



TELECOM REGULATORY AUTHORITY OF INDIA
Regional Office – Hyderabad

Operator Assisted Drive Test (OADT) Chennai City

OADT for Voice - 27th, 28th and 29th July 2021

OADT for Data – 30th July 2021

The Operator Assisted Drive Test (OADT) has been carried out by TRAI in Chennai City & adjoining areas from 9:00 AM to 9:00 PM from 27th July to 30th July 2021. The drive test covered a drive route of 400 KMs & 5 Hotspots over a period of 4 working days. Approximately 600 calls were made for each of 8 networks: Three 2G networks, Two 3G networks, Three LTE networks covering 4 unique TSPs.

Hotspots locations for Data Testing in Chennai City:

1. PHEONIX MALL, VELACHERY
2. AIRPORT, MEENAMBAKKAM
3. BUS STAND, KOYAMBEDU
4. KMC HOSPITAL
5. RAILWAY STATION, EGMORE

Technology	Airtel	BSNL	RJIL	VIL
2G	Y	Y	N	Y
3G	N	Y	N	Y
4G	Y	N	Y	Y
Tools used	TEMS Investigation 21.2.7	TEMS Investigation 17.2.4	XCAL Version 4.09.604	TEMS Investigation 21.2.7

Overview:

Telecom Regulatory Authority of India has been entrusted with the task of laying down the standards of quality of service to be provided by the service providers and ensuring its enforcement; and also TRAI is responsible for conducting the periodical audit of such services provided by the service providers so as to protect the interest of the consumers of telecommunications service

TRAI is regularly monitoring the performance of Telecom Service Providers (TSP) against the benchmarks for the various Quality of Service (QoS) parameters laid down by the Authority. TSPs submit Performance Monitoring Reports to TRAI every quarter. TRAI also undertakes audit and assessment of Quality of Service to verify the Quality of Service claimed.

In view of complaints on call drops and other network quality issues as per the instructions of TRAI HQ, TRAI Regional Office Hyderabad has conducted the drive test with the help of Telecom Service Providers of TN LSA from 27th July 2021 to 30th July 2021 covering various locations in Chennai City & surrounding region. The performance of Airtel, BSNL, Vodafone Idea Limited (VIL) and RJIL were monitored across various technologies (2G, 3G and 4G). The drive test route was defined based on several factors that include - areas from where call drop complaints are commonly received, areas of heavy usage, residential areas away from arterial roads, office areas, areas where previous Drive tests showed network issues etc.

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, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Date: Download and Upload Throughputs, Web browsing Delay, Video Streaming Delay and Latency

Drive test details for Chennai:

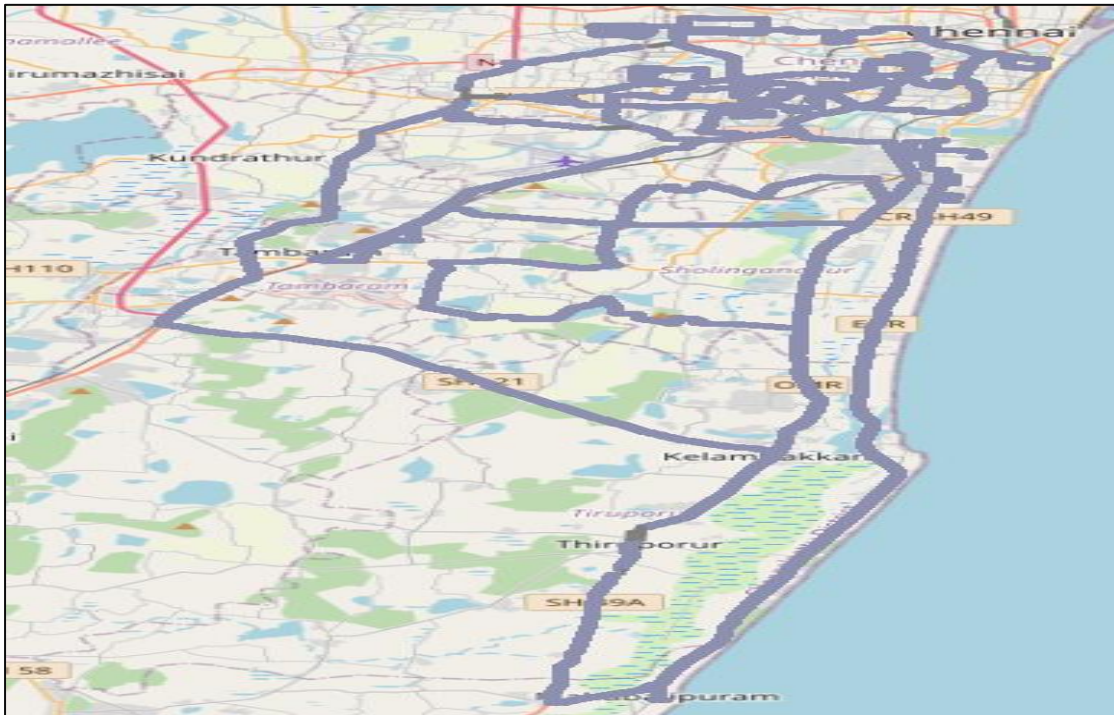
Operator Assisted Drive Test (OADT) was conducted for a period of 4 working days from 27th July to 30th July 2021 in Chennai City & surrounding areas from 9:00 AM to 9:00 PM. Calls were made for 90 sec durations with wait time of 10 sec between calls in all technologies.

Voice Tests: The drive test covered a drive route of 400km approximately and 600 calls were made for each of the 8 networks: Three 2G networks, Two 3G networks, Three LTE networks covering 4 unique TSPs.

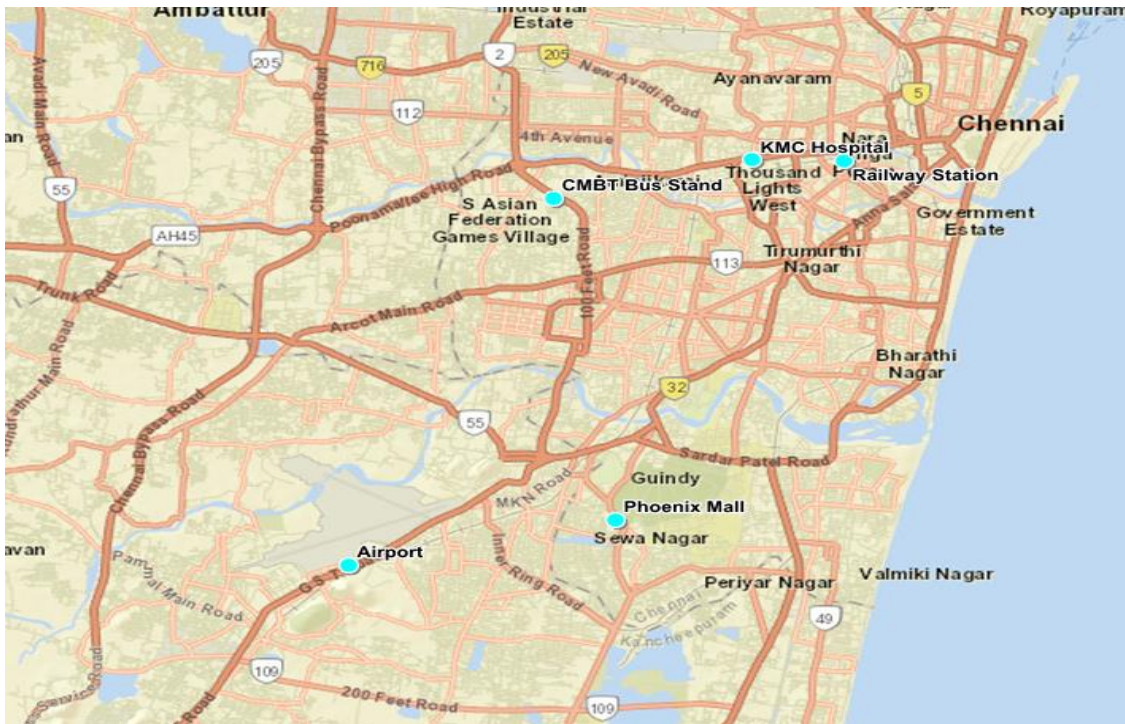
Data Tests: Data Tests were performed at 5 static locations for one day on 30th July 2021: Three 2G (Lock Mode) networks, Two 3G (Dual Mode) networks, Three LTE (Free mode) networks covering 4 unique TSPs were tested.

Service	Specifications
Download	2G (Locked) - 500KB ,3G (Dual)- 20 MB, 4G (Free)- 40MB
Upload	2G (Locked) - 100KB ,3G (Dual)- 5 MB, 4G (Free)- 10MB
Web browsing	3 links of e commerce websites https://www.amazon.in , https://www.flipkart.com , https://paytm.com .
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com .

Voice drive test route (Map):



Data testing hotspot locations (Map):



Key observations of Voice Call

Drop call Rate % (Benchmark < 2%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0%	NA	0%
BSNL	NA	1.1%	0.99%
RJIL	0%	NA	NA
VIL	0.27	0.28	0

Block call Rate % (Benchmark < 3%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0%	NA	0%
BSNL	NA	1.27%	0.98%
RJIL	0%	NA	NA
VIL	0	0.98	0.56

Technology	Parameter	Airtel	BSNL	RJIL	VIL
2G	SDCCH Congestion (<=1%)	0%	0.53%	NA	0%
	TCH Congestion (<=2%)	0%	0.59%	NA	0%
3G	CSFB Failure %	NA	0%		0%
	SDCCH Congestion %	NA			
	RRC Congestion %	NA	0.29%	NA	0%
	SDCCH and RRC Congestion % (<=1%)	NA	0.29%	NA	0%
	TCH Congestion %	NA			
	RAB Congestion %	NA	0.54%	NA	0%
TCH and RAB Congestion % (<=2%)	NA	0.54%	NA	0%	

Coverage

1. Percentage of Coverage sample of 2G >= - 85 dBm

TSP	Airtel	BSNL	RJIL	VIL
Coverage %	94.98	95.07%	NA	99.95

2. Percentage of Coverage sample of 3G >= - 90 dBm

TSP	Airtel	BSNL	RJIL	VIL
Coverage %	NA	91.38%	NA	98.24

3. Percentage of Coverage sample of VoLTE >= -110 dBm

TSP	Airtel	BSNL	RJIL	VIL
Coverage %	99.93	NA	99.36%	99.73

4. Percentage of time spent on 3G Network

TSP	Airtel	BSNL	RJIL	VIL
Time spent %	NA	100%	NA	82.75

5. Percentage of time spent on VoLTE Network

TSP	Airtel	BSNL	RJIL	VIL
Time spent %	100%	NA	100	99.71

6. Percentage of RLT >= 48

TSP	Airtel	BSNL	RJIL	VIL
Percentage of RLT >=48	0	0	0	0

7. Average CST in seconds

TSP	Airtel	BSNL	RJIL	VIL
2G network	3.6	2.75	NA	3.96
3G network	NA	2.2	NA	2.88
VoLTE Network	0.8	NA	0.627	1.14

Voice call summary

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Call attempts	687	804	NA	717
Block call rate %	0.00	0.98%	NA	0.5
CSSR %	100	98.9%	NA	99.4
Drop call rate %	0.00	0.99%	NA	0.00
Mobility HOSR %	99.7	98.4	NA	98.9
RX Quality %	94.1	96.9%	NA	99.5

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Call attempts	NA	816	NA	717
Block call rate %	NA	1.2%	NA	0.98
CSSR %	NA	98.7%	NA	99.0
Drop call rate %	NA	1.1%	NA	0.28
Mobility HOSR %	NA	100%	NA	100
RX Quality %	NA	93.6%	NA	99.1

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Call attempts	690	NA	679	730
Block call rate %	0.00	NA	0.00	0.00
CSSR %	100	NA	98.82	100
Drop call rate %	0.00	NA	0	0.27
Mobility HOSR %	99.7	NA	99.1	99.8
RX Quality %	84.4	NA	92.98	97.2

Data Service Static (on Hotspots)

Hotspot Location -1 (Phoenix Mall)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	257.7	100.1	NA	210.6
Upload Throughput in Kbps	51.7	69.7	NA	70.3
Web browsing delay in second	77.2	25.2	NA	50.7
Latency in (msec)	304	140	NA	205

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	2.1	NA	3.6
Upload Throughput in Mbps	NA	1.0	NA	2.4
Video streaming delay in sec	NA	5.3	NA	2.6
Web browsing delay in second	NA	2.1	NA	4.8
Latency in (msec)	NA	57	NA	4.3

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	47.8	NA	28.9	11.6
Upload Throughput in Mbps	4.2	NA	6.8	7.0
Video streaming delay in sec	0.6	NA	2.4	1.4
Web browsing delay in second	7.0	NA	4.2	6.0
Latency in (msec)	43	NA	85.8	43

Hotspot Location -2 (Airport Meenambakkam)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	243.8	120.2	NA	201.0
Upload Throughput in Kbps	63.1	68.8	NA	138.3
Web browsing delay in second	74.3	35.8	NA	31.0
Latency in (msec)	258	145	NA	204

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	3.2	NA	10.1
Upload Throughput in Mbps	NA	1.1	NA	3.8
Video streaming delay in sec	NA	4.9	2.0	1.9
Web browsing delay in second	NA	2.2	NA	4.7
Latency in (msec)	NA	54	NA	2.8

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	42.5	NA	32.5	35.3
Upload Throughput in Mbps	2.4	NA	5.1	8.8
Video streaming delay in sec	0.8	NA	2.4	1.6
Web browsing delay in second	5.2	NA	4.7	4.5
Latency in (msec)	36	NA	104.5	46

Hotspot Location -3 (Koyambedu Bus Stand)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	194.6	178.0	NA	218.0
Upload Throughput in Kbps	16.3	93.5	NA	97.6
Web browsing delay in second	34.4	12.2	NA	39.5
Latency in (msec)	344	77	NA	223

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	4.4	NA	9.8
Upload Throughput in Mbps	NA	2.2	NA	3.4
Video streaming delay in sec	NA	4.7	NA	1.7
Web browsing delay in second	NA	2.4	NA	3.8
Latency in (msec)	NA	15	NA	70

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	32.2	NA	23.0	52.8
Upload Throughput in Mbps	3.7	NA	5.5	18.7
Video streaming delay in sec	0.6	NA	2.2	1.5
Web browsing delay in second	3.7	NA	4.5	3.3
Latency in (msec)	29	NA	107.2	42

Hotspot Location -4 (KMC Hospital)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	256.5	105.2	NA	176.0
Upload Throughput in Kbps	148.2	77.9	NA	89.0
Web browsing delay in second	34.1	15.4	NA	29.4
Latency in (msec)	386	87	NA	204

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	4.4	NA	9.1
Upload Throughput in Mbps	NA	2.6	NA	3.7
Video streaming delay in sec	NA	4.5	NA	2.2
Web browsing delay in second	NA	2.1	NA	4.3
Latency in (msec)	NA	17	NA	46

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	40.	NA	30.8	10.1
Upload Throughput in Mbps	7.4	NA	5.9	13.5
Video streaming delay in sec	0.7	NA	2.6	1.4
Web browsing delay in second	3.2	NA	4.7	3.8
Latency in (msec)	36	NA	83.8	42

Hotspot Location -5 (Railway Station-Egmore)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	266.3	210.1	NA	173.0
Upload Throughput in Kbps	110.7	84.5	NA	86.3
Web browsing delay in second	32.3	26.9	NA	44.3
Latency in (msec)	297	71	NA	189

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	4.1	NA	8.6
Upload Throughput in Mbps	NA	1.9	NA	3.8
Video streaming delay in sec	NA	4.3	NA	2.3
Web browsing delay in second	NA	1.9	NA	4.18
Latency in (msec)	NA	21	NA	58.00

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	42.4	NA	43.3	30.1
Upload Throughput in Mbps	6.2	NA	6.5	15.4
Video streaming delay in sec	1.0	NA	2.4	1.5
Web browsing delay in second	3.7	NA	4.9	4.1
Latency in (msec)	43	NA	74.3	63.6

Summary Data report static

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	218.766	142.77	NA	195.73
Upload Throughput in Kbps	94.98	78.9	NA	96.33
Web browsing delay in second	52.57	23.12	NA	39.02
Latency in (msec)	384.266	104	NA	205

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	3.74	NA	8.26
Upload Throughput in Mbps	NA	1.8	NA	3.45
Video streaming delay in sec	NA	4.7	NA	2.1
Web browsing delay in second	NA	2.1	NA	4.4
Latency in (msec)	NA	32.8	NA	49

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	42.0	NA	31.7	27.3
Upload Throughput in Mbps	4.6	NA	6.0	12.4
Video streaming delay in sec	0.8	NA	2.4	1.5
Web browsing delay in second	6.9	NA	4.6	4.3
Latency in (msec)	37.9	NA	91.1	47

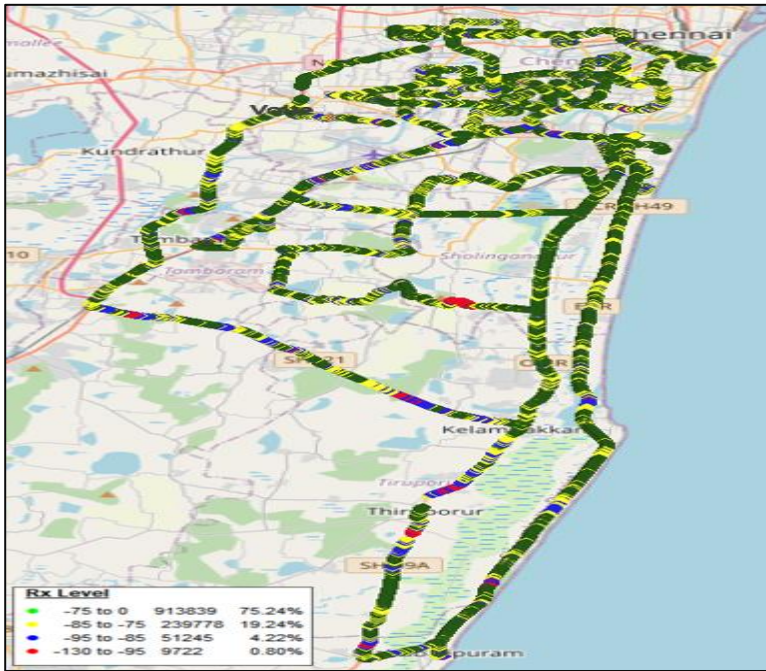
Streaming delay

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Average Initial Start Time (Sec)	NA	4.7	NA	1.3
Average Interruption time in Second	NA	0	NA	1.2

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Average Initial Start Time (Sec)	0.8	NA	2.4	0.8
Average Interruption time in Second	1.7	NA	0	0.7

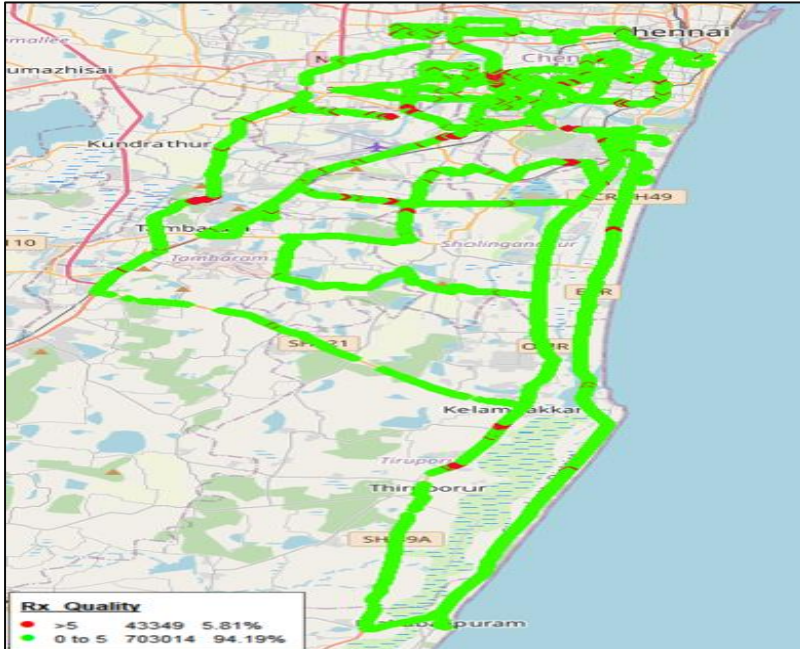
Service	Specifications
Download	2G (Locked) - 500KB ,3G (Dual)- 20 MB, 4G (Free)- 40MB
Upload	2G (Locked) - 100KB ,3G (Dual)- 5 MB, 4G (Free)- 10MB
Web browsing	3 links of e commerce websites https://www.amazon.in , https://www.flipkart.com , https://paytm.com .
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com .

Coverage plots – 2G (Rx level) ---- AIRTEL



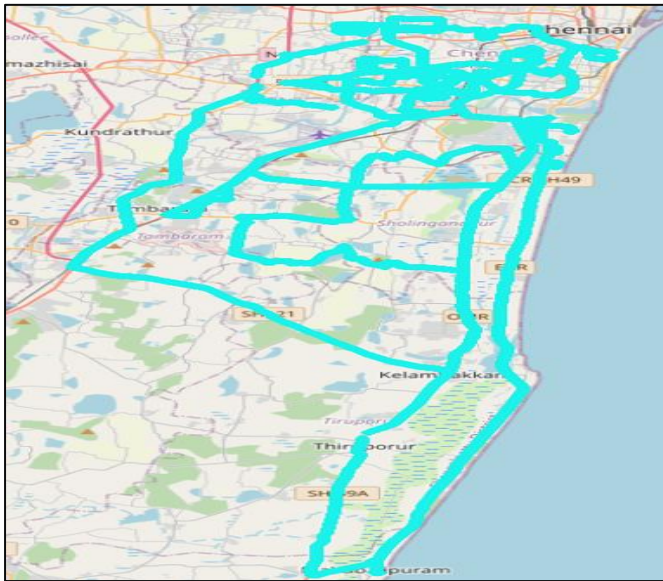
2G Rx level	Samples	Percentage
-75 to 0	913939	75.24
-85 to -75	239778	19.74
-95 to -85	51245	4.22
-130 to -95	9722	0.80

Quality plots- 2G (Rx quality) ---- AIRTEL



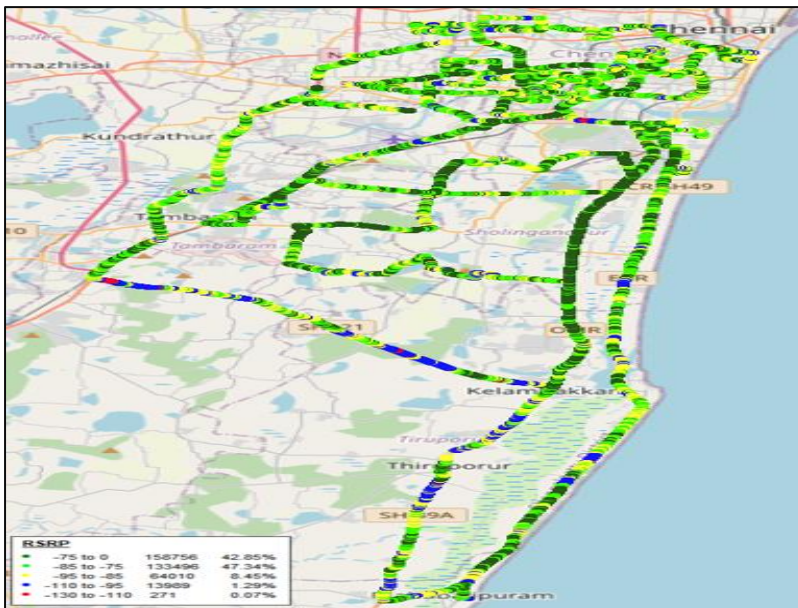
2G Rx Quality	Samples	Percentage
0 to 5	703014	94.19
>5	43349	5.81

2G Technological distribution map: Airtel



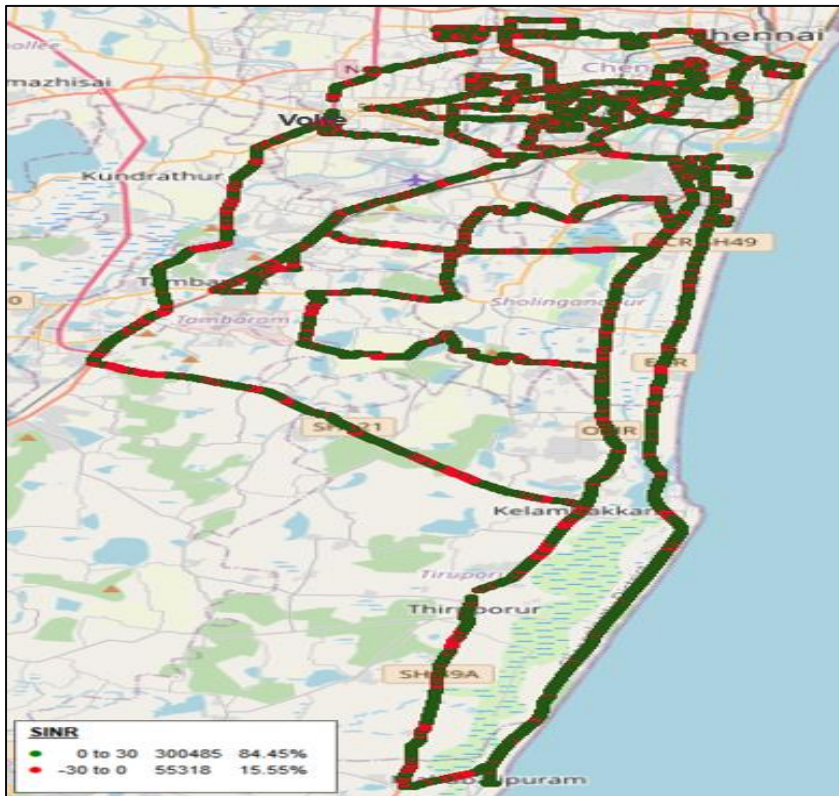
Technology	Time Spent on 2G (%)
Technology Distribution	100%

Coverage plots – VoLTE (4G RSRP) ----- AIRTEL



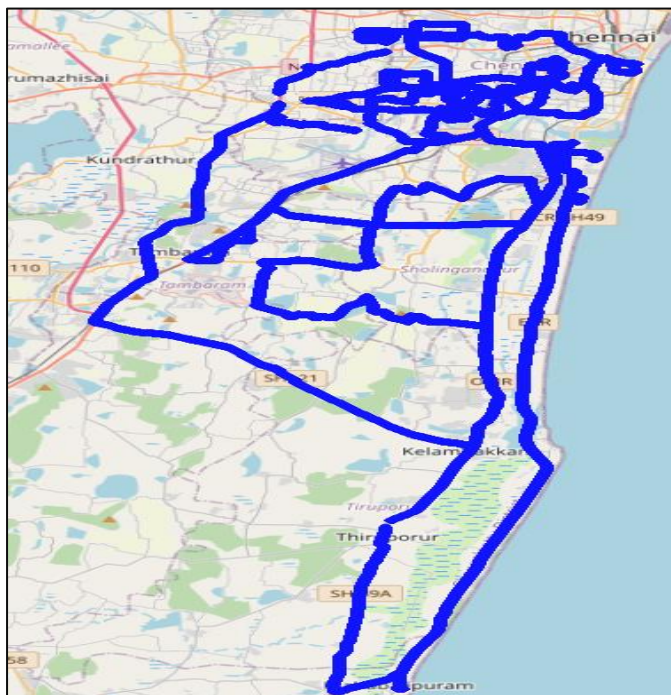
4G RSRP	Samples	Percentage
-75 to 0	158756	42.85
-85 to -75	133496	47.34
-95 to -85	64010	8.45
-110 to -95	13989	1.29
-130 to -110	271	0.07

Quality plots- VoLTE (4G SINR) ---- AIRTEL



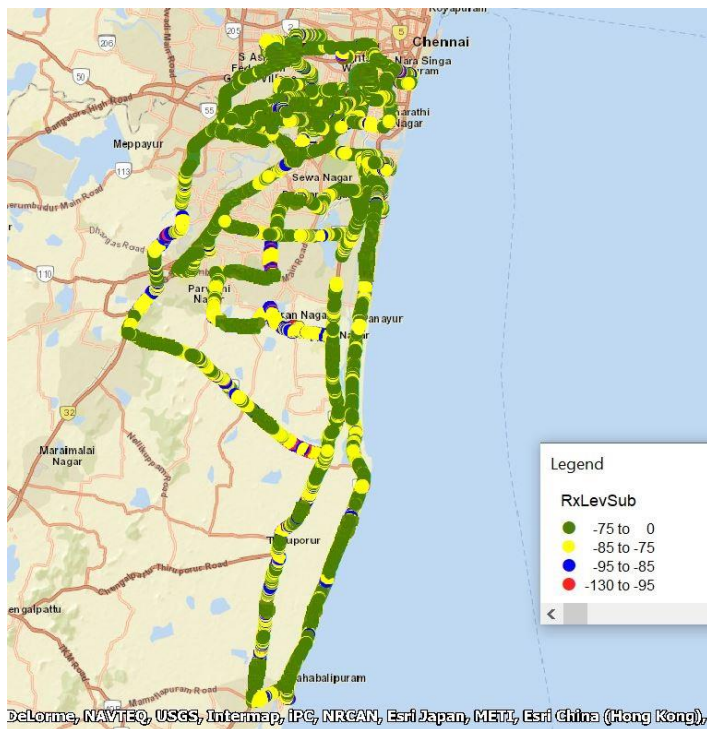
4G SINR	Samples	Percentage
0 to 30	300485	84.45
<0	55318	15.55

4G Technological distribution map: Airtel



Technology	Time Spent on 4G (%)
Technology Distribution	100%

Coverage plots (2G Rx Level) ---- BSNL



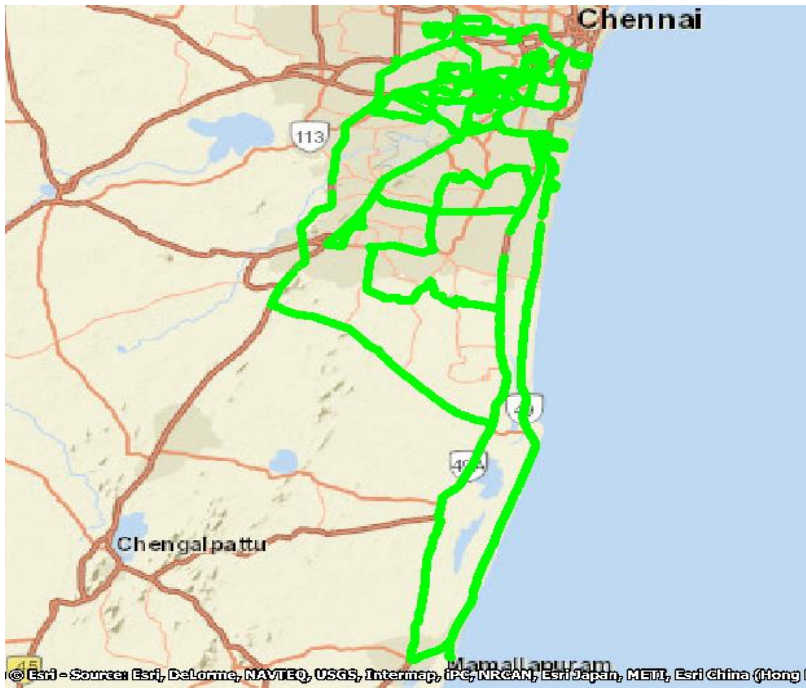
RX level	Samples	Percentage
0 to -75	229961	71.6%
-75 to -85	75306	23.4%
-85 to -95	13041	4.1%
-95 to -130	2934	0.9%

Quality plots (2G RX QUALITY): BSNL



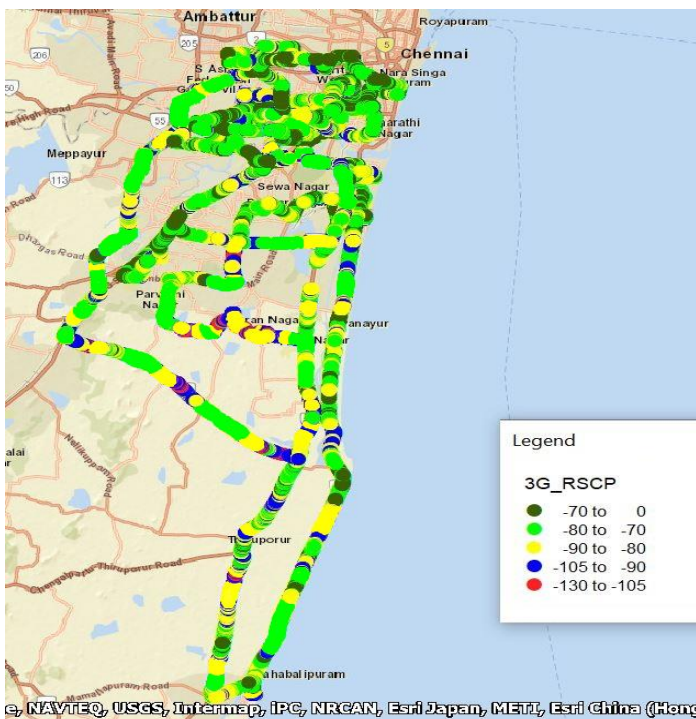
Rx Quality	Samples	Percentage
0 to 5	311412	96.94%
0 -to7	830	3.06%

2G Technological distribution map: BSNL



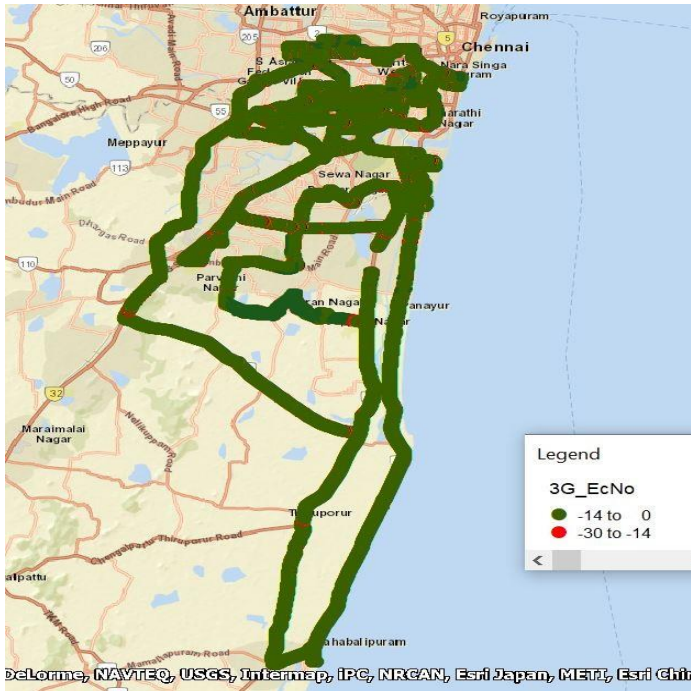
Technology	Time Spent on 2G (%)
GSM	100%(20.95 HOURS)

3G RX Level (RSCP): BSNL



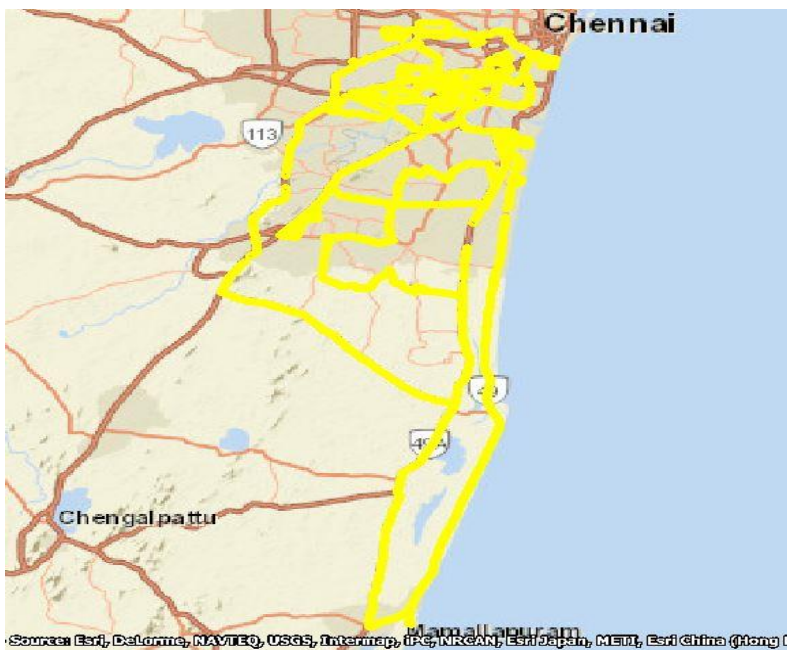
RX level 3G	Samples	Percentage
0 to -70	506729	40.31 %
-70 to -80	488034	38.82 %
-80 to -90	206066	16.4 %
-90 to-105	50383	4.01 %
-105 to-130	5847	0.46%

3G RX QUALITY (ECNO): BSNL



Rx Quality 3G	Samples	Percentage
0 to -14	1197063	95.2%
14 to-30	59996	4.8%

3G Technological distribution map: BSNL



Technology	Time Spent on 3G (%)
UMTS	100%(20.83 HOURS)

Rx Level (4G RSRP) : RJIL



4G RSRP	Total Samples	%
-75 to 0	29742	39.27
-85 to -75	23230	30.67
-95 to -85	14722	19.44
-110 to -95	7568	9.99
-130 to -110	488	0.64

LTE KPI PCell Serving RSRP[dBm]	
●	-75 <= x < 0 (39.27%, 29742)
●	-85 <= x < -75 (30.67%, 23230)
●	-95 <= x < -85 (19.44%, 14722)
●	-110 <= x < -95 (9.99%, 7568)
●	-130 <= x < -110 (0.64%, 488)

Rx Quality (4G SINR): RJIL



4G SINR	Total Samples	%
SINR>0	70429	92.98
SINR<=0	5321	7.02

LTE KPI PCell SINR[dB]	
●	0 < x (92.98%, 70429)
●	x <= 0 (7.02%, 5321)

4G Technological distribution map: RJIL



4G RSRP	Total Samples	%
-75 to 0	29742	39.27
-85 to -75	23230	30.67
-95 to -85	14722	19.44
-110 to -95	7568	9.99
-130 to -110	488	0.64

LTE KPI PCell Serving RSRP[dBm]	
●	-75 <= x < 0 (39.27%, 29742)
●	-85 <= x < -75 (30.67%, 23230)
●	-95 <= x < -85 (19.44%, 14722)
●	-110 <= x < -95 (9.99%, 7568)
●	-130 <= x < -110 (0.64%, 488)

Technology	Time Spent on 4G (%)
4G	100

Coverage plots (2G RX Level): VIL



RX level	Samples	Percentage
-75 <= x < 0	32590	80.4
-85 <= x < -75	7374	18.2
-95 <= x < -85	530	1.3
-130 <= x < -95	21	0.1

Quality plots (2G RX QUALITY): VIL



Rx Quality	Samples	Percentage
0 to 5	35397	99.54
6 to 7	162	0.46

2G Technological distribution map: VIL



Technology	Time Spent on 2G (%)
GSM	100%

Rx Level (3G RSCP) :VIL



RSCP level	Samples	Percentage
$-70 \leq x < 0$	28072	73.21
$-80 \leq x < -70$	7013	18.29
$-90 \leq x < -80$	2586	6.74
$-105 \leq x < -90$	672	1.75
$-130 \leq x < -105$	4	0.01

Rx Quality (3G EC/No): VIL



EC/No	Samples	Percentage
0 to -14	38060	99.14
-14 to -30	330	0.86

3G Technological distribution map:VIL



Technology	Time Spent on 3G (%)
3G	82.75%

Rx Level (4G RSRP): VIL



RSRP level	Samples	Percentage
$-75 \leq x < 0$	9964	24.63
$-85 \leq x < -75$	17692	43.74
$-95 \leq x < -85$	8975	22.19
$-110 \leq x < -95$	3712	9.18
$-130 \leq x < -110$	108	0.27

Rx Quality (4G SINR): VIL



4G SINR	Samples	Percentage
0 to 30	39336	97.27
-30 to 0	1103	2.73

4G Technological distribution map: VIL



Technology	Time Spent on 4G (%)
4G	99.71%

Data speed testing by "TRAI My Speed" App					
Hotspot	Network type	Airtel	BSNL	RJIL	VIL
Phoenix Mall	2G download in Mbps	0.25	0.14	NA	0.23
	2G upload in Mbps	0.14	0.02	NA	0.02
	3G download in Mbps	NA	2.01	NA	5.57
	3G upload in Mbps	NA	0.95	NA	3.06
	4G download in Mbps	17.29	NA	30.26	25.36
	4G upload in Mbps	21.44	NA	8.26	10.19
Airport, Meenambakkam	2G download in Mbps	0.25	0.15	NA	0.17
	2G upload in Mbps	0.17	0.08	NA	0.13
	3G download in Mbps	NA	1.15	NA	11.71
	3G upload in Mbps	NA	0.19	NA	5.02
	4G download in Mbps	33.11	NA	14.07	39.03
	4G upload in Mbps	4.04	NA	4.4	10.67
Bus Stand Koyambedu	2G download in Mbps	0.11	0.07	NA	0.24
	2G upload in Mbps	0.03	0.14	NA	0.17
	3G download in Mbps	NA	2.02	NA	7.85
	3G upload in Mbps	NA	2.21	NA	3.52
	4G download in Mbps	13.61	NA	23.2	46.5
	4G upload in Mbps	6.67	NA	6.61	10.6
KMC Hospital	2G download in Mbps	0.19	0.19	NA	0.24
	2G upload in Mbps	0.16	0.11	NA	0.17
	3G download in Mbps	NA	2.28	NA	12.33
	3G upload in Mbps	NA	2.72	NA	3.93
	4G download in Mbps	23.56	NA	13.94	26.21
	4G upload in Mbps	9.2	NA	7.75	24.18
Railway Station Egmore	2G download in Mbps	0.23	0.12	NA	0.12
	2G upload in Mbps	0.15	0.13	NA	0.15
	3G download in Mbps	NA	2.74	NA	10.9
	3G upload in Mbps	NA	0.78	NA	4.85
	4G download in Mbps	24.76	NA	44.99	42.89
	4G upload in Mbps	6.78	NA	10.18	24.89

Information of Test number used for drive test

TSP		Calling number	Called number
Airtel	Voice 2G	7397422636	57321
	Voice VoLTE	7397422646	57321
	Data 2G	7397422646	-
	Data LTE	7397422646	-
BSNL	Voice 2G	9444018528	334455
	Voice 3G	9445022435	334455
	Data 2G	9444018528	334455
	Data 3G	9445022435	334455
RJIL	Voice VoLTE	56287	6380753544
	Data LTE		6380753544
VIL	Voice 2G	8939833785	9884011090
	Voice 3G	7824038460	9884011090
	Voice VOLTE	7824038267	9884011090
	Data 2G	9176001932	
	Data 3G	9176001932	
	Data LTE	9176001932	

Observations:

1. All TSPs have met the benchmarks with reference to DCR (2%) and CBR(3%) parameters.
2. The following TSPs have not met the Rx Quality (must be >= 95%) with reference their Networks.
 - a) Airtel for 2G network is 94.19%
 - b) Airtel for 4G network is 84.45%
 - c) BSNL for 3G network is 94.64%
 - d) RJio for 4Gnetwork is 92.98%