



TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Delhi LSA

July 2025

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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 July-2025 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	Delhi	City	858.9	09-July-2025	16-July-2025
2	Delhi	Hotspot	21 Locations	12-July-2025	16-July-2025
3	Delhi	Walktest	3.0	16-July-2025	16-July-2025
4	Blue Line, Orange Line, Violet Line, Red Line, Yellow Line & Magenta Line	Metro	250.0	14-July-2025	15-July-2025

Table-1: Drive test summary

Note-

- Hotspot testing has been done on 12th, 14th & 16th July 2025.

2.2 Drive test routes

The map provides overview of drive test routes indicating city drive, hotspots, walk test and metro as per the legends shown on the map.

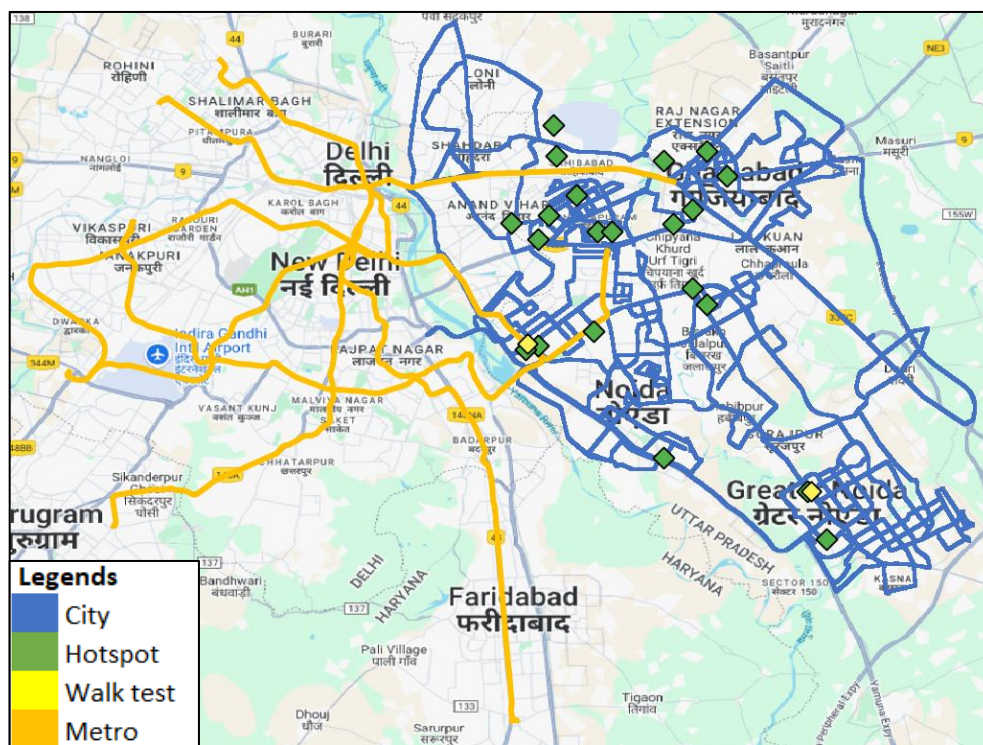


Figure-1: Drive test routes

2.3 Summary of areas covered

a) City-Nearby Shahdara, Anand Vihar, Raj Nagar Extension, Lal Kuan, Indirapuram, Mayur Vihar, Noida Sec-45, Noida Sec-104, Noida Greater Noida Expressway, Surajpur, Dadri, Delta II, Omicron & Eco tech III etc.

b) Hotspot-

1. Advant Navis Business Park, Noida
2. Anand Vihar ISBT, Ghaziabad
3. Apeejay School, Greater Noida
4. Brahmaputra Market, Noida
5. Christ University, Ghaziabad
6. Cloudnine Hospital, Noida
7. Dav Public School, Ghaziabad
8. Delhi Public School, Ghaziabad
9. Gaur City Mall, Greater Noida
10. Gaur Plaza, Ghaziabad
11. Ghaziabad District and Session Court
12. Ghaziabad Railway Station
13. GIP Mall, Noida
14. Hindon Airport, Ghaziabad
15. Indirapuram Habitat Centre
16. Jaipuria Mall, Indirapuram
17. Max Super Speciality Hospital, Ghaziabad
18. Sahibabad Fruit Mandi
19. St. Xavier's High School, Greater Noida
20. Vaishali Metro Station
21. Yatharth Hospital, Greater Noida

c) Walk Test

1. Atta Market Noida
2. Jagat Farm Market Greater Noida

d) Metro

1. Botanical Garden to Krishna Park Extension (Magenta Line)
2. Kashmere Gate to Raja Nahar Singh (Violet line).
3. Noida Electronic City to Dwarka Sec -21 (Blue line).
4. Samaypur Badli to Millennium City Centre (Yellow line).
5. Shaheed Sthal to Rithala (Red line).
6. Yashobhoomi Dwarka Sec-25 to New Delhi (Orange line).

2.4 Telecom service providers detected frequency bands

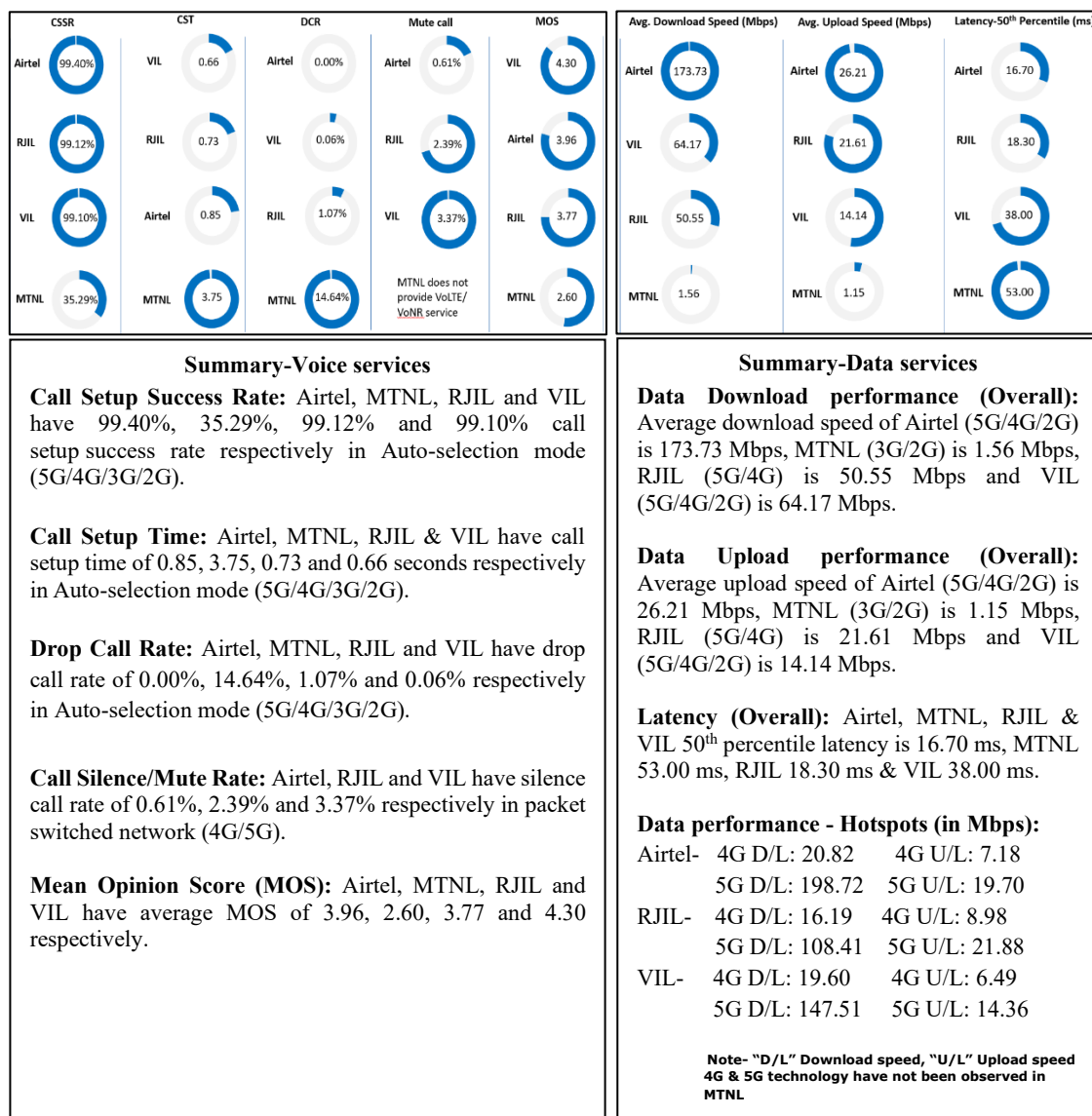
Technologies covered during the IDT and frequency bands in use are summarised in table below:

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	MTNL	2G	900
5	MTNL	3G	2100
6	Reliance JIO Infocomm Ltd.	4G	850,1800,2300
7	Reliance JIO Infocomm Ltd.	5G	700,3500
8	Vodafone Idea Ltd.	2G	1800
9	Vodafone Idea Ltd.	4G	900,1800,2100,2500
10	Vodafone Idea Ltd.	5G	3500

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

2.5 Performance against key QoS parameters

CSSR: Call Setup Success Rate (in %), **CST:** Call Setup Time (in seconds), **DCR:** Drop Call Rate (in %) & **MOS:** Mean Opinion Score.



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 LSA during the month of July-2025 covering city drive, hotspots, walk test and metro. (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	MTNL	VIL
Call Attempts	1163	2477	1156
Call Setup Success Rate %	95.70	28.87	96.45
Drop Call Rate %	1.26	14.97	4.57
Call Setup Time-Average (Second)	3.43	3.13	4.45
Handover Success Rate %	97.04	99.96	95.38

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

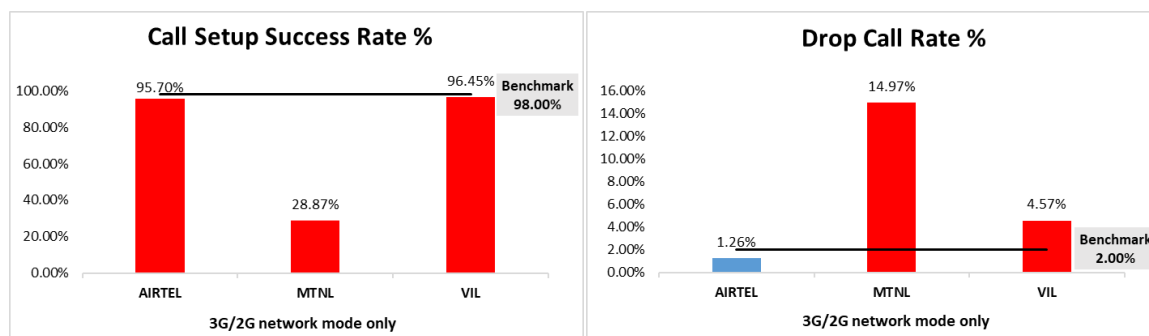


Figure-2: Call setup success rate and drop call rate performance.

Number of unique cell Id's covered in Voice test- Technology wise			
Technology	Service Provider		
	3G/2G network mode only		
	AIRTEL	MTNL	VIL
3G	NA	307	NA
2G	2039	43	1892

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	MTNL	RJIL	VIL
Call Attempts	1668	3097	1696	1669
Call Setup Success Rate %	99.40	35.29	99.12	99.10
Drop Call Rate %	0.00	14.64	1.07	0.06
Call Setup Time-Average (Second)	0.85	3.75	0.73	0.66
Handover Success Rate %	99.75	99.99	99.87	99.87

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

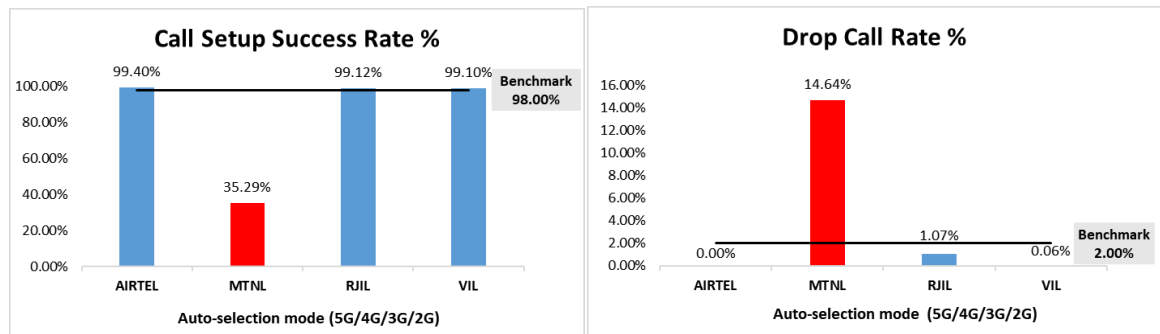


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider Network)	1146	1143	1128	1158
Number of silence call for >4 Sec	7	NA	27	39
Silence Call Rate %	0.61	NA	2.39	3.37
Number of silence instances for >4 Sec	13	NA	32	51
Number of silence instances for >3 Sec	29	NA	59	104
Number of silence instances for >2 sec	68	NA	179	239
RTP Jitter (4G & 5G) in ms	4.73	NA	11.16	15.40
Packet loss Rate Downlink %	0.83	NA	0.89	1.75
Packet loss Rate Uplink %	0.81	NA	1.64	1.68

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

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

Number of unique cell Id's covered in Voice test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
5G	0	NA	1925	0
4G	6890	NA	6949	5128
3G	NA	431	NA	NA
2G	2	193	3	4

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	MTNL	RJIL	VIL
Total Number of MOS Samples for calls table-6	6765	5160	6487	6620
Speech Quality (Average MOS)	3.96	2.60	3.77	4.30
Number of samples with MOS ≥ 4 to < 5 (Excellent)	5418	0	4099	5282
Number of samples with MOS ≥ 3 to < 4 (Good)	1086	1650	1717	870
Number of samples with MOS ≥ 2 to < 3 (Fair)	121	2560	375	234
Number of samples with MOS ≥ 1 to < 2 (Poor)	140	950	296	234
%age of samples with MOS ≥ 4 to < 5 (Excellent)	80.09%	0.00%	63.19%	79.79%
%age of samples with MOS ≥ 3 to < 4 (Good)	16.05%	31.98%	26.47%	13.14%
%age of samples with MOS ≥ 2 to < 3 (Fair)	1.79%	49.61%	5.78%	3.53%
%age of samples with MOS ≥ 1 to < 2 (Poor)	2.07%	18.41%	4.56%	3.53%

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

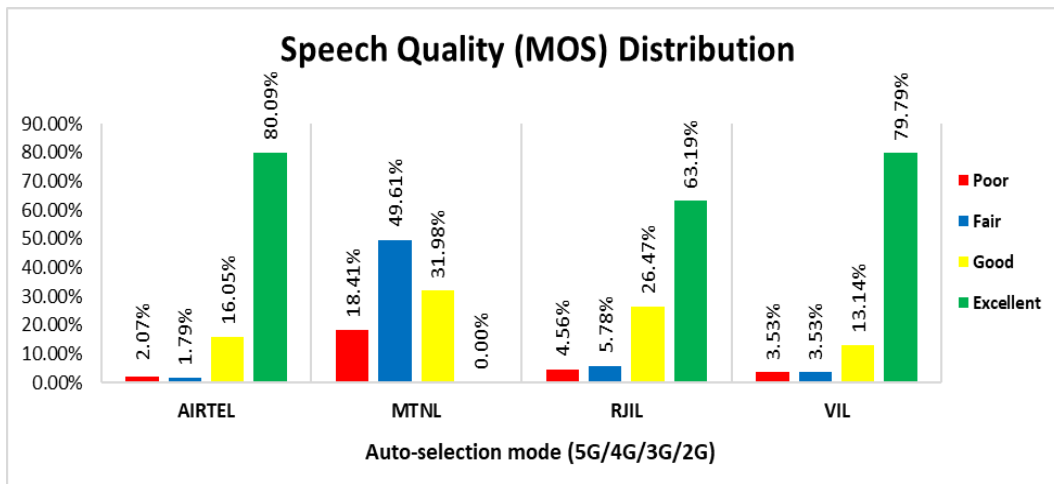


Figure- 4: Distribution of samples in MOS range.

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	MTNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	173.73	1.56	50.55	64.17
	80th Percentile	288.91	2.27	44.44	105.66
	20th Percentile	39.54	0.37	7.70	11.72
Upload Throughput (Mbits/s)	Average	26.21	1.15	21.61	14.14
	80th Percentile	46.52	1.91	38.08	24.04
	20th Percentile	5.36	0.26	4.71	3.29
Latency (ms)	50th Percentile	16.70	53.00	18.30	38.00

Table-9: Summary of data performance in network auto-selection mode.

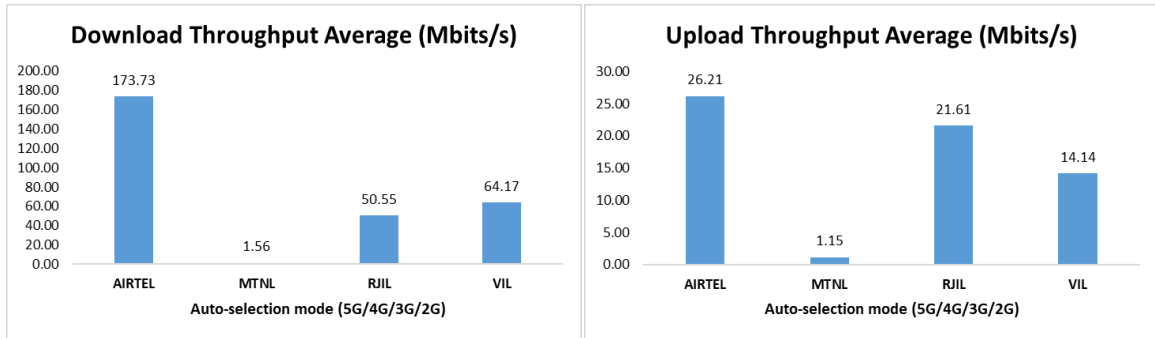


Figure- 5: Download and Upload throughput

Number of unique cell Id's covered in Data test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
5G	0	NA	3159	0
4G	7204	NA	694	3400
3G	NA	429	NA	NA
2G	4	243	NA	16

Table-10: 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, hotspots, walk test and metro 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 09th July 2025 to 16th July 2025 in Delhi. (Refer Table-1)

4.2.1 Drive test route

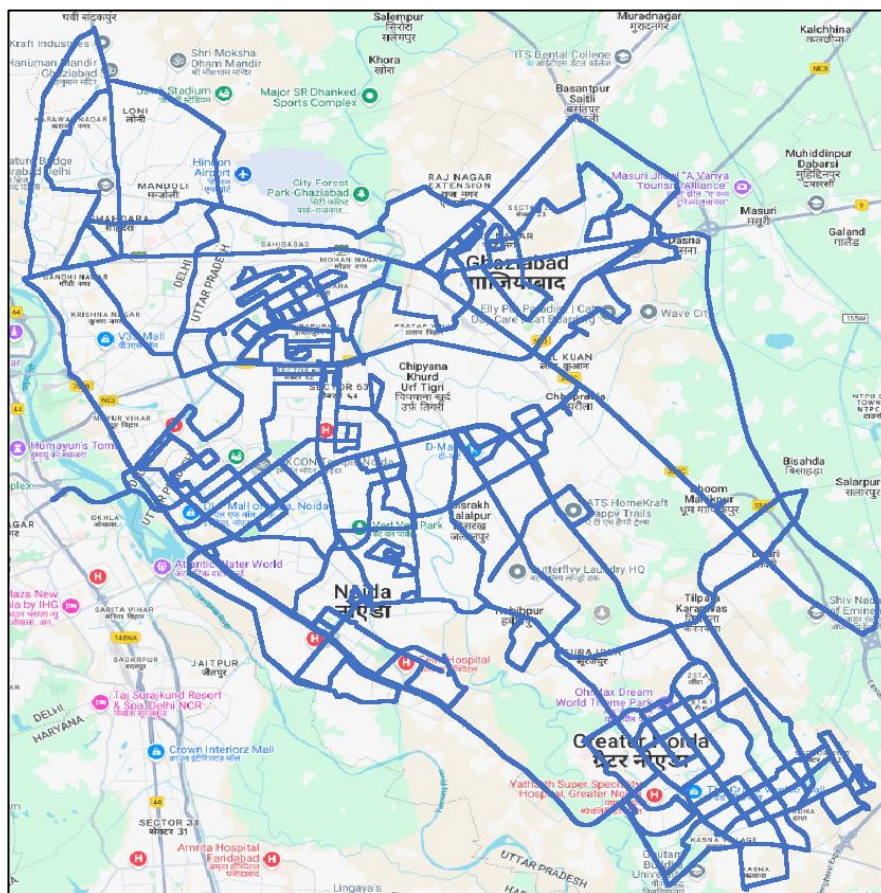


Figure- 6: Drive test routes

4.2.2 Areas covered

Nearby Shahdara, Anand Vihar, Raj Nagar Extension, Lal Kuan, Indirapuram, MayurVihar, Noida Sec-45, Noida Sec-104, Noida Greater Noida Expressway, Surajpur, Dadri, Delta II, Omicron & Eco tech III 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	MTNL	VIL
Call Attempts	1163	2477	1156
Call Setup Success Rate %	95.70	28.87	96.45
Drop Call Rate %	1.26	14.97	4.57
Call Setup Time-Average (Second)	3.43	3.13	4.45
Handover Success Rate %	97.04	99.96	95.38

Table-11: Summary of voice call performance in 3G/2G network mode only.

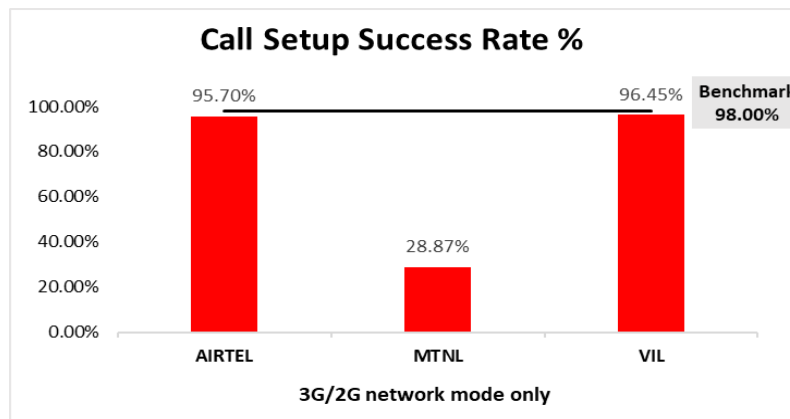


Figure-7: Performance for call setup success rate.

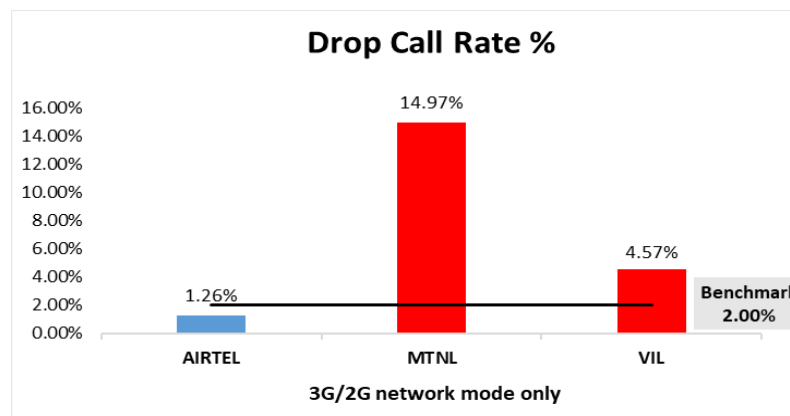


Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	MTNL	VIL
3G	NA	92.90%	NA
2G	99.95%	6.24%	99.83%
Limited Service	0.05%	0.86%	0.17%

Table-12: Time spent on technology during drive test 3G/2G network mode.

Note-

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

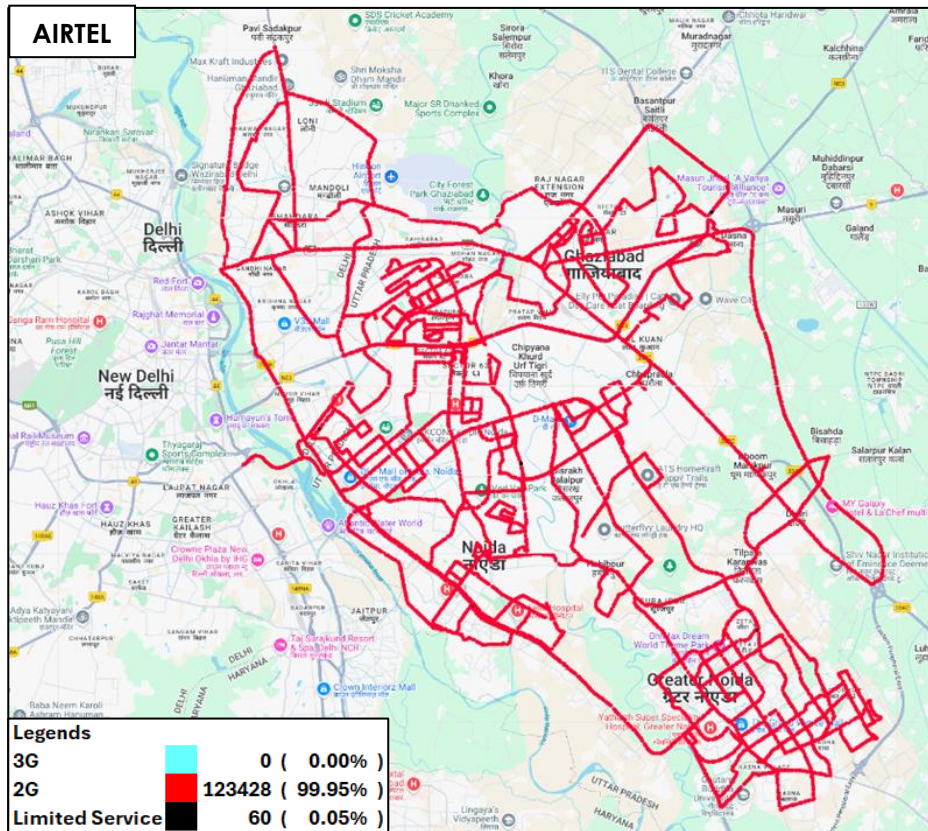


Figure-9: Serving technology plots 3G/2G network mode – AIRTEL

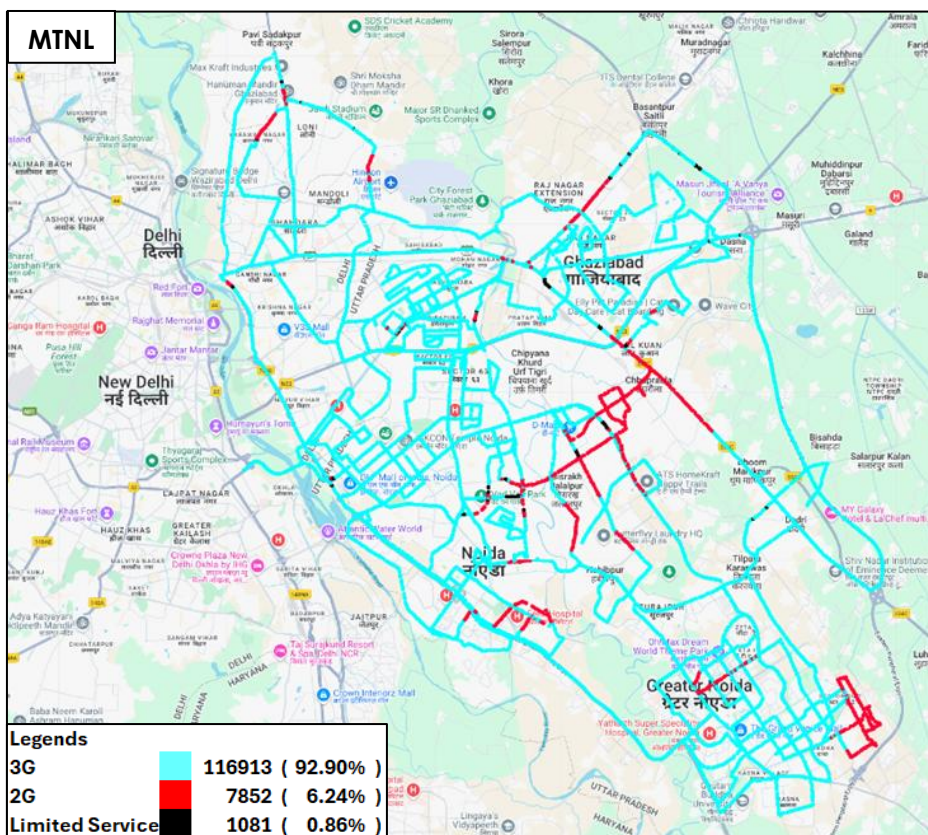


Figure-10: Serving technology plots 3G/2G network mode –MTNL.

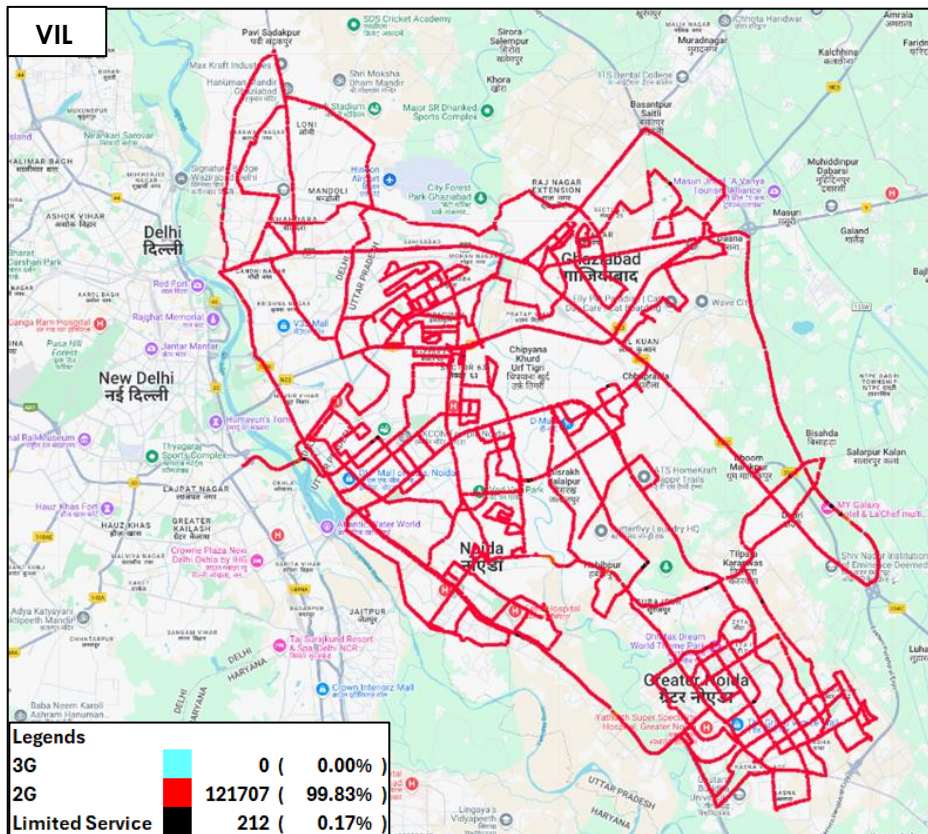


Figure-11: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 96, 97 & 98 for map view)

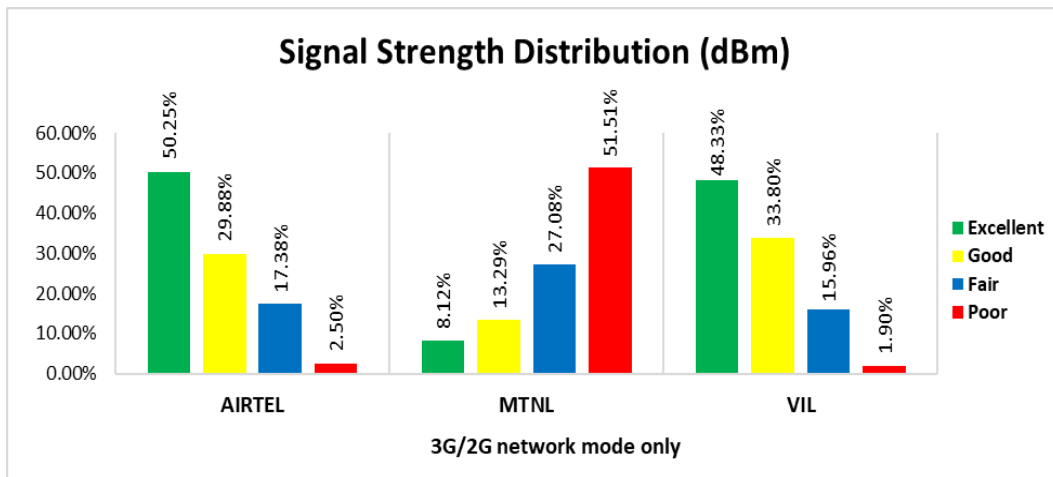


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 50% of samples falling in the excellent signal strength category.
- MTNL has 8% of samples falling in the excellent signal strength category.
- VIL has 48% 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	1183	2518	1208	1183
Call Setup Success Rate %	99.66	30.18	99.67	99.32
Drop Call Rate %	0.00	16.97	1.50	0.09
Call Setup Time Average (Second)	0.80	3.80	0.72	0.67
Handover Success Rate %	99.81	99.98	99.88	99.86

Table-13: Summary of voice call performance in network auto-selection mode.

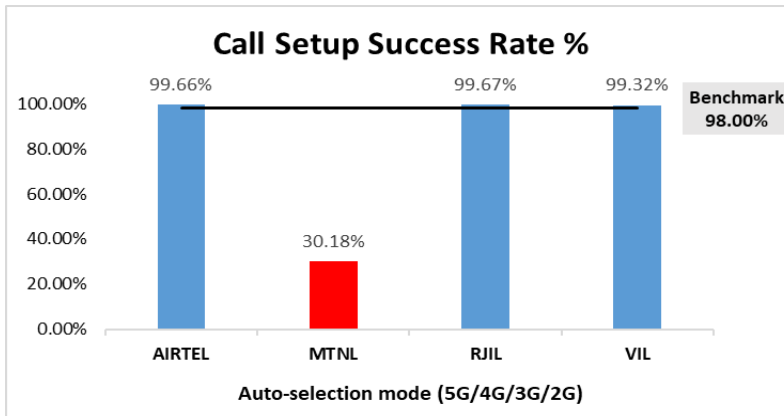


Figure-13: Performance for call setup success rate.

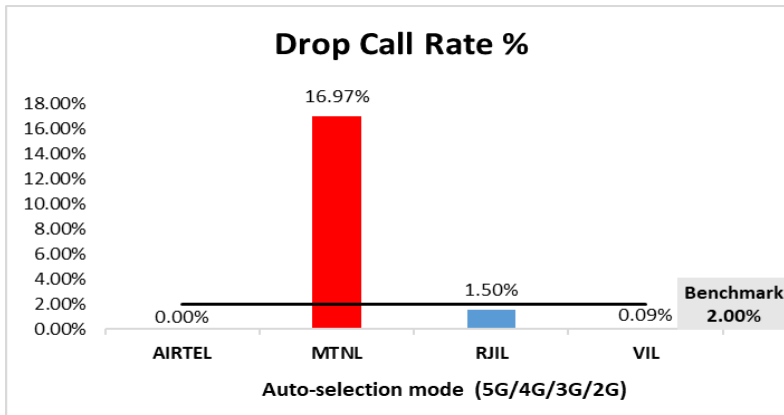


Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider Network)	1146	1143	1128	1158
Number of silence call for >4 Sec	7	NA	27	39
Silence Call Rate %	0.61	NA	2.39	3.37
Number of silence instances for >4 Sec	13	NA	32	51
Number of silence instances for >3 Sec	29	NA	59	104
Number of silence instances for >2 sec	68	NA	179	239
RTP Jitter (4G & 5G) in ms	4.73	NA	11.16	15.40
Packet loss Rate Downlink %	0.83	NA	0.89	1.75
Packet loss Rate Uplink %	0.81	NA	1.64	1.68

Table-14: 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 value 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-14	6765	5160	6487	6620
Speech Quality (Average MOS)	3.96	2.60	3.77	4.30
Number of samples with MOS ≥ 4 to < 5 (Excellent)	5418	0	4099	5282
Number of samples with MOS ≥ 3 to < 4 (Good)	1086	1650	1717	870
Number of samples with MOS ≥ 2 to < 3 (Fair)	121	2560	375	234
Number of samples with MOS ≥ 1 to < 2 (Poor)	140	950	296	234
%age of samples with MOS ≥ 4 to < 5 (Excellent)	80.09%	0.00%	63.19%	79.79%
%age of samples with MOS ≥ 3 to < 4 (Good)	16.05%	31.98%	26.47%	13.14%
%age of samples with MOS ≥ 2 to < 3 (Fair)	1.79%	49.61%	5.78%	3.53%
%age of samples with MOS ≥ 1 to < 2 (Poor)	2.07%	18.41%	4.56%	3.53%

Table-15: Summary of speech quality (MOS) samples.

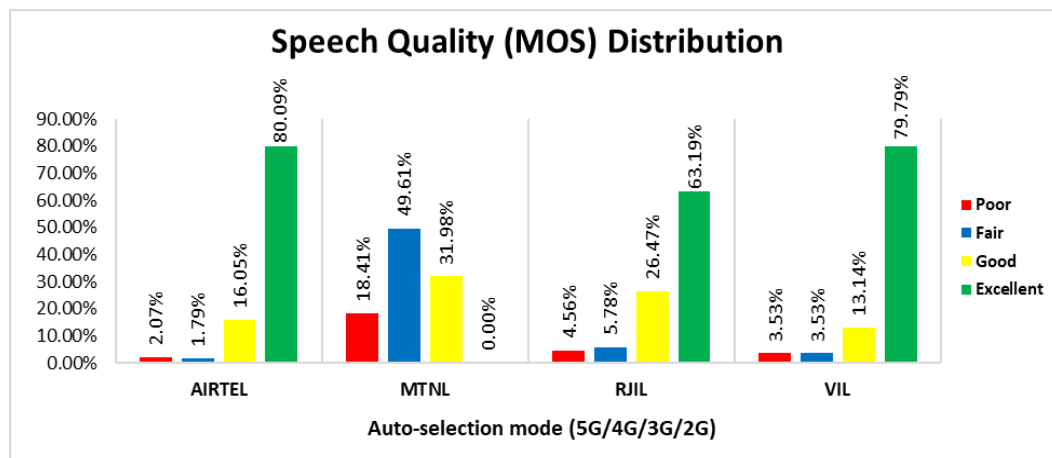


Figure-15: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	3.22%	NA	22.03%	6.40%
4G	96.78%	NA	77.95%	93.59%
3G	NA	93.86%	NA	NA
2G	0.00%	4.80%	NA	0.00%
Limited Service	0.00%	1.33%	0.02%	0.01%

Table-16: Time spent on technology during drive test.

Note-

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

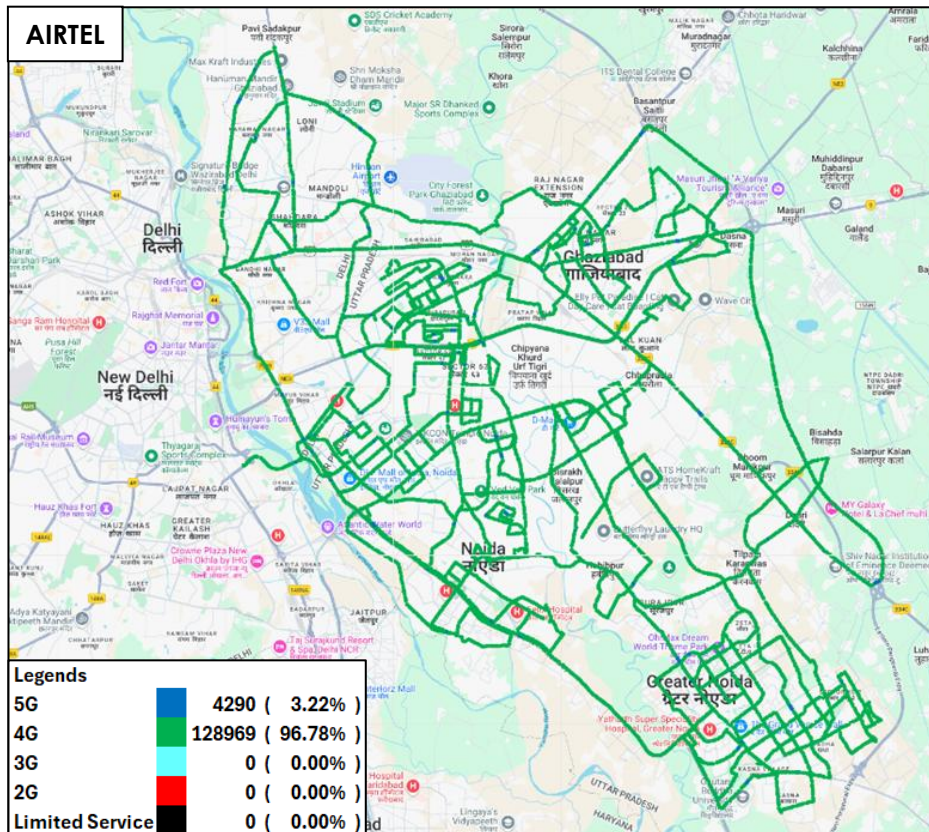


Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -AIRTEL.

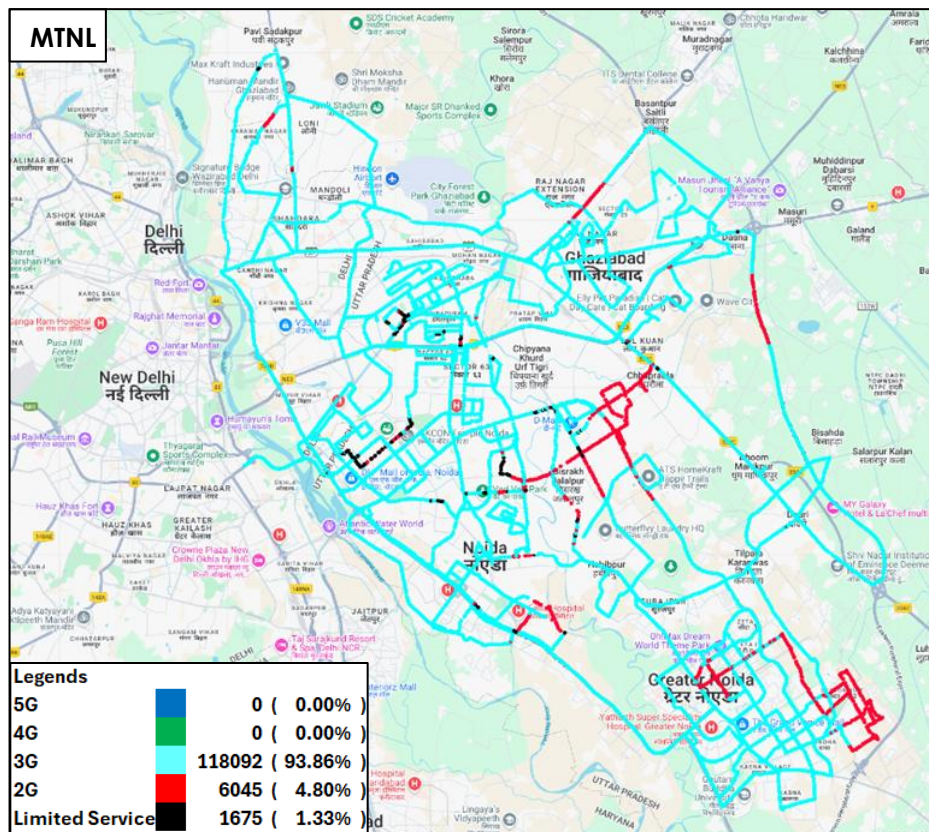


Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G – 4G services being rolled out) – MTNL.

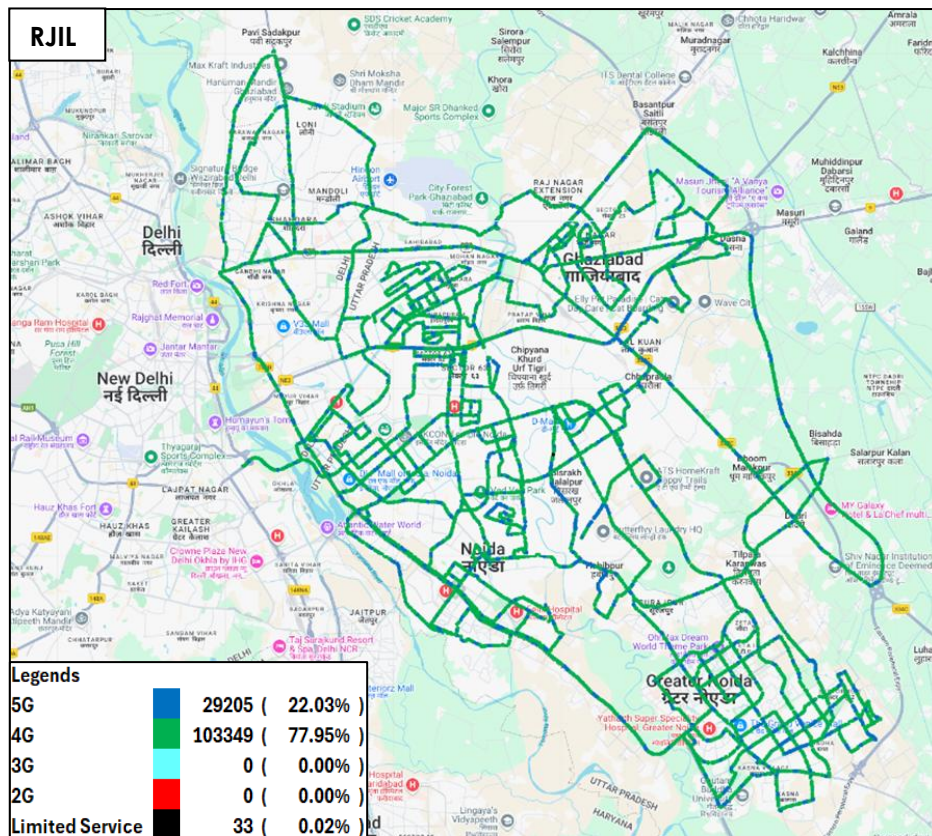


Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.

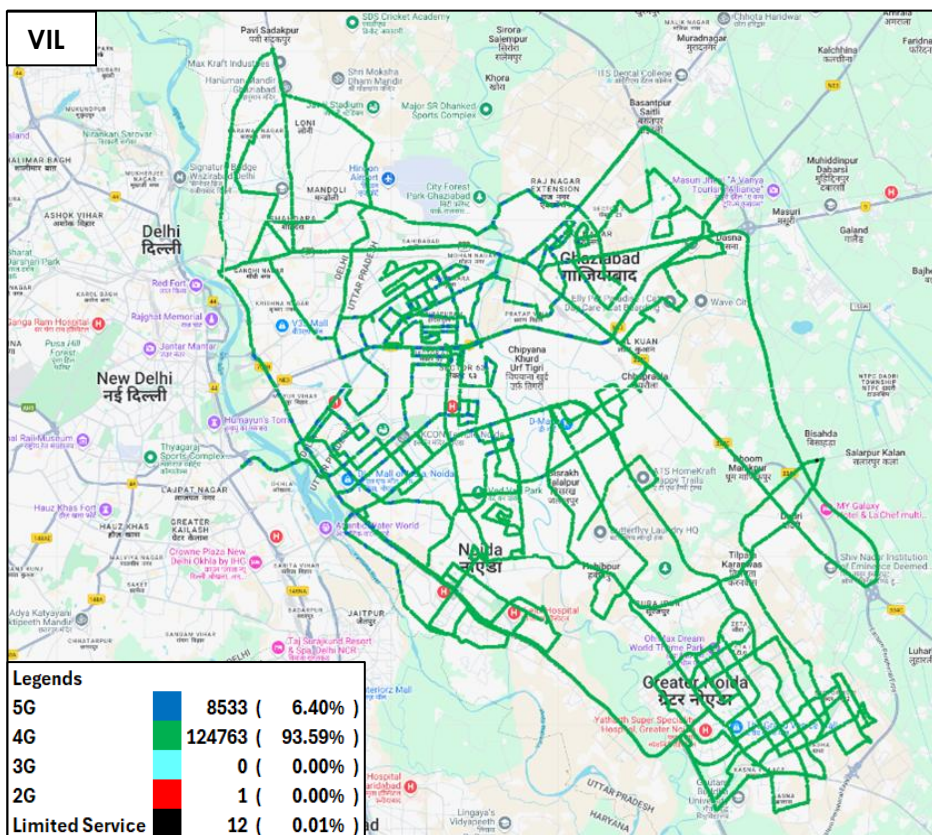


Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) - VIL

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-99, 100, 101 & 102 for map view)

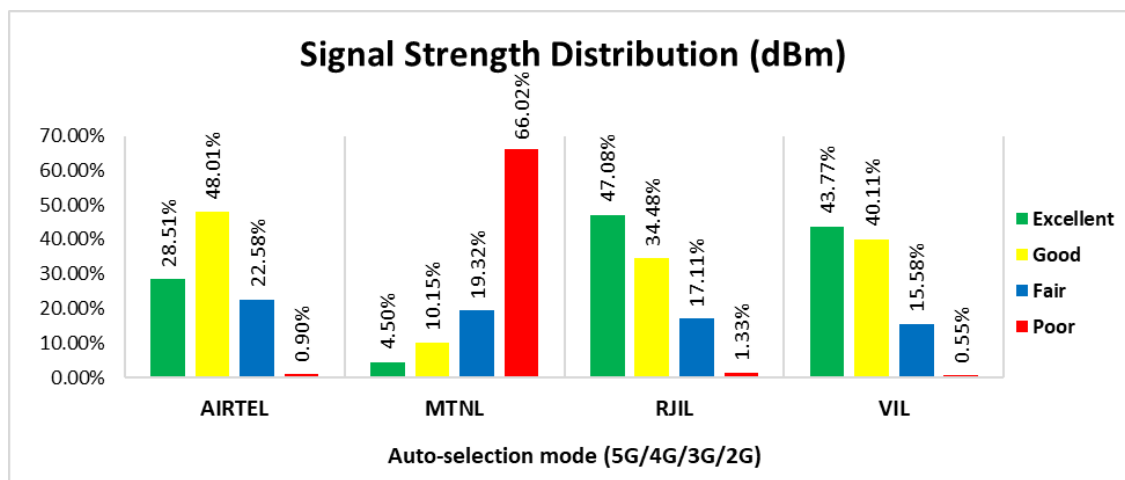


Figure-20: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 29% of samples falling in the excellent signal strength category.
- MTNL has 5% of samples falling in the excellent signal strength category.
- RJIL has 47% of samples falling in the excellent signal strength category.
- VIL has 44% of samples falling in the excellent signal strength category.

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	MTNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	191.50	1.34	27.35	65.36
	80th Percentile	307.06	2.02	12.57	104.21
	20th Percentile	61.74	0.26	7.59	14.06
Upload Throughput (Mbits/s)	Average	27.18	1.08	21.12	13.30
	80th Percentile	47.54	1.82	37.85	20.27
	20th Percentile	5.92	0.20	4.73	3.38
Latency (ms)	50th Percentile	16.08	75.50	17.70	37.90

Table-17: Summary of Data performance in network auto-selection mode.

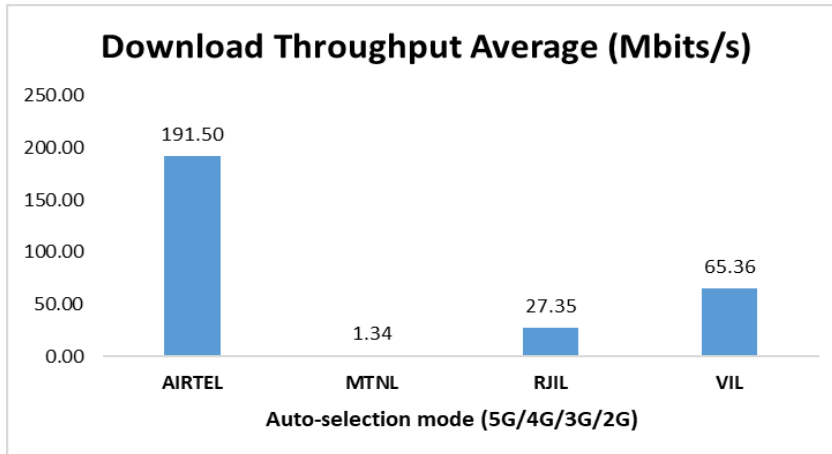


Figure- 21: Download throughput

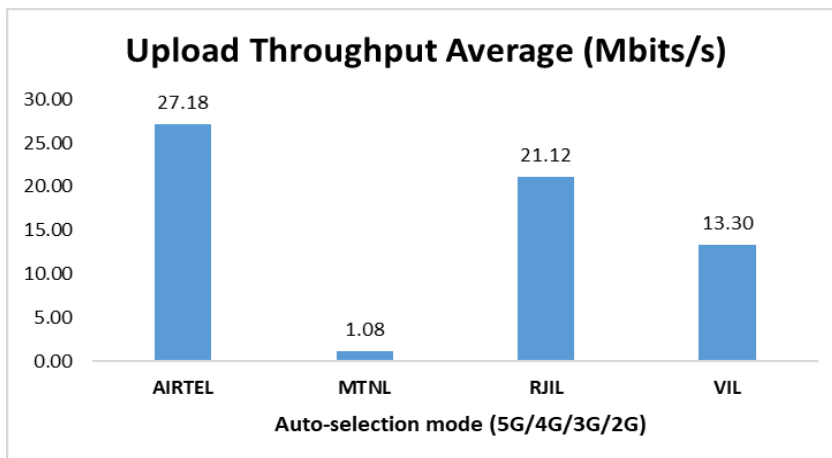


Figure- 22: Upload throughput

4.3 Hotspots

Hotspot testing has been done from 12th July to 16th July 2025. Twenty-one locations have been tested in the city.

4.3.1 Locations

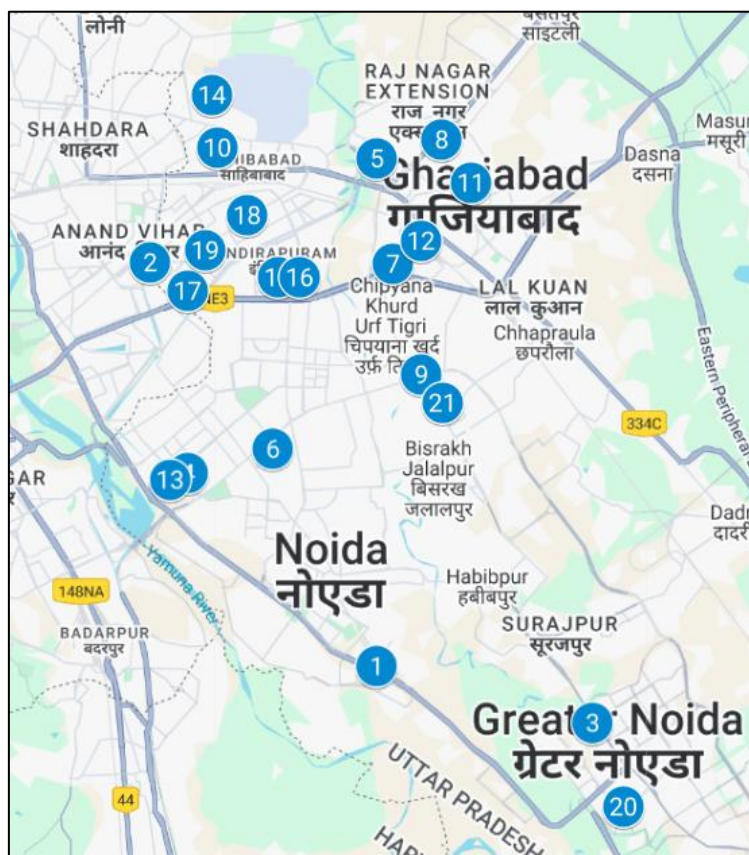


Figure- 23: Hotspot locations

4.3.2 Hotspot covered

1. Advant Navis Business Park, Noida
2. Anand Vihar ISBT, Ghaziabad
3. Apeejay School, Greater Noida
4. Brahmaputra Market, Noida
5. Christ University, Ghaziabad
6. Cloudnine Hospital, Noida
7. Dav Public School, Ghaziabad
8. Delhi Public School, Ghaziabad
9. Gaur City Mall, Greater Noida
10. Gaur Plaza, Ghaziabad
11. Ghaziabad District and Session Court
12. Ghaziabad Railway Station
13. GIP Mall, Noida
14. Hindon Airport, Ghaziabad
15. Indirapuram Habitat Centre
16. Jaipuria Mall, Indirapuram
17. Max Super Speciality Hospital, Ghaziabad
18. Sahibabad Fruit Mandi
19. St. Xavier's High School, Greater Noida
20. Vaishali Metro Station
21. Yatharth Hospital, Greater Noida

4.3.3 Voice performance

Overall Voice Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	210	210	210	210
Call Setup Success Rate %	100.00	74.76	99.52	100.00
Drop Call Rate %	0.00	3.82	0.00	0.00
Call Setup Time-Average (Second)	0.78	3.46	0.64	0.50

Table-18: Overall summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Advant Navis Business Park, Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	1.05	-	0.61	0.46

Table-19: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Note- “-” Call setup time & drop call rate have not been reported as all calls were failed at this location.

Anand Vihar ISBT, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.69	2.70	0.54	0.45

Table-20: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Apeejay School, Greater Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	0.69	-	0.63	0.46

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

Note- “-” Call setup time & drop call rate have not been reported as all calls were failed at this location.

Brahmaputra Market, Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.68	3.00	0.57	0.46

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

Christ University, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.65	2.40	0.68	0.47

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

Cloudnine Hospital, Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.70	3.02	0.68	0.50

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

Dav Public School, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	40.00	100.00	100.00
Drop Call Rate %	0.00	75.00	0.00	0.00
Call Setup Time-Average (Second)	0.71	7.49	0.57	0.47

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

Delhi Public School, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.96	4.57	0.56	0.50

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

Gaur City Mall, Greater Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	50.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.84	2.73	0.61	0.53

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

Gaur Plaza, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.71	3.10	0.56	0.49

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

Ghaziabad District and Session Court				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.86	3.42	0.53	0.61

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

Ghaziabad Railway Station				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.62	3.24	0.57	0.49

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

GIP Mall, Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.87	3.89	0.55	0.48

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

Hindon Airport, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	80.00	90.00	100.00
Drop Call Rate %	0.00	12.50	0.00	0.00
Call Setup Time-Average (Second)	0.80	3.35	1.82	0.53

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

Indirapuram Habitat Centre				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	0.77	-	0.54	0.54

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

Note- "-" Call setup time & drop call rate have not been reported as all calls were failed at this location.

Jaipuria Mall, Indirapuram				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.74	3.04	0.54	0.49

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

Max Super Speciality Hospital, Ghaziabad				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.71	3.33	0.60	0.54

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

Sahibabad Fruit Mandi				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.80	2.76	0.55	0.56

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

St. Xavier's High School, Greater Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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)	0.95	3.83	0.83	0.51

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

Vaishali Metro Station				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	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	20.00	0.00	0.00
Call Setup Time-Average (Second)	0.71	5.00	0.54	0.48

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

Yatharth Hospital, Greater Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	0.80	-	0.55	0.43

Table-39: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Call setup time & drop call rate have not been reported as all calls were failed at this location.

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	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	203.16	1.55	98.13	76.25
Download Throughput 80th Percentile (Mbit/s)	283.17	2.29	133.84	156.88
Download Throughput 20th Percentile (Mbit/s)	61.53	0.69	9.80	6.63
Download Session Setup Success Rate %	100.00	62.86	89.52	96.19
Upload Throughput Average (Mbits/s)	19.53	0.85	23.75	15.62
Upload Throughput 80th Percentile (Mbit/s)	32.15	1.18	37.13	22.13
Upload Throughput 20th Percentile (Mbit/s)	5.24	0.31	7.03	5.22
Upload Session Setup Success Rate %	100.00	61.90	95.24	96.19
Web Browsing Delay (Second)	3.28	4.36	2.34	2.44
Youtube Initial Buffer Delay (Second)	1.23	4.00	0.78	1.24
Latency (ms) - 50th Percentile	17.15	42.38	18.45	38.00
Jitter (ms)	27.58	187.12	72.35	13.52
Packet Loss Rate%	3.31	34.21	36.07	0.90
Packet Loss Rate- 90th percentile	7.10	100.00	41.80	2.00

Table-40: Overall Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Advant Navis Business Park, Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	154.41	3.78	37.92	1.85
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	10.45	2.23	3.54	3.20
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.56	2.99	1.93	2.97
Youtube Initial Buffer Delay (Second)	4.01	1.82	1.07	4.83
Latency (ms) - 50th Percentile	20.10	44.28	26.55	40.05
Jitter (ms)	85.98	14.17	53.96	59.68
Packet Loss Rate%	7.10	0.20	36.70	2.00

Table-41: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G)

Anand Vihar ISBT, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	167.59	0.90	9.21	14.10
Download Session Setup Success Rate %	100.00	40.00	100.00	60.00
Upload Throughput Average (Mbits/s)	7.05	0.79	27.72	2.16
Upload Session Setup Success Rate %	100.00	20.00	100.00	80.00
Web Browsing Delay (Second)	3.74	7.85	2.15	3.74
Youtube Initial Buffer Delay (Second)	1.97	8.42	0.74	-
Latency (ms) - 50th Percentile	18.70	843.00	21.88	42.45
Jitter (ms)	16.64	1146.43	14.30	12.41
Packet Loss Rate%	0.30	87.90	15.40	0.40

Table-42: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- " Youtube tests were failed.

Apeejay School, Greater Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	162.54	0.18	161.28	40.69
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	25.35	0.08	8.88	10.73
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.69	0.00	2.23	2.25
Youtube Initial Buffer Delay (Second)	0.65	-	0.69	0.67
Latency (ms) – 50 th Percentile	16.25	190.75	21.55	28.30
Jitter (ms)	24.71	152.59	50.46	2.72
Packet Loss Rate%	3.00	96.20	36.40	0.00

Table-43: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- " Youtube tests were failed.

Brahmaputra Market, Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	642.95	1.03	706.26	198.18
Download Session Setup Success Rate %	100.00	80.00	80.00	100.00
Upload Throughput Average (Mbits/s)	78.18	0.72	58.68	40.67
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	2.48	4.68	2.21	2.35
Youtube Initial Buffer Delay (Second)	0.63	4.28	0.67	0.65
Latency (ms) - 50th Percentile	11.30	36.88	13.18	46.75
Jitter (ms)	8.82	19.06	2.93	8.14
Packet Loss Rate%	0.70	6.10	43.00	0.10

Table-44: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Christ University, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	164.52	1.39	11.28	83.24
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.48	0.67	14.14	16.80
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	2.53	3.63	2.56	2.11
Youtube Initial Buffer Delay (Second)	1.54	4.65	0.70	0.72
Latency (ms)- 50th Percentile	18.35	28.78	17.60	46.73
Jitter (ms)	16.12	77.31	9.70	23.47
Packet Loss Rate%	0.90	7.90	41.50	8.70

Table-45: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Cloudnine Hospital, Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	199.30	2.15	73.99	139.26
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.79	1.68	31.96	6.92
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	2.28	3.87	2.49	2.26
Youtube Initial Buffer Delay (Second)	0.87	1.42	1.64	0.71
Latency (ms)- 50th Percentile	12.55	24.80	18.30	50.00
Jitter (ms)	2.68	6.97	11.87	10.62
Packet Loss Rate%	0.20	0.10	26.60	0.80

Table-46: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Dav Public School, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	113.99	-	11.72	133.82
Download Session Setup Success Rate%	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	18.95	-	26.50	9.27
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	2.46	-	2.31	2.19
Youtube Initial Buffer Delay (Second)	0.86	-	0.58	0.54
Latency (ms)- 50th Percentile	18.63	-	13.00	46.15
Jitter (ms)	9.74	-	6.56	16.71
Packet Loss Rate%	0.20	100.00	35.90	0.30

Table-47: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- " All tests were failed.
--

Delhi Public School, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	172.64	2.13	10.98	31.47
Download Session Setup Success Rate%	100.00	60.00	80.00	100.00
Upload Throughput Average (Mbits/s)	5.54	0.41	20.50	5.94
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	2.55	3.52	2.24	2.29
Youtube Initial Buffer Delay (Second)	0.72	5.00	0.57	1.91
Latency (ms)- 50th Percentile	28.25	36.65	16.93	48.00
Jitter (ms)	78.48	17.45	7.20	21.77
Packet Loss Rate%	7.30	3.30	37.00	2.40

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

Gaur City Mall, Greater Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	10.74	0.58	247.60	27.44
Download Session Setup Success Rate%	100.00	40.00	100.00	100.00
Upload Throughput Average (Mbits/s)	7.77	0.91	8.11	8.97
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.98	6.27	2.62	2.31
Youtube Initial Buffer Delay (Second)	1.34	7.90	0.79	0.73
Latency (ms)- 50th Percentile	59.00	39.45	21.65	29.80
Jitter (ms)	66.91	86.40	23.93	3.21
Packet Loss Rate%	35.00	18.00	25.10	0.00

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

Gaur Plaza, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	199.97	1.12	9.57	17.02
Download Session Setup Success Rate%	100.00	100.00	80.00	60.00
Upload Throughput Average (Mbits/s)	33.34	0.67	13.33	2.33
Upload Session Setup Success Rate %	100.00	60.00	100.00	60.00
Web Browsing Delay (Second)	2.07	5.89	2.19	2.22
Youtube Initial Buffer Delay (Second)	0.81	5.03	0.62	0.97
Latency (ms)- 50th Percentile	14.30	37.40	18.70	35.10
Jitter (ms)	5.55	10.75	17.95	6.78
Packet Loss Rate%	0.20	0.50	30.80	0.40

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

Ghaziabad District And Session Court				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	279.58	2.45	9.81	6.16
Download Session Setup Success Rate%	100.00	100.00	60.00	100.00
Upload Throughput Average (Mbits/s)	7.92	0.70	3.23	7.21
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.22	3.56	3.12	2.20
Youtube Initial Buffer Delay (Second)	0.66	2.96	0.63	1.20
Latency (ms)- 50th Percentile	13.60	30.50	15.50	33.13
Jitter (ms)	5.39	63.43	5.72	3.69
Packet Loss Rate%	0.10	7.60	35.80	0.40

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

Ghaziabad Railway Station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	89.91	1.34	9.14	48.95
Download Session Setup Success Rate%	100.00	40.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.20	0.72	16.38	33.71
Upload Session Setup Success Rate %	100.00	40.00	100.00	80.00
Web Browsing Delay (Second)	3.46	3.60	2.39	2.66
Youtube Initial Buffer Delay (Second)	2.25	-	0.74	0.56
Latency (ms)- 50th Percentile	13.25	52.00	22.13	44.75
Jitter (ms)	19.80	17.58	17.36	8.86
Packet Loss Rate%	2.60	10.60	36.10	0.10

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

Note- "- " Youtube tests were failed.				
GIP Mall, Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	88.66	1.57	127.79	148.47
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	22.35	1.52	34.24	39.00
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	4.16	3.66	2.32	2.95
Youtube Initial Buffer Delay (Second)	1.27	4.65	0.56	0.72
Latency (ms)- 50th Percentile	19.78	84.50	16.05	47.63
Jitter (ms)	10.67	21.47	10.82	12.00
Packet Loss Rate%	0.30	44.00	35.60	0.50

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

Hindon Airport, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	156.64	0.84	3.26	1.93
Download Session Setup Success Rate%	100.00	60.00	40.00	100.00
Upload Throughput Average (Mbits/s)	2.97	0.19	0.00	4.53
Upload Session Setup Success Rate %	100.00	60.00	60.00	100.00
Web Browsing Delay (Second)	2.10	-	4.92	3.01
Youtube Initial Buffer Delay (Second)	2.27	-	2.56	4.53
Latency (ms)- 50th Percentile	17.73	59.00	157.50	29.85
Jitter (ms)	8.54	9.40	315.93	2.87
Packet Loss Rate%	0.20	8.90	67.70	0.20

Table-54: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G)

Note- "- "Web browsing & Youtube tests were failed.				
Indirapuram Habitat Centre				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	170.66	-	12.73	130.28
Download Session Setup Success Rate%	100.00	0.00	80.00	100.00
Upload Throughput Average (Mbits/s)	8.55	-	62.91	14.53
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	2.18	-	2.05	2.51
Youtube Initial Buffer Delay (Second)	0.74	-	0.64	0.75
Latency (ms)- 50th Percentile	14.55	-	12.45	44.83
Jitter (ms)	4.77	-	5.03	18.90
Packet Loss Rate%	0.00	100.00	41.70	0.80

Table-55: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- "All tests were failed.				
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Jaipuria Mall, Indirapuram				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	744.66	-	12.73	46.92
Download Session Setup Success Rate%	100.00	0.00	80.00	100.00
Upload Throughput Average (Mbits/s)	78.05	-	40.17	54.53
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	2.95	-	2.10	2.07
Youtube Initial Buffer Delay (Second)	0.56	-	0.57	0.64
Latency (ms)- 50th Percentile	14.25	-	13.05	48.55
Jitter (ms)	51.77	-	5.87	8.78
Packet Loss Rate%	0.70	100.00	36.90	0.10

Table-56: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- "All tests were failed.

Max Super Speciality Hospital, Ghaziabad				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	72.88	0.81	9.28	238.68
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	8.23	0.36	4.08	17.82
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	3.65	4.26	2.29	2.40
Youtube Initial Buffer Delay (Second)	0.81	5.88	1.10	0.70
Latency (ms)- 50th Percentile	16.95	36.75	22.75	49.35
Jitter (ms)	76.59	93.86	16.81	23.43
Packet Loss Rate%	4.40	11.60	36.30	0.40

Table-57: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G)

Sahibabad Fruit Mandi				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	201.50	1.42	10.57	5.72
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	14.55	0.86	13.26	3.04
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	5.16	3.18	2.14	2.51
Youtube Initial Buffer Delay (Second)	0.82	1.77	0.84	0.96
Latency (ms)- 50th Percentile	28.00	36.35	30.18	36.90
Jitter (ms)	10.45	53.74	8.84	20.29
Packet Loss Rate%	1.70	5.70	41.70	0.80

Table-58: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

St. Xavier's High School, Greater Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	4.60	0.16	8.16	7.87
Download Session Setup Success Rate%	100.00	40.00	80.00	100.00
Upload Throughput Average (Mbits/s)	1.26	0.05	0.00	6.14
Upload Session Setup Success Rate %	100.00	40.00	40.00	100.00
Web Browsing Delay (Second)	11.64	12.35	0.00	2.43
Youtube Initial Buffer Delay (Second)	-	-	-	0.88
Latency (ms)- 50th Percentile	26.00	83.75	21.05	34.60
Jitter (ms)	44.98	669.99	660.52	6.20
Packet Loss Rate%	4.10	66.50	19.90	0.20

Table-59: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- "Youtube tests were failed.

Vaishali Metro Station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	310.90	1.20	11.18	191.49
Download Session Setup Success Rate%	100.00	20.00	100.00	100.00
Upload Throughput Average (Mbits/s)	32.57	0.00	23.96	11.82
Upload Session Setup Success Rate %	100.00	20.00	100.00	100.00
Web Browsing Delay (Second)	5.09	-	2.30	2.29
Youtube Initial Buffer Delay (Second)	0.63	-	0.61	1.14
Latency (ms)- 50th Percentile	16.40	43.58	15.35	43.85
Jitter (ms)	5.69	14.95	6.51	9.46
Packet Loss Rate%	0.10	12.00	41.80	0.30

Table-60: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "- " Web browsing & Youtube tests were failed.

Yatharth Hospital, Greater Noida				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	157.65	2.48	508.26	33.69
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	3.85	0.87	44.50	8.37
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.85	3.42	2.13	2.15
Youtube Initial Buffer Delay (Second)	1.12	5.10	0.67	0.70
Latency (ms)- 50th Percentile	17.75	48.60	20.70	32.10
Jitter (ms)	26.76	1205.07	6.99	3.93
Packet Loss Rate%	0.40	31.40	35.50	0.10

Table-61: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

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

Overall Data Performance					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	198.72	-	108.41	147.51
	Upload Throughput Average (Mbits/s)	19.70	-	21.88	14.36
4G	Download Throughput Average (Mbits/s)	20.82	-	16.19	19.60
	Upload Throughput Average (Mbits/s)	7.18	-	8.98	6.49

Table-62: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Advant Navis Business Park, Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	131.88	-	19.61	-
	Upload Throughput Average (Mbits/s)	12.05	-	4.06	-
4G	Download Throughput Average (Mbits/s)	2.93	-	6.46	26.20
	Upload Throughput Average (Mbits/s)	1.25	-	-	10.39

Table-63: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Anand Vihar ISBT, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	270.68	-	9.77	-
	Upload Throughput Average (Mbits/s)	11.55	-	28.10	-
4G	Download Throughput Average (Mbits/s)	11.70	-	4.69	10.50
	Upload Throughput Average (Mbits/s)	4.98	-	6.42	3.31

Table-64: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Apeejay School, Greater Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	183.52	-	174.32	-
	Upload Throughput Average (Mbits/s)	36.35	-	9.45	-
4G	Download Throughput Average (Mbits/s)	18.85	-	19.46	44.00
	Upload Throughput Average (Mbits/s)	7.43	-	6.77	6.56

Table-65: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Brahmaputra Market, Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	709.07	324.09
	Upload Throughput Average (Mbits/s)	-	-	61.44	-
4G	Download Throughput Average (Mbits/s)	55.03	-	73.49	28.45
	Upload Throughput Average (Mbits/s)	12.62	-	18.78	12.79

Table-66: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
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Christ University, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	98.86	-	10.40	201.26
	Upload Throughput Average (Mbits/s)	3.16	-	14.22	8.75
4G	Download Throughput Average (Mbits/s)	51.23	-	6.49	18.65
	Upload Throughput Average (Mbits/s)	11.18	-	15.31	12.18

Table-67: Overall Summary of 5G only & 4G only data download & upload speed.

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

Cloudnine Hospital, Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	303.40	-	72.45	137.17
	Upload Throughput Average (Mbits/s)	14.33	-	24.45	14.86
4G	Download Throughput Average (Mbits/s)	54.1	-	42.12	12.49
	Upload Throughput Average (Mbits/s)	12.09	-	8.14	3.56

Table-68: Overall Summary of 5G only & 4G only data download & upload speed.

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

Dav Public School, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	170.20	-	11.65	183.04
	Upload Throughput Average (Mbits/s)	19.97	-	15.31	26.21
4G	Download Throughput Average (Mbits/s)	13.16	-	6.55	12.12
	Upload Throughput Average (Mbits/s)	14.34	-	15.33	9.43

Table-69: Overall Summary of 5G only & 4G only data download & upload speed.

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

Delhi Public School, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	202.00	-	11.39	72.02
	Upload Throughput Average (Mbits/s)	4.91	-	15.08	5.19
4G	Download Throughput Average (Mbits/s)	3.10	-	5.83	15.54
	Upload Throughput Average (Mbits/s)	1.38	-	4.62	8.35

Table-70: Overall Summary of 5G only & 4G only data download & upload speed.

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

Gaur City Mall, Greater Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	8.21	-	234.90	-
	Upload Throughput Average (Mbits/s)	-	-	12.83	-
4G	Download Throughput Average (Mbits/s)	10.08	-	21.16	14.15
	Upload Throughput Average (Mbits/s)	1.55	-	5.03	0.80

Table-71: Overall Summary of 5G only & 4G only data download & upload speed.

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

Gaur Plaza, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	307.92	-	7.13	-
	Upload Throughput Average (Mbits/s)	54.59	-	11.81	-
4G	Download Throughput Average (Mbits/s)	14.15	-	5.79	22.30
	Upload Throughput Average (Mbits/s)	13.24	-	10.38	2.41

Table-72: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
Ghaziabad District and Session Court					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	297.08	-	10.23	-
	Upload Throughput Average (Mbits/s)	13.24	-	6.38	-
4G	Download Throughput Average (Mbits/s)	5.57	-	5.49	13.46
	Upload Throughput Average (Mbits/s)	2.10	-	4.32	6.59

Table-73: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
Ghaziabad Railway Station					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	132.32	-	10.58	47.65
	Upload Throughput Average (Mbits/s)	11.86	-	22.00	42.94
4G	Download Throughput Average (Mbits/s)	32.64	-	5.76	3.02
	Upload Throughput Average (Mbits/s)	19.35	-	4.11	-

Table-74: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
GIP Mall, Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	110.26	-	322.61	-
	Upload Throughput Average (Mbits/s)	29.08	-	25.47	-
4G	Download Throughput Average (Mbits/s)	1.38	-	17.64	35.21
	Upload Throughput Average (Mbits/s)	1.07	-	5.83	16.71

Table-75: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
Hindon Airport, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	78.10	-	0.26	-
	Upload Throughput Average (Mbits/s)	4.58	-	-	-
4G	Download Throughput Average (Mbits/s)	5.51	-	3.42	12.07
	Upload Throughput Average (Mbits/s)	2.97	-	2.27	4.95

Table-76: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
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Indirapuram Habitat Centre					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	11.65	-
	Upload Throughput Average (Mbits/s)	-	-	58.53	-
4G	Download Throughput Average (Mbits/s)	20.69	-	5.76	28.87
	Upload Throughput Average (Mbits/s)	8.14	-	2.84	2.36

Table-77: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Jaipuria Mall, Indirapuram					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	507.71	-	9.69	-
	Upload Throughput Average (Mbits/s)	74.48	-	30.84	-
4G	Download Throughput Average (Mbits/s)	41.32	-	6.46	23.78
	Upload Throughput Average (Mbits/s)	10.96	-	18.03	7.56

Table-78: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Max Super Speciality Hospital, Ghaziabad					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	75.61	-	8.29	-
	Upload Throughput Average (Mbits/s)	8.39	-	5.04	-
4G	Download Throughput Average (Mbits/s)	16.03	-	6.35	11.28
	Upload Throughput Average (Mbits/s)	5.47	-	6.99	3.92

Table-79: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
Sahibabad Fruit Mandi					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	251.26	-	10.01	-
	Upload Throughput Average (Mbits/s)	19.08	-	18.70	-
4G	Download Throughput Average (Mbits/s)	32.33	-	4.82	-
	Upload Throughput Average (Mbits/s)	6.81	-	6.55	-

Table-80: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
St. Xavier's High School, Greater Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	0.21	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	6.43	-	7.55	6.58
	Upload Throughput Average (Mbits/s)	2.11	-	1.49	5.53

Table-81: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "--Respective technology was not observed during the test.					
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Vaishali Metro Station					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	145.55	-	11.62	-
	Upload Throughput Average (Mbits/s)	38.88	-	26.92	-
4G	Download Throughput Average (Mbits/s)	18.02	-	6.37	6.78
	Upload Throughput Average (Mbits/s)	5.06	-	17.76	1.78

Table-82: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
Yatharth Hospital, Greater Noida					
Parameters		Service Provider			
		AIRTEL	MTNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	105.71	-	514.96	-
	Upload Throughput Average (Mbits/s)	4.67	-	25.06	-
4G	Download Throughput Average (Mbits/s)	22.86	-	83.47	40.40
	Upload Throughput Average (Mbits/s)	3.18	-	18.73	3.25

Table-83: Overall Summary of 5G only & 4G only data download & upload speed.

Note- “-”Respective technology was not observed during the test.					
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4.4 Walk Test

Walk Test has been conducted on 16th July 2025. Two locations have been tested in the city.

4.4.1 Walk test locations

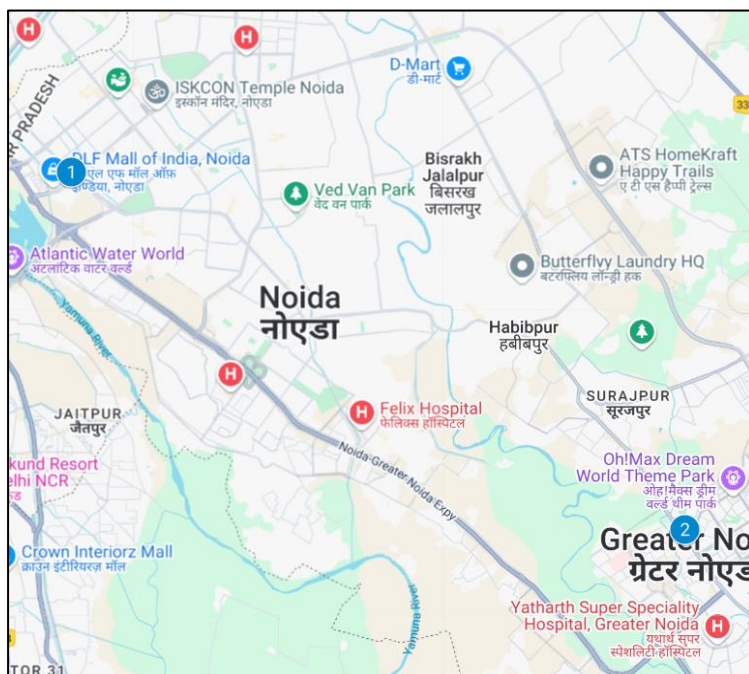


Figure-24: Walk Test locations.

4.4.2 Walk Test Covered

1. Atta Market Noida
2. Jagat Farm Market Greater Noida

4.4.3 Voice Performance

Atta Market Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	12	14	13	12
Call Setup Success Rate %	100.00	92.86	100.00	100.00
Drop Call Rate %	0.00	15.38	0.00	0.00
Call Setup Time-Average (Second)	1.20	3.18	0.62	0.72

Table-84: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Jagat Farm Market Greater Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Call Attempt	13	52	14	13
Call Setup Success Rate %	100.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	0.74	-	0.57	0.52

Table-85: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Call setup time & drop call rate have not been reported as all calls were failed at this location.

4.4.4 Data Performance

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

Atta Market Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	21.16	1.13	144.83	178.24
Download Session Setup Success Rate %	100.00	75.00	61.54	100.00
Upload Throughput Average (Mbits/s)	7.76	0.55	20.22	42.47
Upload Session Setup Success Rate %	100.00	56.25	100.00	100.00
Latency (ms) - 50th Percentile	18.35	40.85	24.13	44.08

Table-86: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Jagat Farm Market Greater Noida				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	300.97	0.12	283.93	67.30
Download Session Setup Success Rate %	100.00	68.75	7.14	100.00
Upload Throughput Average (Mbits/s)	50.60	0.09	54.24	9.44
Upload Session Setup Success Rate %	100.00	68.75	84.62	100.00
Latency (ms) - 50th Percentile	13.50	340.50	15.68	32.55

Table-87: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

4.5 Metro

Drive test has been conducted from 14th July 2025 to 15th July 2025 covering six metro routes. (Refer Table-1)

4.5.1 Drive test route

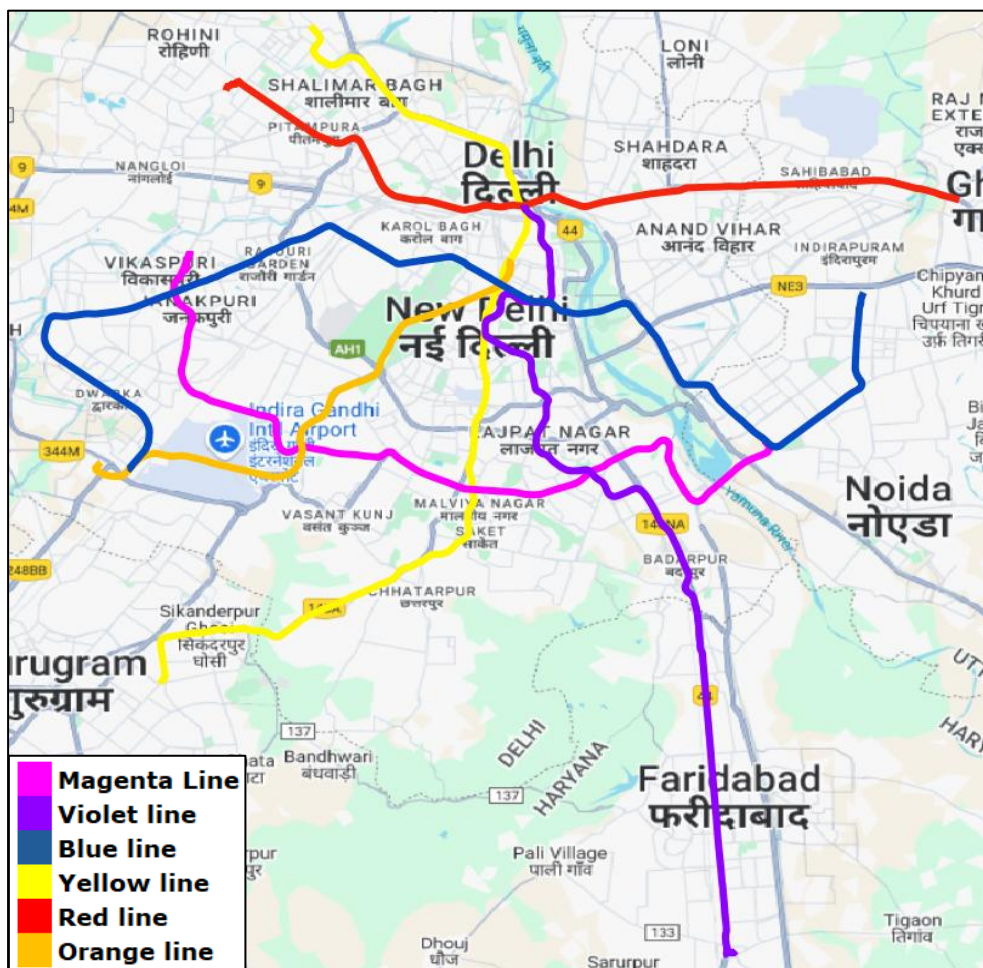


Figure-25: Drive test route metro

4.5.2 Routes Covered

1. Botanical Garden to Krishna Park Extension (Magenta Line)
2. Kashmere Gate to Raja Nahar Singh (Violet line).
3. Noida Electronic City to Dwarka Sec -21 (Blue line).
4. Samaypur Badli to Millennium City Centre (Yellow line).
5. Shaheed Sthal to Rithala (Red line).
6. Yashobhoomi Dwarka Sec-25 to New Delhi (Orange line).

4.5.2.1 Botanical Garden to Krishna Park Extension (Elevated)

i) Voice performance

(a) 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	12	12	12	12
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	25.00	0.00	0.00
Call Setup Time Average (Second)	0.78	3.24	1.46	0.53
Handover Success Rate %	99.40	100.00	99.64	99.22

Table-88: Summary of voice call performance in network auto-selection mode.

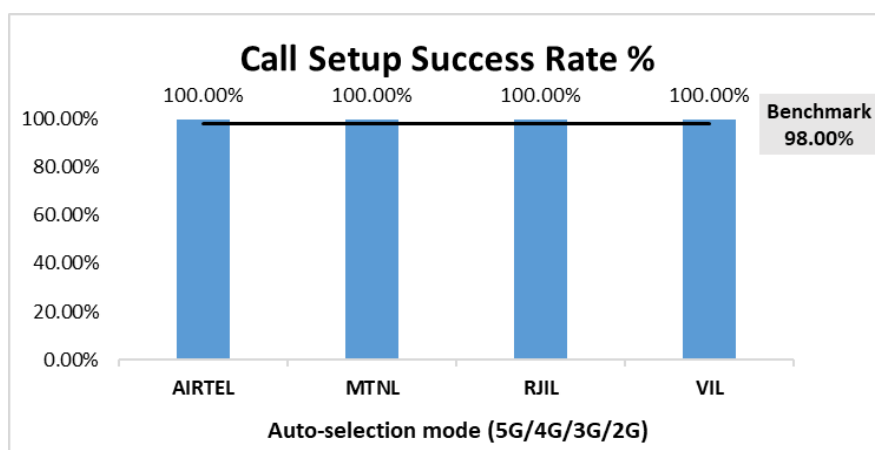


Figure-26: Performance for call setup success rate.

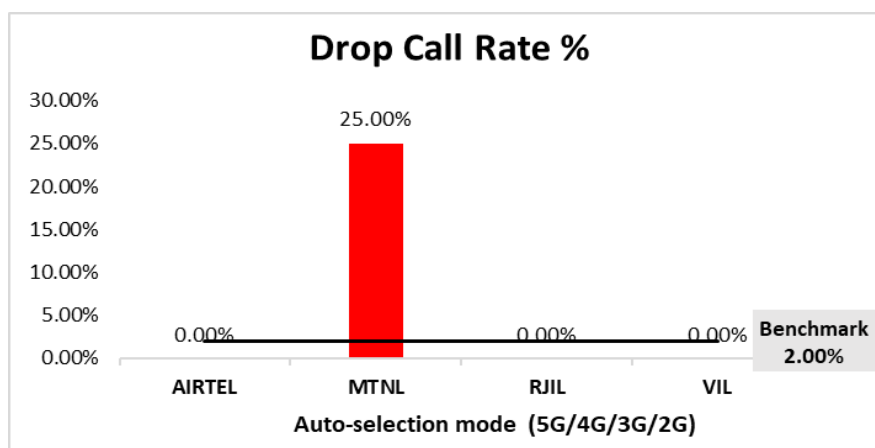


Figure-27: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	9.46%	NA	20.69%	17.50%
4G	90.54%	NA	79.31%	82.50%
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-89:Time spent on technology during drive test.

Note-

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

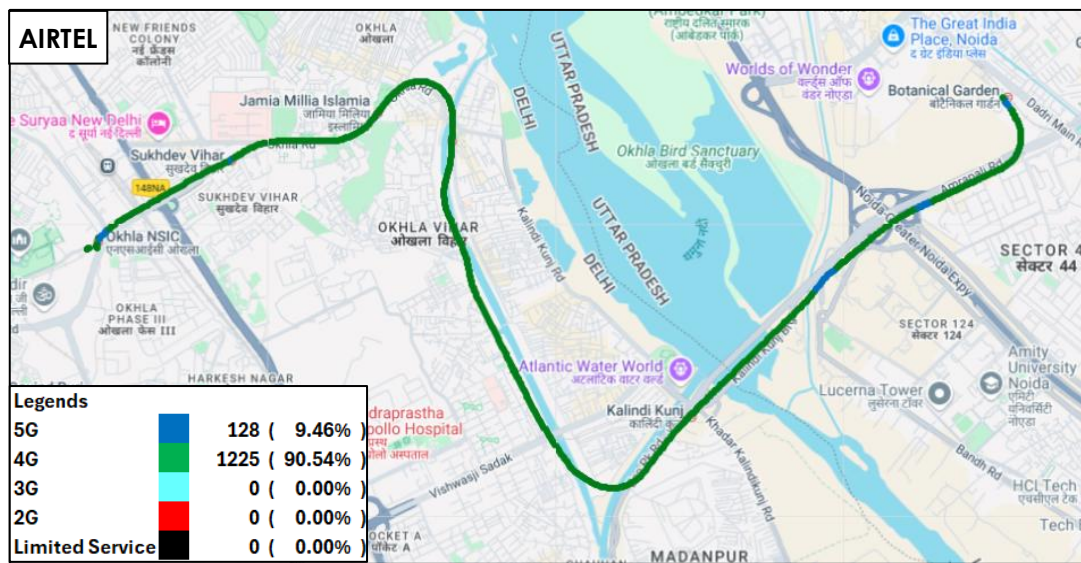


Figure-28: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL.

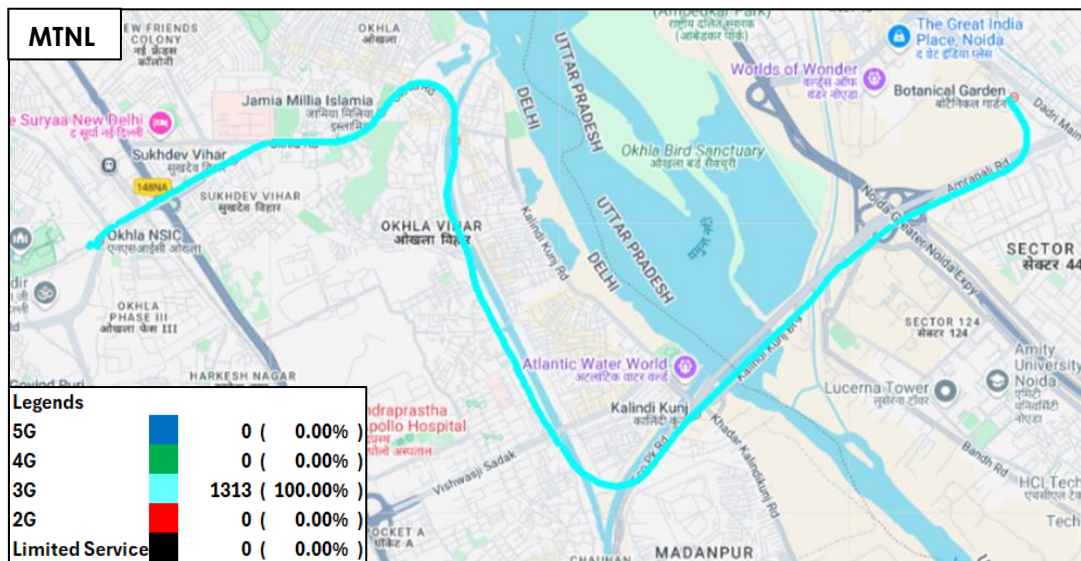


Figure-29: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-MTNL.

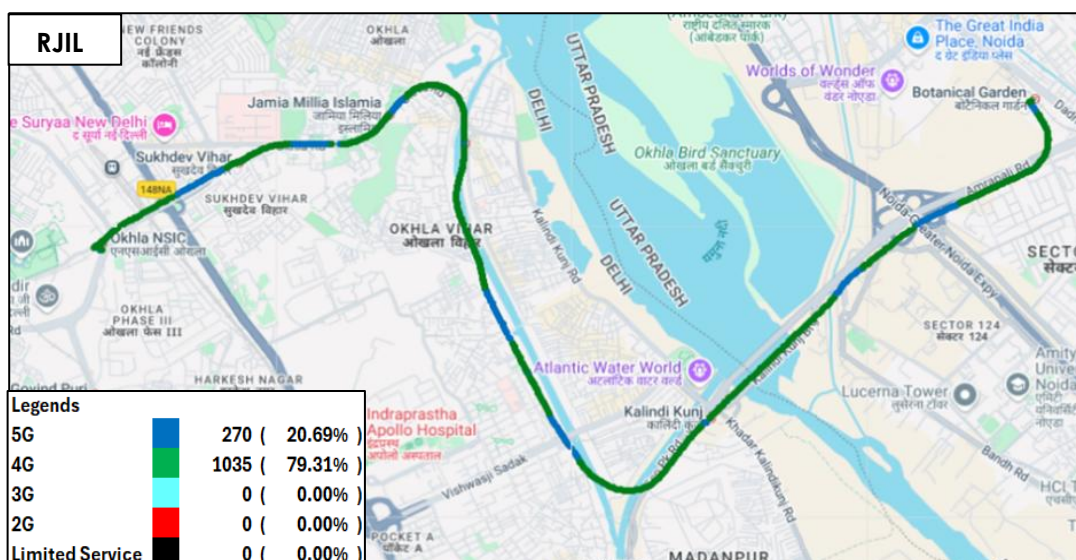


Figure-30: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

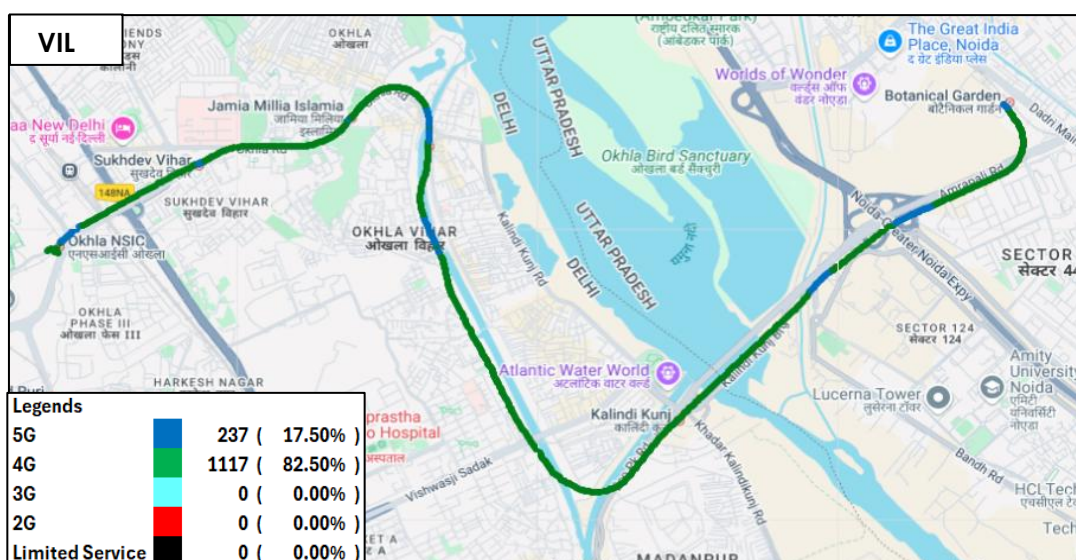


Figure-31: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-103, 104, 105 & 106 for map view)

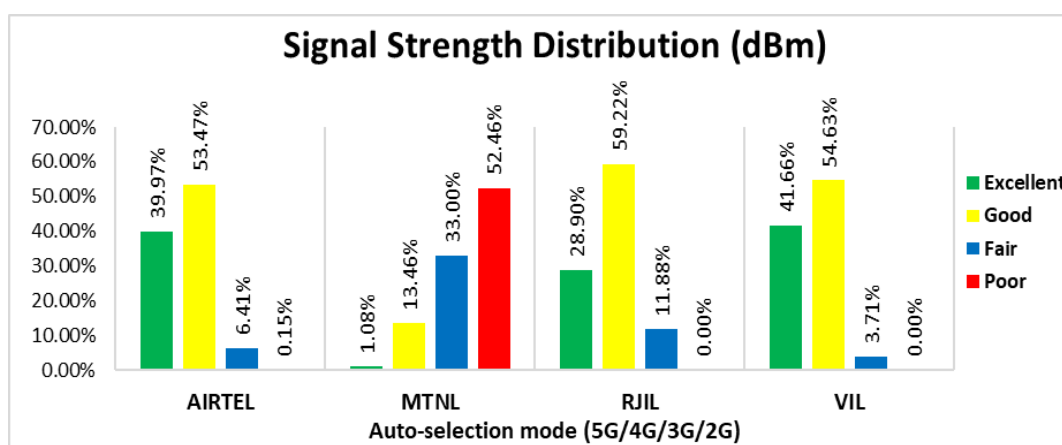


Figure-32: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 40% of samples falling in the excellent signal strength category.
- MTNL has 1% of samples falling in the excellent signal strength category.
- RJIL has 29% of samples falling in the excellent signal strength category.
- VIL has 42% of samples falling in the excellent signal strength category.

ii) 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	60.59	1.03	68.24	119.95
	80th Percentile	77.02	1.60	107.56	158.61
	20th Percentile	19.09	0.43	31.76	75.34
Upload Throughput (Mbits/s)	Average	25.77	1.01	14.19	27.78
	80th Percentile	38.15	1.54	27.43	34.64
	20th Percentile	15.55	0.50	1.07	26.36
Latency (ms)	50th Percentile	19.43	71.50	21.88	46.90

Table-90: Summary of Data performance in network auto-selection mode.

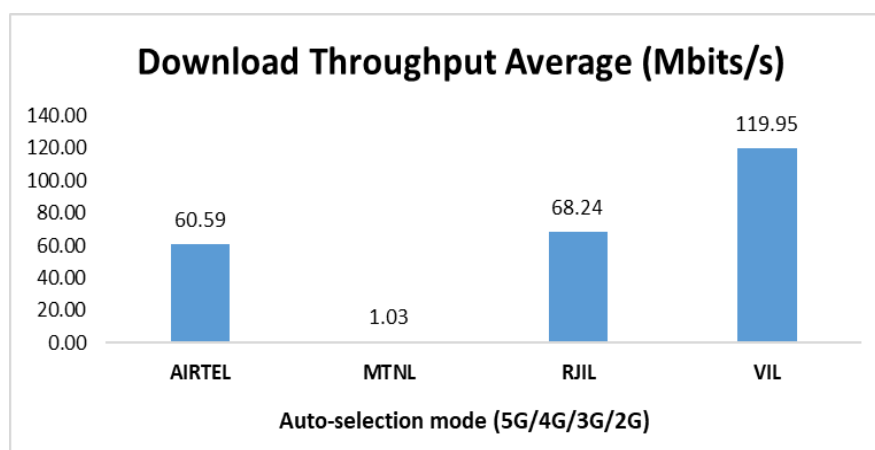


Figure-33: Download throughput

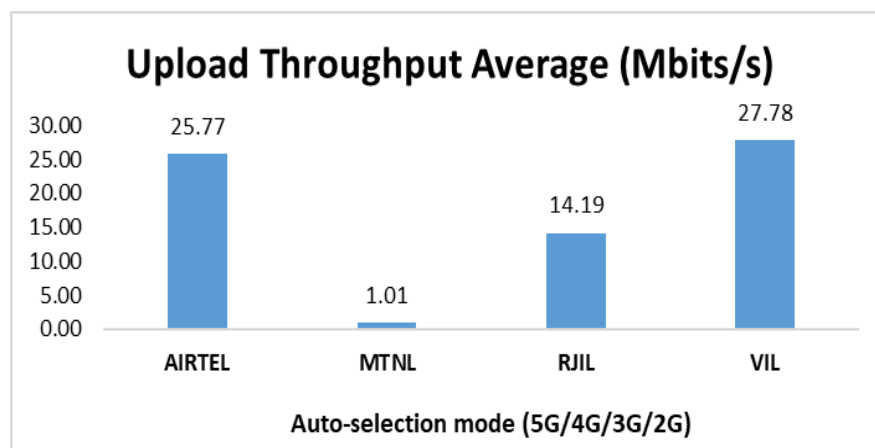


Figure-34: Upload throughput

4.5.2.2 Botanical Garden to Krishna Park Extension (Underground)

i) Voice performance

(a) 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	29	46	31	31
Call Setup Success Rate %	100.00	8.70	87.10	87.10
Drop Call Rate %	0.00	75.00	0.00	0.00
Call Setup Time Average (Second)	1.50	4.32	0.84	0.69
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-91: Summary of voice call performance in network auto-selection mode

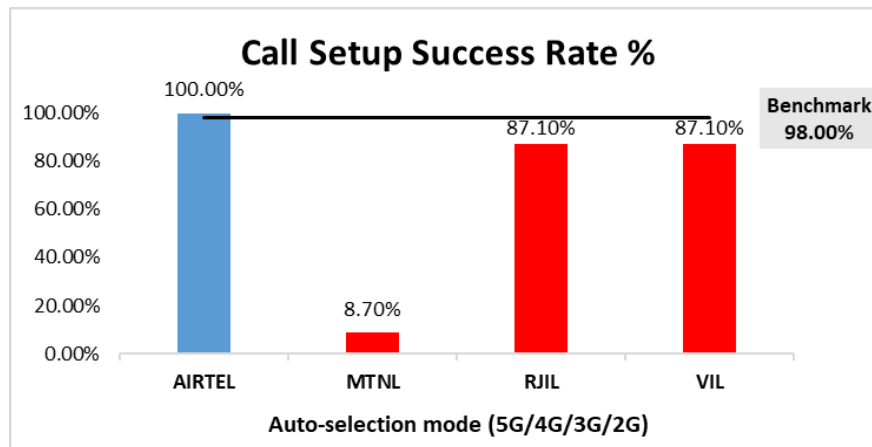


Figure-35: Performance for call setup success rate.

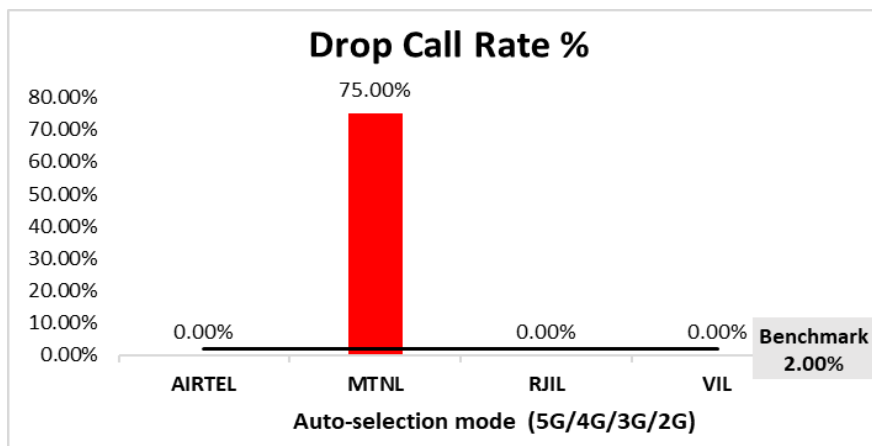


Figure-36: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	3.31%	NA	1.27%	1.58%
4G	96.69%	NA	96.18%	93.40%
3G	NA	26.75%	NA	NA
2G	0.00%	26.19%	NA	0.35%
Limited Service	0.00%	47.05%	2.55%	4.67%

Table-92: Time spent on technology during drive test.

Note-

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

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G).

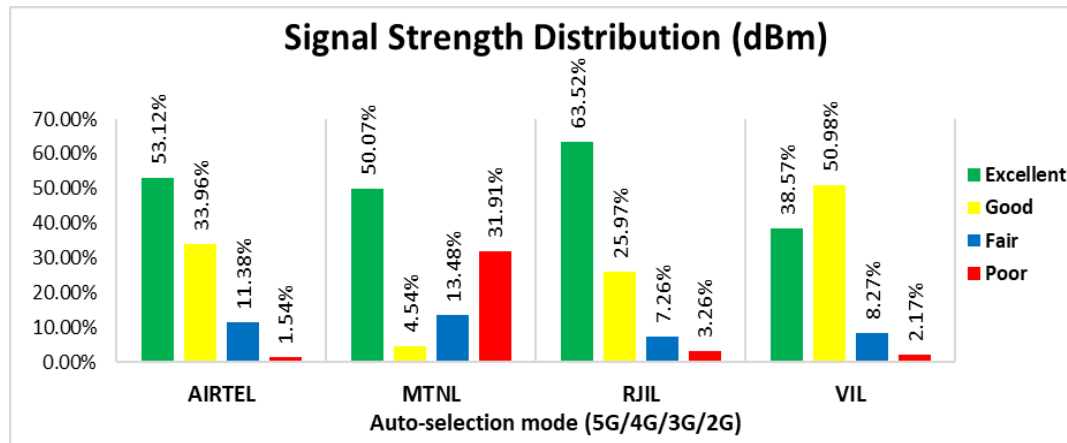


Figure-37: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 53% of samples falling in the excellent signal strength category.
- MTNL has 50% of samples falling in the excellent signal strength category.
- RJIL has 64% of samples falling in the excellent signal strength category.
- VIL has 39% of samples falling in the excellent signal strength category.

ii) 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	9.85	1.63	5.28	24.98
	80th Percentile	10.23	1.99	6.62	25.69
	20th Percentile	0.19	1.28	0.44	6.78
Upload Throughput (Mbits/s)	Average	2.86	1.22	2.80	8.85
	80th Percentile	5.14	1.94	4.97	8.22
	20th Percentile	0.00	0.49	0.40	2.67
Latency (ms)	50th Percentile	71.50	39.50	43.60	38.35

Table-93: Summary of Data performance in network auto-selection mode.

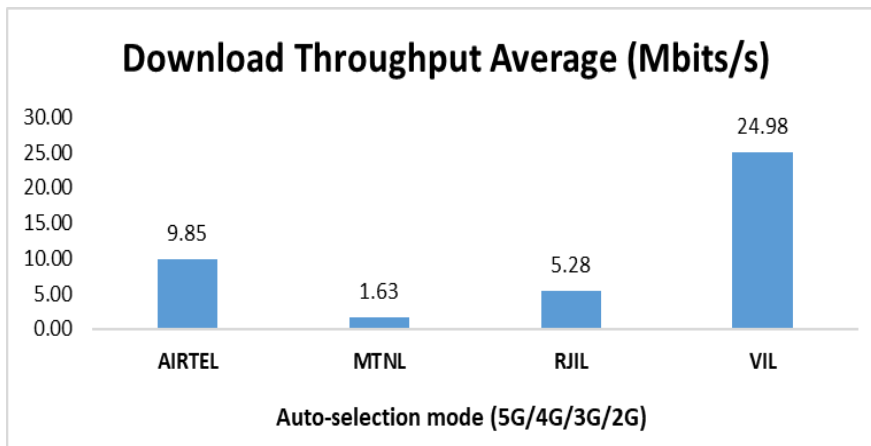


Figure-38: Download throughput

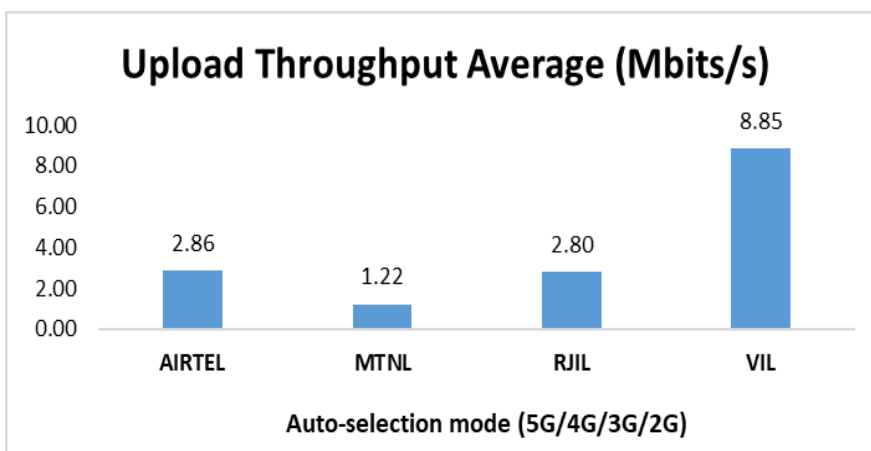


Figure-39: Upload throughput

4.5.2.3 Kashmere Gate to Raja Nahar Singh (Elevated)

i) Voice performance

(a) 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	27	27	27	27
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	3.70	0.00	0.00
Call Setup Time Average (Second)	0.76	3.71	0.74	0.74
Handover Success Rate %	99.48	100.00	99.61	99.70

Table-94: Summary of voice call performance in network auto-selection mode.

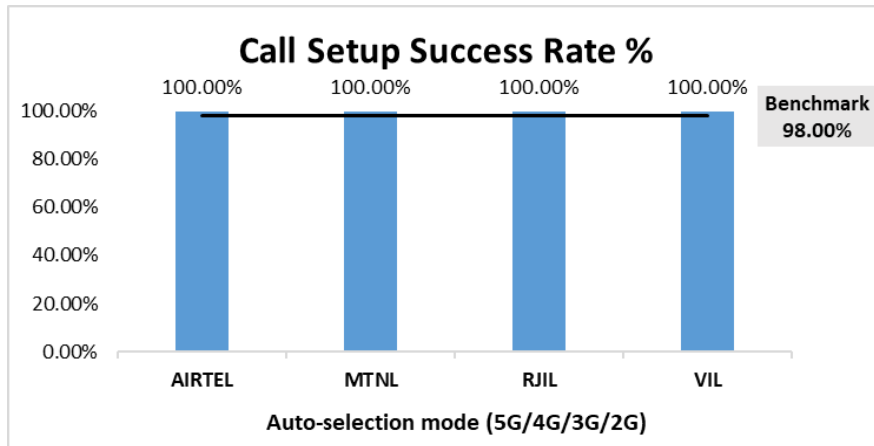


Figure-40: Performance for call setup success rate.

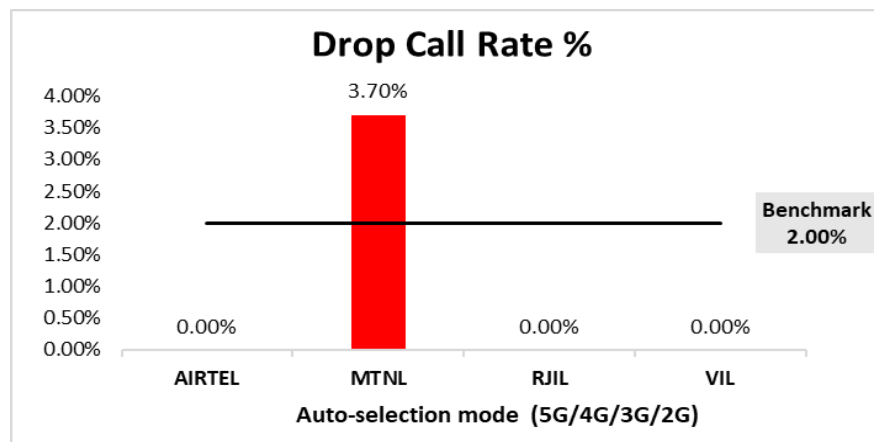


Figure-41: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	2.77%	NA	19.47%	11.39%
4G	97.23%	NA	80.53%	88.61%
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-95:Time spent on technology during drive test.

Note-

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

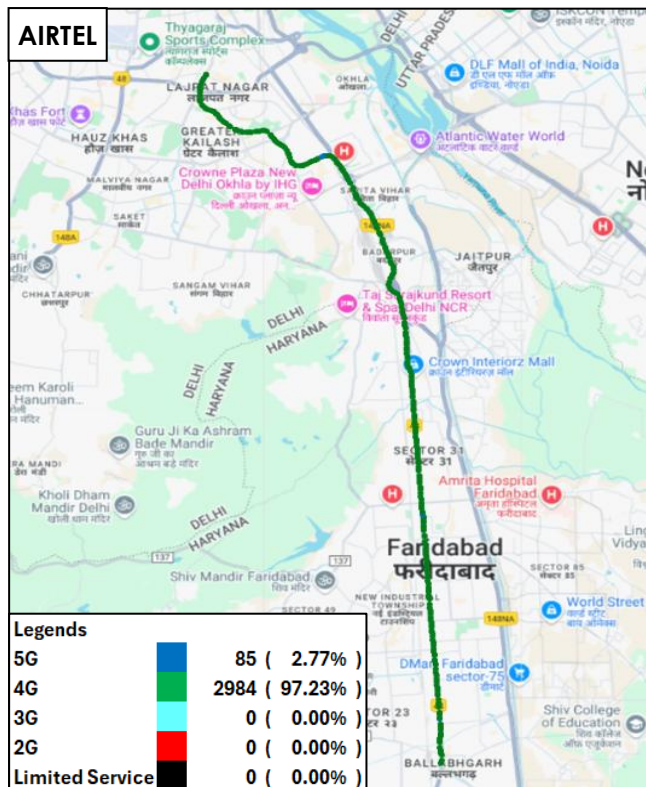


Figure-42: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL.

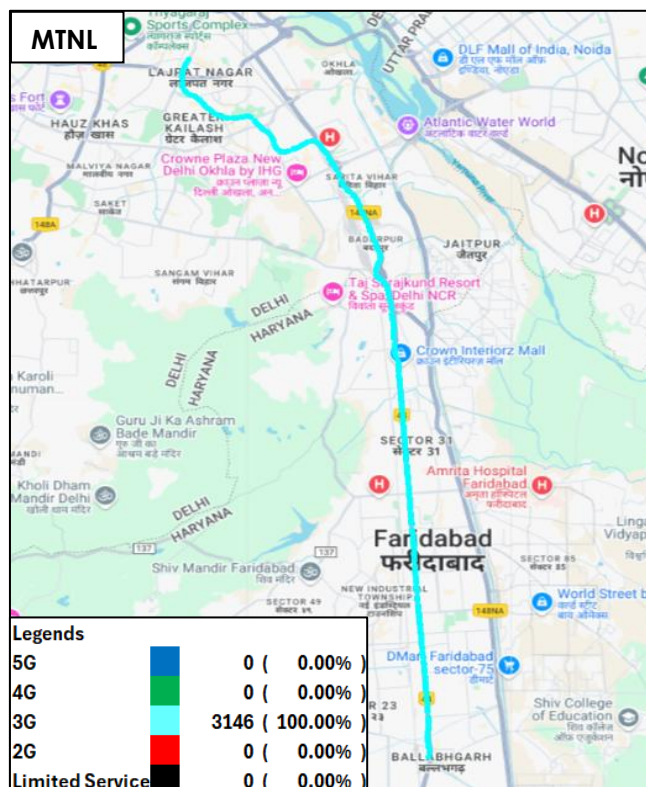


Figure-43: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-MTNL.

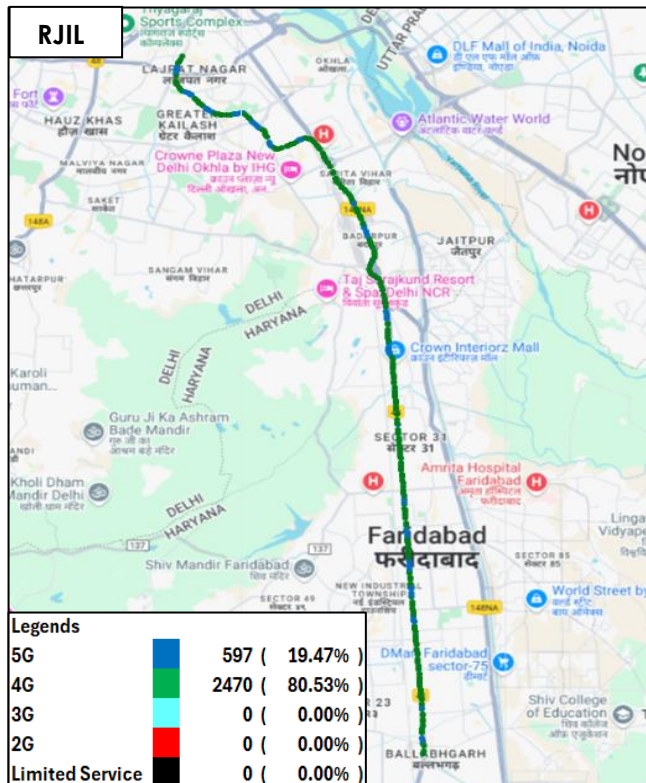


Figure-44: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

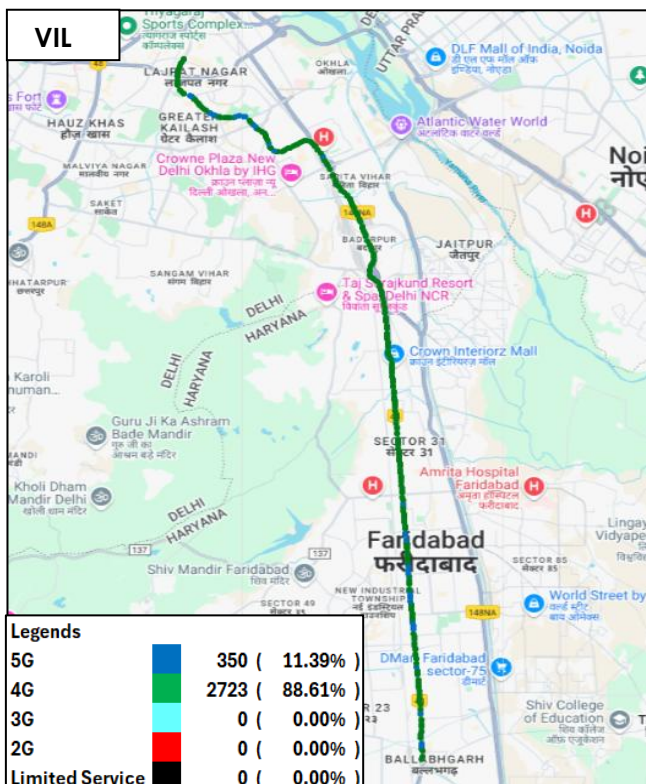


Figure-45: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-107, 108, 109 & 110 for map view)

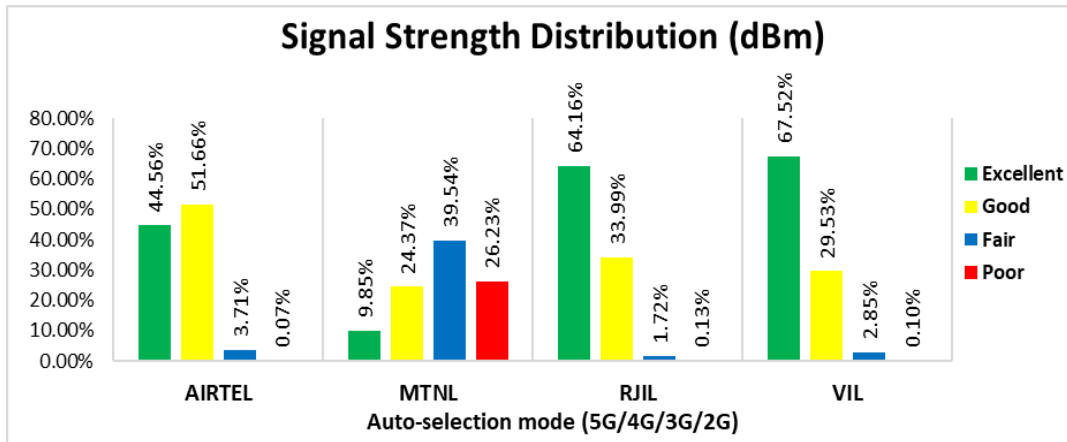


Figure-46: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 45% of samples falling in the excellent signal strength category.
- MTNL has 10% of samples falling in the excellent signal strength category.
- RJIL has 64% of samples falling in the excellent signal strength category.
- VIL has 68% of samples falling in the excellent signal strength category.

ii) 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	47.21	1.30	187.81	44.97
	80th Percentile	55.76	1.65	265.12	91.25
	20th Percentile	7.14	0.97	80.29	6.72
Upload Throughput (Mbits/s)	Average	19.67	1.50	24.20	16.05
	80th Percentile	39.37	2.27	33.97	32.60
	20th Percentile	3.77	0.67	10.52	3.19
Latency (ms)	50th Percentile	18.15	34.10	21.00	37.80

Table-96: Summary of Data performance in network auto-selection mode.

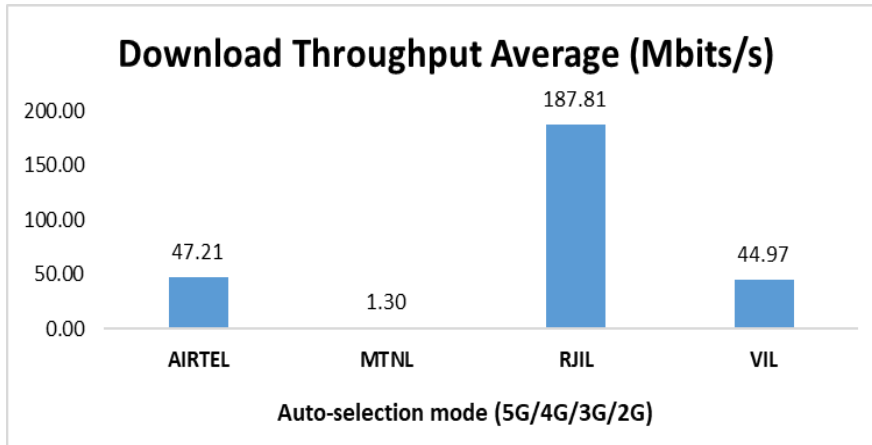


Figure-47: Download throughput

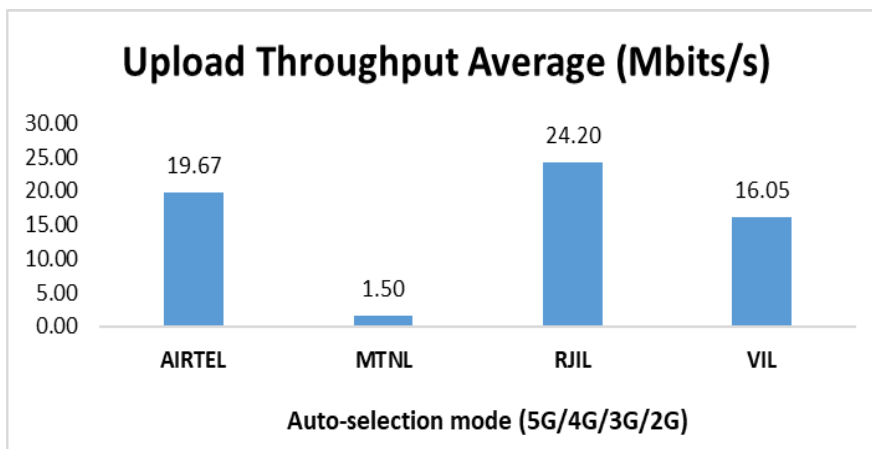


Figure-48: Upload throughput

4.5.2.4 Kashmere Gate to Raja Nahar Singh (Underground)

i) Voice performance

(a) 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	15	23	15	16
Call Setup Success Rate %	100.00	4.35	100.00	93.75
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time Average (Second)	2.74	2.49	2.35	1.60
Handover Success Rate %	100.00	100.00	99.77	100.00

Table-97: Summary of voice call performance in network auto-selection mode.

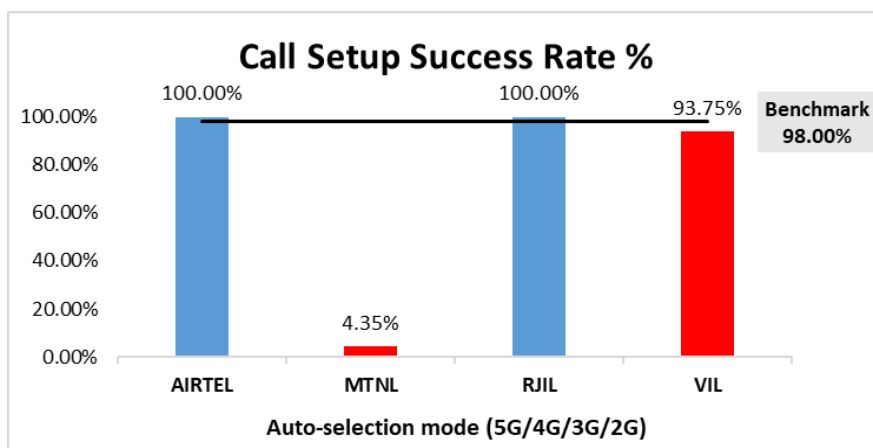


Figure-49: Performance for call setup success rate.

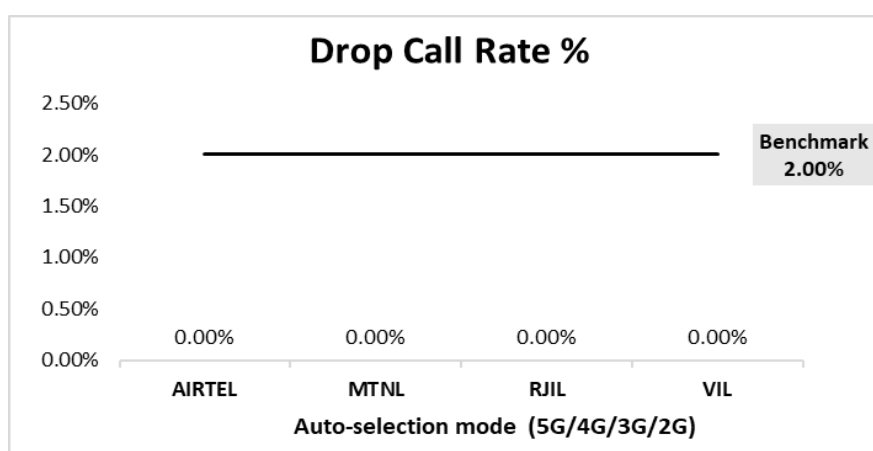


Figure-50: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	1.34%	NA	0.18%	1.42%
4G	98.14%	NA	99.82%	96.71%
3G	NA	14.73%	NA	NA
2G	0.00%	41.47%	NA	1.08%
Limited Service	0.52%	43.79%	0.00%	0.79%

Table-98: Time spent on technology during drive test.

Note-

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

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G).

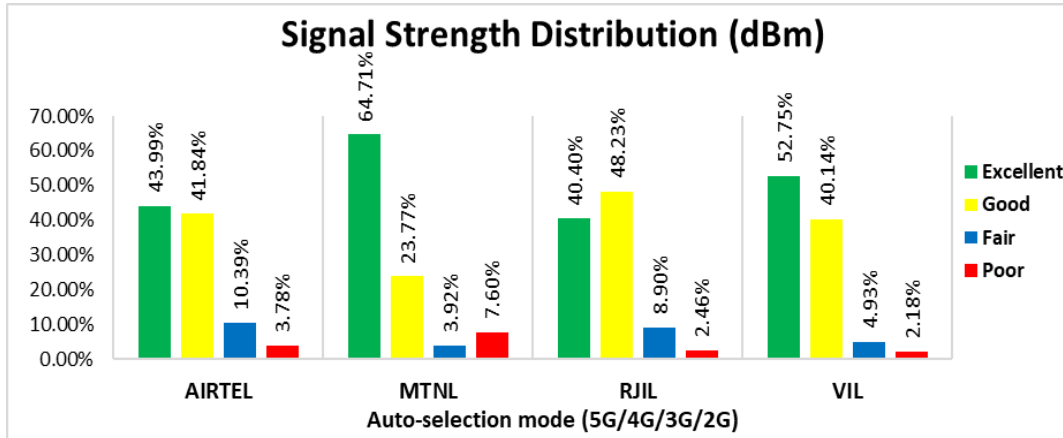


Figure-51: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 44% of samples falling in the excellent signal strength category.
- MTNL has 65% of samples falling in the excellent signal strength category.
- RJIL has 40% of samples falling in the excellent signal strength category.
- VIL has 53% of samples falling in the excellent signal strength category.

ii) 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	37.49	0.78	32.30	41.48
	80th Percentile	51.19	0.78	30.20	43.44
	20th Percentile	7.88	0.78	2.77	11.13
Upload Throughput (Mbits/s)	Average	12.19	0.39	9.43	6.15
	80th Percentile	10.48	0.39	10.95	9.62
	20th Percentile	3.84	0.39	2.77	2.32
Latency (ms)	50th Percentile	22.00	45.60	22.40	26.40

Table-99: Summary of Data performance in network auto-selection mode.

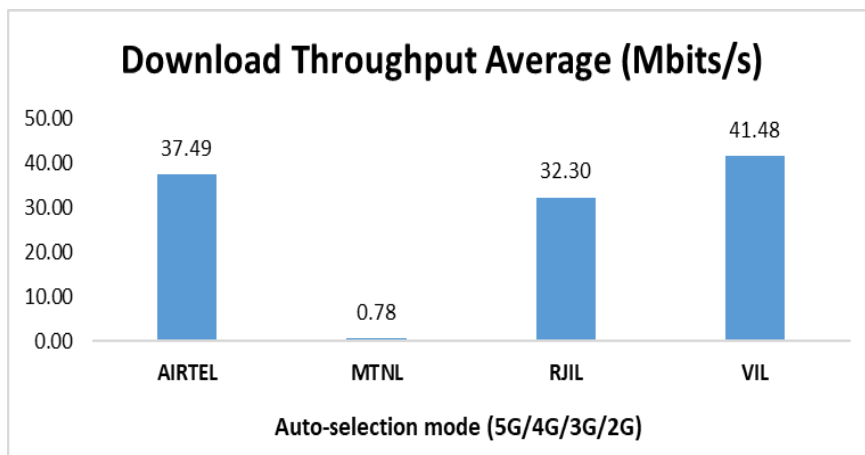


Figure-52: Download throughput

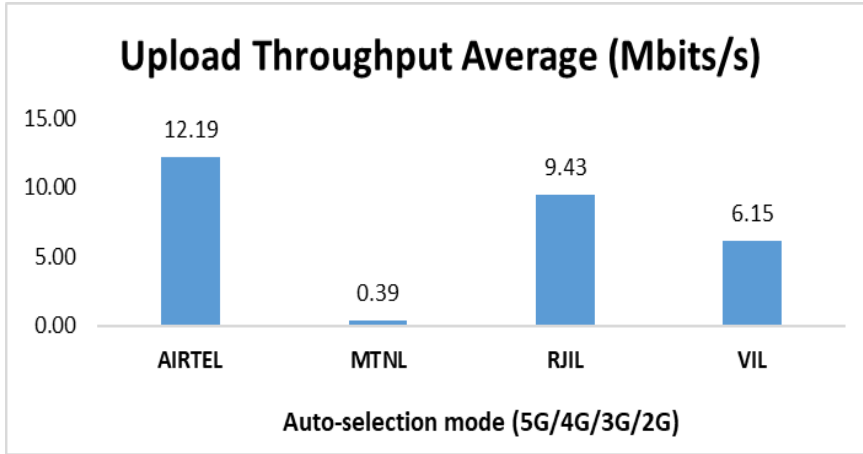


Figure-53: Upload throughput

4.5.2.5 Noida Electronic City to Dwarka Sec -21 (Elevated)

i) Voice performance

(a) 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	57	58	58	57
Call Setup Success Rate %	100.00	91.38	100.00	100.00
Drop Call Rate %	0.00	5.66	0.00	0.00
Call Setup Time Average (Second)	0.86	4.02	0.73	0.70
Handover Success Rate %	99.06	100.00	99.80	100.00

Table-100: Summary of voice call performance in network auto-selection mode.

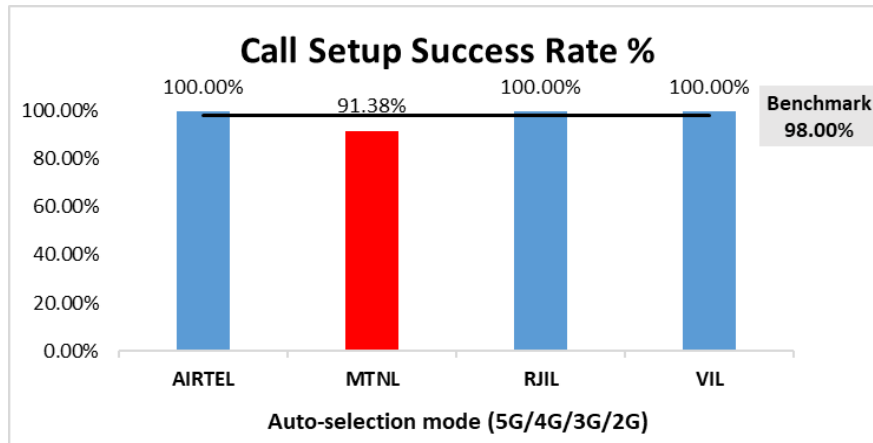


Figure-54: Performance for call setup success rate.

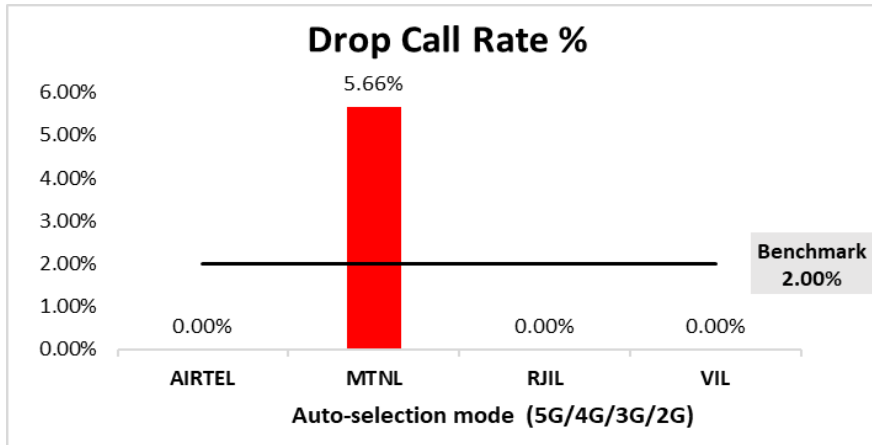


Figure-55: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	2.63%	NA	19.26%	10.68%
4G	97.37%	NA	80.63%	89.32%
3G	NA	97.78%	NA	NA
2G	0.00%	0.24%	NA	0.00%
Limited Service	0.00%	1.99%	0.11%	0.00%

Table-101:Time spent on technology during drive test.

Note-

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

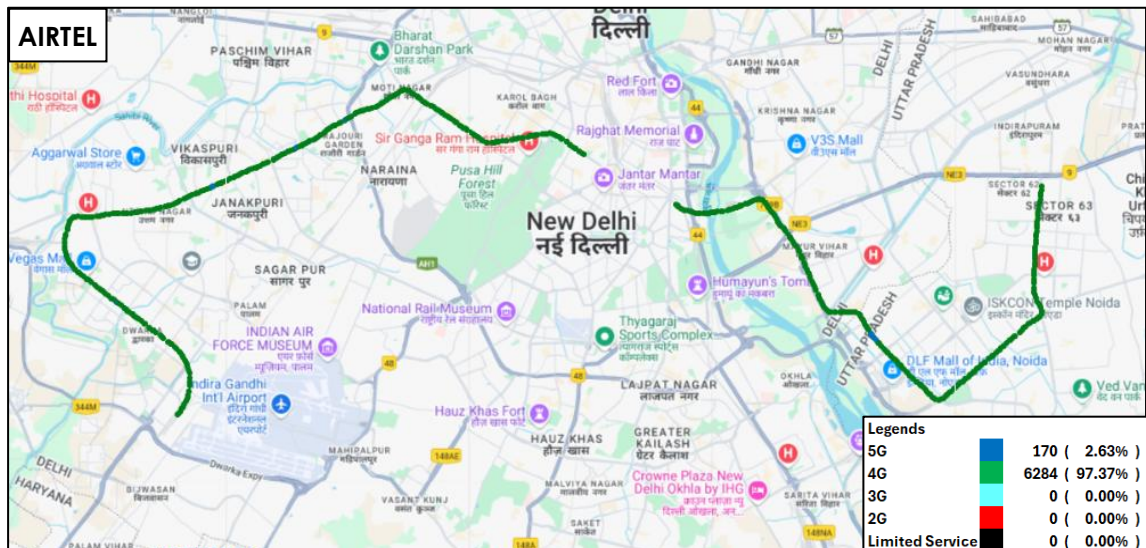


Figure-56: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL.

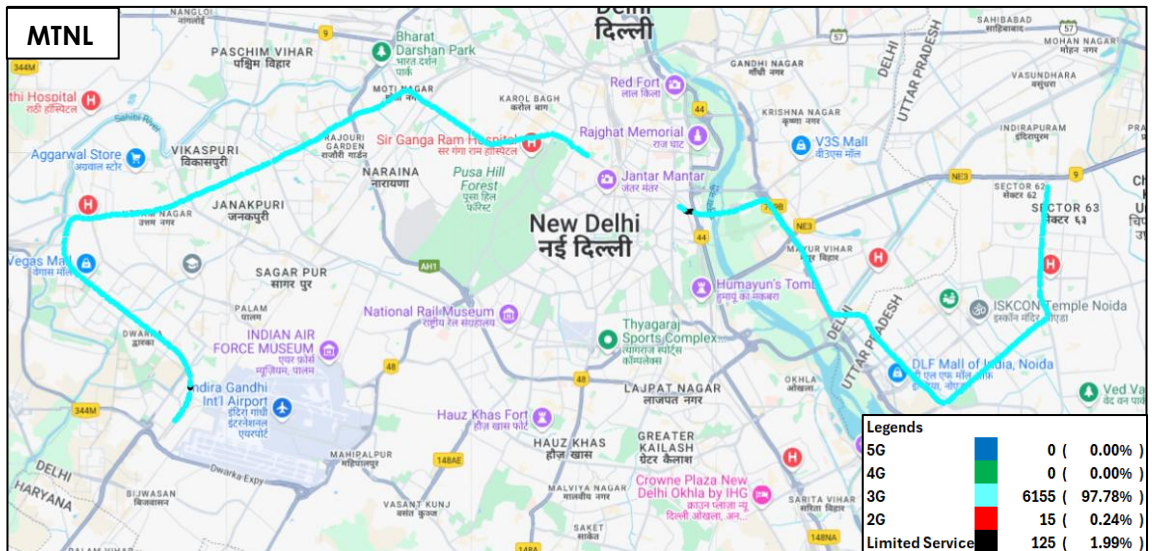


Figure-57: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-MTNL.

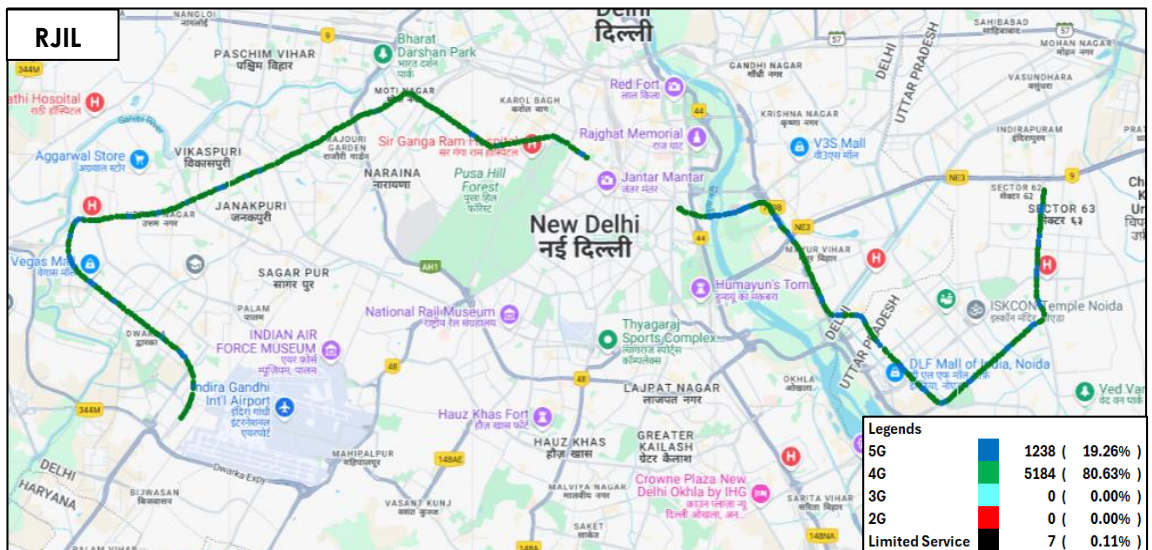


Figure-58: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

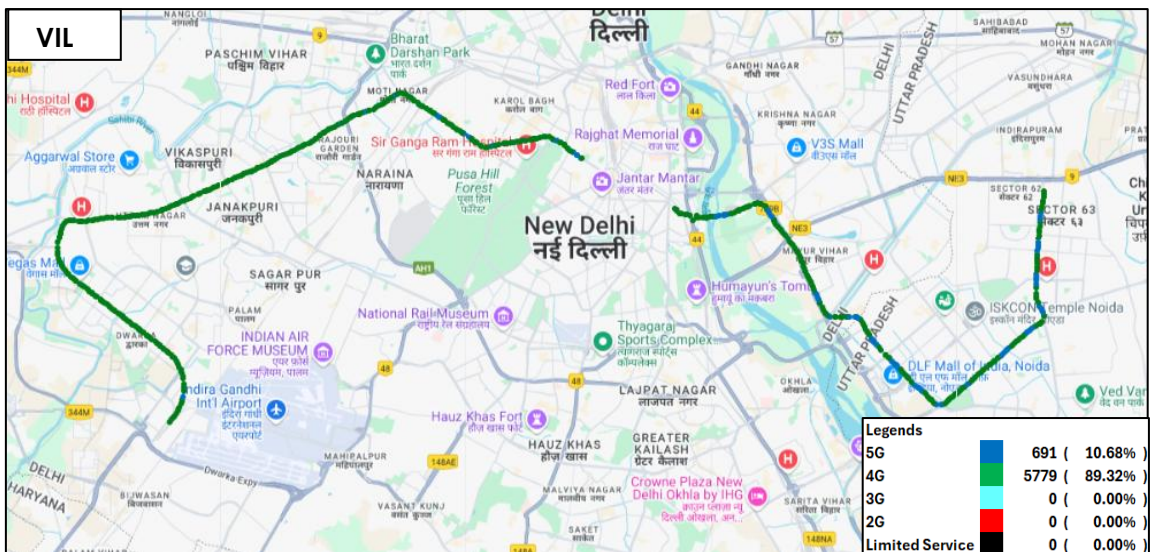


Figure-59: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-111, 112, 113 & 114 for map view)

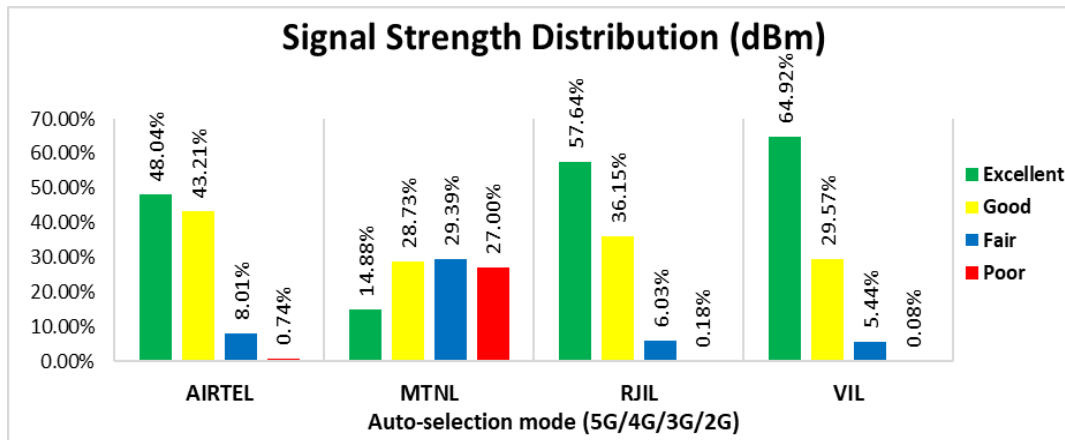


Figure-60: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 48% of samples falling in the excellent signal strength category.
- MTNL has 15% of samples falling in the excellent signal strength category.
- RJIL has 58% of samples falling in the excellent signal strength category.
- VIL has 65% of samples falling in the excellent signal strength category.

ii) 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	55.21	3.69	188.60	61.97
	80th Percentile	93.50	5.40	264.23	116.31
	20th Percentile	7.21	1.42	78.13	9.96
Upload Throughput (Mbits/s)	Average	20.77	1.89	31.91	27.15
	80th Percentile	42.30	3.06	46.83	48.51
	20th Percentile	4.20	0.88	16.71	3.42
Latency (ms)	50th Percentile	17.20	39.60	18.65	38.18

Table-102: Summary of Data performance in network auto-selection mode.

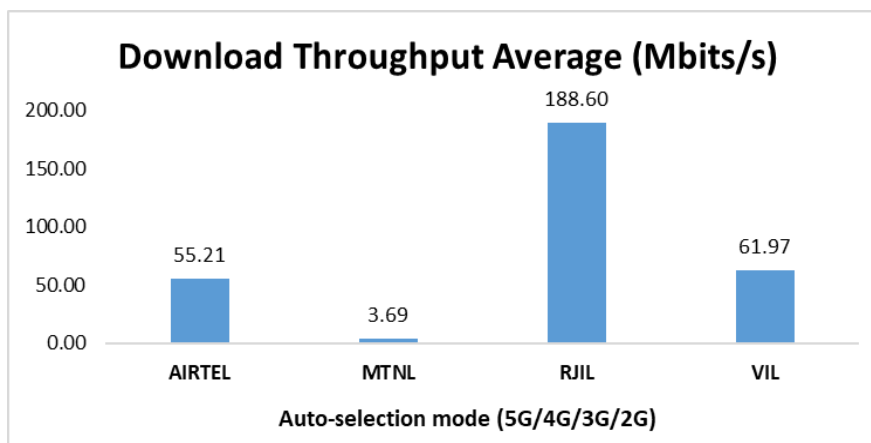


Figure-61: Download throughput

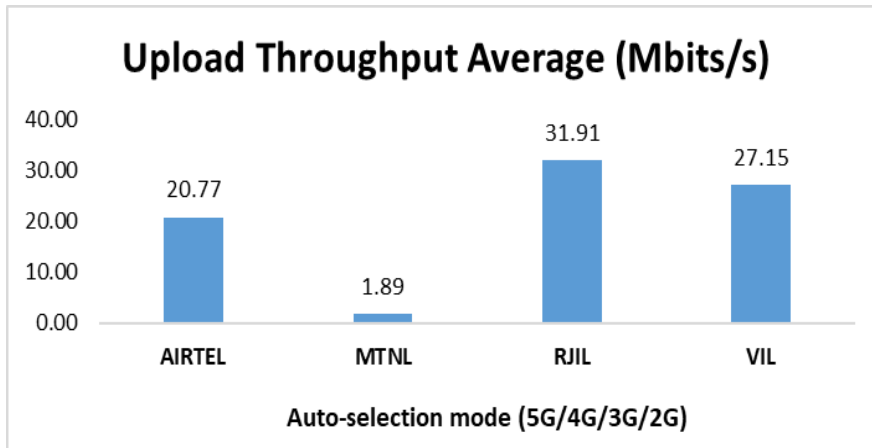


Figure-62: Upload throughput

4.5.2.6 Noida Electronic City to Dwarka Sec -21 (Underground)

i) Voice performance

(a) 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	6	8	6	6
Call Setup Success Rate %	100.00	22.22	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time Average (Second)	0.77	2.85	0.66	0.51
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-103: Summary of voice call performance in network auto-selection mode.

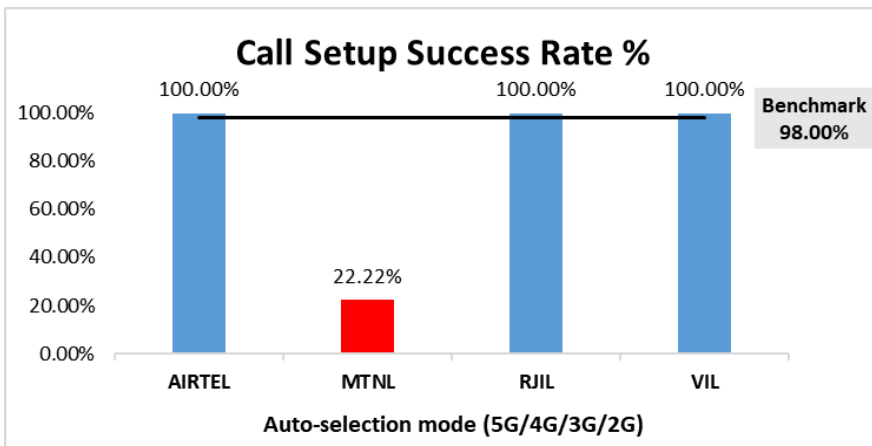


Figure-63: Performance for call setup success rate.

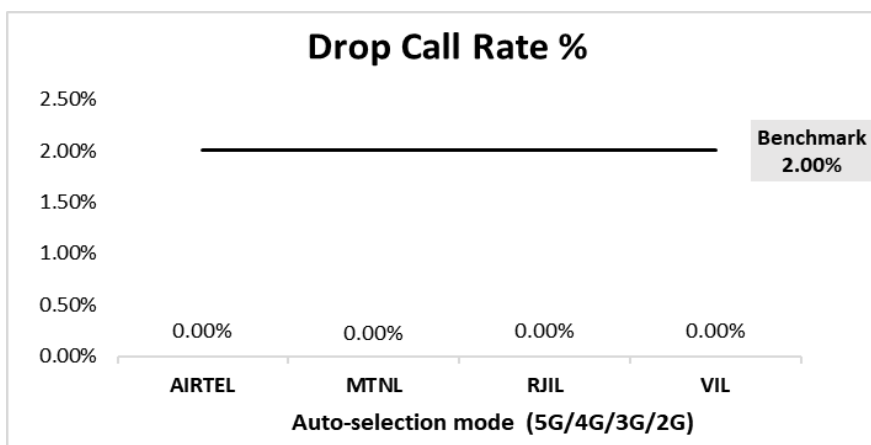


Figure-64: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	0.15%	NA	3.91%	8.10%
4G	99.85%	NA	96.09%	91.90%
3G	NA	72.77%	NA	NA
2G	0.00%	9.60%	NA	0.00%
Limited Service	0.00%	17.63%	0.00%	0.00%

Table-104: Time spent on technology during drive test.

Note-

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

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G).

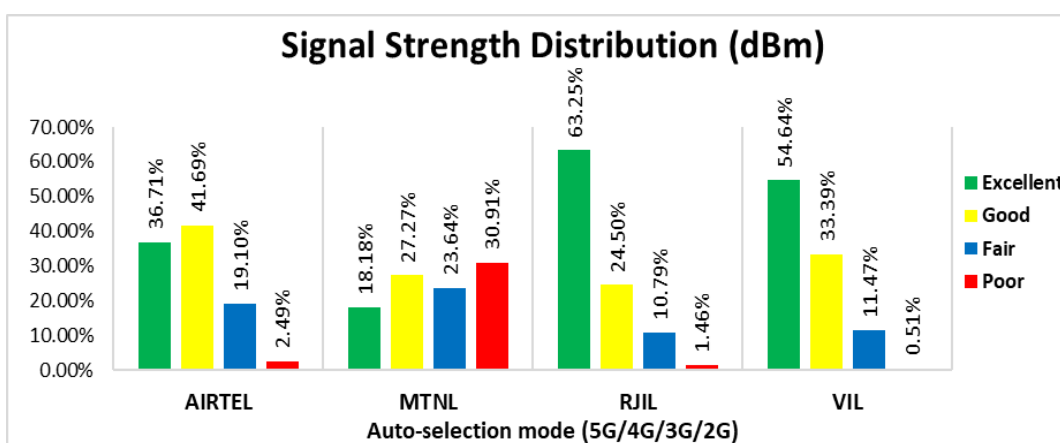


Figure-65: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 37% of samples falling in the excellent signal strength category.
- MTNL has 18% of samples falling in the excellent signal strength category.
- RJIL has 63% of samples falling in the excellent signal strength category.
- VIL has 55% of samples falling in the excellent signal strength category

ii) 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	90.34	1.58	38.09	51.51
	80th Percentile	202.17	3.06	59.37	50.77
	20th Percentile	10.66	0.01	1.51	7.11
Upload Throughput (Mbits/s)	Average	24.49	1.40	13.08	7.68
	80th Percentile	38.26	1.64	20.66	8.48
	20th Percentile	1.98	1.16	5.78	6.30
Latency (ms)	50th Percentile	18.40	46.25	28.40	29.10

Table-105: Summary of Data performance in network auto-selection mode.

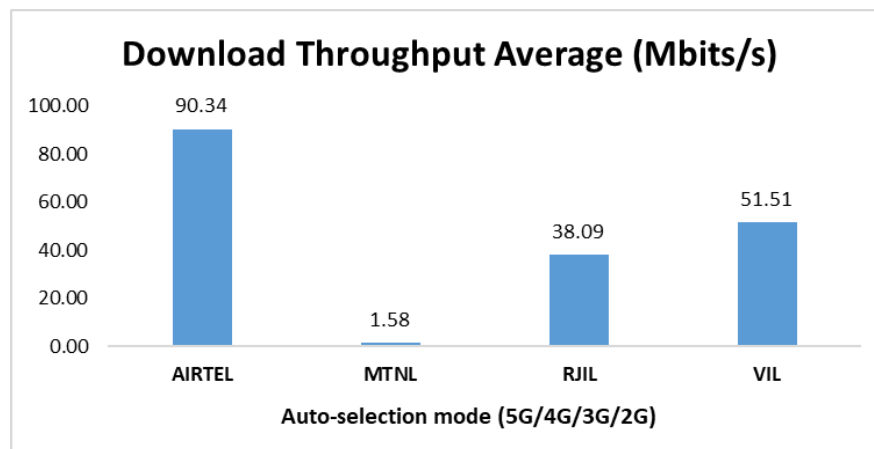


Figure-66: Download throughput

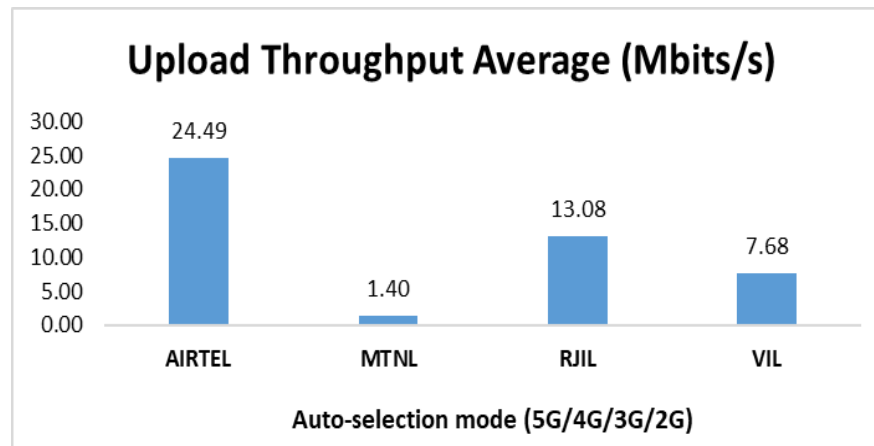


Figure-67: Upload throughput.

4.5.2.7 Samaypur Badli to Millennium City Centre (Elevated)

i) Voice performance

(a) 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	22	24	22	22
Call Setup Success Rate %	100.00	95.83	100.00	100.00
Drop Call Rate %	0.00	21.74	0.00	0.00
Call Setup Time Average (Second)	0.79	4.22	0.60	0.59
Handover Success Rate %	100.00	100.00	99.77	100.00

Table-106: Summary of voice call performance in network auto-selection mode.

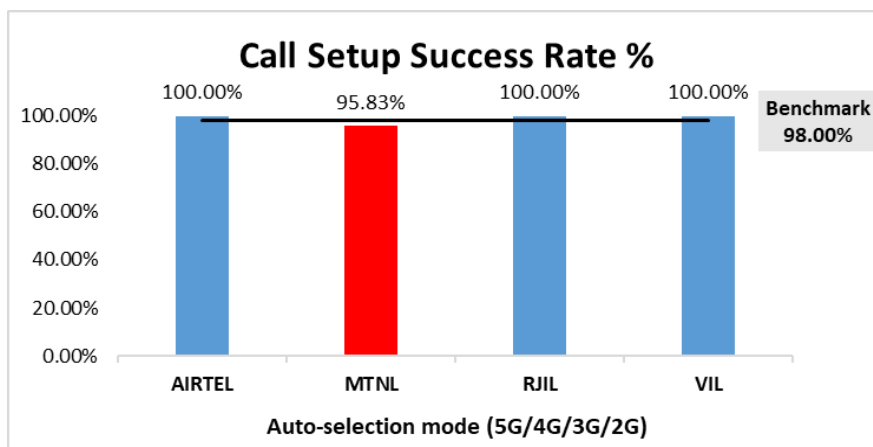


Figure-68: Performance for call setup success rate.

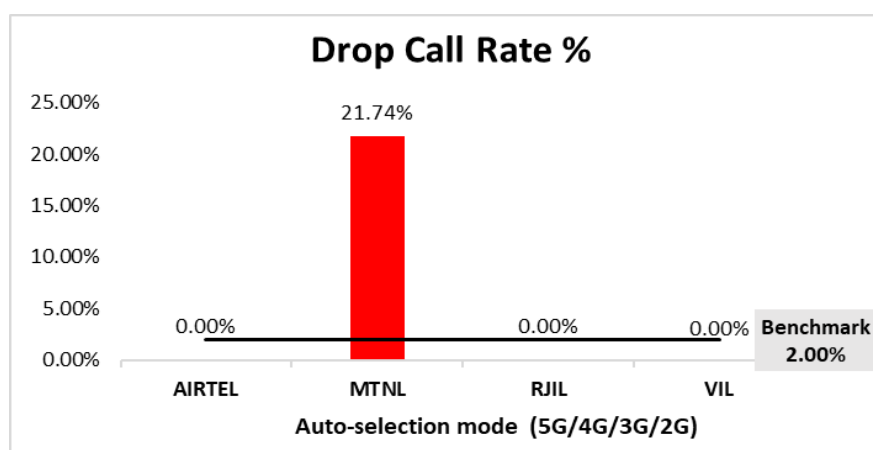


Figure-69: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	5.97%	NA	17.74%	4.92%
4G	94.03%	NA	82.26%	95.08%
3G	NA	99.59%	NA	NA
2G	0.00%	0.00%	NA	0.00%
Limited Service	0.00%	0.41%	0.00%	0.00%

Table-107:Time spent on technology during drive test.

Note-

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

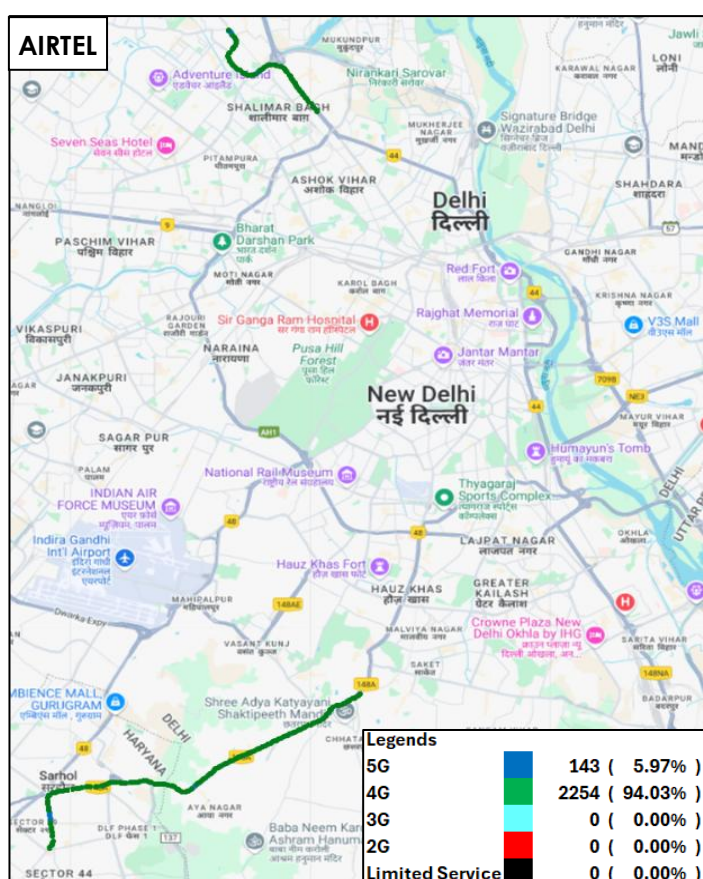


Figure-70: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL.

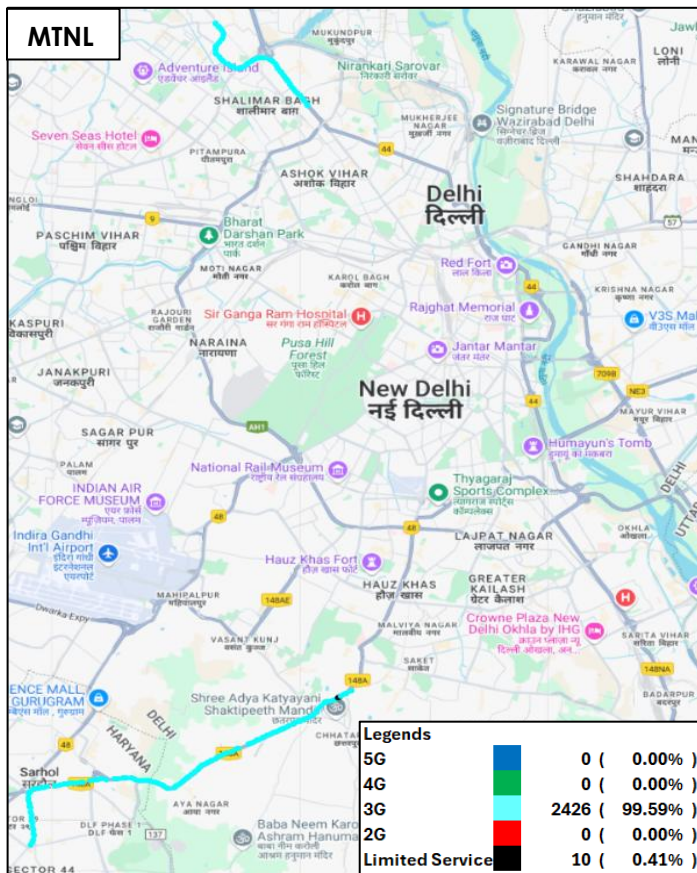


Figure-71: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-MTNL.

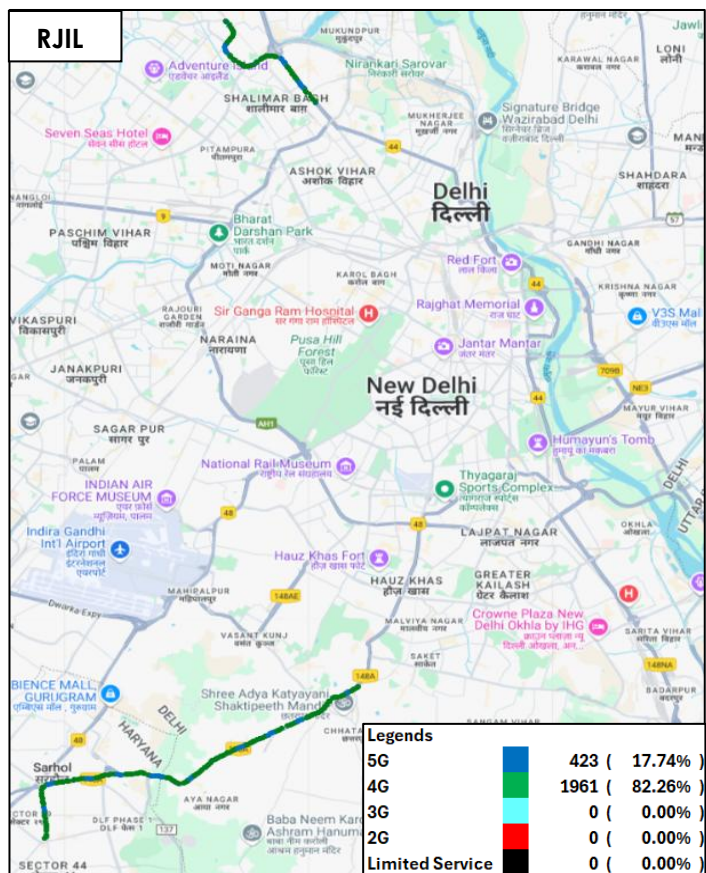


Figure-72: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

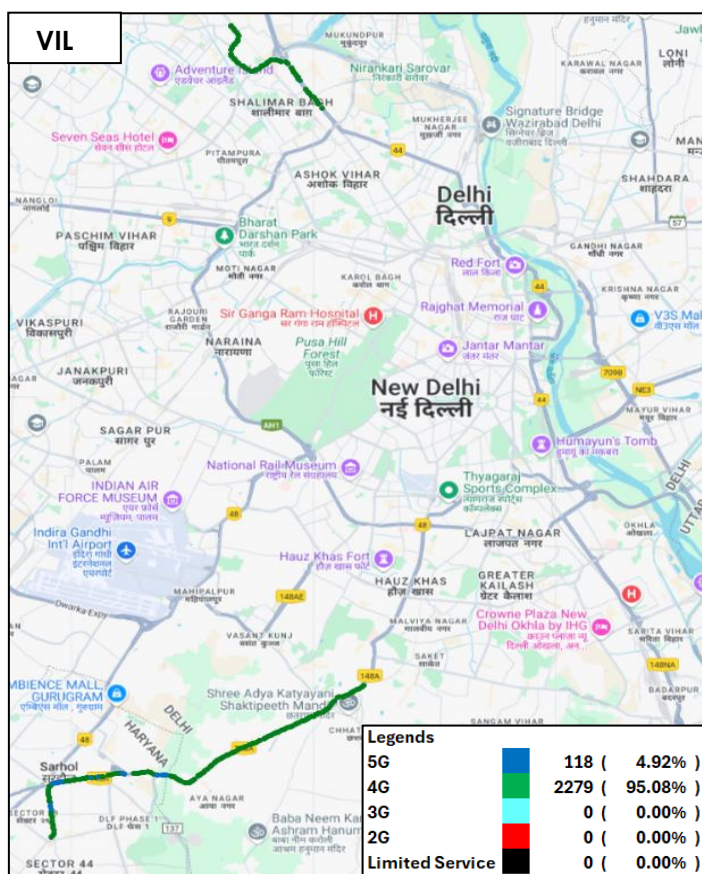


Figure-73: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-115, 116, 117 & 118 for map view)

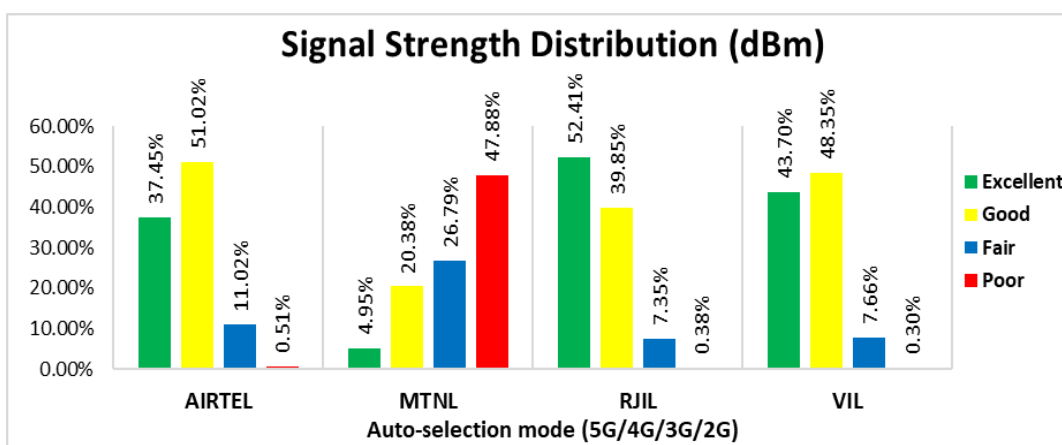


Figure-74: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 37% of samples falling in the excellent signal strength category.
- MTNL has 5% of samples falling in the excellent signal strength category.
- RJIL has 52% of samples falling in the excellent signal strength category.
- VIL has 44% of samples falling in the excellent signal strength category.

ii) 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	145.47	0.85	157.33	17.83
	80th Percentile	210.66	1.39	222.49	16.08
	20th Percentile	80.96	0.44	89.42	4.63
Upload Throughput (Mbits/s)	Average	40.29	1.15	21.76	14.09
	80th Percentile	61.61	1.74	32.70	32.35
	20th Percentile	18.25	0.47	7.85	2.17
Latency (ms)	50th Percentile	16.00	39.60	18.35	44.48

Table-108: Summary of Data performance in network auto-selection mode.

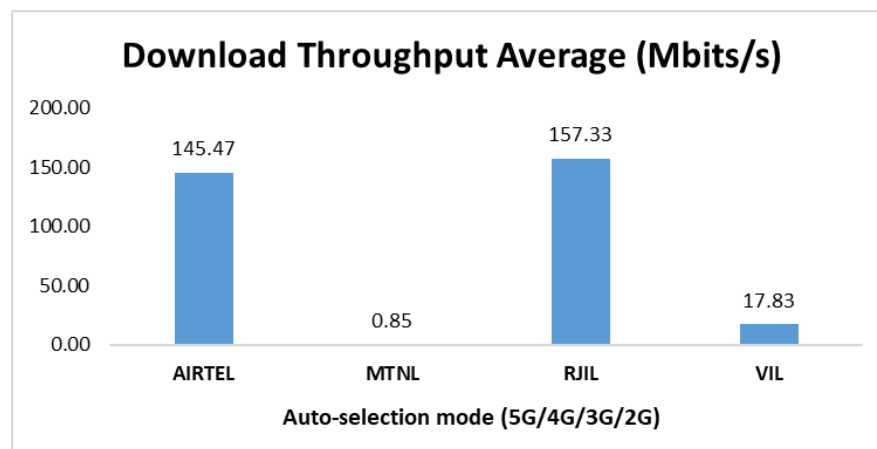


Figure-75: Download throughput

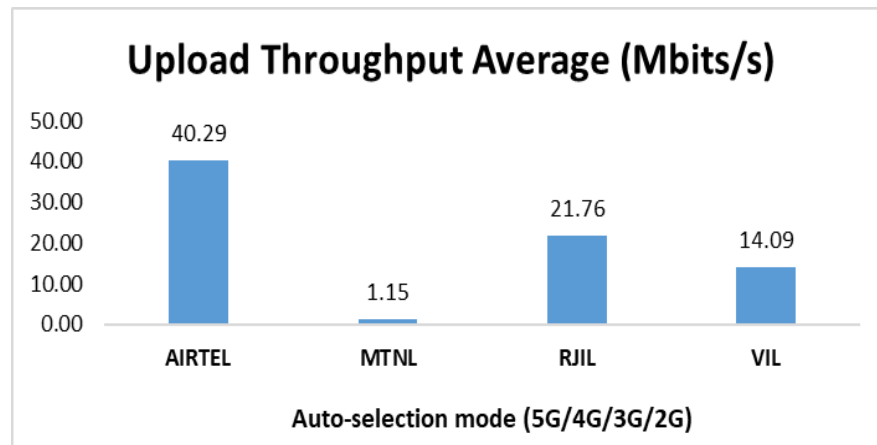


Figure-76: Upload throughput

4.5.2.8 Samaypur Badli to Millennium City Centre (Underground)

i) Voice performance

(a) 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	28	41	28	27
Call Setup Success Rate %	100.00	9.76	96.43	100.00
Drop Call Rate %	0.00	25.00	0.00	0.00
Call Setup Time Average (Second)	1.21	6.88	0.79	0.57
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-109: Summary of voice call performance in network auto-selection mode.

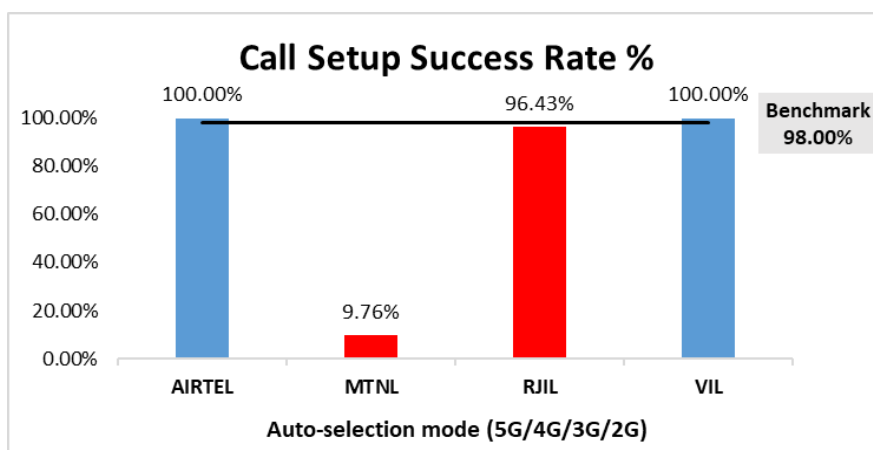


Figure-77: Performance for call setup success rate.

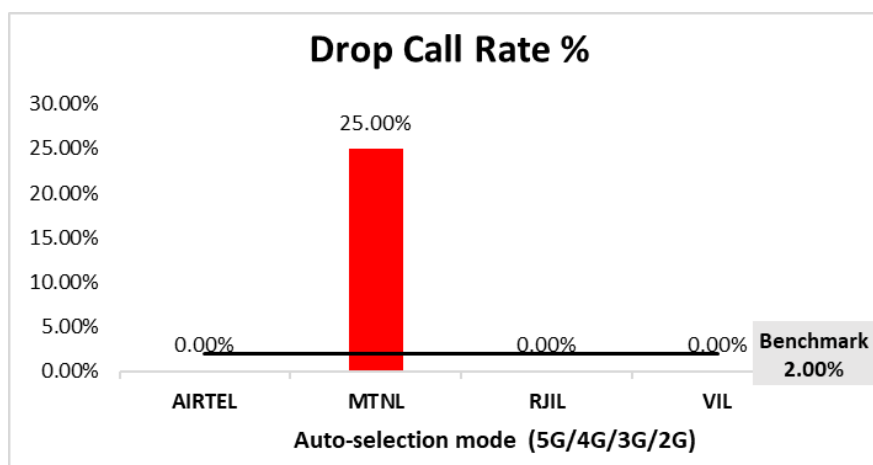


Figure-78: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	4.64%	NA	2.31%	2.65%
4G	95.36%	NA	96.83%	97.35%
3G	NA	29.80%	NA	NA
2G	0.00%	34.01%	NA	0.00%
Limited Service	0.00%	36.18%	0.86%	0.00%

Table-110: Time spent on technology during drive test.

Note-

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

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G).

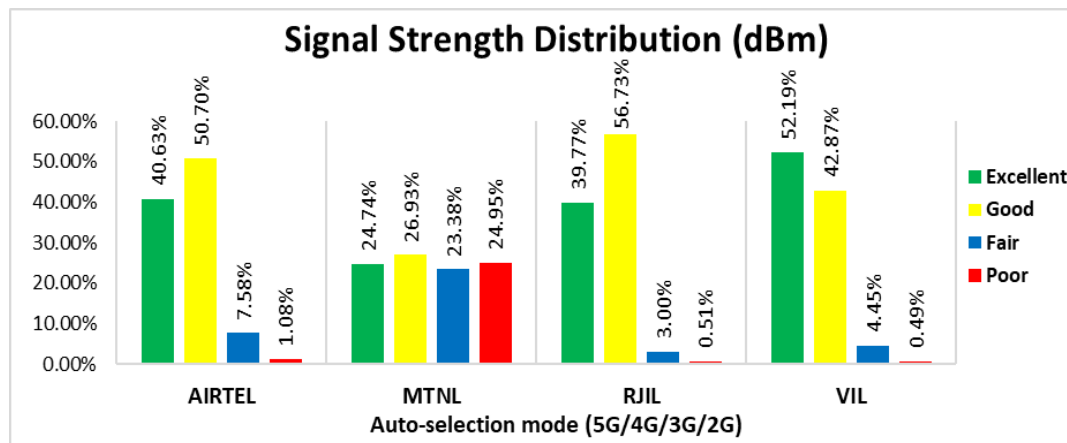


Figure-79: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 41% of samples falling in the excellent signal strength category.
- MTNL has 25% of samples falling in the excellent signal strength category.
- RJIL has 40% of samples falling in the excellent signal strength category.
- VIL has 52% of samples falling in the excellent signal strength category.

ii) 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	72.27	0.81	23.14	28.02
	80th Percentile	172.55	1.03	24.37	19.93
	20th Percentile	8.85	0.66	1.13	5.67
Upload Throughput (Mbits/s)	Average	16.26	1.62	7.17	5.89
	80th Percentile	29.98	2.07	3.41	4.31
	20th Percentile	0.73	1.08	0.00	1.76
Latency (ms)	50th Percentile	23.25	47.53	33.50	39.05

Table-111: Summary of Data performance in network auto-selection mode.

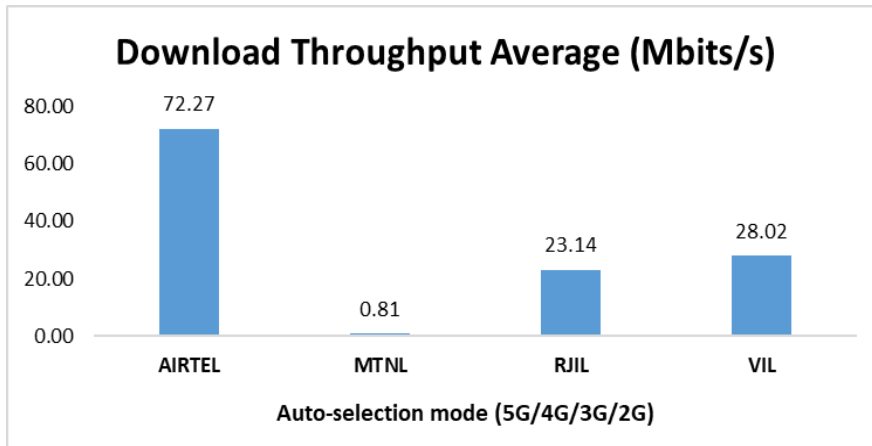


Figure-80: Download throughput

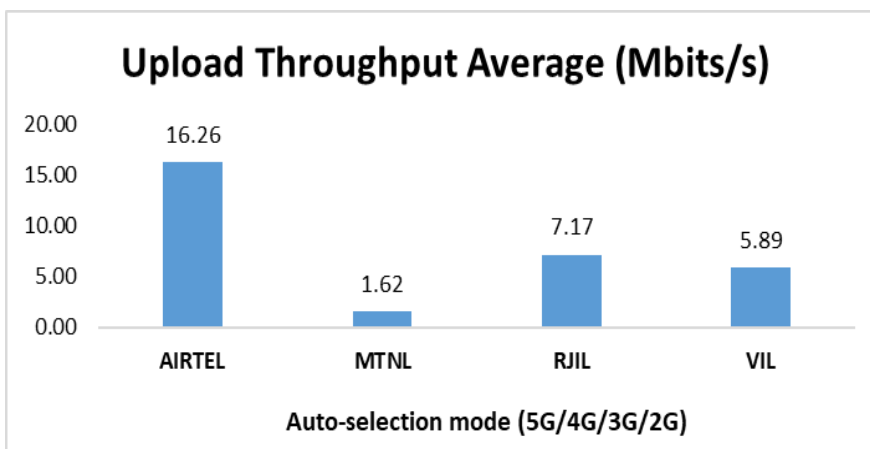


Figure-81: Upload throughput

4.5.2.9 Shaheed Sthal to Rithala

i) Voice performance

(a) 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	35	38	35	35
Call Setup Success Rate %	100.00	89.47	100.00	100.00
Drop Call Rate %	0.00	17.65	0.00	0.00
Call Setup Time Average (Second)	0.85	3.15	0.84	0.61
Handover Success Rate %	99.78	100.00	100.00	100.00

Table-112: Summary of voice call performance in network auto-selection mode.

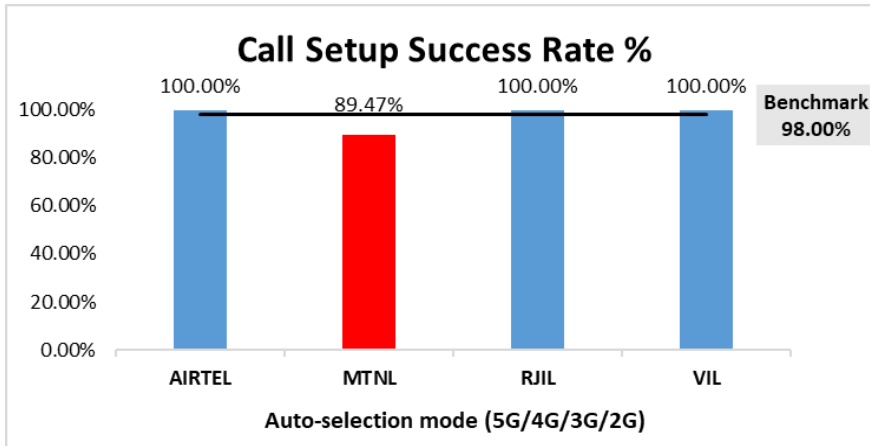


Figure-82: Performance for call setup success rate.

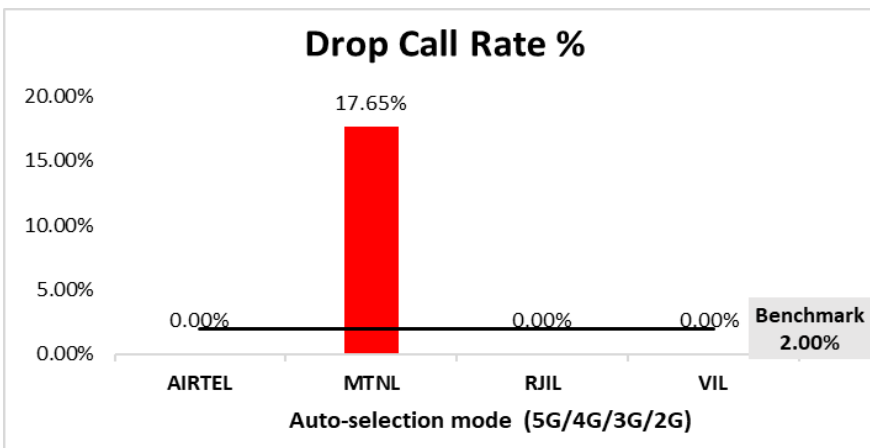


Figure-83: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	0.78%	NA	18.61%	4.51%
4G	99.22%	NA	81.39%	95.49%
3G	NA	97.45%	NA	NA
2G	0.00%	0.18%	NA	0.00%
Limited Service	0.00%	2.37%	0.00%	0.00%

Table-113:Time spent on technology during drive test.

Note-

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

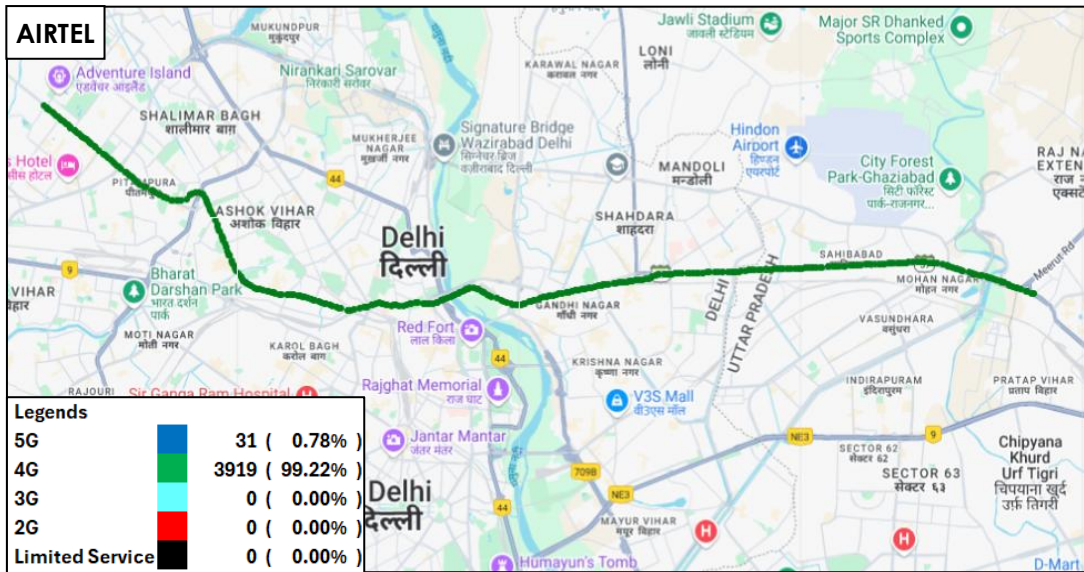


Figure-84: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL.

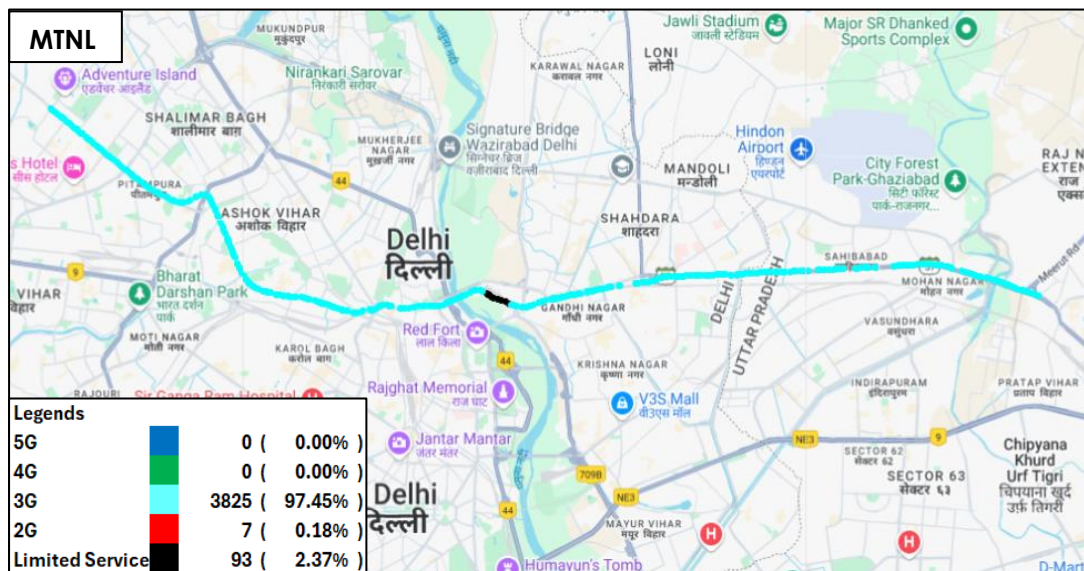


Figure-85: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-MTNL.

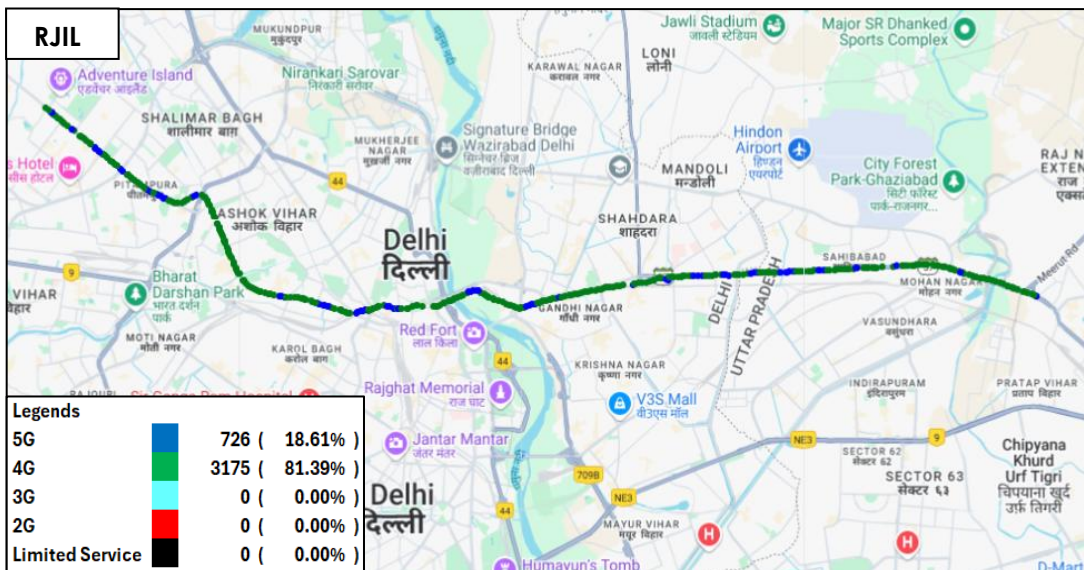


Figure-86: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

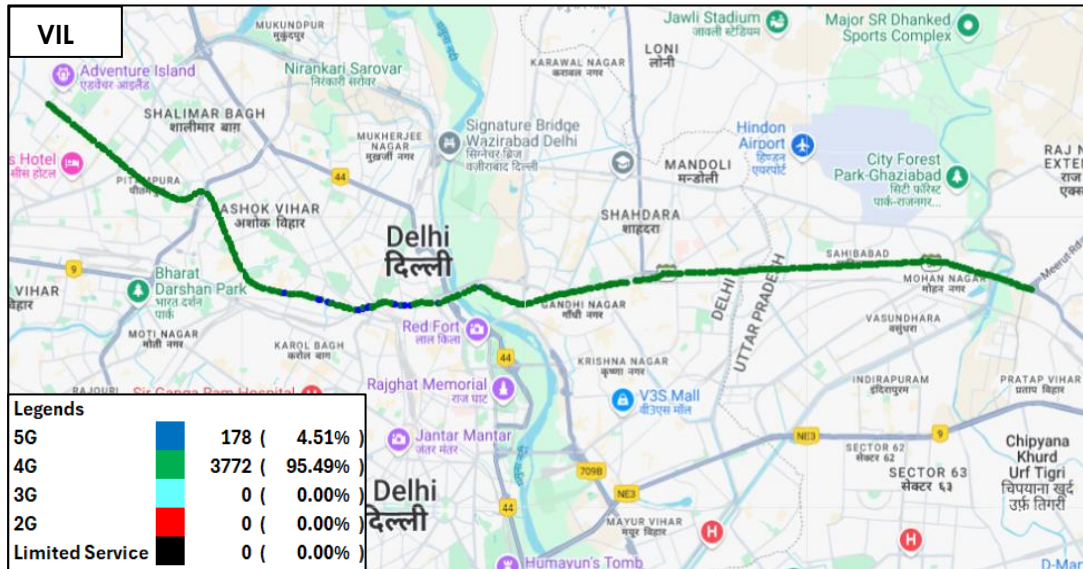


Figure-87: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-119, 120, 121 & 122 for map view)

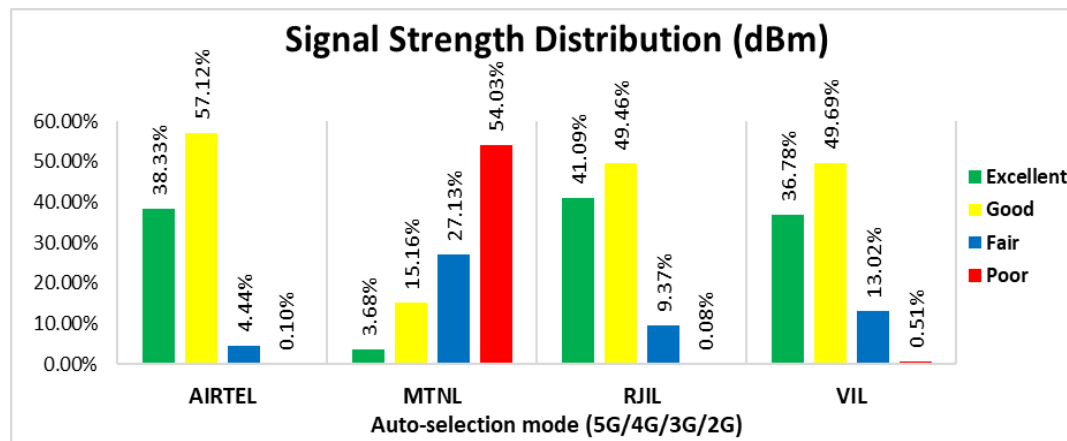


Figure-88: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 38% of samples falling in the excellent signal strength category.
- MTNL has 4% of samples falling in the excellent signal strength category.
- RJIL has 41% of samples falling in the excellent signal strength category.
- VIL has 37% of samples falling in the excellent signal strength category.

ii) 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	115.02	3.73	208.65	54.48
	80th Percentile	168.05	5.76	270.50	74.19
	20th Percentile	49.85	1.68	145.66	4.13
Upload Throughput (Mbits/s)	Average	34.55	1.87	24.52	17.08
	80th Percentile	49.96	2.79	35.60	35.33
	20th Percentile	19.61	0.96	11.88	2.54
Latency (ms)	50th Percentile	17.65	37.10	20.10	46.35

Table-114: Summary of Data performance in network auto-selection mode.

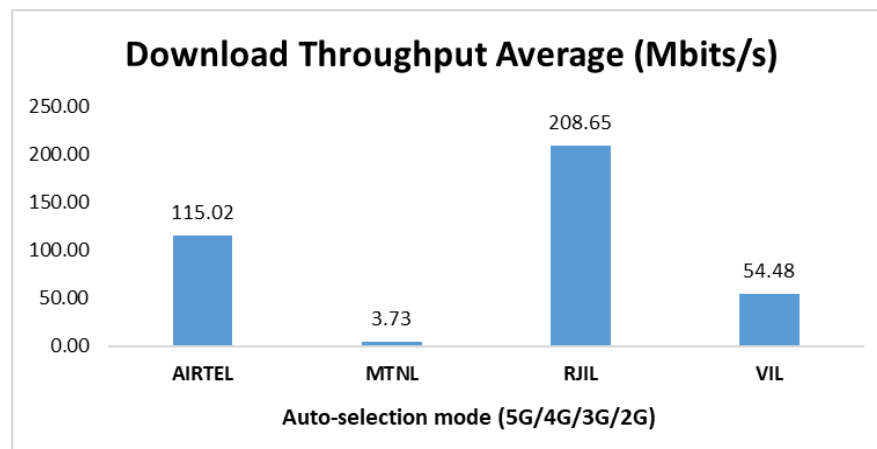


Figure-89: Download throughput

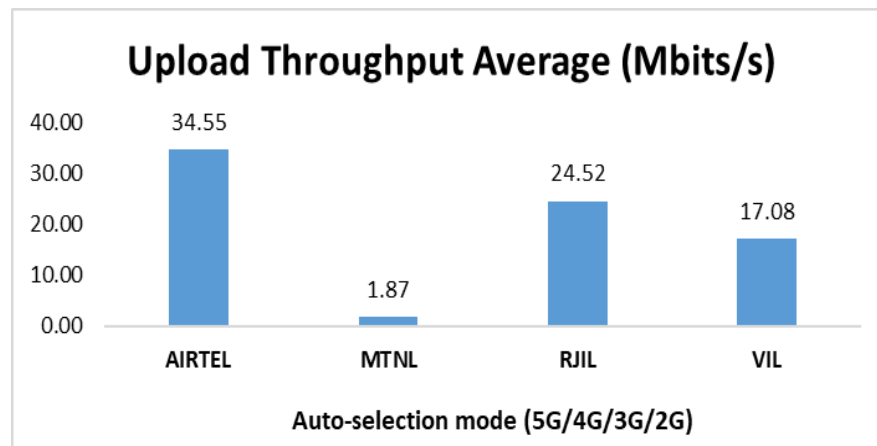


Figure-90: Upload throughput.

4.5.2.10 Yashobhoomi Dwarka Sec-25 to New Delhi

i) Voice performance

(a) 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	19	25	18	18
Call Setup Success Rate %	68.42	12.00	72.22	88.89
Drop Call Rate %	0.00	33.33	0.00	0.00
Call Setup Time Average (Second)	1.85	5.13	0.64	1.55
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-115: Summary of voice call performance in network auto-selection mode.

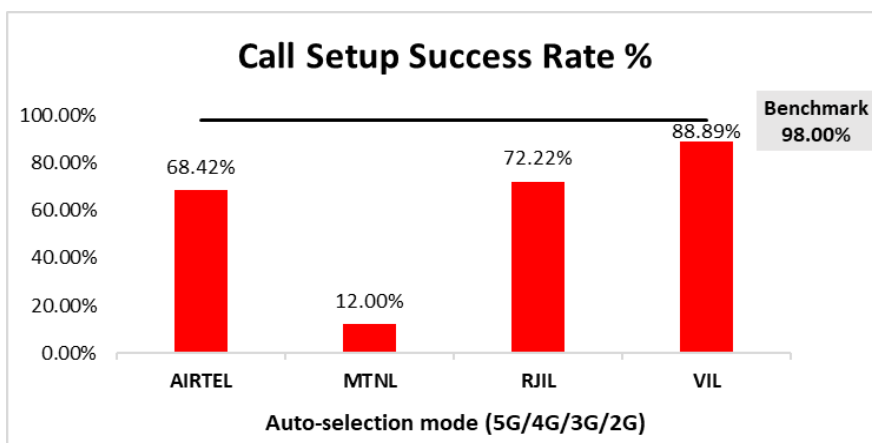


Figure-91: Performance for call setup success rate.

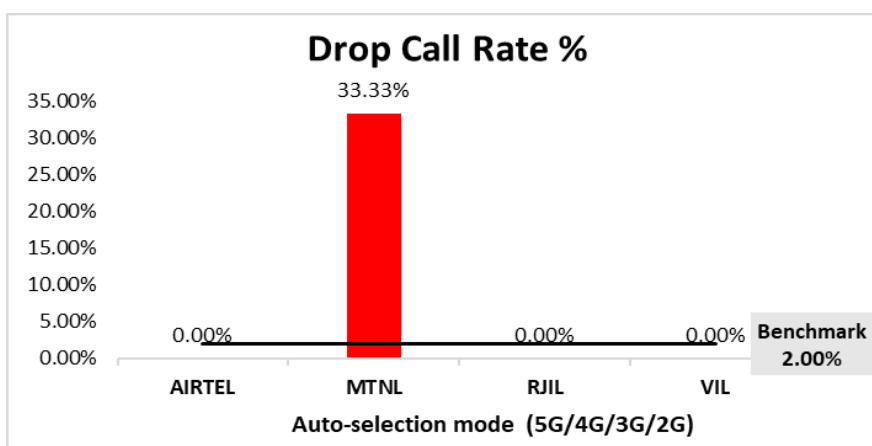


Figure-92: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	0.00%	NA	4.35%	3.45%
4G	85.40%	NA	93.67%	90.44%
3G	NA	41.01%	NA	NA
2G	5.26%	31.52%	NA	6.11%
Limited Service	9.35%	27.47%	1.98%	0.00%

Table-116: Time spent on technology during drive test.

Note-

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

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G).

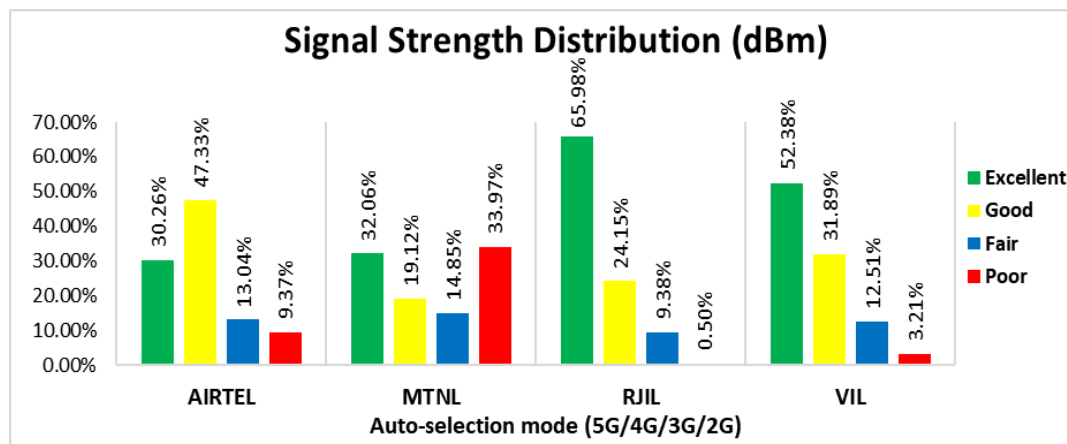


Figure-93: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 30% of samples falling in the excellent signal strength category.
- MTNL has 32% of samples falling in the excellent signal strength category.
- RJIL has 66% of samples falling in the excellent signal strength category.
- VIL has 52% of samples falling in the excellent signal strength category.

ii) 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 (Mbps/s)	Average	57.91	1.31	93.10	23.78
	80th Percentile	123.23	1.52	152.51	37.47
	20th Percentile	1.27	1.11	4.76	8.03
Upload Throughput (Mbps/s)	Average	15.19	1.38	8.26	10.09
	80th Percentile	28.21	1.85	11.32	13.35
	20th Percentile	1.21	0.83	1.23	2.26
Latency (ms)	50th Percentile	18.05	85.50	21.90	33.88

Table-117: Summary of Data performance in network auto-selection mode.

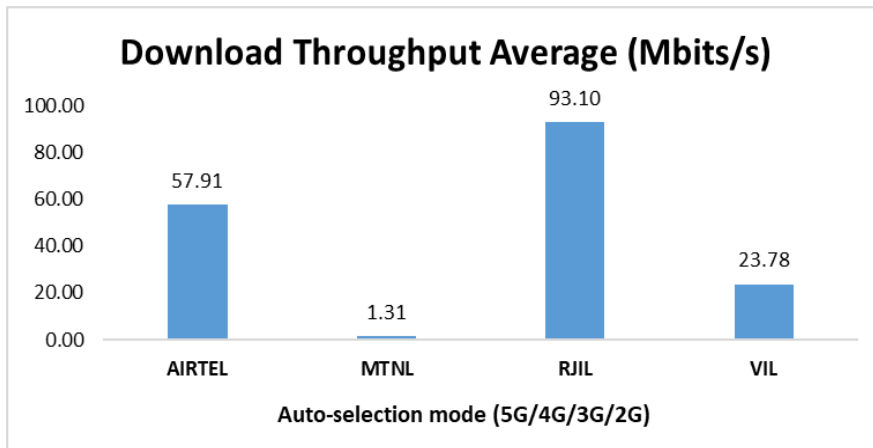


Figure-94: Download throughput

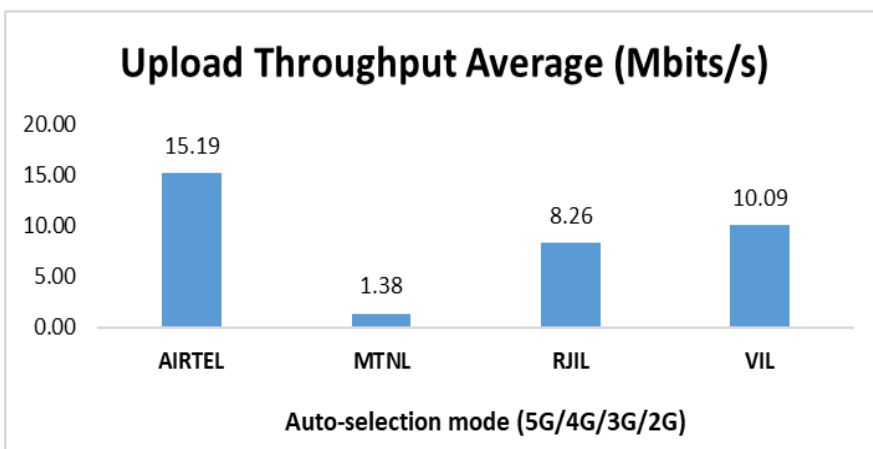


Figure-95: Upload throughput

5. Voice & Data Key findings

5.1 Overall Voice

1. Call Setup Success Rate:

- a) Airtel, MTNL and VIL have 95.70%, 28.87% and 96.45% call setup success rate respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, MTNL, RJIL and VIL have 99.40%, 35.29%, 99.12% and 99.10% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

2. Call Setup Time:

- a) Airtel, MTNL and VIL call setup time is 3.43, 3.13 & 4.45 seconds respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, MTNL, RJIL & VIL call setup time is 0.85, 3.75, 0.73 & 0.66 seconds respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. Call Silence/Mute Rate:

In packet switched network (4G/5G) VIL, RJIL & Airtel have 3.37%, 2.39% & 0.61% silence call rate respectively. Further VIL has higher RTP packet loss rate in downlink (1.75%) compared to RJIL (0.89%), Airtel (0.83%). In uplink the RTP packet loss rate is higher for VIL (1.68%) compared to RJIL (1.64%) & Airtel (0.81%). (refer table-6)

4. Drop Call Rate:

- a) Airtel, MTNL and VIL drop call rate is 1.26%, 14.97% and 4.57% respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, MTNL, RJIL and VIL drop call rate is 0.00%, 14.64%, 1.07% and 0.06% 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, MTNL, RJIL and VIL average download speeds are 173.73 Mbps, 1.56 Mbps, 50.55 Mbps and 64.17 Mbps respectively. (refer table-9)
- b) Airtel, MTNL, RJIL and VIL average upload speeds are 26.21 Mbps, 1.15 Mbps, 21.61 Mbps and 14.14 Mbps respectively. (refer table-9)

2. Data download and upload performance (static i.e. while stationary):

- a) Airtel, MTNL, RJIL and VIL average download speeds are 203.16 Mbps, 1.55 Mbps, 98.13 Mbps and 76.25 Mbps respectively. (refer table-40)
- b) Airtel, MTNL, RJIL and VIL average upload speeds are 19.53 Mbps, 0.85 Mbps, 23.75 Mbps and 15.62 Mbps respectively. (refer table-40)

3. Data session setup success rate (static i.e. while stationary):

- a) Airtel, MTNL, RJIL and VIL have 100.00%, 62.86%, 89.52% and 96.19% download session setup success rate respectively. (refer table-40)
- b) Airtel, MTNL, RJIL and VIL have 100.00%, 61.90%, 95.24% and 96.19% upload session setup success rate respectively. (refer table-40)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 95.70% call setup success rate and 1.26% drop call rate have been observed in 3G/2G network mode for LSA/city drive. Performance is not meeting the benchmark of 98.00% call setup success rate. (refer table-3 and 11)
- 99.40% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 99.66% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 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. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-18)
- 100.00% call setup success rate and 0.00% drop call rate has been observed in auto-selection mode (5G/4G/3G/2G) at both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-84 & 85)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across all metro route drive except Yashobhoomi Dwarka Sec-25 to New Delhi Metro. Performance is well within the benchmark 98.00% & of 2.00% respectively. (refer table-88, 91, 94, 97, 100, 103, 106, 109 & 112)
- 68.42% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Yashobhoomi Dwarka Sec-25 to New Delhi metro route. Performance is not meeting the benchmark 98.00% for call setup success rate. (refer table-115)

Data

- Airtel has 173.73 Mbps average download speed & 26.21 Mbps average upload speed for LSA. (refer table-9)
- Airtel has 191.50 Mbps average download speed & 27.18 Mbps average upload speed across the measured routes for city drive. (refer table-17)
- Gaur City Mall-Greater Noida, Ghaziabad Railway Station, GIP Mall-Noida, Max Super Speciality Hospital-Ghaziabad and St. Xavier's High School-Greater Noida have less download speed (less than 100 Mbps) out of total 21 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-49, 52, 53, 57 & 59)
- Advant Navis Business Park Noida, Anand Vihar ISBT Ghaziabad, Christ University Ghaziabad, Cloudnine Hospital Noida, Dav Public School Ghaziabad, Delhi Public School Ghaziabad, Gaur City Mall Greater Noida, Ghaziabad District And Session Court, Ghaziabad Railway Station, Hindon Airport Ghaziabad, Indirapuram Habitat Centre, Max Super Speciality Hospital Ghaziabad, Sahibabad Fruit Mandi, St. Xavier's High School Greater Noida and Yatharth Hospital Greater Noida have less upload speed (less than 20 Mbps) out of total 21 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table- 41, 42, 45, 46, 47, 48, 49, 51, 52, 54, 55, 57, 58, 59 & 61)

- Atta Market Noida has less download speed (less than 100 Mbps) and upload speed (less than 20 Mbps) out of total 2 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table- 86)
- All metro routes have less download speed (less than 100 Mbps) except Samaypur Badli to Millennium City Centre (Elevated) & Shaheed Sthal to Rithala metro routes for auto-selection mode (5G/4G/3G/2G) (refer Table-90, 93, 96, 99, 102, 105, 111 & 117)
- Botanical Garden to Krishna Park Extension (Underground), Kashmere Gate to Raja Nahar Singh (Elevated & Underground), Samaypur Badli to Millennium City Centre (Underground) and Yashobhoomi Dwarka Sec-25 to New Delhi metro route has the less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G) (refer Table- 93, 96, 99, 111 & 117)

2. MTNL:

Voice

- 28.87% call setup success rate and 14.97% drop call rate have been observed in 3G/2G network mode for LSA/city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3 and 11)
- 35.29% call setup success rate and 14.64% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 30.18% call setup success rate and 16.97% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 74.76% call setup success rate and 3.82% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-18)
- 92.86% call setup success rate and 15.38% drop call rate has been observed in auto-selection mode (5G/4G/3G/2G) at Atta Market- Noida Walk test location. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-84)
- 0.00% call setup success has been observed in auto-selection mode (5G/4G/3G/2G) at Jagat Farm Market Greater Noida walk test location. (refer table-85)
- 100.00% call setup success rate and 25.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Botanical Garden to Krishna Park Extension (Elevated) metro route. Performance is not meeting the benchmark of 2.00% for drop call rate. (refer table-88)
- 8.70% call setup success rate and 75.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Botanical Garden to Krishna Park Extension (Underground) metro route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-91)
- 100.00% call setup success rate and 3.70% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Kashmere Gate to Raja Nahar Singh (Elevated) metro route. Performance is not meeting the benchmark of 2.00% for drop call rate. (refer table-94)

- 4.35% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Kashmere Gate to Raja Nahar Singh (Underground) metro route. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-97)
- 91.38% call setup success rate and 5.66% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Noida Electronic City to Dwarka Sec -21 (Elevated) metro route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-100)
- 22.22% call setup success rate and 0.00 % drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Noida Electronic City to Dwarka Sec -21 (Underground) metro route. (refer table-103)
- 95.83% call setup success rate and 21.74% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Samaypur Badli to Millennium City Centre (Elevated) metro route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-106)
- 9.76% call setup success rate and 25.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Samaypur Badli to Millennium City Centre (Underground) metro route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-109)
- 89.47% call setup success rate and 17.65% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Shaheed Sthal to Rithala metro route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-112)
- 12.00% call setup success rate and 33.33% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Yashobhoomi Dwarka Sec-25 to New Delhi metro route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-115)

Data

- MTNL has 1.56 Mbps average download speed & 1.15 Mbps average upload speed for LSA. (refer table-9)
- MTNL has 1.34 Mbps average download speed & 1.08 Mbps average upload speed across the measured routes for city drive. (refer table-17)
- All hotspot locations have less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 41 to 61)
- All hotspot locations have less upload speed (less than 2 Mbps) except Advant Navis Business Park Noida for auto-selection mode (5G/4G/3G/2G). (refer table- 42 to 61)
- Both walk test locations have less download speed (less than 10 Mbps) and less upload speed (less than 2 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-86 & 87)
- All metro routes have less download speed (less than 10 Mbps) and upload speed (less than 2 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-90, 93, 96, 99, 102, 105, 108, 111, 114 & 117)

3. RJIL: Voice

- 99.12% call setup success rate and 1.07% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 99.67% call setup success rate and 1.50% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 99.52% 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. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-18)
- 100.00% call setup success rate and 0.00% drop call rate has been observed in auto-selection mode (5G/4G/3G/2G) at both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-84 & 85)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across all metro route except Botanical Garden to Krishna Park Extension (Underground), Samaypur Badli to Millennium City Centre (Underground), Yashobhoomi Dwarka Sec-25 to New Delhi. Performance is well within the benchmark 98.00% & of 2.00% respectively. (refer table-88, 94, 97, 100, 103, 106 & 112)
- 87.10% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Botanical Garden to Krishna Park Extension (Underground) metro route. Performance is not meeting the benchmark 98.00% call setup success rate. (refer table- 91)
- 96.43% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Samaypur Badli to Millennium City Centre (Underground) metro route. Performance is not meeting the benchmark 98.00% call setup success rate. (refer table- 109)
- 72.22% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Yashobhoomi Dwarka Sec-25 to New Delhi metro route. Performance is not meeting the benchmark 98.00% call setup success rate. (refer table- 115)

Data

- RJIL has 50.55 Mbps average download speed & 21.61 Mbps average upload speed for LSA. (refer table-9)
- RJIL has 27.35 Mbps average download speed & 21.12 Mbps average upload speed across the measured routes for city drive. (refer table-17)
- All locations have less download speed except Apeejay School Greater Noida, Brahmputra Market Noida, Gaur City Mall Greater Noida, GIP Mall Noida and Yatharth Hospital Greater Noida (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-41, 42, 45, 46, 47, 48, 50, 51, 52, 54, 55, 56, 57, 58, 59 & 60)
- Advant Navis Business Park Noida, Apeejay School Greater Noida, Christ University Ghaziabad, Gaur City Mall Greater Noida, Gaur Plaza Ghaziabad, Ghaziabad District And Session Court, Ghaziabad Railway Station, Hindon Airport Ghaziabad, Max Super Speciality Hospital Ghaziabad, Sahibabad Fruit

Mandi and St. Xavier's High School Greater Noida have less upload speed (less than 20 Mbps) out of total 21 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-41, 43, 45, 49, 50, 51, 52, 54, 57, 58 & 59)

- Botanical Garden to Krishna Park Extension (Elevated & Underground), Kashmere Gate to Raja Nahar Singh (Underground), Noida Electronic City to Dwarka Sec -21 (Underground), Samaypur Badli to Millennium City Centre (Underground) and Yashobhoomi Dwarka Sec-25 to New Delhi metro route have the less download speed (less than 100 Mbps) and upload speed (less than 20 Mbps) out of 10 metro routes for auto-selection mode (5G/4G/3G/2G) (refer Table- 90, 93, 99, 105, 111 & 117)

4. VIL: Voice

- 96.45% call setup success rate and 4.57% drop call rate have been observed in 3G/2G network mode for LSA/city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3 and 11)
- 99.10% call setup success rate and 0.06% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 99.32% call setup success rate and 0.09% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 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. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-18)
- 100.00% call setup success rate and 0.00% drop call rate has been observed in auto-selection mode (5G/4G/3G/2G) at both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-84 & 85)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across all metro route except Botanical Garden to Krishna Park Extension (Underground), Kashmere Gate to Raja Nahar Singh (Underground) and Yashobhoomi Dwarka Sec-25 to New Delhi. Performance is well within the benchmark 98.00% & of 2.00% respectively. (refer table-88, 94, 100, 103, 106, 109 & 112)
- 87.10% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Botanical Garden to Krishna Park Extension (Underground) metro route. Performance is not meeting the benchmark 98.00% for call setup success rate. (refer table- 91)
- 93.75% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across Kashmere Gate to Raja Nahar Singh (Underground) metro route. Performance is not meeting the benchmark 98.00% for call setup success rate. (refer table- 97)
- 88.89% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Yashobhoomi Dwarka Sec-25 to New Delhi metro route. Performance is not meeting the benchmark 98.00% call setup success rate. (refer table- 115)

Data

- VIL has 64.17 Mbps average download speed & 14.14 Mbps average upload speed for LSA. (refer table-9)
- VIL has 65.36 Mbps average download speed & 13.30 Mbps average upload speed across the measured routes for city drive. (refer table-17)
- All locations have less download speed expect Brahmaputra Market Noida, Cloudnine Hospital Noida, Dav Public School Ghaziabad, GIP Mall Noida, Indirapuram Habitat Centre, Max Super Specialty Hospital Ghaziabad and Vaishali Metro Station (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-41, 42, 43, 45, 48, 49, 50, 51, 52, 54, 56, 58, 59 & 61)
- All locations have less upload speed expect Brahmaputra Market Noida, Ghaziabad Railway Station, GIP Mall Noida and Jaipuria Mall Indirapuram have less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-41, 42, 43, 45, 46, 47, 48, 49, 50, 51, 54, 55, 57, 58, 59, 60 & 61)
- Jagat Farm Greater Noida has less download speed (less than 100 Mbps) and upload speed (less than 20 Mbps) out of total 2 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table- 87)
- All metro routes have less download speed (less than 100 Mbps) except Botanical Garden to Krishna Park Extension (Elevated) for auto-selection mode (5G/4G/3G/2G). (refer table- 93, 96, 99, 102, 105, 108, 111, 114 & 117)
- All metro routes have less upload speed (less than 20 Mbps) except Botanical Garden to Krishna Park Extension (Elevated) & Noida Electronic City to Dwarka Sec -21 (Elevated) for auto-selection mode (5G/4G/3G/2G). (refer table- 93, 96, 99, 105, 108, 111, 114 & 117)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

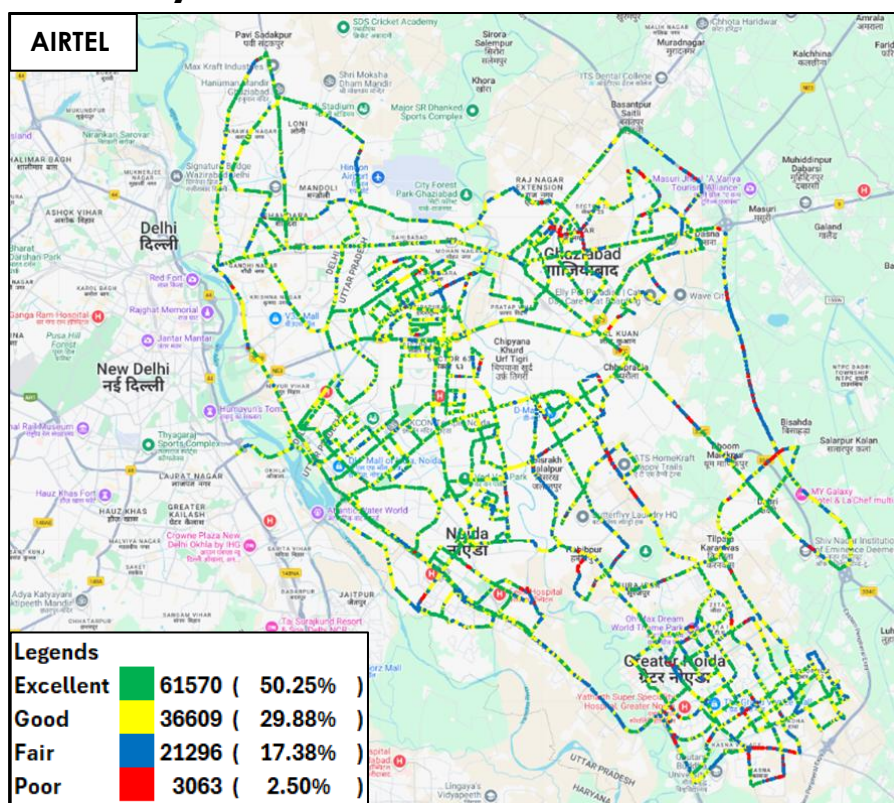


Figure-96: Signal strength 3G/2G network mode – AIRTEL.

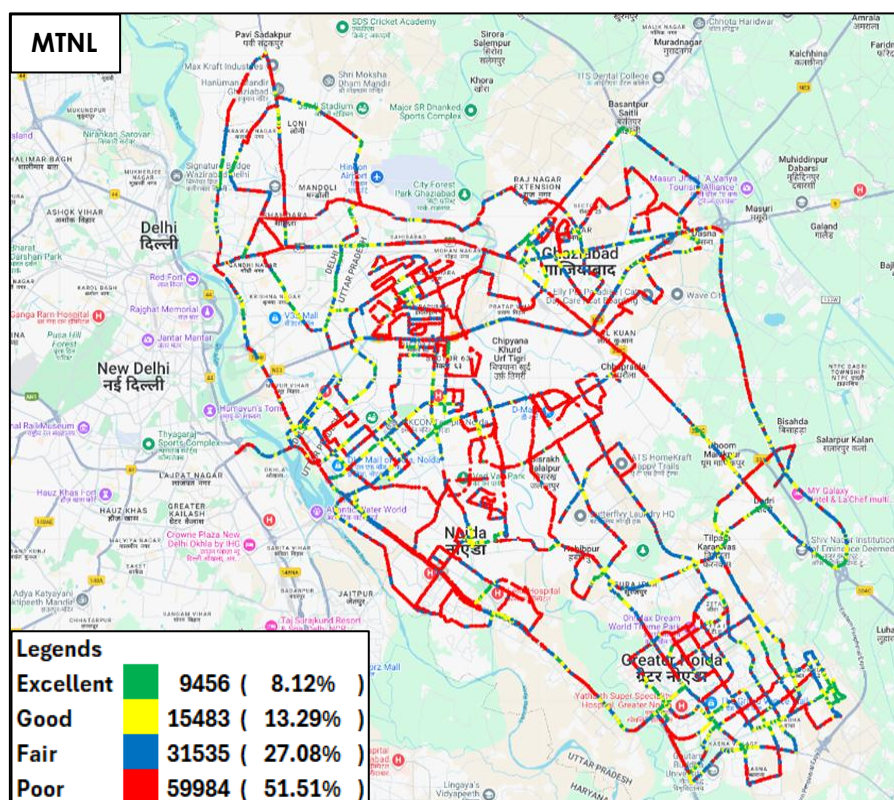


Figure-97: Signal strength 3G/2G network mode – MTNL.

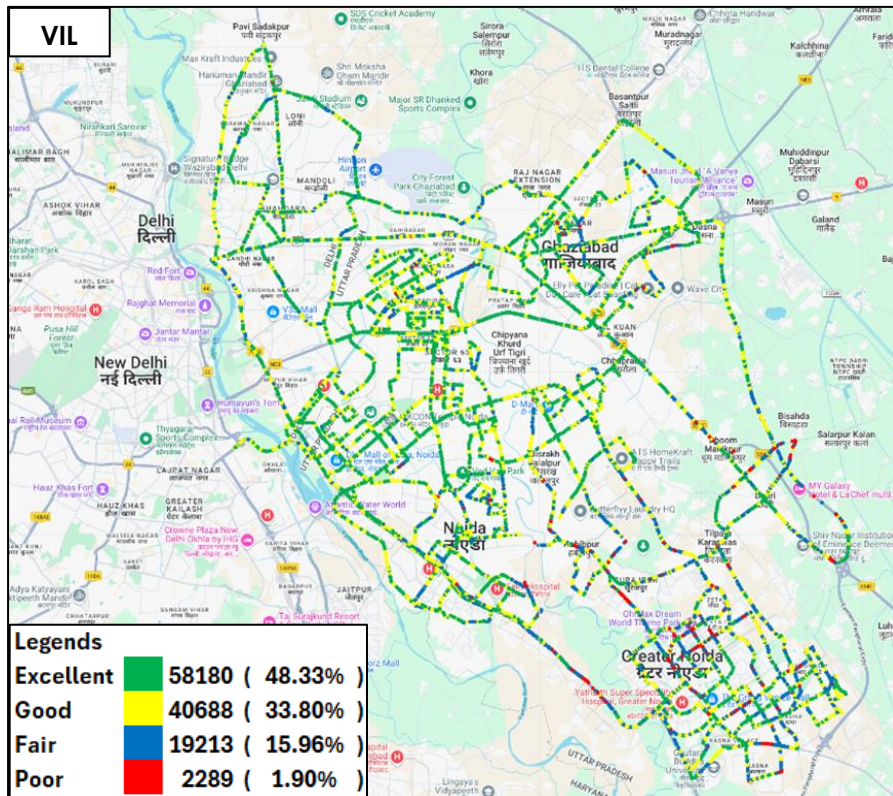


Figure-98: Signal strength 3G/2G network mode – VIL.

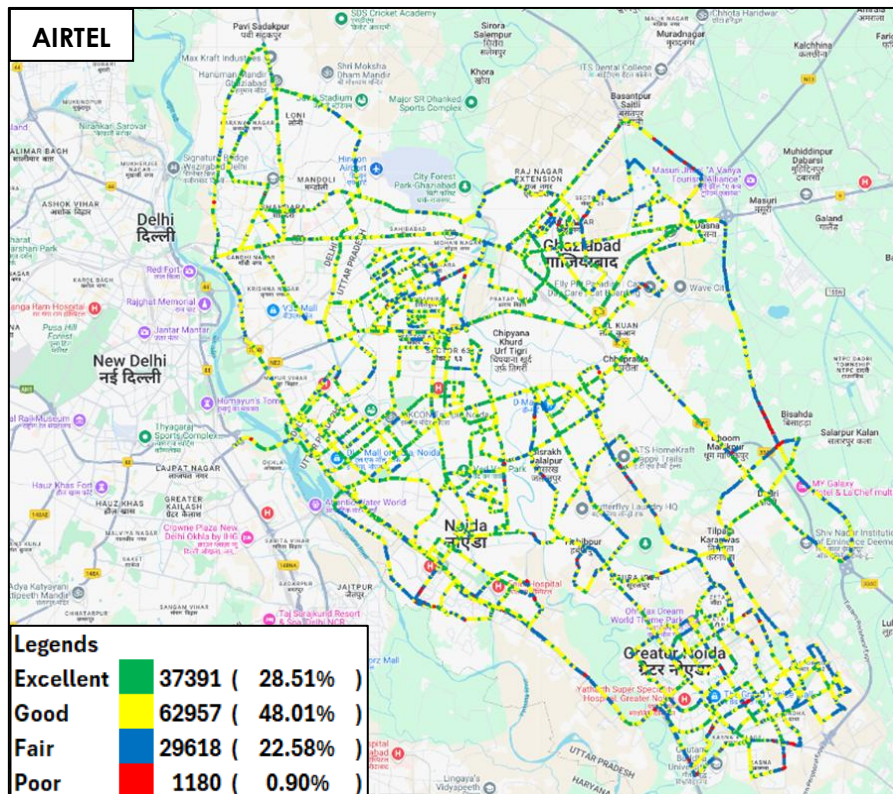


Figure-99: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

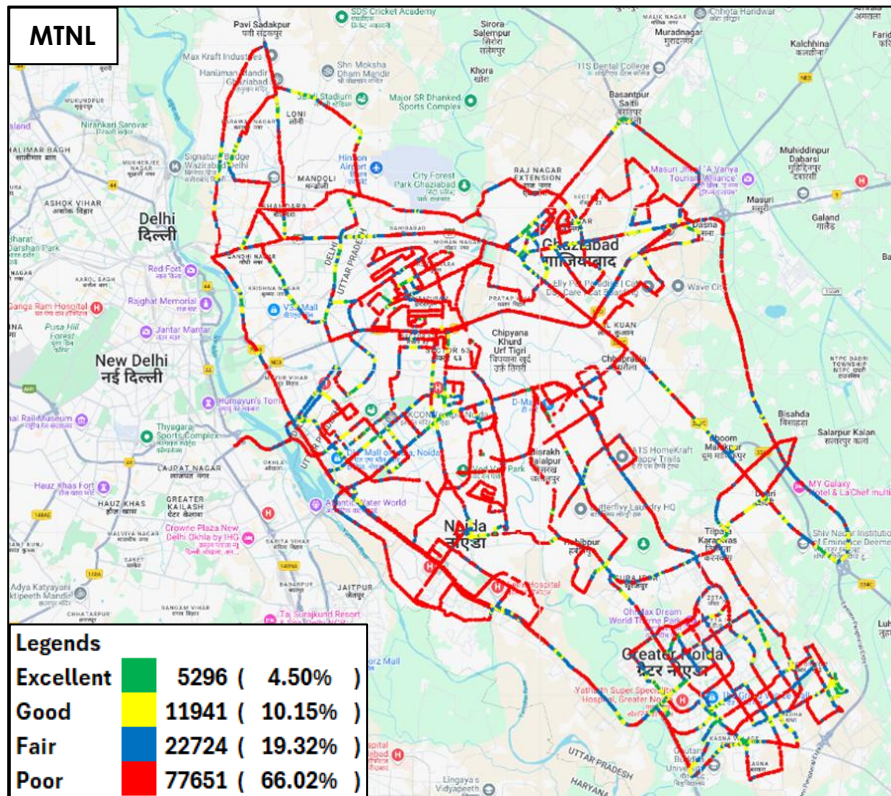


Figure-100: Signal strength auto-selection mode 5G/4G/3G/2G – MTNL.

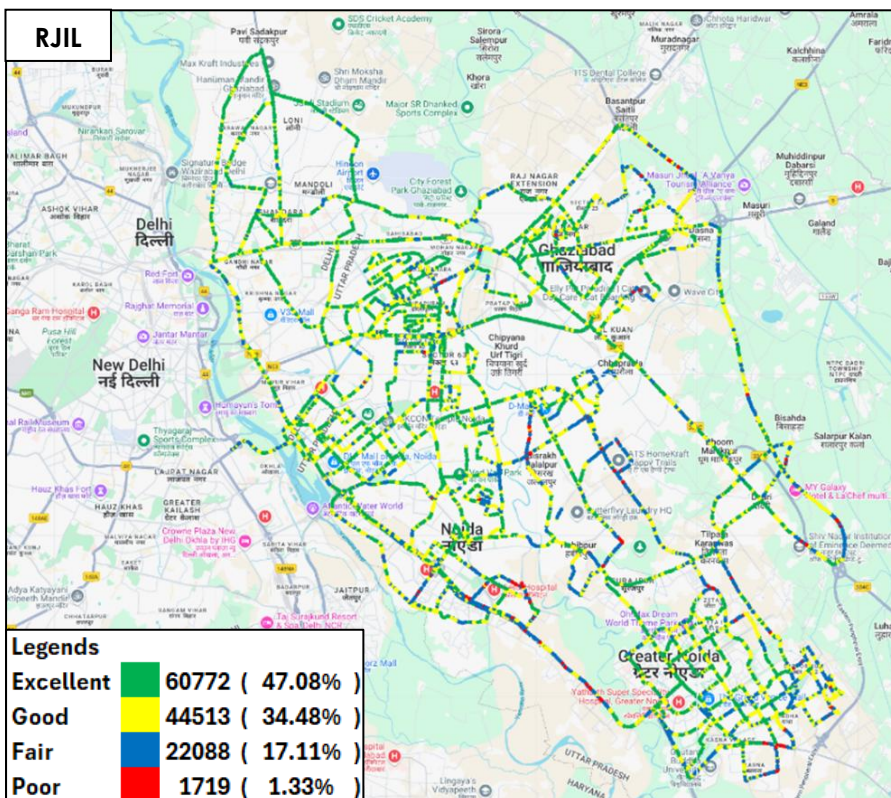


Figure-101: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

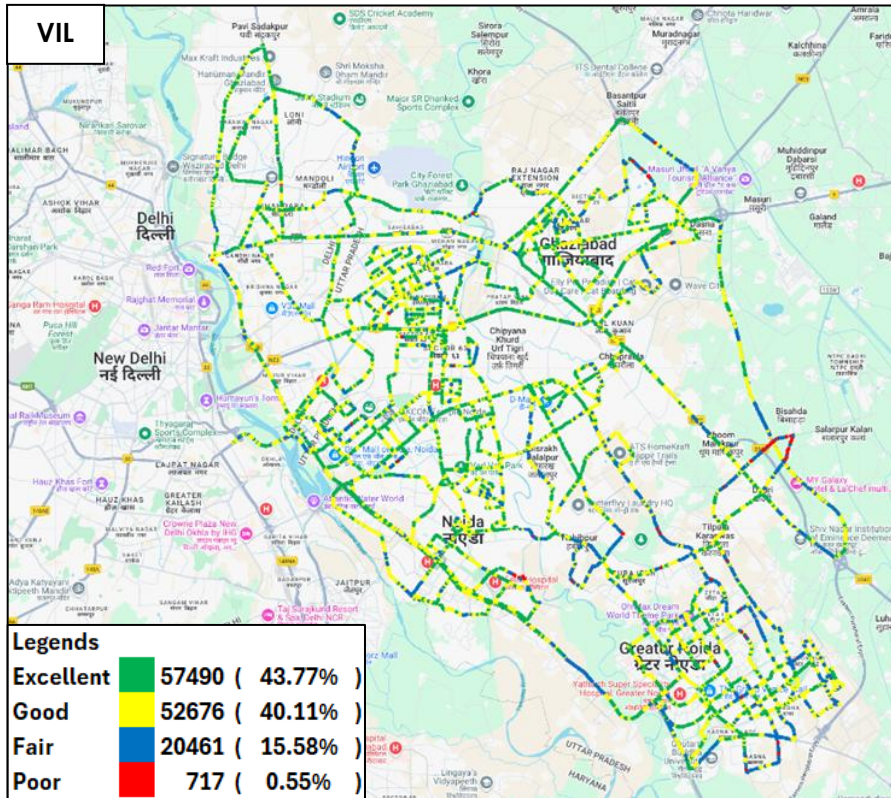


Figure-102: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

6.1.2 Metro

i) Botanical Garden to Krishna Park Extension

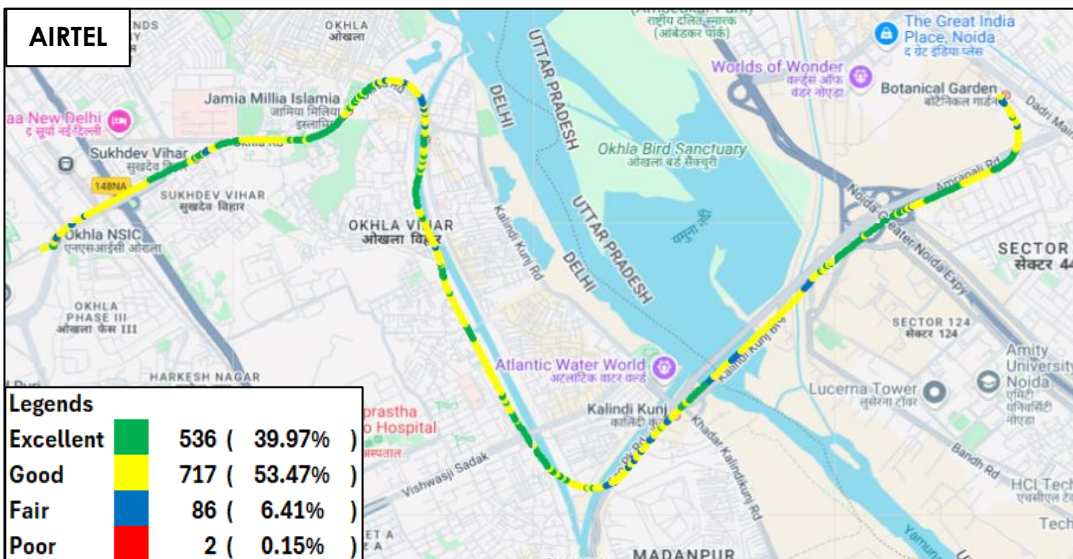


Figure-103: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL

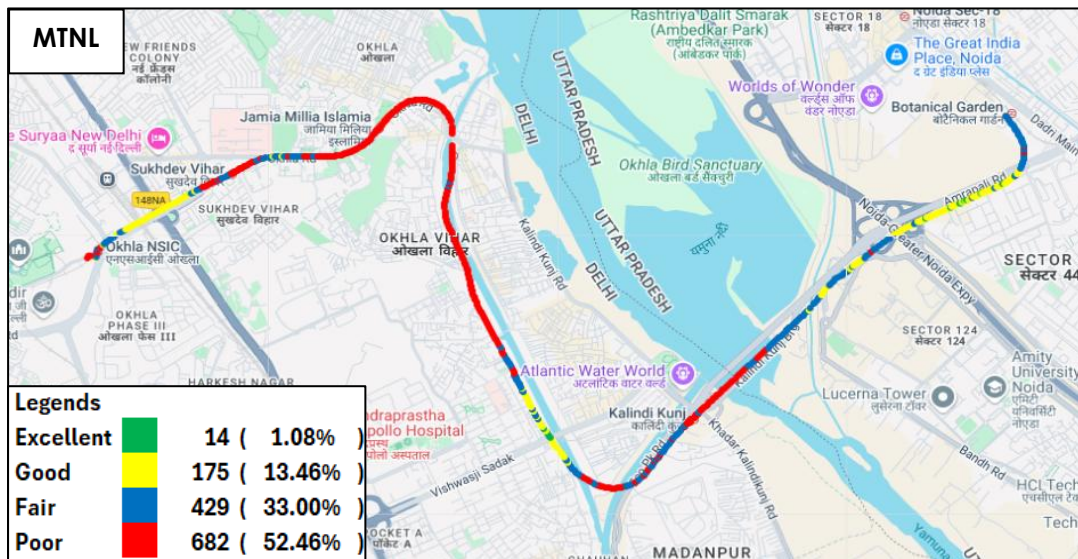


Figure-104: Signal strength auto-selection mode 5G/4G/3G/2G - MTNL

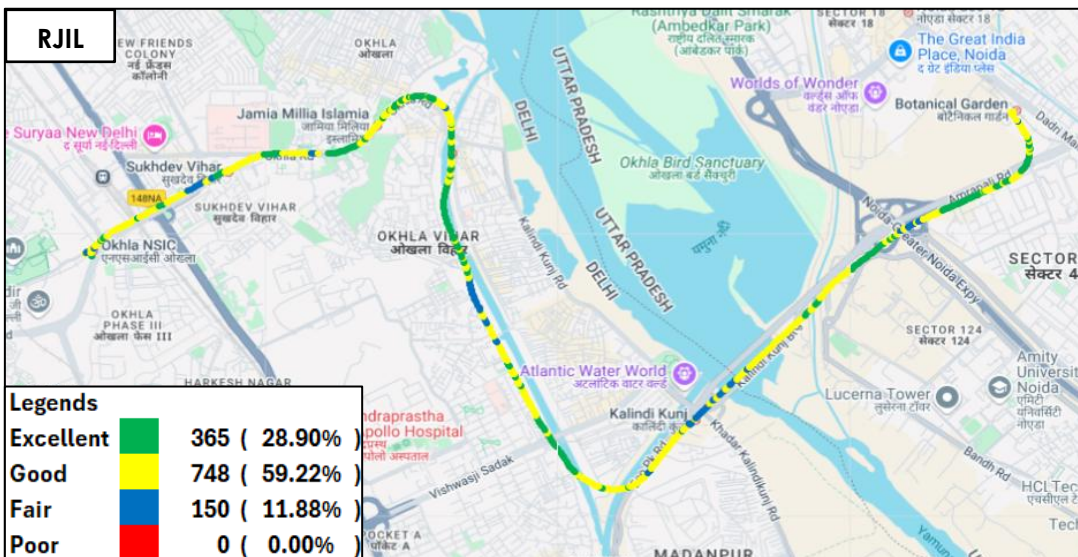


Figure-105: Signal strength auto-selection mode 5G/4G/3G/2G - RJIL

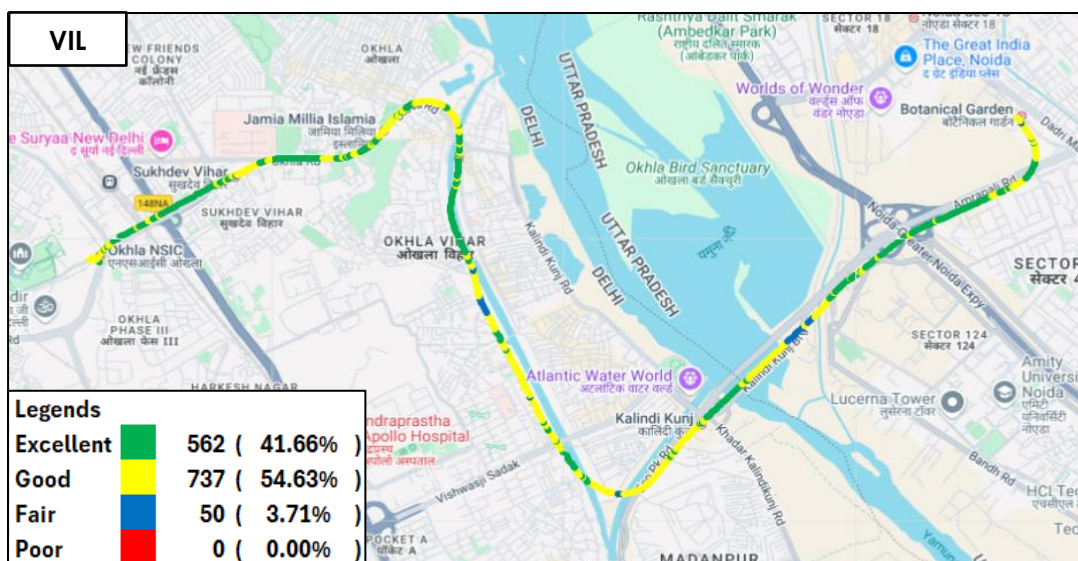


Figure-106: Signal strength auto-selection mode 5G/4G/3G/2G - VIL

ii) Kashmere Gate to Raja Nahar Singh

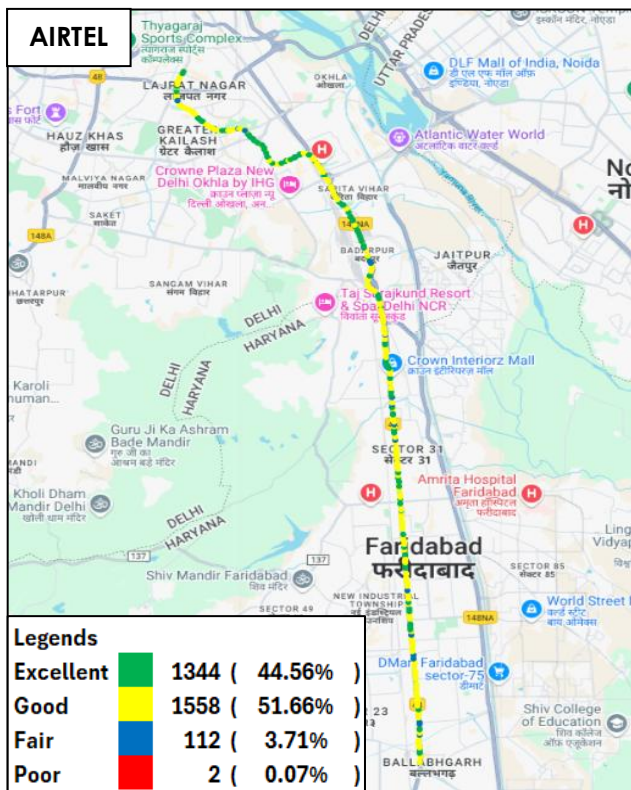


Figure-107: Signal strength auto-selection mode 5G/4G/3G/2G –AIRTEL

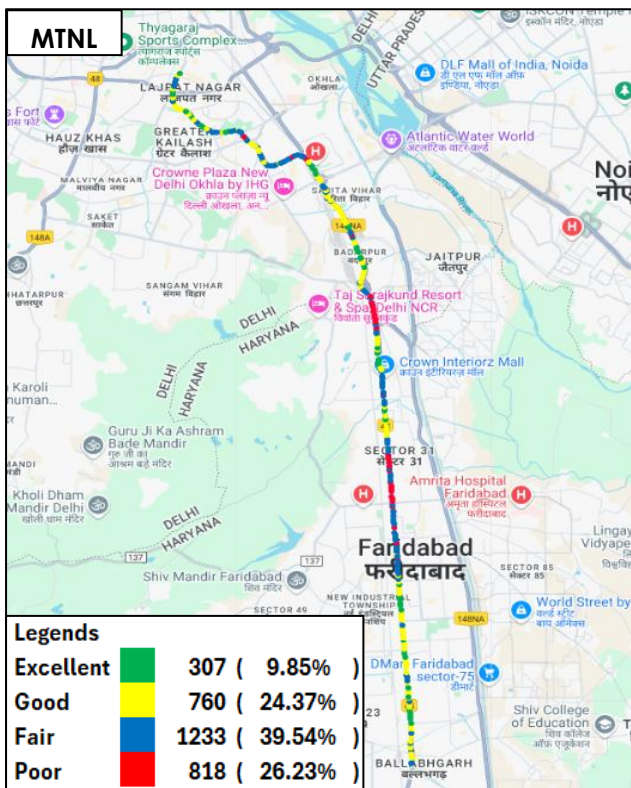


Figure-108: Signal strength auto-selection mode 5G/4G/3G/2G -MTNL

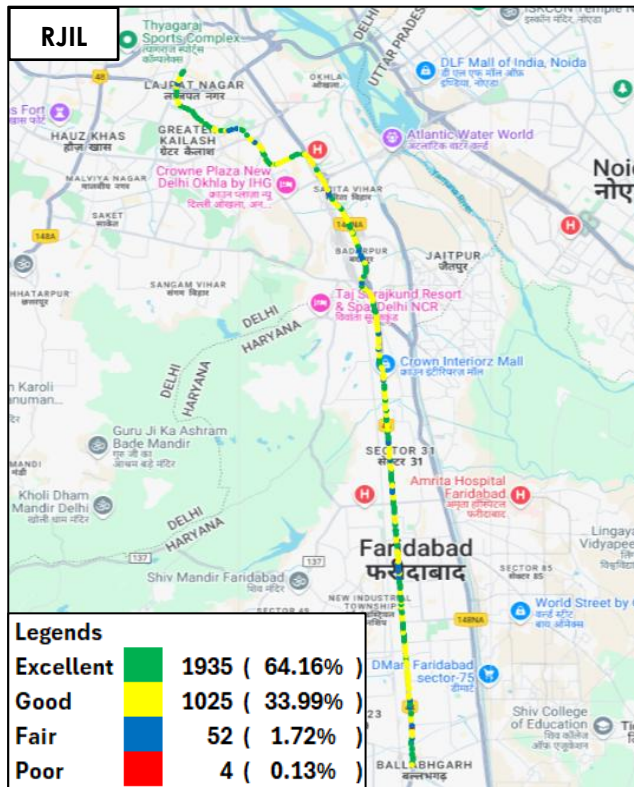


Figure-109: Signal strength auto-selection mode 5G/4G/3G/2G - RJIL

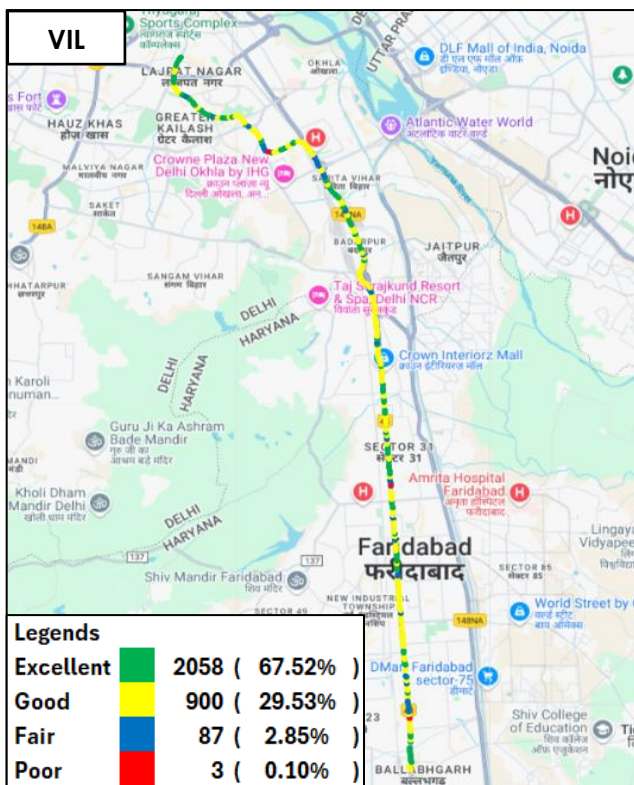


Figure-110: Signal strength auto-selection mode 5G/4G/3G/2G - VIL

iii) Noida Electronic City to Dwarka Sec -21

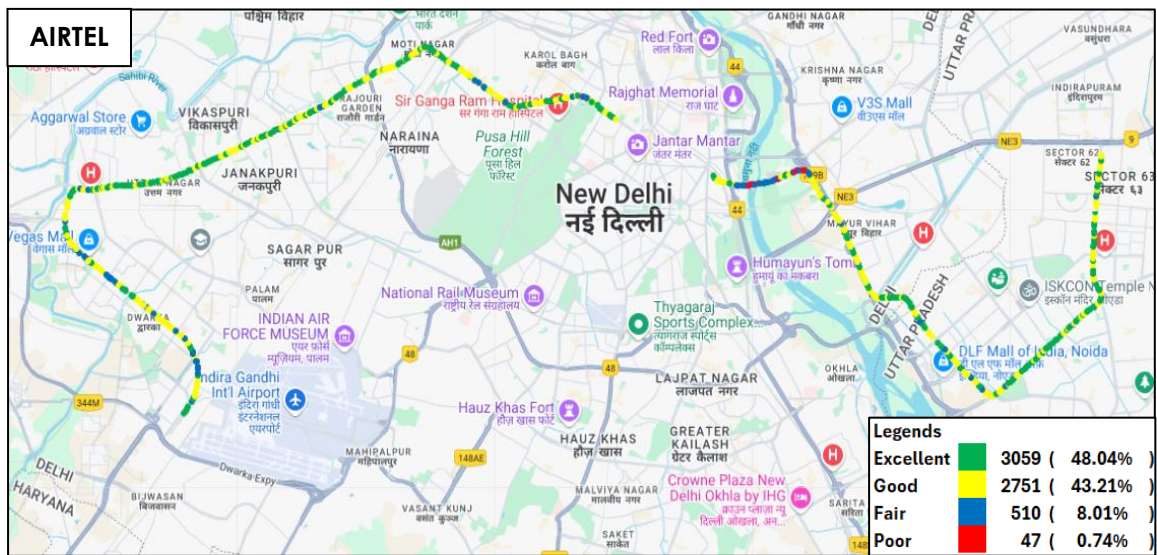


Figure-111: Signal strength auto-selection mode 5G/4G/3G/2G –AIRTEL

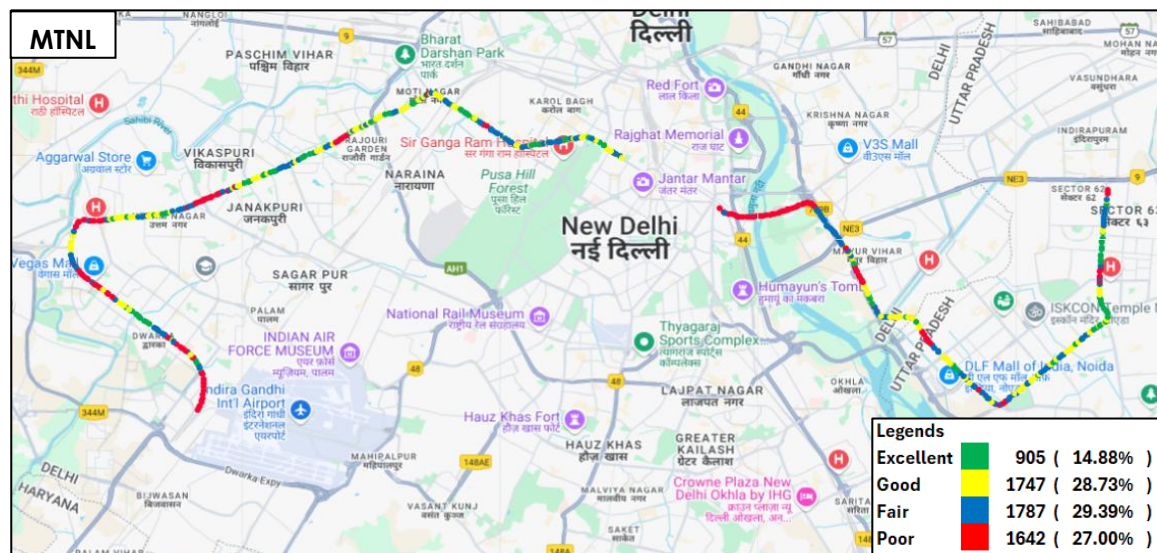


Figure-112: Signal strength auto-selection mode 5G/4G/3G/2G -MTNL

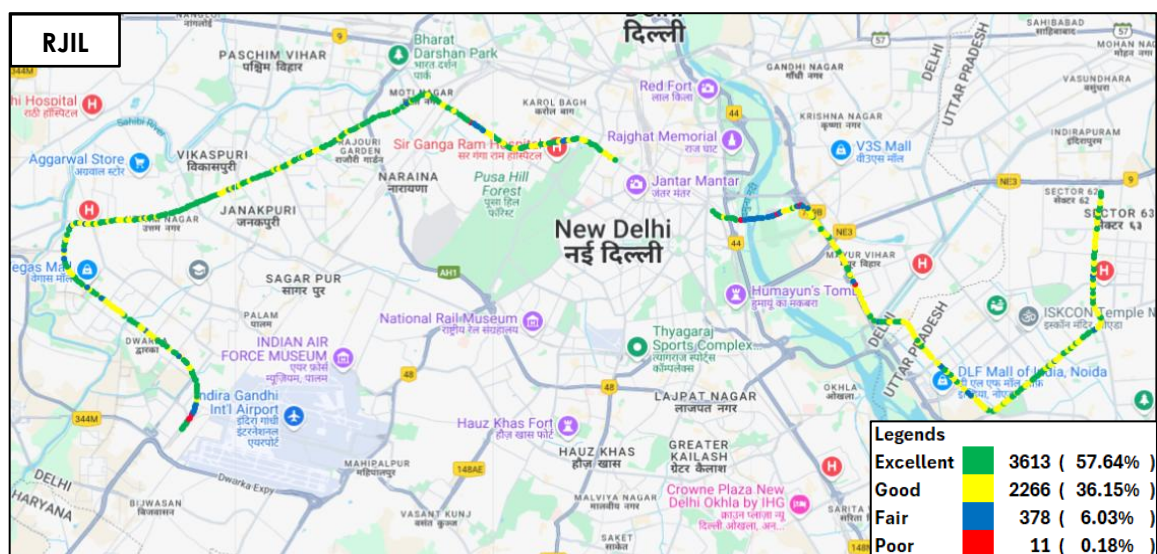


Figure-113: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL

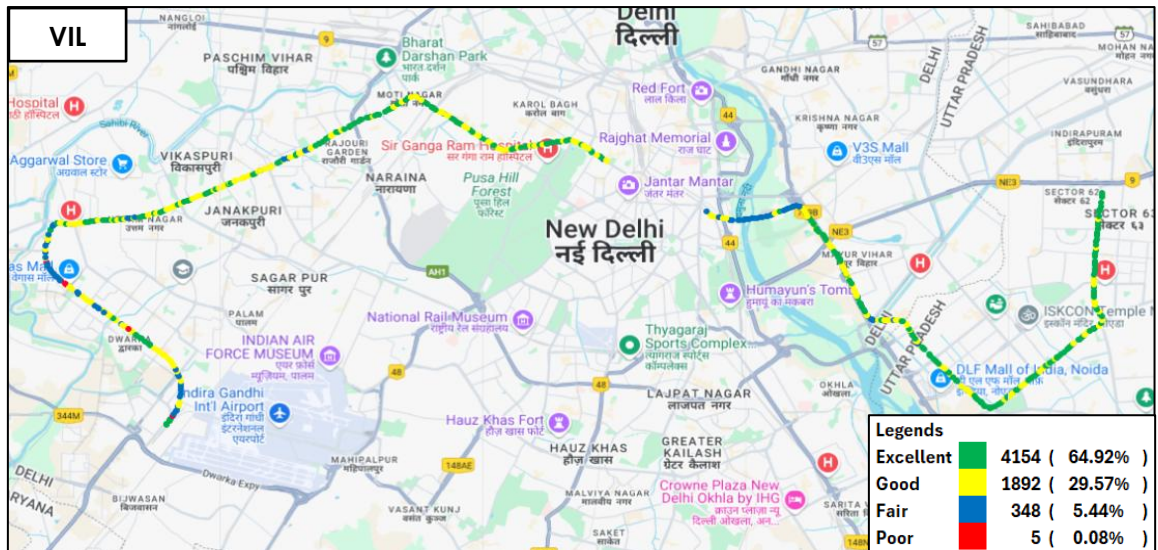


Figure-114: Signal strength auto-selection mode 5G/4G/3G/2G - VIL

iv) Samaypur Badli to Millennium City Centre

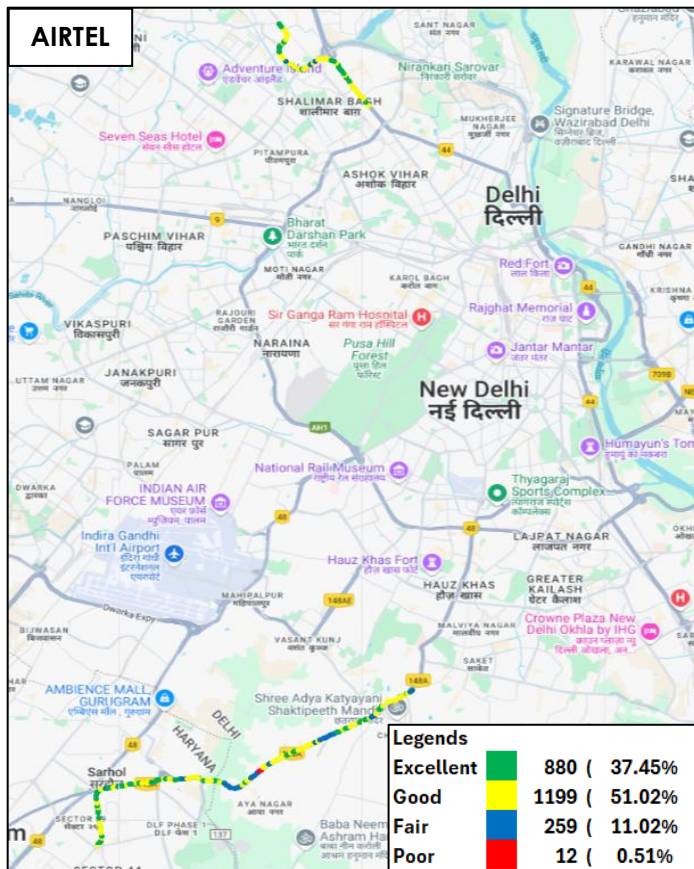


Figure-115: Signal strength auto-selection mode 5G/4G/3G/2G - AIRTEL

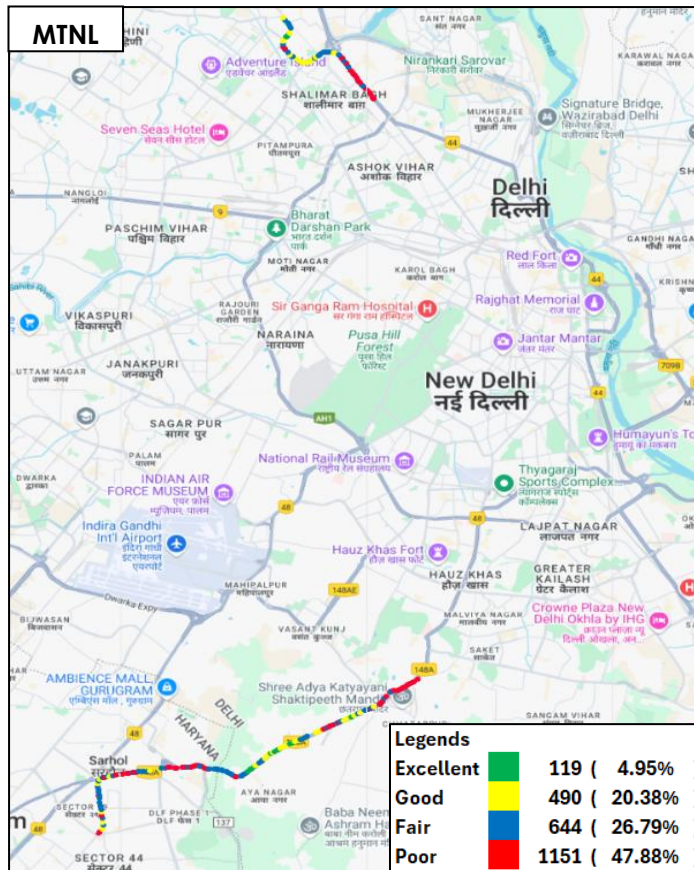


Figure-116: Signal strength auto-selection mode 5G/4G/3G/2G -MTNL

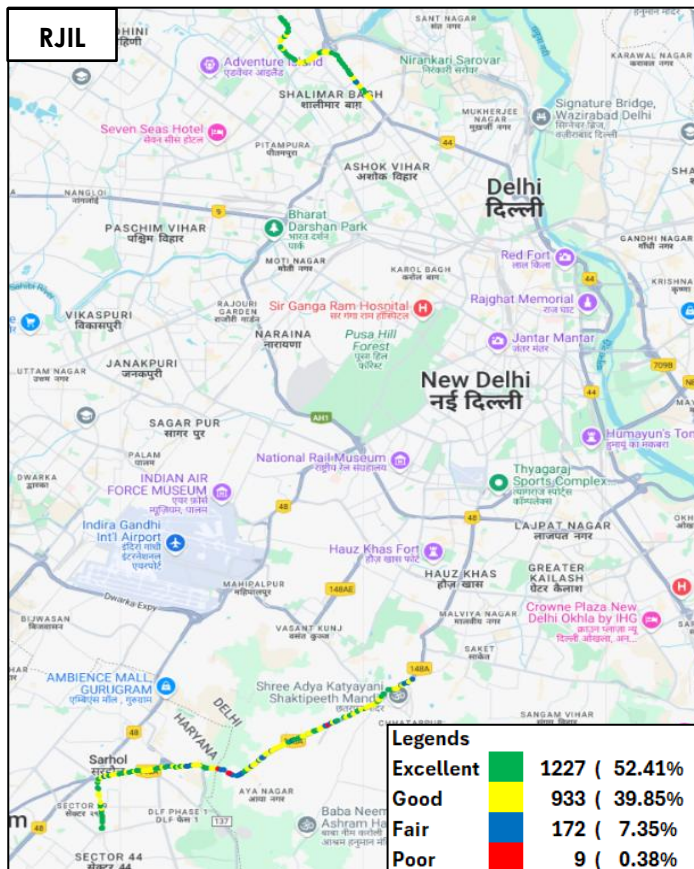


Figure-117: Signal strength auto-selection mode 5G/4G/3G/2G - RJIL

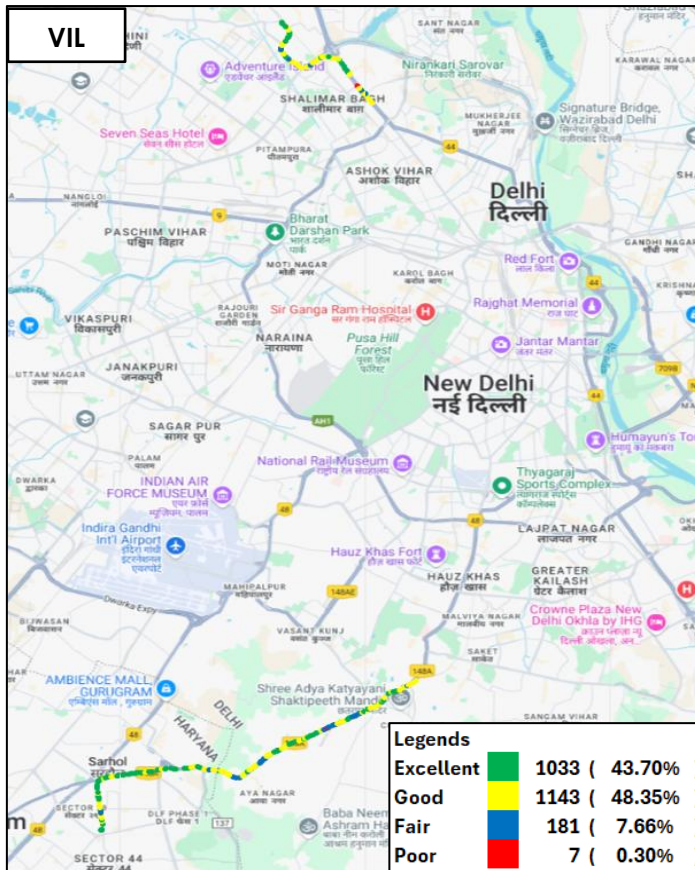


Figure-118: Signal strength auto-selection mode 5G/4G/3G/2G – VIL

v) Shaheed Sthal to Rithala

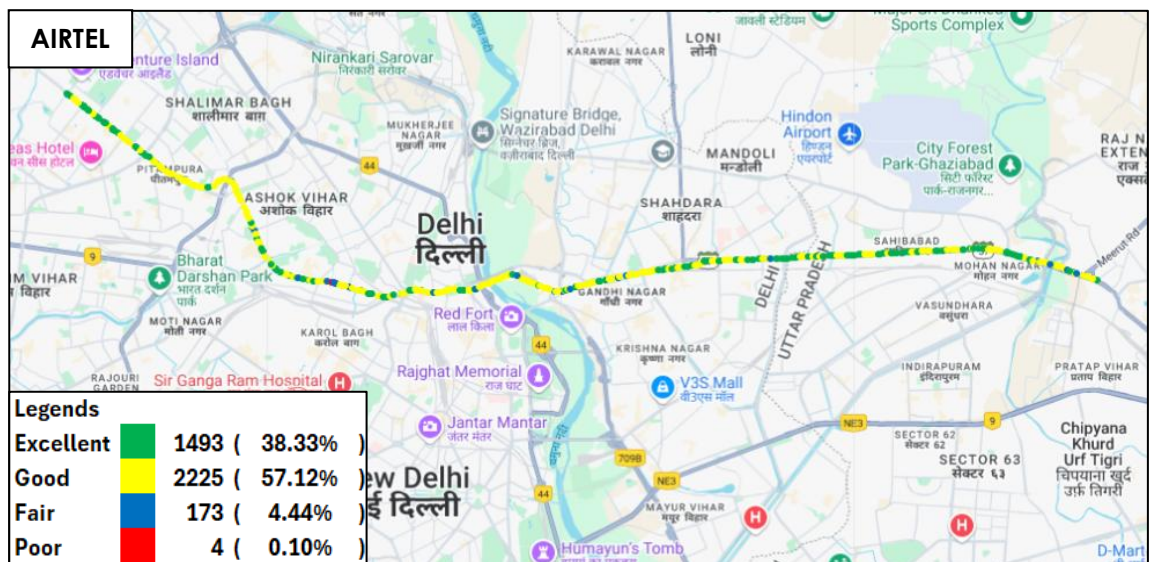


Figure-119: Signal strength auto-selection mode 5G/4G/3G/2G –AIRTEL

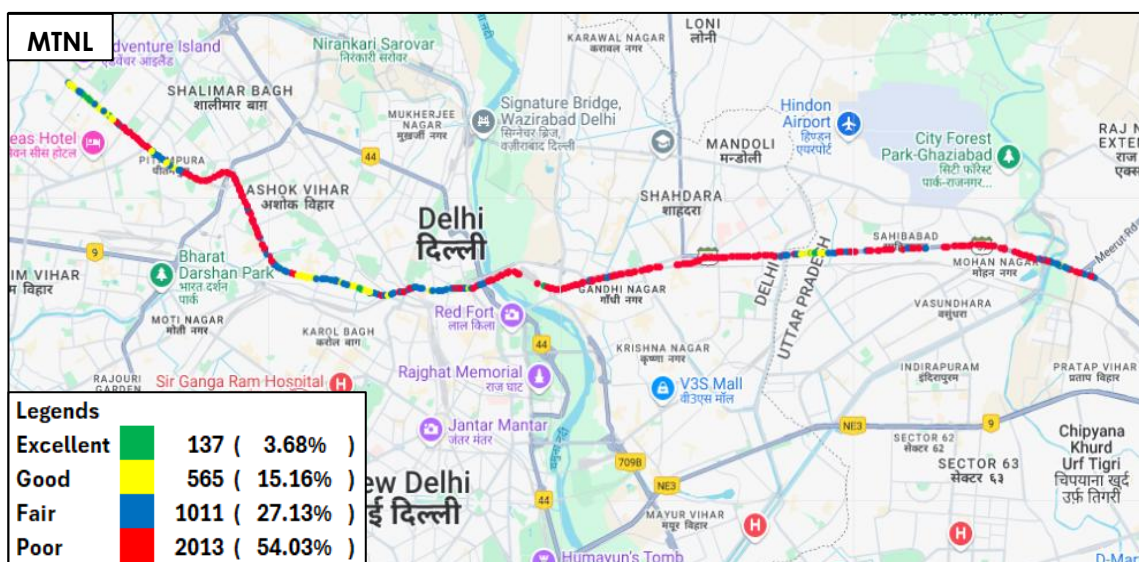


Figure-120: Signal strength auto-selection mode 5G/4G/3G/2G -MTNL

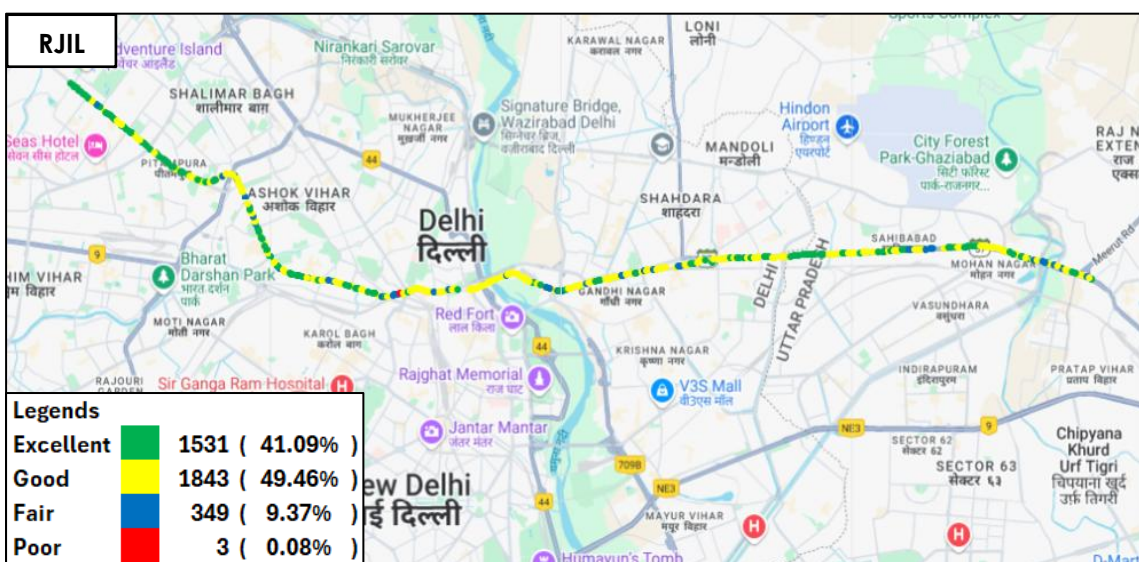


Figure-121: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL

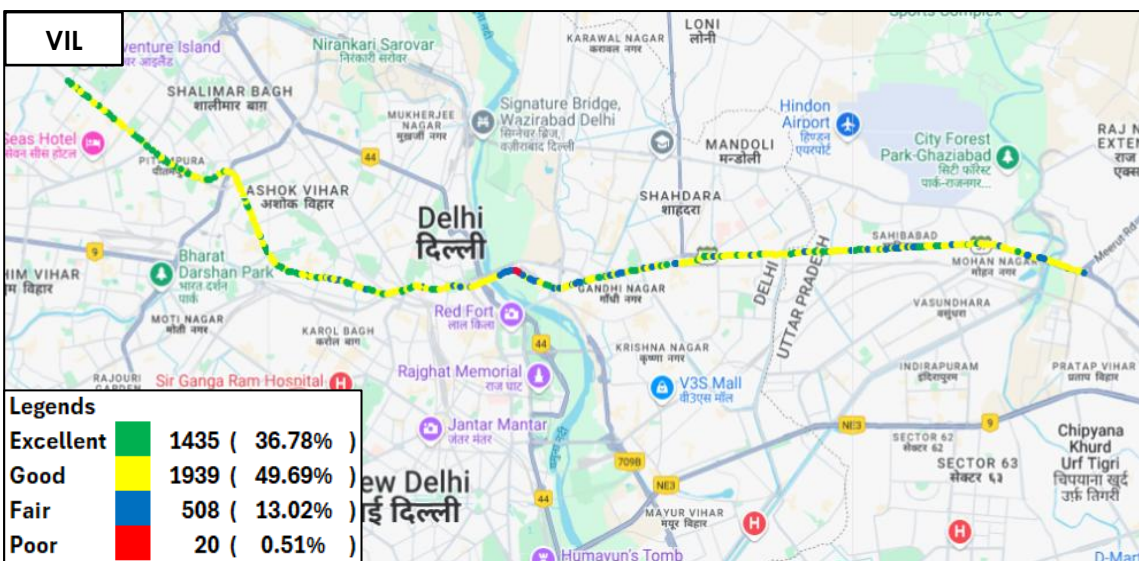


Figure-122: Signal strength auto-selection mode 5G/4G/3G/2G – VIL

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 Sec
Wait/ Guard Time		15 Sec

Table-118: 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.
- 180 Sec calls were made only in highway & railway route drive.

Data Test		
Test Type	Technology	Detail
HTTP/FTP Download	5G/4G/3G/2G Auto Mode	500 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
HTTP/FTP 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.co.in) 20 sec timeout (only at Hotspot)

Latency		25 count- Dynamic 1000 count- Hotspot Payload- 42 bytes in all drive
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Table-119: 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.
- Ping 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.
- Download and upload testing has been done on FTP server for Airtel, MTNL & RJIL.
(Airtel, MTNL & RJIL not provided HTTP server)
- VIL download and upload testing is done on HTTP Server.

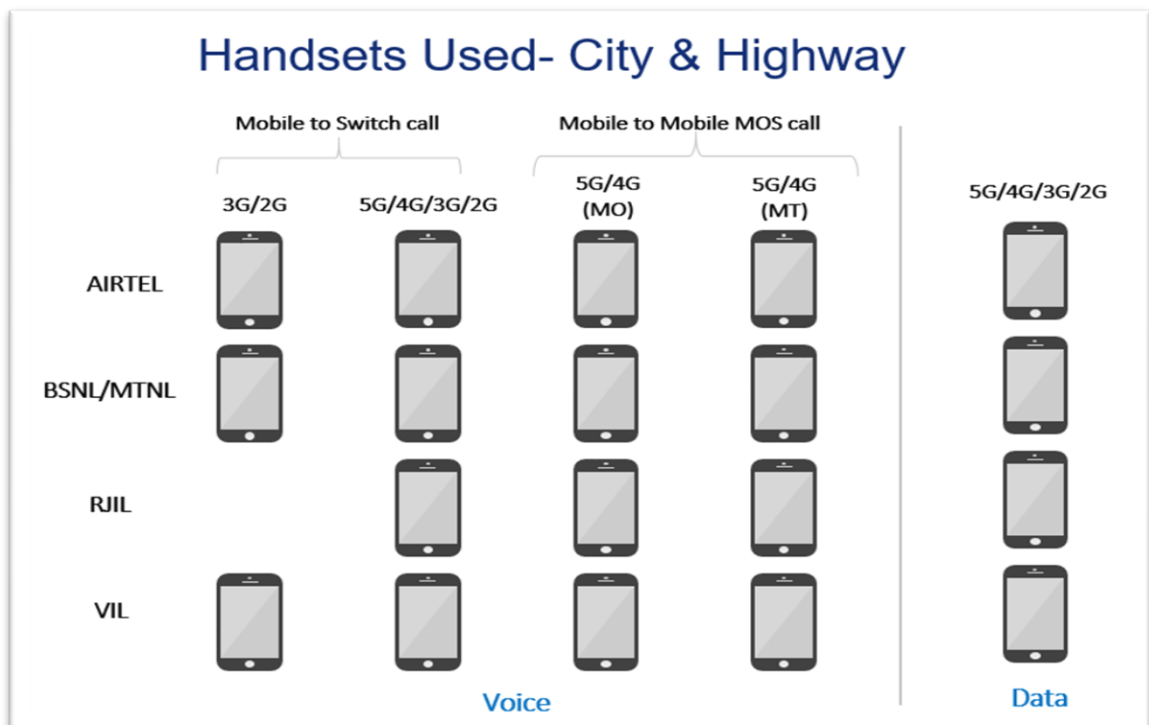


Figure-123: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

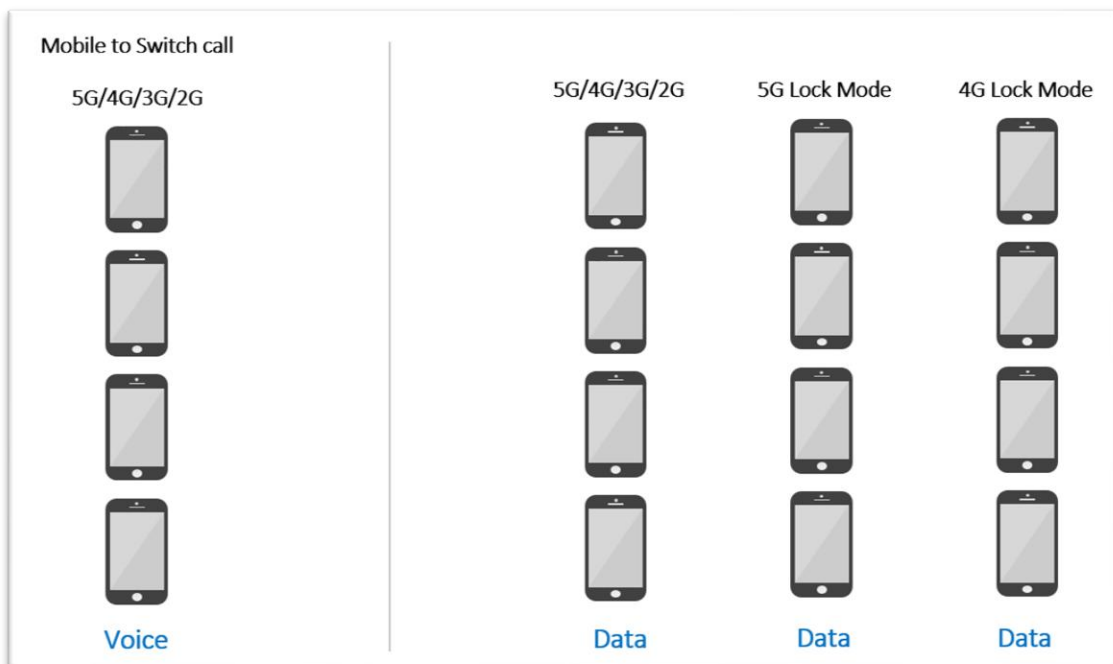


Figure-124: Number of handsets used in railway/metro/walktest/hotspot/coastal area

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)

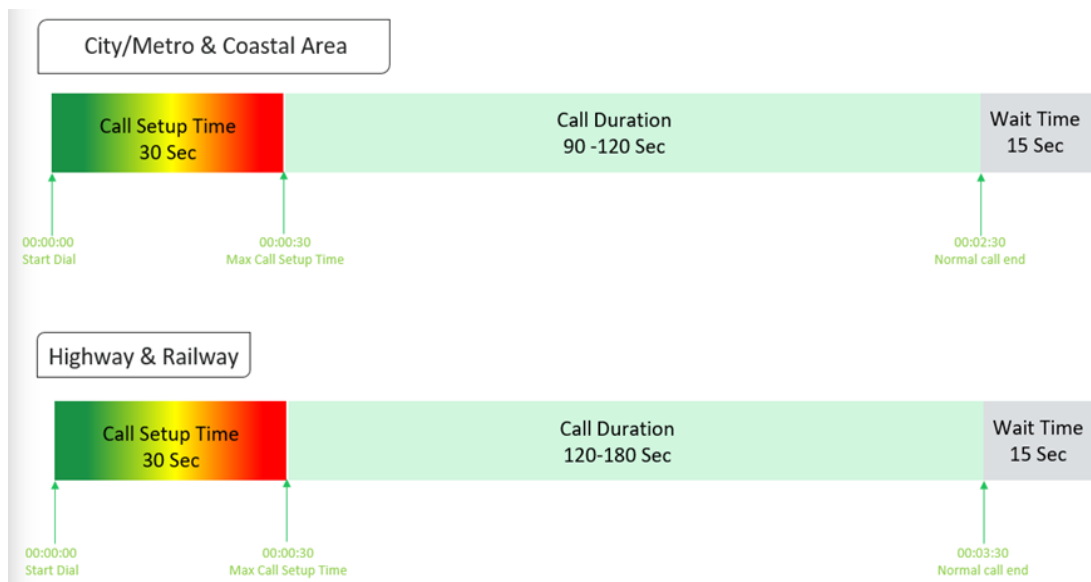


Figure-125: Voice test script for city/railway/metro/highway & coastal area

- 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-126: 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

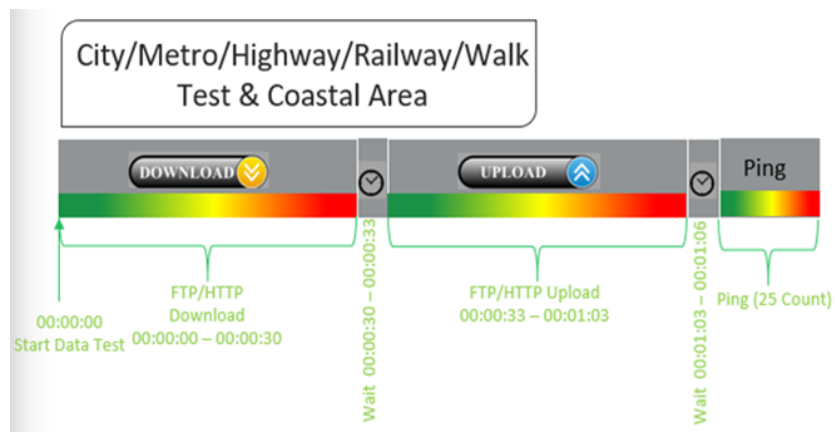


Figure-127: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

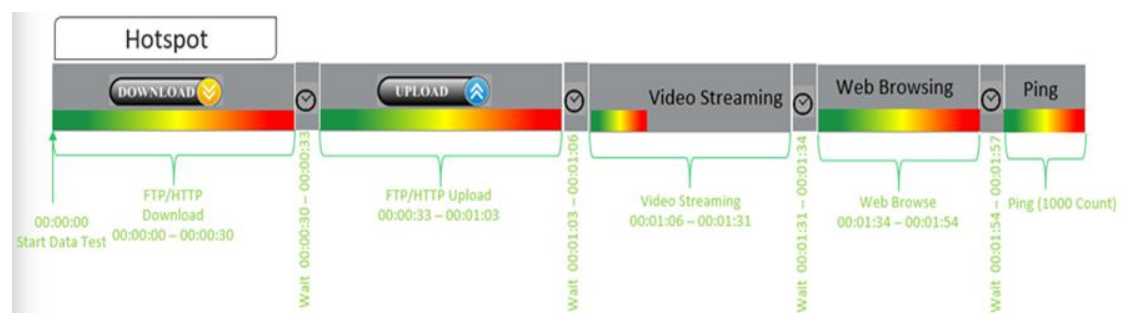


Figure-128: Data test script used at hotspot

- 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.
- Only 1 ping iteration (with 1000 Count) done at the 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 ≥ 4 and < 5 Good : MOS ≥ 3 and < 4 Fair : MOS ≥ 2 and < 3 Poor : MOS ≥ 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.

Jitter	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 S_i is the RTP timestamp from packet i, and R_i 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: $D(i,j) = (R_j - R_i) - (S_j - S_i)$ 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 $J(i) = J(i-1) + (D(i-1,i) - J(i-1))/16 \text{ or } 8$																																		
Downlink Packet Drop Rate	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)																																		
Uplink Packet Drop Rate	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).																																		
Signal Strength	Signal strength is the signal power level received by the wireless user. <table><tr><th rowspan="2">Parameter Name</th><th rowspan="2">Technology</th><th colspan="4">Signal Strength (dBm)</th></tr><tr><th>Excellent</th><th>Good</th><th>Fair</th><th>Poor</th></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>	Parameter Name	Technology	Signal Strength (dBm)				Excellent	Good	Fair	Poor	Rx Level	GSM	0 to ≥ -65	<-65 to ≥ -75	<-75 to ≥ -85	<-85 to min	RSCP	WCDMA	0 to ≥ -70	<-70 to ≥ -80	<-80 to ≥ -90	<-90 to min	RSRP	LTE	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min	SS_RSRP	NR	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min
Parameter Name	Technology			Signal Strength (dBm)																															
		Excellent	Good	Fair	Poor																														
Rx Level	GSM	0 to ≥ -65	<-65 to ≥ -75	<-75 to ≥ -85	<-85 to min																														
RSCP	WCDMA	0 to ≥ -70	<-70 to ≥ -80	<-80 to ≥ -90	<-90 to min																														
RSRP	LTE	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min																														
SS_RSRP	NR	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min																														

Table-120: 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	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	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	Number of packets lost out of total packet transferred during test. Packet loss rate = (Total packet lost / Total packet sent) *100 * Packet delay (using ping) >90 ms considered as packet loss and included in packet loss rate. * Packet loss rate is calculated based on ICMP *90th percentile for Packet loss rate has been reported in overall Hotspot performance summary.

Table-121: 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.