

Operator Assisted Drive Test Report

TRICHY SSA

JUNE 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 has been carried out by Regional Office, Hyderabad with the help of Service Providers in Trichy City & surrounding regions of Karur and Pudukottai from 9:00 AM to 8:00 PM during 20th June to 23rd June 2023. The drive test covered drive route of 410 KMs & 6 hotspots over a period of 4 days. Approximately 620 calls were made for each of the 8 networks: three 2G networks, one 3G networks and four LTE network covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

Regional Office, TRAI Hyderabad conducted Operator Assisted Drive Test from 20th to 23rd June 2023 covering various locations in Trichy City & surrounding regions of Karur and Pudukottai. The performance of Airtel, BSNL, Vodafone Idea and Jio 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, Video Streaming Interruption delay, 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 410 KMs over a period of 3 days from 20th to 23rd June 2023. Approximately 620 calls were made for each of the 8 networks: three 2G (Lock Mode) networks, one 3G (Dual mode) network and four VoLTE network covering 4 unique TSPs.

Data Tests:

1. Dynamic data test was conducted for 410 kms over a period of 3 days for download throughput for 3G & 4G technologies.

2. Data Tests were performed at 6 static locations for 2G, 3G & 4G technologies.

* 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.

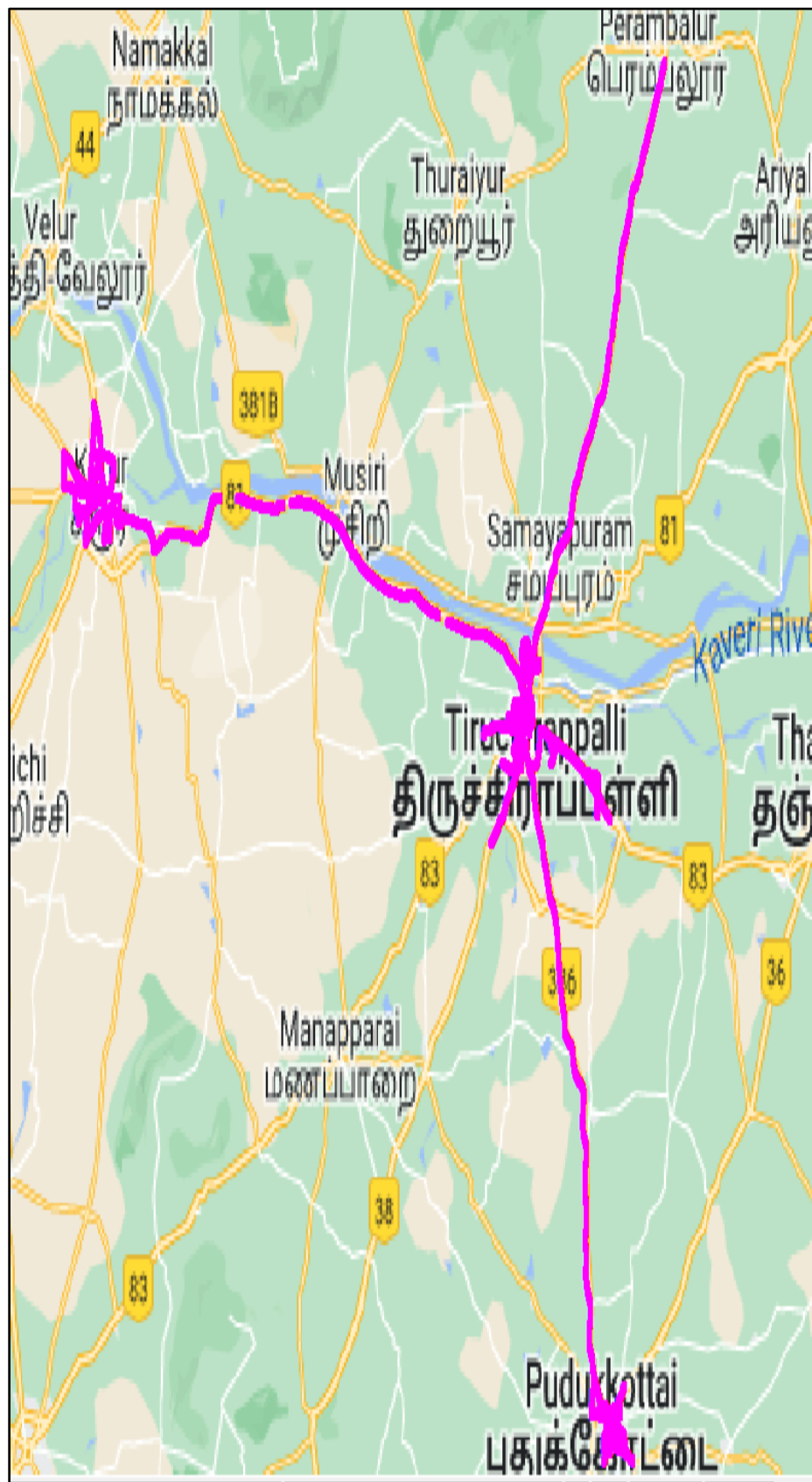
* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

* 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 (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 www.myntra.com.
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route



Areas Covered – Trichy Town(Day 1)

Cantonment	Ammamandapam
Palakkarai	Srirangam
Gandhi Market	Tiruvanaikovil
Chatram Bus stand	Palpannai
Thennur	Kattur
Puthur	Thiruverumbur
Woraiyur	NIT
Thillai Nagar	Shanmuga nagar
Heber road	Srinivasa nagar
EB Road	Vasan anagar
WB Road	Vasan Valley
Railway Junction	Somasampettai
Karumandapam	Ramalinga Nagar
Crawford	Sastri Road
Ramachandra Nagar	Salai Road
Annamalai Nagar	Rajacolony

Areas Covered- Karur (Day 2)

Areas Covered- Pudukottai (Day 3)

Trichy-Karur NH	Trichy-Pudukottai NH
Collectorate	Thirukkokarnam
Bharathidasan Nagar	Thodaiman Nagar
Thanthoni	Keela Raja vedhi
Sunga Gate	Machuvadi
Thirumanilayur	Forest Office
Bus stand Karur	Kamarajapuram
Sengunthapuram	Ayyanarpuram
Vadivel Nagar	Ashok Nagar
Coimbatore Raod	NGO Colony
Arasu colony	Railway station
Gandhigramam	Trichy-Perambalur NH

V. Static Data Test-Details



Data Service Test- Static Locations

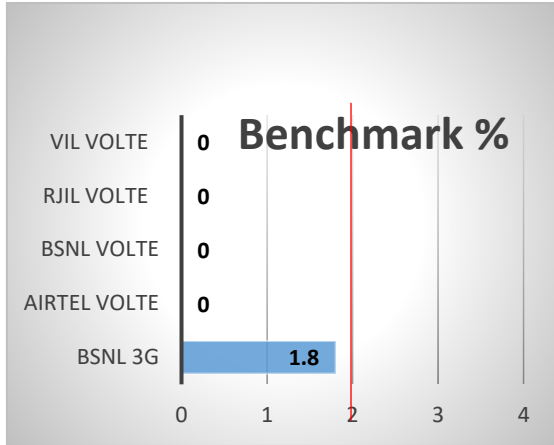
Static Locations
Trichy Railway Junction
Gandhi Market
Chathram Bus stand
Srirangam Temple
Karur-Bus stand
Pudukkottai-Bus stand

Voice Calls

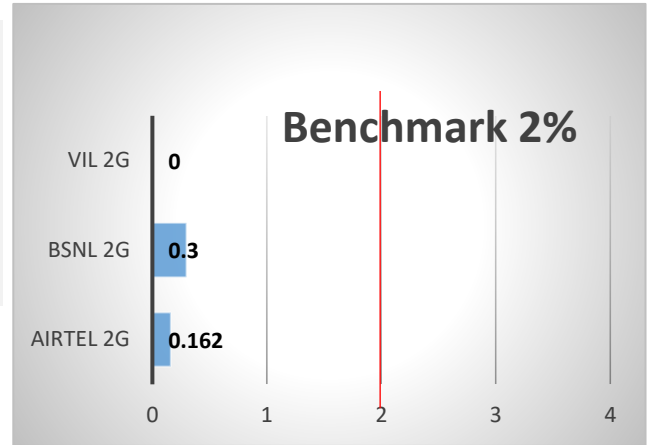
Key Observations

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

Drop Call Rate (%)

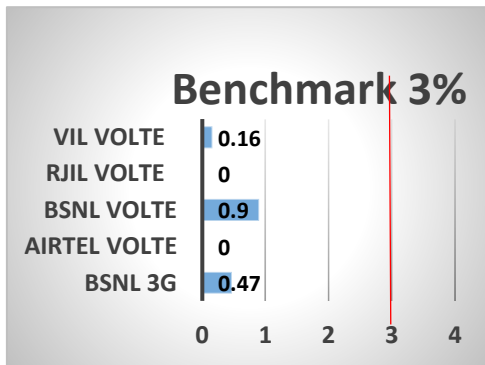


3G/VoLTE Network

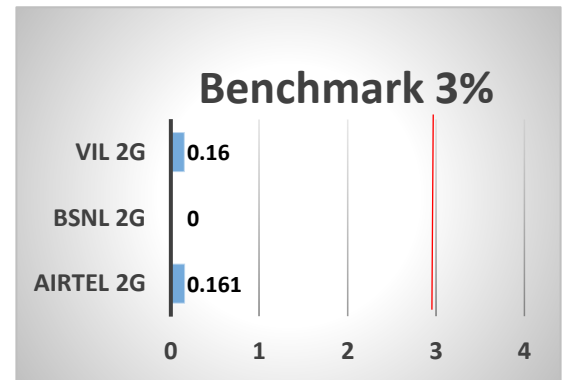


2G Network

Block Call Rate (%)



3G / VoLTE Network



2G Network

KPIs	2G			3G	VoLTE			
	Airtel	BSNL	VIL	BSNL	Airtel	BSNL	RJIL	VIL
Drop Call Rate %	0.162	0.3	0	1.8	0	0	0	0
Block Call Rate %	0.161	0	0.16	0.47	0	0.9	0	0.16

- All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%).
- Block Call 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 %	93.07	95.36	94.76

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

TSPs	3G	VoLTE			
	BSNL	Airtel	BSNL	JIO	VIL
Coverage %	93.03	99.86	99.5	99.26	99.35

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

TSPs	3G/VoLTE			
	Airtel	BSNL	JIO	VIL
% of Time Spent on 3G/4G	100	73.23	100	99.02

Summary

SSA Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	601	651	634
Blocked Call Rate (%)	0.161	0	0.16
CSSR% (Accessibility)	99.69	100	99.84
Drop Call Rate (%)	0.162	0.3	0
Mobility HOSR (%)	99.61	98.82	99.03
Rx Quality (%)	95.28	99.38	99.1

Voice Call	BSNL 3G	VoLTE			VIL VoLTE
		Airtel VoLTE	BSNL VoLTE	JIO VoLTE	
Call Attempt	424	621	221	603	601
Blocked Call Rate (%)	0.47	0	0.9	0	0.16
CSSR% (Accessibility)	99.53	100	99.1	100	99.84
Drop Call Rate (%)	1.8	0	0	0	0
Mobility HOSR (%)	99.2	99.77	99.5	99.47	99.82
Rx Quality (%)	98.13	83.12	87.03	92.5	95.3

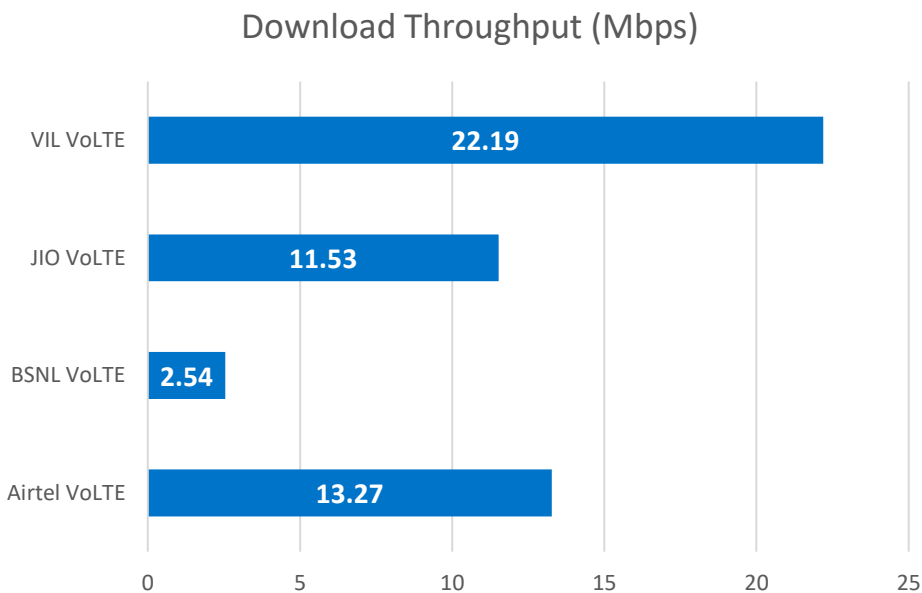
Data Services Dynamic

Key Observations

Dynamic Data was tested for 410Kms. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic

4G/ Network:



Data Services Static Dynamic	VoLTE			
	Airtel VoLTE	BSNL VoLTE	JIO VoLTE	VIL VoLTE
Download Throughput (Mbps)	13.27	2.54	11.53	22.19

Data Services Static

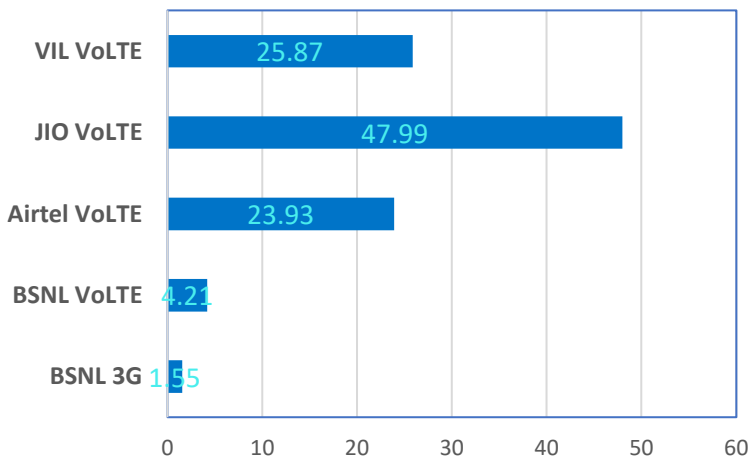
**Key Observations
(Average of 6
Hotspots)**

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

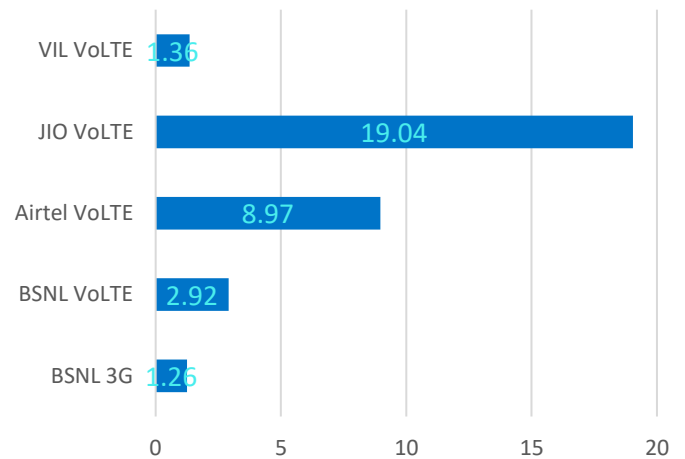
Data Download and Upload Performance (Mbps)

4G / Network:

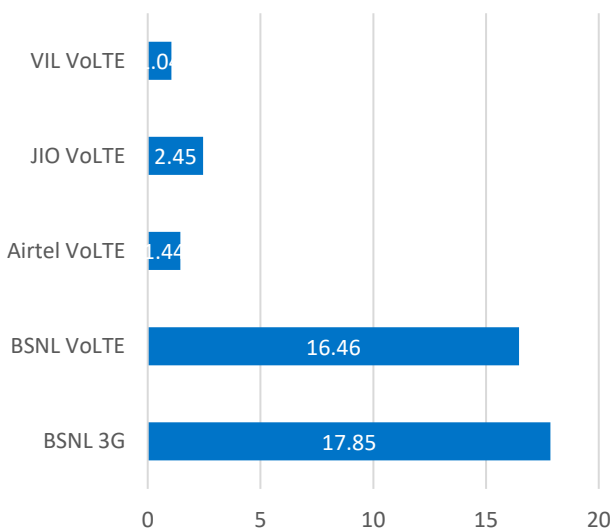
Download Throughput (Mbps)



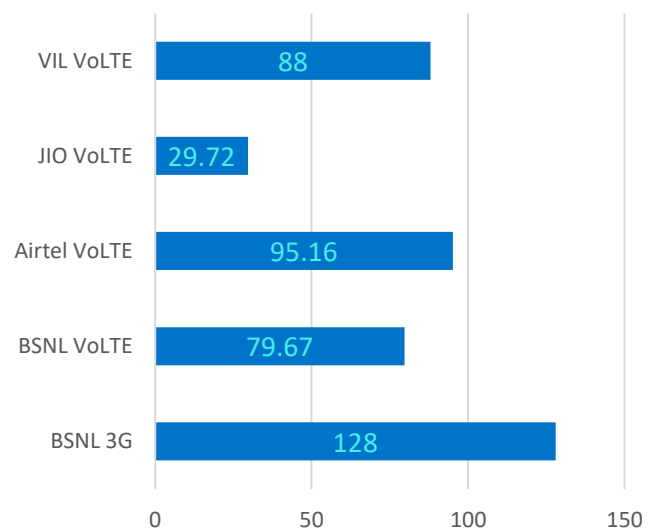
Upload Throughput (Mbps)



Web Browsing delay (Sec)



Latency (ms)



Summary

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

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	172.72	121.43	140.63
Upload Throughput (kbps)	73.32	50.05	70.03
Web Browsing Delay (sec)	6.23	80.86	6.39
Latency (msec)	269.16	240.28	305.5

Data Services Static	BSNL 3G	VoLTE			
		BSNL VoLTE	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download Throughput (Mbps)	1.55	4.21	23.93	47.99	25.87
Upload Throughput (Mbps)	1.26	2.92	8.97	19.04	1.36
Web Browsing Delay (sec)	17.85	16.46	1.44	2.45	1.04
Latency (msec)	128	79.67	95.16	29.72	88

Trichy Railway Junction	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	176.96	111.02	199.3
Upload Throughput (kbps)	70.3	40.92	96.8
Web Browsing Delay (sec)	5.941	111.33	3.39
Latency (msec)	268	188.33	251

Gandhi Market Trichy	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	152.96	131.85	182.1
Upload Throughput (kbps)	46.5	53.78	53.7
Web Browsing Delay (sec)	5.064	86.01	5.01
Latency (msec)	241	188.67	339

Chatham Bus Stand Trichy	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	142.3	155.63	127.9
Upload Throughput (kbps)	89.3	39.5	48.6
Web Browsing Delay (sec)	9.779	62.84	7.8
Latency (msec)	238.66	234.33	268

Srirangam Temple Trichy	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	159.56	98.93	93.3
Upload Throughput (kbps)	81.03	50.19	63.8
Web Browsing Delay (sec)	5.229	91.38	10.89
Latency (msec)	275	227.33	225

Karur Bus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	154.93	214.17	74.1
Upload Throughput (kbps)	83.93	104.03	65.7
Web Browsing Delay (sec)	6.567	58.98	6.17
Latency (msec)	370.66	323	233

Pudukkottai Bus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	249.61	165.42	167.1
Upload Throughput (kbps)	68.83	56.24	91.6
Web Browsing Delay (sec)	4.80	74.60	5
Latency (msec)	221.66	280	517

Trichy Railway Junction	LTE	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	5.55	15.88	35.43	29.95
Upload Throughput (Mbps)	5.02	17.53	18.72	1.47
Web Browsing Delay (sec)	11.95	0.94	3.01	0.9
Latency (msec)	63	113.66	31.22	89

Gandhi Market Trichy	LTE	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	3.77	15.06	54.92	36.86
Upload Throughput (Mbps)	2.47	2.57	20.63	1.25
Web Browsing Delay (sec)	10.10	0.91	2.37	1.2
Latency (msec)	75.67	89.66	24.61	87

Chatham Bus Stand Trichy	LTE	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	4.89	26.09	44.09	19.30
Upload Throughput (Mbps)	4.61	4.72	19.97	1.27
Web Browsing Delay (sec)	20.34	1.28	2.27	1.05
Latency (msec)	86.67	94.3	30.06	99

Srirangam Temple Trichy	LTE	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	3.43	39.62	49.46	33.30
Upload Throughput (Mbps)	1.91	2.69	19.63	1.41
Web Browsing Delay (sec)	23.46	0.79	2.21	1.3
Latency (msec)	93.33	92	32.11	79

Karur Bus Stand	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.15	9.77	43.21	31.41
Upload Throughput (Mbps)	1.18	10.01	18.53	1.31
Web Browsing Delay (sec)	21.57	3.72	2.39	1.4
Latency (msec)	169.67	90.66	32.27	74

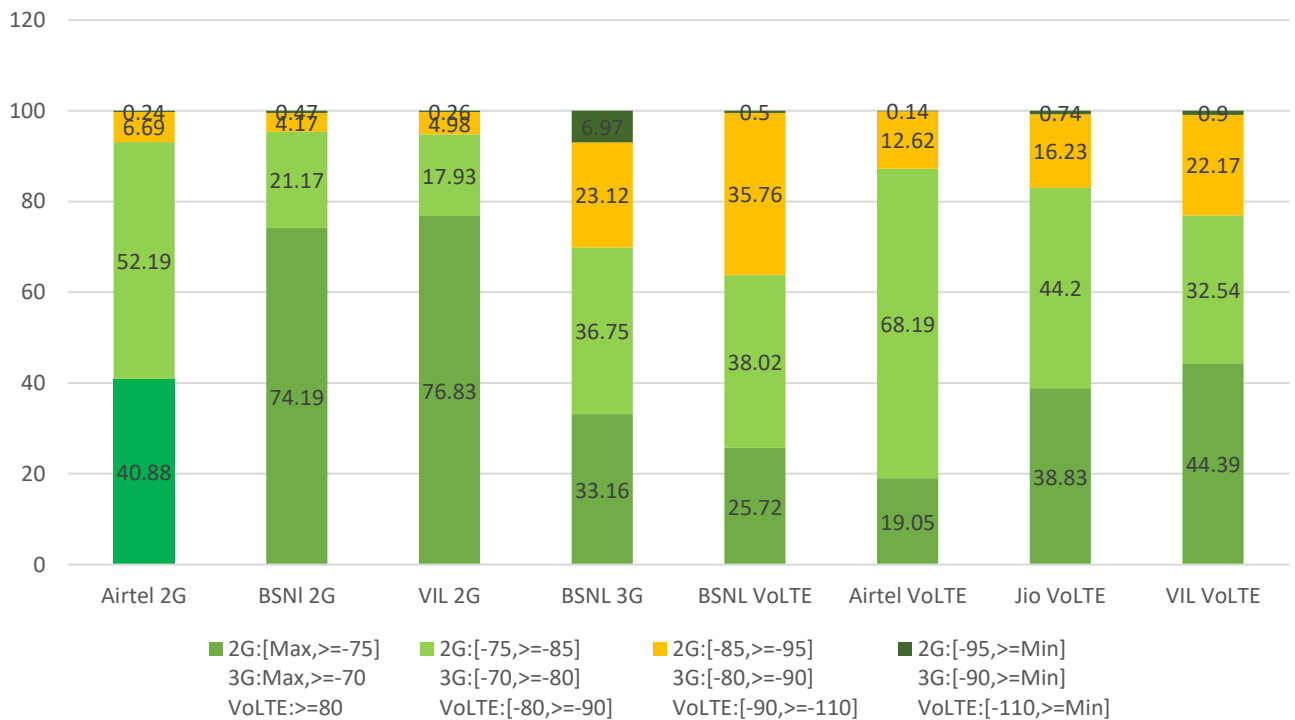
Pudukkottai Bus Stand	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.64	37.13	60.80	11.81
Upload Throughput (Mbps)	1.35	16.31	16.75	1.52
Web Browsing Delay (sec)	14.13	0.99	2.44	0.6
Latency (msec)	86.33	90.66	28.06	91

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	93.07
BSNI 2G	95.36
VIL 2G	94.76
BSNL 3G	93.03
BSNL VoLTE	99.50
Airtel VoLTE	99.86
Jio VoLTE	99.26
VIL VoLTE	99.10

Coverage Details

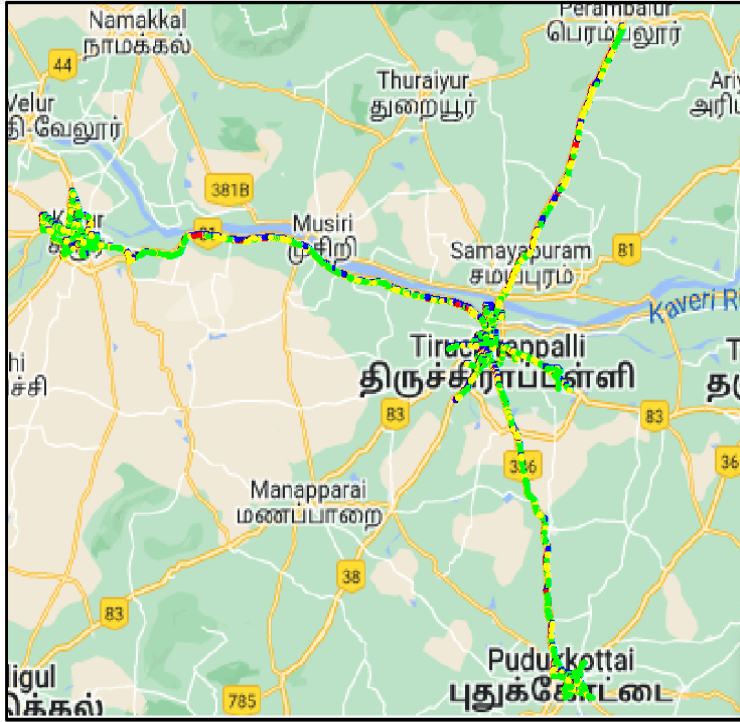


I. Coverage Details

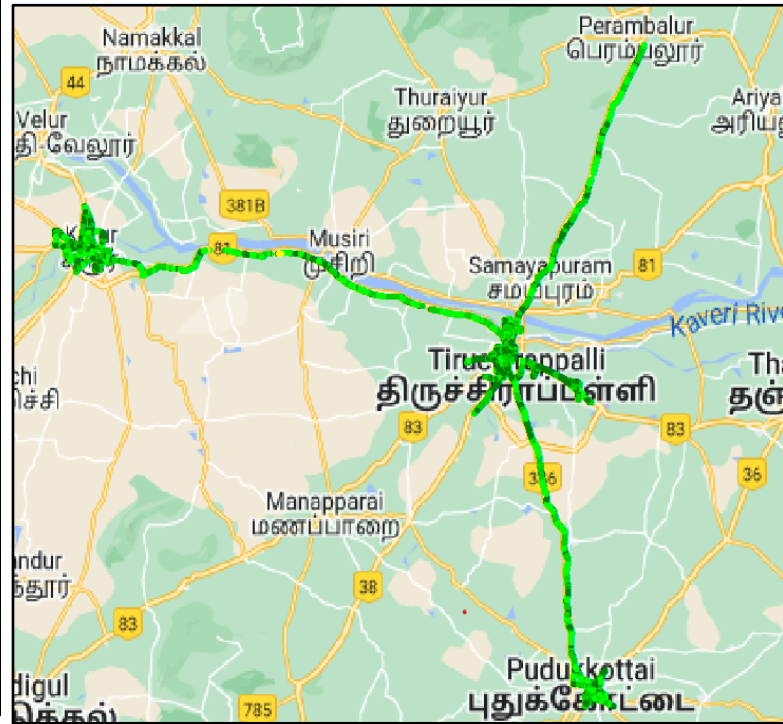
AIRTEL

TSP	Coverage Rate %
Airtel 2G	93.07
Airtel VoLTE	99.86

2G



VoLTE



Overall Rx Level	# Samples	% PDF
[Max, >=-75]	3231868	40.88
[-75, >=-85)	4125932	52.19
[-85, >=-95)	528808	6.69
[-95, >=Min)	18583	0.24
Total	7905191	100

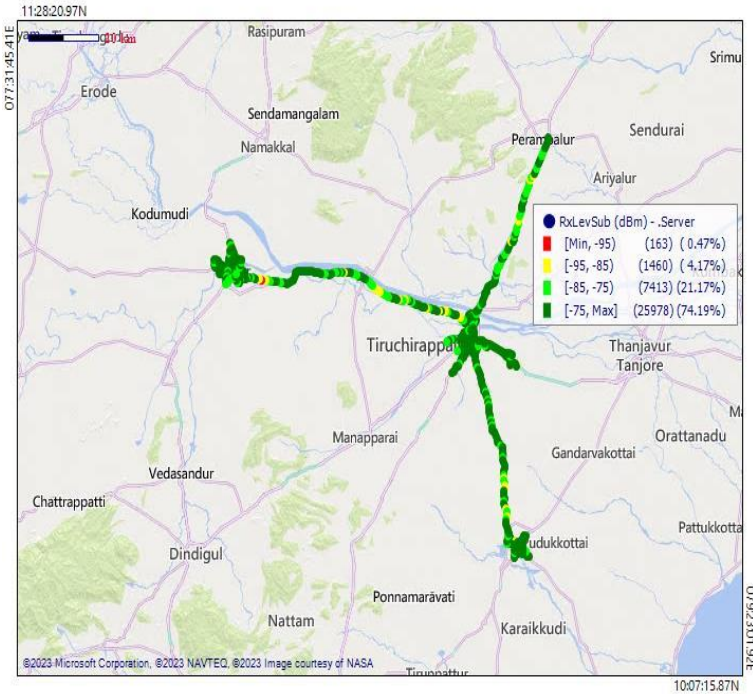
Overall RSRP	# Samples	% PDF
[Max, >=-80]	2094574	19.05
[-80, >=-90)	7496762	68.19
[-90, >=-110)	1386994	12.62
[-110, >=Min)	15614	0.14
Total	10993944	100

I. Coverage Details

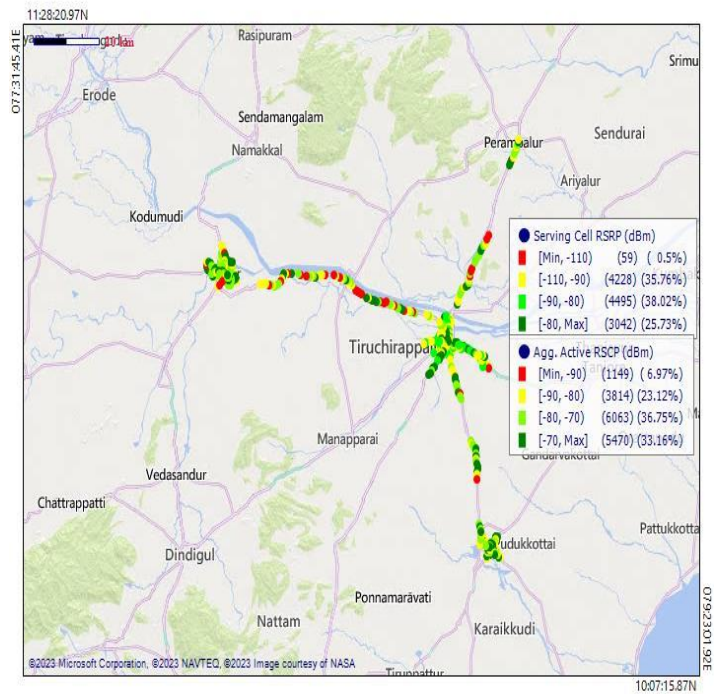
BSNL

Technology	Coverage Rate %
2G	95.36
VoLTE	93.03

2G



3G



2G

Overall RxLevel	# Samples	% PDF
[Max, >=-75]	25978	74.19
[-75, >=-85)	7413	21.17
[-85, >=-95)	1460	4.17
[-95, >=Min)	163	0.47
Total	35014	100

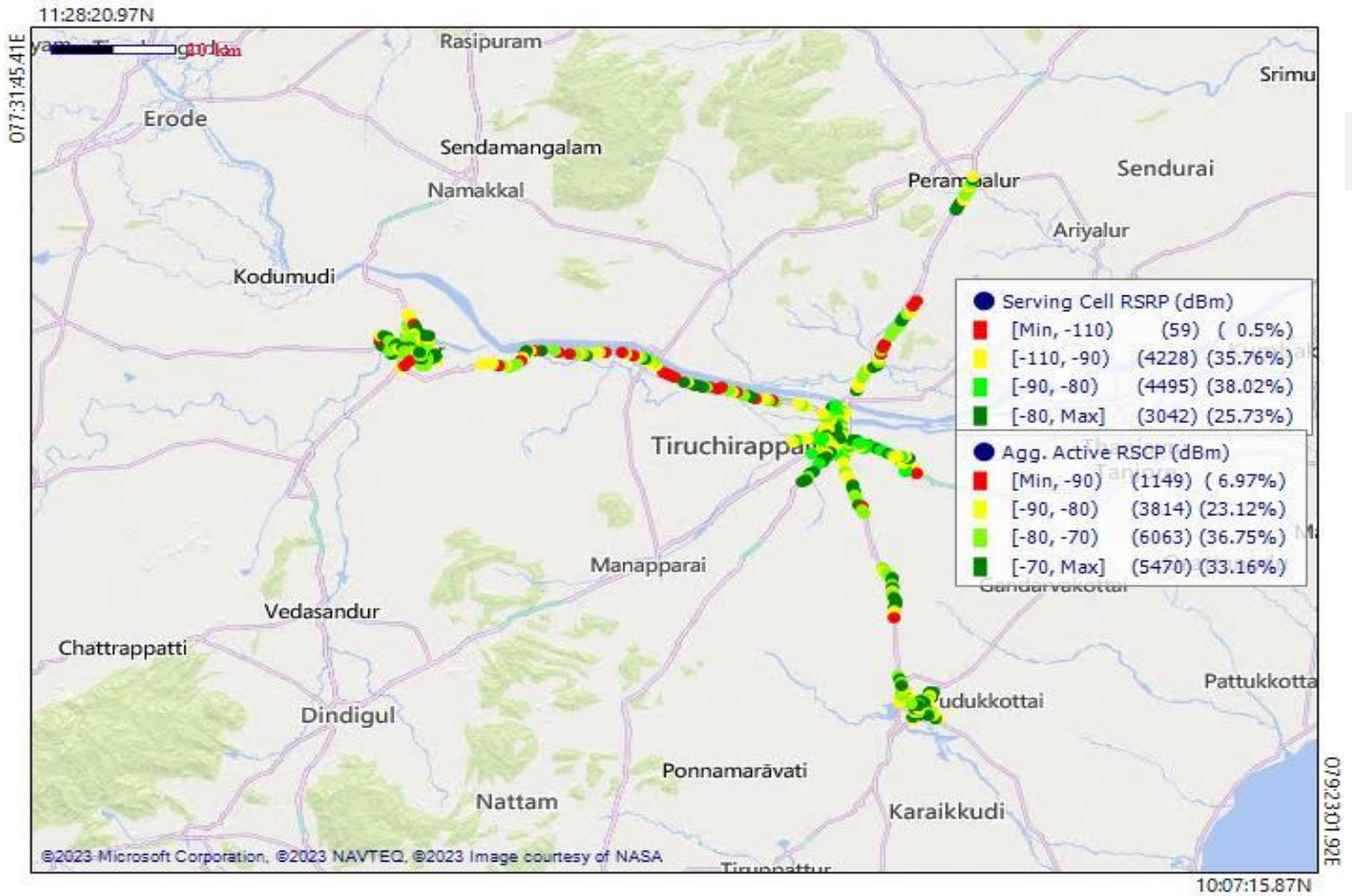
3G

Overall RSCP	# Samples	% PDF
[Max, >=-70]	5470	33.16
[-70, >=-80)	6063	36.75
[-80, >=-90)	3814	23.12
[-90, >=Min)	1149	6.97
Total	16496	100

I. Coverage Details

BSNL

Technology	Coverage Rate %
VoLTE	99.50

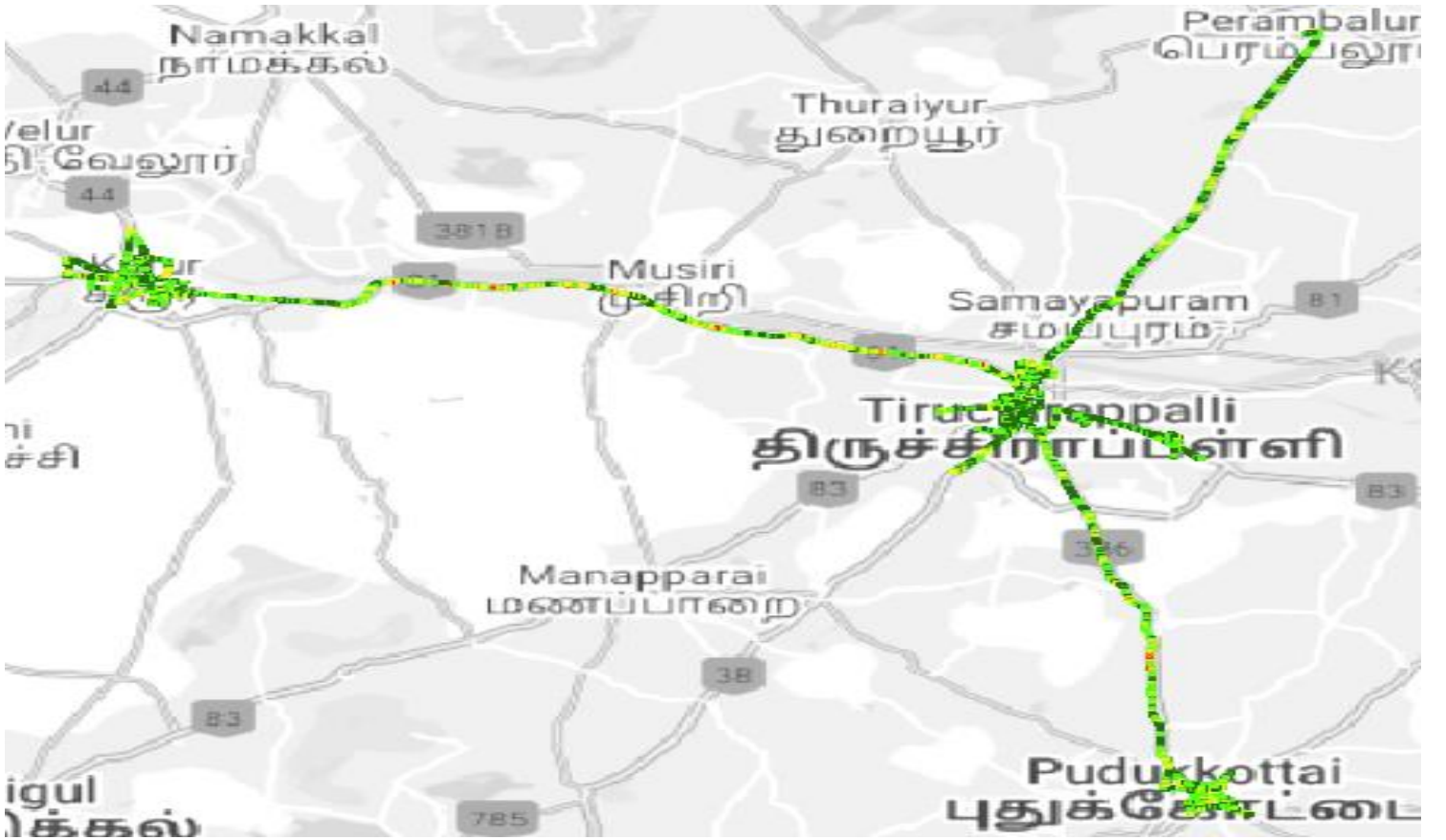


VoLTE		
Overall RSRP	# Samples	% PDF
[Max, >=-80]	3042	25.72
[-80, >=-90)	4495	38.02
[-90, >=-110)	4228	35.76
[-110, >=Min)	59	0.5
Total	11824	100

I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	99.26



VoLTE

Overall RSRP	# Samples	%
[Max, >=-80]	24236	38.83
[-80, >=-95)	27592	44.20
[-95, >=-110)	10130	16.23
[-110, >=Min)	459	0.74
Total	62417	100

I. Coverage Details

VIL

Technology	Coverage Rate %
2G	94.76

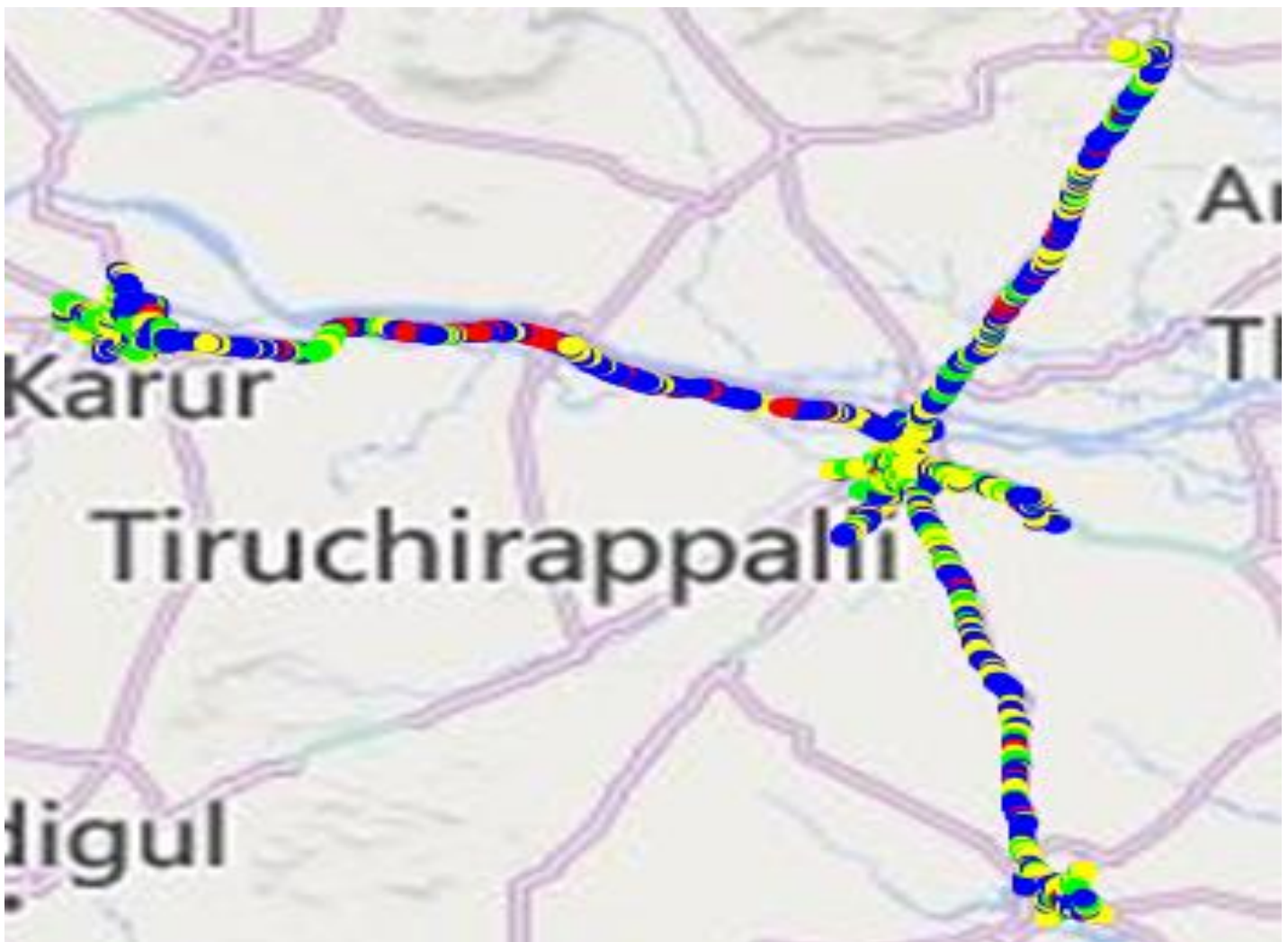
2G



Overall Rx Level	# Samples	% PDF
[Max, >=-75]	40898	76.83
[-75, >=-85)	9543	17.93
[-85, >=-95)	2655	4.98
[-95, >=Min)	138	0.26
Total	53234	100.00

I. Coverage Details

VIL	
Technology	Coverage Rate %
VoLTE	99.10

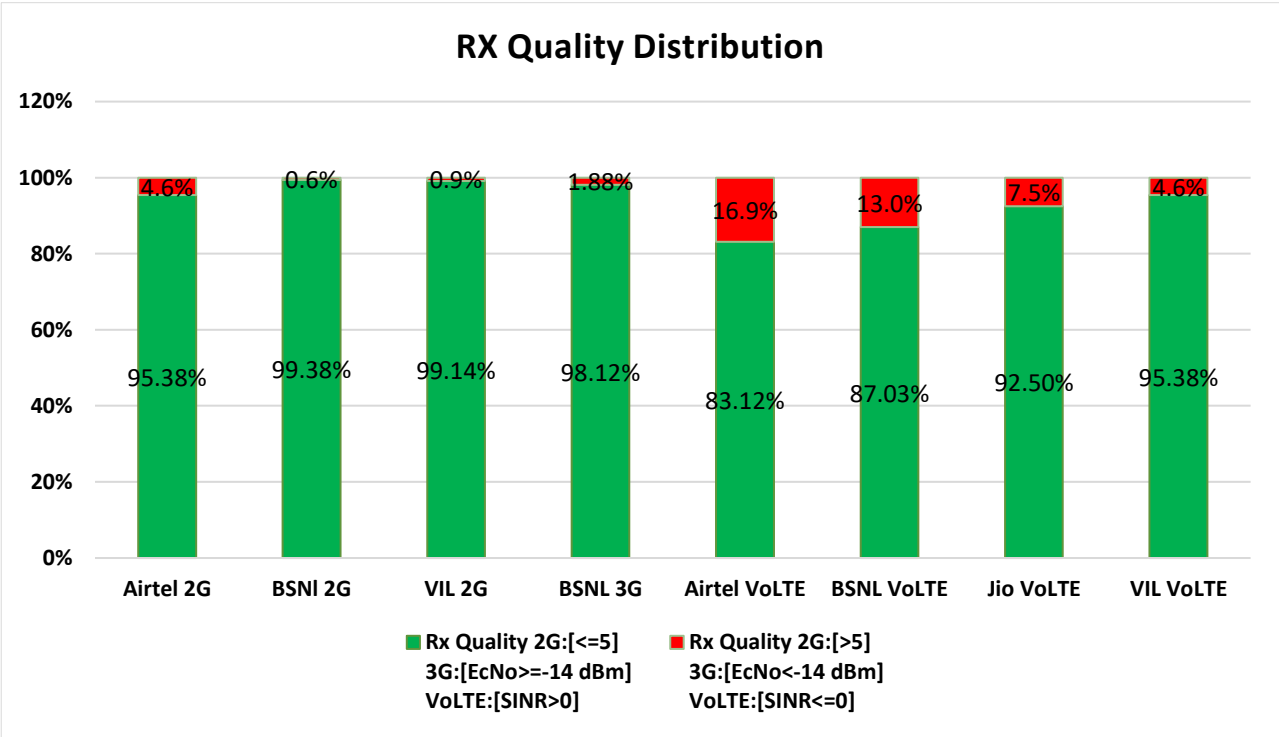


Overall RSRP	# Samples	% PDF
[Max, >=-80]	26064	44.39
[-80, >=-90)	19411	32.54
[-90, >=-110)	13125	22.17
[-110, >=Min)	583	0.90
Total	59183	100

II. Quality Details

For measuring voice quality, as per the QoS norms, Rx Qual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSPs and 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	95.28
BSNI 2G	99.38
VIL 2G	99.14
BSNL 3G	98.12
Airtel VoLTE	83.12
BSNL VoLTE	87.03
Jio VoLTE	92.50
VIL VoLTE	95.38

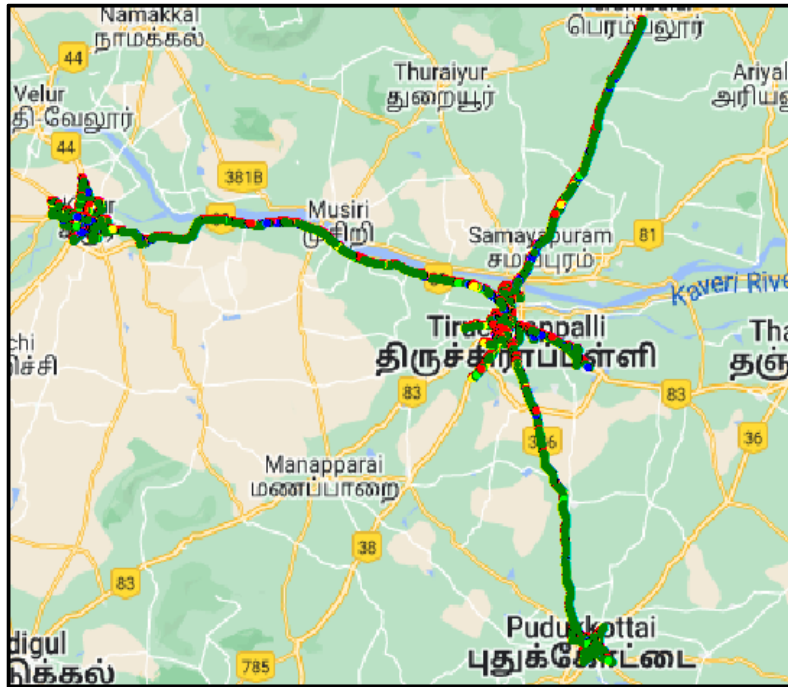


II. Quality Details

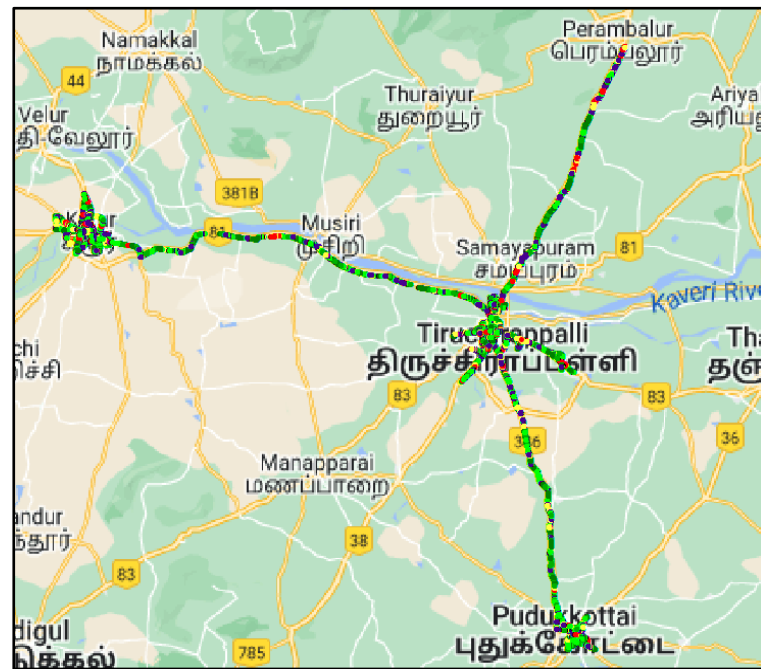
Airtel

Technology	Rx Quality %
2G	95.28
3G	83.12

2G



VoLTE



Overall Rx Quality	# Samples	% PDF
(Min, <=2)	6917461	87.51%
(2, <=3)	238781	3.02%
(3, <=4)	208225	2.63%
(4, <=5)	167712	2.12%
(5, <=Max)	373016	4.72%
Total	7905195	100.00%

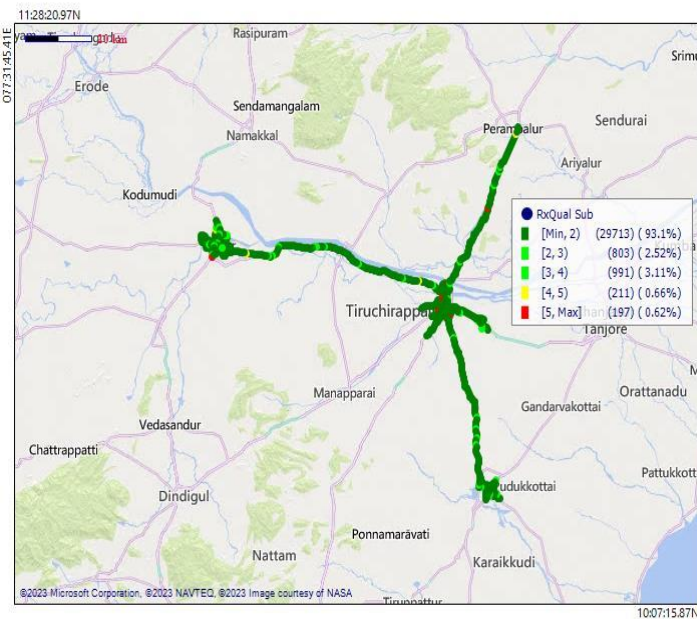
Overall SINR	# Samples	% PDF
(Min, <= -3)	705426	7.28%
(-3, <=0)	929557	9.60%
(0, <=5)	1990619	20.56%
(5, <=10)	2967887	30.65%
(10, <=15)	1685399	17.41%
(15, <=Max)	1404478	14.5%
Total	8278888	100%

II. Quality Details

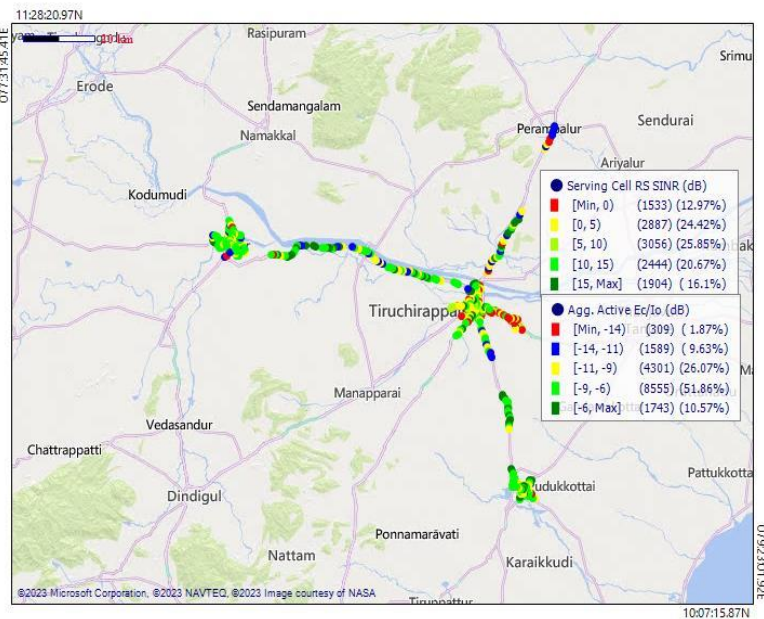
BSNL

Technology	Rx Quality %
2G	99.38
3G	98.12

2G



3G



Overall Rx Quality	# Samples	% PDF
(Min, <=2)	29713	93.1
(2, <=3)	803	2.52
(3, <=4)	991	3.11
(4, <=5)	211	0.66
(5, <=Max)	197	0.62
Total	31915	100

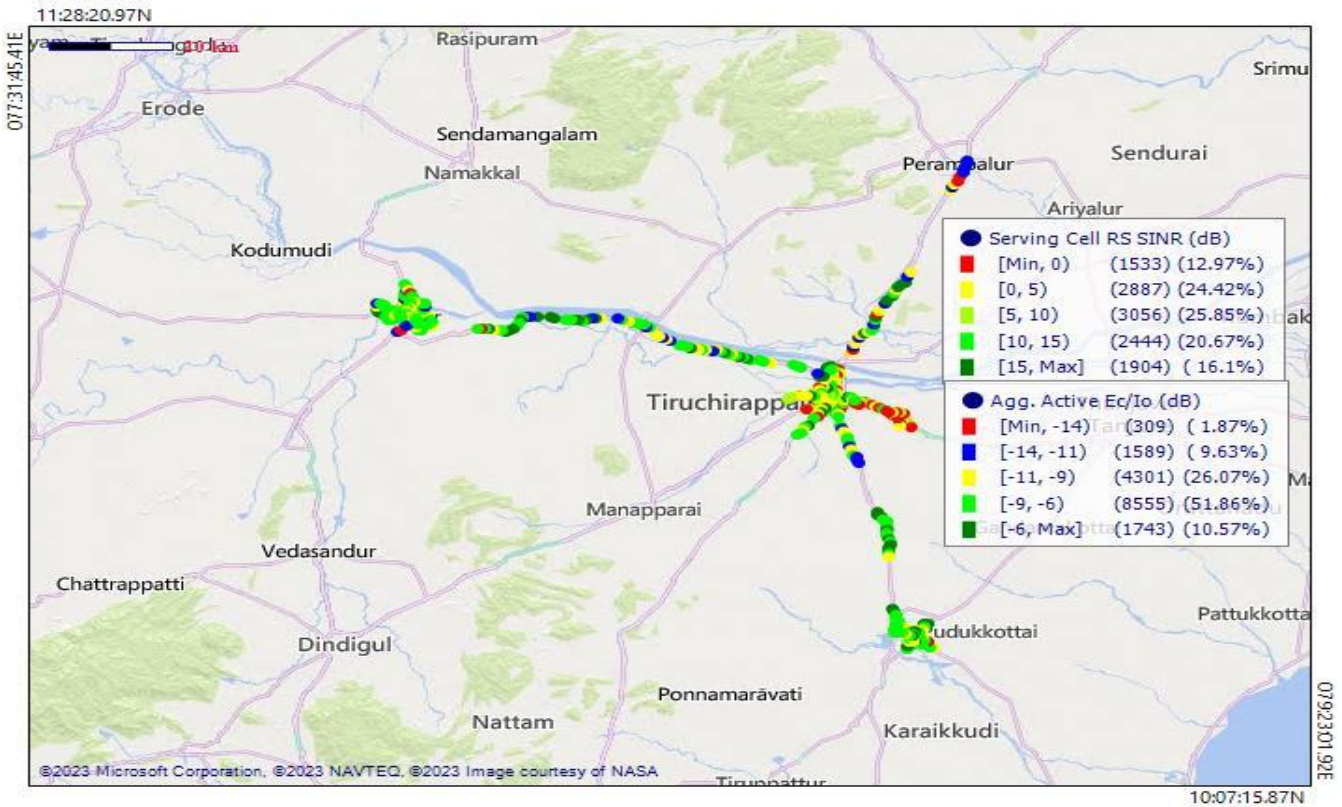
Overall EcNo	# Samples	% PDF
(Max, <=-6)	1743	10.57
(-6, <=-9)	8555	51.86
(-9, <=-11)	4301	26.07
(-11, <=-14)	1589	9.63
(-14, <= Min)	309	1.87
Total	16497	100

II. Quality Details

BSNL

Technology	Rx Quality %
VoLTE	87.03

VoLTE

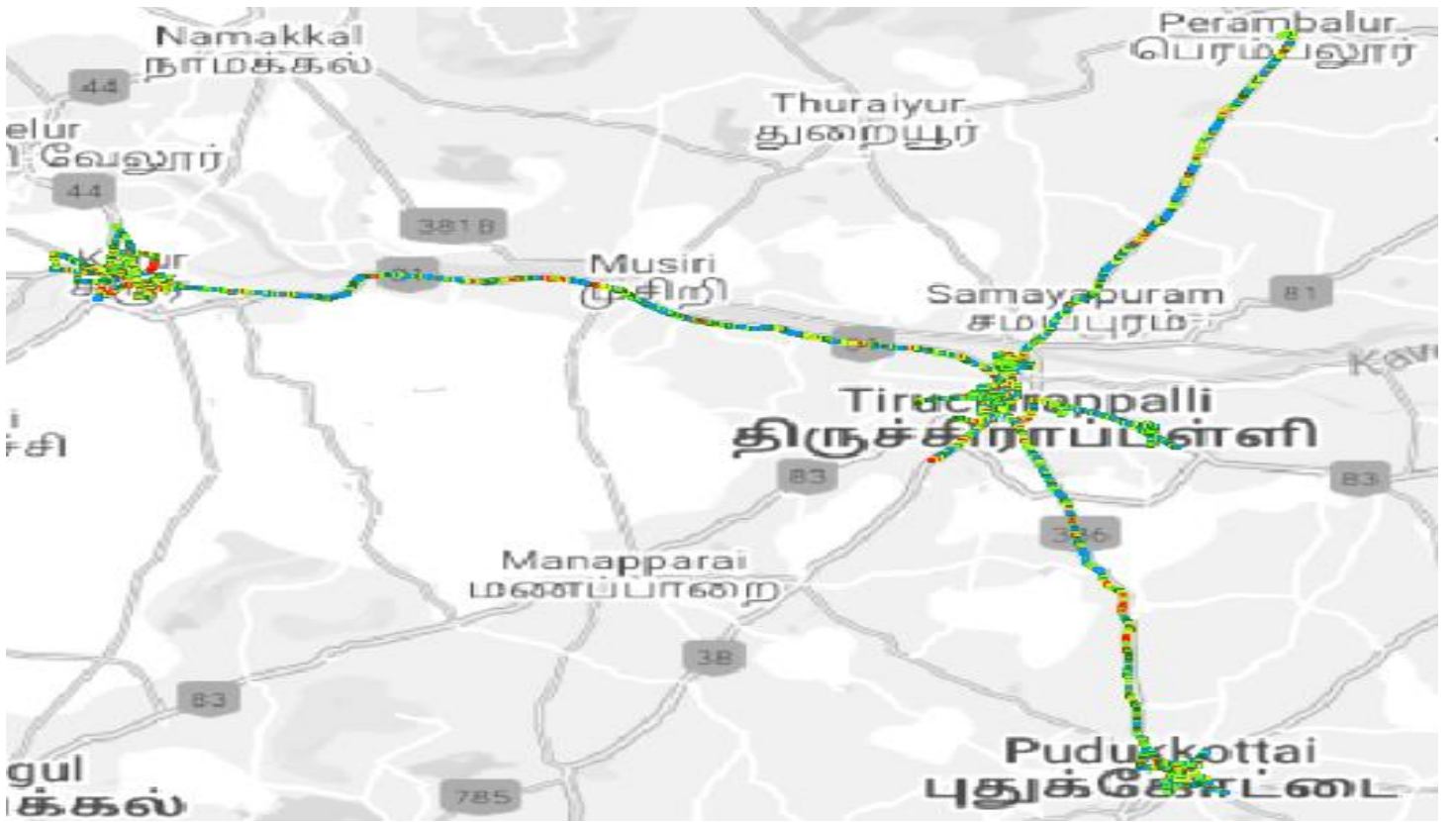


Overall SINR	# Samples	% PDF
(Min, <=0)	1533	12.97
(0, <=5)	2887	24.42
(5, <=10)	3056	25.85
(10, <=15)	2444	20.67
(15, <=Max)	1904	16.1
Total	11824	100

II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	92.50



VoLTE		
Overall SINR	# Samples	%
(15, <=Max)	13534	21.68
(10, <=15)	14521	23.26
(5, <=10)	17030	27.29
(0, <=5)	12650	20.27
(Min, <=0)	4682	7.50
Total	62417	100

II. Quality Details

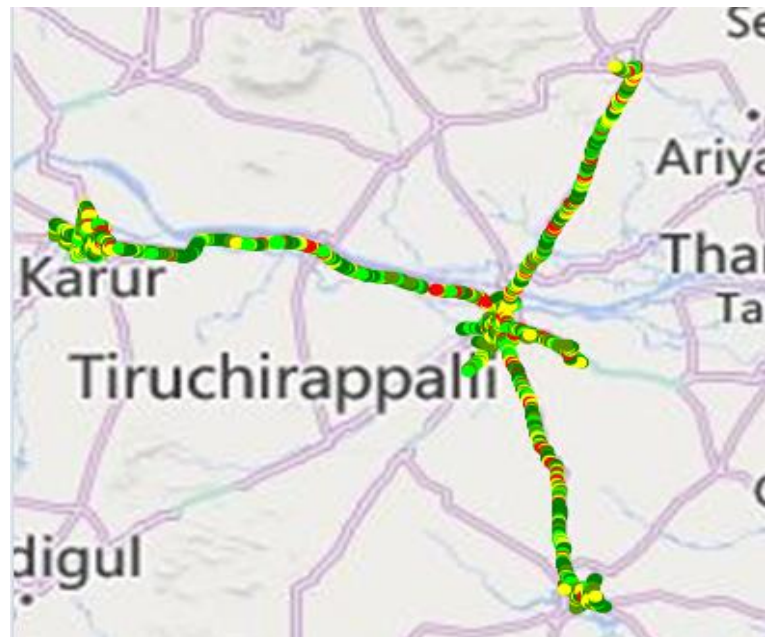
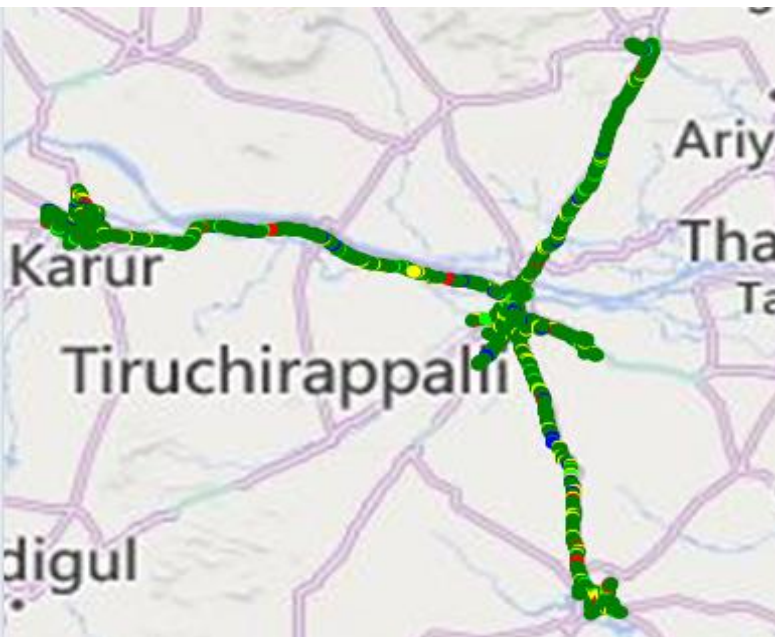
For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSPs and SINR > 0 in case of VoLTE is considered to be good, whereas quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.

VIL

Technology	Rx Quality %
2G	99.14
VoLTE	95.38

2G

VoLTE

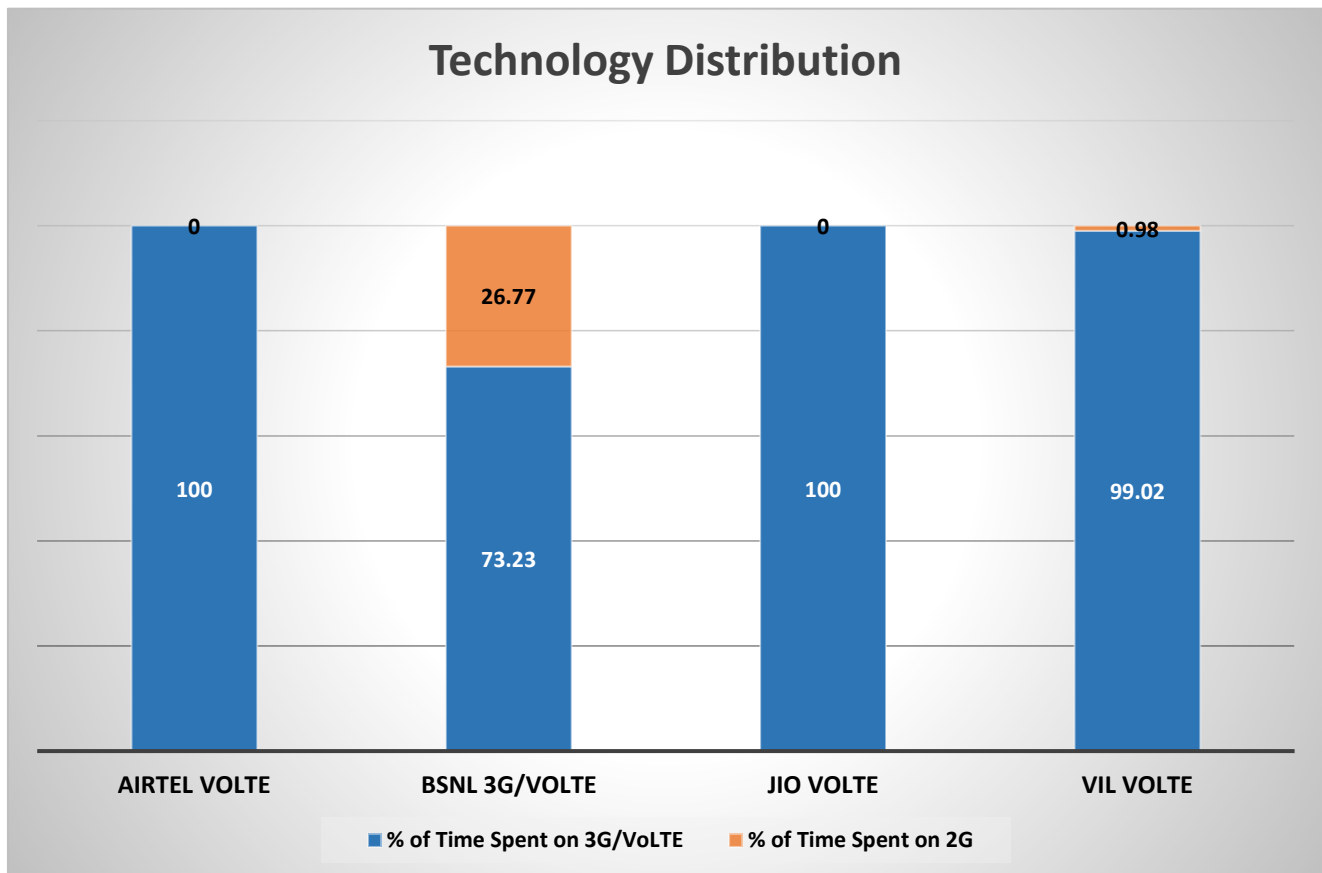


Overall Rx Quality	# Samples	% PDF
(Min, ≤ 2)	43670	89.28
(2, ≤ 3)	1910	3.91
(3, ≤ 4)	2414	4.94
(4, ≤ 5)	495	1.01
(5, \leq Max)	422	0.86
Total	48911	100.00

Overall SINR	# Samples	% PDF
(Min, ≤ 0)	2728	4.62
(0, ≤ 5)	5618	9.51
(5, ≤ 10)	8096	13.70
(10, ≤ 15)	10977	18.57
(15, \leq Max)	31685	53.61
Total	59104	100.00

III. Technology Details

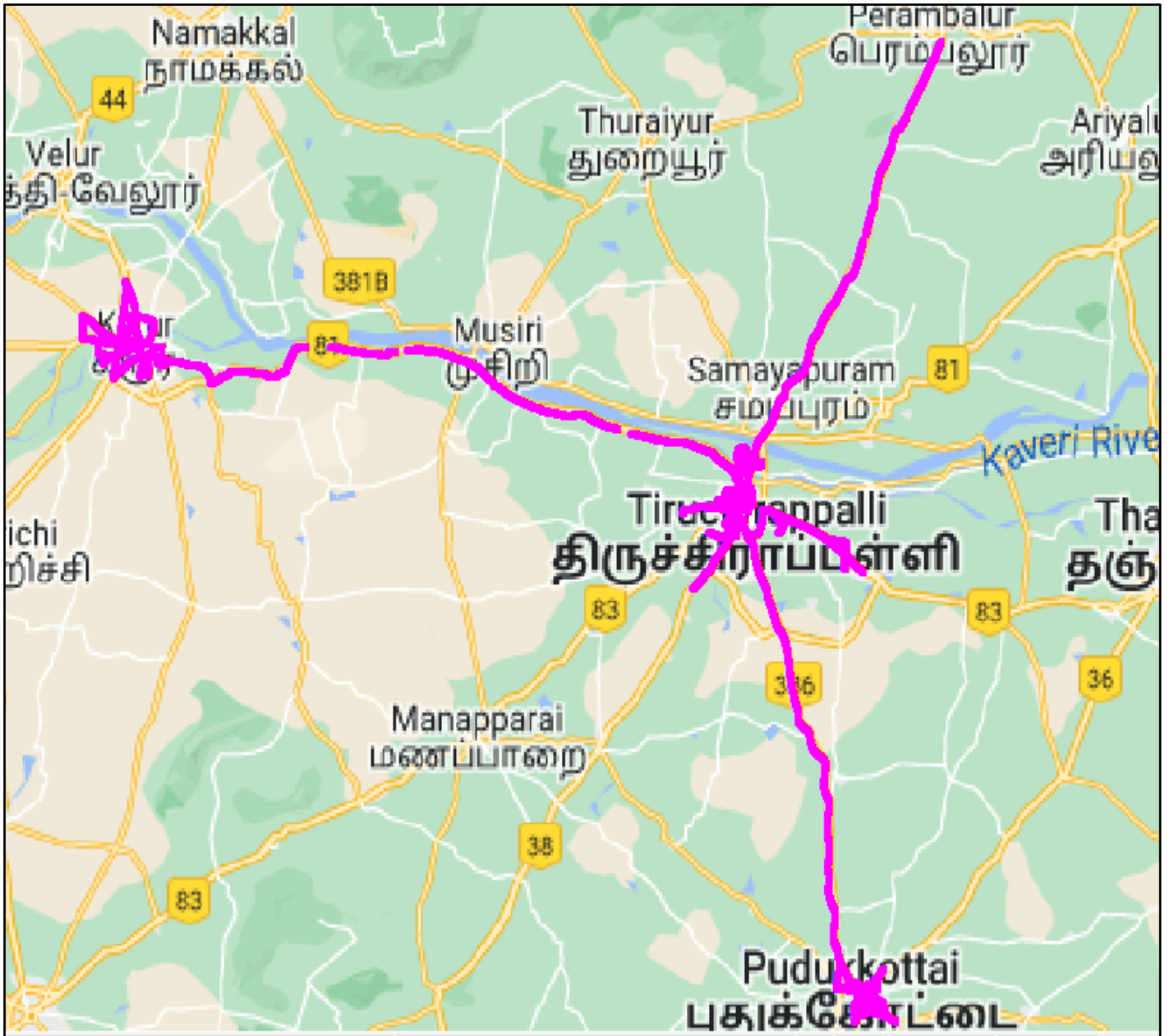
TSP	% of Time Spent on 3G/VoLTE
Airtel VoLTE	100
BSNL 3G / VoLTE	73.23
Jio VoLTE	100
VIL VoLTE	99.02



III. Technology Details

Airtel

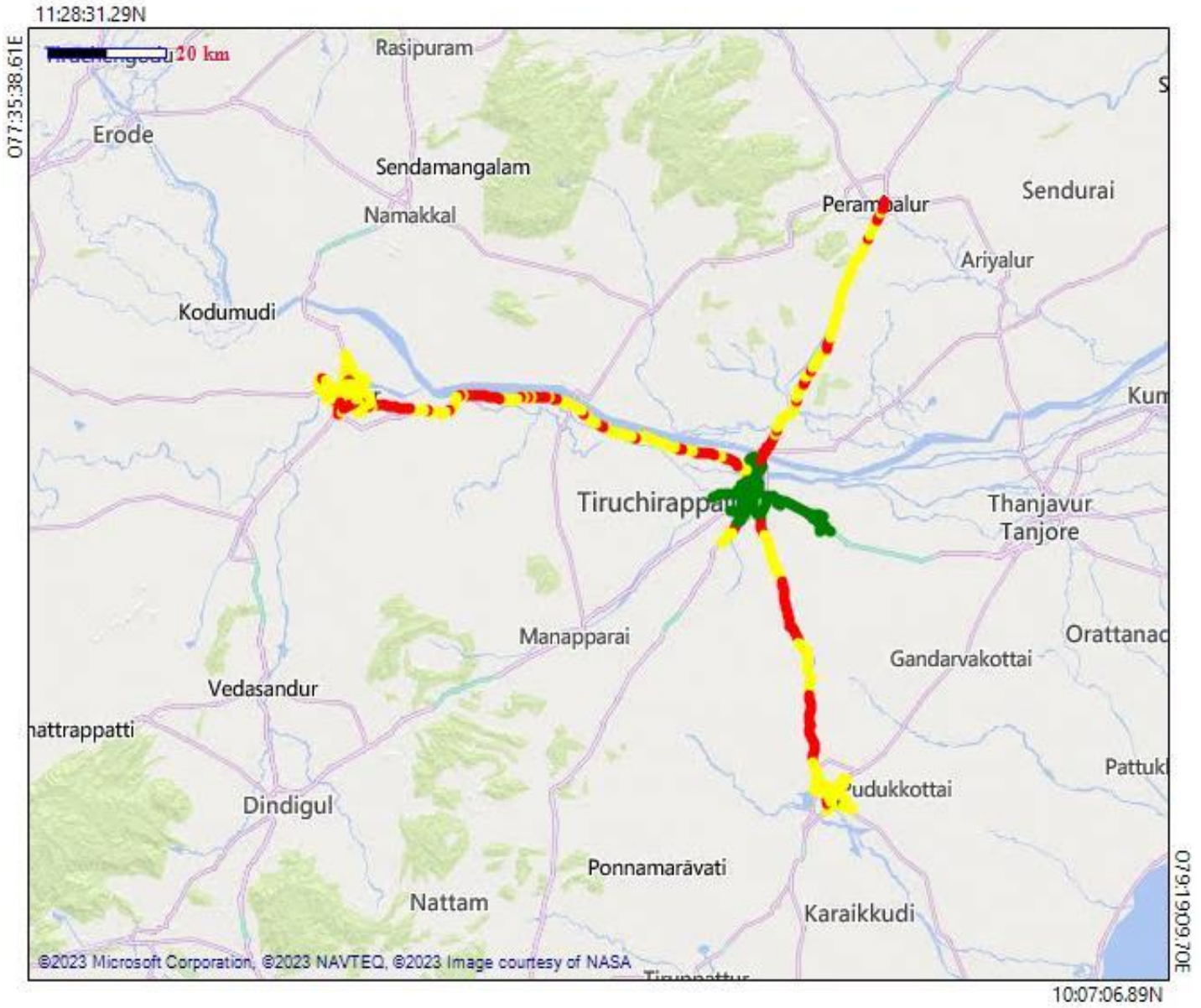
Technology	Time Spent on 4G
4G	100



III. Technology Details

BSNL

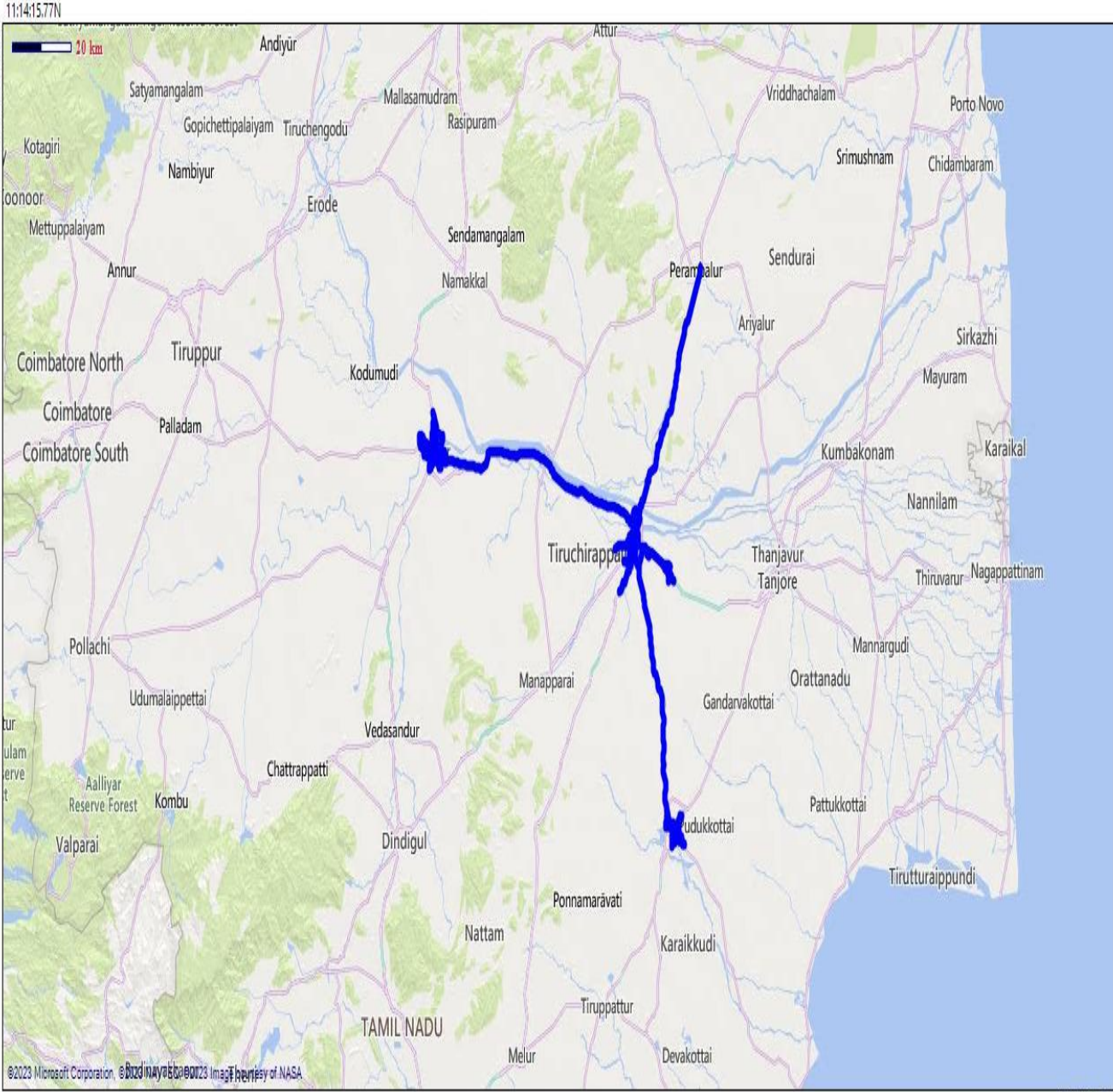
Technology	Time Spent on 3G / VoLTE
3G / VoLTE	73.23



III. Technology Details

JIO

Technology	Time Spent on 4G
VoLTE	100



10212036N

III. Technology Details

VIL

Technology	Time Spent on 4G
VoLTE	99.02

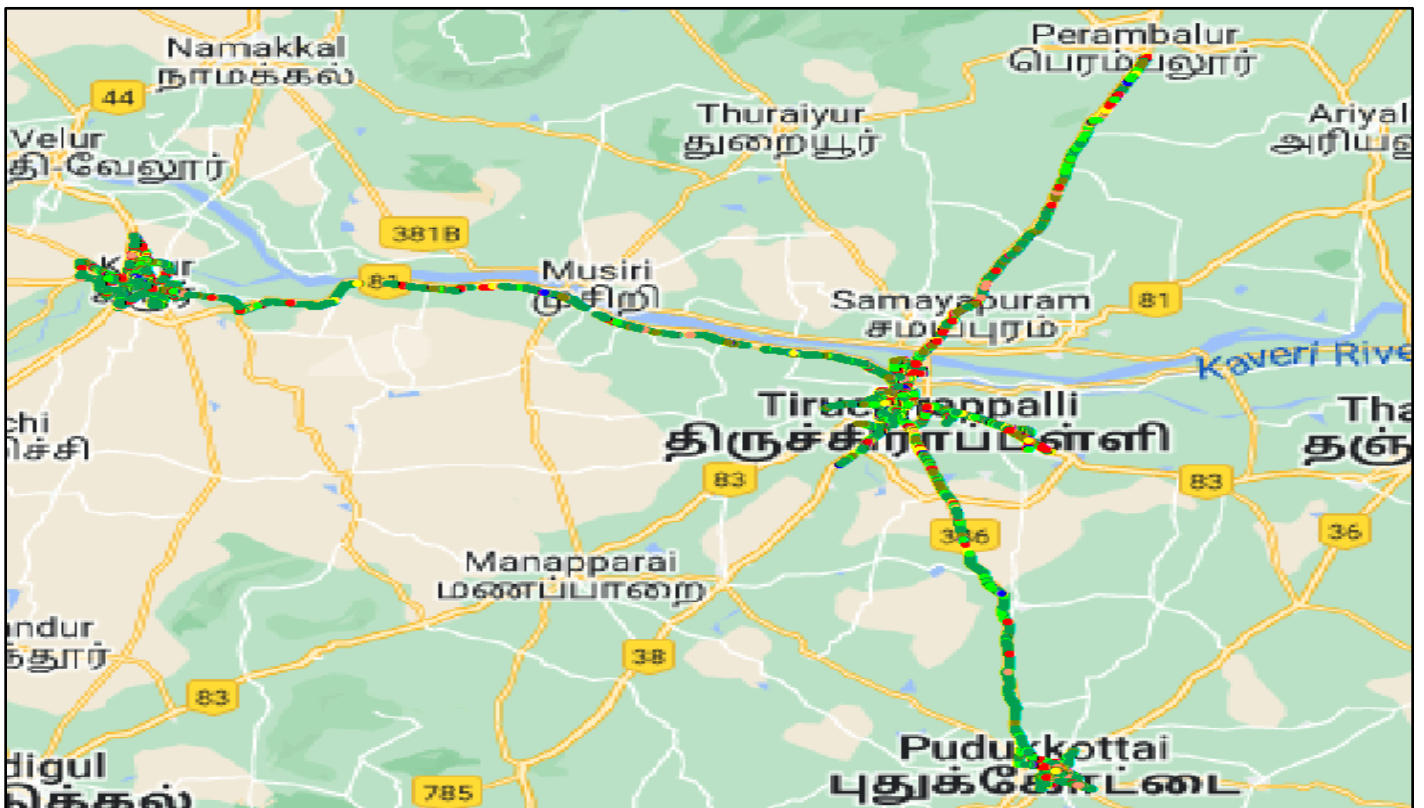


IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete SSA - 410Kms

Data KPIs – Overall	4G
Download Throughput (Mbps)	13.27



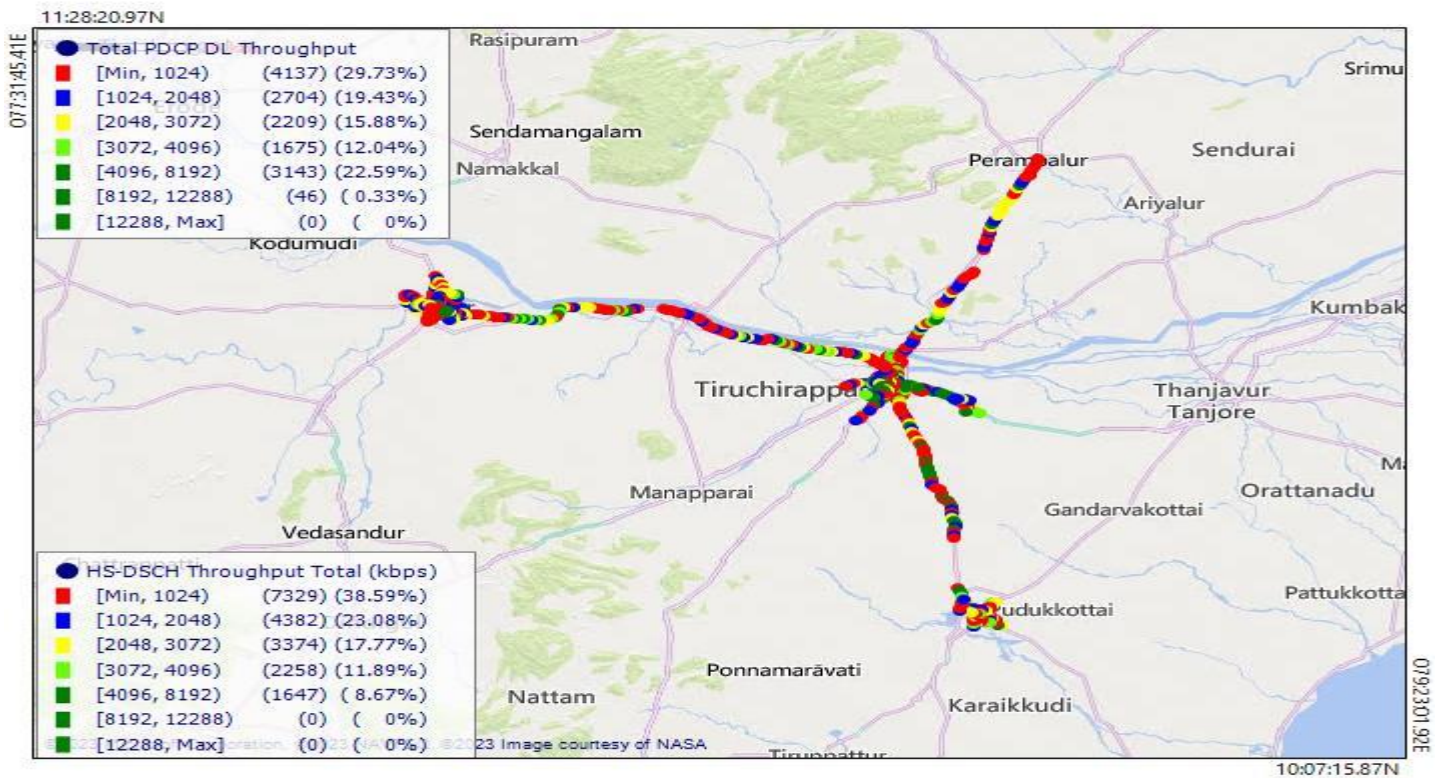
DL throughput	No of Sample	Percentage(%)
>12 Mbps	4997739	61.17
8 to 12 Mbps	842114	10.31
4 to 8 Mbps	924937	11.32
3 to 4 Mbps	246928	3.02
2 to 3 Mbps	268714	3.29
1 to 2 Mbps	215417	2.64
0 to 1 Mbps	674607	8.26
Total	8170456	100

IV. Dynamic Data Test- 4G DL Details

BSNL

Data Statistics - Dynamic Complete SSA 410 Kms

Data KPIs – Overall	4G
Download Throughput (Mbps)	2.54



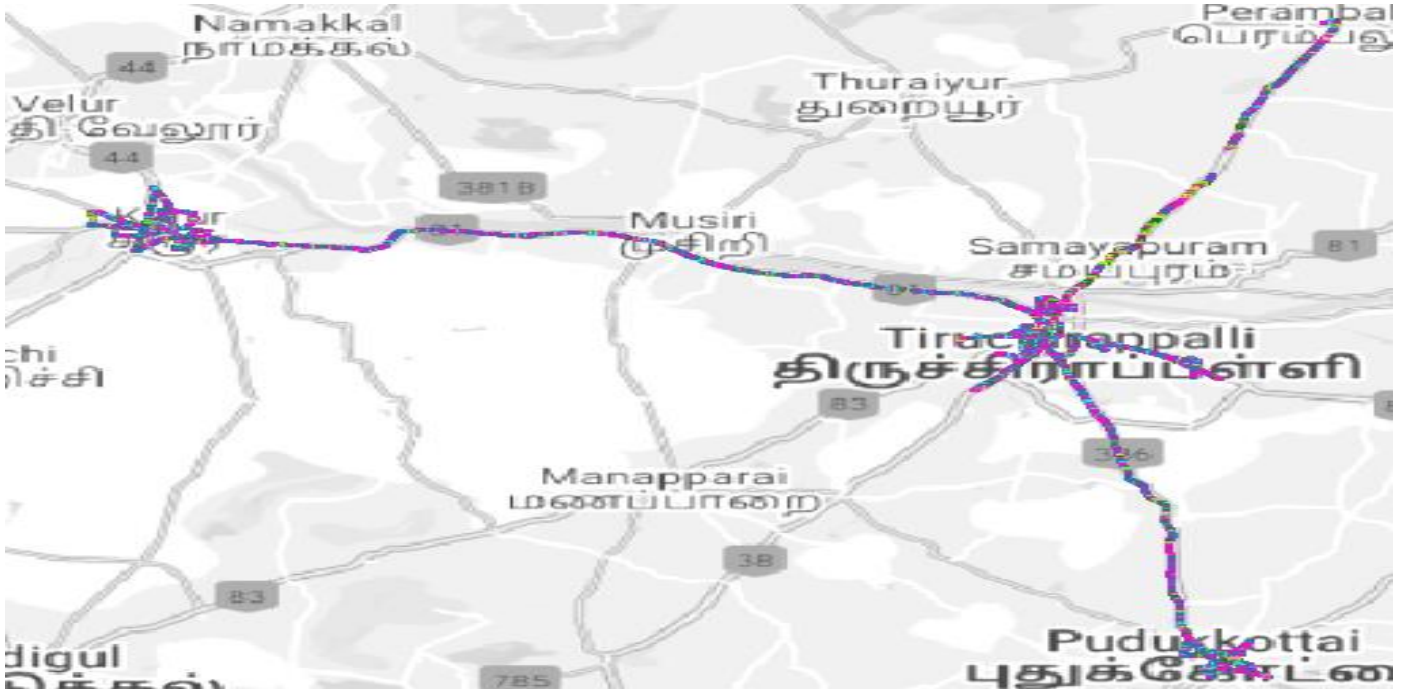
4G-DL throughput	No of Sample	%
0 to 1 Mbps	4137	29.73
1 to 2 Mbps	2704	19.43
2 to 3 Mbps	2209	15.88
3 to 4 Mbps	1675	12.04
4 to 8 Mbps	3143	22.59
8 to 12 Mbps	46	0.33
>12 Mbps	0	0
Total	13914	100

IV. Dynamic Data Test- 4G DL Details

JIO

Data Statistics - Dynamic Complete SSA - 410 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	11.53



DL throughput	No. of samples	%
>12 Mbps	20045	35.57
8 to 12 Mbps	6303	11.19
4 to 8 Mbps	7373	13.08
3 to 4 Mbps	1990	3.531
2 to 3 Mbps	1938	3.439
1 to 2 Mbps	1534	2.722
0 to 1 Mbps	17169	30.47

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete SSA - 410 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	22.19



DL throughput	No of Sample	%
0 to 1 Mbps	2894	9.78%
1 to 2 Mbps	701	2.37%
2 to 3 Mbps	1127	3.81%
3 to 4 Mbps	757	2.56%
4 to 8 Mbps	1036	3.50%
8 to 12 Mbps	1340	4.53%
>12 Mbps	21744	73.46%
Total	38527	100

V. TRAI MySpeed App

Airtel

Technology- 4G	Trichy Railway Junction	Gandhi Market Trichy	Chathram Bus Stand Trichy	Srirangam Temple Trichy	Karur Bus Stand	Pudukkottai Bus Stand
Download Speed Mbps	44.41	30.16	34.27	76.83	22.05	31.00
Upload Speed Mbps	42.97	30.03	4.91	7.16	15.07	48.91

BSNL

Technology- 3G/4G	Trichy Railway Junction 4G	Gandhi Market Trichy 4G	Chathram Bus Stand Trichy 4G	Srirangam Temple Trichy 4G	Karur Bus Stand 3G	Pudukkottai Bus Stand 3G
Download Speed Mbps	11.63	6.93	3.54	7.63	4.85	7.74
Upload Speed Mbps	9.20	8.75	7.00	6.50	2.12	2.29

JIO

Technology- 4G	Trichy Railway Junction	Gandhi Market Trichy	Chathram Bus Stand Trichy	Srirangam Temple Trichy	Karur Bus Stand	Pudukkottai Bus Stand
Download Speed Mbps	69.23	124.16	90.7	119.86	71.77	54.21
Upload Speed Mbps	20.07	26.51	20.55	23.56	25.76	22.43

VIL

Technology- 4G	Trichy Railway Junction	Gandhi Market Trichy	Chathram Bus Stand Trichy	Srirangam Temple Trichy	Karur Bus Stand	Pudukkottai Bus Stand
Download Speed Mbps	71.61	94.37	44.70	110.12	37.19	77.83
Upload Speed Mbps	51.95	48.75	31.24	112.41	35.65	143.65