Operator Assisted Drive Test Report

Coimbatore
August 2024

(RO, HYDERABAD)

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2%. All TSPs have met the Block Call Rate (BCR) benchmark of 3%. All TSPs have met the Call Setup Success Rate (CSSR) of 95%. All TSPs have met the Rx Quality of 95% except Airtel 4G, BSNL 4G & JIO 4G

The Operator Assisted Drive Test has been carried out by Regional Office with the help of Service Providers in Coimbatore City and surrounding areas Tiruppur and Pollachi District from 9:00 AM to 8:00 PM during 27th Aug. to 30th Aug 2024. The drive test covered drive route of 405 KMs & 6 hotspot over a period of 4 days. Approximately 558 calls were made for 2G , 3G and 4G VOLTE networks:

Overview	Voice Summary	Data Summary

Overview

TRAI Hyderabad conducted Operator Assisted Drive Test from 27th Aug. to 30th Aug 2024. The drive test covered drive route of 405 KMs & 6 hotspot over a period of 4 days. Approximately 558 calls were made for 2G , 3G and 4G VOLTE networks: 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 405 KMs over a period of 3 days from 27th to 30th Aug. 2024. Approximately 558 + calls were made for 2G (Lock Mode) and Volte network

Data Tests:

1.Dynamic data test was conducted for 405 kms over a period of 3 days for download throughput for 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
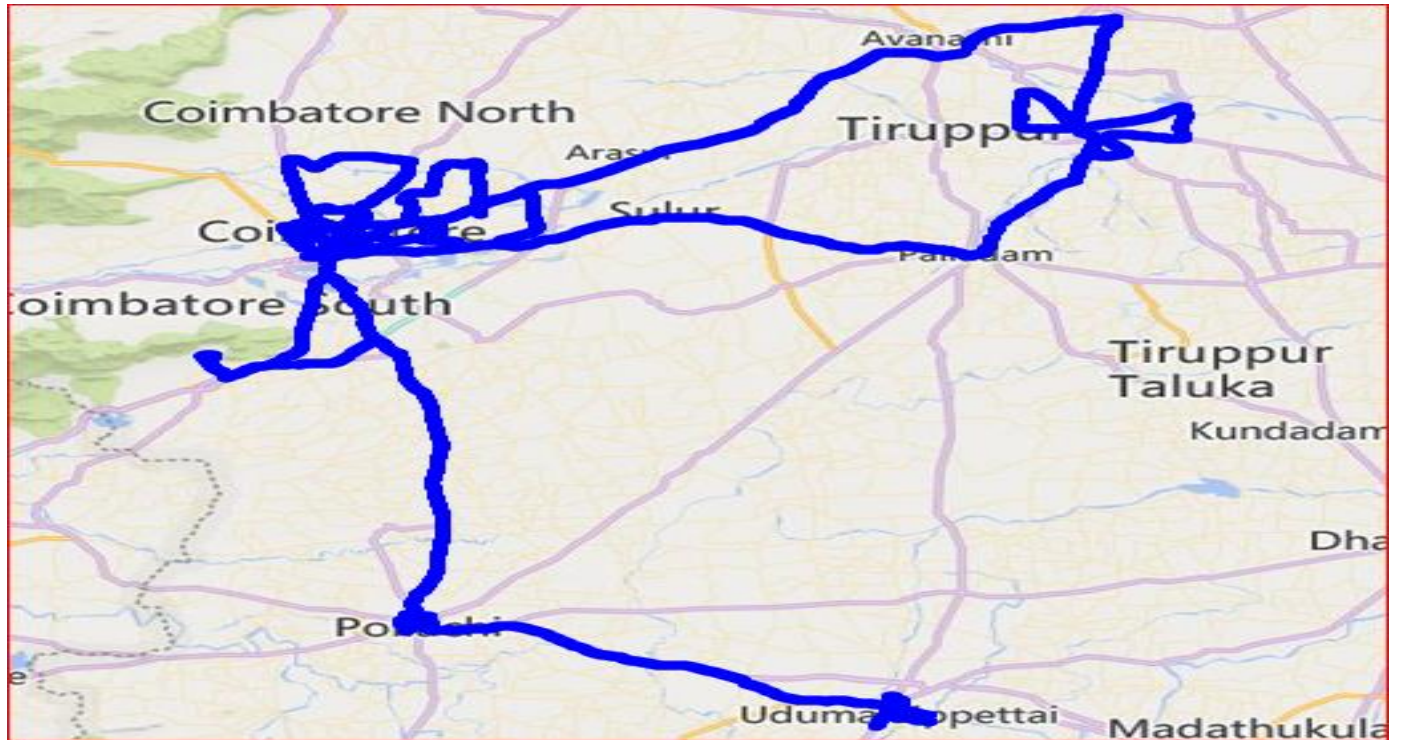
Areas Covered – Coimbatore Town (Day 1)	Areas Covered – Pollachi Town (Day 2)	Areas Covered – Coimbatore Town (Day 3)	Areas Covered – Tiruppur Town (Day 4)
Saibaba Colony	Ukkadam	Vadavalli	Neelambur
RS Puram	Malumitcham Patti	Lawly Road	Avinashi
Kannappan Nagar	Kuniyamuthur	Thondamuthur	Tiruppur old Bustand
Sidhapudur	Aathupalam	Perur	Tiruppur Railway Station
Ganthipuram	Pothanur	Selvapuram	Perumanallur
Racecourse	Kinathukadavu	Matahmpatti	Mangalam Road
Singanallur	Othkkalmandapam	Isha Yoga	Uthukuli Road
Trichy Road	Karpagam College	Airport	Dharapuram Road
Avinashi Road	Amirtha College	Railway station	Kangayam Road
Gandhi Managar	Pollachi ByPass	Central Busstand	Palladam
Ganapathi Location	Pollachi	PSG College	Karanampettai
Saravanampatti	Udumalaipettai	Ganthipark	Sulur
Thudiyalur	Madukkarai	Town Hall	Ondipudur

Overview

Data Service Test- Static Locations
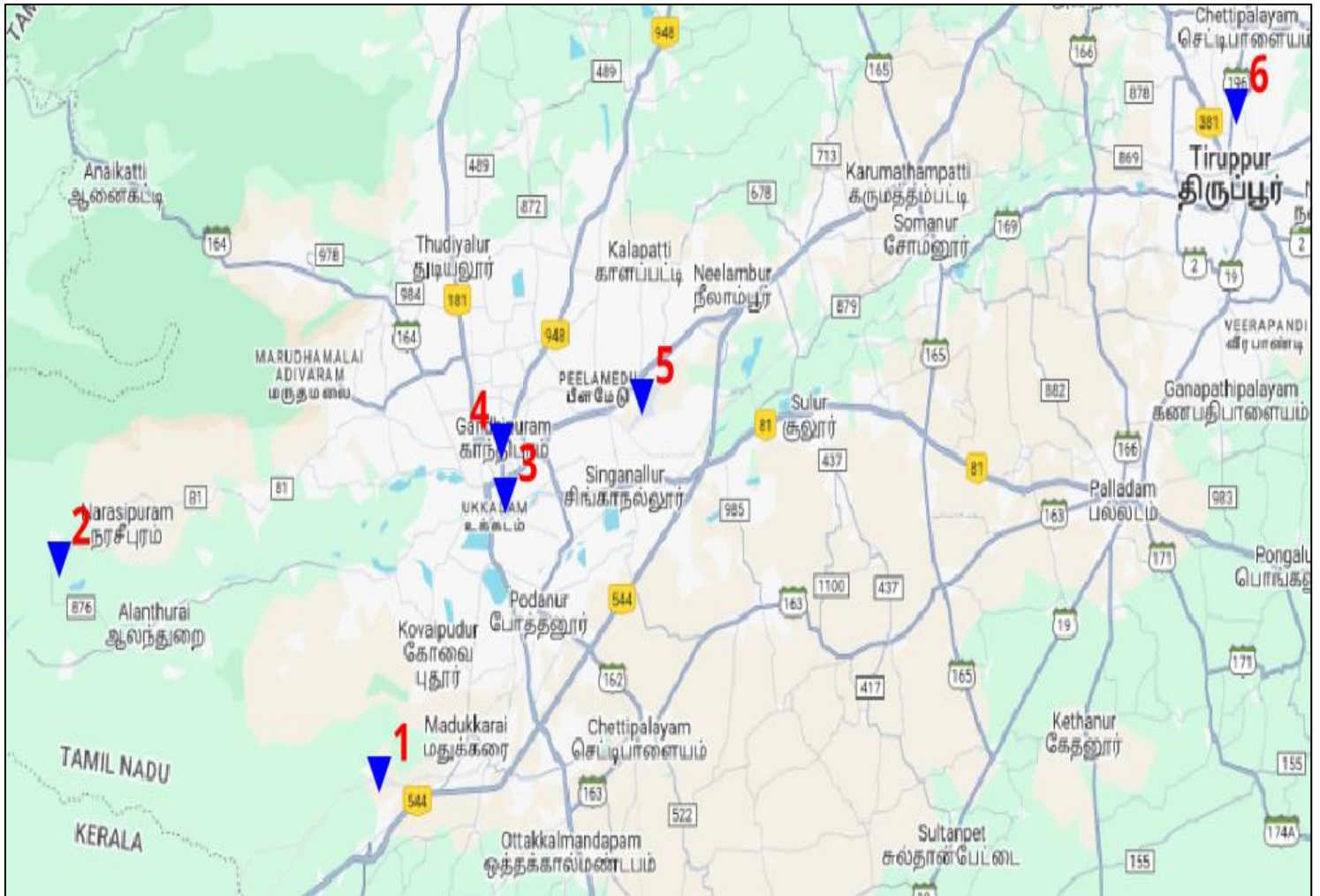
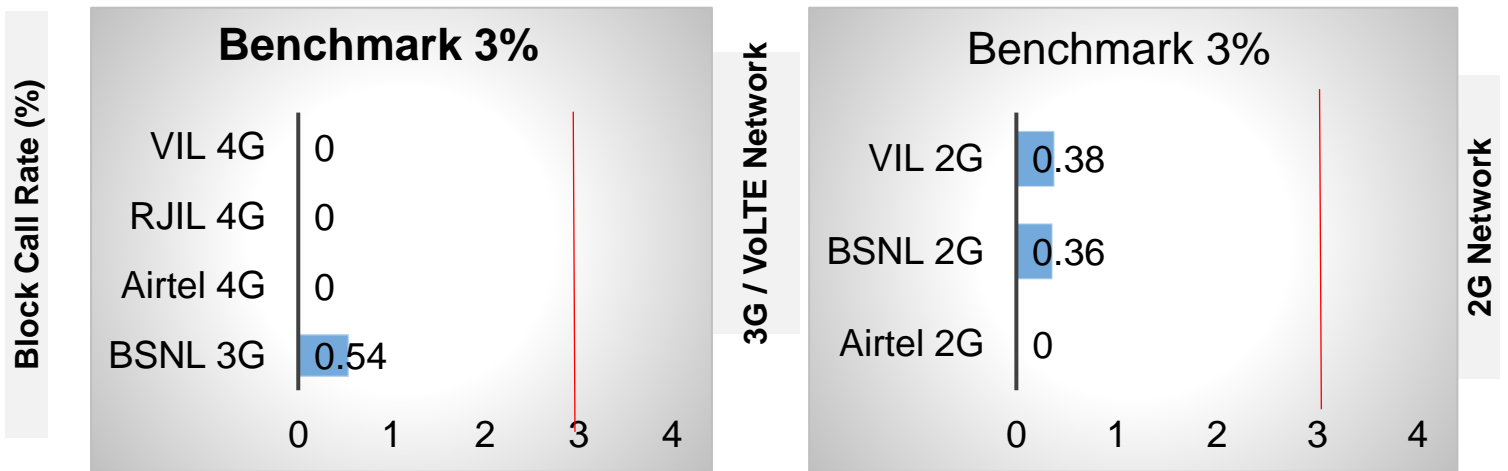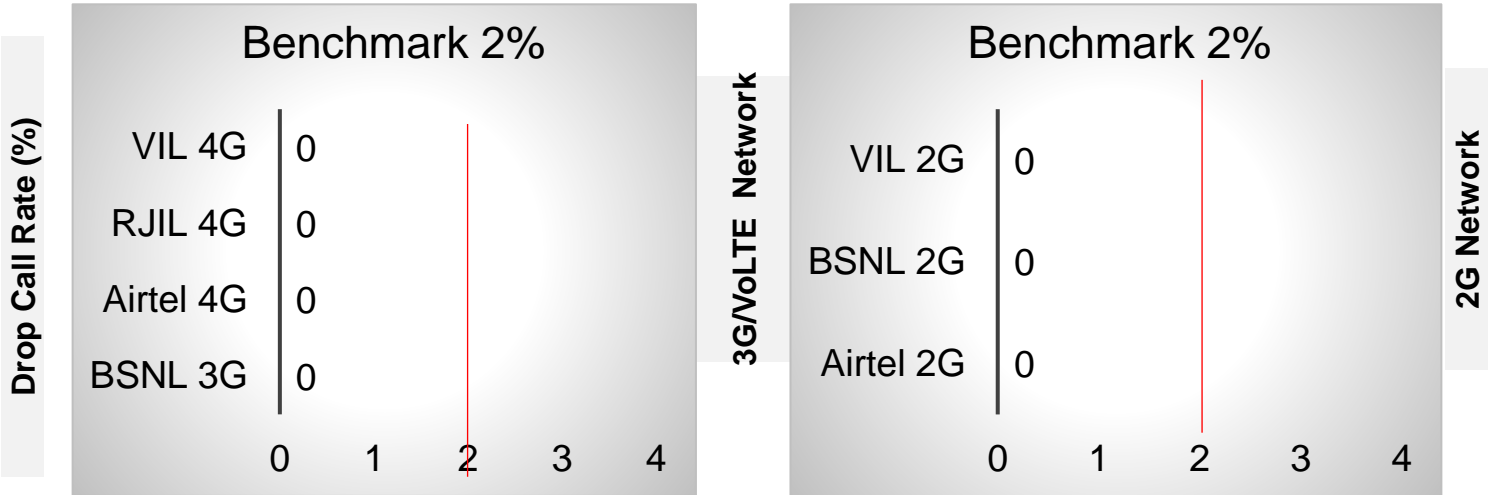| 6 Static Locations |
| :---: |
| Amrita University |
| Isha Yoga Center |
| Coimbatore Railway Station |
| Coimbatore Central Bus Stand |
| Coimbatore Airport |
| Tiruppur New Bus stand |

Voice Calls

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

Drop Call Rate (%)

Benchmark 2% (3G/VoLTE Network)

TSP	Value
VIL 4G	0
RJIL 4G	0
Airtel 4G	0
BSNL 3G	0

Benchmark 2% (2G Network)

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

Block Call Rate (%)

Benchmark 3% (3G / VoLTE Network)

TSP	Value
VIL 4G	0
RJIL 4G	0
Airtel 4G	0
BSNL 3G	0.54

Benchmark 3% (2G Network)

TSP	Value
VIL 2G	0.38
BSNL 2G	0.36
Airtel 2G	0

KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	JIO	VIL
Drop Call Rate %	0	0	0	0	0	0	0
Block Call Rate %	0	0.36	0.38	0.54	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 %	95.28	94.13	88.24

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

TSP	3G	VoLTE (≥ -110 dBm)			
	BSNL	Airtel	BSNL	JIO	VIL
Coverage %	91.02	99.79	97.67	99.23	99.65

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

TSP	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent %	90.25	100	100	100

Data Services Static

Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing delay (Flipkart, Amazon, Myntra)
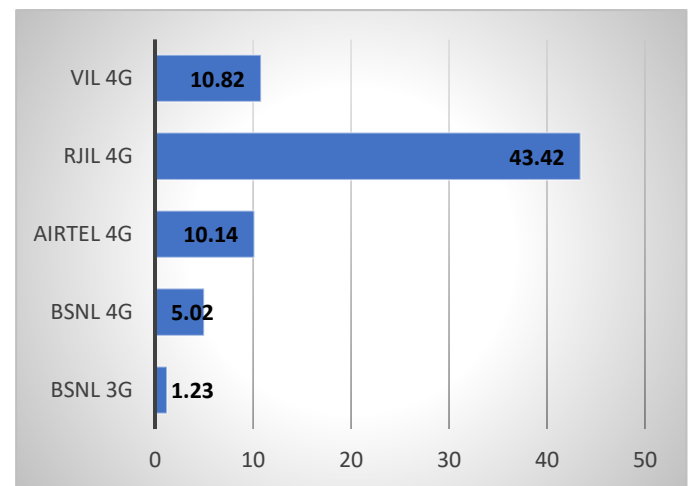
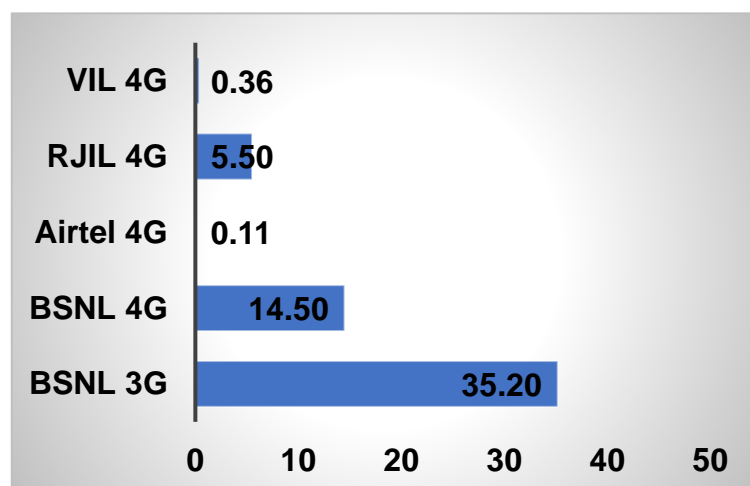## Data Download and Upload Performance (Mbps)
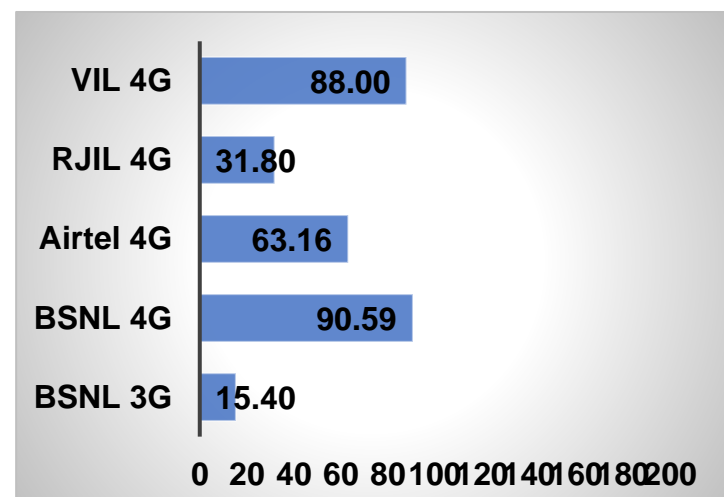
3G/4G/ Network:

Download Throughput (Mbps)
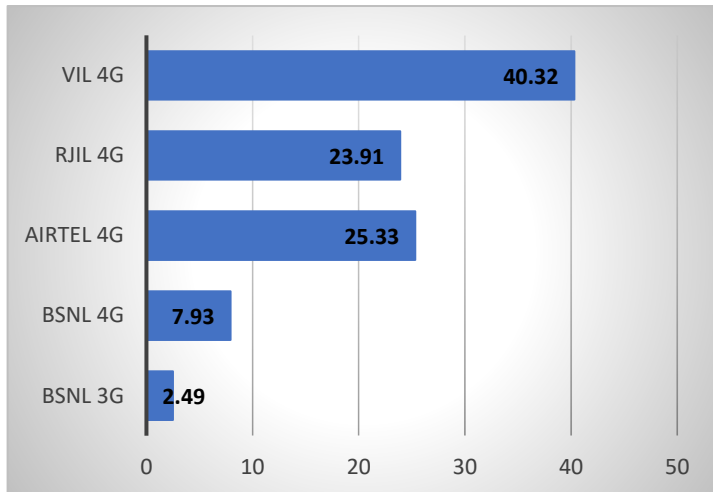
Network	Value
VIL 4G	40.32
RJIL 4G	23.91
AIRTEL 4G	25.33
BSNL 4G	7.93
BSNL 3G	2.49

Upload Throughput (Mbps)

Network	Value
VIL 4G	10.82
RJIL 4G	43.42
AIRTEL 4G	10.14
BSNL 4G	5.02
BSNL 3G	1.23

Web Browsing delay (Sec)

Network	Value
VIL 4G	0.36
RJIL 4G	5.50
Airtel 4G	0.11
BSNL 4G	14.50
BSNL 3G	35.20

Latency (ms)

Network	Value
VIL 4G	88.00
RJIL 4G	31.80
Airtel 4G	63.16
BSNL 4G	90.59
BSNL 3G	15.40

Dynamic Data was tested, Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:
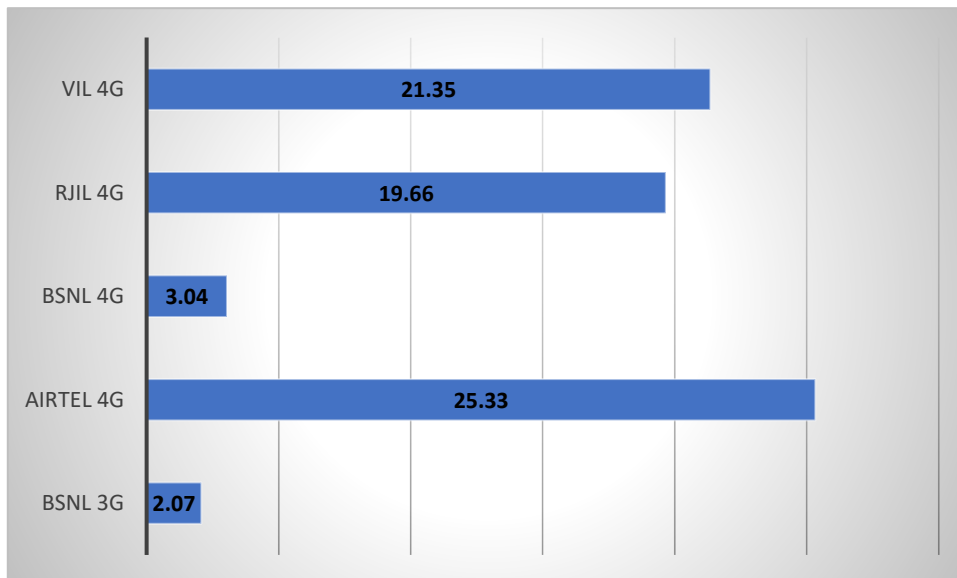
Data Services Dynamic	3G / 4G				
	BSNL 3G	**BSNL 4G**	**Airtel 4G**	**JIO 4G**	**VIL 4G**
Download throughput in Mbps	2.07	3.04	25.33	19.66	21.35

Summary

Voice Calls	2G		
	Airtel	**BSNL**	**VIL**
Call attempts	546	560	523
Block call rate %	0.00	0.36	0.38
CSSR %	100	99.64	99.61
Drop call rate %	0	0	0
Mobility HOSR %	97.69	98.48	98.5
RX Quality %	95.06	98.66	97.96

Voice Calls	3G	VoLTE			
TSP (For 3G)	**BSNL**	**BSNL**	**Airtel**	**JIO**	**VIL**
Call attempts	368	186	560	560	558
Block call rate %	0.54	0	0.00	0	0
CSSR %	99.46	100	100	100	100
Drop call rate %	0	0	0	0	0
Mobility HOSR %	99.5	98.51	99.96	99.23	99.94
RX Quality %	97.92	89.79	93.02	93.87	95.50

Summary

Data Services Static	3G / 4G				
	BSNL 3G	BSNL 4G	Airtel 4G	JIO 4G	VIL 4G
Download throughput in Mbps	2.49	7.93	25.33	23.91	40.32
Upload Throughput in Mbps	1.23	5.02	10.14	43.42	10.82
Web browsing delay in second	35.2	14.50	0.118	5.5	0.36
Latency in (msec)	15.40	90.59	63.16	31.8	88.00

Data Services static

Amrita University

	LTE			
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	7.29	36.25	26.51	39.6
Upload Throughput (Mbps)	4.35	5.62	38.93	13.6
Web Browsing Delay (sec)	1.29	0.034	5.5	0.32
Latency (msec)	7.53	66	31	91

Isha Yoga Center

	LTE			
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	7.26	40.41	19.45	13.8
Upload Throughput (Mbps)	5.20	6.32	51.57	4.4
Web Browsing Delay (sec)	1.78	0.058	5.40	0.31
Latency (msec)	9.51	67	29	113

Coimbatore Railway Station

	LTE			
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	8.89	37.39	24.35	57.5
Upload Throughput (Mbps)	5.75	38.81	40.84	13.14
Web Browsing Delay (sec)	1.09	0.068	5.6	0.3
Latency (msec)	9.08	69	32	53

Coimbatore Central Bus Stand

	LTE			
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	7.88	13.67	24.17	30.1
Upload Throughput (Mbps)	6.20	14.34	39.54	9.49
Web Browsing Delay (sec)	1.22	0.133	5.7	0.41
Latency (msec)	9.15	68	31	91

Coimbatore Airport

	LTE			
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	8.32	21.39	26.08	50.2
Upload Throughput (Mbps)	3.59	29.40	52.06	5.09
Web Browsing Delay (sec)	1.85	0.093	5.5	0.38
Latency (msec)	1.00	55	34	90.3

Tiruppur New Bus stand

	LTE			
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.49	40.62	22.90	50.5
Upload Throughput (Mbps)	1.23	40.64	37.56	19.2
Web Browsing Delay (sec)	3.52	0.324	5.6	0.43
Latency (msec)	1.54	54	33	92

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	95.28
BSNL 2G	94.13
VIL 2G	88.24
BSNL 3G	91.02
Airtel VoLTE	99.79
BSNL 4G	97.67
JIO VoLTE	99.23
VIL VoLTE	99.65

Coverage Details

0.00	0.14	0.58	8.98	0.20	2.33	0.77	0.35
29.74	5.74	11.17	26.09	17.95	46.35	8.55	30.09
65.54	27.96	26.43	35.51	42.97	33.12	31.78	41.9
	66.17	61.81	29.42	38.87	18.20	58.89	27.66
Airtel 2G	BSNl 2G	VIL 2G	BSNL 3G	Airtel 4G	BSNL 4G	RJIL 4G	VIL 4G

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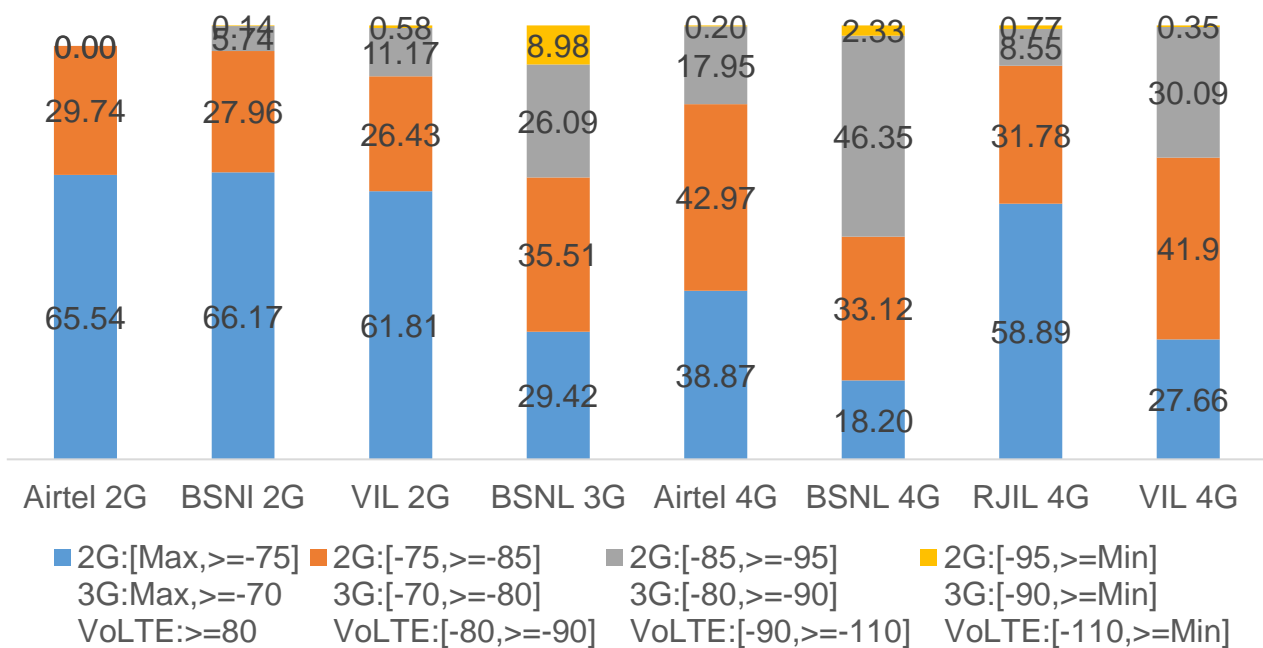
AIRTEL

Technology99.2	Coverage Rate %
2G	95.28
VoLTE	99.79

2G	**VoLTE**
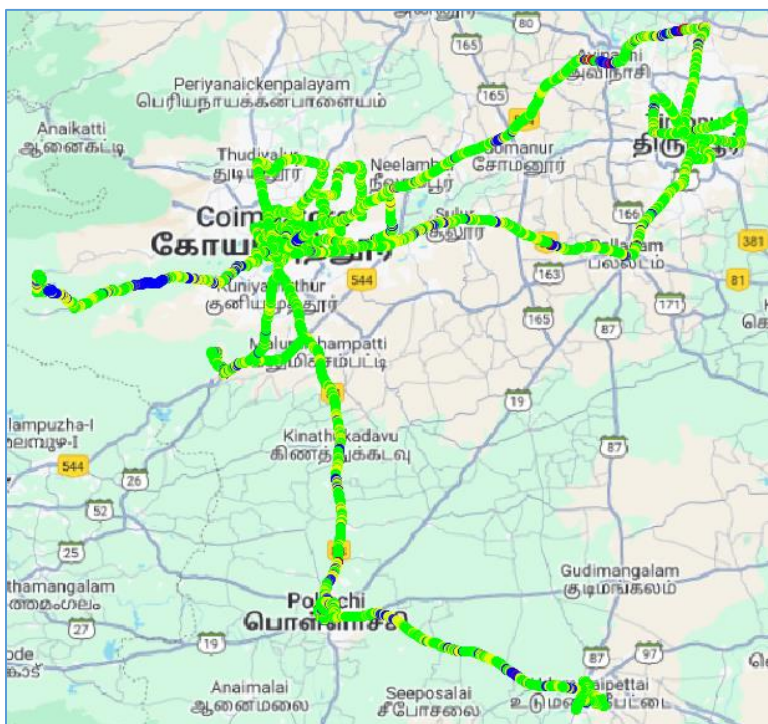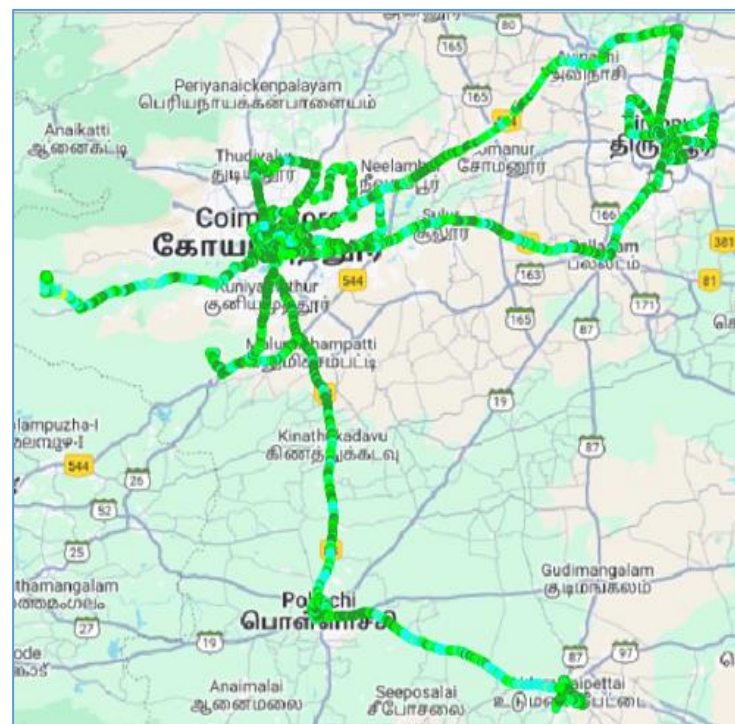
2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	25321	65.54
[-75, >=-85]	11492	29.74
[-85, >=-95]	1738	4.50
[-95, >=Min]	86	0.22
Total	38637	100

VoLTE		
Overall RSRP	# Samples	%
[Max, >=-80]	19846	38.87
[-80, >=-90]	21936	42.97
[-90, >=-110]	9166	17.95
[-110, >=-120]	103	0.20
[-120, >=Min]	2	0.01
Total	51053	100

BSNL

Technology	Coverage Rate %
2G	94.13
3G	91.02
4G	97.67

2G	3G & 4G
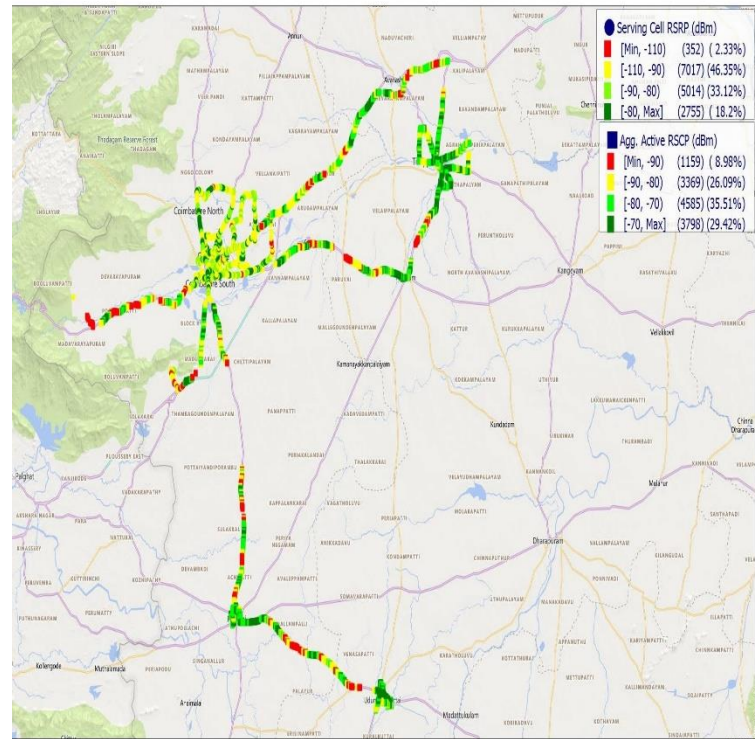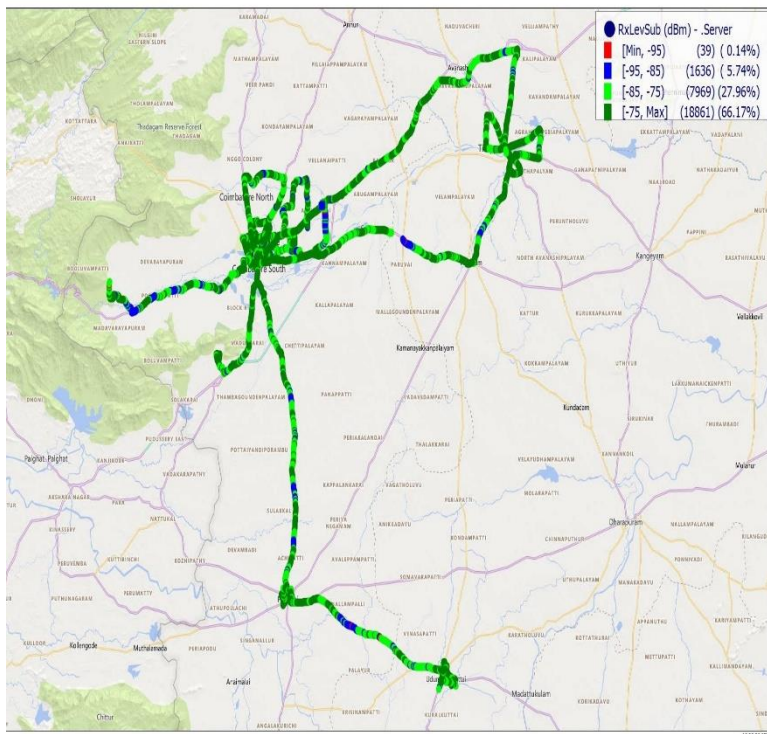
2G				3G			VoLTE		
Overall RxLevel	**# Samples**	**% PDF**		**Overall RSCP**	**# Samples**	**% PDF**	**Overall RSRP**	**# Samples**	**% PDF**
[Max, >=-75]	18861	66.17		**[Max, >=-70]**	3798	29.42	**[Max, >=-80]**	2755	18.2
[-75, >=-85)	7969	27.96		**[-70, >=-80)**	4585	35.51	**[-80, >=-90)**	5014	33.12
[-85, >=-95)	1636	5.74		**[-80, >=-90)**	3369	26.09	**[-90, >=-110)**	7017	46.35
[-95, >=Min)	39	0.14		**[-90, >=Min)**	1159	8.98	**[-110, >=Min)**	352	2.33
Total	**28505**	**100**		**Total**	**12911**	**100**	**Total**	**15138**	**100**

JIO

Technology	Coverage Rate %
VoLTE	99.23

VoLTE

LTE KPI PCell Serving RSRP[dBm]

- $-80 <= x < 0$ (58.89% , 35402)
- $-95 <= x < -80$ (31.78% ,19105)
- $-110 <= x < -95$ (8.55% ,5141)
- $x < -110$ (0.77% ,464)
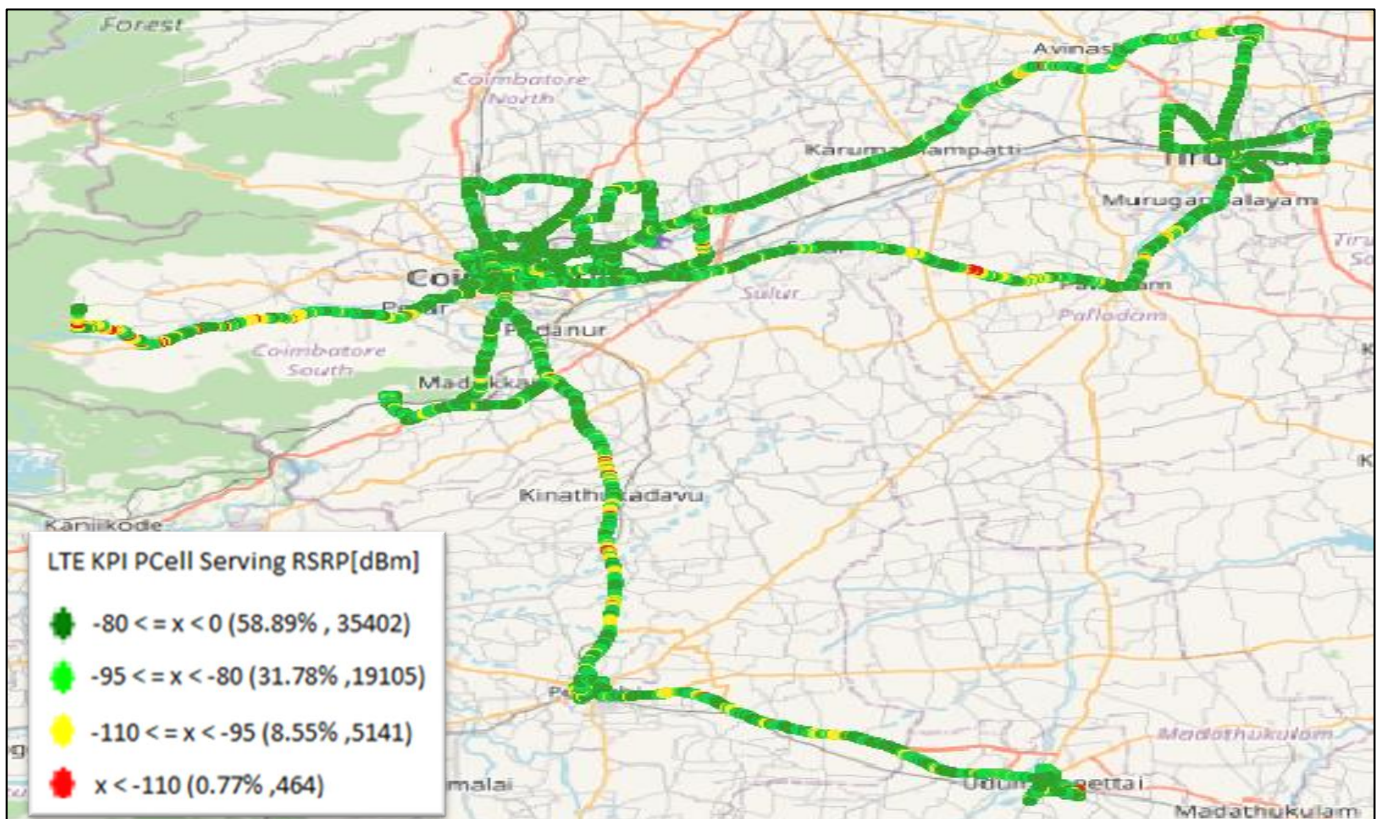
VoLTE		
Overall RSRP	# Samples	%
[Max, >=-80]	35402	58.89
[-80, >=-90]	19105	31.78
[-90, >=-110]	5141	8.55
[-110, >=-120]	464	0.77
Total	60112	100

VIL

Technology	Coverage Rate %
2G	88.24
VoLTE	99.65

2G	VoLTE
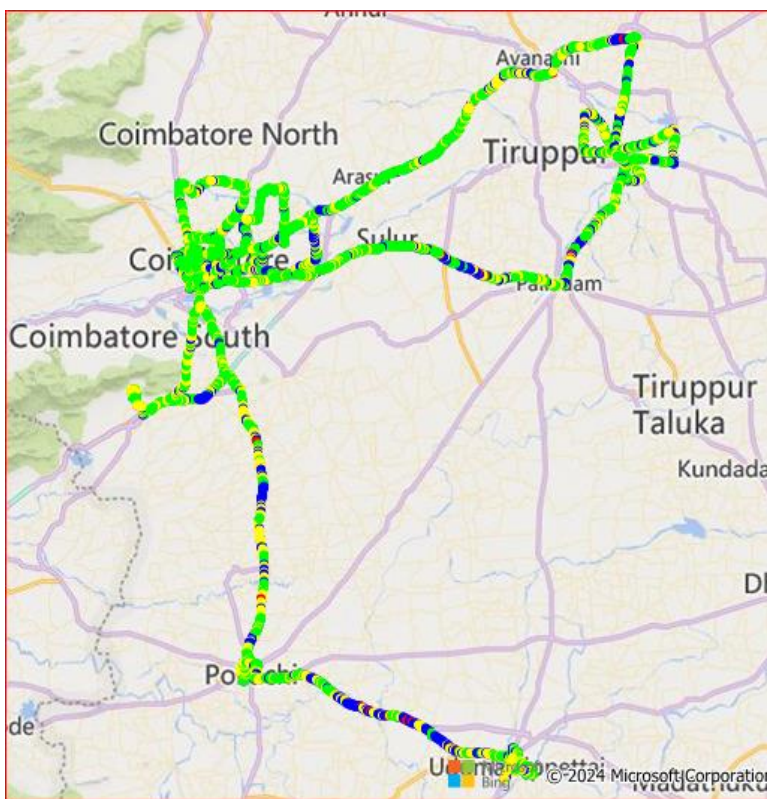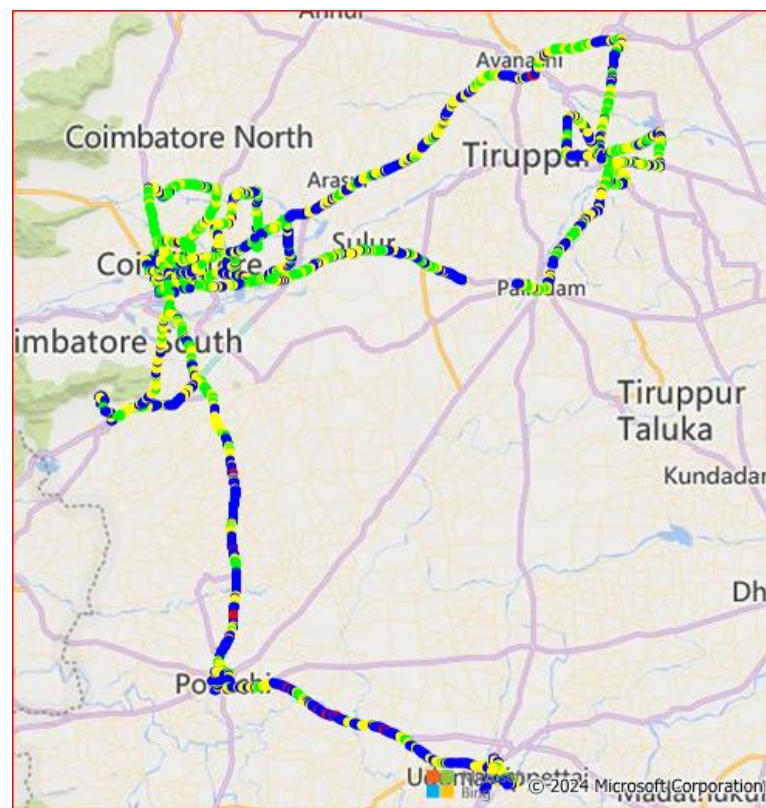
2G		
Overall RxLevel	**# Samples**	**%**
[Max, >=-75]	16987	61.81
[-75, >=-85]	7265	26.43
[-85, >=-95]	3071	11.17
[-95, >=Min]	160	0.58
Total	**27483**	**100**

VoLTE		
Overall RSRP	**# Samples**	**%**
[Max, >=-80]	7754	27.66
[-80, >=-90]	11746	41.9
[-90, >=-110]	8434	30.09
[-110, >=-Min]	97	0.35
Total	28031	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, whereas quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP	Rx Quality %
Airtel 2G	95.06
BSNL 2G	98.66
VIL 2G	97.96
BSNL 3G	97.92
Airtel 4G	93.02
BSNL 4G	89.79
JIO 4G	93.87
VIL 4G	95.50

RX Quality Distribution

	Airtel 2G	BSNI 2G	VIL 2G	BSNL 3G	Airtel 4G	BSNL 4G	Jio 4G	VIL 4G
Below Benchmark %	4.94	1.34	2.04	2.08	6.98	10.21	6.13	4.5
Rx Quality %	95.06	98.66	97.96	97.92	93.02	89.79	93.87	95.5

■ Rx Quality %   ■ Below Benchmark %
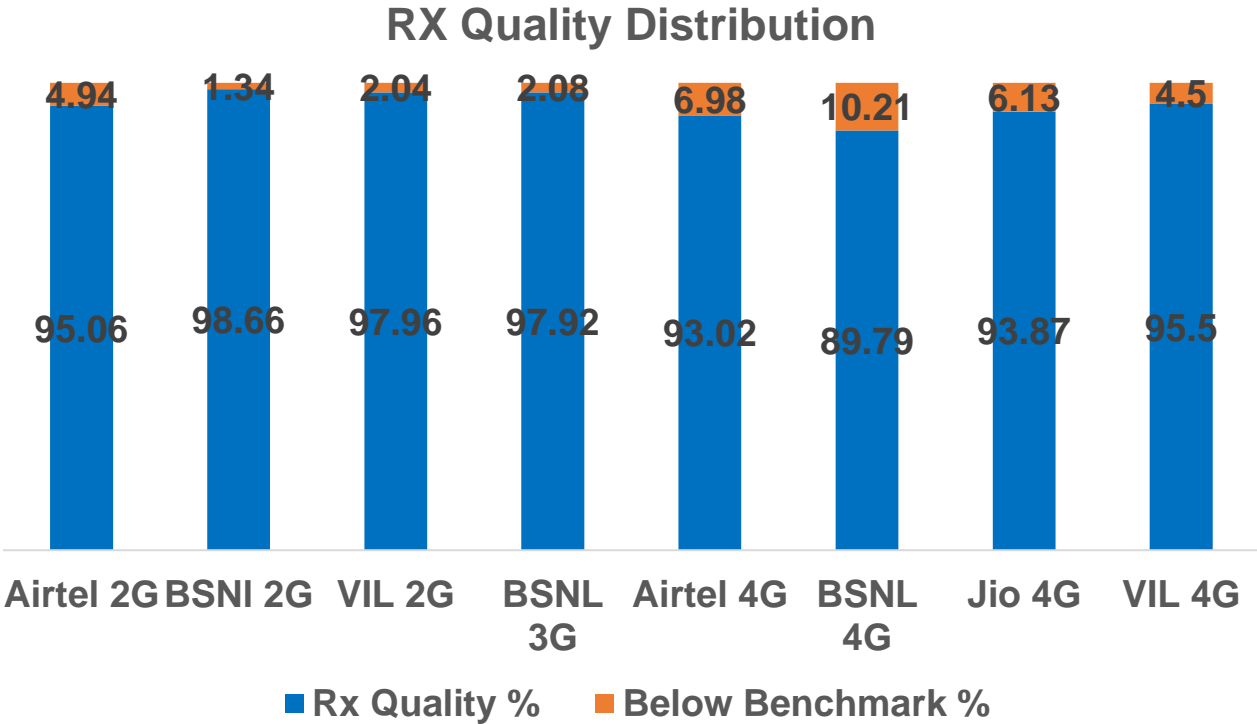
Airtel

Technology	Rx Quality %
2G	95.06
VoLTE	93.02

2G	VoLTE
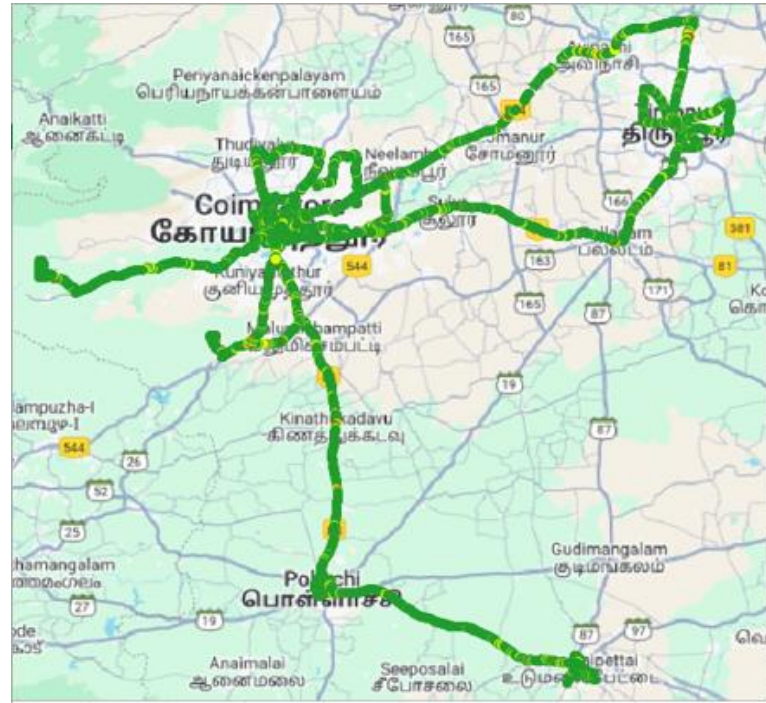
Overall Rx Quality	# Samples	%
(Min, <=2)	23761	69.59
(2, <=3)	4911	14.38
(3 , <=4)	3668	8.99
(4 , <=5)	517	2.10
(5 , <=Max)	1285	4.94
Total	34142	100

Overall SINR	# Samples	%
(Min, <=-6)	151	0.30
(-6, <=0)	3407	6.68
(0, <=35)	47442	93.02
Total	51000	100

BSNL

Technology	Rx Quality %
BSNL 2G	98.66
BSNL 3G	97.92
BSNL 4G	89.79

2G
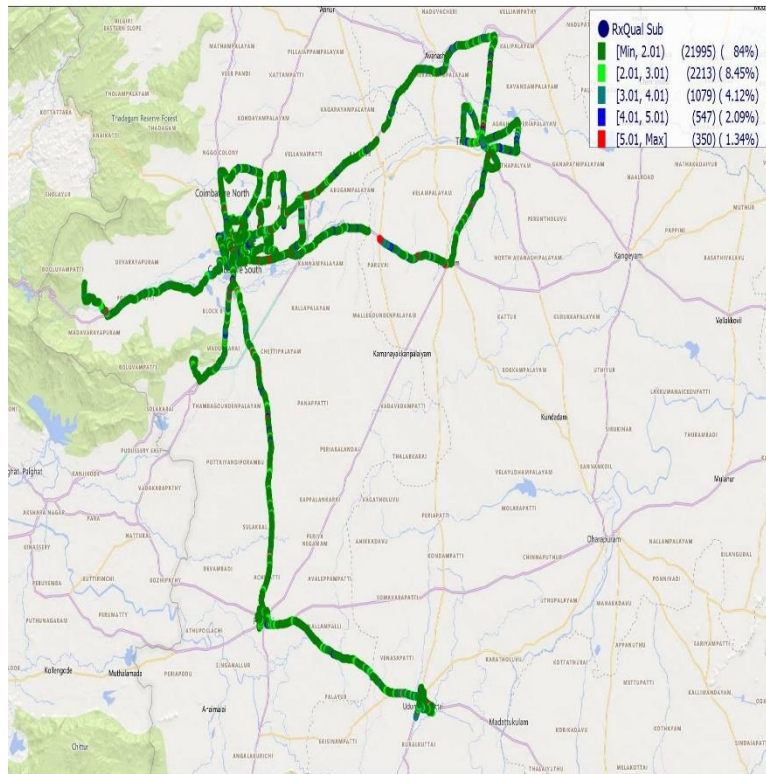
3G
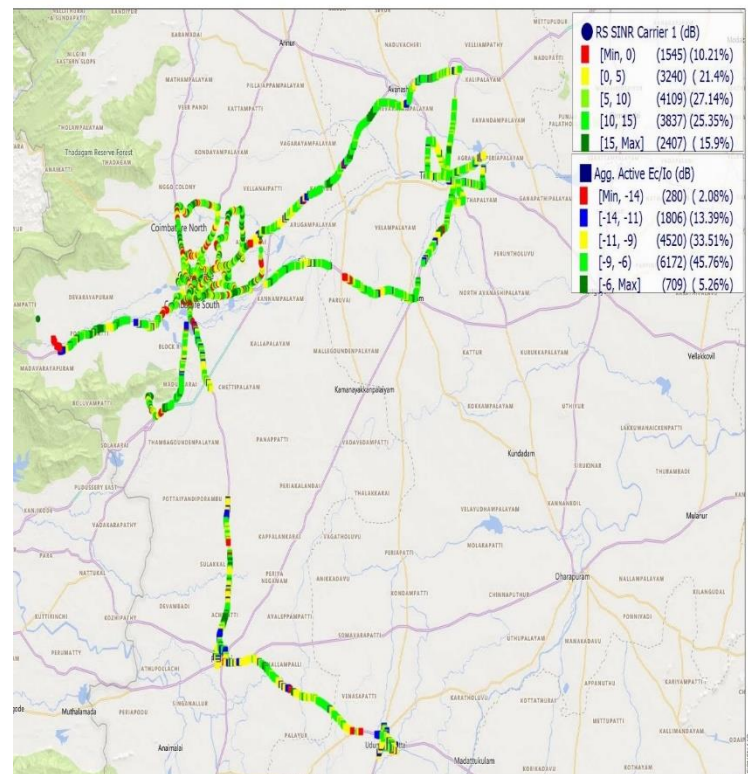
Overall Rx Quality	# Samples	% PDF		Overall EcNo	# Samples	% PDF		Overall SINR	# Samples	% PDF
(Min, <=2)	21995	84		(Max, <=-6)	709	5.26		(Min, <=0)	1545	10.21%
(2, <=3)	2213	8.45		(-6, <=-9)	6172	45.76		(0, <=5)	3240	21.4%
(3 , <=4)	1079	4.12		(-9, <=-11)	4520	33.51		(5, <=10)	4109	27.14%
(4 , <=5)	547	2.09		(-11, <=-14)	1806	13.39		(10, <=15)	3837	25.35%
(5 , <=Max)	350	1.34		(-14, <= Min)	280	2.08		(15, <=Max)	2407	15.9%
Total	26184	100		Total	13487	100		Total	15138	100%

JIO	

Technology	Rx Quality %
VoLTE	93.87

VoLTE

LTE KPI PCell SINR[dB]

- 15 <= x (27.38% , 16461)
- 10 <= x < 15 (22.44% , 13489)
- 5 <= x < 10 (24.87% , 14947)
- 0 <= x < 5 (19.18% , 11530)
- -6 <= x < 0 (5.90% , 3545)
- x < -6 (0.23% , 140)
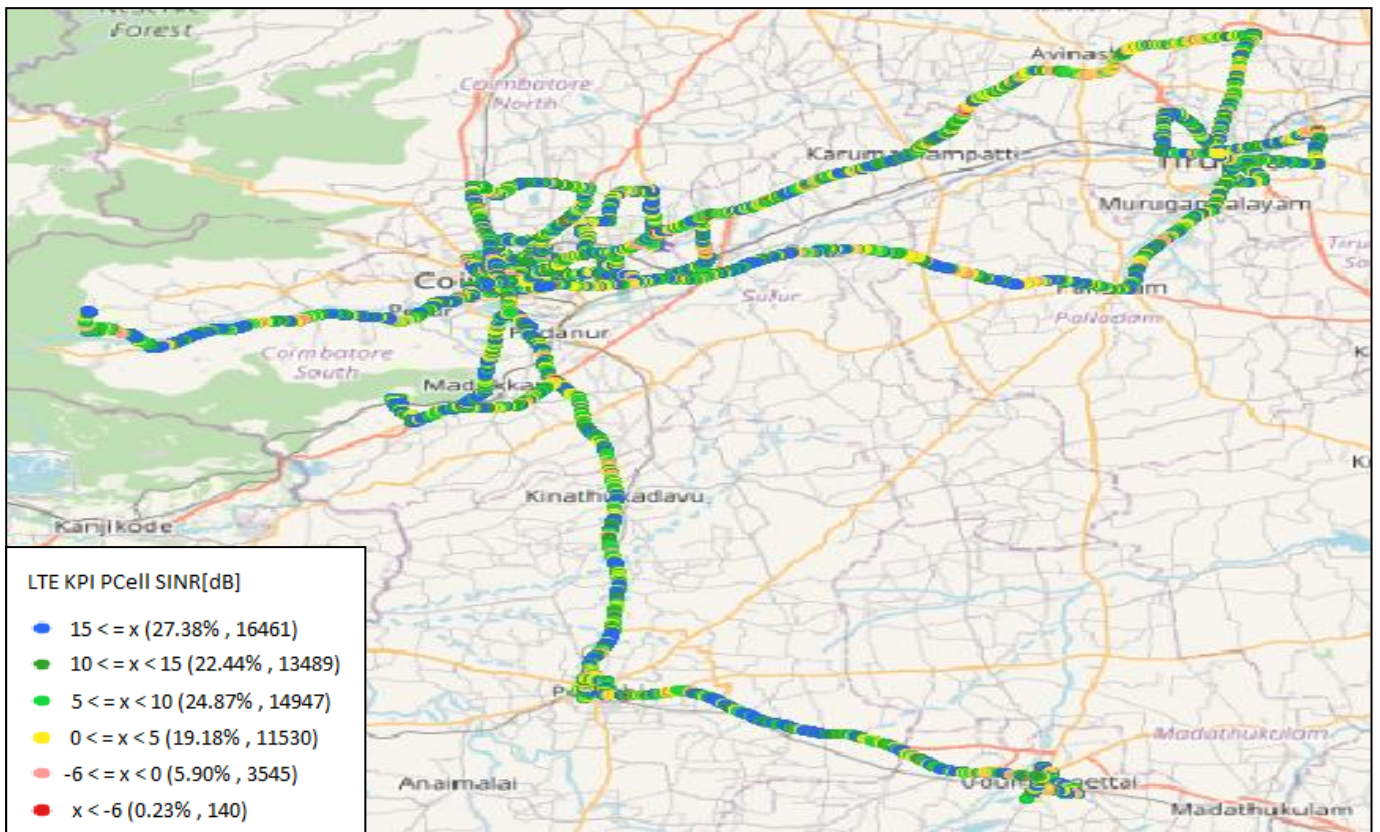
VoLTE		
Overall	**# Samples**	**%**
<-6	140	0.23
-6 to 0	3545	5.90
0 to 5	11530	19.18
5 to 10	14947	24.87
10 to 15	13489	22.44
>=15	16461	27.38
Grand Total	**60112**	**100**

VIL

Technology	Rx Quality %
2G	97.96
VoLTE	95.50

2G	VoLTE
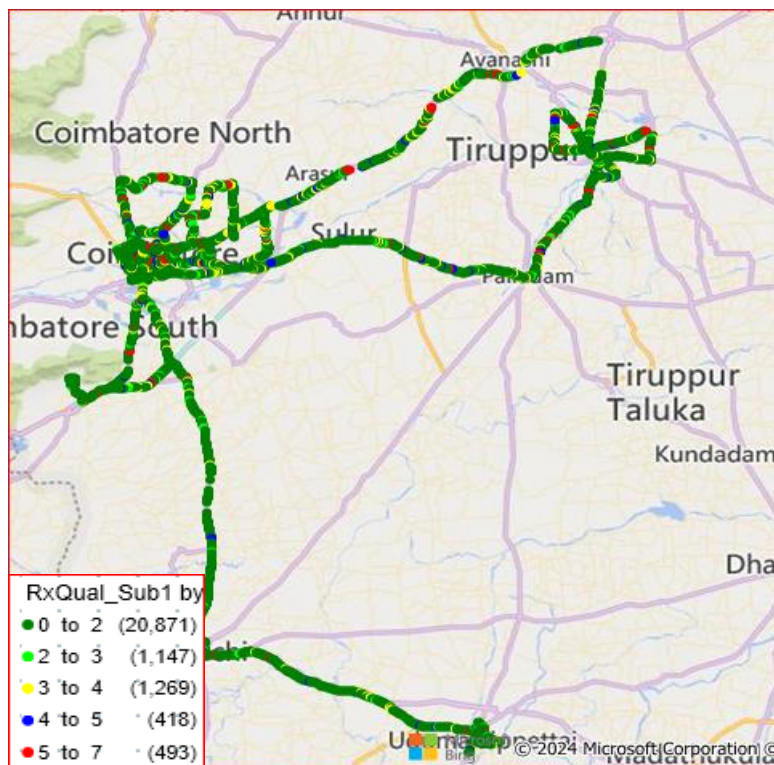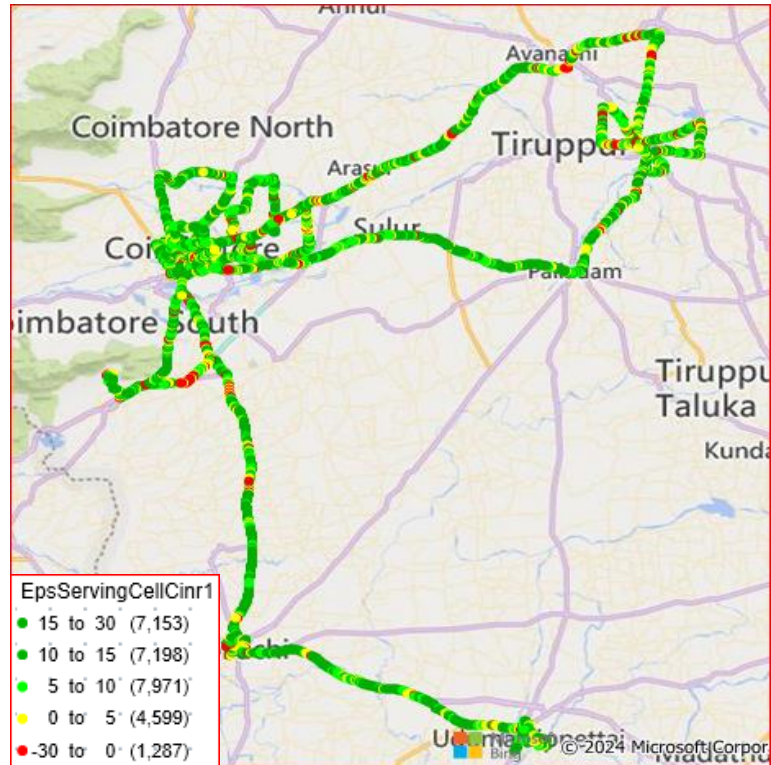
Overall Rx Quality	# Samples	%
(Min, <=2)	20871	86.25
(2, <=3)	1147	4.74
(3 , <=4)	1269	5.24
(4 , <=5)	418	1.72
(5 , <=Max)	493	2.03
Total	24198	100.00

Overall SINR	# Samples	% PDF
(Min, <=0)	1287	4.5
(0, <=5)	4599	16.3
(5, <=10)	7971	28.5
(10, <=15)	7198	25.5
(15, <=Max)	7153	25.1
Total	28208	100%

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	90.25
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	100

Legend: ■ % of Time Spent on 3G/VoLTE   ■ % of Time Spent on 2G
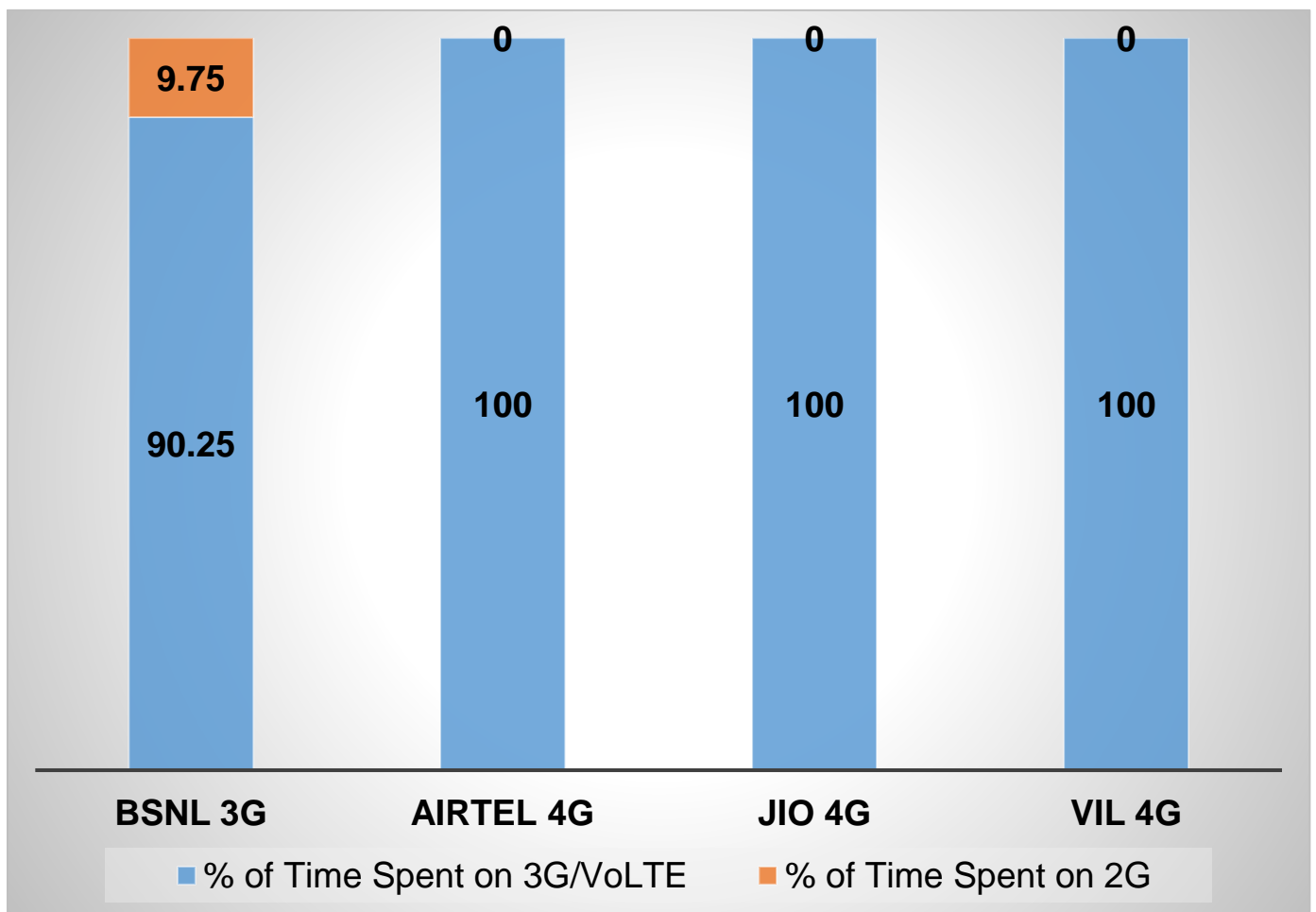
Airtel

Technology	Time Spent %
3G / VoLTE	100
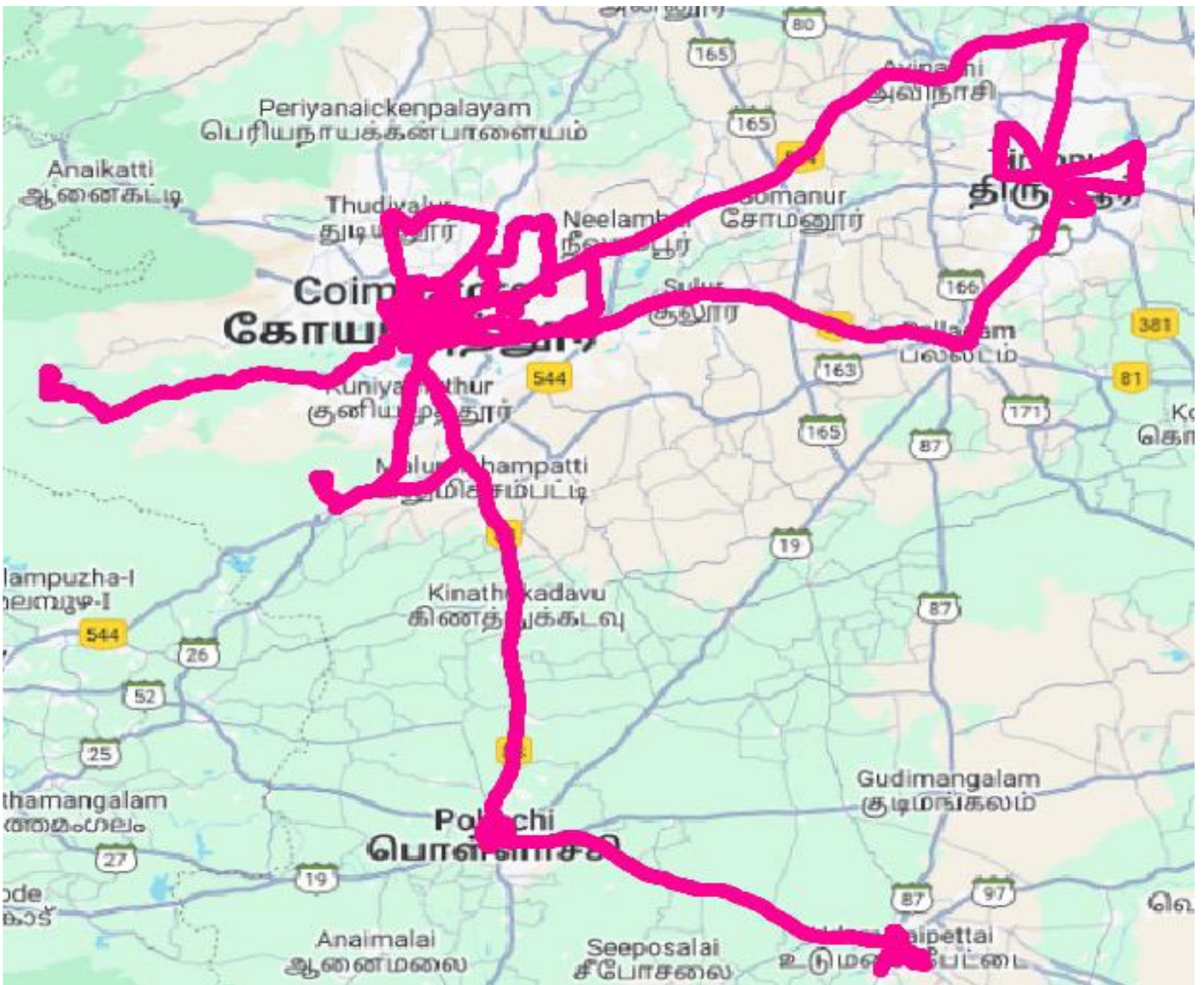
BSNL

Technology	Time Spent on 3G
3G	90.25
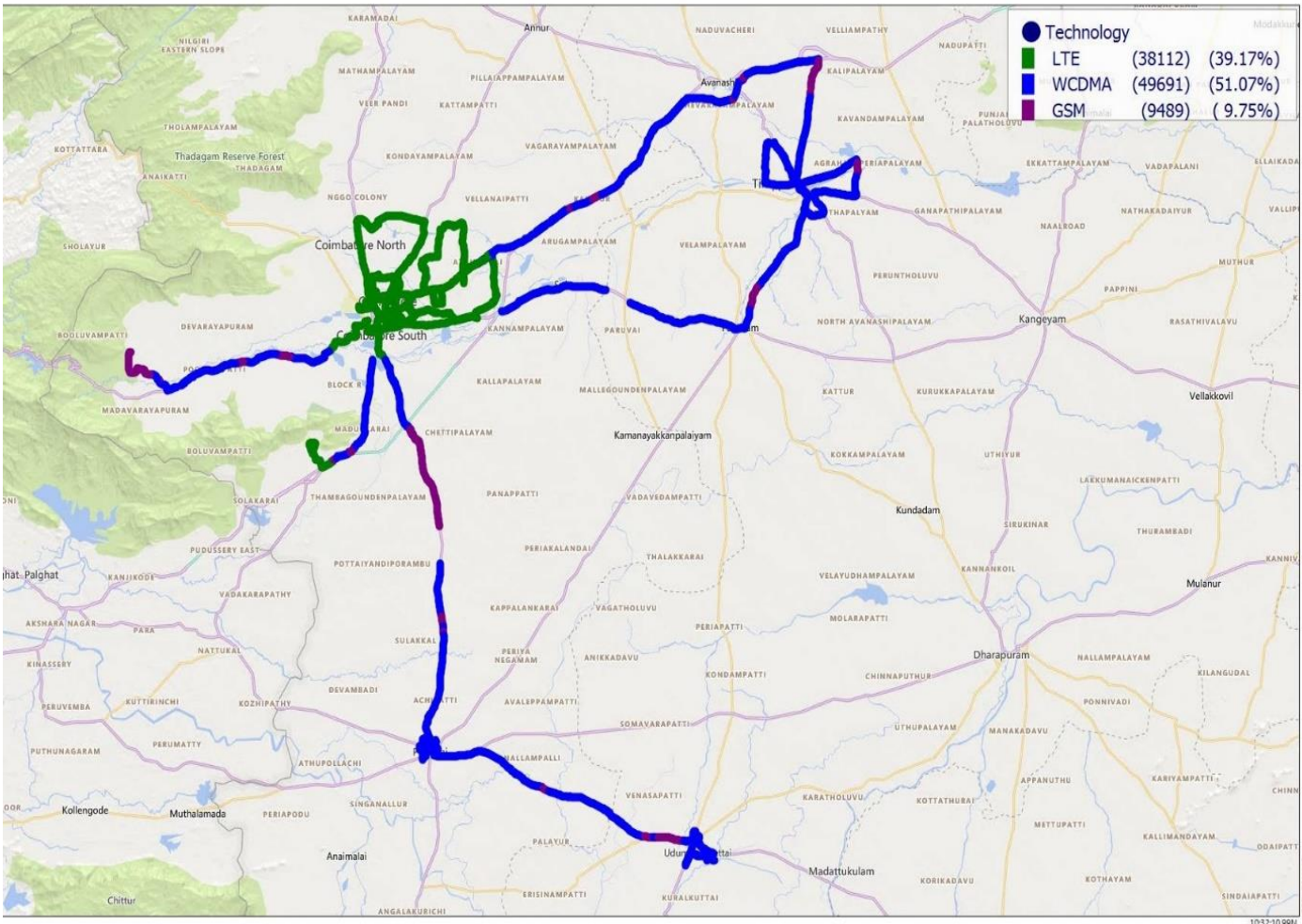
JIO

Technology	Time Spent %
3G / VoLTE	100
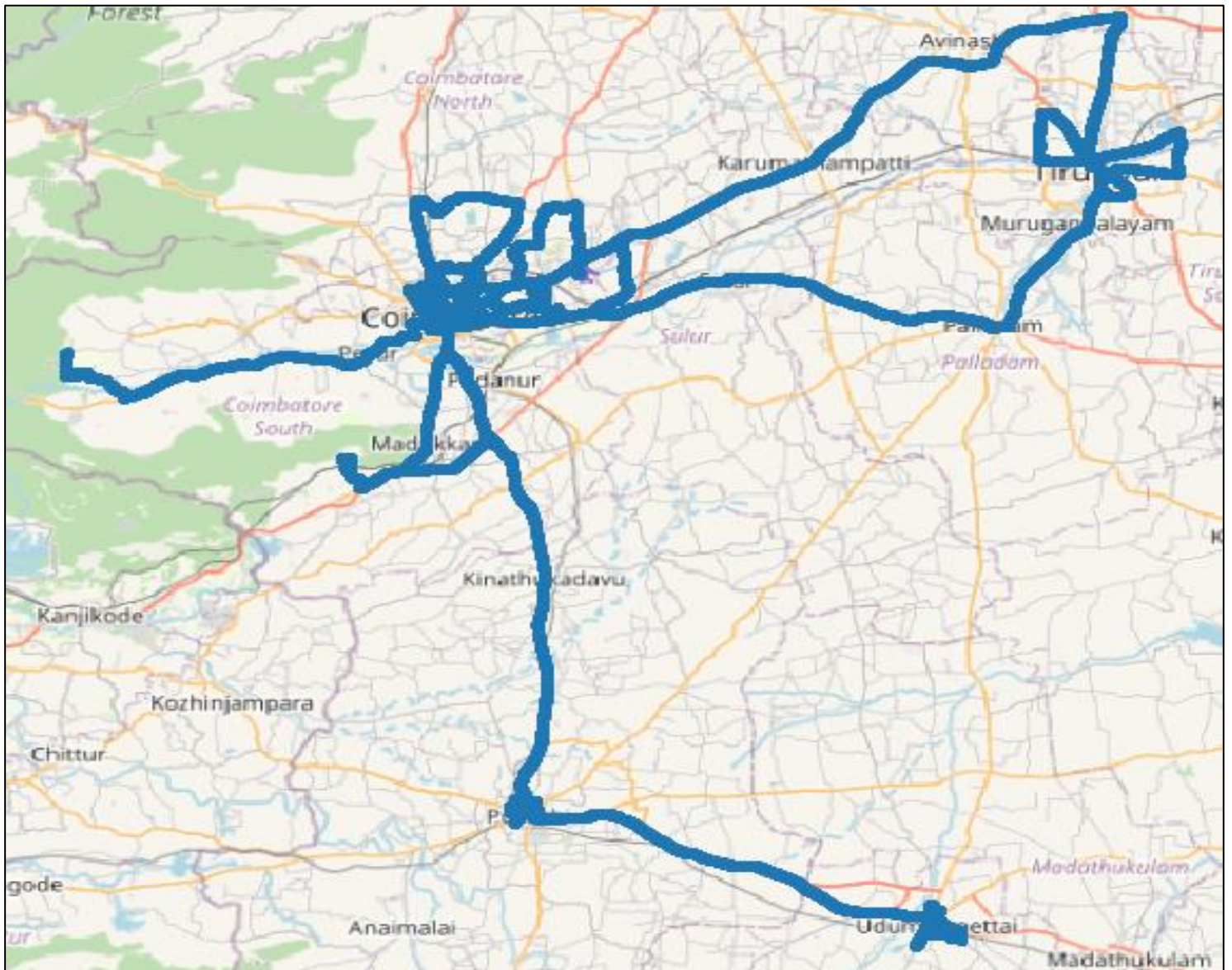
VIL

Technology	Time Spent %
3G / VoLTE	100
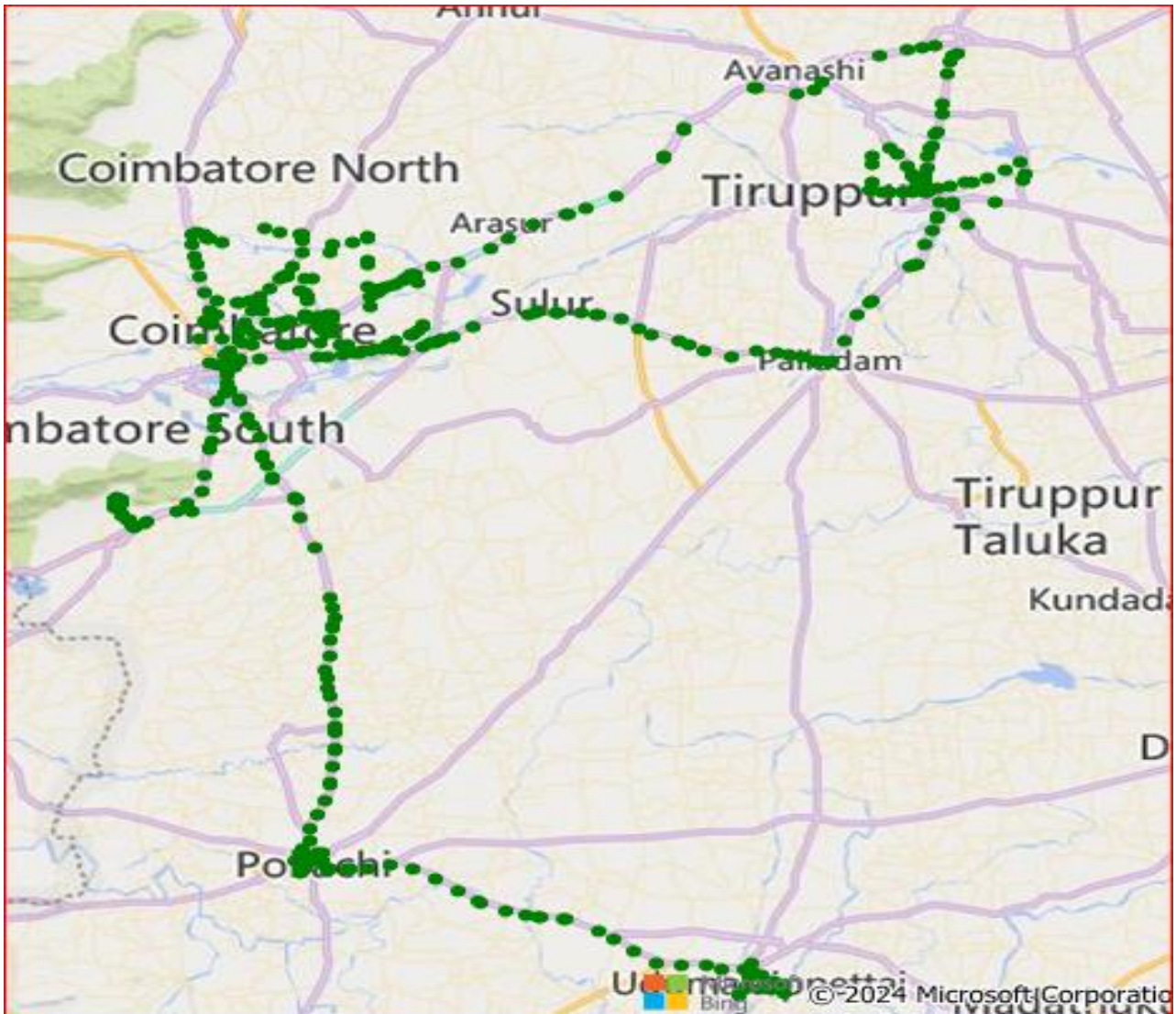
Airtel

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	3G / 4G
Download Throughput (Mbps)	25.33
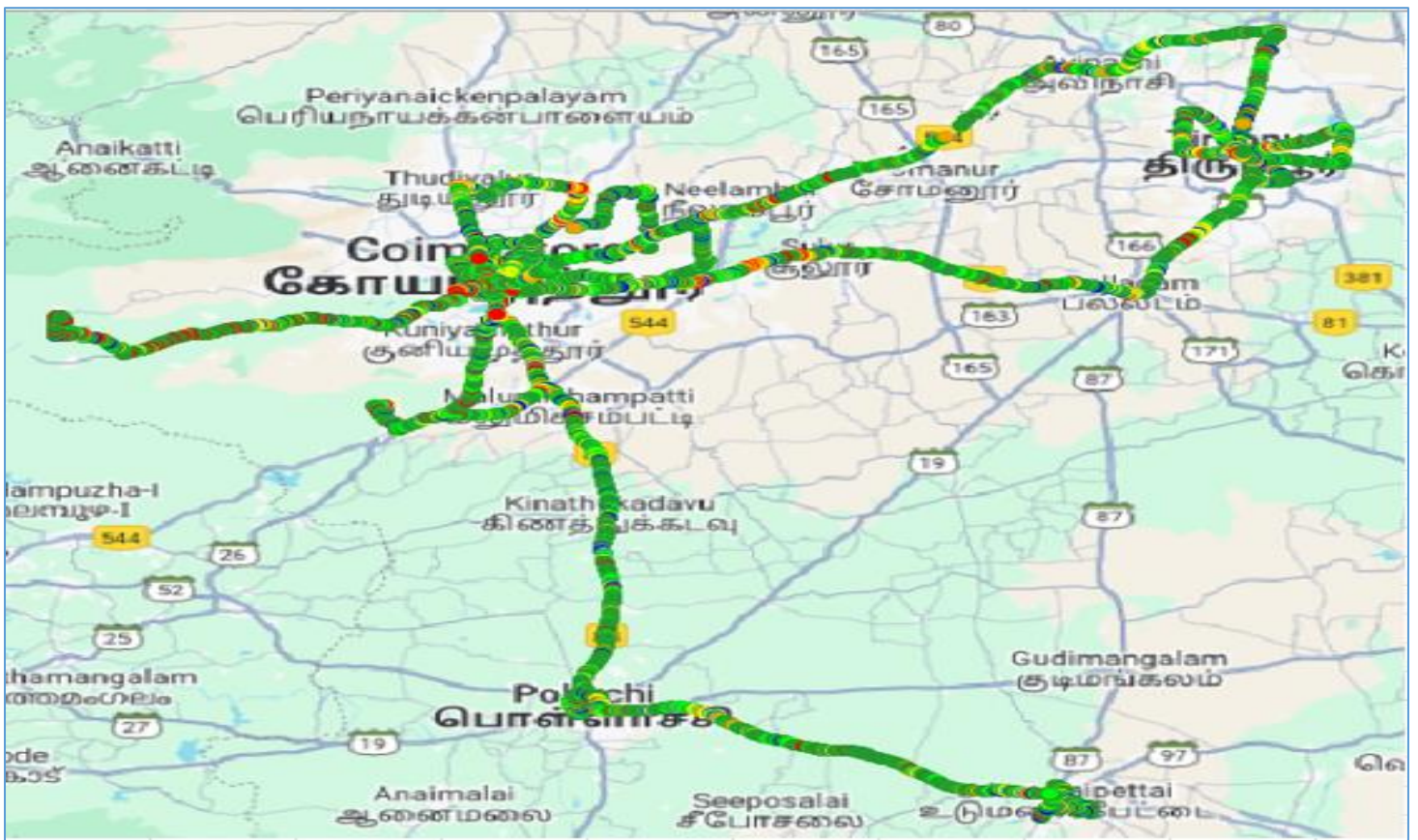
DL throughput	No of Sample	%
0 to 1 Mbps	4106	9.33
1 to 2 Mbps	4283	9.73
2 to 3 Mbps	7153	16.25
3 to 4 Mbps	3926	8.92
4 to 8 Mbps	3121	7.09
8 to 12 Mbps	5060	11.50
>12 Mbps	16364	31.18
Total	44013	100

BSNL

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	3G	4G
Download Throughput (Mbps)	2.07	3.04
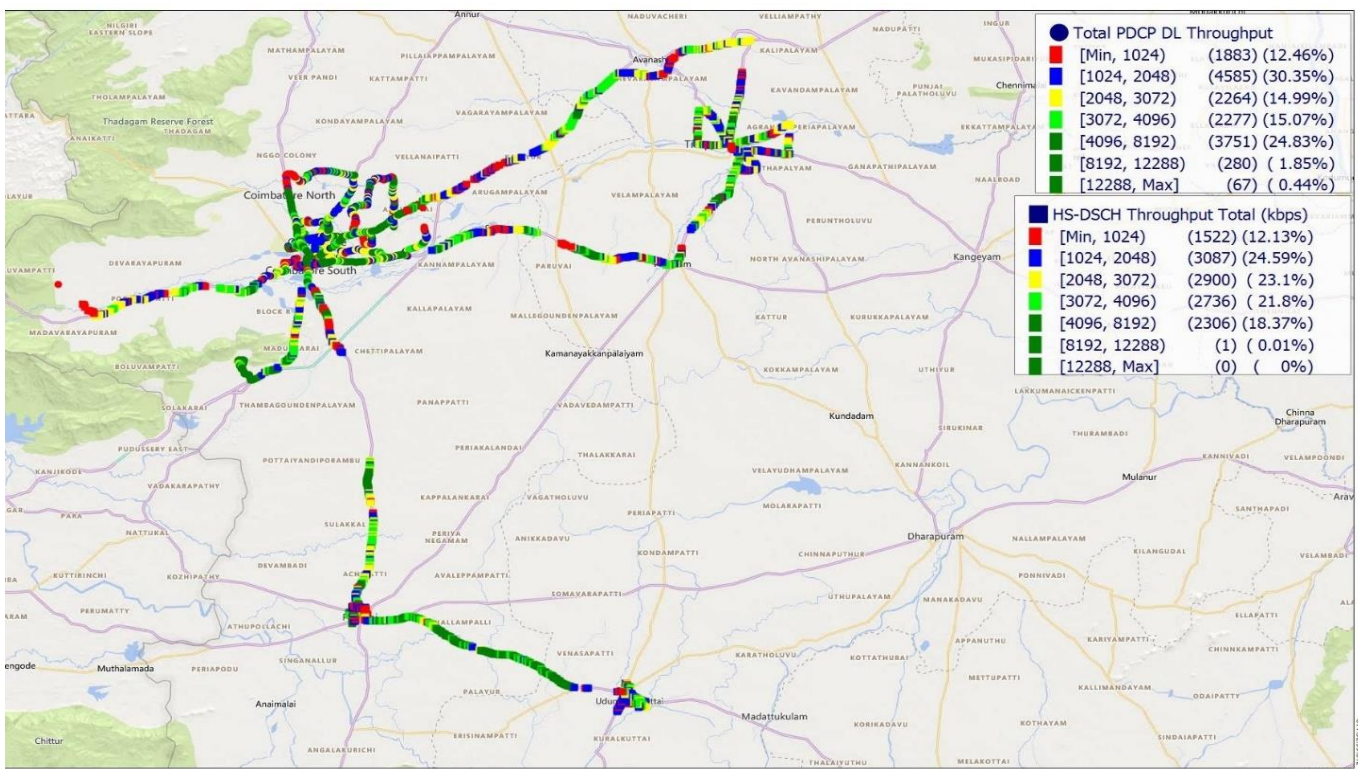
3G-DL throughput	No of Sample	%
0 to 1 Mbps	1522	12.13
1 to 2 Mbps	3087	24.59
2 to 3 Mbps	2900	23.1
3 to 4 Mbps	2736	21.8
4 to 8 Mbps	2306	18.37
8 to 12 Mbps	1	0.01
>12 Mbps	0	0
Total	12552	100

4G-DL throughput	No of Sample	%
0 to 1 Mbps	1883	12.46
1 to 2 Mbps	4585	30.35
2 to 3 Mbps	2264	14.99
3 to 4 Mbps	2277	15.07
4 to 8 Mbps	3751	24.83
8 to 12 Mbps	280	1.85
>12 Mbps	67	0.44
Total	15107	100

JIO

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	4G
Download Throughput (Mbps)	19.66

LTE KPI DL Throughput [Mbps]

- >12 Mbps (55.65% , 24198)
- 8 <= x 12 (9.25% , 4023)
- 4 < = x < 8 (9.94% , 4322)
- 3 < = x < 4 (2.56% , 1113)
- 2 < = x < 3 (2.85% , 1240)
- 1 < = x < 2 (3.10% , 1346)
- 0 < x < = 1 (16.65% , 7240)
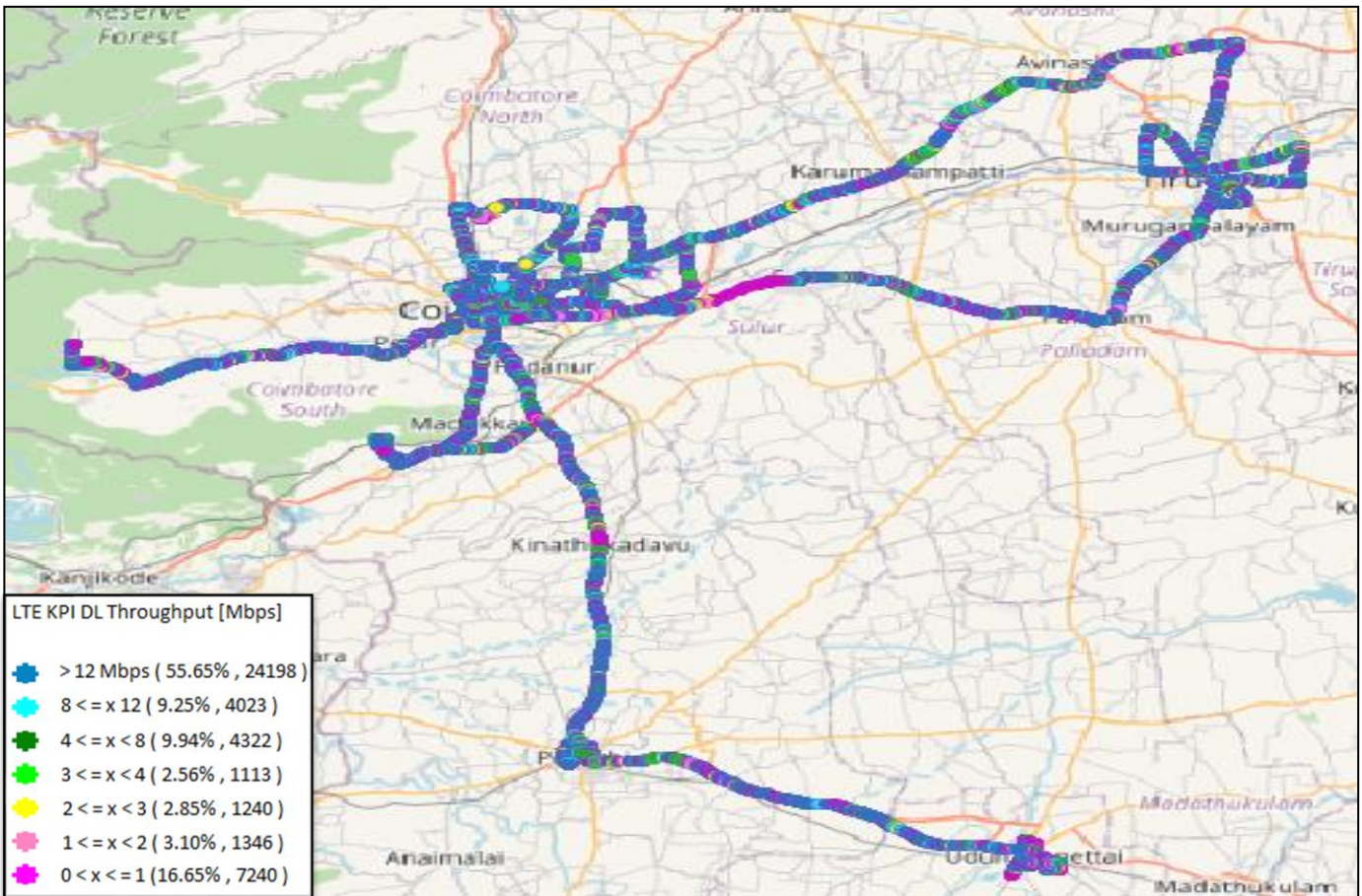
DL throughput	No. of samples	%
0 to 1 Mbps	7240	16.65
1 to 2 Mbps	1346	3.10
2 to 3 Mbps	1240	2.85
3 to 4 Mbps	1113	2.56
4 to 8 Mbps	4322	9.94
8 to 12 Mbps	4023	9.25
>12 Mbps	24198	55.65

VIL

Data Statistics - Dynamic Complete SSA

Data KPIs - Overall	3G / 4G
Download Throughput (Mbps)	21.35
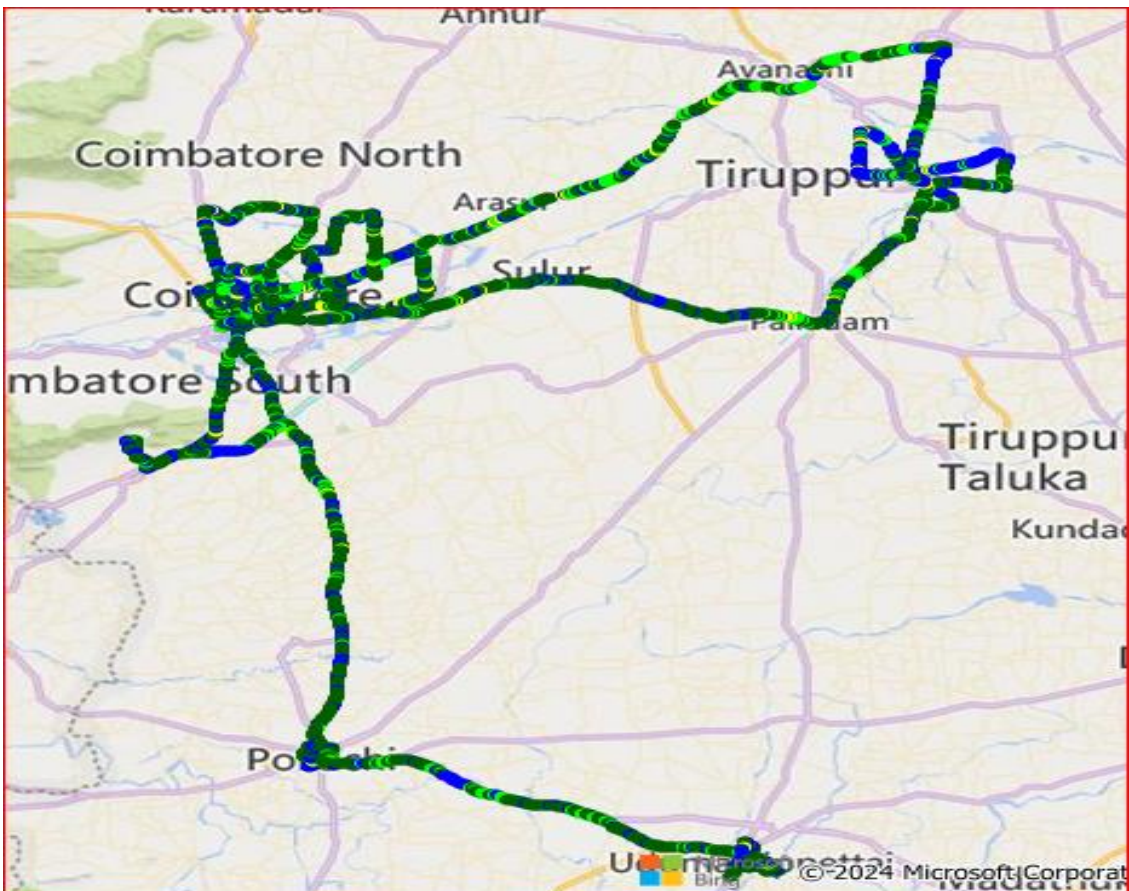
DL throughput	No of Sample	%
0 to 1 Mbps	4638	19.9
1 to 2 Mbps	620	2.66
2 to 3 Mbps	434	1.83
3 to 4 Mbps	450	1.93
4 to 8 Mbps	2058	8.83
8 to 12 Mbps	1992	8.55
>12 Mbps	13099	56.24
Total	23291	100

Airtel

Technology 4G	1. Amrita College	2. Isha Yoga Center	3. Coimbatore Railway Station	4. Coimbatore Central Bus Stand	5. Coimbatore Airport	6. Tiruppur New Bus stand
Download in Mbps	50.13	63.90	70.16	27.47	42.13	92.13
Upload in Mbps	5.98	30.78	17.83	8.34	3.56	6.75

BSNL

Technology 4G	1. Amrita College	2. Isha Yoga Center	3. Coimbatore Railway Station	4. Coimbatore Central Bus Stand	5. Coimbatore Airport	6. Tiruppur New Bus stand
Download in Mbps	12.94	12.55	13.86	11.34	14.67	3.35
Upload in Mbps	11.86	8.92	3.38	4.65	3.23	1.50

JIO

Technology 4G	1. Amrita College	2. Isha Yoga Center	3. Coimbatore Railway Station	4. Coimbatore Central Bus Stand	5. Coimbatore Airport	6. Tiruppur New Bus stand
Download in Mbps	20.05	17.29	44.00	33.23	31.43	38.90
Upload in Mbps	8.03	10.59	9.58	3.70	9.14	4.84

VIL

Technology 4G	1. Amrita College	2. Isha Yoga Center	3. Coimbatore Railway Station	4. Coimbatore Central Bus Stand	5. Coimbatore Airport	6. Tiruppur New Bus stand
Download in Mbps	75.53	52.50	66.63	69.94	36.62	48.29
Upload in Mbps	54.32	100.6	24.07	22.87	21.71	43.25

	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	Coimbatore to Pollachi	NH 83		44
2	Pollachi to Udumalpet	NH 83		30
3	Coimbatore to Palladam	NH 81		40
4	Coimbatore to Tiruppur	NH 544		56
5	Coimbatore to Saravanampatti	NH 948		10
6	Coimbatore to Thudiyalur	NH 181		7
7	Coimbatore to Idayarpalayam		SH 164	4
8	Coimbatore to Pothanur		SH 162	10
9	Coimbatore to Isha Yoga		SH	29