

Operator Assisted Drive Test (OADT)

Ludhiana SSA

for

Airtel / BSNL / Reliance Jio / VIL

OADT for Voice & Data – 18th to 22nd Oct 2021



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 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. It conducts drive tests at various places in view of complaints on call drops and other network quality issues.

TRAI Regional Office, Jaipur as directed by TRAI HQ to conduct the Operator Assisted Drive test with the help of Telecom Service Providers of Punjab from 18th Oct 2021 to 22nd Oct 2021 covering various locations in Ludhiana City & surrounding areas and SDCA of Ludhiana SSA.

The OADT was performed by TSP's on their own network testing kits in their own vehicles. The post processing data submitted by TSPs on the emails were compiled by RO Jaipur as below.

Methodology Adopted

The OADT carried out in Ludhiana SSA as per directions of TRAI HQ according to following methodology.

1. Drive test routes and data hotspots covered in the exercise were discussed and finalized by regional office after discussion with the service providers.
2. The voice drive route was decided based on several factors that include:
 - Major roads, residential and commercial areas.
 - Important landmarks such as major public buildings, tourist spots, important educational institutions etc.
 - Areas from where call drop complaints are commonly received.
 - Areas of heavy usage.
 - Areas where previous drive tests showed network issues; etc.
3. The performance of four licensed operational TSPs namely Airtel, BSNL, Vodafone Idea Limited (VIL) and Reliance Jio were monitored across various available technologies (2G, 3G, and 4G) as mentioned below
 - M/s Airtel- 2G and 4G.
 - M/s BSNL- 2G and 3G.
 - M/s Reliance Jio – 4G.
 - M/s Vodafone Idea Ltd.- 2G and 4G.
4. The measurement for drive test was performed as mentioned below:
 - 2G – measurement – UE Locked in 2G
 - 3G – measurement – UE in Dual mode (2G and 3G)
 - 4G – measurement – UE in Free mode
5. **Voice:** Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies.
6. Public places spread all across the city were selected as hotspots for testing data. TRAI My Speed App was used to measure the data performance at the different hotspots.
7. **Data:** Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency.
 - Download : 2G(500KB), 3G (20MB), 4G (40 MB)
 - Upload : 2G (100KB) ,3G(5 MB), 4G(10MB)
 - Web browsing - 3 links of e commerce websites <https://www.amazon.in>, <https://www.flipkart.com>, <https://paytm.com>.
 - Video Streaming – 130 sec clips
 - Latency – 32 Bytes on www.google.com.

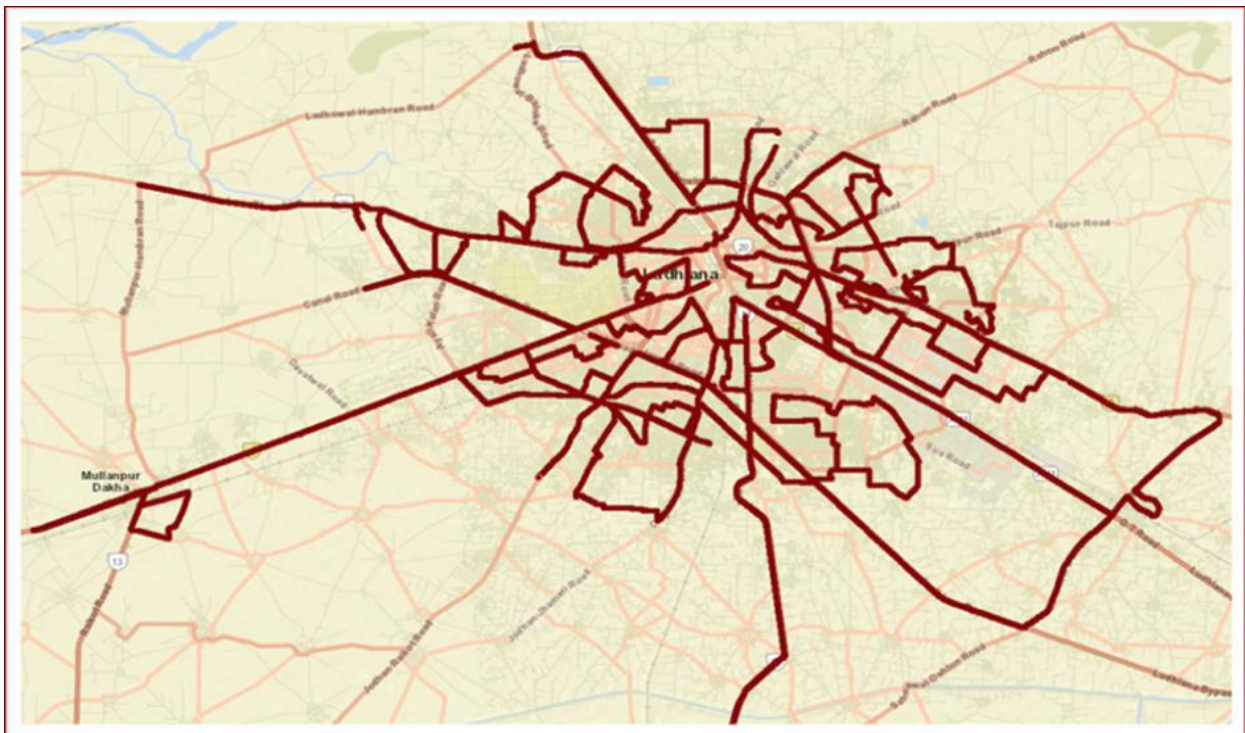
Drive Test Details

The drive test covered a drive route of approx. 450 KMs & 5 hotspots in Ludhiana SSA for 04 days. Calls were made for 2G/3G/ 4G VoLTE networks (as applicable)

- Day wise voice and data drive details

S.No.	Date	Area Covered	Total Kms.
1	18.10.21 Data	Hotspot Statics and Data dynamic testing – KIPS market, Khalsa College Ghumar Mandi, District Court Complex, Railway Station and Civil Hospital.	35 KM
2	20.10.21 Voice	Bharat Nagar, Sargodha Colony, Model town, Sanchar Colony, Vikas Nagar, SAS Nagar, Rajguru Nagar, Lal Nagar, Mullanpur, Jangpur, Lalton Kalan, Green Avenue, Guru Angad Devji Nagar, Kheri, Sarinh, Kaind, Ishar Nagar, Grain Market, Sunder Nagar, F2 Raceway, Malakpur, Hambran, Ferozpur Road, Gurdev Nagar	145 Km
3	21.10.21 Voice	Industrial Area, Guru Amardas Colony, Janta Colony, Shimlapur, Dhandari Kalan, Dehlon, Shanewal Road, Shanewal, Mandi Gobindgarh, Kohara, Chandigarh road, Focal Pont, Urban Estate, Jamalpur, Transport Nagar, Chaura Bazar, Basti Jahangpuri	155 Km
4	22.10.21 Voice	Civil lines, Partap, AyaliKhurd, Haibowal Kalan, Sunder Nagar, Govind Pura, Bank colony, Jodhewal, Vardhman Nagar, Bajrah, Bahadake, Heera Singh Nagar, Hussianpura, Phuggwal, Ladhawal, Jassian, Railway colony, Haibowal, Sandhu Nagar, SBS Nagar, Kitchlu Nagar, Joshi Nagar, Deep Nagar, Mann Singh Nagar, Shivpuri	120 Km

Total 3 days Voice Route



- **Data Hotspots Details**

S.No.	Location Name	Area
1	Dist. Court	Ludhiana
2	Railway Station	Ludhiana
3	Civil Hospital	Ludhiana
4	Khalsa College, Guman Mandi	Ludhiana
5	Kips Market	Ludhiana

Data Locations



- **Annexure 1** of the report contains the coverage and quality plots submitted by service providers.
- **Annexure 2** of the report contains screenshots of the TRAI My Speed App as submitted by service providers.
- **Annexure 3** of the report contains the details of test SIMs used by service providers during the OADT.

Observations

A. Voice Services

1. Drop Call Rate % (Benchmark < 2%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0	NA	0
BSNL	NA	0.95	0.96
JIO	0.22	NA	NA
VIL	0	NA	0

2. Block Call Rate % (Benchmark < 3%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0	NA	0
BSNL	NA	0.57	0.76
JIO	0.22	NA	NA
VIL	0.19	NA	0

Technology	Parameter	Airtel	BSNL	JIO	VIL
2G	SDCCH Congestion (<=1%)	0%	0.79	NA	0%
	TCH Congestion (<=2%)	0%	0.52	NA	0%
3G	CSFB Failure %	NA	NA	NA	NA
	SDCCH Congestion %	NA	0.39	NA	NA
	RRC Congestion %	NA	0	NA	NA
	SDCCH and RRC Congestion % (<=1%)	NA	0.39	NA	NA
	TCH Congestion %	NA	0.26	NA	NA
	RAB Congestion %	NA	0	NA	NA
TCH and RAB Congestion % (<=2%)	NA	0.26	NA	NA	

B. Coverage

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

TSP	Airtel	BSNL	JIO	VIL
Coverage %	96.23	81.20	NA	95.55

ii Percentage of Coverage sample of 3G >= - 90 dBm

TSP	Airtel	BSNL	JIO	VIL
Coverage %	NA	76.44	NA	NA

iii Percentage of Coverage sample of VoLTE >= -110 dBm

TSP	Airtel	BSNL	JIO	VIL
Coverage %	99.26	NA	99.44	98.87

iv. Percentage of time spent on 3G Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	NA	03%	NA	NA

v. Percentage of time spent on VoLTE Network

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

vi. Percentage of RLT >= 48

TSP	Airtel	BSNL	JIO	VIL
Percentage of RLT >=48	0	33.24	NA	0

vii. Average CST in second

TSP	Airtel	BSNL	JIO	VIL
Seconds in 2G network	5.23	3.04	NA	3.4
Seconds in 3G network	NA	2.89	NA	NA
Seconds in Volte Network	2.06	NA	0.6	1.73

Voice call summary

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	607	520	NA	472
Block call rate %	0	0.58	NA	0
CSSR %	100	99.42	NA	100
Drop call rate %	0	0.96	NA	0
Mobility HOSR %	99.57	97.66	NA	97.88
RX Quality %	95.28	94.4	NA	95.29

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	526	NA	NA
Block call rate %	NA	0.77	NA	NA
CSSR %	NA	99.23	NA	NA
Drop call rate %	NA	0.95	NA	NA
Mobility HOSR %	NA	100	NA	NA
RX Quality %	NA	91.12	NA	NA

TSP (For VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	622	NA	451	472
Block call rate %	0	NA	0.22	0.19
CSSR %	100	NA	99.78	99.81
Drop call rate %	0	NA	0.22	0
Mobility HOSR %	100	NA	98.28	100
RX Quality %	95.11	NA	97.85	95.42

Data Service Dynamic 18.10.21

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	61.59	156.57	NA	86.38
Upload Throughput in Kbps	19.23	NA	NA	42.626
Web browsing delay in second	2.66	NA	NA	3
Latency in (msec)	579	NA	NA	927

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.78	NA	NA
Upload Throughput in Mbps	NA	NA	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	11.96	NA	7.9765	12.49
Upload Throughput in Mbps	3.91	NA	NA	11.40
Video streaming delay in sec	0.89	NA	NA	0
Web browsing delay in second	0.23	NA	NA	0
Latency in (msec)	68.08	NA	NA	59

viii. Data Service Static (on Hotspots)

1. Hotspot -1 (Location - Distt Court, Ludhiana)

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	89.32	46.93	NA	84.2
Upload Throughput in Kbps	18.96	28.87	NA	92.9
Web browsing delay in second	2.68		NA	2.47
Latency in (msec)	606	131	NA	607

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.509	NA	NA
Upload Throughput in Mbps	NA	1.017	NA	NA
Video streaming delay in sec	NA		NA	NA
Web browsing delay in second	NA	5.267	NA	NA
Latency in (msec)	NA	78	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	7.54	NA	17.807	8.81
Upload Throughput in Mbps	3.51	NA	11.983	13.27
Video streaming delay in sec	1.30	NA	NA	0.71
Web browsing delay in second	0.10	NA	2.89/4.25/3.54	0.12
Latency in (msec)	47.16	NA	45.33	61

2. Hotspot -2 (Location, KIPS Market, Ludhiana)

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	85.15	137.27	NA	141.4
Upload Throughput in Kbps	21.66	30.86	NA	45.2
Web browsing delay in second	3.49		NA	3.1
Latency in (msec)	502	235	NA	759

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.021	NA	NA
Upload Throughput in Mbps	NA	0.96	NA	NA
Video streaming delay in sec	NA		NA	NA
Web browsing delay in second	NA	6.97	NA	NA
Latency in (msec)	NA	107	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	7.13	NA	44.23	3.61
Upload Throughput in Mbps	4.3	NA	7.931	13.43
Video streaming delay in sec	0.57	NA	NA	0.86
Web browsing delay in second	0.12	NA	3.03/4.56/2 .81	0.08
Latency in (msec)	73.16	NA	50.33	59

3. Hotspot -3 (Khalsa College, Ludhiana)

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	99.10	113.75	NA	192.9
Upload Throughput in Kbps	19.52	33.69	NA	44.3
Web browsing delay in second	3.61		NA	3.21
Latency in (msec)	417	194	NA	744

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.687	NA	NA
Upload Throughput in Mbps	NA	0.846	NA	NA
Video streaming delay in sec	NA		NA	NA
Web browsing delay in second	NA	11.072	NA	NA
Latency in (msec)	NA	91	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	18.72	NA	20.214	7.68
Upload Throughput in Mbps	6.28	NA	6.425	13.60
Video streaming delay in sec	0.86	NA	NA	0.57
Web browsing delay in second	0.27	NA	2.42/4.27/3 .28	0.29
Latency in (msec)	67.16	NA	41.67	63

4. Hotspot -4 (Railway Station Ludhiana)

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	87.23	94.77	NA	114.8
Upload Throughput in Kbps	25.01	27.74	NA	90.1
Web browsing delay in second	2.46		NA	2.8
Latency in (msec)	590	250	NA	859

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	1.935	NA	NA
Upload Throughput in Mbps	NA	0.778	NA	NA
Video streaming delay in sec	NA		NA	NA
Web browsing delay in second	NA	6.552	NA	NA
Latency in (msec)	NA	158	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	7.33	NA	54.322	6.20
Upload Throughput in Mbps	3.51	NA	7.998	11.21
Video streaming delay in sec	0.85	NA	NA	0.84
Web browsing delay in second	0.095	NA	3.13/4.4/3.317	0.14
Latency in (msec)	79.16	NA	49.0	50

5. Hotspot -5 (Civil Hospital, Ludhiana)

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	83.89	115.60	NA	118.6
Upload Throughput in Kbps	23.54	36.08	NA	40.63
Web browsing delay in second	3.57		NA	1.04
Latency in (msec)	457	191	NA	723

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	4.055	NA	NA
Upload Throughput in Mbps	NA	1.023	NA	NA
Video streaming delay in sec	NA		NA	NA
Web browsing delay in second	NA	5.59	NA	NA
Latency in (msec)	NA	98	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	12.87	NA	20.899	7.38
Upload Throughput in Mbps	4.41	NA	6.835	13.93
Video streaming delay in sec	0.38	NA	NA	0.51
Web browsing delay in second	0.079	NA	2.57/4.21/3.82	0.53
Latency in (msec)	43.83	NA	46.6	78

Summary Data report Dynamic

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	61.59	156.57	NA	86.38
Upload Throughput in Kbps	19.23	NA	NA	42.626
Web browsing delay in second	2.66	NA	NA	3
Latency in (msec)	579	NA	NA	927

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.78	NA	NA
Upload Throughput in Mbps	NA	NA	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	11.96	NA	7.9765	12.20
Upload Throughput in Mbps	3.91	NA	NA	11.13
Video streaming delay in sec	0.89	NA	NA	0
Web browsing delay in second	0.23	NA	NA	0
Latency in (msec)	68.08	NA	NA	59

Summary Data report static

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Download throughput in Kbps	88.93	101.664	NA	130.38
Upload Throughput in Kbps	21.93	31.448	NA	62.626
Web browsing delay in second	3.16		NA	2.524
Latency in (msec)	514	200.2	NA	738.4

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	NA	3.2414	NA	NA
Upload Throughput in Mbps	NA	0.9246	NA	NA
Video streaming delay in sec	NA		NA	NA
Web browsing delay in second	NA	7.0902	NA	NA
Latency in (msec)	NA	106.4	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Download throughput in Mbps	10.71	NA	31.494	6.54
Upload Throughput in Mbps	4.4	NA	8.234	13.09
Video streaming delay in sec	0.79	NA	2.81/4.34/3.35	0.698
Web browsing delay in second	0.13	NA	46.586	0.232
Latency in (msec)	62.08	NA	31.494	62.2

Streaming delay

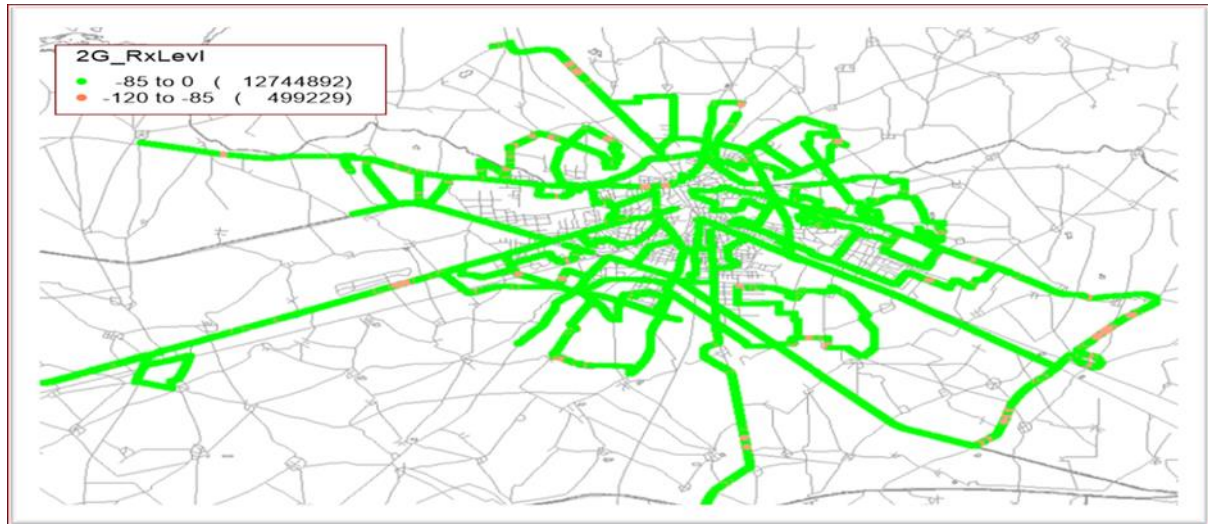
TSP (For 3G)	Airtel	BSNL	JIO	VIL
Average Initial Start Time (Sec)	NA	NA	NA	NA
Average Interruption time in Second	NA	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	JIO	VIL
Average Initial Start Time (Sec)	0.423	NA	NA	0.0
Average Interruption time in Second	0.0	NA	NA	0.0

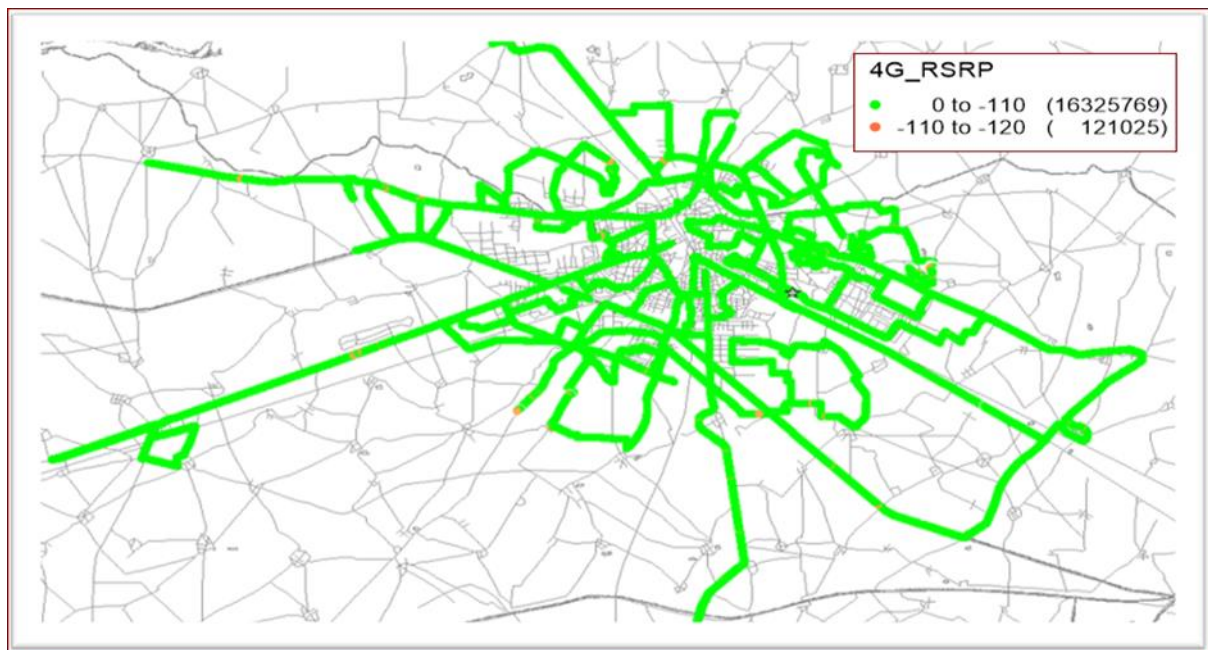
Annexure-1

AIRTEL Coverage plots

1. 2G

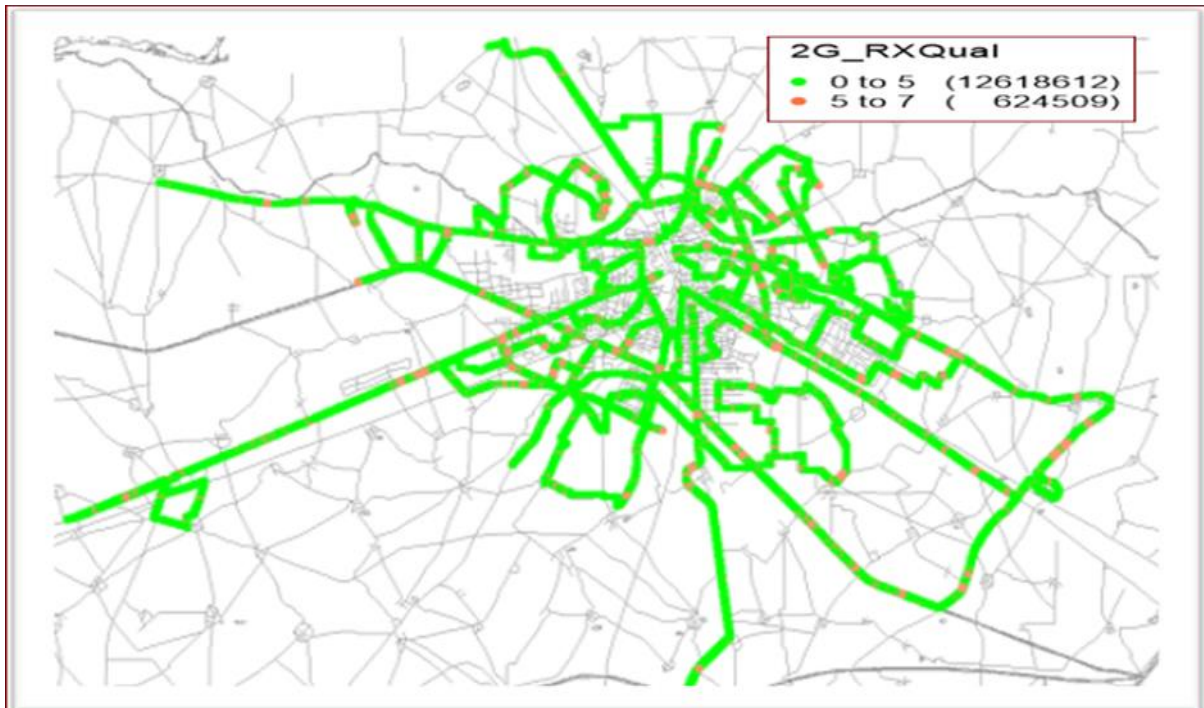


2. 2G / 4G dual

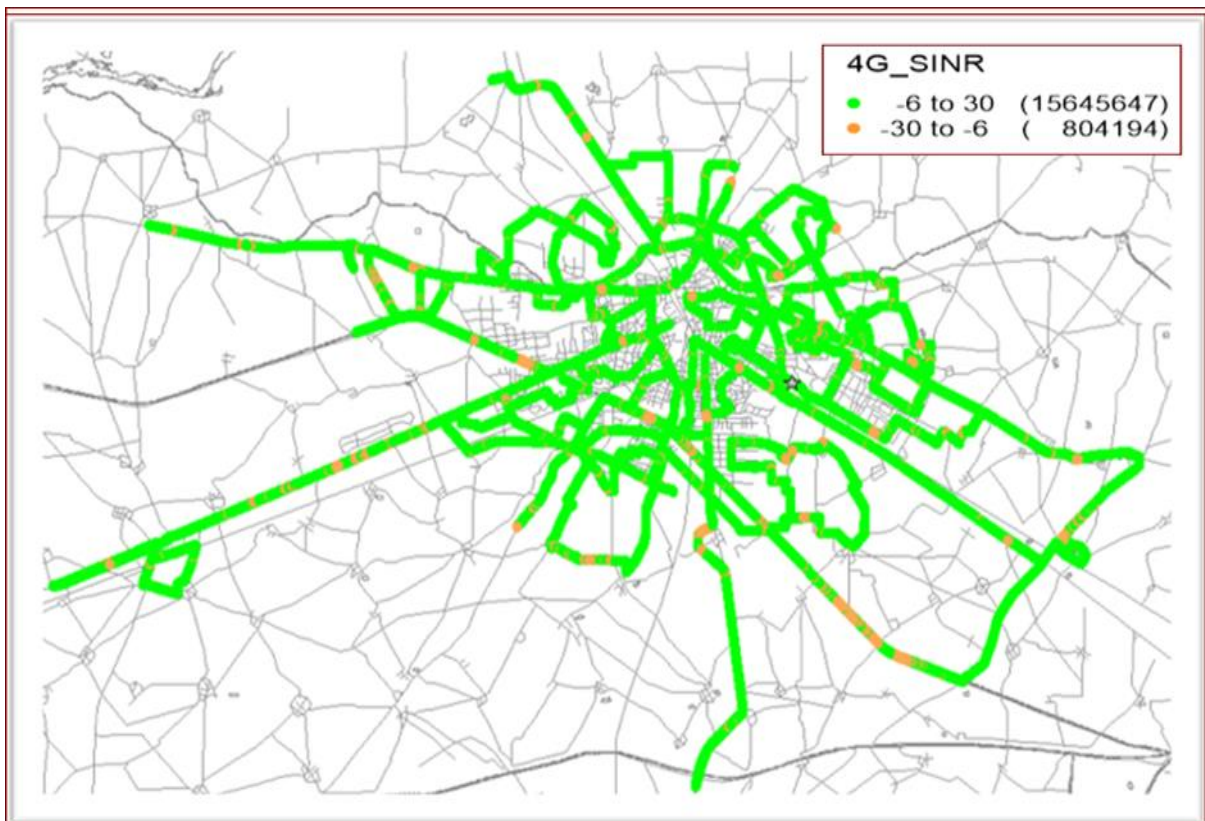


AIRTEL Quality plots

1. 2G

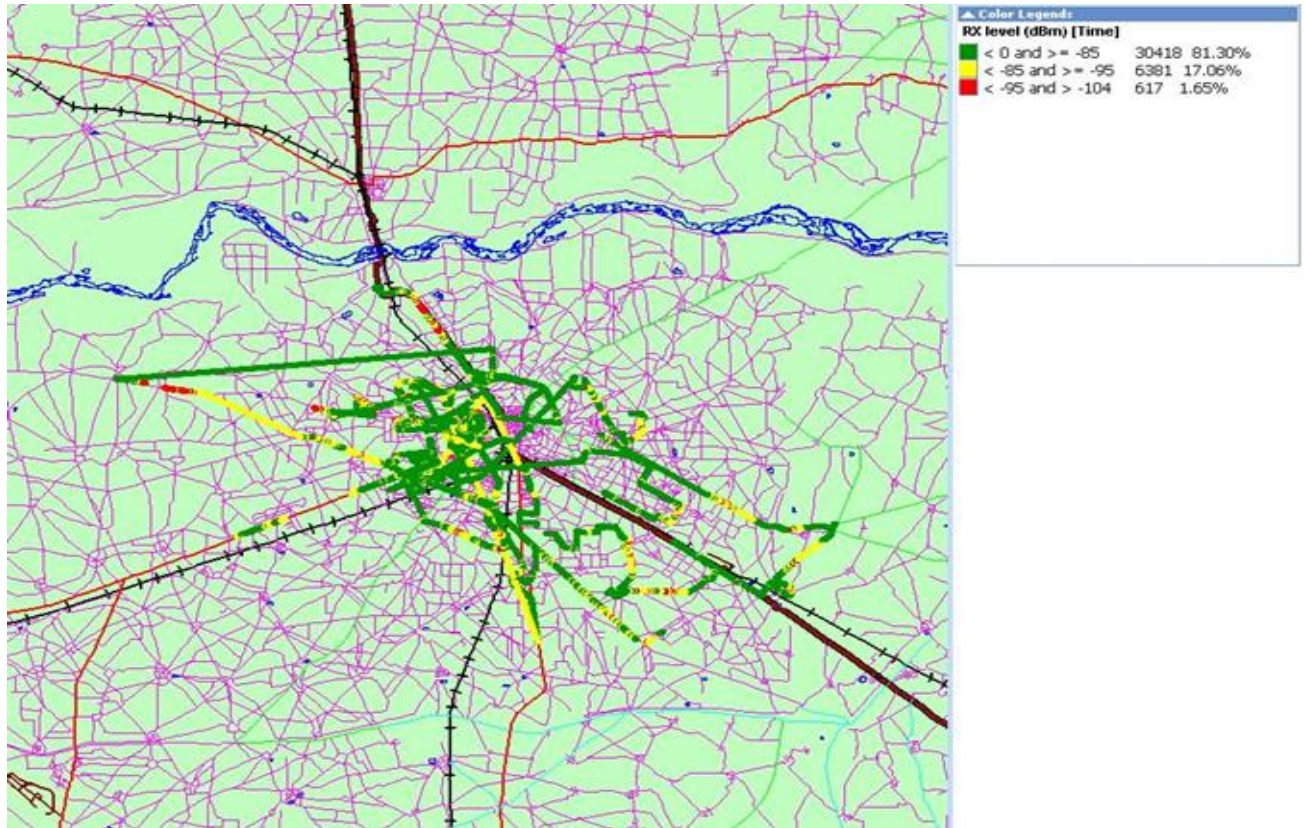


2. 2G/4G dual

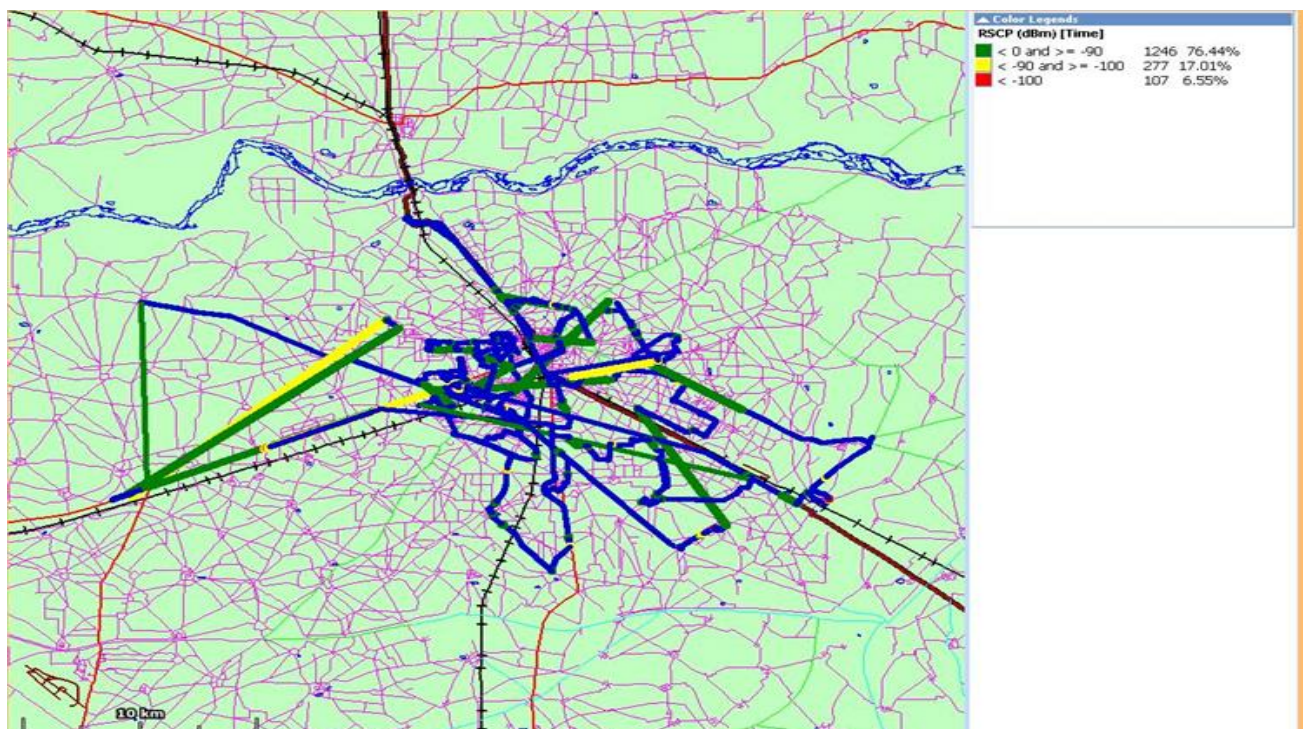


BSNL Coverage plots

3. 2G

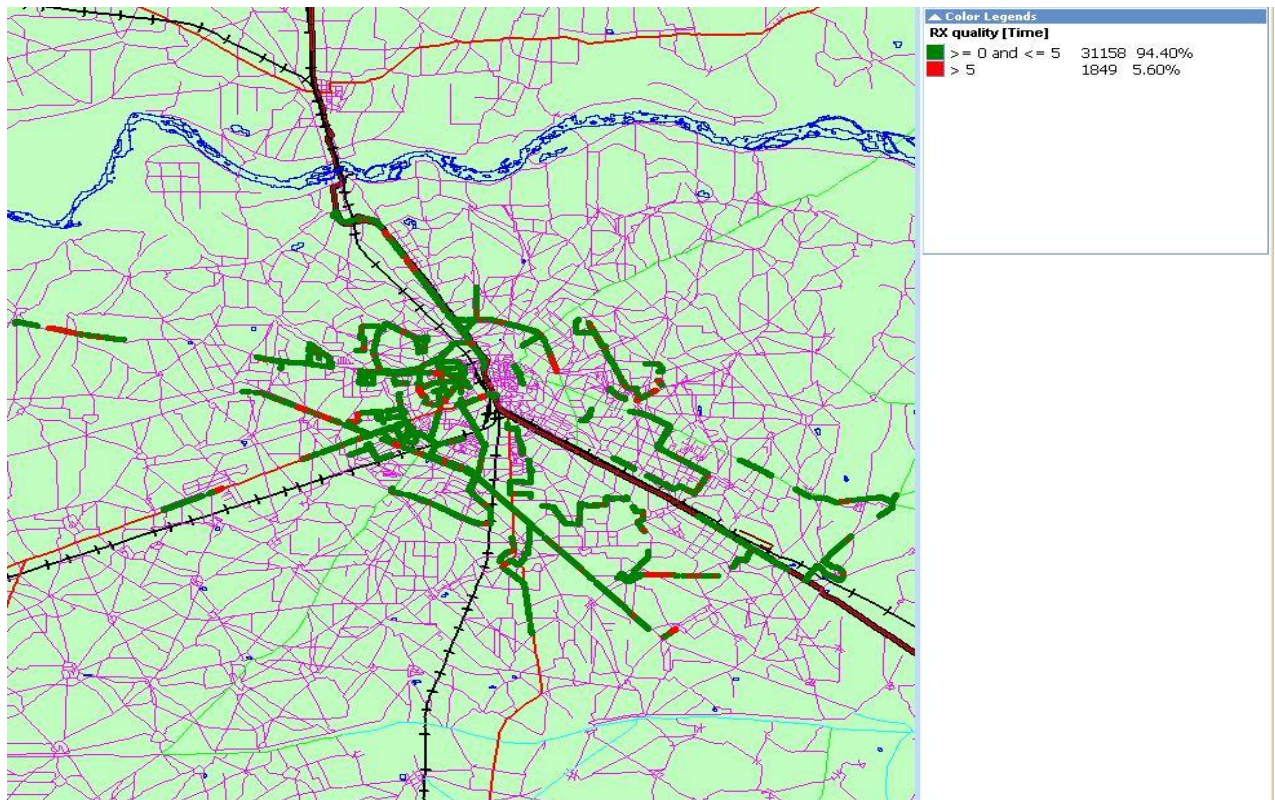


4. 2G/3G dual

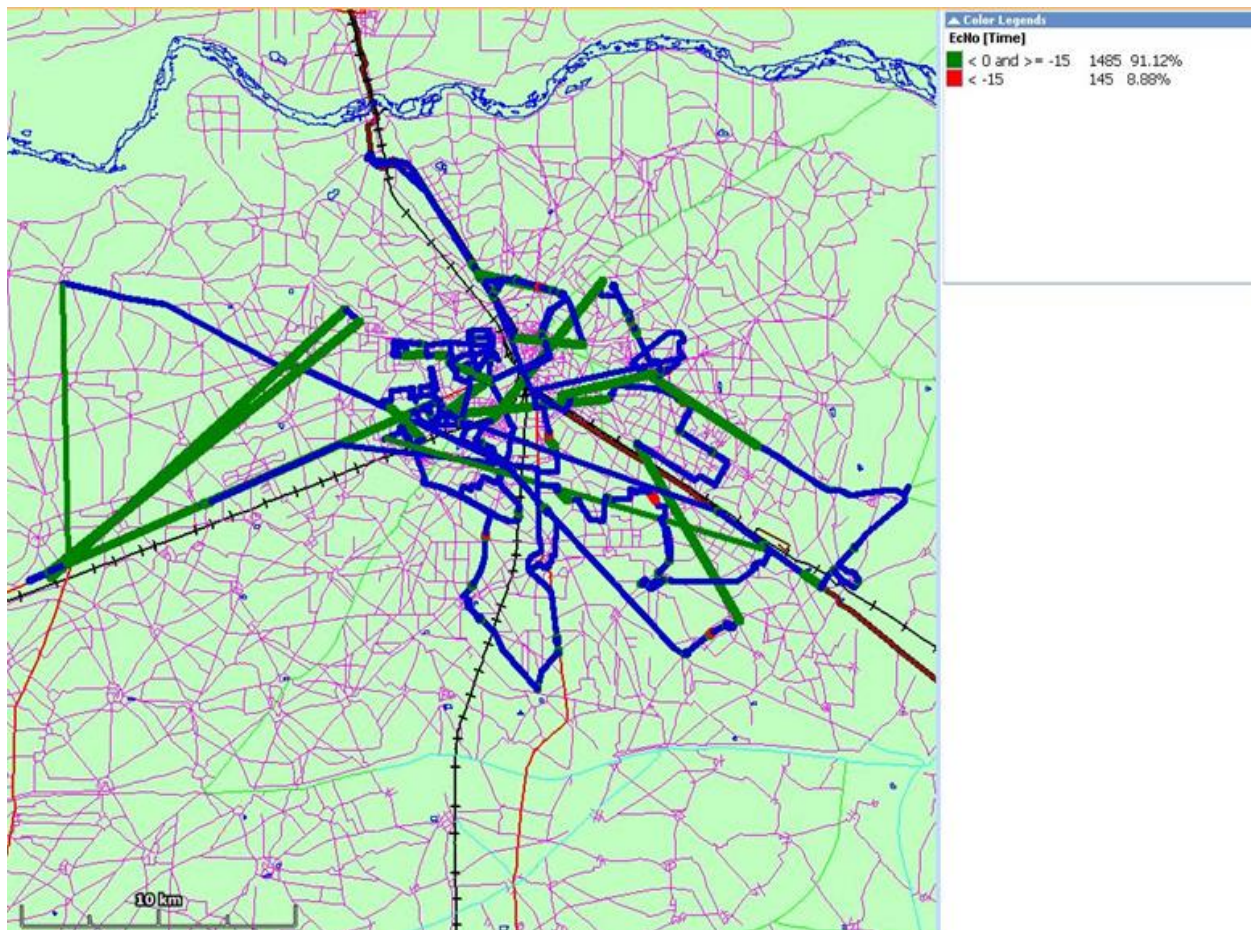


BSNL Quality plots

5. 2G



6. 2G/3G dual



Jio Coverage plots

7. VoLTE (Free) : Jio



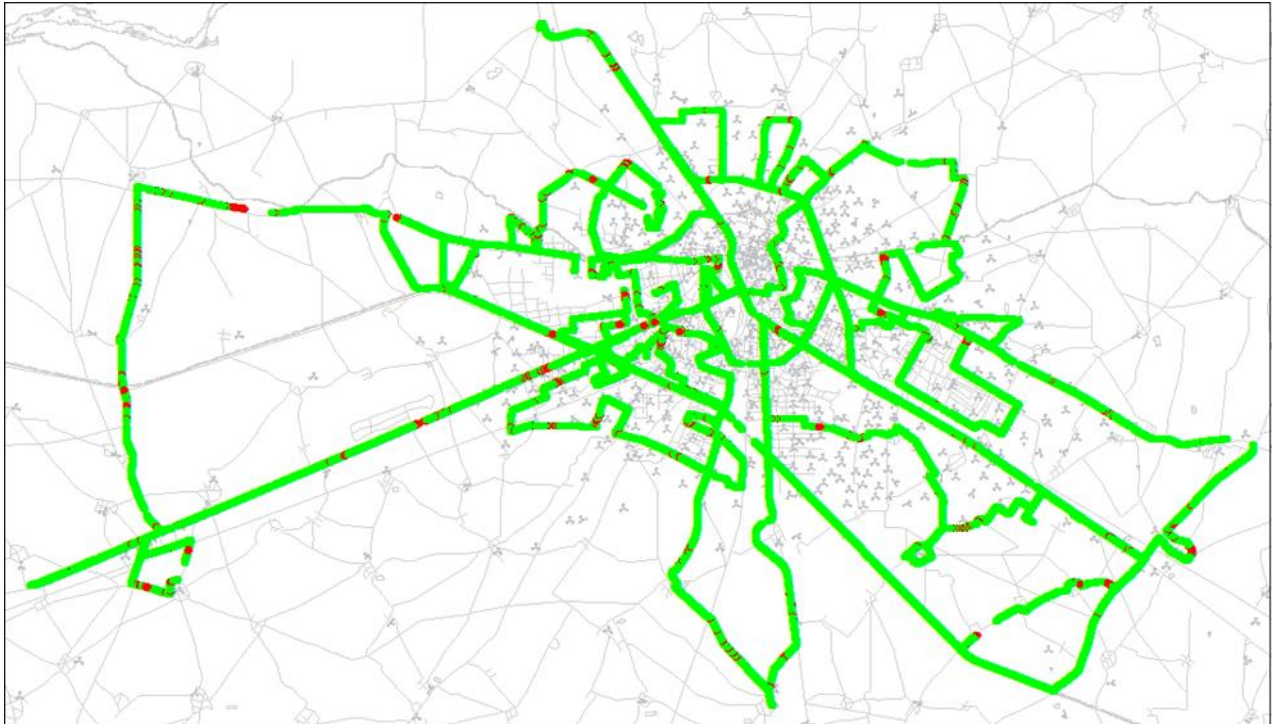
Jio Quality plots

8. VoLTE (Free) : Jio



Voda Idea Coverage plots

9. 2G

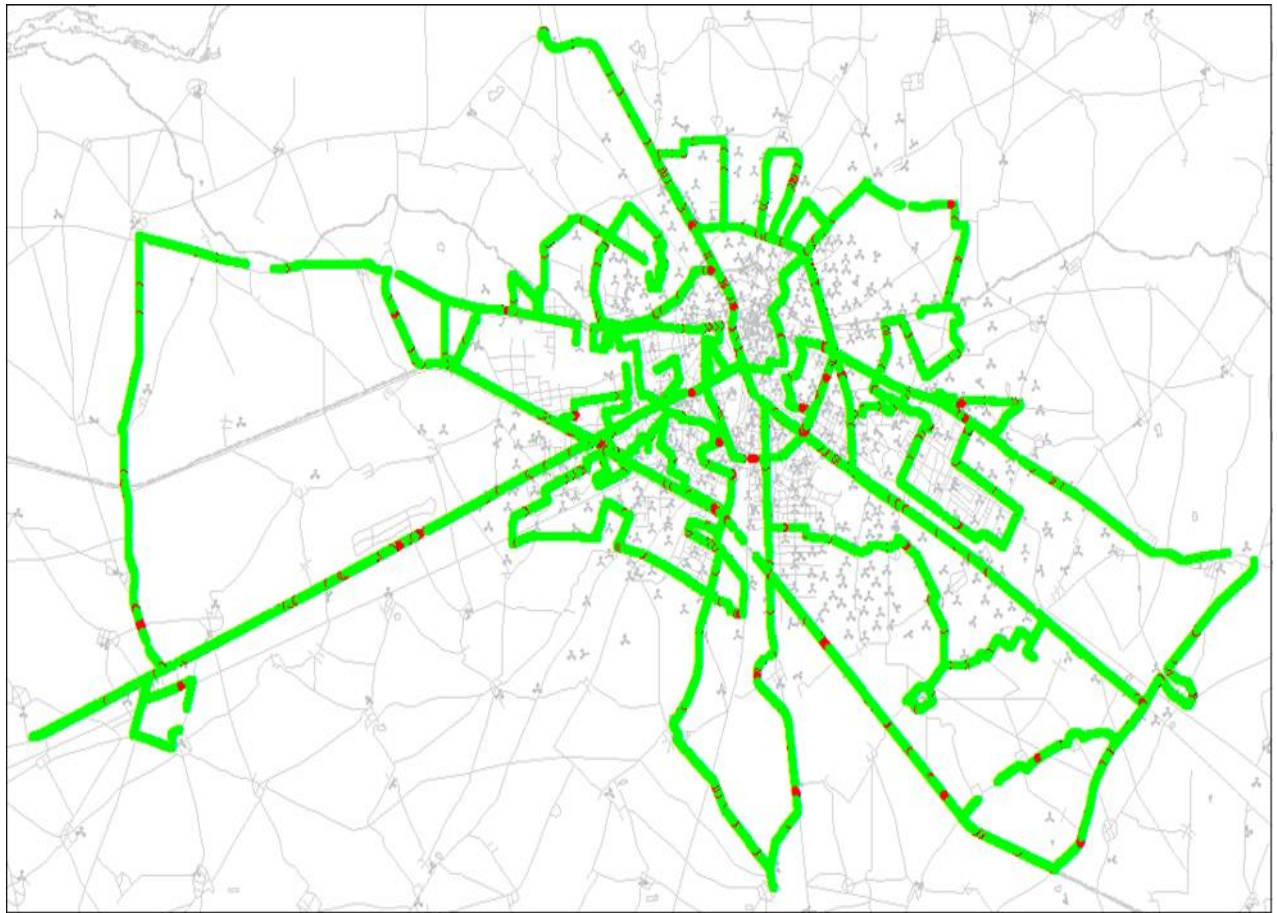


10. Volte (Free)

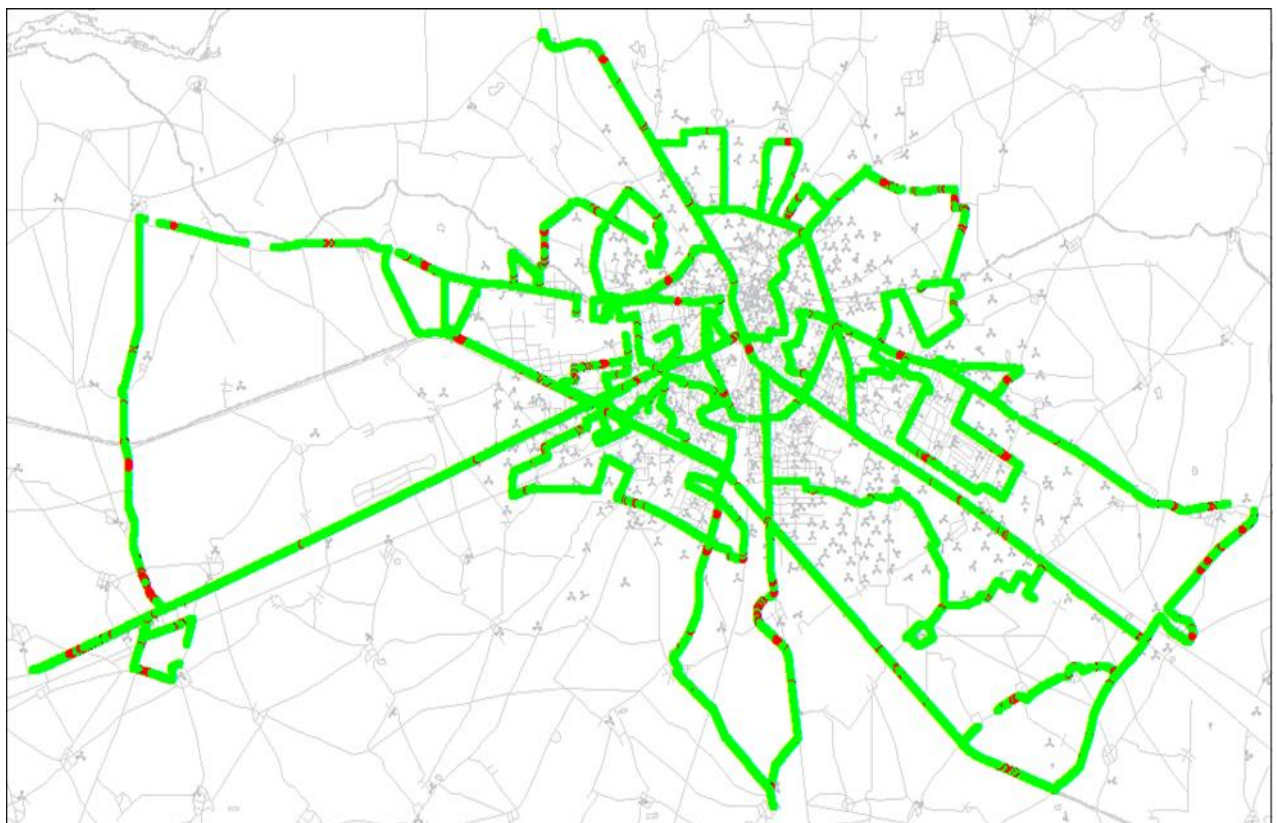


Voda Idea Quality plots 2G

11. 2G



12. Volte (Free)



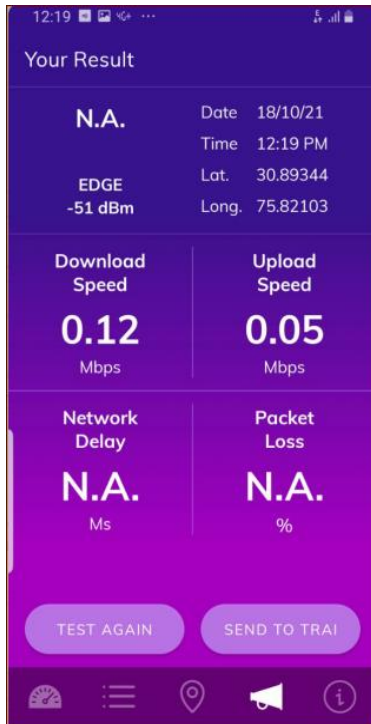
Annexure 2

Screenshots of data speed testing by “TRAI MySpeed” app

1. AIRTEL

Hotspot location 1 (KIPS Market Ludhiana)

2G

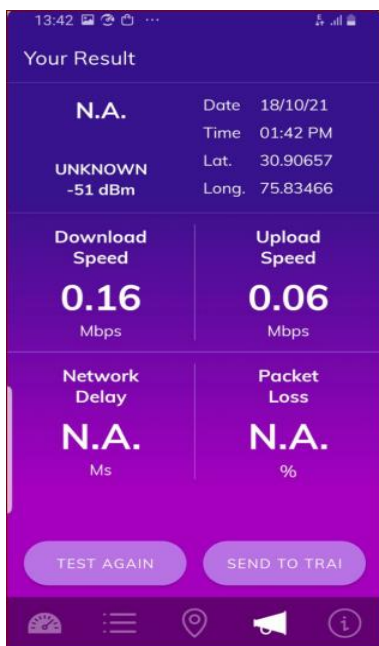


LTE

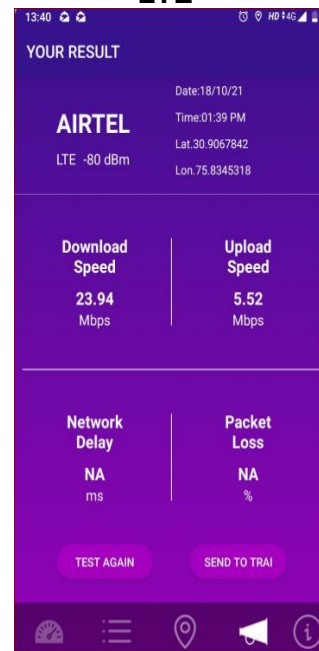


Hotspot location 2 (Khalsa Collage Ludhiana)

2G



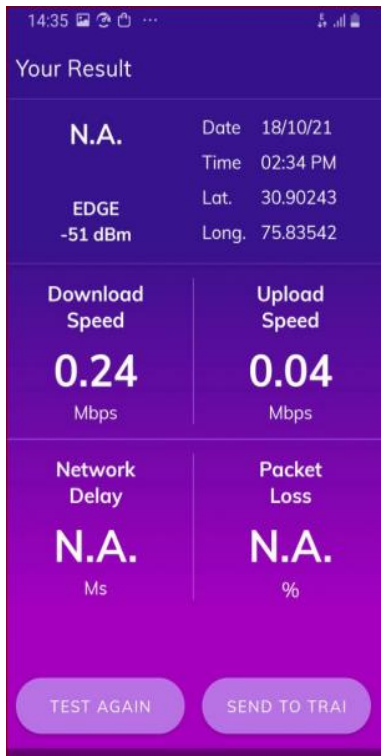
LTE



Hotspot location 3 (Dist.Court, Ludhiana)

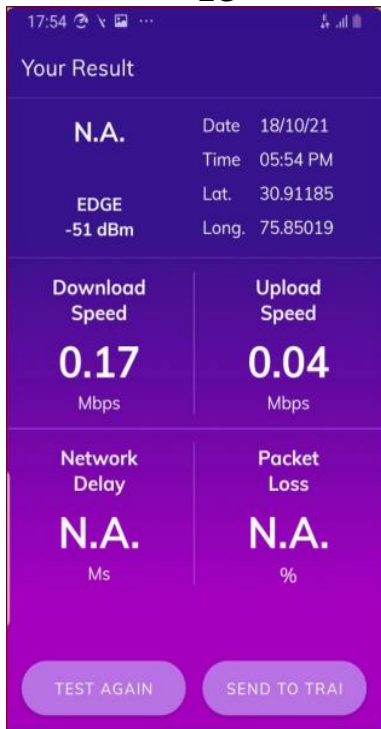
2G

LTE

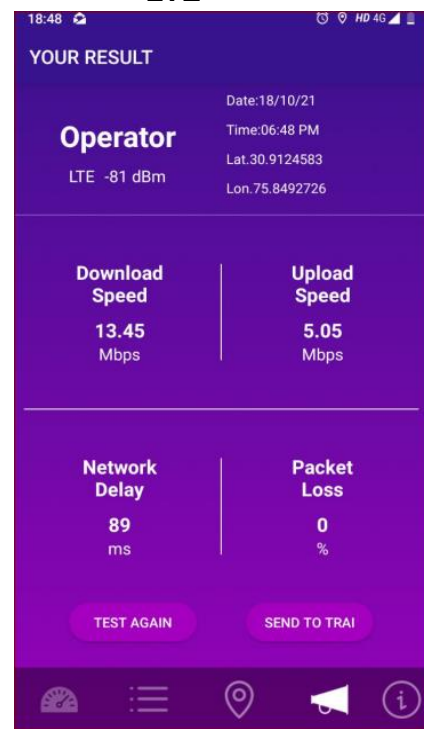


Hotspot location 4 (Railway Station -Ludhiana)

2G



LTE



Hotspot location 5 (Civil Hospital -Ludhiana)

2G

Your Result	
N.A.	Date 18/10/21
	Time 04:50 PM
EDGE	Lat. 30.90695
-51 dBm	Long. 75.85924
Download Speed	Upload Speed
0.13	0.07
Mbps	Mbps
Network Delay	Packet Loss
N.A.	N.A.
Ms	%
TEST AGAIN	SEND TO TRAI

LTE

Your Result	
N.A.	Date 18/10/21
	Time 04:43 PM
LTE	Lat. 30.90695
-84 dBm	Long. 75.85924
Download Speed	Upload Speed
76.86	28.99
Mbps	Mbps
Network Delay	Packet Loss
N.A.	N.A.
Ms	%
TEST AGAIN	SEND TO TRAI

2. BSNL

- **Hotspot location 1 (Kipps Market, Ludhiana)**

2G

Your Result	
N.A.	Date 18/10/21
	Time 10:39 AM
EDGE	Lat. 30.89325
-51 dBm	Long. 75.82142
Download Speed	Upload Speed
0.24	0.13
Mbps	Mbps
Network Delay	Packet Loss
N.A.	N.A.
Ms	%
TEST AGAIN	SEND TO TRAI

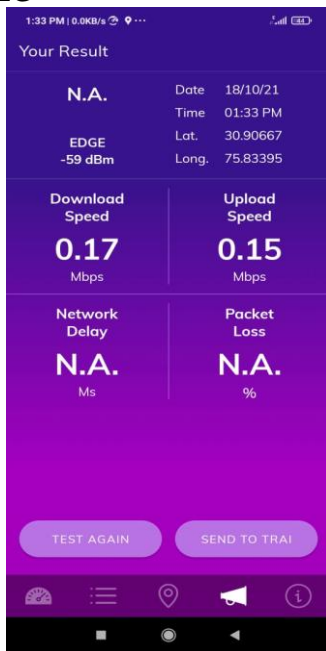
3G

Your Result	
CELLONE	Date 18/10/21
	Time 10:35 AM
HSPAP	Lat. 30.89331
-61 dBm	Long. 75.82140
Download Speed	Upload Speed
5.58	1.87
Mbps	Mbps
Network Delay	Packet Loss
N.A.	N.A.
Ms	%
TEST AGAIN	SEND TO TRAI

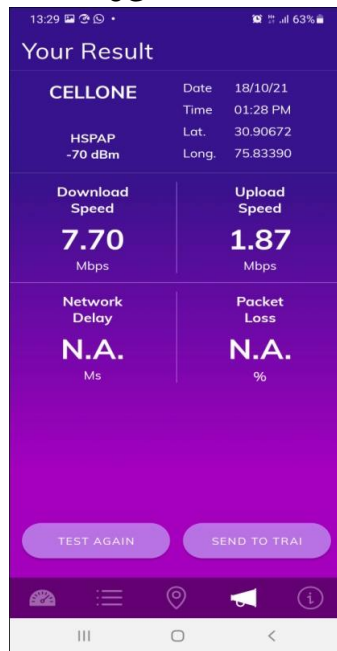
LTE

- Hotspot location 2 (,Khalsa College, Ludhiana)

2G



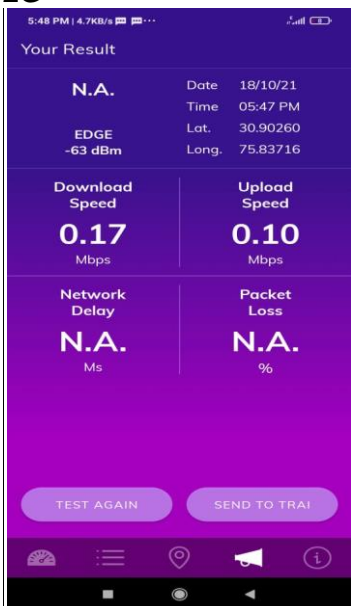
3G



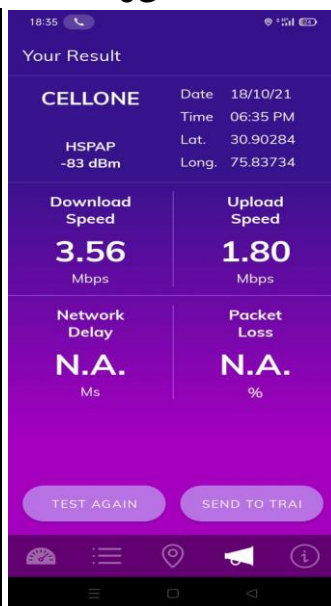
LTE

- Hotspot location 3 (District Court, Ludhiana)

2G



3G



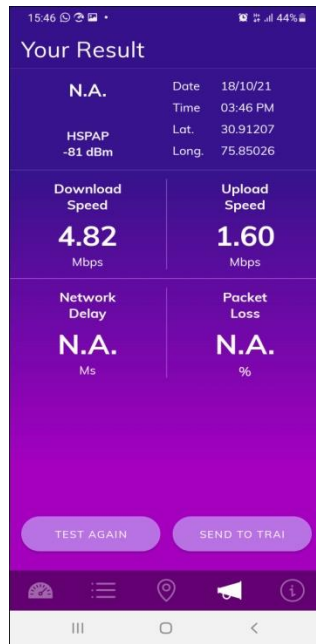
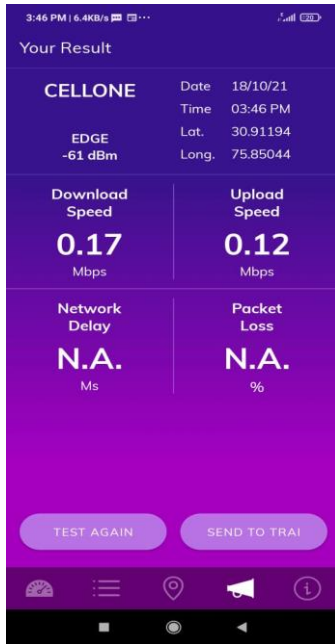
LTE

- Hotspot location 4 (Railway Station, Ludhiana)

2G

3G

LTE

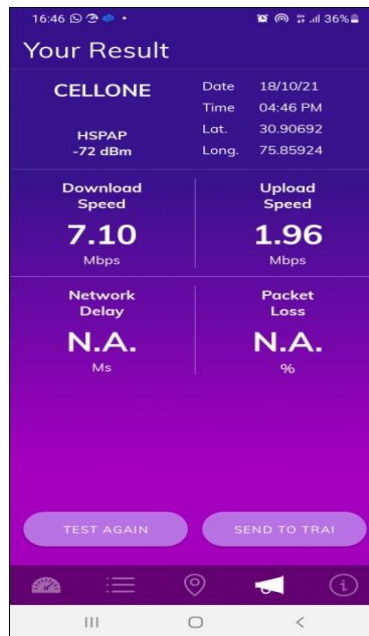
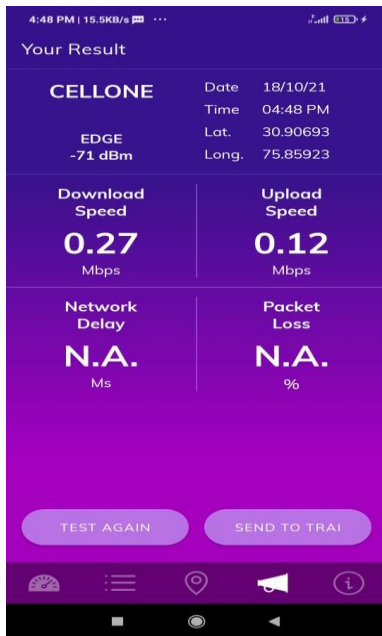


- Hotspot location 5 (Civil Hospital, Ludhiana)

2G

3G

LTE



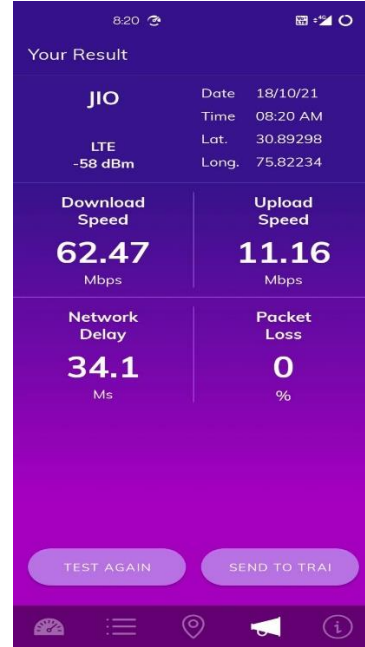
3. Jio

- Hotspot location 1 (KIPS Market, Ludhiana)

2G

3G

LTE

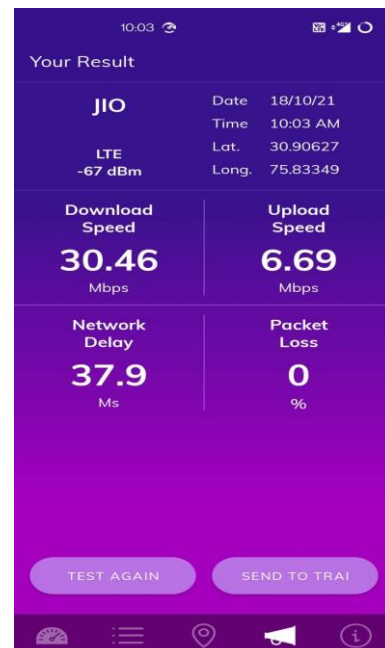


- Hotspot location 2 (Khalsa College, Ghumar Mandi, Ludhiana)

2G

3G

LTE

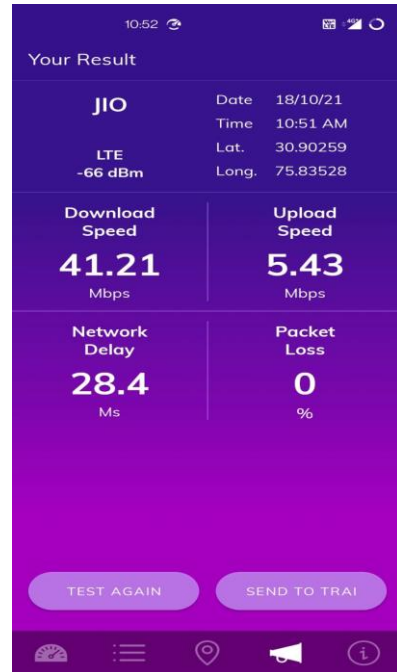


- Hotspot location 3 (District Court Complex, Ludhiana)

2G

3G

LTE

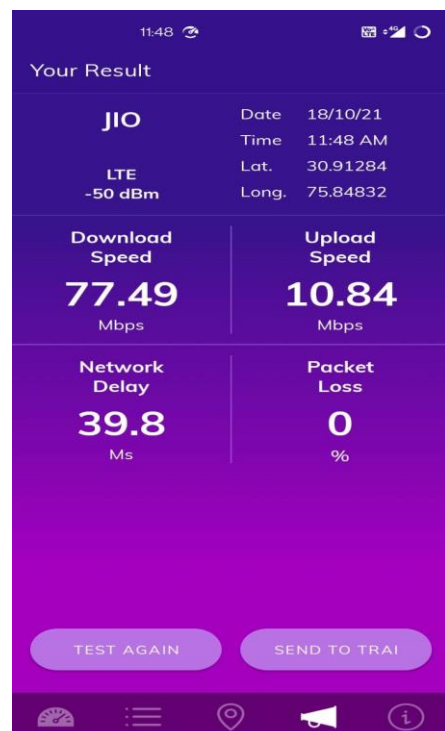


- Hotspot location 4 (Railway Station, Ludhiana)

2G

3G

LTE

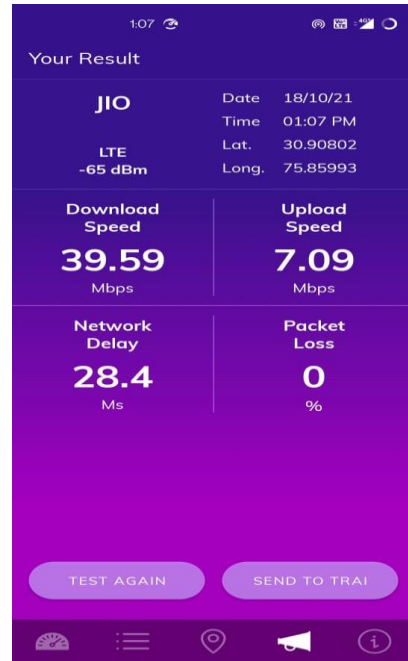


- Hotspot location 5 (Civil Hospital, Ludhiana)

2G

3G

LTE



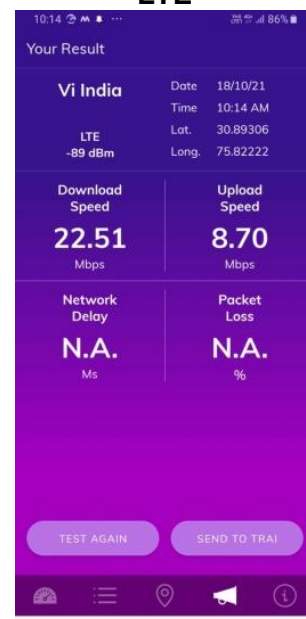
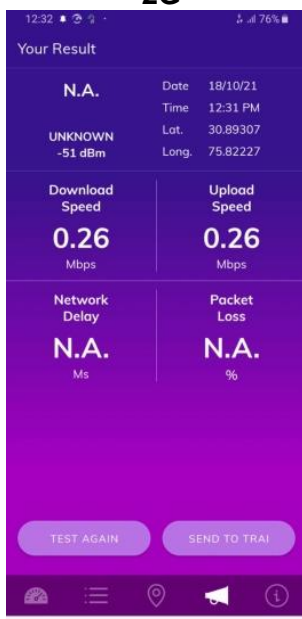
4. VIL

- Hotspot location 1 (Kips Market)

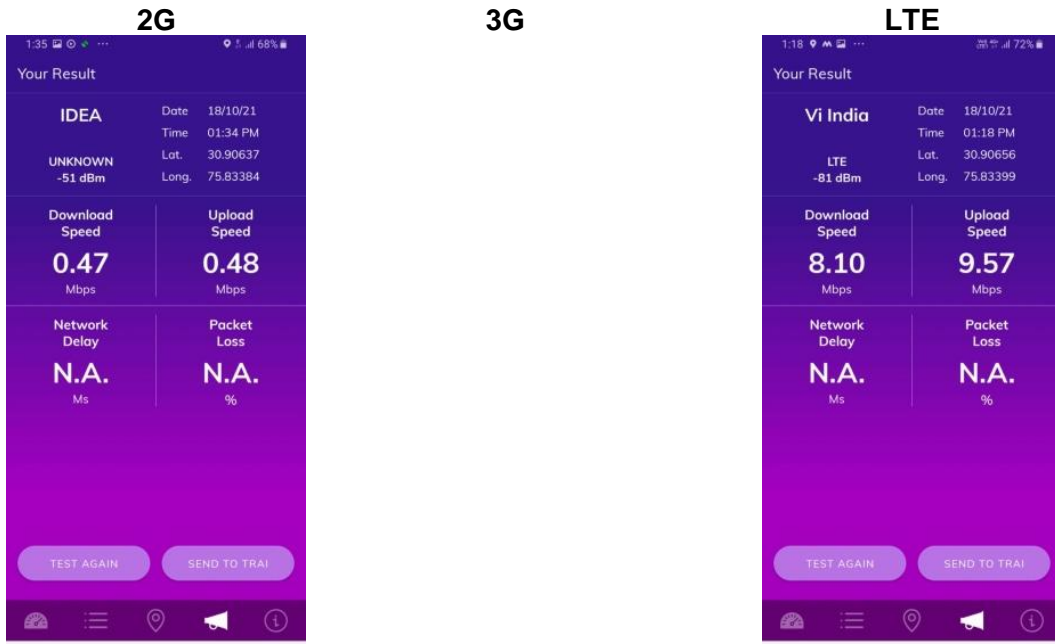
2G

3G

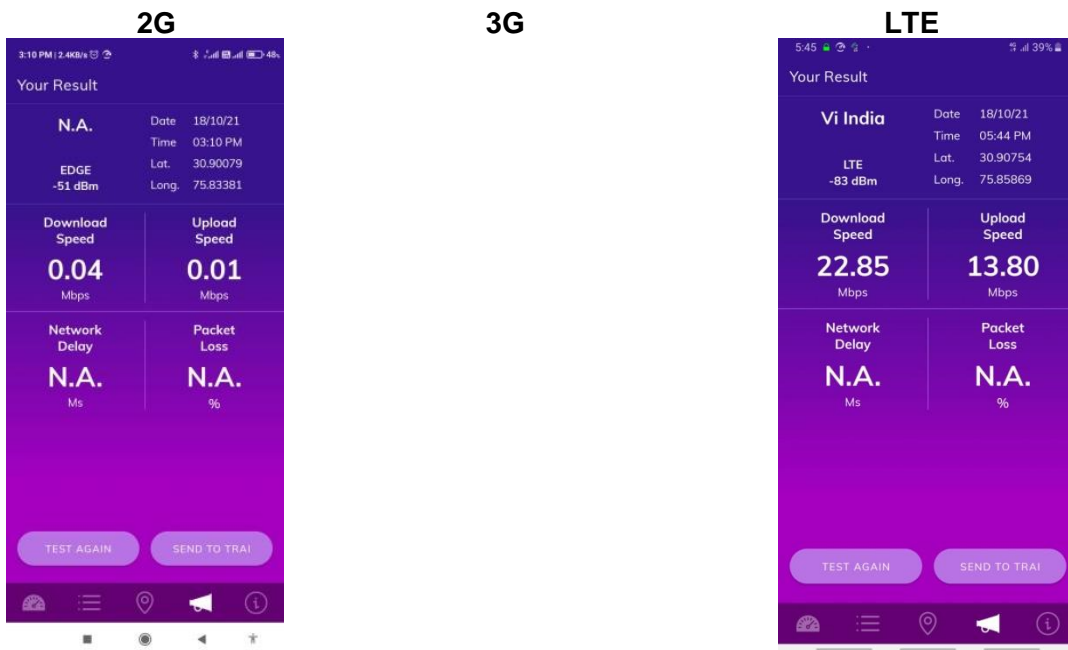
LTE



- **Hotspot location 2 (Khalsa College)**



- **Hotspot location 3 (District Court)**



- Hotspot location 4 (Railway Station)



- Hotspot location 5 (Civil Hospital)

