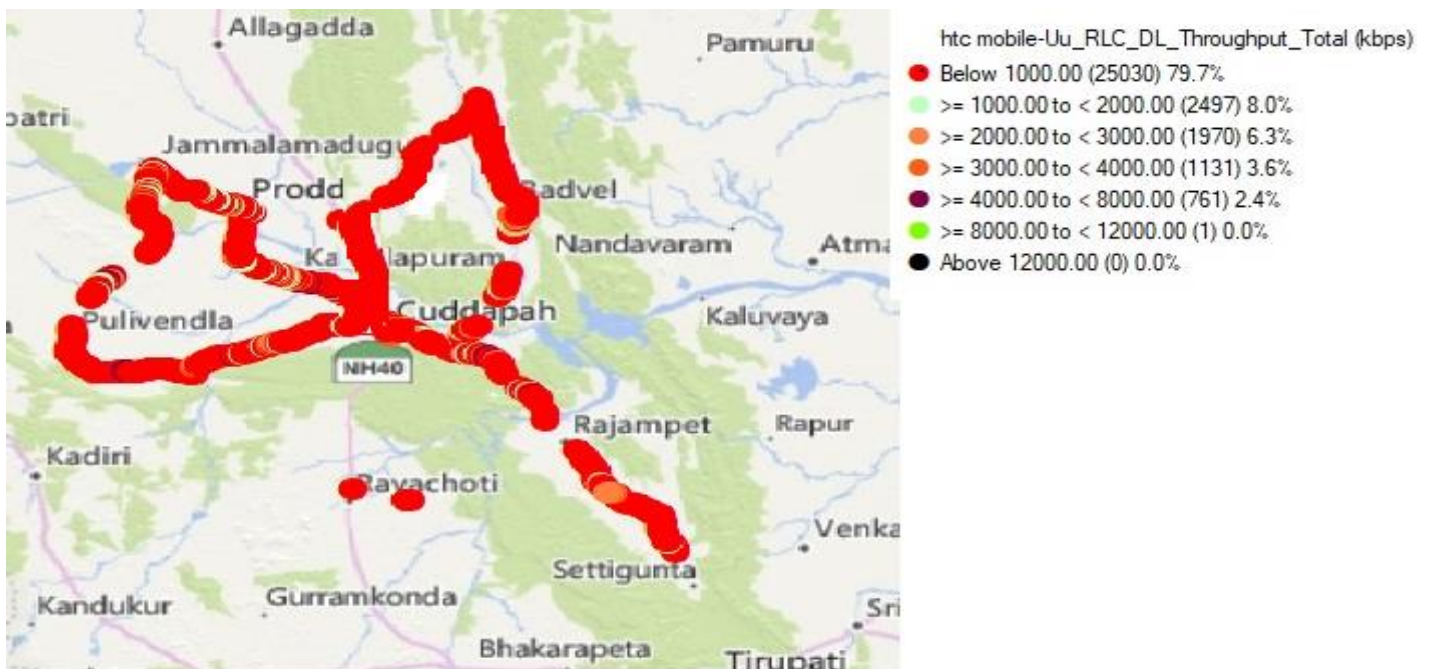
DL throughput C	No of Sample	%
0 to 1 Mbps	1270512	15.1
1 to 2 Mbps	750223	8.9
2 to 3 Mbps	939924	11.2
3 to 4 Mbps	922750	11
4 to 8 Mbps	2312851	27.5
8 to 12 Mbps	654804	7.8
>12 Mbps	1546851	18.42
Total	8397915	

IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	3G
Download Throughput (Mbps)	1.63



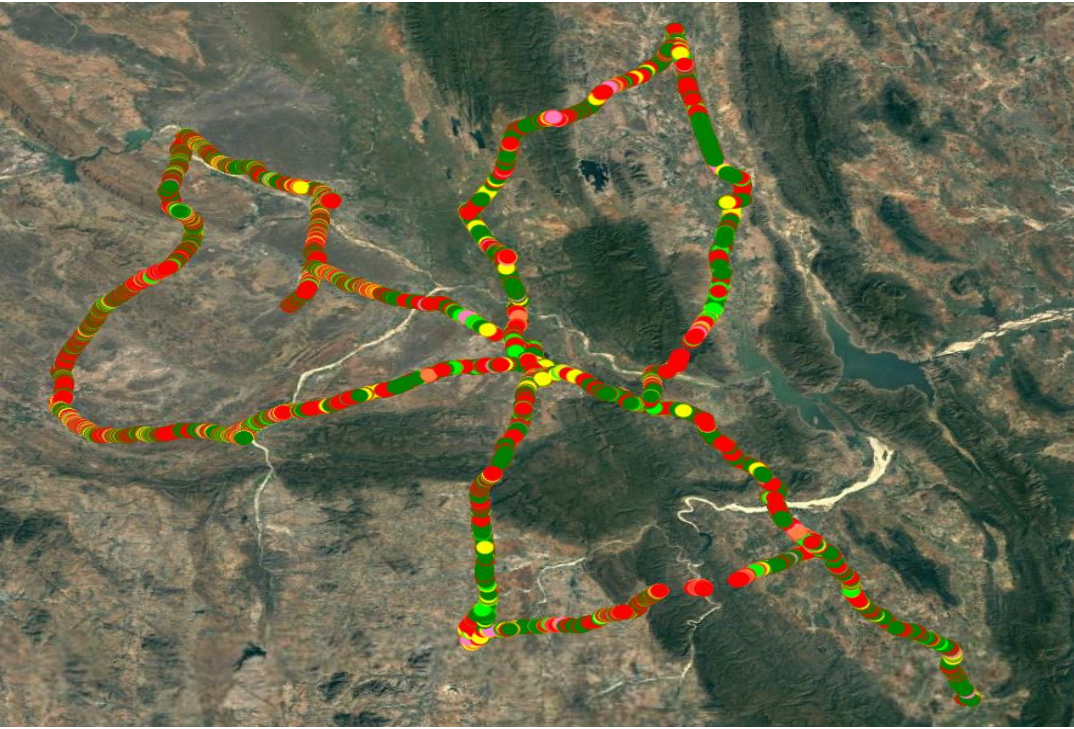
DL throughput	No of Samples	%
0 to 1 Mbps	25030	79.7
1 to 2 Mbps	2497	8.0
2 to 3 Mbps	1970	6.3
3 to 4 Mbps	1131	3.6
4 to 8 Mbps	761	2.4

IV. Dynamic Data Test- 4G DL Details

JIO

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	4G
Download Throughput (Mbps)	30.62



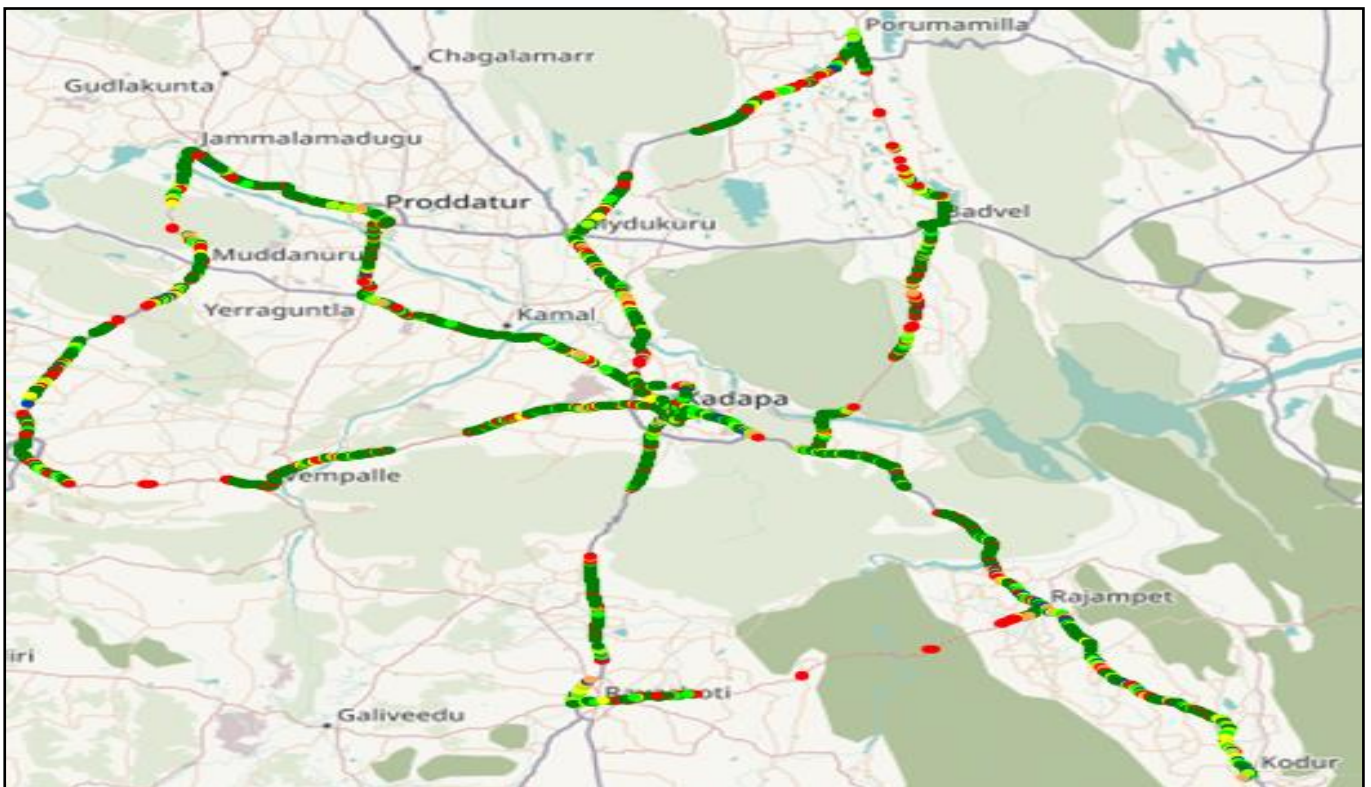
DL Throughput	No of Samples	%
0 to 1Mbps	29138	34.59
1 to 2Mbps	3174	3.77
2 to 3Mbps	2927	3.48
3 to 4Mbps	2758	3.27
4 to 8Mbps	9301	11.04
8 to 12 Mbps	7496	8.90
>12Mbps	29434	34.95

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	4G
Download Throughput (Mbps)	32.16



DL throughput	No of Sample	%
0 to 1 Mbps	974254	4.01
1 to 2 Mbps	406206	1.67
2 to 3 Mbps	503422	2.07
3 to 4 Mbps	534338	2.2
4 to 8 Mbps	6668969	27.48
8 to 12 Mbps	1791451	7.38
>12 Mbps	13389652	55.17
Total	24268292	100

V. TRAI MySpeed App

Airtel

Technology- 4G	RTC Bus stand - Proddatur	RTC Bus stand - Mydukur	railway station- kodur	RTC Bus stand - kadapa	Railway station - kadapa	Govt hospital- kadapa
Download Speed Mbps	54.91	87.25	78.81	88.26	74.34	80.40
Upload Speed Mbps	5.04	15.87	17.15	36.68	23.25	23.20

BSNL

Technology- 3G	RTC Bus stand - Proddatur	RTC Bus stand - Mydukur	railway station- kodur	RTC Bus stand - kadapa	Railway station - kadapa	Govt hospital- kadapa
Download Speed Mbps	4.56	7.92	2.55	2.68	2.50	2.70
Upload Speed Mbps	2.33	1.28	1.98	1.48	0.05	2.12

JIO

Technology- 4G	RTC Bus stand - Proddatur	RTC Bus stand - Mydukur	railway station- kodur	RTC Bus stand - kadapa	Railway station - kadapa	Govt hospital- kadapa
Download Speed Mbps	75.86	91.20	55.52	98.23	66.89	66.20
Upload Speed Mbps	14.14	30.75	23.72	16.65	16.99	15.75

VIL

Technology- 4G	RTC Bus stand - Proddatur	RTC Bus stand - Mydukur	railway station- kodur	RTC Bus stand - kadapa	Railway station - kadapa	Govt hospital- kadapa
Download Speed Mbps	42.35	14.42	26.09	20.38	45.70	39.74
Upload Speed Mbps	24.38	3.57	6.15	6.32	8.62	14.76

VI. NH/SH Routes covered

NH/SH Routes covered in OADT by Airtel / BSNL / RJIL / VIL				
SI No	No of NH/SH routes	NH routes	SH routes	Distance(Km)
1	Kadapa to Yerragunla	NH 47	SH 31	41 Kms
2	Yerraguntla to Proddatur		SH 67	18 Kms
3	Proddatur to Jammalamadugu		SH 57	38 Kms
4	Jammalamadugu to Muddanur		SH 28	21 Kms
5	Muddanur to Pulivendula		SH 60	38 Kms
6	Pulivendula to Kadapa		SH 51	76 Kms
7	Kadapa to badvel	NH40	SH 56	59 Kms
8	Badvel to porumamilla		SH 56	34Kms
9	Porumamilla to Mydukur		SH 54	45 Kms
10	kadapa to koduru		SH 31	91 Kms
11	Rajampeta to Rayachoty		SH 34	56 kms
12	Rayachoti to Mydukur	NH 40		84 Kms