

Operator Assisted Drive Test Report

THANJAVUR SSA

DECEMBER 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%. Rx Quality of 95% is not achieved by Airtel VoLTE & JIO VoLTE.

The Operator Assisted Drive Test has been carried out by Regional Office, Hyderabad with the help of Service Providers in Thanjavur City & Surrounding Regions of Thiruvarur, Mannargudi and Pattukottai from 9:00 AM to 8:00 PM during 18th December to 21st December 2023. The Drive Test Covered drive route of 420 KMs & 6 Hotspots over a period of 4 days. Approximately 500+ calls were made for each of the 7 networks: Three 2G Networks, One 3G Networks and Three LTE Network covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

Regional Office, TRAI Hyderabad conducted Operator Assisted Drive from 18th December to 21th December 2023, The drive test covered drive route of 420 KMs (appx) & 6 hotspots over a period of 4 days at Districts HQ and nearby areas. 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 420 KMs over a period of 3 days from 18th to 21st December 2023. Approximately 500+ calls were made for each of the 7 networks: three 2G (Lock Mode) networks, one 3G (Dual mode) network and three VoLTE network covering 4 unique TSPs.

Data Tests:

1. Dynamic data test was conducted for 420 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.

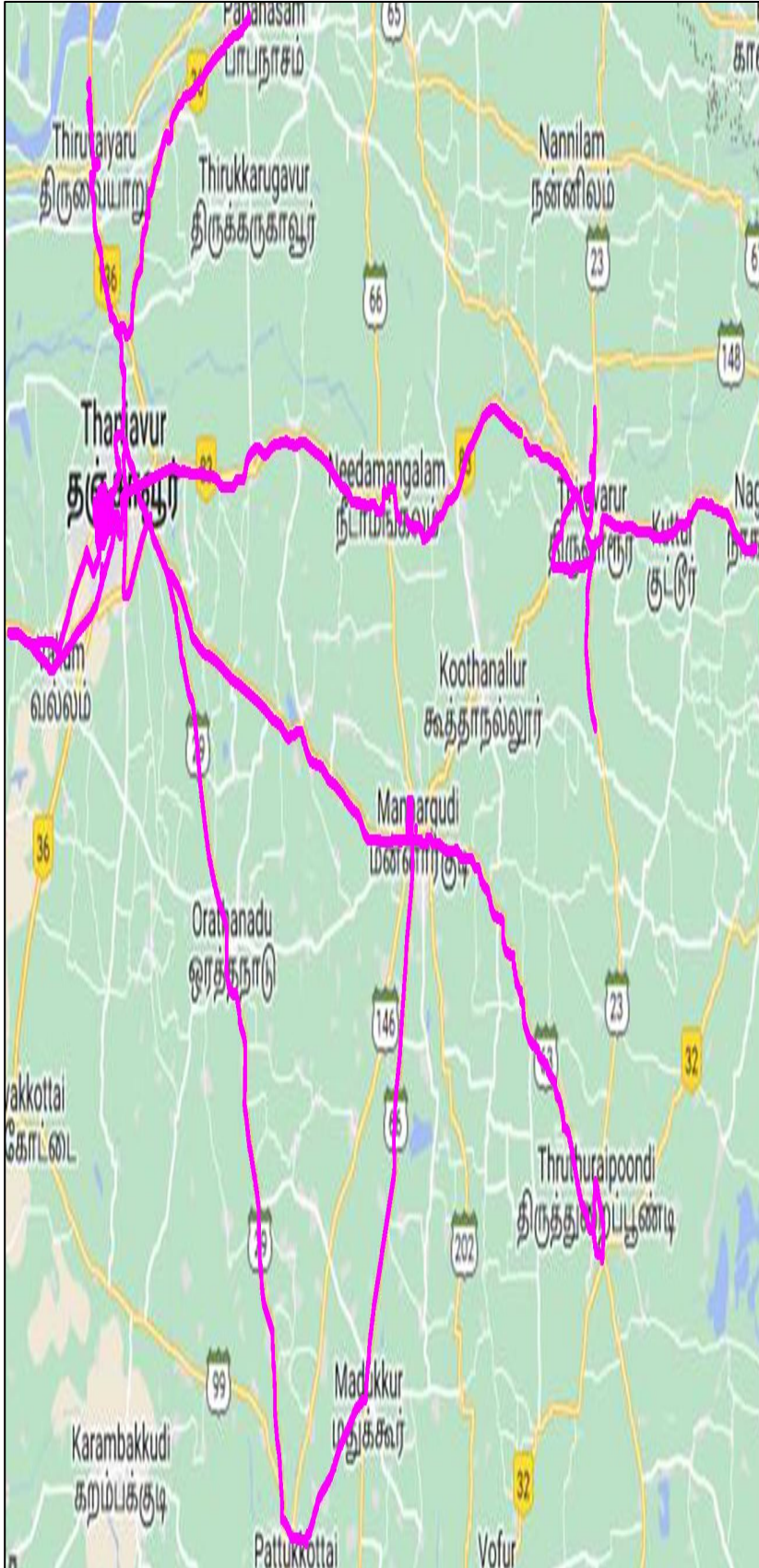
* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

* 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

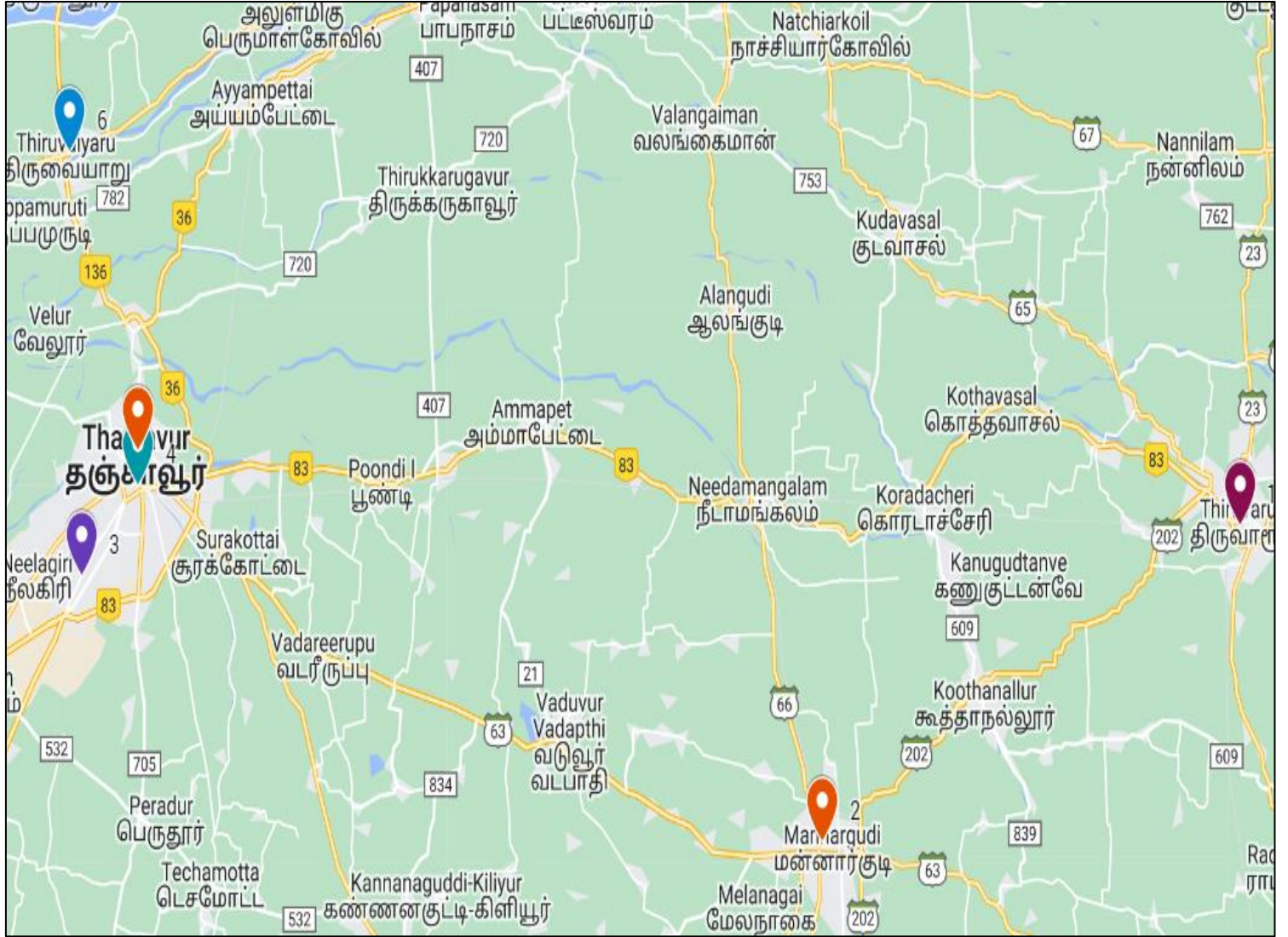


Areas Covered – Thanjavur Town (Day 1)

Thanjavur	Thirukkarukavur
VOC Nagar	papanasam
Parisutham Nagar	Puliyamangalam
Medical college Roade	Vayacheri
Municipal colony	Uthamanatha Puram
Pudukottai Roade	Gopuraraja Puram
Surakotai	Neithalur
Vallam	Annapanpetai
Thirumorthi malai samuthiram	Melachitakadu
Sengipatti	Kadakadapai
Ammanpettai	SNM Rahman Nagar
kandiur	South rampart
nadukadai	NK Roade
Thiruvaiyaru	Neelagiri
Hasurnagar	Membalam Roade
Ayyampettai	Ellaiamman kovil street
Areas Covered- Thiruvarur (Day 2)	Areas Covered- Pattu kottai (Day 3)
Poondi	Mela Ullur
Ammappettai	Orathanadu
Mahalingam	Telgaguduyar
Needamangalam	Dipiyakutti
Koradacheri	karambayam
Kothavasal	Mudakathalur
Thakkil	Pattukottai
Thiruvarur	Vadaseri
Aarukudi	Allamgota
Katchanam	Mannarkudi
Alatmaddi	Neivasal
Thiruthurai poondi	Vadareerupu

Overview

Data Service Test- Static Locations



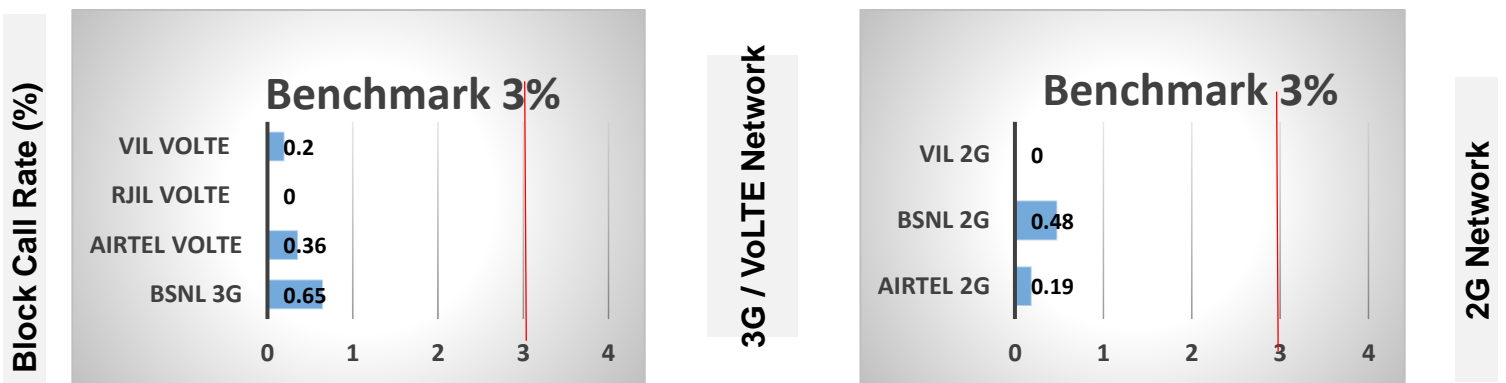
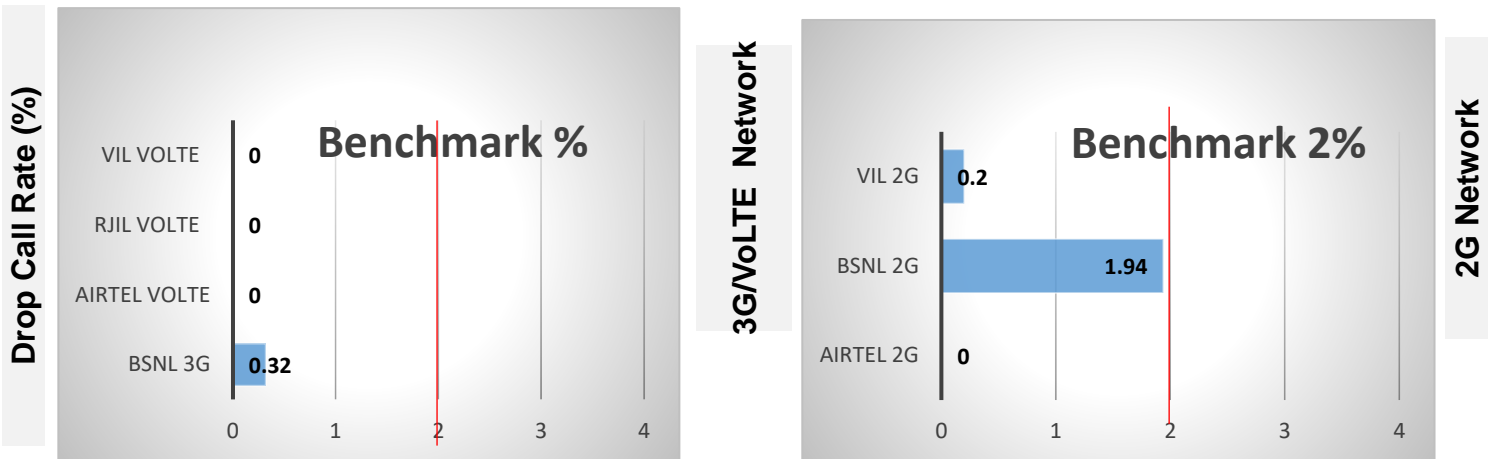
Data Service Test- Static Locations

Static Location
New Bus Stand- Thanjavur
Old Bus Stand- Thanjavur
Railway Junction- Thanjavur
Railway Junction - Thiruvarur
Mannargudi - Temple
Thiruvaiyaru - Temple

Voice Calls

Key Observations

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



	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	1.94	0.20	0.32	0	0	0
Block Call Rate %	0.19	0.48	0	0.65	0.36	0	0.20

- a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%).
- b) 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 %	78.00	76.33	91.0

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

TSPs	3G/ VoLTE	VoLTE		
	BSNL	Airtel	JIO	VIL
Coverage %	68.30	99.37	97.77	97.10

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

hel	3G/VoLTE			
	Airtel	BSNL	JIO	VIL
% of Time Spent on 3G/4G	100	48.63	100	99.96

Summary

SSA Level Summary-Voice

Voice Calls	2G		
	Airtel	BSNL	VIL
Call attempts	514	411	509
Block call rate %	0.19	0.48	0.0
CSSR %	99.81	99.0	99.7
Drop call rate %	0.00	1.94	0.20
Mobility HOSR %	99.46	96.55	99.0
RX Quality %	95.71	95.67	98.0

Voice Calls	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Call attempts	307	523	514	503
Block call rate %	0.65	0.36	0.00	0.20
CSSR %	99.30	99.64	100	99.80
Drop call rate %	0.32	0.00	0.00	0.00
Mobility HOSR %	99.0	99.64	98.81	100.00
RX Quality %	97.00	87.83	90.42	96.00

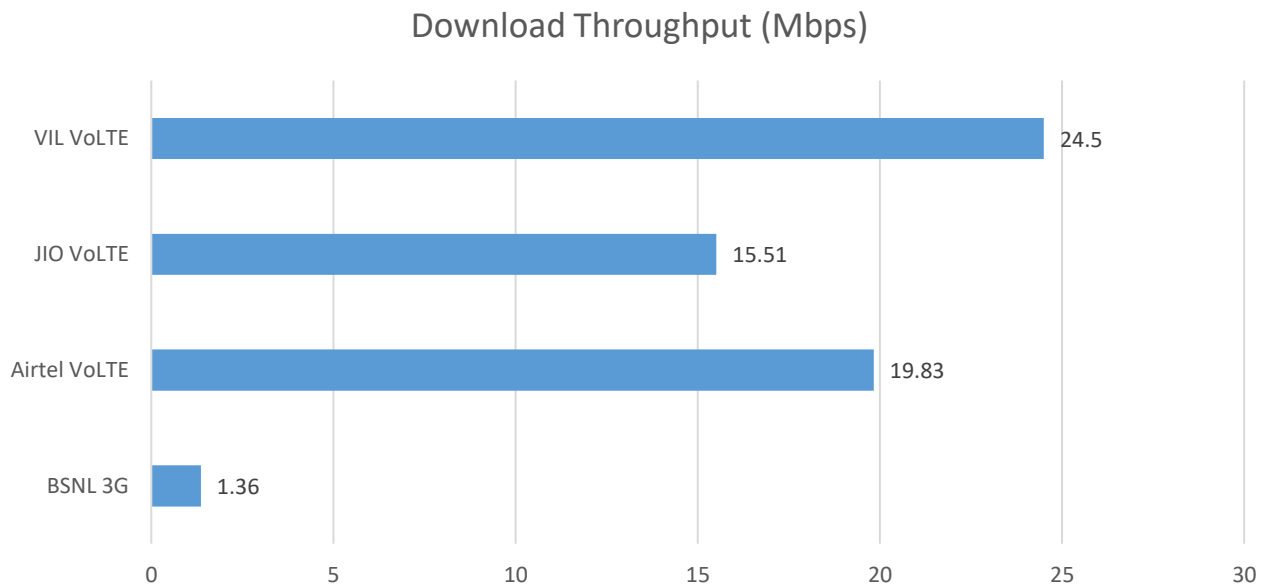
Data Services Dynamic

Key Observations

Dynamic Data was tested for 420Kms. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic

4G/ 3G Network:



3G / VOLTE				
Data Services Dynamic	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download Throughput (Mbps)	1.36	19.83	15.51	24.50

Data Services Static

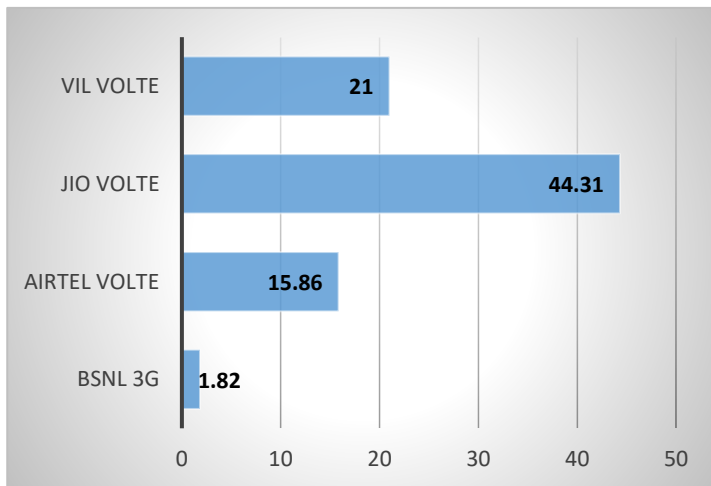
Key Observations (Average of 6 Hotspots)

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

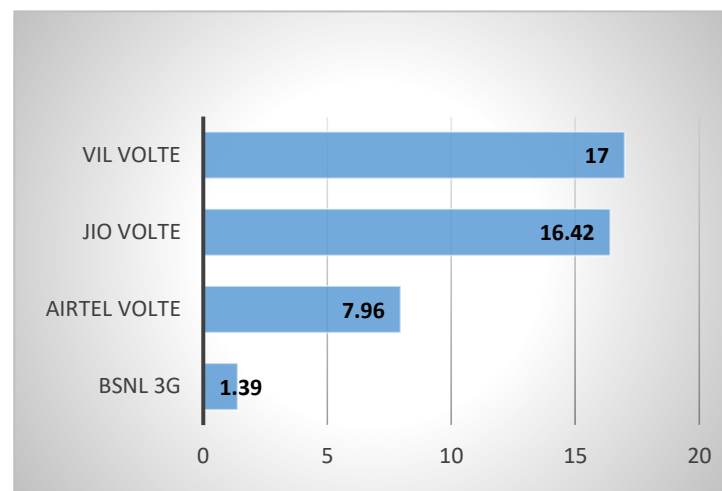
Data Download and Upload Performance (Mbps)

3G/4G Network:

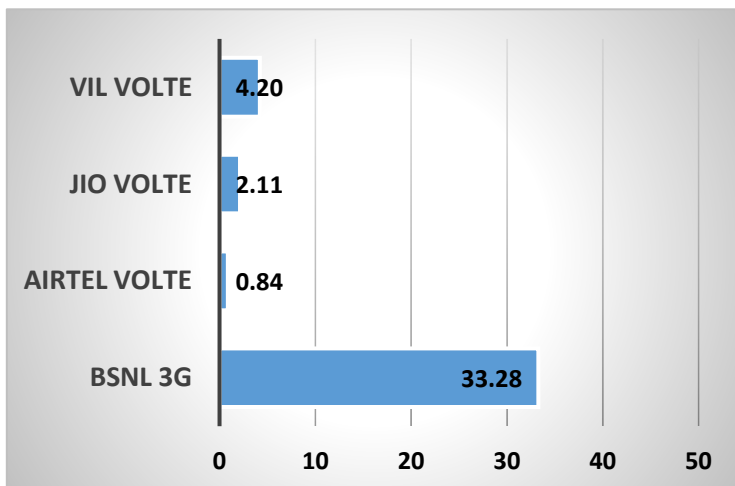
Download Throughput (Mbps)



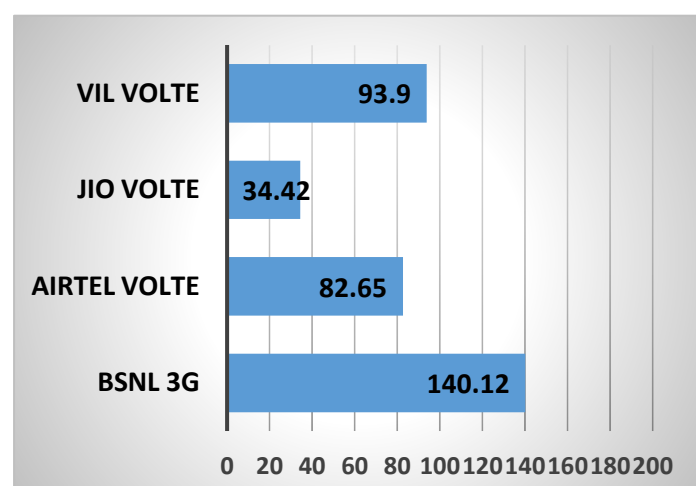
Upload Throughput (Mbps)



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)	118.94	148.41	103.6
Upload Throughput (kbps)	77.78	104.69	60.6
Web Browsing Delay (sec)	2.81	79.95	77.8
Latency (msec)	220.00	309.19	571

Data Services Static	3G	LTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.82	15.86	44.31	21.0
Upload Throughput (Mbps)	1.39	7.96	16.42	17.0
Web Browsing Delay (sec)	33.28	0.84	2.11	4.2
Latency (msec)	140.12	82.65	34.42	93.9

New Bustand Tanjavur

2G

Airtel

BSNL

VIL

Download Throughput (kbps)

159.6

124.1

120.1

Upload Throughput (kbps)

81.03

132.58

88.3

Web Browsing Delay (sec)

3.61

70.82

114.6

Latency (msec)

221

286.33

391

Old Bustand Tanjavur

2G

Airtel

BSNL

VIL

Download Throughput (kbps)

71.5

184.4

81.5

Upload Throughput (kbps)

58.9

80.6

23.0

Web Browsing Delay (sec)

3.49

100.2

51.5

Latency (msec)

230

366

660

Railway Station Thanjavur

2G

Airtel

BSNL

VIL

Download Throughput (kbps)

176.6

124.21

98.0

Upload Throughput (kbps)

103.3

110.13

80.9

Web Browsing Delay (sec)

1.67

82.81

98.6

Latency (msec)

227

373

611

Railway Station Thiruvarur

2G

Airtel

BSNL

VIL

Download Throughput (kbps)

131.5

165.6

144.4

Upload Throughput (kbps)

82.7

65.29

51.2

Web Browsing Delay (sec)

3.25

68.67

61.5

Latency (msec)

188

247.25

602

Mannargudi Temple

2G

Airtel

BSNL

VIL

Download Throughput (kbps)

93.8

122.06

87.9

Upload Throughput (kbps)

74.7

148.77

86.2

Web Browsing Delay (sec)

2.94

72.11

93.6

Latency (msec)

236

277.33

523

Thiruvaiyaru Temple

2G

Airtel

BSNL

VIL

Download Throughput (kbps)

81

169.12

90.0

Upload Throughput (kbps)

66.1

90.78

34.0

Web Browsing Delay (sec)

1.95

85.12

46.7

Latency (msec)

218

305.24

638

New Bustand Tanjavur	BSNL	LTE		
	3G	Airtel	JIO	VIL
Download Throughput (Mbps)	2.61	12.67	55.49	15.4
Upload Throughput (Mbps)	1.64	8.07	18.26	13.3
Web Browsing Delay (sec)	31.43	0.737	2.31	3.2
Latency (msec)	110.24	56.67	28.07	102

Old Bustand Tanjavur	BSNL	LTE		
	3G	Airtel	JIO	VIL
Download Throughput (Mbps)	1.64	14.86	42.24	15.6
Upload Throughput (Mbps)	1.07	7.31	12.17	17.8
Web Browsing Delay (sec)	39.12	0.799	1.90	4.7
Latency (msec)	172.4	90.66	39.38	88

Railway JunctionThanjavur	BSNL	LTE		
	3G	Airtel	JIO	VIL
Download Throughput (Mbps)	2.12	15.88	36.74	26.1
Upload Throughput (Mbps)	1.42	7.53	16.36	19.1
Web Browsing Delay (sec)	36.52	0.876	1.98	4.5
Latency (msec)	117.42	89.76	35.67	89

Railway Junction Thiruvarur	BSNL	LTE		
	3G	Airtel	JIO	VIL
Download Throughput (Mbps)	1.66	17.06	38.29	18.8
Upload Throughput (Mbps)	1.19	6.57	16.92	13.5
Web Browsing Delay (sec)	32.35	0.923	2.56	4.5
Latency (msec)	151.2	76.46	36.28	93

Mannargudi Temple	BSNL	LTE		
	3G	Airtel	JIO	VIL
Download Throughput (Mbps)	1.04	18.62	53.07	27.0
Upload Throughput (Mbps)	1.43	10.69	19.42	14.4
Web Browsing Delay (sec)	37.13	0.799	1.90	4.3
Latency (msec)	125.67	89	32.57	83

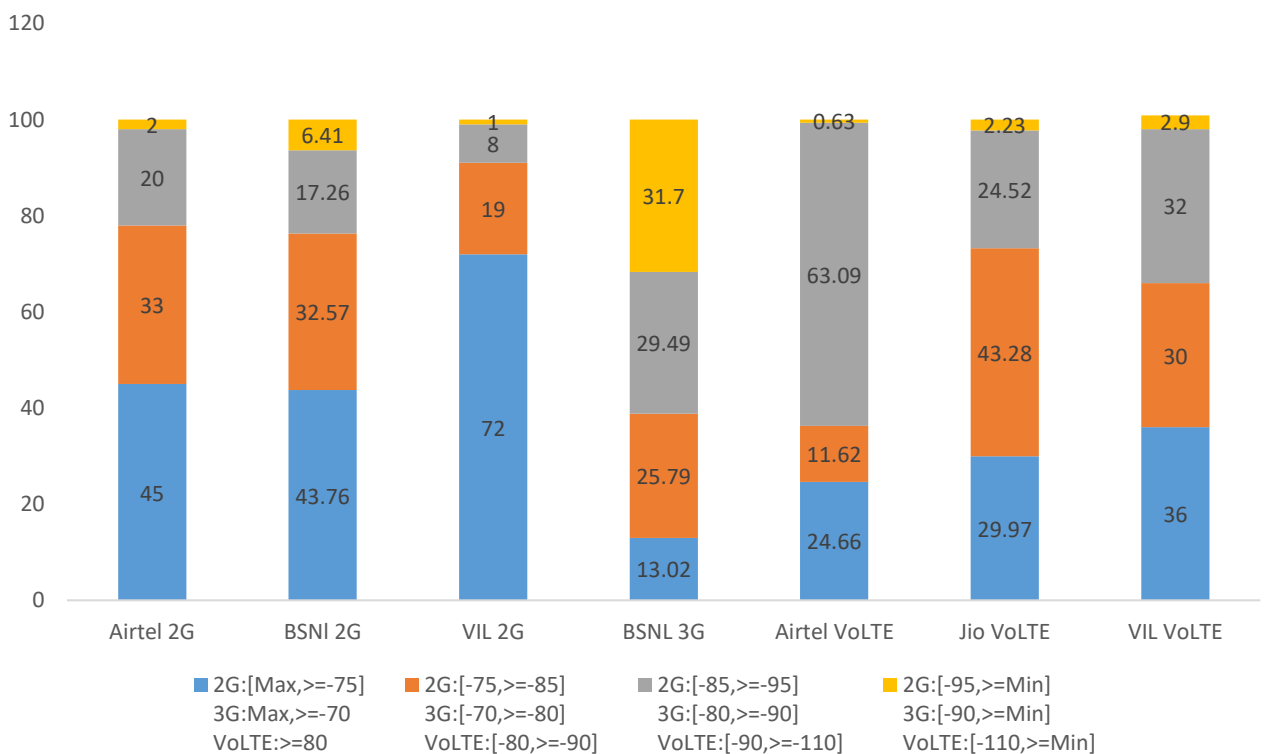
Thiruvaiyaru Temple	BSNL	LTE		
	3G	Airtel	JIO	VIL
Download Throughput (Mbps)	1.86	16.09	40.02	22.8
Upload Throughput (Mbps)	1.64	7.71	15.38	23.8
Web Browsing Delay (sec)	23.15	0.956	2.00	4.2
Latency (msec)	163.8	93.46	34.57	109

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.

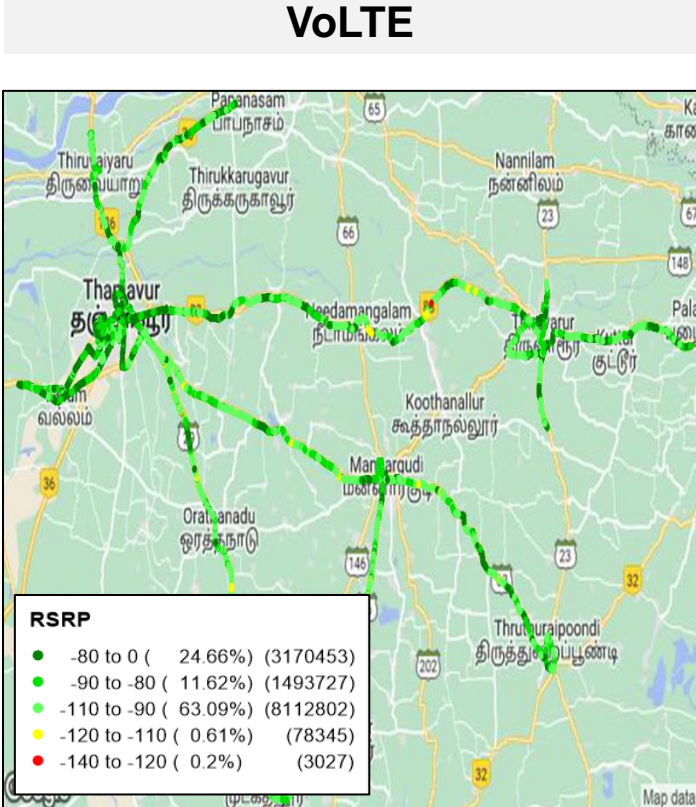
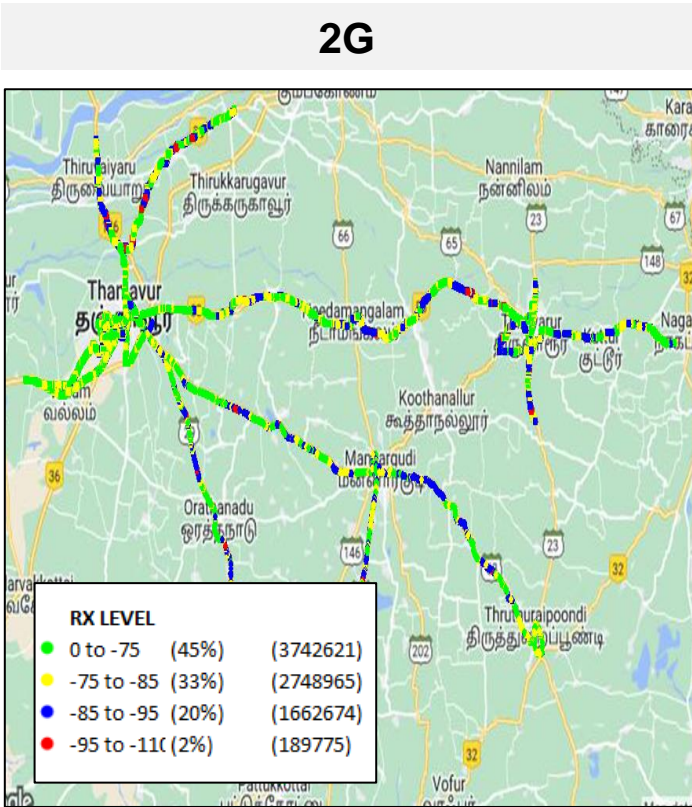
TSP	Coverage Rate %
Airtel 2G	78.00
BSNL 2G	76.33
VIL 2G	91.00
BSNL 3G	68.30
Airtel VoLTE	99.37
Jio VoLTE	97.77
VIL VoLTE	97.10

Coverage Distribution



I. Coverage Details

Technology	Coverage Rate %
2G	78.00
4G	99.37



Overall Rx Level	# Samples	% PDF
[Max, >=-75]	3742621	45
[-75, >=-85)	2748965	33
[-85, >=-95)	1662674	20
[-95, >=Min)	189775	02
Total	8344035	100

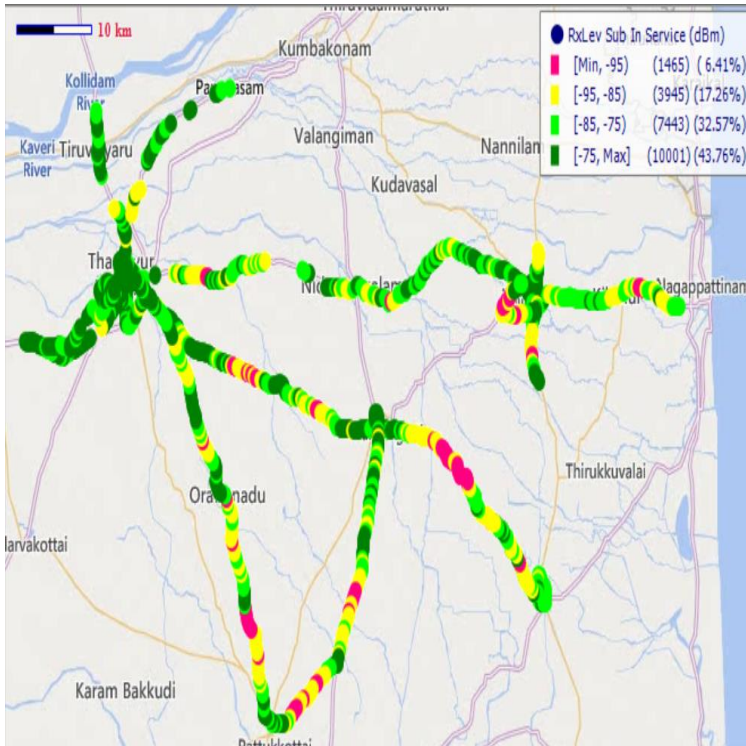
Overall RSRP	# Samples	% PDF
[Max, >=-80]	3170453	24.66
[-80, >=-90)	1493727	11.62
[-90, >=-110)	8112802	63.09
[-110, >=Min)	81372	0.63
Total	12858354	100

I. Coverage Details

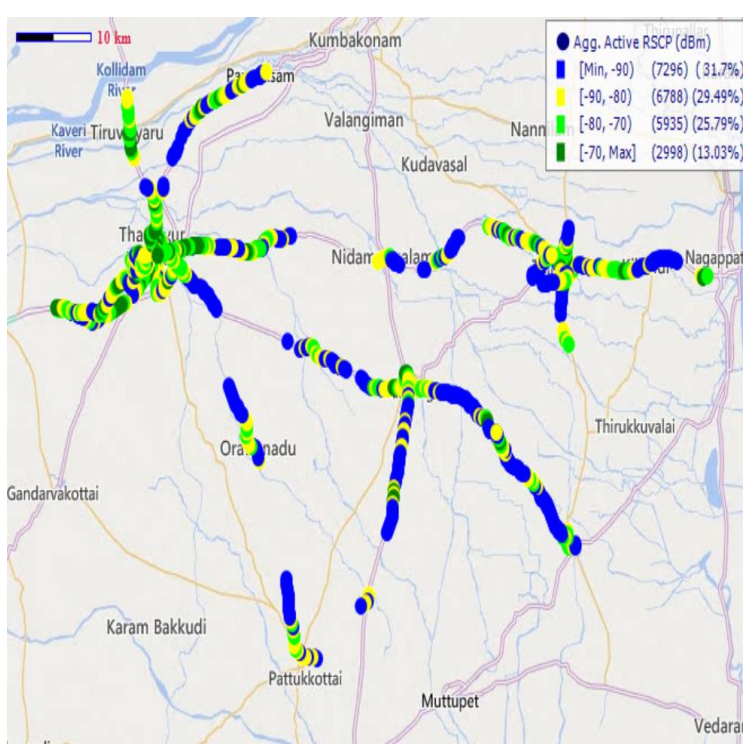
BSNL

Technology	Coverage Rate %
2G	76.33
3G	68.30

2G



3G



2G

Overall RxLevel	# Samples	% PDF
[Max, >=-75]	10001	43.76
[-75, >=-85)	7443	32.57
[-85, >=-95)	3945	17.26
[-95, >=Min)	1465	6.41
Total	22854	100

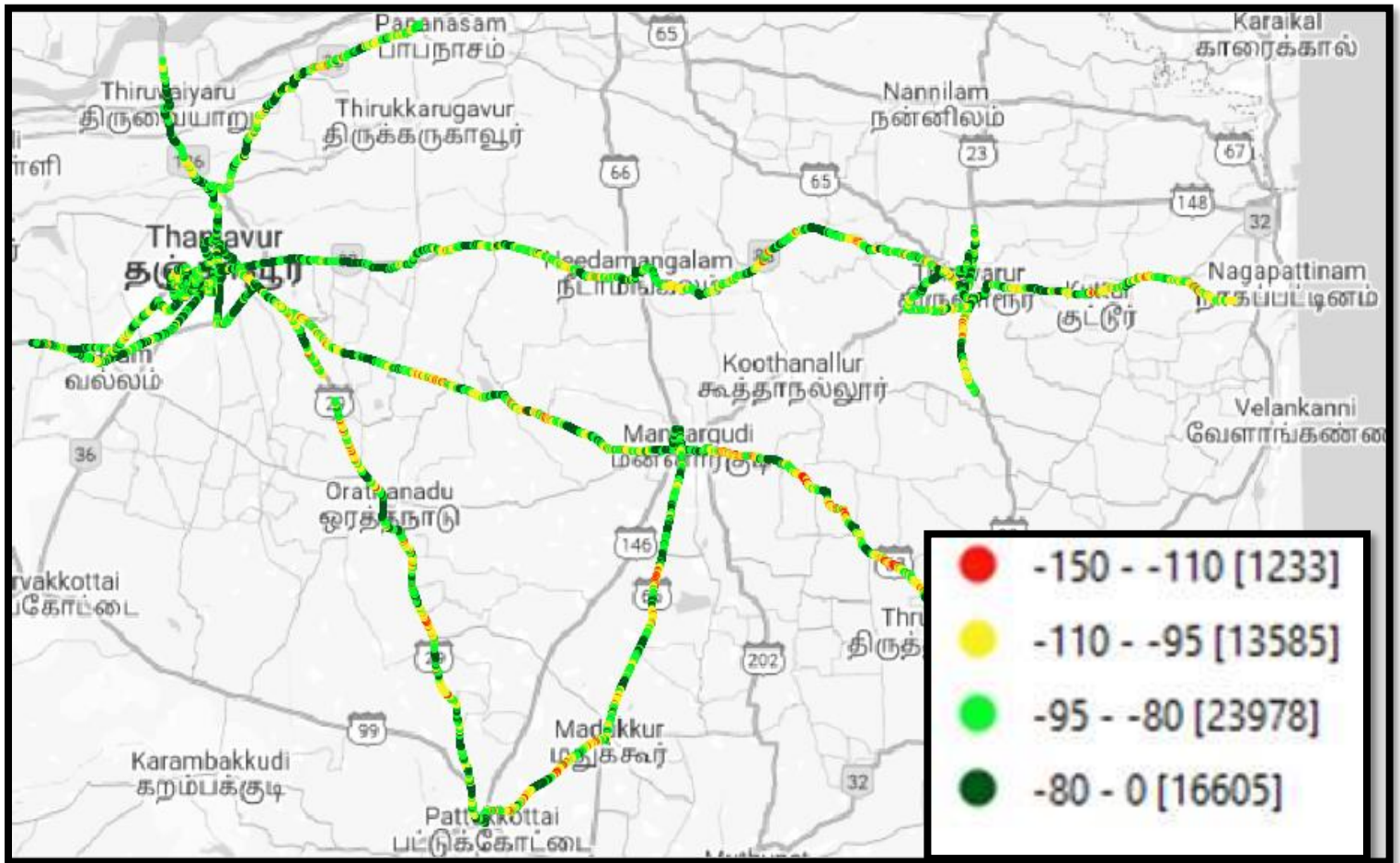
3G

Overall RSCP	# Samples	% PDF
[Max, >=-70]	2998	13.02
[-70, >=-80)	5935	25.79
[-80, >=-90)	6788	29.49
[-90, >=Min)	7296	31.7
Total	23017	100

I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	97.77



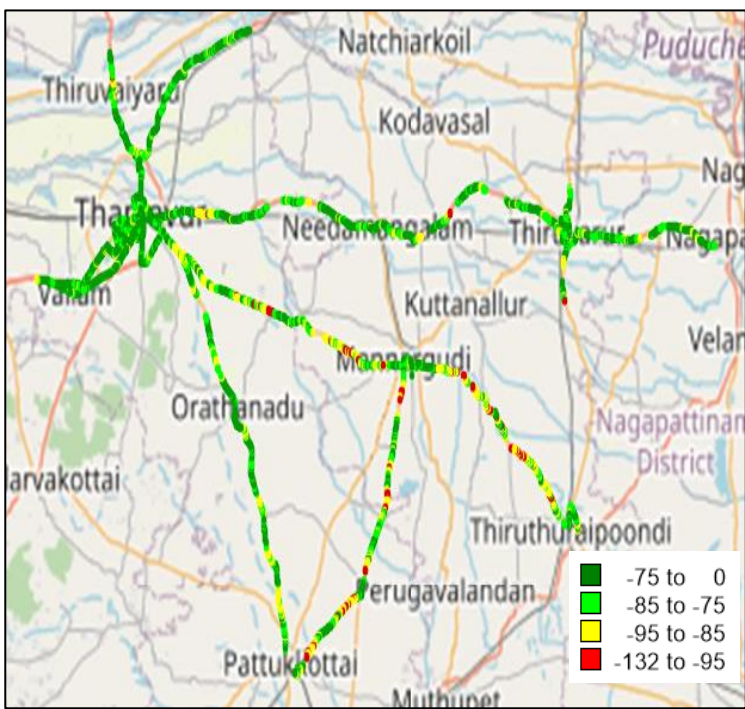
VoLTE RSRP		
Overall RSRP	# Samples	%
[-110, >=Min)	1233	2.23
[-90, >=-110)	13585	24.52
[-80, >=-90)	23978	43.28
[Max, >=-80]	16605	29.97
Total	55401	100%

I. Coverage Details

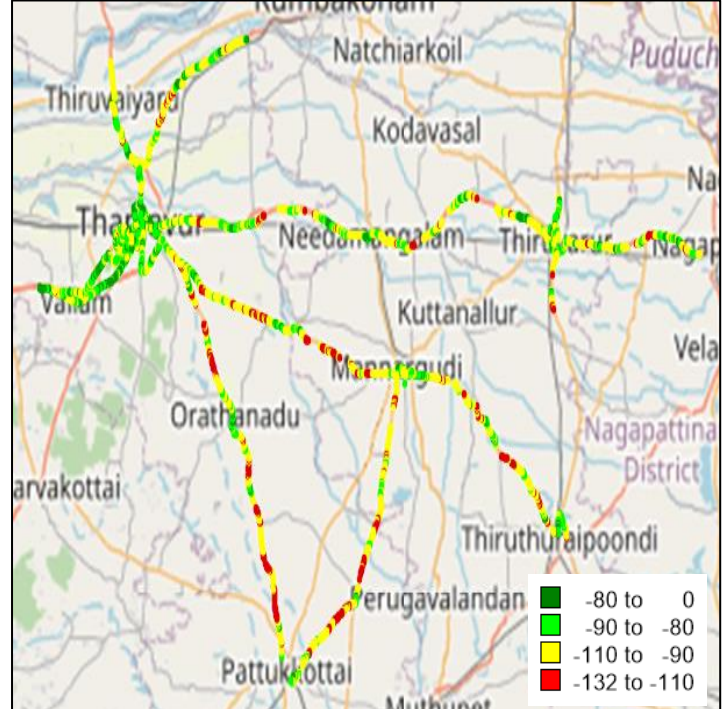
VIL

TSP	Coverage Rate %
VIL 2G	91.00
VIL VoLTE	97.10

2G



VoLTE



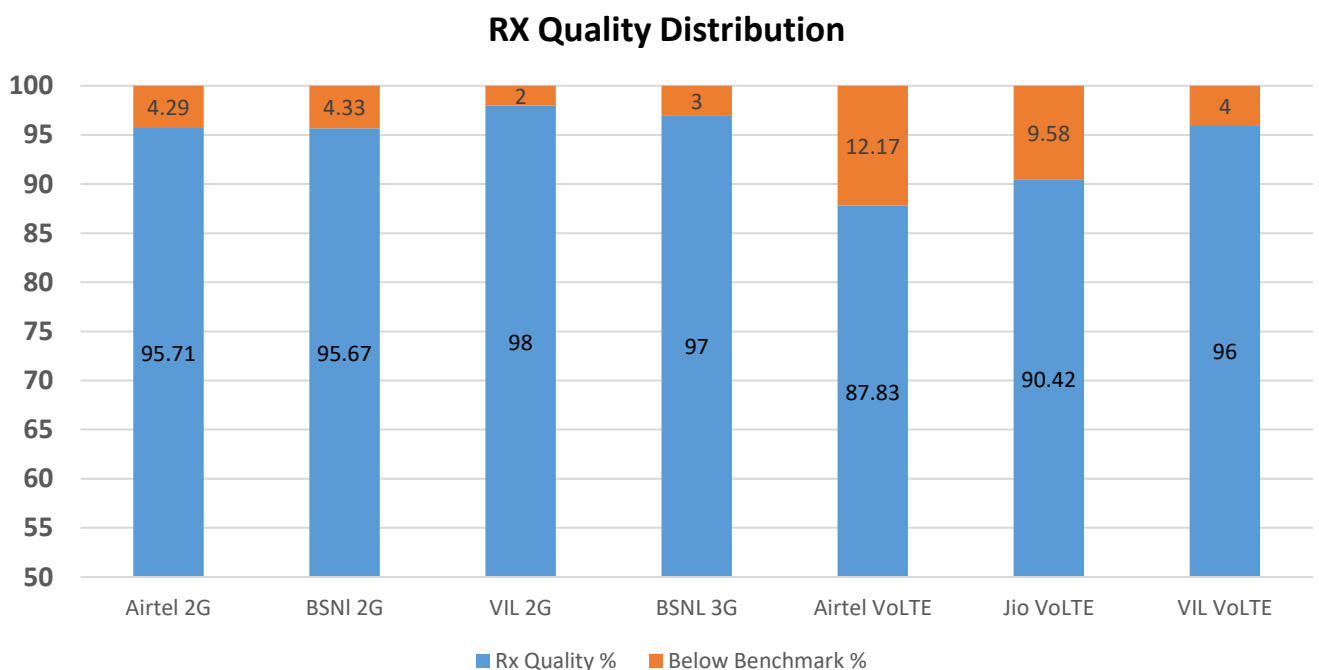
Overall Rx Level	# Samples	% PDF
[Max, >=-75]	24542	72
[-75, >=-85)	6423	19
[-85, >=-95)	2642	08
[-95, >=Min)	386	01
Total	33993	100

Overall RSRP	# Samples	% PDF
[Max, >=-80]	13935	36
[-80, >=-90)	11395	30
[-90, >=-110)	12562	32
[-110, >=Min)	1266	2.9
Total	38482	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	95.71
BSNI 2G	95.67
VIL 2G	98.00
BSNL 3G	97.00
Airtel VoLTE	87.83
Jio VoLTE	90.42
VIL VoLTE	96.00

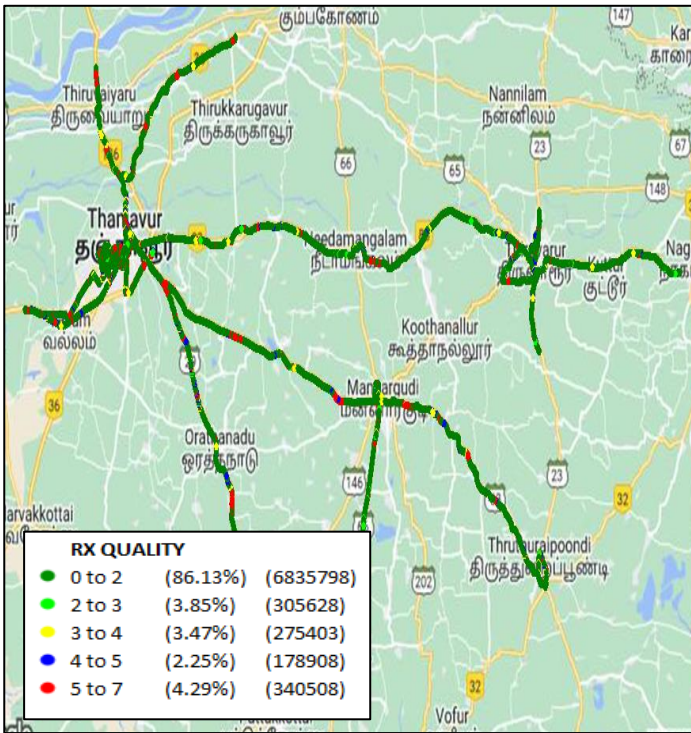


II. Quality Details

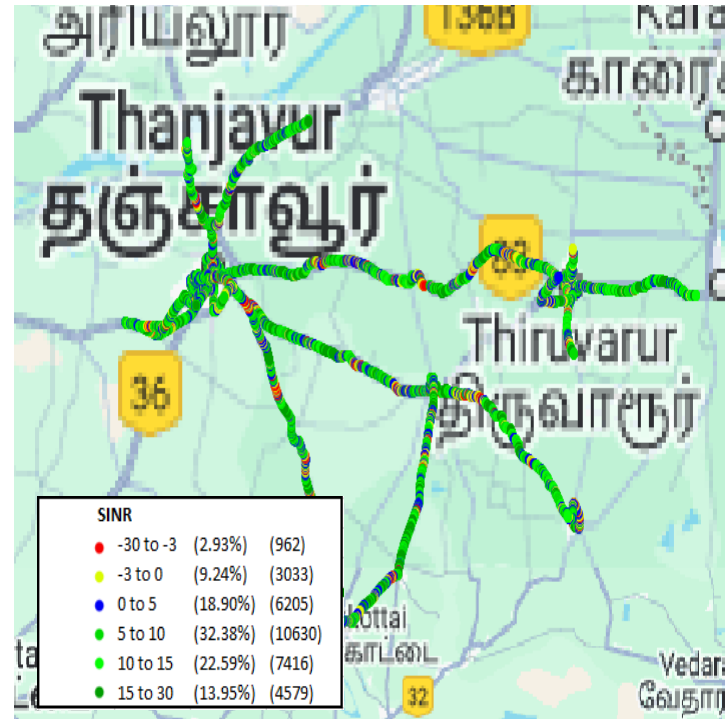
AIRTEL

Technology	Rx Quality %
2G	95.71
4G	87.83

2G



VoLTE



Overall Rx Quality	# Samples	% PDF
(Min, <=2)	6835798	86.13
(2, <=3)	305628	3.85
(3, <=4)	275403	3.47
(4, <=5)	178908	2.25
(5, <=Max)	340508	4.29
Total	7936245	100

Overall SINR	# Samples	% PDF
(Min, <= -3)	962	2.93
(-3, <=0)	3033	9.24
(0, <=5)	6205	18.90
(5, <=10)	10630	32.38
(10, <=15)	7416	22.59
(15, <=Max)	4579	13.95
Total	32825	100

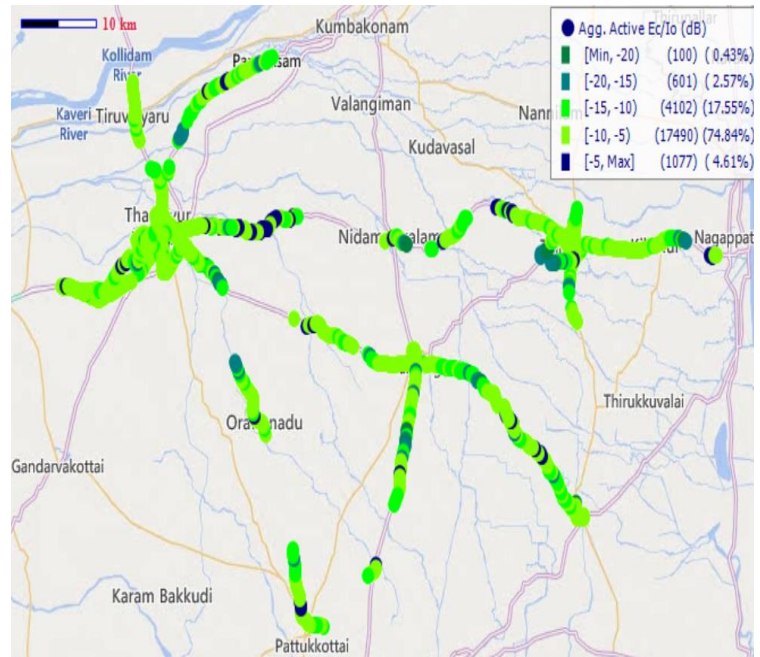
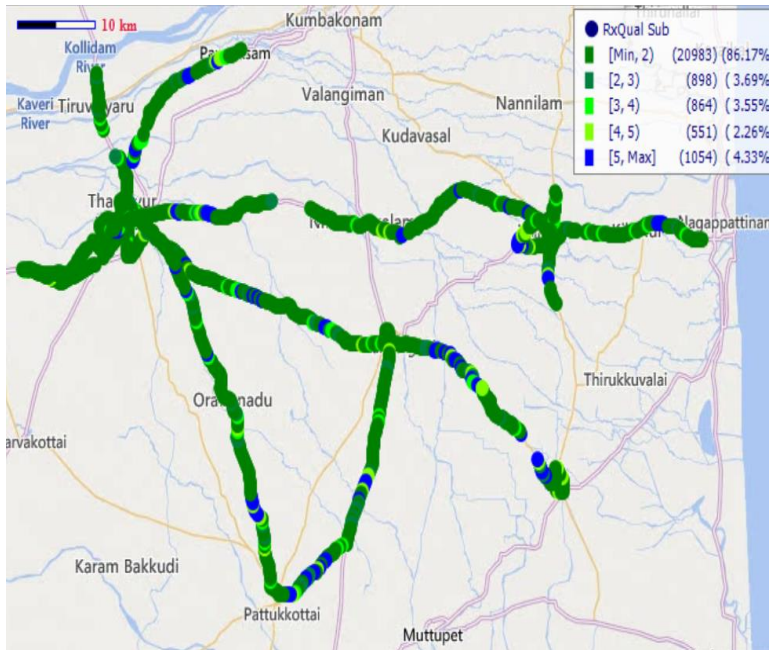
II. Quality Details

BSNL

Technology	Rx Quality %
2G	95.67
3G	97.00

2G

3G



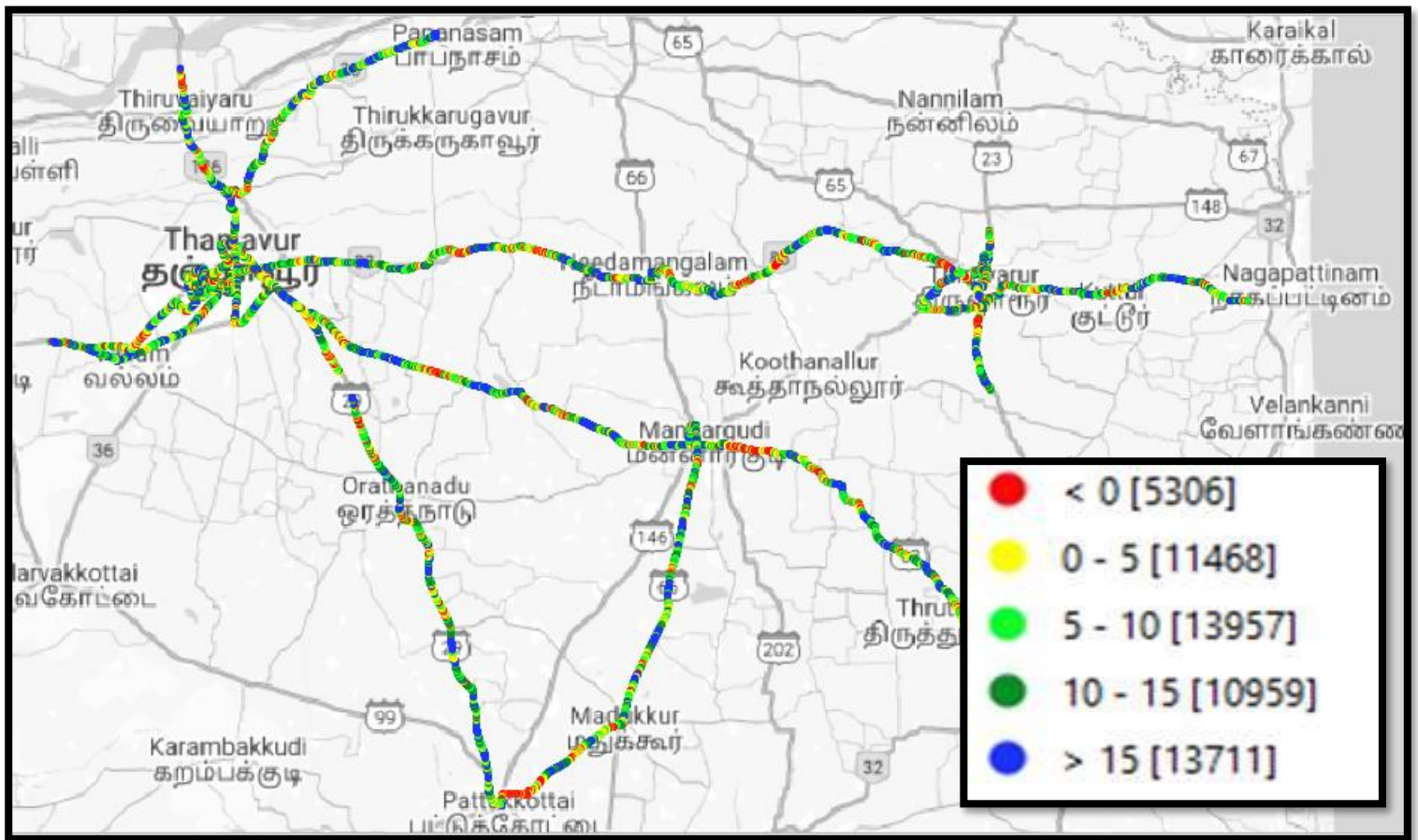
Overall Rx Quality	# Samples	% PDF
(Min, <=2)	20983	86.17
(2, <=3)	898	3.69
(3, <=4)	864	3.55
(4, <=5)	551	2.26
(5, <=Max)	1054	4.33
Total	24350	100.00

Overall EC/I0	# Samples	% PDF
[Min, -20)	100	0.43
[-20, -15)	601	2.57
[-15, -10)	4102	17.55
[-10, -5)	17490	74.84
[-5, Max]	1077	4.61
Total	23370	100

II. Quality Details

JIO

Technology	Rx Quality
VoLTE	90.42



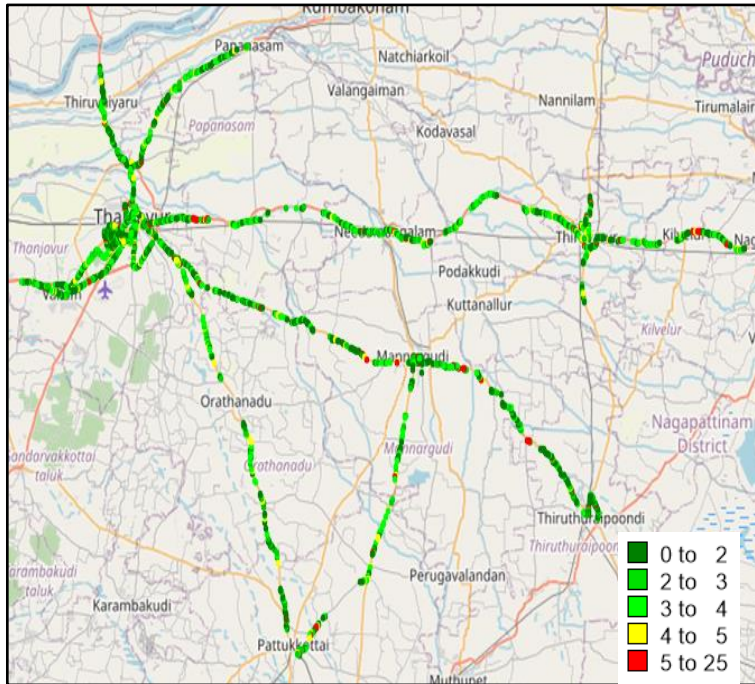
VoLTE SINR		
Overall SINR	# Samples	%
(Min, <=0)	5306	9.58
(0, <=5)	11468	20.70
(5, <=10)	13957	25.19
(10, <=15)	10959	19.78
(15, <=Max)	13711	24.75
Total	55401	100%

II. Quality Details

VIL

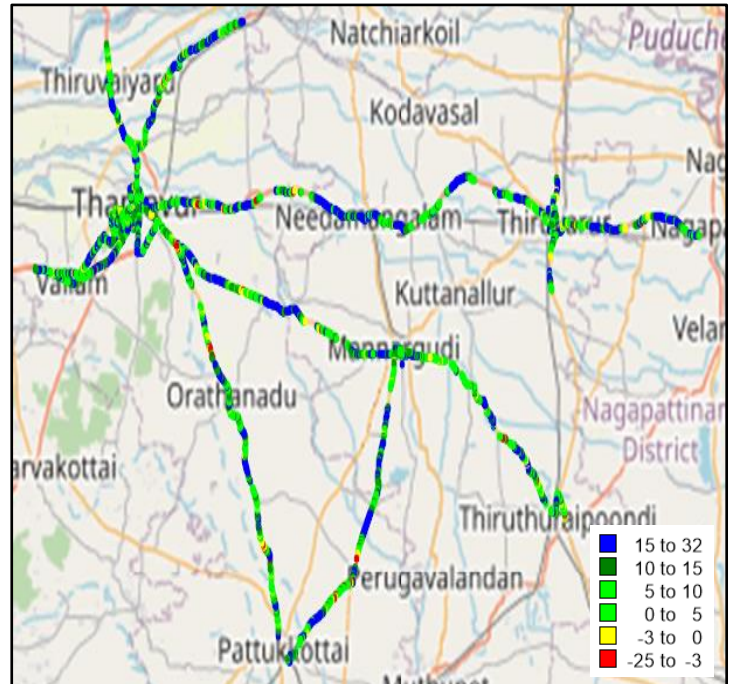
Technology	Rx Quality %
2G	98.00
VoLTE	96.00

2G



Overall Rx Quality	# Samples	% PDF
(Min, <=2)	2581	41
(2, <=3)	1233	20
(3, <=4)	1828	29
(4, <=5)	496	08
(5, <=Max)	101	02
Total	6239	100

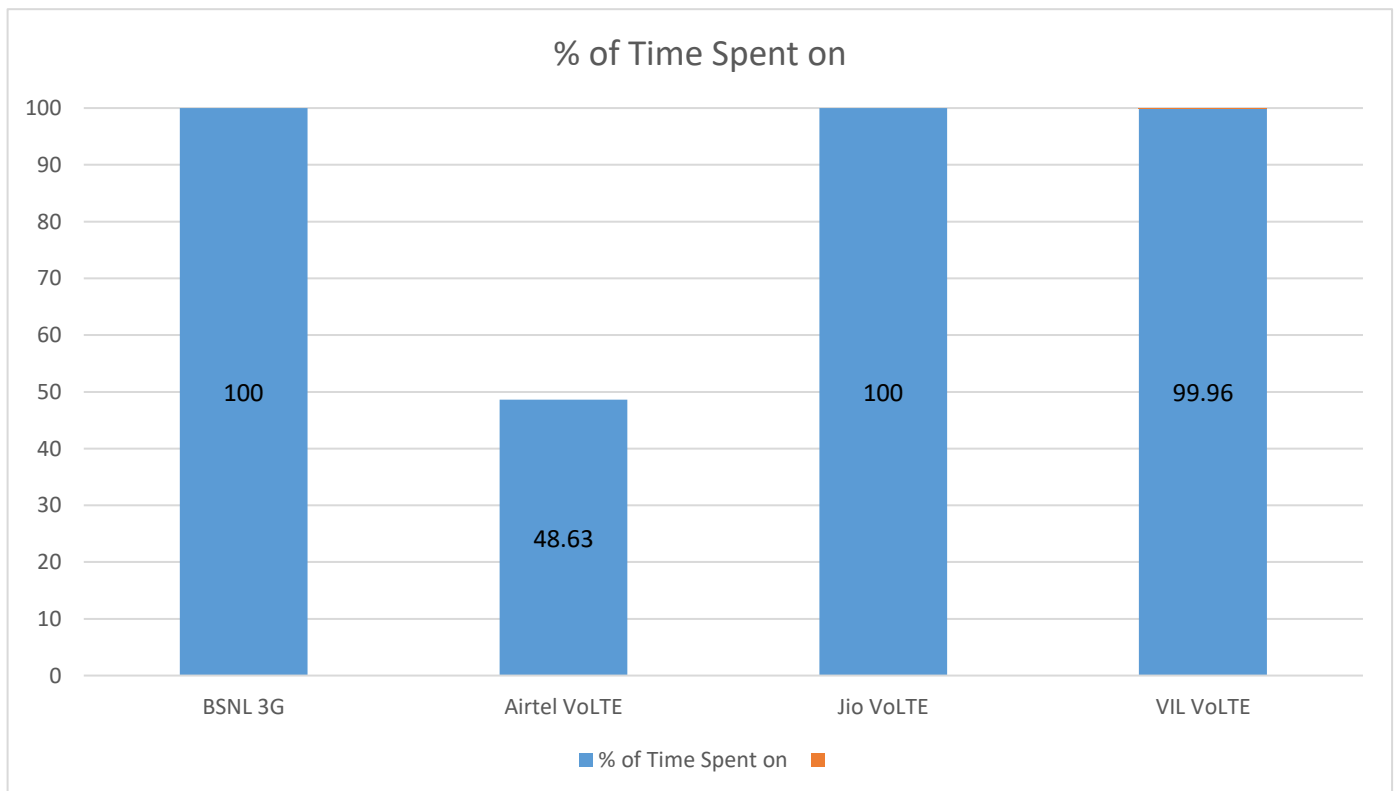
VoLTE



Overall SINR	# Samples	% PDF
(Min, <= -3)	414	01
(-3, <=0)	1174	03
(0, <=5)	4314	11
(5, <=10)	6106	16
(10, <=15)	6270	16
(15, <=Max)	20143	52
Total	38421	100

III. Technology Details

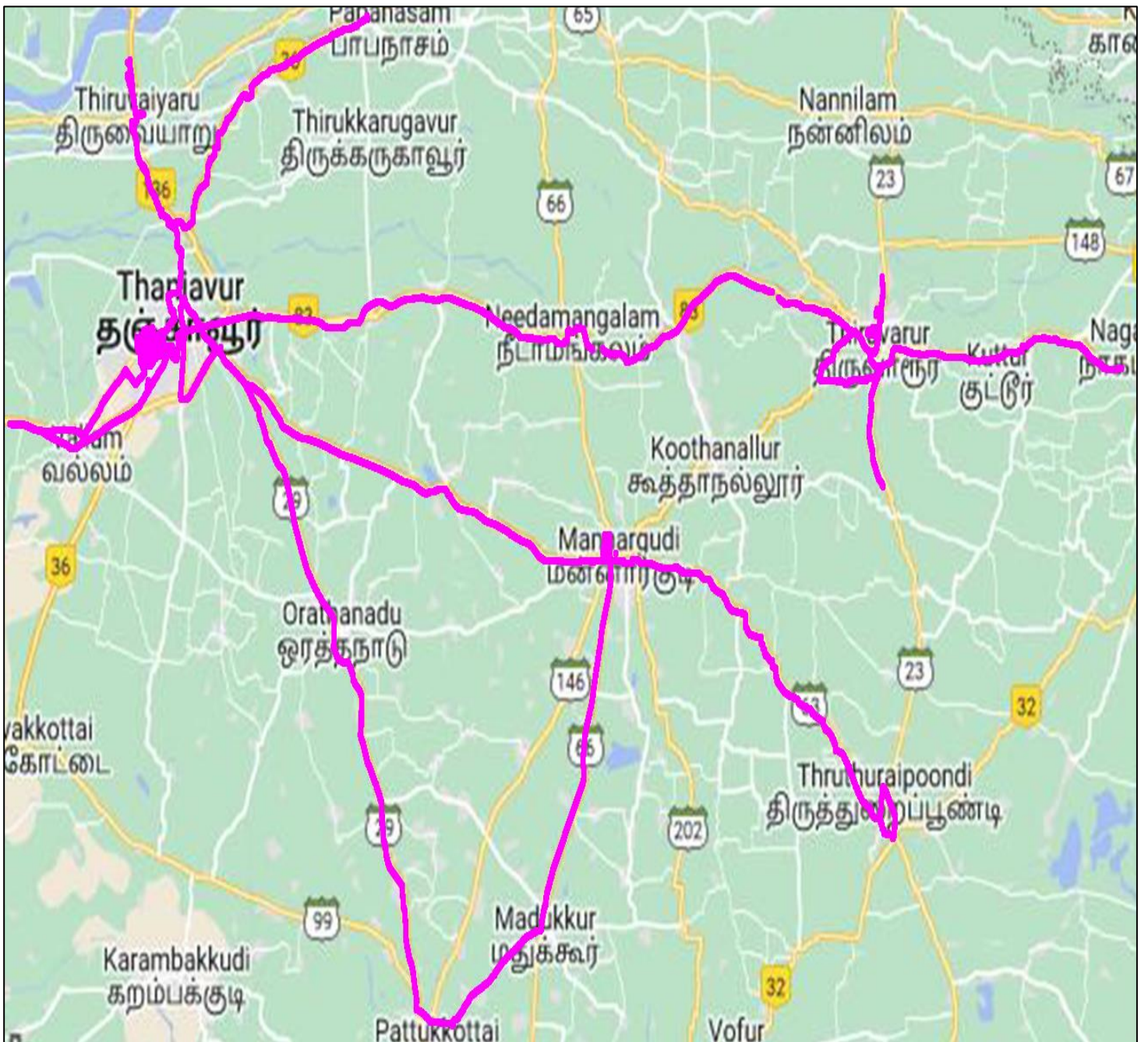
TSP	% of Time Spent on 3G/VoLTE
Airtel VoLTE	100
BSNL 3G	48.63
Jio VoLTE	100
VIL VoLTE	99.96



III. Technology Details

AIRTEL 4G

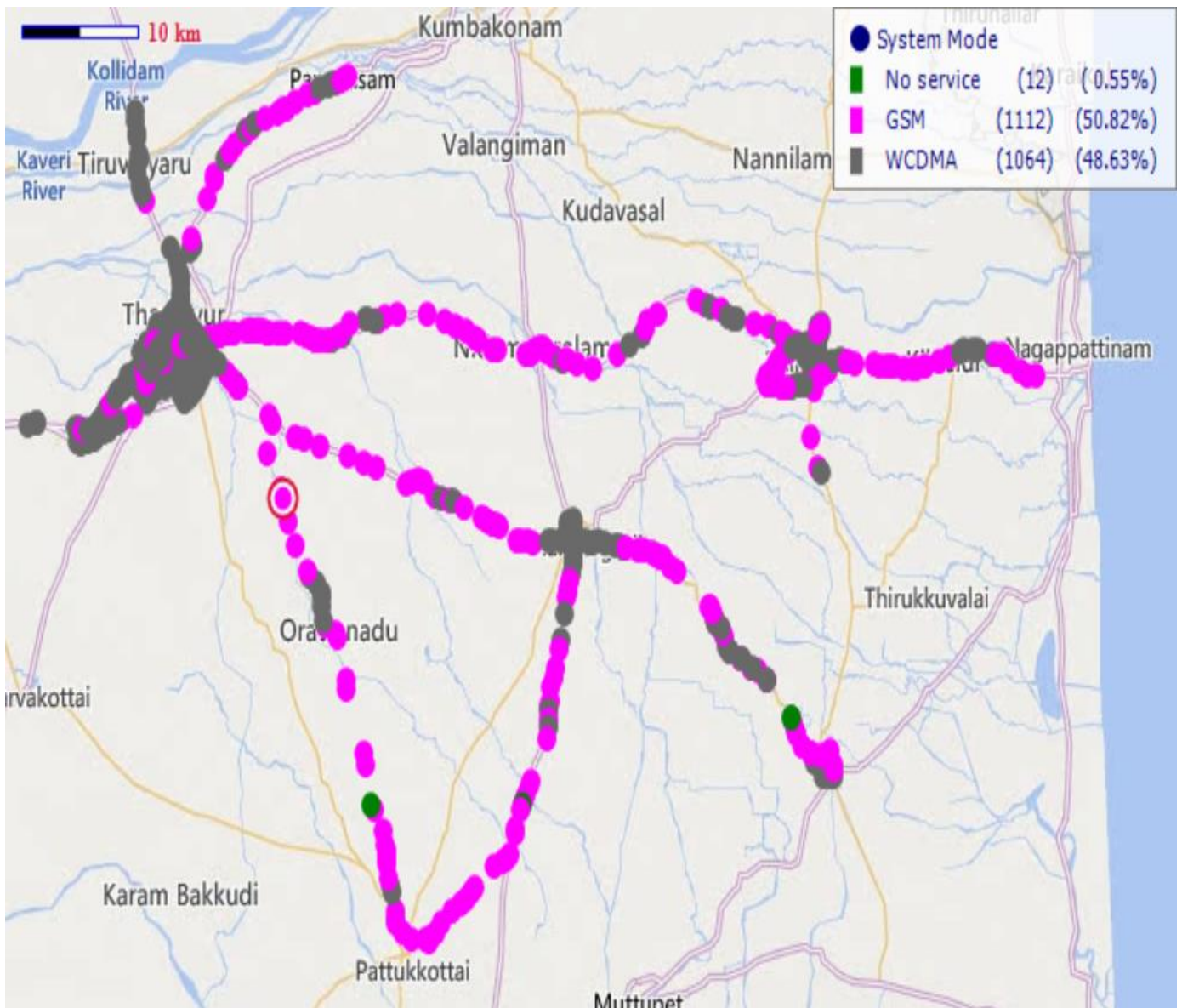
Technology	Time Spent on 4G
4G	100%



III. Technology Details

BSNL 3G

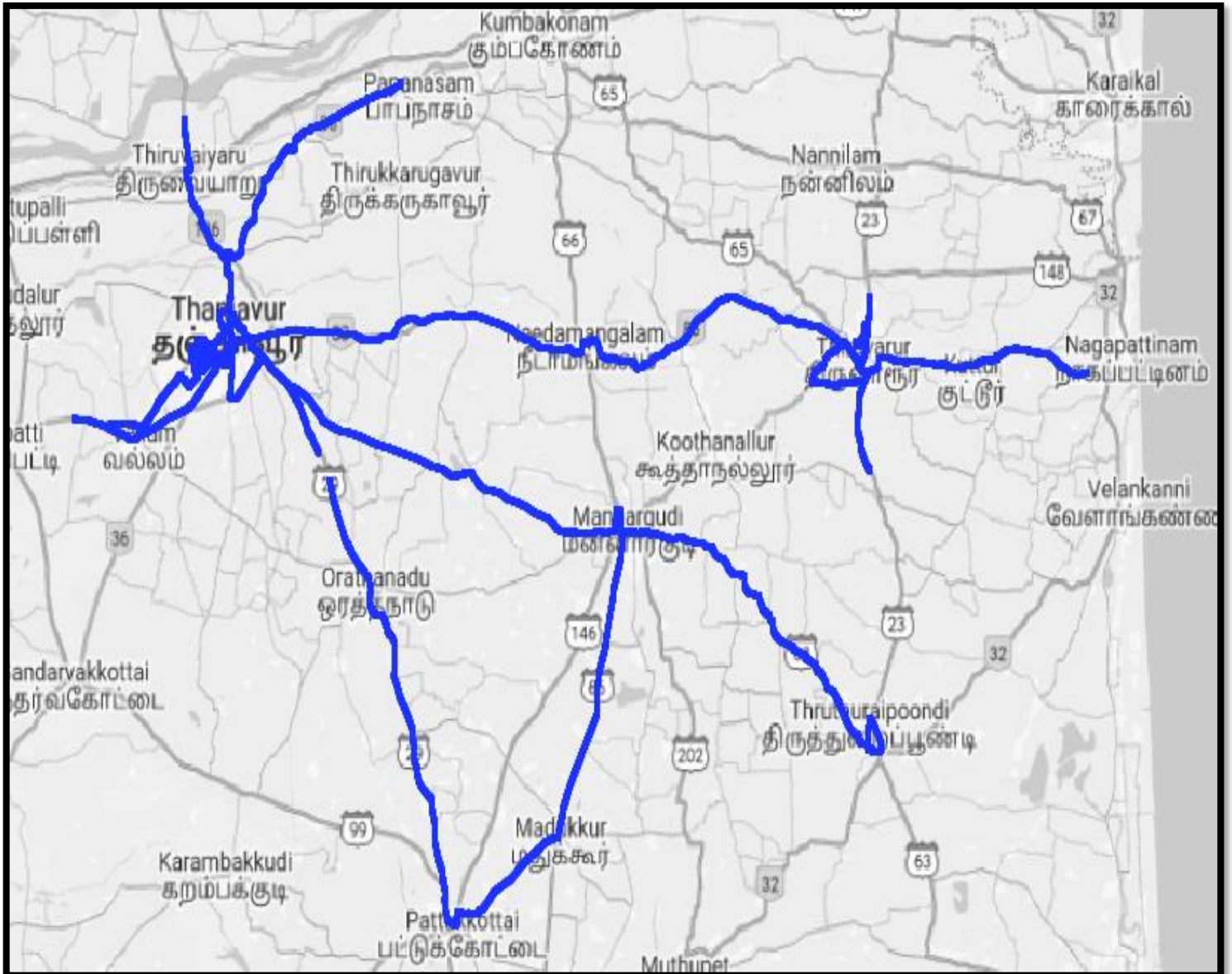
Technology	%Time Spent on 3G
3G	48.63



III. Technology Details

JIO 4G

Technology	%Time Spent on 4G
4G	100

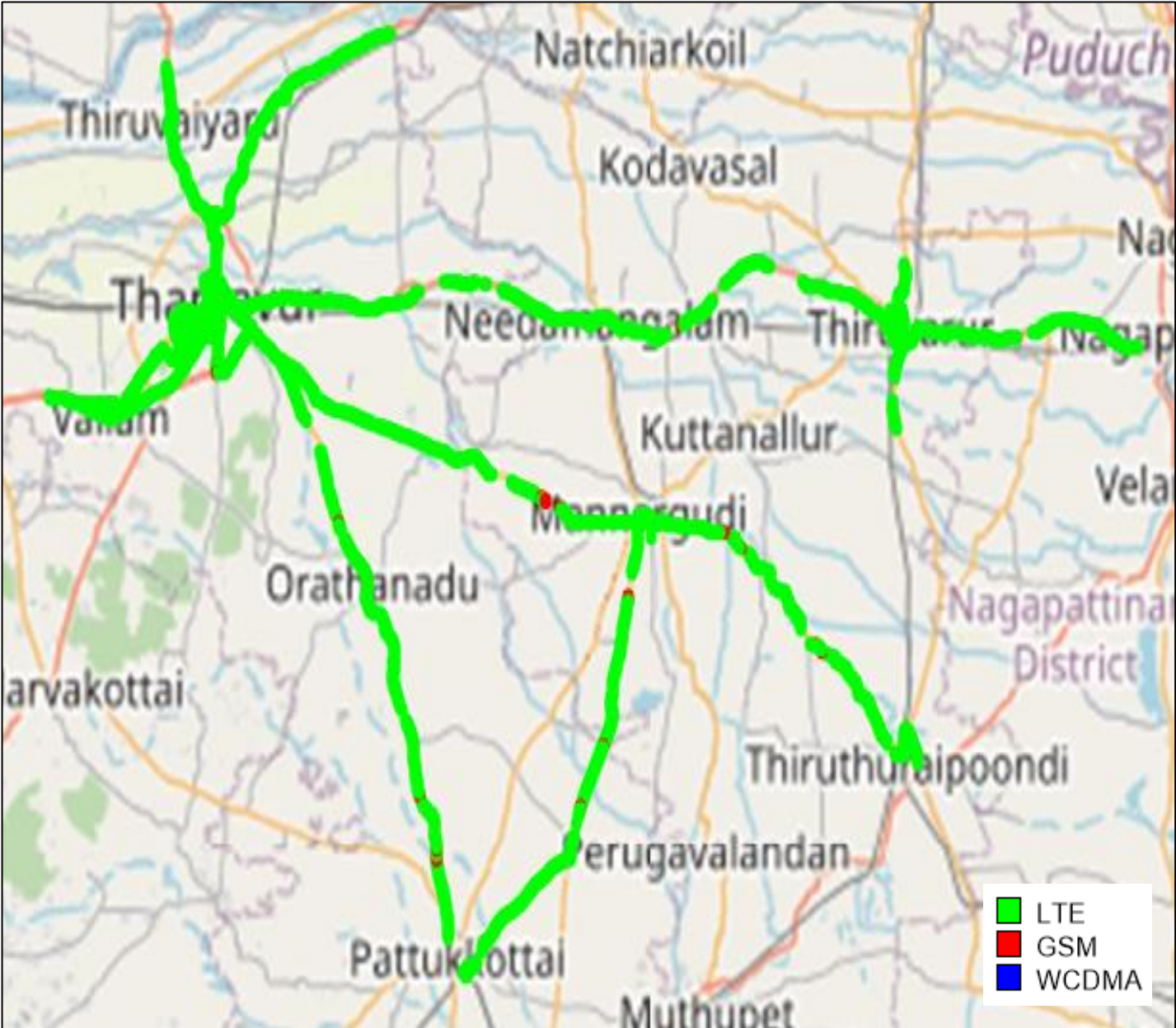


III. Technology Details

VIL

Technology	%Time Spent on 4G
4G	99.96

4G

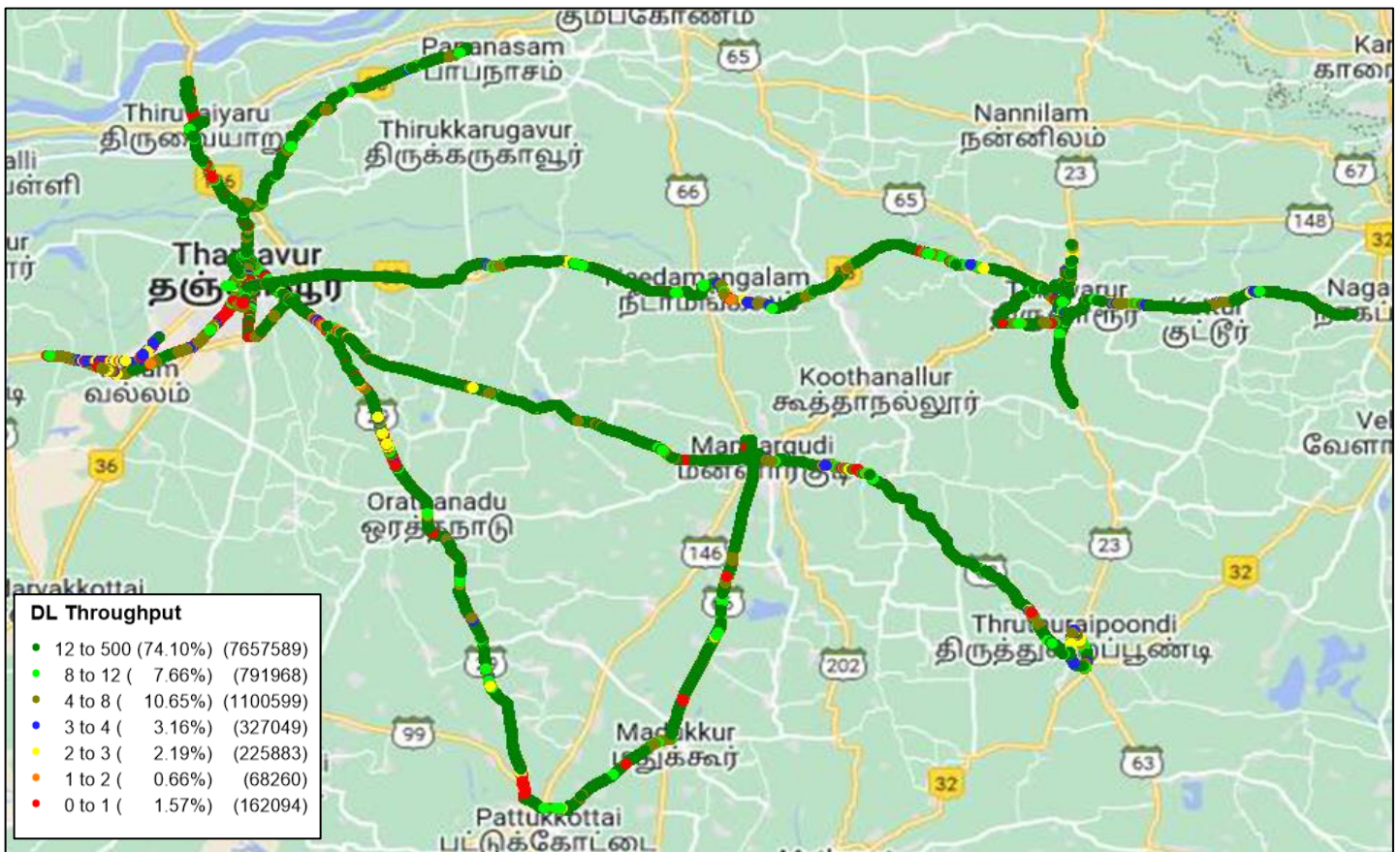


IV. Dynamic Data Test- 4G DL Details

AIRTEL

Data Statistics - Dynamic Complete SSA - 420 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	19.83 Mbps



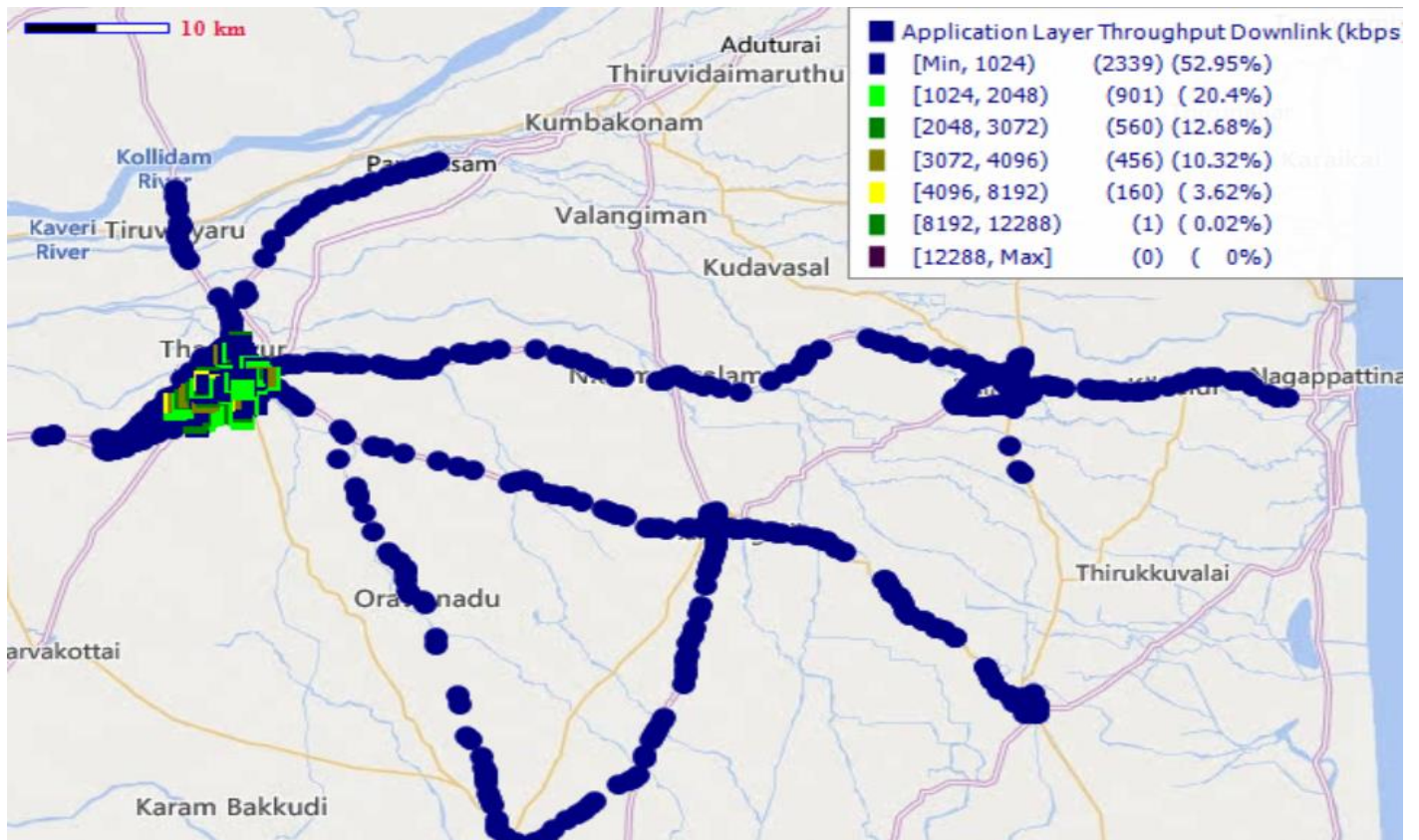
DL throughput	No of Sample	Percentage(%)
>12 Mbps	7657589	74.10
8 to 12 Mbps	791968	7.66
4 to 8 Mbps	1100599	10.65
3 to 4 Mbps	327049	3.16
2 to 3 Mbps	225883	2.19
1 to 2 Mbps	68260	0.66
0 to 1 Mbps	162094	1.57
Total	10333442	100

IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete SSA 420 Kms

Data KPIs – Overall	3G
Download Throughput (Mbps)	1.36



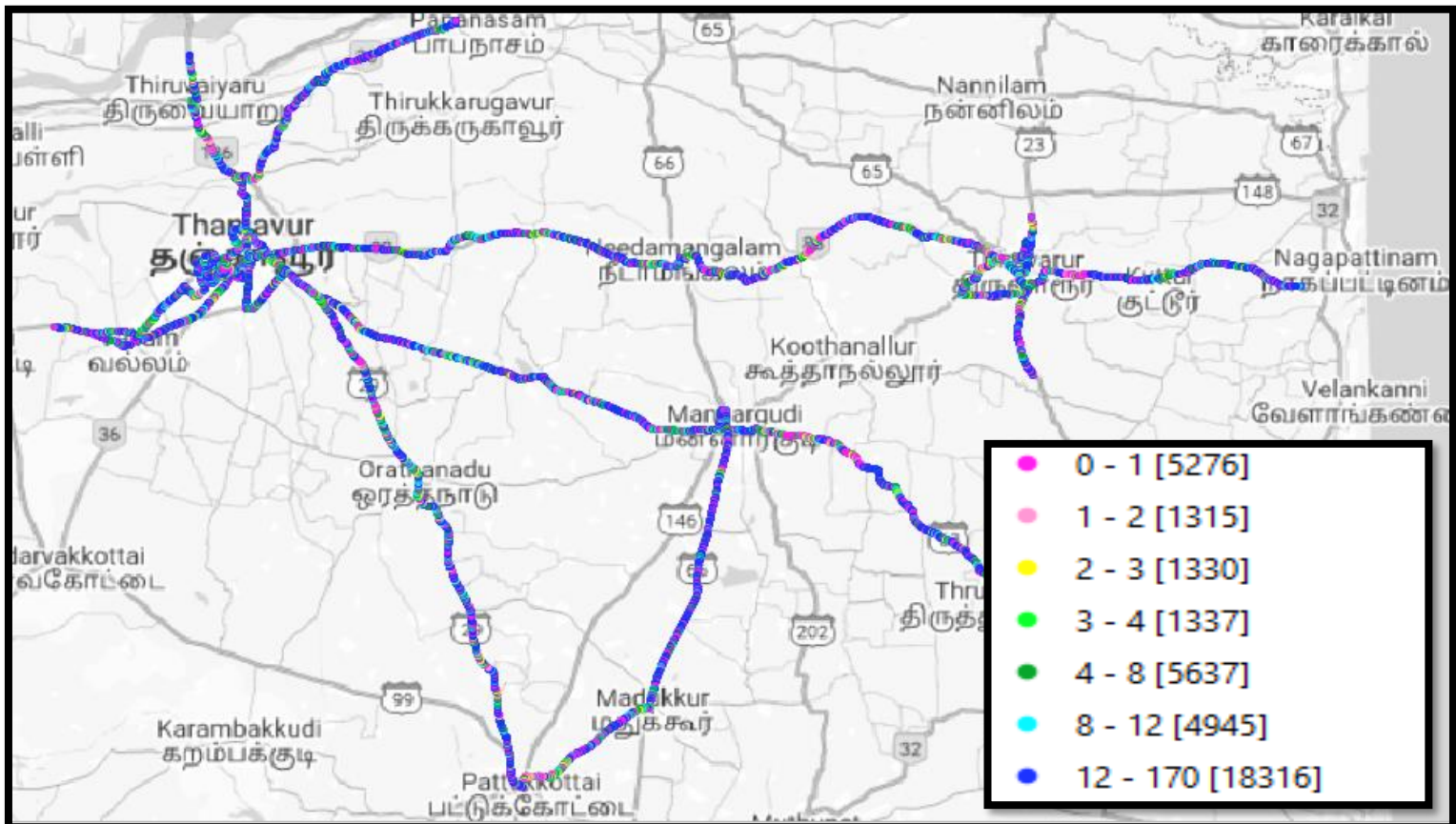
3G-DL throughput	No of Sample	%
0 to 1 Mbps	2339	52.95
1 to 2 Mbps	901	20.4
2 to 3 Mbps	560	12.68
3 to 4 Mbps	456	10.32
4 to 8 Mbps	160	3.62
8 to 12 Mbps	1	0.02
>12 Mbps	0	0
Total	4417	100

IV. Dynamic Data Test- 4G DL Details

JIO

Data Statistics - Dynamic Complete SSA - 420 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	15.51



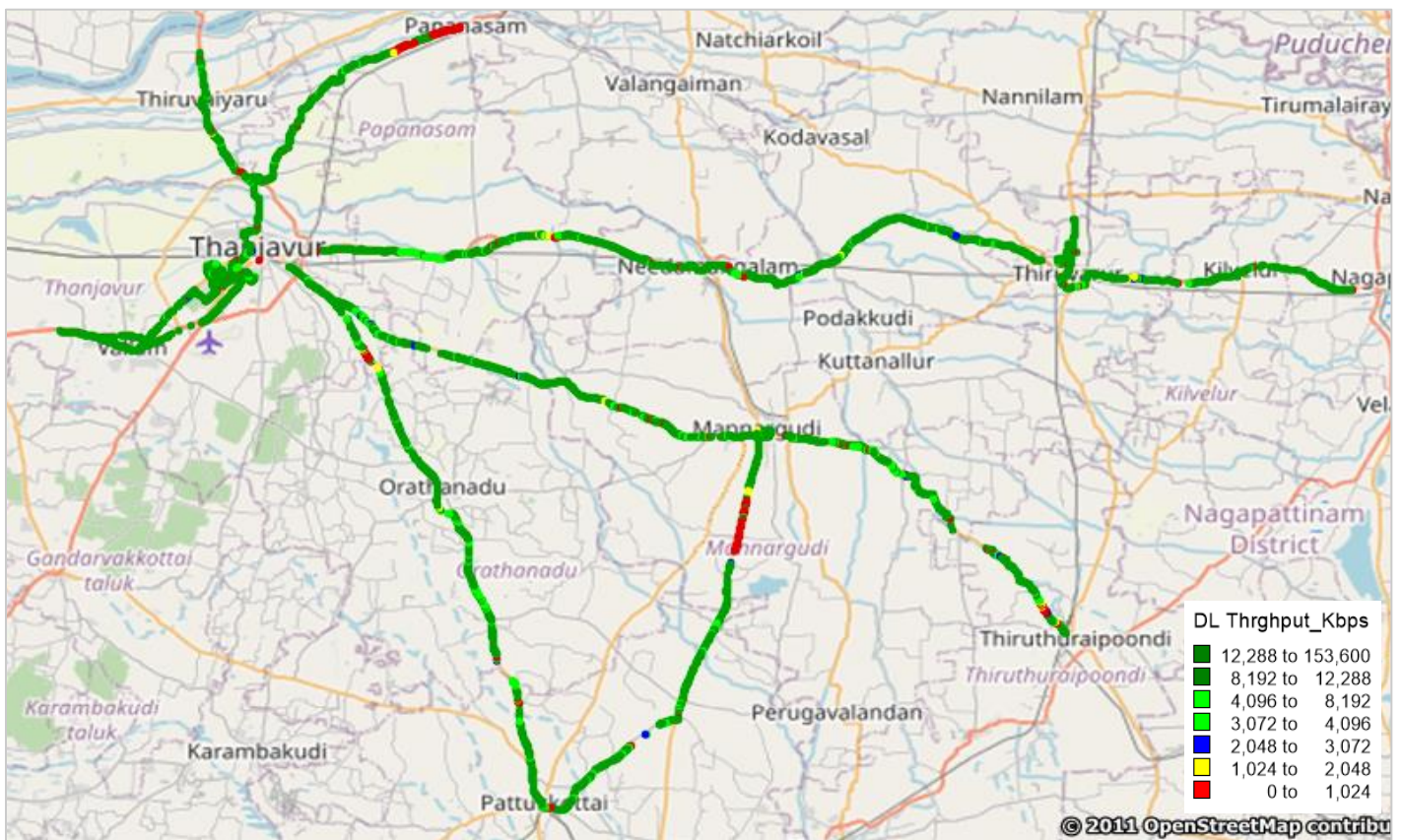
DL Throughput	No. of Samples	%
0 to 1 Mbps	5276	13.83
1 to 2 Mbps	1315	3.45
2 to 3 Mbps	1330	3.49
3 to 4 Mbps	1337	3.5
4 to 8 Mbps	5637	14.77
8 to 12 Mbps	4945	12.96
>12 Mbps	18316	48

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete SSA - 420Kms

Data KPIs – Overall	4G
Download Throughput (Mbps)	24.50



DL throughput	No of Sample	Percentage(%)
>12 Mbps	11511	67
8 to 12 Mbps	1521	9
4 to 8 Mbps	1352	8
3 to 4 Mbps	218	1
2 to 3 Mbps	256	1
1 to 2 Mbps	242	1
0 to 1 Mbps	2100	12
Total	17200	100

V. TRAI MySpeed App

AIRTEL

Technology- 4G	New Bus Stand - Thanjavur	Old Bus Stand- Thanjavur	Railway Junction- Thanjavur	Mannargudi- Temple	Railway Junction- Thiruvarur	Thiruvaiyaru - Temple
Download Speed Mbps	59.75	50.28	45.68	43.73	35.96	81.60
Upload Speed Mbps	30.13	47.70	18.30	29.30	18.13	33.24

BSNL

Technology- 3G/4G	Thiruvarur Railwaystation	Mannargudi Temple	Thanjavur Newbustand	Thanjavur Railway Station	Thanjavur Old Bustand	Thiruvaiyaru Temple
Download Speed Mbps	2.09	1.36	2.89	2.04	2.37	2.11
Upload Speed Mbps	2.03	1.11	1.99	1.84	0.56	1.81

JIO

Technology 4G	Thiruvarur Railway Junction	Mannargudi Temple	Thanjavur New Bus Stand	Thanjavur Railway Junction	Thanjavur Old Bus Stand	Thiruvaiyaru Temple
Download Speed Mbps	69.58	51.74	79.15	49	52.95	96.46
Upload Speed Mbps	23.09	7.47	9.70	17.57	12.56	26.70

VIL

Technology- 4G	Thiruvaiyaru Bustand	Mannargudi Bustand	Thanjavur Railway station	Thanjavur Old bustand	Thiruvarur Railway station	Thanjavur New bustand
Download Speed Mbps	51.4	75.1	47.9	10.2	32.2	29.6
Upload Speed Mbps	8.82	31.4	10.5	6.15	13	13.3

VI. NH/SH Routes covered

NH/SH Routes covered in OADT by Airtel / BSNL / RJIL / VIL				
S.No	No of NH/SH routes	NH routes	SH routes	Distance(Km)
1	Thanjavur to sikkal (VIA-Thiruvarur)	NH	-	82
2	Thanjavur to Thiruthuraipoondi	-	SH	68
3	Thanjavur to Pattukottai	-	SH	49
4	Mannargudi to Pattukottai	-	SH	33.2
5	Thanjavur to papanasam	-	SH	30