

Operator Assisted Drive Test Report

For

Kannur

24th to 26th Sep 2024

Kannur – Ambalappadi – Kannur via Kuttiady (NH/SH) - 153
Kms

(24th Sep 2024)

Kannur & Surrounding Area - 277 Kms

(25th & 26th Sep 2024)

TRAI RO, Bengaluru

Key Performance Indicators:

- All TSPs have met the 2% QOS benchmark of Drop Call Rate except BSNL 2G.
- All TSPs have met the 3% QOS benchmark of Call Block Rate.
- All 3G/4G TSPs have met the Rx Quality except BSNL 3G and VIL 4G.

The Operator Assisted Drive Test has been carried out by the Regional Office, Bangalore with the help of Service Providers from **24th to 26th Sep 2024**. The drive test covered the route of **430 Kms** including NH/SH of **153 Kms** & **6** hotspots. Approximately **450** calls were made for each of the 7 networks: three 2G networks, one 3G network, and three 4G networks covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

Regional Office, TRAI Bengaluru conducted Operator Assisted Drive Test from **24th to 26th Sep 2024** covering various locations in **Kannur & Surrounding Region**. The performance of Airtel, BSNL, Vodafone Idea, and Jio were monitored across various technologies (2G, 3G, and 4G/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, Hand Over 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 a wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately **430 KMs** including **NH/SH of 153 Kms** over a period of 3 days from **24th to 26th Sep 2024**. Approximately 450 calls were made for each of the 7 networks: three 2G (Lock Mode) networks, one 3G (Dual mode) network, and three 4G networks covering 4 unique TSPs.

Data Tests: Dynamic data test (Test Data on Move) was conducted for **430 KMs** including **NH/SH of 153 Kms** over a period of 3 days for download throughput for 3G & 4G technology. Data Tests were performed at 6 static locations; three 2G (Lock mode) networks, one 3G (Dual mode) network, and four 4G (Free mode) networks covering 4 unique TSPs were tested. **All the data through put figure mentioned in the report are based on the average value.**

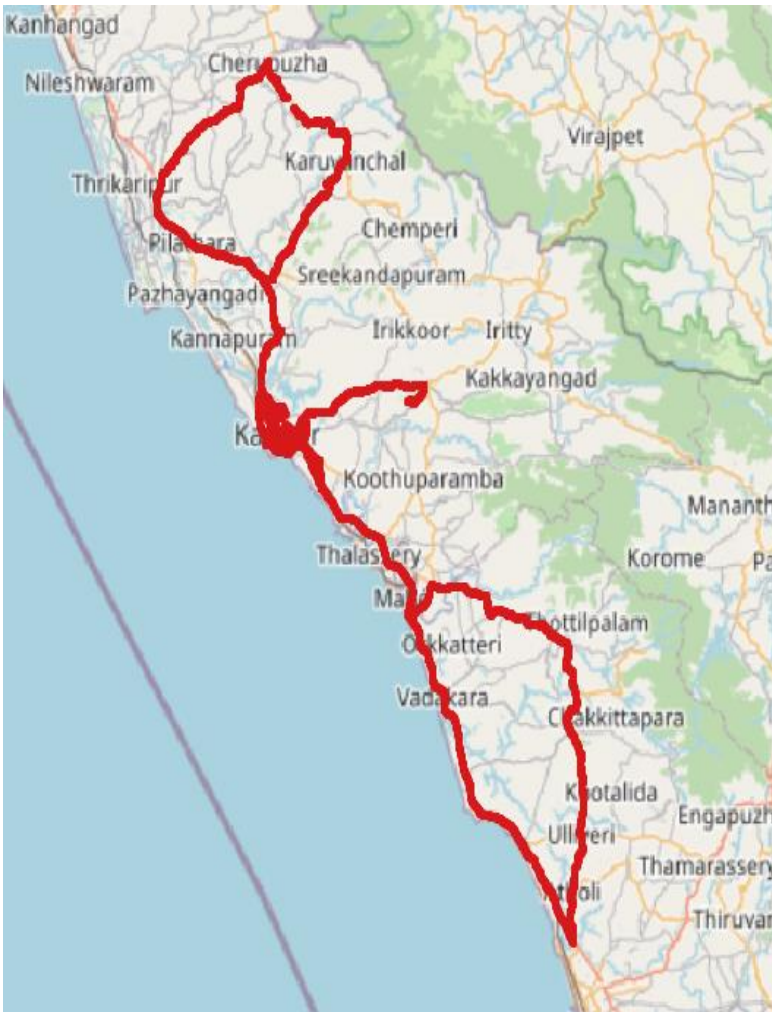
* For Voice and Data KPI's, 2G measurement is done with UE locked on 2G, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.

* 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.

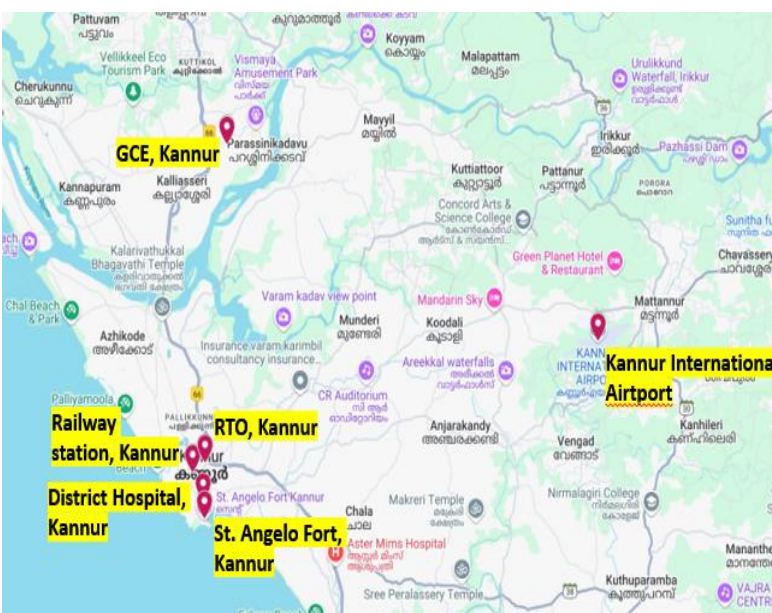
Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in , www.flipkart.com and PayTm
Latency	32 Bytes on www.google.com
Video Streaming	130 secs clip

Voice & Dynamic Data Test (Data Test on Move) Drive Route



Areas covered	
Kannur	Ulliyeri
Taliparamba	Perambra
Cherupuzha	Kuttiadi
Alakode	Nadapuram
Thalassery	Peringattoor
Mahe	Mattanur
Vadakara	
Koyilandy	
Chemmachery	
Atholi	

Data Service Test- Static Locations



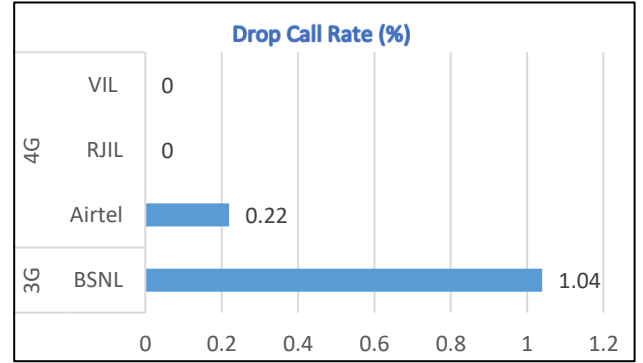
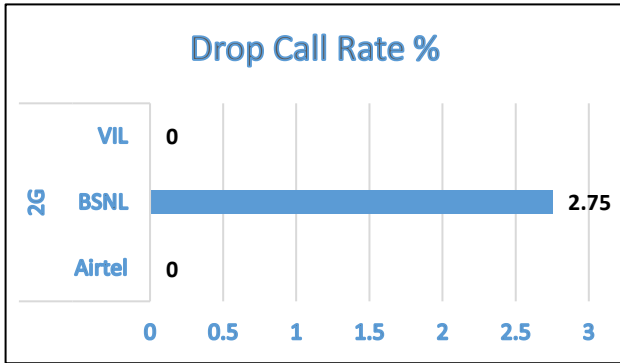
1. Government College of Engineering, Kannur
2. Regional Transport Office Kannur
3. St. Angelo Fort Kannur
4. Kannur Railway Station
5. Kannur International Airport
6. District Hospital Kannur

Voice Calls

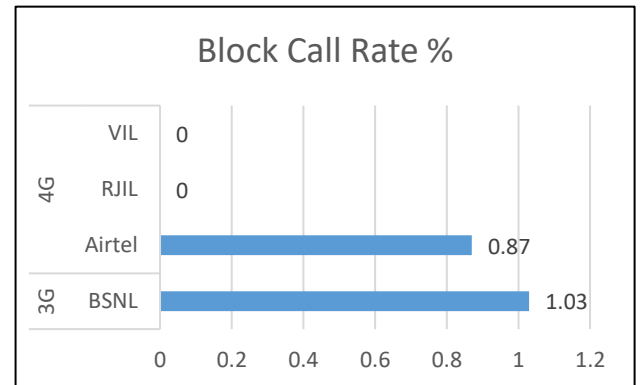
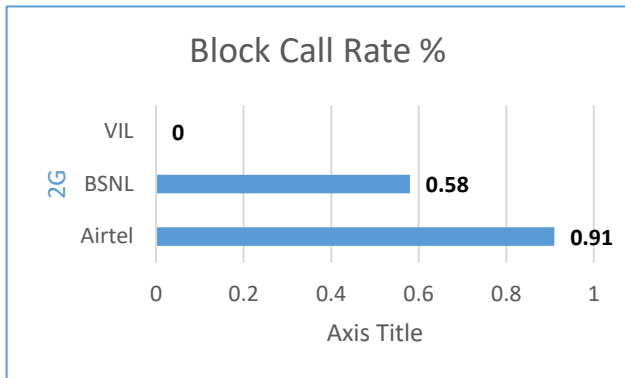
Key Observations

QoS compliance of the TSPs for Voice across technologies 2G/3G/4G-4G:

Drop Call Rate (%)



Block Call Rate (%)



KPIs	2G			3G	4G		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	2.75	0	1.04	0.22	0	0
Block Call Rate %	0.91	0.58	0	1.03	0.87	0	0

- a) All TSPs have met the 2% QOS benchmark of Drop Call Rate except BSNL 2G.
- b) All TSPs have met the 3% QOS benchmark of Call Block.

Voice Calls

Key Observations

Coverage

a) Percentage of coverage samples for 2G \geq -85 dBm.

TSPs	2G		
	Airtel	BSNL	VIL
Coverage%	83.77	90.60	91.60

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

TSPs	3G	4G		
	BSNL	Airtel	JIO	VIL
Coverage %	83.10	97.01	98.00	95.61

c) Percentage of time spent on 3G/4G network

TSPs	3G	4G		
	BSNL	Airtel	JIO	VIL
Time Spent on 3G/4G%	89.62	100	100	93.66

Summary

City Level Summary

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	440	513	469
Blocked Call Rate (%)	0.91	0.58	0
CSSR% (Accessibility)	99.09	99.41	100
Drop Call Rate (%)	0	2.75	0
Rx Quality (%)	98.62	98.2	97.58
Mobility HOSR (%)	97.99	98.2	99.13

Voice Call	3G/4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Call Attempt	485	462	419	486
Blocked Call Rate (%)	1.03	0.87	0	0
CSSR% (Accessibility)	98.97	99.13	100	100
Drop Call Rate (%)	1.04	0.22	0	0
Rx Quality (%)	94.11	98.16	96.65	93.39
Mobility HOSR (%)	98.77	99.31	99.54	99.42

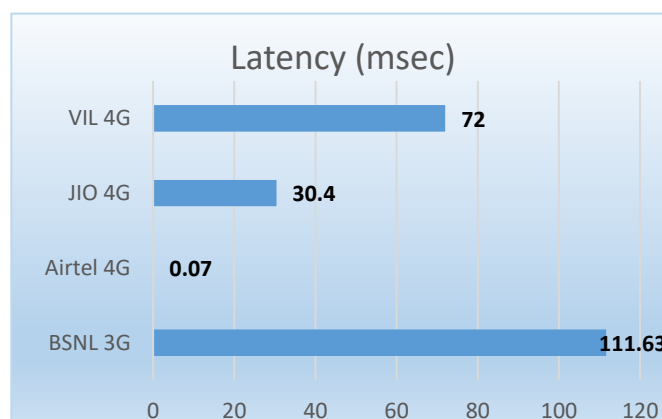
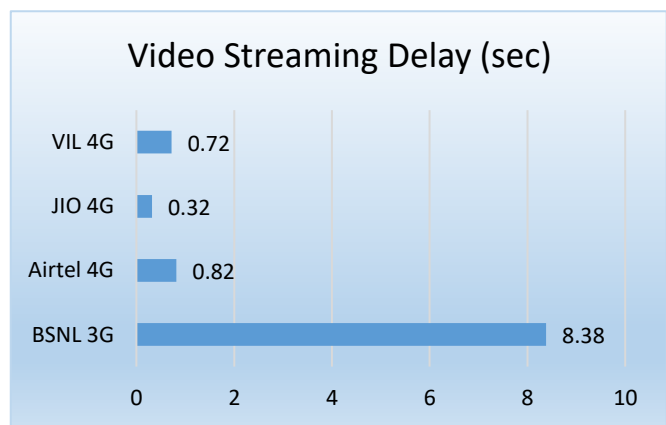
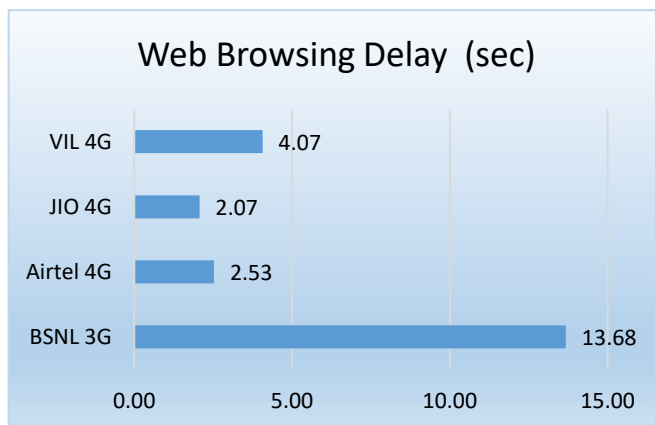
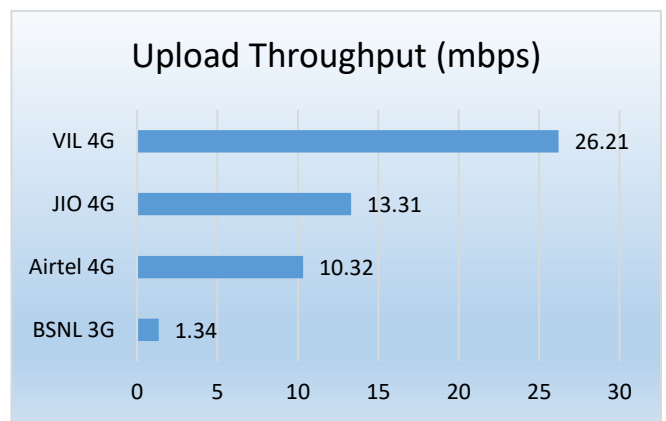
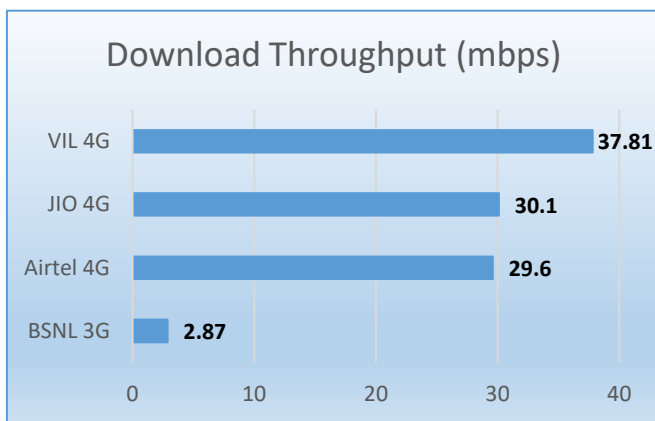
Data Services Static

Key Observations

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

Data Download, Upload Performance (Mbps), Web Browsing delay, Video Streaming and Latency 3G/4G

3G/4G/ Network:



Summary

City Level Summary(contd.)

Data Services Static	3G/4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (mbps)	2.87	29.6	30.1	37.81
Upload Throughput (mbps)	1.34	10.32	13.31	26.21
Web Browsing Delay (sec)	13.68	2.53	2.07	4.07
Video Streaming Delay (sec)	8.38	0.82	0.32	0.72
Latency (msec)	111.63	0.07	30.4	72

Data Services Dynamic (Data Test on Move)	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	2.36	29.29	12.7	23.08
Upload Throughput (mbps)	1.31	11.42	4.8	10.97

Summary

City Level Data Services Static(contd.)

Data Services Static – General Hospital	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.73	33.92	22.17	37.55
Upload Throughput (Mbps)	1.39	6.4	5.92	32.44
Web Browsing Delay (sec)	16.47	2.13	2.06	3.85
Video Streaming Delay (sec)	8.53	0.86	0.29	0.79
Latency (ms)	209	0.06	30	78.4

Data Services Static - RTO Kannur	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	5.16	34.29	17.95	41.97
Upload Throughput (Mbps)	1.41	10.93	18.99	28.8
Web Browsing Delay (sec)	10.38	2.89	1.54	4.238
Video Streaming Delay (sec)	8.87	0.72	0.32	0.736
Latency (ms)	81	0.07	33	71.6

Data Services Static – Kannur Railway Stadium	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.95	21.95	44.07	43.9
Upload Throughput (Mbps)	1.39	10.53	16.64	26.57
Web Browsing Delay (sec)	10.81	3.05	2.06	3.69
Video Streaming Delay (sec)	4.27	0.82	0.31	0.69
Latency (ms)	82.80	0.06	28	81

Summary

City Level Data Services Static(contd.)

Data Services Static – Angelo Fort Kannur	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	1.43	29.47	11.91	24.95
Upload Throughput (Mbps)	1.08	9.29	5.81	15.26
Web Browsing Delay (sec)	17.51	2.48	2.6	3.96
Video Streaming Delay (sec)	11.98	0.9	0.35	0.71
Latency (ms)	83	0.06	31	73

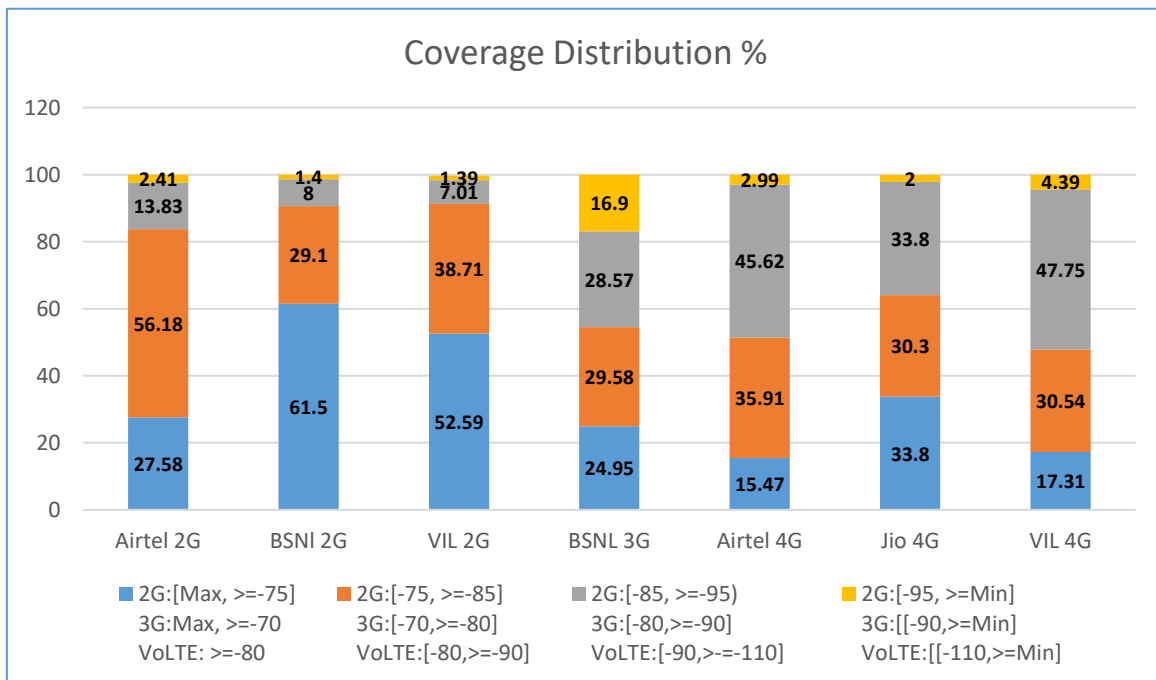
Data Services Static – Airport Kannur	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.74	39.37	51.01	43.23
Upload Throughput (Mbps)	1.36	12.56	18.43	38.98
Web Browsing Delay (sec)	12.77	2.04	2.34	4.35
Video Streaming Delay (sec)	7.94	0.85	0.33	0.73
Latency (ms)	87	0.09	31	65

Data Services Static – District Hospital Kannur	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.19	18.6	33.52	35.24
Upload Throughput (Mbps)	1.42	12.19	14.09	15.18
Web Browsing Delay (sec)	14.21	2.55	2.04	4.31
Video Streaming Delay (sec)	8.7	0.74	0.3	0.71
Latency (ms)	127	0.06	30	60

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	83.77
BSNI 2G	90.60
VIL 2G	91.60
BSNL 3G	83.10
Airtel 4G	97.01
Jio 4G	97.99
VIL 4G	95.61

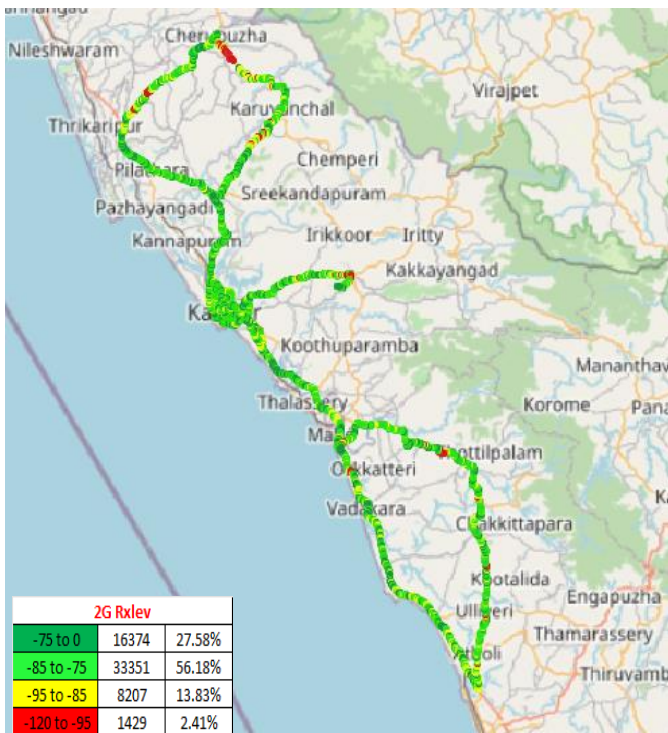


I. Coverage Details

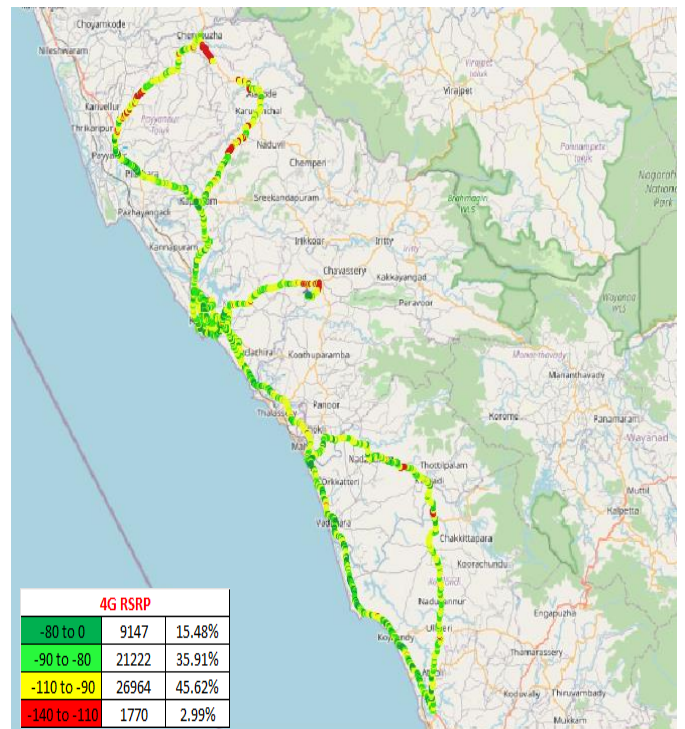
AIRTEL

Technology	Coverage Rate %
2G	83.77
4G	97.01

2G



4G



2G

Overall RxLevel	# Samples	% PDF
[Max, >=-75]	16374	27.58
[-75, >=-85)	33351	56.18
[-85, >=-95)	8207	13.83
[-95, >=Min)	1429	2.41
Total	59361	100

4G/VoLTE

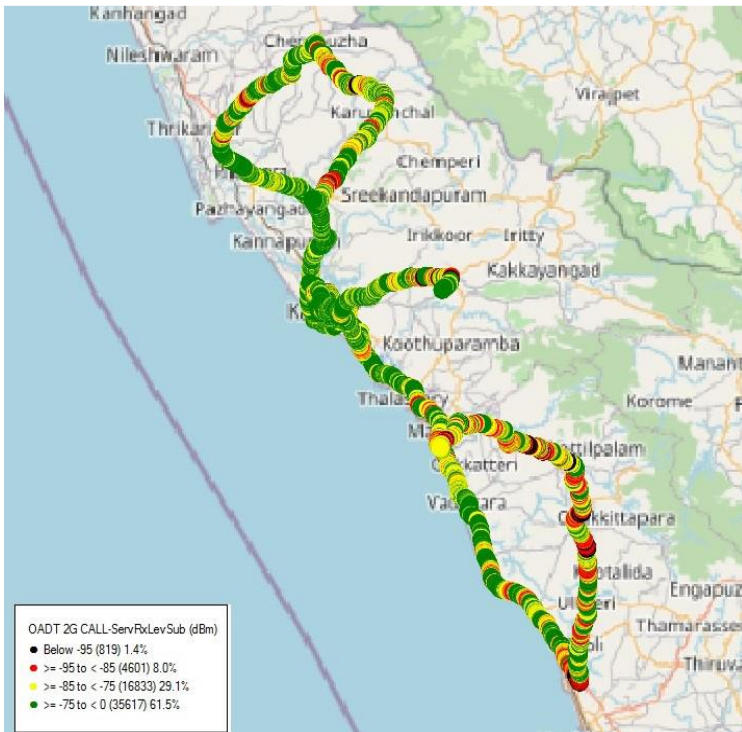
Overall RSRP	# Samples	% PDF
[Max, >=-80]	9147	15.47
[-80, >=-90)	21222	35.91
[-90, >=-110)	26964	45.62
[-110, >=Min)	1770	2.99
Total	59103	100

I. Coverage Details

BSNL

Technology	Coverage Rate %
2G	90.6
3G	83.10

2G



3G



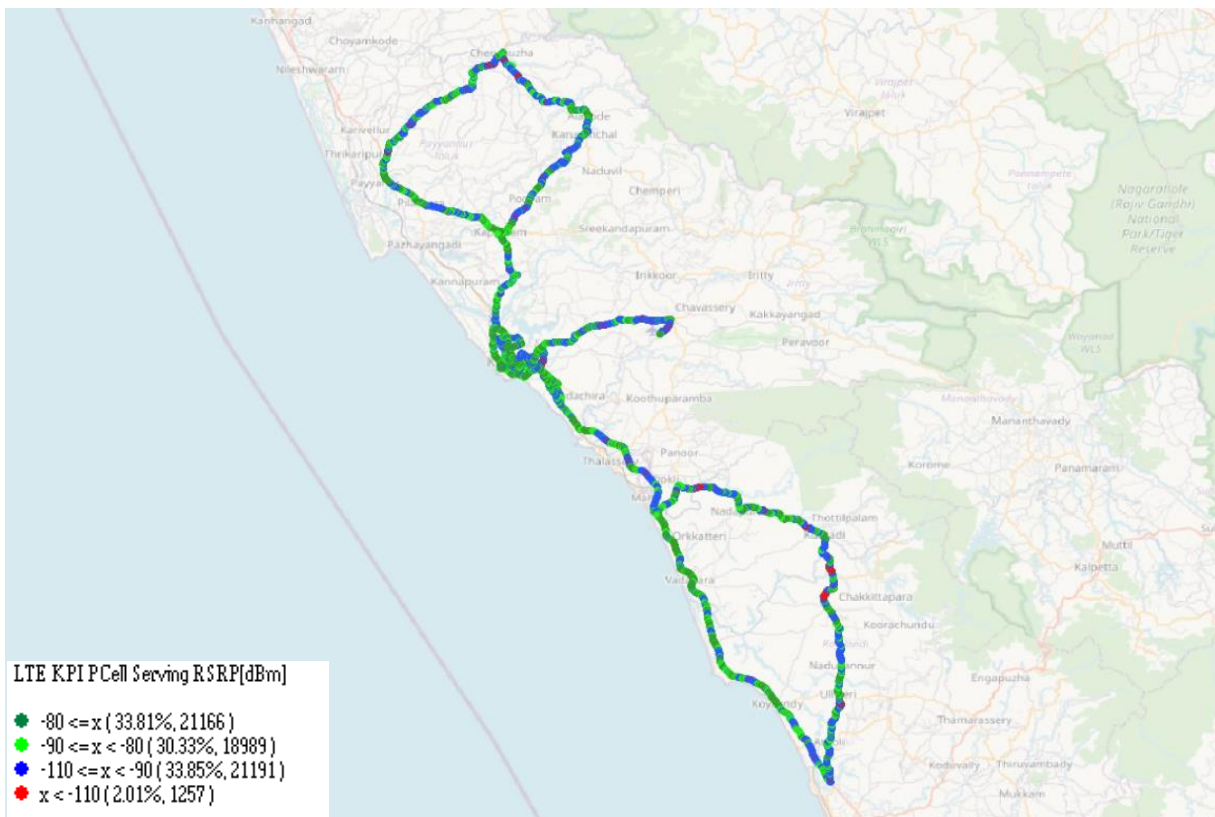
2G		
Overall RxLevel	# Samples	% PDF
[Max, >=-75]	35617	61.5
[-75, >=-85]	16833	29.1
[-85, >=-95]	4601	8.0
[-95, >=Min]	819	1.4
Total	57870	100

3G		
Overall RSCP	# Samples	% PDF
[Max, >=-70]	57674	24.95
[-70, >=-80]	68384	29.58
[-80, >=-90]	66050	28.57
[-90, >=Min]	39062	16.90
Total	231170	100

I. Coverage Details

JIO

Technology	Coverage Rate %
4G	97.99



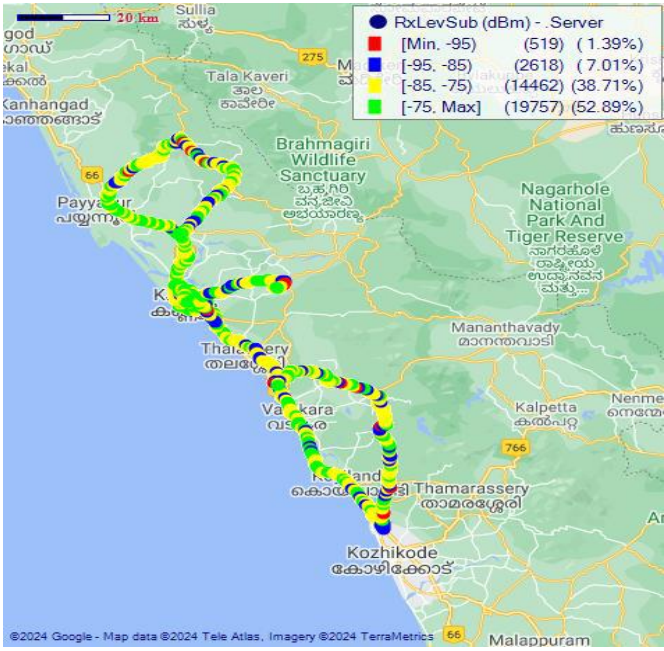
4G/VoLTE		
Overall RSRP	# Samples	% PDF
[Max, >=-80]	21166	33.8
[-80, >=-90)	18989	30.3
[-90, >=-110)	21191	33.8
[-110, >=Min)	1257	2.0
Total	62603	100

I. Coverage Details

VIL

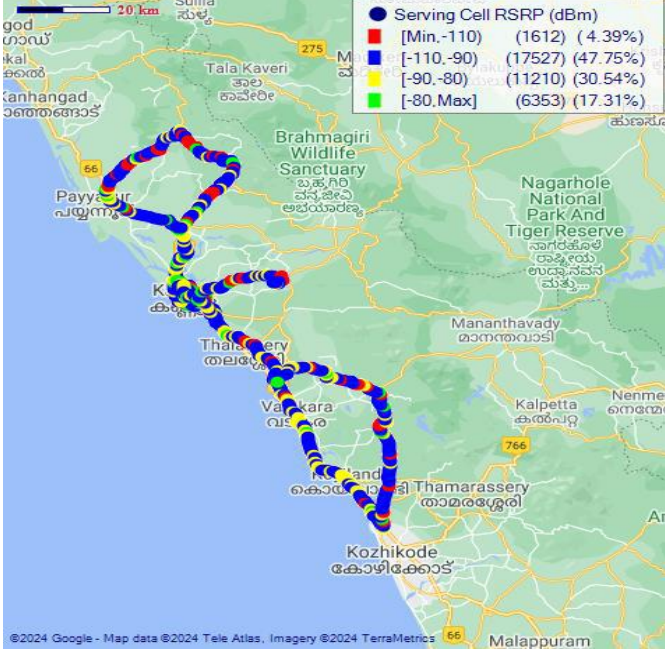
Technology	Coverage Rate %
2G	91.60
4G	95.61

2G



2G		
Overall RxLevel	# Samples	% PDF
[Max, >=-75]	19757	52.89
[-75, >=-85)	14462	38.71
[-85, >=-95)	2618	7.01
[-95, >=Min)	519	1.39
Total	37356	100

4G

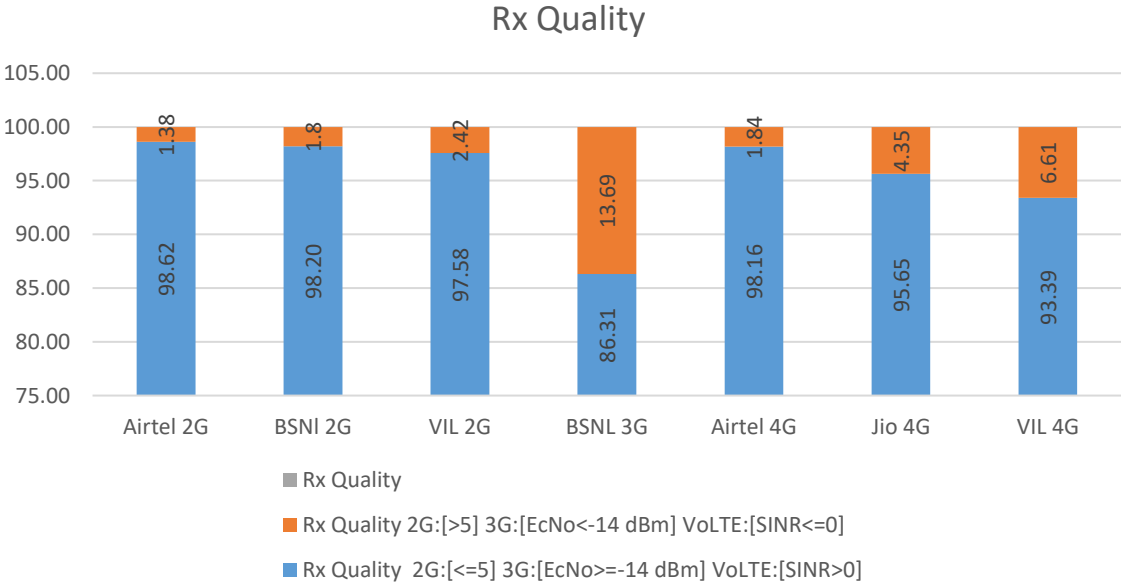


4G/VoLTE		
Overall RSRP	# Samples	% PDF
[Max, >=-80]	6353	17.31
[-80, >=-90)	11210	30.54
[-90, >=-110)	17527	47.57
[-110, >=Min)	1612	4.39
Total	36702	100

II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP and SINR > 0 in case of 4G 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	98.62
BSNI 2G	98.20
VIL 2G	97.58
BSNL 3G	86.31
Airtel 4G	98.16
Jio 4G	95.65
VIL 4G	93.39

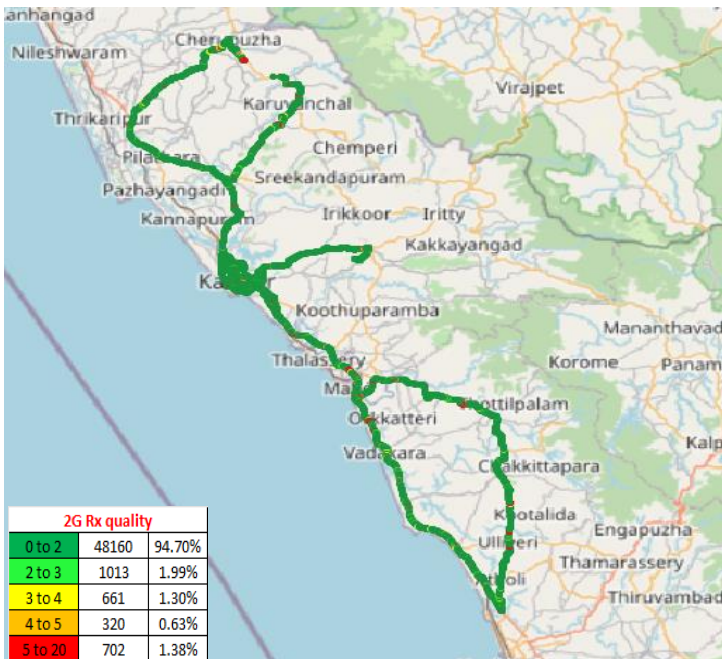


II. Quality Details

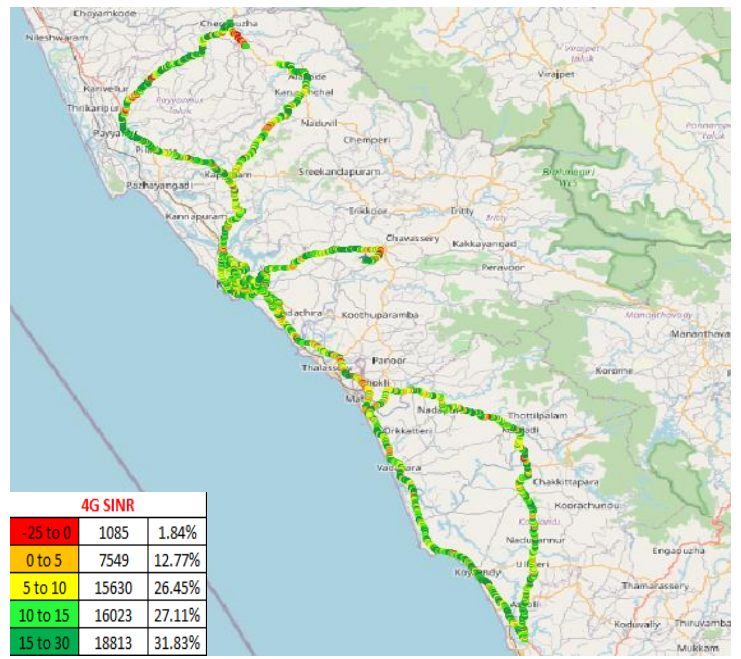
Airtel

Technology	Rx Quality %
2G	98.62
4G	98.16

2G



4G



Overall Rx Quality	# Samples	% PDF
(Min, <=2)	48160	94.70
(2, <=3)	1013	1.99
(3, <=4)	661	1.30
(4, <=5)	320	0.63
(5, <=Max)	702	1.38
Total	50856	100

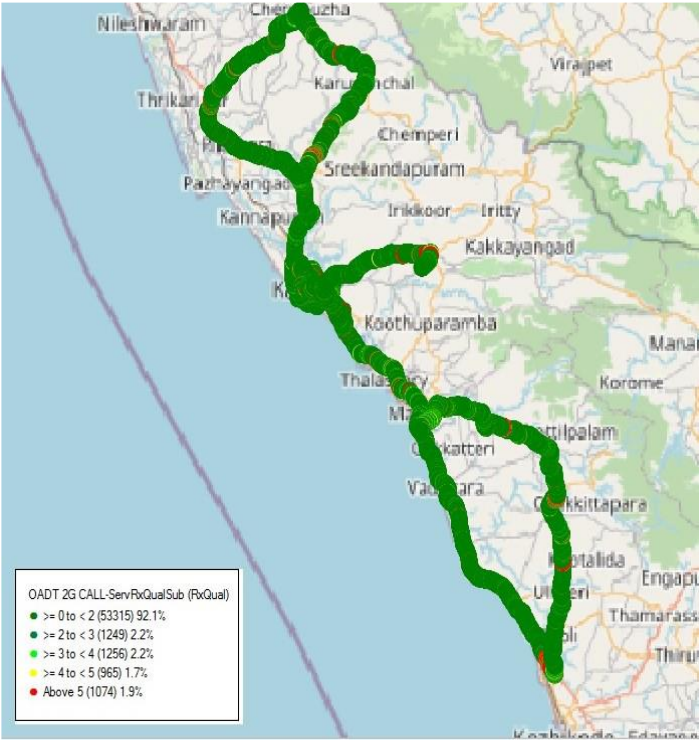
Overall SINR	# Samples	% PDF
(Min, <=0)	1085	1.84
(0, <=5)	7549	12.77
(5, <=10)	15630	26.45
(10, <=15)	16023	27.11
(15, <=Max)	18813	31.83
Total	59100	100

II. Quality Details

BSNL

Technology	Rx Quality %
2G	98.20
3G	86.31

2G



3G



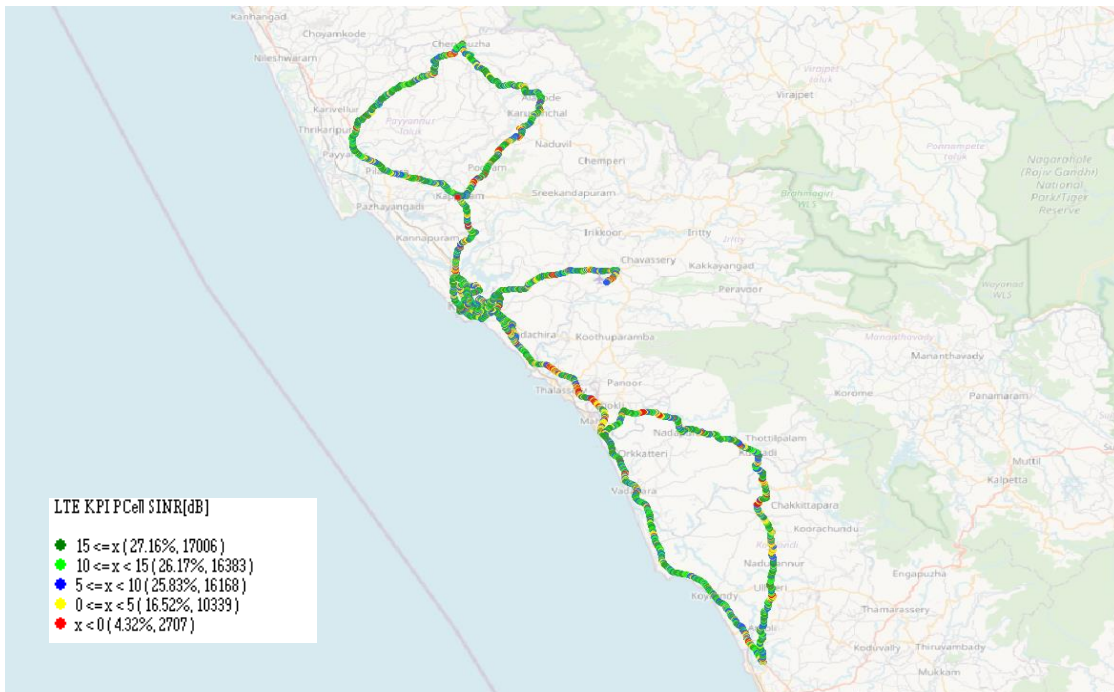
Overall Rx Quality	# Samples	% PDF
(Min, <=2)	53315	92.1
(2, <=3)	1249	2.2
(3, <=4)	1256	2.2
(4, <=5)	965	1.7
(5, <=Max)	1074	1.9
Total	57859	100

Overall EcNo	# Samples	% PDF
(Max, <=-6)	2291	0.99
(-6, <=-9)	8300	3.59
(-9, <=-11)	46323	20.04
(-11, <=-14)	142612	61.69
(-14, <= Min)	31644	13.69
Total	231170	100

II. Quality Details

JIO

Technology	Rx Quality (%)
4G/4G	95.65



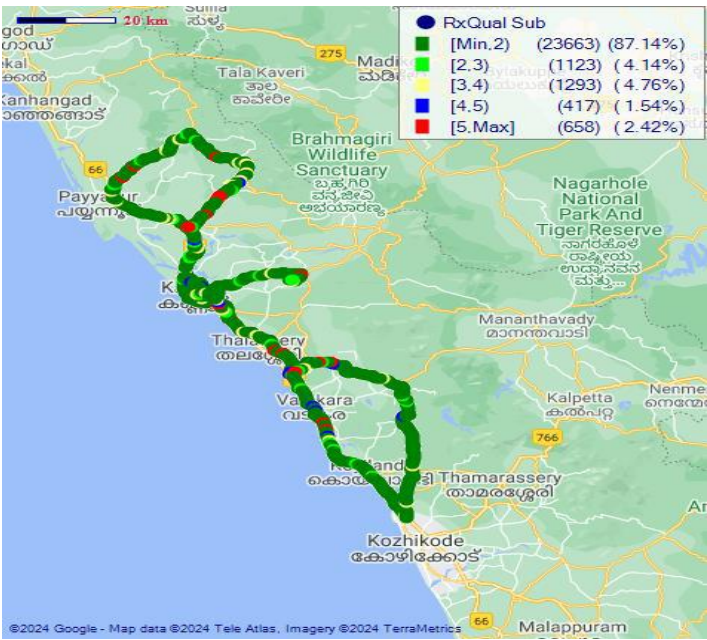
Overall SINR	# Samples	% PDF
(Min, ≤=0)	2707	4.3
(0, ≤=5)	10339	16.5
(5, ≤=10)	16168	25.8
(10, ≤=15)	16383	26.2
(15, ≤=Max)	17006	27.2
Total	62603	100

II. Quality Details

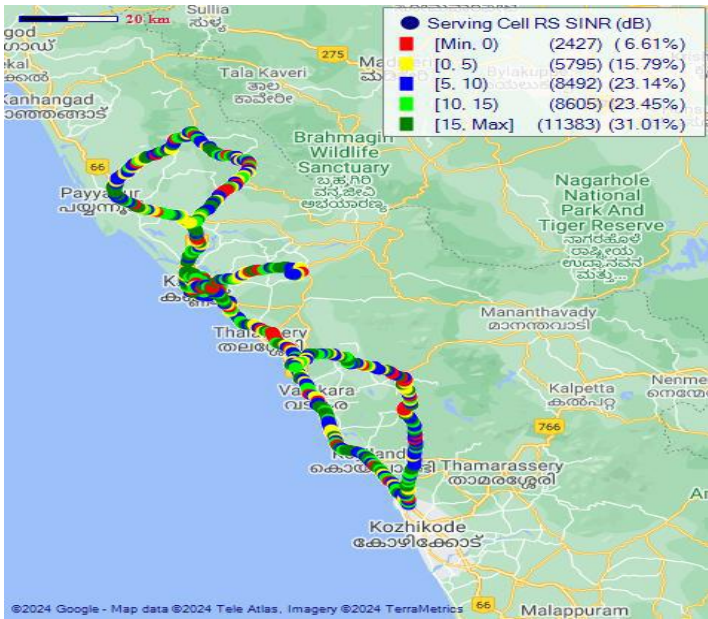
VIL

Technology	Rx Quality %
2G	97.58
4G	93.39

2G



4G

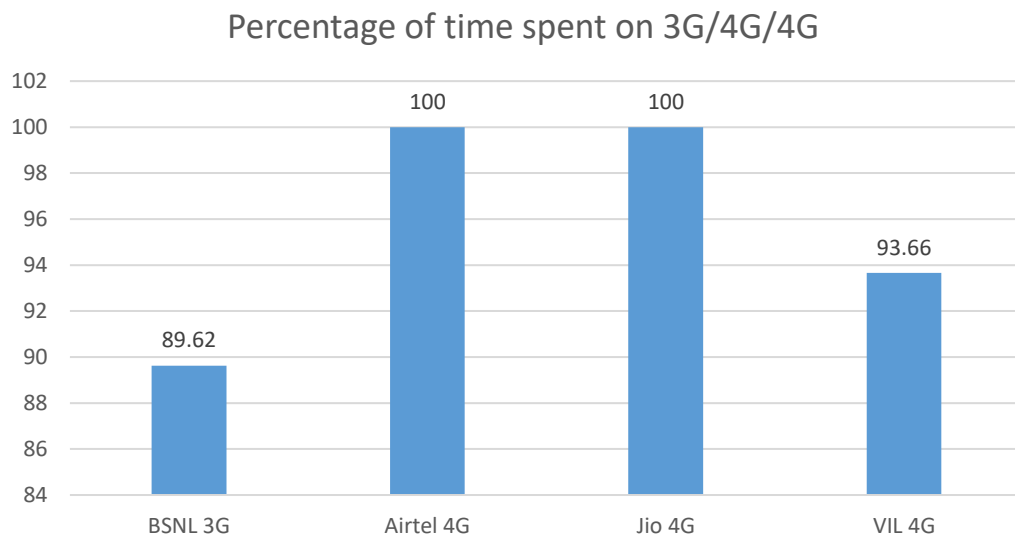


Overall Rx Quality	# Samples	% PDF
(Min, <=2)	23663	87.14
(2, <=3)	1123	4.14
(3, <=4)	1293	4.76
(4, <=5)	417	1.54
(5, <=Max)	658	2.42
Total	27154	100

Overall SINR	# Samples	% PDF
(Min, <=0)	2427	6.61
(0, <=5)	5795	15.79
(5, <=10)	8492	23.14
(10, <=15)	8605	23.45
(15, <=Max)	11383	31.01
Total	36702	100

III. Technology Details

TSP	Time Spent on 3G/4G %
BSNL 3G	89.62
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	93.66



III. Technology Details

Airtel

Technology	Time Spent %
4G	100



III. Technology Details

BSNL

Technology	Time Spent %
3G	89.62



III. Technology Details

JIO

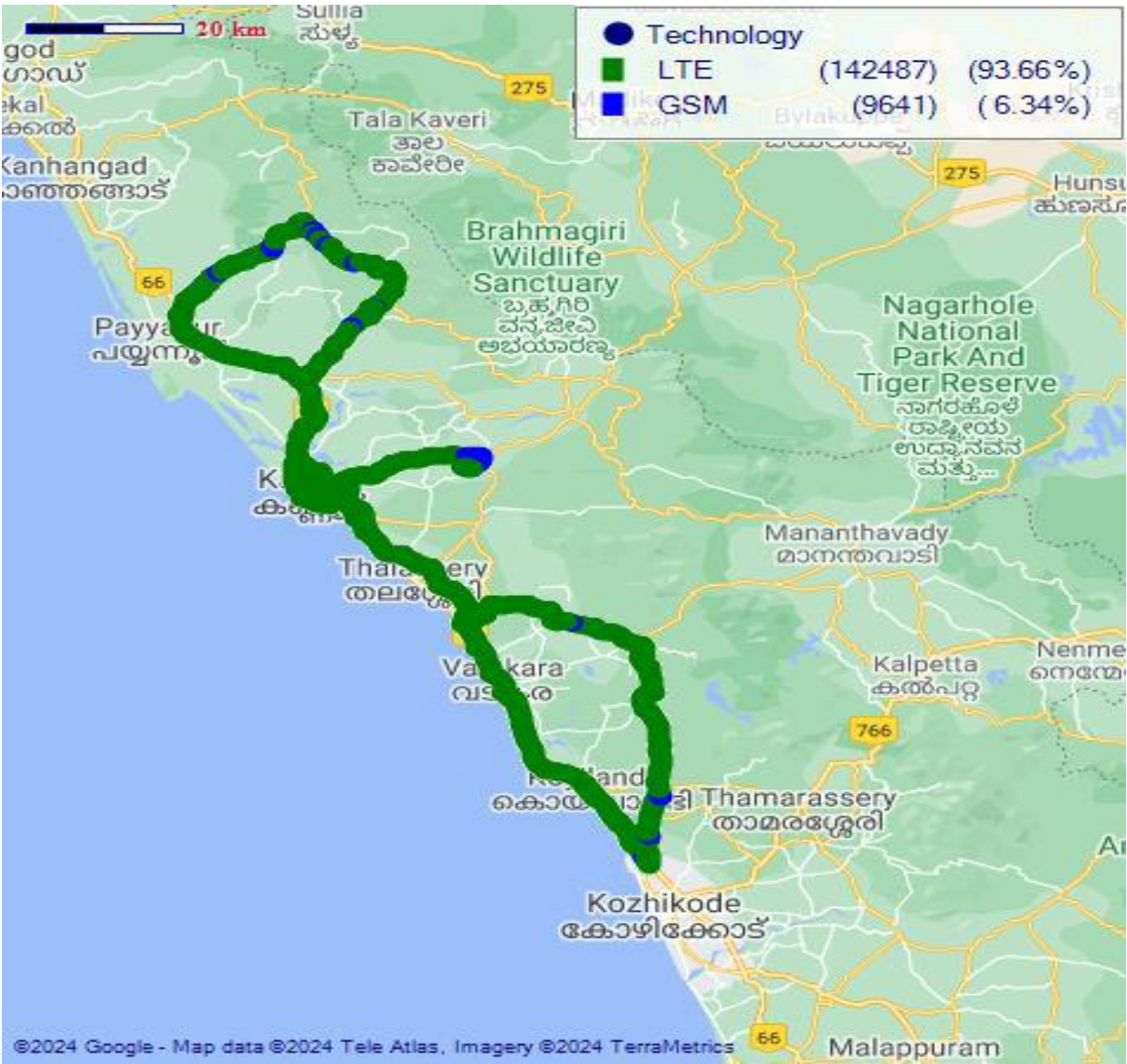
Technology	Time Spent %
4G	100



III. Technology Details

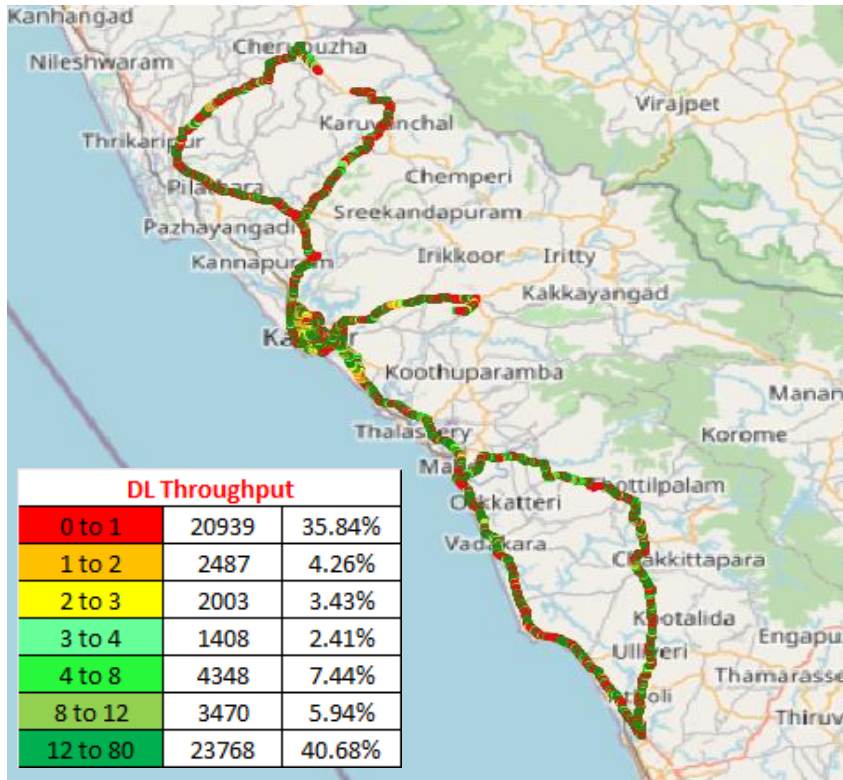
VIL

Technology	Time Spent
4G	93.66

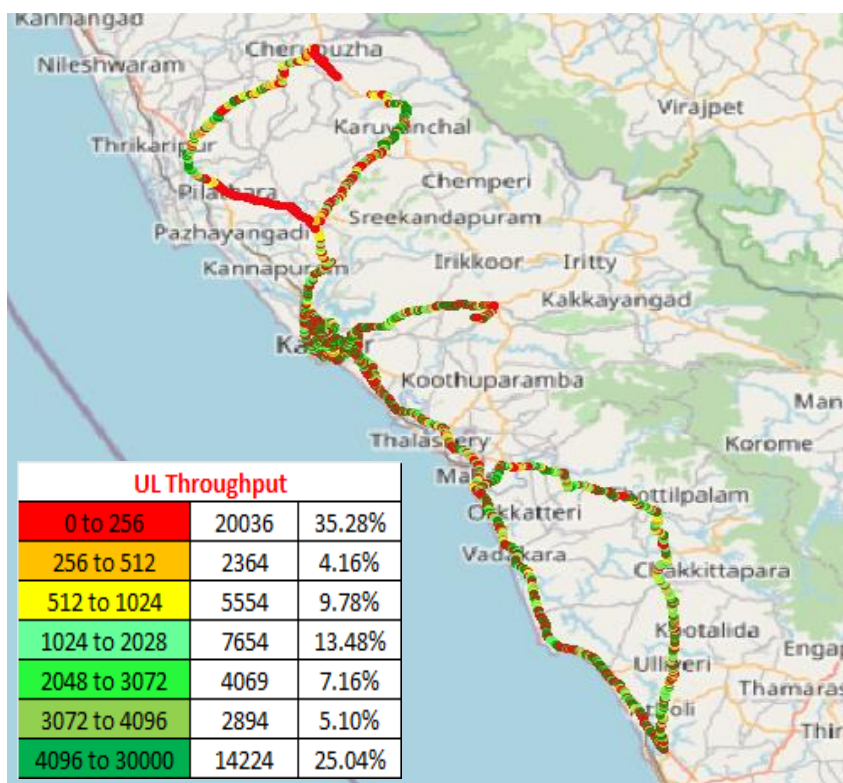


IV. Dynamic Data Test (Data Test on Move) - 4G DL/UL Details

Airtel



DL throughput	No. of Samples	%
0 to 1 Mbps	20939	35.84
1 to 2 Mbps	2487	4.26
2 to 3 Mbps	2003	3.43
3 to 4 Mbps	1408	2.41
4 to 8 Mbps	4348	7.44
8 to 12 Mbps	3470	5.94
>12 Mbps	23768	40.68
Total	58423	100



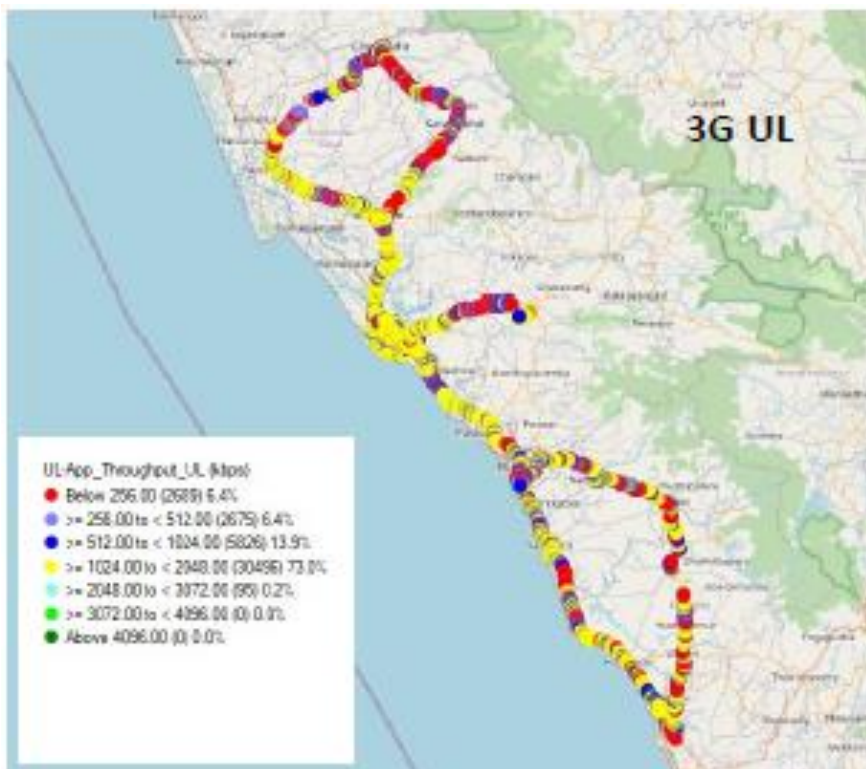
UL throughput	No. of samples	%
0 to 256 Kbps	20036	35.28
250 to 512 Kbps	2364	4.16
512 Kbps to 1 Mbps	5554	9.78
1 to 2 Mbps	7654	13.48
2 to 3 Mbps	4069	7.16
3 to 4 Mbps	2894	5.10
>4 Mbps	14224	25.04
Total	56795	100

IV. Dynamic Data Test(Data Test on Move)- 3G/4G DL/UL Details

BSNL



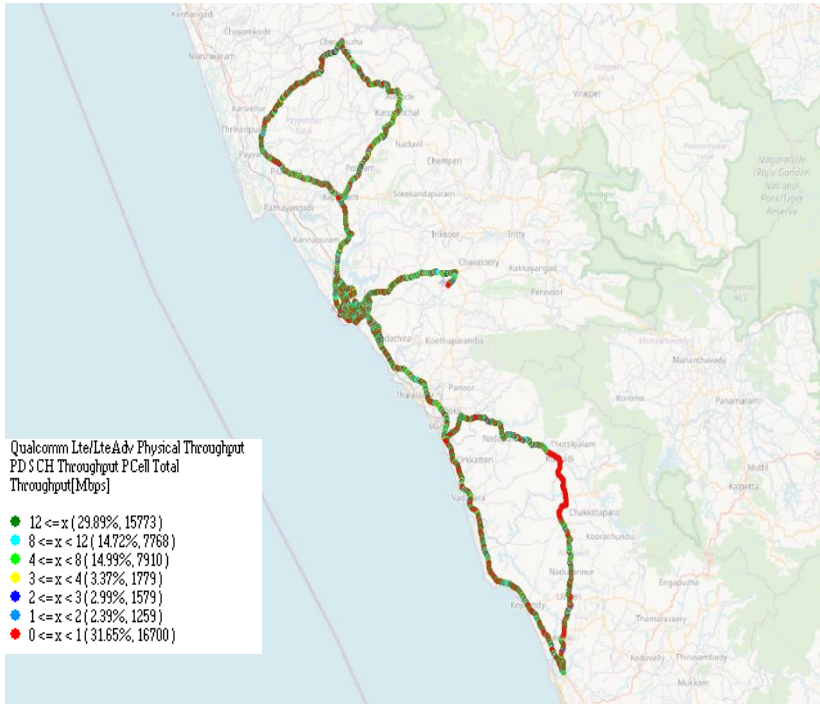
DL throughput	No. of Samples	%
0 to 1 Mbps	19103	37.48
1 to 2 Mbps	10393	20.39
2 to 3 Mbps	7156	14.04
3 to 4 Mbps	4835	9.49
4 to 8 Mbps	8326	16.34
8 to 12 Mbps	1110	2.18
>12 Mbps	43	0.08
Total	50966	100



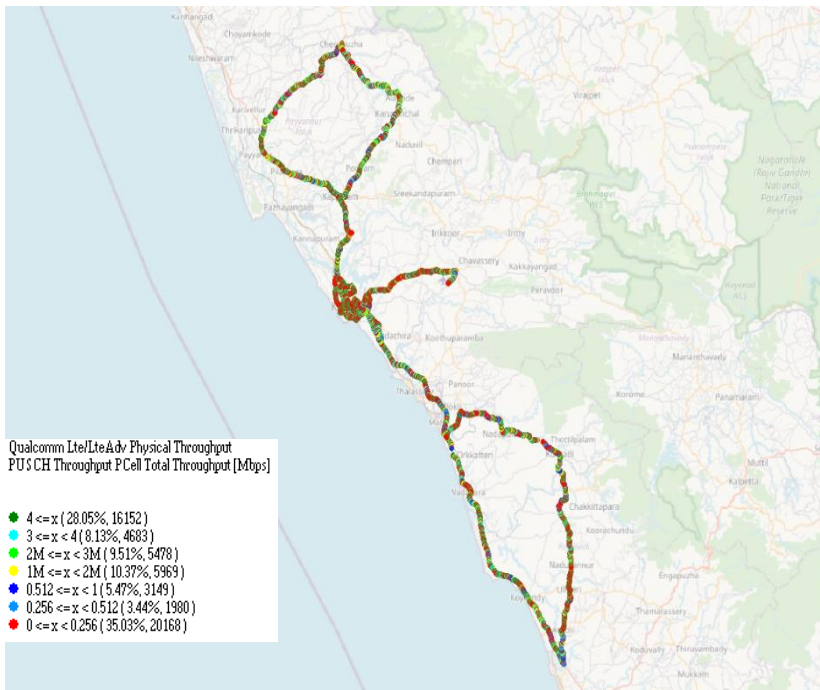
UL throughput	No. of Samples	%
0 to 1 Mbps	2689	6.4
1 to 2 Mbps	2675	6.4
2 to 3 Mbps	5826	13.9
3 to 4 Mbps	30496	73
4 to 8 Mbps	95	0.2
8 to 12 Mbps	0	0
>12 Mbps	0	0
Total	41781	100

IV. Dynamic Data Test(Data Test on Move)- 4G DL/UL Details

JIO



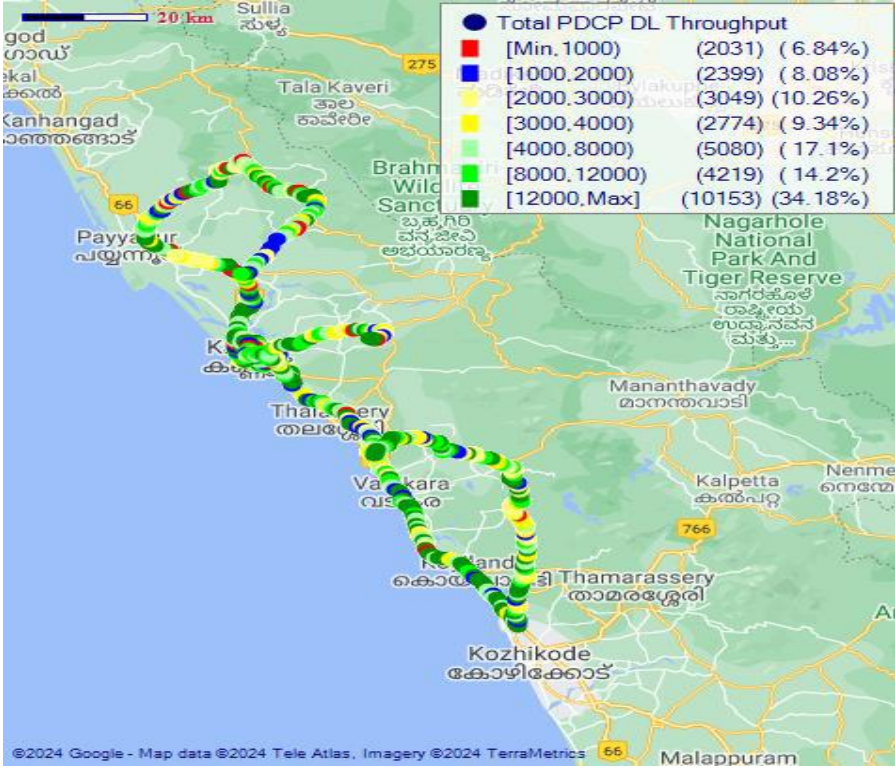
DL throughput	No. of Samples	%
0 to 1 Mbps	16700	32
1 to 2 Mbps	1259	2
2 to 3 Mbps	1579	3
3 to 4 Mbps	1779	3
4 to 8 Mbps	7910	15
8 to 12 Mbps	7768	15
>12 Mbps	15773	30
Total	52768	100



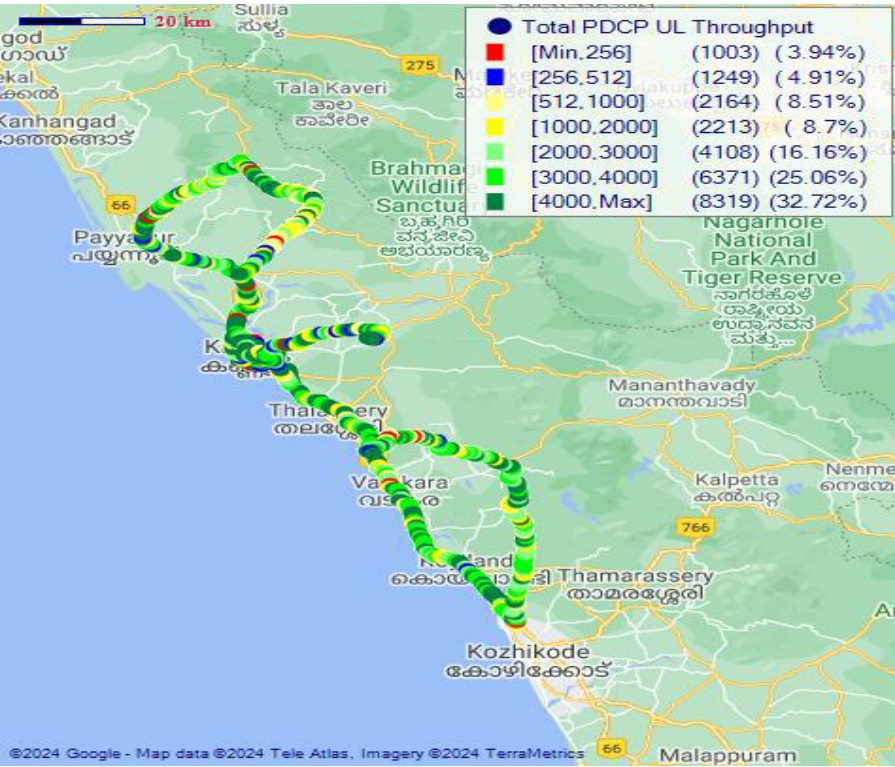
UL throughput	No. of samples	%
0 to 256 kbps Mbps	20168	35.03
256 to 512 kbps	1980	3.44
512 Kbps to 1 Mbps	3149	5.47
1 to 2 Mbps	5969	10.37
2 to 3 Mbps	5478	9.51
3 to 4 Mbps	4683	8.13
>4Mbps	16152	28.05
Total	57579	100

IV. Dynamic Data Test (Data Test on Move)- 4G DL/UL Details

VIL



DL throughput	No. of Samples	%
0 to 1 Mbps	2031	6.84
1 to 2 Mbps	2399	8.08
2 to 3 Mbps	3049	10.26
3 to 4 Mbps	2774	9.34
4 to 8 Mbps	5080	17.10
8 to 12 Mbps	4219	14.20
>12 Mbps	10153	34.18
Total	29705	100

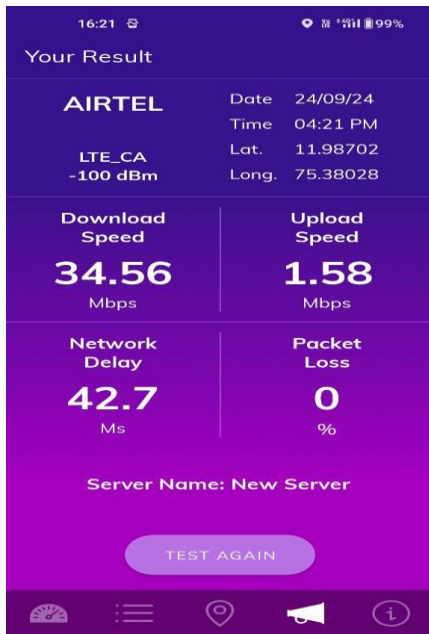


UL throughput	No. of samples	%
0 to 256 Kbps	1003	3.94
250 to 512 Kbps	1249	4.91
512 Kbps to 1 Mbps	2164	8.51
1 to 2 Mbps	2213	8.70
2 to 3 Mbps	4108	16.15
3 to 4 Mbps	6370	25.06
>4Mbps	8319	32.72
Total	25427	100

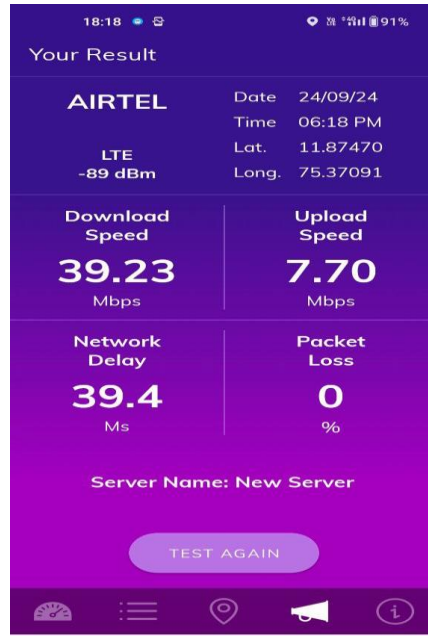
V. TRAI My Speed App Test Details-4G

Techology-4G	GEC	RTO Kannur	Railway Station	Angelo Fort	Airport Kannur	District Hospital
Download Speed (Mbps)	34.56	39.23	36.46	28.79	42.10	29.84
Upload Speed (Mbps)	1.58	7.70	14.27	9.03	27.08	10.87
Latency (ms)	42.7	39.4	31.0	40	26.3	35.2

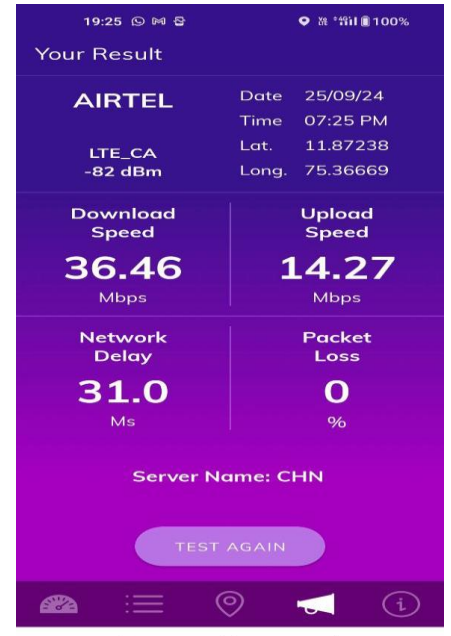
GEC



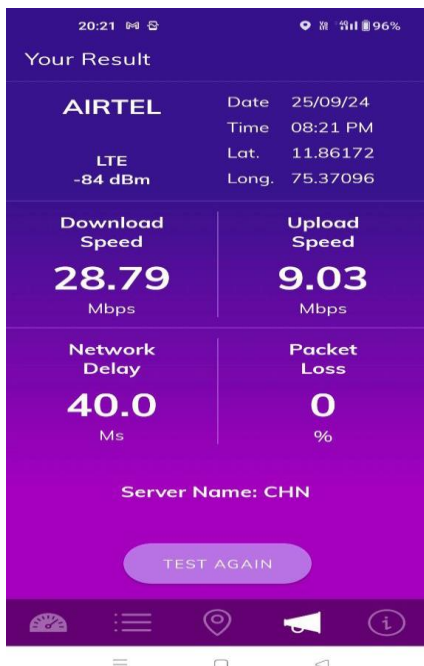
RTO Kannur



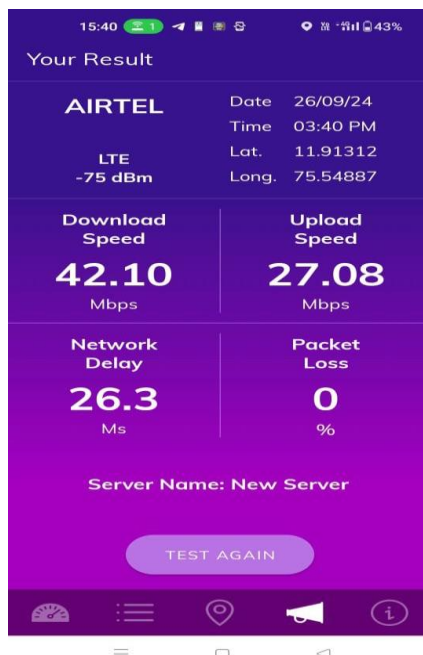
Railway Station



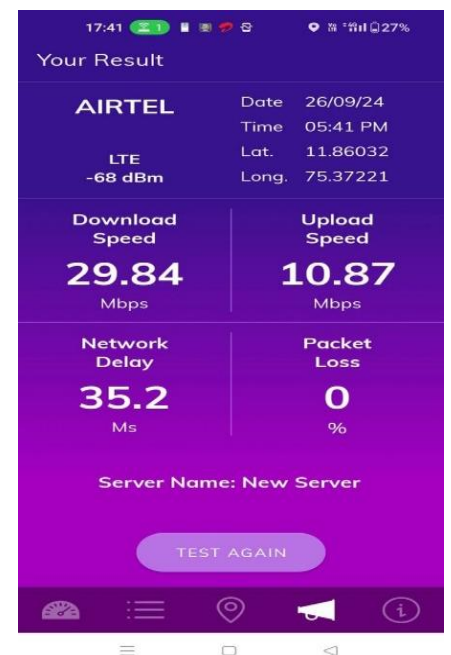
Angelo Fort



Airport Kannur



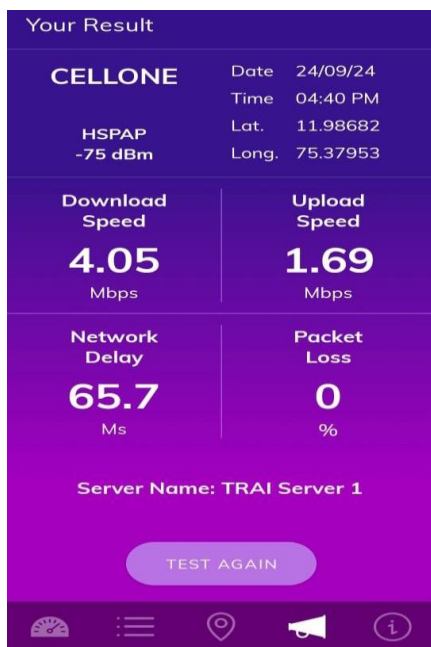
District Hospital



V. TRAI My Speed App Test Details- 3G/4G

Techology-4G	GEC	RTO Kannur	Railway Station	Angelo Fort	Airport Kannur	District Hospital
Download Speed (Mbps)	4.05	8.15	6.53	3.31	4.26	3.85
Upload Speed (Mbps)	1.69	1.83	1.76	1.77	1.75	1.77
Latency (ms)	65.7	61.9	59.3	60.1	85.4	59.2

GEC



RTO Kannur



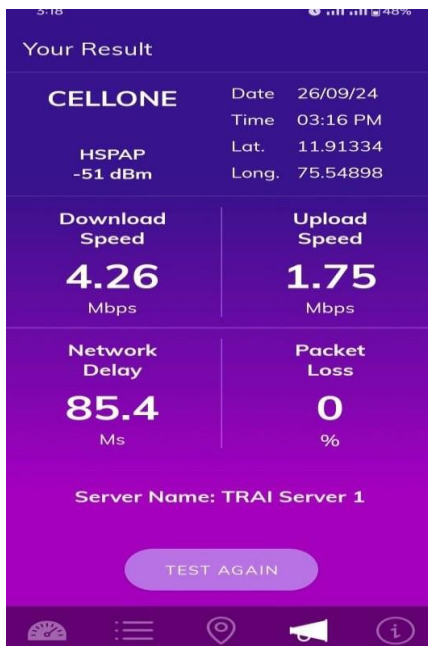
Railway Station



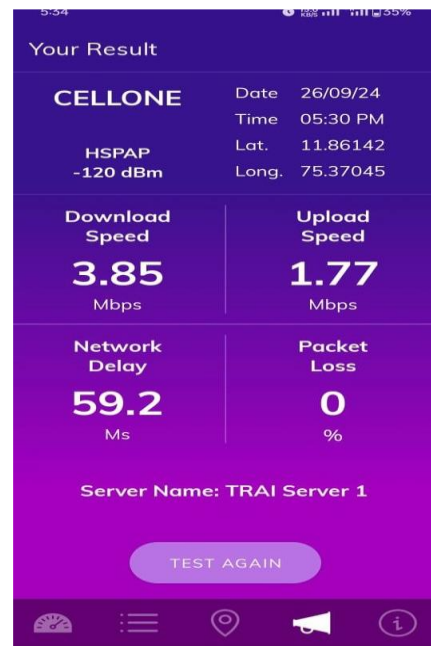
Angelo Fort



Airport Kannur



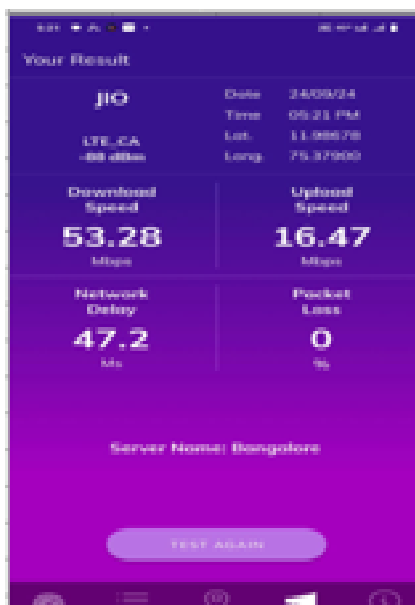
District Hospital



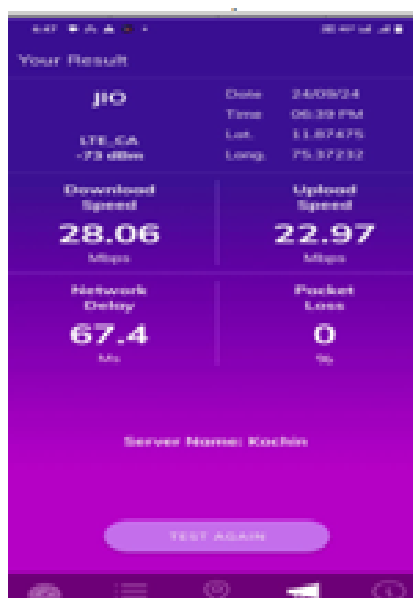
V. TRAI My Speed App Test Details-4G

Techology-4G	GEC	RTO Kannur	Railway Station	Angelo Fort	Airport Kannur	District Hospital
Download Speed (Mbps)	53.28	28.06	60.05	26.24	68.61	52.57
Upload Speed (Mbps)	16.47	22.97	35.08	11.38	23.60	23.89
Latency (ms)	47.2	67.4	38.9	34.7	45.9	42.6

GEC



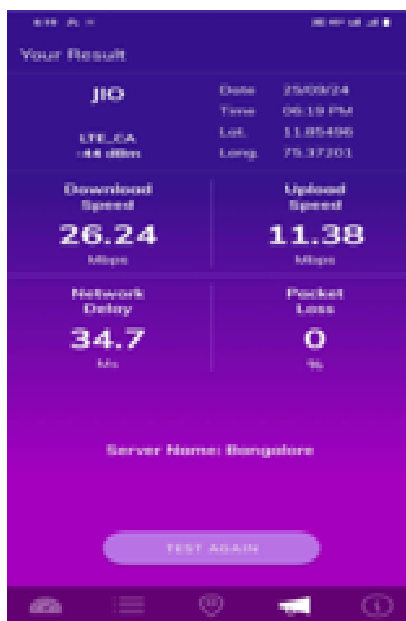
RTO Kannur



Railway Station



Angelo Fort



Airport Kannur



District Hospital



V. TRAI My Speed App Test Details-4G

Techology-4G	GEC	RTO Kannur	Railway Station	Angelo Fort	Airport Kannur	District Hospital
Download Speed (Mbps)	23.09	27.24	38.12	31.42	47.40	37.51
Upload Speed (Mbps)	28.76	25.87	30.8	26.08	34.48	30.67
Latency (ms)	NA	NA	NA	NA	NA	NA

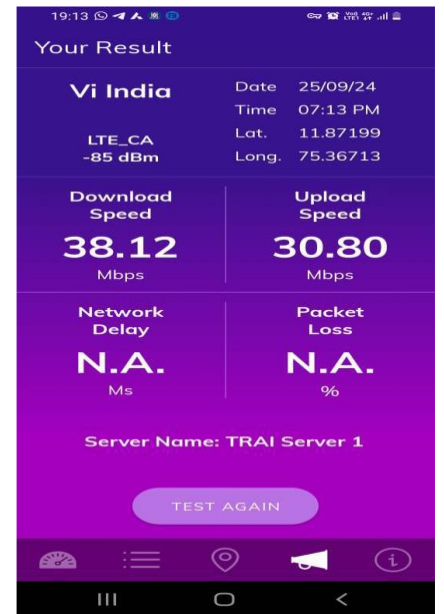
GEC



RTO Kannur



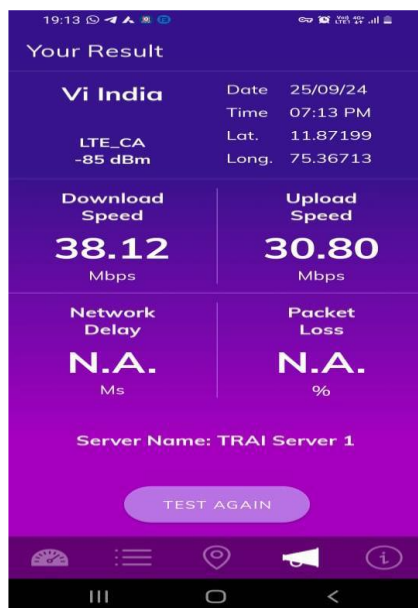
Railway Station



Angelo Fort



Airport Kannur



District Hospital

