भादूविप्रा
TRAI

TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Delhi LSA

September 2026

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1. Introduction

TRAI Act, 1997 mandates the Authority to ensure the services delivered through various telecommunications networks meet the required quality standards prescribed, to protect the interest of the consumers of telecommunication services. TRAI is also responsible for conducting the periodical audit of such services provided by the service providers so as to protect the interests of the consumers of telecommunications services.

Accordingly, TRAI has engaged M/s RedMango Analytics Pvt. Ltd. to undertake assessment of Quality of Service of mobile service through Independent Drive Test (IDT).

In IDT, the performance of all service providers providing service in a Licensed Service Area (LSA) through various technologies (like 2G/ 3G/ 4G/ 5G) for voice and data are measured by conducting drive test. The drive test routes are finalised based on various objective criteria like reported network performance, consumer complaints etc. Methodology adopted for conducting IDT is elaborated in **APPENDIX-I**.

2. Executive Summary (LSA)

2.1 Drive test details

This report covers the findings of the IDT undertaken in Delhi License Service Area (LSA) during the month of September-2026 under the supervision of TRAI Regional Office (RO) Delhi. Details of route/area covered during the IDT are as given below:

S. No	Drive test route	Type of route	Distance covered (KMs)	From date	To date
1	Ghaziabad, Noida and Greater Noida	City	788.6	1-Sep-2026	4-Sep-2026
2	Greater Noida	Inter Operator Calling	1 Location	5-Sep-2026	5-Sep-2026
3	Ghaziabad, Noida and Greater Noida	Hotspot	8 Locations	5-Sep-2026	5-Sep-2026
4	Ghaziabad and Noida	Walk test	3.8	5-Sep-2026	5-Sep-2026
5	Noida Sector 121 to World Trade Centre	City route	24.8	4-Sep-2026	4-Sep-2026

Table-1: Drive test summary.

2.2 Drive test routes

The map provides overview of drive test routes indicating city drive, Inter-operator call test, hotspots, walk test and city route as per the legends shown on the map.

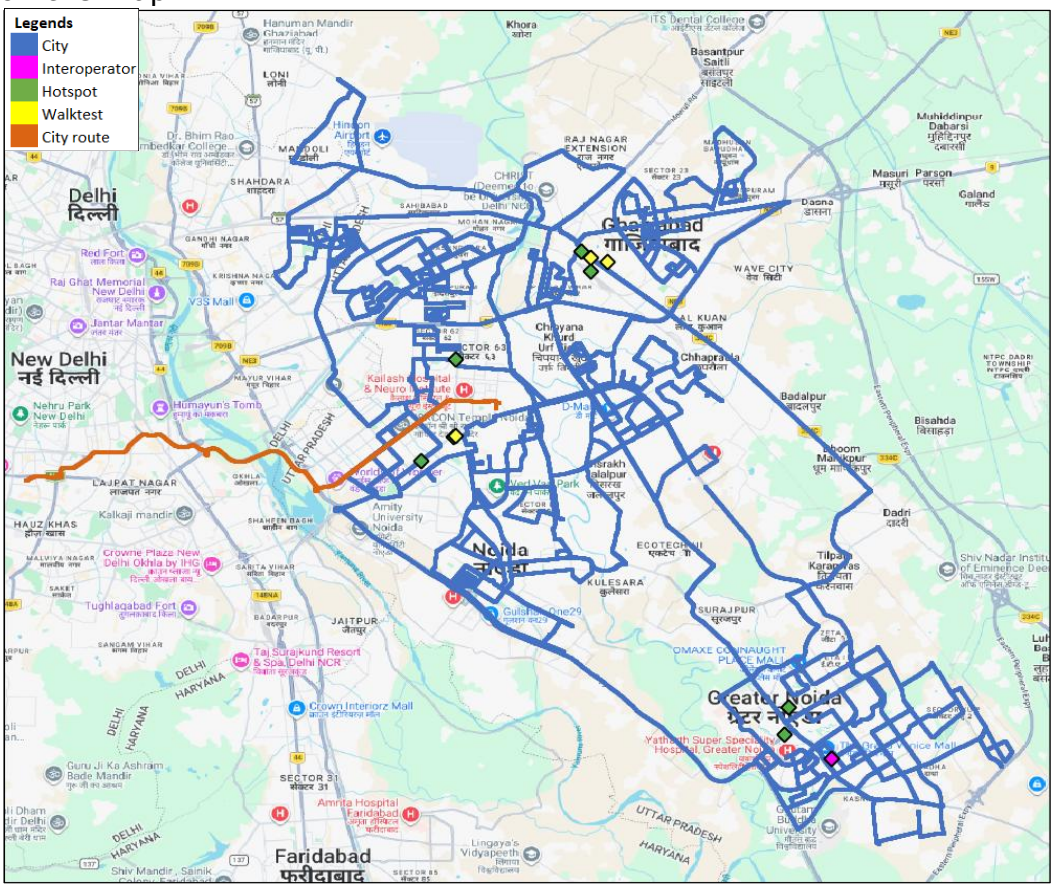


Figure-1: Drive test routes.

2.3 Summary of areas covered

a) City- Mandoli, Sahibabad, Govindpuram, Vasundhara, Indirapuram, Pratap Vihar, Lal Kuan, Dhoom Manikpur, Madhuban Bapudham, Chipyana Khurd urf Tigri, Ghaziabad, Raj Nagar Extension, Chhapraula, Noida, Noida Sector 62, Noida Sector 63, Amity University Noida, Bisrakh Jalalpur, Kulesara, Surajpur, Greater Noida, Badalpur, Tilpata Karanwas, Sector XU-2, Dadha and Kasna etc.

b) Hotspot

1. Alpha 1 Market
2. Fortis Hospital Sec-62 Noida
3. Ghaziabad Junction Railway Station
4. MMG District Hospital
5. Noida City Centre Bus Stand
6. Noida Sector 52 Metro Station
7. Pari Chowk Metro Station
8. The Grand Venice Mall

c) Walk Test

1. Gandhi Nagar Market Ghaziabad
2. Ghaziabad Ghantaghar Market including Turav Nagar Market
3. Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas

d) City Route-. Noida Sector 121 to World Trade Centre.

2.4 Telecom service providers detected frequency bands

Technologies covered during the IDT and frequency bands in use are summarised in table below:

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

Table-2: Telecom service provider (TSP) covered in IDT.

Note- Testing was carried out using BSNL SIM cards in some areas of Delhi LSA as per the instructions received from RO Delhi.

2.5 Key findings of Independent Drive Test

1. **Drive Test Area:** The overall mobile network performance across Ghaziabad, Noida and Greater Noida (Delhi LSA) for the key Parameters has been summarized below:

a) Coverage Gap - The signal strength observed during voice testing on the drive test route in auto-selection mode (5G/4G/3G/2G). (refer figure- 29 to 32)

Parameter	AIRTEL	BSNL/ MTNL	RJIL	VIL
Total Number of Samples captured on Drive test route	127346	121733	127212	132094
Number of Samples having poor signal strength	1053	79985	2146	1246
Number of Samples having limited service (No Coverage)	8	1334	0	0

b) Dropped Calls - The TSP-wise details of dropped calls in auto selection mode (5G/4G/3G/2G). (refer figure-15 to 18)

Parameter	AIRTEL	BSNL/ MTNL	RJIL	VIL
Number of successful Calls Established	1139	1071	1146	1158
Number of dropped Calls	9	173	14	2

c) Call Silence Instance - The TSP-wise details of Call silence instance in Auto-selection mode (5G/4G). (refer figure-19 to 22)

Parameter	AIRTEL	BSNL/ MTNL	RJIL	VIL
Call Established (within service provider network)	1086	878	1086	1107
Number of silences calls for >3 Sec	7	7	45	4
Total number of silence instances for >3 Sec	8	10	54	4

d) Packet loss rate Downlink & Uplink- The TSP-wise details of packet loss rate in downlink & uplink for Auto-selection mode (5G/4G).

Parameter	AIRTEL	BSNL/ MTNL	RJIL	VIL
Call Established (within service provider network)	1086	878	1086	1107
Packet loss Rate Downlink %	1.00	3.22	2.54	0.76
Packet loss Rate Uplink %	1.12	3.56	2.59	0.81

e) Data Download and Upload Throughput-

i) Data Download Throughput: The TSP-wise details of **Average Download (DL) throughput** against declared typical DL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure- 34 to 37)

Parameter	Measured in	AIRTEL (upto 5G)	BSNL/ MTNL (upto 4G)	RJIL (upto 5G)	VIL (upto 5G)
Typical Download Throughput declared by TSP	(Mbits/s)	23.00	8.00	15.00	15.00
Average Download Throughput measured during IDT	(Mbits/s)	114.38	5.49	248.50	94.30

ii) Data Upload Throughput: The TSP-wise details of **Average Upload (UL) throughput** against declared typical UL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure-38 to 41)

Parameter	Measured in	AIRTEL (upto 5G)	BSNL/ MTNL (upto 4G)	RJIL (upto 5G)	VIL (upto 5G)
Typical Upload Throughput declared by TSP	(Mbits/s)	10.00	1.00	7.00	8.00
Average Upload Throughput measured during IDT	(Mbits/s)	25.11	1.72	18.71	18.92

2. Drive Test Area: The overall mobile network performance on Noida Sector 121 to World Trade Centre (Delhi LSA) for the key Parameters has been summarized below:

a) Coverage Gap - The signal strength observed during voice testing on the drive test route in auto-selection mode (5G/4G/3G/2G). (refer figure- 65 to 68)

Parameter	AIRTEL	MTNL	RJIL	VIL
Total Number of Samples captured on Drive test route	2793	2743	2849	2973
Number of Samples having poor signal strength	1	1646	12	4
Number of Samples having limited service (No Coverage)	0	0	0	0

b) Dropped Calls - The TSP-wise details of dropped calls in auto selection mode (5G/4G/3G/2G). (refer figure-58)

Parameter	AIRTEL	MTNL	RJIL	VIL
Number of successful Calls Established	25	23	26	26
Number of dropped Calls	0	6	0	0

c) Call Silence Instance - The TSP-wise details of Call silence instance in Auto-selection mode (5G/4G).

Parameter	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider network)	24	17	21	24
Number of silences calls for >3 Sec	0	NA	0	0
Total number of silence instances for >3 Sec	0	NA	0	0

Note- "NA" Due to unavailability of packet switched (VoLTE & VoNR) network in MTNL silence instances are not captured.

d) Packet loss rate Downlink & Uplink - The TSP-wise details of packet loss rate in downlink & uplink for Auto-selection mode (5G/4G).

Parameter	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider network)	24	17	21	24
Packet loss Rate Downlink %	0.91	NA	2.01	2.25
Packet loss Rate Uplink %	0.88	NA	1.54	2.06

e) Data Download and Upload Throughput-

i) Data Download Throughput: The TSP-wise details of **Average Download (DL) throughput** against declared typical DL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure- 70 to 73)

Parameter	Measured in	AIRTEL (upto 5G)	MTNL (upto 3G)	RJIL (upto 5G)	VIL (upto 5G)
Typical Download Throughput declared by TSP	(Mbits/s)	23.00	8.00	15.00	15.00
Average Download Throughput measured during IDT	(Mbits/s)	175.41	3.39	346.84	129.86

ii) Data Upload Throughput: The TSP-wise details of **Average Upload (UL) throughput** against declared typical UL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure-74 to 77)

Parameter	Measured in	AIRTEL (upto 5G)	MTNL (upto 3G)	RJIL (upto 5G)	VIL (upto 5G)
Typical Upload Throughput declared by TSP	(Mbits/s)	10.00	1.00	7.00	8.00
Average Upload Throughput measured during IDT	(Mbits/s)	19.29	1.02	27.94	29.08

QoS Performance Analysis- Delhi LSA

3. QoS performance analysis-LSA level

3.1 Overview

This section provides summary of overall QoS performance of the telecom service provider's network in the LSA by aggregating the results of drive tests conducted in the Delhi LSA during the month of September-2026 covering city drive, hotspot, walk test and city route. (Refer Table-1)

3.2 Voice performance

(a) Voice Call Performance in 3G/2G network mode only: 3G/2G network mode testing has been done to reflect experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL/MTNL	VIL
Call Attempts	1136	1665	1183
Call Setup Success Rate %	98.86	58.20	94.59
Drop Call Rate %	0.89	12.69	1.43
Call Setup Time-Average (Second)	2.92	3.75	3.00
Handover Success Rate %	96.87	99.90	97.37

Table-3: Summary of voice call performance in 3G/2G network mode only.

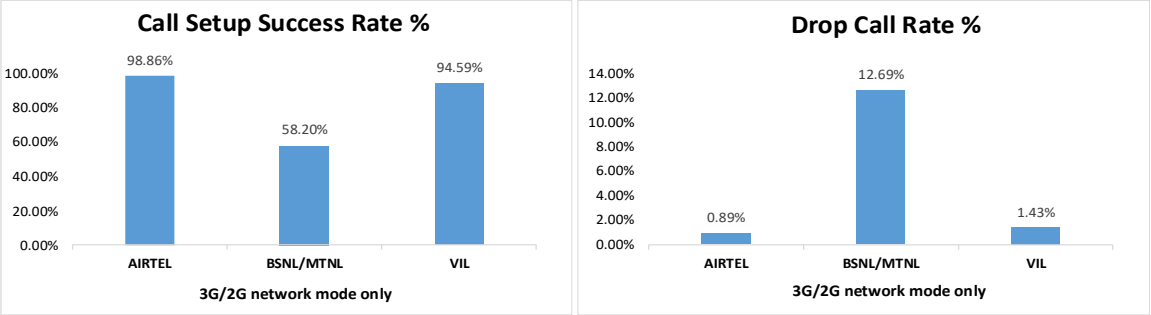


Figure-2: Call setup success rate and drop call rate performance.

Number of unique cell Id's covered in Voice test- Technology wise			
Technology	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL/MTNL	VIL
3G	NA	167	NA
2G	1706	118	1836

Table-4: Technology wise number of network cell Id's latched during drive test.

Note-
- RJIL does not have 3G/2G network.
- NA- Service provider doesn't provide services in respective technology.

(b) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL/MTNL	RJIL	VIL
Call Attempts	1293	1465	1303	1308
Call Setup Success Rate %	99.61	83.14	99.46	100.00
Drop Call Rate %	0.70	14.70	1.08	0.15
Call Setup Time-Average (Second)	0.48	3.84	0.63	0.60
Handover Success Rate %	99.70	99.95	99.87	99.86

Table-5: Summary of voice call performance in network auto-selection mode.

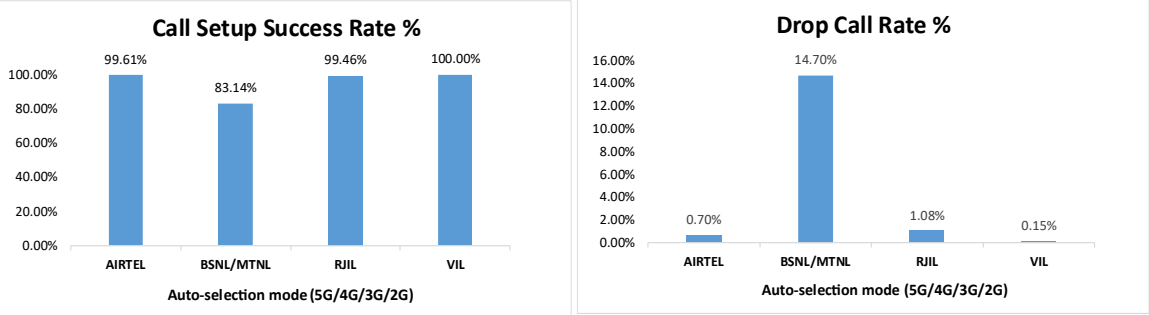


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G – Open Mode)			
	AIRTEL	BSNL/ MTNL	RJIL	VIL
Call Established (within service provider Network)	1110	895	1107	1131
Number of silences call for >4 Sec	4	5	30	0
Silence Call Rate %	0.36	0.56	2.71	0.00
Number of silence instances for >4 Sec	5	7	33	0
Number of silence instances for >3 Sec	8	10	54	4
Number of silence instances for >2 sec	21	16	110	15
RTP Jitter (4G & 5G) in ms	6.01	4.42	12.33	17.83
Packet loss Rate Downlink %	1.00	3.22	2.53	0.79
Packet loss Rate Uplink %	1.12	3.56	2.57	0.83

Table-6: Summary of silence instances & packet loss rate for mobile to mobile calls.

Number of unique cell Id's covered in Voice test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL/MTNL	RJIL	VIL
5G	923	NA	2599	0
4G	3855	169	1367	3642
3G	NA	127	NA	NA
2G	0	80	NA	1

Table-7: Technology wise number of network cell Id's latched during drive test.

Note-
- NA- Service provider doesn't provide services in respective technology.
- 0- No cell Id's were found in respective technology.

(c) Mean Opinion Score (MOS) performance for speech quality:

Mean opinion score indicates quality of speech observed during the drive test across different technologies. This parameter has been calculated for mobile-to-mobile calls made within same operator network in auto mode (5G/4G/3G/2G). As per ITU-T Recommendation P.863.1, MOS values means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL/ MTNL	RJIL	VIL
Total Number of MOS Samples for calls table-6	6997	5233	7315	7640
Speech Quality (Average MOS)	3.91	2.64	4.36	4.47
Number of samples with MOS >=4 to <5 (Excellent)	5422	590	6181	6713
Number of samples with MOS >=3 to <4 (Good)	1173	1297	567	592
Number of samples with MOS >=2 to <3 (Fair)	164	2052	209	146
Number of samples with MOS >=1 to <2 (Poor)	238	1294	358	189
%age of samples with MOS >=4 to <5 (Excellent)	77.49%	11.27%	84.50%	87.87%
%age of samples with MOS >=3 to <4 (Good)	16.76%	24.79%	7.75%	7.75%
%age of samples with MOS >=2 to <3 (Fair)	2.34%	39.21%	2.86%	1.91%
%age of samples with MOS >=1 to <2 (Poor)	3.40%	24.73%	4.89%	2.47%

Table-8: Summary of speech quality (MOS) samples.

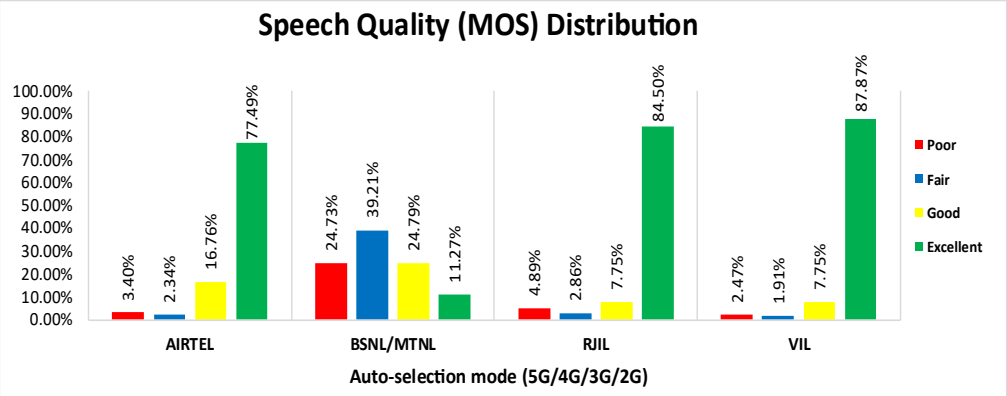


Figure- 4: Distribution of samples in MOS range.

(d) Inter-service provider voice call performance: To check the performance of inter-service providers call setup success rate, total 15 inter operator calls were attempted at one location which is Grand Venice Mall Greater Noida. The call setup success rate and call setup time observation are as below.

Call Setup Success Rate %				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	100.00	100.00	100.00
BSNL	100.00	NA	100.00	93.33
RJIL	100.00	100.00	NA	100.00
VIL	100.00	100.00	100.00	NA

Table-9: Call setup success rate across service providers.

Note-

- NA- Only inter-operator calls were measured during test.

Call setup time average (seconds)				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	5.00	2.07	1.28
BSNL	4.18	NA	2.96	3.32
RJIL	4.16	5.14	NA	1.44
VIL	1.39	3.41	1.88	NA

Table-10: Call setup time across service providers.

Note-
- NA- Only inter-operator calls were measured during test.

3.3 Data performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	113.61	5.34	249.49	94.92
	80th Percentile	178.14	7.65	395.89	153.40
	20th Percentile	44.10	1.07	102.57	30.44
Upload Throughput (Mbits/s)	Average	25.50	1.77	18.68	19.89
	80th Percentile	43.42	2.47	33.33	32.33
	20th Percentile	7.00	0.00	2.80	5.93
Latency (ms)	50th Percentile	39.88	25.30	23.75	40.78

Table-11: Summary of data performance in network auto-selection mode.

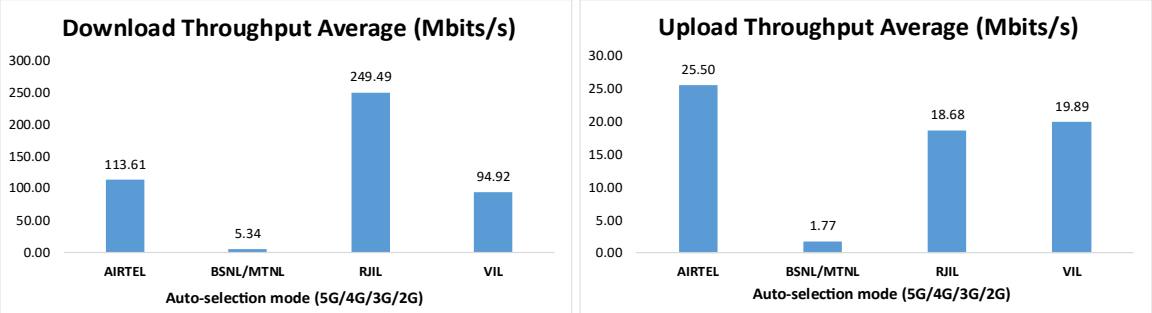


Figure- 5: Download and Upload throughput.

Number of unique cell Id's covered in Data test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL/MTNL	RJIL	VIL
5G	1191	NA	2165	0
4G	2032	186	418	3167
3G	NA	194	NA	NA
2G	1	77	NA	1

Table-12: Technology wise number of network cell Id's latched during drive test.

Note-
- NA**-** Service provider doesn't provide services in respective technology.
- 0- No cell Id's were found in respective technology.

Detailed QoS Performance Analysis

4. Detailed QoS performance analysis

4.1 Overview

This section covers analysis on performance of various categories of drives like city and hotspots for all telecom service providers, the results of drive tests conducted are shown individually for respective areas/locations.

4.2 City

Drive test has been conducted from 1st September 2026 to 4th September 2026 in Ghaziabad, Noida and Greater Noida. (Refer Table-1)

4.2.1 Drive test route

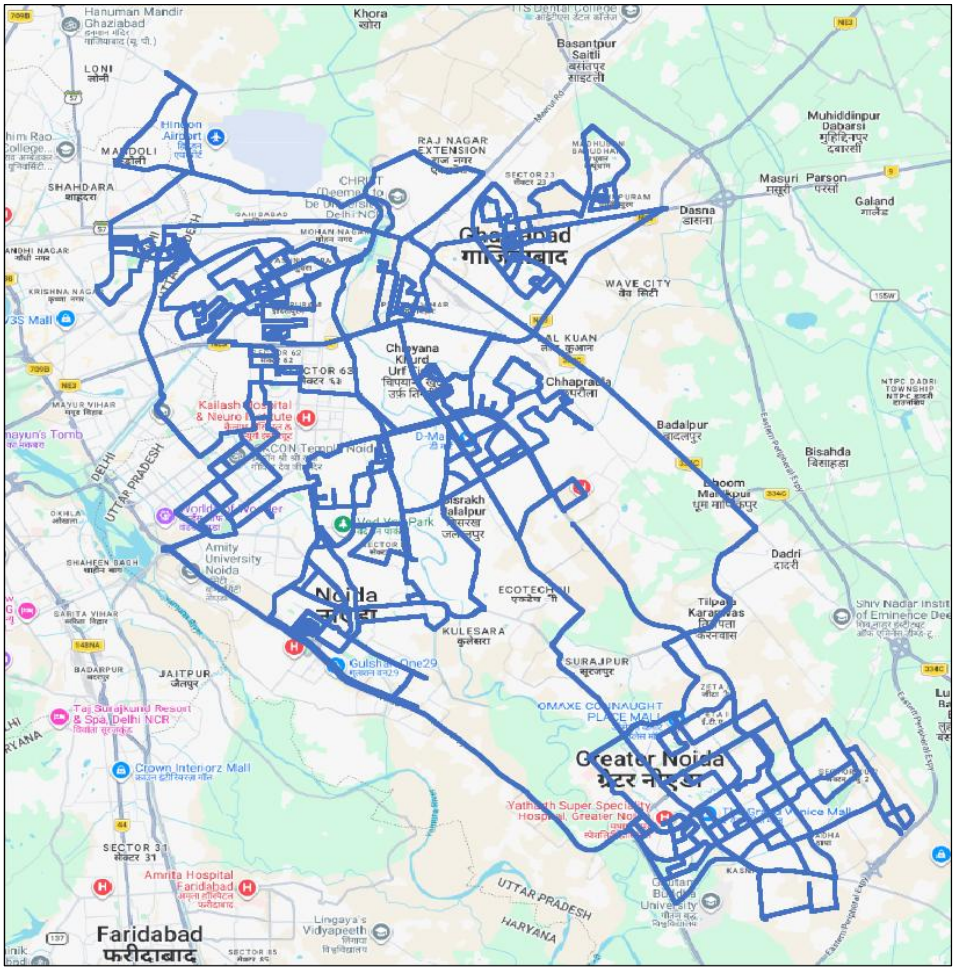


Figure- 6: Drive test routes.

4.2.2 Areas covered

Mandoli, Sahibabad, Govindpuram, Vasundhara, Indirapuram, Pratap Vihar, Lal Kuan, Dhoom Manikpur, Madhuban Bapudham, Chipyana Khurd urf Tigri, Ghaziabad, Raj Nagar Extension, Chhapraula, Noida, Noida Sector 62, Noida Sector 63, Amity University Noida, Bisrakh Jalalpur, Kulesara, Surajpur, Greater Noida, Badalpur, Tilpata Karanwas, Sector XU-2, Dadha and Kasna etc.

4.2.3 Voice performance

(a) Voice Call Performance in 3G/2G network mode only: 3G/2G network mode testing has been done to reflect experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL/MTNL	VIL
Call Attempts	1111	1634	1158
Call Setup Success Rate %	98.83	57.89	94.47
Drop Call Rate %	0.82	12.47	1.46
Call Setup Time-Average (Second)	2.92	3.76	3.01
Handover Success Rate %	97.02	99.89	97.41

Table-13: Summary of voice call performance in 3G/2G network mode only.

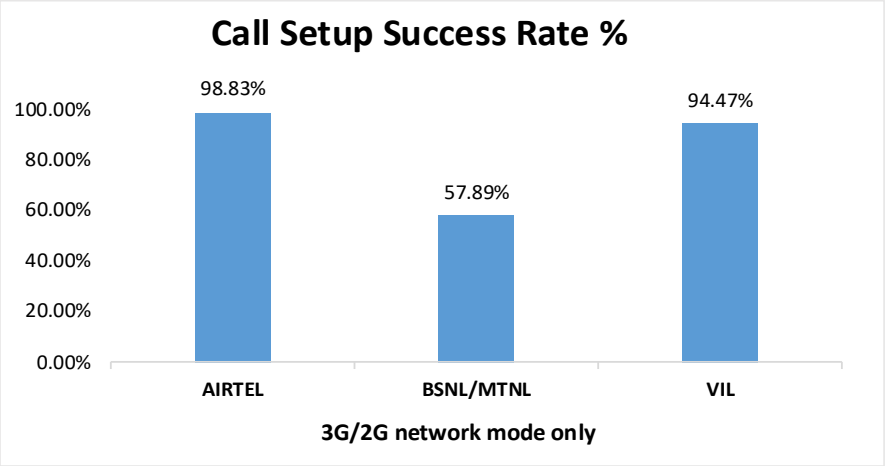


Figure-7: Performance for call setup success rate.

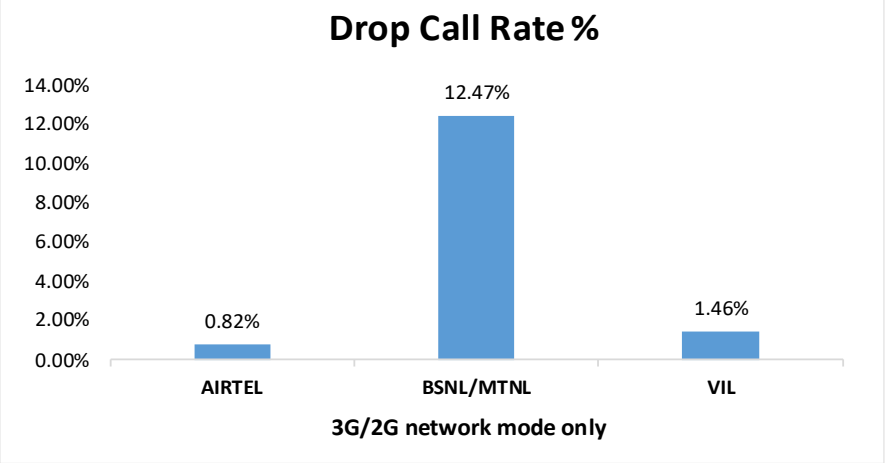


Figure-8: Performance for drop call rate.

(b) Network Technology: This section represent time spent on various network technologies.

Technology	Service Provider		
	AIRTEL	BSNL/MTNL	VIL
3G	NA	84.92%	NA
2G	99.99%	13.98%	99.97%
Limited Service	0.01%	1.09%	0.03%

Table-14: Time spent on technology during drive test 3G/2G network mode.

Note-
- NA- Service provider doesn't provide services in respective technology.

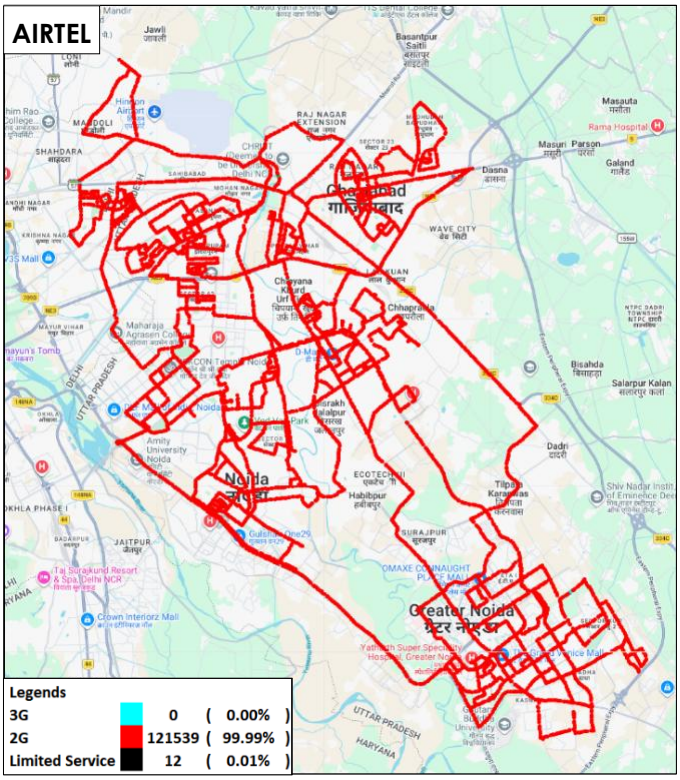


Figure-9: Serving technology plots 3G/2G network mode - AIRTEL.

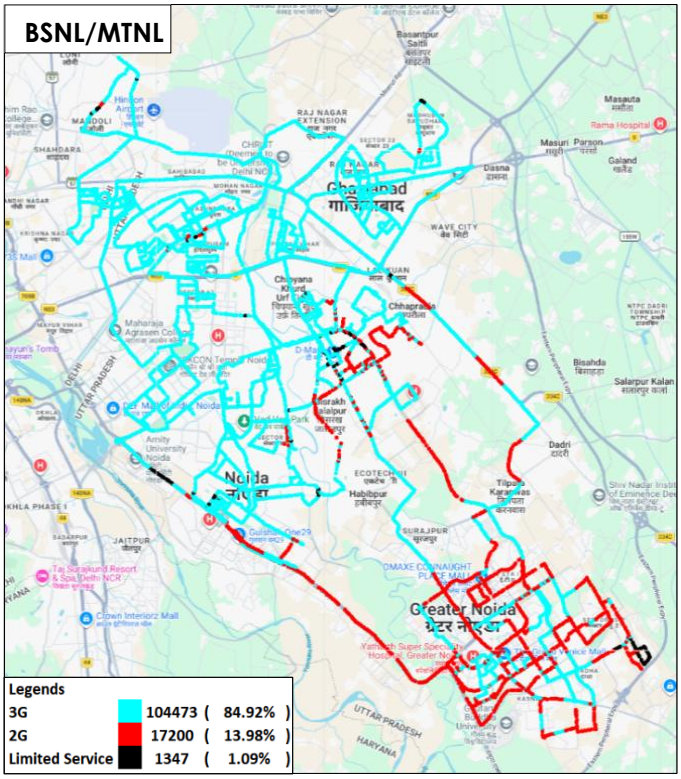


Figure-10: Serving technology plots 3G/2G network mode - BSNL/MTNL.

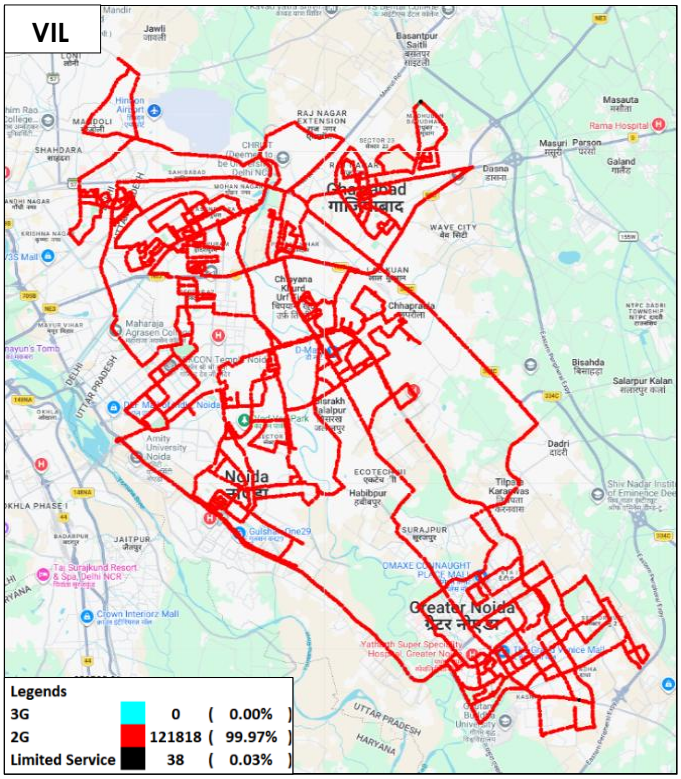


Figure-11: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 83, 84 & 85 for map view)

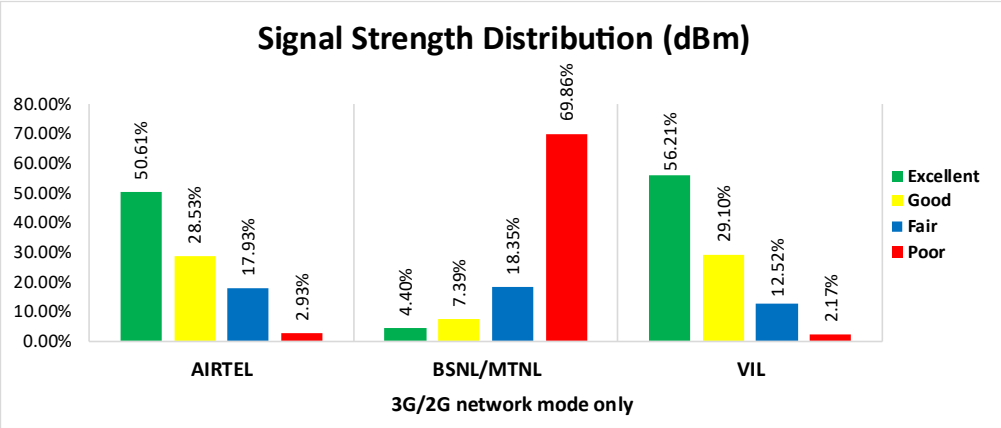


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 51% of samples falling in the excellent signal strength category.
- BSNL/MTNL has 4% of samples falling in the excellent signal strength category.
- VIL has 56% of samples falling in the excellent signal strength category.

(d) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL/MTNL	RJIL	VIL
Call Attempts	1144	1310	1153	1158
Call Setup Success Rate %	99.56	81.76	99.39	100.00
Drop Call Rate %	0.79	16.15	1.22	0.17
Call Setup Time Average (Second)	0.47	3.97	0.63	0.61
Handover Success Rate %	99.72	99.94	99.86	99.85

Table-15: Summary of voice call performance in network auto-selection mode.

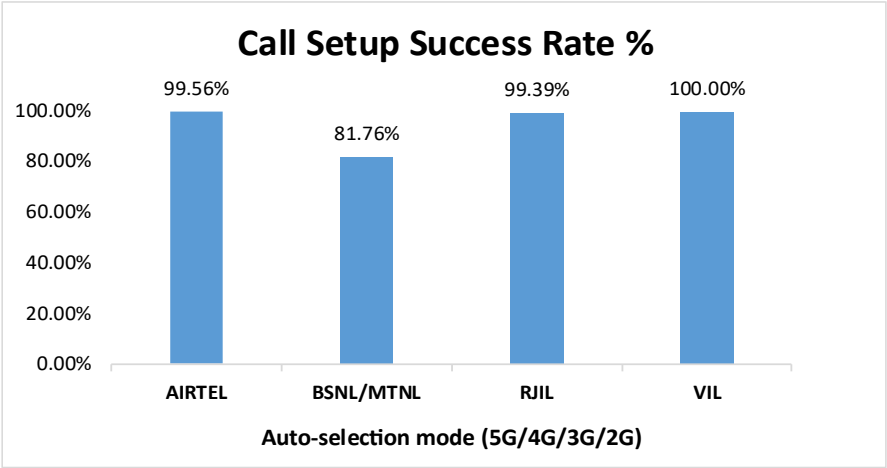


Figure-13: Performance for call setup success rate.

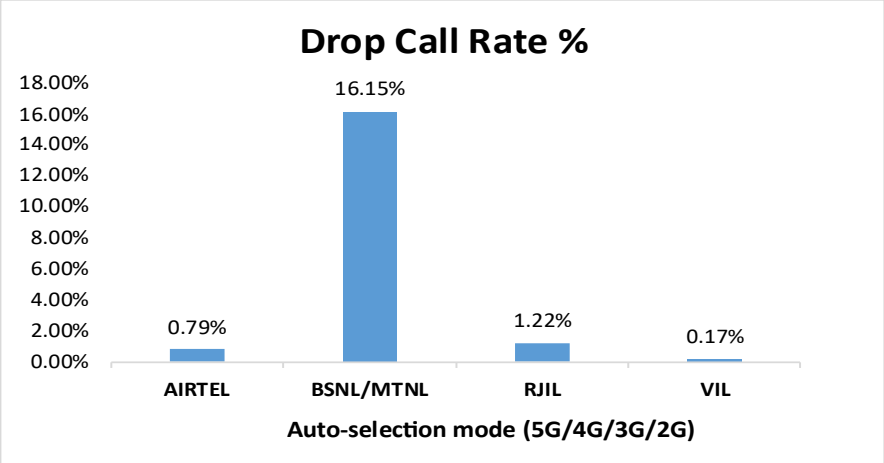


Figure-14: Performance for drop call rate.

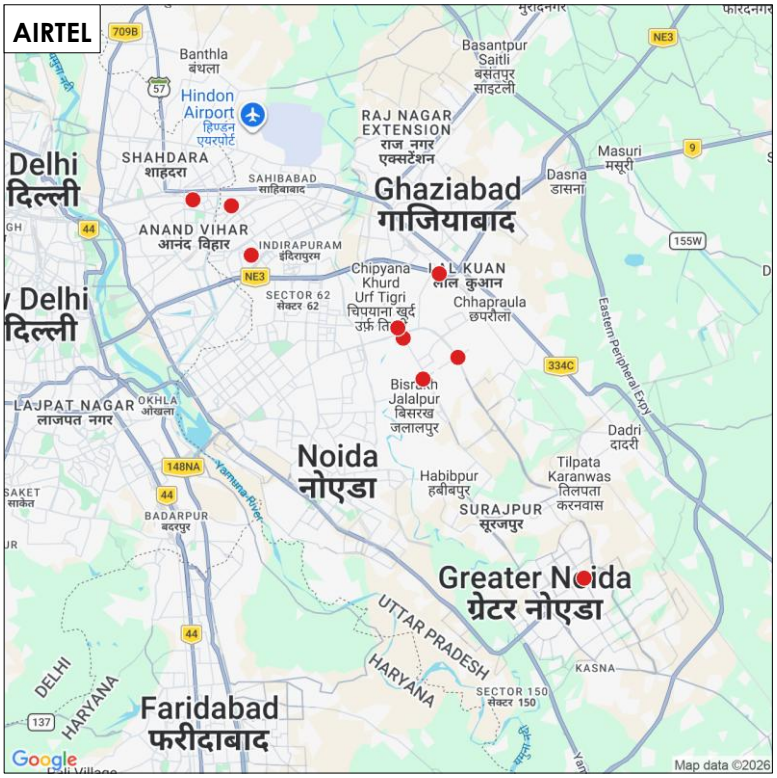


Figure-15: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

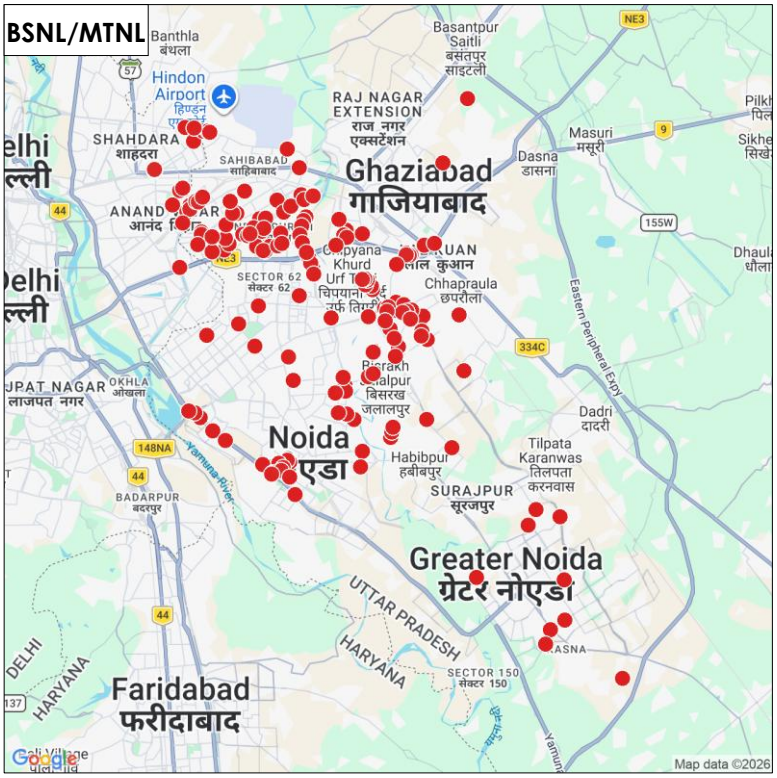


Figure-16: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice – BSNL/MTNL.

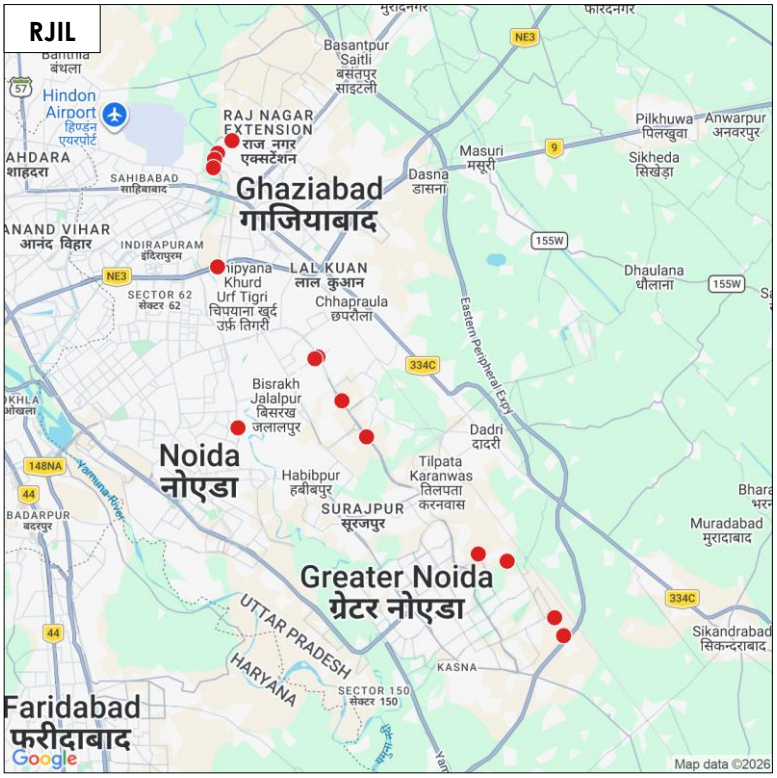


Figure-17: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

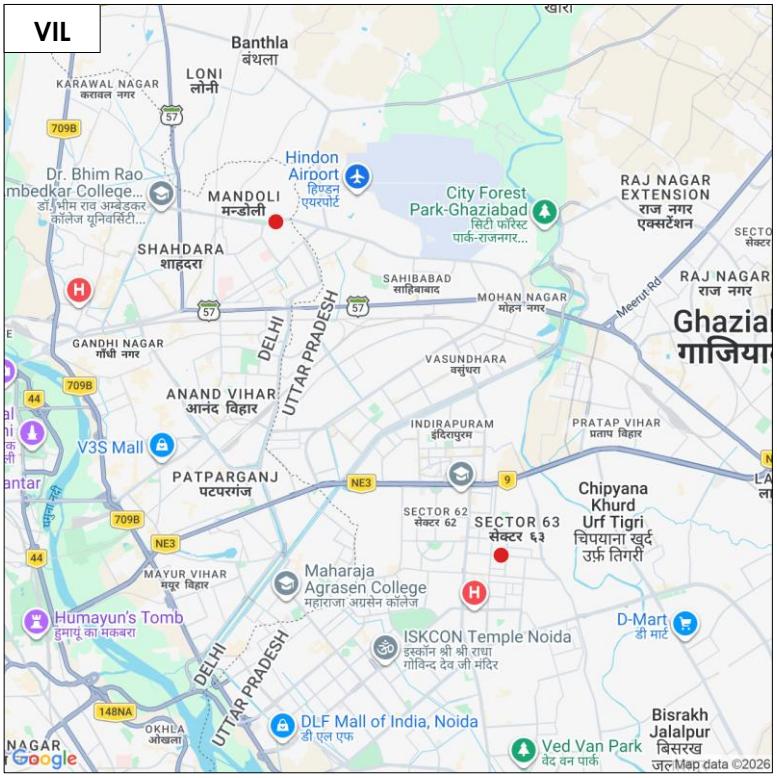


Figure-18: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - VIL.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G – Open Mode)			
	AIRTEL	BSNL/ MTNL	RJIL	VIL
Call Established (within service provider Network)	1086	878	1086	1107
Number of silences call for >4 Sec	4	5	30	0
Silence Call Rate %	0.37	0.57	2.76	0.00
Number of silence instances for >4 Sec	5	7	33	0
Number of silence instances for >3 Sec	8	10	54	4
Number of silence instances for >2 sec	21	16	106	15
RTP Jitter (4G & 5G) in ms	6.03	4.42	12.36	17.82
Packet loss Rate Downlink %	1.00	3.22	2.54	0.76
Packet loss Rate Uplink %	1.12	3.56	2.59	0.81

Table-16: Summary of silence instances & packet loss rate for mobile to mobile call.

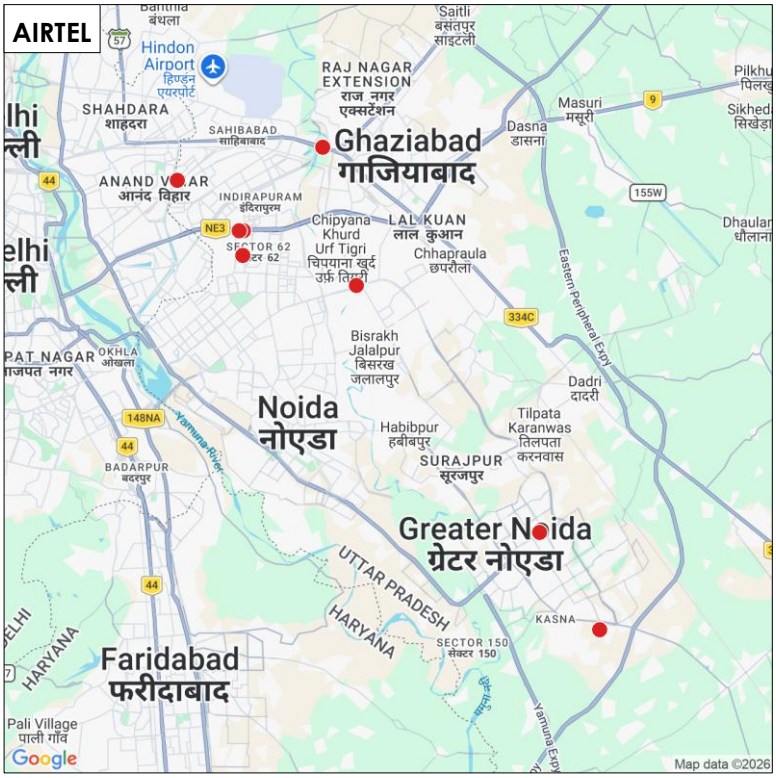


Figure-19: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-AIRTEL.

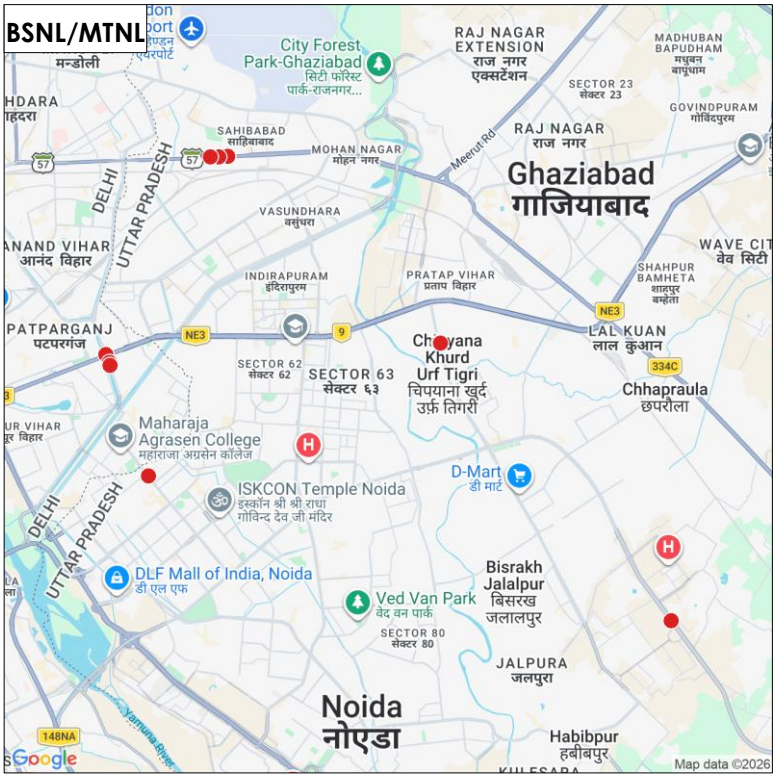


Figure-20: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-BSNL/MTNL.

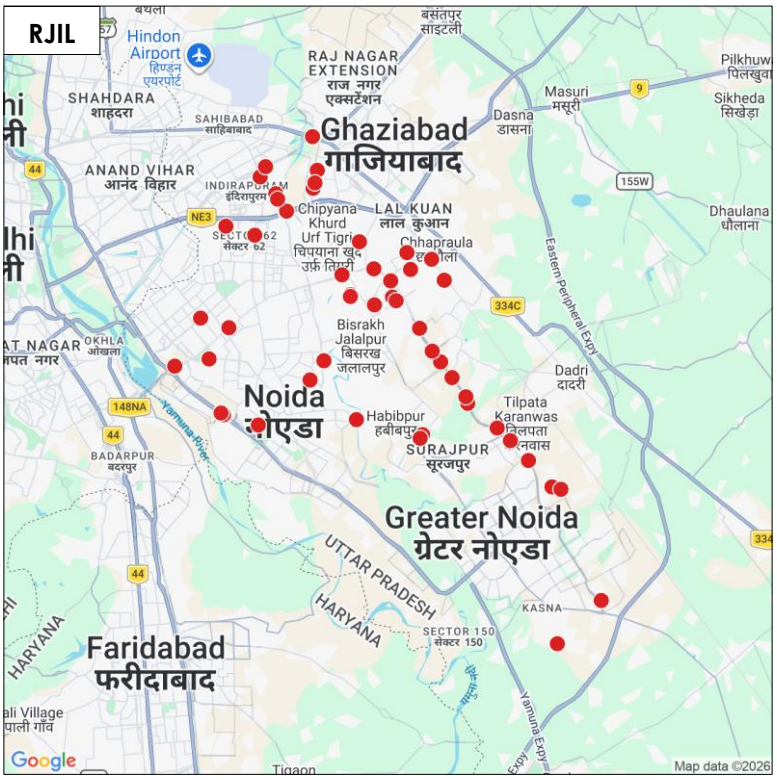


Figure-21: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-RJIL.

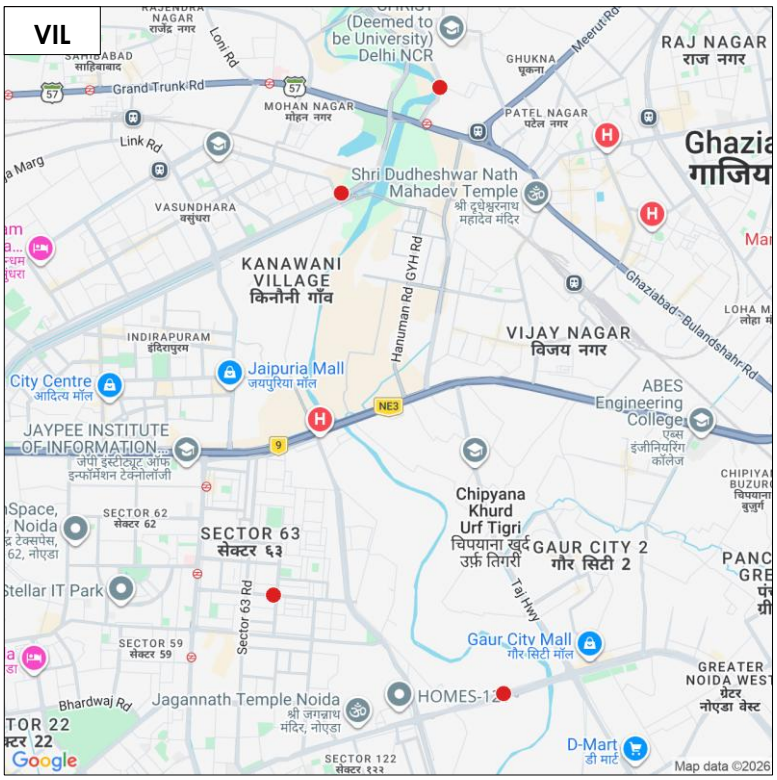


Figure-22: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-VIL.

(e) Mean Opinion Score (MOS) performance for speech quality:

Mean opinion score indicate quality of speech observed during the drive test across different technologies. This parameter has been calculated for mobile to mobile calls made within same operator network in auto mode (5G/4G/3G/2G). As per ITU-T Recommendation P.863.1, MOS value means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL/ MTNL	RJIL	VIL
Total Number of MOS Samples for calls in table-16	6842	5131	7176	7474
Speech Quality (Average MOS)	3.91	2.64	4.37	4.47
Number of samples with MOS >=4 to <5 (Excellent)	5308	590	6070	6580
Number of samples with MOS >=3 to <4 (Good)	1141	1251	551	577
Number of samples with MOS >=2 to <3 (Fair)	160	2014	202	140
Number of samples with MOS >=1 to <2 (Poor)	233	1276	353	177
%age of samples with MOS >=4 to <5 (Excellent)	77.58%	11.50%	84.59%	88.04%
%age of samples with MOS >=3 to <4 (Good)	16.68%	24.38%	7.68%	7.72%
%age of samples with MOS >=2 to <3 (Fair)	2.34%	39.25%	2.81%	1.87%
%age of samples with MOS >=1 to <2 (Poor)	3.41%	24.87%	4.92%	2.37%

Table-17: Summary of speech quality (MOS) samples.

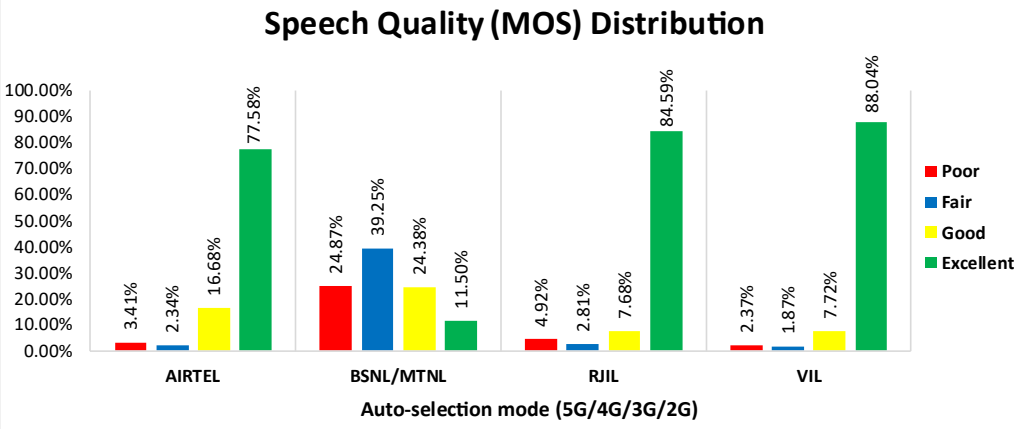


Figure-23: Distribution of samples in MOS range.

(f) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	BSNL/MTNL	RJIL	VIL
5G	19.41%	NA	83.56%	2.86%
4G	80.58%	20.19%	16.44%	97.11%
3G	NA	70.46%	NA	NA
2G	0.00%	8.29%	NA	0.04%
Limited Service	0.01%	1.06%	0.00%	0.00%

Table-18: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) voice.

Note-

- NA**-** Service provider doesn't provide services in respective technology.

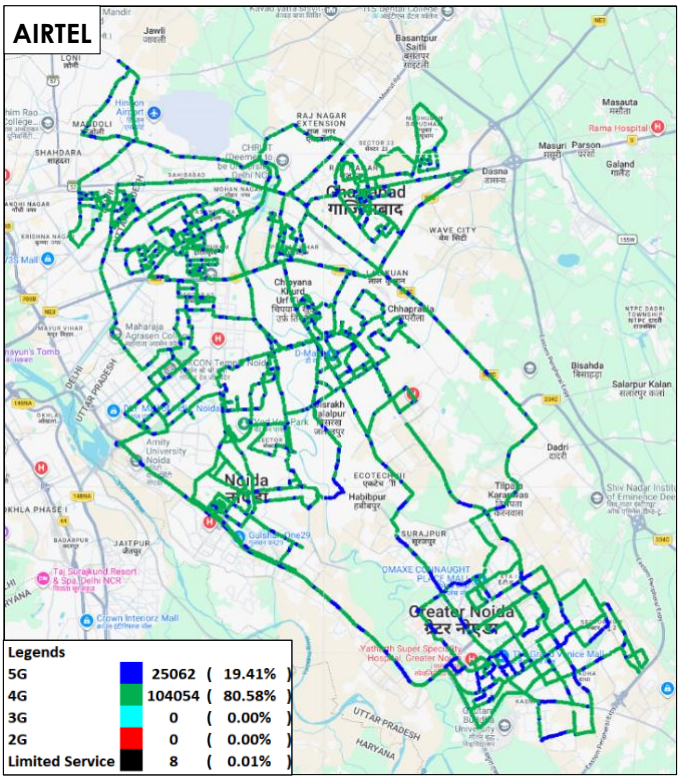


Figure-24: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

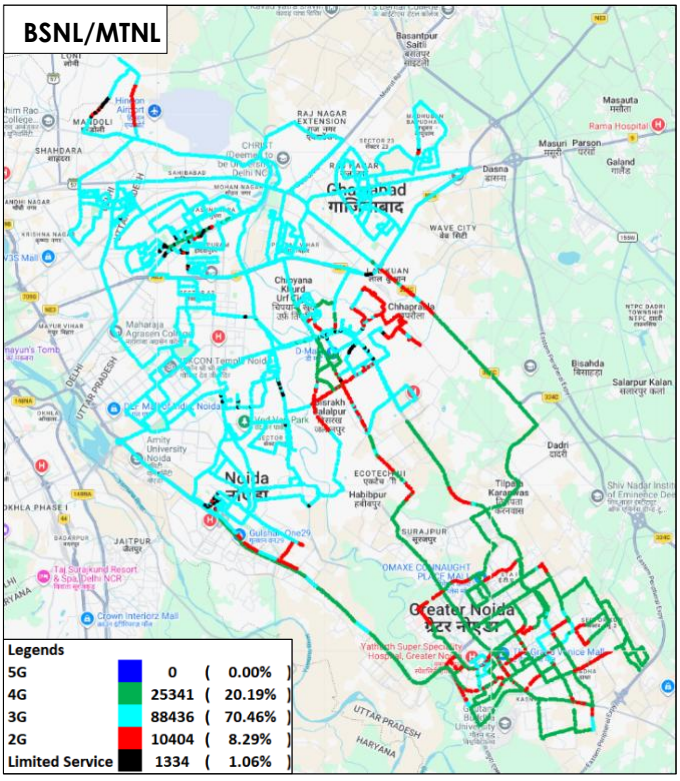


Figure-25: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL/MTNL.

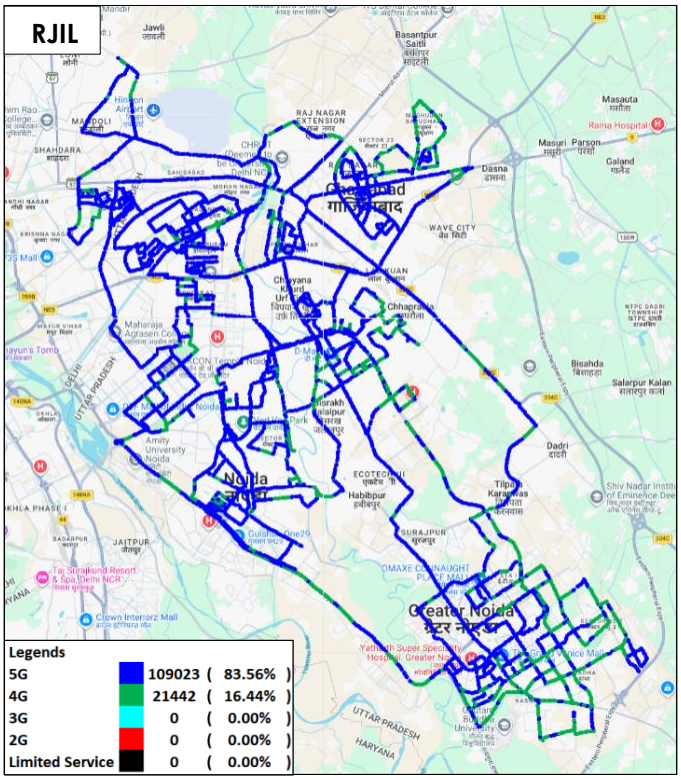


Figure-26: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

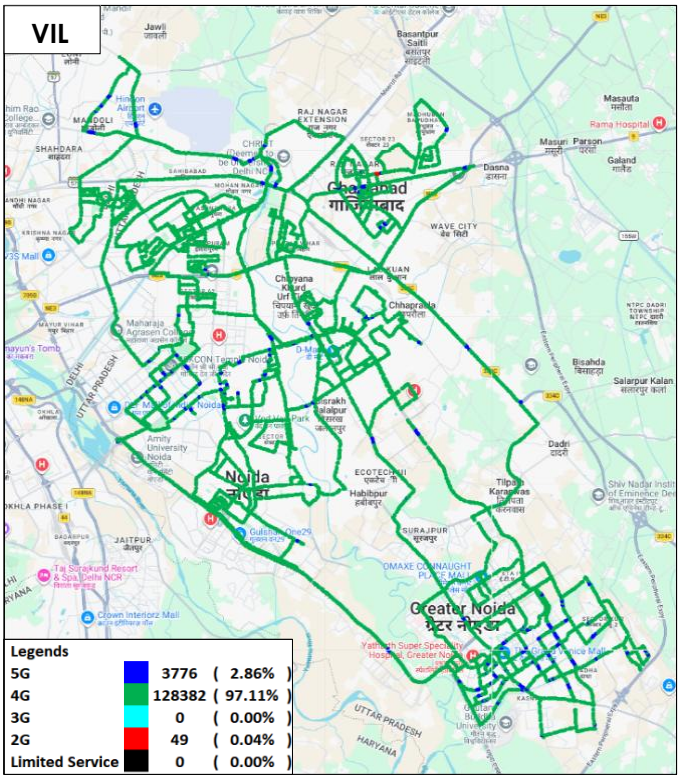


Figure-27: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-86, 87, 88 & 89 for map view)

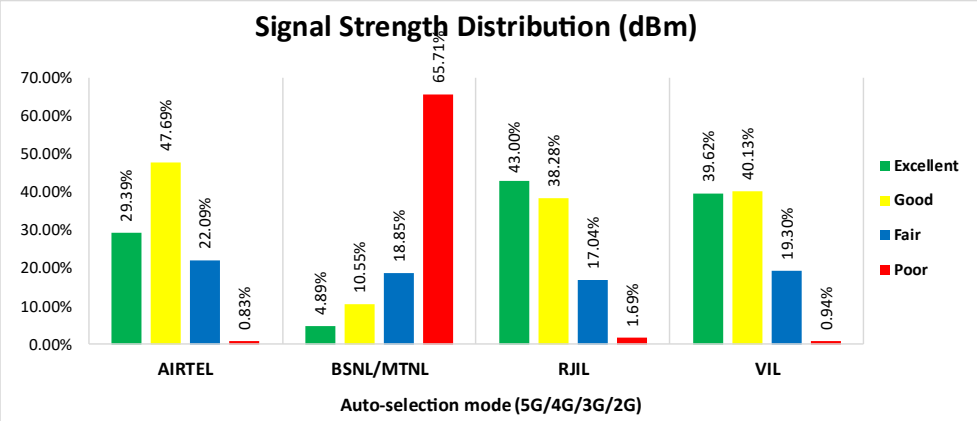


Figure-28: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 29% of samples falling in the excellent signal strength category.
- BSNL/MTNL has 5% of samples falling in the excellent signal strength category.
- RJIL has 43% of samples falling in the excellent signal strength category.
- VIL has 40% of samples falling in the excellent signal strength category.

(h) Coverage Gap observed

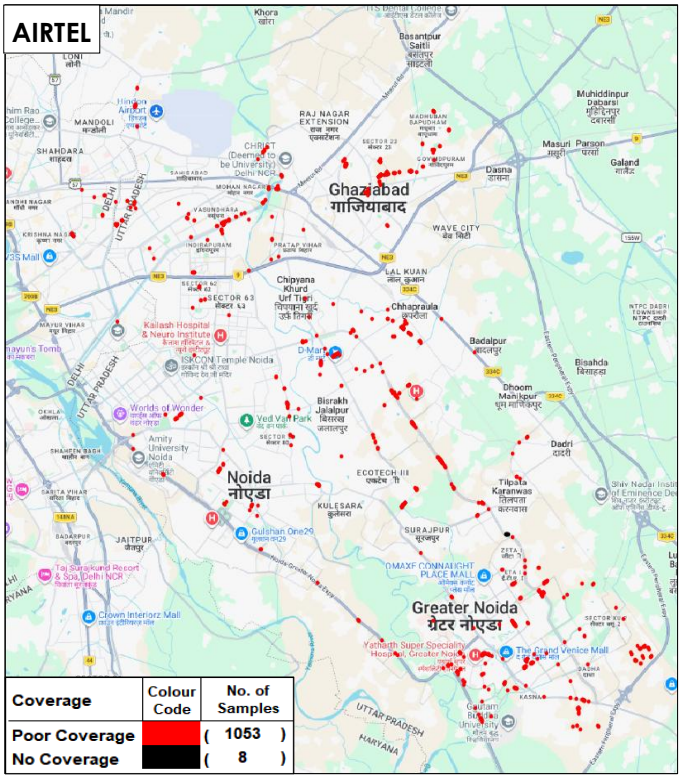


Figure-29: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice-AIRTEL.

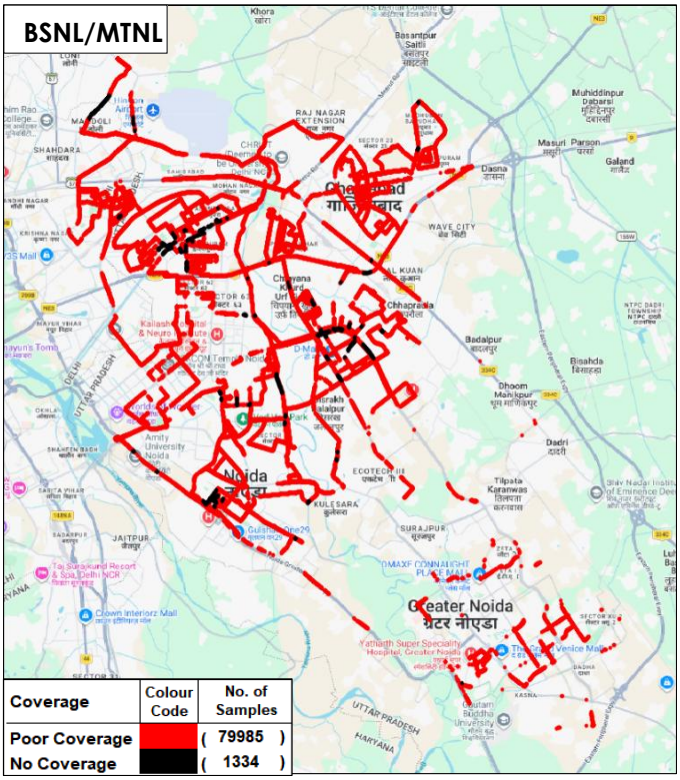


Figure-30: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice-BSNL/MTNL.

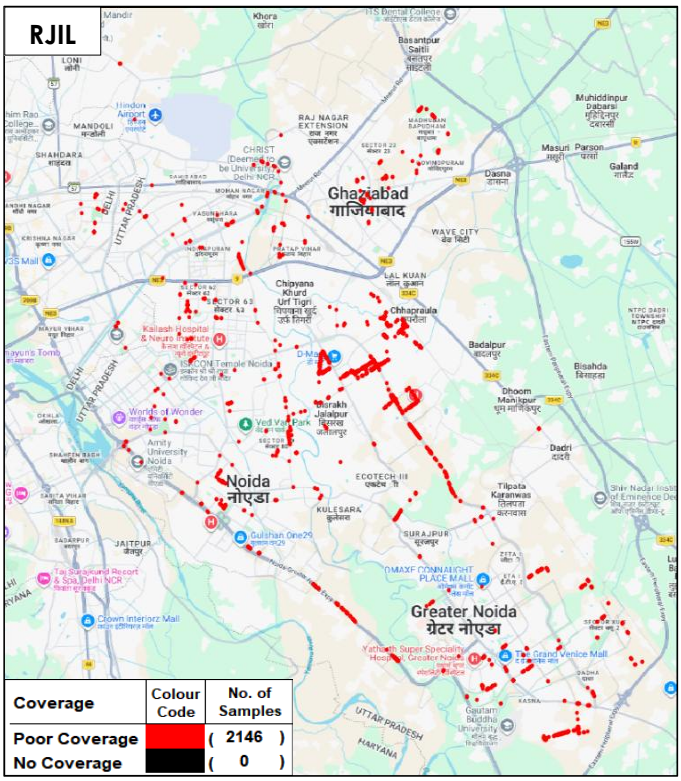


Figure-31: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice-RJIL.

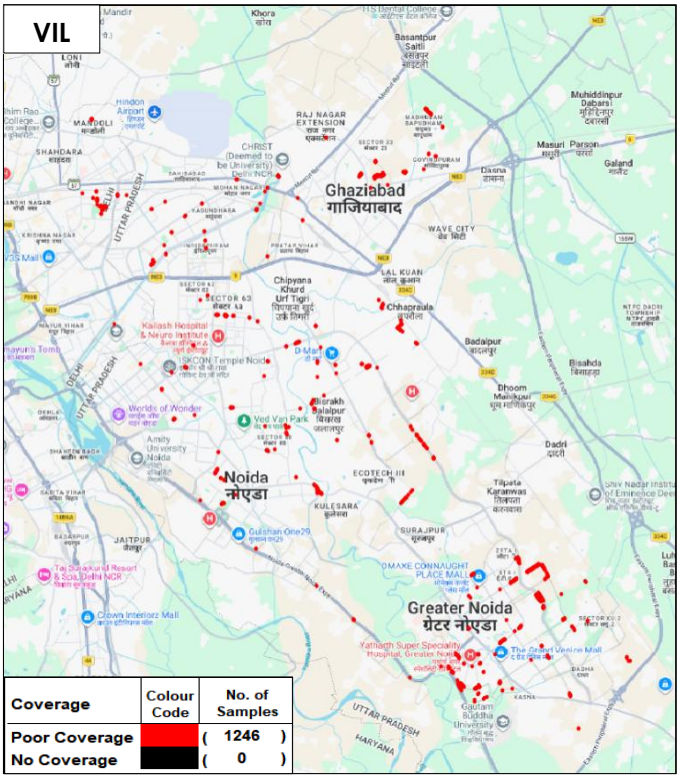


Figure-32: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice-VIL.

4.2.4 Data performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	114.38	5.49	248.50	94.30
	80th Percentile	178.89	7.85	400.49	151.14
	20th Percentile	44.10	1.00	99.68	30.52
Upload Throughput (Mbits/s)	Average	25.11	1.72	18.71	18.92
	80th Percentile	43.08	2.23	34.17	31.10
	20th Percentile	6.92	0.00	2.67	5.60
Latency (ms)	50th Percentile	39.63	27.95	23.37	42.34

Table-19: Summary of Data performance in network auto-selection mode.

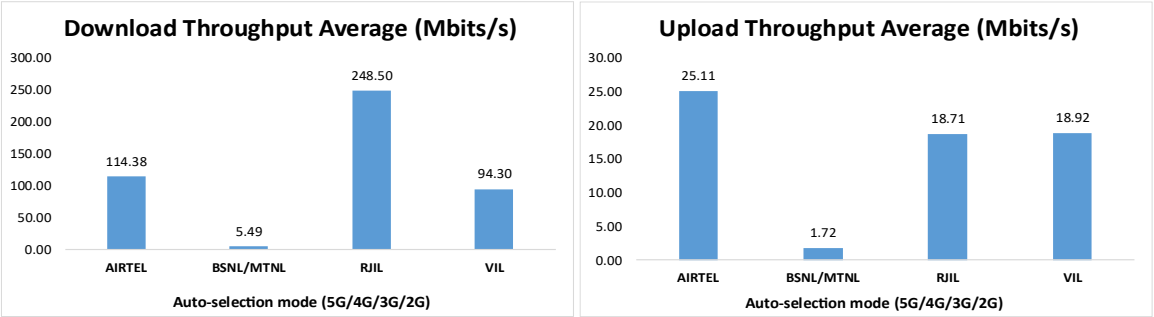


Figure- 33: Download & Upload throughput.

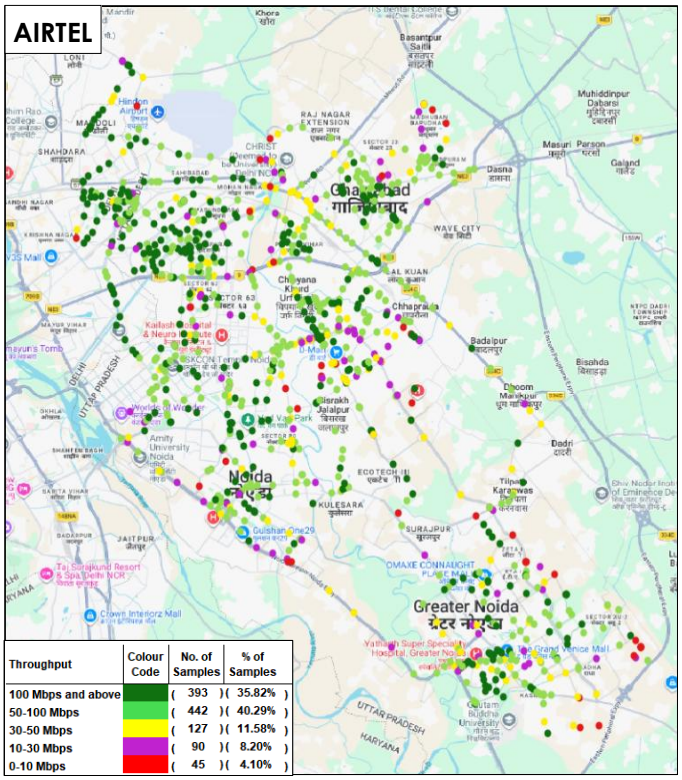


Figure-34: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

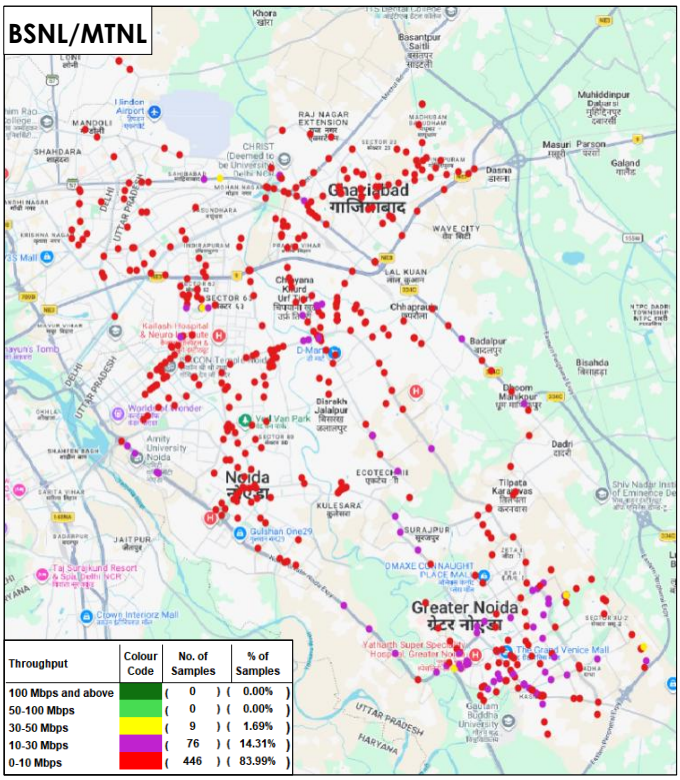


Figure-35: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - BSNL/MTNL.

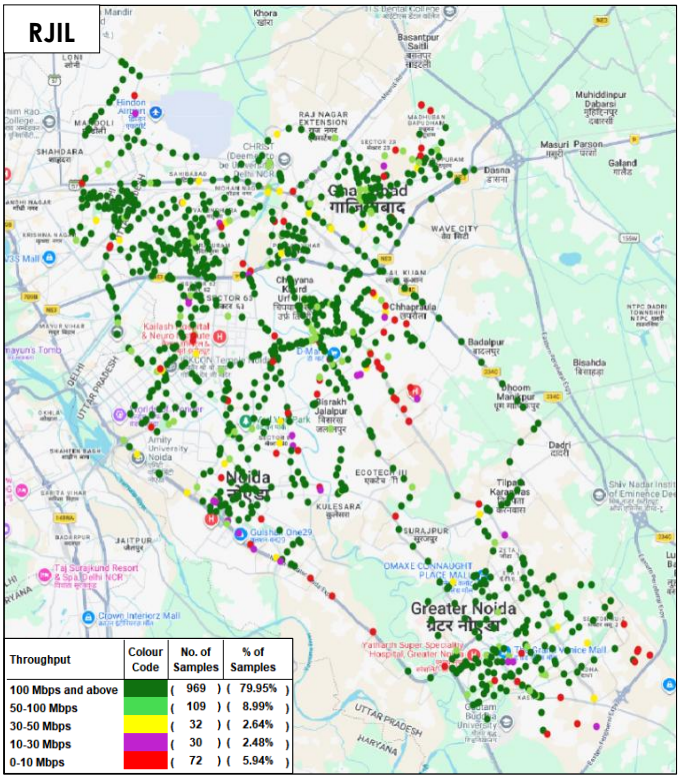


Figure-36: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

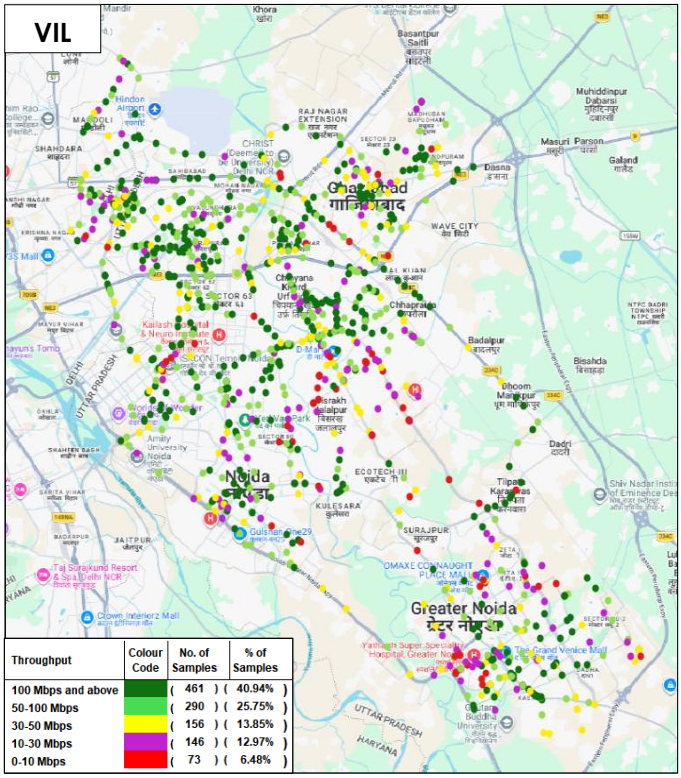


Figure-37: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.

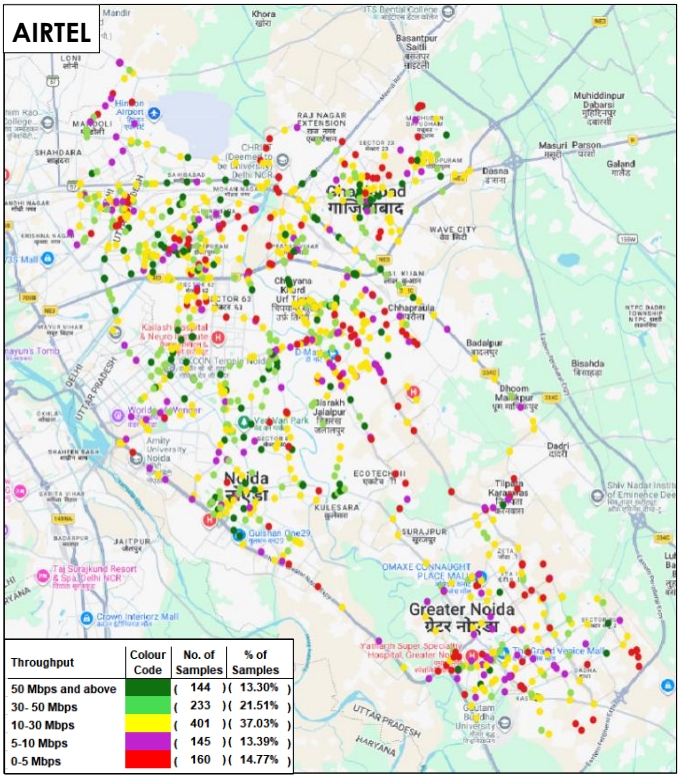


Figure-38: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

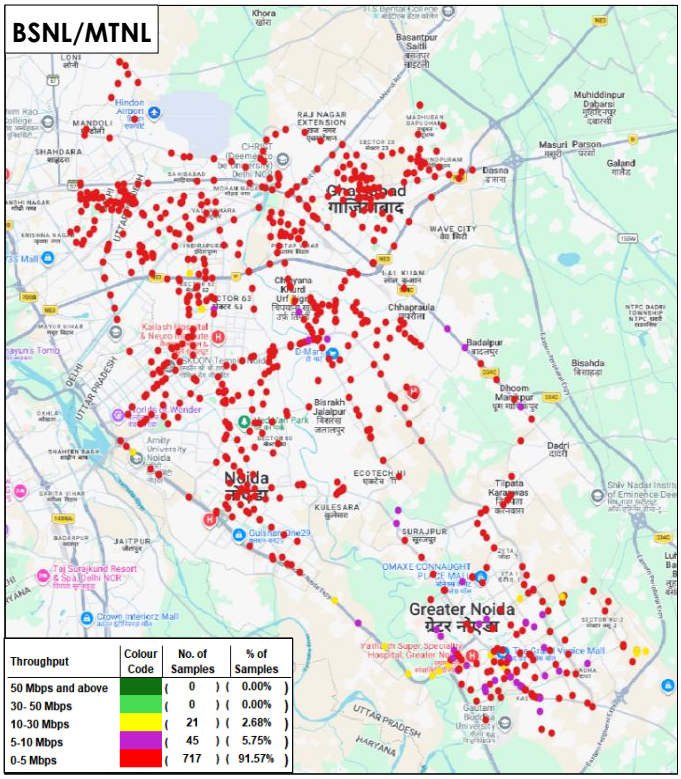


Figure-39: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - BSN/MTNL.

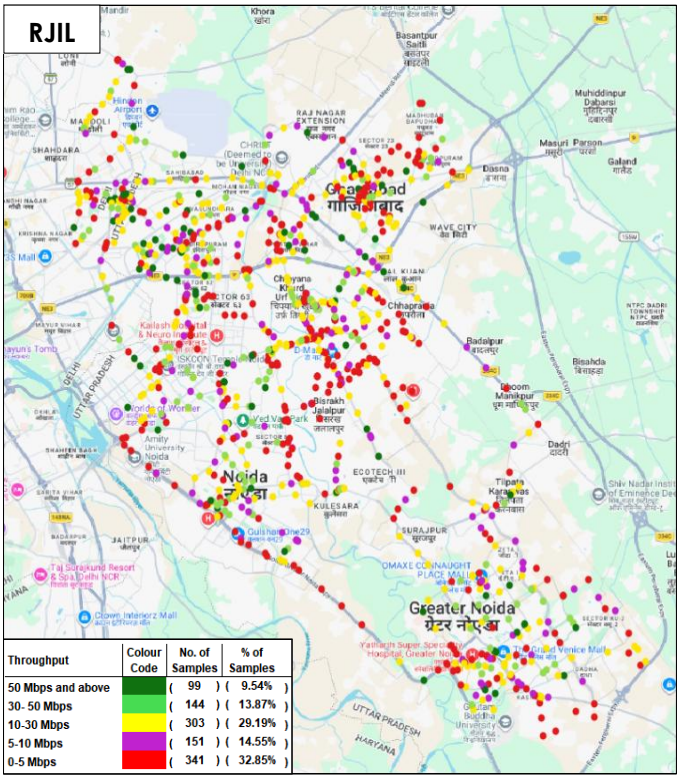


Figure-40: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) – RJIL.

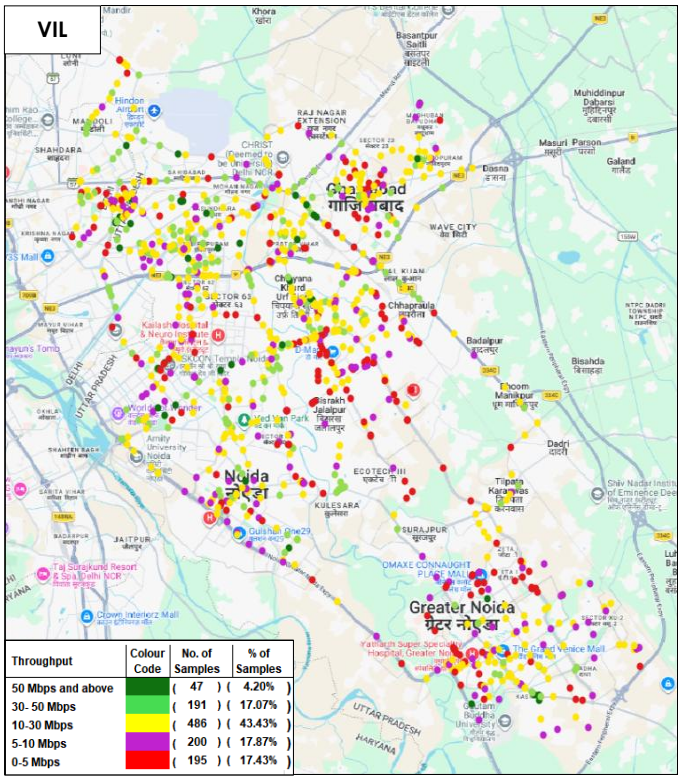


Figure-41: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) – VIL.

(b) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	BSNL/MTNL	RJIL	VIL
5G	89.01%	NA	95.70%	74.98%
4G	10.96%	17.04%	4.27%	24.98%
3G	NA	76.36%	NA	NA
2G	0.00%	3.76%	NA	0.01%
Limited Service	0.03%	2.84%	0.03%	0.03%

Table-20: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) data.

Note-

- NA**-** Service provider doesn't provide services in respective technology.

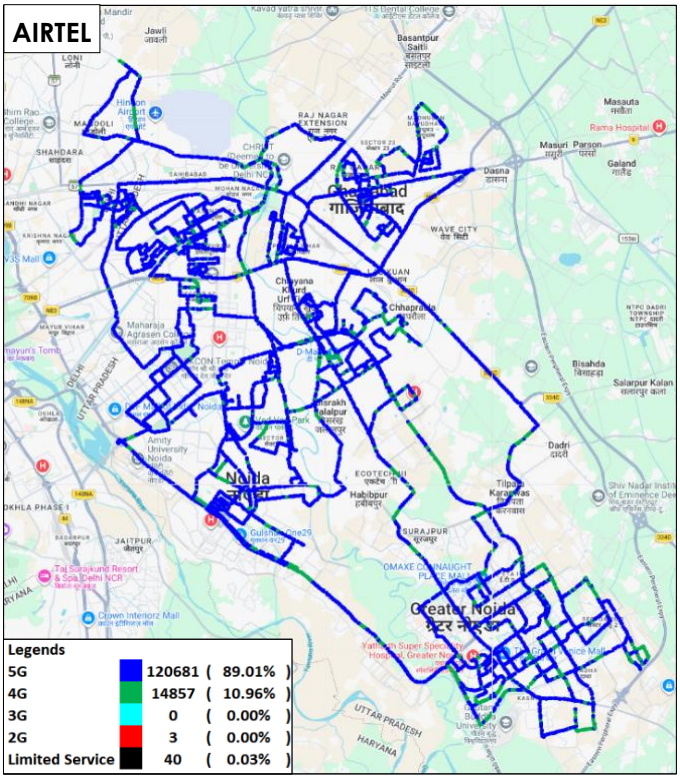


Figure-42: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

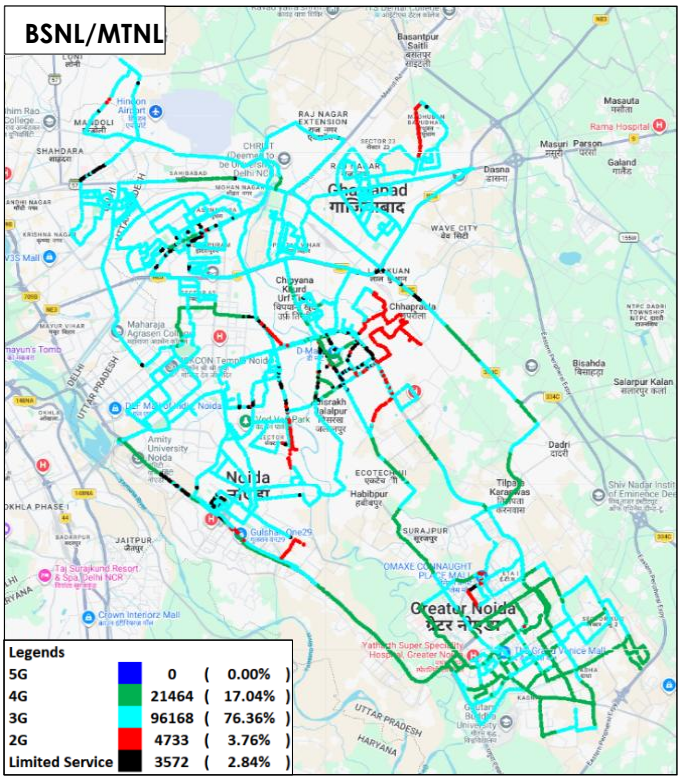


Figure-43: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data – BSNL/MTNL.

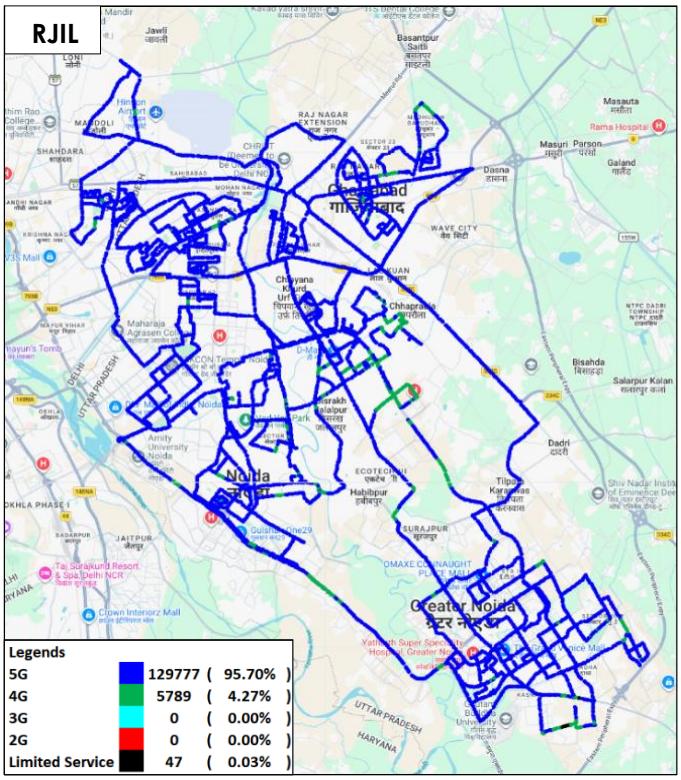


Figure-44: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

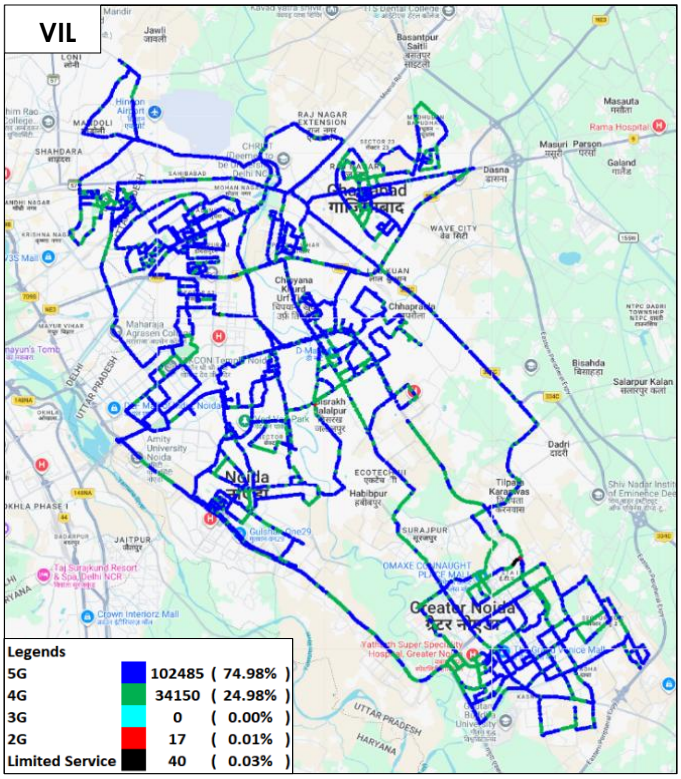


Figure-45: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-90, 91, 92 & 93 for map view)

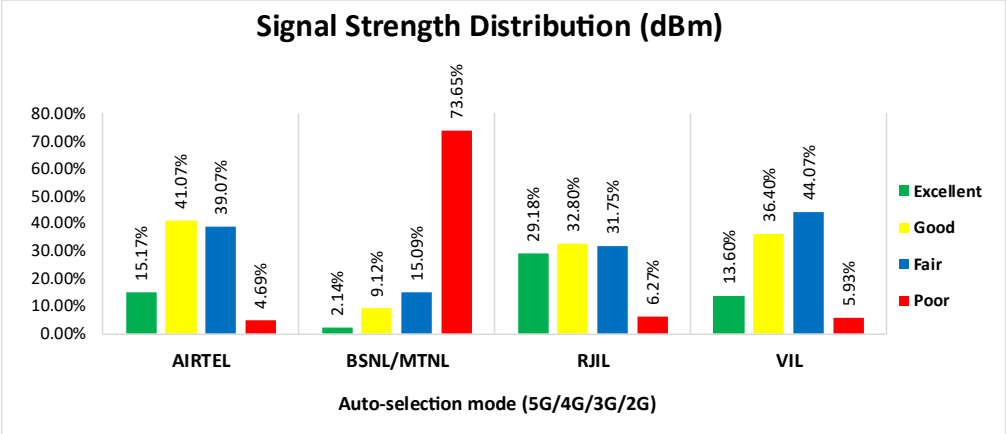


Figure-46: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 15% of samples falling in the excellent signal strength category.
- BSNL/MTNL has 2% of samples falling in the excellent signal strength category.
- RJIL has 29% of samples falling in the excellent signal strength category.
- VIL has 14% of samples falling in the excellent signal strength category.

4.3 Hotspots

Hotspot testing has been done on 5th September 2026. Eight locations have been tested in the Ghaziabad, Noida and Greater Noida. (Refer Table-1)

4.3.1 Locations

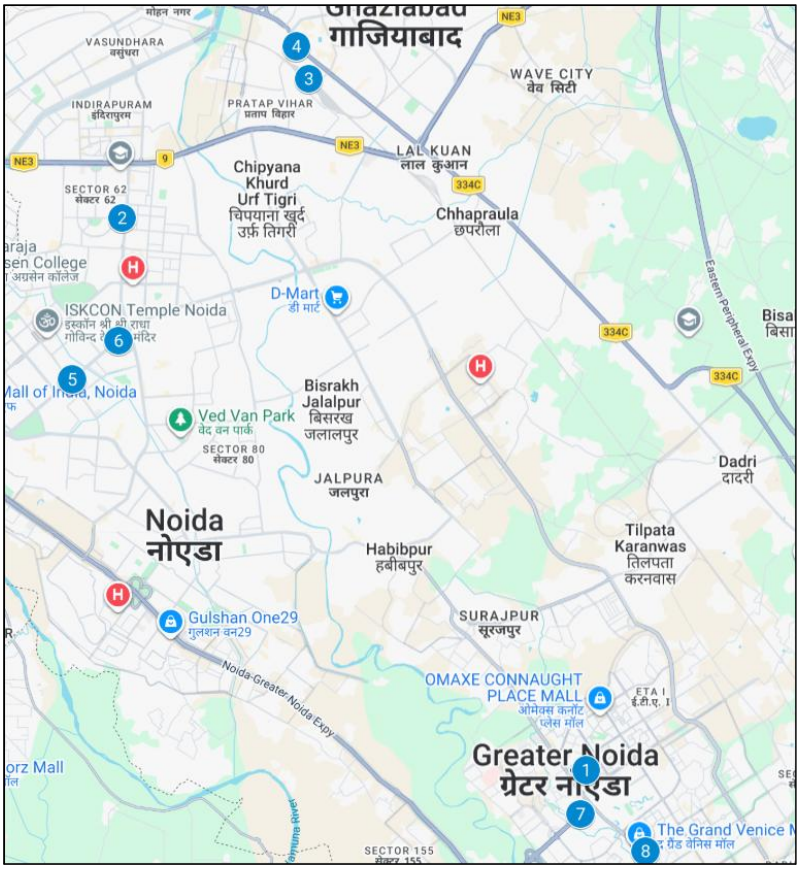


Figure- 47: Hotspot locations.

4.3.2 Hotspot covered

1. Alpha 1 Market
2. Fortis Hospital Sec-62 Noida
3. Ghaziabad Junction Railway Station
4. MMG District Hospital
5. Noida City Centre Bus Stand
6. Noida Sector 52 Metro Station
7. Pari Chowk Metro Station
8. The Grand Venice Mall

4.3.3 Voice performance

Overall Voice Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	80	80	80	80
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.36	2.56	0.52	0.53

Table-21: Overall summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Alpha 1 Market				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.35	1.84	0.52	0.54

Table-22: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

Fortis Hospital Sec-62 Noida				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.30	3.10	0.49	0.54

Table-23: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

Ghaziabad Junction Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.34	2.78	0.48	0.51

Table-24: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

MMG District Hospital				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.33	2.48	0.45	0.54

Table-25: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

Noida City Centre Bus Stand				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.48	2.95	0.62	0.50

Table-26: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

Noida Sector 52 Metro Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.44	3.14	0.53	0.55

Table-27: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

Pari Chowk Metro Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.29	2.16	0.54	0.51

Table-28: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

The Grand Venice Mall				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.40	2.00	0.54	0.54

Table-29: Summary of voice call performance in network auto-selection mode(5G/4G/3G/2G)

4.3.4 Data performance (Auto-selection mode 5G/4G/3G/2G)

Overall Data Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	82.53	5.32	211.31	72.80
Download Throughput 80th Percentile (Mbit/s)	110.83	7.60	290.52	119.50
Download Throughput 20th Percentile (Mbit/s)	36.13	1.96	149.60	25.60
Download Session Setup Success Rate %	97.50	77.50	100.00	100.00
Upload Throughput Average (Mbits/s)	25.45	2.92	14.69	24.96
Upload Throughput 80th Percentile (Mbit/s)	43.72	6.18	22.06	33.49
Upload Throughput 20th Percentile (Mbit/s)	8.17	0.00	4.90	17.09
Upload Session Setup Success Rate %	100.00	97.50	100.00	100.00
Web Browsing Delay (Second)	6.10	4.59	4.14	4.59
Youtube Initial Buffer Delay (Second)	2.31	1.88	0.91	0.84
Latency (ms) – 50th Percentile	43.06	21.68	26.81	38.49
Jitter (ms)	9.48	62.03	18.80	17.85
Packet Loss Rate%	7.10	24.44	8.95	5.64
Packet Loss Rate- 90th percentile	25.50	100.00	10.90	1.60

Table-30: Overall Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Alpha 1 Market				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	95.48	10.02	303.20	84.97
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	23.32	1.72	23.12	15.04
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.51	8.11	3.64	5.02
Youtube Initial Buffer Delay (Second)	1.27	1.66	0.72	0.65
Latency (ms) – 50th Percentile	39.38	18.49	21.25	38.11
Jitter (ms)	5.29	2.63	3.19	12.55
Packet Loss Rate%	0.80	0.20	0.10	0.10

Table-31: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Fortis Hospital Sec-62 Noida				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	44.76	1.00	312.66	13.92
Download Session Setup Success Rate %	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	11.53	1.53	14.59	5.82
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	4.80	5.99	3.80	2.86
Youtube Initial Buffer Delay (Second)	2.14	-	0.74	2.19
Latency (ms) – 50th Percentile	51.26	-	25.47	500.13
Jitter (ms)	27.57	-	9.01	47.81
Packet Loss Rate%	16.70	100.00	0.00	43.10

Table-32: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Youtube & Ping tests were failed.

Ghaziabad Junction Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	94.61	2.18	214.85	27.99
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	34.83	0.55	26.86	22.65
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.39	4.31	3.65	2.74
Youtube Initial Buffer Delay (Second)	1.28	-	0.68	0.73
Latency (ms) – 50th Percentile	52.76	25.33	21.38	37.44
Jitter (ms)	11.01	114.24	17.98	7.78
Packet Loss Rate%	0.10	5.70	1.20	0.80

Table-33: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Youtube tests were failed.

MMG District Hospital				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	62.24	-	222.86	160.26
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	5.16	0.00	9.22	31.36
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.54	-	3.88	6.59
Youtube Initial Buffer Delay (Second)	6.29	-	0.74	0.73
Latency (ms) – 50th Percentile	42.45	-	27.18	38.87
Jitter (ms)	7.68	-	8.82	7.30
Packet Loss Rate%	0.80	81.80	0.10	0.10

Table-34: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Respective tests were failed.

Noida City Centre Bus Stand				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	211.18	5.28	209.71	73.26
Download Session Setup Success Rate%	100.00	40.00	100.00	100.00
Upload Throughput Average (Mbits/s)	47.75	0.30	25.97	35.28
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.31	9.69	3.38	4.04
Youtube Initial Buffer Delay (Second)	2.44	-	0.82	0.60
Latency (ms)- 50th Percentile	43.13	25.38	34.33	32.56
Jitter (ms)	7.51	235.54	5.60	6.45
Packet Loss Rate%	0.10	6.10	0.20	0.10

Table-35: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Youtube tests were failed.

Noida Sector 52 Metro Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	78.12	4.30	211.53	37.89
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	60.48	2.60	3.79	31.32
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.31	1.90	5.12	4.80
Youtube Initial Buffer Delay (Second)	1.87	1.53	1.71	0.70
Latency (ms) – 50th Percentile	33.66	14.90	47.57	39.89
Jitter (ms)	2.29	13.73	52.10	6.55
Packet Loss Rate%	0.10	0.50	7.50	0.10

Table-36: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Pari Chowk Metro Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	36.15	9.71	206.20	94.59
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	12.38	7.62	3.17	24.71
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.27	5.14	6.77	4.95
Youtube Initial Buffer Delay (Second)	0.78	1.10	1.17	0.73
Latency (ms)- 50th Percentile	66.15	19.58	42.82	34.40
Jitter (ms)	6.02	2.22	34.91	47.31
Packet Loss Rate%	0.50	0.10	8.50	0.50

Table-37: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

The Grand Venice Mall				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	26.52	3.25	9.43	82.54
Download Session Setup Success Rate%	80.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	8.14	8.72	13.67	33.50
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.49	3.34	2.93	4.80
Youtube Initial Buffer Delay (Second)	2.42	3.04	1.02	0.64
Latency (ms)- 50th Percentile	44.03	26.08	-	39.20
Jitter (ms)	8.48	3.80	-	7.03
Packet Loss Rate%	37.70	1.10	54.00	0.30

Table-38: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Ping tests were failed.

4.3.5 Data performance (5G Only & 4G Only Download & Upload Speed)

Overall Data Performance					
Parameters		**Service Provider**			
		AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	72.82	-	178.81	103.85
	Upload Throughput Average (Mbits/s)	24.71	-	11.11	25.85
4G	**Download Throughput Average (Mbits/s)**	31.81	8.46	42.37	33.15
	Upload Throughput Average (Mbits/s)	12.43	8.11	11.26	9.21

Table-39: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Alpha 1 Market					
Parameters		**Service Provider**			
		AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	73.19	-	315.95	170.82
	Upload Throughput Average (Mbits/s)	20.71	-	23.76	22.28
4G	**Download Throughput Average (Mbits/s)**	41.89	10.87	39.87	40.20
	Upload Throughput Average (Mbits/s)	9.64	7.99	12.03	11.83

Table-40: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Fortis Hospital Sec-62 Noida					
Parameters		**Service Provider**			
		AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	29.29	-	265.25	78.66
	Upload Throughput Average (Mbits/s)	10.71	-	14.22	9.78
4G	**Download Throughput Average (Mbits/s)**	37.43	-	53.16	46.73
	Upload Throughput Average (Mbits/s)	9.61	-	4.15	10.87

Table-41: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Ghaziabad Junction Railway Station					
Parameters		Service Provider			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	118.46	-	200.02	68.55
	Upload Throughput Average (Mbits/s)	39.62	-	25.05	20.31
4G	Download Throughput Average (Mbits/s)	20.77	-	15.02	12.18
	Upload Throughput Average (Mbits/s)	16.32	-	8.21	17.76

Table-42: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

MMG District Hospital					
Parameters		Service Provider			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	63.95	-	198.60	148.73
	Upload Throughput Average (Mbits/s)	9.48	-	8.20	30.88
4G	Download Throughput Average (Mbits/s)	79.35	-	21.65	36.09
	Upload Throughput Average (Mbits/s)	19.26	-	4.82	13.91

Table-43: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Noida City Centre Bus Stand					
Parameters		Service Provider			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	162.24	-	279.36	75.59
	Upload Throughput Average (Mbits/s)	44.00	-	36.52	27.50
4G	Download Throughput Average (Mbits/s)	6.34	-	38.10	55.27
	Upload Throughput Average (Mbits/s)	6.59	-	12.77	3.82

Table-44: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Noida Sector 52 Metro Station					
Parameters		Service Provider			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	68.23	-	142.51	45.04
	Upload Throughput Average (Mbits/s)	52.15	-	3.19	35.13
4G	Download Throughput Average (Mbits/s)	44.74	-	24.30	37.72
	Upload Throughput Average (Mbits/s)	23.44	-	19.52	3.80

Table-45: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Pari Chowk Metro Station					
Parameters		Service Provider			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	25.14	-	18.66	65.05
	Upload Throughput Average (Mbits/s)	12.61	-	2.13	29.05
4G	Download Throughput Average (Mbits/s)	8.15	11.39	108.85	21.76
	Upload Throughput Average (Mbits/s)	13.33	9.13	24.19	6.03

Table-46: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

The Grand Venice Mall					
Parameters		Service Provider			
		AIRTEL	BSNL/ MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	42.08	-	10.15	191.79
	Upload Throughput Average (Mbits/s)	8.36	-	13.15	31.90
4G	Download Throughput Average (Mbits/s)	15.78	3.12	38.04	15.25
	Upload Throughput Average (Mbits/s)	1.28	7.21	3.96	5.67

Table-47: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

4.4 Walk Test

Walk Test has been conducted on 5th September 2026. Three locations have been tested in the Ghaziabad and Noida. (Refer Table-1)

4.4.1 Walk test locations

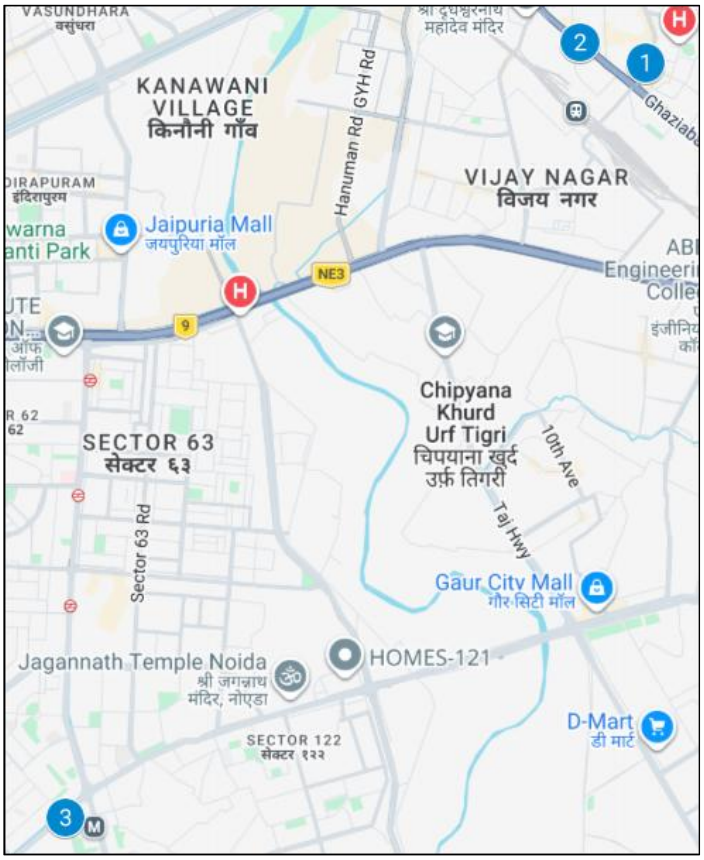


Figure-48: Walk Test locations.

4.4.2 Walk Test Covered

1. Gandhi Nagar Market Ghaziabad
2. Ghaziabad Ghantaghar Market Including Turav Nagar Market
3. Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas

4.4.3 Voice Performance

Gandhi Nagar Market Ghaziabad				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	12	12	12	12
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.42	2.98	0.51	0.49

Table-48: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Ghaziabad Ghantaghar Market Including Turav Nagar Market				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	15	15	15	16
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.42	2.80	0.54	0.51

Table-49: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/MTNL**	**RJIL**	**VIL**
Call Attempt	17	17	17	16
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.00	2.74	0.75	0.57

Table-50: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

4.4.4 Data Performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Gandhi Nagar Market Ghaziabad				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	86.56	1.62	291.11	116.40
Download Session Setup Success Rate %	100.00	20.00	100.00	100.00
Upload Throughput Average (Mbits/s)	73.40	0.36	15.96	37.84
Upload Session Setup Success Rate %	100.00	28.57	100.00	100.00
Latency (ms) – 50th Percentile	35.03	-	27.68	39.25

Table-51: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Ping tests were failed.

Ghaziabad Ghantaghar Market Including Turav Nagar Market				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	87.58	3.16	287.25	141.00
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	25.78	2.29	23.08	36.63
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms) – 50th Percentile	39.39	20.72	25.06	40.43

Table-52: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL/ MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	68.21	4.36	73.69	71.23
Download Session Setup Success Rate %	92.31	100.00	61.54	100.00
Upload Throughput Average (Mbits/s)	24.70	2.41	2.01	35.96
Upload Session Setup Success Rate %	91.67	100.00	66.67	100.00
Latency (ms) – 50th Percentile	36.27	16.55	24.10	40.12

Table-53: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

4.5 City Route

Drive test has been conducted on 4th September 2026 covering one route. (Refer Table-1)

4.5.1 Drive test route



Figure-49: Drive test route.

4.5.2 Routes Covered

Noida Sector 121 to World Trade Centre.

4.5.3 Voice performance

(a) Voice Call Performance in 3G/2G network mode only: 3G/2G network mode testing has been done to reflect the experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	MTNL	VIL
Call Attempts	25	31	25
Call Setup Success Rate %	100.00	74.19	100.00
Drop Call Rate %	4.00	21.74	0.00
Call Setup Time-Average (Second)	2.85	3.57	2.84
Handover Success Rate %	92.08	100.00	95.92

Table-54: Summary of voice call performance in 3G/2G network mode only.

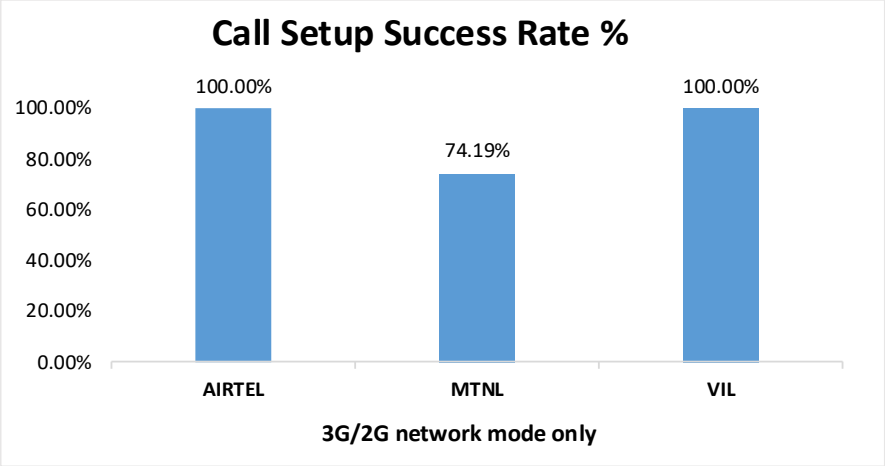


Figure-50: Performance for call setup success rate.

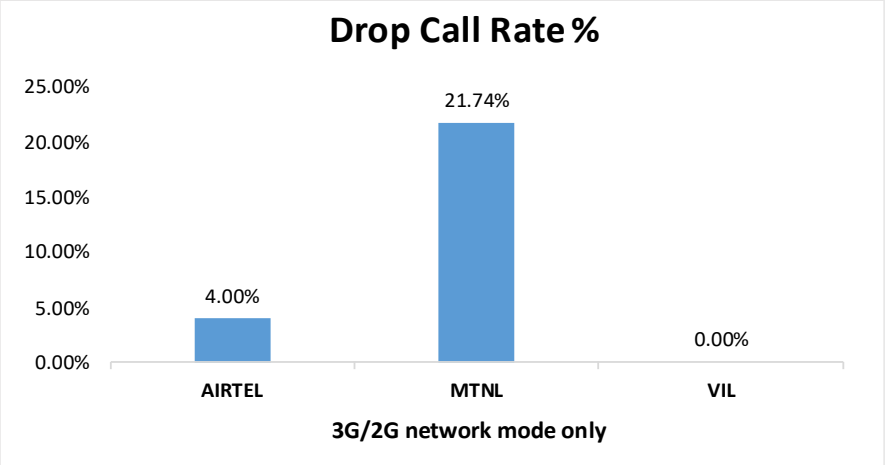


Figure-51: Performance for drop call rate.

(b) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider		
	AIRTEL	**MTNL**	**VIL**
3G	NA	100.00%	NA
2G	100.00%	0.00%	100.00%
Limited Service	0.00%	0.00%	0.00%

Table-55: Time spent on technology during drive test 3G/2G network mode only.

Note-

- NA**-** Service provider doesn't provide services in respective technology.



Figure-52: Serving technology plots 3G/2G network mode - AIRTEL.



Figure-53: Serving technology plots 3G/2G network mode - MTNL.



Figure-54: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure-94, 95 & 96 for map view)

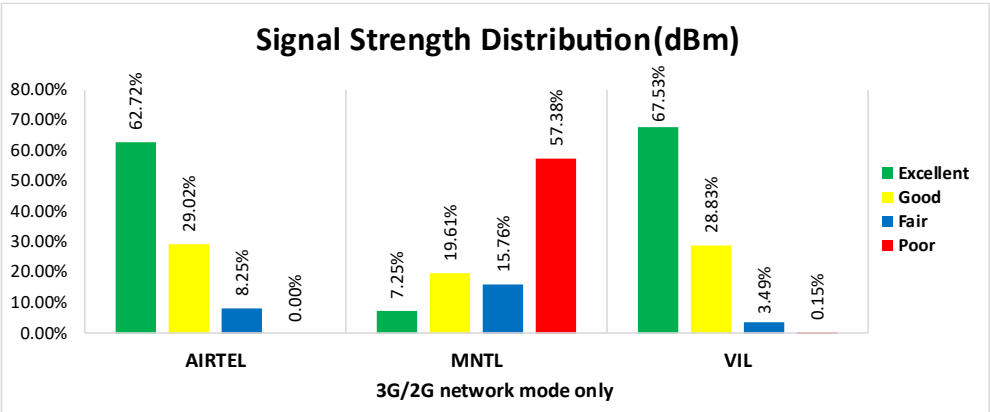


Figure-55: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 63% of samples falling in the excellent signal strength category.
- MTNL has 7% of samples falling in the excellent signal strength category.
- VIL has 68% of samples falling in the excellent signal strength category.

(d) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempts	25	31	26	26
Call Setup Success Rate %	100.00	74.19	100.00	100.00
Drop Call Rate %	0.00	26.09	0.00	0.00
Call Setup Time Average (Second)	0.94	4.01	0.64	0.54
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-56: Summary of voice call performance in network auto-selection mode.

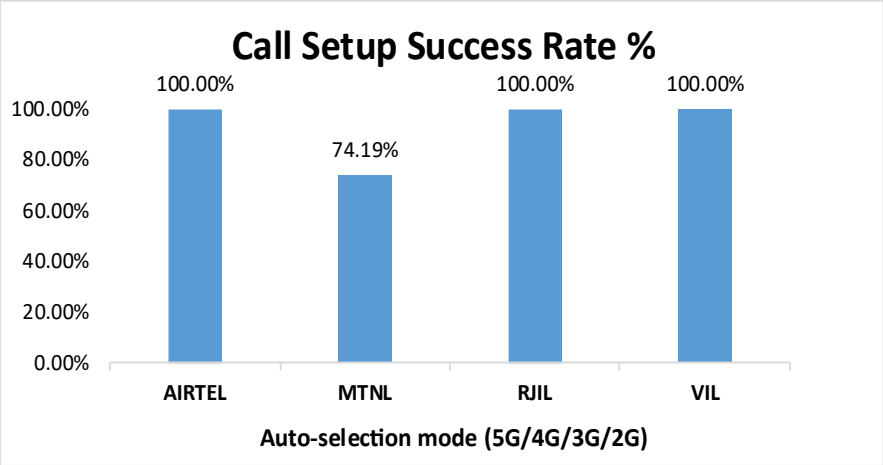


Figure-56: Performance for call setup success rate.

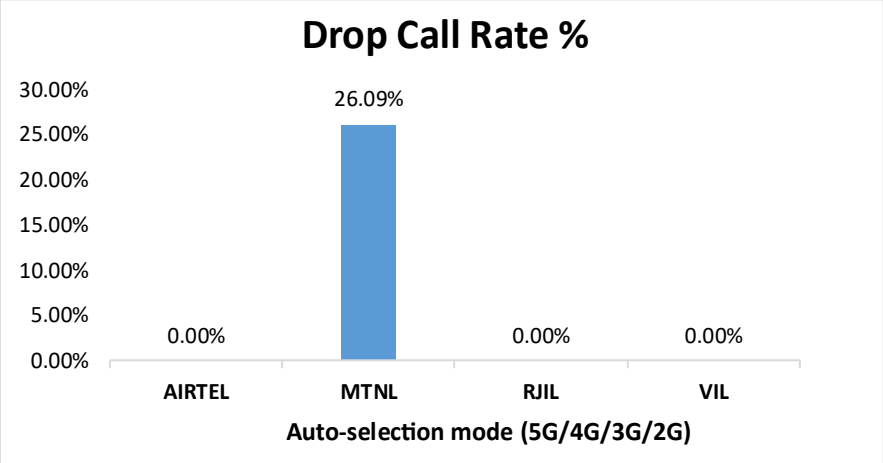


Figure-57: Performance for drop call rate.



Figure-58: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - MTNL.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G – Open Mode)			
	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider Network)	24	17	21	24
Number of silence call for >4 Sec	0	NA	0	0
Silence Call Rate %	0.00	NA	0.00	0.00
Number of silence instances for >4 Sec	0	NA	0	0
Number of silence instances for >3 Sec	0	NA	0	0
Number of silence instances for >2 sec	0	NA	4	0
RTP Jitter (4G & 5G) in ms	5.27	NA	11.16	18.40
Packet loss Rate Downlink %	0.91	NA	2.01	2.25
Packet loss Rate Uplink %	0.88	NA	1.54	2.06

Table-57: Summary of silence instances & packet loss rate for mobile to mobile call.

Note-
- NA- Due to unavailability of packet switched (VoLTE & VoNR) network in MTNL silence instances are not captured.

(e) Mean Opinion Score (MOS) performance for speech quality:

Mean opinion score indicate quality of speech observed during the drive test across different technologies. This parameter has been calculated for mobile to mobile calls made within same operator network in auto mode (5G/4G/3G/2G). As per ITU-T Recommendation P.863.1, MOS values means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
Total Number of MOS Samples for calls in table-57	155	102	139	166
Speech Quality (Average MOS)	3.90	2.67	4.31	4.25
Number of samples with MOS >=4 to <5 (Excellent)	114	0	111	133
Number of samples with MOS >=3 to <4 (Good)	32	46	16	15
Number of samples with MOS >=2 to <3 (Fair)	4	38	7	6
Number of samples with MOS >=1 to <2 (Poor)	5	18	5	12
%age of samples with MOS >=4 to <5 (Excellent)	73.55%	0.00%	79.86%	80.12%
%age of samples with MOS >=3 to <4 (Good)	20.65%	45.10%	11.51%	9.04%
%age of samples with MOS >=2 to <3 (Fair)	2.58%	37.25%	5.04%	3.61%
%age of samples with MOS >=1 to <2 (Poor)	3.23%	17.65%	3.60%	7.23%

Table-58: Summary of speech quality (MOS) samples.

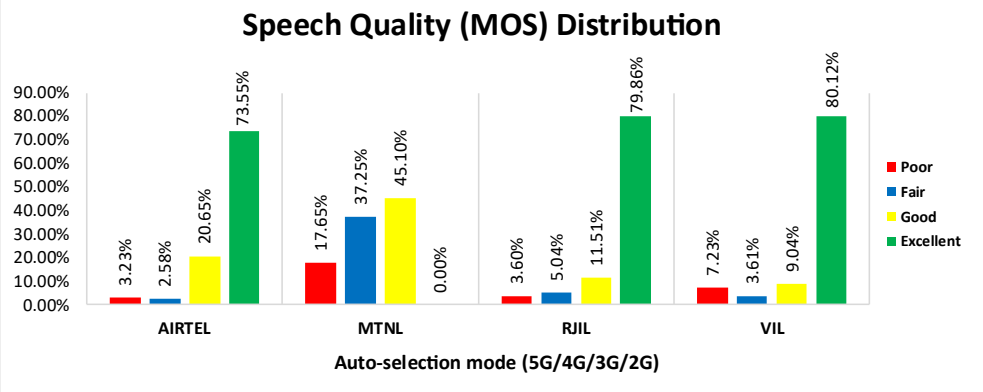


Figure-59: Distribution of samples in MOS range.

(f) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	19.32%	NA	95.25%	0.91%
4G	80.68%	NA	4.75%	99.09%
3G	NA	100.00%	NA	NA
2G	0.00%	0.00%	NA	0.00%
Limited Service	0.00%	0.00%	0.00%	0.00%

Table-59: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) voice.

Note-

- NA- Service provider doesn't provide services in respective technology.



Figure-60: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.



Figure-61: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - MTNL.



Figure-62: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.



Figure-63: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-97, 98, 99 & 100 for map view)

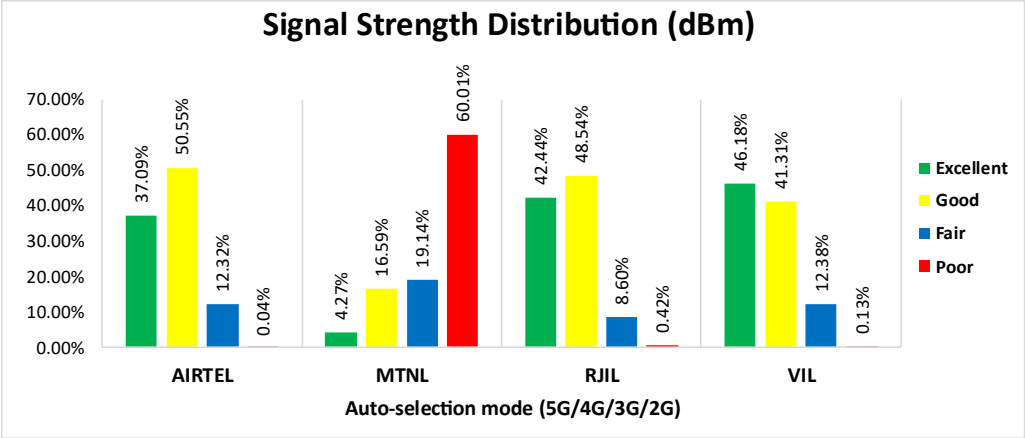


Figure-64: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 37% of samples falling in the excellent signal strength category.
- MTNL has 4% of samples falling in the excellent signal strength category.
- RJIL has 42% of samples falling in the excellent signal strength category.
- VIL has 46% of samples falling in the excellent signal strength category.

(h) Coverage Gap observed

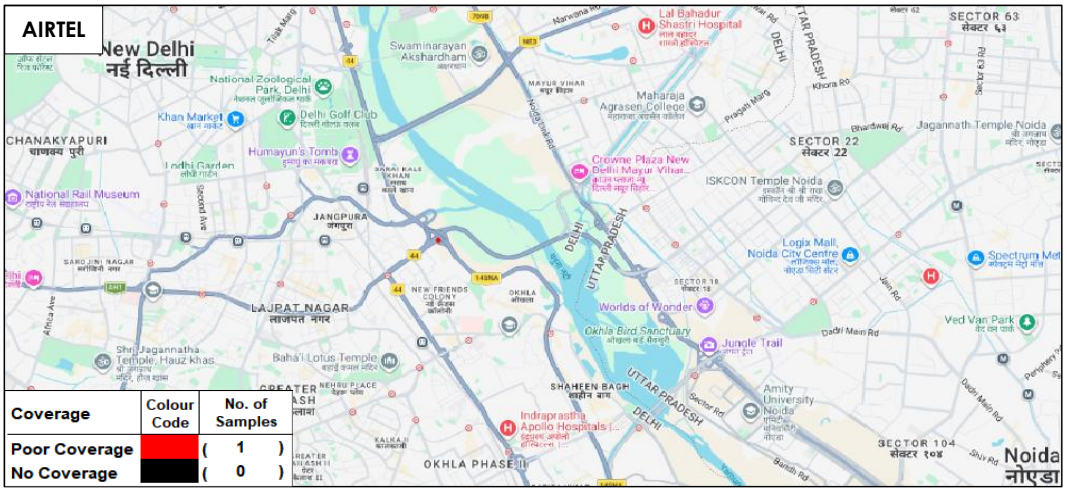


Figure-65: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

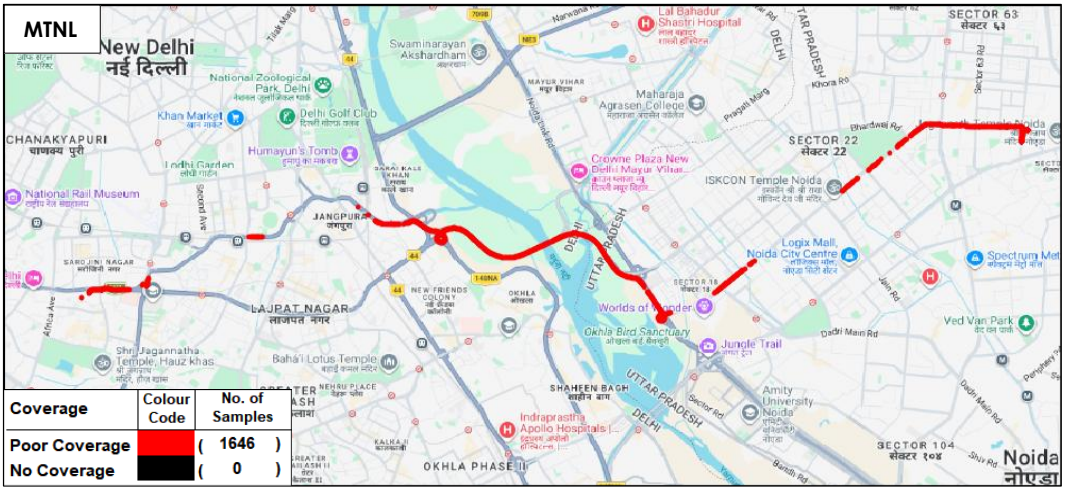


Figure-66: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - MTNL.

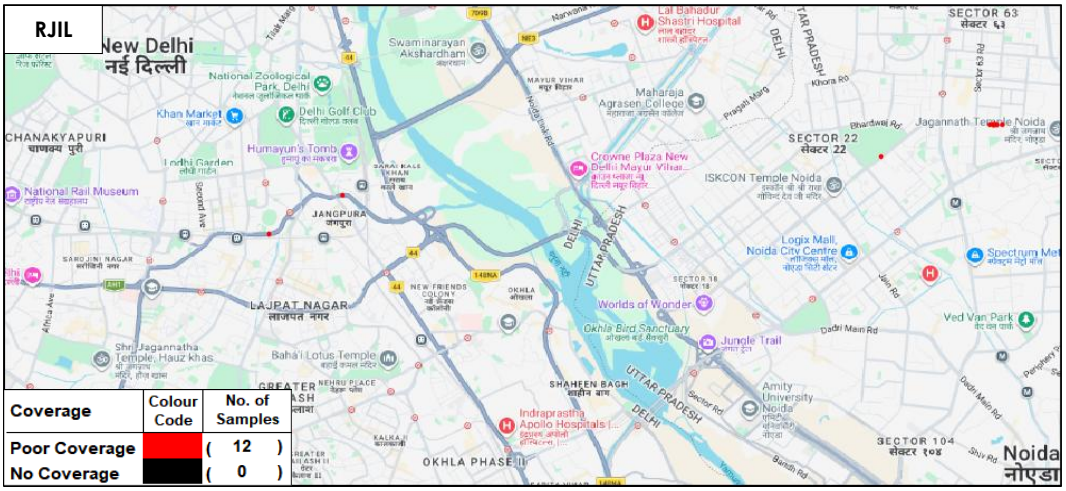


Figure-67: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

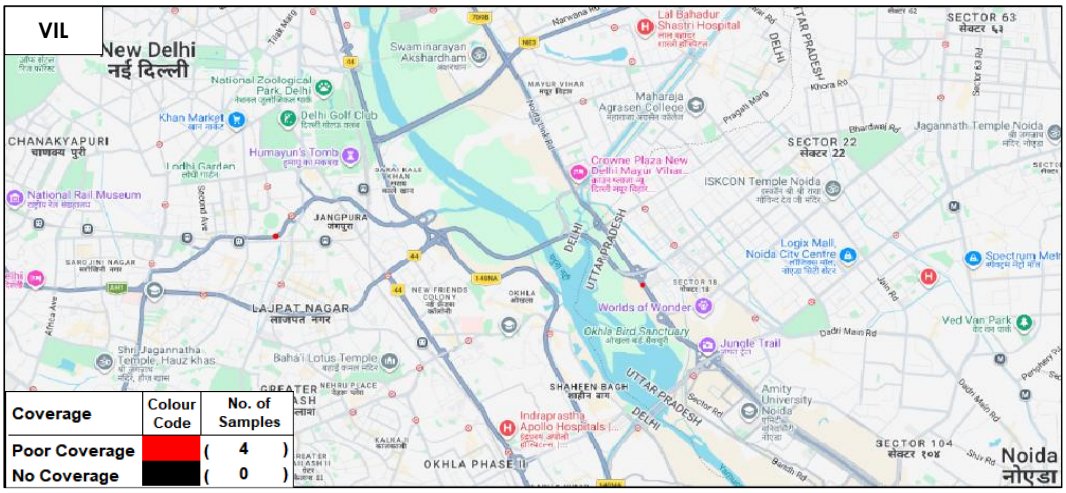


Figure-68: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - VIL.

4.5.4 Data performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	MTNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	175.41	3.39	346.84	129.86
	80th Percentile	227.38	3.95	561.15	232.97
	20th Percentile	89.65	1.18	124.69	44.04
Upload Throughput (Mbits/s)	Average	19.29	1.02	27.94	29.08
	80th Percentile	33.12	1.62	43.27	47.77
	20th Percentile	5.87	0.00	7.15	6.86
Latency (ms)	50th Percentile	35.18	19.50	22.36	42.99

Table-60: Summary of Data performance in network auto-selection mode.

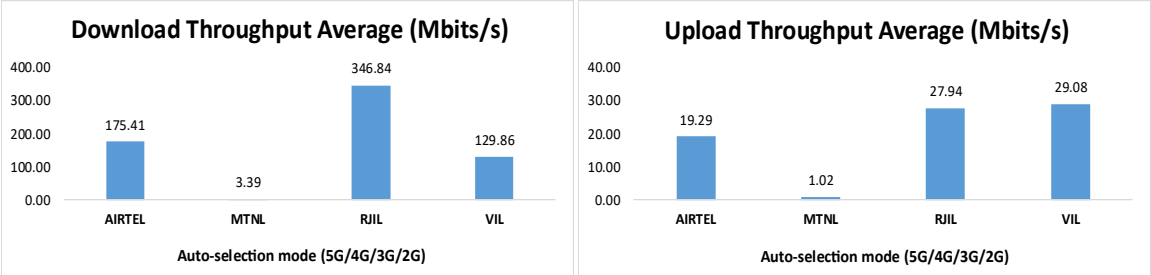


Figure-69: Download & Upload throughput.



Figure-70: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

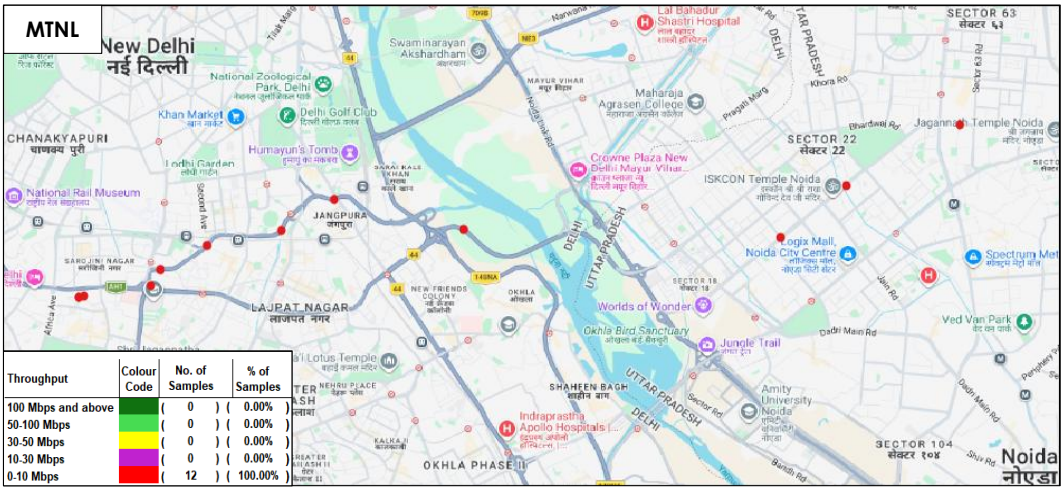


Figure-71: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - MTNL.

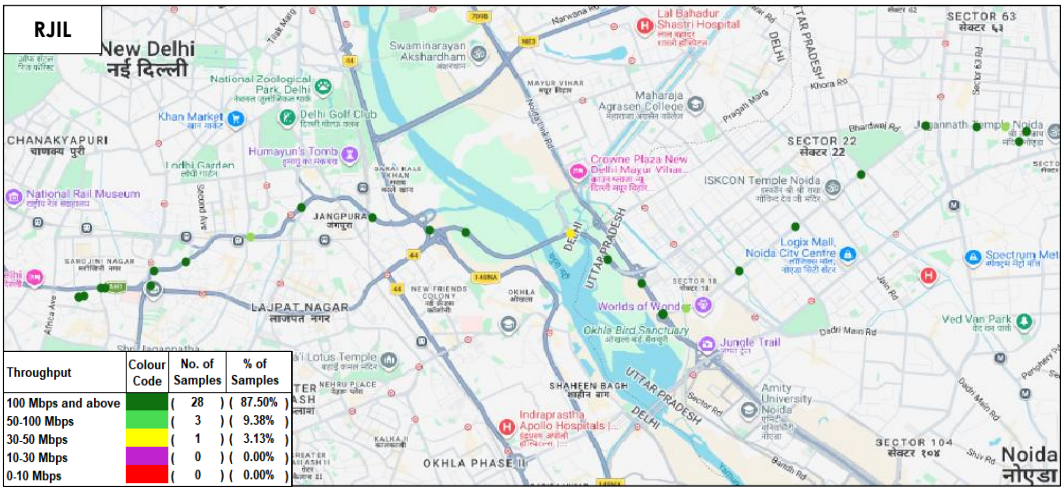


Figure-72: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

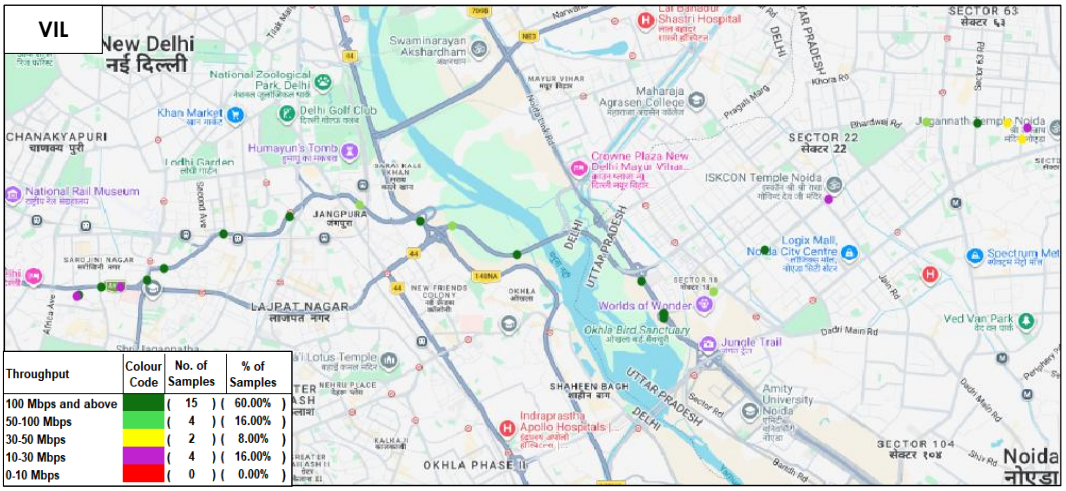


Figure-73: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.

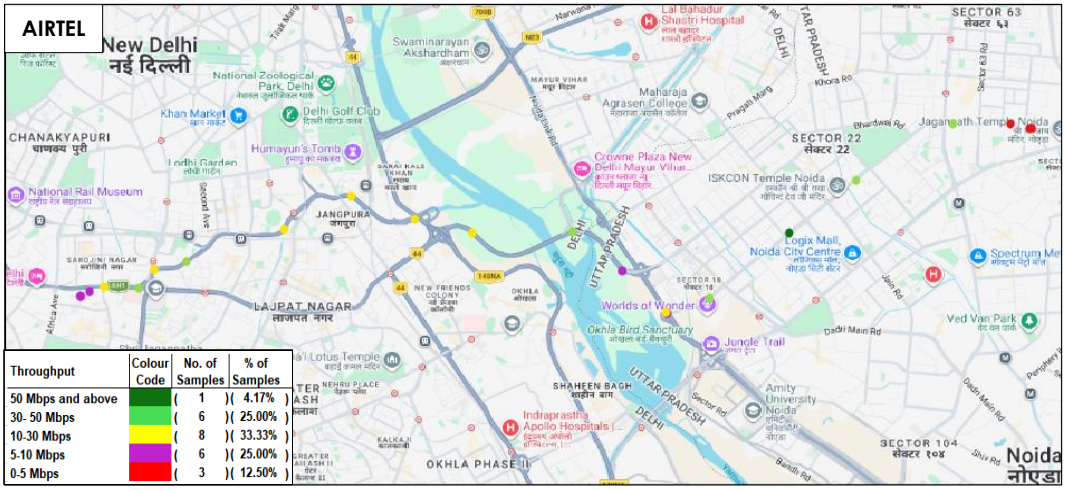


Figure-74: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.



Figure-75: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - MTNL.



Figure-76: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

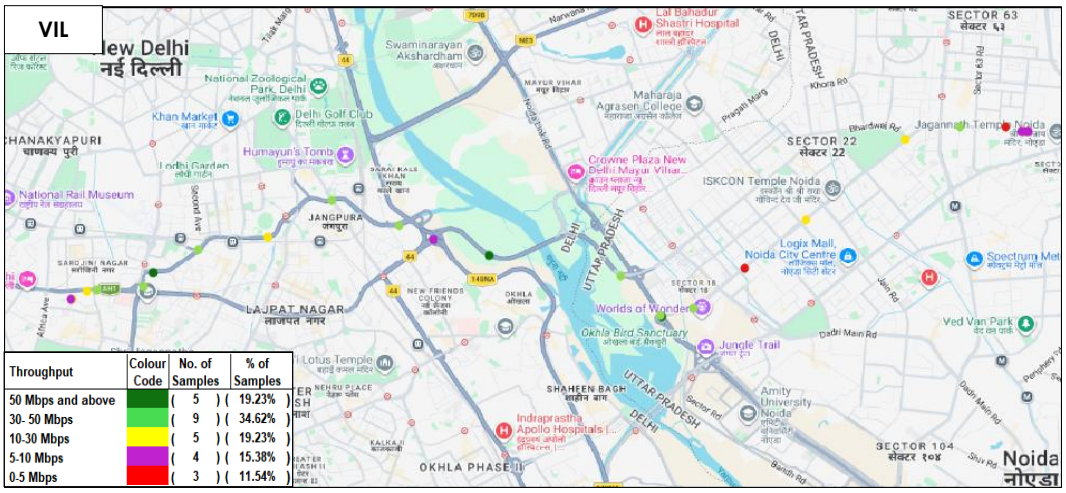


Figure-77: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.

(b) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
5G	96.76%	NA	100.00%	87.55%
4G	3.24%	NA	0.00%	12.45%
3G	NA	94.27%	NA	NA
2G	0.00%	0.13%	NA	0.00%
Limited Service	0.00%	5.60%	0.00%	0.00%

Table-61: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) data.

Note-

- NA- Service provider doesn't provide services in respective technology.



Figure-78: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.



Figure-79: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - MTNL.



Figure-80: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.



Figure-81: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-101, 102, 103 & 104 for map view)

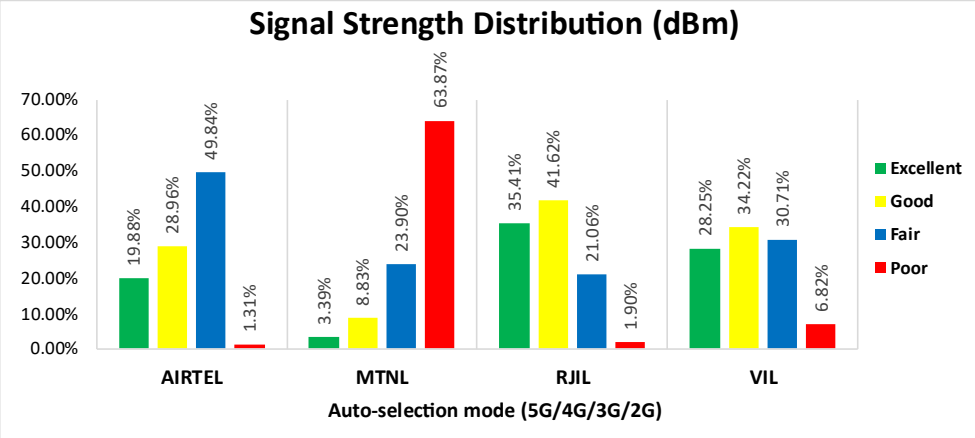


Figure-82: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 20% of samples falling in the excellent signal strength category.
- MTNL has 3% of samples falling in the excellent signal strength category.
- RJIL has 35% of samples falling in the excellent signal strength category.
- VIL has 28% of samples falling in the excellent signal strength category.

5. Voice & Data Key findings

5.1 Overall Voice

1. **Call Setup Success Rate:**
   a) Airtel, BSNL/MTNL and VIL have 98.86%, 58.20% and 94.59% call setup success rate respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL/MTNL, RJIL and VIL have 99.61%, 83.14%, 99.46% and 100.00% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

   c) Airtel, RJIL and VIL have 100.00% call setup success rate while calling on peer service provider's network for inter-operator calls. (refer table-9)

   d) BSNL had a 100.00% call setup success rate when calling Airtel and RJIL while call blocking was observed when calling on VIL. (refer table-9)

2. **Call Setup Time**:
   a) Airtel, BSNL/MTNL and VIL call setup time is 2.92, 3.75 & 3.00 seconds respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL/MTNL, RJIL & VIL call setup time is 0.48, 3.84, 0.63 & 0.60 seconds respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. **Call Silence/Mute Rate**: In packet switched network (4G/5G) RJIL, BSNL/MTNL, Airtel and VIL have 2.71%, 0.56%, 0.36% & 0.00% silence call rate respectively. Further BSNL/MTNL has higher RTP packet loss rate in downlink (3.22%) compared to RJIL (2.53%) Airtel (1.00%) & VIL (0.79%). In uplink the RTP packet loss rate is higher for BSNL/MTNL (3.56%) compared to RJIL (2.57%) Airtel (1.12%) & VIL (0.83%). (refer table-6)

4. **Drop Call Rate**:
   a) Airtel, BSNL/MTNL and VIL drop call rate is 0.89%, 12.69% and 1.43% respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL/MTNL, RJIL and VIL drop call rate is 0.70%, 14.70%, 1.08% and 0.15% respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

5.2 Overall Data

1. **Data download and upload performance (Overall i.e. LSA):**
   a) Airtel, BSNL/MTNL, RJIL and VIL average download speeds are 113.61 Mbps, 5.34 Mbps, 249.49 Mbps and 94.92 Mbps respectively. (refer table-11)

   b) Airtel, BSNL/MTNL, RJIL and VIL average upload speeds are 25.50 Mbps, 1.77 Mbps, 18.68 Mbps and 19.89 Mbps respectively. (refer table-11)

2. **Data download and upload performance (static i.e. while stationary):**
   a) Airtel, BSNL/MTNL, RJIL and VIL average download speeds are 82.53 Mbps, 5.32 Mbps, 211.31 Mbps and 72.80 Mbps respectively. (refer table-30)

   b) Airtel, BSNL/MTNL, RJIL and VIL average upload speeds are 25.45 Mbps, 2.92 Mbps, 14.69 Mbps and 24.96 Mbps respectively. (refer table-30)

3. **Data session setup success rate (static i.e. while stationary):**
   a) Airtel, BSNL/MTNL, RJIL and VIL have 97.50%, 77.50%, 100.00% and 100.00% download session setup success rate respectively. (refer table-30)

b) Airtel, BSNL/MTNL, RJIL and VIL have 100.00%, 97.50%, 100.00% and 100.00% upload session setup success rate respectively. (refer table-30)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 98.86% call setup success rate and 0.89% drop call rate have been observed in 3G/2G network mode for LSA. (refer table-3)
- 99.61% call setup success rate and 0.70% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)
- 98.83% call setup success rate and 0.82% drop call rate have been observed in 3G/2G network mode for city drive. (refer table-13)
- 99.56% call setup success rate and 0.79% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (refer table-15)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-21)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at all walk test locations. (refer table-48, 49 & 50)
- 100.00% call setup success rate and 4.00% drop call rate have been observed in 3G/2G network mode for Airport route. (refer table-54)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Airport route (refer table-56)

Data

- Airtel has 113.61 Mbps average download speed & 25.50 Mbps average upload speed for LSA. (refer table-11)
- Airtel has 114.38 Mbps average download speed & 25.11 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- All hotspot locations have less download speed (less than 100 Mbps) except Noida City Centre Bus Stand for auto-selection mode (5G/4G/3G/2G). (refer table-31, 32, 33, 34, 36, 37 & 38)
- Fortis Hospital Sec-62 Noida, MMG District Hospital, Pari Chowk Metro Station and The Grand Venice Mall have less upload speed (less than 20 Mbps) out of total 8 hotspots locations for auto-selection mode (5G/4G/3G/2G). (refer table-32, 34, 37 & 38)
- All walk test locations have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 51, 52 & 53)
- Airtel has 175.41 Mbps average download speed & 19.29 Mbps average upload speed across the measured routes for Airport route. (refer table-60)

2. BSNL/MTNL:

Voice

- 58.20% call setup success rate and 12.69% drop call rate have been observed in 3G/2G network mode for LSA. (refer table-3)

- 83.14% call setup success rate and 14.70% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 57.89% call setup success rate and 12.47% drop call rate have been observed in 3G/2G network mode for city drive. (refer table-13)

- 81.76% call setup success rate and 16.15% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (refer table-15)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-21)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at all walk test locations. (refer table-48, 49 & 50)

- 74.19% call setup success rate and 21.74% drop call rate have been observed in 3G/2G network mode for Airport route. (refer table-54)

- 74.19% call setup success rate and 26.09% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Airport route. (refer table-56)

Data

- BSNL/MTNL has 5.34 Mbps average download speed & 1.77 Mbps average upload speed for LSA. (refer table-11)

- BSNL/MTNL has 5.49 Mbps average download speed & 1.72 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- All hotspot locations have less download speed (less than 10 Mbps) except Alpha 1 Market for auto-selection mode (5G/4G/3G/2G). (refer table-32, 33, 34, 35, 36, 37 & 38)

- Alpha 1 Market, Fortis Hospital Sec-62 Noida, Ghaziabad Junction Railway Station, MMG District Hospital and Noida City Centre Bus Stand have less upload speed (less than 2 Mbps) out of total 8 hotspots locations for auto-selection mode (5G/4G/3G/2G). (refer table-31, 32, 33, 34 & 35)

- All walk test locations have less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 51, 52 & 53)

- Gandhi Nagar Market Ghaziabad has less upload speed (less than 2 Mbps) out of 3 walk test loctions for auto-selection mode (5G/4G/3G/2G). (refer table-51)

- MTNL has 3.39 Mbps average download speed & 1.02 Mbps average upload speed across the measured routes for Airport route. (refer table-60)

3. RJIL:

Voice

- 99.46% call setup success rate and 1.08% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 99.39% call setup success rate and 1.22% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (refer table-15)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-21)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at all walk test locations. (refer table-48, 49 & 50)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Airport route. (refer table-56)

Data

- RJIL has 249.49 Mbps average download speed & 18.68 Mbps average upload speed for LSA. (refer table-11)

- RJIL has 248.50 Mbps average download speed & 18.71 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- The Grand Venice Mall has less download speed (less than 100 Mbps) out of total 8 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-38)

- Fortis Hospital Sec-62 Noida, MMG District Hospital, Noida Sector 52 Metro Station, Pari Chowk Metro Station and The Grand Venice Mall have less upload speed (less than 20 Mbps) out of total 8 hotspots locations for auto-selection mode (5G/4G/3G/2G). (refer table-32, 34, 36, 37 & 38)

- Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas has less download speed (less than 100 Mbps) out of total 3 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table-53)

- Gandhi Nagar Market Ghaziabad and Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas have less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-51 & 53)

- RJIL has 346.84 Mbps average download speed & 27.94 Mbps average upload speed across the measured routes for Airport route. (refer table-60)

4. VIL:

Voice

- 94.59% call setup success rate and 1.43% drop call rate have been observed in 3G/2G network mode for LSA. (refer table-3)

- 100.00% call setup success rate and 0.15% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 94.47% call setup success rate and 1.46% drop call rate have been observed in 3G/2G network mode for city drive. (refer table-13)

- 100.00% call setup success rate and 0.17% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (refer table-15)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-21)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at all walk test locations. (refer table-48, 49 & 50)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in 3G/2G network mode for Airport route. (refer table-54)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Airport route. (refer table-56)

Data

- VIL has 94.92 Mbps average download speed & 19.89 Mbps average upload speed for LSA. (refer table-11)
- VIL has 94.30 Mbps average download speed & 18.92 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- All hotspot locations have less download speed (less than 100 Mbps) except MMG District Hospital for auto-selection mode (5G/4G/3G/2G). (refer table-31, 32, 33, 35, 36, 37 & 38)
- Alpha 1 Market and Fortis Hospital Sec-62 Noida have less upload speed (less than 20 Mbps) out of total 8 hotspots locations for auto-selection mode (5G/4G/3G/2G). (refer table-31 & 32)
- Noida Sec-52 Metro to Noida Sec-51 Skywalk and Surrounding Areas has less download speed (less than 100 Mbps) out of total 3 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table- 53)
- VIL has 129.86 Mbps average download speed & 29.08 Mbps average upload speed across the measured routes for Airport route. (refer table-60)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

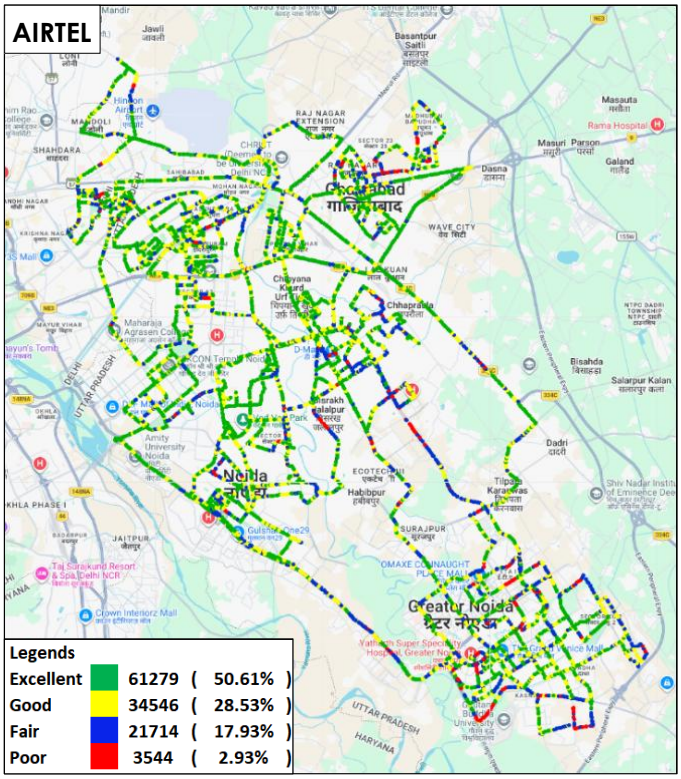


Figure-83: Signal strength 3G/2G network mode voice - AIRTEL.

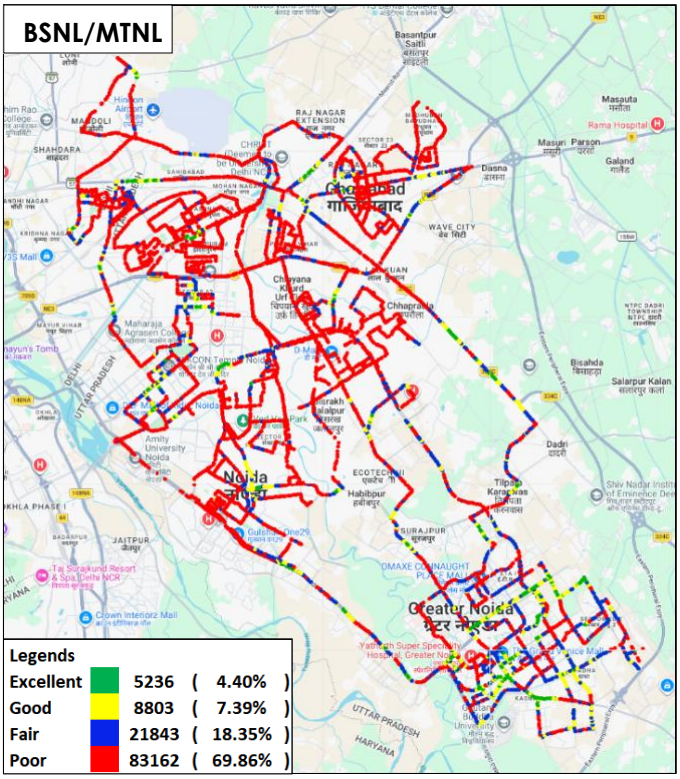


Figure-84: Signal strength 3G/2G network mode voice – BSNL/MTNL.

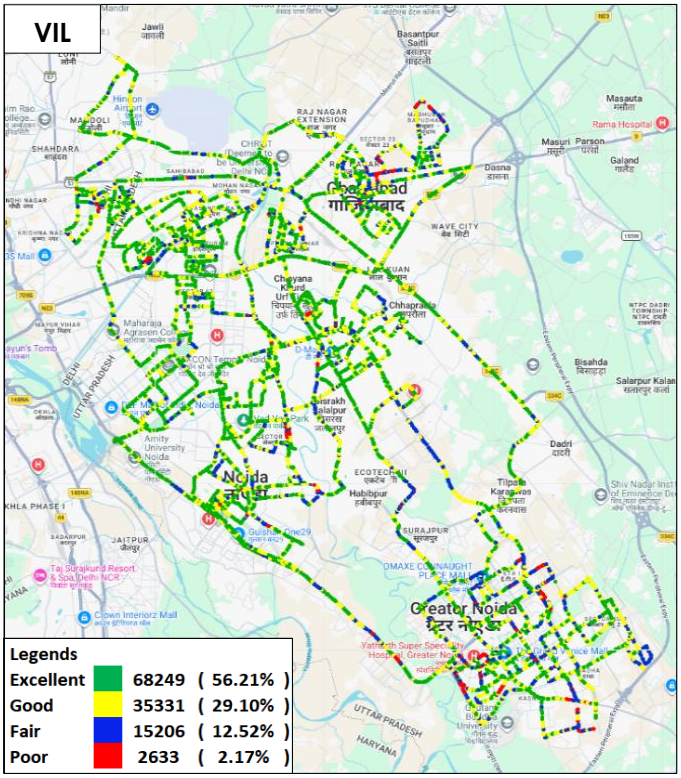


Figure-85: Signal strength 3G/2G network mode voice - VIL.

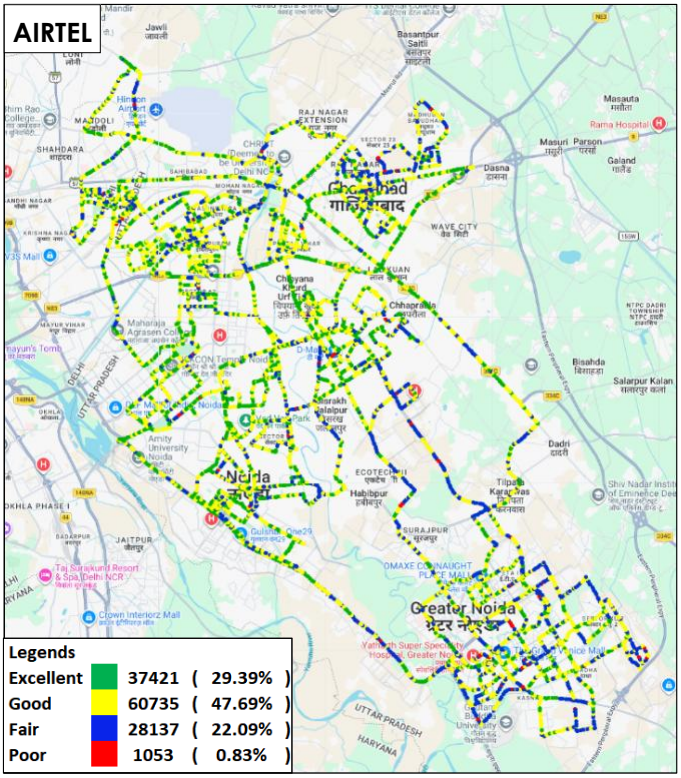


Figure-86: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

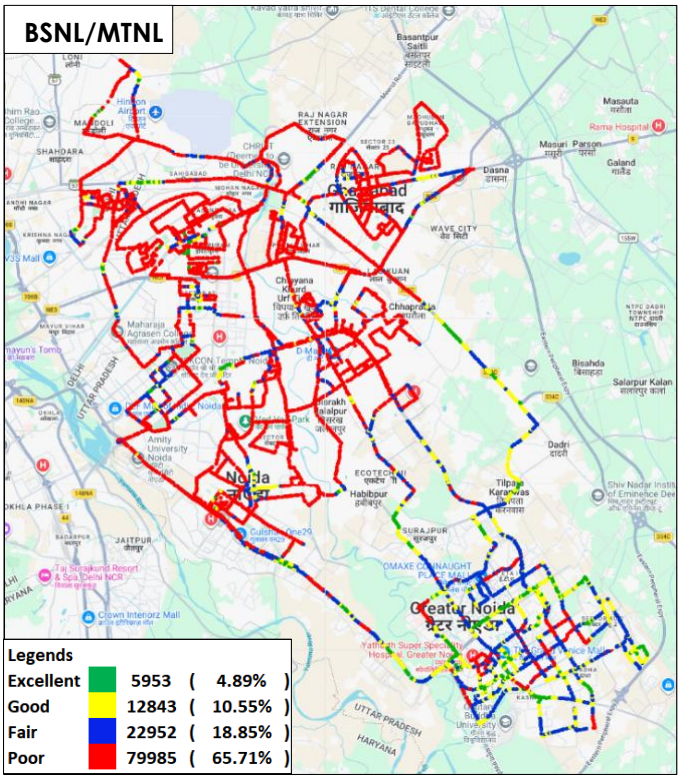


Figure-87: Signal strength auto-selection mode (5G/4G/3G/2G) voice – BSNL/MTNL.

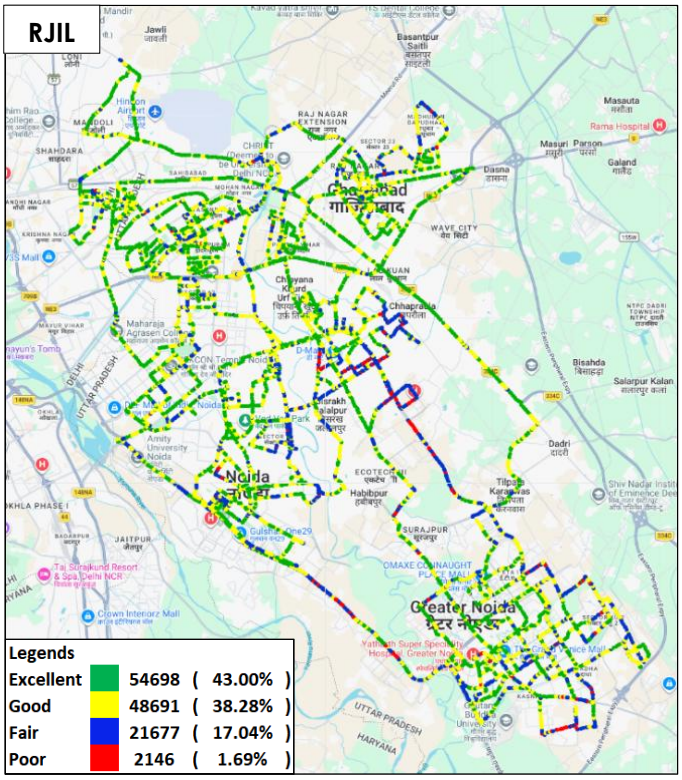


Figure-88: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

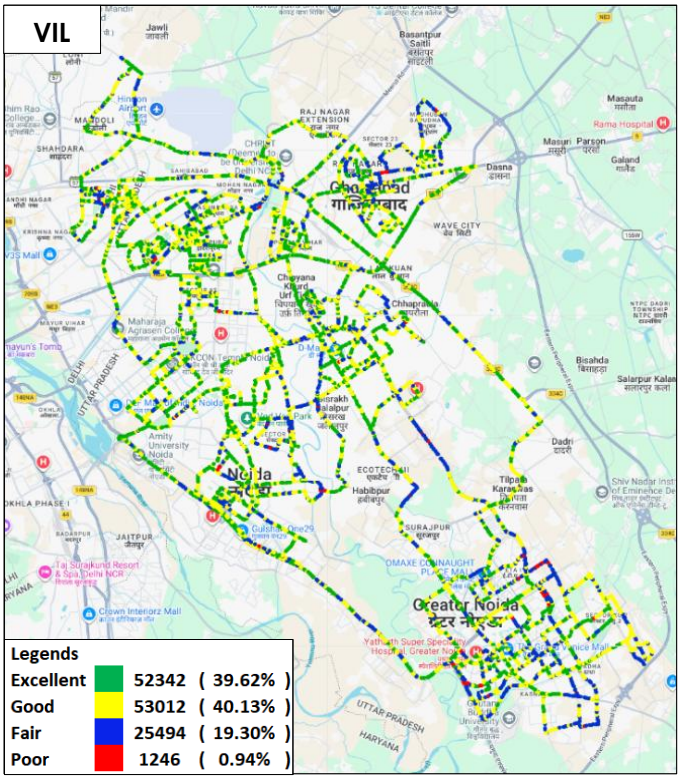


Figure-89: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.

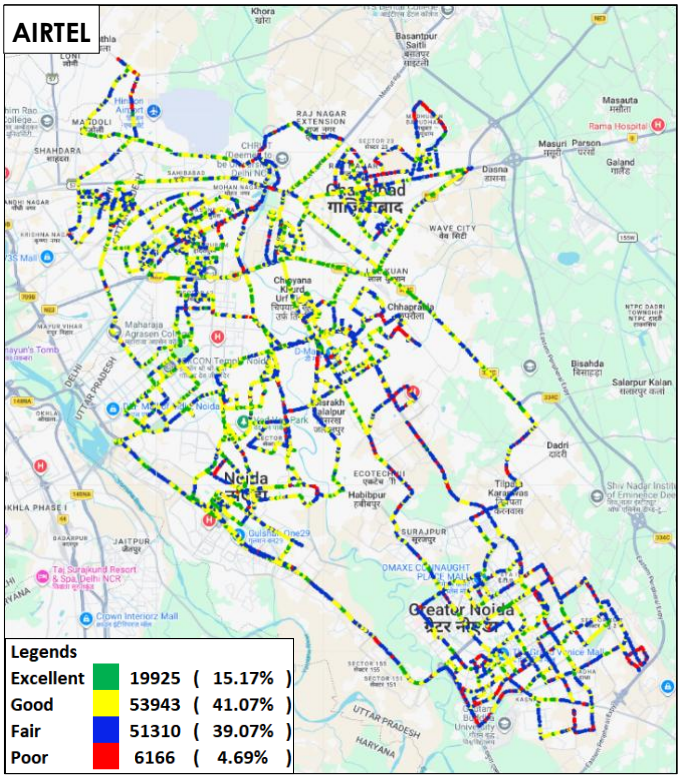


Figure-90: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

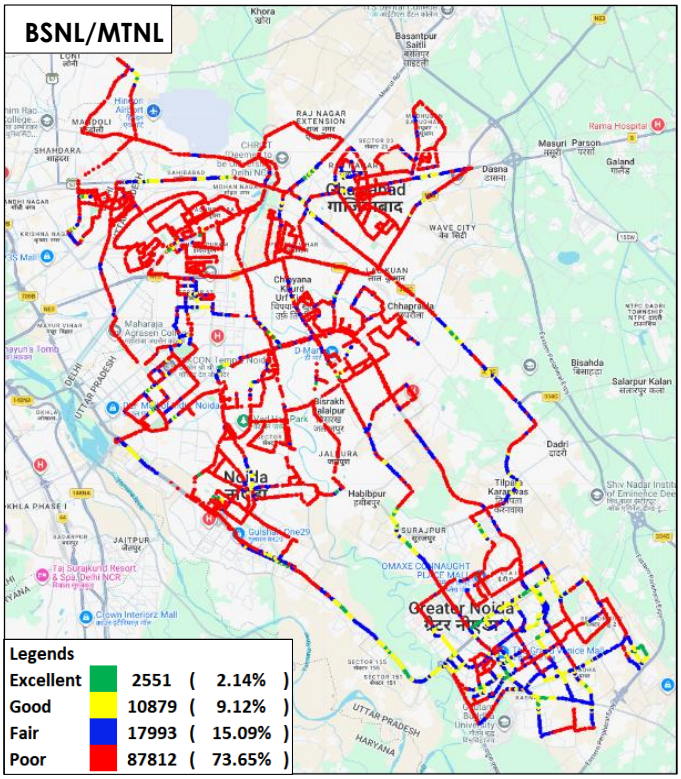


Figure-91: Signal strength auto-selection mode (5G/4G/3G/2G) data – BSNL/MTNL.

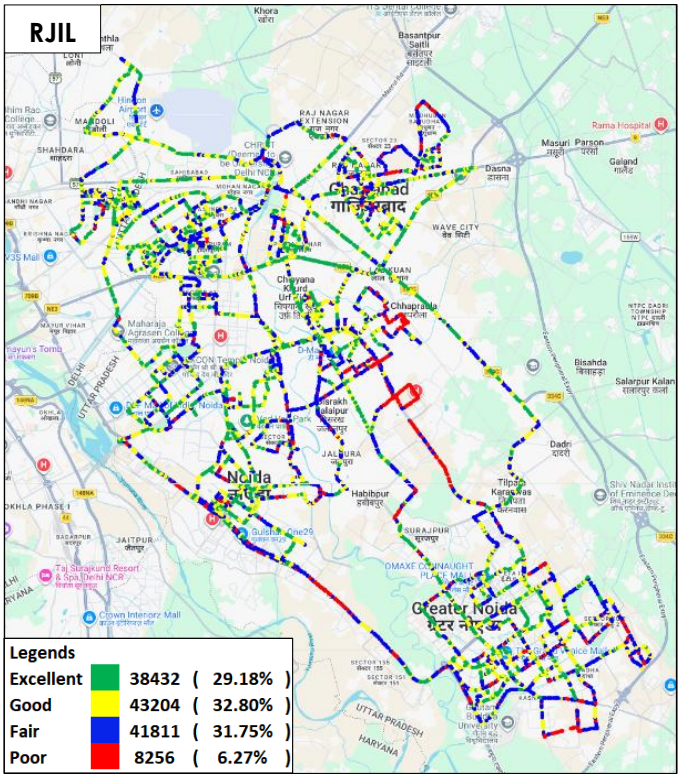


Figure-92: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.

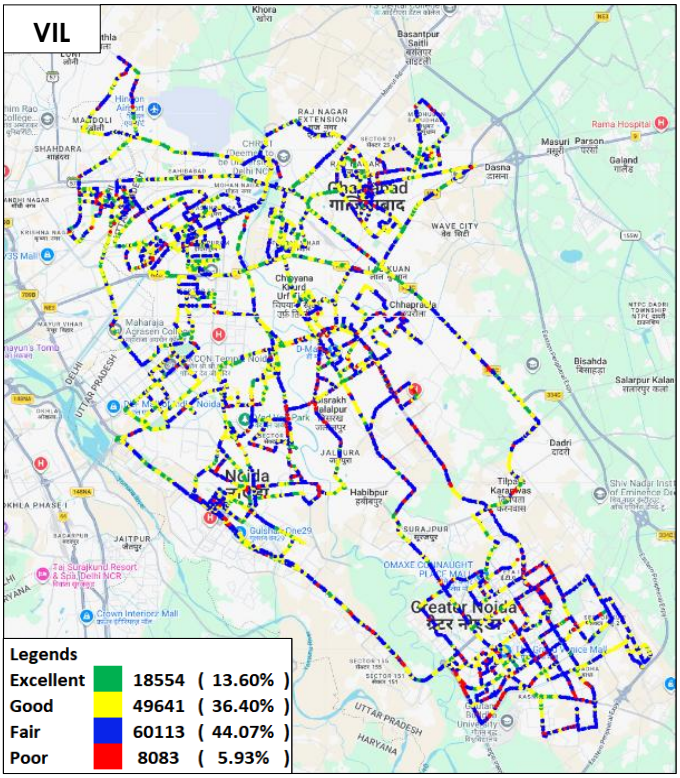


Figure-93: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

6.1.2 Airport Route

i) Noida Sector 121 to World Trade Centre



Figure-94: Signal strength 3G/2G network mode voice - AIRTEL.



Figure-95: Signal strength 3G/2G network mode voice - MTNL.



Figure-96: Signal strength 3G/2G network mode voice - VIL.



Figure-97 Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.



Figure-98: Signal strength auto-selection mode (5G/4G/3G/2G) voice - MTNL.



Figure-99: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.



Figure-100: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.



Figure-101: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.



Figure-102: Signal strength auto-selection mode (5G/4G/3G/2G) data – MTNL.



Figure-103: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.



Figure-104: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

7. Appendix

The details of the setup used for conducting the drive test and the network or performance parameters captured under different conditions may be seen at Appendix-I. The calculation method of each QoS parameter is given in Appendix-II of the report. The summary of key equipment used in technical setup is as under

- **Device-1**: OnePlus Nord CE3 for 3G/2G CAT-15 Smartphone.
- **Device-2**: Samsung Galaxy S23 for 5G/4G/3G/2G CAT-20 Smartphone
- **Drive test Software**: Azenqos Engineering capable Applications to capture actual user experience.

7.1 Appendix-I

7.1.1 Drive test setup

Voice Call		
Call details	**Technology**	**Detail**
Call Setup Timeout	• 3G/2G auto mode- switch Call • 5G/4G/3G/2G auto mode- switch Call • 5G/4G MOS Call	30 Sec
Call Duration		90 seconds
Wait/ Guard Time		15 Sec

Table-62: Voice test detail

Note-

- There is 15 sec wait time after locking and before starting first call in 3G/2G call.
- 10 calls to be made at each Hotspot location.
- Minimum 10 Calls to be made during the walk test. Call count will be increased based on walk test distance.
- Speech quality (MOS) has been measured only in city drive & highway by making Mobile to Mobile call.

Data Test		
Test Type	**Technology**	**Detail**
FTP/HTTP Download	5G/4G/3G/2G Auto Mode	500 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
FTP/HTTP Upload		250 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
YouTube Streaming		20 Sec Video & 25 sec Timeout (Only at Hotspot)
Web Browsing		3 popular websites (www.google.co.in, www.irctc.co.in, www.sbi.bank.in) 20 sec timeout (only at Hotspot)

Latency & Jitter (TWAMP-UDP)		25 count- Dynamic 500 count- Hotspot Payload- 42 bytes in all drive
Packet Loss Rate (TWAMP-UDP & TCP)		500 counts (TWAMP-UDP) 500 counts (TCP) at each hotspot Payload- 42 bytes in all drive

Table-63: Data test detail

Note-

- 5 Data iteration to be done at each hotspot location.
- Minimum 5 iteration to be made during the walk test. Iteration count will be increased based on walk test distance.
- TWAMP-UDP & TCP test to be performed only once at hotspot location.
- Youtube & Web browsing test to be performed at static location only.
- All values are taken up to two decimal places with round off.
- Airtel server was used for FTP Download, FTP Upload, TCP and TWAMP testing, for Airtel
- Delhi-based TRAI server was used for HTTP Download, HTTP Upload, TCP and TWAMP testing, for BSNL.
- RJIL server was used for FTP Download, FTP Upload, TCP and TWAMP testing, for RJIL.
- VIL server was used for HTTP Download, HTTP Upload, TCP and TWAMP testing, for VIL.

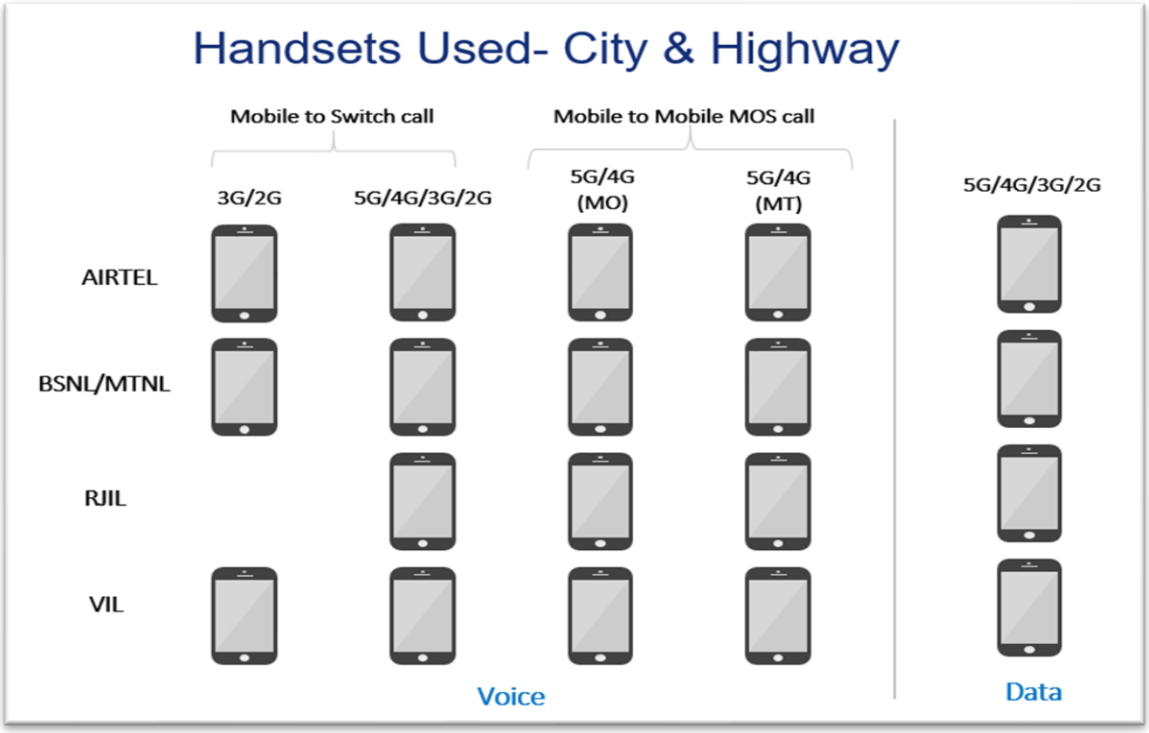


Figure-105: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

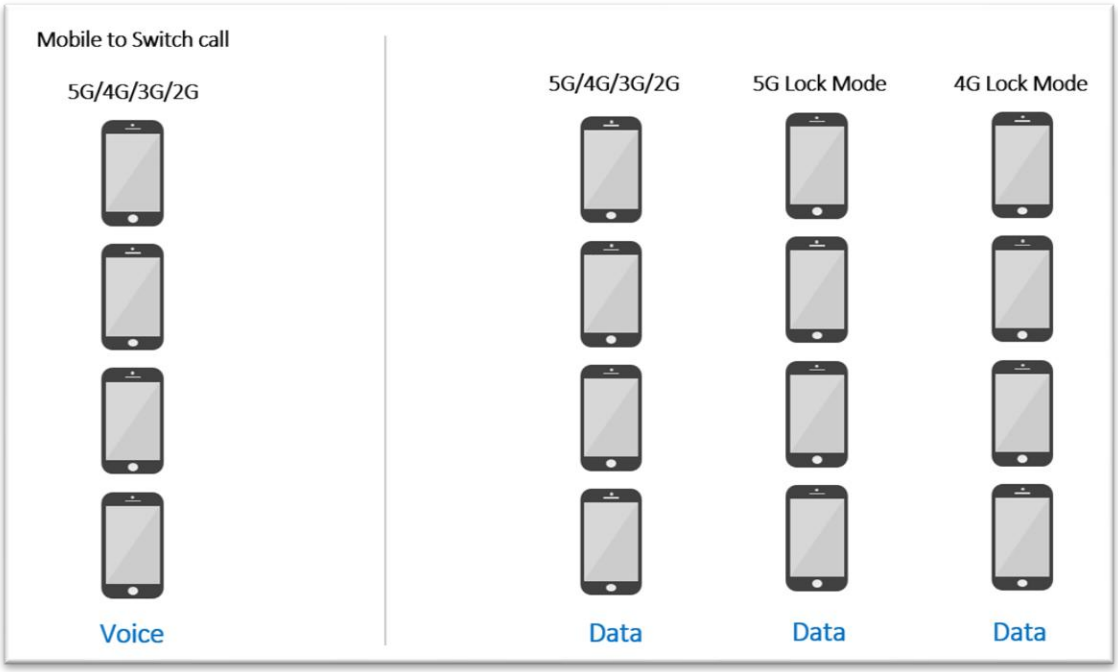


Figure-106: Number of handsets used in railway/metro/walktest/hotspot/ coastal area

Note- 5G & 4G Lock mode testing has been performed at hotspot locations only.

7.1.2 Drive test Methodology

(a) Dynamic voice testing (on the move)

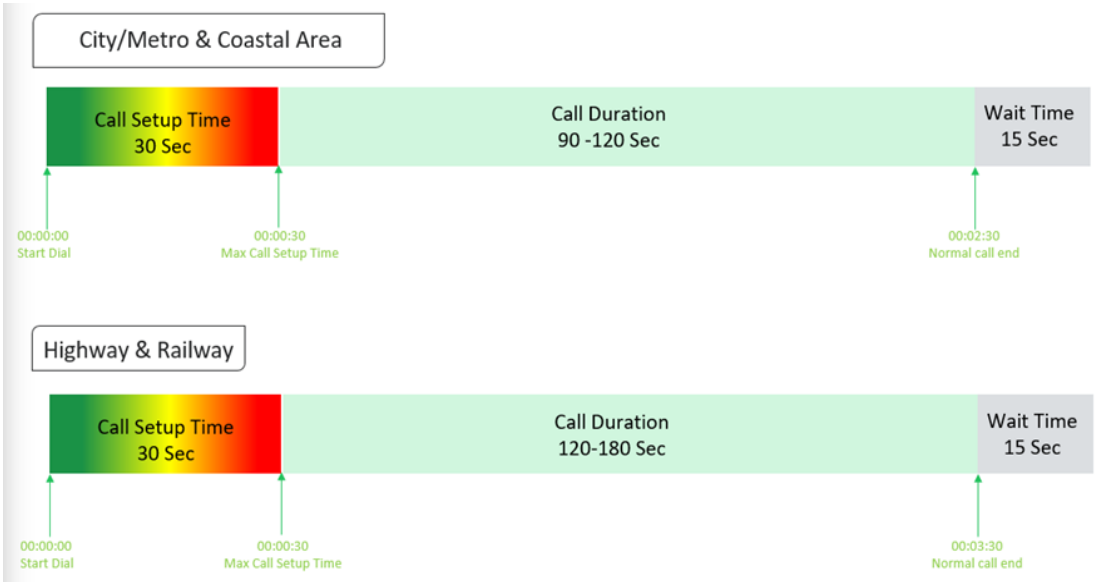


Figure-107: Voice test script for city/railway/metro/highway & coastal area

- 15 sec wait time is applied after locking Radio Access Technology (RAT) to 3G/2G and before starting first call in 3G/2G call.
- Speech quality (MOS) will be measured only City & Highway drive by making Mobile to Mobile calls.

(b) Hotspot voice testing



Figure-108: Voice test script for walktest/hotspot

- 10 calls to be made at each Hotspot location.
- Minimum 10 Calls to be made during the walk test. Call count will be increased based on walk test distance.

(c) Dynamic Data (internet) test

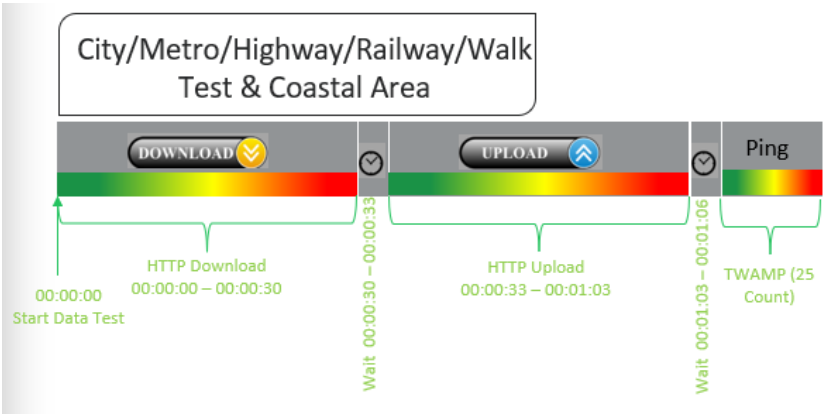


Figure-109: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

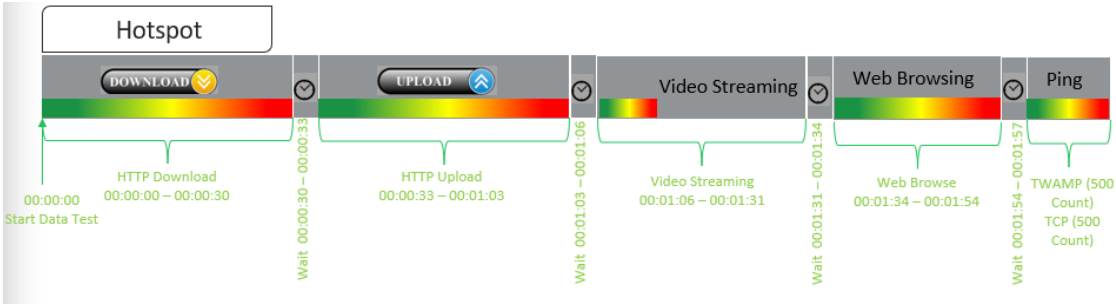


Figure-110: Data test script used at hotspot

- 5 Data iteration done at each hotspot location
- Min. 5 iteration made during the walk test.
- Web browsing duration mentioned above is for one web site only.
- One ping iteration (with 500 Count of each- TWAMP & TCP) done at hotspot location.

7.2 Appendix-II

7.2.1 Network Performance Parameters for Voice calls

Parameter Name	Definition
Call Setup Success Rate	(i) Call Setup Success Rate is defined as the ratio of Established Calls to Call Attempts. 'Established Calls' mean the following events have happened in call setup: (a) Call attempt is made (b) The signaling channel is allocated (c) The call is routed to the outwards path of the terminating network (d) An alert signal is received by caller in the form of ring back tone, busy tone, or an announcement. CSSR = (Total Call Established/ Total Call Attempt) *100 As per QoS Regulation 2024 benchmark value is **>=98%**
Drop Call Rate	Call drop represents the service provider network's ability to maintain a call once it has been successfully established. This parameter shall include both incoming calls and outgoing calls which, once they have been established and have an assigned traffic channel/ bearer, are dropped, or interrupted before their normal completion by the user, the cause of the early termination being within the service provider's network Drop Call Rate = (Total Call Drop/Total Call Established) *100 As per QoS Regulation 2024 benchmark value is **<=2%**
Call Setup Time	Time taken from call initiate to call alerting/ringing. Call Setup Time = T2- T1 T2- Ringing (VoLTE/VoNR) & Alerting (for WCDMA & GSM), T1- Invite (VoLTE/VoNR) & CM Service Request (for WCDMA & GSM)
Voice Quality (MOS)	Voice quality in mobile networks is measured with algorithms based on ITU-T P.863 (POLQA). The grading for Voice quality has been given as: Excellent: MOS $\geq$ 4 and < 5 Good : MOS $\geq$ 3 and < 4 Fair : MOS $\geq$ 2 and < 3 Poor : MOS $\geq$ 1 and < 2
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 type which are considered- 2G Inter & Intra cell, 3G Soft & IRAT, 4G Inter & Intra frequency & SRVCC, 5G Inter & Intra frequency & 5G to 4G handovers.
Silence Call	A call which has ≥ 4 sec continuous RTP gap is considered as a Silence Call. Silence call rate = (count of silence call / Total calls established) *100 If a call observes multiple silence count >=4 sec in a particular established call it has been taken as one silent event.

<table>
<tr><td>Jitter</td><td>The inter arrival jitter is the difference in the relative transit time for two packets. The relative transit time is the difference between a packet's Real-time Transport Protocol (RTP) timestamp and the receiver's clock at the time of arrival, measured in the same units. If Si is the RTP timestamp from packet i, and Ri is the time of arrival in RTP timestamps units for packet i, then for two packets i and j the inter-arrival jitter D can be expressed as:
D(i,j) = (Rj - Ri) - (Sj - Si)

The interarrival jitter is calculated continuously as each data packet i is received from source SSRC_n, using this difference D for that packet and the previous packet i-1 in order of arrival (not necessarily in sequence), according to the formula
J(i) = J(i-1) + (|D(i-1,i)| - J(i-1))/16 or 8</td></tr>
<tr><td>Downlink Packet Drop Rate</td><td>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 is calculated from MOS call for packet call only (VoNR/VoLTE)</td></tr>
<tr><td>Uplink Packet Drop Rate</td><td>Number of RTP (Real-time Transport Protocol) Packets lost divided by total RTP packet received (against each source_SSRC and sequence number) at call terminating handset. This KPI is calculated from MOS call for packet call only (VoNR/VoLTE).</td></tr>
<tr><td>Signal Strength</td><td>Signal strength is the signal power level received by the wireless user.

<table>
<tr><td rowspan="2">Parameter Name</td><td rowspan="2">Technology</td><td colspan="4">Signal Strength (dBm)</td></tr>
<tr><td>Excellent</td><td>Good</td><td>Fair</td><td>Poor</td></tr>
<tr><td>Rx Level</td><td>GSM</td><td>0 to ≥ -65</td><td><-65 to ≥ -75</td><td><-75 to ≥-85</td><td><-85 to min</td></tr>
<tr><td>RSCP</td><td>WCDMA</td><td>0 to ≥ -70</td><td><-70 to ≥ -80</td><td><-80 to ≥ -90</td><td><-90 to min</td></tr>
<tr><td>RSRP</td><td>LTE</td><td>0 to ≥ -80</td><td><-80 to ≥ -95</td><td><-95 to ≥-110</td><td><-110 to min</td></tr>
<tr><td>SS_RSRP</td><td>NR</td><td>0 to ≥ -80</td><td><-80 to ≥ -95</td><td><-95 to ≥-110</td><td><-110 to min</td></tr>
</table>
</td></tr>
</table>

Table-64: Network performance parameter and definition voice

7.2.2 Network Performance Parameters Data tests

Parameter Name	Definition
Download Speed (Mbps)	The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device. Download Speed = Total bytes transferred during download / Total time for transfer • 80th percentile (upper range) & 20th percentile (lower range) value has been calculated for download throughput in dynamic drive and Hotspot combine data
Upload Speed (Mbps)	The upload speed is the data transmission rate that is achieved for uploading a test file from a test device to a test server. Upload Speed = Total bytes transferred during upload / Total time for transfer. • 80th percentile (upper range) & 20th percentile (lower range) value has been calculated for upload throughput in dynamic drive and Hotspot combine data.
Download Session Setup Success Rate	(total download session established (successfully connected to server)/ total download session attempt) *100. This KPI has been calculated for Hotspot only.

Upload Session Setup Success Rate	(total upload session established (successfully connected to server)/ total upload session attempt)*100. This KPI need to report for Hotspot only.
Web Page Download Time	Web browsing test is used to measure performance in terms of opening a web/HTTP page. Time taken to open the web page successfully is considered as web browsing delay/web page download time.
Video Streaming Delay	The Video streaming delay is time taken from start of video transfer to First video frame displayed in player.
Latency (TWAMP-UDP)	Latency is the time it takes for a small data set to be transmitted from a device to a server on the Internet and back to the same device again. The Latency is measured in milliseconds (ms). To calculate the one-way latency, we just do half of the round-trip time. 50th percentile of one-way latency has been reported.
Jitter (TWAMP-UDP)	Measure of variation in time in arrival of packets from a source to destination The consideration of packet delay jitter is considered by standard deviation of Inter Packet Delay Variation. If IPDV is used. By standard deviation is meant the average of standard deviation of IPDV on DL IPDV(i) = D(i) – D(i-1) then Stdvs of IPDV is considered as jitter.
Packet Loss Rate (TWAMP-UDP & TCP)	Number of packets lost out of total packet transferred during test. Packet loss rate = (Total packet lost / Total packet sent) *100 * Packet delay (using TWAMP-UDP & TCP) >90 ms considered as packet loss and included in packet loss rate. * Packet loss rate is calculated based on TWAMP-UDP & TCP. *90th percentile for Packet loss rate has been reported in overall Hotspot performance summary.

Table-65: Network performance parameter and definition Data

Disclaimer: The observations presented above and, in the reports, represent the performance of the service providers on the area/route under test on the day/time of conducting the drive test and no inference whatsoever may be drawn regarding the quality of the telecom service by the service providers in the whole city/state/licensed service area.

Hardik Rajeshbhai Patel

Digitally signed by Hardik Rajeshbhai Patel
Date: 2026.09.25 17:54:06 +05'30'