भादूविप्रा
TRAI

TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Delhi LSA

January 2025

Contents

1. Introduction

TRAI Act, 1997 mandates the Authority to ensure the services delivered through various telecommunications networks meet 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 interest of the consumers of telecommunications service.

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, Haryana & Rajasthan License Service Area (LSA) during the month of January-2025 under the supervision of TRAI Regional Office (RO), Delhi. Details of route / area covered during the IDT is as given below:

Sl. No	Drive test route	Type of route	Distance covered (KMs)	From date	To date
1	Delhi	City	592.0	20-Jan-2025	29-Jan-2025
2	Delhi	Inter Operator Calling	14.9	24-Jan-2025	24-Jan-2025
3	Delhi	Hotspot	19 Locations	23-Jan-2025	30-Jan-2025
4	Sohna to Dausa	Highway	193.5	31-Jan-2025	31-Jan-2025

Table-1: Drive test summary

2.2 Drive test routes

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

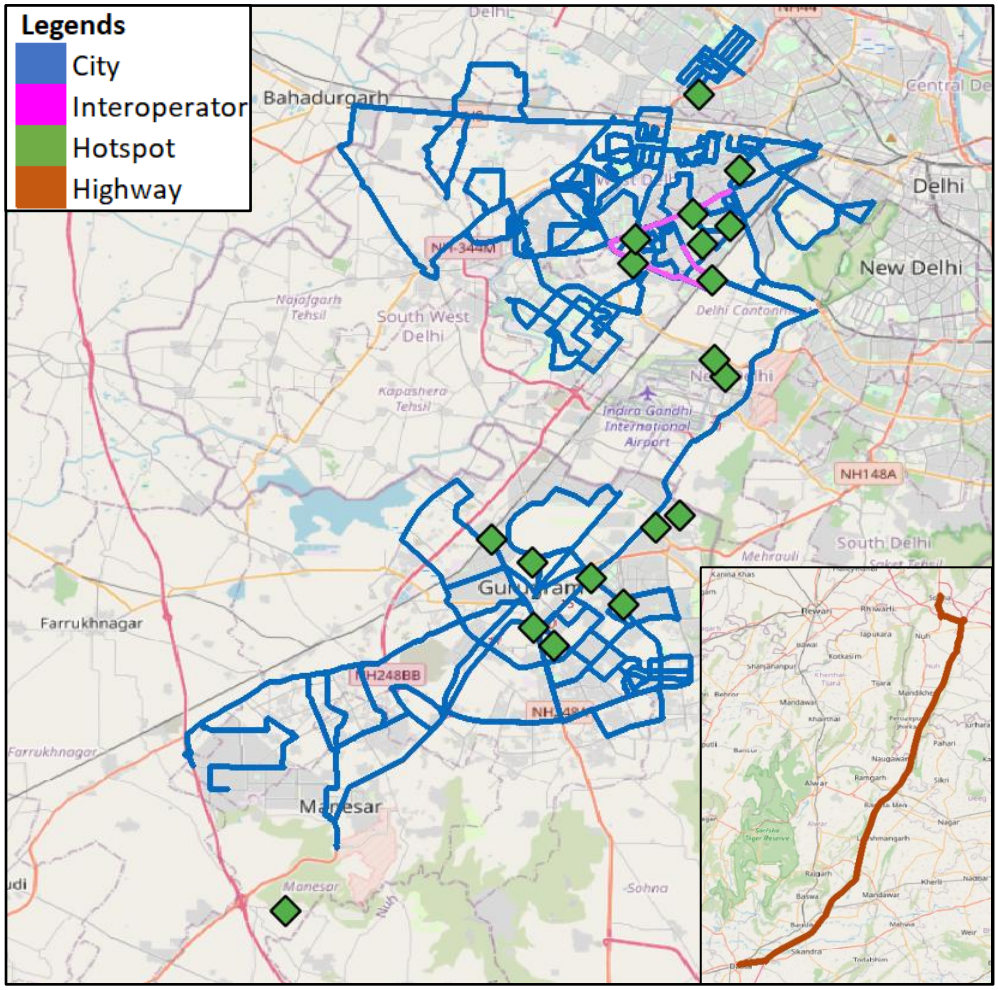


Figure-1: Drive test routes

2.3 Summary of areas covered

a) City- Nearby Tilak Nagar, Paschim Vihar, Lok Nayak Puram, Dwarka, Kirti Nagar, Rohini, Sunder Vihar, Nangloi, Gurugram, IMT Chowk, Kendriya Vihar, Patel Nagar, Motinagar, Hastsal, Uttam Nagar, Bangrola etc.

b) Hotspot-

1. Mata Chanan Devi Hospital, Janakpuri
2. Pacific Mall, Tagore Garden
3. Shadley Public School, Subhash Nagar
4. Presidium School, Punjabi Bagh
5. Deen Dayal Upadhyay Hospital
6. Delhi Cantt Railway Station
7. Jaipur Golden Hospital, Rohini
8. District Centre, Janakpuri
9. Palam Airport
10. Airforce Museum, Palam

11. Ambience Mall
12. Gurugram Railway Station
13. Sheetla Mata Mandir
14. Huda City Centre
15. Medanta Hospital, Gurugram
16. MDI Gurugram
17. DLF Cyber Hub
18. Amity University
19. District Court, Gurugram

c) Highway

1. Sohna to Dausa via Mumbai Expressway passing through Umri, Kamala, Khuspuri, Indpur, Khorpuri and Bhadrej.

2.4 Telecom service providers detected frequency bands

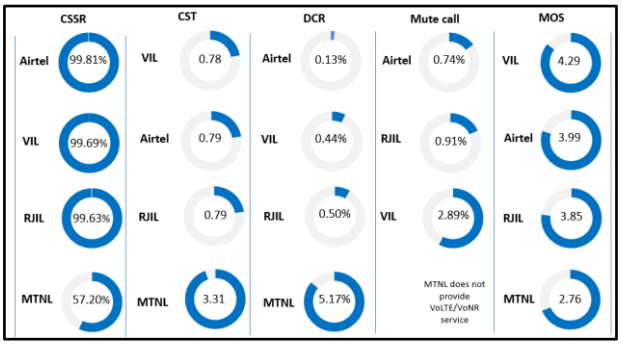
Technologies covered during the IDT and frequency bands in use are summarised in table below:

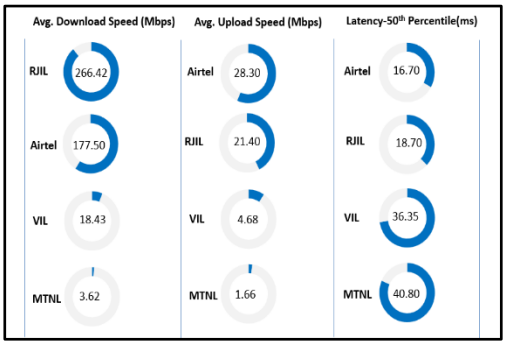
S.no.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	900,1800
2	Bharti Airtel Ltd.	4G	850,900,1800,2100,2300
3	Bharti Airtel Ltd.	5G	3500
4	MTNL	2G	900,1800
5	MTNL	3G	2100
6	Reliance JIO Infocomm Ltd.	4G	850,1800,2300
7	Reliance JIO Infocomm Ltd.	5G	700,3500
8	Vodafone Idea Ltd.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

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

2.5 Performance against key QoS parameters

CSSR: Call Setup Success Rate, **CST:** Call Setup Time, **DCR:** Drop Call Rate





Summary-Voice services

Call Setup Success Rate: Airtel, VIL, RJIL & MTNL have 99.81%, 99.69%, 99.63% and 57.20% call setup success rate respectively in Auto-selection mode (5G/4G/3G/2G).

Call Setup Time: MTNL has taken comparatively longer time (3.31 seconds) to establish the voice call, whereas VIL, Airtel and RJIL call setup time is 0.78, 0.79 & 0.79 second respectively in Auto-selection mode (5G/4G/3G/2G).

Call Drop Rate: Overall MTNL's call drop rate (5.17%) is higher (QoS benchmark of 2%), while Airtel, VIL and RJIL have 0.13%, 0.44% and 0.50% respectively in Auto-selection mode (5G/4G/3G/2G).

Call Silence/Mute Rate: In packet switched network (4G/5G), Airtel, RJIL and VIL have 0.74%, 0.91% & 2.89% silence call rate respectively.

Mean Opinion Score (MOS): Quality of speech of VIL (4.29) is having a MOS score >4, whereas Airtel (3.99), RJIL (3.85) and MTNL (2.76) is having a MOS score <4.

Summary-Data services

Data Download performance (Dynamic): MTNL offers a download speed of 3.62 Mbps while VIL provides 18.43 Mbps, utilizing legacy technologies respectively. In contrast, Airtel and RJIL achieve significantly higher average download speeds of 177.50 Mbps and 266.42 Mbps respectively.

Data Upload performance (Dynamic): MTNL offers a upload speed of 1.66 Mbps while VIL provides 4.68 Mbps, utilizing legacy technologies respectively, In contrast, Airtel and RJIL offer higher speeds of 28.30 Mbps and 21.40 Mbps respectively.

QoS Performance Analysis- Delhi, Haryana & Rajasthan 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 January-2025 covering City, Hotspots and Highway. (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	1579	2379	1707
Call Setup Success Rate %	79.61	47.50	95.31
Drop Call Rate %	0.48	7.88	2.51
Call Setup Time-Average (Second)	3.15	3.09	4.02
Handover Success Rate %	98.12	99.88	99.83

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

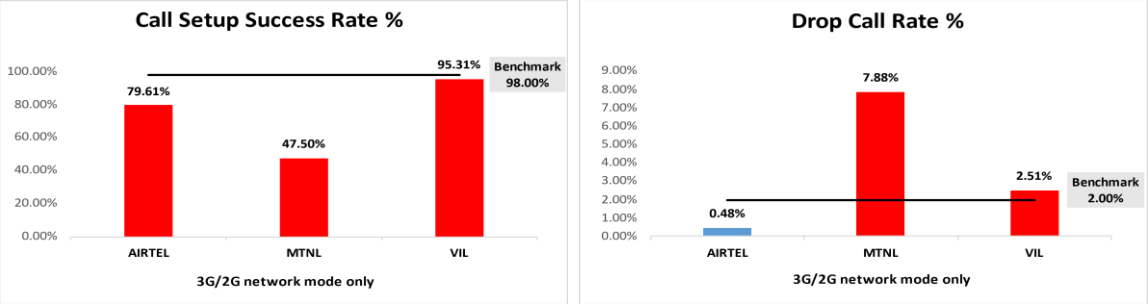


Figure-2: Call setup success rate and drop call rate performance.

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	432	428
2G	2064	73	1167

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	1583	2299	1605	1590
Call Setup Success Rate %	99.81	57.20	99.63	99.69
Drop Call Rate %	0.13	5.17	0.50	0.44
Call Setup Time-Average (Second)	0.79	3.31	0.79	0.78
Handover Success Rate %	99.88	99.99	99.89	99.90

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

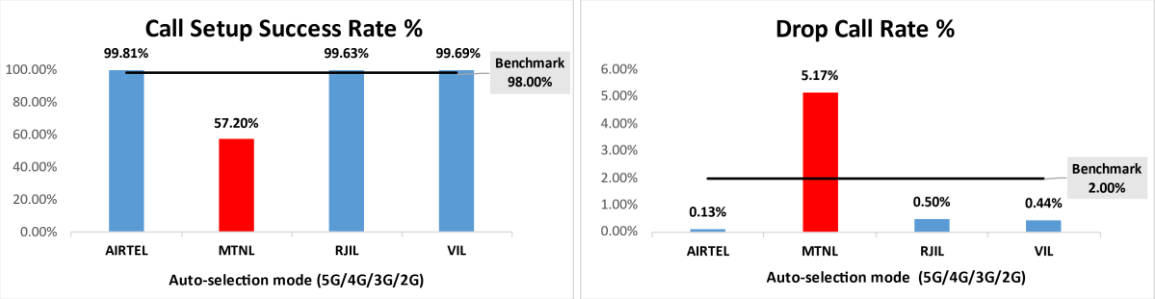


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider Network)	1344	1211	1320	1351
Number of silence call for >4 Sec	10	NA	12	39
Silence Call Rate %	0.74	NA	0.91	2.89
Number of silence instances for >4 Sec	11	NA	14	52
Number of silence instances for >3 Sec	20	NA	23	94
Number of silence instances for >2 sec	44	NA	79	286
RTP Jitter (4G & 5G) in ms	4.70	NA	8.64	46.43
Packet loss Rate Downlink %	0.63	NA	0.60	1.94
Packet loss Rate Uplink %	0.41	NA	0.81	2.01

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 Mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
5G	0	NA	1899	NA
4G	4795	NA	4813	4442
3G	NA	429	NA	1
2G	1	97	NA	7

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 score 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	8426	6972	8134	8335
Speech Quality (Average MOS Score)	3.99	2.76	3.85	4.29
Number of samples with MOS >=4 to <5 (Excellent)	6860	0	5477	6413
Number of samples with MOS >=3 to <4 (Good)	1307	3200	2030	1357
Number of samples with MOS >=2 to <3 (Fair)	146	2766	420	352
Number of samples with MOS >=1 to <2 (Poor)	113	1006	207	213
%age of samples with MOS >=4 to <5 (Excellent)	81.42%	0.00%	67.34%	76.94%
%age of samples with MOS >=3 to <4 (Good)	15.51%	45.90%	24.96%	16.28%
%age of samples with MOS >=2 to <3 (Fair)	1.73%	39.67%	5.16%	4.22%
%age of samples with MOS >=1 to <2 (Poor)	1.34%	14.43%	2.54%	2.56%

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

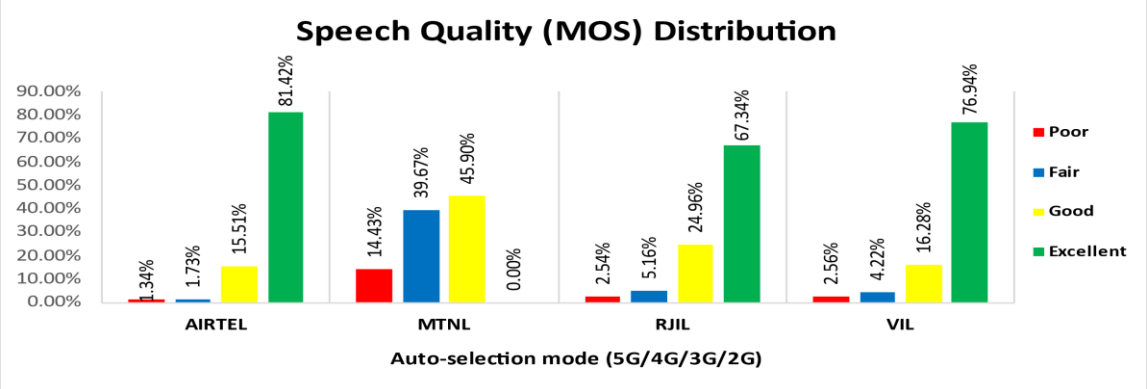


Figure- 4: Distribution of samples in MOS score range.

(d) Inter-service provider voice call performance: To check the performance of inter-service provider call setup success rate, total 55 to 65 inter operator calls were attempted. The call setup success rate and call setup time observation are as below.

Call setup success rate %				
From Service Provider	**To Service Provider**			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
AIRTEL	NA	100.00	100.00	100.00
MTNL	96.30	NA	98.18	98.21
RJIL	100.00	100.00	NA	98.44
VIL	100.00	96.36	100.00	NA

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

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

Call setup time average (seconds)				
From Service Provider	**To Service Provider**			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
AIRTEL	NA	5.23	2.61	2.45
MTNL	3.68	NA	4.04	4.54
RJIL	2.05	4.59	NA	1.95
VIL	1.90	4.80	2.24	NA

Table-10: Call setup time across service providers.

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

3.3 Data performance

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

Parameters		**Service Provider**			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput (Mbits/s)	**Average**	177.50	3.62	266.42	18.43
	80th Percentile	281.37	6.01	423.29	28.91
	20th Percentile	48.25	0.85	94.68	7.63
Upload Throughput (Mbits/s)	**Average**	28.30	1.66	21.40	4.68
	80th Percentile	49.74	2.68	38.66	6.79
	20th Percentile	5.81	0.41	4.25	1.86
Latency (ms)	**50th Percentile**	16.70	40.80	18.70	36.35

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

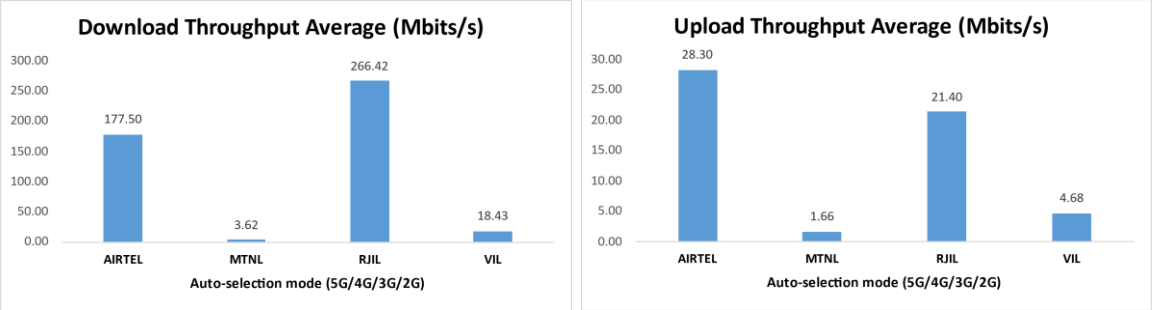


Figure- 5: Download and Upload throughput

Number of unique cell Id's covered in Data test- Technology wise				
Technology	**Service Provider**			
	Auto-selection mode 5G/4G/3G/2G			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
5G	0	NA	2353	NA
4G	4883	NA	456	3495
3G	NA	514	NA	3
2G	1	123	NA	12

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

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

Detailed QoS Performance Analysis

4. Detailed QoS performance analysis

4.1 Overview

This section covers analysis on performance of various categories of drives like City, Hotspots & Highway for all telecom service providers, the results of drive tests conducted is shown individually for respective areas/locations.

4.2 City

Drive test has been conducted from 20th January 2025 to 29th January 2025 in Delhi. (Refer Table-1)

4.2.1 Drive test route

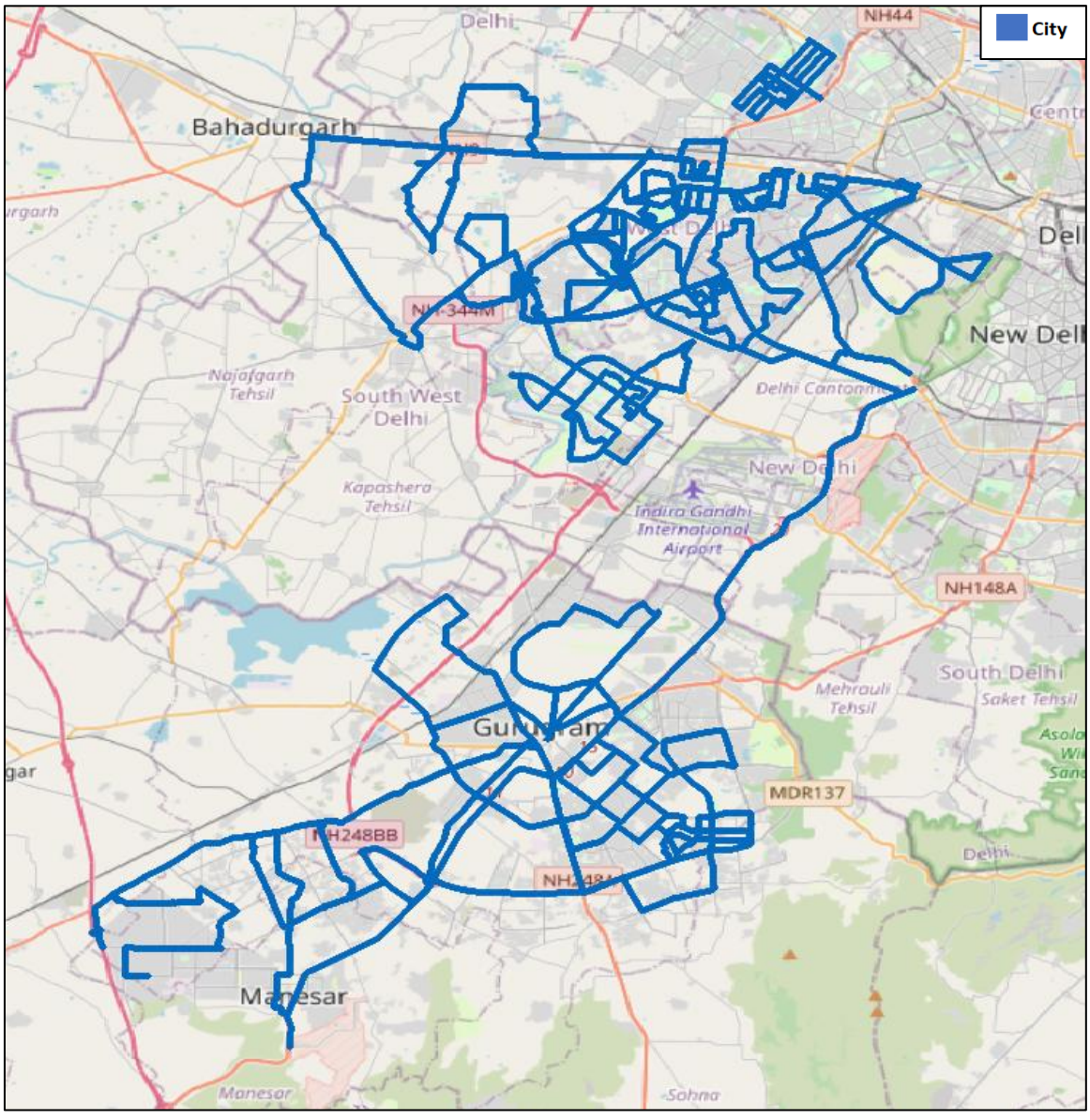


Figure- 6: Drive test routes

4.2.2 Areas covered

Nearby Tilak Nagar, Paschim Vihar, Lok Nayak Puram, Dwarka, Kirti Nagar, Rohni, Sunder Vihar, Nangloi, Gurugram, IMT Chowk, Kendriya Vihar, Patel Nagar, Motinagar, Hastsal, Uttam Nagar, Bangrola 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	1282	1795	1314
Call Setup Success Rate %	98.05	62.95	93.99
Drop Call Rate %	0.48	7.88	2.51
Call Setup Time-Average (Second)	3.15	3.09	3.96
Handover Success Rate %	98.17	99.98	99.15

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

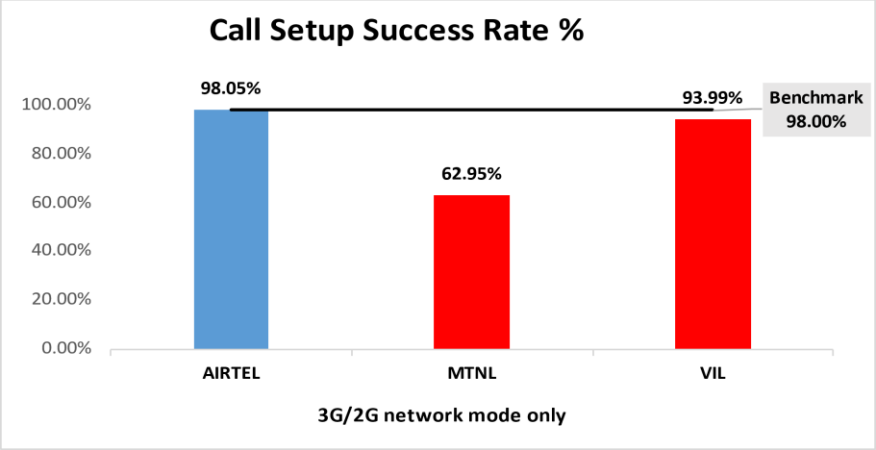


Figure-7: Performance for call setup success rate.

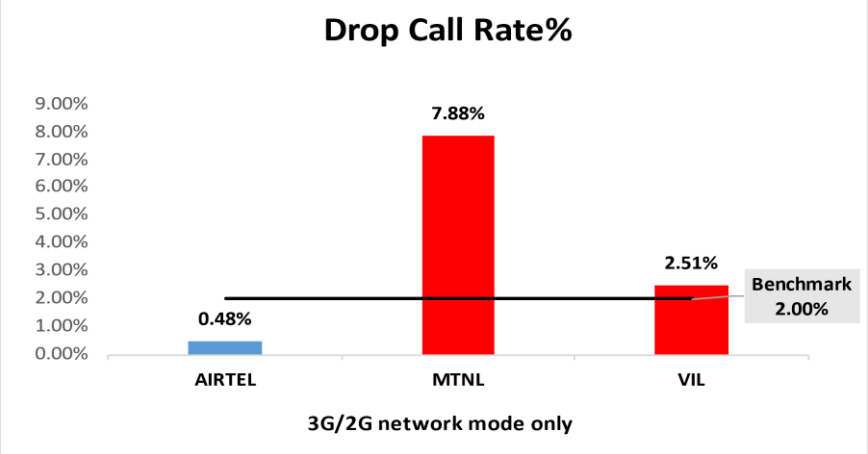


Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	**MTNL**	**VIL**
3G	NA	95.56%	55.40%
2G	100.00%	3.95%	44.60%
Limited Service	0.00%	0.49%	0.00%

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

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

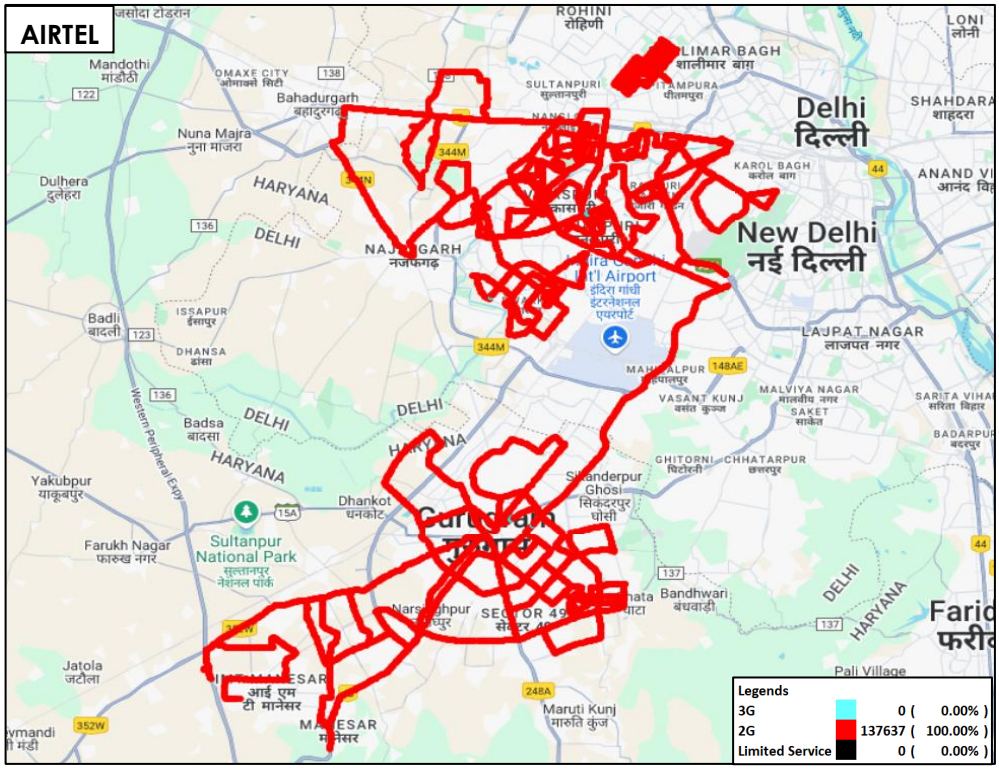


Figure-9: Serving technology plots 3G/2G network mode – AIRTEL.

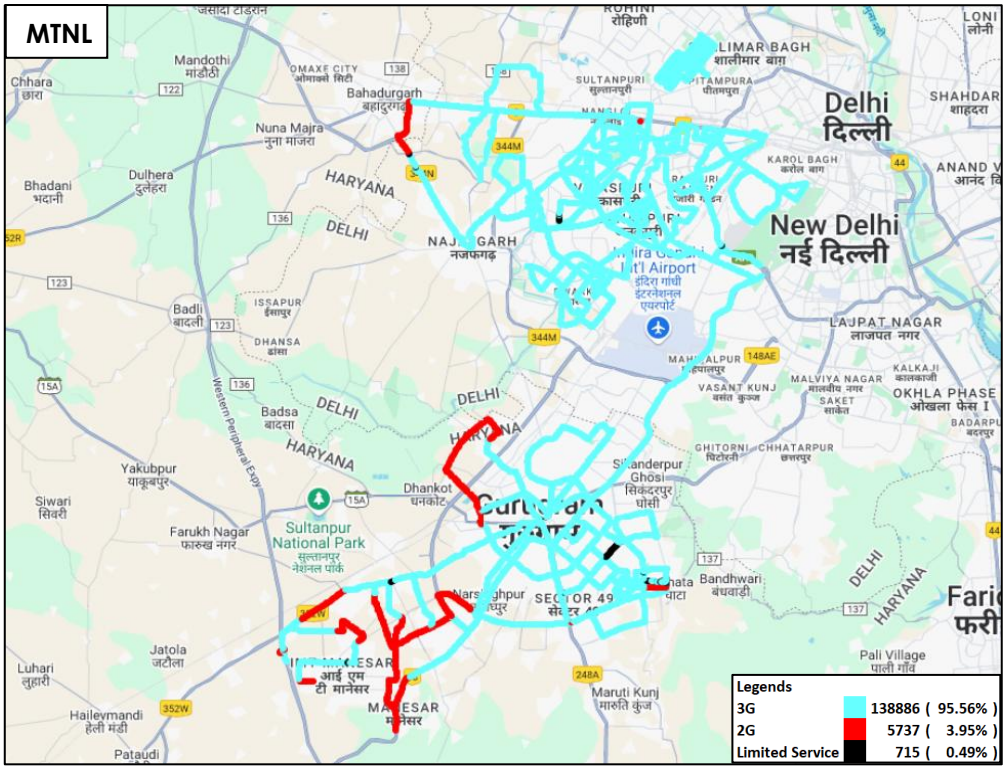


Figure-10: Serving technology plots 3G/2G network mode –MTNL.

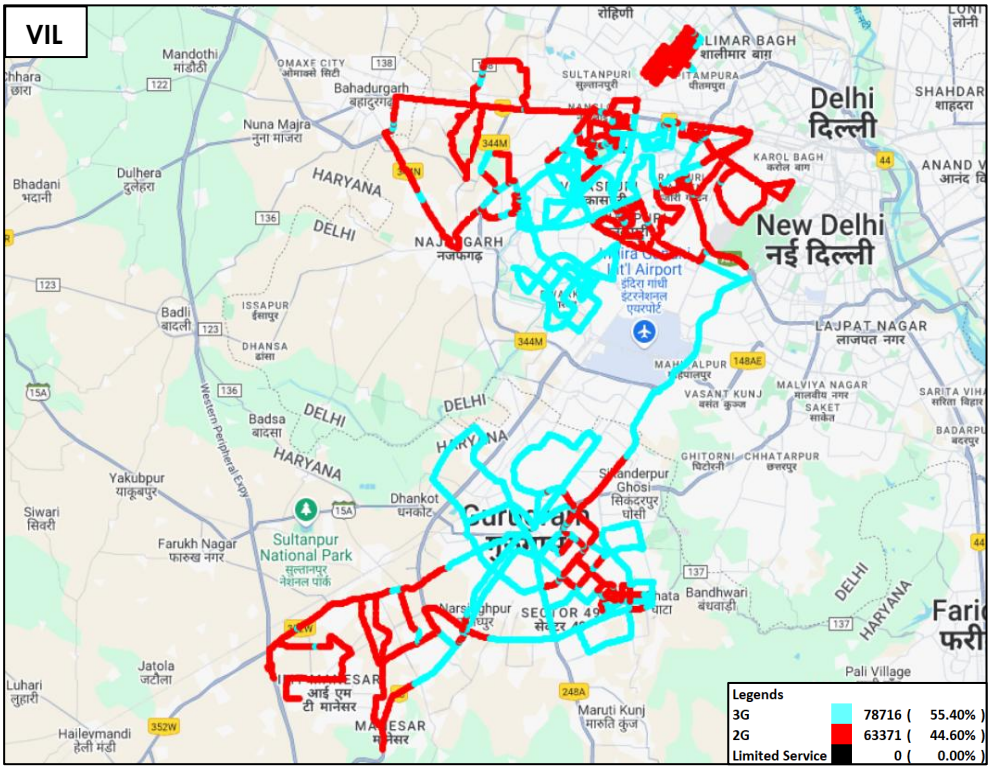


Figure-11: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 40, 41 & 42 for map view)

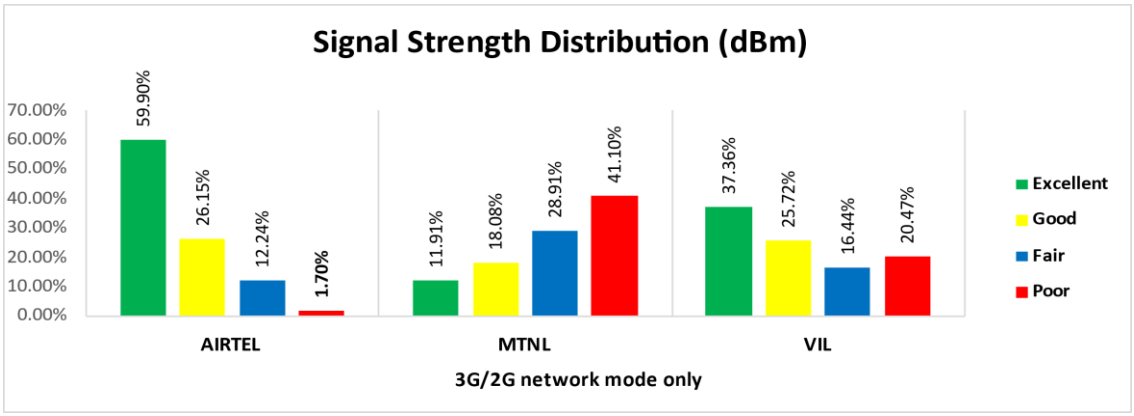


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 60% of samples falling in the excellent signal strength category.
- MTNL has 12% of samples falling in the excellent signal strength category.
- VIL has 37% 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	1315	1617	1334	1320
Call Setup Success Rate %	99.77	69.57	99.55	99.62
Drop Call Rate %	0.15	6.04	0.38	0.53
Call Setup Time Average (Second)	0.80	3.38	0.80	0.77
Handover Success Rate %	99.89	100.00	99.89	99.89

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

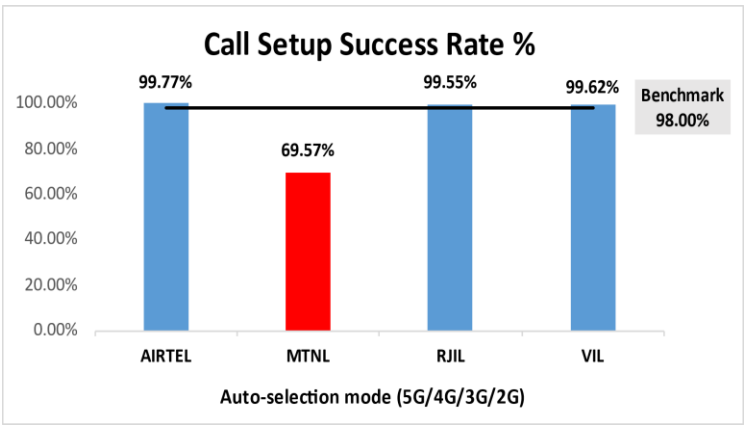


Figure-13: Performance for call setup success rate.

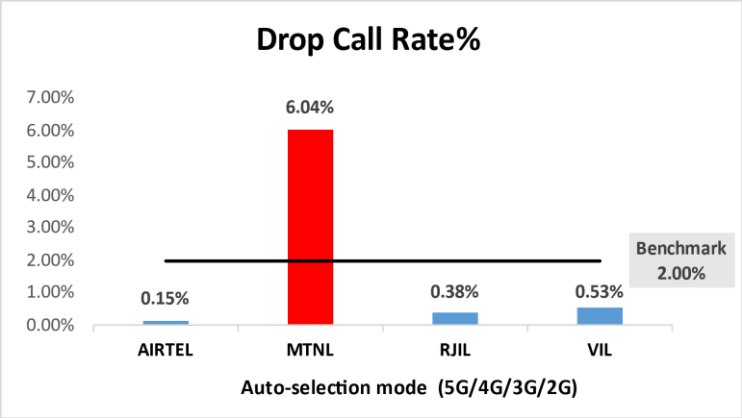


Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider Network)	1268	1132	1242	1272
Number of silence call for >4 Sec	7	NA	9	30
Silence Call Rate %	0.55	NA	0.72	2.36
Number of silence instances for >4 Sec	7	NA	11	37
Number of silence instances for >3 Sec	11	NA	20	64
Number of silence instances for >2 sec	26	NA	67	256
RTP Jitter (4G & 5G) in ms	4.56	NA	8.54	50.25
Packet loss Rate Downlink %	0.59	NA	0.61	1.89
Packet loss Rate Uplink %	0.36	NA	0.80	1.95

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

Note-
- NA- Due to unavailability of packet switched (VoLTE & 5G) 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 score 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-16	7479	6218	7218	7399
Speech Quality (Average MOS Score)	4.01	2.80	3.86	4.28
Number of samples with MOS >=4 to <5 (Excellent)	6148	0	4893	5648
Number of samples with MOS >=3 to <4 (Good)	1147	3102	1795	1257
Number of samples with MOS >=2 to <3 (Fair)	113	2301	361	330
Number of samples with MOS >=1 to <2 (Poor)	71	815	169	164
%age of samples with MOS >=4 to <5 (Excellent)	82.20%	0.00%	67.79%	76.33%
%age of samples with MOS >=3 to <4 (Good)	15.34%	49.89%	24.87%	16.99%
%age of samples with MOS >=2 to <3 (Fair)	1.51%	37.01%	5.00%	4.46%
%age of samples with MOS >=1 to <2 (Poor)	0.95%	13.11%	2.34%	2.22%

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

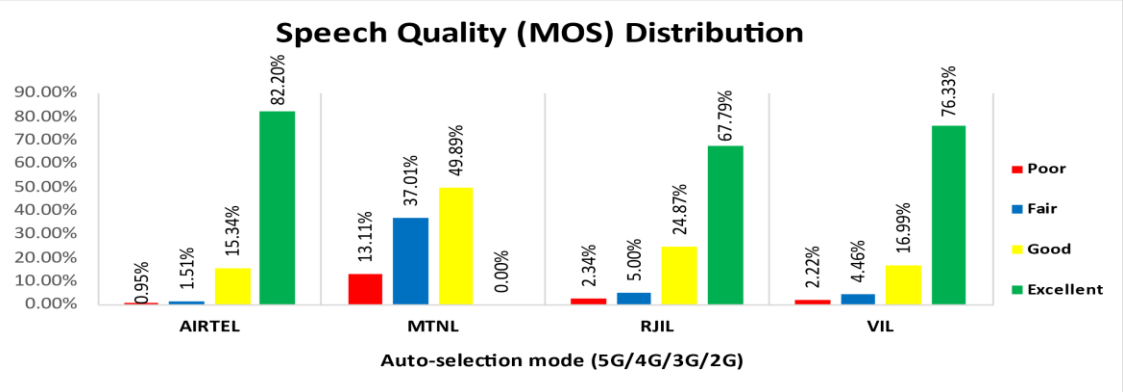


Figure-15: Distribution of samples in MOS score range.

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

Technology	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
5G	3.87%	NA	20.46%	NA
4G	96.13%	NA	79.54%	99.99%
3G	NA	93.92%	NA	0.00%
2G	0.00%	4.90%	NA	0.01%
Limited Service	0.00%	1.19%	0.00%	0.00%

Table-18: Time spent on technology during drive test.

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

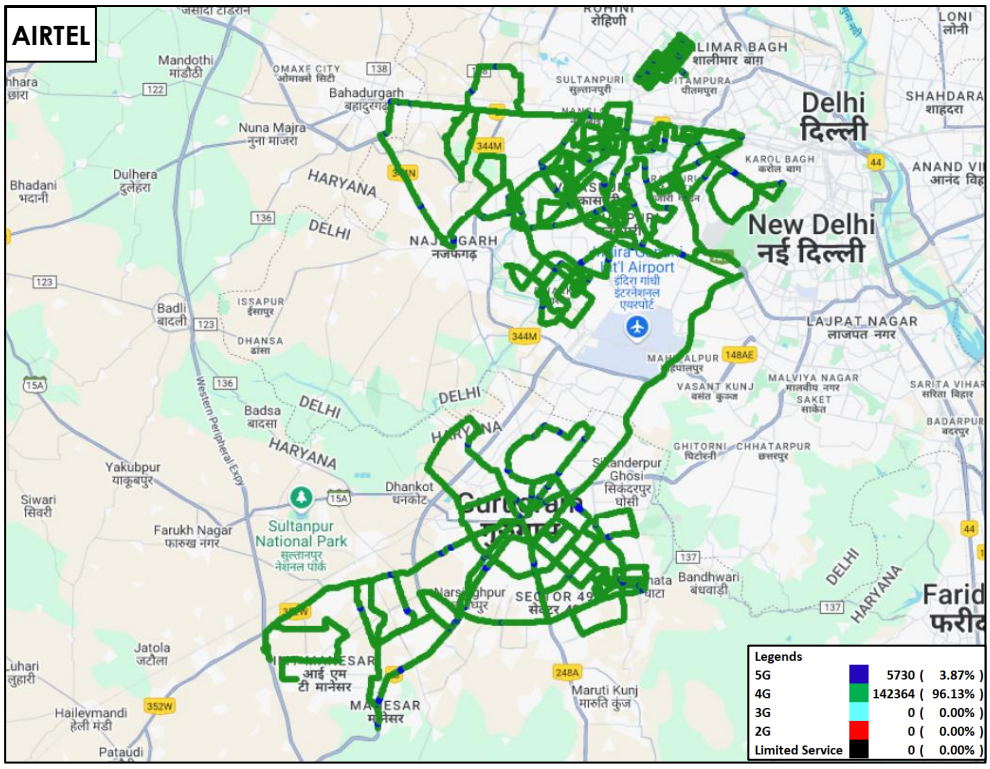


Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -AIRTEL.

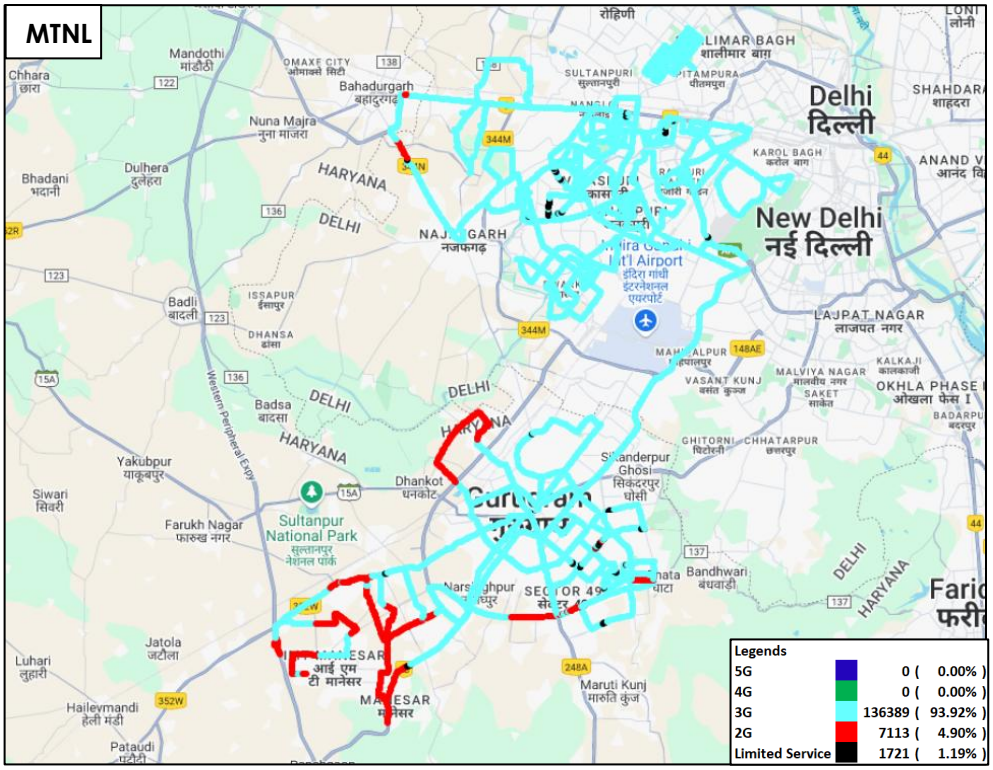


Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -MTNL.

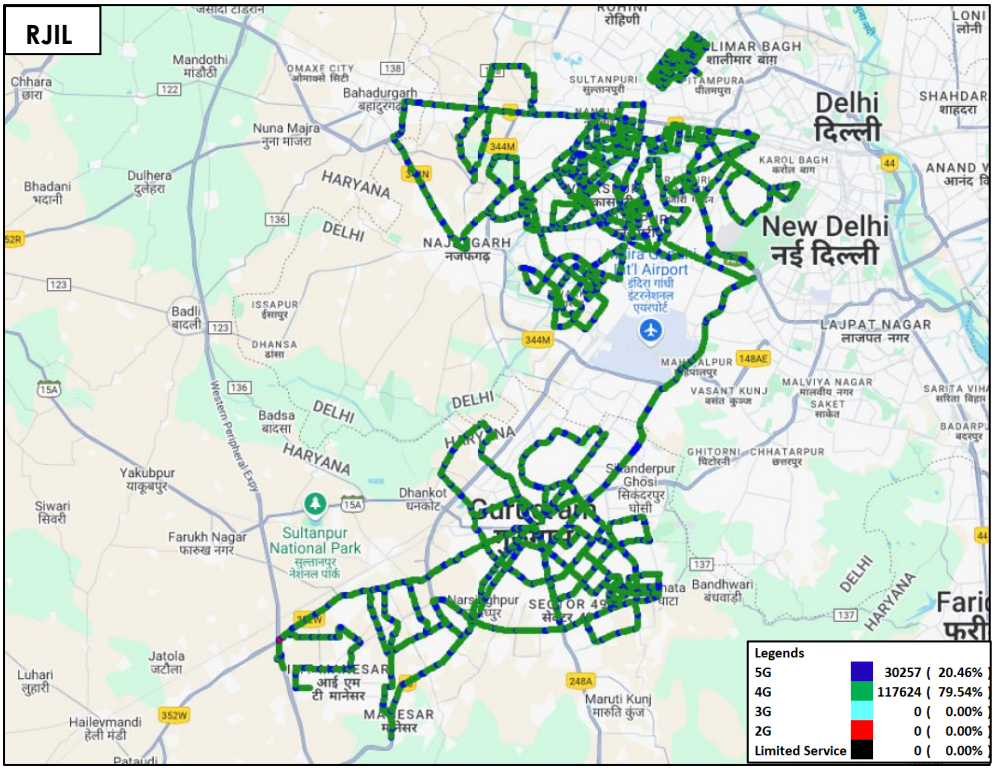


Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.

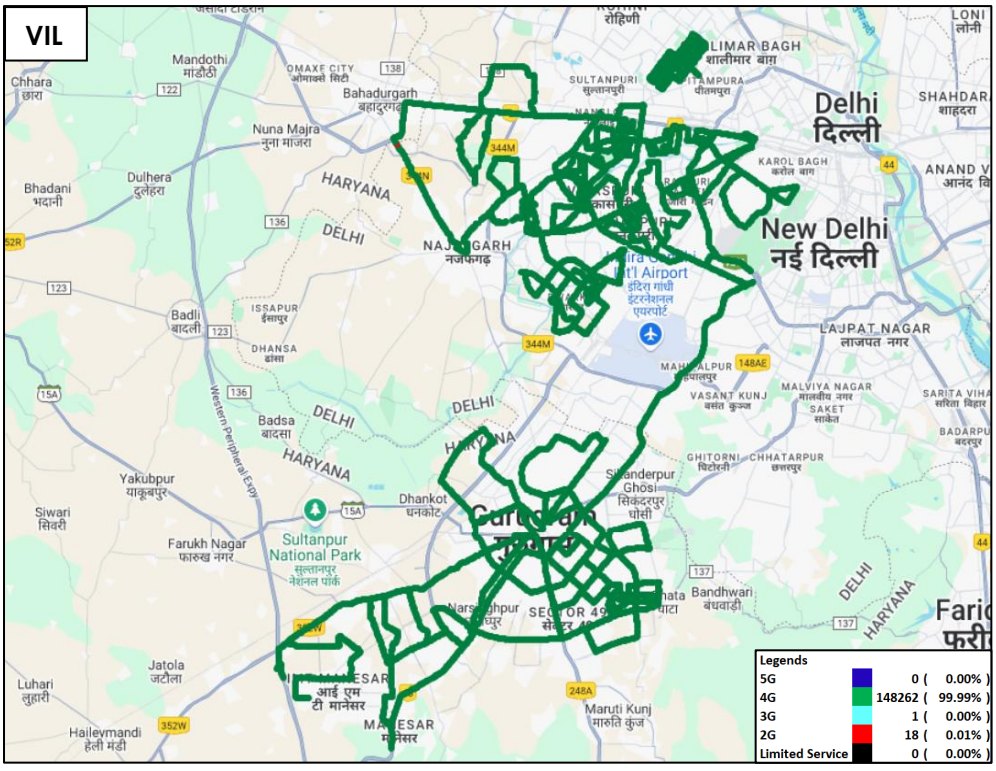


Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) – VIL.

(g) Network Signal Strength Distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-43, 44, 45 & 46 for map view)

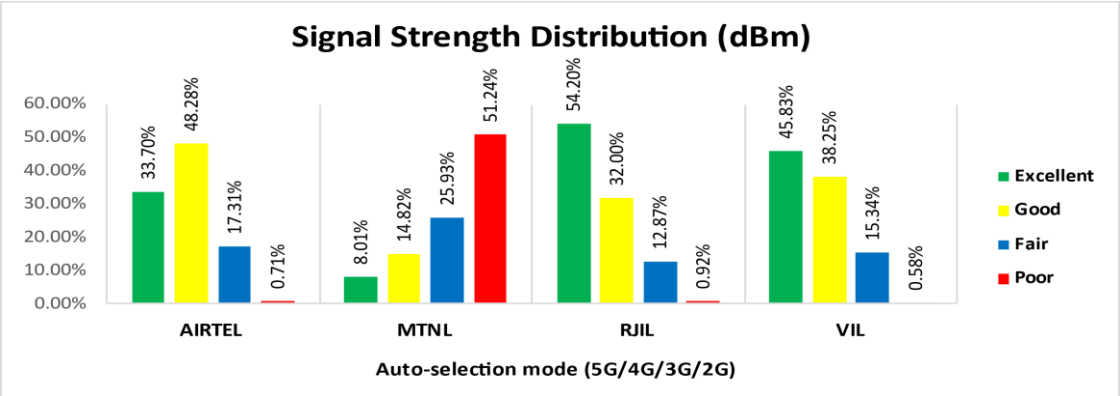


Figure-20: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 34% of samples falling in the excellent signal strength category.
- MTNL has 8% of samples falling in the excellent signal strength category.
- RJIL has 54% of samples falling in the excellent signal strength category.
- VIL has 46% 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	186.79	3.71	275.79	17.91
	80th Percentile	288.02	6.01	437.25	28.24
	20th Percentile	56.65	1.00	100.68	7.70
Upload Throughput (Mbits/s)	Average	29.95	1.71	21.97	4.35
	80th Percentile	52.96	2.73	39.72	6.19
	20th Percentile	6.32	0.51	4.36	1.84
Latency (ms)	50th Percentile	16.25	133.00	16.85	36.55

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

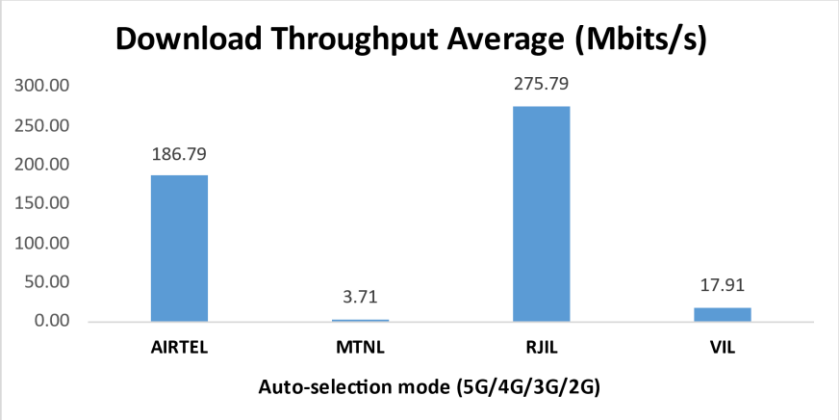


Figure- 21: Download throughput

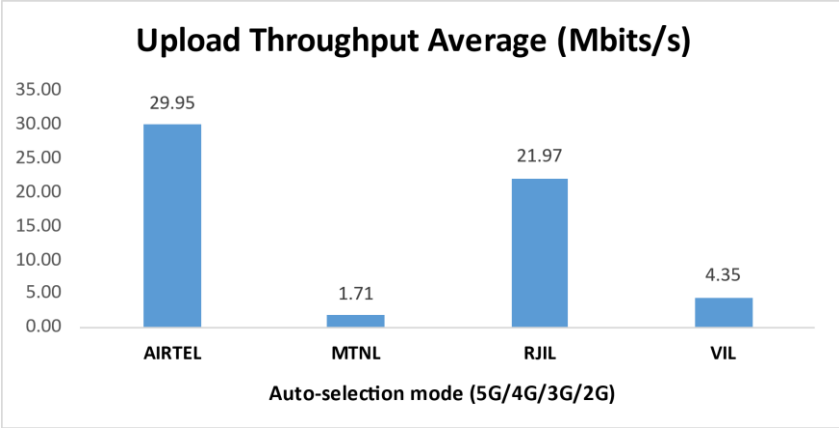


Figure- 22: Upload throughput

4.3 Hotspots

Hotspot testing have been done from 23rd January 2025 to 30th January 2025. Nineteen locations have been tested in the city.

4.3.1 Locations

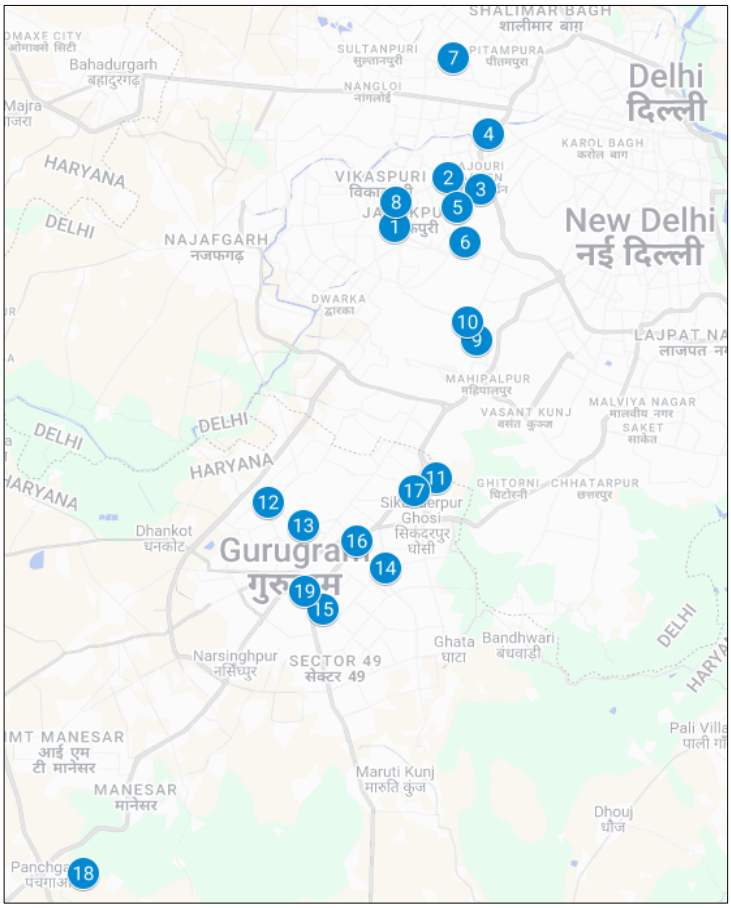


Figure- 23: Hotspot locations

4.3.2Hotspot covered

1. Mata Chanan Devi Hospital, Janakpuri
2. Pacific Mall, Tagore Garden
3. Shadley Public School, Subhash Nagar
4. Presidium School, Punjabi Bagh
5. Deen Dayal Upadhyay Hospital
6. Delhi Cantt Railway Station
7. Jaipur Golden Hospital, Rohini
8. District Centre, Janakpuri
9. Palam Airport
10. Airforce Museum, Palam
11. Ambience Mall
12. Gurugram Railway Station
13. Sheetla Mata Mandir
14. Huda City Centre
15. Medanta Hospital, Gurugram

16. MDI Gurugram
17. DLF Cyber Hub
18. Amity University
19. District Court, Gurugram

4.3.3 Voice performance

Overall Voice Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Call Attempt	190	190	190	190
Call Setup Success Rate %	100.00	94.74	99.47	100.00
Drop Call Rate %	0.00	0.00	2.12	0.00
Call Setup Time-Average (Second)	0.75	2.91	0.62	0.93

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

Mata Chanan Devi Hospital, Janakpuri				
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)	0.77	3.31	0.89	0.62

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

Pacific Mall, Tagore Garden				
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	10.00	0.00
Call Setup Time-Average (Second)	0.71	3.29	0.58	0.74

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

Shadley Public School, Subhash Nagar				
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)	0.92	3.38	0.59	0.57

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

Presidium School, Punjabi Bagh				
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)	0.67	2.92	0.58	0.64

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

Deen Dayal Upadhyay Hospital				
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	2.77	0.55	0.65

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

Delhi Cantt 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)	0.90	2.76	0.84	0.71

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

Jaipur Golden Hospital, Rohini				
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)	0.66	2.15	0.54	0.67

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

District Centre, Janakpuri				
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)	1.01	2.54	0.69	0.63

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

Palam Airport				
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	3.05	0.68	3.04

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

Airforce Museum, Palam				
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	3.17	0.52	4.11

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

Ambience Mall				
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	3.12	0.60	0.59

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

Gurugram 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)	0.74	2.72	0.62	0.51

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

Sheetla Mata Mandir				
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	2.93	0.56	0.50

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

Huda City 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	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.71	2.69	0.55	0.70

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

Medanta Hospital, Gurugram				
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	2.94	0.56	0.53

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

MDI Gurugram				
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	2.85	0.62	0.60

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

DLF Cyber Hub				
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	2.91	0.56	0.57

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

Amity University				
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	90.00	100.00
Drop Call Rate %	0.00	-	33.33	0.00
Call Setup Time-Average (Second)	0.67	-	0.63	0.59

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

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

District Court, Gurugram				
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	2.89	0.60	0.61

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

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

Overall Data Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	196.40	4.86	211.63	20.42
Download Throughput 80th Percentile (Mbit/s)	305.22	6.78	320.36	34.62
Download Throughput 20th Percentile (Mbit/s)	74.70	2.42	99.14	8.35
Download Session Setup Success Rate %	100.00	74.74	87.37	97.87
Upload Throughput Average (Mbits/s)	26.88	1.85	17.56	4.63
Upload Throughput 80th Percentile (Mbit/s)	41.56	2.61	35.71	7.70
Upload Throughput 20th Percentile (Mbit/s)	6.18	1.19	3.05	1.90
Upload Session Setup Success Rate %	100.00	77.89	92.63	96.84
Web Browsing Delay (Second)	1.55	2.11	1.56	1.52
Youtube Initial Buffer Delay (Second)	0.98	1.94	1.05	0.96
Latency (ms) - 50th Percentile	16.25	20.10	20.35	35.65
Jitter (ms)	16.17	114.04	94.73	11.94
Packet Loss Rate%	4.26	18.48	7.34	4.60
Packet Loss Rate- 90th percentile	3.60	95.94	32.52	8.22

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

Mata Chanan Devi Hospital, Janakpuri				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	MTNL	RJIL	VIL
Download Throughput Average (Mbits/s)	156.90	0.71	361.02	25.78
Download Session Setup Success Rate %	100.00	40.00	100.00	100.00
Upload Throughput Average (Mbits/s)	11.43	0.41	17.51	8.54
Upload Session Setup Success Rate %	100.00	20.00	100.00	100.00
Web Browsing Delay (Second)	1.38	6.54	1.08	1.32
Youtube Initial Buffer Delay (Second)	0.66	3.22	0.76	0.78
Latency (ms)- 50th Percentile	16.03	34810.50	15.50	29.20
Jitter (ms)	4.37	178.34	4.72	3.61
Packet Loss Rate%	0.00	100.00	0.00	0.50

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

Note- MTNL 50th percentile latency is very high, resulting in high Jitter and packet loss.

Pacific Mall, Tagore Garden				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	184.88	6.85	137.32	1.16
Download Session Setup Success Rate %	100.00	100.00	100.00	50.00
Upload Throughput Average (Mbits/s)	4.32	1.53	3.14	0.60
Upload Session Setup Success Rate %	100.00	100.00	100.00	25.00
Web Browsing Delay (Second)	1.40	1.76	1.33	-
Youtube Initial Buffer Delay (Second)	3.01	1.19	0.92	-
Latency (ms) - 50th Percentile	17.28	14.13	38.10	65.25
Jitter (ms)	9.40	31.18	26.08	56.25
Packet Loss Rate%	0.10	2.60	5.00	43.00

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

Note- "-" All Web Browsing & Youtube tests were failed.

Shadley Public School, Subhash Nagar				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	237.33	9.12	329.29	31.94
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	5.58	1.20	40.07	5.68
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.30	5.70	1.21	1.28
Youtube Initial Buffer Delay (Second)	0.59	-	0.93	0.73
Latency (ms) - 50th Percentile	13.75	12.10	12.70	38.55
Jitter (ms)	5.29	11.56	9.00	8.39
Packet Loss Rate%	0.00	1.50	0.10	1.30

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

Note- "-"All Youtube test were failed.

Presidium School, Punjabi Bagh				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	129.23	-	379.50	16.32
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	22.84	-	15.18	3.52
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	2.07	-	1.13	1.18
Youtube Initial Buffer Delay (Second)	0.62	-	0.75	0.88
Latency (ms) - 50th Percentile	17.05	4391.50	31.73	31.15
Jitter (ms)	3.96	1763.15	38.58	4.00
Packet Loss Rate%	0.00	94.80	5.00	0.70

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

Note-"-" Download, Upload, Web Browsing and Youtube tests were failed.

Deen Dayal Upadhyay Hospital				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	374.16	3.52	207.55	14.40
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	39.42	1.93	8.76	3.39
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.31	1.29	1.05	1.51
Youtube Initial Buffer Delay (Second)	0.59	2.15	0.66	0.73
Latency (ms) - 50th Percentile	16.10	26.25	15.50	43.00
Jitter (ms)	3.68	19.36	5.63	3.96
Packet Loss Rate%	0.00	2.70	0.00	0.50

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

Delhi Cantt Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	225.45	1.87	188.29	38.84
Download Session Setup Success Rate %	100.00	60.00	100.00	100.00
Upload Throughput Average (Mbits/s)	5.15	0.76	2.78	4.23
Upload Session Setup Success Rate %	100.00	60.00	100.00	100.00
Web Browsing Delay (Second)	1.11	1.54	2.38	1.17
Youtube Initial Buffer Delay (Second)	0.64	-	0.93	0.75
Latency (ms) - 50th Percentile	16.35	21.65	18.25	26.10
Jitter (ms)	3.85	7.08	1221.01	17.43
Packet Loss Rate%	0.10	0.20	7.20	2.70

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

Note- "-"All Youtube test were failed.

Jaipur Golden Hospital, Rohini				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	130.40	5.11	246.67	5.30
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	24.23	1.51	13.69	1.23
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.00	2.30	1.07	2.31
Youtube Initial Buffer Delay (Second)	0.60	-	0.73	1.19
Latency (ms) - 50th Percentile	15.53	10.65	18.73	41.70
Jitter (ms)	5.91	22.86	11.90	8.72
Packet Loss Rate%	0.00	7.80	0.10	0.70

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

Note- "-"All Youtube test were failed.

District Centre, Janakpuri				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	360.64	9.49	186.04	6.47
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	18.78	2.05	5.14	2.79

Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.07	1.62	1.23	1.37
Youtube Initial Buffer Delay (Second)	1.56	1.56	0.86	1.06
Latency (ms)- 50th Percentile	15.05	13.15	17.70	44.20
Jitter (ms)	10.37	60.23	38.71	18.31
Packet Loss Rate%	0.30	4.90	6.80	1.70

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

Palam Airport				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	17.84	1.54	10.46	11.36
Download Session Setup Success Rate%	100.00	40.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.14	0.71	1.92	2.14
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	1.64	5.84	2.47	2.75
Youtube Initial Buffer Delay (Second)	1.63	6.66	4.47	1.48
Latency (ms)- 50th Percentile	19.60	21.60	35.55	38.33
Jitter (ms)	8.09	25.42	25.54	23.30
Packet Loss Rate%	0.10	2.80	0.90	4.20

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

Airforce Museum, Palam				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	51.32	-	69.36	26.13
Download Session Setup Success Rate%	100.00	0.00	80.00	100.00
Upload Throughput Average (Mbits/s)	22.40	0.00	30.52	9.86
Upload Session Setup Success Rate %	100.00	20.00	100.00	100.00
Web Browsing Delay (Second)	2.11	6.43	1.63	2.21
Youtube Initial Buffer Delay (Second)	2.65	-	0.64	1.09
Latency (ms)- 50th Percentile	14.90	26280.00	15.35	37.40
Jitter (ms)	9.15	1751.20	5.29	8.58
Packet Loss Rate%	0.10	98.60	0.10	24.30

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

Note- "-" Download, Youtube tests were failed at this location.
MTNL 50th percentile latency is very high, resulting in high Jitter and packet loss.

Ambience Mall				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	127.13	2.06	210.98	38.85
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.44	1.15	22.32	6.93
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.12	3.31	1.13	1.25
Youtube Initial Buffer Delay (Second)	0.93	9.64	0.68	0.67
Latency (ms)- 50th Percentile	16.70	28.60	22.08	30.55
Jitter (ms)	10.26	89.25	12.14	3.26
Packet Loss Rate%	0.90	8.60	0.50	0.50

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

Gurugram Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	127.80	6.23	136.97	27.89
Download Session Setup Success Rate%	100.00	100.00	80.00	100.00
Upload Throughput Average (Mbits/s)	56.24	3.58	2.60	3.12
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.04	1.90	1.93	2.44
Youtube Initial Buffer Delay (Second)	0.53	1.12	1.68	0.77
Latency (ms)- 50th Percentile	13.43	10.95	63.00	35.60
Jitter (ms)	4.84	3.43	209.09	8.85
Packet Loss Rate%	0.00	0.00	40.60	0.60

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

Sheetla Mata Mandir				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	369.18	5.92	431.51	39.45
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	89.57	2.95	38.38	5.96
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.06	1.18	1.00	1.16
Youtube Initial Buffer Delay (Second)	0.56	1.13	0.57	0.56
Latency (ms)- 50th Percentile	13.85	15.60	14.15	36.10
Jitter (ms)	8.23	19.87	8.24	14.23
Packet Loss Rate%	0.20	2.40	0.00	1.50

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

Huda City Centre				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	374.55	3.01	298.59	16.01
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	66.43	1.37	37.83	10.81
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	0.88	1.27	1.06	1.13
Youtube Initial Buffer Delay (Second)	0.56	-	0.68	0.83
Latency (ms)- 50th Percentile	14.25	22.18	17.00	24.70
Jitter (ms)	4.62	24.90	5.85	3.46
Packet Loss Rate%	0.00	2.40	0.10	0.50

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

Note- "-"All Youtube test were failed.

Medanta Hospital, Gurugram				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	72.95	2.20	150.22	33.04
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	26.17	1.50	9.63	2.15
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.42	2.38	1.26	1.36
Youtube Initial Buffer Delay (Second)	0.84	-	1.10	0.82

Latency (ms)- 50th Percentile	44.20	25.00	30.00	40.30
Jitter (ms)	20.29	19.66	13.19	4.30
Packet Loss Rate%	14.40	1.40	1.60	0.30

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

Note- "-"All Youtube test were failed.

MDI Gurugram				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	260.72	4.89	46.56	6.57
Download Session Setup Success Rate%	100.00	100.00	60.00	100.00
Upload Throughput Average (Mbits/s)	28.84	1.75	2.86	2.15
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	0.96	1.35	4.73	1.13
Youtube Initial Buffer Delay (Second)	0.60	1.37	0.72	1.25
Latency (ms)- 50th Percentile	13.30	22.05	53.00	32.55
Jitter (ms)	4.85	16.38	116.76	10.59
Packet Loss Rate%	0.00	1.60	38.20	1.30

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

DLF Cyber Hub				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	3.14	5.08	219.85	9.33
Download Session Setup Success Rate%	100.00	100.00	80.00	100.00
Upload Throughput Average (Mbits/s)	1.78	2.05	54.98	2.07
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.57	1.09	1.11	1.97
Youtube Initial Buffer Delay (Second)	-	1.54	0.72	3.90
Latency (ms)- 50th Percentile	170.00	14.60	17.30	35.85
Jitter (ms)	177.17	7.88	9.62	15.45
Packet Loss Rate%	64.60	0.20	0.00	1.80

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

Note- "-"All Youtube test were failed.

Amity University				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	313.80	-	-	9.04
Download Session Setup Success Rate%	100.00	0.00	0.00	100.00
Upload Throughput Average (Mbits/s)	25.31	-	-	8.05
Upload Session Setup Success Rate %	100.00	0.00	0.00	100.00
Web Browsing Delay (Second)	0.93	-	1.57	1.16
Youtube Initial Buffer Delay (Second)	0.49	-	1.86	0.77
Latency (ms)- 50th Percentile	15.25	-	35.40	33.15
Jitter (ms)	4.85	-	19.58	7.08
Packet Loss Rate%	0.00	-	2.20	0.70

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

Note- "-" All data tests were failed.

District Court, Gurugram				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	214.22	3.99	11.12	18.58
Download Session Setup Success Rate%	100.00	100.00	60.00	100.00
Upload Throughput Average (Mbits/s)	43.62	3.72	3.08	2.27
Upload Session Setup Success Rate %	100.00	100.00	60.00	100.00
Web Browsing Delay (Second)	1.05	1.19	4.92	1.24
Youtube Initial Buffer Delay (Second)	0.55	1.76	0.81	0.72
Latency (ms)- 50th Percentile	24.33	12.30	62.00	35.80
Jitter (ms)	10.78	6.94	31.83	7.20
Packet Loss Rate%	0.20	0.10	31.10	0.60

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

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

Overall Data Performance				
Parameters	**Service Provider**			
	Auto-selection mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	29.57	4.21	34.72	20.54
Download Throughput 80th Percentile (Mbit/s)	45.13	7.02	45.37	33.31
Download Throughput 20th Percentile (Mbit/s)	10.12	1.34	15.05	9.23
Download Session Setup Success Rate %	100.00	81.05	98.95	95.74
Upload Throughput Average (Mbits/s)	12.23	2.24	11.30	4.39
Upload Throughput 80th Percentile (Mbit/s)	18.46	3.08	21.25	6.84
Upload Throughput 20th Percentile (Mbit/s)	2.93	1.37	3.58	1.93
Upload Session Setup Success Rate %	100.00	80.00	98.95	96.84

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

Mata Chanan Devi Hospital, Janakpuri				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	24.93	1.04	19.34	32.84
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	13.26	1.06	4.43	1.94
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00

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

Pacific Mall, Tagore Garden				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	8.42	5.24	4.57	2.85
Download Session Setup Success Rate%	100.00	100.00	100.00	25.00
Upload Throughput Average (Mbits/s)	1.52	2.00	0.84	1.61
Upload Session Setup Success Rate %	100.00	100.00	80.00	80.00

Table-62: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Shadley Public School, Subhash Nagar				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	5.71	4.65	26.63	12.14
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.05	0.98	20.74	6.20
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00

Table-63: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Presidium School, Punjabi Bagh				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	32.62	-	49.58	18.39
Download Session Setup Success Rate%	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	19.25	-	6.02	4.24
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00

Table-64: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Note- "-" All Data test were failed.

Deen Dayal Upadhyay Hospital				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	24.36	2.42	11.56	17.68
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.64	1.60	2.86	4.27
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-65: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Delhi Cantt Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	15.14	3.63	58.01	35.39
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	3.57	1.83	4.57	7.66
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-66: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Jaipur Golden Hospital, Rohini				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	33.28	7.54	25.66	7.93
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	17.91	3.43	17.71	1.81
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-67: Summary of Data performance in network auto-selection mode (4G/3G/2G).

District Centre, Janakpuri				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	14.34	6.51	9.76	11.32
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	4.14	1.39	2.90	2.82
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-68: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Palam Airport				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	8.72	2.46	7.57	10.21
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	4.06	2.12	3.93	2.07
Upload Session Setup Success Rate %	100.00	100.00	100.00	80.00

Table-69: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Airforce Museum, Palam				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	72.36	0.30	144.14	33.16
Download Session Setup Success Rate%	100.00	20.00	100.00	100.00
Upload Throughput Average (Mbits/s)	29.04	0.31	25.34	7.90
Upload Session Setup Success Rate %	100.00	20.00	100.00	100.00

Table-70: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Ambience Mall				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	51.09	1.41	35.11	32.58
Download Session Setup Success Rate%	100.00	40.00	100.00	100.00
Upload Throughput Average (Mbits/s)	16.17	1.64	6.41	5.63
Upload Session Setup Success Rate %	100.00	40.00	100.00	100.00

Table-71: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Gurugram Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	38.73	7.55	69.72	26.89
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	17.13	3.99	10.22	2.84
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-72: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Sheetla Mata Mandir				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	27.91	7.11	18.62	40.75
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	13.82	2.99	27.08	5.06
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-73: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Huda City Centre				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	19.36	1.02	28.92	11.38
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	17.44	1.44	11.12	9.74
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-74: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Medanta Hospital, Gurugram				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	12.75	4.74	34.68	30.19
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.66	2.53	12.62	1.90
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-75: Summary of Data performance in network auto-selection mode (4G/3G/2G).

MDI Gurugram				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	35.27	2.95	28.44	3.93
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	6.48	2.76	3.93	1.79
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-76: Summary of Data performance in network auto-selection mode (4G/3G/2G).

DLF Cyber Hub				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	41.83	2.69	39.36	13.33
Download Session Setup Success Rate%	100.00	100.00	80.00	80.00
Upload Throughput Average (Mbits/s)	22.25	2.11	21.10	1.38
Upload Session Setup Success Rate %	100.00	100.00	100.00	80.00

Table-77: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Amity University				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	56.16	-	22.52	9.61
Download Session Setup Success Rate%	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	23.89	-	23.29	9.69
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00

Table-78: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Note- "-" All Data tests were failed.

District Court, Gurugram				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	38.90	4.85	26.41	24.04
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	10.15	3.58	7.47	3.14
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-79: Summary of Data performance in network auto-selection mode (4G/3G/2G)

4.4 Highway

Drive test has been conducted on 31st January 2025 covering one Highway route. (Refer Table-1)

4.4.1 Drive test route

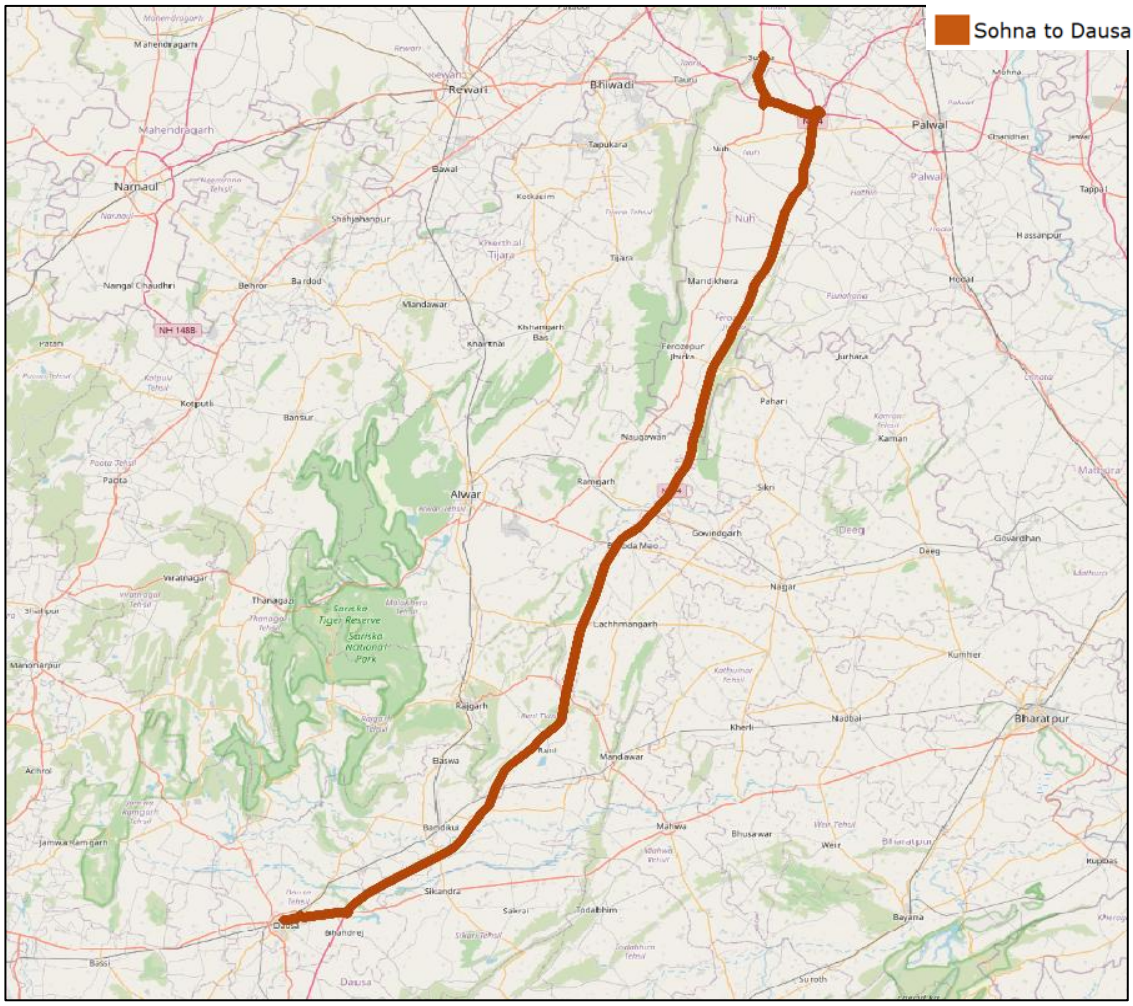


Figure-24: Drive test route highway

4.4.2 Routes Covered

1. Sohna to Dausa via Mumbai Expressway passing through Umri, Kamala, Khuspuri, Indpur, Khorpuri, Bhadrej. Drive test for this route has been conducted on 31st January 2025.

4.4.3 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	297	584	393
Call Setup Success Rate %	0.00	0.00	99.75
Drop Call Rate %	-	-	-
Call Setup Time-Average (Second)	-	-	4.43
Handover Success Rate %	97.08	100.00	95.45

Table-80: Summary of voice call performance in 3G/2G network mode only.

Note- All calls in Airtel were blocked due to call setup timeout.
All calls in MTNL were blocked.
All calls in VIL were disconnected after Alerting. Owing to which, no calls were established and drop call rate has not been reported.

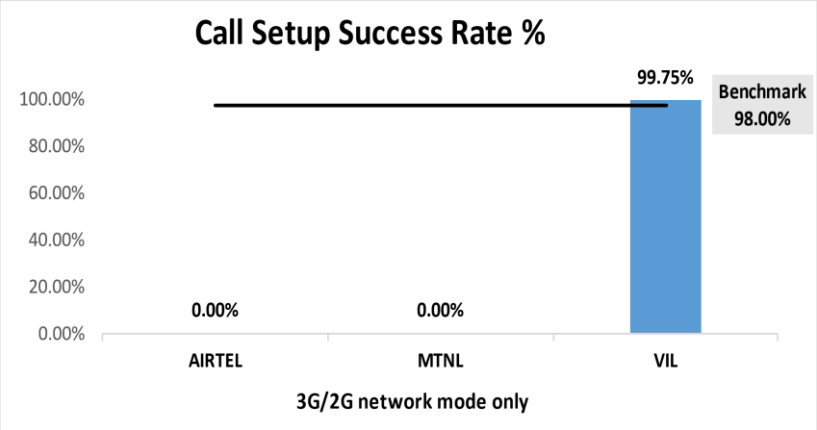


Figure-25: Performance for call setup success rate.

Note- Call drop chart is not given as No calls were established for any operator.

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

Technology	Service Provider		
	AIRTEL	MTNL	VIL
3G	NA	66.73%	0.77%
2G	100.00%	31.70%	99.23%
Limited Service	0.00%	1.58%	0.00%

Table-81: Time spent on technology during drive test 3G/2G network mode only.

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

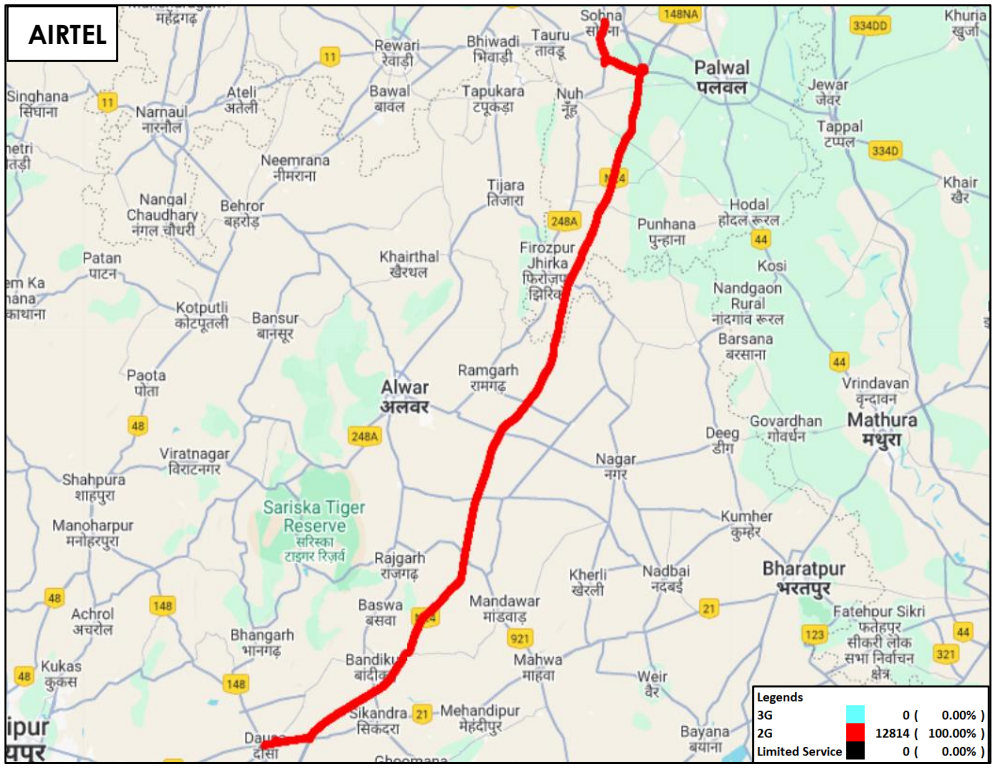


Figure-26: Serving technology plots 3G/2G network mode – AIRTEL.

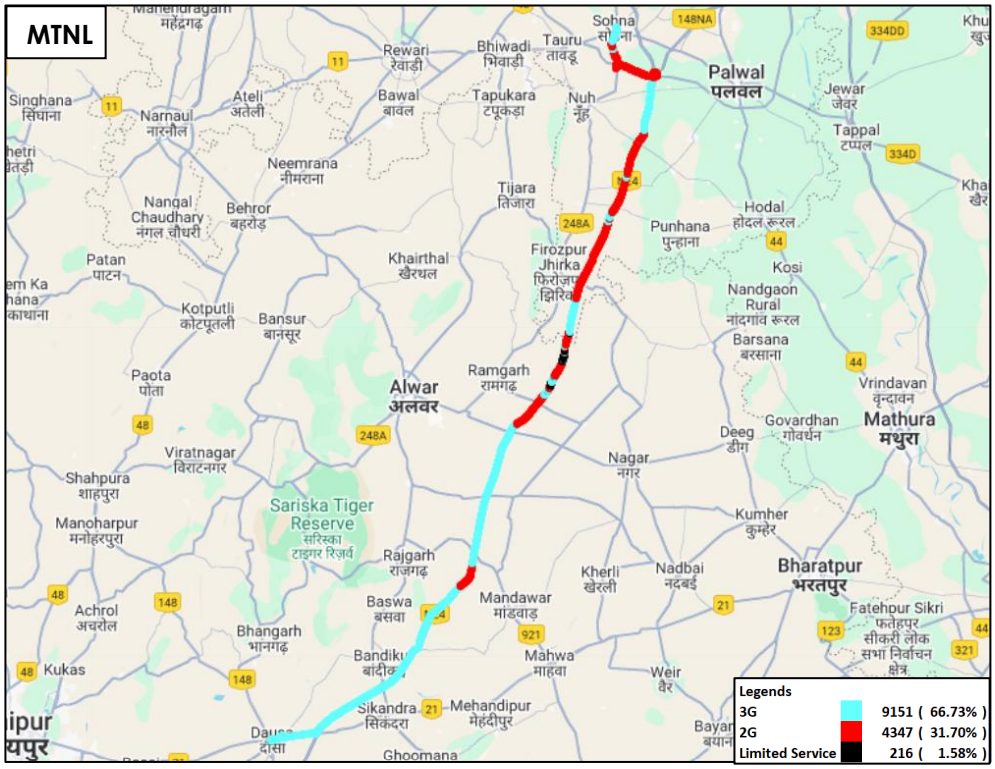


Figure-27: Serving technology plots 3G/2G network mode – MTNL.

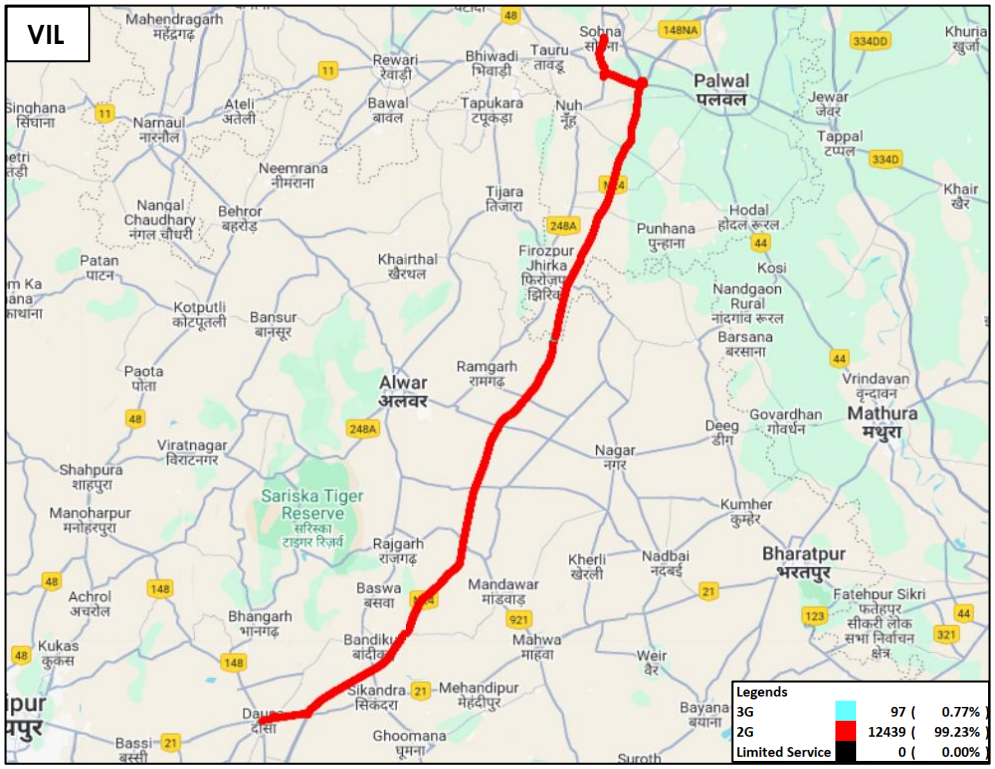


Figure-28: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure-47, 48 & 49 for map view)

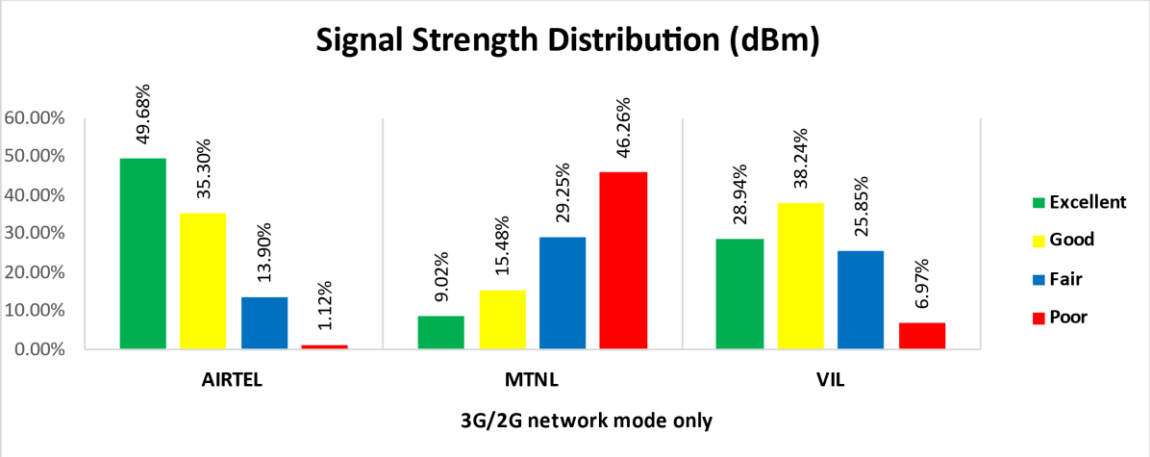


Figure-29: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 50% of samples falling in the excellent signal strength category.
- MTNL has 9% of samples falling in the excellent signal strength category.
- VIL has 29% 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	78	492	81	80
Call Setup Success Rate %	100.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	3.70	0.00
Call Setup Time Average (Second)	0.75	-	0.90	0.64
Handover Success Rate %	99.75	99.75	99.89	100.00

Table-82: Summary of voice call performance in network auto-selection mode.

Note- "-"KPI's are not reported as all calls were blocked.

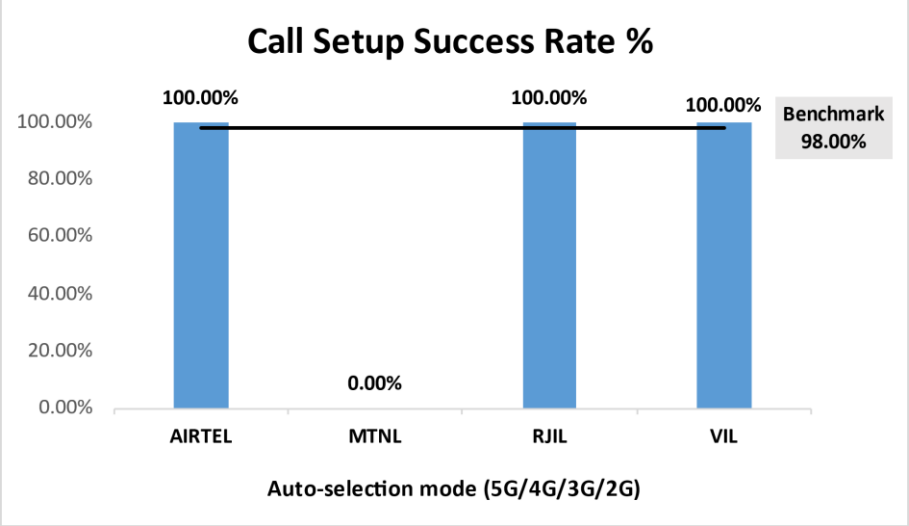


Figure-30: Performance for call setup success rate.

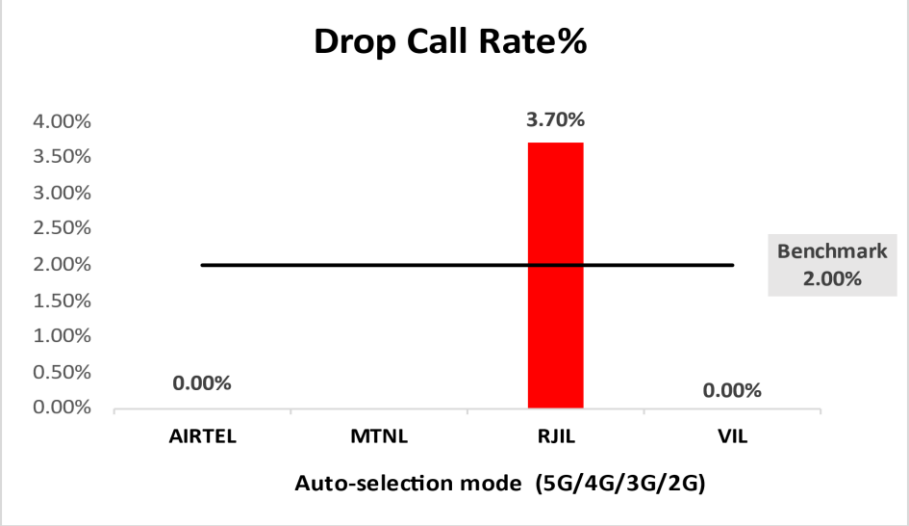


Figure-31: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	MTNL	RJIL	VIL
Call Established (within service provider Network)	76	79	78	79
Number of silence call for >4 Sec	3	NA	3	9
Silence Call Rate %	3.95	NA	3.85	11.39
Number of silence instances for >4 Sec	4	NA	3	15
Number of silence instances for >3 Sec	9	NA	3	30
Number of silence instances for >2 sec	18	NA	12	30
RTP Jitter (4G & 5G) in ms	6.01	NA	9.64	13.61
Packet loss Rate Downlink %	1.18	NA	0.94	2.92
Packet loss Rate Uplink %	1.18	NA	0.94	2.92

Table-83: Summary of silence instances & packet loss rate for mobile to mobile call.

Note-
- Due to unavailability of packet switched (4G & 5G) 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 score values means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	MTNL	RJIL	VIL
Total Number of MOS Samples for calls in table-39	947	754	916	936
Speech Quality (Average MOS Score)	3.85	2.40	3.77	4.32
Number of samples with MOS >=4 to <5 (Excellent)	712	0	584	765
Number of samples with MOS >=3 to <4 (Good)	160	98	235	100
Number of samples with MOS >=2 to <3 (Fair)	33	465	59	22
Number of samples with MOS >=1 to <2 (Poor)	42	191	38	49
%age of samples with MOS >=4 to <5 (Excellent)	75.18%	0.00%	63.76%	81.73%
%age of samples with MOS >=3 to <4 (Good)	16.90%	13.00%	25.66%	10.68%
%age of samples with MOS >=2 to <3 (Fair)	3.48%	61.67%	6.44%	2.35%
%age of samples with MOS >=1 to <2 (Poor)	4.44%	25.33%	4.15%	5.24%

Table-84: Summary of speech quality (MOS) samples.

Note-
- MOS samples count are very less as more number of block calls are reported in 5G/4G open mode during highway drive for MTNL.

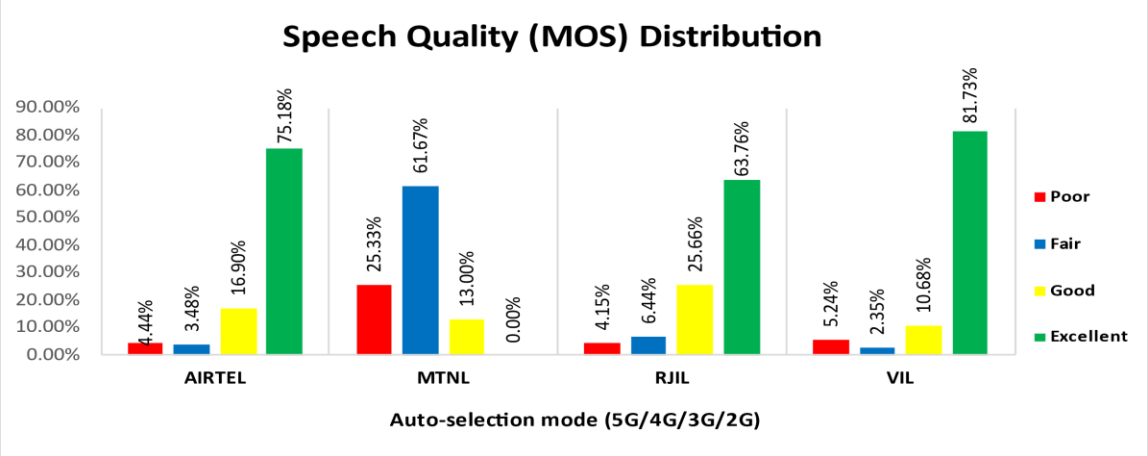


Figure-32: Distribution of samples in MOS score range.

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

Technology	Service Provider			
	AIRTEL	**MTNL**	**RJIL**	**VIL**
5G	0.37%	NA	15.51%	NA
4G	99.63%	NA	84.49%	99.85%
3G	NA	62.88%	NA	0.00%
2G	0.00%	36.31%	NA	0.15%
Limited Service	0.00%	0.80%	0.00%	0.00%

Table-85: Time spent on technology during drive test.

Note-

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

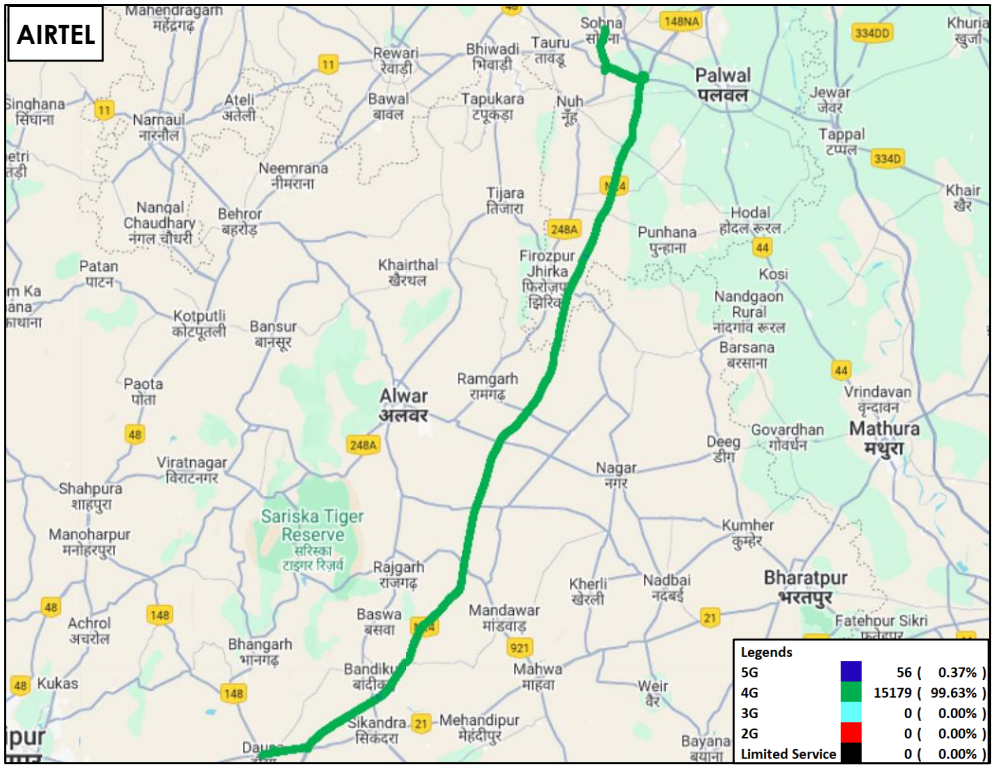


Figure-33: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL

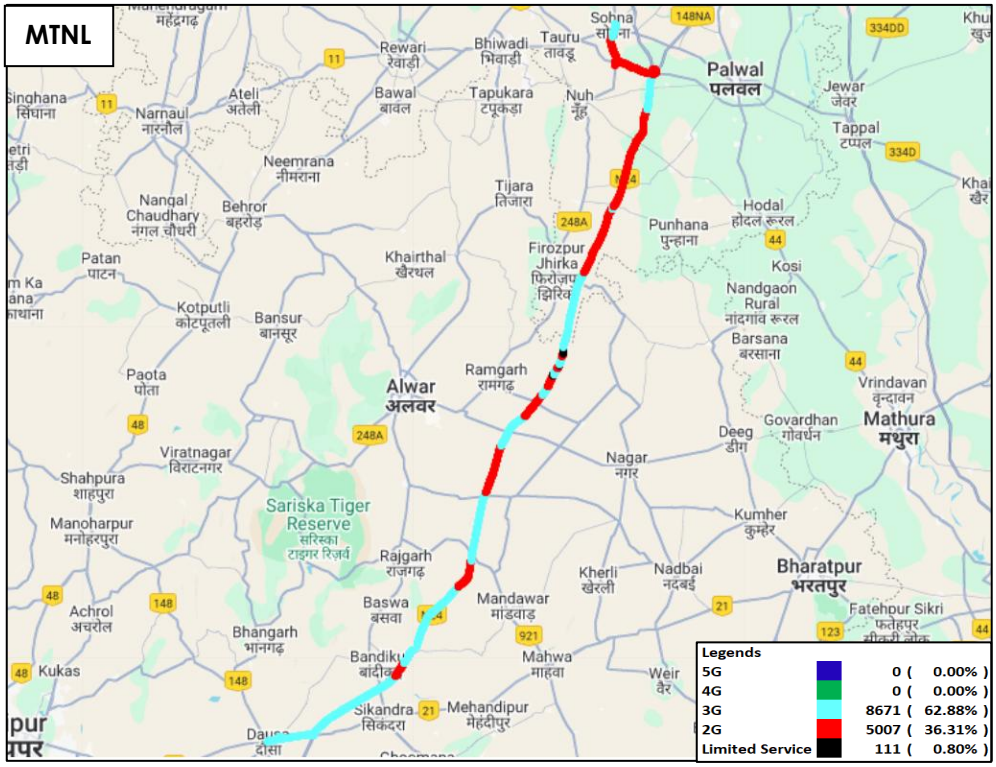


Figure-34: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-MTNL

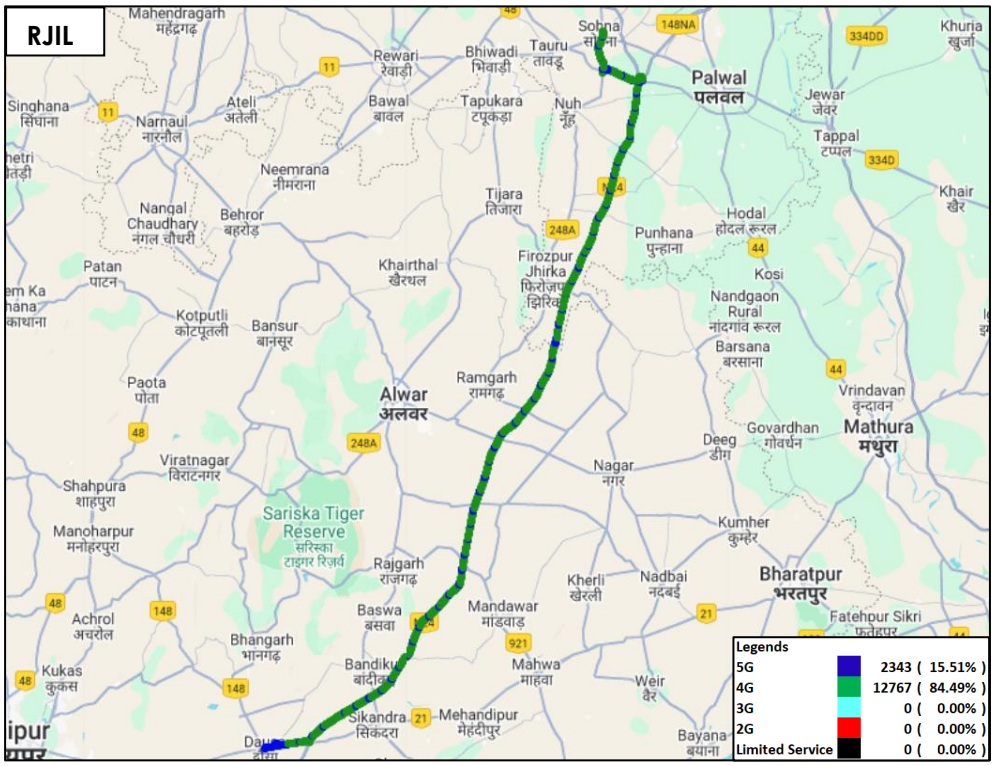


Figure-35: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

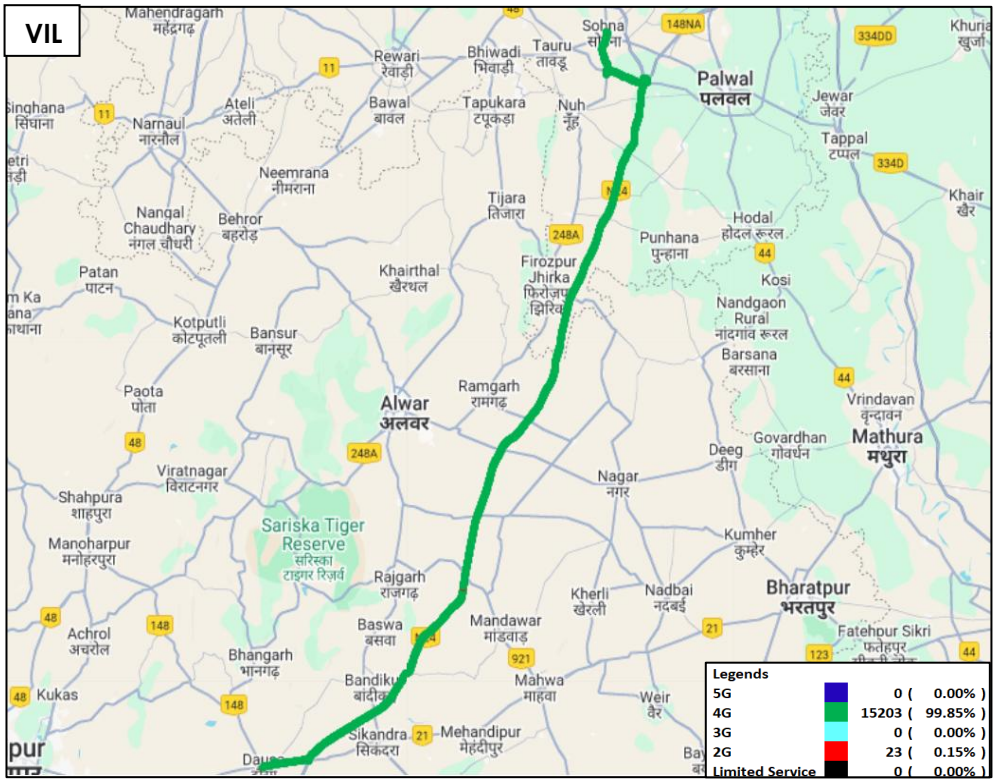


Figure-36: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -VIL.

(g) Network Signal Strength Distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-50, 51, 52 & 53 for map view)

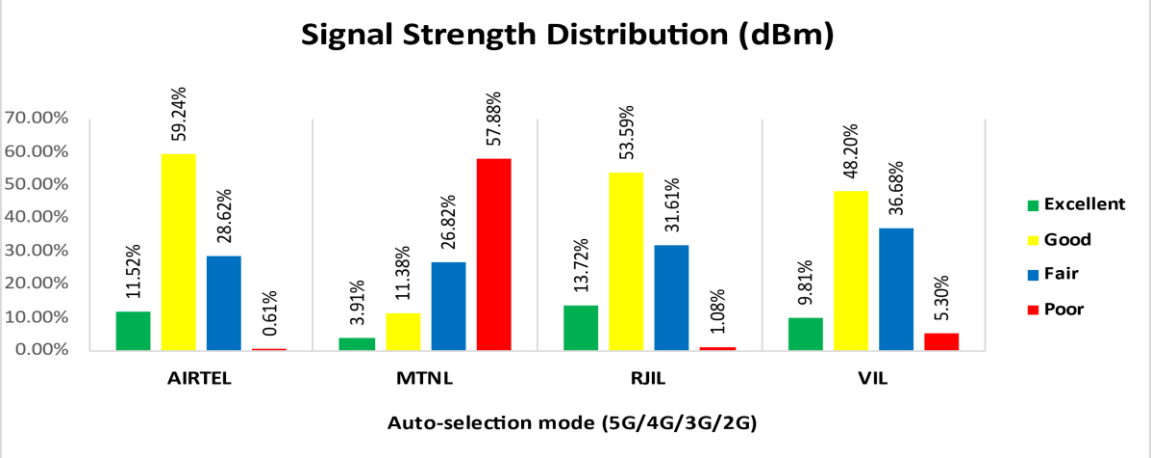


Figure-37: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 12% of samples falling in the excellent signal strength category.
- MTNL has 4% of samples falling in the excellent signal strength category.
- RJIL has 14% of samples falling in the excellent signal strength category.
- VIL has 10% of samples falling in the excellent signal strength category.

4.4.4 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	73.10	0.67	7.92	21.98
	80th Percentile	131.56	1.38	9.45	38.22
	20th Percentile	6.70	0.01	6.46	6.17
Upload Throughput (Mbits/s)	Average	12.52	0.64	13.89	7.86
	80th Percentile	18.09	1.62	18.89	12.91
	20th Percentile	3.84	0.04	4.42	2.34
Latency (ms)	50th Percentile	28.35	1716.00	30.05	38.00

Table-86: Summary of Data performance in network auto-selection mode.

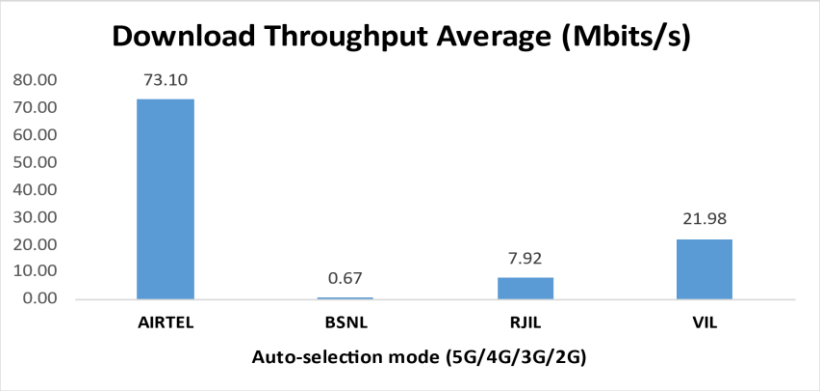


Figure-38: Download throughput

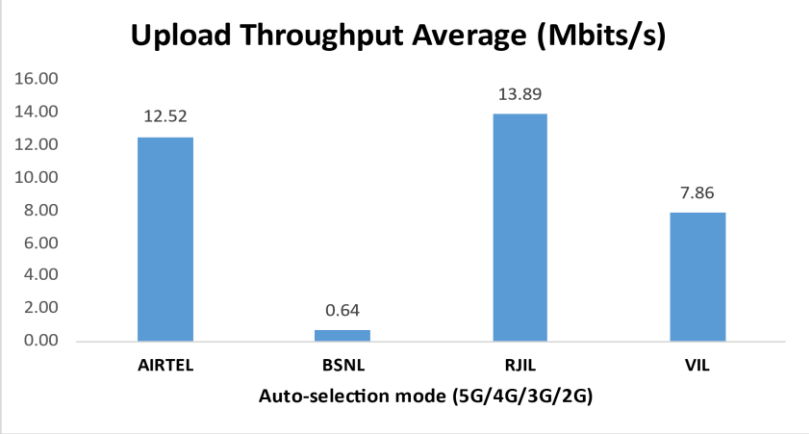


Figure-39: Upload throughput

5. Voice & Data Key findings

5.1 Overall Voice

1. **Call Setup Success Rate:**
   a) Airtel, MTNL and VIL have 79.61%, 47.50% and 95.31% call setup success rate respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, MTNL, RJIL and VIL have 99.81%, 57.20%, 99.63% and 99.69% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

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

2. **Call Setup Time**:
   a) VIL has taken comparatively longer time (4.02 second) to establish the voice call, whereas Airtel and MTNL call setup time is 3.15 & 3.09 seconds respectively in 3G/2G network mode. (refer table-3)

   b) MTNL has taken comparatively longer time (3.31 second) to establish the voice call, whereas Airtel, RJIL & VIL call setup time is 0.79,0.79 & 0.78 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 and Airtel have 2.89%, 0.91% & 0.74% silence call rate respectively. Further VIL has higher RTP packet loss rate in downlink (1.94%) compared to Airtel (0.63%) and RJIL (0.60%). In uplink the RTP packet loss rate is higher for VIL (2.01%) compared to RJIL (0.81%) and Airtel (0.41%). (refer table-6)

4. **Call Drop Rate**:
   a) Overall Airtel's, MTNL's & VIL's drop call rate 0.48%, 7.88%, and 2.51% respectively in 3G/2G network mode. (refer table-3)

   b) Overall MTNL's call drop rate 5.17% is higher than QoS benchmark of 2%, while RJIL, VIL & Airtel have 0.50%, 0.44% and 0.13% drop call rate respectively in Auto-selection mode (5G/4G/3G/2G). (refer table-5)

5.2 Overall Data

1. **Data download and upload performance (Dynamic i.e. while moving):**
   a) MTNL offers a download speed of 3.62 Mbps while VIL provides 18.43 Mbps, utilizing legacy technologies respectively. In contrast, Airtel and RJIL achieve significantly higher average download speeds of 177.50 Mbps and 266.42 Mbps respectively. (refer table-11)

   b) MTNL offers a upload speed of 1.66 Mbps while VIL provides 4.68 Mbps, utilizing legacy technologies respectively, In contrast, Airtel and RJIL offer higher speeds of 28.30 Mbps and 21.40 Mbps respectively.(refer table-11)

2. **Data download and upload performance (static i.e. while stationary):**
   a) At Hotspots, RJIL has better 5G QoS performance comparatively, with average download speed of 211.63 Mbps. (refer table-40)

   b) At Hotspots, Airtel has better 5G QoS performance comparatively, with average upload speed of 26.88 Mbps. (refer table-40)

3. **Data session setup success rate (static i.e. while stationary):**
   a) Airtel, VIL, RJIL and MTNL have 100.00%, 97.87%, 87.37% and 74.74% download session setup success rate respectively. (refer table-40)

   b) Airtel has 100.00% while VIL, RJIL & MTNL have 96.84%, 92.63% and 77.89% upload session setup success rate respectively. (refer table-40)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 79.61% call setup success rate and 0.48% call drop rate have been observed in 3G/2G network mode. Whereas the call setup success rate is below the benchmark of 98.00% and the call drop rate is within the benchmark of 2.00%. (refer table-3)

- 99.81% call setup success rate and 0.13% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively.(refer table-5)

- 98.05% call setup success rate and 0.48% call drop rate have been observed in 3G/2G network mode for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively (refer table-13)

- 99.77% call setup success rate and 0.15% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-15)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for 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-20)

- 0.00% call setup success rate has been observed for 3G/2G network mode for highway drive. All calls were failed across the highway route. (refer table-80)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-82)

Data

- Airtel has 177.50 Mbps average download throughput & 28.30 Mbps average upload throughput across measured routes for LSA. (refer table-11)

- Airtel has 186.79 Mbps average download throughput & 29.95 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- Palam Airport, Airforce Museum Palam, Medanta Hospital Gurugram and DLF Cyber Hub have less download speed (less than 100 Mbps) out of total 19 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-49, 50, 55, & 57)

- Mata Chanan Devi Hospital Janakpuri , Pacific Mall Tagore Garden, Shadley Public School Subhash Nagar, Delhi Cantt Railway Station , District Centre Janakpuri , Palam Airport , Ambience Mall & DLF Cyber Hub hotspot have less upload speed (less than 20 Mbps) out of total 19 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-41, 42, 43, 46, 48, 49, 51 & 57)

- Pacific Mall Tagore Garden, Shadley Public School Subhash Nagar & Palam Airport have less download speed (less than 10 Mbps) for auto-selection mode (4G/3G/2G) (refer table-62, 63 & 69)

- Pacific Mall Tagore Garden, Shadley Public School Subhash Nagar & Medanta Hospital Gurugram have less upload speed (less than 2 Mbps) for auto-selection mode (4G/3G/2G) (refer table- 62, 63 & 75)

- Airtel has 73.10 Mbps average download throughput & 12.52 Mbps average upload throughput across measured routes for highway drive. (refer table-86)

2. MTNL:

Voice

- 47.50% call setup success rate and 7.88% call drop rate have been observed in 3G/2G network mode. Performance is not meeting the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-3)

- 57.20% call setup success rate and 5.17% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). Performance is not meeting the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-5)

- 62.95% call setup success rate and 7.88% call drop rate have been observed in 3G/2G network mode. Performance is not meeting the benchmark of 98.00% & 2.00% respectively for city drive. (refer table-13)

- 69.57% call setup success rate and 6.04% call drop 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-15)

- 94.74% 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. Whereas the call setup success rate is below the benchmark of 98.00% and the call drop rate is within the benchmark of 2.00%. (refer table-20)

- 0.00% call setup success rate has been observed for 3G/2G network mode for highway drive. All calls were failed across the highway route. (refer table-80)

- 0.00% call setup success rate has been observed for auto-selection mode (5G/4G/3G/2G) for highway drive. All calls were failed across the highway route. (refer table-82)

Data

- MTNL has 3.62 Mbps average download throughput & 1.66 Mbps average upload throughput across measured routes for LSA. (refer table-11)

- MTNL has 3.71 Mbps average download throughput & 1.71 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- MTNL has 0.67 Mbps average download throughput & 0.64 Mbps average upload throughput across measured routes for highway drive. (refer table-86)

3. RJIL:

Voice

- 99.63% call setup success rate and 0.50% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). Performance is well within the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-5)

- 99.55% call setup success rate and 0.38% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). Performance is well within the benchmark of 98.00% & 2.00% respectively for city drive. (refer table-15)

- 99.47% call setup success rate and 2.12% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). for all hotspot locations. Whereas the call setup success rate is within the benchmark of 98.00% and the call drop rate is not meeting the benchmark of 2.00%. (refer table-20)

- 100.00% call setup success rate and 3.70% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for highway drive. Whereas the call setup success rate is within the benchmark of 98.00% and the call drop rate is not meeting the benchmark of 2.00%. (refer table-82)

Data

- RJIL has 266.42 Mbps average download speed & 21.40 Mbps average upload speed across measured routes in LSA. (refer table-11)

- RJIL has 275.79 Mbps average download speed & 21.97 Mbps average upload speed across measured routes in city drive. (refer table-19)

- Palam Airport, Airforce Museum Palam, MDI Gurugram, Amity University and District Court Gurugram have less download speed (less than 100 Mbps) out of total 19 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-49, 50, 56, 58 & 59)

- Pacific Mall Tagore Garden, District Centre Janakpuri and Palam Airport has less download speed (less than 10 Mbps) out of total 19 hotspots for auto-selection mode (4G/3G/2G). (refer table-62, 68 & 69)

- Mata Chanan Devi Hospital Janakpuri , Pacific Mall Tagore Garden, Presidium School Punjabi Bagh, Deen Dayal Upadhyay Hospital , Delhi Cantt Railway Station , Jaipur Golden Hospital Rohini, District Centre Janakpuri , Palam Airport , Gurugram Railway Station, Medanta Hospital Gurugram, MDI Gurugram, Amity University & District Court Gurugram have less upload speed (less than 20 Mbps) out of total 19 hotspots. (refer table-41, 42, 44, 45, 46, 47, 48, 49, 52, 55, 56, 58 & 59)

- Pacific Mall Tagore Garden has less upload speed (less than 2 Mbps) out of total 19 hotspots for auto-selection mode (4G/3G/2G). (refer table-62)

- RJIL has 7.92 Mbps average download throughput & 13.89 Mbps average upload throughput across measured routes for highway drive. (refer table-86)

4. VIL:

Voice

- 95.31% call setup success rate and 2.51% call drop rate have been observed in 3G/2G network mode. Performance is not meeting the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-3)

- 99.69% call setup success rate and 0.44% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for LSA. Performance is meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)

- 93.99% call setup success rate and 2.51% call drop rate have been observed in 3G/2G network mode. Performance is not meeting the benchmark of 98.00% & 2.00% respectively for city drive. (refer table-13)

- 99.62% call setup success rate and 0.53% call drop rate have been observed for auto-selection mode (5G/4G/3G/2G). Performance is meeting the benchmark of 98.00% & 2.00% respectively for city drive. (refer table-15)

- 100.00% call setup success rate and 0.00% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is meeting the benchmark of 98.00% & 2.00% respectively. (refer table-20)

- 99.75% call setup success rate has been observed for 3G/2G network mode for highway drive. (refer table-80)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-82)

Data

- VIL has 18.43 Mbps average download speed & 4.68 Mbps average upload speed across measured routes in LSA. (refer table-11)

- VIL has 17.91 Mbps average download speed & 4.35 Mbps average upload speed across measured routes in city drive. (refer table-19)

- Pacific Mall Tagore Garden, Jaipur Golden Hospital Rohini, District Centre Janakpuri , MDI Gurugram, DLF Cyber Hub & Amity University hotspots have less download speeds (less than 10 Mbps) out of total 19 hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-42, 47, 48, 56, 57 & 58)

- Pacific Mall Tagore Garden & Jaipur Golden Hospital Rohini have less upload speed (less than 2 Mbps) out of total 19 hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-42 & 47)

- Pacific Mall Tagore Garden, Jaipur Golden Hospital Rohini, MDI Gurugram and Amity University area have less download speed (less than 10 Mbps) out of total 19 hotspots for auto-selection mode (4G/3G/2G) (refer table-62, 67, 76 & 78)

- Mata Chanan Devi Hospital Janakpuri , Pacific Mall Tagore Garden, Jaipur Golden Hospital Rohini, Medanta Hospital Gurugram, MDI Gurugram & DLF Cyber Hub area have less upload speed (less than 2 Mbps) out of total 19 hotspots for auto-selection mode (4G/3G/2G) (refer table- 61, 62, 67, 75, 76 & 77)

- VIL has 21.98 Mbps average download throughput & 7.86 Mbps average upload throughput across measured routes for highway drive. (refer table-86)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

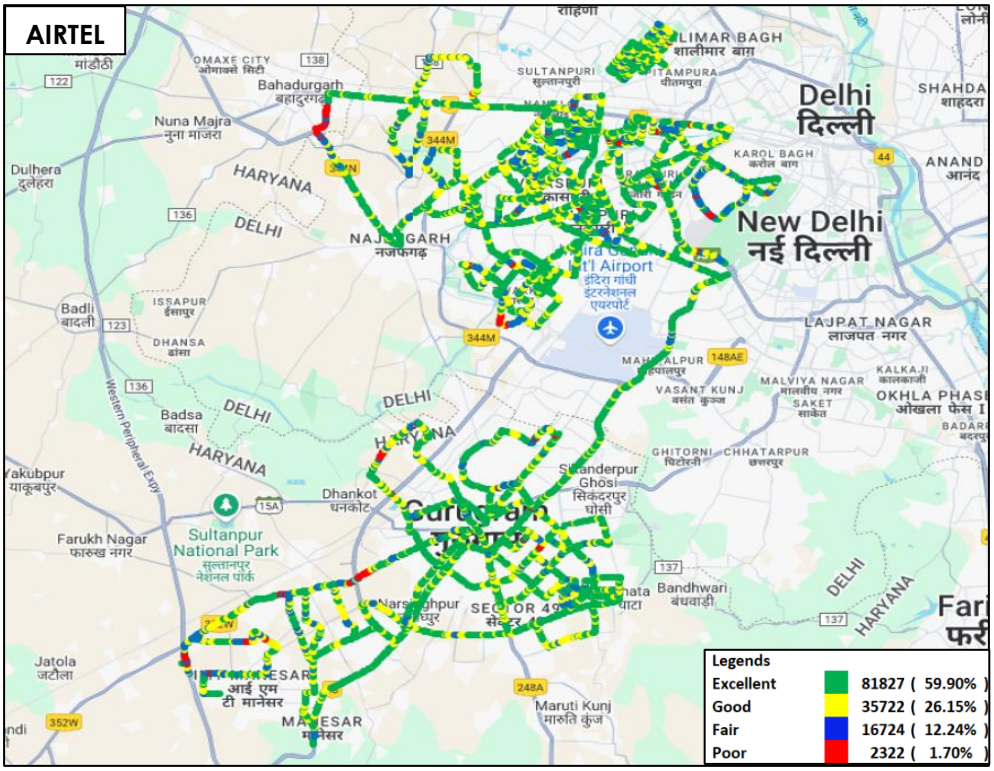


Figure-40: Signal strength 3G/2G network mode – AIRTEL.

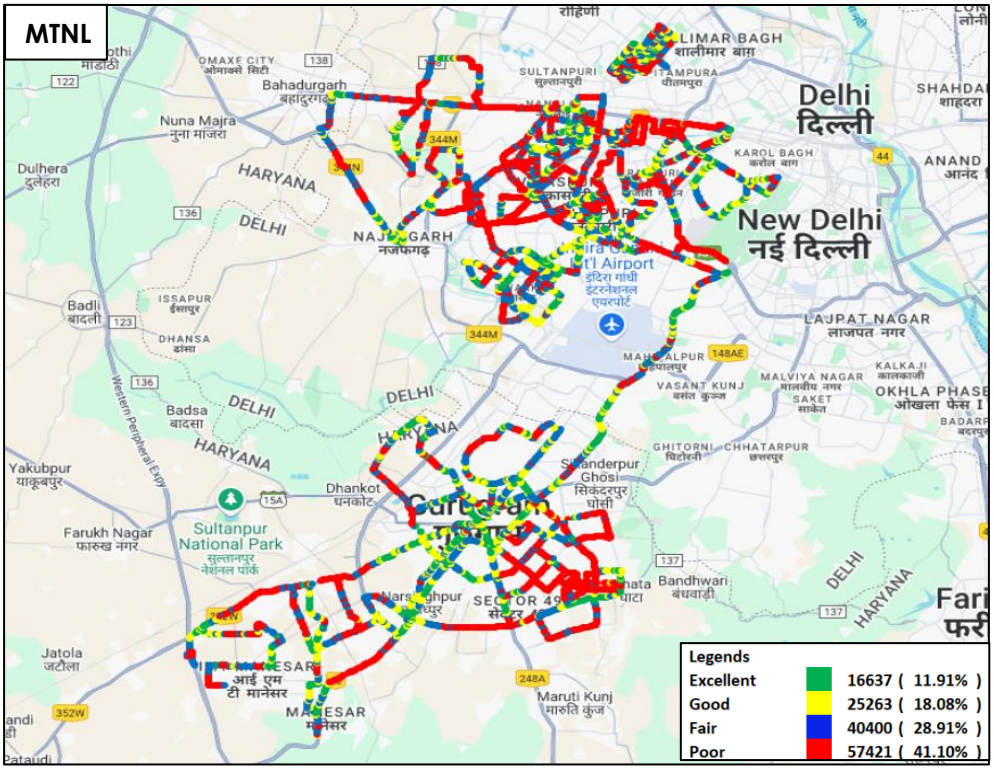


Figure-41: Signal strength 3G/2G network mode – MTNL.

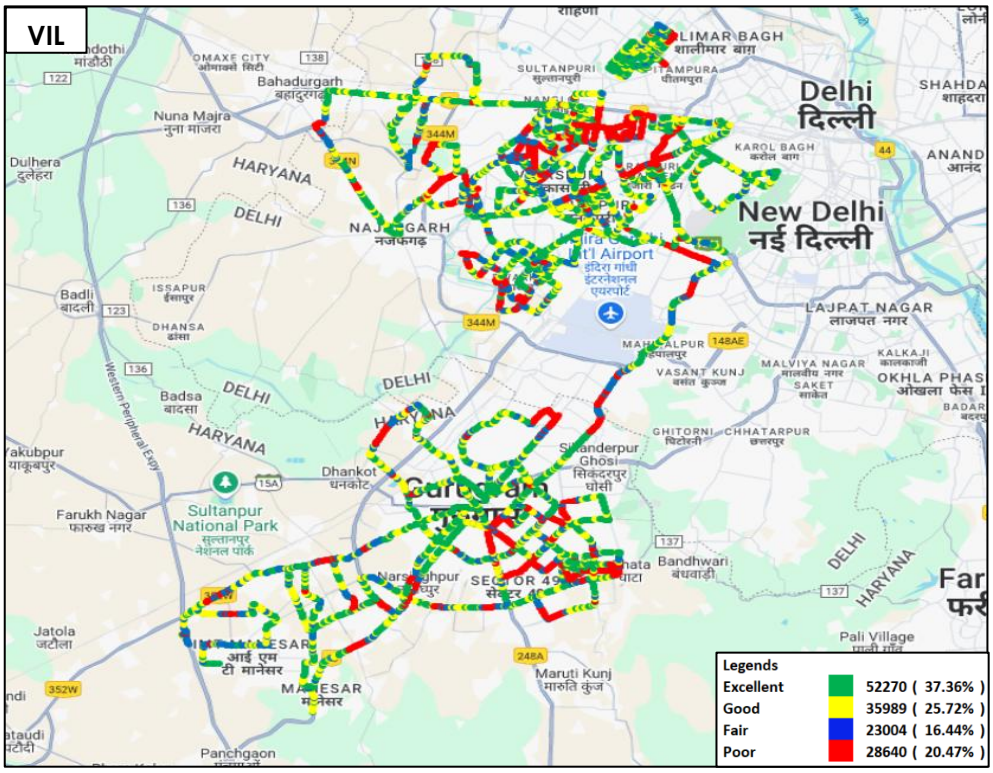


Figure-42: Signal strength 3G/2G network mode – VIL.

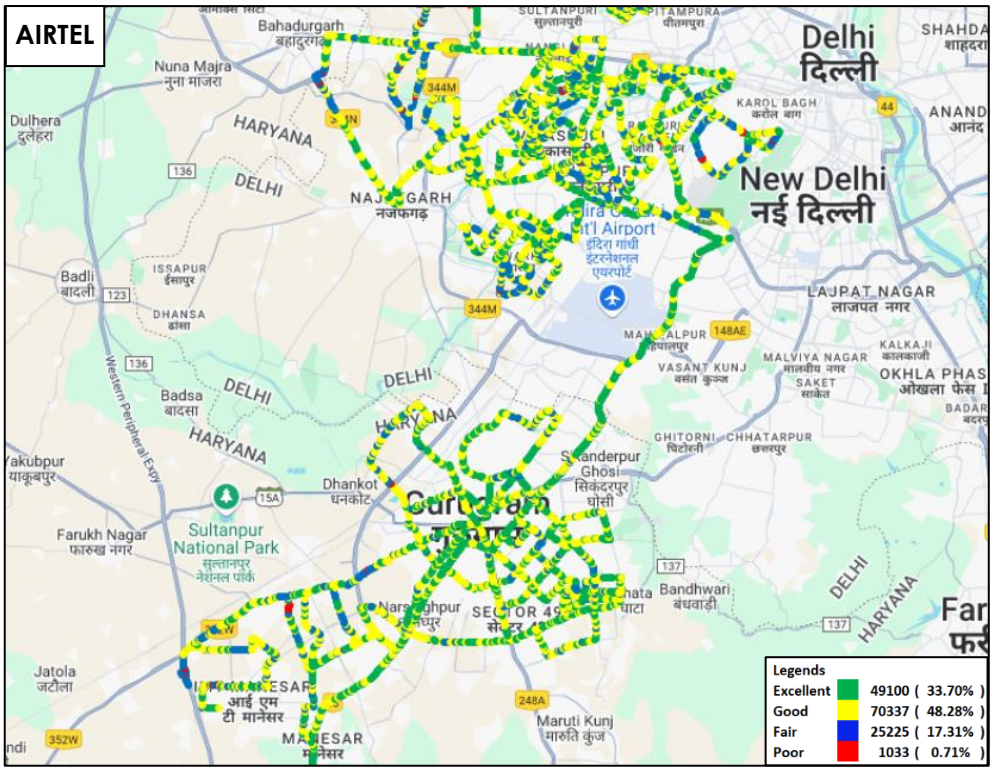


Figure-43: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

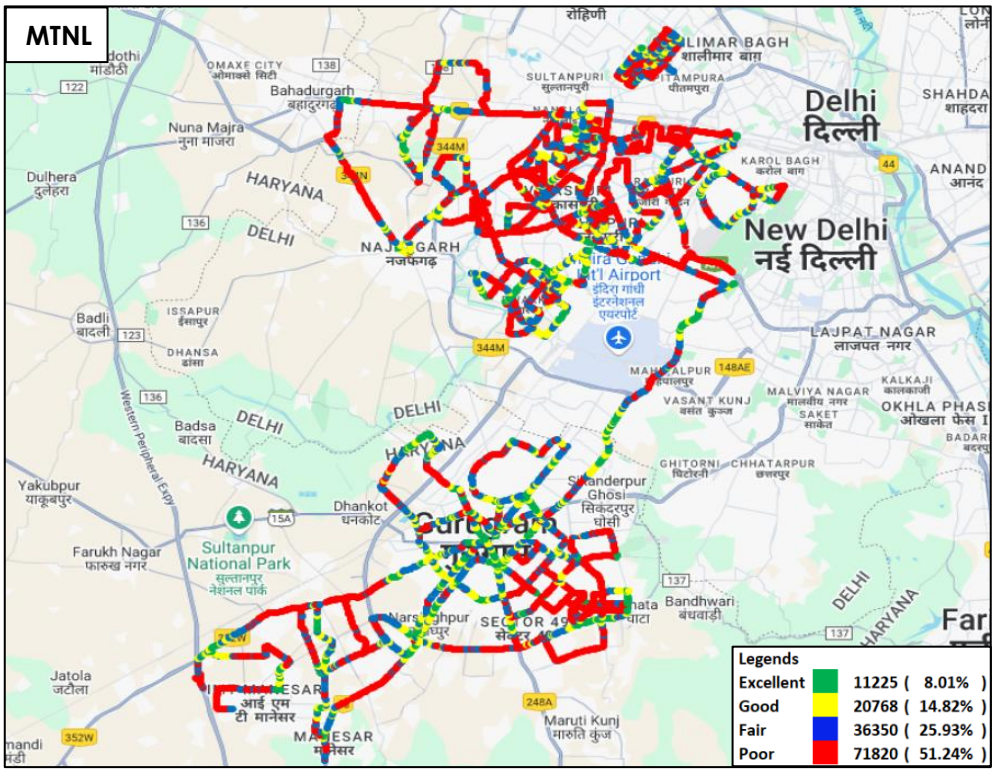


Figure-44: Signal strength auto-selection mode 5G/4G/3G/2G – MTNL.

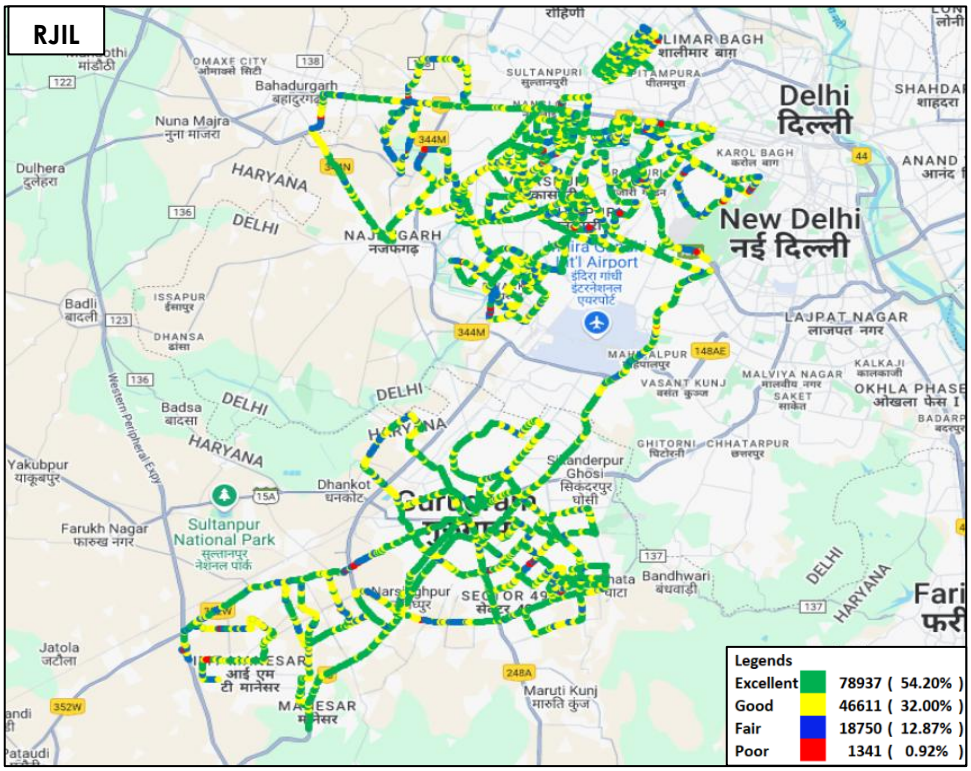


Figure-45: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

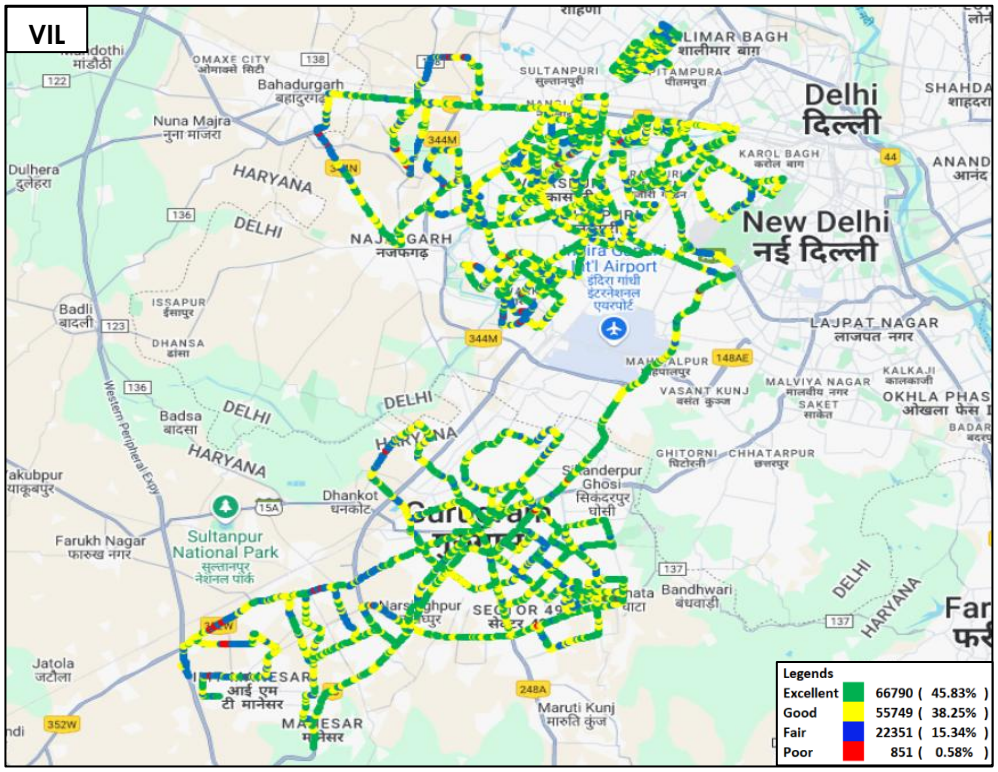


Figure-46: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

6.1.2 Highway

i) Sohna to Dausa via Mumbai Expressway

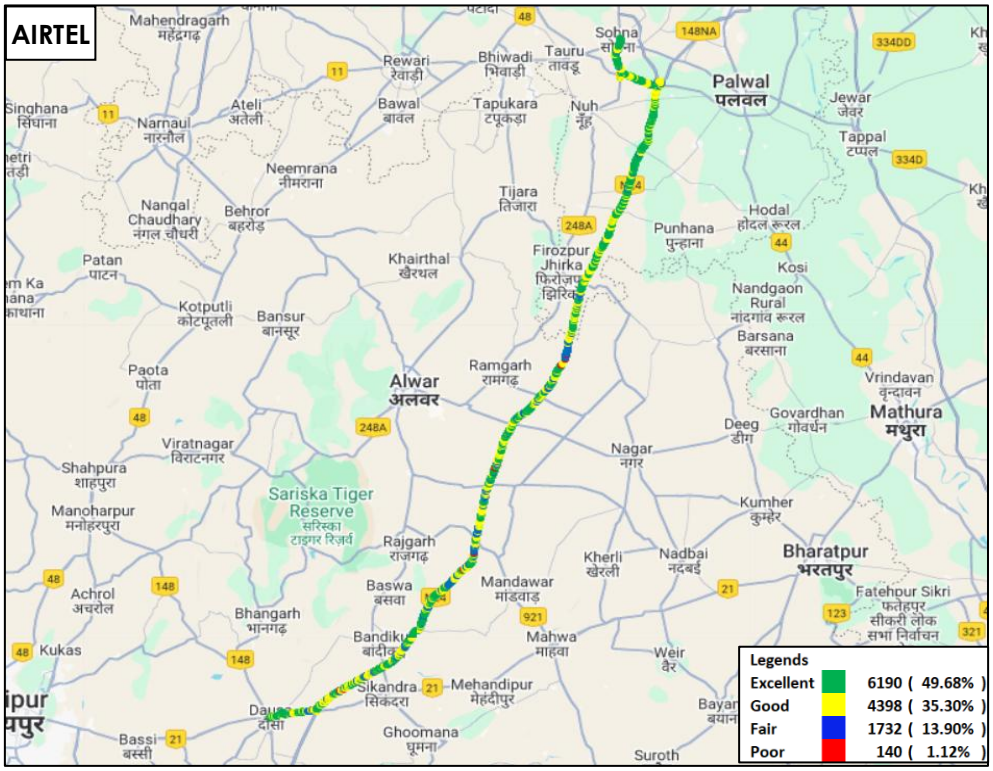


Figure-47: Signal strength 3G/2G network mode – AIRTEL.

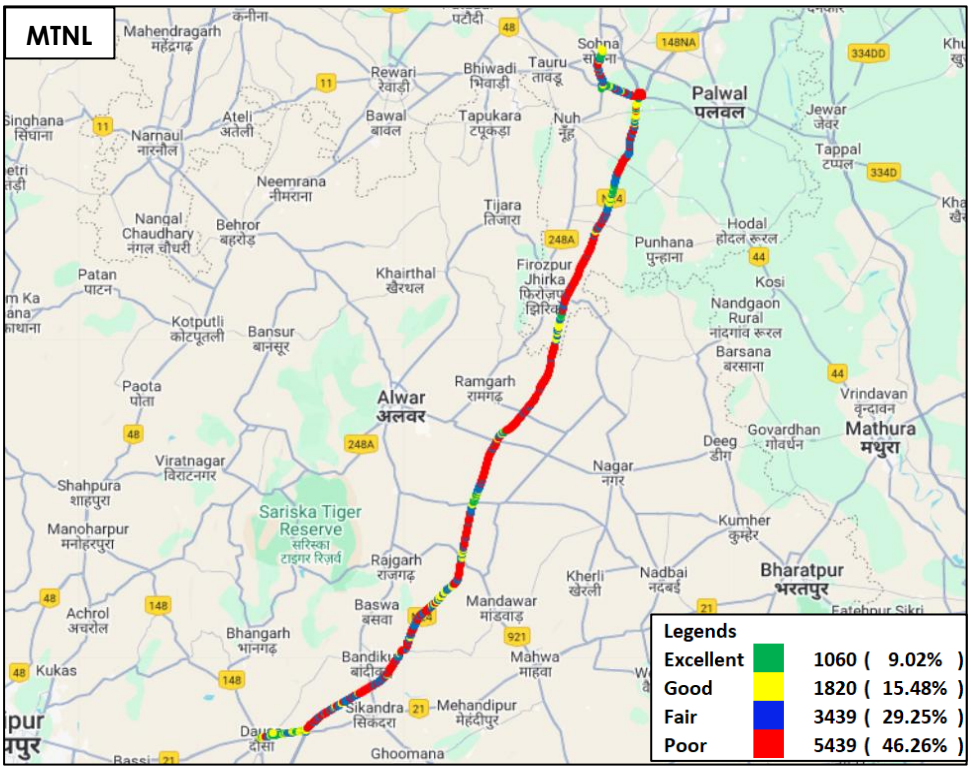


Figure-48: Signal strength 3G/2G network mode – MTNL.

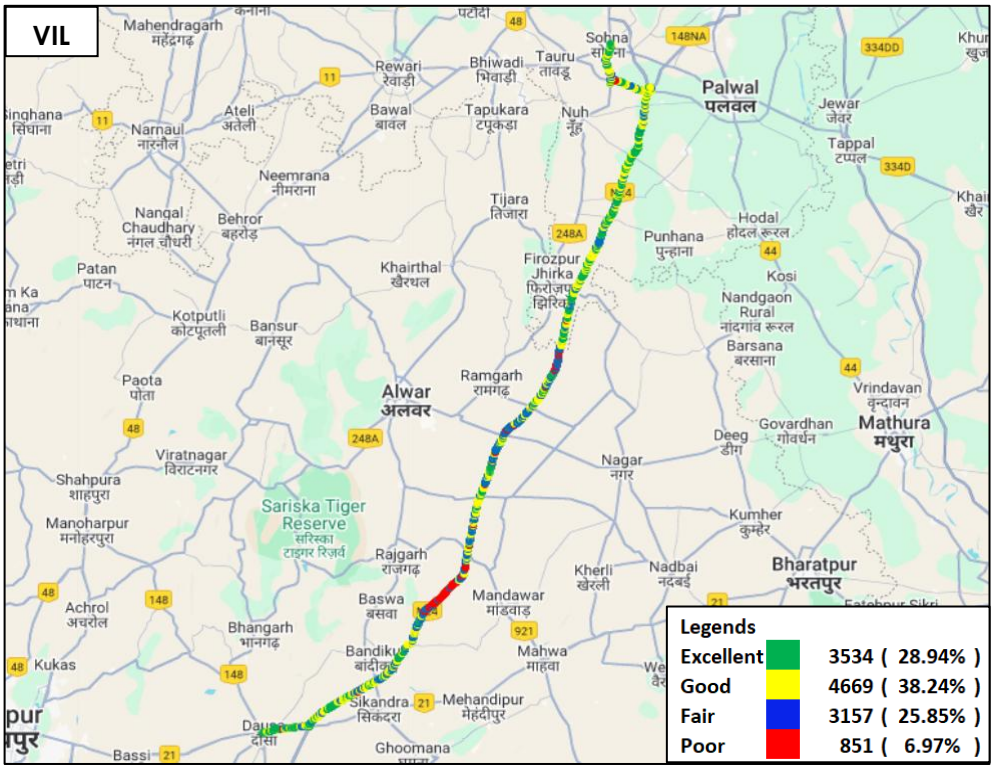


Figure-49: Signal strength 3G/2G network mode – VIL

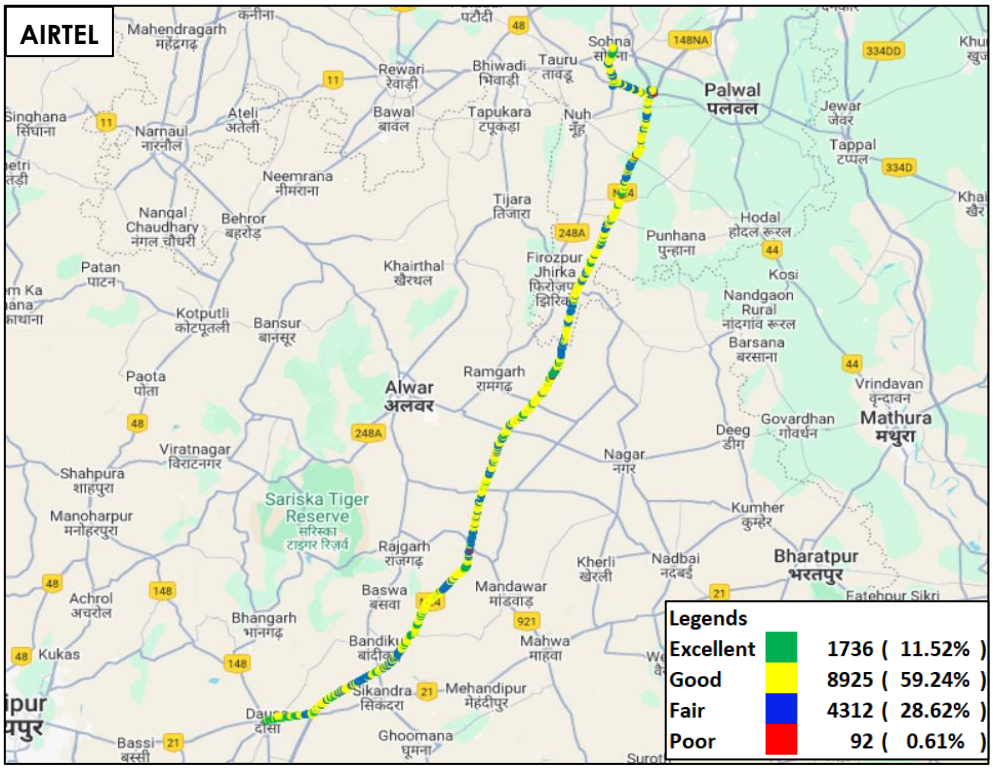


Figure-50: Signal strength auto-selection mode 5G/4G/3G/2G-AIRTEL

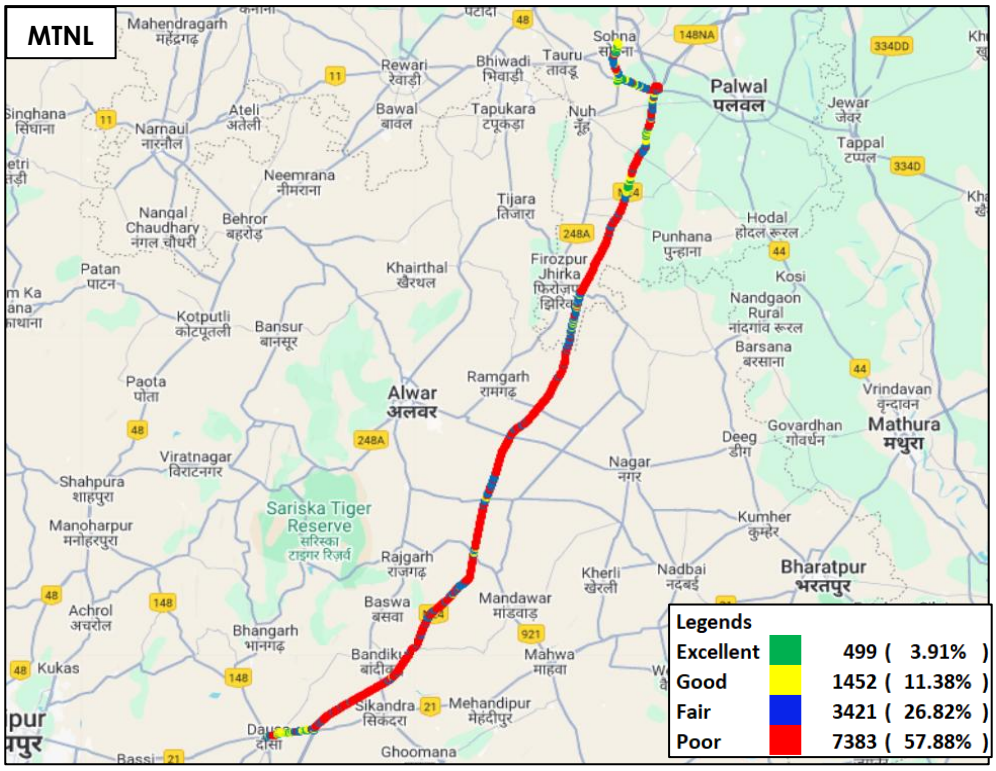


Figure-51: Signal strength auto-selection mode 5G/4G/3G/2G – MTNL.

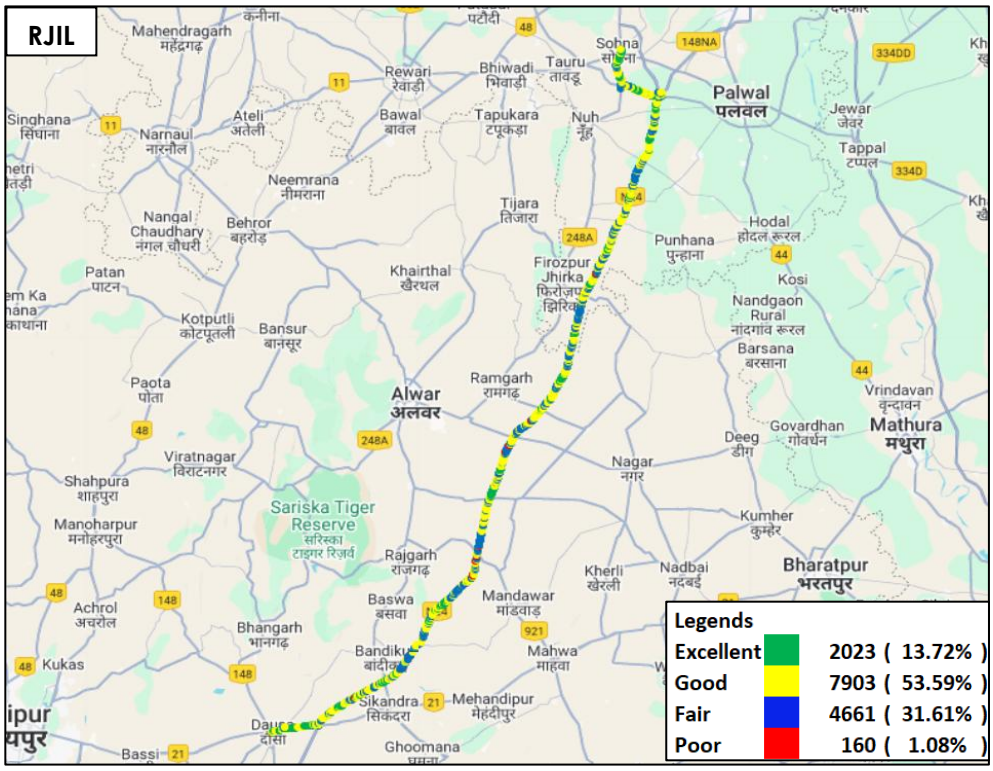


Figure-52: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL

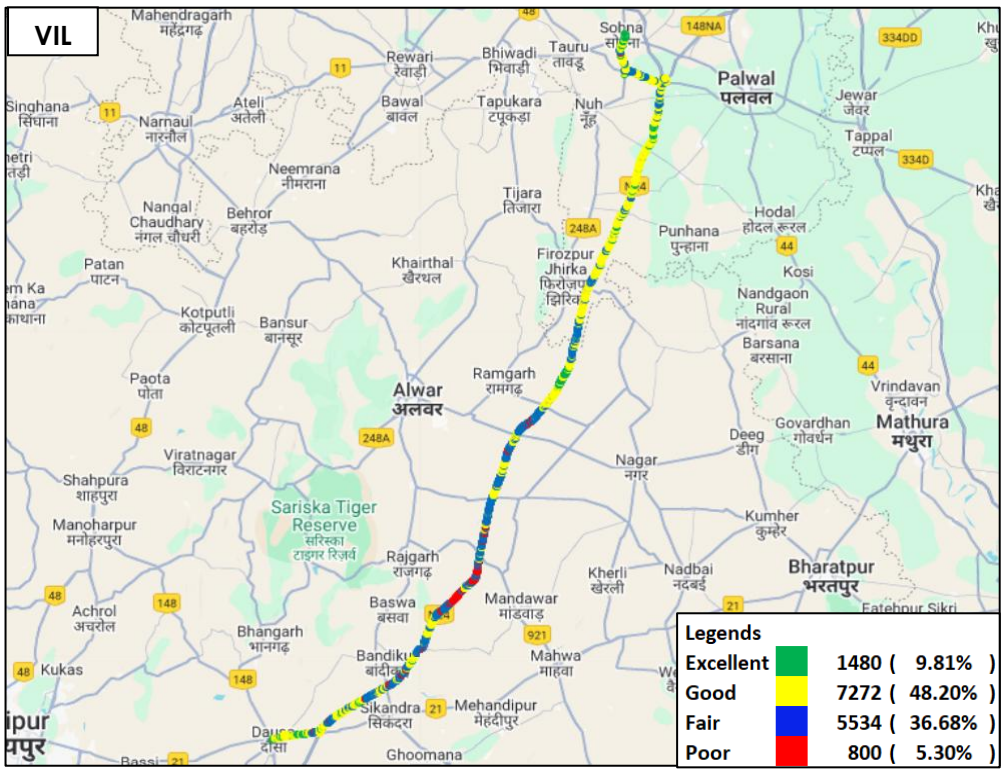


Figure-53: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

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/180 Sec
Wait/ Guard Time		15 Sec

Table-87: 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.
- 5G/4G/3G/2G auto mode MOS call were made in MTNL as MTNL don't have VoLTE & VoNR network availability.

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

Table-88: 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.
- Download & Upload test performed at hotspot locations in 4G/3G/2G auto-selection also.

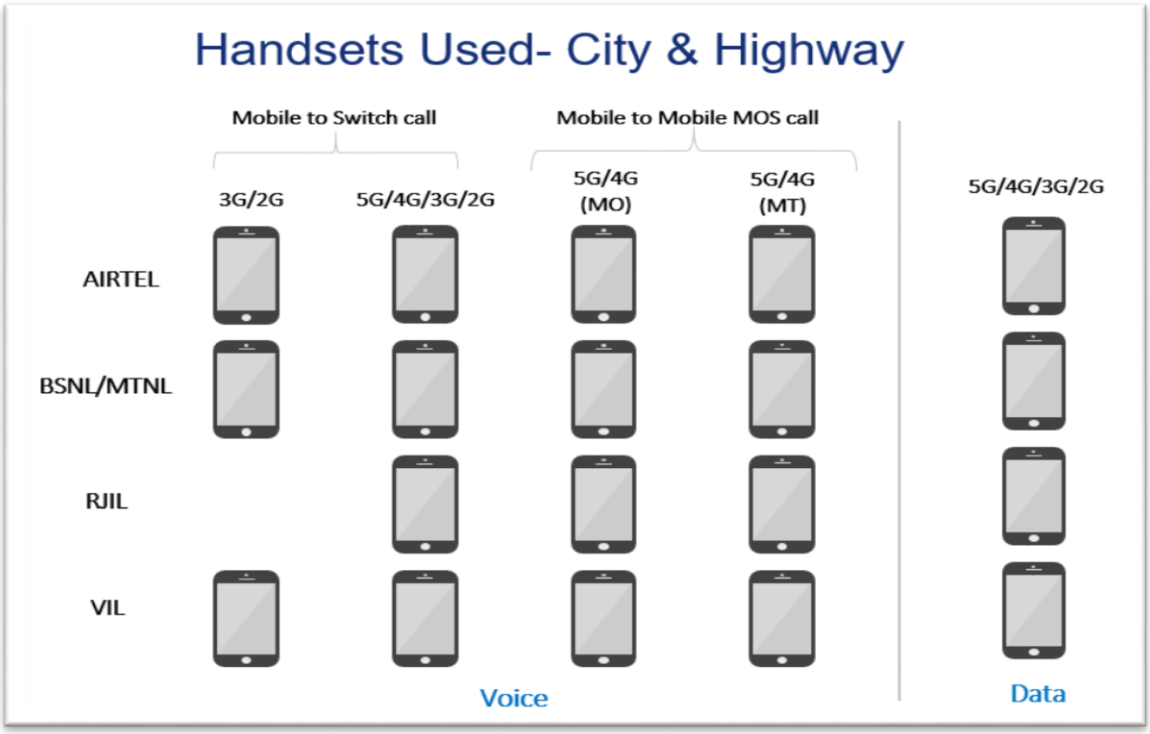


Figure-54: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

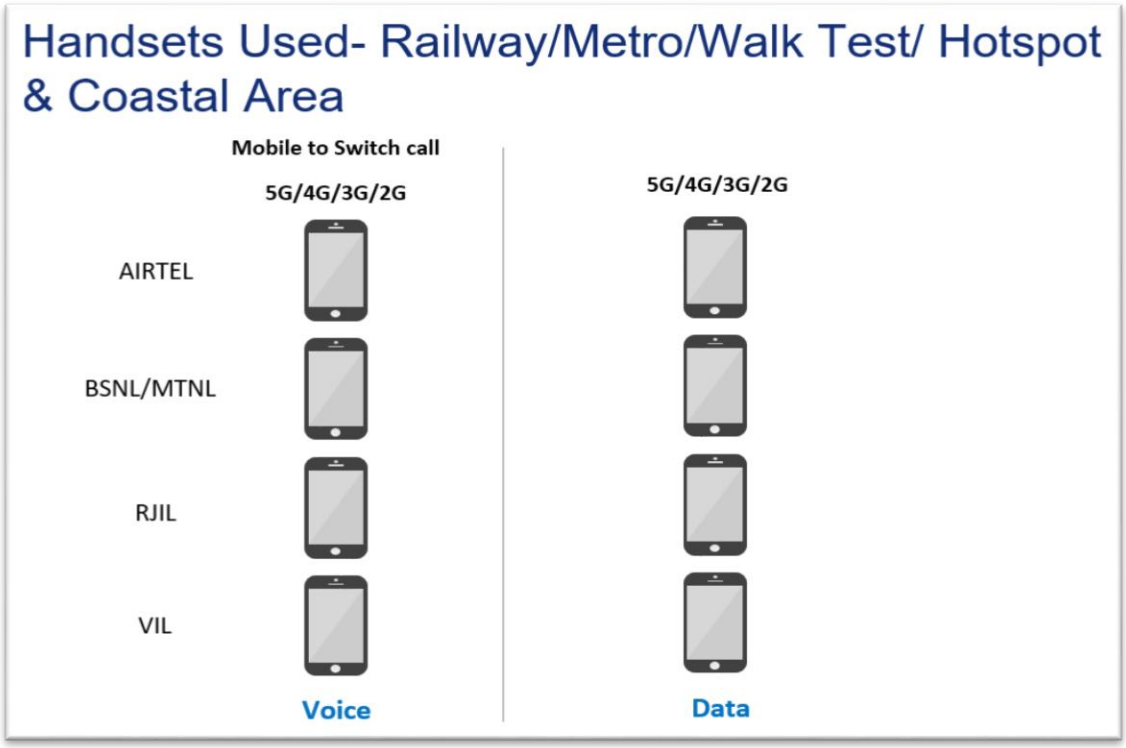


Figure-55: Number of handsets used in railway/metro/walktest/hotspot & coastal area

7.1.2 Drive test Methodology

(a) Dynamic voice testing (on the move)

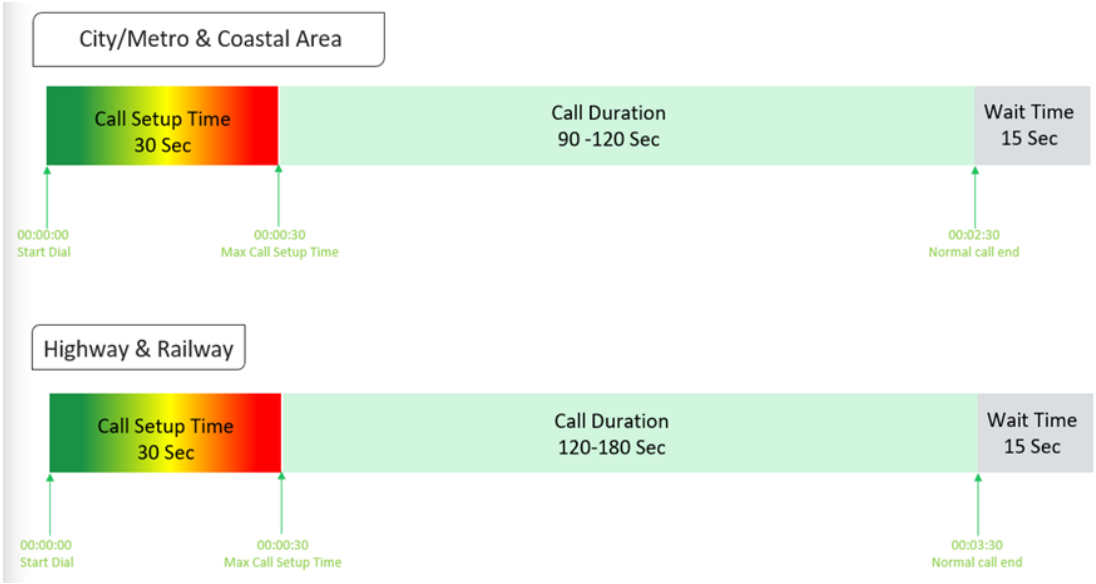


Figure-56: Voice test script for city/railway/metro/highway & coastal area

- 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-57: 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

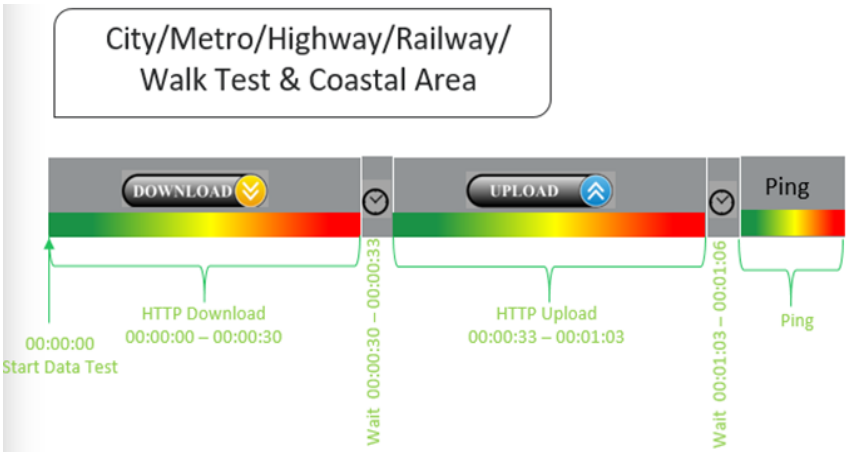


Figure-58: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

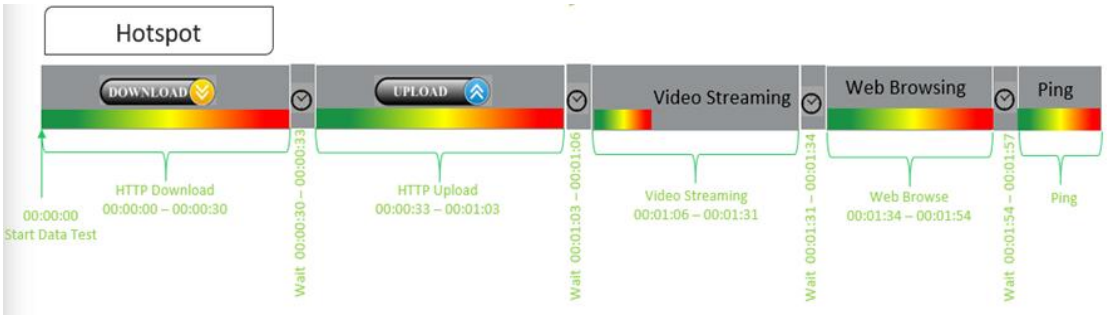


Figure-59: Data test script used at hotspot

- 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 hotspot location.
- Download & Upload test performed at hotspot locations in 4G/3G/2G auto-selection also.

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%**
Call Drop 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 Call Drop Rate = (Total Call Drop/Total Call Established) *100 As per QoS Regulation 2024 benchmark value is **<=2%**
Call Setup Time	Time taken from call initiate to call alerting/ringing. Call Setup Time = T2- T1 T2- Ringing (VoLTE/VoNR) & Alerting (for WCDMA & GSM), T1- Invite (VoLTE/VoNR) & CM Service Request (for WCDMA & GSM)
Voice Quality (MOS)	Voice quality in mobile networks is measured with algorithms based on ITU-T P.863 (POLQA). The grading for Voice quality has been given as: Excellent: MOS $\geq$ 4 and < 5 Good : MOS $\geq$ 3 and < 4 Fair : MOS $\geq$ 2 and < 3 Poor : MOS $\geq$ 1 and < 2
Handover Success Rate	Handover Success Rate = Count of successful handovers (All Technology Handover combined) / Total count of Handover Attempt (All Technology Handover combined) *100 Handover type which are considered- 2G Inter & Intra cell, 3G Soft & IRAT, 4G Inter & Intra frequency & SRVCC, 5G Inter & Intra frequency & 5G to 4G handovers.
Silence Call	A call which has ≥ 4 sec continuous RTP gap is considered as a Silence Call. Silence call rate = (count of silence call / Total calls established) *100 If a call observes multiple silence count >=4 sec in a particular established call it has been taken as one silent event.

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

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

<table>
<tr><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>
</td></tr>
</table>

Table-89: 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-90: Network performance parameter and definition Data

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

Hardik Rajeshbhai Patel

Digitally signed by Hardik Rajeshbhai Patel
Date: 2025.02.28 21:51:55 +05'30'