



TELECOM REGULATORY AUTHORITY OF INDIA
Regional Office – Hyderabad

Operator Assisted Drive Test (OADT)
Hyderabad City

OADT for Voice - 16th, 17th and 18th March 2021

OADT for Data – 19th March 2021

The Operator Assisted Drive Test (OADT) has been carried out by TRAI in Hyderabad City & adjoining areas from 9:00 AM to 9:00 PM; 16th March to 19th March 2021. The drive test covered an drive route of 407 KMs & 5 Hotspot 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

- 1 Rajiv Gandhi International Airport (RGIA), Shamshabad
- 2 Mahatma Gandhi Bus Station (MGBS)
- 3 Osmania University Campus
- 4 Secunderabad Railway station
- 5 Prasad IMAX Multiplex

Technology	Airtel	BSNL	JIO	VIL
2G	Y	Y	N	Y
3G	Y	Y	N	N
4G	Y	N	Y	Y
Tools used	TEMS Investigation 22.3	AGILENT 16.2	X-CIL Version 4.09.601	TEMS Investigation 19.2.3

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 and as per the instructions of TRAI HQ, TRAI Regional Office Hyderabad has conducted the drive test with the help of telecom Service Providers of AP LSA (Hyderabad) from 16th March 2021 to 19th March 2021 covering various locations in Hyderabad City & surrounding region. The performance of Airtel, BSNL, Vodafone Idea Limited (VIL) and Jio were monitored across various technologies (2G, 3G, and 4G). The drive test route was defined on the basis of 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 Hyderabad:

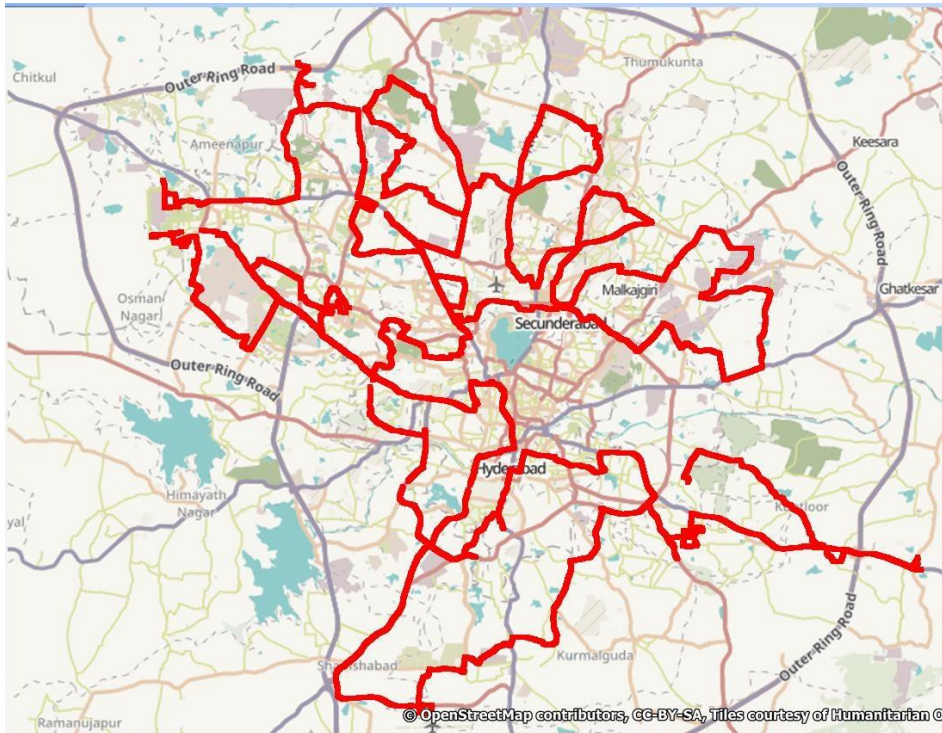
Operator Assisted Drive Test (OADT) was conducted for a period of 4 working days from 16th March to 19th March 2021 in Hyderabad City & Surrounding areas from 9:00 AM to 9:00 PM. Calls were made for 90 sec duration with wait time of 10 sec between call in all technologies.

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

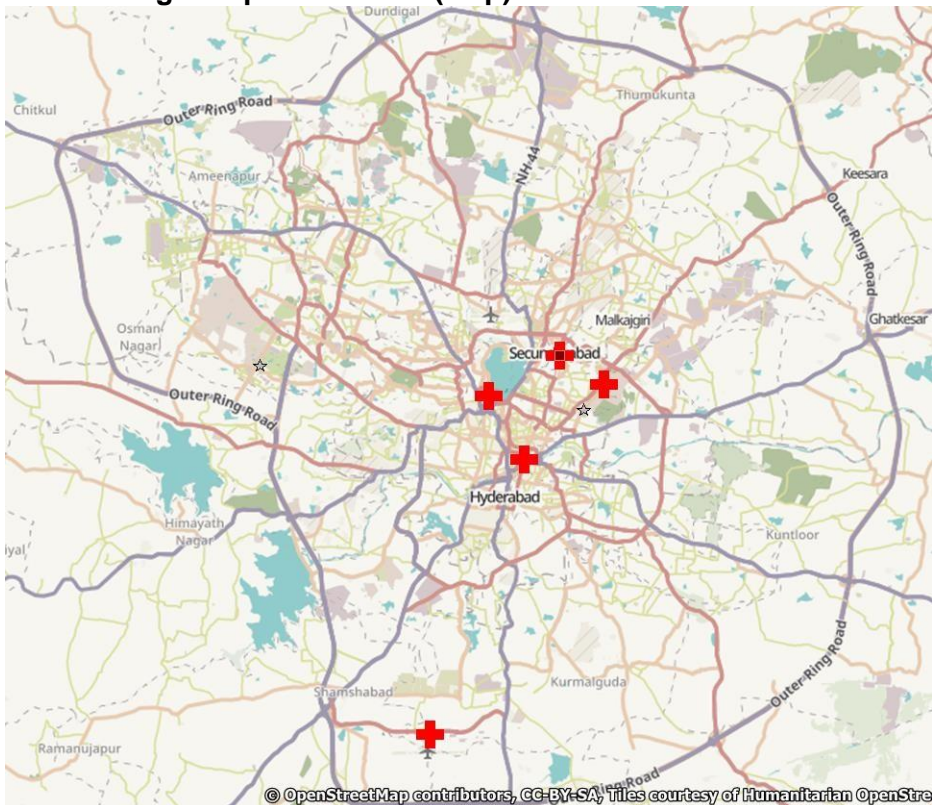
Data Tests: Data Tests were performed at 5 static locations for one day on 19th March 2021: Three 2G (Lock Mode) networks, Two 3G (Dual Mode) networks, Three LTE (Free mode) networks covering 4 unique TSPs were tested.

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	0.15	0.15
BSNL	NA	1.90	1.18
JIO	0.35	NA	NA
VIL	1.05	NA	0.28

Block call Rate % (Benchmark <= 3%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0.15	0	0
BSNL	NA	2.3	1.90
JIO	-	NA	NA
VIL	0.90	NA	0.42

Technology	Parameter	Airtel	BSNL	JIO	VIL
2G	SDCCH Congestion (<=1%)	0	0.254	NA	-
	TCH Congestion (<=2%)	0	1.652	NA	-
3G	CSFB Failure %	0	0	NA	NA
	SDCCH Congestion %	0	0.15	NA	NA
	RRC Congestion %	0	0.356	NA	NA
	SDCCH and RRC Congestion % (<=1%)	0	0.506	NA	NA
	TCH Congestion %	0	0.52	NA	NA
	RAB Congestion %	0	1.169	NA	NA
	TCH and RAB Congestion % (<=2%)	0	1.689	NA	NA

Coverage

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

TSP	Airtel	BSNL	JIO	VIL
Coverage %	89.9	95.1	NA	91.42

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

TSP	Airtel	BSNL	JIO	VIL
Coverage %	82.87	84.7	NA	NA

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

TSP	Airtel	BSNL	JIO	VIL
Coverage %	98.71	NA	97.55	97.48

4. Percentage of time spent on 3G Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	92.70	85.02	NA	NA

5. Percentage of time spent on VoLTE Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	100	NA	100	98.922

6. Percentage of RLT >= 48

TSP	Airtel	BSNL	JIO	VIL
Percentage of RLT >=48	0	0	NA	0

7. Average CST in seconds

TSP	Airtel	BSNL	JIO	VIL
2G network	3.2	2.483	NA	3.06
3G network	3.1	2.333	NA	NA
VoLTE Network	0.8	NA	1.29	0.69

Voice call summary

TSP (2G)	Airtel	BSNL	JIO	VIL
Call attempts	679	787	NA	713
Block call rate %	0	1.90	NA	0.42
CSSR %	100	98.06	NA	99.58
Drop call rate %	0.15	1.18	NA	0.28
Mobility HOSR %	99.61	98.31	NA	95.77
RX Quality %	96.29	96.4	NA	95.41

TSP (3G)	Airtel	BSNL	JIO	VIL
Call attempts	674	592	NA	NA
Block call rate %	0	2.3	NA	NA
CSSR %	100	97.7	NA	NA
Drop call rate %	0.15	1.9	NA	NA
Mobility HOSR %	100	100	NA	NA
RX Quality %	95.22	94.3	NA	NA

TSP (VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	646	NA	566	668
Block call rate %	0.15	NA	NA	0.90
CSSR %	99.85	NA	98.40	99.10
Drop call rate %	0	NA	0.35	1.05
Mobility HOSR %	100	NA	99.03	99.55
RX Quality %	85.57	NA	93.6	77.95

Data Service Static (on Hotspots)

Hotspot Location -1 (Rajiv Gandhi International Airport (RGIA), Shamshabad)

TSP (2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	178.79	210.56	NA	223
Upload Throughput in Kbps	84.27	46.62	NA	78.59
Web browsing delay in second	35.78	15.16	NA	36.03
Latency in (msec)	317	247	NA	293.33

TSP (3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	7.11	2.612	NA	NA
Upload Throughput in Mbps	2.67	2.315	NA	NA
Video streaming delay in sec	0	4	NA	NA
Web browsing delay in second	3.43	5.32	NA	NA
Latency in (msec)	84.07	77	NA	NA

TSP (LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	12.03	NA	11.87	15.9
Upload Throughput in Mbps	4.18	NA	4.63	6.4
Video streaming delay in sec	0	NA	NA	0.66
Web browsing delay in second	2.02	NA	4.4	2.09
Latency in (msec)	38.30	NA	68	114

Hotspot Location -2 (Mahatma Gandhi Bus Station (MGBS))

TSP (2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	163.17	262.80	NA	167.01
Upload Throughput in Kbps	79.65	73.14	NA	141.25
Web browsing delay in second	37.67	23.88	NA	35.73
Latency in (msec)	233.97	331	NA	353.66

TSP (3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	4.49	3.725	NA	NA
Upload Throughput in Mbps	2.45	2.546	NA	NA
Video streaming delay in sec	0	4	NA	NA
Web browsing delay in second	3.76	3.680	NA	NA
Latency in (msec)	74.32	81	NA	NA

TSP (LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	9.66	NA	20.96	11.6
Upload Throughput in Mbps	3.08	NA	7.3	18.9
Video streaming delay in sec	0	NA	NA	0.79
Web browsing delay in second	2.45	NA	7.9	2.18
Latency in (msec)	34.12	NA	74	62

Hotspot Location -3 (Osmania University Campus)

TSP (2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	182.74	117.27	NA	251.49
Upload Throughput in Kbps	28.17	33.6	NA	153.60
Web browsing delay in second	36.32	22.47	NA	33.76
Latency in (msec)	287.62	244	NA	295.66

TSP (3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.3	NA	NA
Upload Throughput in Mbps	NA	4.65	NA	NA
Video streaming delay in sec	NA	5	NA	NA
Web browsing delay in second	NA	4.69	NA	NA
Latency in (msec)	NA	136	NA	NA

TSP (LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	10.29	NA	30.87	18.1
Upload Throughput in Mbps	4.95	NA	6.24	18.7
Video streaming delay in sec	0	NA	NA	0.60
Web browsing delay in second	1.69	NA	6.5	2.01
Latency in (msec)	45.41	NA	61	75.66

Hotspot Location -4 (Secunderabad Railway Station)

TSP (2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	166.09	111.30	NA	264.23
Upload Throughput in Kbps	24.73	42.4	NA	148.24
Web browsing delay in second	39.13	22.32	NA	35.49
Latency in (msec)	94.39	201.66	NA	287

TSP (3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	4.01	2.447	NA	NA
Upload Throughput in Mbps	2.45	1.574	NA	NA
Video streaming delay in sec	0	5	NA	NA
Web browsing delay in second	4.63	5.57	NA	NA
Latency in (msec)	94.44	69.16	NA	NA

TSP (LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	12.27	NA	28.22	9.3
Upload Throughput in Mbps	11.50	NA	7.6	17.2
Video streaming delay in sec	0	NA	NA	0.60
Web browsing delay in second	1.92	NA	7.9	2.11
Latency in (msec)	41.30	NA	83	122

Hotspot Location -5 (Prasad IMAX Multiplex)

TSP (2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	186.55	84.97	NA	198.64
Upload Throughput in Kbps	78.71	34.64	NA	127.37
Web browsing delay in second	27.53	22.40	NA	33.88
Latency in (msec)	79.53	261.33	NA	412.0

TSP (3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	4.72	3.30	NA	NA
Upload Throughput in Mbps	2.74	1.818	NA	NA
Video streaming delay in sec	0	4	NA	NA
Web browsing delay in second	4.40	4.18	NA	NA
Latency in (msec)	82.2	92.16	NA	NA

TSP (LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	8.13	NA	31.81	21.1
Upload Throughput in Mbps	1.82	NA	4.45	12.4
Video streaming delay in sec	0	NA	NA	0.65
Web browsing delay in second	3.30	NA	7.8	2.05
Latency in (msec)	35.36	NA	72	88.33

Summary Data report static

TSP (2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	175.47	157.38	NA	220.87
Upload Throughput in Kbps	59.11	46.08	NA	129.81
Web browsing delay in second	35.29	21.246	NA	34.97
Latency in (msec)	202.50	256.983	NA	337.93

TSP (3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	5.08	3.068	NA	NA
Upload Throughput in Mbps	2.58	2.58	NA	NA
Video streaming delay in sec	0	4.4	NA	NA
Web browsing delay in second	4.05	4.69	NA	NA
Latency in (msec)	83.76	91.06	NA	NA

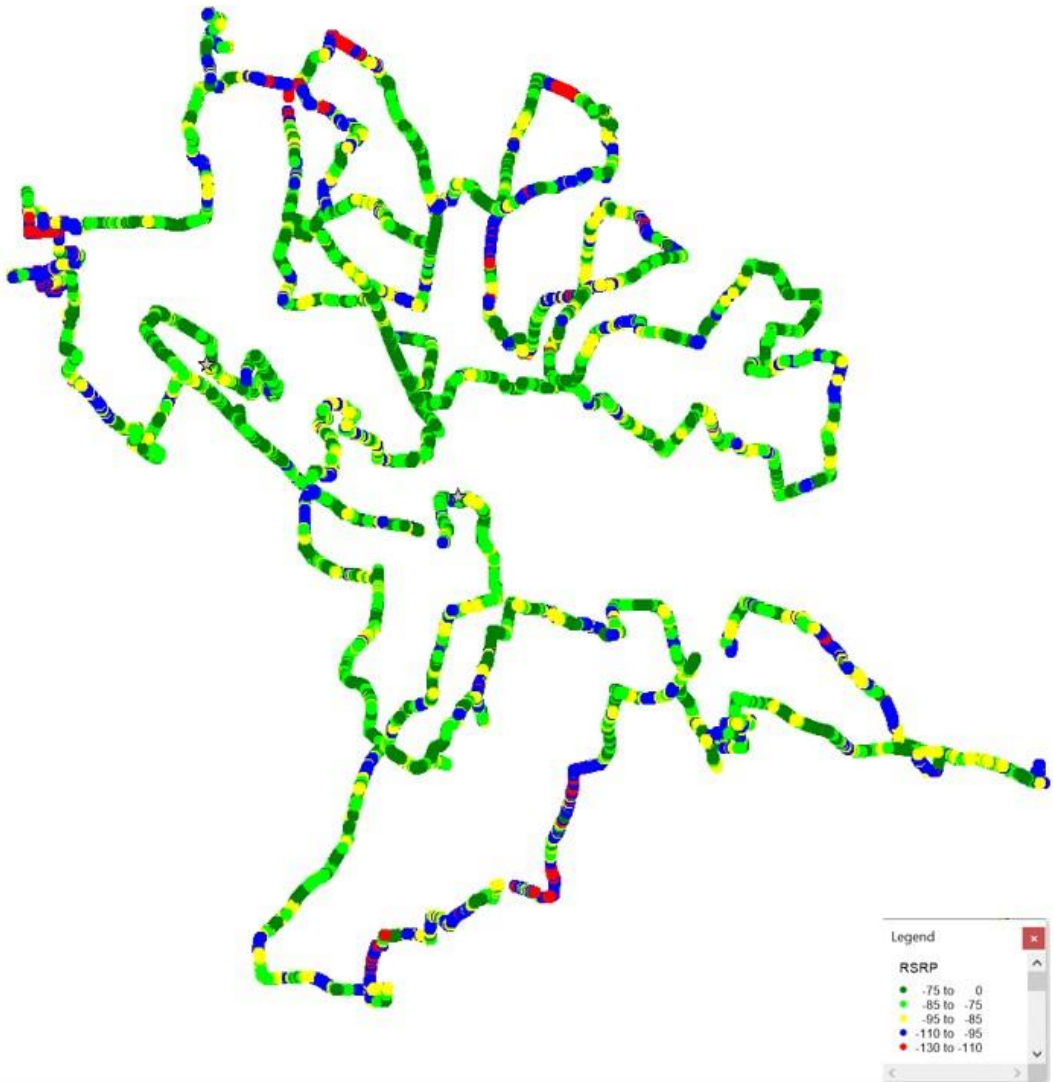
TSP (LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	10.48	NA	24.74	15.07
Upload Throughput in Mbps	5.11	NA	6.04	14.72
Video streaming delay in sec	0	NA	NA	0.66
Web browsing delay in second	2.27	NA	7.6	2.08
Latency in (msec)	38.90	NA	71	92.4

Streaming delay

TSP (3G)	Airtel	BSNL	JIO	VIL
Average Initial Start Time (Sec)	1.0	4.4	NA	NA
Average Interruption time in Second	0	0	NA	NA

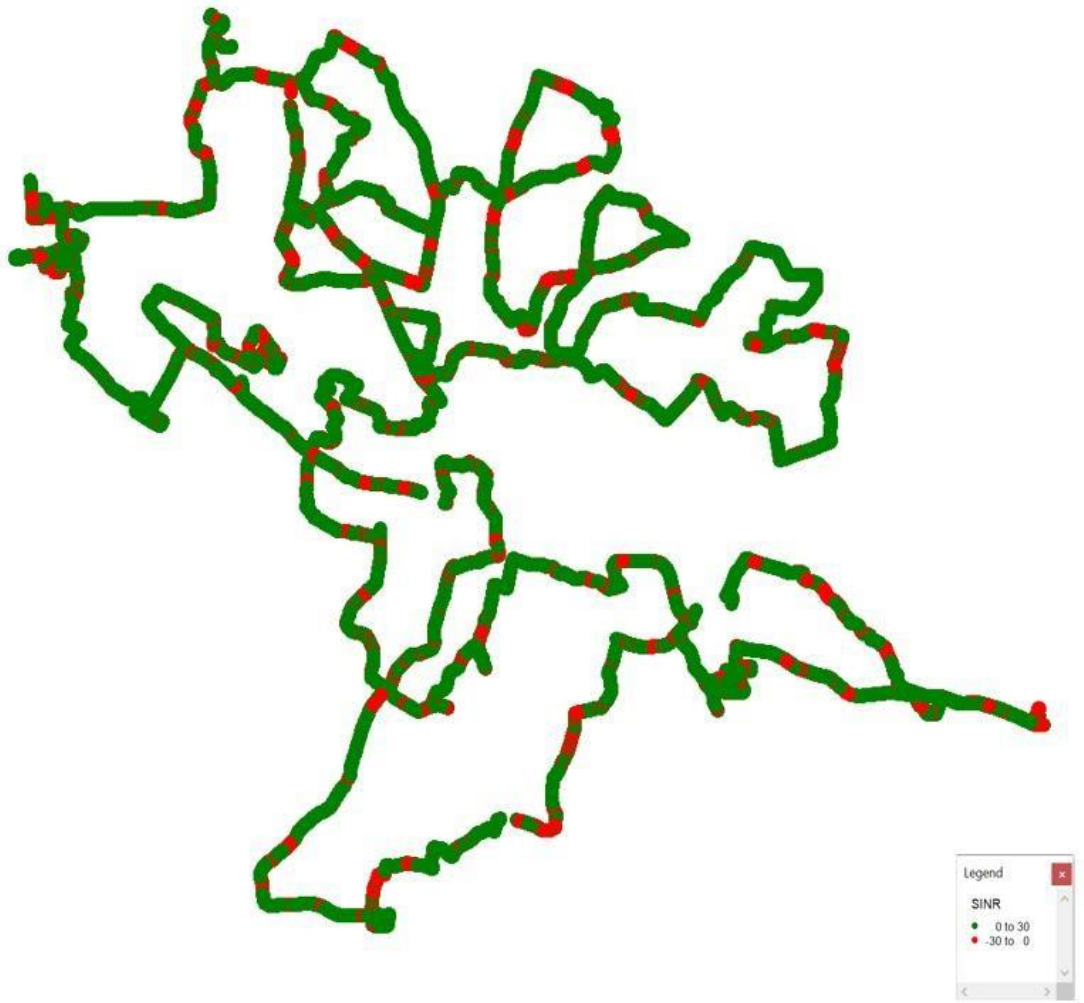
TSP (LTE)	Airtel	BSNL	JIO	VIL
Average Initial Start Time (Sec)	0.5	NA	NA	0.12
Average Interruption time in Second	0	NA	NA	0

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



RSRP	Total Samples	%
0 to -75	3925725	30%
-75 to -85	4758488	36%
-85 to -95	2638081	20%
-95 to -110	1805735	14%
-110 to -130	171152	1%

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



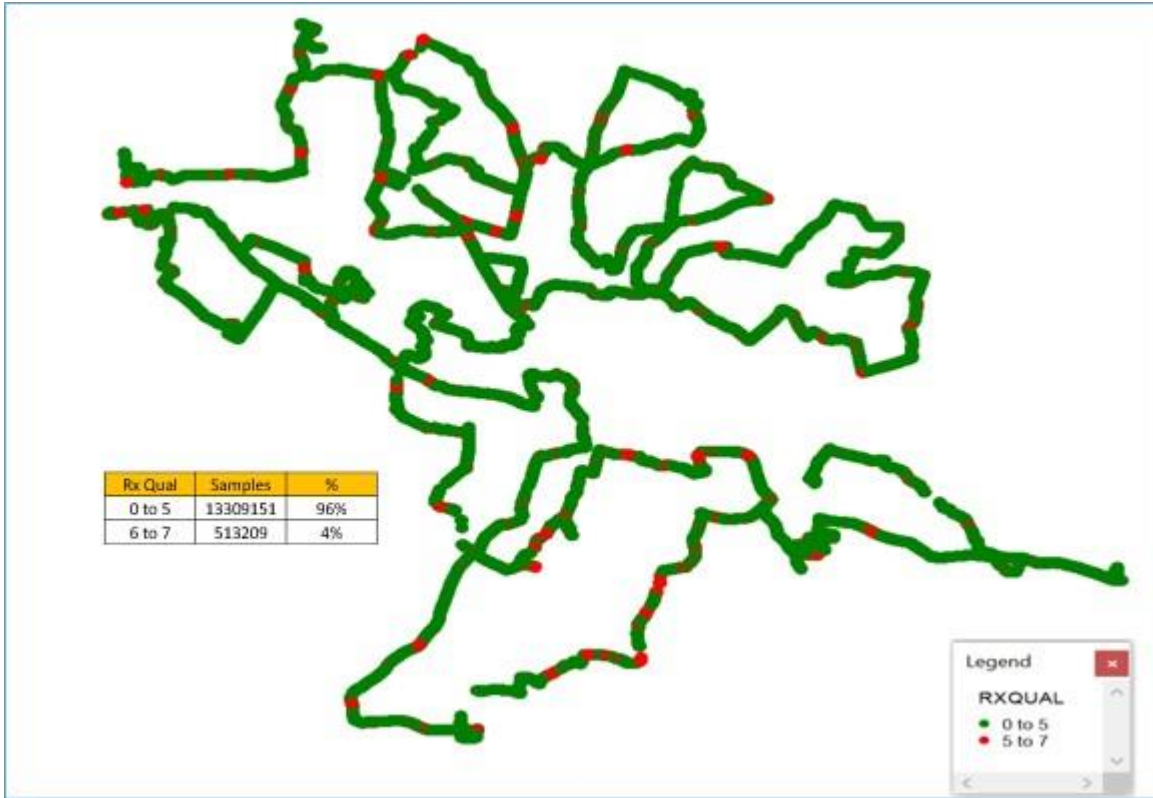
SINR	Total Samples	%
SINR>0	11468148	86%
SINR<=0	1933263	14%

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

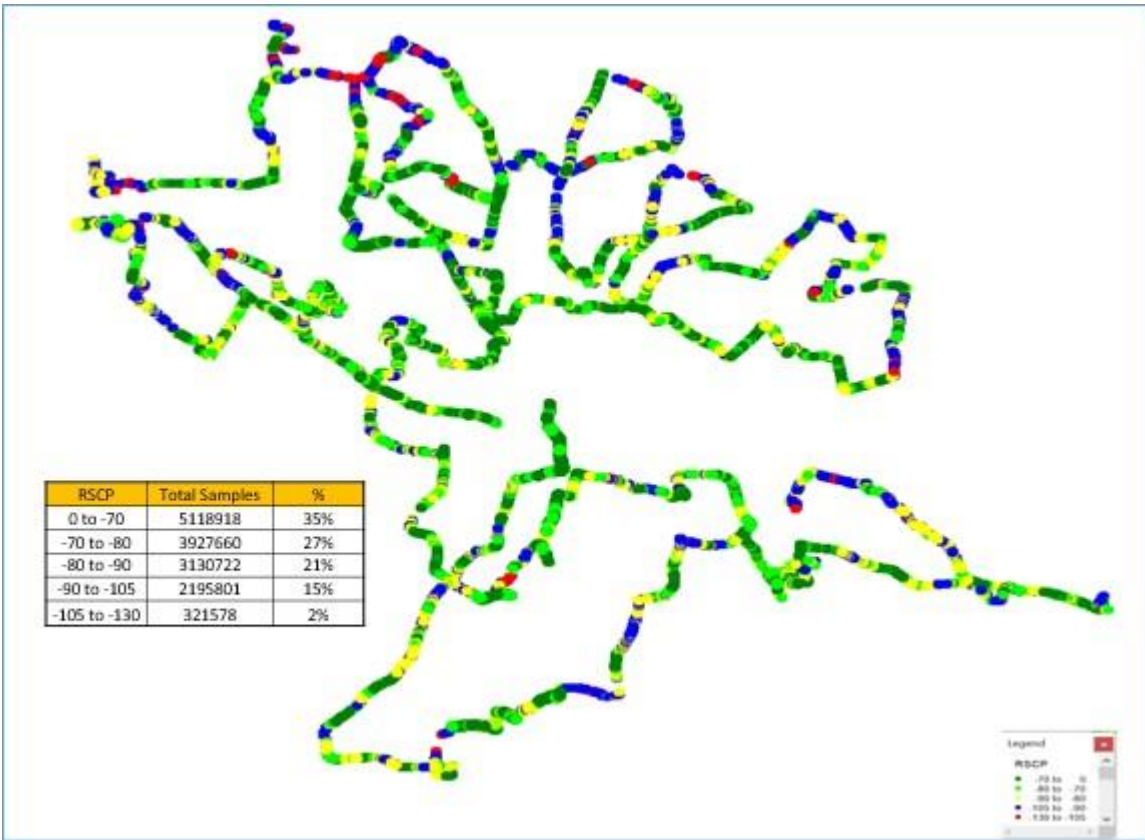


Rxlevel	Samples	%
0 to -75	10218246	64%
-75 to -85	4140165	26%
-85 to -95	1439493	9%
-95 to -130	174957	1%

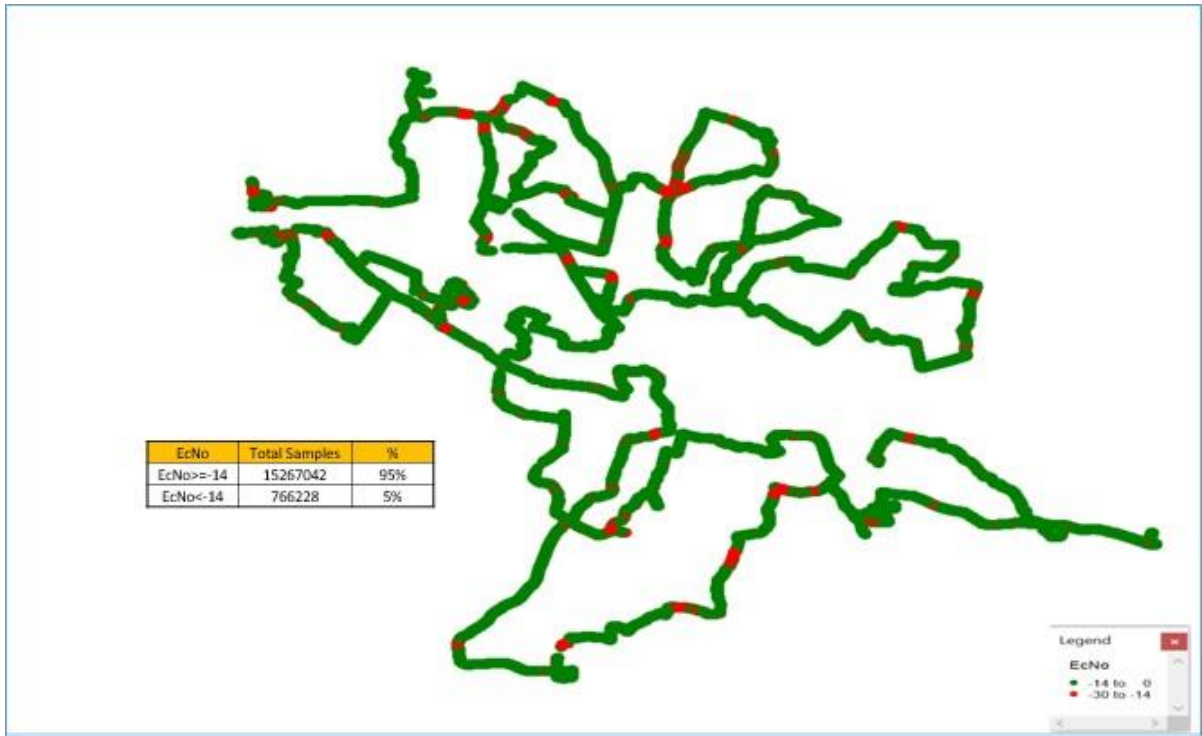
Quality plots- 2G(Rx quality)----- AIRTEL



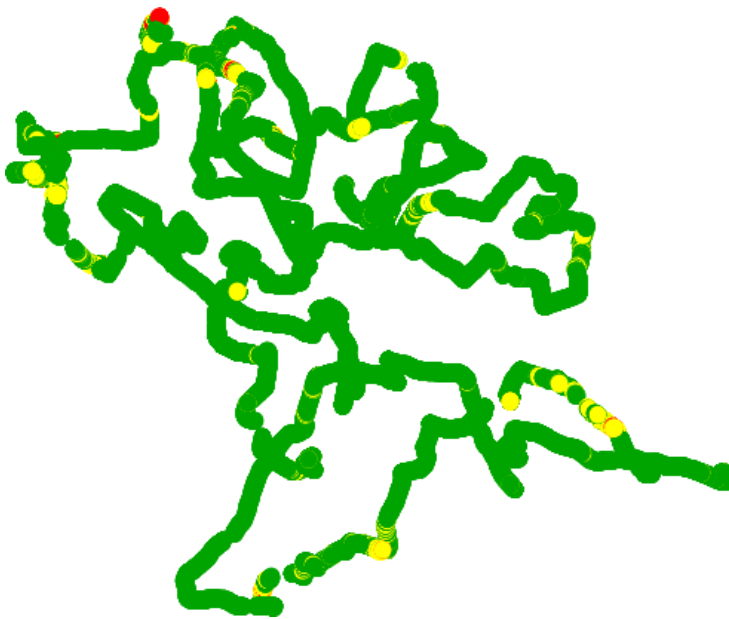
Coverage plots – 3G(RSCP) ---- AIRTEL






Quality plots- 3G(ECNO)----- AIRTEL





2G Rx Level Map----- BSNL



SuperStream001 TRAI 2G-ServRxLevSub (dBm)	
	Below -95 (152) 0.2%
	>= -95 to < -85 (2710) 4.4%
	Above -85 (58201) 95.3%

2G Rx Quality Map ---- BSNL



SuperStream001 TRAI 2G-ServRxQualSub (RxQual)	
	Below 6 (58902) 96.5%
	Above 6 (2161) 3.5%

3G Mobile Level Map----- BSNL



SuperStream001 TRAI 3G-Uu_ActiveSet_RSCP_0 (dBm)	
Below -105.00	(1003) 1.6%
>= -105.00 to < -90.00	(8388) 13.8%
Above -90.00	(51499) 84.6%

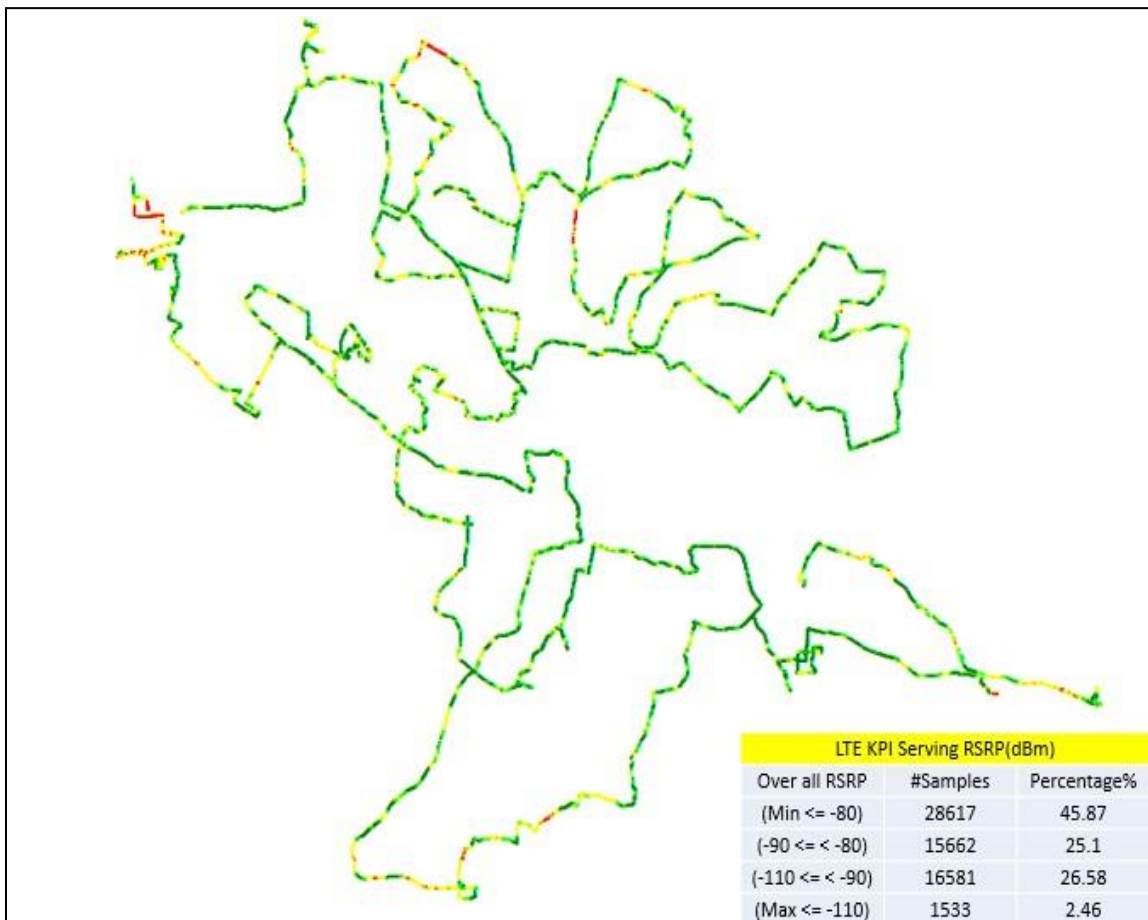
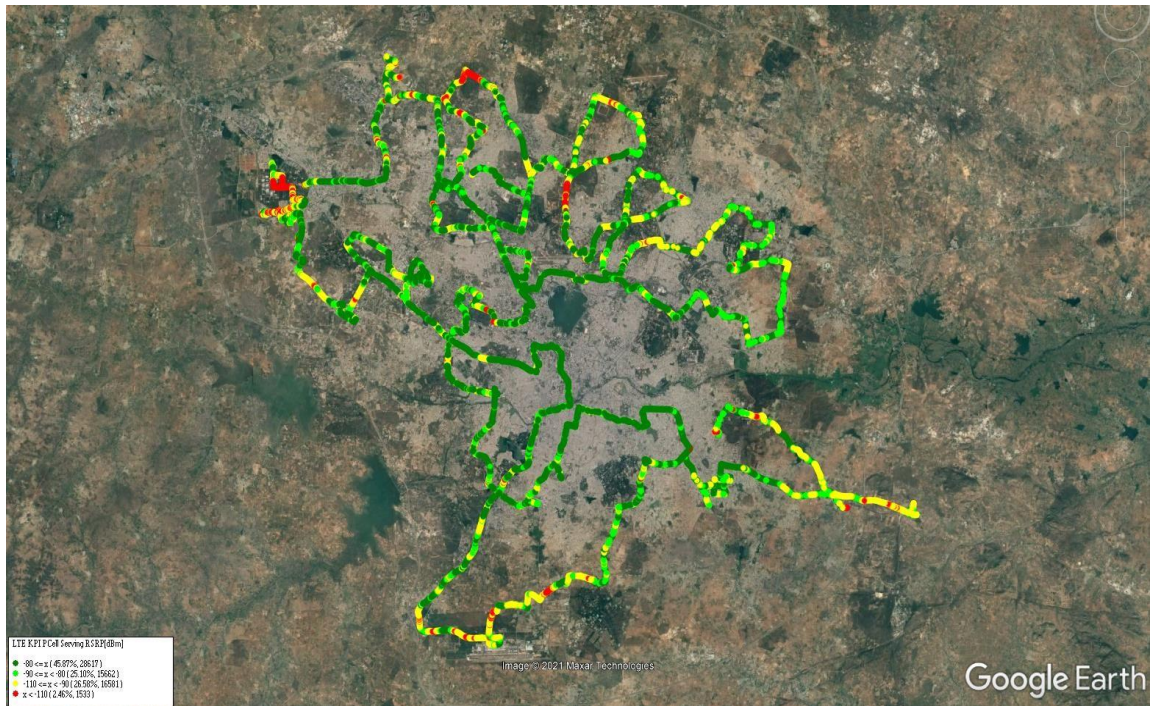
3G Mobile Quality Map----- BSNL



SuperStream001 TRAI 3G-Uu_ActiveSet_EcNo_0 (dB)	
Below -15.00	(3502) 5.8%
Above -15.00	(57388) 94.2%

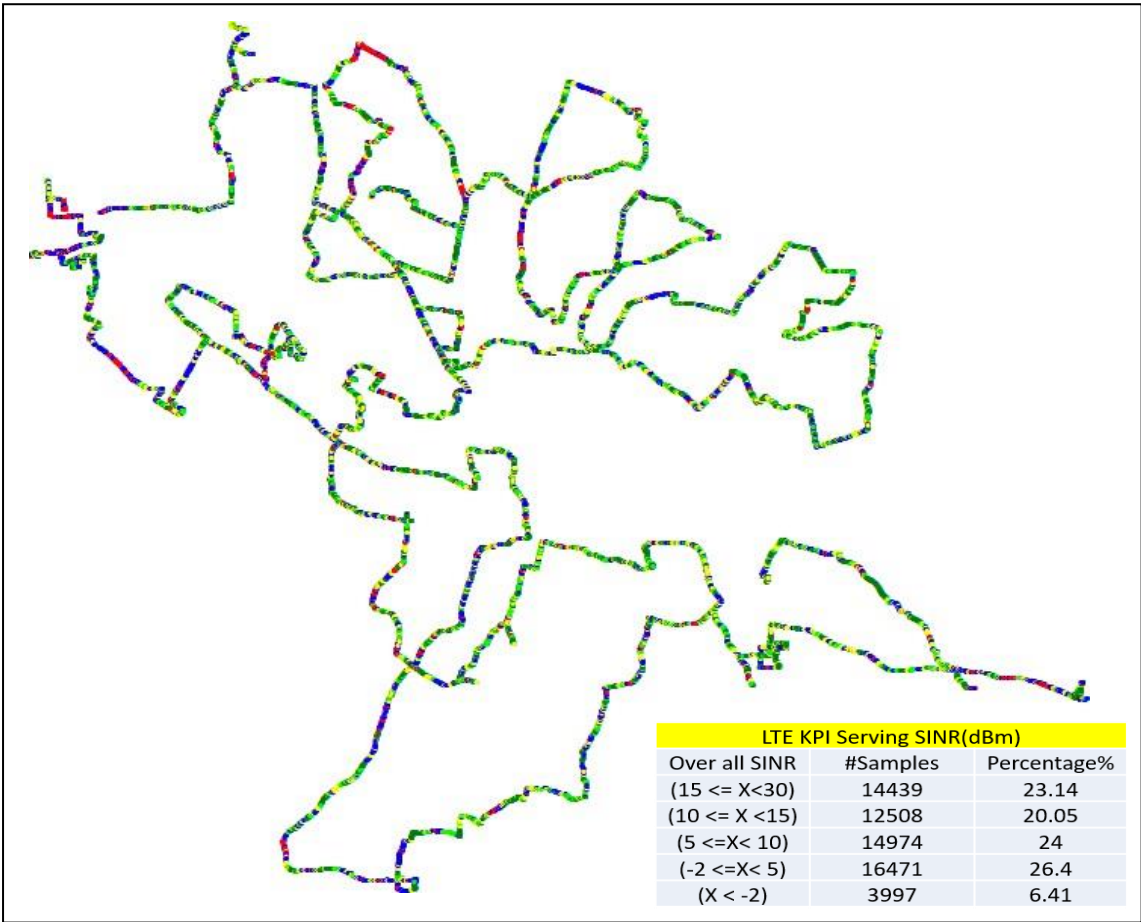
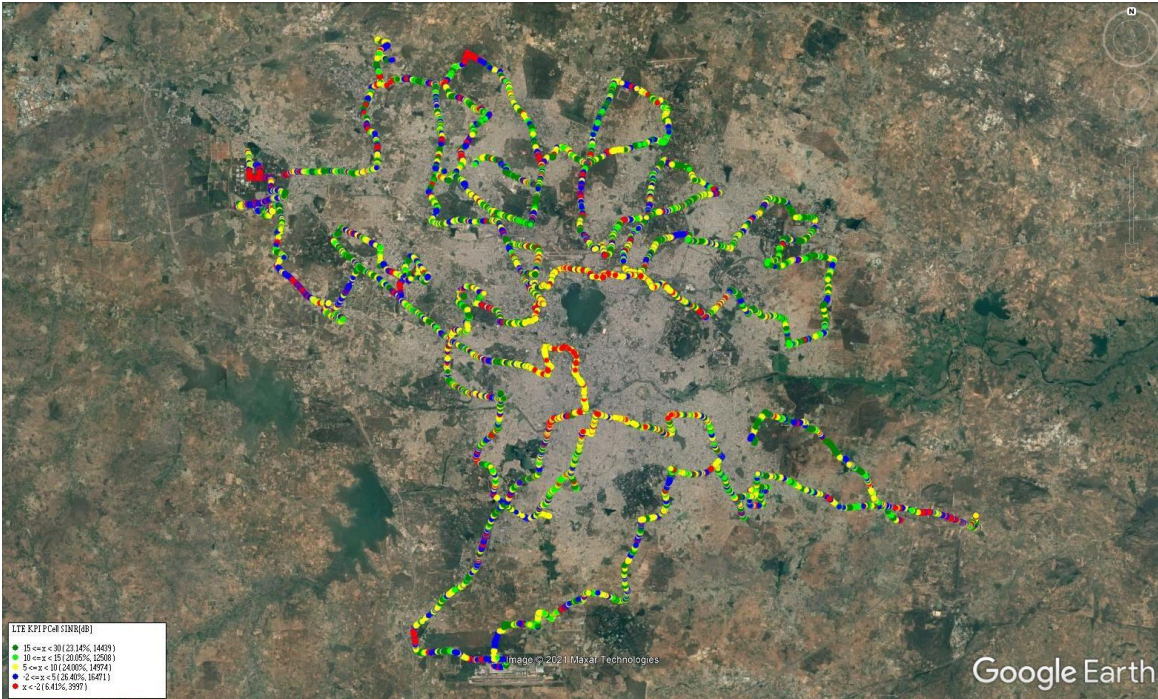
Coverage plots

VoLTE (Free) -----RELIANCE JIO



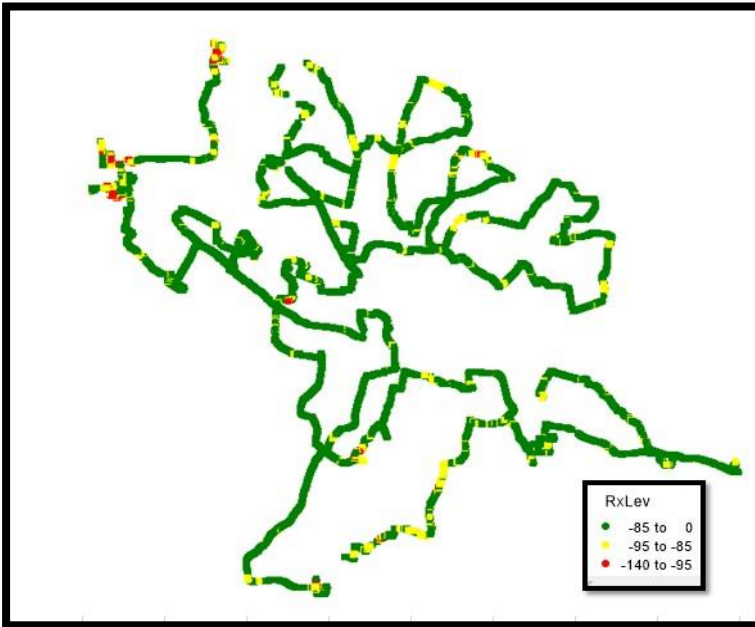
Quality plots

VoLTE (Free) -----RELIANCE JIO



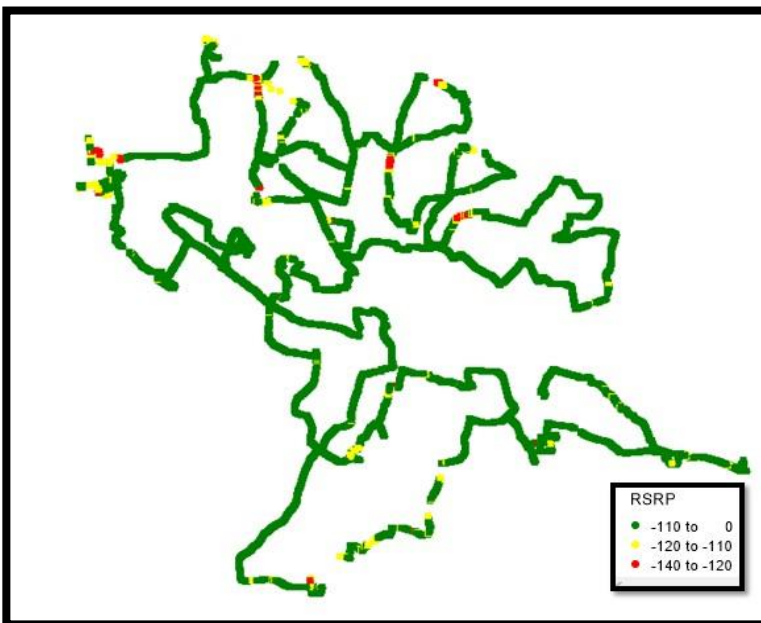
Coverage plots:

2G RX Level-----VODAFONE IDEA



RX level	Samples	Percentage
0 to -85	6096076	91.42
-85 to -95	516006	7.74
-95 to -120	55837	0.84
total	6667919	100

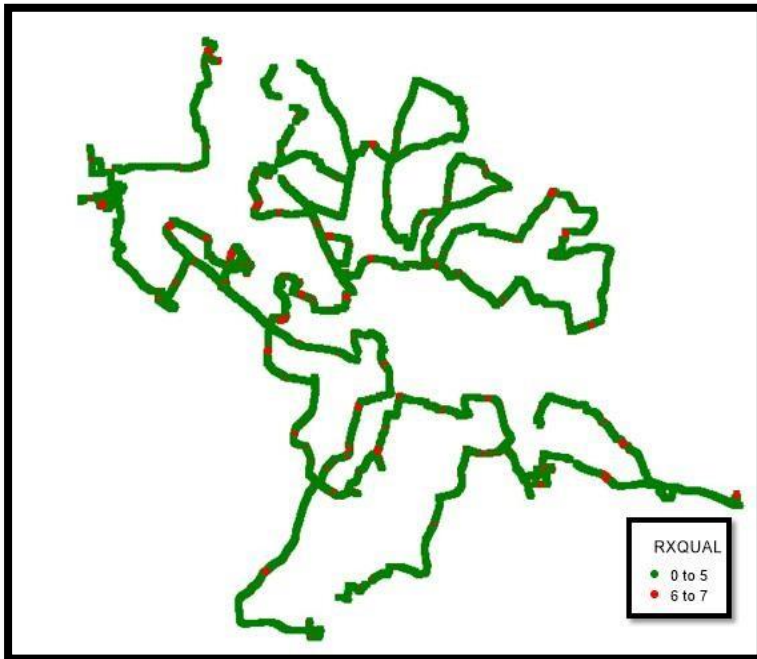
4G RSRP-----VODAFONE IDEA



4G RSRP	Samples	Percentage
0 to- 110	18673029	97.48
-110 to -120	443936	2.32
-120 to -140	38686	0.20
total	19155651	100.00

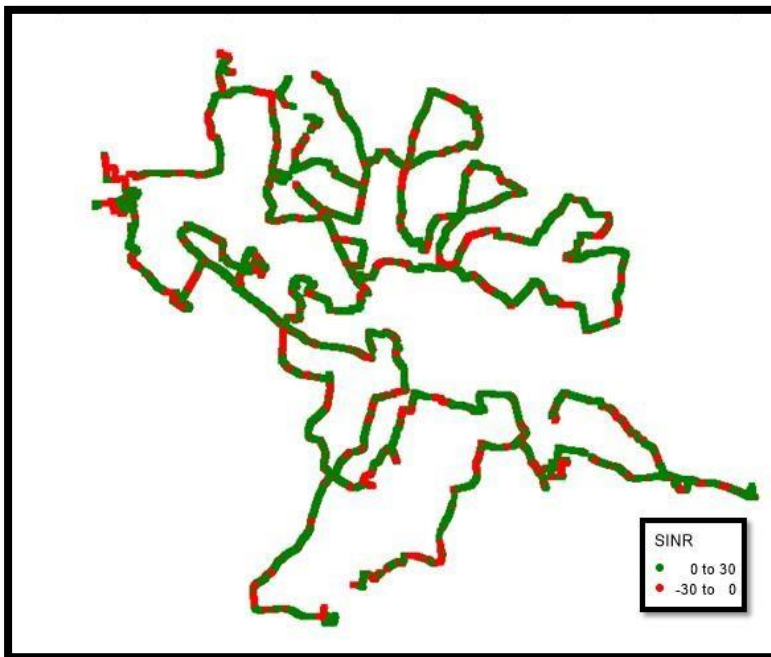
Quality plots:

2G RX QUALITY ---- VODAFONE IDEA



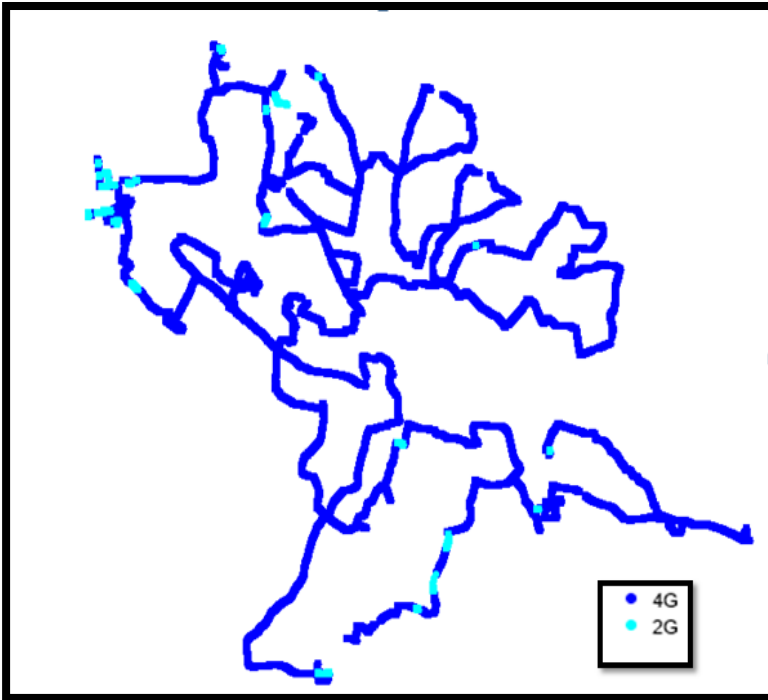
Rx Quality	Samples	Percentage
0 to 5	6440035	95.41
6 to 7	309573	4.59
total	6749608	100

4G SINR -----VODAFONE IDEA



4G SINR	Samples	Percentage
0 to 30	15005354	77.95
-30 to 0	4244508	22.05
total	19249862	100.00

4G Technological distribution map ---- VODAFONE IDEA



Technology	Time Spent on 4G (%)
Dual (4G/2G)	98.922

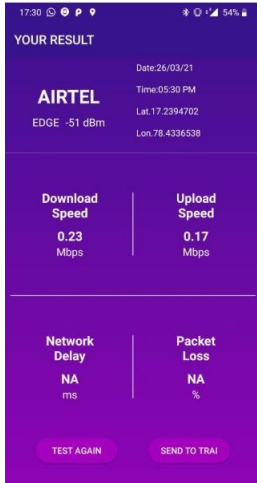
Data speed testing by "TRAI MySpeed" App					
Hotspot	Network type	Airtel	BSNL	Rjio	VIL
Rajiv Gandhi International Airport (RGIA), Shamshabad	2G download in Mbps	0.23			0.23
	2G upload in Mbps	0.17			0.11
	3G download in Mbps	9	2.93		
	3G upload in Mbps	1.36	0.93		
	4G download in Mbps	25.4		19.64	32.68
	4G upload in Mbps	5.93		7.86	9.05
Mahatma Gandhi Bus Station	2G download in Mbps	0.27			0.15
	2G upload in Mbps	0.19			0.14
	3G download in Mbps	12.53	2.81		
	3G upload in Mbps	1.33	3.07		
	4G download in Mbps	37.28		15.42	11.89
	4G upload in Mbps	26.45		2.88	23.86
Osmania University Campus	2G download in Mbps	0.2			0.26
	2G upload in Mbps	0.14			0.21
	3G download in Mbps		2.94		
	3G upload in Mbps		0.67		
	4G download in Mbps	57.27		37.71	28.39
	4G upload in Mbps	4.58		11.65	26.06
Secunderabad Railway Station	2G download in Mbps	0.22			0.22
	2G upload in Mbps	0.06			0.25
	3G download in Mbps	5.08	2.17		
	3G upload in Mbps	1.26	4.5		
	4G download in Mbps	27.09		24.54	16.36
	4G upload in Mbps	8.19		3.97	22.45
Prasad Imax Multiplex	2G download in Mbps	0.26			0.26
	2G upload in Mbps	0.19			0.16
	3G download in Mbps	8.81	4.36		
	3G upload in Mbps	1.33	3.64		
	4G download in Mbps	17.69		26.21	40.5
	4G upload in Mbps	8.85		4.01	22.59

Screenshots of data speed testing by "traimyspeed" app

Hotspot location 1 (Rajiv Gandhi International Airport (RGIA), Shamshabad)

AIRTEL

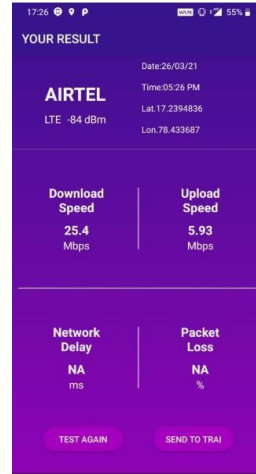
2G



3G



LTE



BSNL

2G

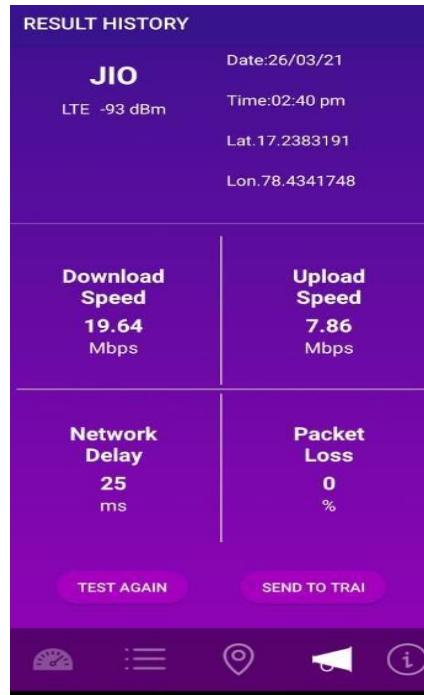
3G

LTE



JIO

LTE



VIL

2G

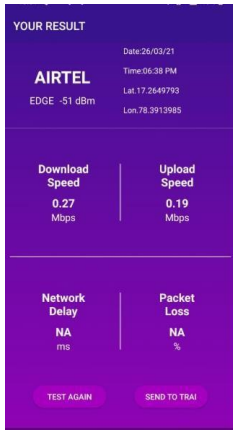
LTE



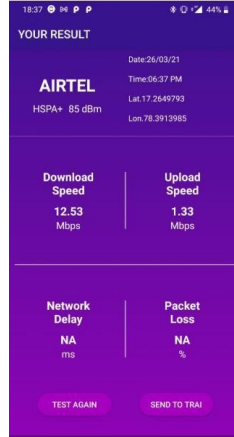
Hotspot location 2 (Mahatma Gandhi Bus Station (MGBS))

AIRTEL

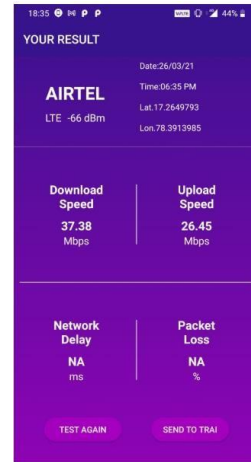
2G



3G



LTE

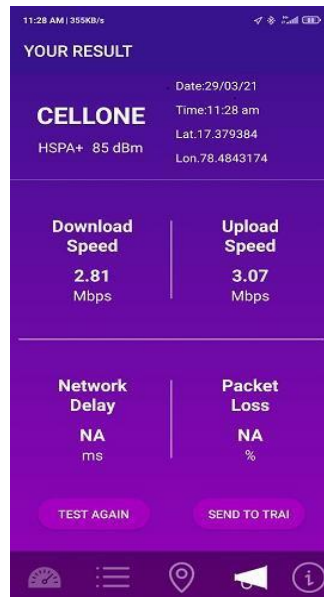


BSNL

2G

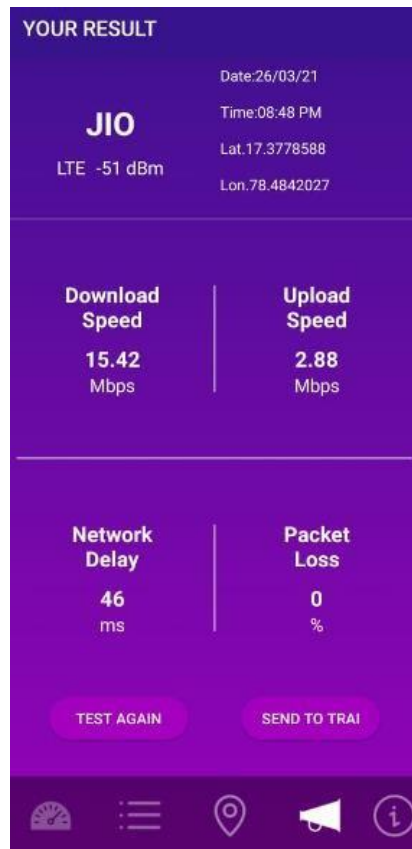
3G

LTE



JIO

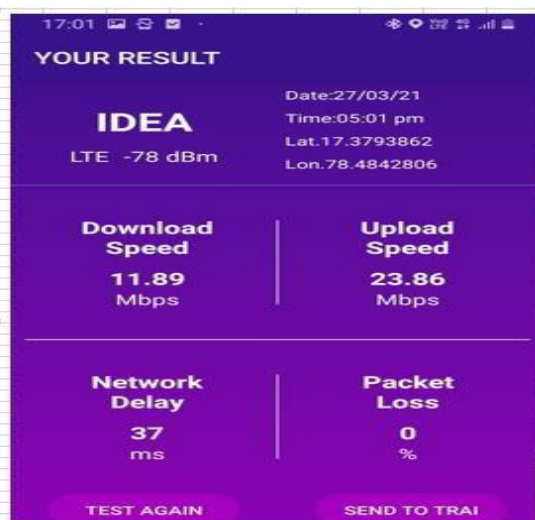
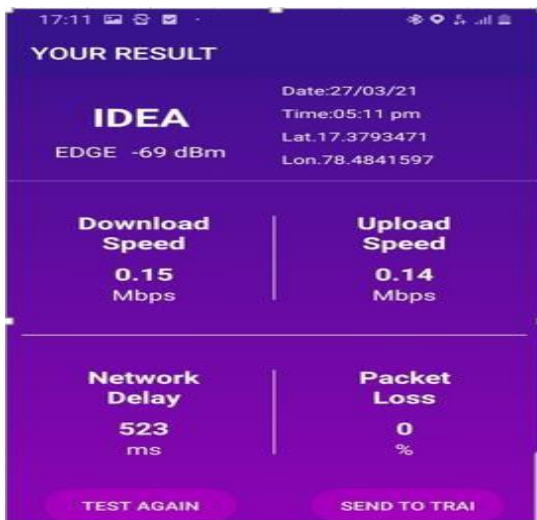
LTE



VIL

2G

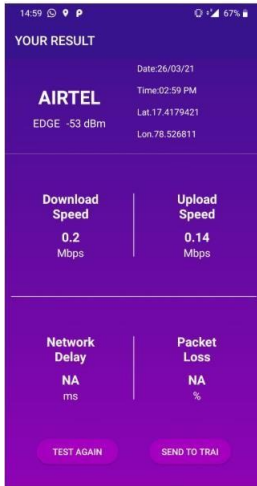
LTE



Hotspot location 3 (Osmania University Campus)

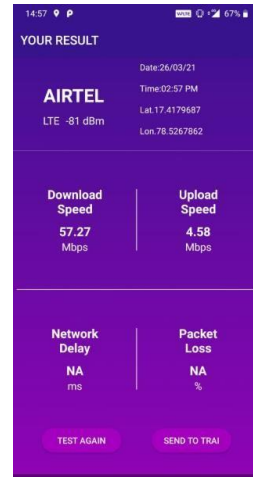
AIRTEL

2G



3G

LTE



BSNL

2G

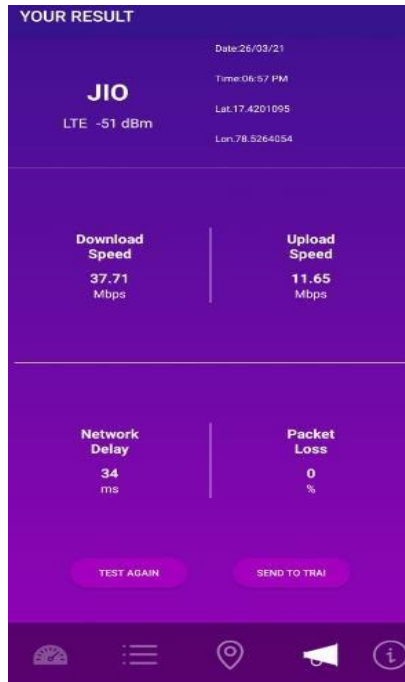
3G

LTE



JIO

LTE



VIL

2G

LTE



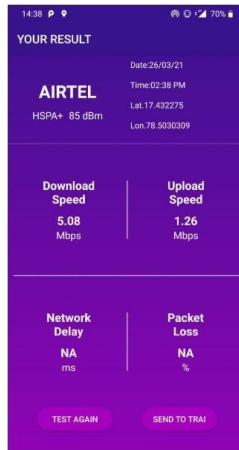
Hotspot location 4 (Secunderabad Railway station)

AIRTEL

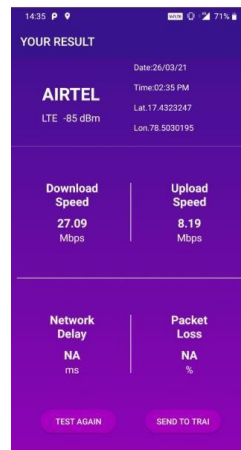
2G



3G



LTE



BSNL

2G

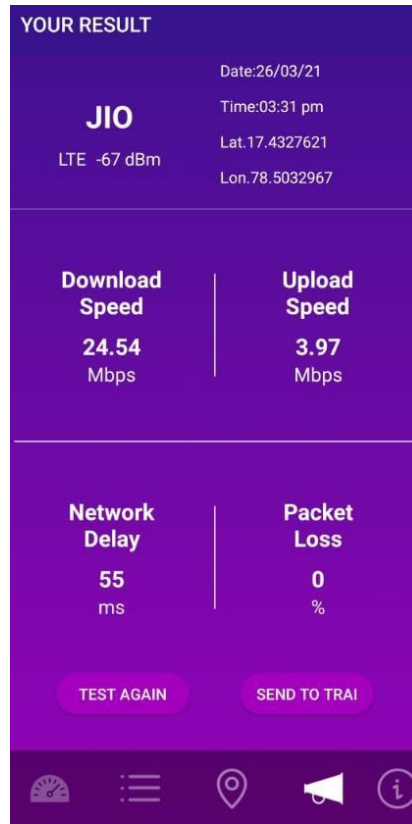
3G

LTE



JIO

LTE



VIL

2G

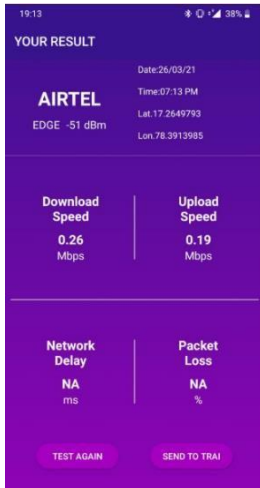
LTE



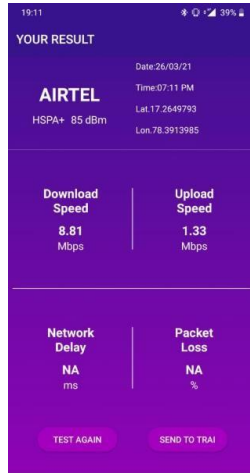
Hotspot location 5 (Prasad's IMAX Multiplex)

AIRTEL

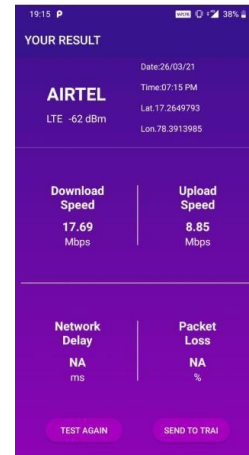
2G



3G



LTE



BSNL

2G

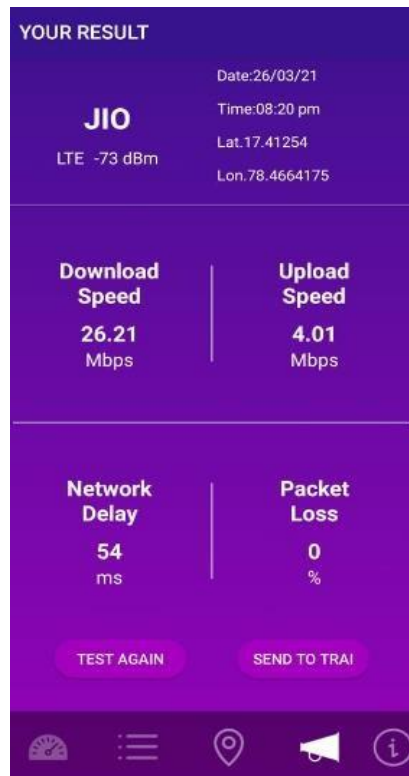
3G



LTE

JIO

LTE



VIL

2G

LTE



Test Numbers for Drive Test

TSP		Calling number	Called number
Airtel	Voice 2G	7893009954	9849080077
	Voice 3G	9154698949	9849080077
	Voice VoLTE	7093001682	9849080077
	Data 2G	7995002894	
	Data 3G	7995001641	
	Data LTE	7995001641	
BSNL	Voice 2G	7382014195	127161
	Voice 3G	9490000309	127161
	Voice VoLTE		
	Data 2G		
	Data 3G		
JIO	Voice VoLTE	6301752277	56287
	Data LTE	6301752367	
VIL	Voice 2G	8367445902	4000
	Voice VoLTE	8367446295	4000
	Data 2G	8367446294, 8367446295	
	Data LTE	8367447695, 8367446295	

Observations

Key Performance Indicators:

- All TSPs have met the Drop Call Rate (DCR) benchmark of 2%.
- Block Call Rate (BCR) benchmark of 3% was achieved by all TSPs.
- All TSPs have met the Call Setup Success Rate (CSSR) of 95%.
- Receive Quality benchmark of >95% was not met by Airtel for VoLTE, BSNL for 3G, Reliance Jio for VoLTE, VIL for VoLTE