



Operator Assisted Drive Test (OADT)
For

Navi Mumbai

11th to 13th Nov 2025

TRAI RO, Bengaluru

Self-Drive Test by TSP



Drive Test Report for

Nov Month 2025 Year

Navi Mumbai and Nearby Area
11 Nov to 13 Nov 2025
by
TRAI RO ,Bengaluru

Table of contents

1. Overview

- 1.1 Telecom Service Providers, Technologies and frequency bands captured
- 1.2 Quality of Service parameters measured

2. Executive Summary

- 2.1 Route Map of Drive test & Hotspot locations
- 2.2 Drive Test Area detail
- 2.3 Details of Drive Test Tools
- 2.4 Key Findings (Voice & Data)

3. QoS Performance Analysis - Dynamic

- 3.1 Voice Service Performance (3G/2G Lock mode)
- 3.2 Voice Service Performance (5G/4G/3G/2G - Auto mode)
- 3.3 Data Service performance (5G/4G/3G/2G (Auto mode)
- 3.4 Time spent (Technology Wise)

4. QoS Performance Analysis - Static

- 4.1 Hot spot Locations
- 4.2 Voice Service Performance (5G/4G/3G/2G - Auto mode) – Over all
- 4.3 Data Service Performance (5G/4G/3G/2G - Auto mode) – Over all
- 4.4 Voice Service Performance (5G/4G/3G/2G-Auto mode) at each Static location
- 4.5 Data Service Performance (5G/4G/3G/2G-Auto mode) at each Static location
- 4.6 Signal Strength Distribution (5G/4G/3G/2G - Auto mode) – Over all

5. Improvement plan for shortcoming observed during Drive Test

6. Compliance Report on shortcomings observed during Drive Test

1. Overview

The Operator Assisted Drive Test carried out in Dharwad City and nearby areas from date 14/10/25 to 16/10/25 From 9:00 AM to 6:00 PM. The drive test covered drive route of around 346 KMs in 3 days and 6 hotspot locations.

1.1 Telecom Service Providers(TSPs),Technologies and frequency bands captured during Drive Test are as below:

S. No.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	1800
2	Bharti Airtel Ltd.	4G	900 , 1800 , 2100 , 2300
3	Bharti Airtel Ltd.	5G	3500
4	MTNL	2G	900
5	MTNL	3G	2100
6	Reliance JIO Infocomm Ltd.	4G	850 ,1800 ,2300
7	Reliance JIO Infocomm Ltd.	5G	700 ,3500
8	Vodafone Idea Ltd.	2G	1800
9	Vodafone Idea Ltd.	4G	900 ,1800 , 2100 ,2500
10	Vodafone Idea Ltd.	5G	3300 ,2600

(1) Quality of Service parameters measured:

Voice Service:

Dynamic	Static (Hotspot Location)
Call setup time	Call setup time
Call setup success rate (CSSR)	Call setup success rate (CSSR)
Dropped Call rate	Dropped Call rate
Call Silence Rate	
Handover Success Rate (HOSR)	
Packet Drop Rate (Uplink & Downlink)	
Mean Opinion Score (MOS)	
Signal Strength	

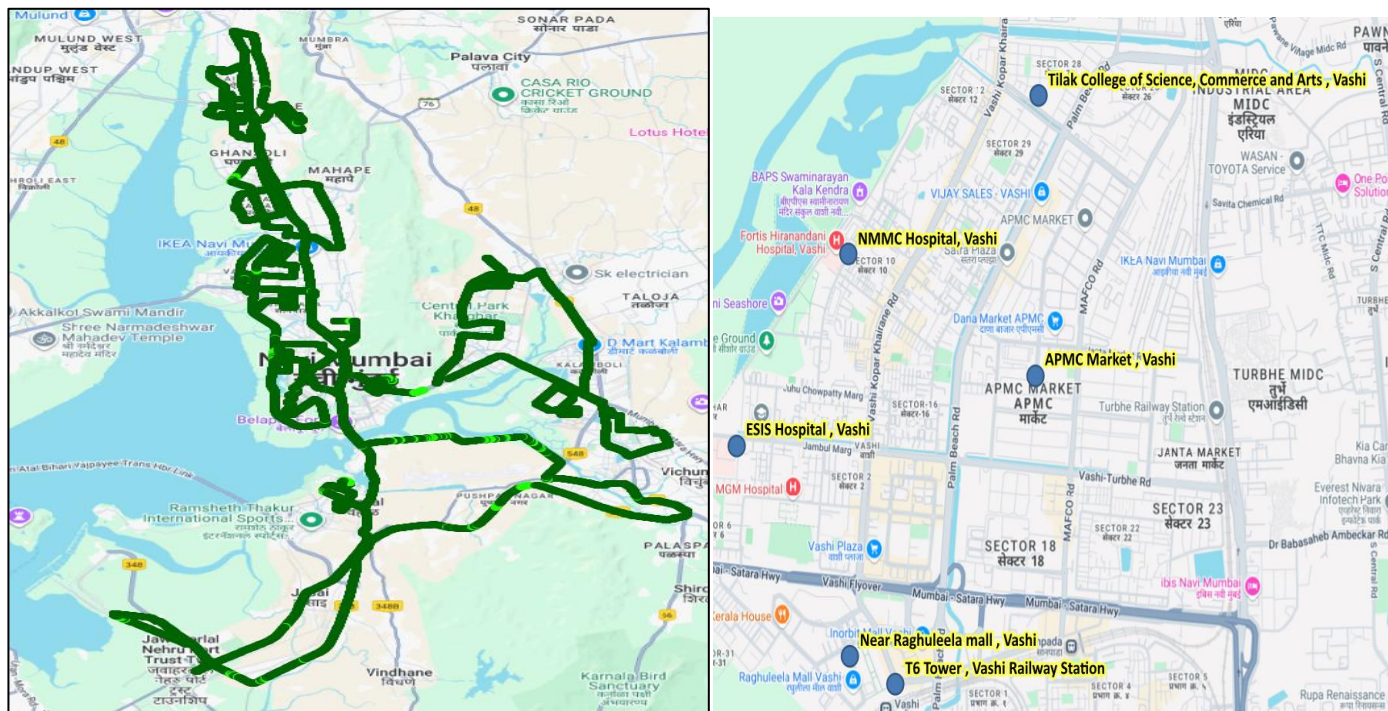
(2) Data Service:

Dynamic	Static (Hotspot Location)
Data speed (DL / UL both)	Data speed (DL/UL both)
Latency	Latency
Jitter	Jitter
	Session Setup Success Rate (DL/UL)
	Packet Drop rate
	Web browsing delay
	Video Streaming performance

2. Executive Summary

This report covers the findings of the OADT undertaken in Navi Mumbai ,Mumbai License Service Area (LSA) during the month of Nov (2025) under the supervision of TRAI Regional Office (RO), Bengaluru . Details of route/ area covered during the IDT is as given below:

2.1 Route Map of Drive test & Hotspot locations:



2.2 Drive Test Area detail

Date	Duration AM to PM	Drive test route	Distance covered (in Kms)
11-Nov-25	09.00AM to 8.00PM	Vashi MTNL Office_kopar kahirane_Ghansoli_Airoli_Dighe_Via Thane Belapur road	75km
12-Nov-25	09.00AM to 8.00PM	Juhu Nagar vashi_Belapur_Wahal_Jasai_INPT_Palasp Phata_Via Pune satara Highway	110km
13-Jul-25	09.00AM to 8.00PM	Juhu Nagar vashi_jui Nagar_Saiworld Empire Kharghar_Kalamboli_Panvel_Via Pune satara highway	61km

Date	Time	Hotspot Location	Latitude / Longitude
11-Nov-25	3.30 PM	APMC Market , Vashi	19.0776842,73.0074347
11-Nov-25	4.15 PM	Near Raghuleela mall , Vashi	19.0654579,72.9968115
12-Nov-25	2.00 PM	NMMC Hospital, Vashi	19.0829971,72.9967910
12-Nov-25	2.45 PM	Tilak College of Science, Commerce and Arts , Vashi	19.0829428,72.9966977
13-Nov-25	2.40 PM	ESIS Hospital , Vashi	19.0746530,72.9902926
13-Nov-25	4.00 PM	T6 Tower , Vashi Railway Station	19.0642638,72.9994497

2.3 Details of Drive Test Tools used:

Airtel - TEMS Investigation 27.1.0.

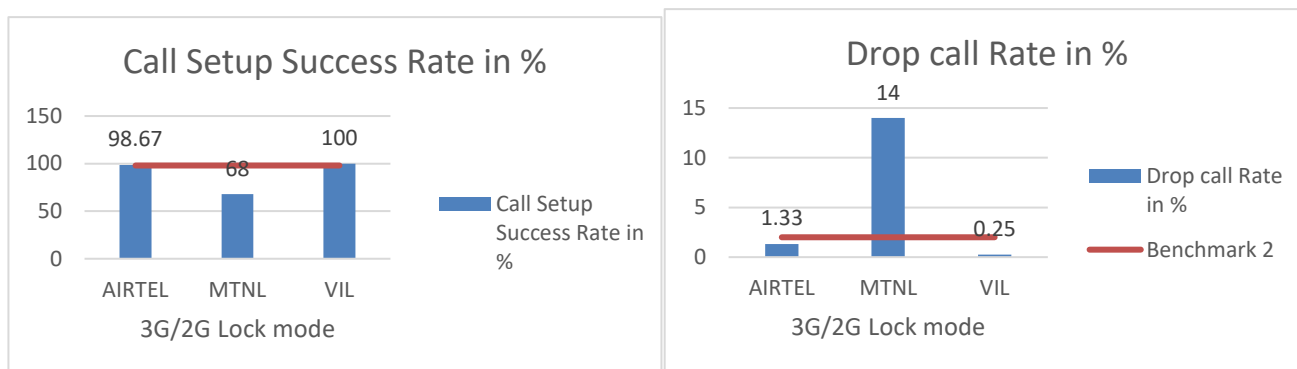
MTNL – Azenqos Sigma PA.

JIO – XCAL.

VIL - Azenqos Sigma PA.

2.4 Key findings(Voice & Data)

2.4.1 Voice Service performance in 3G/2G mode only

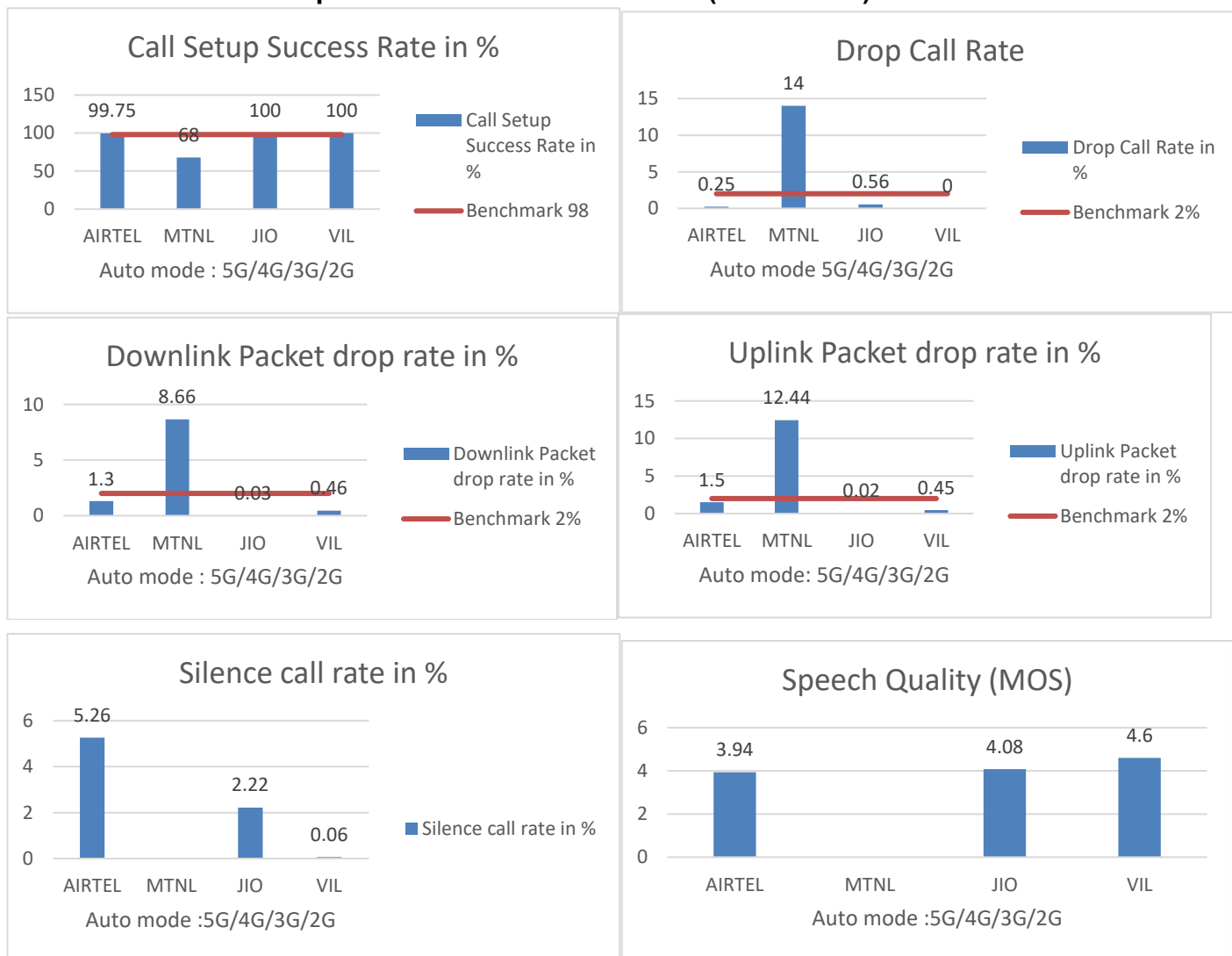


Parameter	Benchmark	AIRTEL	MTNL	VIL
Call Attempts		375	458	397
Call Setup Success Rate(in%)	$\geq 98.0\%$	98.67	68	100
Drop Call Rate(in%)	$\leq 2\%$	1.33	14	0.25
Call Setup Time-Average(in Seconds)		0.41	6	3.14
Handover Success Rate(in %)	$\geq 95\%$	99.89	72	97.55

2.4.2 Number of Cell ids latched during drive test

Technology	AIRTEL	MTNL	VIL
3G	NA	362	NA
2G	742	112	709

2.4.3 Voice Service performance in 5G/4G/3G/2G (Auto mode)

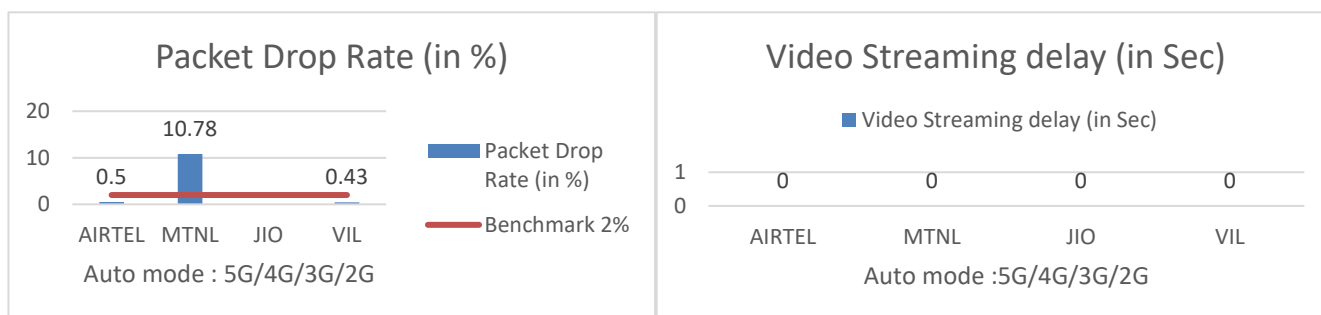
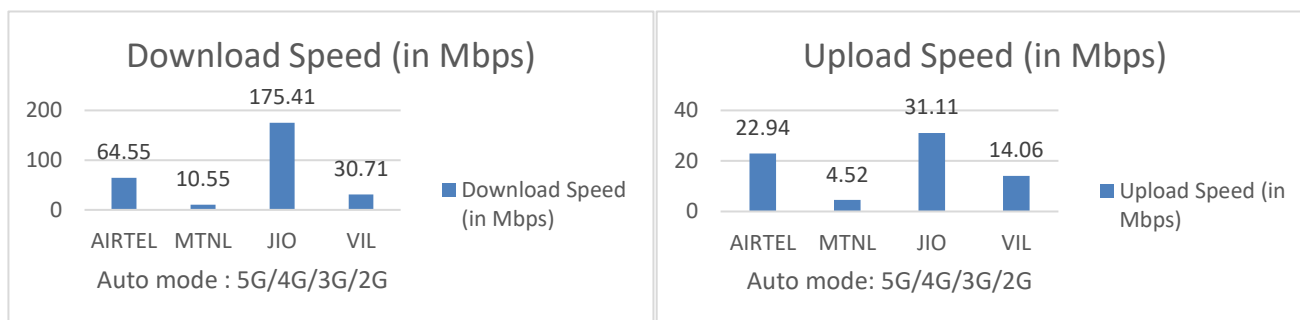


Parameter	AIRTEL	MTNL	RJIL	VIL
Call Attempts	399	458	356	382
Call Setup Success Rate%	99.75	68%	100	100%
Drop Call Rate%	0.25%	14%	0.56	0.00%
Call Setup Time-Average(Second)	0.41	6 sec	1.01	0.29 Sec
Handover Success Rate%	99.68	72%	99.85	99.49%
Downlink Packet drop rate %	1.3	8.66%	0.03	0.46%
Uplink Packet drop rate%	1.5	12.44%	0.02	0.45%
Silence Call Rate%*	5.26	-	2.22	0.06
Speech Quality (AverageMOS)	3.94	-	4.08	4.6

2.4.4 Number of Cell ids latched during drive test

Technology	AIRTEL	MTNL	RJIL	VIL
5G	-	-	713	5
4G	1424	-	609	487
3G	-	362	-	-
2G	0	112	-	3

2.4.5 Data performance in 5G/4G/3G/2G(Automode)



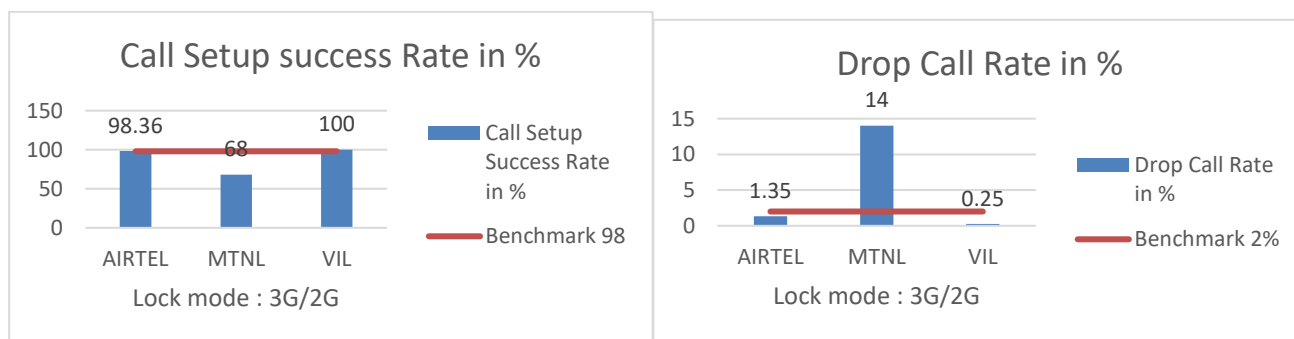
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed (Mbits/s)	Typical	5.14	11.08		18.64
	Average	64.55	10.55	175.41	30.71
	80thPercentile	112.35	22.12	409.5	46.92
Download Session Setup Success Rate%		99.67	58	100%	98.01
Upload speed (Mbits/s)	Typical	8.04	2.83		5.83
	Average	22.94	4.52	31.11	14.06
	80thPercentile	36.41	10.5	64.76	19.19
Upload Session Setup Success Rate%		99.29	67.58	100%	97.38
Latency(in ms)	50thPercentile	27	38.5		28.53
Jitter(in ms)	Average	3.8	10.88		7.61
Packet Drop Rate%		0.5	10.78		0.43
Web browsing delay(in sec)		-	NA		NA
Video Streaming performance for video		-	NA		NA

2.4.6 TSP-wise Key Findings:

Detailed QoS Performance Analysis

3. Performance Analysis-Dynamic

3.1 Voice Service Performance(3G/2GLockmode)-Dynamic



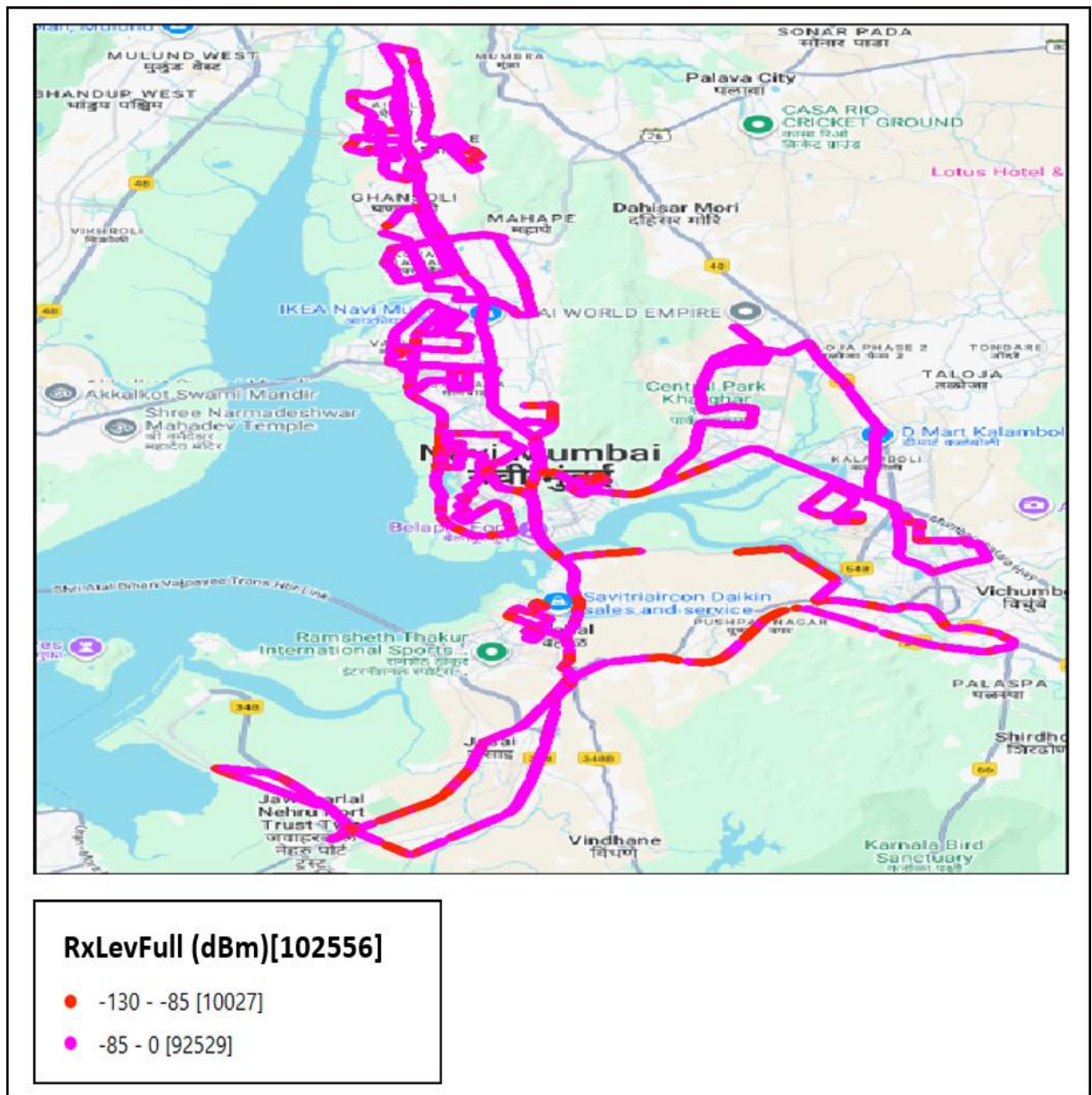
Parameters	Airtel	MTNL	RJIL	VIL
Total Distance covered(in Kms)	246	240	N/A	236.18
No .of Call Attempts	375	458	N/A	397
No. of Call Established	362	311	N/A	397
Call setup success rate(CSSR)%	98.36	68%	N/A	100
No. of Drop Call	5	43	N/A	1
Drop Call Rate%	1.35	14%	N/A	0.25%
Call Setup Time Average(Sec.)	4.82	6 sec	N/A	3.14
No. of Handover Attempts	865	362	N/A	694
No .of Handover success	826	261	N/A	677
HOSR%	95.49	72%	N/A	97.55
Total no of RLT Occurrence	74679	-	N/A	2
No of RLT>48	0	-	N/A	0

3.1.1 Number of Cell ids latched during drive test (3G/2G-Lockmode)

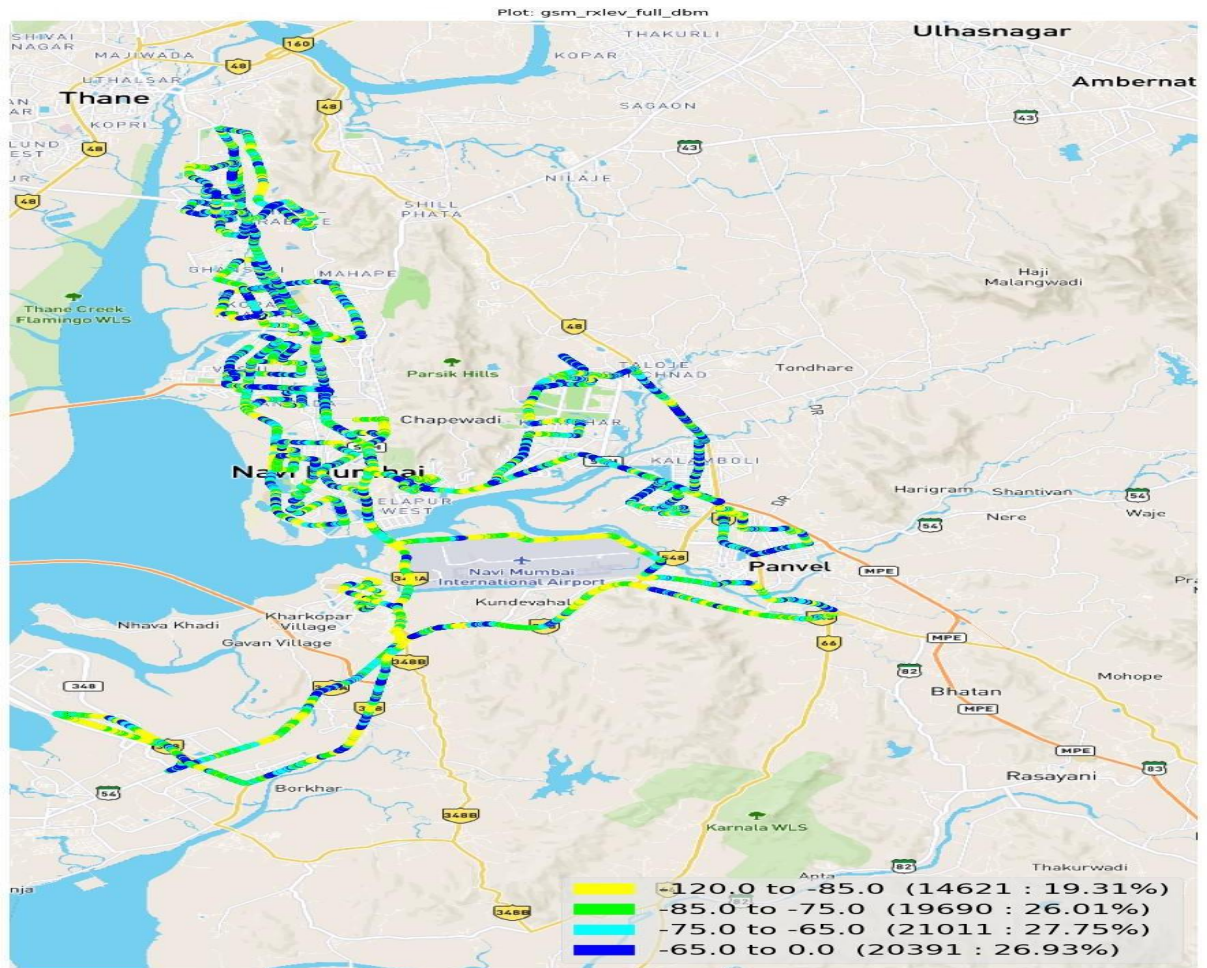
Number of unique Cell ids covered in Voice test				
Technology	AIRTEL	MTNL	RJIL	VIL
3G	NA	362	NA	NA
2G	742	112	NA	709

3.1.2 Signal Strength Map:(3G/2G-Lockmode) Airtel

Signal Strength Map (for each TSP)	Map Legend: 2G- Pink (Rx Level ≥ -85 dBm), 3G- Sky blue (RSCP Level ≥ -90 dBm) Red (Rx Level < -85 dBm) Dark Blue (RSCP Level < -90 dBm)
---	---

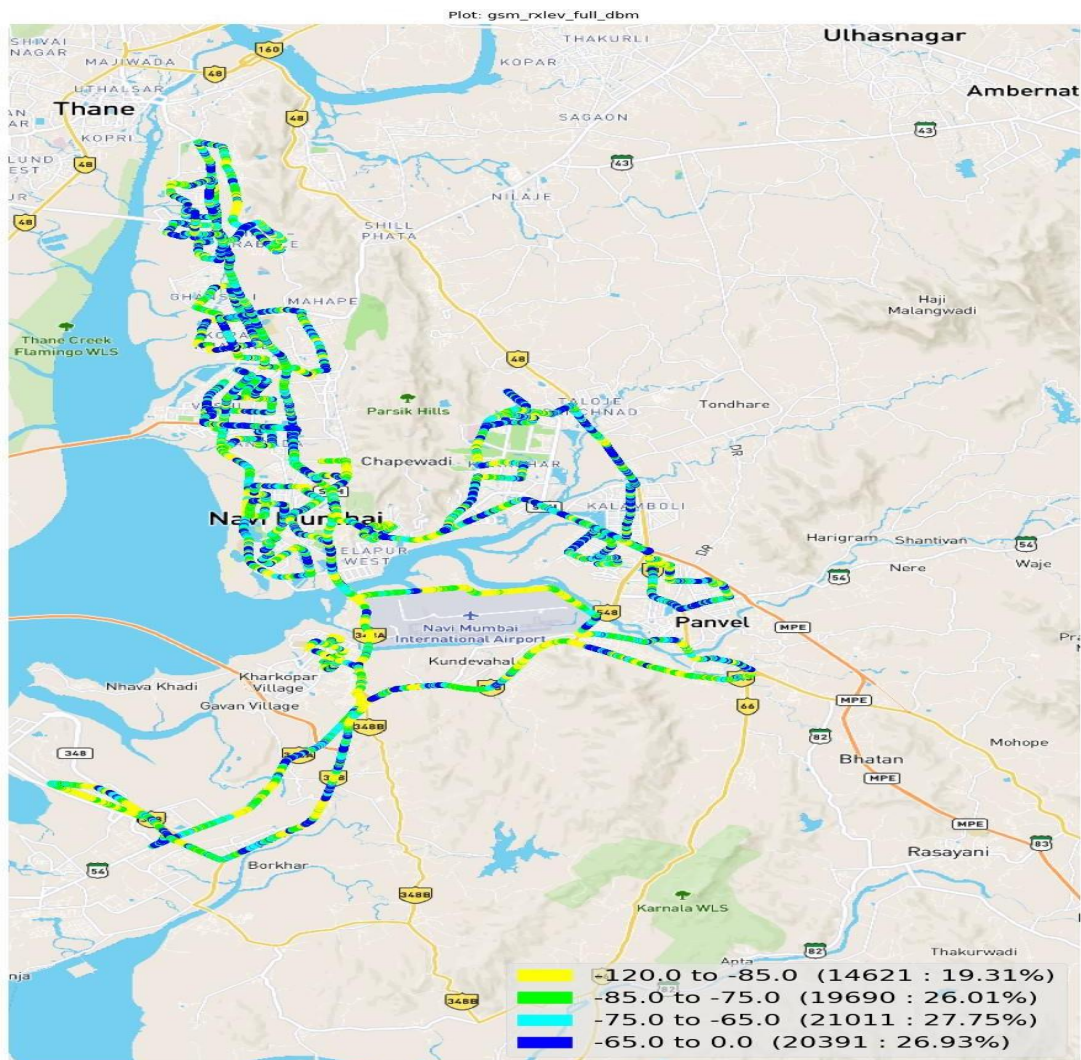


Signal Strength Map:(3G/2G-Lockmode) MTNL



Signal Strength Map:(3G/2G-Lockmode) VIL

Signal Strength Map (for each TSP)	Map Legend:
	2G- Pink (Rx Level ≥ -85 dBm),
	3G- Sky blue (RSCP Level ≥ -90 dBm)
	Red (Rx Level < -85 dBm)
	Dark Blue (RSCP Level < -90 dBm)

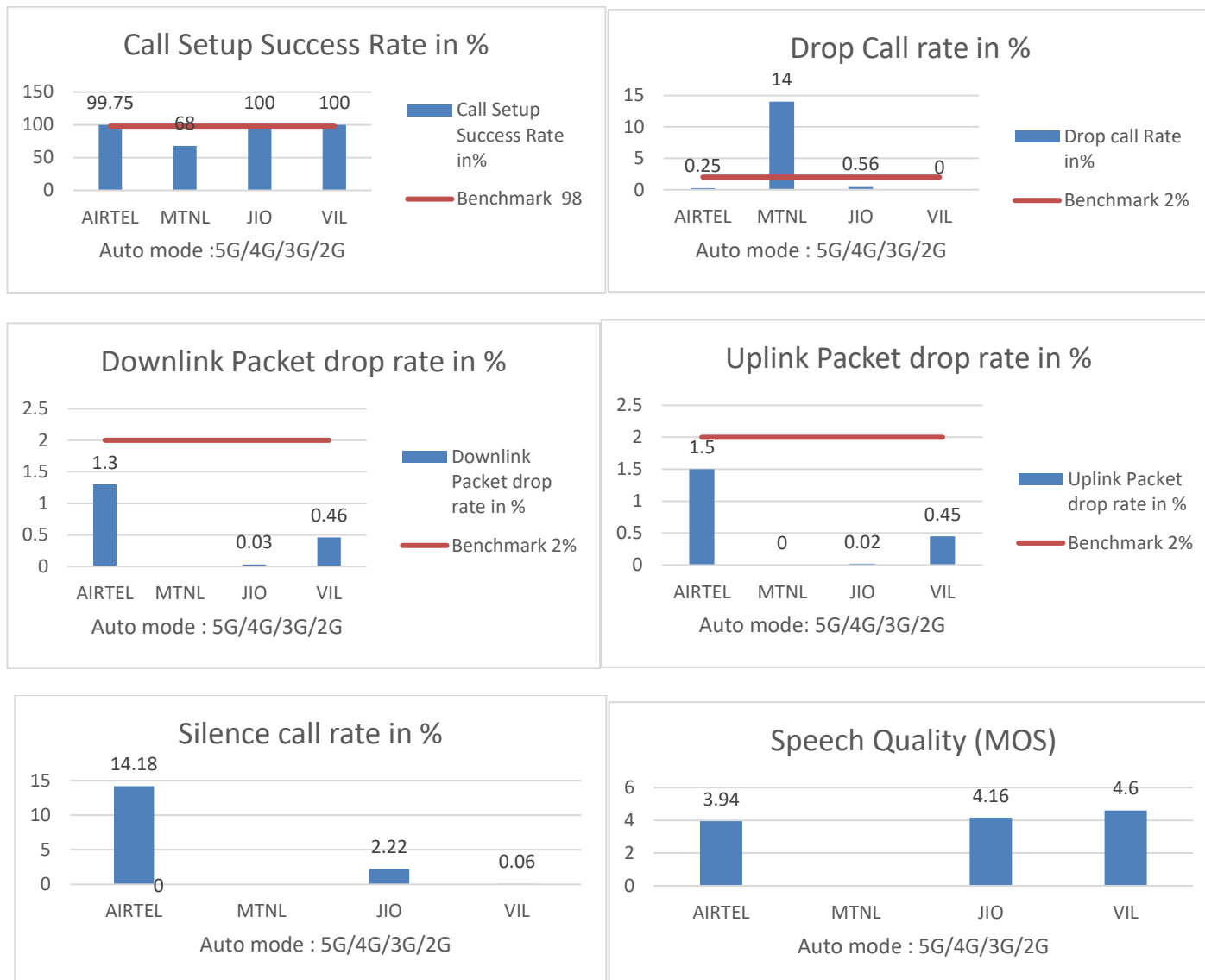


3.1.3 Signal Strength Distribution:(3G/2G-Lockmode)

RxLevel-2G								
Overall Rx Level	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-65]	34040	8185	NA	20391	33.19	10.11	NA	26.93
[-65,≥-75)	34508	14325	NA	21011	33.65	17.71	NA	27.31
[-75,≥-85)	24429	25516	NA	19690	23.82	33.54	NA	25.38
[-85,≥Min)	9579	32854	NA	14621	9.34	40.66	NA	19.25
Total	102556	80880	NA	75713	100.00%	100	NA	100

RxLevel-3G								
Overall RSCP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-70]	NA	6524	NA	NA	NA	7.6	NA	NA
[-70,≥-80)	NA	8599	NA	NA	NA	10.07	NA	NA
[-80,≥-90)	NA	12658	NA	NA	NA	14.83	NA	NA
[-90,≥Min)	NA	57548	NA	NA	NA	67.44	NA	NA
Total	NA	85329	NA	NA	NA	100.00%	NA	NA

3.2 Voice Service Performance in 5G/4G/3G/2G(Automode)-Dynamic



3.2 Voice Service Performance in 5G/4G/3G/2G(Automode)-Dynamic

Parameters	Airtel	MTNL	RJIL	VIL
Total Distance covered(in Kms)	246	240	237	236.47
No. of Call Attempts	399	458	356	382
No. of Call Established	398	311	356	382
Call setup success rate(CSSR)%	99.75	68%	100%	100
No. of Drop Call	1	43	2	0
Drop Call Rate%	0.25	14%	0.56%	0
Call Setup Time Average(Sec.)	0.41	6 sec	1.01	0.29
No. of Handover Attempts	963	362	5316	2721
No. of Handover success	960	261	5308	2707
HOSR%	99.68	72%	99.85	99.49
Packet Drop Rate (Downlink)	1.3	-	0.03	0.46
Packet Drop Rate (Uplink)	1.5	-	0.02	0.45
Number of silence call for>2sec.	5.26	-	44	20
Silence Call Rate%	14.18	-	2.22	0.06
Number of MOS samples	3062	--	3139	2088
Average MOS score	3.94		4.08	4.6

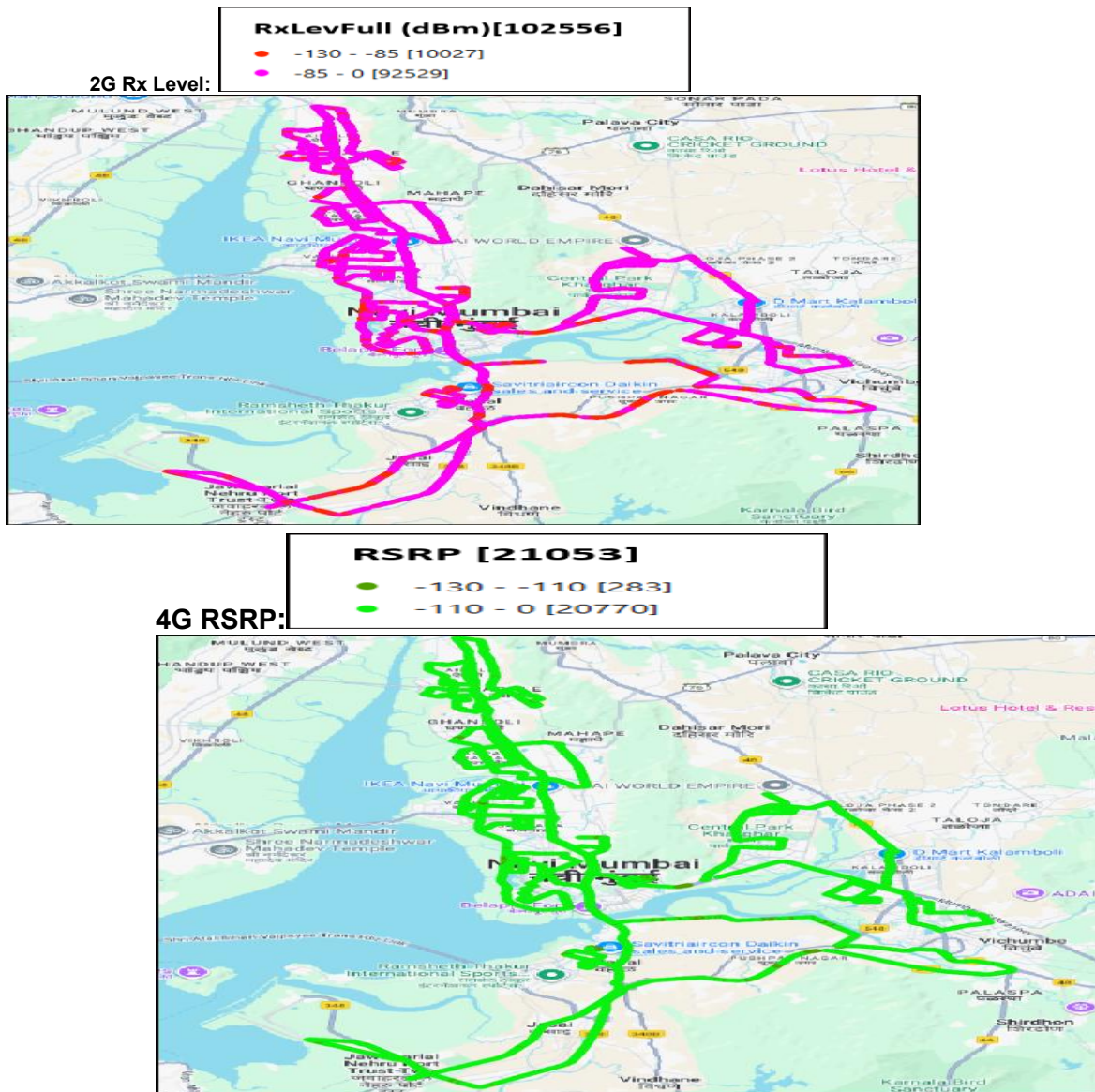
3.2.1 Number of Cell ids latched during drive test 5G/4G/3G/2G-Automode)

Number of unique cell ids covered in Voice test				
Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
3G	NA	215		NA
2G	0	88		3
4G	589	-	609	487
5G	0	-	713	5

3.2.2 Signal Strength Map:(5G/4G/3G/2G-Automode)

Signal Strength Map	Map Legend- 2G- Pink (Rx Level ≥ -85 dBm), 3G- Sky blue (RSCP Level ≥ -90 dBm)	Red (Rx Level < -85 dBm) Dark Blue (RSCP Level < -90 dBm)
	Map Legend- 4G- Light Green (RSRP Level ≥ -110 dBm), 5G- Light Yellow (RSRP Level ≥ -110 dBm), 5G- Dark Yellow (RSRP Level < -110 dBm)	Dark Green (RSRP Level < -110 dBm)

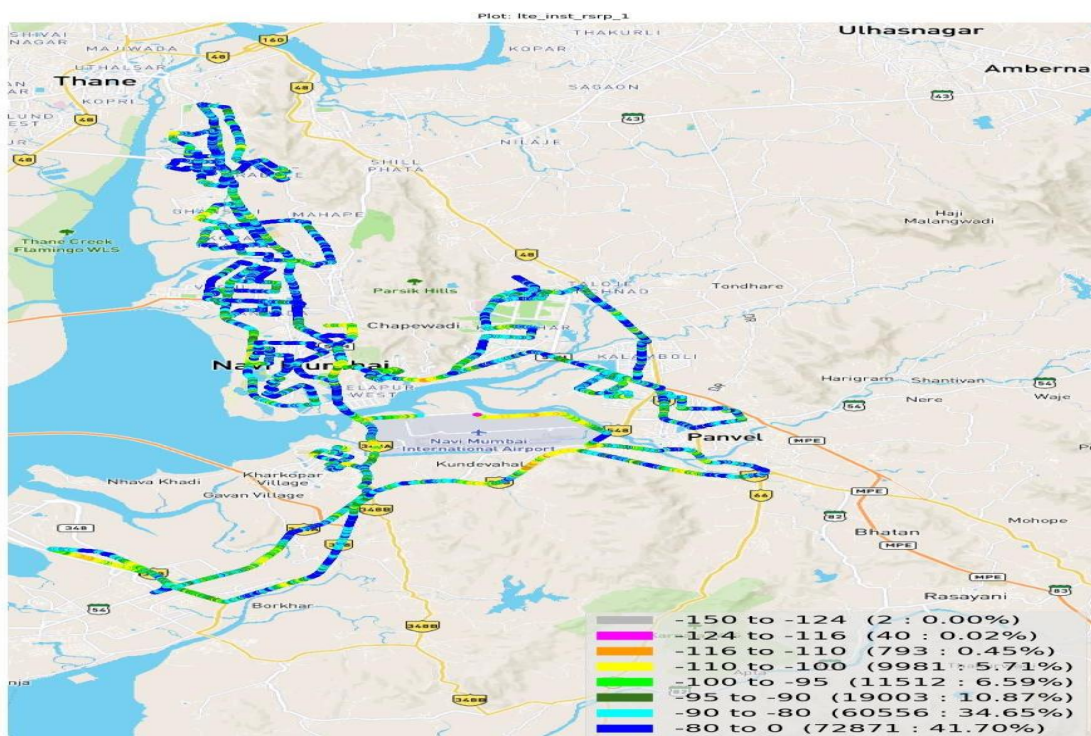
Signal Strength Map - Airtel :(5G/4G/3G/2G-Automode)



Signal Strength Map - MTNL : (5G/4G/3G/2G-Automode)

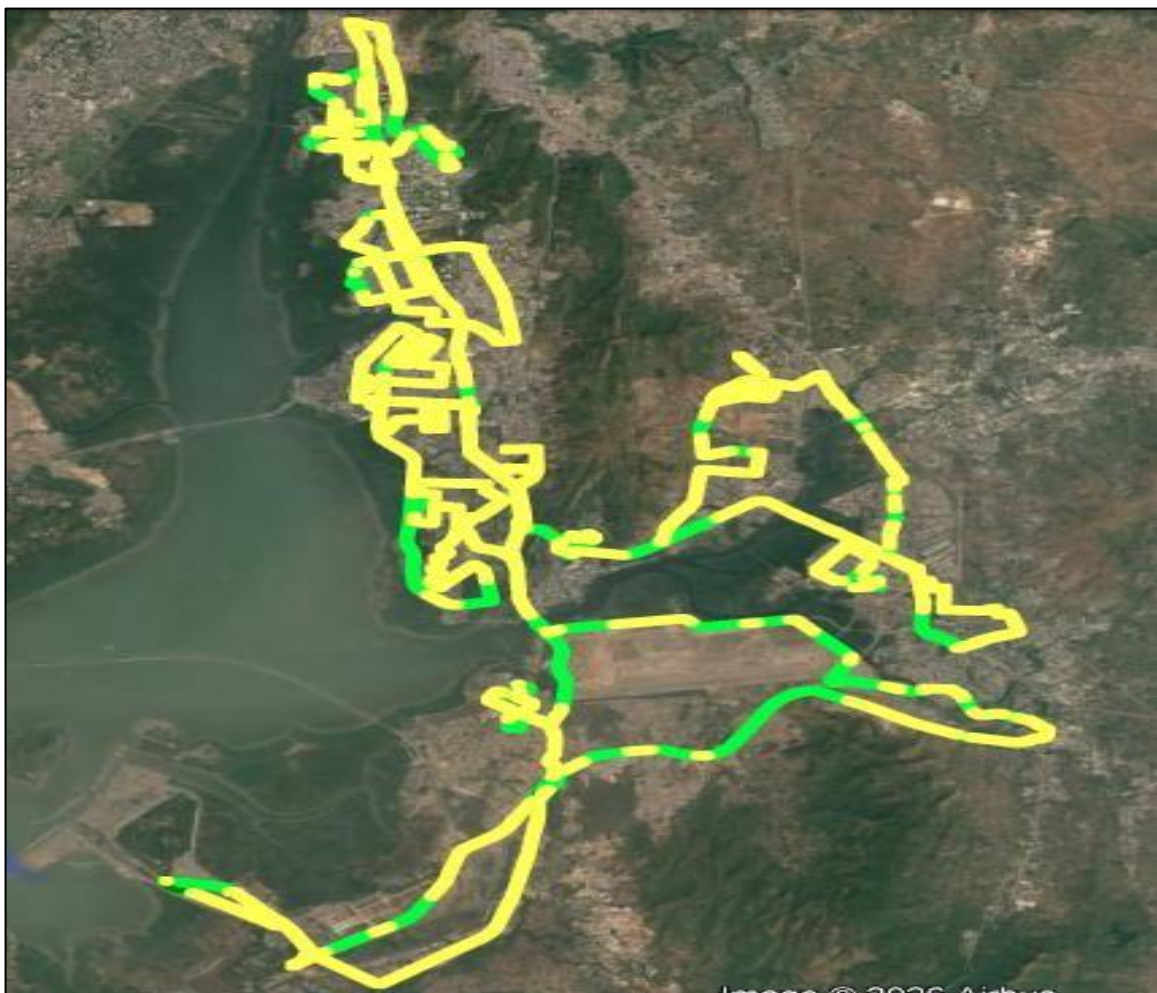
SignalStrength Map	MapLegend- 2G- Pink (RxLevel $\geq$ -85dBm), 3G- Skyblue (RSCPLLevel $\geq$ -90dBm)	Red (RxLevel $<$ -85dBm) DarkBlue (RSCPLLevel $<$ -90dBm)
	MapLegend- 4G- Light Green (RSRPLevel $\geq$ -110 dBm), DarkGreen (RSRPLevel $<$ -110 dBm) 5G- Light Yellow (RSRP Level $\geq$ -110 dBm), DarkYellow (RSRPLevel $<$ -110dBm)	

Technology	Parameter	Range	Colour
2G	RxLevel	$\geq$ -85dBm	Pink
		$<$ -85dBm	Red
3G	RSCP	$\geq$ -90 dBm	Skyblue
		$<$ -90dBm	DarkBlue
4G	RSRP	$\geq$ -110dBm	Light Green
		$<$ -110dBm	DarkGreen
5G	RSRP	$\geq$ -110dBm	Light Yellow
		$<$ -110dBm	DarkYellow



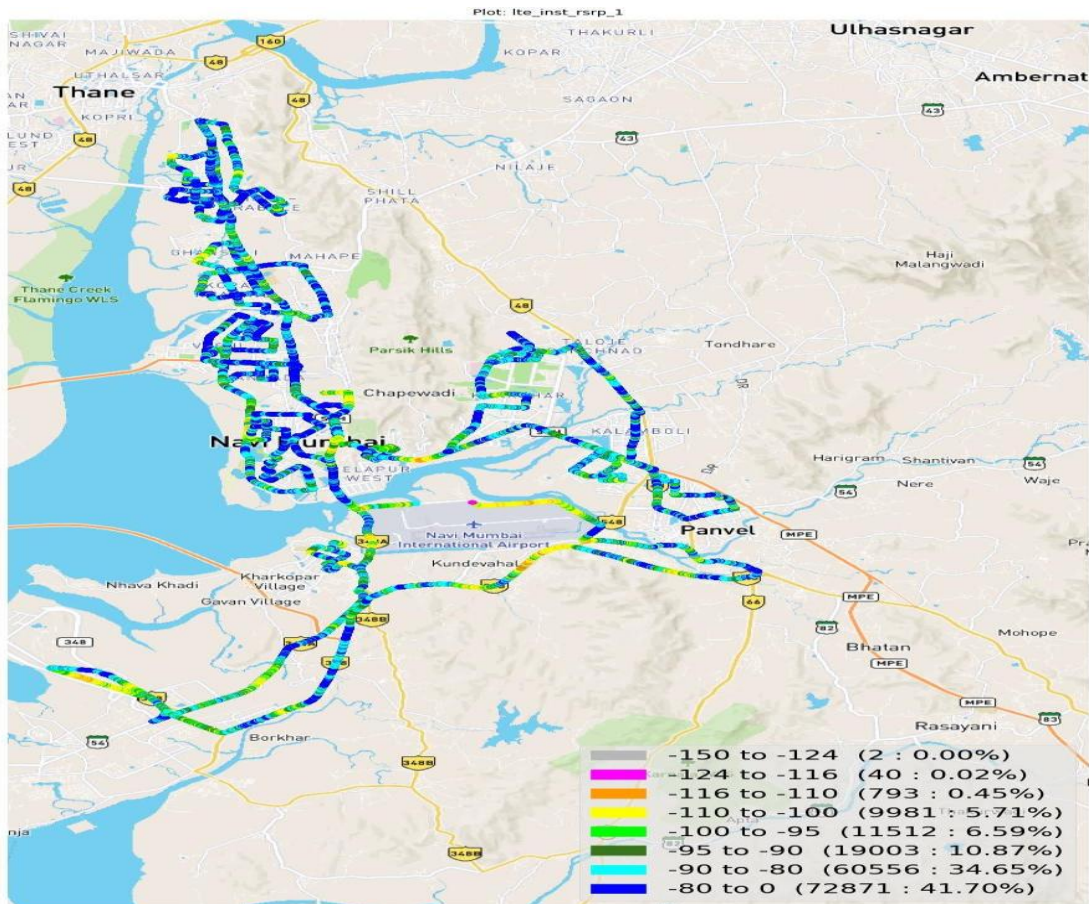
Signal Strength Map: JIO (5G/4G/3G/2G-Automode)

Signal Strength Map	Map Legend- 2G- Pink (Rx Level $\geq$ -85 dBm), 3G- Sky blue (RSCP Level $\geq$ -90 dBm)	Red (Rx Level $<$ -85 dBm) Dark Blue (RSCP Level $<$ -90 dBm)
	Map Legend- 4G- Light Green (RSRP Level $\geq$ -110 dBm), 5G- Light Yellow (RSRP Level $\geq$ -110 dBm),	Dark Green (RSRP Level $<$ -110 dBm) Dark Yellow (RSRP Level $<$ -110 dBm)



Signal Strength Map: VIL (5G/4G/3G/2G-Automode)

Signal Strength Map	Map Legend- 2G- Pink (Rx Level ≥ -85 dBm), Red (Rx Level < -85 dBm) 3G- Sky blue (RSCP Level ≥ -90 dBm) Dark Blue (RSCP Level < -90 dBm)
	Map Legend- 4G- Light Green (RSRP Level ≥ -110 dBm), Dark Green (RSRP Level < -110 dBm) 5G- Light Yellow (RSRP Level ≥ -110 dBm), Dark Yellow (RSRP Level < -110 dBm)



3.2.3 Signal Strength distribution:(5G/4G/3G/2G-Automode)

RxLevel-2G								
Overall Rx Level	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-65]	34040	8185	NA	53	33.19	10.11	NA	24.65
[-65,≥-75)	34508	14325	NA	68	33.65	17.71	NA	31.63
[-75,≥-85)	24429	25516	NA	81	23.82	31.54	NA	37.67
[-85, ≥Min)	9579	32854	NA	13	9.34	40.66	NA	6.05
Total	102556	80880	NA	215	100	100	NA	100

RxLevel-3G								
Overall RSCP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-70]	NA	6524	NA	NA	NA	7.6	NA	NA
[-70,≥-80)	NA	8599	NA	NA	NA	10.07	NA	NA
[-80,≥-90)	NA	12658	NA	NA	NA	14.83	NA	NA
[-90, ≥Min)	NA	57548	NA	NA	NA	67.44	NA	NA
Total	NA	85329	NA	NA	NA	100	NA	NA

RxLevel-4G								
Overall RSRP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-80]	6316	NA	3286	72871	30	NA	38.13%	41.7
[-80,≥-95]	11077	NA	3064	79559	52.61	NA	35.55%	45.52
[-95,≥-110]	3377	NA	2108	21493	16.04	NA	24.46%	12.3
[-110,≥Min]	283	NA	161	835	1.34	NA	1.87%	0.48
Total	21053	NA	8619	174758	100.00%	NA	100	100

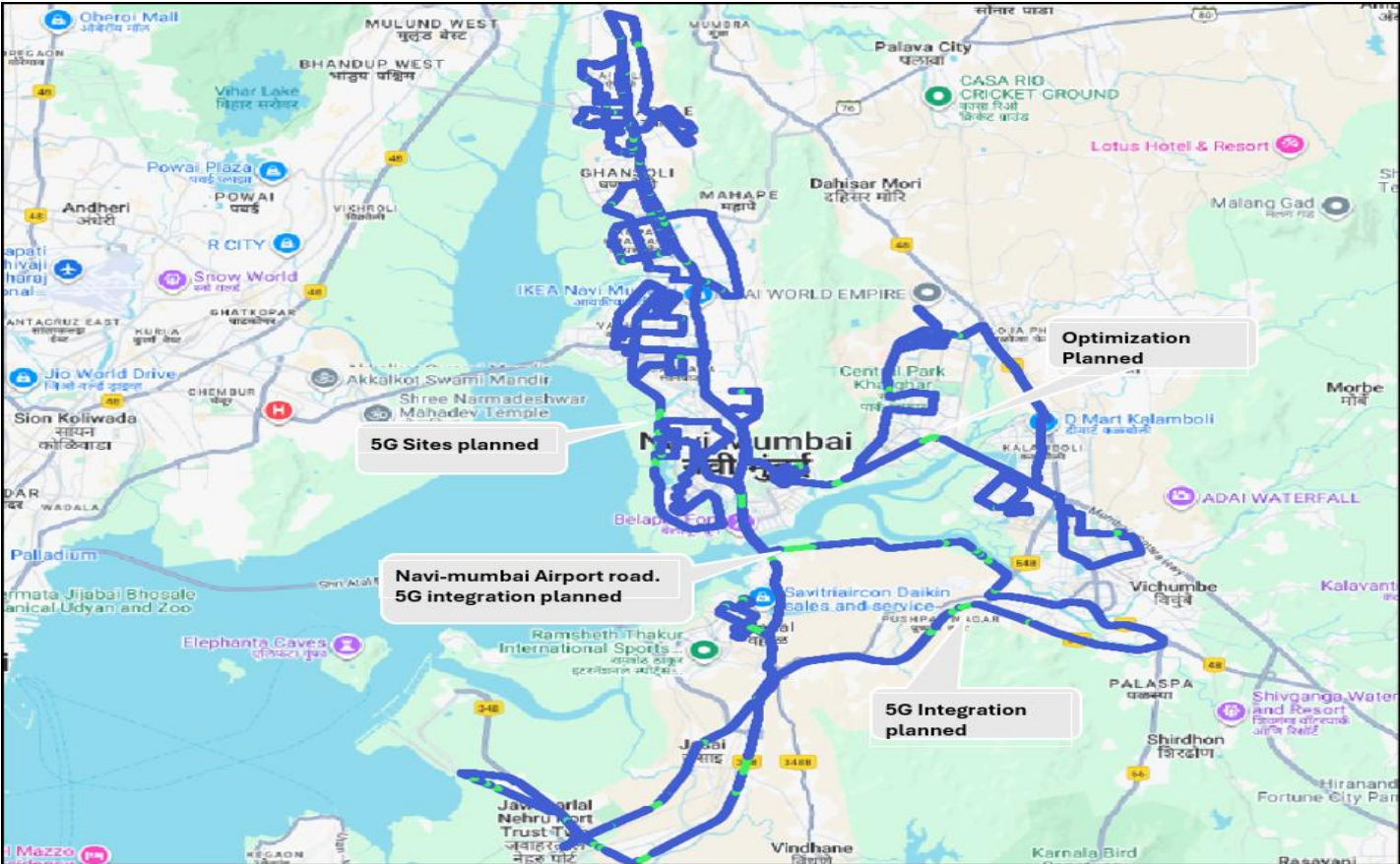
RxLevel-5G								
Overall RSRP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-80]	NA	NA	14794	24	NA	NA	47.71%	29.63
[-80,≥-95]	NA	NA	13542	14	NA	NA	43.67%	17.28
[-95,≥-110]	NA	NA	2585	42	NA	NA	8.34%	51.85
[-110,≥Min]	NA	NA	86	1	NA	NA	0.28%	1.23
Total	NA	NA	31007	81	NA	NA	100	100

3.3 Data Service performance in 5G/4G/3G/2G(Automode)-Dynamic

QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed (M bits/s)	Average	64.55	-	175.41	30.71
	80thPercentile	112.3499	-	409.5	46.92
	20thPercentile	5.139999	-	0.64	18.64
Upload speed (M bits/s)	Average	22.94	-	31.11	14.06
	80thPercentile	36.409	-	64.76	19.19
	20thPercentile	8.0399	-	2.22	5.83
Latency (ms)	Average	17	-		29.55
	50thPercentile	13.5	-		28.53
Jitter(ms)	Average	8.08	-		7.61

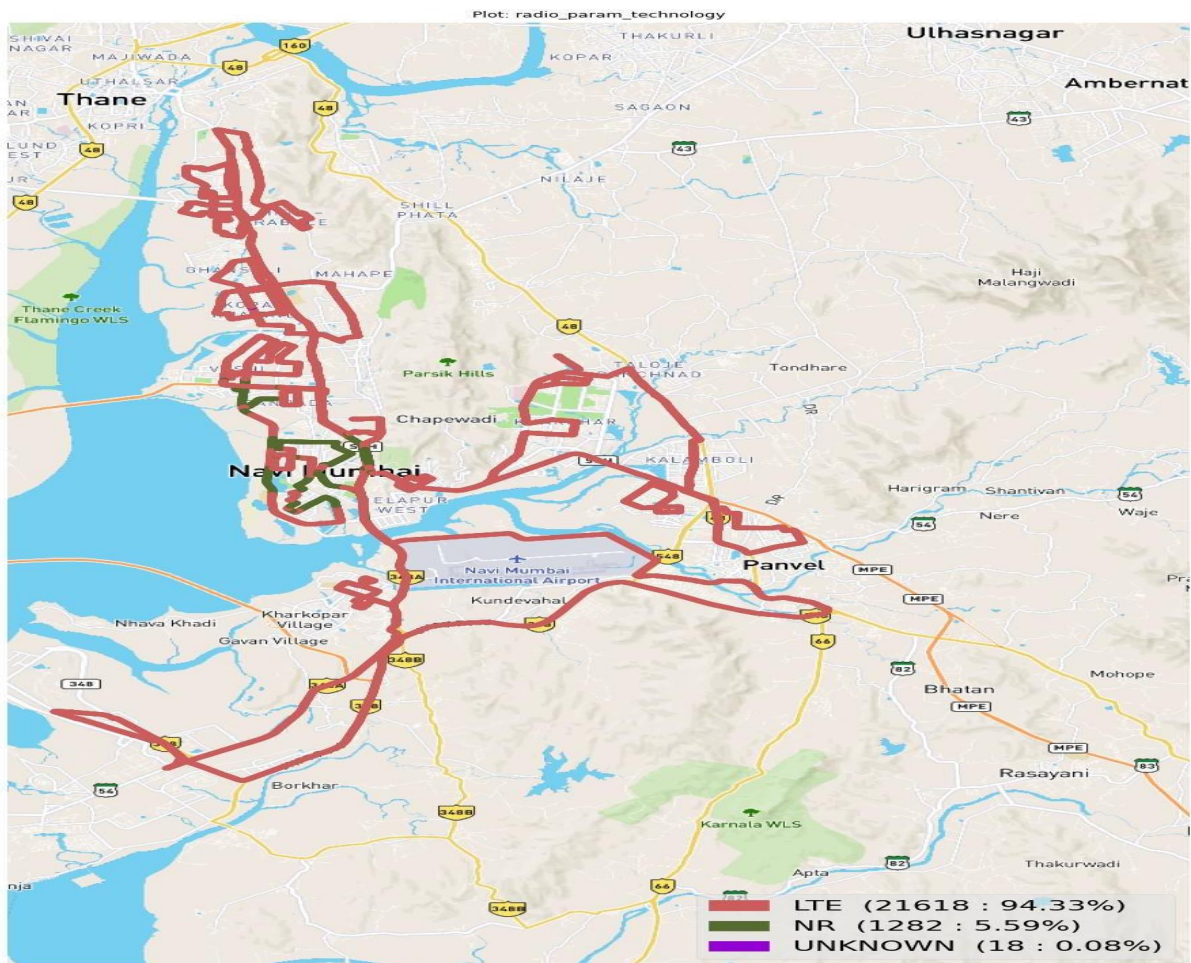
3.4 Time Spent(Technology-wise) Airtel

Time Spent Map (for each TSP)	Map Legend:	
	2G – Red	3G – Yellow
	4G – Green	5G - Blue



Time Spent(Technology-wise) MTNL

Time Spent Map (for each TSP)	Map Legend: 2G – Red 3G – Yellow 4G – Green 5G - Blue
-------------------------------	--



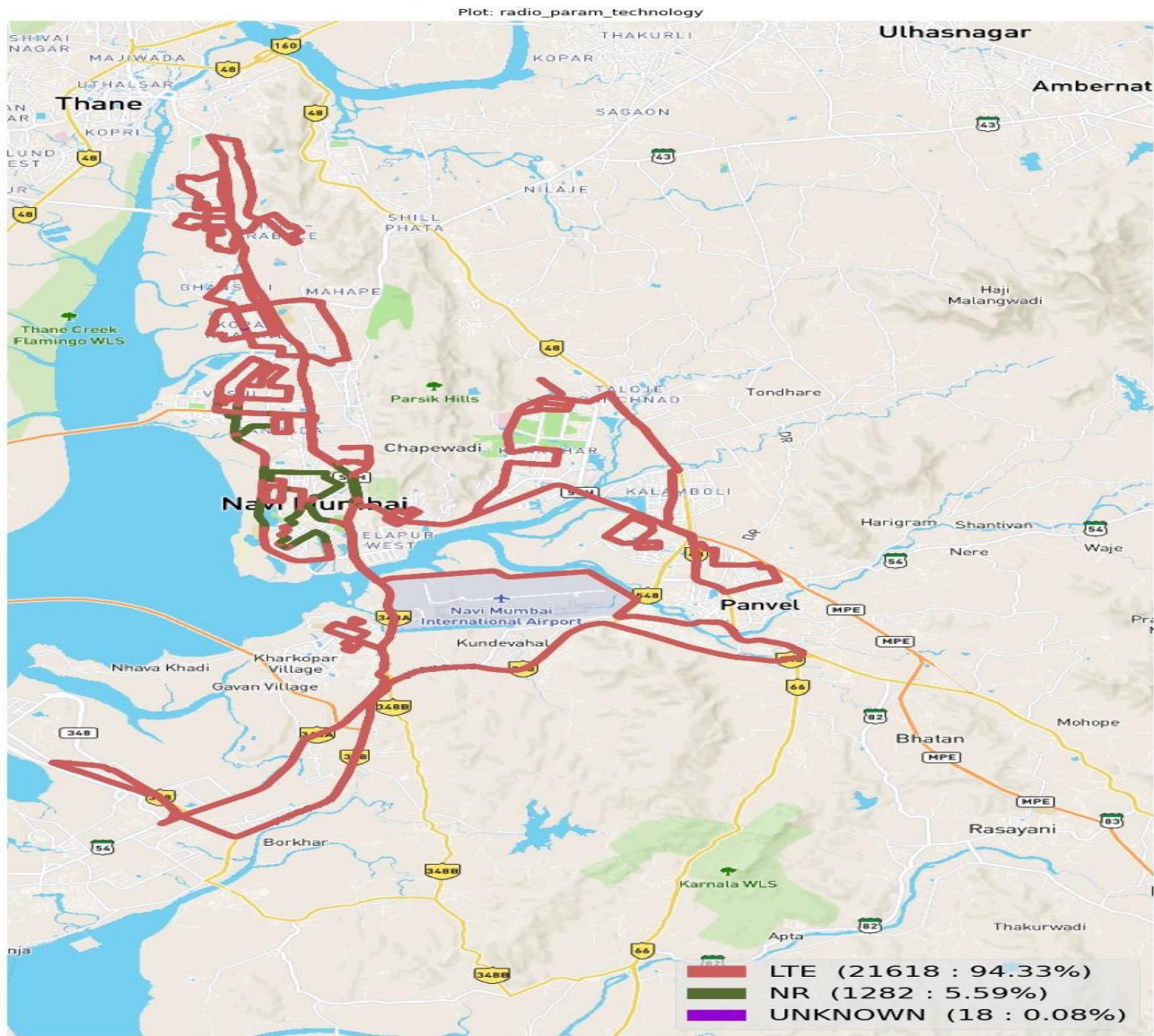
Time Spent(Technology-wise) JIO

Time Spent Map (for each TSP)	Map Legend: 2G – Red 3G – Yellow 4G – Green 5G - Blue
-------------------------------	---



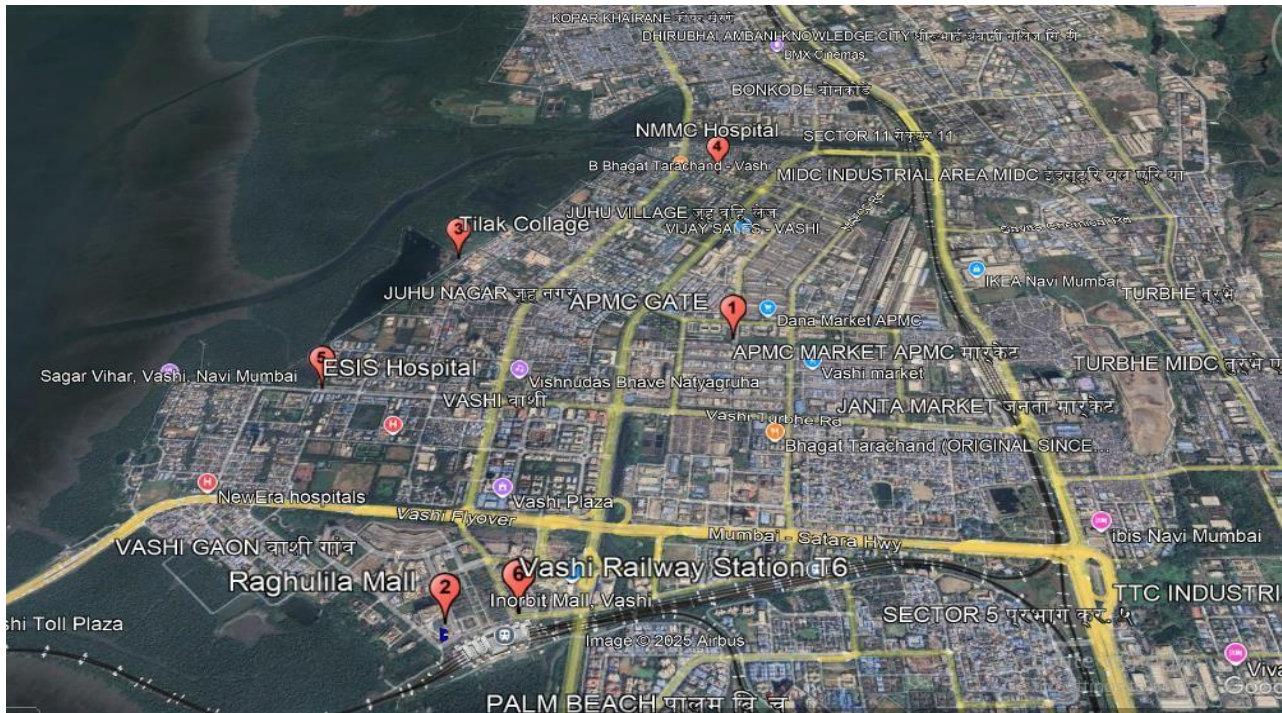
Time Spent(Technology-wise) VIL

Time Spent Map (for each TSP)	Map Legend:	
	2G – Red	3G – Yellow
	4G – Green	5G - Blue



QoS Performance Analysis-Static

4.1 Hotspot Locations



Hotspot Name	Latitude & Longitude	Date of Measurement	Time of Measurement
APMC Market Vashi	19.078017,73.0073921	11-Nov-25	2025-11-11 15:39:38.73
Raghu Lila Mall	19.0640837,72.997110	11-Nov-25	2025-11-11 17:45:09.33
Tilak College of Science, Commerce & Arts	19.0896438,73.0071105	12-Nov-25	2025-11-12 13:56:21.21
NMMC Hospital	19.0832622,72.9952805	12-Nov-25	2025-11-12 14:47:06.36
ESIS Hospital	19.0751266,72.9907691	13-Nov-25	2025-11-13 15:34:54.19
Vashi Railway Station T6	19.0645022,72.9995639	13-Nov-25	2025-11-13 16:30:14.90

4.2 Voice Service Performance(5G/4G/3G/2G-Automode)–Overall

Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	35	30	30	30
No of Call Established	35	18	30	30
Call setup success rate(CSSR)%	100	60	100	100
No. of Drop Call	0	1	0	0
Drop Call Rate%	0	3.33	0	0
Call Setup Time Average(.)	0.66	7	1.19	0.27

4.3 Data Service Performance(5G/4G/3G/2G-Automode)–Overall

QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	18.86	11.08		18.01
	Average	60.92	10.55	87.45	38.79
	80thPercentile	98.31	22.12	233.26	55.03
Download Session Setup Success Rate%		100	58	99.35	100
Upload speed (M bits/s)	Typical	11.83	2.83		8.08
	Average	15.845	4.52	17.3	12.49
	80thPercentile	20.04	10.5	24.99	23.33
Upload Session Setup Success Rate%		100	67.58	99.35	100
Latency(in ms)	50thPercentile	93.88	38.5	24.5	36.66
Jitter(in ms)	Average	36.03	10.88	25.7	10.57
Packet Drop Rate%		1.35	10.78	0.69	0.8
Web browsing delay(in sec)		5.89	NA	3.604	5.08
Video Streaming performance for video		1.26	NA	0.392	1.27

4.4 Voice Service Performance (5G/4G/3G/2G-Automode) at APMC Market

Name of Hotspot Location 1	APMC Market Vasi			
Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	5	5	5	5
No of Call Established	5	3	5	5
Call setup success rate(CSSR)%	100	60%	100	100
No. of Drop Call	0	1	0	0
Drop Call Rate%	0	20	0	0
Call Setup Time Average(.)	0.39	7	1.12	0.28
Total no of RLT Occurrence	-	-		-
No of RLT>48	-	-		-

4.5 Data Service Performance (5G/4G/3G/2G-auto mode) at APMC Market

Name of Hotspot Location 1		APMC Market Vasi			
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	24.84	5.8		31.81
	Average	85.21	4.6	155.63	43.72
	80thPercentile	132.59	32.5	434.66	52.41
Download Session Setup Success Rate%		100		100	100
Upload speed (M bits/s)	Typical	24.24	1.24		3.96
	Average	31.52	1.12	23.11	10.94
	80thPercentile	39.55	28	74.37	15.84
Upload Session Setup Success Rate%		100	-	100	100
Latency(in ms)	50thPercentile	12.5	-	18.5	36.66
Jitter(in ms)	Average	8.16	-	8.87	8
Packet Drop Rate%		0	-	0	0
Web browsing delay(in)		7.6	-	2.574	5.63
Video Streaming performance for video		0.89	-	0.377	0.89

Voice Service Performance (5G/4G/3G/2G-Automode) at RaghuLeela Mall

Name of Hotspot Location 2	Near Raghuleela Mall Vashi			
Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	6	5	5	5
No of Call Established	6	4	5	5
Call setup success rate(CSSR)%	100%	80%	100	100
No. of Drop Call	0	0	0	0
Drop Call Rate%	0%	0	0	0
Call Setup Time Average(sec.)	0.69	7	1.04	0.27
Total no of RLT Occurrence	-	-		-
No of RLT>48	-	-		-

Data Service Performance (5G/4G/3G/2G-auto mode) at RaghuLeela Mall

Name of Hotspot Location 2		Near Raghuleela Mall Vashi			
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	5.69	8.4		28.92
	Average	13.24	7.8	78.29	49.49
	80thPercentile	19.1	31.88	221.2	64.41
Download Session Setup Success Rate%		100		100	100
Upload speed (M bits/s)	Typical	16.59	1.32		6.95
	Average	20.95	1.65	30.21	17.58
	80thPercentile	25.57	26.5	83.67	23.79
Upload Session Setup Success Rate%		100		100	100
Latency(in ms)	50thPercentile	17		41	26.04
Jitter(in ms)	Average	10.25		32.94	7.74
Packet Drop Rate%		0		0	0
Web browsing delay(in)		6.42		4.124	4.05
Video Streaming performance for video		2.25		0.41	0.62

Voice Service Performance (5G/4G/3G/2G-Automode) at NMMC Hospital

Name of Hotspot Location 3	NMMC Hospital Vashi			
Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	6	5	5	5
No of Call Established	6	0	5	5
Call setup success rate(CSSR)%	100	0	100	100
No. of Drop Call	0	0	0	0
Drop Call Rate%	0%	0	0	0
Call Setup Time Average(.)	0.82	7	0.95	0.29
Total no of RLT Occurrence	-	-		-
No of RLT>48	-	-	-	-

Data Service Performance (5G/4G/3G/2G-auto mode) at NMMC Hospital

Name of Hotspot Location 3		NMMC Hospital Vashi			
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	26.64			4.59
	Average	43.66		135.79	9.6
	80thPercentile	58.76		409.96	13.1
Download Session Setup Success Rate%		100		100	100
Upload speed (Mbits/s)	Typical	2.67			1.5
	Average	4.54		9.72	4
	80thPercentile	6.11		19.56	5.9
Upload Session Setup Success Rate%		100		100	100
Latency(in ms)	50thPercentile	162		22	54.54
Jitter(in ms)	Average	96.27		5.98	21.75
Packet Drop Rate%		0.83		0	0.9
Web browsing delay(in)		4.7		2.831	7.62
Video Streaming performance for video		0.89		0.33	2.62

Voice Service Performance (5G/4G/3G/2G-Automode) at Tilak college Vashi

Name of Hotspot Location 4	Tilak College of Science,commerce & Arts, Vashi			
Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	6	5	5	5
No of Call Established	6	2	5	5
Call setup success rate(CSSR)%	100%	40%	100	100
No. of Drop Call	0	0	0	0
Drop Call Rate%	0%	0	0	0
Call Setup Time Average(.)	0.54	7	1.42	0.27
Total no of RLT Occurrence	-	-		-
No of RLT>48	-	-		-

Data Service Performance (5G/4G/3G/2G-auto mode) at Tilak college Vashi

Name of Hotspot Location 4		Tilak College of Science,com & Arts, Vashi			
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	10.89			11.51
	Average	26.3		1.22	33.43
	80thPercentile	39.59		0.06	49.12
Download Session Setup Success Rate%		100		100	100
Upload speed (Mbits/s)	Typical	8.4			2.98
	Average	10.02		0.1	14.29
	80thPercentile	12.01		0.05	23.77
Upload Session Setup Success Rate%		100		100	100
Latency(in ms)	50thPercentile	45.26		16.5	42.82
Jitter(in ms)	Average	63.93		6.21	7.17
Packet Drop Rate%		7.27		0	1.4
Web browsing delay(in)		4.85		2.745	4.58
Video Streaming performance for video		1.01		0.31	1.01

Voice Service Performance (5G/4G/3G/2G-Automode) at ESIS Hospital

Name of Hotspot Location 5	ESIS Hospital Vashi			
Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	6	5	5	5
No of Call Established	6	4	5	5
Call setup success rate(CSSR)%	100	80%	100	100
No. of Drop Call	0	0	0	0
Drop Call Rate%	0	0	0	0
Call Setup Time Average(.)	0.73	7	1.61	0.25
Total no of RLT Occurrence	-	-		-
No of RLT>48	-	-		-

Data Service Performance (5G/4G/3G/2G-auto mode) at ESIS Hospital

Name of Hotspot Location 5		ESIS Hospital Vashi			
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	39.34			29.68
	Average	181.42		24.47	37.72
	80thPercentile	318.19		4.14	43.01
Download Session Setup Success Rate%		100		95.24	100
Upload speed (M bits/s)	Typical	5.33			7.58
	Average	7.48		0.84	17.13
	80thPercentile	9.35		1.52	25.94
Upload Session Setup Success Rate%		100		95.24	100
Latency(in ms)	50thPercentile	146.5		28	36.05
Jitter(in ms)	Average	9.46		44.07	6.47
Packet Drop Rate%		0		4	0.5
Web browsing delay(in)		NA		8.221	4.59
Video Streaming performance for video		NA		0.715	1.18

Voice Service Performance (5G/4G/3G/2G-Automode) at Vashi Railway Station

Name of Hotspot Location 6	Vashi Railway Station			
Parameters	Airtel	MTNL	RJIL	VIL
No of Call Attempts	6	5	5	5
No of Call Established	6	5	5	5
Call setup success rate(CSSR)%	100	100%	100	100
No. of Drop Call	0	0	0	0
Drop Call Rate%	0	0	0	0
Call Setup Time Average(.)	0.79	7	1.02	0.28
Total no of RLT Occurrence	-	-		-
No of RLT>48	-	-		-

Data Service Performance (5G/4G/3G/2G-auto mode) at Vashi Railway Station

Name of Hotspot Location 6		Vashi Railway Station			
QoS Parameters		AIRTEL	MTNL	RJIL	VIL
Download speed(M bits/s)	Typical	5.74	9.8		29.16
	Average	15.7	10.54	83.75	65.16
	80thPercentile	21.63	32.88	237.63	79.29
Download Session Setup Success Rate%		100		100	100
Upload speed (Mbits/s)	Typical	13.74	2.44		5.93
	Average	20.56	2.66	29.17	19.04
	80thPercentile	27.64	28	74.12	28.68
Upload Session Setup Success Rate%		100		100	100
Latency(In ms)	50thPercentile	180		43.5	27.92
Jitter(in ms)	Average	28.08		20.4	6.99
Packet Drop Rate%		0		0	0
Web browsing delay(in)		NA		3.895	4.28
Video Streaming performance for video		NA		0.342	0.85

4.3 Signal Strength distribution at Static location–Overall

RxLevel-2G								
Overall Rx Level	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-65]	1584	235	NA	-	76.66	3.9	NA	-
[-65,≥-75)	114	854	NA	-	5.51	14.44	NA	-
[-75,≥-85)	191	1265	NA	-	9.24	21.33	NA	-
[-85, ≥Min)	177	3574	NA	-	8.56	60.29	NA	-
Total	2066	5928	NA	-	100	100	NA	-

RxLevel-3G								
Overall RSCP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-70]	NA	128	NA	NA	NA	3.57	NA	NA
[-70,≥-80)	NA	459	NA	NA	NA	12.82	NA	NA
[-80,≥-90)	NA	1298	NA	NA	NA	36.26	NA	NA
[-90, ≥Min)	NA	1874	NA	NA	NA	52.36	NA	NA
Total	NA	3759	NA	NA	NA	100	NA	NA

RxLevel-4G								
Overall RSRP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-80]	1737	NA	1545	4787	40.1	NA	48.85%	32.3
[-80,≥-95]	2561	NA	1227	7094	59.13	NA	38.79%	47.86
[-95,≥-110]	33	NA	391	2196	0.76	NA	12.36%	14.82
[-110,≥Min]	0	NA	0	745	0	NA		5.03
Total	4331	NA	3163	14822	100.00%	NA	100.00%	100

RxLevel-5G								
Overall RSRP	No of Sample				Sample%			
	Airtel	MTNL	RJIL	VIL	Airtel	MTNL	RJIL	VIL
[Max,≥-80]	NA	NA	4407	200	NA	NA	47.74%	100
[-80,≥-95]	NA	NA	1912	0	NA	NA	20.71%	0
[-95,≥-110]	NA	NA	2361	0	NA	NA	25.57%	0
[-110,≥Min]	NA	NA	552	0	NA	NA	5.98%	0
Total	NA		9232	200	NA		100	100

5 Improvement plan for short coming observed during Drive Test

Sr. No.	Name of TSP	Location Name of Area & LSA	Lat. & long.	Observation (No coverage/ Poor coverage / Poor Signal Quality/ Call drops/ Call Setup failure, and Hand Over failure/Block/ Down Link Packet Drop/ Up Link Packet Drop/speed less than 2Mb locations/)	Improvement Plan (Optimization/Radiation of New Site/up gradation of existing site/upgradation of backhaul etc.)	Timeline/ Remarks
1	Airtel	Mumbai	18.98204,73.0858912	Call Drop(4G)	Optimization Plan	Optimization Plan
2	Airtel	Mumbai	19.0734502,73.011561	Call Drop(2G)	Optimization Plan	Optimization Plan
3	Airtel	Mumbai	19.145326,73.0134	Call Drop(2G)	Optimization Plan	Optimization Plan
4	Airtel	Mumbai	19.034519,73.00779	Call Drop(2G)	Optimization Plan	Optimization Plan
5	Airtel	Mumbai	19.001206,73.042908	Call Drop(2G)	Optimization Plan	New Site planned
6	Airtel	Mumbai	19.02471,73.054702	Call Drop(2G)	Optimization Plan	Optimization Plan

7	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
8	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
9	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
11	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
12	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
13	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
14	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
15	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
17	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
18	MTNL	Navi Mumbai	Mumbai			BSNL 4G under deployment	
19	Reliance Jio	Vashi-IKEA-Koper Khairane-Sai Baba Mandir-sector 5-sector 4-Airoli-Newa Bhakti park-	Mumbai	19.109798, 72.998711	Poor coverage	Radiation of New Site	

		Vashi					
20	VIL	Airport	Ulwe Navi Mumbai International Airport	18.999951 05/73.033 87419	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
21	VIL	HIGHWAY	JNPT Rd Panvel	18.980457 99/73.090 33593	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
22	VIL	HIGHWAY	Palm Beach Road	19.036377 1/73.0078 8925	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
23	VIL	City	Airoli Rd, Near Kambli Motors	19.163603 29/72.989 12121	Coverage patch is due to unavailability of site, and due to geographic limitations	New site is planned	Awaiting for Options, WIP
24	VIL	HIGHWAY	Relince Tank Farm JNPT Rd. Sheva	18.918578 02/72.970 77	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
25	VIL	HIGHWAY	JNPT Rd Panvel	18.972673 77/73.074 99673	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
26	VIL	Airport	Navi Mumbai International Airport	19.000486 39/73.085 6449	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
27	VIL	City	Belapur CBD Near RBI Colony Metro	19.022763 35/73.046 52296	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP
28	VIL	City	Power House Shiravane, Ner ul, Juinagar	19.049897 39/73.032 373	Coverage patch is due to unavailability of site, and due to geographic limitations	New site is planned	Awaiting for Options, WIP
29	VIL	City	8, MIDC IOC Terminal Rd. Turbhe	19.053848 42/73.026 50795	Coverage patch is due to unavailability of site, site is planned.	New site is planned	Awaiting for Options, WIP

6 Compliance Report for short comings observed during Drive Test Airtel

Improvement in KPI Parameter	Airtel			
Call Drop location/ area wise action taken and improvement observed				
Down Link Packet Drop (DLPD) for voice & Up Link Packet Drop (ULPD) for voice in 4G & 5G - location/area wise action taken and improvement observed				
Call Setup failure, and Hand Over failure - location/area wise action taken and improvement observed				
Poor Rx Quality - location/area wise action taken and improvement observed				
Poor Coverage - location/area wise action taken and improvement observed				
Poor DL Speed (i.e. Speed < 2 Mbps) - location/area wise action taken and improvement observed				
Others Poor KPIs (e.g. high latency, etc) - location/area wise action taken and improvement observed				

Drive Test Methodology adopted during the Drive test:

(1) VoiceTests:

Sl.No.	QoS Parameter	Measurement Criteria and methodology
1	Call setup time	Time taken from call initiate to call alerting/ringing.
2	Call setup success rate	CSSR=(Total Call Established/Total Call Attempt)*100 Call Setup attempt time: 30 sec. Call duration(City/Highway):90/180sec. Wait/ Guard Time: 15sec.
3	Dropped Call rate(DCR)	Call Drop Rate=(Total Call Drop/Total Call Established)*100
4	Call Silence Rate (Muting)	Silence call rate=(count of silence/Total calls established)*100 Continuous RTP gap ≥ 2 sec
5	Handover Success Rate	Handover Success Rate = Count of successful handovers (All Technology Handover combined) / Total count of Handover Attempt (All Technology Handover combined) *100 Handover types which are considered- 2G Inter & Intra cell, 3G Soft & IRAT, 4G Inter & Intra frequency & SRVCC, 5G Inter & Intra frequency & 5G to 4G handovers.
6	Packet Drop Rate(DL& UL)for Packet Switched Network (4G & 5G)	Number of RTP (Real-time Transport Protocol) Packets lost divided by total RTP packet received (against each source SSRC and sequence number) at call originating handset. This KPI will be calculated from MOS call for packet call only (VoNR/VoLTE)
7	Mean Opinion Score (MOS) Performance(in5G/4G/3G/2G:Auto mode)	Voice quality in mobile networks is measured with algorithms based on ITU-T P.863 (POLQA) Excellent: MOS ≥ 4 and < 5 , Good :MOS ≥ 3 and < 4 , Fair: MOS ≥ 2 and < 3 ,Poor :MOS ≥ 1 and < 2

(2) Data Tests:

Sl. No.	QoS Parameter	Measurement Criteria and methodology
1	Data speed in M bits/s (DL/UL both)	DownloadSpeed=Totalbytes transferred during download/Total time for transfer Speed = Total bytes transferred during upload / Total time for transfer. Download: File Size: 500 MB for 120 sec, 30 Sec Timeout Upload: File size: 250 MB for 120 sec, 30 Sec Timeout (Multithread3-TCPConnection at a time for both DL&UL)
2	Latency(in ms)	Latency is the time taken by a packet to reach the receiving endpoint after being transmitted from the sending point in broadband service. Test with Packet of size of 512 Bytes - 1000 count on TSP's Test server using UDP packets (TWAMP)
3	Jitter(in ms)	Test with Packet of size of 512/256 Bytes - 1000 count on TSP's own Test server using UDP (TWAMP) & RTP packets separately
4	Session Setup Success Rate(in %)(DL/UL)	(Total DL or UL session established (successfully connected to server)/ Total DL or UL session attempt) x100
5	Packet drop rate (in %)	No. of packets lost out of total packet transferred during the testing. - Packet loss rate=(Total packet lost/Total packet sent)x100 - Packet delay(RTT)>90ms considered as packet loss and included in Packet drop rate. - The measurements should include all major types of packets i.e., TCP, UDP and RTP in their representative ratio. The 90th percentile value of the packet drop measurements shall be considered the Packet drop rate.
6	Web browsing delay(in seconds)	Time taken to open the web pages successfully is considered as web browsing delay/ web page download time. LSA-wise 3 popular websites to be taken
7	Video Streaming performance (in seconds)	TRAI Prescribed Video of 20 Sec with 25 sec Timeout & without caching https://www.youtube.com/watch?v=rH2RjvI0DFs