Operator Assisted Drive Test Report

Cuddalore SSA

JAN – 2025
(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%. All TSPs have met the Receive Quality of 95%.**

The Operator Assisted Drive Test (OADT) has been carried out by TRAI RO Hyderabad with the help of Service Providers in Cuddalore City and surrounding areas viz. Chidambaram, Neyveli and Villupuram from 9:00 AM to 8:00 PM during 28th January to 31st January 2025. The drive test covered drive route of 375 KMs & 8 hotspot over a period of 4 days. Approximately 614 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 28th to 31st January 2025 covering various locations in Chidambaram, Neyveli and Villupuram.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 375 KMs over a period of 4 days from 28th to 31st January 2025. Approximately 614 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 TSPs.

Data Tests:

1.Dynamic data test was conducted for 375 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 (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
Video Streaming	130 Sec Clip
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route
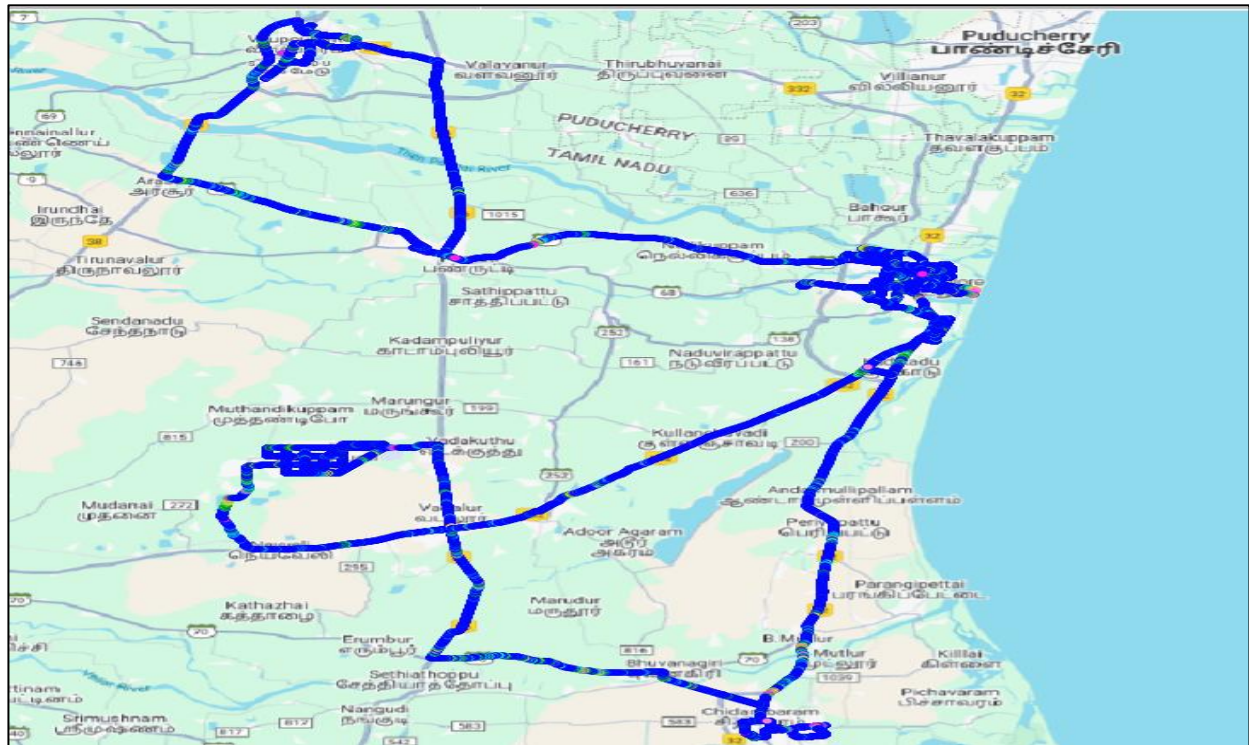
Areas Covered – Cuddalore Town (Day 1)	Areas Covered – Chidambaram Town (Day 2)	Areas Covered – Villupuram Town (Day 3)
Cuddalore city	Cuddalore to Chidambaram highway	Thiruvanthipuram
Manja kuppam	Parangipettai	Nellikuppam
NGO Nagar	Bhuvanagiri	Melapattampakam
Pudukuppam	Parameswaranallur	Panruti
Deavanampatinam	Sethiyathop	NH-38
Pudupalayam	Kurunjipadi	Perungaiur
V square Mall	Vadalur	Pedagam
Cuddalore Collectorate	Neyveli	Trichy Trunk Road
Cuddalore post office	Periyakuruchi	Ganpathy Nagar
Cuddalore Old Town	Melpathi	Veraittikuppam
Cuddalore New Town	Kulanchavadi	Salamedu
Semandalam	Neyveli Township	Keezhapuram
Thirupathirpuliyur	Sedapalayam	Kamanagar-Viluppuram

Overview
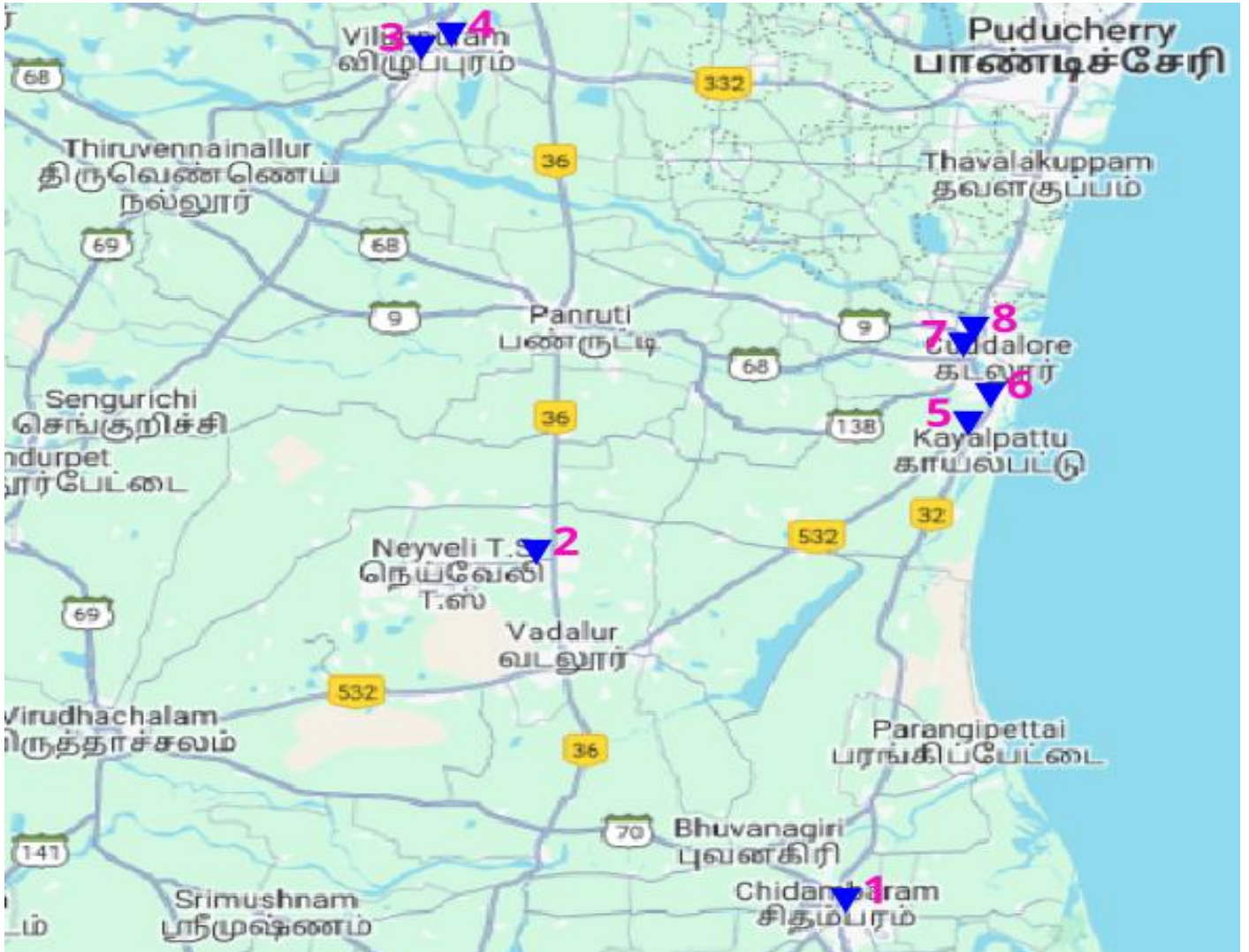
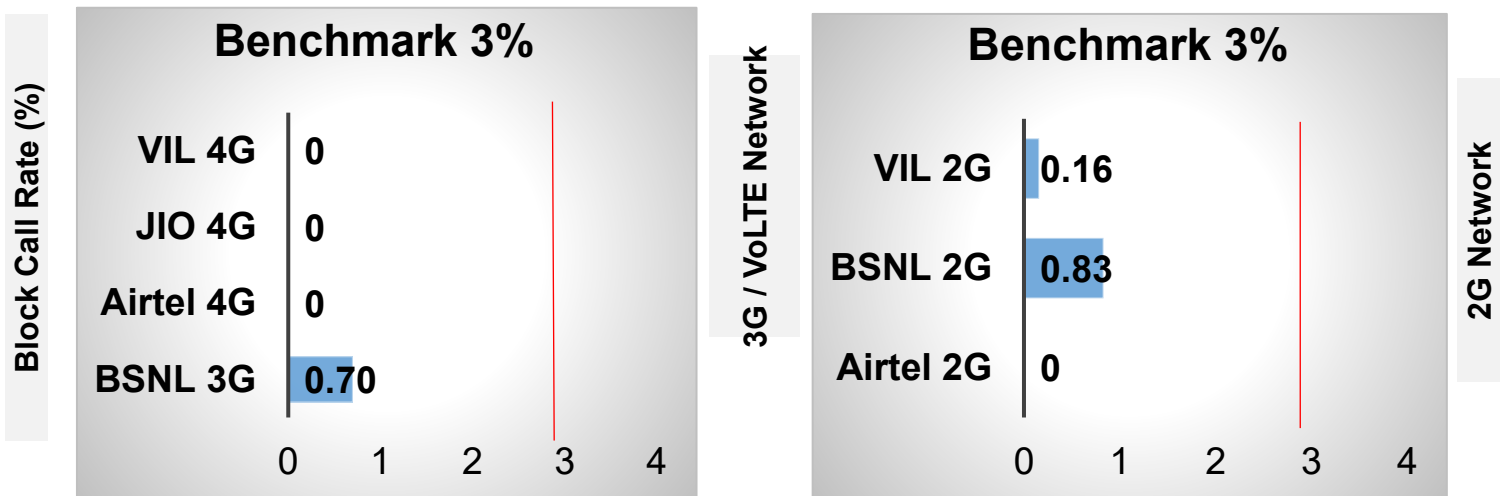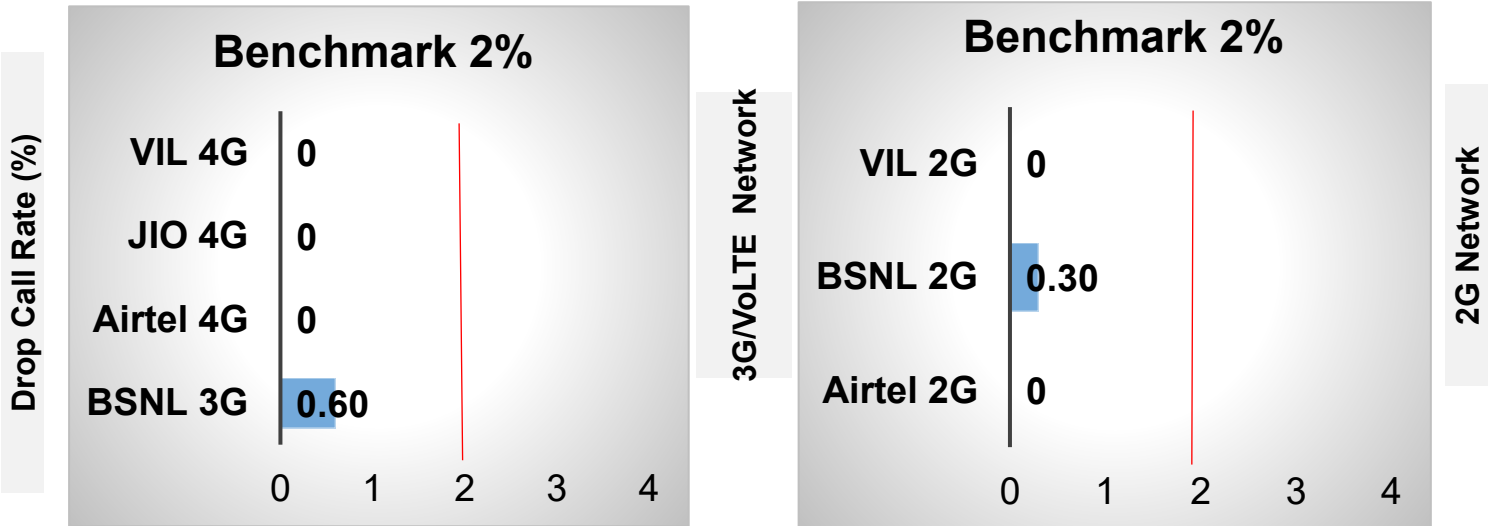| 8 Static Locations |
|---|
| Chidambaram Nataraja Temple |
| Neyveli Arch Gate |
| Villupuram Railway Station |
| Villupuram Bustand |
| Cuddalore SIPCOT |
| Cuddalore Railway Station |
| Cuddalore Bustand |
| Cuddalore Govt.Hospital |

Voice Calls

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

Drop Call Rate (%)

Benchmark 2% — 3G/VoLTE Network

TSP	Value
VIL 4G	0
JIO 4G	0
Airtel 4G	0
BSNL 3G	0.60

Benchmark 2% — 2G Network

TSP	Value
VIL 2G	0
BSNL 2G	0.30
Airtel 2G	0

Block Call Rate (%)

Benchmark 3% — 3G/VoLTE Network

TSP	Value
VIL 4G	0
JIO 4G	0
Airtel 4G	0
BSNL 3G	0.70

Benchmark 3% — 2G Network

TSP	Value
VIL 2G	0.16
BSNL 2G	0.83
Airtel 2G	0

KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	JIO	VIL
Drop Call Rate %	0	0.30	0	0.60	0	0	0
Block Call Rate %	0	0.83	0.16	0.70	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

Coverage

a) Percentage of coverage samples for 2G ≥ -85 dBm.

TSPS	2G		
	Airtel	**BSNL**	**VIL**
Coverage %	95.79	84.80	95.23

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

TSP	3G	VoLTE (≥ -110 dBm)			VoLTE (-110 to ≥ -120 dBm)		
	BSNL	**Airtel**	**JIO**	**VIL**	**Airtel**	**JIO**	**VIL**
Coverage %	79.70	99.69	98.89	98.44			

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

TSP	3G	VoLTE		
	BSNL	**Airtel**	**JIO**	**VIL**
Time spent %	78.00	100	100	99.98

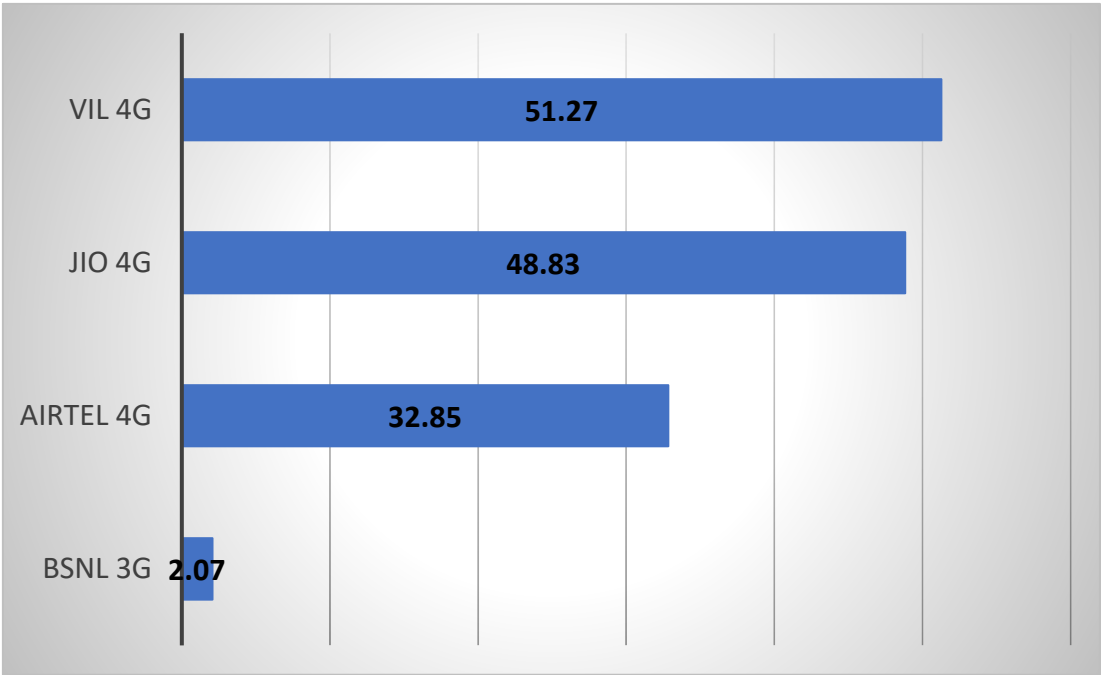# Data Services Dynamic

Dynamic Data was tested, Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

Data Services Dynamic	3G / 4G			
	BSNL 3G	**Airtel 4G**	**JIO 4G**	**VIL 4G**
Download throughput in Mbps	2.07	32.85	48.83	51.27

Data Services Static

Data was tested at 8 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing delay (Flipkart, Amazon, Myntra)
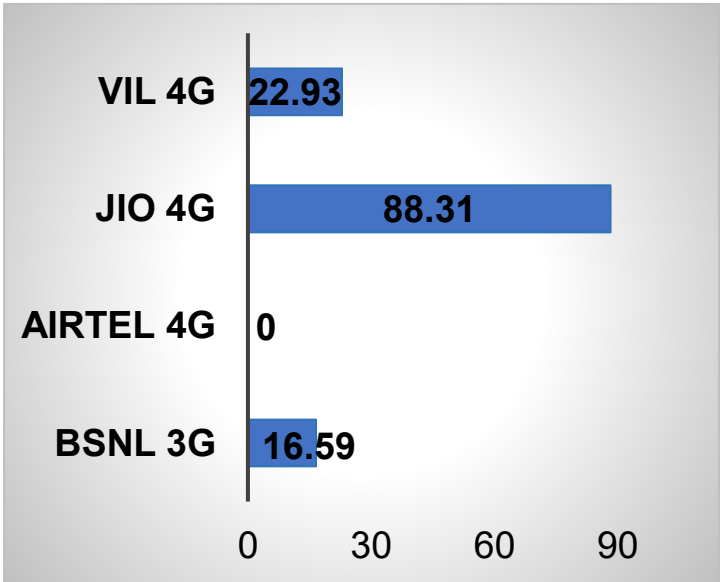
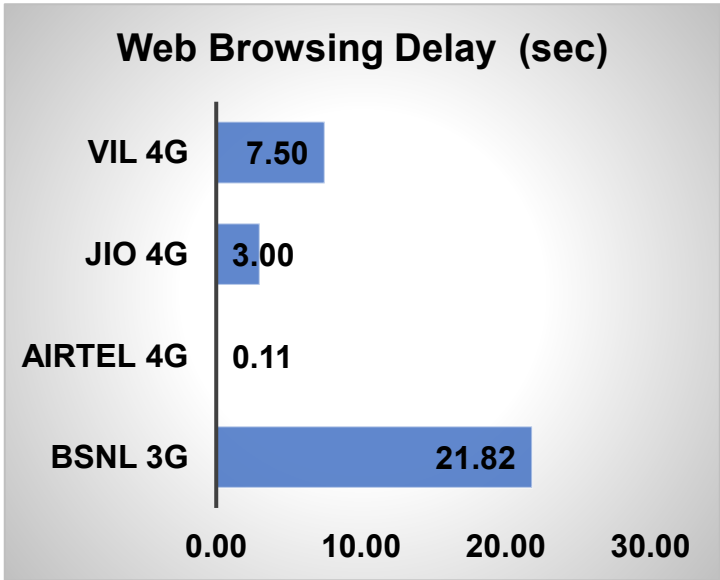## Data Download and Upload Performance (Mbps)
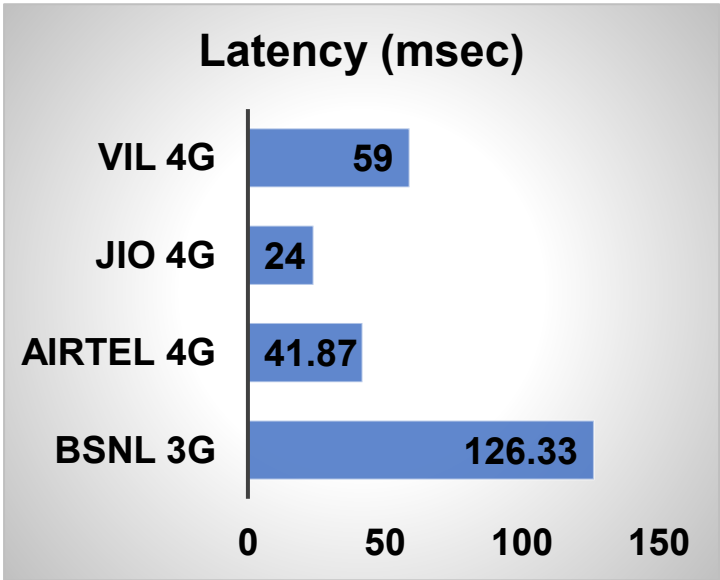
3G/4G/ Network:

Download Throughput (Mbps)
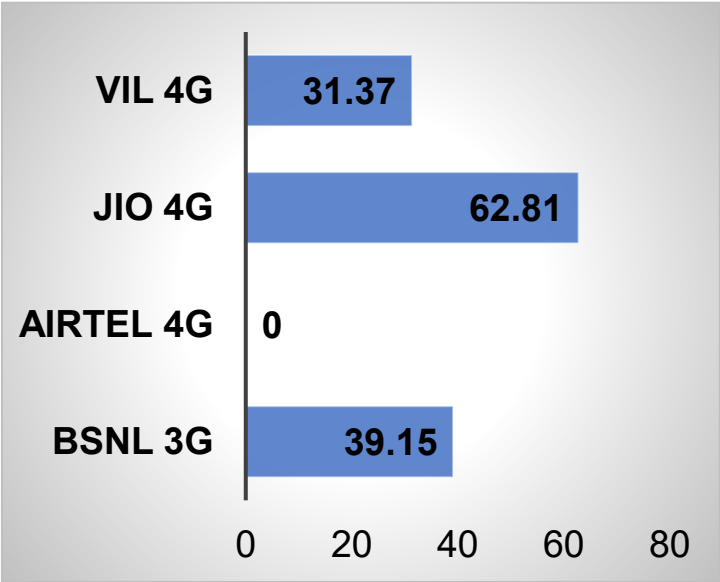
Network	Value
VIL 4G	31.37
JIO 4G	62.81
AIRTEL 4G	0
BSNL 3G	39.15

Upload Throughput (Mbps)

Network	Value
VIL 4G	22.93
JIO 4G	88.31
AIRTEL 4G	0
BSNL 3G	16.59

Web Browsing delay (Sec)

Web Browsing Delay (sec)

Network	Value
VIL 4G	7.50
JIO 4G	3.00
AIRTEL 4G	0.11
BSNL 3G	21.82

Latency (ms)

Latency (msec)

Network	Value
VIL 4G	59
JIO 4G	24
AIRTEL 4G	41.87
BSNL 3G	126.33

Summary

Voice Calls	2G		
	Airtel	**BSNL**	**VIL**
Call attempts	585	598	606
Block call rate %	0	0.83	0.16
CSSR %	100	99.16	99.84
Drop call rate %	0	0.30	0
Mobility HOSR %	97.40	99.16	97.5
RX Quality %	96.23	98.60	98.82

Voice Calls	3G	VoLTE		
TSP (For 3G)	**BSNL**	**Airtel**	**JIO**	**VIL**
Call attempts	543	597	653	617
Block call rate %	0.70	0	0	0
CSSR %	99.3	100	100	100
Drop call rate %	0.60	0	0	0
Mobility HOSR %	100	99.79	99.56	99.8
RX Quality %	95.10	94.84	99.76	96.49

Summary

Data Services Static	3G/4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download throughput in Mbps	3.91	45.41	62.81	31.37
Upload Throughput in Mbps	1.66	35.07	88.31	22.93
Web browsing delay in second	21.82	0.11	3.00	7.50
Latency in (msec)	126.33	41.87	24	59

Data Services static

Chidambaram Nataraja Temple	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.01	30.34	70.17	39.6
Upload Throughput (Mbps)	1.61	6.73	9.87	26.00
Web Browsing Delay (sec)	10.35	0.05	3	5.9
Latency (msec)	89.33	41.17	21	49.4

Neyveli Arch Gate	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.18	62.49	84.22	23.8
Upload Throughput (Mbps)	1.11	44.38	9.27	10
Web Browsing Delay (sec)	11.96	0.30	3	6.4
Latency (msec)	127.33	44.9	14	54.4

Villupuram Railway Station	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.73	26.78	46.92	35.1
Upload Throughput (Mbps)	1.33	33.82	5.92	32.4
Web Browsing Delay (sec)	11.58	0.01	3	7.4
Latency (msec)	68.66	42.20	20	60.6

Villupuram Bustand	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	6.21	40.33	26.57	16.9
Upload Throughput (Mbps)	2.29	37.99	8.73	14
Web Browsing Delay (sec)	5.89	0.17	3	5.52
Latency (msec)	51.33	40.2	24	54.6

Data Services static

Cuddalore SIPCOT	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	5.73	45.54	95.57	44.8
Upload Throughput (Mbps)	1.58	22.30	69.60	24.7
Web Browsing Delay (sec)	8.07	0.07	3	6.2
Latency (msec)	88.66	40.73	21	76.8

Cuddalore OT Railway Station	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	3.91	56.65	39.01	17.4
Upload Throughput (Mbps)	1.66	37.31	83.50	21.9
Web Browsing Delay (sec)	21.82	0.16	2	8.43
Latency (msec)	126.33	44.76	26	55

Cuddalore Bustand	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.44	44.58	35.43	32.8
Upload Throughput (Mbps)	1.62	41.46	12.71	24.6
Web Browsing Delay (sec)	7.86	0.13	3	8.9
Latency (msec)	105.66	45.76	33	64.8

Cuddalore GH	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	7.37	56.59	104.64	36.7
Upload Throughput (Mbps)	1.67	37.54	8.81	29.4
Web Browsing Delay (sec)	6.11	0.03	3	11.3
Latency (msec)	106.66	35.30	31	53.2

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 ≥ -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	95.79
BSNL 2G	84.80
VIL 2G	95.23
BSNL 3G	79.70
Airtel VoLTE	99.69
JIO VoLTE	98.89
VIL VoLTE	98.46

Coverage Details

■ 2G:[Max,>=-75] 3G:Max,>=-70 VoLTE:>=80	■ 2G:[-75,>=-85] 3G:[-70,>=-80] VoLTE:[-80,>=-90]
■ 2G:[-85,>=-95] 3G:[-80,>=-90] VoLTE:[-90,>=-110]	■ 2G:[-95,>=Min] 3G:[-90,>=Min] VoLTE:[-110,>=Min]
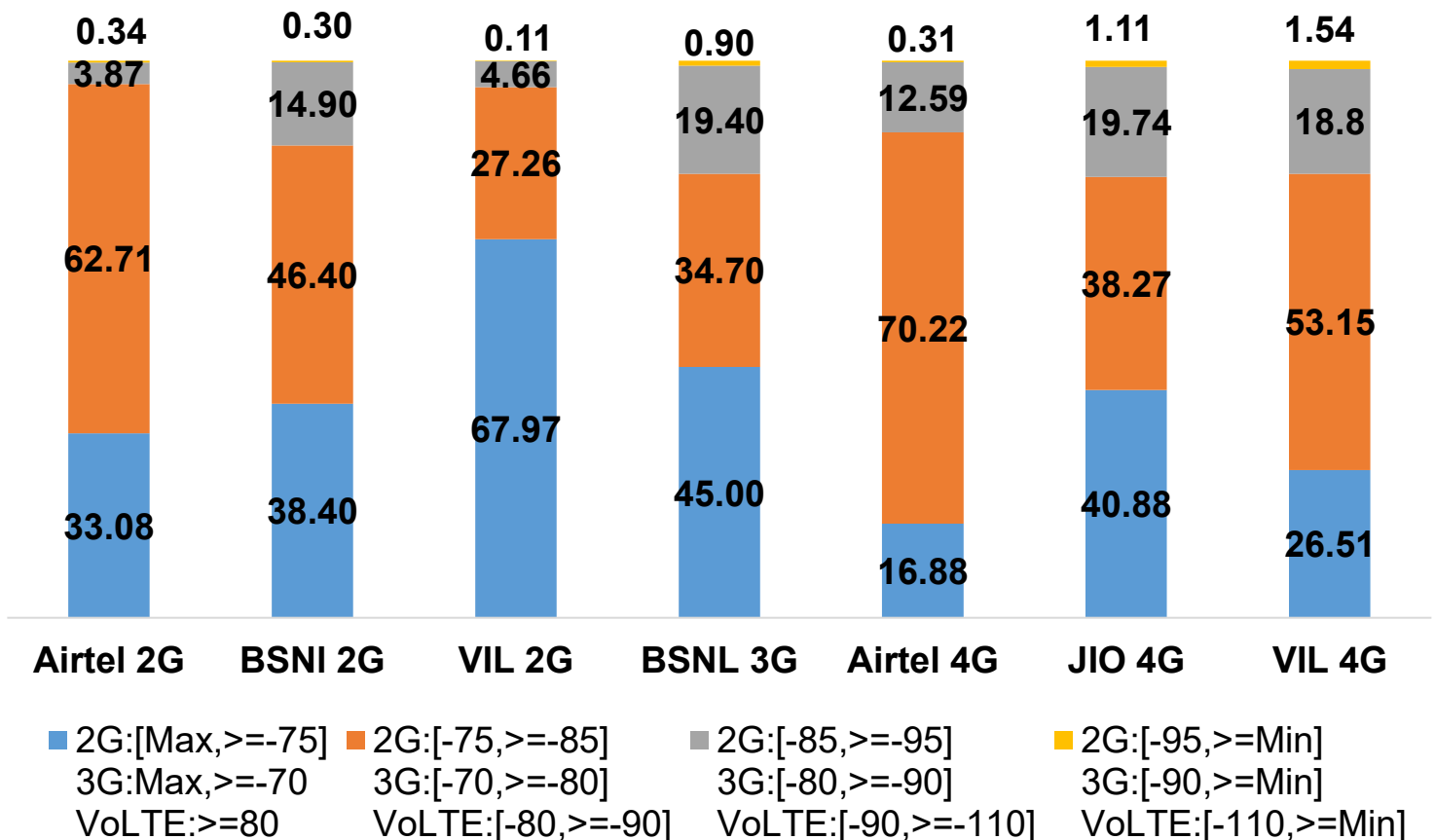
AIRTEL

Technology99.2	Coverage Rate %
2G	95.79
VoLTE	99.69

2G	VoLTE
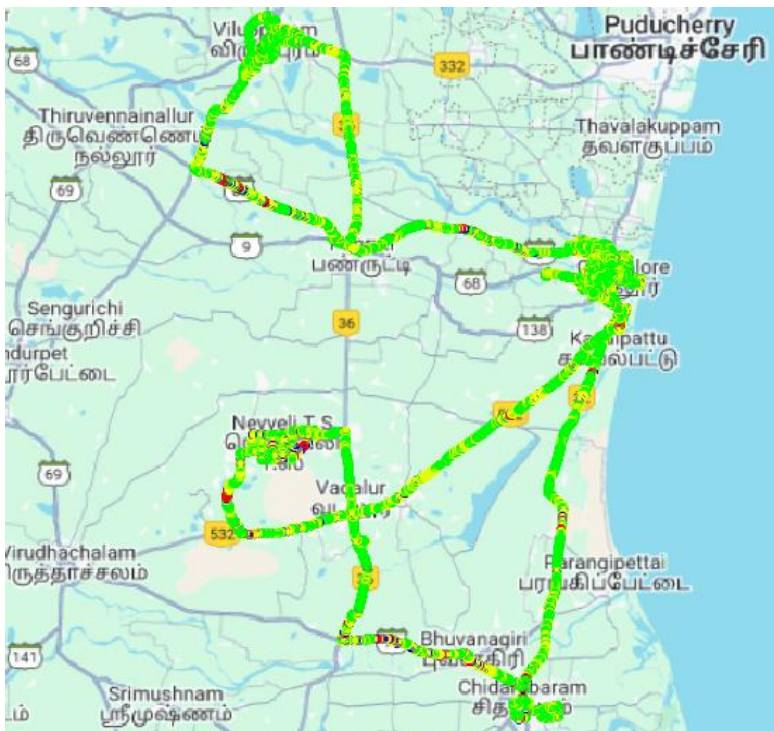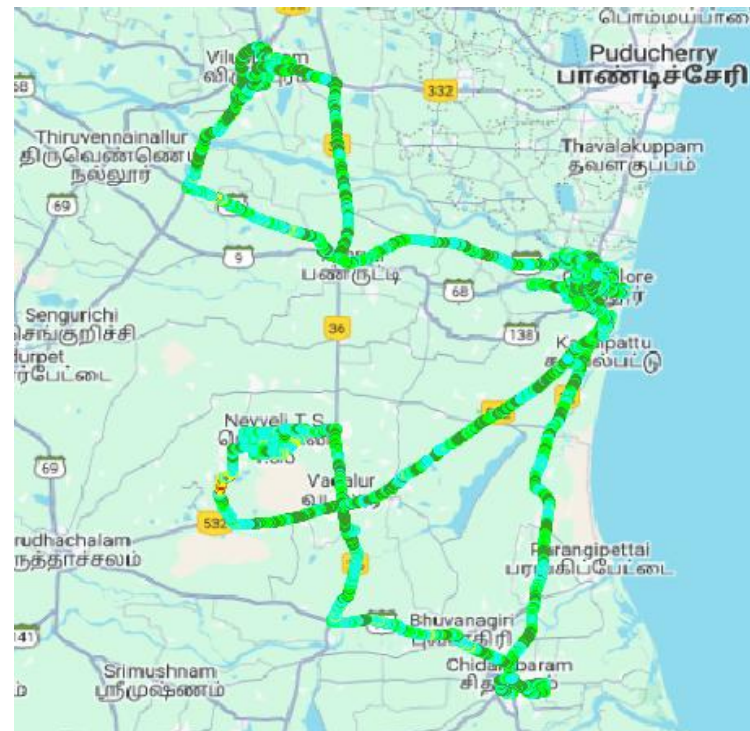
2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	3488932	33.08
[-75, >=-85]	6613243	62.71
[-85, >=-95]	408632	3.87
[-95, >=Min]	35701	0.34
Total	10546508	100

VoLTE		
Overall RSRP	# Samples	%
[Max, >=-80]	1889237	16.88
[-80, >=-90]	7856968	70.22
[-90, >=-110]	1408550	12.59
[-110, >=-120]	33159	0.30
[-120, >=Min]	1786	0.01
Total	11189700	100

BSNL

Technology	Coverage Rate %
2G	84.80
3G	79.70

2G	3G

2G -ServRxLevSub (dBm)
- Below -95 (140) 0.3%
- >= -95 to < -85 (8006) 14.9%
- >= -85 to < -75 (24946) 46.4%
- Above -75 (20645) 38.4%

3G -Uu_ActiveSet_CalculatedRSCP_0 (dBm)
- Below -110.00 (525) 0.9%
- >= -110.00 to < -90.00 (11616) 19.4%
- >= -90.00 to < -80.00 (20774) 34.7%
- Above -80.00 (26903) 45.0%
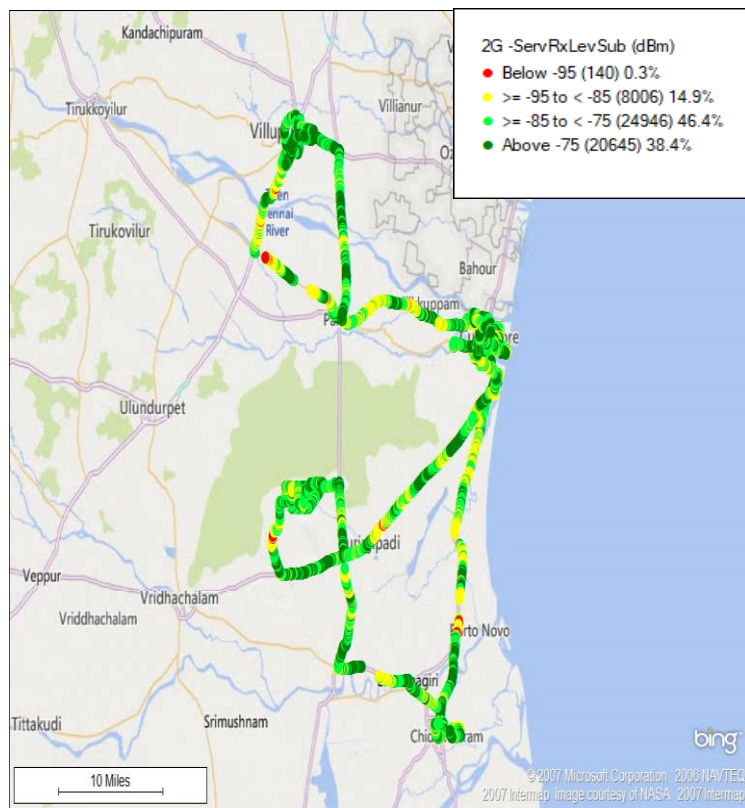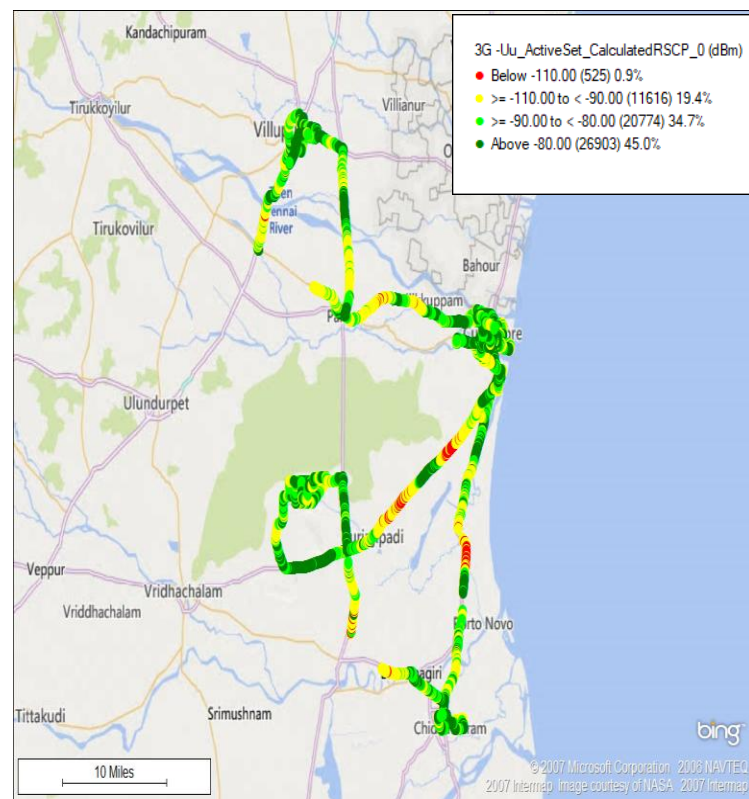
2G		
Overall RxLevel	**# Samples**	**%**
[Max, >=-75]	20645	38.40
[-75, >=-85]	24946	46.40
[-85,>=-95]	8006	14.9
[-95, >=Min]	140	0.3
Total	**53737**	**100**

3G		
Overall RSRP	**# Samples**	**%**
[Max, >=-70]	26903	45.00
[-70, >=-80]	20774	34.70
[-80, >=-90]	11616	19.40
[-90, >=Min]	525	0.90
Total	**59818**	**100**

JIO

Technology	Coverage Rate %
VoLTE	98.89

VoLTE
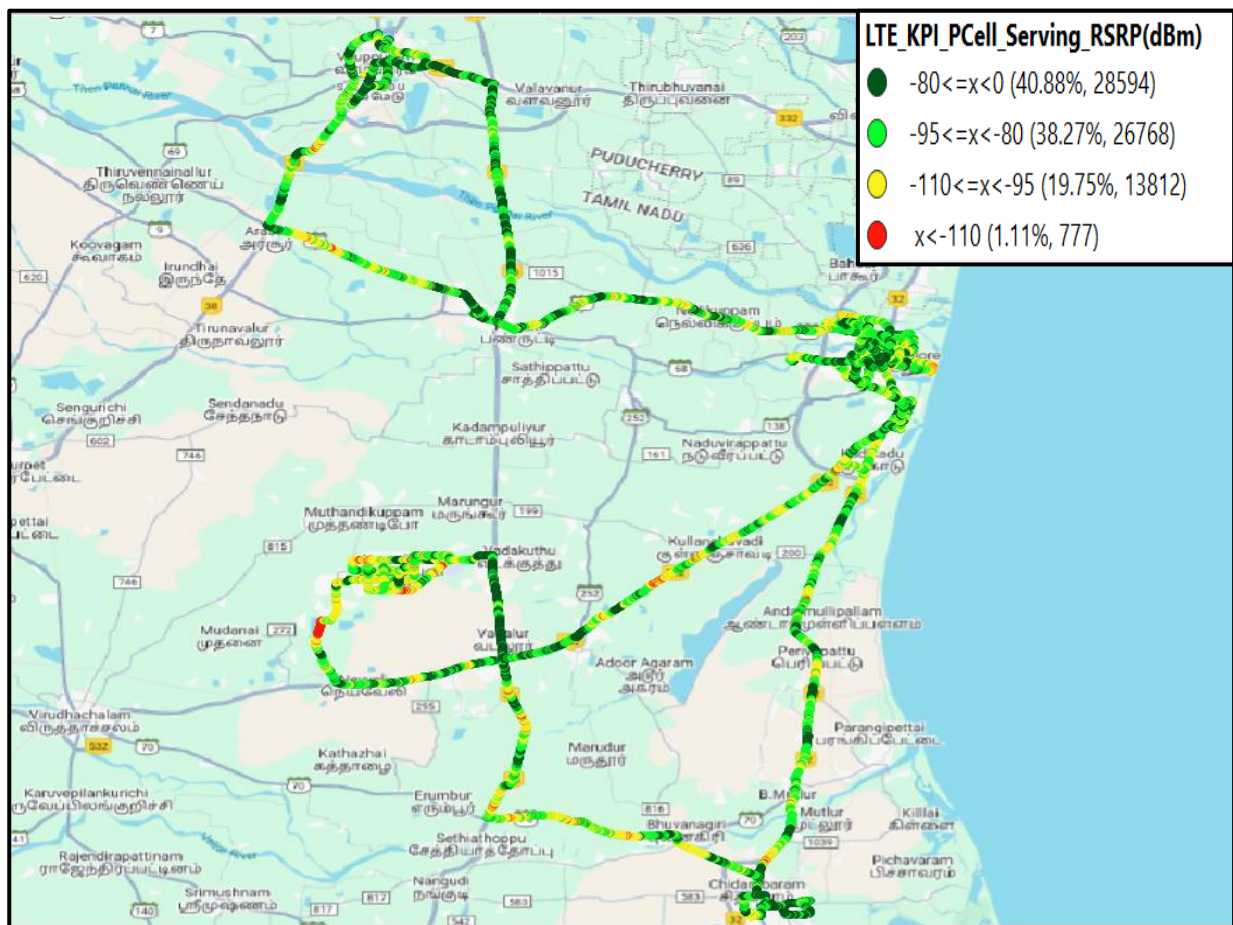
VoLTE		
Overall RSRP	**# Samples**	**%**
[Max, >=-80]	28594	40.88
[-80, >=-90]	26768	38.27
[-90, >=-110]	13812	19.74
[-110, >=-120]	777	1.11
Total	69951	100

VIL

Technology	Coverage Rate %
2G	95.23
VoLTE	98.46

2G	VoLTE
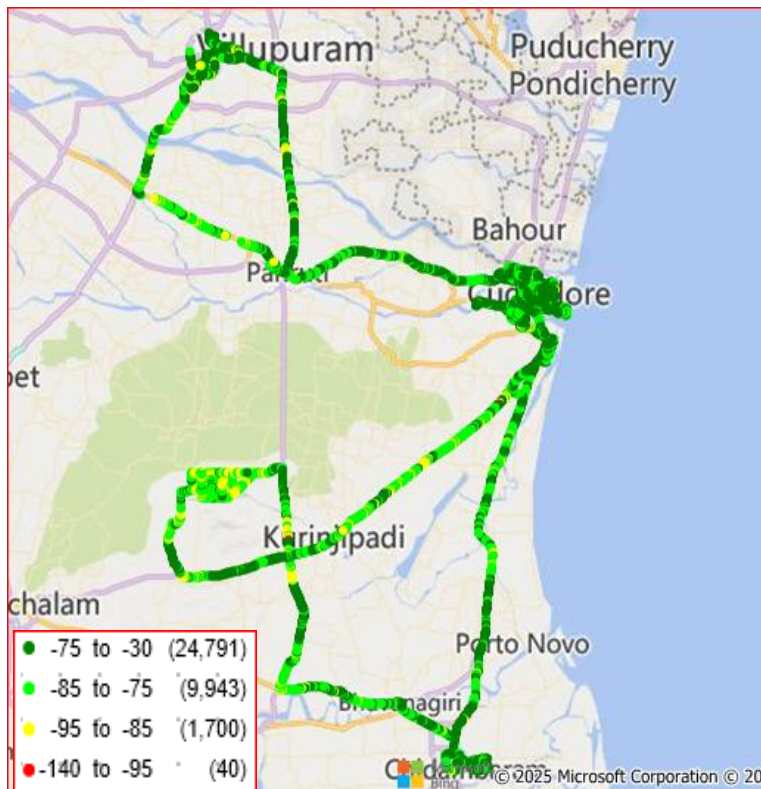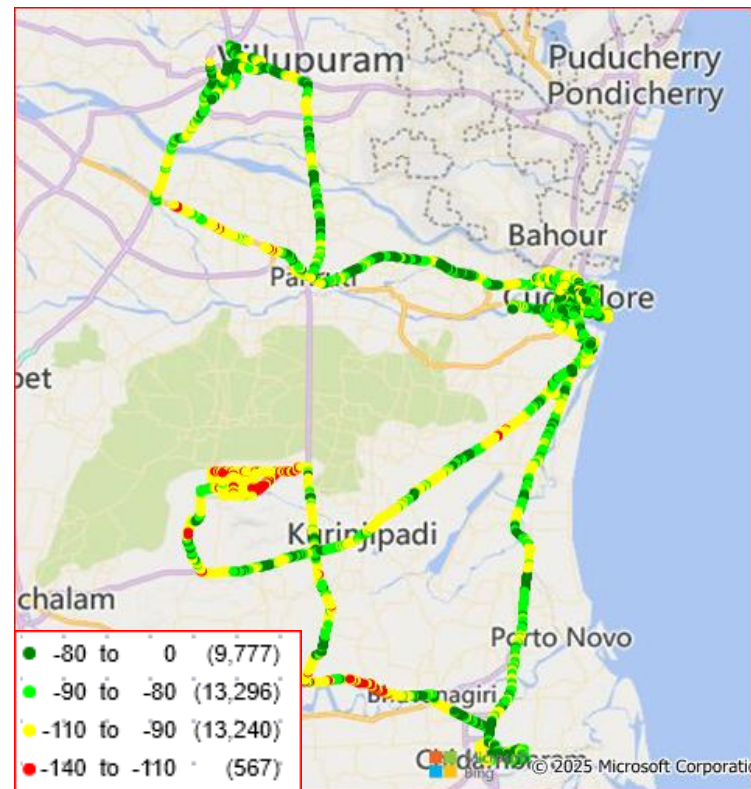
2G		
Overall RxLevel	**# Samples**	**%**
[Max, >=-75]	24791	67.97
[-75, >=-85]	9943	27.26
[-85, >=-95]	1700	4.66
[-95, >=Min]	40	0.11
Total	**36474**	**100**

VoLTE		
Overall RSRP	**# Samples**	**%**
[Max, >=-80]	9777	26.51
[-80, >=-90]	19602	53.15
[-90, >=-110]	6934	18.80
[-110, >=-120]	567	1.54
Total	36880	100

For measuring voice quality, as per the QoS norms, Rx Qual <=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 ≥ 95%.

TSP	Rx Quality %
Airtel 2G	96.23
BSNL 2G	98.60
VIL 2G	98.82
BSNL 3G	95.10
Airtel 4G	94.84
JIO 4G	99.76
VIL 4G	96.49

RX Quality Distribution

	Airtel 2G	BSNI 2G	VIL 2G	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Below Benchmark %	3.77	1.40	1.18	4.90	5.16	0.24	3.51
Rx Quality %	96.23	98.60	98.82	95.10	94.84	99.76	96.49

■ Rx Quality %   ■ Below Benchmark %
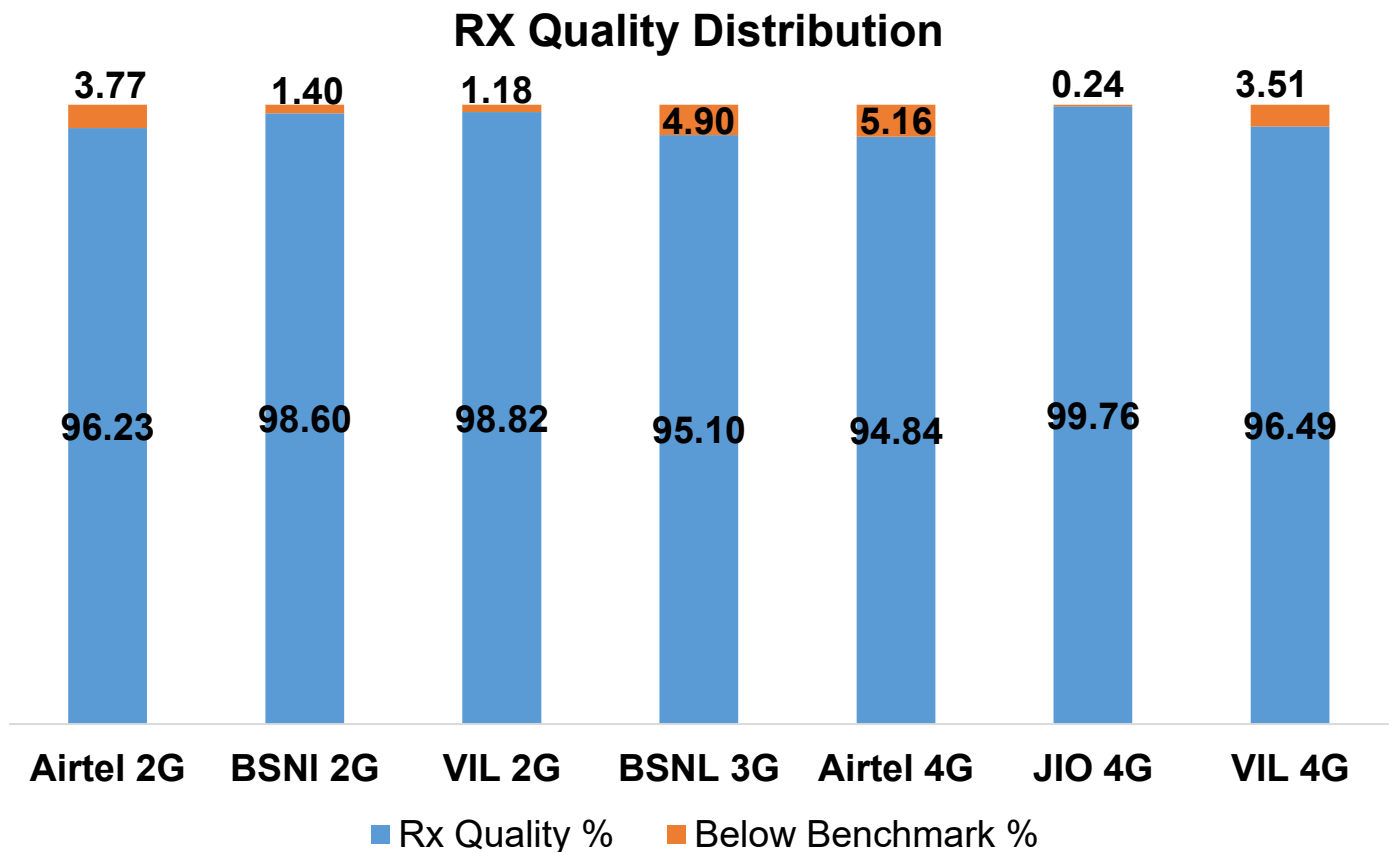
Airtel

Technology	Rx Quality %
2G	96.23
VoLTE	94.84
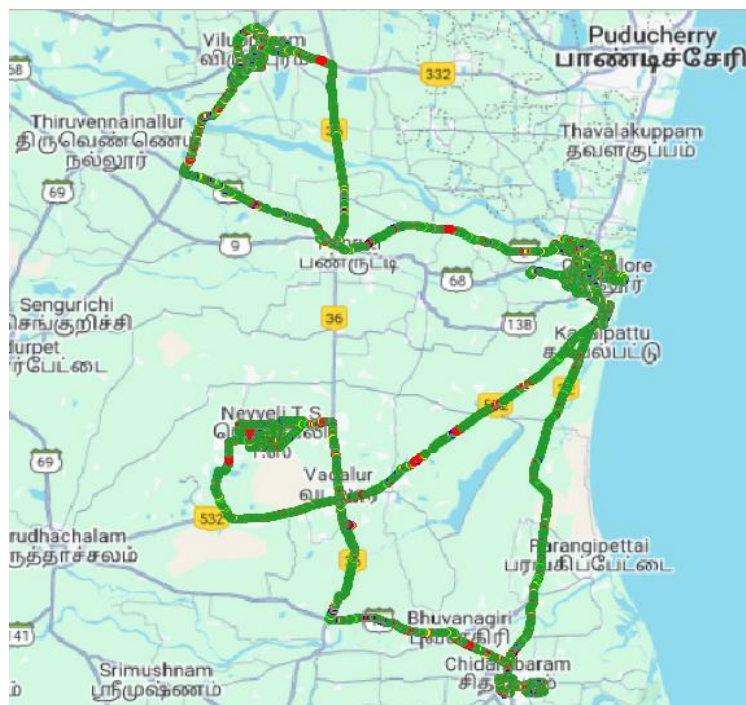
2G	**VoLTE**
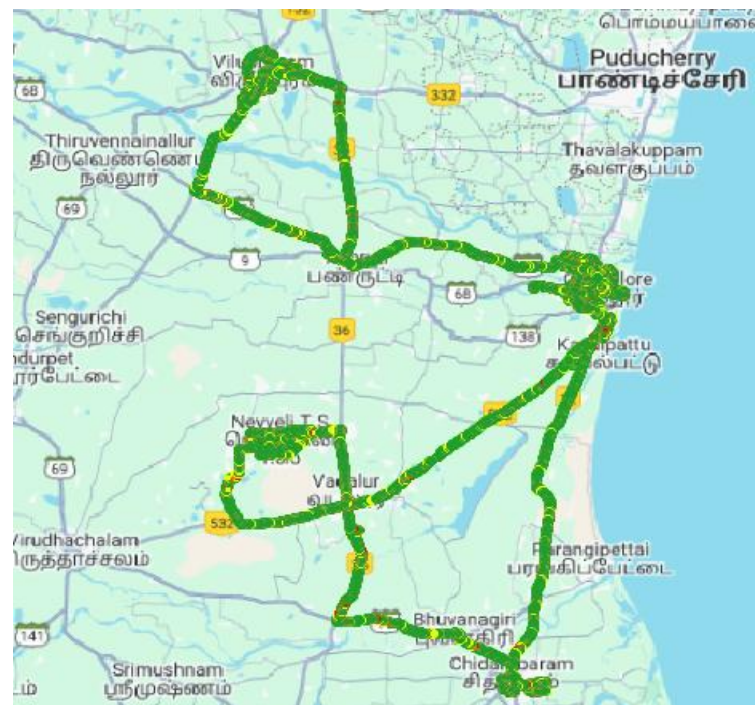
Overall Rx Quality	# Samples	%
(Min, <=2)	7941965	87.61
(2, <=3)	250038	2.76
(3 , <=4)	292683	3.23
(4 , <=5)	238648	2.63
(5 , <=Max)	341747	3.77
Total	9065081	100

Overall SINR	# Samples	%
(Min, <=-3)		
(-3, <=0)		
(0, <=3 to 5)	3258090	94.84
(5, <=10)	168857	4.92
(10, <=15)	8276	0.24
(15, <=Max)		
Total		

BSNL

Technology	Rx Quality %
2G	98.60
3G	95.10

2G
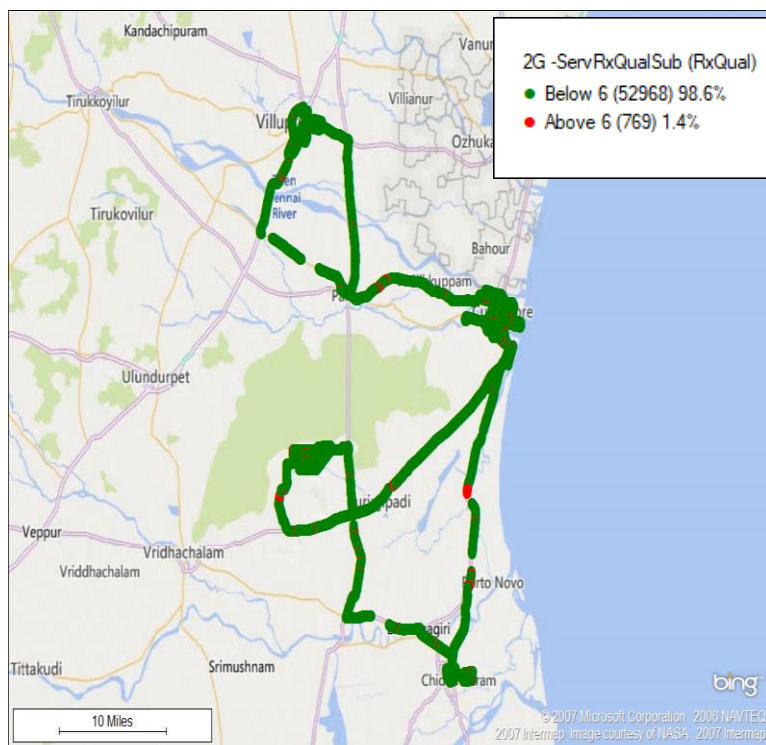
3G
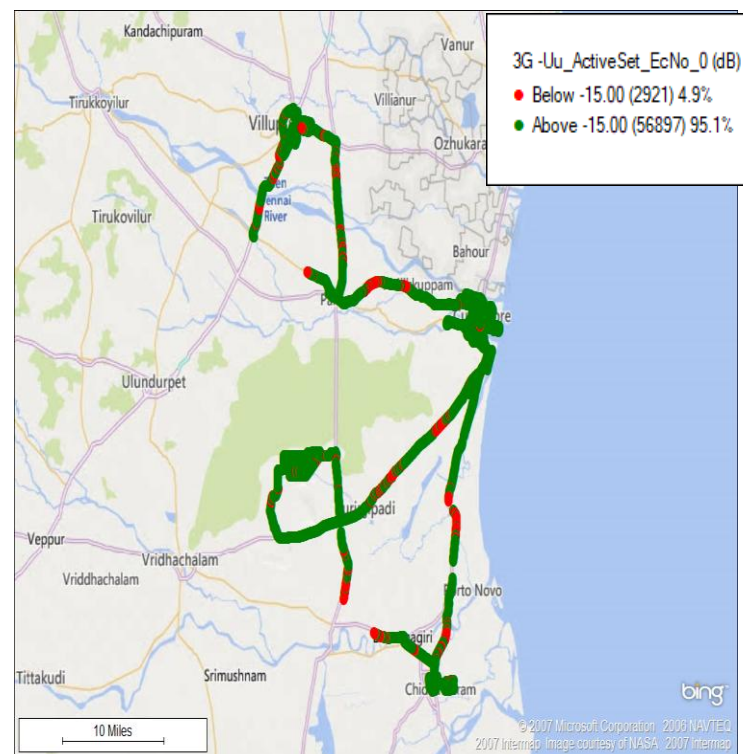
Overall Rx Quality	# Samples	%
(Min, <=6)	52968	98.6%
(6 , <=Max)	769	1.40%
Total	**53737**	**100%**

Overall SINR	# Samples	%
(Max, <=-14)	56897	95.1%
(-14, <= Min)	2921	4.9%
Total	**59818**	**100%**

JIO

Technology	Rx Quality %
VoLTE	99.76

VoLTE

LTE KPI PCell SINR(dB)
- ● 15<=x (28.76%, 20119)
- ● 10<=x<15 (24.02%, 16801)
- ● 5<=x<10 (25.48%, 17823)
- ● 0<=x<5 (16.49%, 11537)
- ● -6<=x<0 (5.01%, 3504)
- ● x<-6 (0.24%, 167)
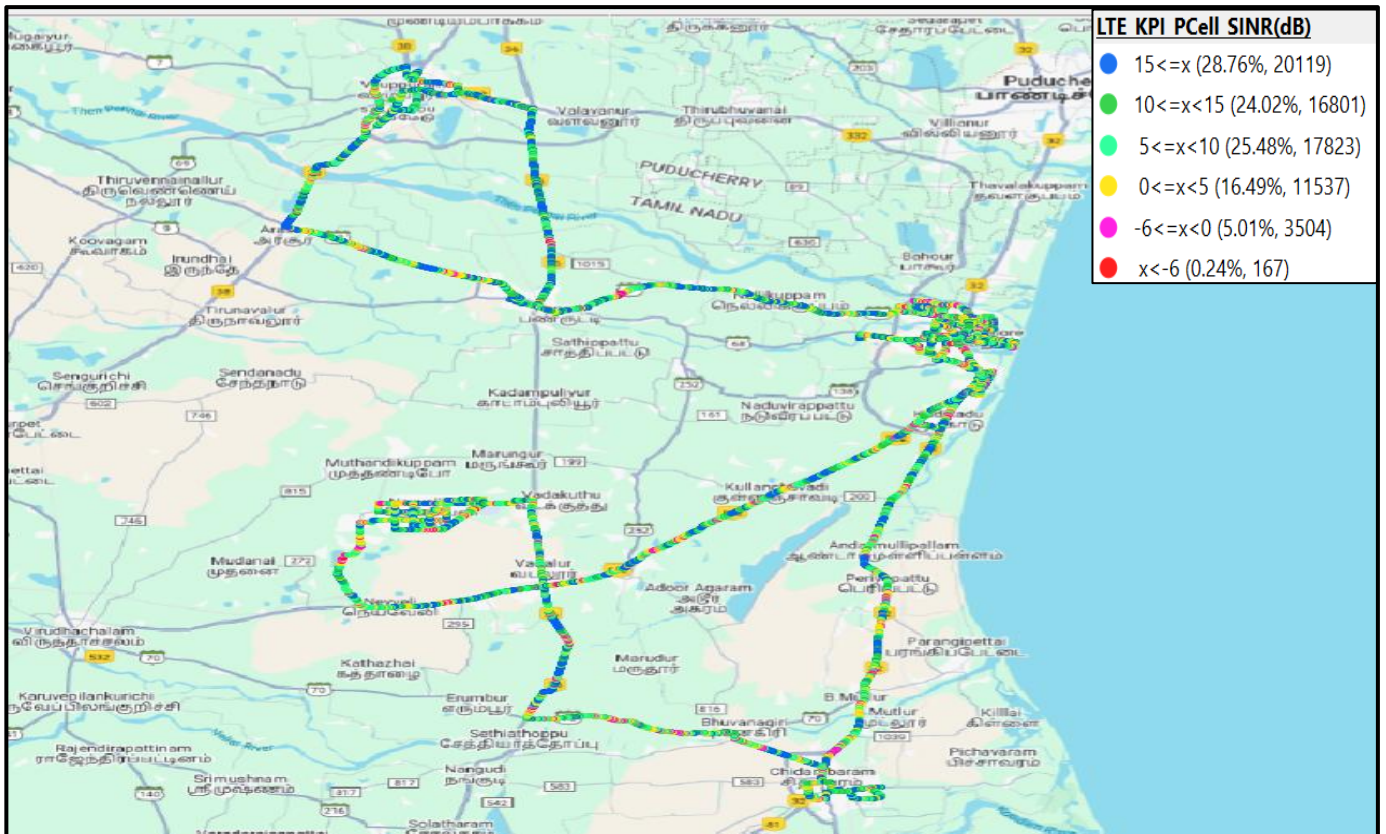
Overall SINR	# Samples	%
(Min, <=-6)	167	0.24
(-6, <=0)	3504	5.01
(0, <=5)	11537	16.49
(5, <=10)	17823	25.48
(10, <=15)	168011	24.02
(15, <=Max)	20119	28.76
Total	**69951**	**100**

VIL

Technology	Rx Quality %
2G	98.82
VoLTE	96.49

2G	VoLTE

RxQual_Sub2 by
- 0 to 2 (25,661)
- 2 to 3 (937)
- 3 to 4 (1,108)
- 4 to 5 (355)
- 5 to 7 (334)

EpsServingCellCinr1
- 15 to 30 (15,486)
- 10 to 15 (8,418)
- 5 to 10 (7,840)
- 0 to 5 (3,800)
- -30 to 0 (1,294)
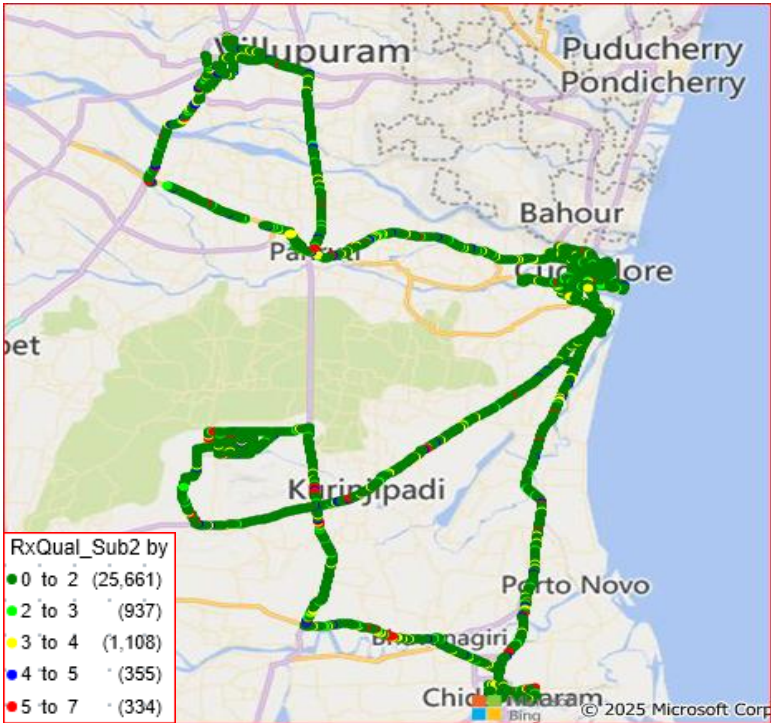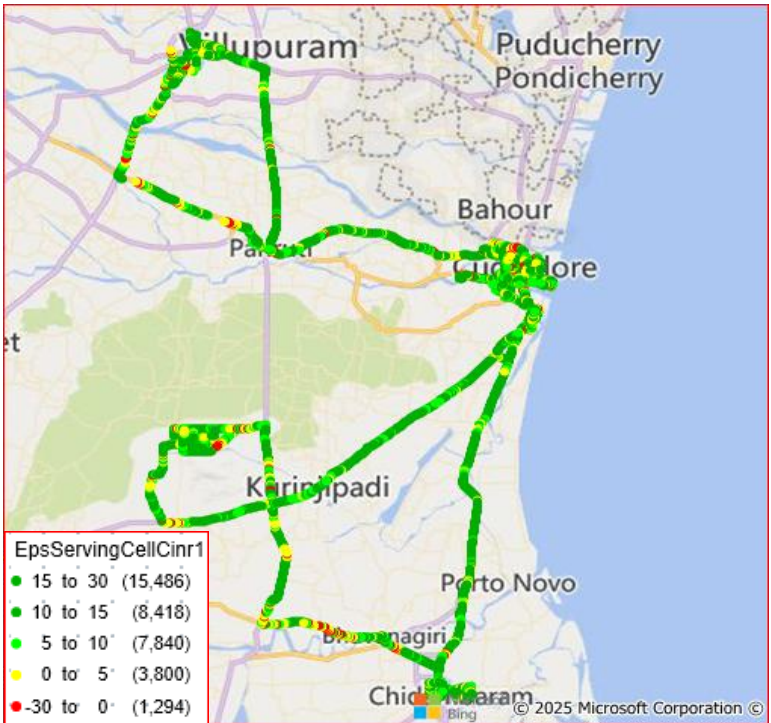
Overall Rx Quality	# Samples	%
(Min, <=2)	25661	90.37
(2, <=3)	937	3.3
(3 , <=4)	1108	3.9
(4 , <=5)	355	1.25
(5 , <=Max)	334	1.18
Total	28395	100

Overall SINR	# Samples	%
(Min, <=0)	1294	3.51
(0, <=5)	3843	10.42
(5, <=10)	7840	21.26
(10, <=15)	8418	22.82
(15, <=Max)	15486	41.99
Total	36881	100%

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	78.00
Airtel VoLTE	100
JIO VoLTE	100
VIL VoLTE	99.98
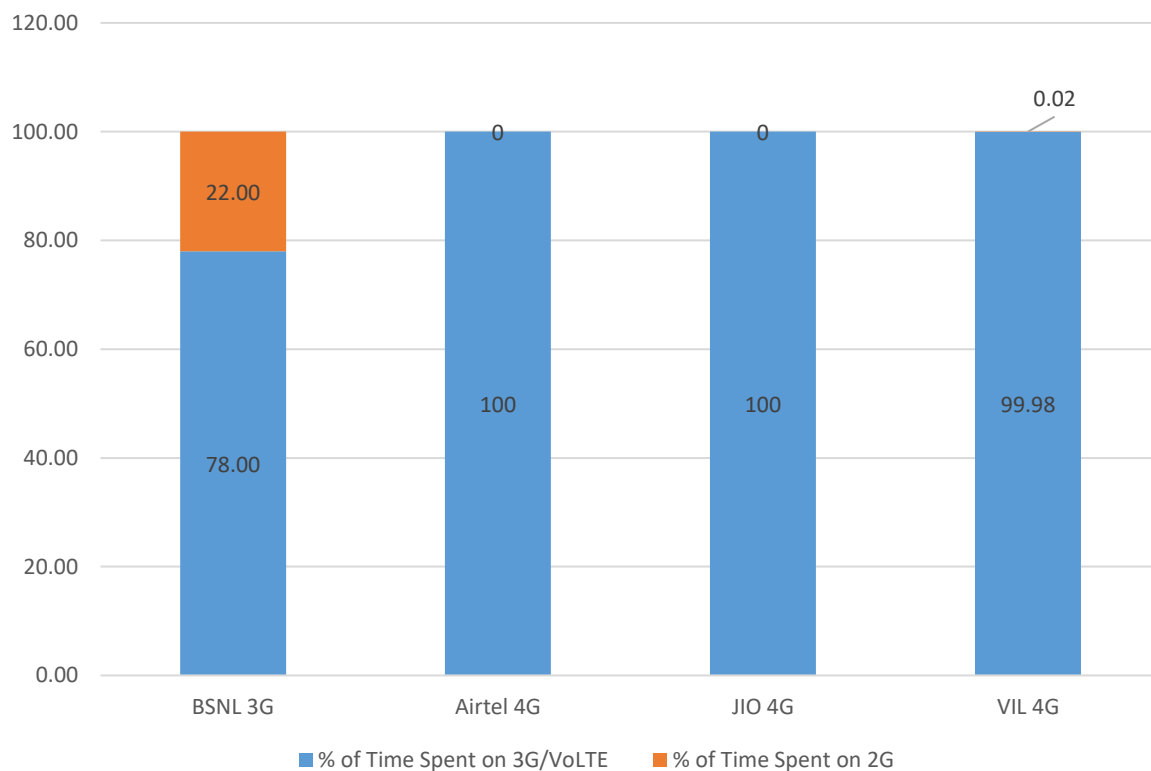
Airtel

Technology	Time Spent %
3G / VoLTE	100
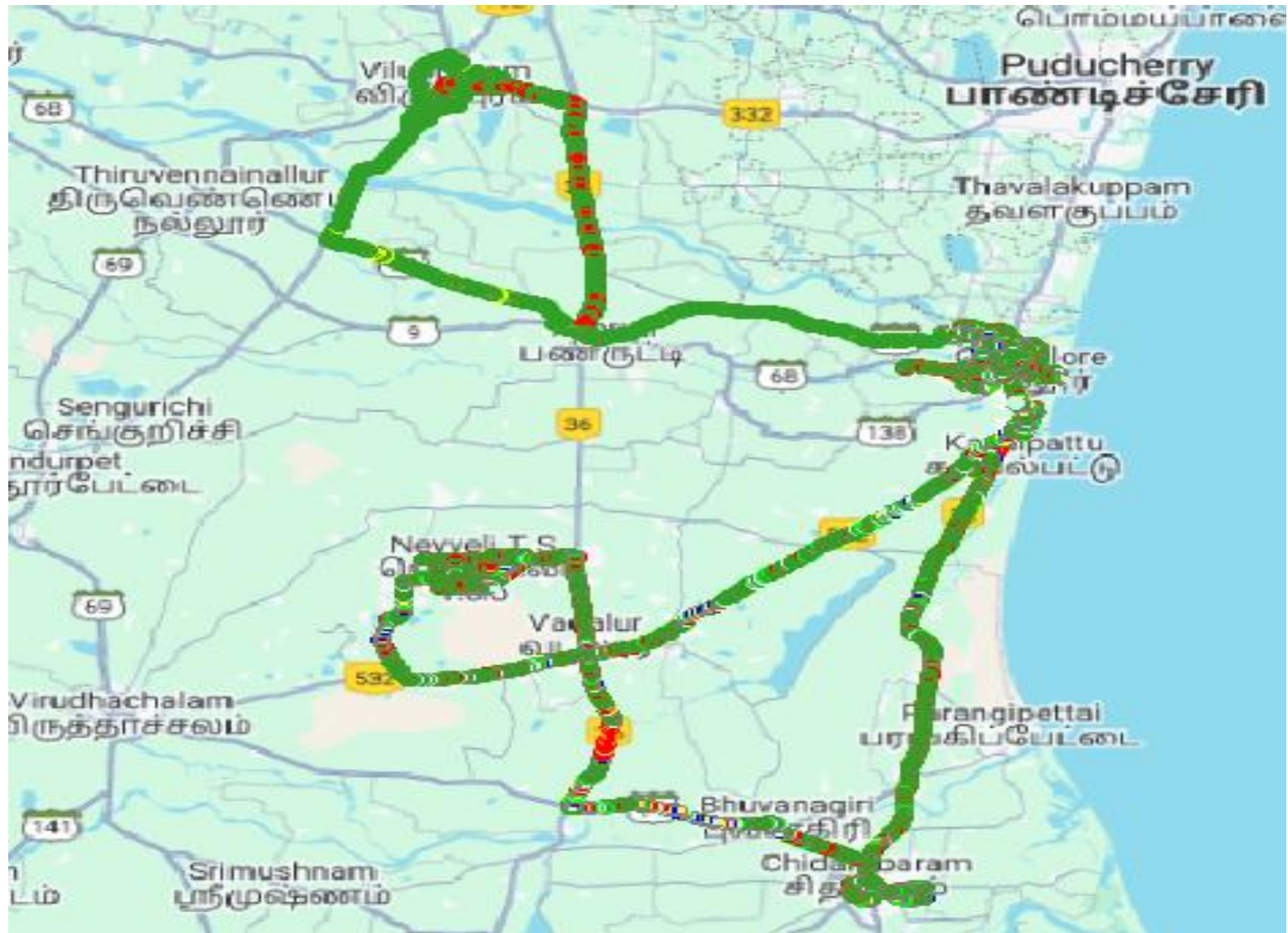
BSNL

Technology	Time Spent on 3G
3G	78.00
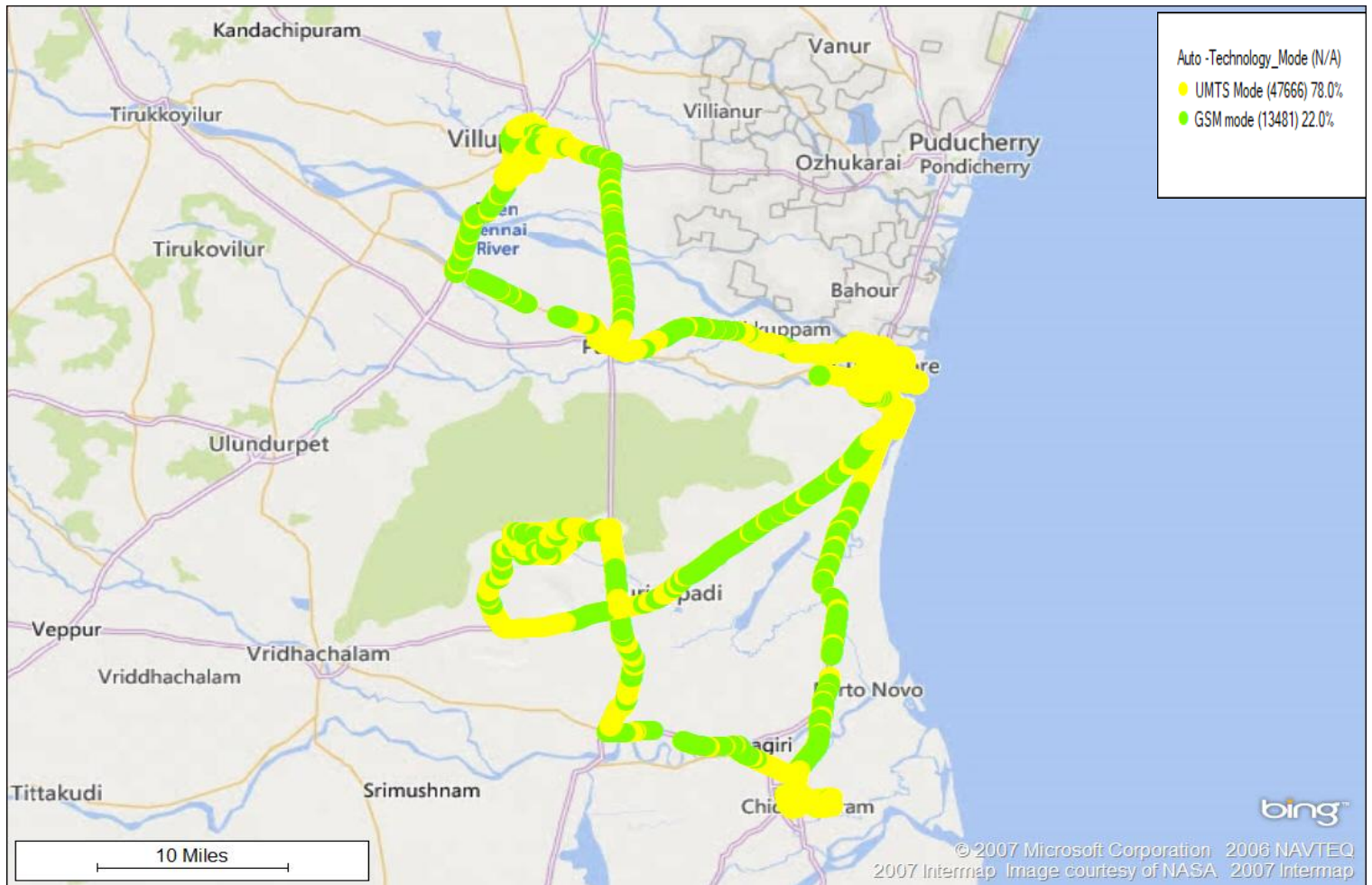
JIO

Technology	Time Spent %
3G / VoLTE	100
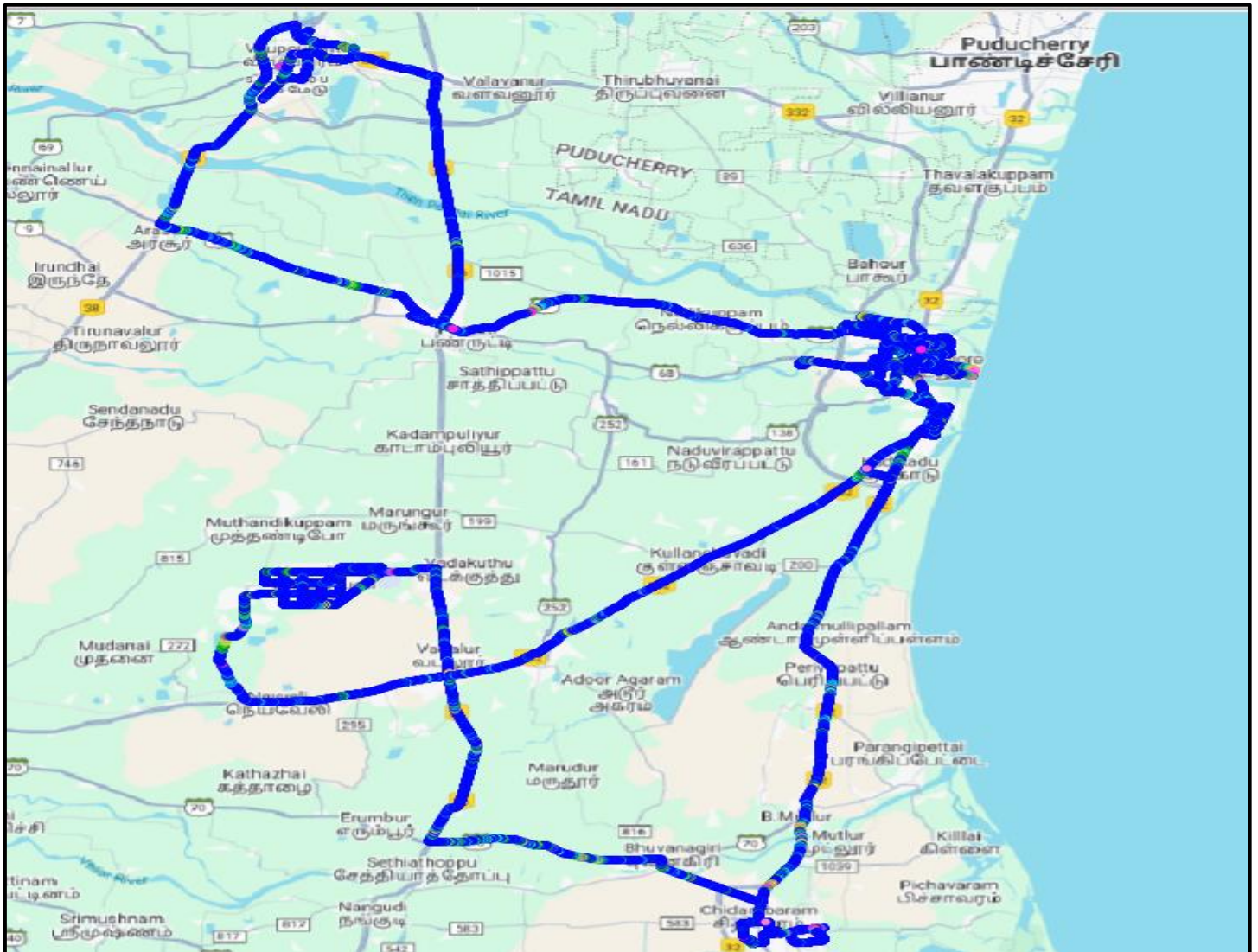
VIL

Technology	Time Spent %
3G / VoLTE	99.98
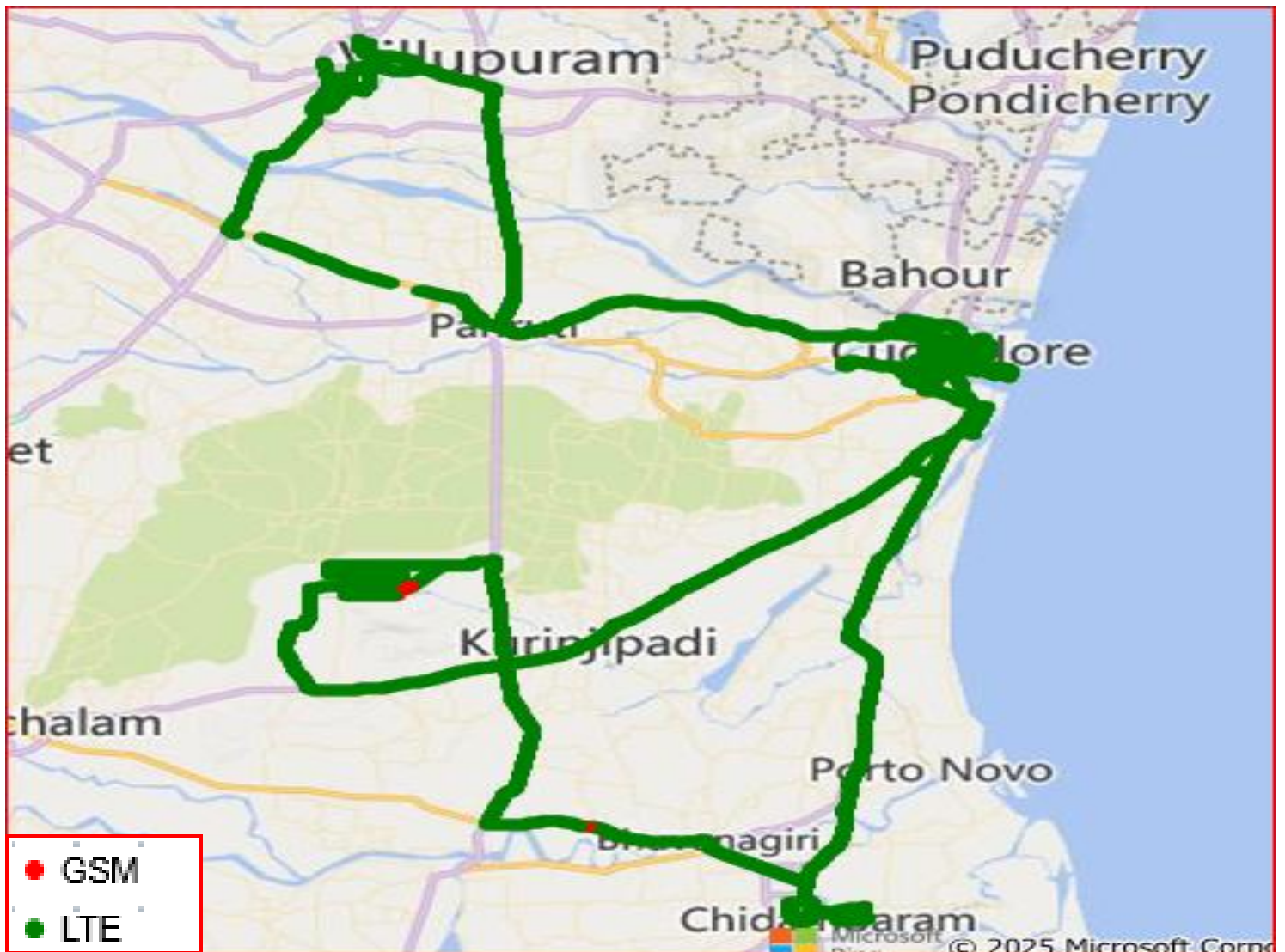
Airtel

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	4G
Download Throughput (Mbps)	32.85
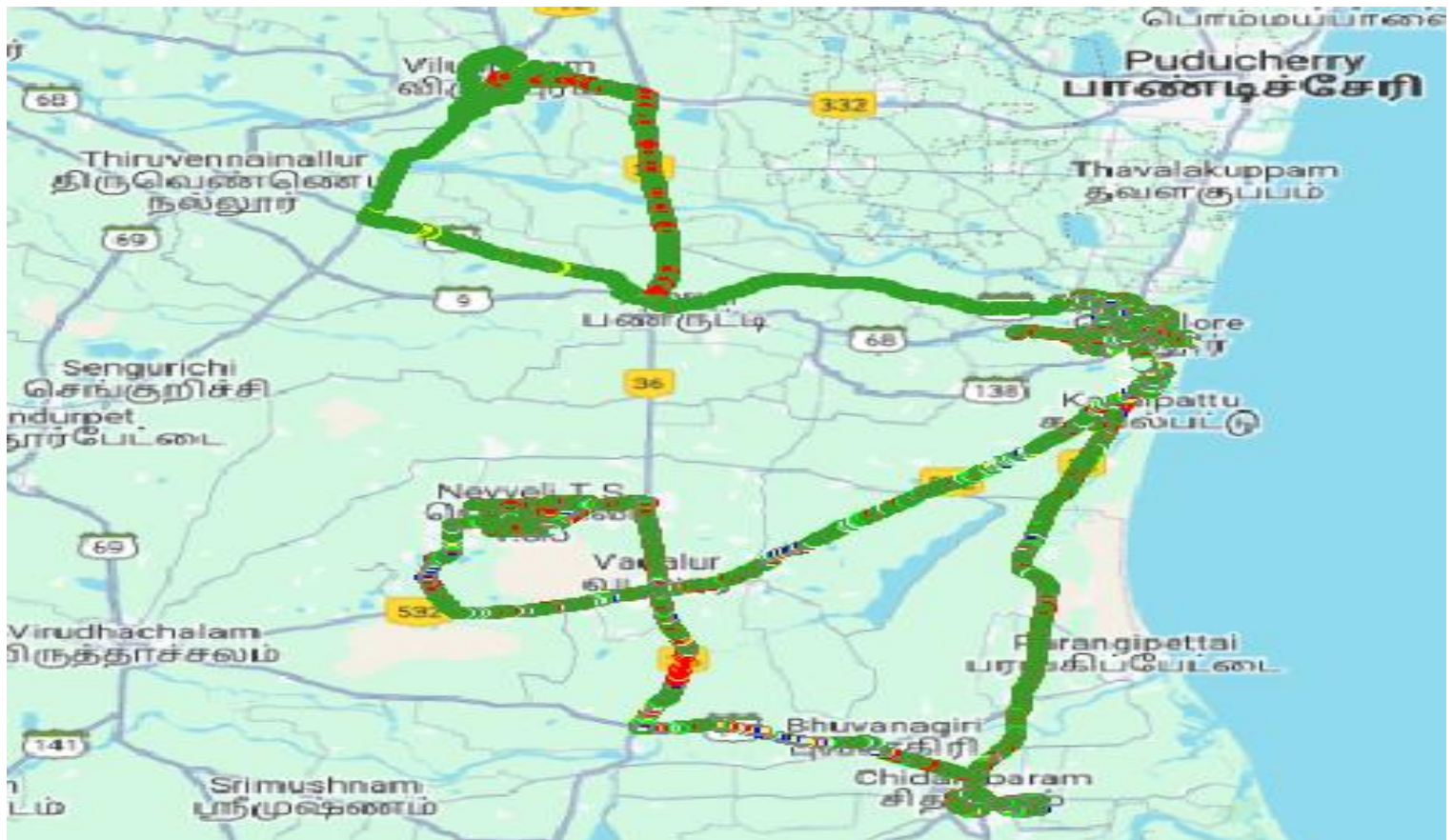
DL throughput	No of Sample	%
0 to 1 Mbps	105687	1.12
1 to 2 Mbps	54452	0.58
2 to 3 Mbps	158422	1.68
3 to 4 Mbps	75080	0.79
4 to 8 Mbps	299067	3.16
8 to 12 Mbps	284243	3.01
>12 Mbps	8475856	89.67
Total	9452807	100

BSNL

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.07
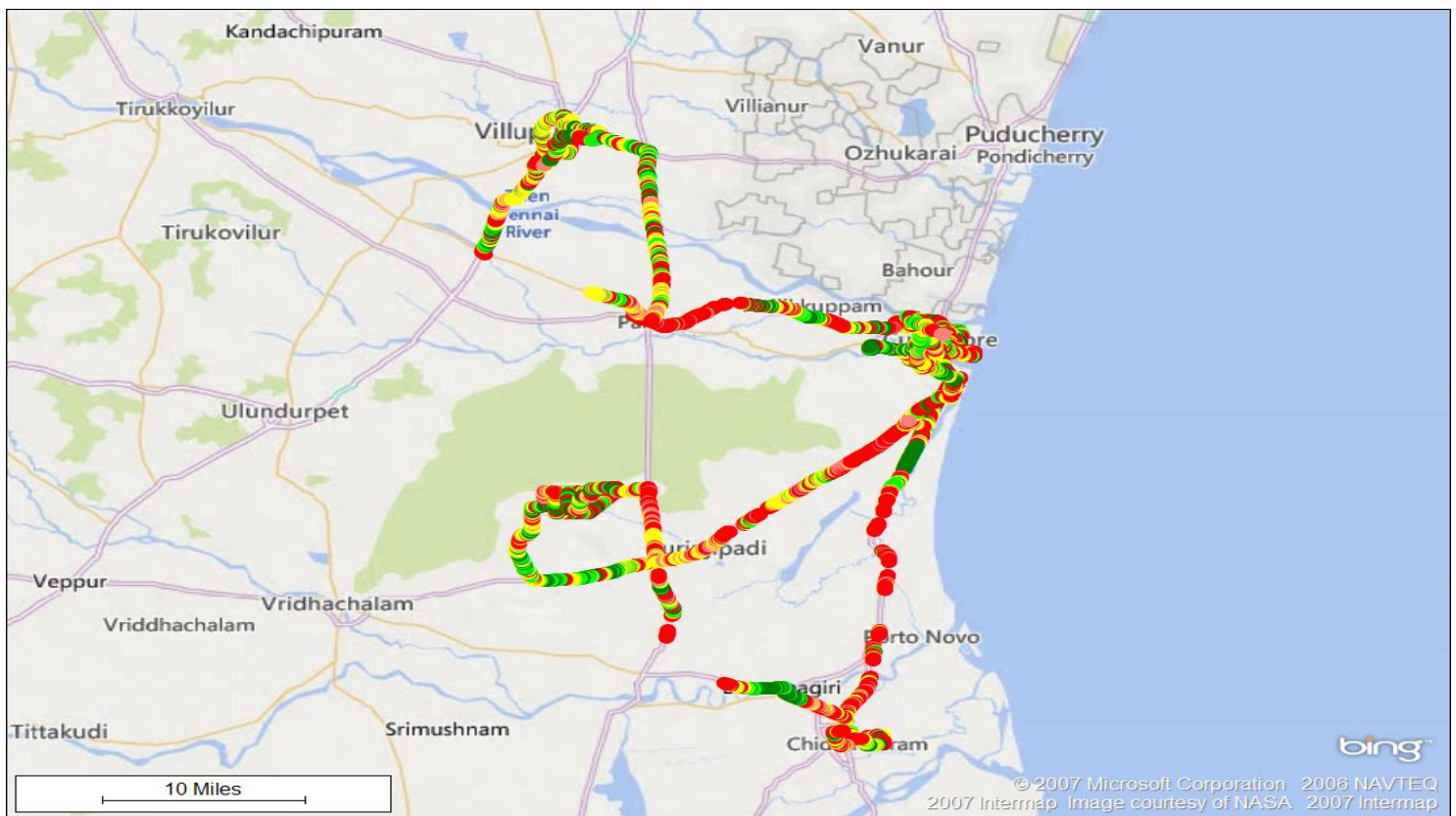
DL throughput	No of Sample	%
0 to 500 kbps	18914	34.1
500Kbps to 1 Mbps	4448	8.0
1 to 2 Mbps	14998	27.0
2 to 4 Mbps	9182	16.5
>4 Mbps	7946	14.4
Total	**61387**	**100**

JIO

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	4G
Download Throughput (Mbps)	48.83
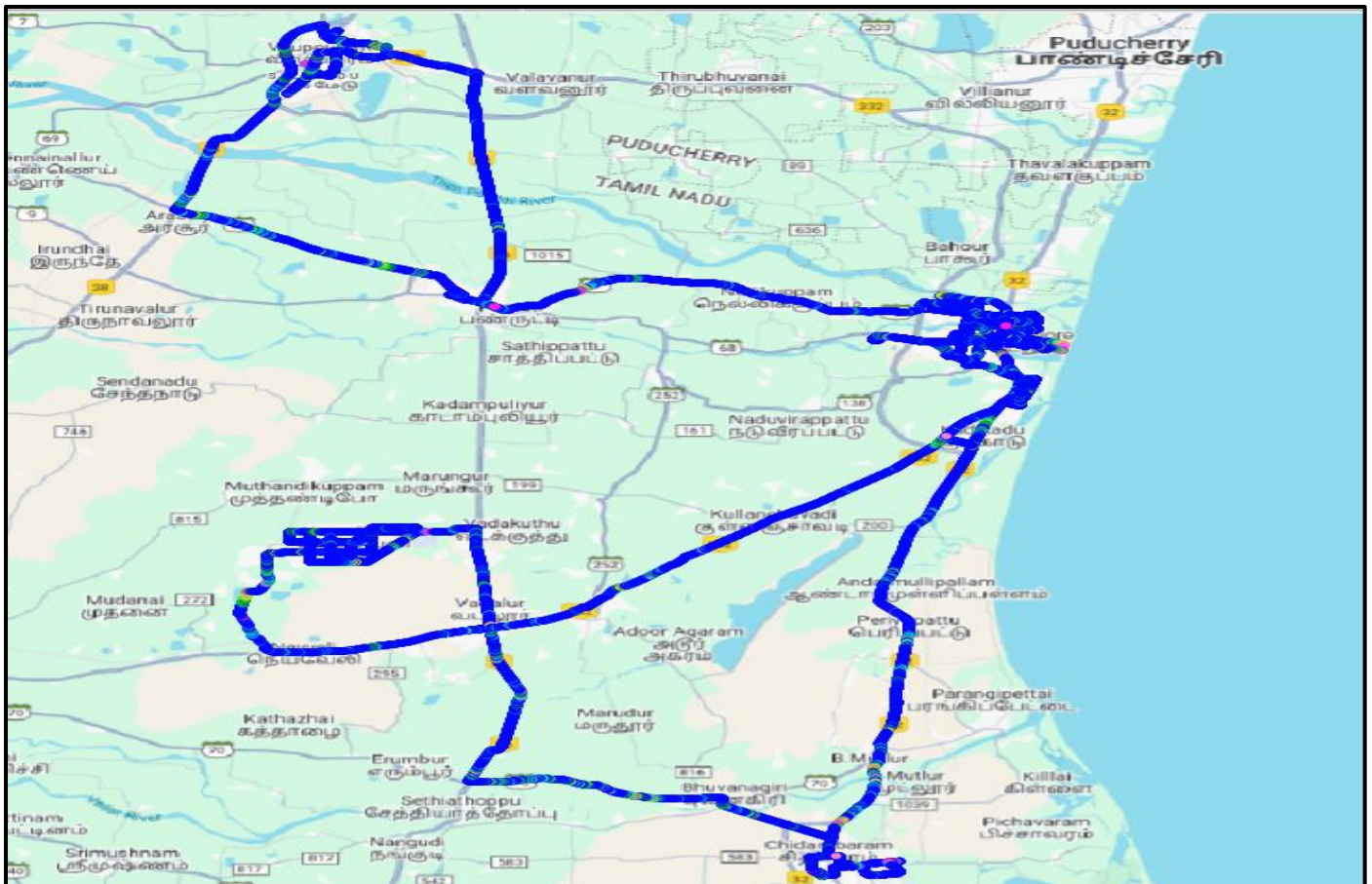
DL Throughput	No of Sample	%
0 to 1 Mbps	347	0.51
1 to 2 Mbps	339	0.50
2 to 3 Mbps	353	0.52
3 to 4 Mbps	389	0.57
4 to 8 Mbps	2020	2.97
8 to 12 Mbps	2582	3.79
>12 Mbps	62023	91.14
Total	68053	100

VIL

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	4G
Download Throughput (Mbps)	51.27
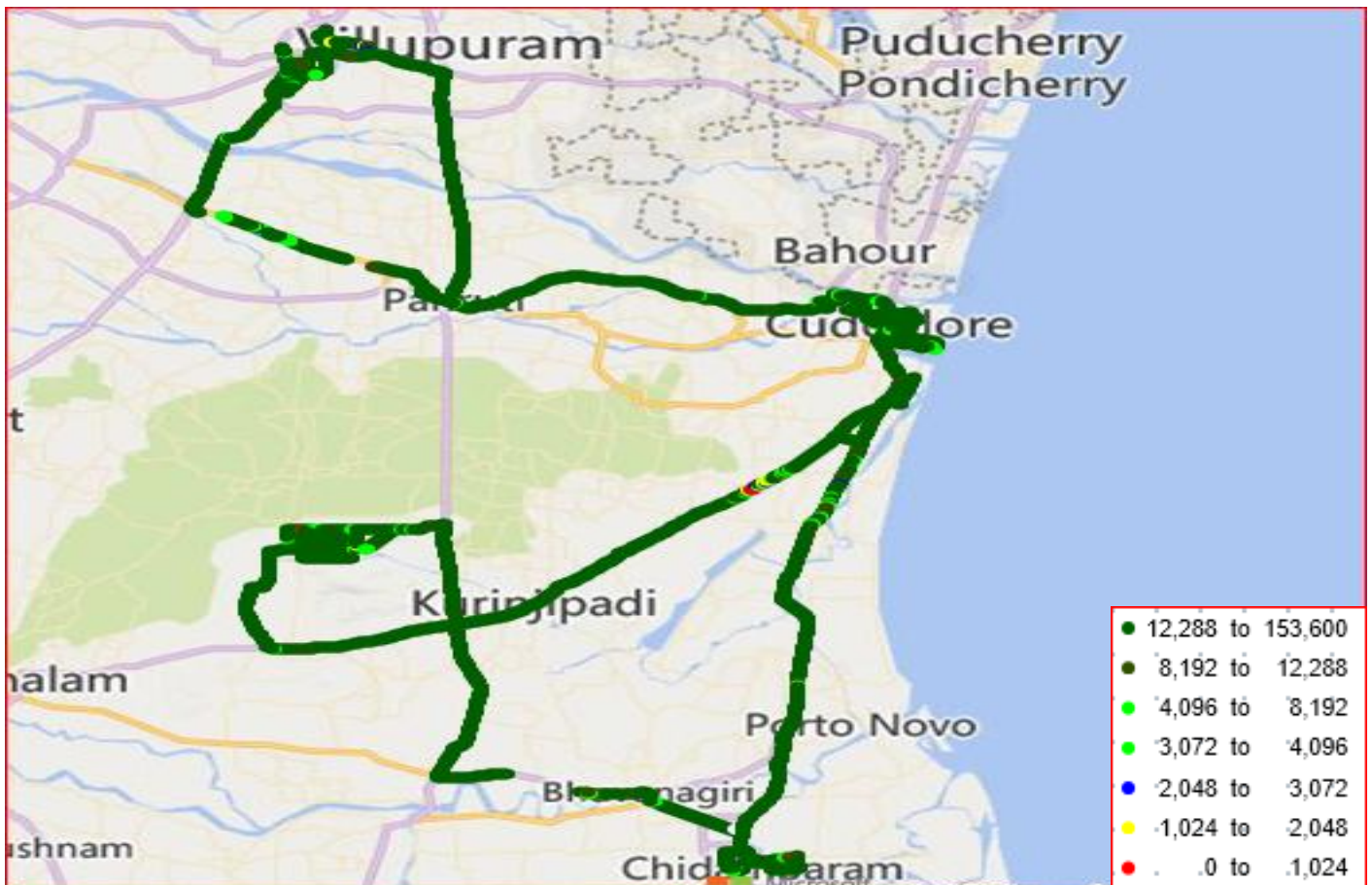
DL throughput	No of Sample	%
0 to 1 Mbps	367	1.28
1 to 2 Mbps	62	0.22
2 to 3 Mbps	54	0.19
3 to 4 Mbps	68	0.24
4 to 8 Mbps	540	1.89
8 to 12 Mbps	681	2.38
>12 Mbps	26840	93.80
Total	**28612**	**100**

Airtel

Technology 4G	1. Chidambaram Nataraja Temple	2. Neyveli Arch Gate	3. Villupuram Railway Station	4. Villupuram Bustand
Download in Mbps	59.63	44.70	27.47	48.20
Upload in Mbps	18.98	2.04	20.07	5.37

Technology 4G	5. Cuddalore SIPCOT	6. Cuddalore OT Railway Station	7. Cuddalore Bustand	8. Cuddalore GH
Download in Mbps	38.29	54.00	54.76	71.78
Upload in Mbps	19.56	43.57	46.21	20.72

BSNL

Technology 4G	1. Chidambaram Nataraja Temple	2. Neyveli Arch Gate	3. Villupuram Railway Station	4. Villupuram Bustand
Download in Mbps	1.27	1.6	2.82	4.23
Upload in Mbps	1.59	1.47	1.02	1.92

Technology 4G	5. Cuddalore SIPCOT	6. Cuddalore OT Railway Station	7. Cuddalore Bustand	8. Cuddalore GH
Download in Mbps	2.01	1.78	1.08	2.59
Upload in Mbps	0.97	1.71	1.48	1.36

JIO

Technology 4G	1. Chidambaram Nataraja Temple	2. Neyveli Arch Gate	3. Villupuram Railway Station	4. Villupuram Bustand
Download in Mbps	46.56	62.14	24.64	29.37
Upload in Mbps	7.31	11.37	9.67	8.76

Technology 4G	5. Cuddalore SIPCOT	6. Cuddalore OT Railway Station	7. Cuddalore Bustand	8. Cuddalore GH
Download in Mbps	50.01	37.56	37.27	79.48
Upload in Mbps	10.02	24.23	24.54	10.09

VIL

Technology 4G	1. Chidambaram Nataraja Temple	2. Neyveli Arch Gate	3. Villupuram Railway Station	4. Villupuram Bustand
Download in Mbps	25.58	12.05	21.23	13.17
Upload in Mbps	8.45	6.31	21.46	6.14

Technology 4G	5. Cuddalore SIPCOT	6. Cuddalore OT Railway Station	7. Cuddalore Bustand	8. Cuddalore GH
Download in Mbps	23.83	10.41	12.12	39.68
Upload in Mbps	14.6	9.34	9.44	12.11

S.No	No of NH/SH routes	NH routes	SH routes	Distance (Km)
— **NH/SH Routes covered in OADT by Airtel / BSNL / RJIL / VIL**				
1	Cuddalore to Chithambaram	NH	-	43
2	Chitambaram to Neyveli	-	SH	42
3	Neyveli to Cuddalore	-	SH	41
4	Cuddalore to Panrutti	-	SH	25
5	Arasur to Villupuram	NH	-	15
6	Villupuram to Panrutti	-	SH	28