



TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Jammu & Kashmir LSA

June 2026

Contents

1. Introduction	3
2. Executive Summary (LSA)	3
2.1 Drive test details	3
2.2 Drive test routes	4
2.3 Summary of areas covered	4
2.4 Telecom service providers detected frequency bands	5
2.5 Performance against key QoS parameters	5
3. QoS performance analysis-LSA level	8
3.1 Overview	8
3.2 Voice performance	8
3.3 Data performance	11
4. Detailed QoS performance analysis	13
4.1 Overview	13
4.2 City	13
4.2.1 Srinagar & Gulmarg City	13
4.2.1.1 Drive test route	13
4.2.1.2 Areas covered	13
4.2.1.3 Voice performance	13
4.2.1.4 Data performance	21
4.2.2 Anantnag & Pahalgam City	25
4.2.2.1 Drive test route	25
4.2.2.2 Areas covered	25
4.2.2.3 Voice performance	25
4.2.2.4 Data performance	34
4.3 Hotspots	38
4.3.1 Locations	38
4.3.2 Hotspot covered	38
4.3.3 Voice performance	38
4.3.4 Data performance (Auto-selection mode 5G/4G/3G/2G)	40
4.3.5 Data performance (5G Only & 4G Only Download & Upload Speed)	42
4.4 Walk Test	44
4.4.1 Walk test locations	44
4.4.2 Walk Test Covered	44
4.4.3 Voice Performance	44

4.4.4 Data Performance.....	44
4.5 Highway	45
4.5.1 Srinagar to Pahalgam.....	45
4.5.1.1 Drive test route.....	45
4.5.1.2 Routes covered	45
4.5.1.3 Voice performance.....	45
4.5.1.4 Data performance.....	54
4.5.2 Srinagar to Gulmarg	58
4.5.2.1 Drive test route.....	58
4.5.2.2 Areas covered	58
4.5.2.3 Voice performance.....	58
4.5.2.4 Data performance.....	65
5. Voice & Data Key findings.....	69
5.1 Overall Voice.....	69
5.2 Overall Data	69
5.3 Operator wise Key Findings.....	70
6. Annexure	76
6.1 Route wise coverage map	76
6.1.1 City	76
6.2.1 Highway	87
7. Appendix	97
7.1 Appendix-I	97
7.1.1 Drive test setup	97
7.1.2 Drive test Methodology	99
7.2 Appendix-II	101
7.2.1 Network Performance Parameters for Voice calls	101
7.2.2 Network Performance Parameters Data tests	102

1. Introduction

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

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

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

2. Executive Summary (LSA)

2.1 Drive test details

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

S. No	Drive test route	Type of route	Distance covered (KMs)	From date	To date
1	Srinagar, Gulmarg, Anantnag & Pahalgam	City	373.6	08-June-2026	12-June-2026
2	Srinagar	Inter Operator Calling	1 Location	12-June-2026	12-June-2026
3	Srinagar & Pahalgam	Hotspot	6 Locations	08-June-2026	11-June-2026
4	Srinagar	Walk test	4.9	12-June-2026	12-June-2026
5	Srinagar to Pahalgam & Srinagar to Gulmarg	Highway	111.5	09-June-2026	12-June-2026

Table-1: Drive test summary.

2.2 Drive test routes

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

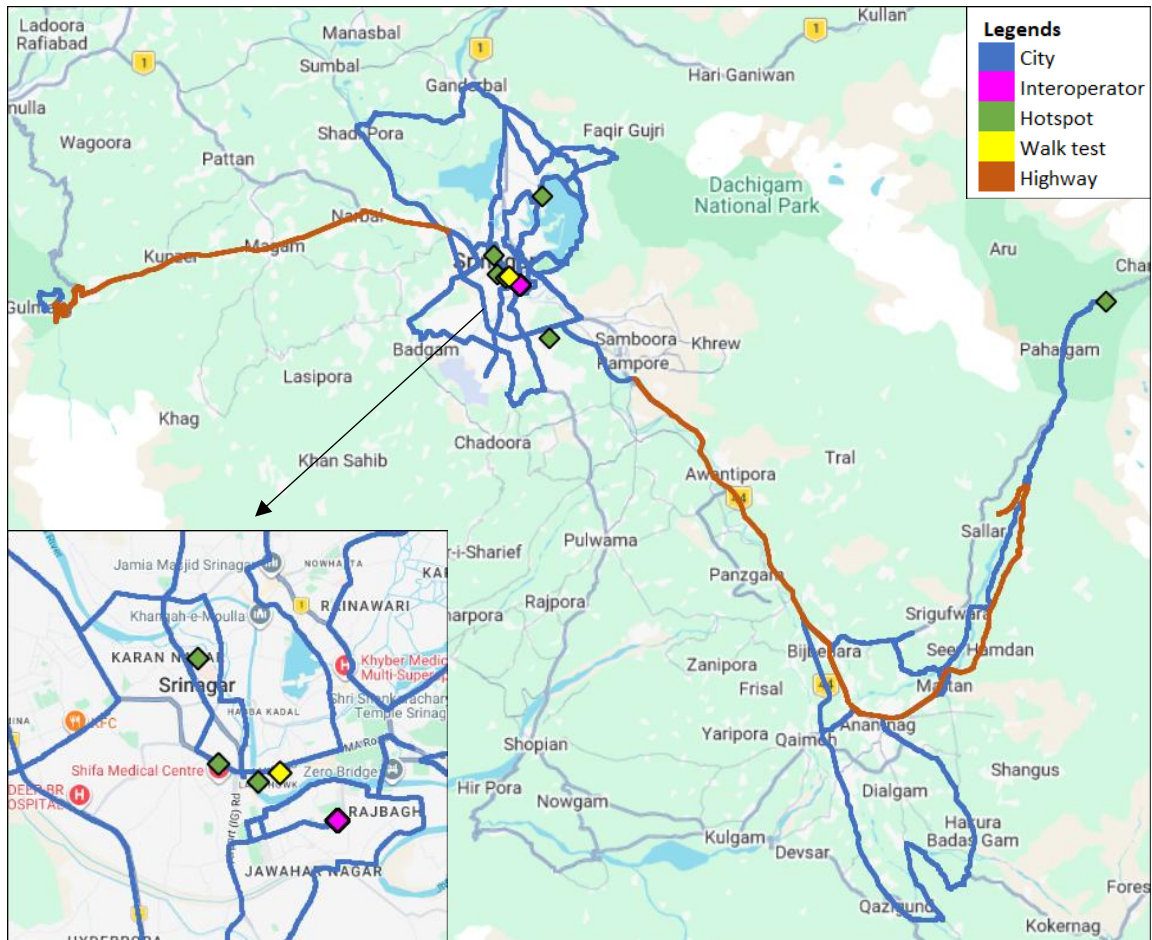


Figure-1: Drive test routes

2.3 Summary of areas covered

a) City

Srinagar & Gulmarg – Srinagar, Rajbagh, Nowgam, Chanpora, Hyderpora, Ranbirgarh, Shadi Pora, Dab Sadat, Seh Pora, Ganderbal, Rangil, New Theed, Dani Hama, Rainawari, Soura, Hardu Aboora and Gulmarg etc.

Anantnag & Pahalgam – Anantnag, Hakura Badas Gam, Qazigund, Qaimoh, Bijbehara, Mattan, Seer Hamdan, Srigufwara, Sallar and Pahalgam etc.

b) Hotspot

1. Accounts General Office
2. Betaab Valley View Point
3. Hari Singh High St.
4. SMHS Hospital
5. Srinagar Railway Station
6. University of Kashmir Srinagar

c) Walk test

1. Lal Chowk to Ghanta Ghar

d) Highway

Srinagar to Pahalgam – Pampore, Lethipora, Barsoo, Awantipora, Chersoo Awantipora, Bijbehara, Mattan, Seer Hamdan, Aishmuqam and Yanier etc.

Srinagar to Gulmarg – Narbal, Kawoosa Khalisa, Magam, Kunzer, Cahandilora, Tungmarg and Gulmarg etc.

2.4 Telecom service providers detected frequency bands

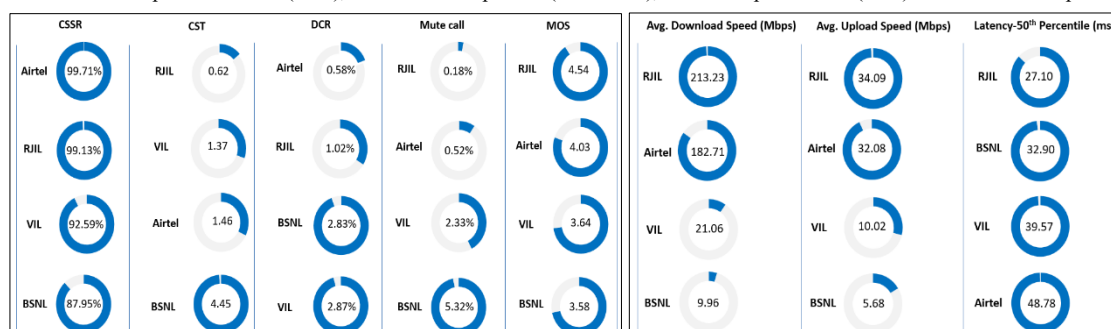
Technologies covered during the IDT and frequency bands in use are summarised in table below:

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

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

2.5 Performance against key QoS parameters

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



Summary-Voice services

Call Setup Success Rate: Airtel, BSNL, RJIL and VIL have 99.71%, 87.95%, 99.13% and 92.59% call setup success rate respectively in Auto-selection mode (5G/4G/3G/2G).

Call Setup Time: Airtel, BSNL, RJIL and VIL have call setup time of 1.46, 4.45, 0.62 and 1.37 seconds respectively in Auto-selection mode (5G/4G/3G/2G).

Drop Call Rate: Airtel, BSNL, RJIL and VIL have drop call rate of 0.58%, 2.83%, 1.02% and 2.87% respectively in Auto-selection mode (5G/4G/3G/2G).

Call Silence/Mute Rate: Airtel, BSNL, RJIL and VIL have silence call rate of 0.52%, 5.32%, 0.18% and 2.33% respectively in packet switched network (4G/5G).

Mean Opinion Score (MOS): Airtel, BSNL, RJIL and VIL have average MOS of 4.03, 3.58, 4.54 and 3.64 respectively.

Summary-Data services

Data Download performance (Overall): Average download speed of Airtel (5G/4G) is 182.71 Mbps, BSNL (4G/3G/2G) is 9.96 Mbps, RJIL (5G/4G) is 213.23 Mbps and VIL (4G/2G) is 21.06 Mbps.

Data Upload performance (Overall): Average upload speed of Airtel (5G/4G) is 32.08 Mbps, BSNL (4G/3G/2G) is 5.68 Mbps, RJIL (5G/4G) is 34.09 Mbps and VIL (4G/2G) is 10.02 Mbps.

Latency (Overall): Airtel, BSNL, RJIL and VIL 50th percentile latency is 48.78 ms, 32.90 ms, 27.10 ms, 39.57 ms respectively.

Data performance - Hotspots (in Mbps):

Airtel- 4G D/L: 14.08 4G U/L: 6.45
 5G D/L: 125.67 5G U/L: 32.26
 BSNL- 4G D/L: 11.53 4G U/L: 7.64
 RJIL- 4G D/L: 45.28 4G U/L: 7.34
 5G D/L: 91.90 5G U/L: 29.59
 VIL- 4G D/L: 23.88 4G U/L: 13.83

Note- "D/L" Download speed, "U/L" Upload speed

- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **voice** testing has been observed in 0.48%, 3.45%, 0.44% & 11.36% of the **Srinagar and Gulmarg City IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 99 to 102** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **data** testing has been observed in 4.48%, 8.20%, 4.27% & 12.90% of the **Srinagar and Gulmarg City IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 103 to 106** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **voice** testing has been observed in 1.26%, 19.37%, 2.04% & 44.44% of the **Anantnag and Pahalgam City IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 110 to 113** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **data** testing has been observed in 12.75%, 44.12%, 10.53% & 42.93% of the **Anantnag and Pahalgam City IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 114 to 117** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **voice** testing has been observed in 1.06%, 24.27%, 1.74% & 32.13% of the **Srinagar to Pahalgam Highway IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 121 to 124** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **data** testing has been observed in 12.46%, 15.82%, 9.98% & 25.15% of the **Srinagar to Pahalgam Highway IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 125 to 128** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **voice** testing has been observed in 7.67%, 34.12%, 10.67% & 50.77% of the **Srinagar to Gulmarg Highway IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 132 to 135** as per the **Section 6.1** under Para-6 (Annexure)}
- The Poor signal strength in auto-selection mode (5G/4G/3G/2G) during **data** testing has been observed in 17.30%, 34.45%, 13.81% & 53.21% of the **Srinagar to Gulmarg Highway IDT route** in case of Airtel, BSNL, RJIL and VIL respectively. {refer **figure- 136 to 139** as per the **Section 6.1** under Para-6 (Annexure)}

QoS Performance Analysis- Jammu & Kashmir 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 Jammu & Kashmir LSA during the month of June-2026 covering city drive, hotspots, walk test 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	BSNL	VIL
Call Attempts	571	600	591
Call Setup Success Rate %	98.42	94.00	94.75
Drop Call Rate %	0.89	8.87	1.79
Call Setup Time-Average (Second)	3.02	5.69	3.27
Handover Success Rate %	99.69	94.40	97.29

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

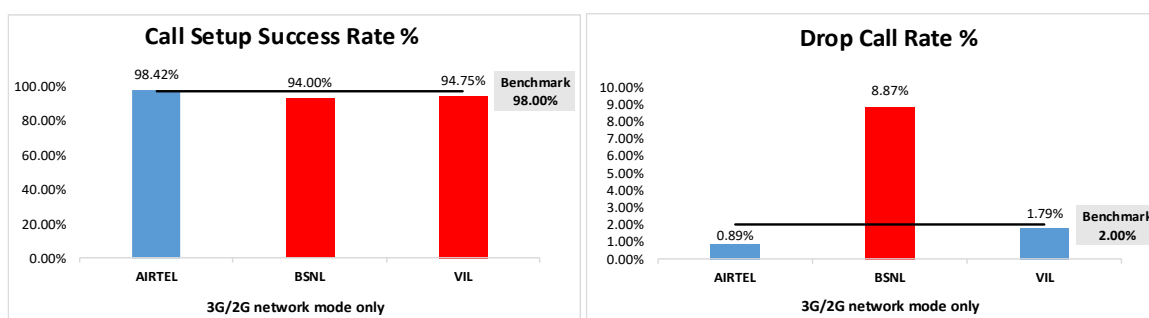


Figure-2: Call setup success rate and drop call rate performance.

Number of unique cell Id's covered in Voice test- Technology wise			
Technology	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
3G	NA	170	NA
2G	920	158	514

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

Note-

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

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	686	722	690	715
Call Setup Success Rate %	99.71	87.95	99.13	92.59
Drop Call Rate %	0.58	2.83	1.02	2.87
Call Setup Time-Average (Second)	1.46	4.45	0.62	1.37
Handover Success Rate %	99.89	99.85	99.92	99.55

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

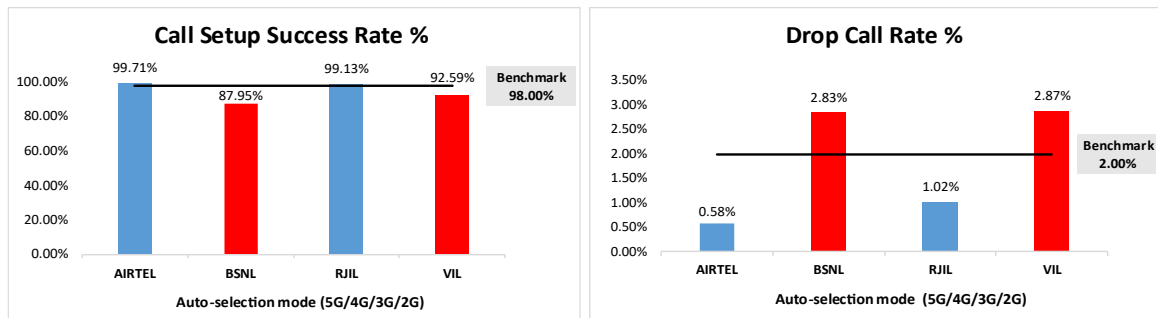


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	572	526	563	514
Number of silences call for >4 Sec	3	28	1	12
Silence Call Rate %	0.52	5.32	0.18	2.33
Number of silence instances for >4 Sec	5	35	1	15
Number of silence instances for >3 Sec	5	72	4	21
Number of silence instances for >2 sec	9	162	13	32
RTP Jitter (4G & 5G) in ms	3.48	5.77	17.04	17.24
Packet loss Rate Downlink %	0.38	4.99	0.64	1.66
Packet loss Rate Uplink %	0.37	3.72	0.58	1.64

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

Number of unique cell Id's covered in Voice test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
5G	0	NA	877	NA
4G	1523	640	537	455
3G	NA	25	NA	NA
2G	1	50	NA	125

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

Note-

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

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

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

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls table-6	3777	3179	3691	3264
Speech Quality (Average MOS)	4.03	3.58	4.54	3.64
Number of samples with MOS ≥ 4 to < 5 (Excellent)	3284	1916	3319	1687
Number of samples with MOS ≥ 3 to < 4 (Good)	420	525	255	992
Number of samples with MOS ≥ 2 to < 3 (Fair)	38	333	58	321
Number of samples with MOS ≥ 1 to < 2 (Poor)	35	405	59	264
%age of samples with MOS ≥ 4 to < 5 (Excellent)	86.95%	60.27%	89.92%	51.69%
%age of samples with MOS ≥ 3 to < 4 (Good)	11.12%	16.51%	6.91%	30.39%
%age of samples with MOS ≥ 2 to < 3 (Fair)	1.01%	10.47%	1.57%	9.83%
%age of samples with MOS ≥ 1 to < 2 (Poor)	0.93%	12.74%	1.60%	8.09%

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

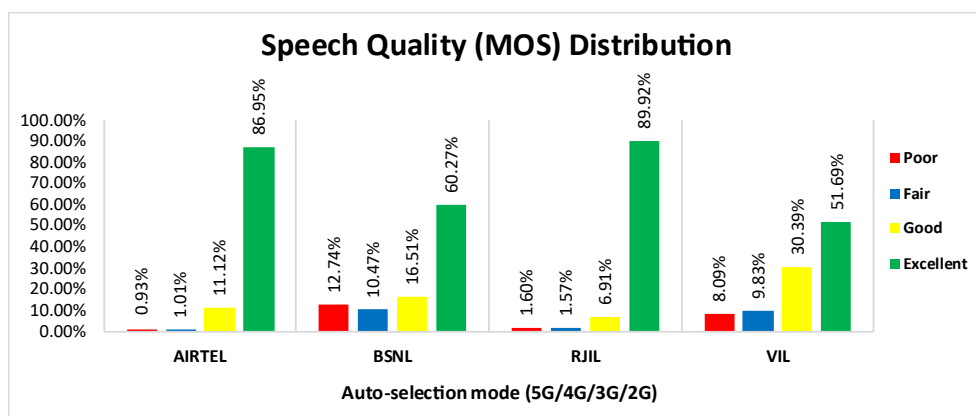


Figure- 4: Distribution of samples in MOS range.

(d) Inter-service provider voice call performance: To check the performance of inter-service providers call setup success rate, total 11 to 14 inter operator calls were attempted at one location which is Police Station Rajbagh Srinagar. The call setup success rate and call setup time observation is as below.

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

Table-9: Call setup success rate across service providers

Note-

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

Call setup time average (seconds)				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	5.39	1.63	2.76
BSNL	4.92	NA	6.43	4.79
RJIL	2.12	3.97	NA	1.75
VIL	2.23	2.41	1.62	NA

Table-10: Call setup time across service providers.

Note-

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

3.3 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	182.71	9.96	213.23	21.06
	80th Percentile	268.80	13.99	375.04	32.02
	20th Percentile	69.67	3.71	79.60	7.77
Upload Throughput (Mbits/s)	Average	32.08	5.68	34.09	10.02
	80th Percentile	56.03	8.96	59.23	17.97
	20th Percentile	7.63	1.50	8.34	2.02
Latency (ms)	50th Percentile	48.78	32.90	27.10	39.57

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

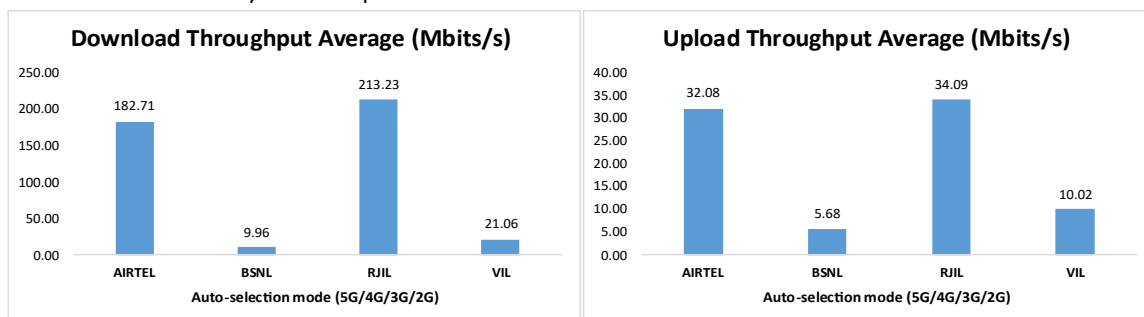


Figure- 5: Download and Upload throughput.

Number of unique cell Id's covered in Data test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
5G	0	NA	915	NA
4G	1481	583	228	474
3G	NA	82	NA	NA
2G	0	29	NA	130

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, walktest and highway for all telecom service providers, the results of drive tests conducted are shown individually for respective areas/locations.

4.2 City

Drive test has been conducted from 8th June 2026 to 12th June 2026 in Srinagar, Gulmarg, Anantnag and Pahalgam city. (Refer Table-1)

4.2.1 Srinagar & Gulmarg City

4.2.1.1 Drive test route

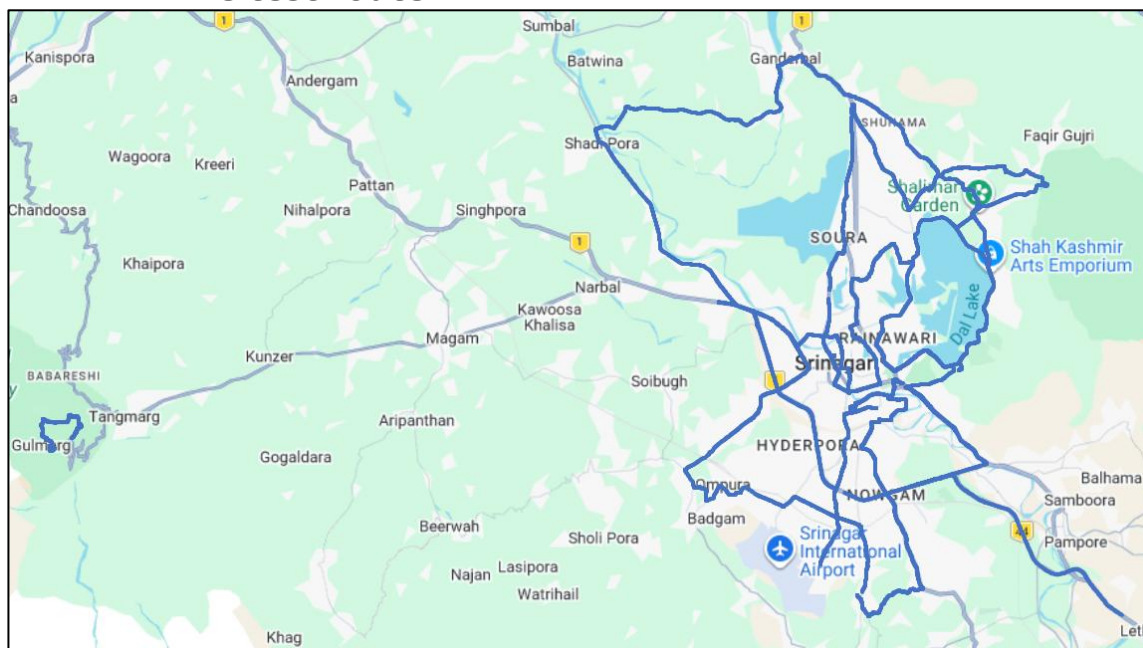


Figure- 6: Drive test routes

4.2.1.2 Areas covered

Srinagar, Rajbagh, Nowgam, Chanpora, Hyderpora, Ranbirgarh, Shadi Pora, Dab Sadat, Seh Pora, Ganderbal, Rangil, New Theed, Dani Hama, Rainawari, Soura, Hardu Aboora and Gulmarg etc.

4.2.1.3 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	348	362	351
Call Setup Success Rate %	100.00	96.96	99.72
Drop Call Rate %	0.86	8.55	0.29
Call Setup Time-Average (Second)	3.05	5.69	3.06
Handover Success Rate %	99.45	93.94	96.51

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

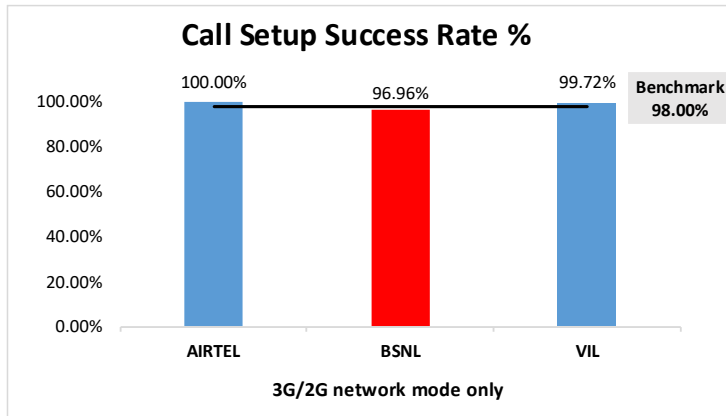


Figure-7: Performance for call setup success rate.

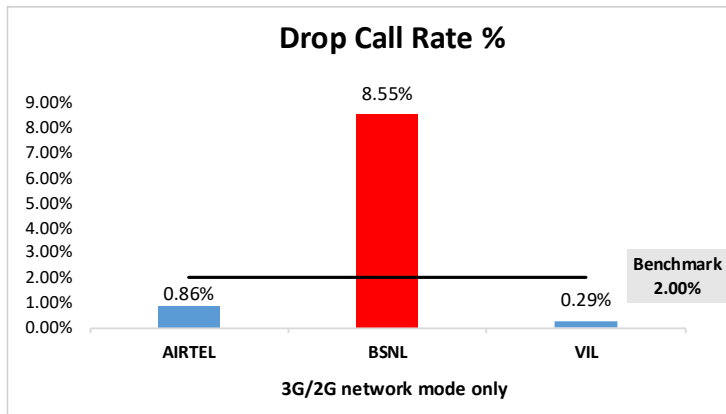


Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	63.92%	NA
2G	99.97%	36.05%	99.97%
Limited Service	0.03%	0.03%	0.03%

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

Note-

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

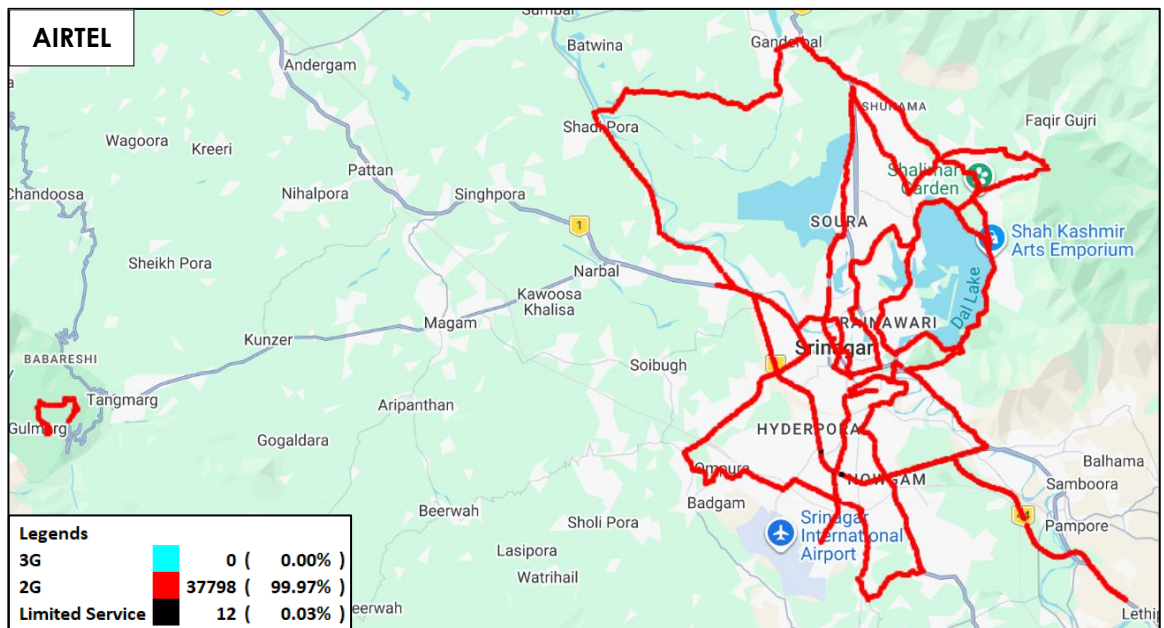


Figure-9: Serving technology plots 3G/2G network mode - AIRTEL

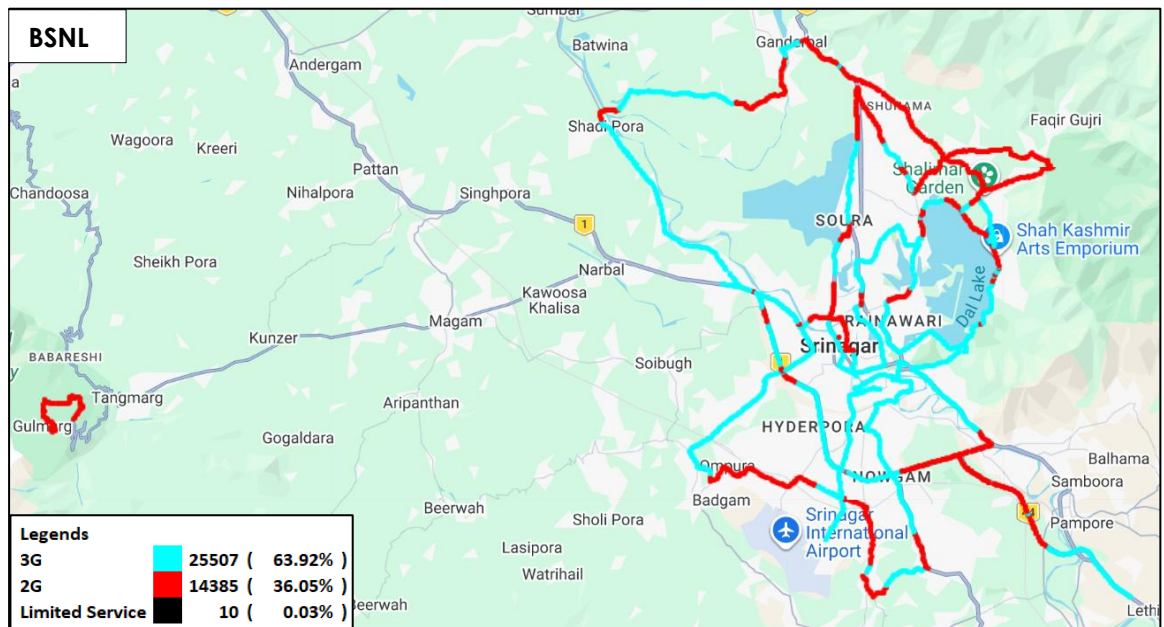


Figure-10: Serving technology plots 3G/2G network mode - BSNL.

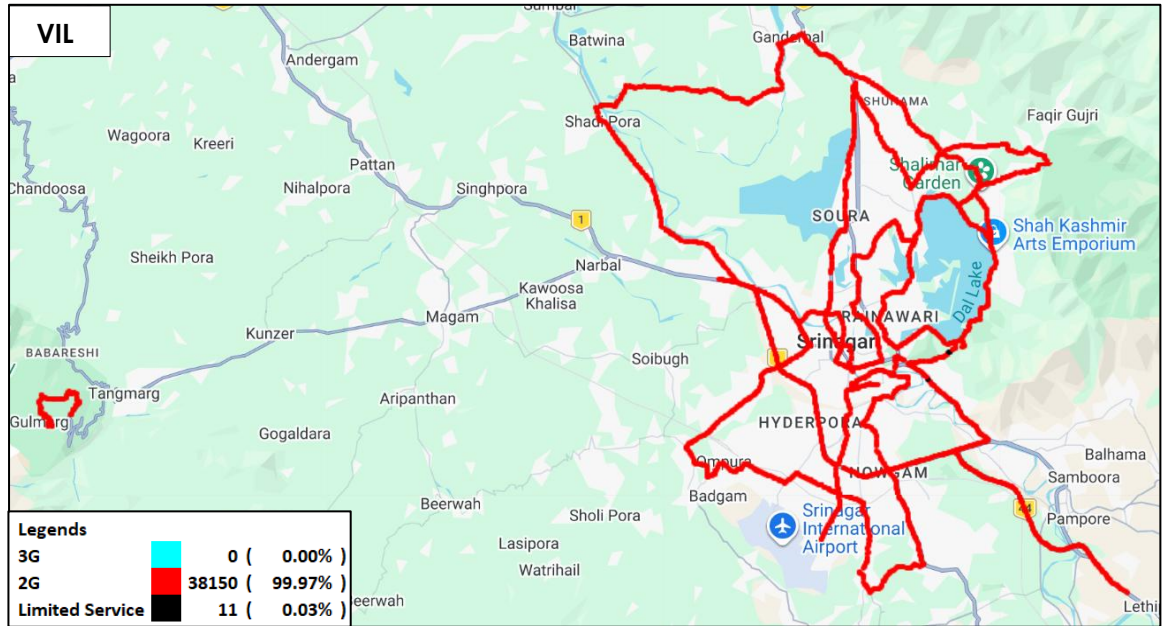


Figure-11: Serving technology plots 3G/2G network mode - VIL.

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

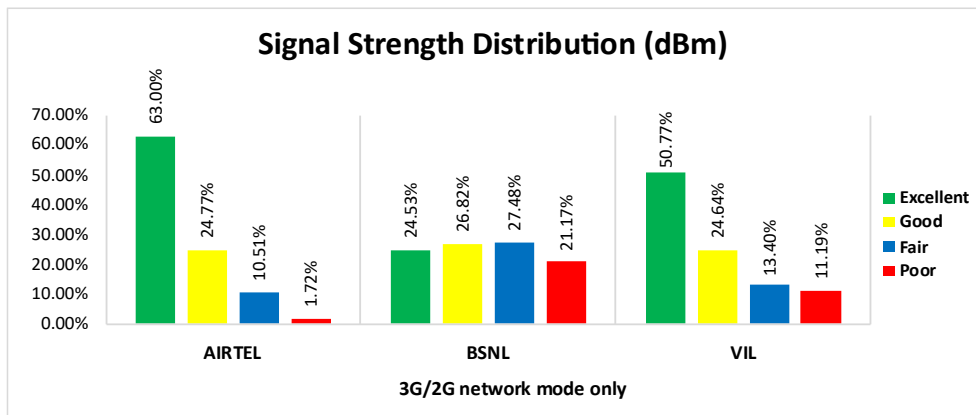


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 63% of samples falling in the excellent signal strength category.
- BSNL has 25% of samples falling in the excellent signal strength category.
- VIL has 51% of samples falling in the excellent signal strength category.

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	362	380	361	366
Call Setup Success Rate %	100.00	89.47	100.00	98.36
Drop Call Rate %	0.00	2.06	0.00	0.83
Call Setup Time Average (Second)	1.45	4.37	0.57	0.87
Handover Success Rate %	100.00	100.00	100.00	99.82

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

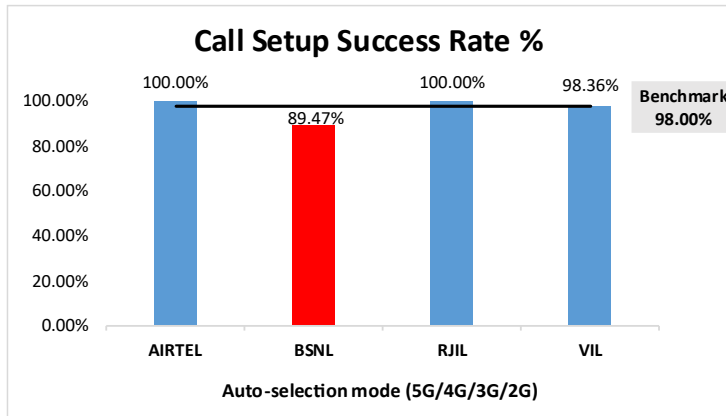


Figure-13: Performance for call setup success rate.

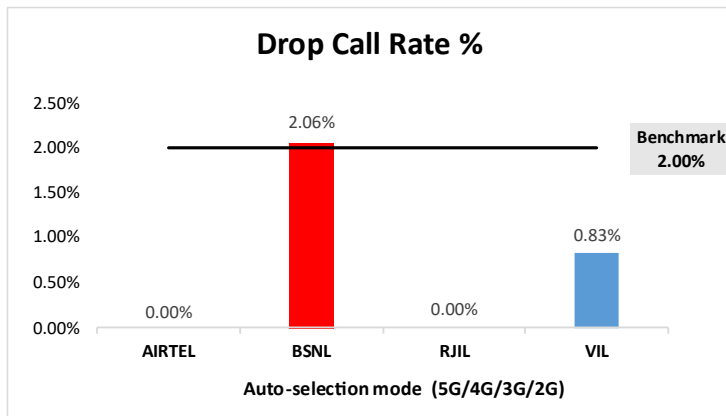


Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	352	332	348	344
Number of silences call for >4 Sec	0	13	0	7
Silence Call Rate %	0.00	3.92	0.00	2.03
Number of silence instances for >4 Sec	0	15	0	9
Number of silence instances for >3 Sec	0	39	2	9
Number of silence instances for >2 sec	3	96	5	11
RTP Jitter (4G & 5G) in ms	3.43	6.71	18.15	17.04
Packet loss Rate Downlink %	0.23	3.43	0.45	0.96
Packet loss Rate Uplink %	0.24	3.79	0.45	1.03

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

(e) 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 value means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-16	2073	1787	2054	1961
Speech Quality (Average MOS)	4.04	3.70	4.54	3.91
Number of samples with MOS ≥ 4 to < 5 (Excellent)	1802	1219	1843	1198
Number of samples with MOS ≥ 3 to < 4 (Good)	235	211	148	652
Number of samples with MOS ≥ 2 to < 3 (Fair)	23	144	37	67
Number of samples with MOS ≥ 1 to < 2 (Poor)	13	213	26	44
%age of samples with MOS ≥ 4 to < 5 (Excellent)	86.93%	68.21%	89.73%	61.09%
%age of samples with MOS ≥ 3 to < 4 (Good)	11.34%	11.81%	7.21%	33.25%
%age of samples with MOS ≥ 2 to < 3 (Fair)	1.11%	8.06%	1.80%	3.42%
%age of samples with MOS ≥ 1 to < 2 (Poor)	0.63%	11.92%	1.27%	2.24%

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

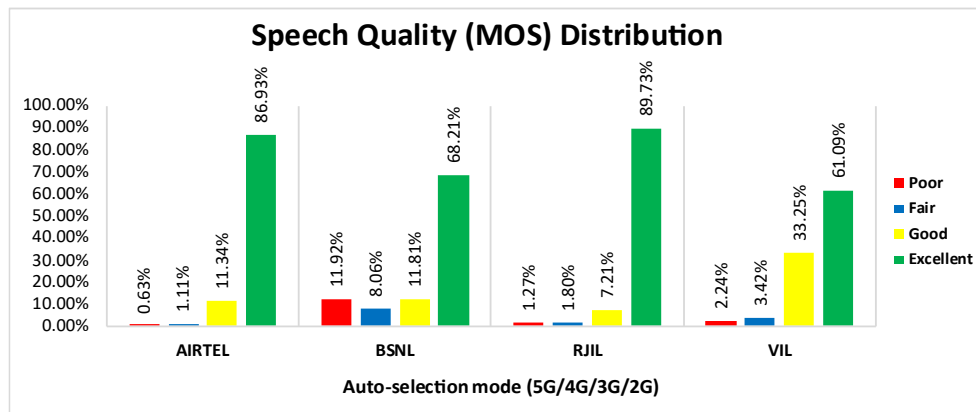


Figure-15: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	2.67%	NA	91.34%	NA
4G	97.33%	94.77%	8.66%	90.89%
3G	NA	1.99%	NA	NA
2G	0.00%	3.09%	NA	8.97%
Limited Service	0.00%	0.14%	0.00%	0.14%

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

Note-

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

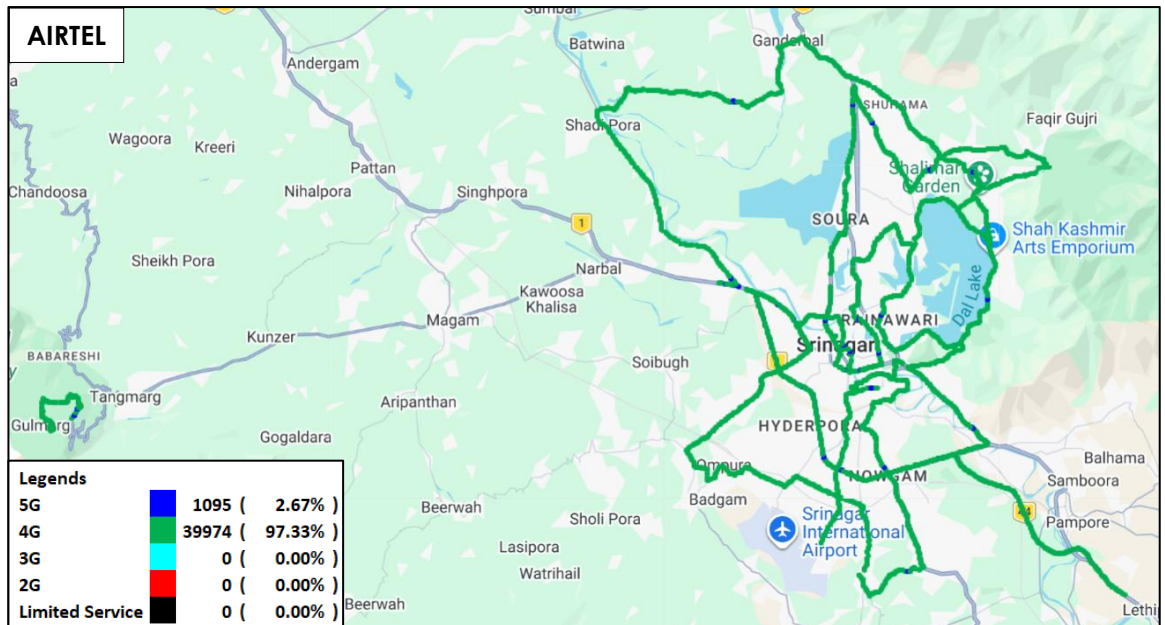


Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

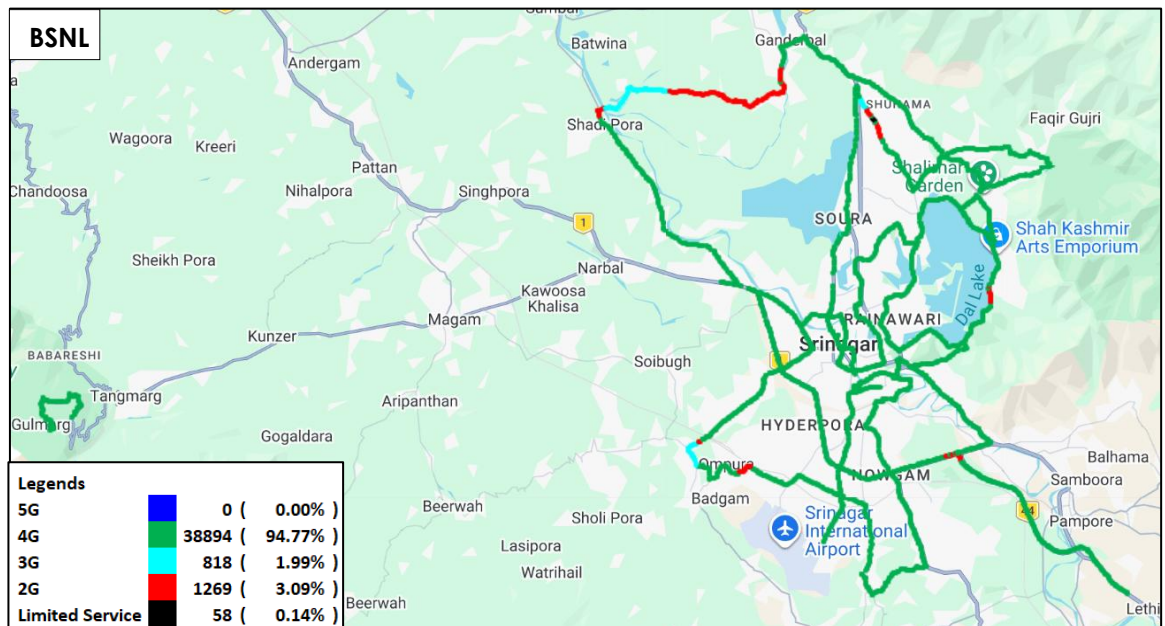


Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

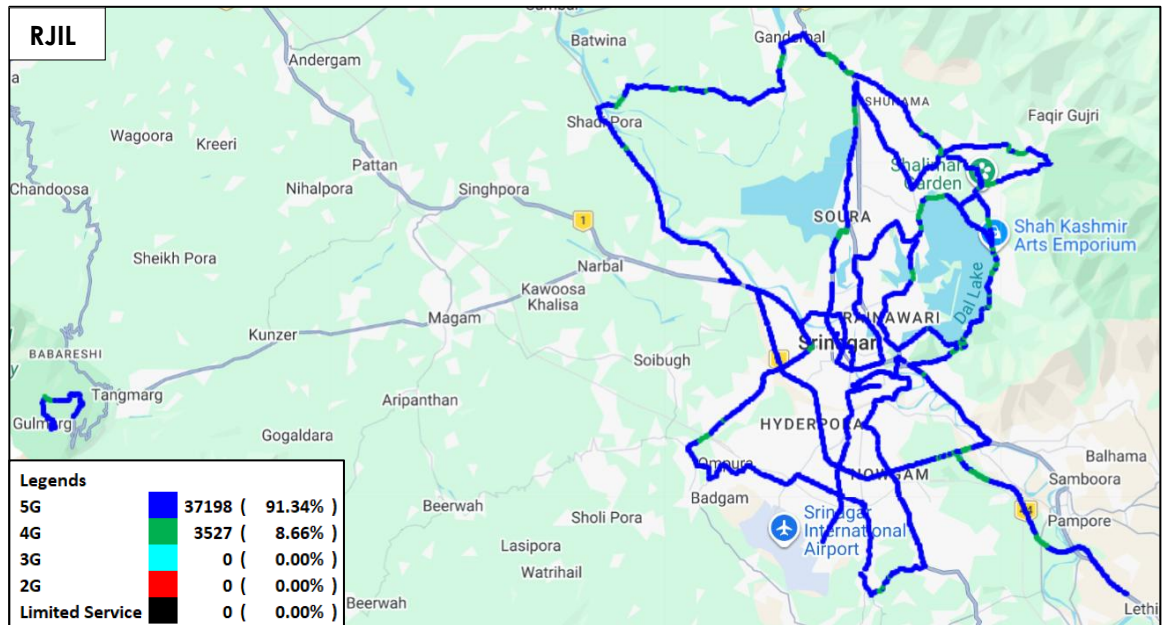


Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

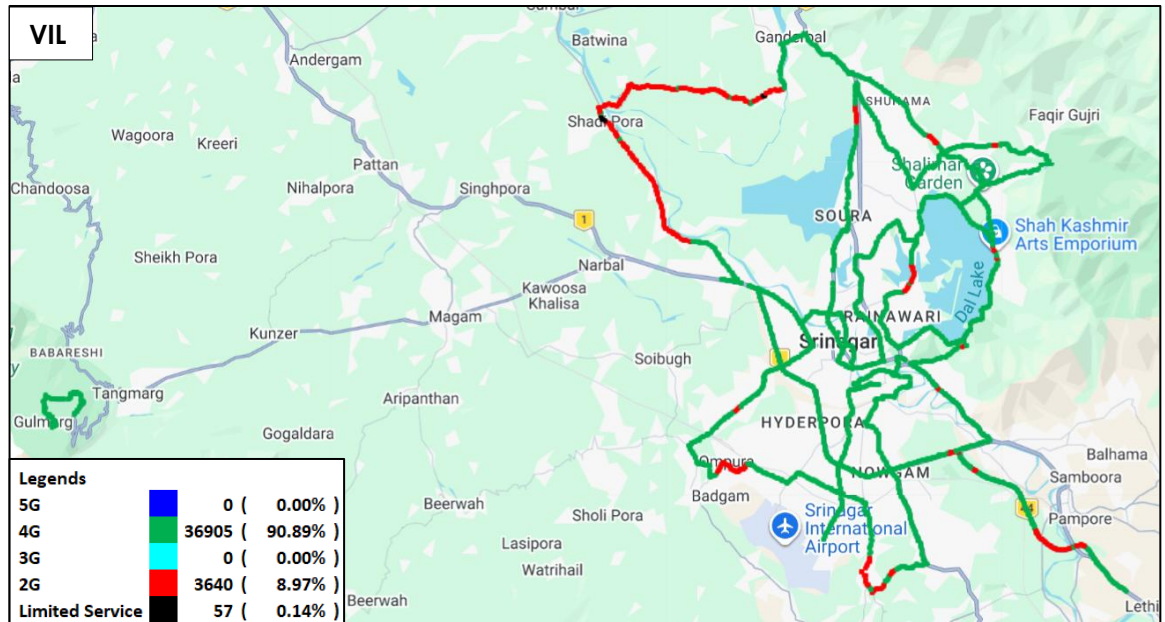


Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

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

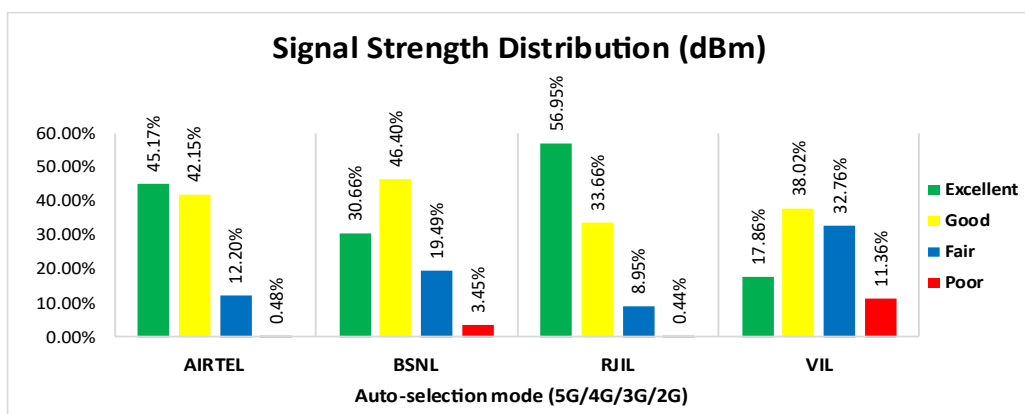


Figure-20: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 45% of samples falling in the excellent signal strength category.
- BSNL has 31% of samples falling in the excellent signal strength category.
- RJIL has 57% of samples falling in the excellent signal strength category.
- VIL has 18% of samples falling in the excellent signal strength category.

4.2.1.4 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	188.64	10.77	276.92	24.14
	80th Percentile	271.21	15.54	451.09	34.63
	20th Percentile	89.52	4.00	107.57	12.68
Upload Throughput (Mbits/s)	Average	33.69	6.34	35.90	10.79
	80th Percentile	57.61	10.20	60.98	17.73
	20th Percentile	8.54	1.79	9.63	3.73
Latency (ms)	50th Percentile	49.16	32.88	26.40	39.49

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

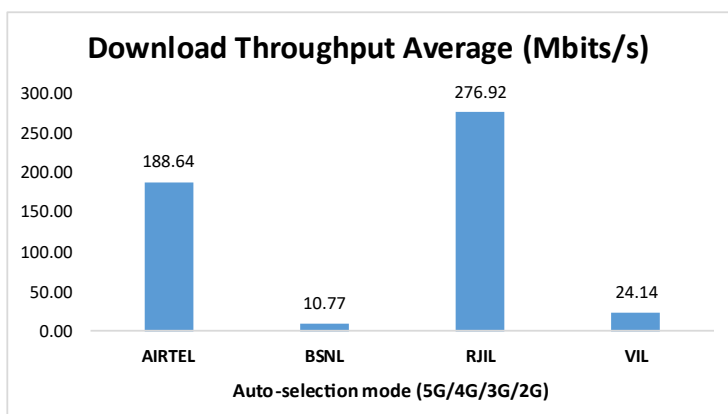


Figure- 21: Download throughput.

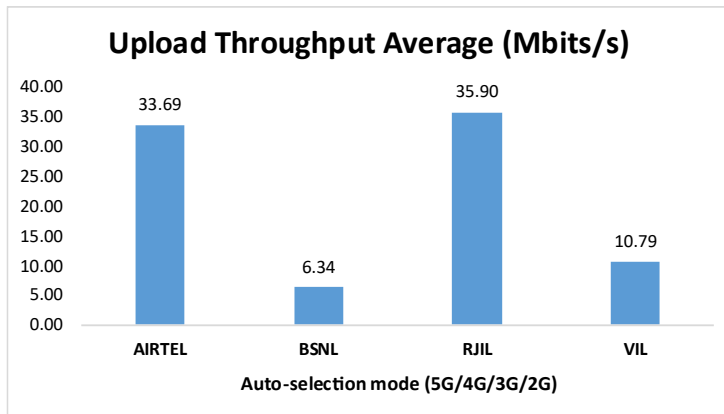


Figure- 22: Upload throughput.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	88.58%	NA	96.90%	NA
4G	11.42%	89.42%	3.10%	87.81%
3G	NA	9.79%	NA	NA
2G	0.00%	0.65%	NA	11.12%
Limited Service	0.00%	0.14%	0.00%	1.07%

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

Note-

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

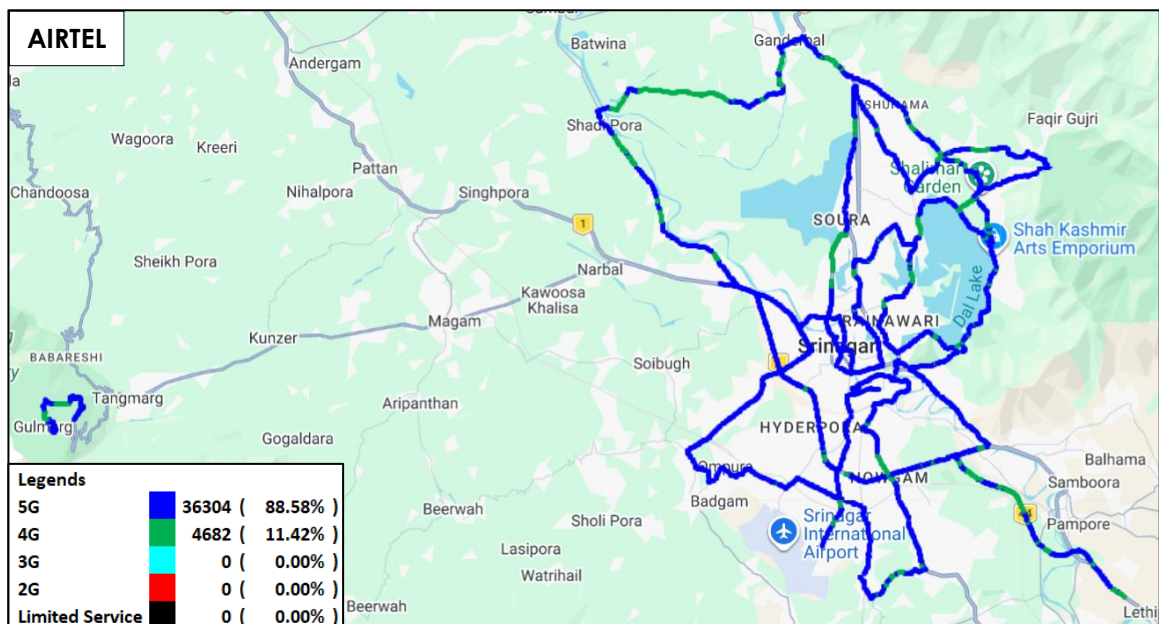


Figure-23: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

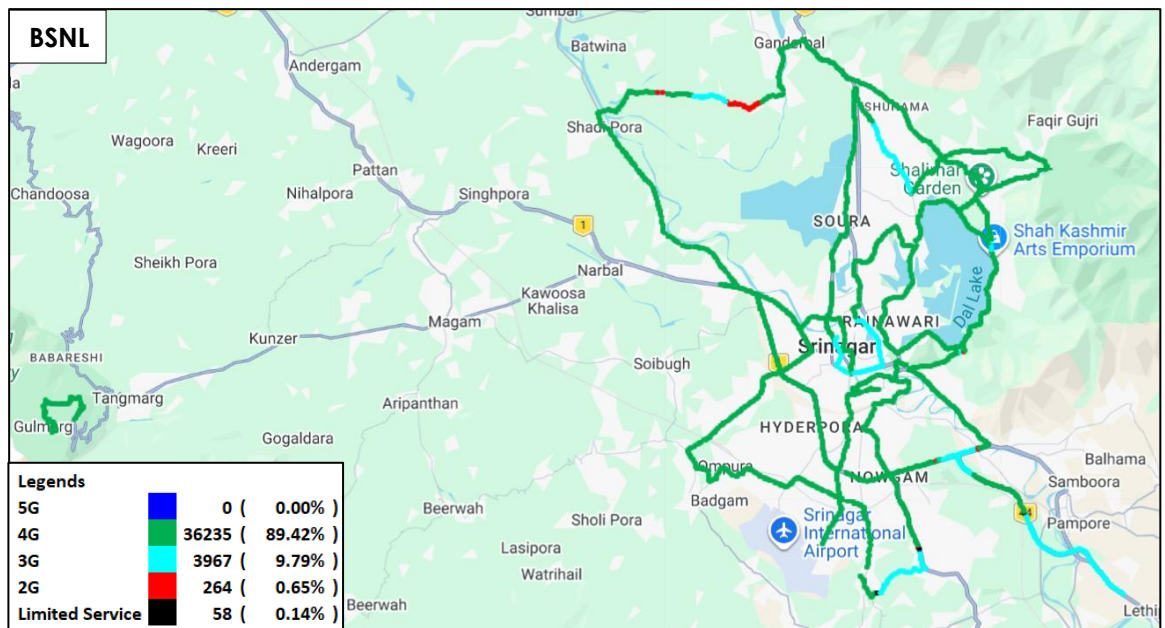


Figure-24: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - BSNL.

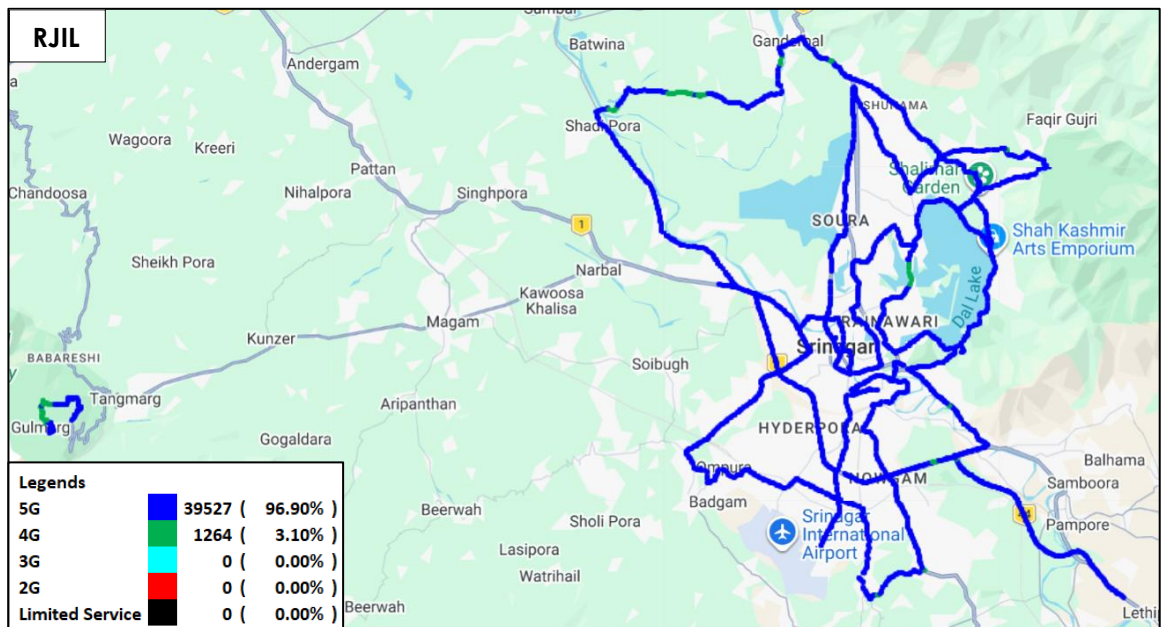


Figure-25: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

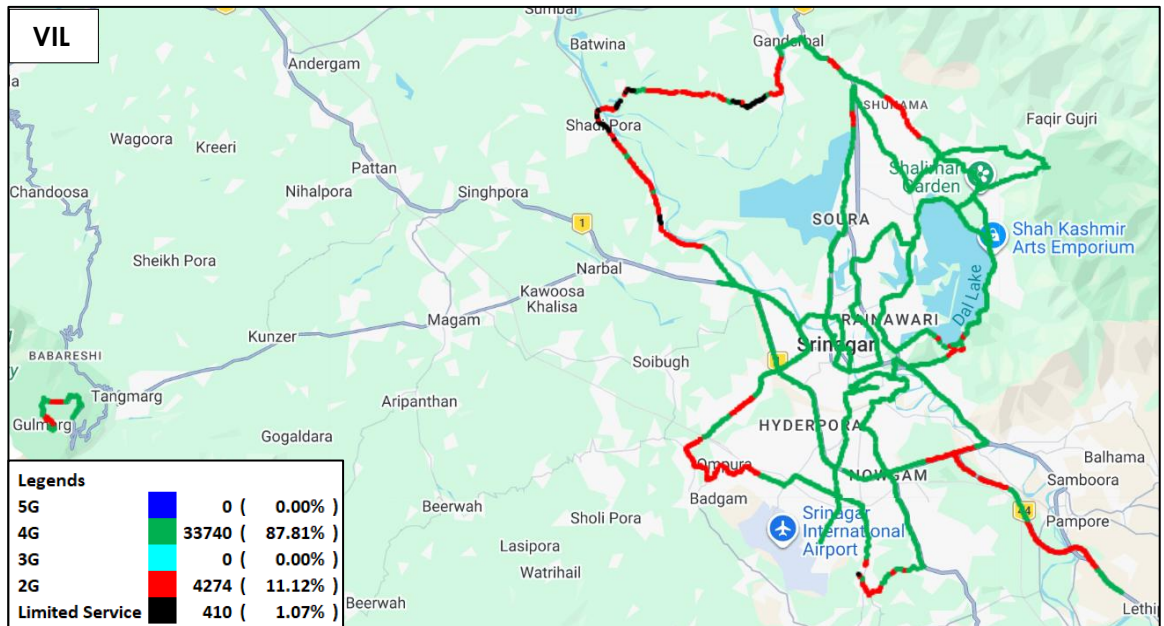


Figure-26: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

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

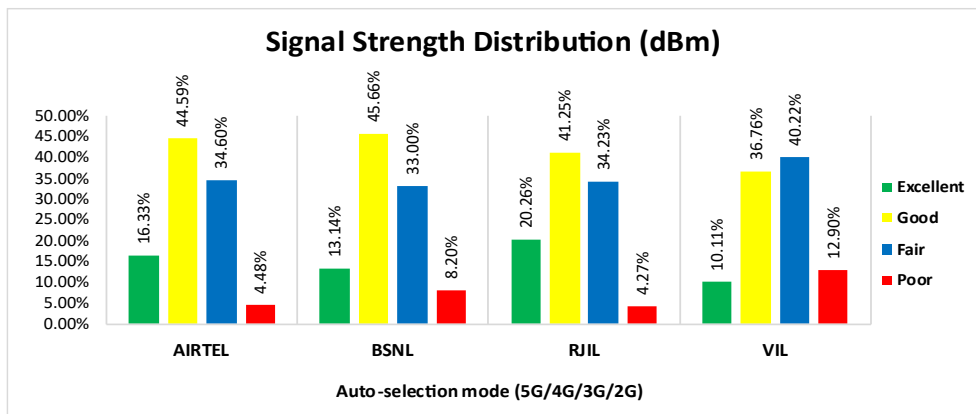


Figure-27: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 16% of samples falling in the excellent signal strength category.
- BSNL has 13% of samples falling in the excellent signal strength category.
- RJIL has 20% of samples falling in the excellent signal strength category.
- VIL has 10% of samples falling in the excellent signal strength category.

4.2.2 Anantnag & Pahalgam City

4.2.2.1 Drive test route

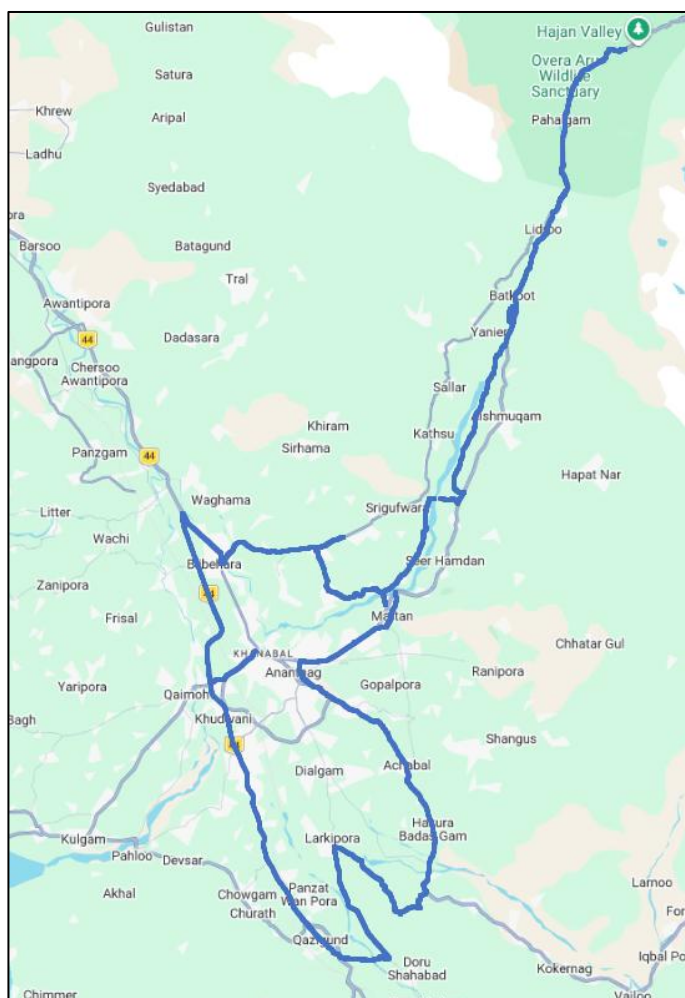


Figure- 28: Drive test routes

4.2.2.2 Areas covered

Anantnag, Hakura Badas Gam, Qazigund, Qaimoh, Bijbehara, Mattan, Seer Hamdan, Srigufwara, Sallar and Pahalgam etc.

4.2.2.3 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	155	167	161
Call Setup Success Rate %	100.00	89.82	92.55
Drop Call Rate %	1.29	9.33	2.68
Call Setup Time-Average (Second)	2.94	5.69	3.82
Handover Success Rate %	100.00	92.80	100.00

Table-21: Summary of voice call performance in 3G/2G network mode only.

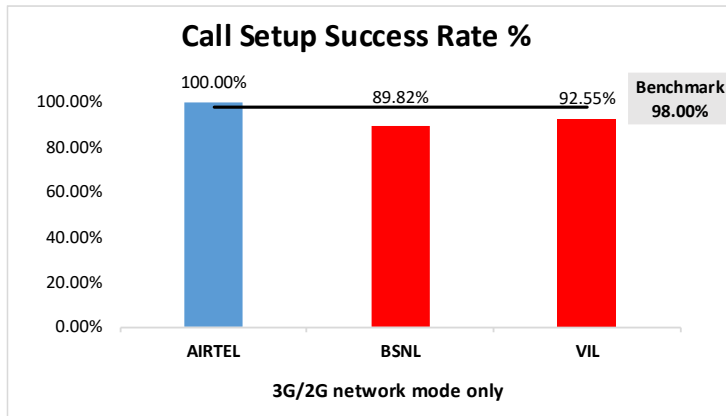


Figure-29: Performance for call setup success rate.

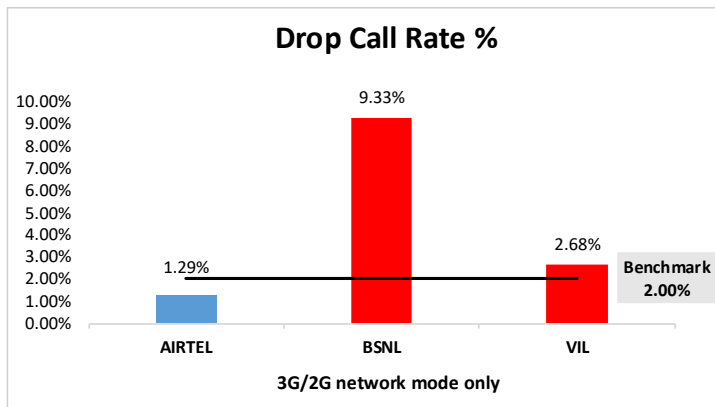


Figure-30: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	66.40%	NA
2G	99.95%	32.40%	98.93%
Limited Service	0.05%	1.20%	1.07%

Table-22: Time spent on technology during drive test 3G/2G network mode.

Note-

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

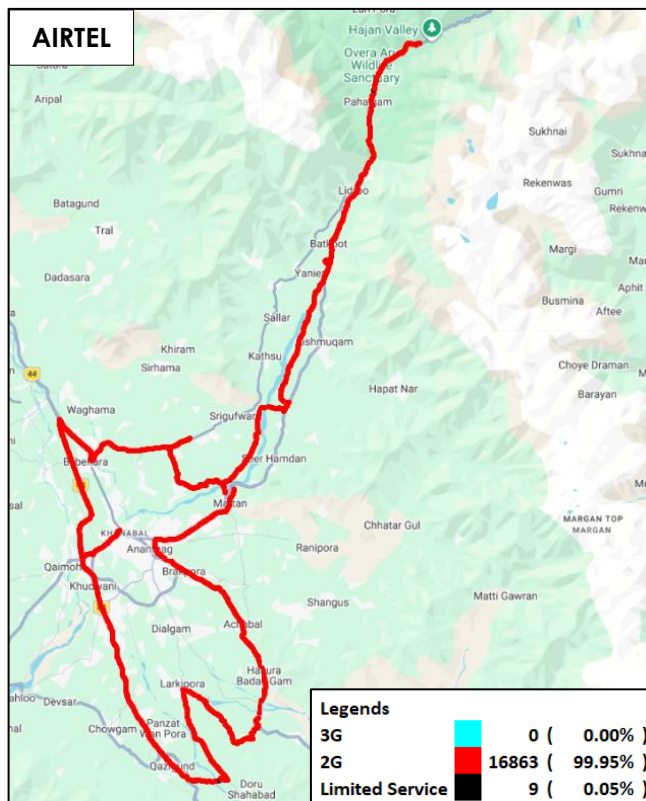


Figure-31: Serving technology plots 3G/2G network mode - AIRTEL.

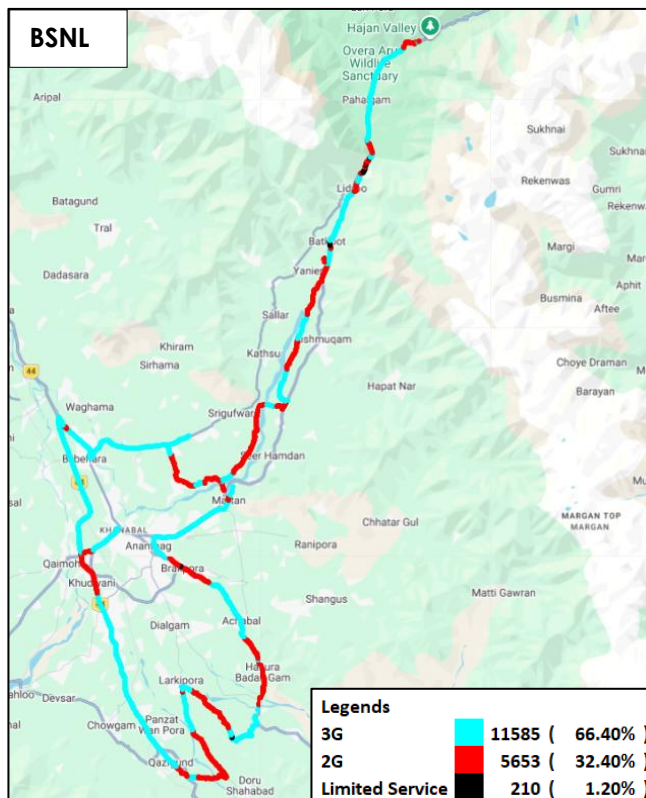


Figure-32: Serving technology plots 3G/2G network mode - BSNL.

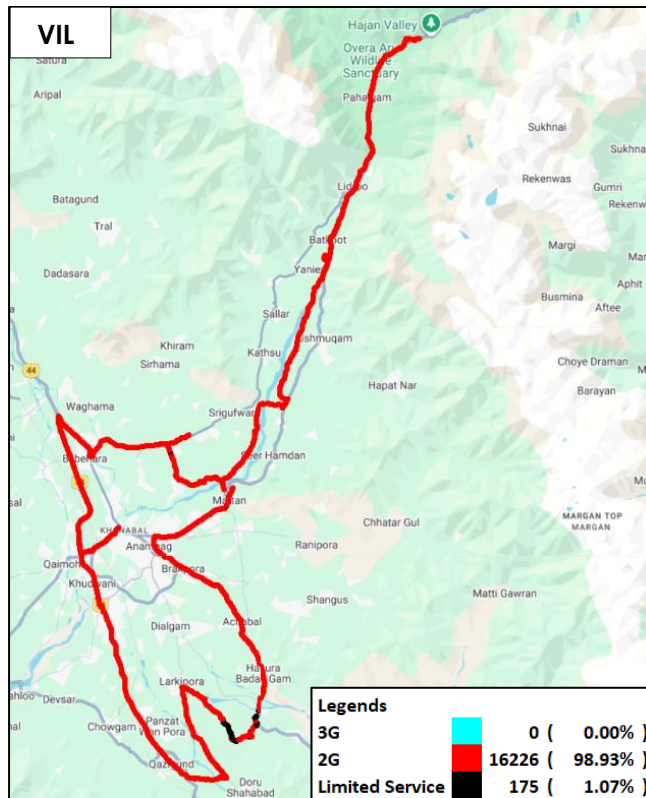


Figure-33: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 107, 108 & 109 for map view)

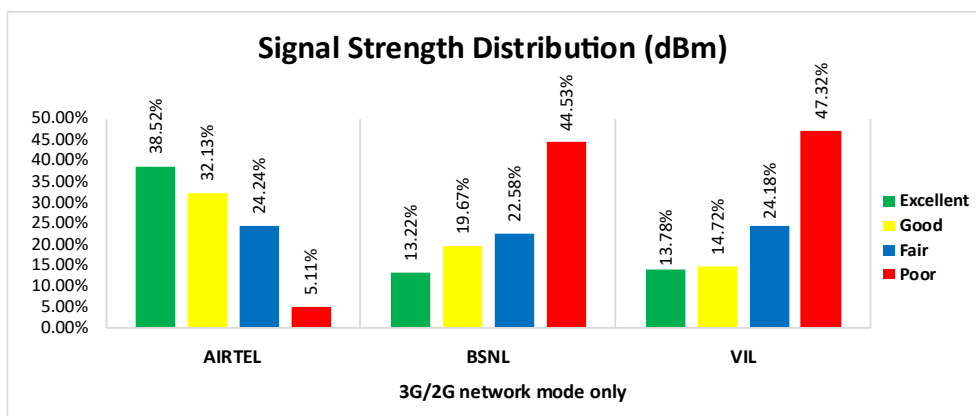


Figure-34: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 39% of samples falling in the excellent signal strength category.
- BSNL has 13% of samples falling in the excellent signal strength category.
- VIL has 14% of samples falling in the excellent signal strength category.

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	161	173	161	172
Call Setup Success Rate %	100.00	82.08	100.00	84.30
Drop Call Rate %	0.00	2.82	0.00	3.45
Call Setup Time Average (Second)	1.46	4.83	0.63	2.53
Handover Success Rate %	99.88	99.38	99.89	97.60

Table-23: Summary of voice call performance in network auto-selection mode.

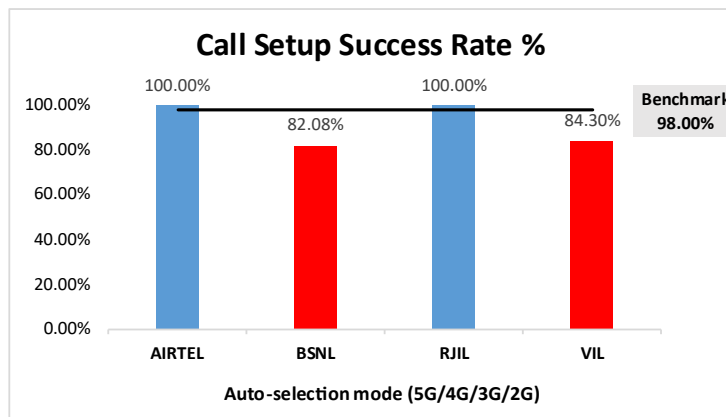


Figure-35: Performance for call setup success rate.

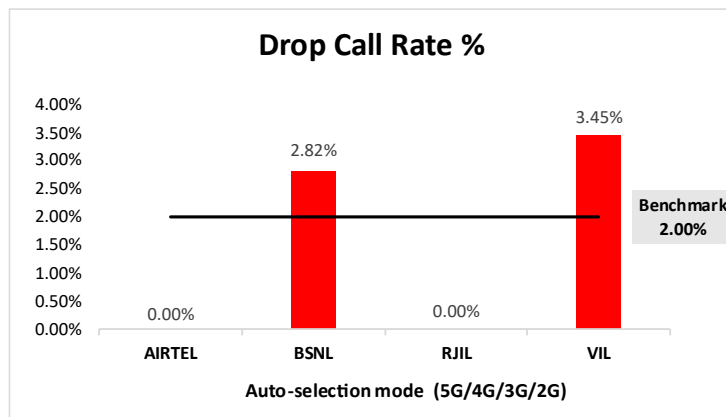


Figure-36: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	156	133	155	111
Number of silences call for >4 Sec	1	6	1	4
Silence Call Rate %	0.64	4.51	0.65	3.60
Number of silence instances for >4 Sec	1	9	1	5
Number of silence instances for >3 Sec	1	17	2	10
Number of silence instances for >2 sec	1	31	7	18
RTP Jitter (4G & 5G) in ms	3.55	3.68	15.26	17.91
Packet loss Rate Downlink %	0.25	7.71	0.55	3.90
Packet loss Rate Uplink %	0.39	2.53	0.61	3.35

Table-24: Summary of silence instances & packet loss rate for mobile to mobile call.

(e) 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 value means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-24	926	739	911	646
Speech Quality (Average MOS)	4.03	3.35	4.56	3.69
Number of samples with MOS >=4 to <5 (Excellent)	803	323	828	348
Number of samples with MOS >=3 to <4 (Good)	104	191	59	209
Number of samples with MOS >=2 to <3 (Fair)	10	120	11	32
Number of samples with MOS >=1 to <2 (Poor)	9	105	13	57
%age of samples with MOS >=4 to <5 (Excellent)	86.72%	43.71%	90.89%	53.87%
%age of samples with MOS >=3 to <4 (Good)	11.23%	25.85%	6.48%	32.35%
%age of samples with MOS >=2 to <3 (Fair)	1.08%	16.24%	1.21%	4.95%
%age of samples with MOS >=1 to <2 (Poor)	0.97%	14.21%	1.43%	8.82%

Table-25: Summary of speech quality (MOS) samples.

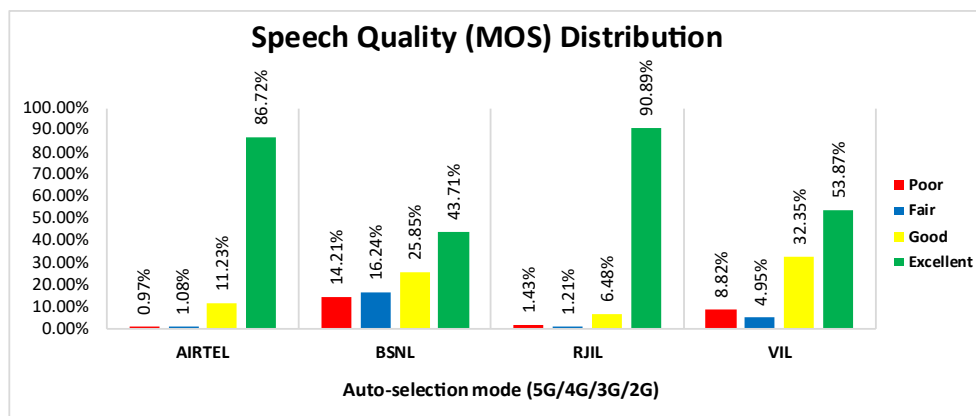


Figure-37: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	0.54%	NA	61.00%	NA
4G	99.46%	67.92%	39.00%	56.70%
3G	NA	22.56%	NA	NA
2G	0.00%	5.41%	NA	39.40%
Limited Service	0.00%	4.10%	0.00%	3.90%

Table-26:Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) voice.

Note-

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

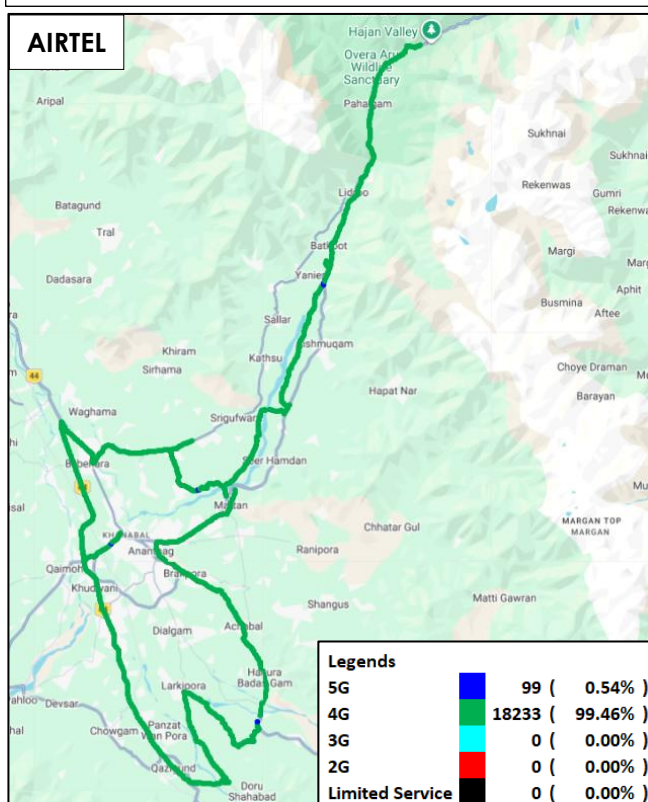


Figure-38: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

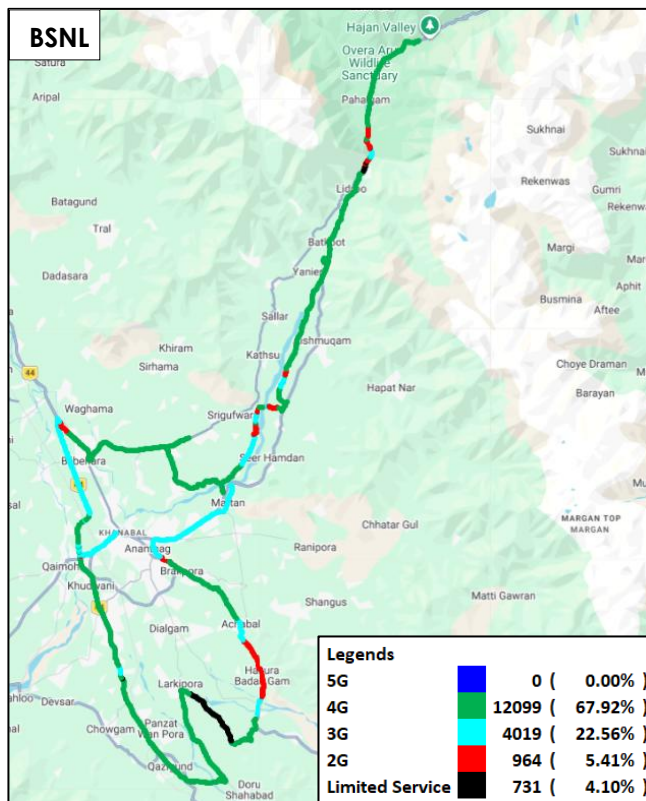


Figure-39: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

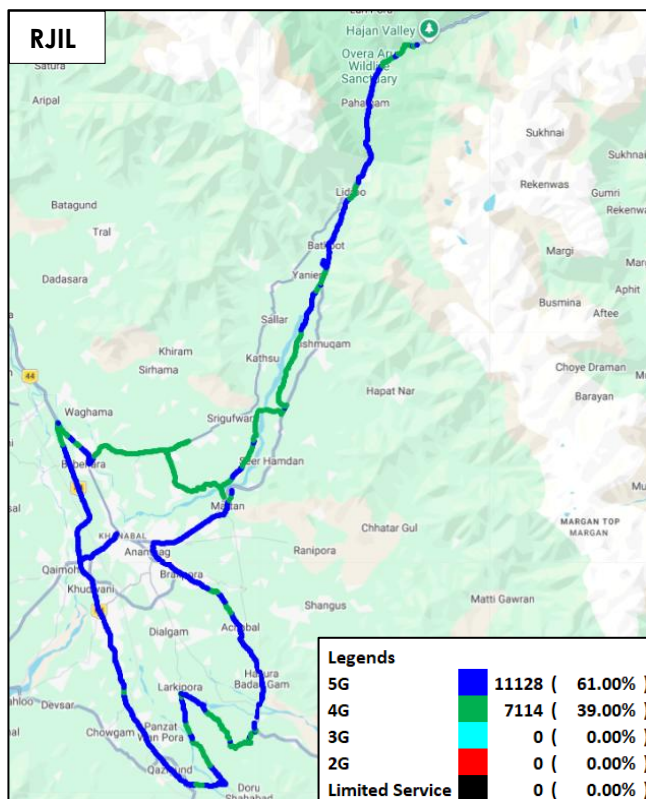


Figure-40: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

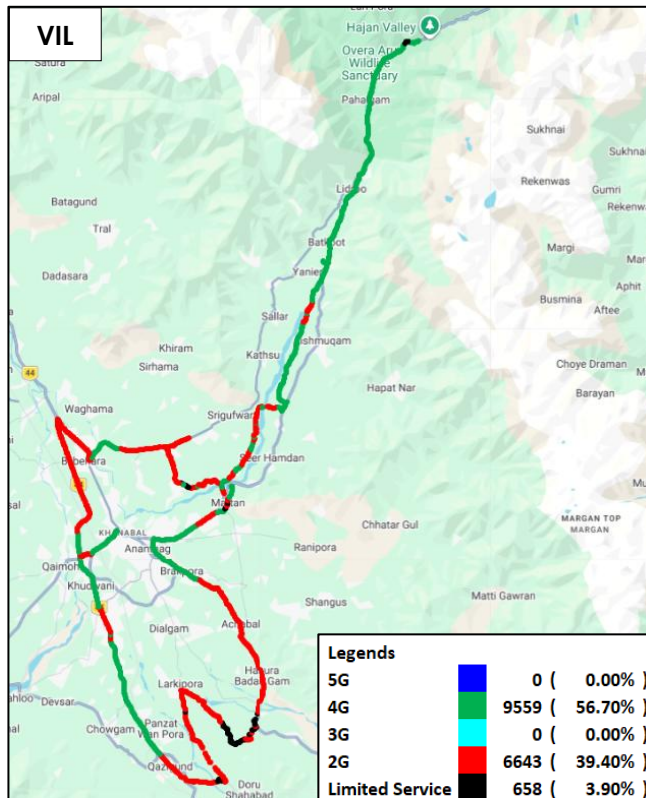


Figure-41: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-110, 111, 112 & 113 for map view)

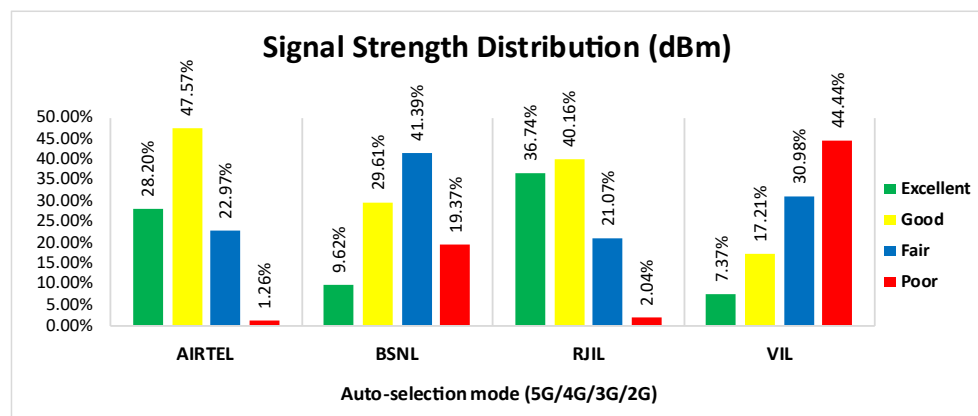


Figure-42: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 28% of samples falling in the excellent signal strength category.
- BSNL has 10% of samples falling in the excellent signal strength category.
- RJIL has 37% of samples falling in the excellent signal strength category.
- VIL has 7% of samples falling in the excellent signal strength category.

4.2.2.4 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	183.84	6.86	163.53	12.92
	80th Percentile	292.41	10.26	268.29	22.54
	20th Percentile	39.11	2.53	68.73	0.02
Upload Throughput (Mbits/s)	Average	24.43	2.91	24.98	5.79
	80th Percentile	40.63	4.26	48.58	9.71
	20th Percentile	4.23	0.77	4.31	0.08
Latency (ms)	50th Percentile	52.48	36.52	27.83	41.48

Table-27: Summary of Data performance in network auto-selection mode.

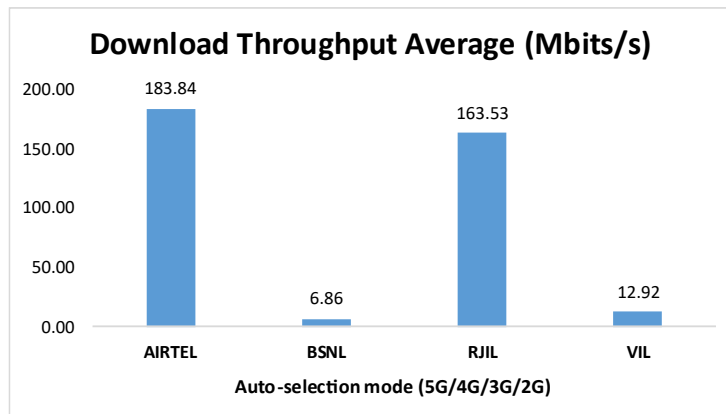


Figure- 43: Download throughput.

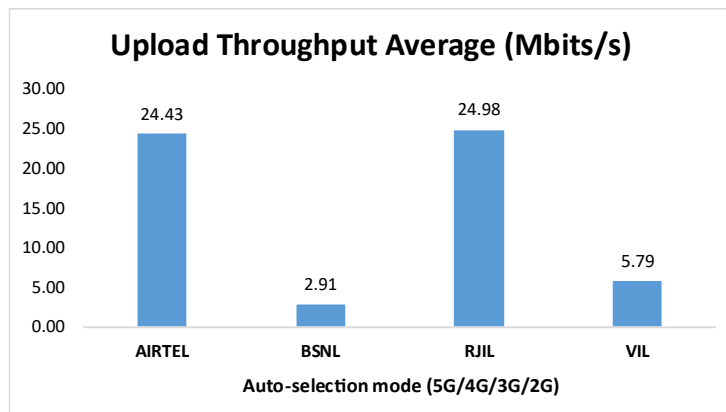


Figure- 44: Upload throughput.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	65.68%	NA	77.01%	NA
4G	34.32%	39.27%	22.99%	54.16%
3G	NA	53.50%	NA	NA
2G	0.00%	5.52%	NA	41.18%
Limited Service	0.00%	1.71%	0.00%	4.66%

Table-28: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) data.

Note-

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

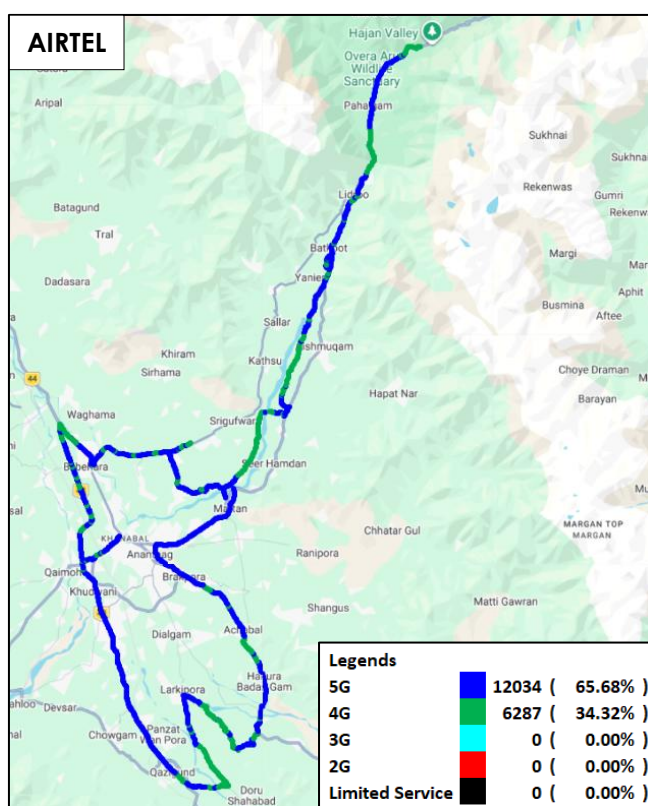


Figure-45: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

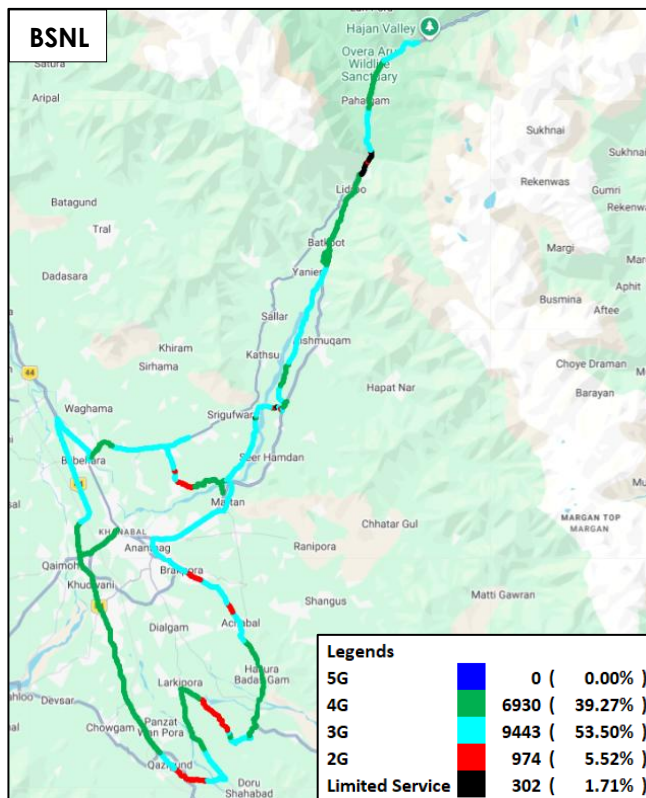


Figure-46: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - BSNL.

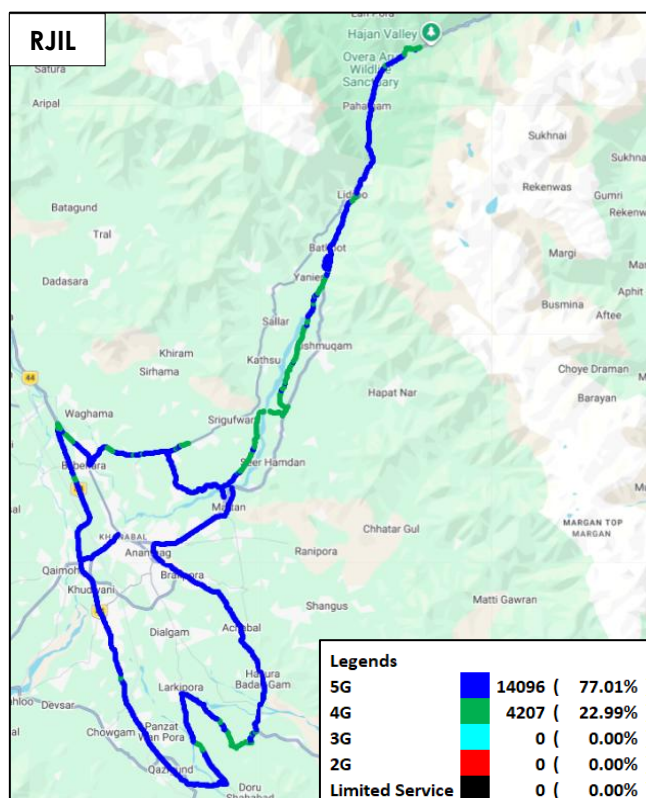


Figure-47: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

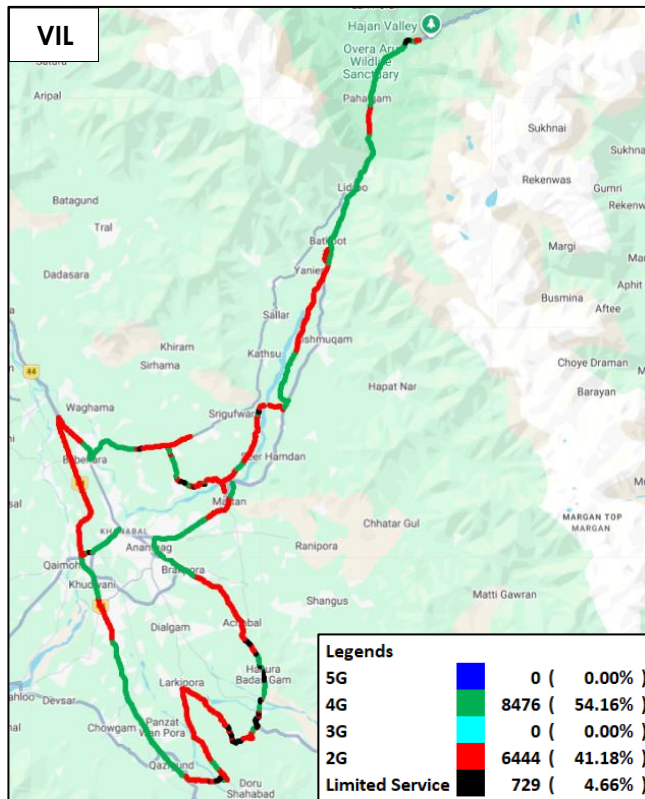


Figure-48: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-114, 115, 116 & 117 for map view)

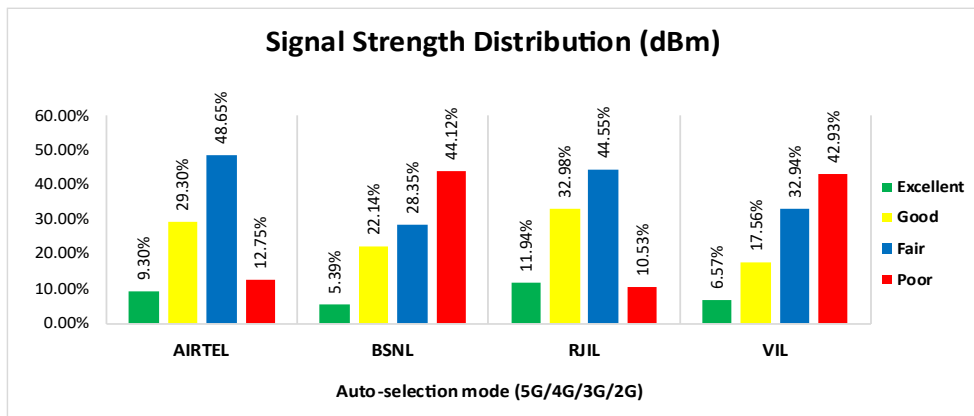


Figure-49: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 9% of samples falling in the excellent signal strength category.
- BSNL has 5% of samples falling in the excellent signal strength category.
- RJIL has 12% of samples falling in the excellent signal strength category.
- VIL has 7% of samples falling in the excellent signal strength category.

4.3 Hotspots

Hotspot testing has been conducted on 8th, 10th & 11th June 2026. Six locations have been tested in Srinagar and Pahalgam cities. (Refer Table-1)

4.3.1 Locations

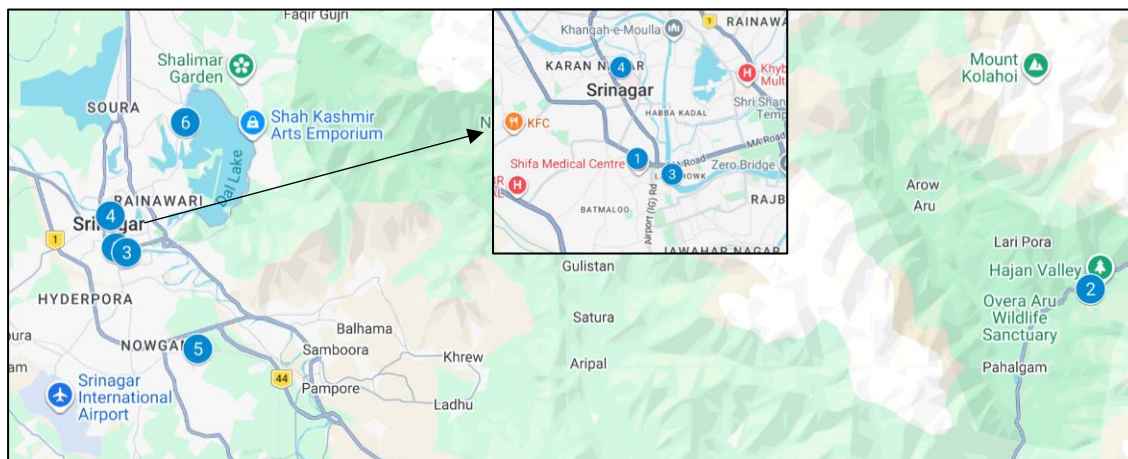


Figure- 50: Hotspot locations.

4.3.2 Hotspot covered

1. Accounts General Office
2. Betaab Valley View Point
3. Hari Singh High St.
4. SMHS Hospital
5. Srinagar Railway Station
6. University of Kashmir Srinagar

4.3.3 Voice performance

Overall Voice Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	60	60	60	60
Call Setup Success Rate %	100.00	95.00	100.00	95.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.44	4.08	0.55	0.82

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

Accounts General Office				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	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)	1.41	2.85	0.55	0.52

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

Betaab Valley View Point				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	70.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.43	4.52	0.59	2.81

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

Hari Singh High St.				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	80.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.41	4.73	0.54	0.63

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

SMHS Hospital				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	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)	1.45	2.81	0.53	0.50

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

Srinagar Railway Station				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	90.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.49	4.03	0.56	0.47

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

University of Kashmir Srinagar				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	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)	1.45	5.65	0.53	0.56

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

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

Overall Data Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	116.30	8.83	240.73	27.02
Download Throughput 80th Percentile (Mbit/s)	170.22	12.73	568.73	45.39
Download Throughput 20th Percentile (Mbit/s)	25.73	4.20	61.40	14.33
Download Session Setup Success Rate %	100.00	90.00	100.00	86.67
Upload Throughput Average (Mbits/s)	20.62	5.28	45.13	15.11
Upload Throughput 80th Percentile (Mbit/s)	29.93	8.69	87.41	25.03
Upload Throughput 20th Percentile (Mbit/s)	4.30	1.61	12.15	6.82
Upload Session Setup Success Rate %	100.00	100.00	100.00	86.67
Web Browsing Delay (Second)	4.62	3.33	3.71	4.64
Youtube Initial Buffer Delay (Second)	1.37	2.05	1.75	1.33
Latency (ms) - 50th Percentile	46.65	33.30	28.13	38.80
Jitter (ms)	21.63	6.41	12.03	5.80
Packet Loss Rate%	5.45	0.83	0.52	16.77
Packet Loss Rate- 90th percentile	16.82	2.08	2.10	90.10

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

Accounts General Office				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	148.20	3.44	91.47	33.17
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	27.42	2.98	50.46	20.44
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.80	5.07	2.41	4.21
Youtube Initial Buffer Delay (Second)	0.76	5.17	0.79	1.09
Latency (ms) - 50th Percentile	46.90	31.11	27.66	38.28
Jitter (ms)	21.20	5.95	3.23	5.01
Packet Loss Rate%	9.20	0.50	0.00	0.00

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

Betaab Valley View Point				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	12.92	17.24	12.17	0.00
Download Session Setup Success Rate %	100.00	80.00	100.00	20.00
Upload Throughput Average (Mbits/s)	10.80	8.55	0.89	0.03
Upload Session Setup Success Rate %	100.00	100.00	100.00	20.00
Web Browsing Delay (Second)	4.69	3.31	10.59	8.98
Youtube Initial Buffer Delay (Second)	1.37	1.16	6.65	-
Latency (ms) - 50th Percentile	48.68	33.32	40.64	-
Jitter (ms)	7.67	3.00	41.91	-
Packet Loss Rate%	0.60	1.40	1.30	100.00

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

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

Hari Singh High St.				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	85.29	5.87	106.72	16.64
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	23.99	8.59	86.53	20.41
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.09	1.81	1.71	5.58
Youtube Initial Buffer Delay (Second)	0.75	1.59	0.64	2.30
Latency (ms) – 50 th Percentile	44.27	32.67	28.26	41.14
Jitter (ms)	10.24	14.09	5.08	10.71
Packet Loss Rate%	1.20	0.60	0.10	0.50

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

SMHS Hospital				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	278.77	12.35	81.05	50.72
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	47.25	4.41	14.85	23.08
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	3.45	4.15	3.82	3.97
Youtube Initial Buffer Delay (Second)	0.71	1.16	0.99	0.97
Latency (ms) - 50th Percentile	43.18	35.72	26.73	36.65
Jitter (ms)	7.61	2.84	14.77	3.43
Packet Loss Rate%	0.20	0.30	1.70	0.00

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

Srinagar Railway Station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	121.80	9.16	600.18	18.97
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	2.96	4.88	17.90	9.87
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.86	3.27	1.50	4.96
Youtube Initial Buffer Delay (Second)	3.34	1.33	1.59	1.05
Latency (ms)- 50th Percentile	42.36	36.38	28.56	38.60
Jitter (ms)	4.40	5.20	3.13	5.36
Packet Loss Rate%	0.30	1.60	0.00	0.10

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

University of Kashmir Srinagar				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	50.79	5.14	552.80	21.00
Download Session Setup Success Rate %	100.00	60.00	100.00	100.00
Upload Throughput Average (Mbits/s)	11.31	2.24	100.15	4.78
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.96	2.00	2.95	4.16
Youtube Initial Buffer Delay (Second)	1.26	4.69	0.83	1.23
Latency (ms) - 50th Percentile	66.40	31.96	26.35	44.33
Jitter (ms)	78.64	7.37	4.07	4.51
Packet Loss Rate%	21.20	0.60	0.00	0.00

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

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

Overall Data Performance					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	125.67	-	91.90	-
	Upload Throughput Average (Mbits/s)	32.26	-	29.59	-
4G	Download Throughput Average (Mbits/s)	14.08	11.53	45.28	23.88
	Upload Throughput Average (Mbits/s)	6.45	7.64	7.34	13.83

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

Note- "-"Respective technology was not observed during the test.					
Accounts General Office					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	153.75	-	102.78	-
	Upload Throughput Average (Mbits/s)	50.94	-	7.91	-
4G	Download Throughput Average (Mbits/s)	20.24	3.73	15.36	34.26
	Upload Throughput Average (Mbits/s)	11.01	6.04	6.33	20.08

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

Note- "-"Respective technology was not observed during the test.					
Betaab Valley View Point					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	0.50	-
	Upload Throughput Average (Mbits/s)	-	-	1.77	-
4G	Download Throughput Average (Mbits/s)	4.17	31.85	9.12	2.15
	Upload Throughput Average (Mbits/s)	5.88	22.29	0.86	1.02

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

Note- "-"Respective technology was not observed during the test.					
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Hari Singh High St.					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	98.34	-	108.44	-
	Upload Throughput Average (Mbits/s)	24.83	-	90.11	-
4G	Download Throughput Average (Mbits/s)	19.40	6.45	112.53	14.29
	Upload Throughput Average (Mbits/s)	5.40	6.85	14.48	14.86

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

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

SMHS Hospital					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	261.46	-	130.68	-
	Upload Throughput Average (Mbits/s)	72.24	-	14.75	-
4G	Download Throughput Average (Mbits/s)	22.23	15.40	37.02	41.05
	Upload Throughput Average (Mbits/s)	5.52	8.27	5.51	24.71

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

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

Srinagar Railway Station					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	79.75	-	102.18	-
	Upload Throughput Average (Mbits/s)	2.87	-	30.96	-
4G	Download Throughput Average (Mbits/s)	3.73	8.67	65.74	19.09
	Upload Throughput Average (Mbits/s)	2.01	3.43	8.59	7.50

Table-48: Overall Summary of 5G only & 4G only data download & upload speed.

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

University of Kashmir Srinagar					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	35.07	-	106.80	-
	Upload Throughput Average (Mbits/s)	10.41	-	26.51	-
4G	Download Throughput Average (Mbits/s)	14.73	2.51	31.92	15.05
	Upload Throughput Average (Mbits/s)	8.92	1.87	8.29	7.14

Table-49: Overall Summary of 5G only & 4G only data download & upload speed.

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

4.4 Walk Test

Walk test has been conducted on 12th June 2026. One location has been tested in the Srinagar city. (Refer Table-1)

4.4.1 Walk test locations

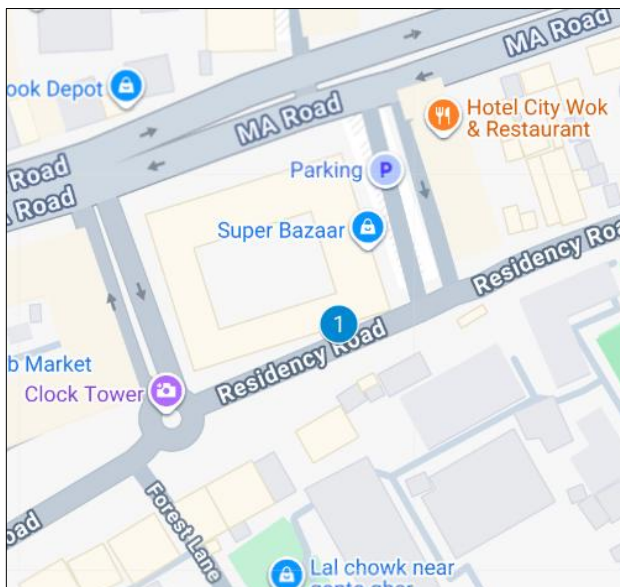


Figure-51: Walk Test locations.

4.4.2 Walk Test Covered

1. Lal Chowk to Ghanta Ghar

4.4.3 Voice Performance

Lal Chowk to Ghanta Ghar				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	34	34	34	34
Call Setup Success Rate %	100.00	94.12	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.40	4.36	0.71	0.53

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

4.4.4 Data Performance

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

Lal Chowk to Ghanta Ghar				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	161.00	6.25	106.12	27.05
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	52.96	8.01	50.86	21.40
Upload Session Setup Success Rate %	100.00	100.00	96.97	100.00
Latency (ms) - 50th Percentile	47.86	29.92	27.11	39.01

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

4.5 Highway

Drive test has been conducted on 9th June 2026 and 12th June 2026 covering two highway routes Srinagar to Pahalgam and Srinagar to Gulmarg. (Refer Table-1)

4.5.1 Srinagar to Pahalgam

4.5.1.1 Drive test route

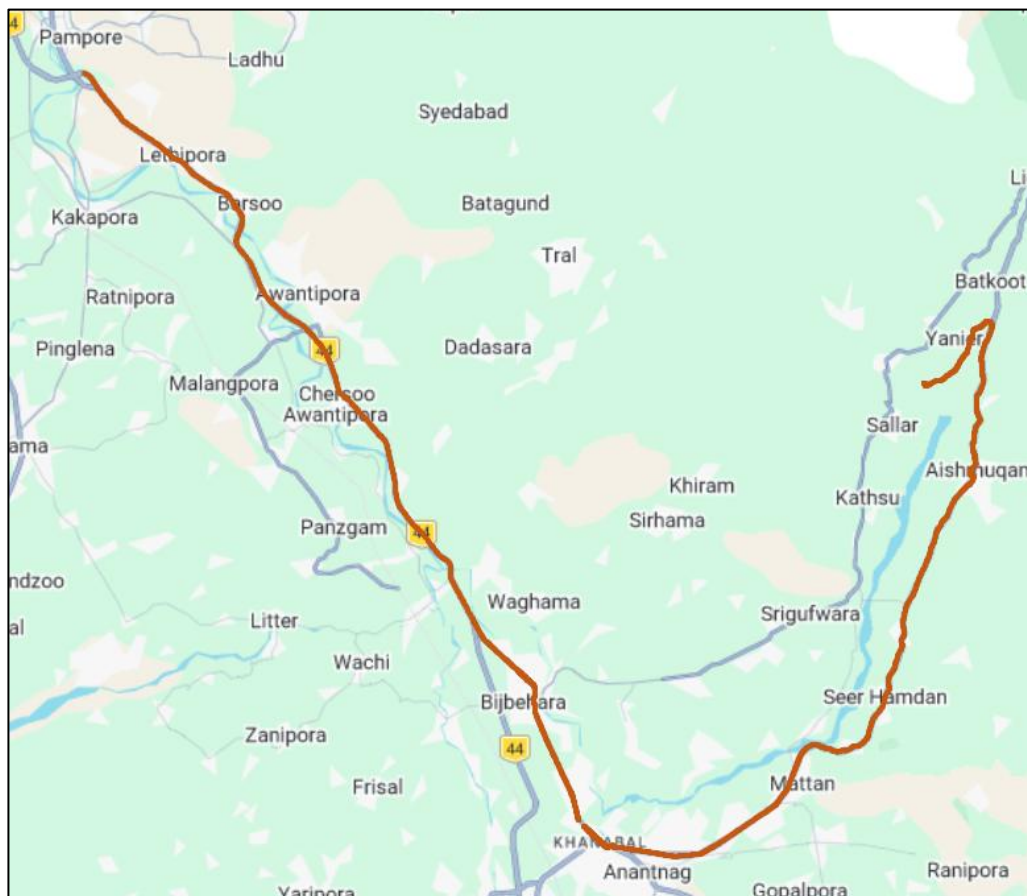


Figure-52: Drive test routes.

4.5.1.2 Routes covered

Pampore, Lethipora, Barsoo, Awantipora, Chersoo Awantipora, Bijbehara, Mattan, Seer Hamdan, Aishmuqam and Yanier etc.

4.5.1.3 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	38	40	40
Call Setup Success Rate %	100.00	100.00	100.00
Drop Call Rate %	0.00	5.00	5.00
Call Setup Time-Average (Second)	2.89	5.62	3.07
Handover Success Rate %	100.00	100.00	100.00

Table-52: Summary of voice call performance in 3G/2G network mode only.

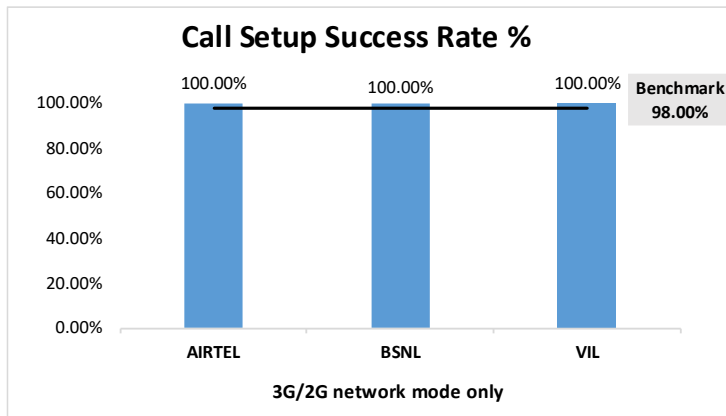


Figure-53: Performance for call setup success rate.

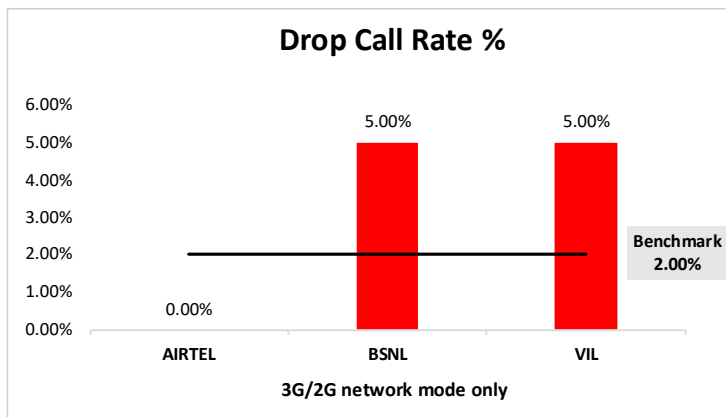


Figure-54: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	61.06%	NA
2G	100.00%	38.94%	100.00%
Limited Service	0.00%	0.00%	0.00%

Table-53: Time spent on technology during drive test 3G/2G network mode.

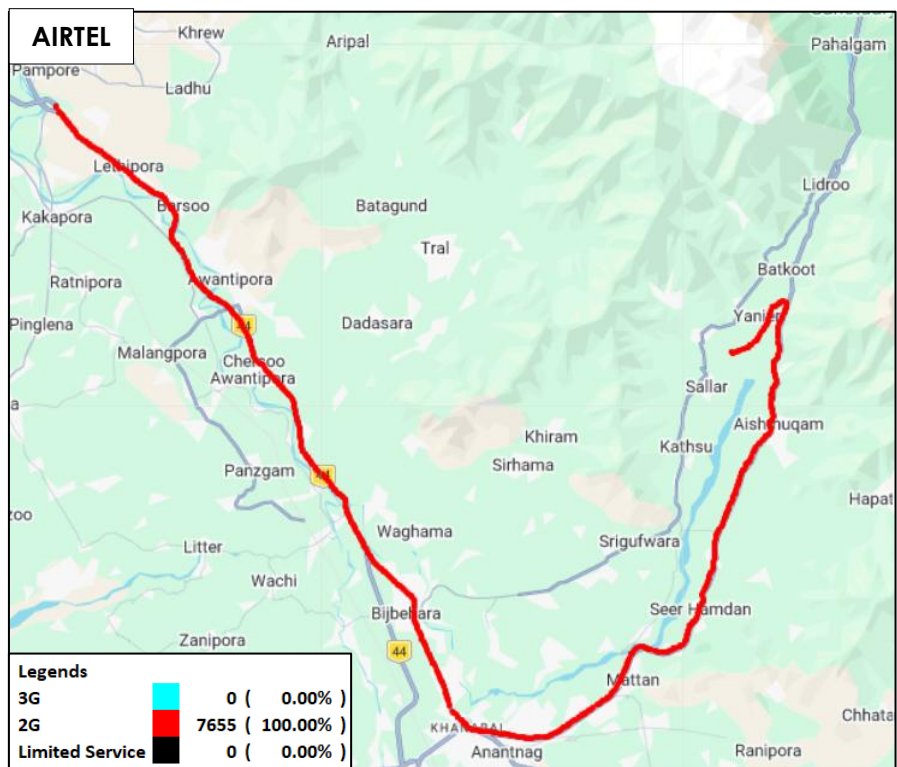


Figure-55: Serving technology plots 3G/2G network mode - AIRTEL.

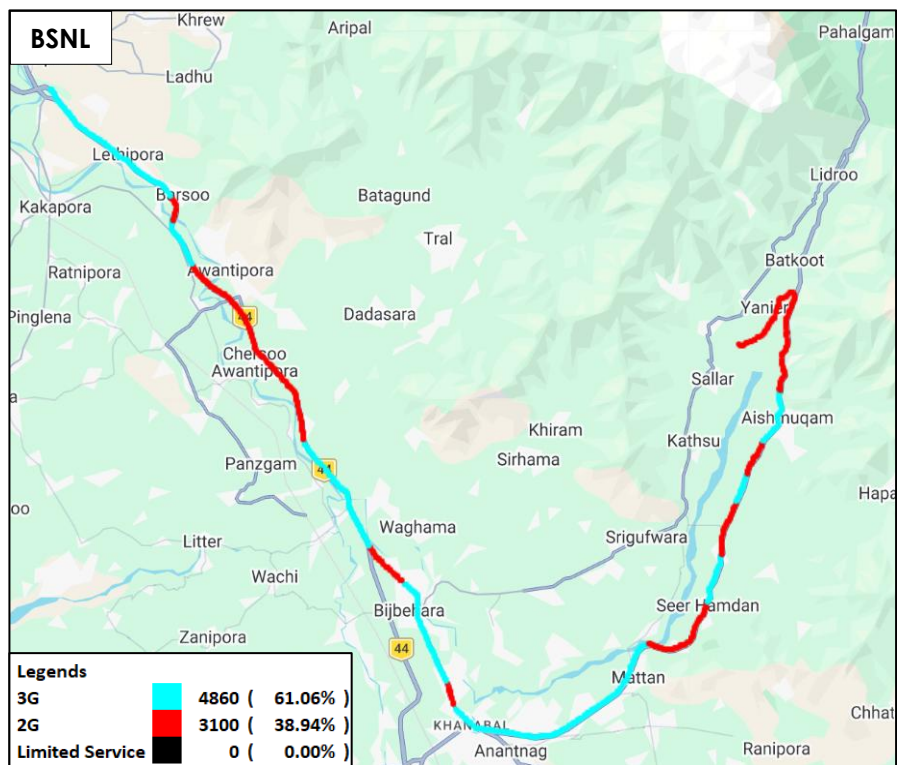


Figure-56: Serving technology plots 3G/2G network mode - BSNL.

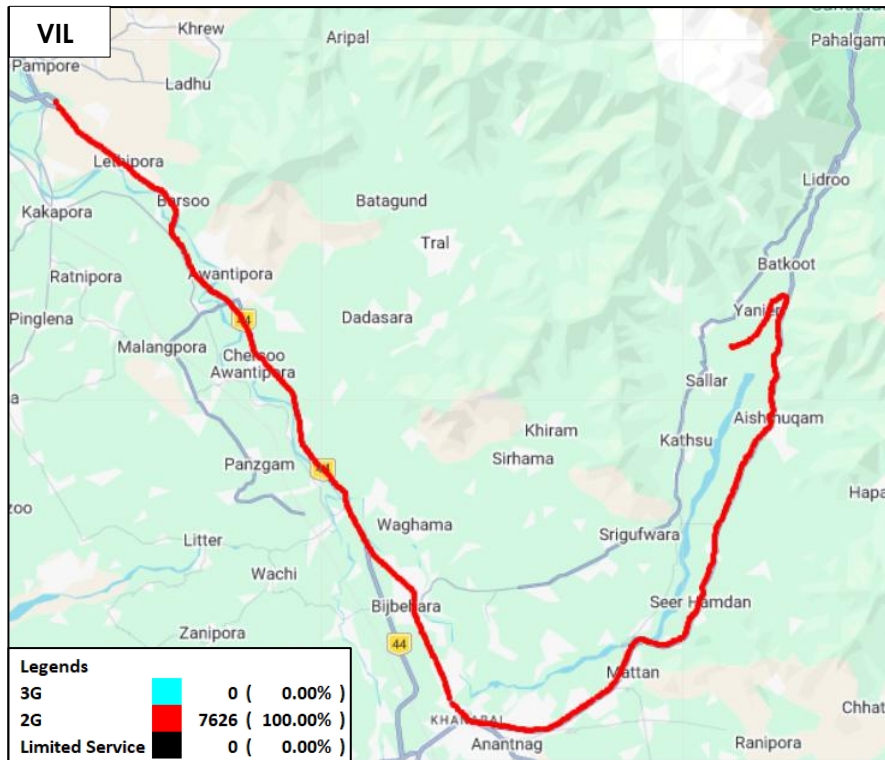


Figure-57: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 118, 119 & 120 for map view)

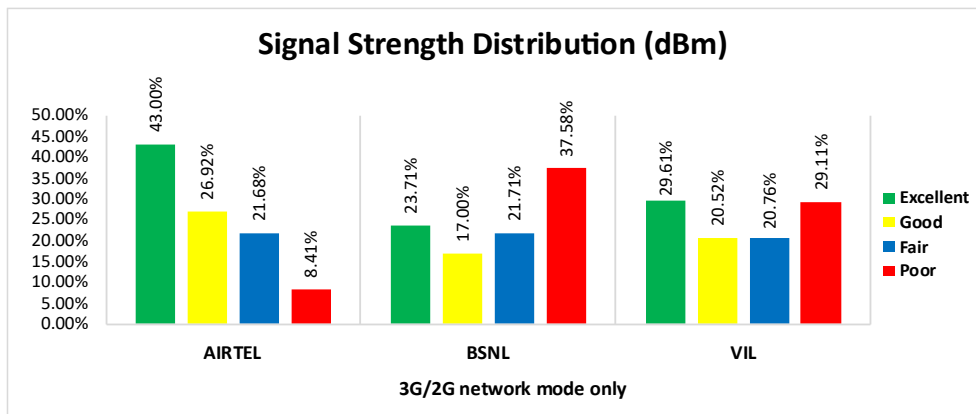


Figure-58: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 43% of samples falling in the excellent signal strength category.
- BSNL has 24% of samples falling in the excellent signal strength category.
- VIL has 30% of samples falling in the excellent signal strength category.

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	40	44	41	43
Call Setup Success Rate %	100.00	86.36	100.00	95.35
Drop Call Rate %	0.00	0.00	0.00	9.76
Call Setup Time Average (Second)	1.43	5.62	0.61	2.30
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-54: Summary of voice call performance in network auto-selection mode.

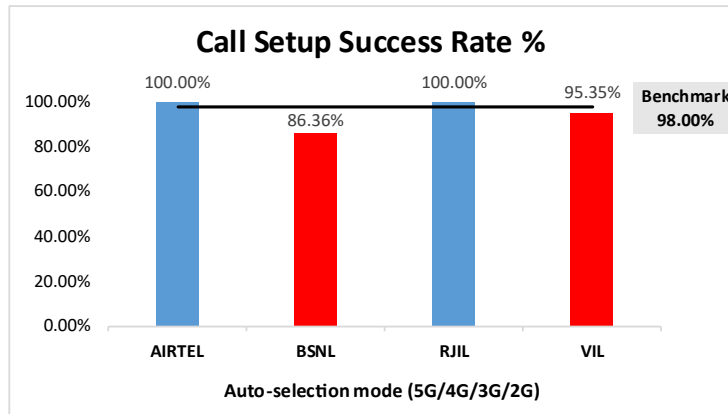


Figure-59: Performance for call setup success rate.

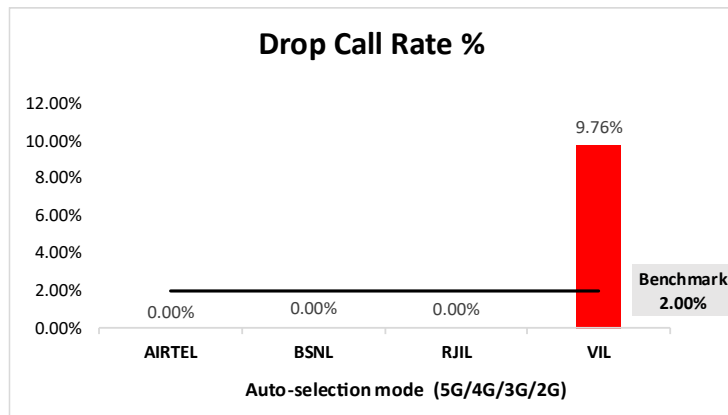


Figure-60: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	39	35	38	38
Number of silences call for >4 Sec	0	4	0	0
Silence Call Rate %	0.00	11.43	0.00	0.00
Number of silence instances for >4 Sec	0	6	0	0
Number of silence instances for >3 Sec	0	9	0	1
Number of silence instances for >2 sec	0	26	1	2
RTP Jitter (4G & 5G) in ms	3.52	5.3	14.83	17.54
Packet loss Rate Downlink %	0.33	4.94	0.64	1.23
Packet loss Rate Uplink %	0.34	3.76	0.91	0.38

Table-55: Summary of silence instances & packet loss rate for mobile to mobile call.

(e) 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 value means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-55	494	439	494	449
Speech Quality (Average MOS)	4.03	3.57	4.52	2.91
Number of samples with MOS >=4 to <5 (Excellent)	432	270	443	109
Number of samples with MOS >=3 to <4 (Good)	53	70	34	74
Number of samples with MOS >=2 to <3 (Fair)	4	42	7	185
Number of samples with MOS >=1 to <2 (Poor)	5	57	10	81
%age of samples with MOS >=4 to <5 (Excellent)	87.45%	61.50%	89.68%	24.28%
%age of samples with MOS >=3 to <4 (Good)	10.73%	15.95%	6.88%	16.48%
%age of samples with MOS >=2 to <3 (Fair)	0.81%	9.57%	1.42%	41.20%
%age of samples with MOS >=1 to <2 (Poor)	1.01%	12.98%	2.02%	18.04%

Table-56: Summary of speech quality (MOS) samples.

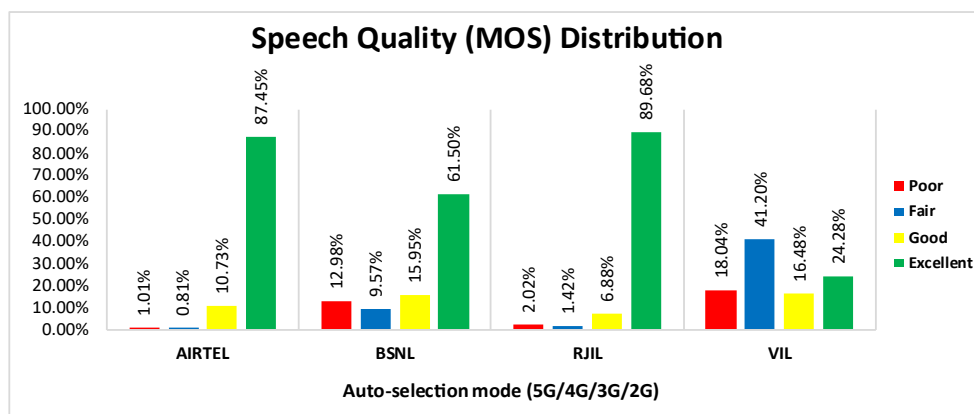


Figure-61: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	0.85%	NA	68.36%	NA
4G	99.15%	61.11%	31.64%	54.36%
3G	NA	25.04%	NA	NA
2G	0.00%	13.47%	NA	45.64%
Limited Service	0.00%	0.39%	0.00%	0.00%

Table-57:Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) voice.

Note-

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

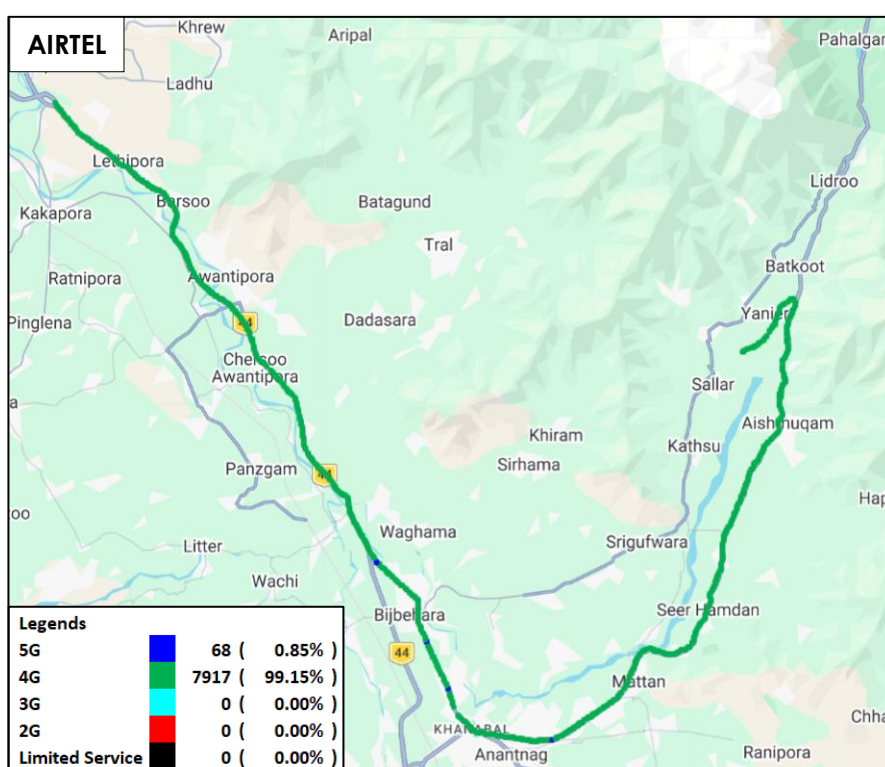


Figure-62: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

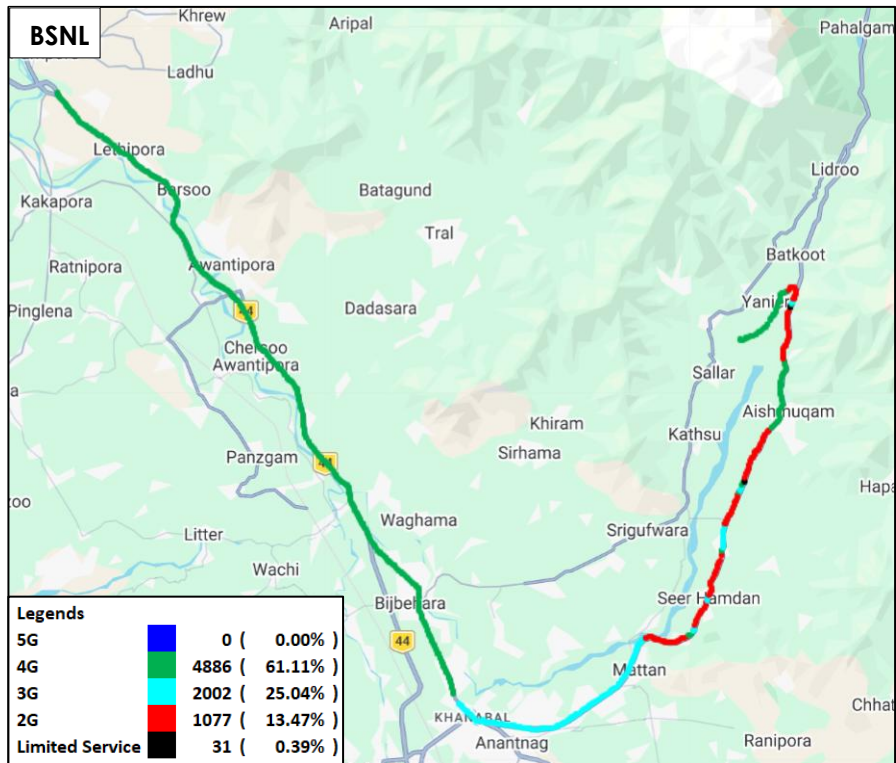


Figure-63: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

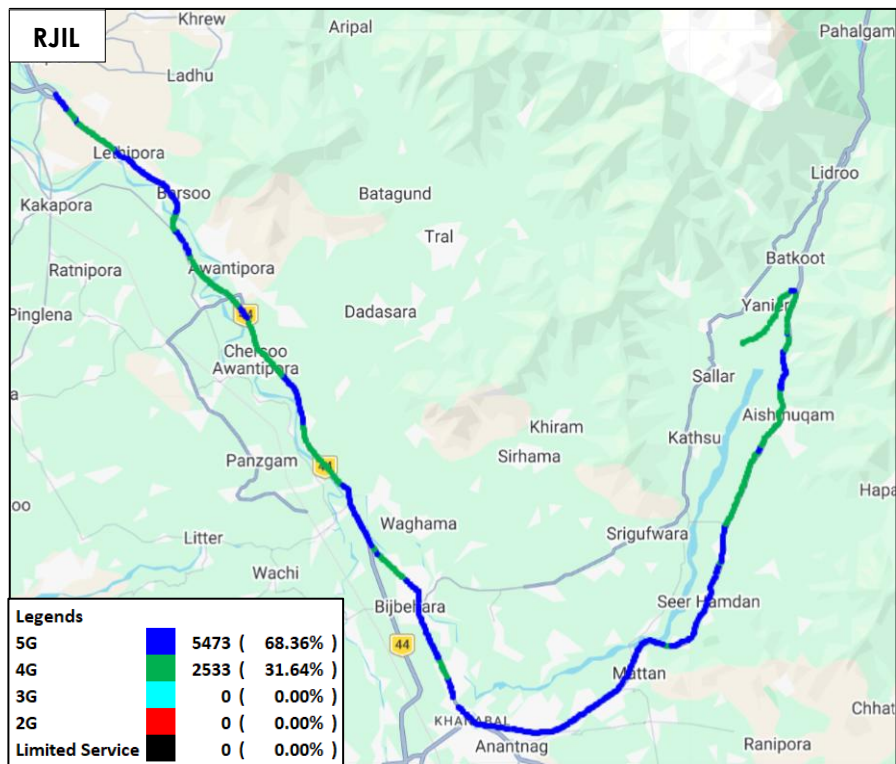


Figure-64: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

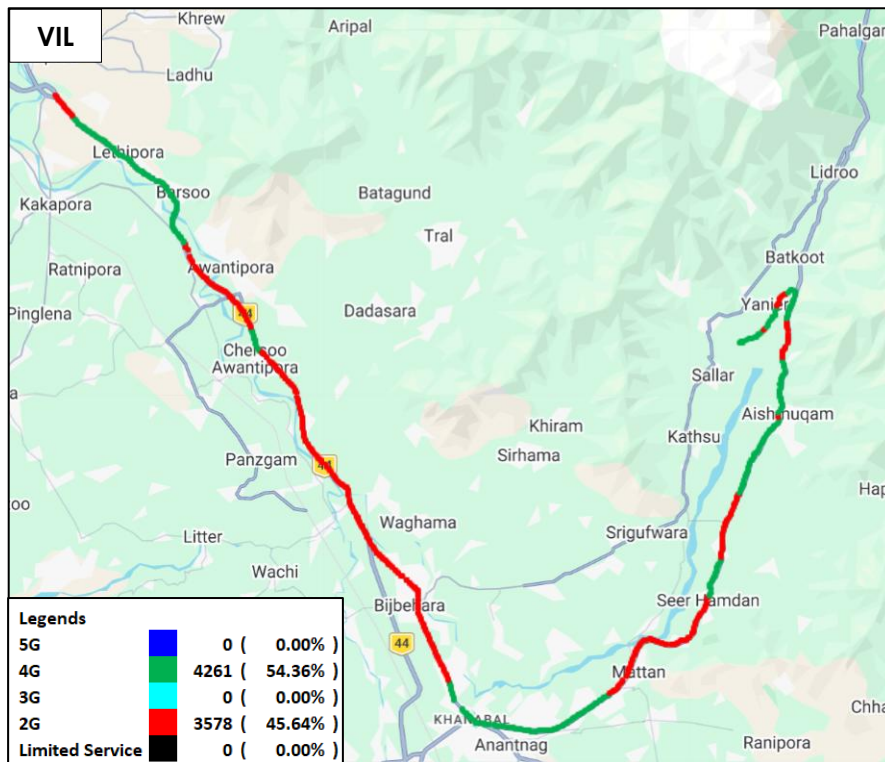


Figure-65: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-121, 122, 123 & 124 for map view)

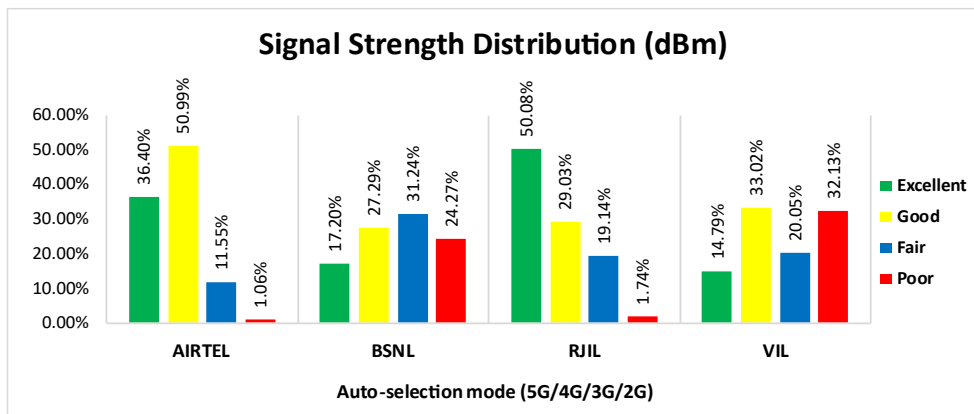


Figure-66: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 36% of samples falling in the excellent signal strength category.
- BSNL has 17% of samples falling in the excellent signal strength category.
- RJIL has 50% of samples falling in the excellent signal strength category.
- VIL has 15% of samples falling in the excellent signal strength category.

4.5.1.4 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	192.01	14.61	88.24	14.27
	80th Percentile	267.64	21.08	117.49	26.26
	20th Percentile	65.33	5.49	61.47	0.06
Upload Throughput (Mbits/s)	Average	34.19	8.00	32.05	5.90
	80th Percentile	54.35	12.50	55.27	10.96
	20th Percentile	10.81	3.03	4.81	0.10
Latency (ms)	50th Percentile	46.43	30.90	28.23	39.45

Table-58: Summary of Data performance in network auto-selection mode.

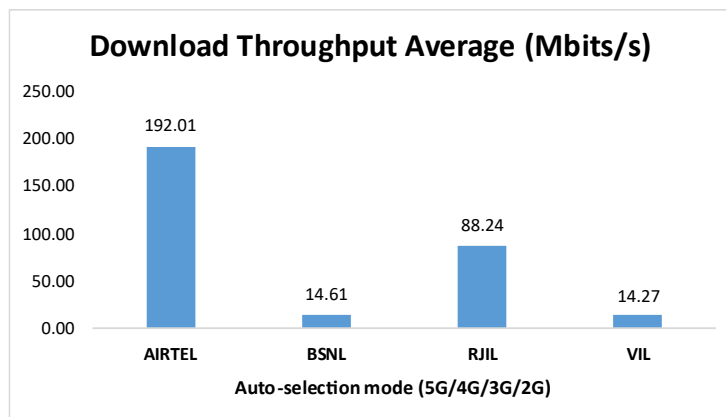


Figure-67: Download throughput.

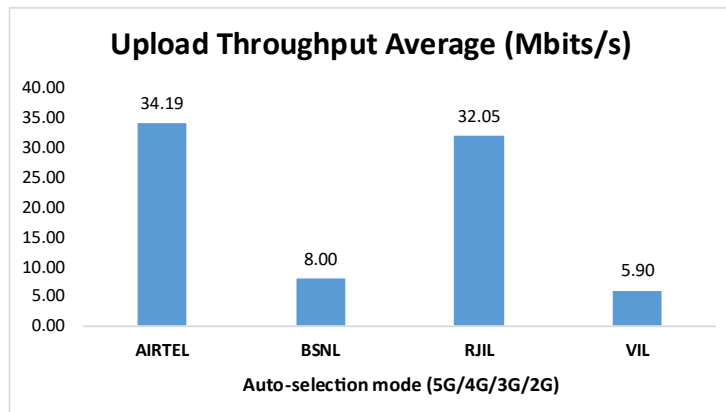


Figure- 68: Upload throughput.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	83.35%	NA	90.82%	NA
4G	16.65%	82.63%	9.18%	67.22%
3G	NA	17.15%	NA	NA
2G	0.00%	0.14%	NA	32.26%
Limited Service	0.00%	0.08%	0.00%	0.52%

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

Note-

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

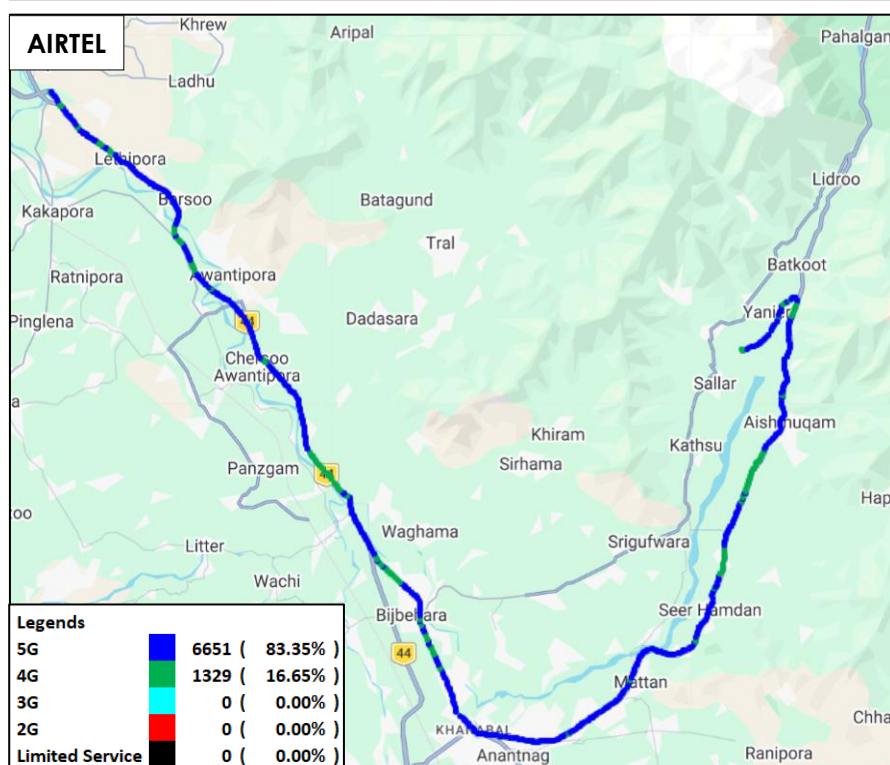


Figure-69: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

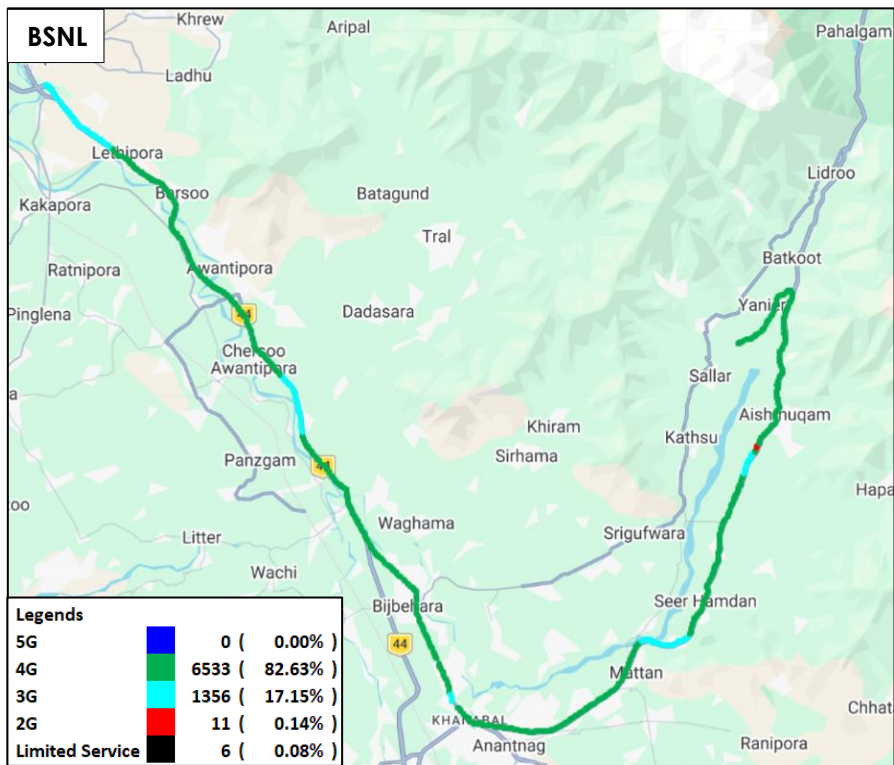


Figure-70: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - BSNL.

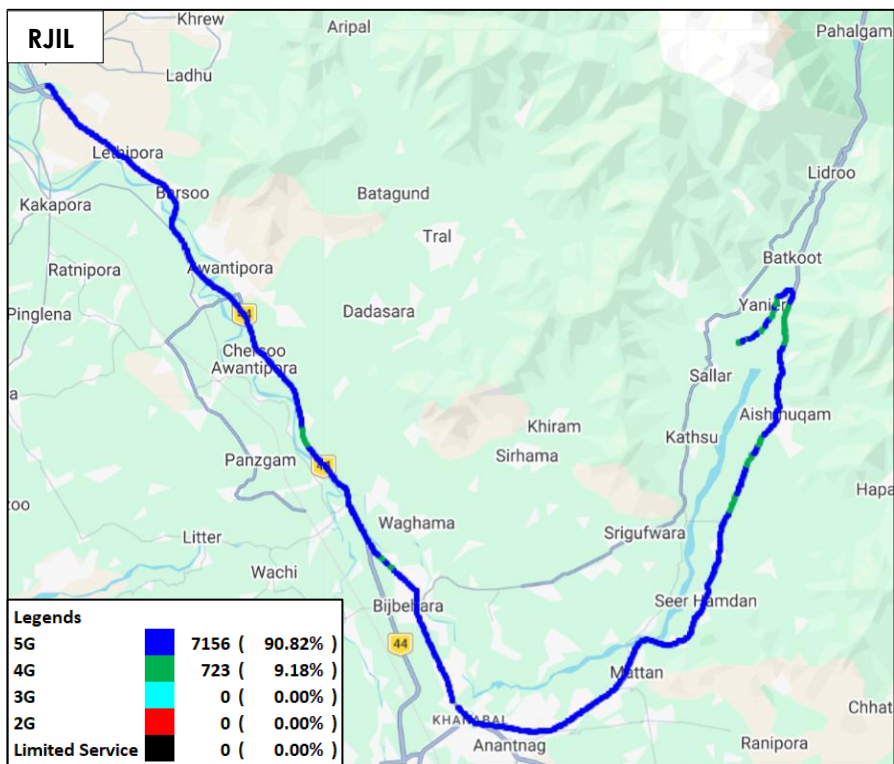


Figure-71: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

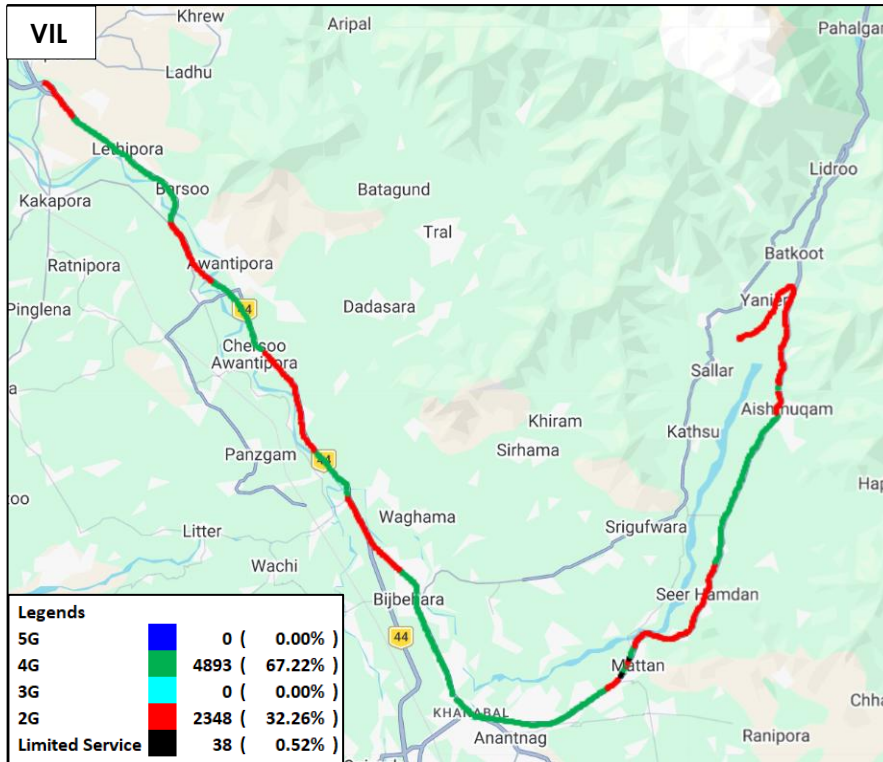


Figure-72: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-125, 126, 127 & 128 for map view)

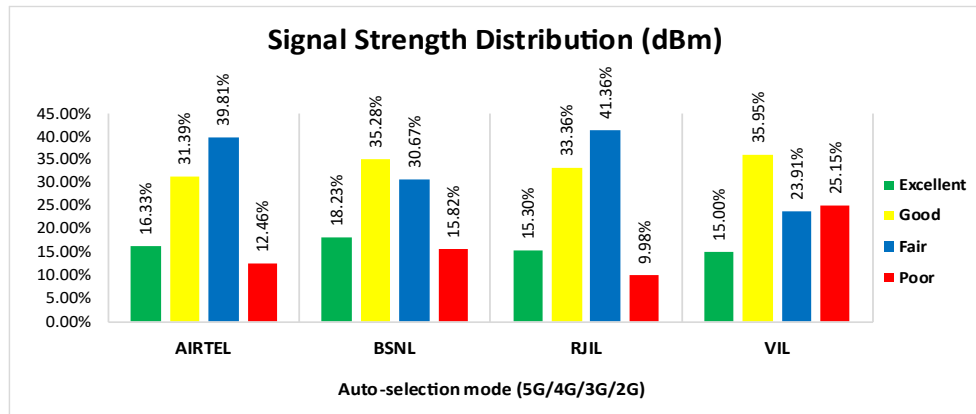


Figure-73: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 16% of samples falling in the excellent signal strength category.
- BSNL has 18% of samples falling in the excellent signal strength category.
- RJIL has 15% of samples falling in the excellent signal strength category.
- VIL has 15% of samples falling in the excellent signal strength category.

4.5.2 Srinagar to Gulmarg

4.5.2.1 Drive test route

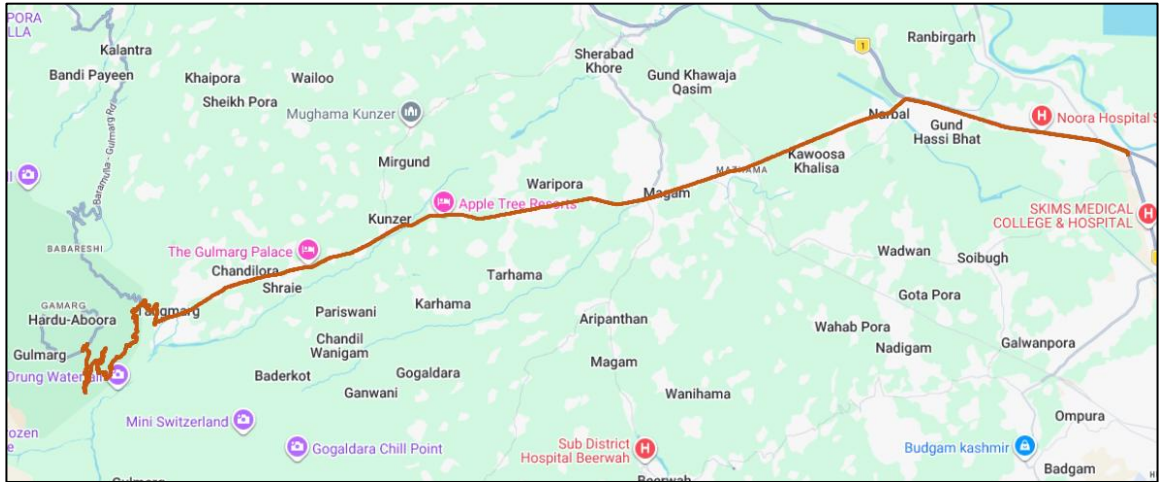


Figure-74: Drive test routes.

4.5.2.2 Areas covered

Narbal, Kawoosa Khalisa, Magam, Kunzer, Chandilora, Tungmarg and Gulmarg etc.

4.5.2.3 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	30	31	39
Call Setup Success Rate %	70.00	74.19	53.85
Drop Call Rate %	0.00	17.39	14.29
Call Setup Time-Average (Second)	3.43	5.98	3.39
Handover Success Rate %	100.00	96.77	100.00

Table-60: Summary of voice call performance in 3G/2G network mode only.

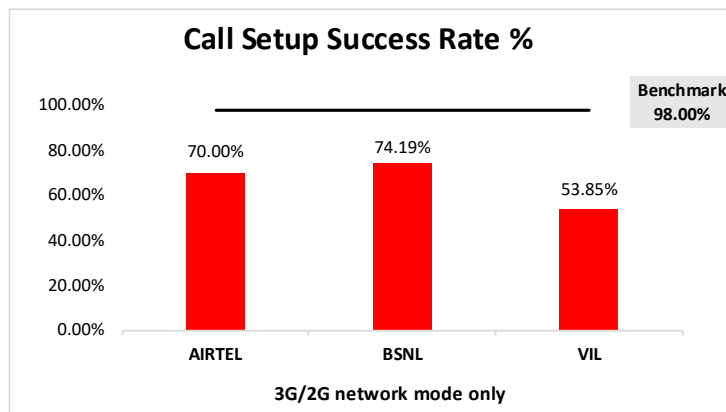


Figure-75: Performance for call setup success rate.

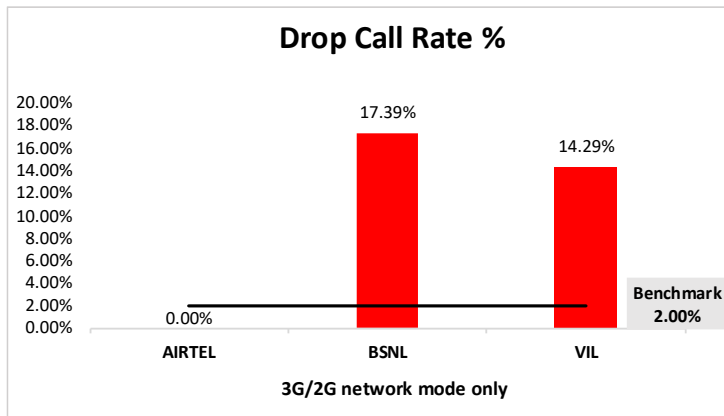


Figure-76: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	21.94%	NA
2G	90.93%	68.06%	91.68%
Limited Service	9.07%	10.00%	8.32%

Table-61: Time spent on technology during drive test 3G/2G network mode.

Note-

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

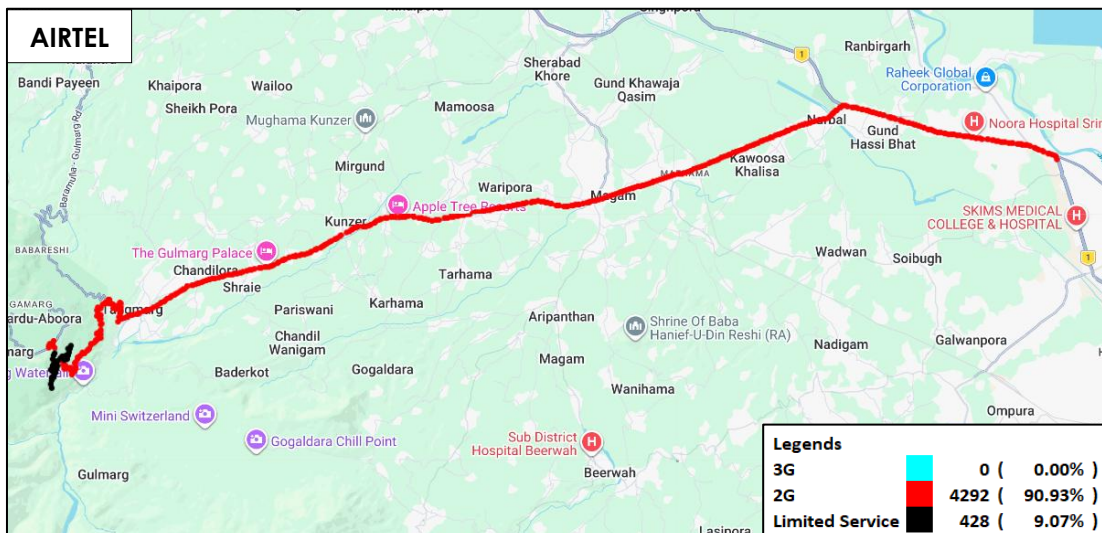


Figure-77: Serving technology plots 3G/2G network mode - AIRTEL

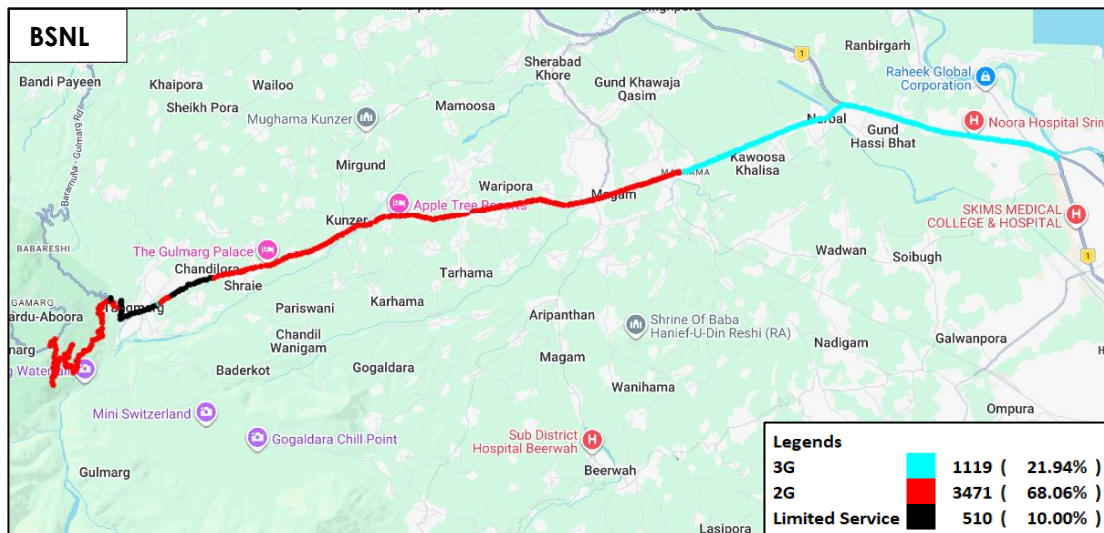


Figure-78: Serving technology plots 3G/2G network mode - BSNL.

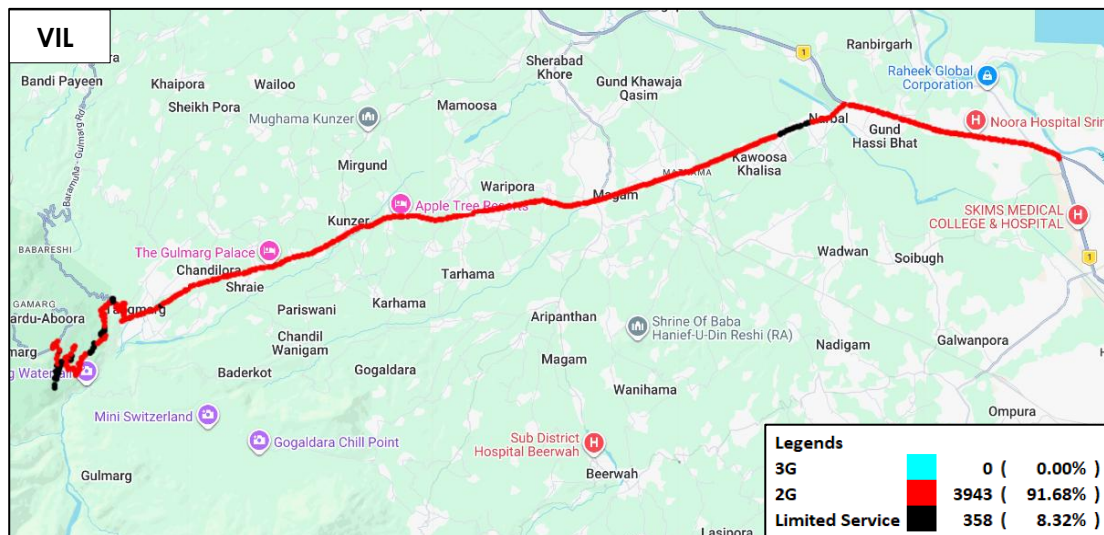


Figure-79: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 129, 130 & 131 for map view)

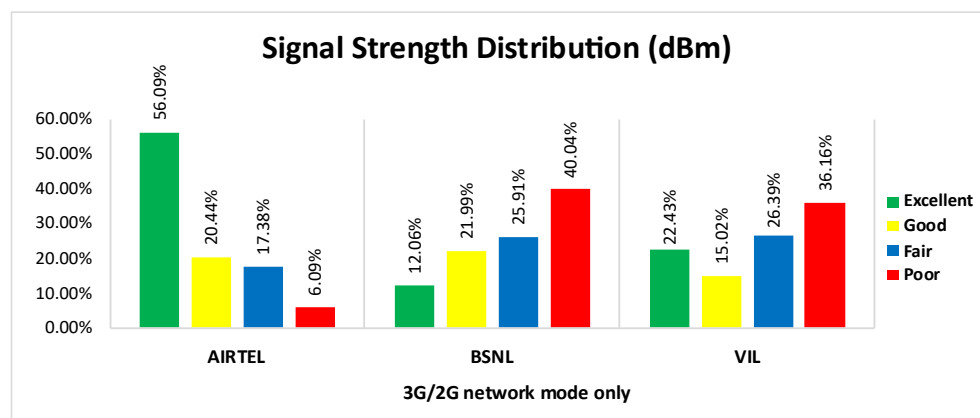


Figure-80: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 56% of samples falling in the excellent signal strength category.
- BSNL has 12% of samples falling in the excellent signal strength category.
- VIL has 22% of samples falling in the excellent signal strength category.

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	29	31	33	40
Call Setup Success Rate %	93.10	83.87	81.82	62.50
Drop Call Rate %	14.81	26.92	25.93	28.00
Call Setup Time Average (Second)	1.88	2.56	1.24	2.62
Handover Success Rate %	98.84	100.00	98.96	98.63

Table-62: Summary of voice call performance in network auto-selection mode.

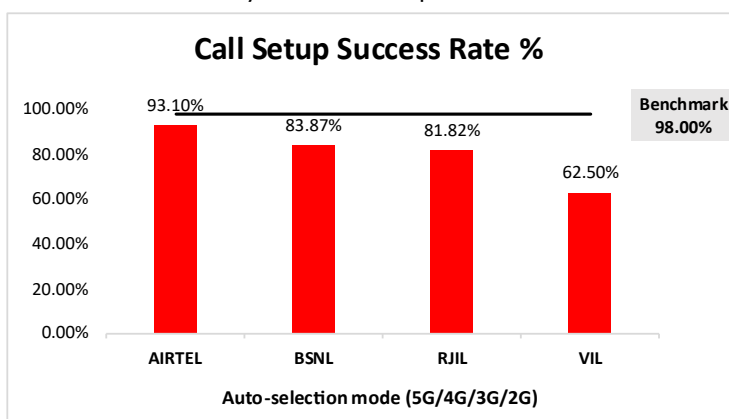


Figure-81: Performance for call setup success rate.

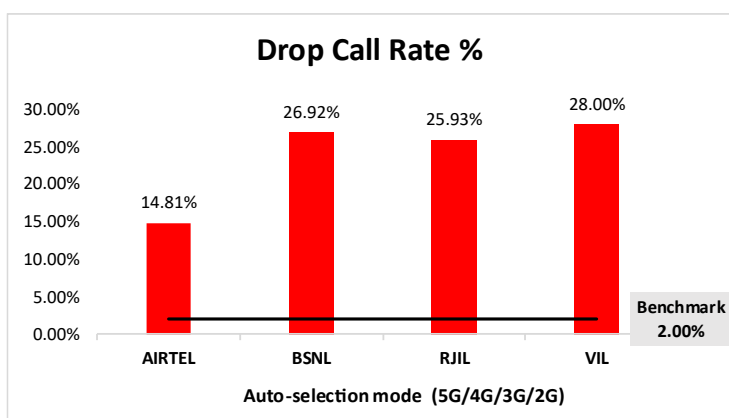


Figure-82: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	25	26	22	21
Number of silences call for >4 Sec	2	5	0	1
Silence Call Rate %	8.00	19.23	0.00	4.76
Number of silence instances for >4 Sec	4	5	0	1
Number of silence instances for >3 Sec	4	7	0	1
Number of silence instances for >2 sec	5	9	0	1
RTP Jitter (4G & 5G) in ms	3.60	9.37	18.65	15.55
Packet loss Rate Downlink %	3.34	13.21	4.50	1.89
Packet loss Rate Uplink %	2.31	7.60	2.07	4.48

Table-63: Summary of silence instances & packet loss rate for mobile to mobile call.

(e) 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 value means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-63	284	214	232	208
Speech Quality (Average MOS)	3.98	3.43	4.46	2.50
Number of samples with MOS >=4 to <5 (Excellent)	247	104	205	32
Number of samples with MOS >=3 to <4 (Good)	28	53	14	57
Number of samples with MOS >=2 to <3 (Fair)	1	27	3	37
Number of samples with MOS >=1 to <2 (Poor)	8	30	10	82
%age of samples with MOS >=4 to <5 (Excellent)	86.97%	48.60%	88.36%	15.38%
%age of samples with MOS >=3 to <4 (Good)	9.86%	24.77%	6.03%	27.40%
%age of samples with MOS >=2 to <3 (Fair)	0.35%	12.62%	1.29%	17.79%
%age of samples with MOS >=1 to <2 (Poor)	2.82%	14.02%	4.31%	39.42%

Table-64: Summary of speech quality (MOS) samples.

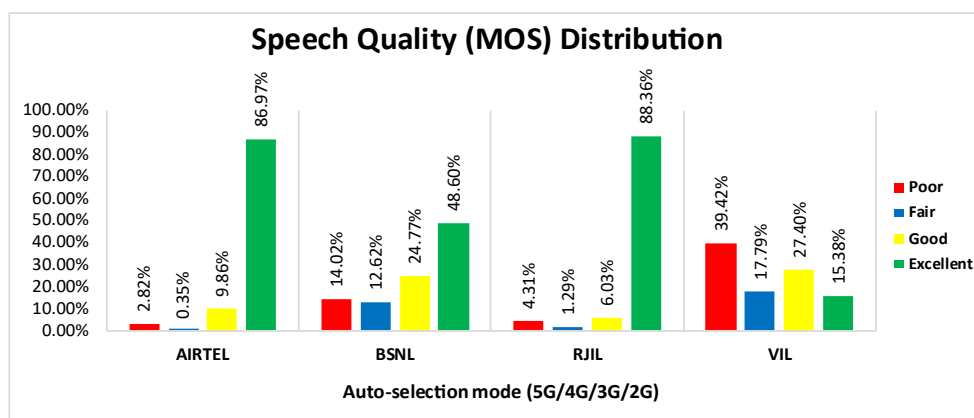


Figure-83: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	0.25%	NA	63.65%	NA
4G	96.70%	75.83%	27.75%	41.35%
3G	NA	0.59%	NA	NA
2G	0.98%	21.53%	NA	52.51%
Limited Service	2.07%	2.05%	8.61%	6.14%

Table-65: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) voice.

Note-

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

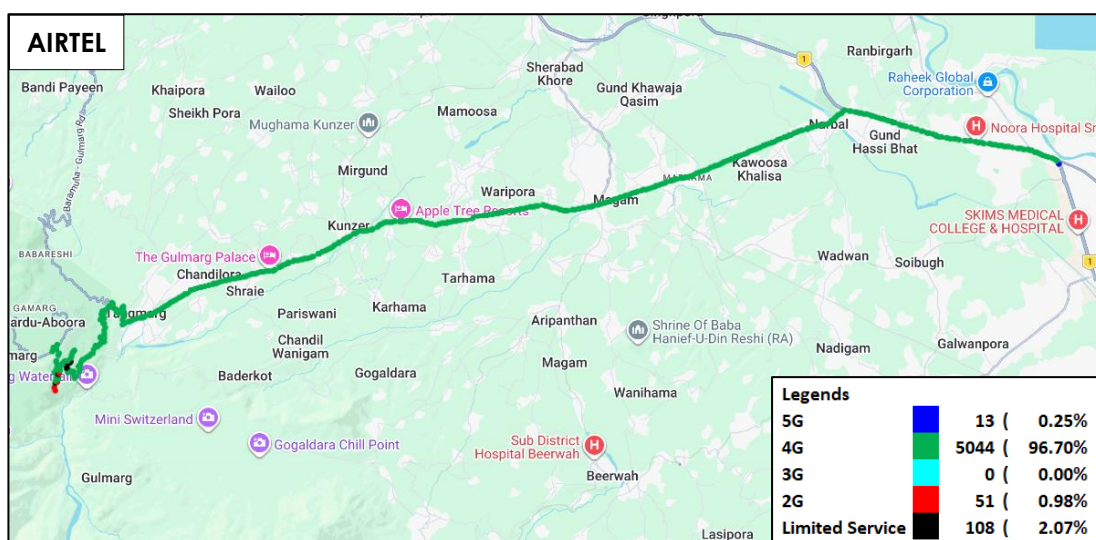


Figure-84: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

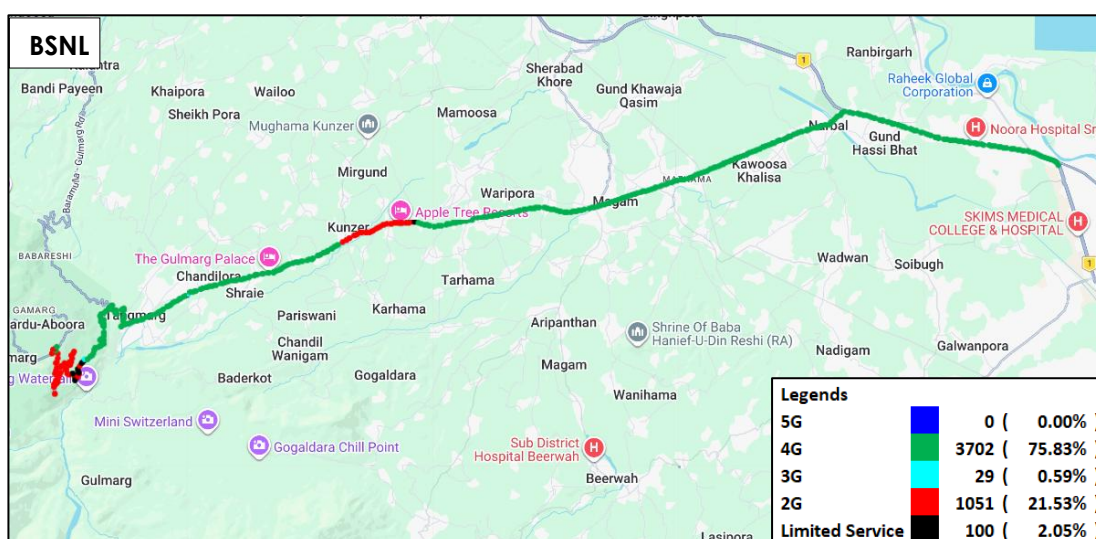


Figure-85: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

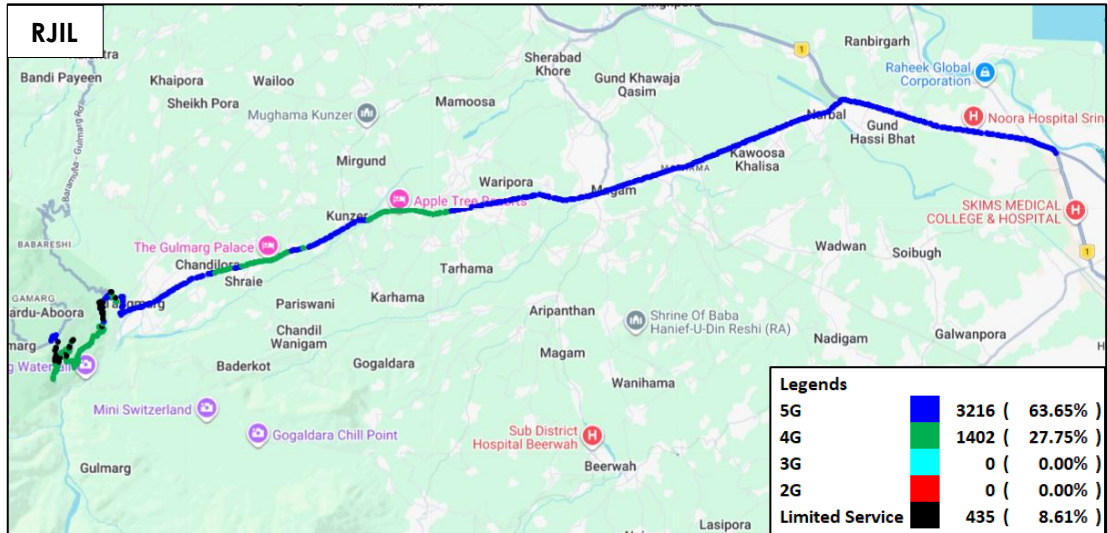


Figure-86: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

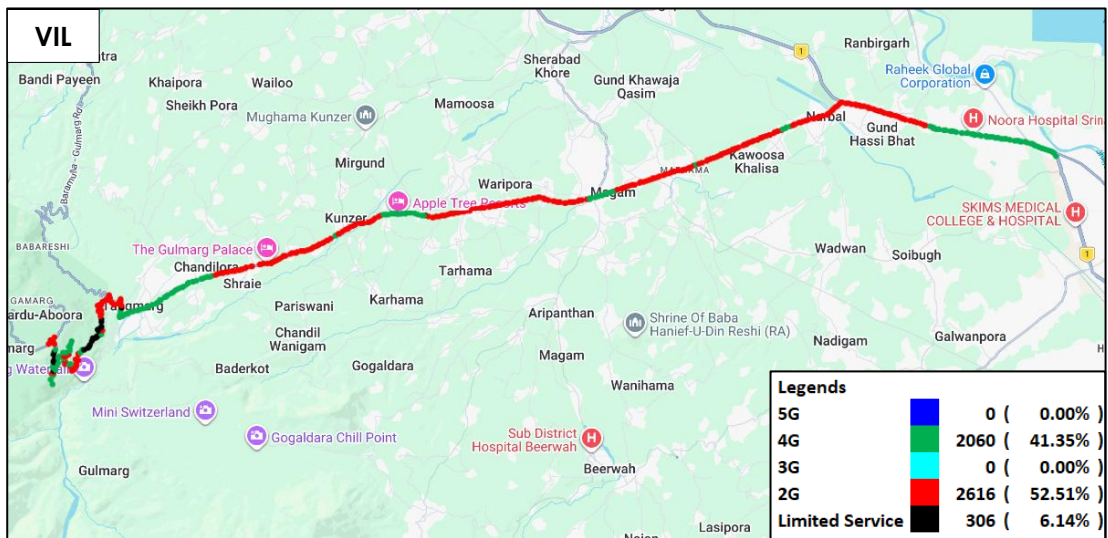


Figure-87: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-132, 133, 134 & 135 for map view)

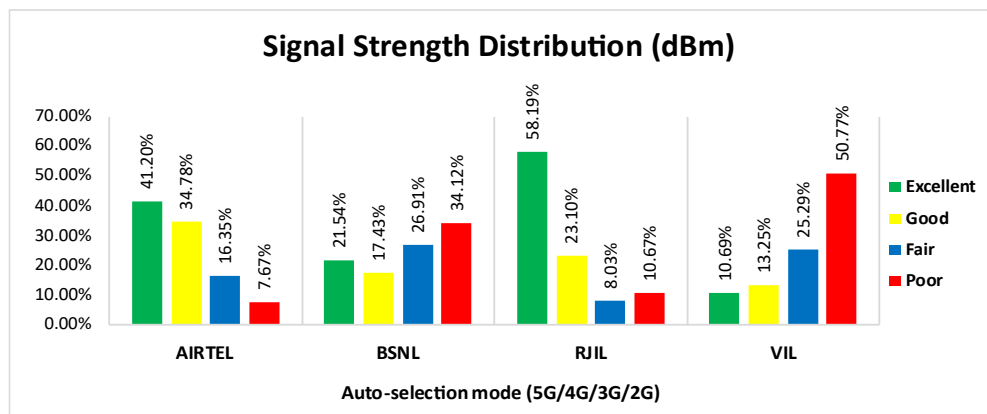


Figure-88: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 41% of samples falling in the excellent signal strength category.
- BSNL has 22% of samples falling in the excellent signal strength category.
- RJIL has 58% of samples falling in the excellent signal strength category.
- VIL has 11% of samples falling in the excellent signal strength category.

4.5.2.4 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	176.89	8.82	88.14	13.80
	80th Percentile	254.30	14.29	124.39	23.87
	20th Percentile	76.42	2.51	48.21	0.00
Upload Throughput (Mbits/s)	Average	36.14	4.20	33.45	5.09
	80th Percentile	57.45	5.84	57.43	8.25
	20th Percentile	7.73	1.50	13.13	0.06
Latency (ms)	50th Percentile	42.66	31.23	27.51	40.10

Table-66: Summary of Data performance in network auto-selection mode.

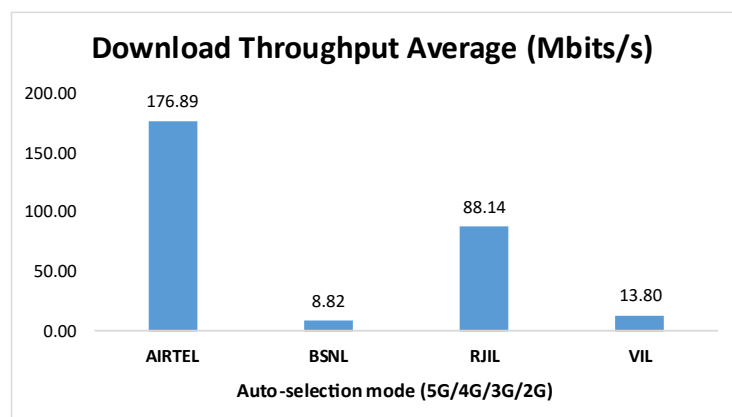


Figure-89: Download throughput.

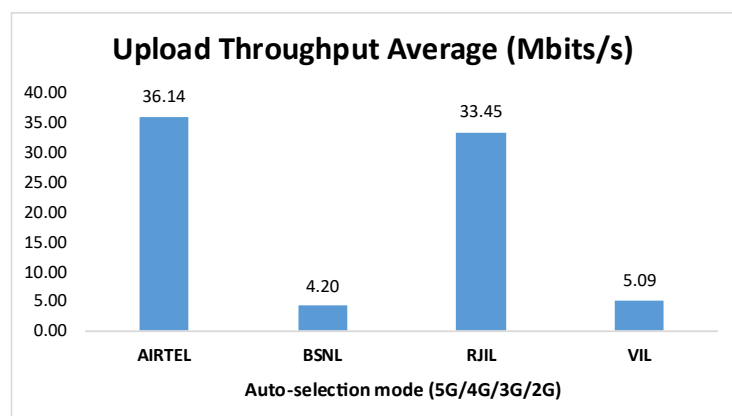


Figure- 90: Upload throughput.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	70.48%	NA	75.65%	NA
4G	21.67%	84.09%	12.97%	34.91%
3G	NA	2.24%	NA	NA
2G	0.00%	2.94%	NA	47.05%
Limited Service	7.85%	10.72%	11.38%	18.04%

Table-67: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) data.

Note-

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

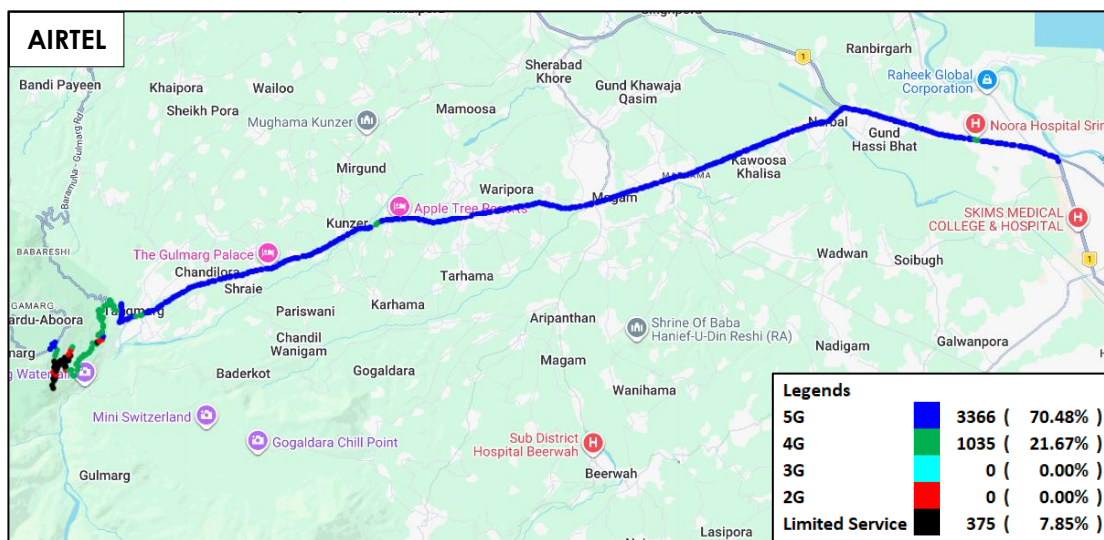


Figure-91: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

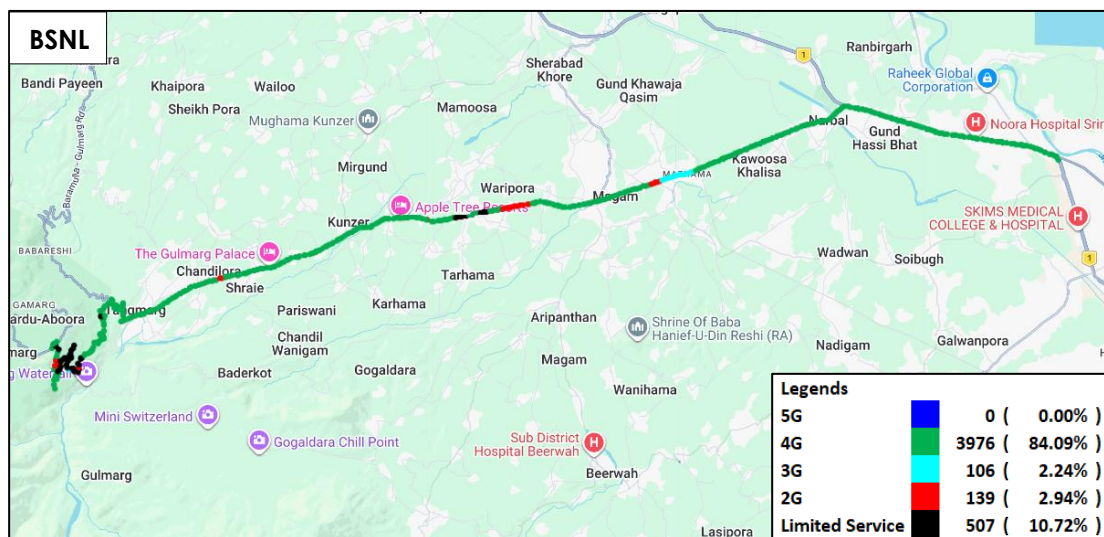


Figure-92: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - BSNL.

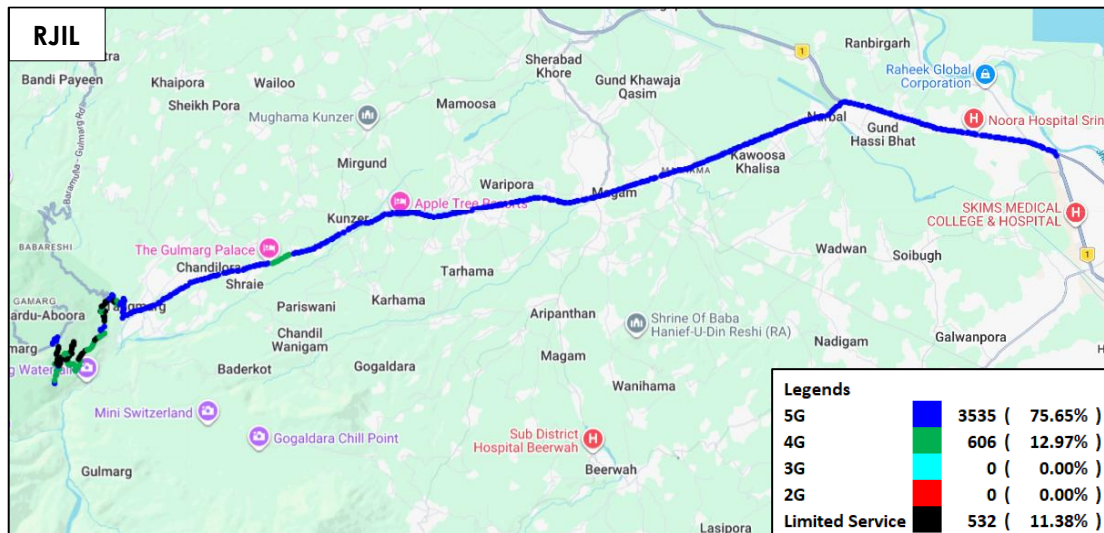


Figure-93: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

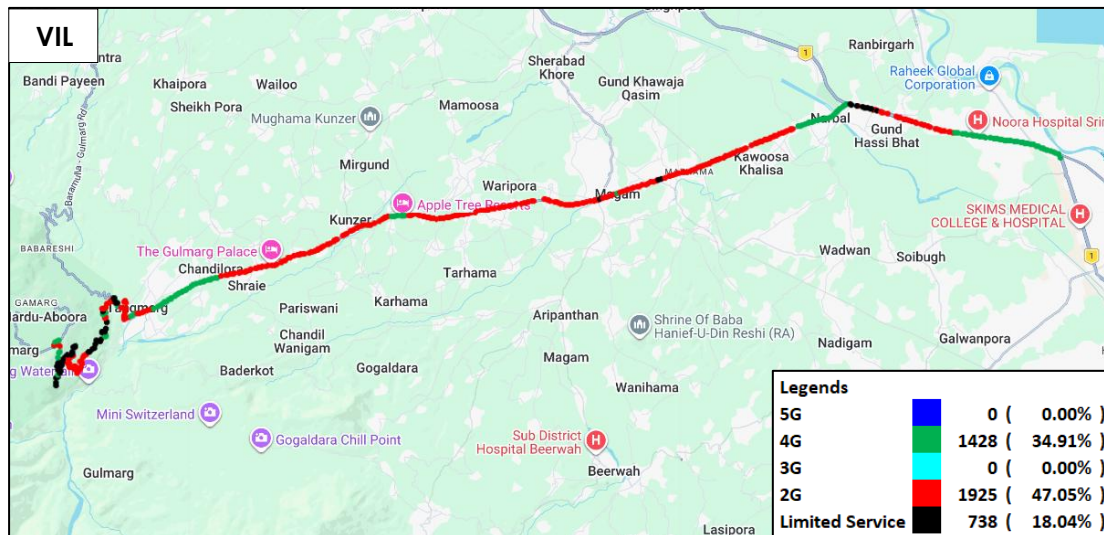


Figure-94: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-136, 137, 138 & 139 for map view)

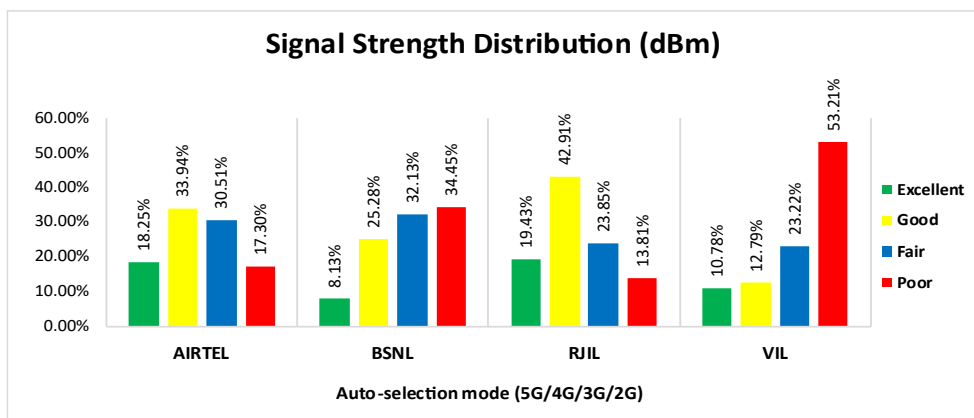


Figure-95: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 18% of samples falling in the excellent signal strength category.
- BSNL has 8% of samples falling in the excellent signal strength category.
- RJIL has 19% of samples falling in the excellent signal strength category.
- VIL has 11% of samples falling in the excellent signal strength category.

5. Voice & Data Key findings

5.1 Overall Voice

1. Call Setup Success Rate:

- a) Airtel, BSNL and VIL have 98.42%, 94.00% and 94.75% call setup success rate respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL and VIL have 99.71%, 87.95%, 99.13% and 92.59% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)
- c) All Operators have 100.00% call setup success rate while calling on peer service provider's network for inter-operator calls. (refer table-9)

2. Call Setup Time:

- a) Airtel, BSNL and VIL call setup time is 3.02, 5.69 and 3.27 seconds respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL & VIL call setup time is 1.46, 4.45, 0.62 & 1.37 seconds respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. Call Silence/Mute Rate:

In packet switched network (4G/5G) BSNL, VIL, Airtel and RJIL have 5.32%, 2.33%, 0.52% and 0.18% silence call rate respectively. Further BSNL has higher RTP packet loss rate in downlink (4.99%) compared to VIL (1.66%), RJIL (0.64%) & Airtel (0.38%). In uplink the RTP packet loss rate is higher for BSNL (3.72%) compared to VIL (1.64%), RJIL (0.58%) & Airtel (0.37%). (refer table-6)

4. Drop Call Rate:

- a) Airtel, BSNL and VIL drop call rate is 0.89%, 8.87% and 1.79% respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL and VIL drop call rate is 0.58%, 2.83%, 1.02% and 2.87% respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

5.2 Overall Data

1. Data download and upload performance (Overall i.e. LSA):

- a) Airtel, BSNL, RJIL and VIL average download speeds are 182.71 Mbps, 9.96 Mbps, 213.23 Mbps and 21.06 Mbps respectively. (refer table-11)
- b) Airtel, BSNL, RJIL and VIL average upload speeds are 32.08 Mbps, 5.68 Mbps, 34.09 Mbps and 10.02 Mbps respectively. (refer table-11)

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

- a) Airtel, BSNL, RJIL and VIL average download speeds are 116.30 Mbps, 8.83 Mbps, 240.73 Mbps and 27.02 Mbps respectively. (refer table-36)
- b) Airtel, BSNL, RJIL and VIL average upload speeds are 20.62 Mbps, 5.28 Mbps, 45.13 Mbps and 15.11 Mbps respectively. (refer table-36)

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

- a) Airtel, BSNL, RJIL and VIL have 100.00%, 90.00%, 100.00% and 86.67% download session setup success rate respectively. (refer table-36)
- b) Airtel, BSNL, RJIL and VIL have 100.00%, 100.00%, 100.00% and 86.67% upload session setup success rate respectively. (refer table-36)

5.3 Operator wise Key Findings

1.Airtel:

Voice

- 98.42% call setup success rate and 0.89% drop call rate have been observed in 3G/2G network mode for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-3)
- 99.71% call setup success rate and 0.58% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 100.00% call setup success rate and 0.86% drop call rate have been observed in 3G/2G network mode for Srinagar and Gulmarg city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar and Gulmarg city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-15)
- 100.00% call setup success rate and 1.29% drop call rate have been observed in 3G/2G network mode for Anantnag and Pahalgam city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-21)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Anantnag and Pahalgam city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-23)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-29)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at walktest location. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-50)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in 3G/2G network mode for Srinagar to Pahalgam highway route. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-52)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Pahalgam highway route. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-54)
- 70.00% call setup success rate and 0.00% drop call rate have been observed in 3G/2G network mode for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-60)
- 93.10% call setup success rate and 14.81% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-62)

Data

- Airtel has 182.71 Mbps average download speed & 32.08 Mbps average upload speed for LSA. (refer table-11)

- Airtel has 188.64 Mbps average download speed & 33.69 Mbps average upload speed across measured routes for Srinagar and Gulmarg city drive. (refer table-19)
- Airtel has 183.84 Mbps average download speed & 24.43 Mbps average upload speed across measured routes for Anantnag and Pahalgam city drive. (refer table-27)
- Betaab Valley View Point, Hari Singh High St. and University of Kashmir Srinagar have less download speed (less than 100 Mbps) out of total 6 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-38, 39 & 42)
- Betaab Valley View Point, Srinagar Railway Station and University of Kashmir Srinagar have less upload speed (less than 20 Mbps) out of total 6 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-38, 41 & 42)
- Airtel has 192.01 Mbps average download speed & 34.19 Mbps average upload speed across measured routes for Srinagar to Pahalgam highway route. (refer table-58)
- Airtel has 176.89 Mbps average download speed & 36.14 Mbps average upload speed across measured routes for Srinagar to Gulmarg highway route. (refer table-66)

2. BSNL:

Voice

- 94.00% call setup success rate and 8.87% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3)
- 87.95% call setup success rate and 2.83% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 96.96% call setup success rate and 8.55% drop call rate have been observed in 3G/2G network mode for Srinagar and Gulmarg city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 89.47% call setup success rate and 2.06% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar and Gulmarg city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-15)
- 89.82% call setup success rate and 9.33% drop call rate have been observed in 3G/2G network mode for Anantnag and Pahalgam city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-21)
- 82.08% call setup success rate and 2.82% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Anantnag and Pahalgam city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-23)
- 95.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-29)
- 94.12% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at walktest location. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-50)

- 100.00% call setup success rate and 5.00% drop call rate have been observed in 3G/2G network mode for Srinagar to Pahalgam highway route. Performance is not meeting the benchmark of 2.00% for drop call rate. (refer table-52)
- 86.36% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Pahalgam highway route. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-54)
- 74.19% call setup success rate and 17.39% drop call rate have been observed in 3G/2G network mode for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-60)
- 83.87% call setup success rate and 26.92% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-62)

Data

- BSNL has 9.96 Mbps average download speed & 5.68 Mbps average upload speed for LSA. (refer table-11)
- BSNL has 10.77 Mbps average download speed & 6.34 Mbps average upload speed across measured routes for Srinagar and Gulmarg city drive. (refer table-19)
- BSNL has 6.86 Mbps average download speed & 2.91 Mbps average upload speed across measured routes for Anantnag and Pahalgam city drive. (refer table-27)
- All hotspot locations have less download speed (less than 10 Mbps) except Betaab Valley View Point and SMHS Hospital for auto-selection mode (5G/4G/3G/2G). (refer table-37, 39, 41 & 42)
- Lal Chowk to Ghanta Ghar walk test location has less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-51)
- BSNL has 14.61 Mbps average download speed & 8.00 Mbps average upload speed across measured routes for Srinagar to Pahalgam highway route. (refer table-58)
- BSNL has 8.82 Mbps average download speed & 4.20 Mbps average upload speed across measured routes for Srinagar to Gulmarg highway route. (refer table-66)

3. RJIL:

Voice

- 99.13% call setup success rate and 1.02% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar and Gulmarg 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 in auto-selection mode (5G/4G/3G/2G) for Anantnag and Pahalgam city drive.

Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-23)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-29)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at walktest location. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-50)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Pahalgam highway route. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-54)
- 81.82% call setup success rate and 25.93% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-62)

Data

- RJIL has 213.23 Mbps average download speed & 34.09 Mbps average upload speed for LSA. (refer table-11)
- RJIL has 276.92 Mbps average download speed & 35.90 Mbps average upload speed across measured routes for Srinagar and Gulmarg city drive. (refer table-19)
- RJIL has 163.53 Mbps average download speed & 24.98 Mbps average upload speed across measured routes for Anantnag and Pahalgam city drive. (refer table-27)
- Accounts General Office, Betaab Valley View Point and SMHS Hospital have less download speed (less than 100 Mbps) out of total 6 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-37, 38 & 40)
- Betaab Valley View Point, SMHS Hospital and Srinagar Railway Station have less upload speed (less than 20 Mbps) out of total 6 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-38, 40 & 41)
- RJIL has 88.24 Mbps average download speed & 32.05 Mbps average upload speed across measured routes for Srinagar to Pahalgam highway route. (refer table-58)
- RJIL has 88.14 Mbps average download speed & 33.45 Mbps average upload speed across measured routes for Srinagar to Gulmarg highway route. (refer table-66)

4. VIL: Voice

- 94.75% call setup success rate and 1.79% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-3)
- 92.59% call setup success rate and 2.87% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)

- 99.72% call setup success rate and 0.29% drop call rate have been observed in 3G/2G network mode for Srinagar and Gulmarg city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 98.36% call setup success rate and 0.83% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar and Gulmarg city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-15)
- 92.55% call setup success rate and 2.68% drop call rate have been observed in 3G/2G network mode for Anantnag and Pahalgam city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-21)
- 84.30% call setup success rate and 3.45% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Anantnag and Pahalgam city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-23)
- 95.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-29)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at walktest location. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-50)
- 100.00% call setup success rate and 5.00% drop call rate have been observed in 3G/2G network mode for Srinagar to Pahalgam highway route. Performance is not meeting the benchmark of 2.00% for drop call rate. (refer table-52)
- 95.35% call setup success rate and 9.76% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Pahalgam highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-54)
- 53.85% call setup success rate and 14.29% drop call rate have been observed in 3G/2G network mode for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-60)
- 62.50% call setup success rate and 28.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for Srinagar to Gulmarg highway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-62)

Data

- VIL has 21.06 Mbps average download speed & 10.02 Mbps average upload speed for LSA. (refer table-11)
- VIL has 24.14 Mbps average download speed & 10.79 Mbps average upload speed across measured routes for Srinagar and Gulmarg city drive. (refer table-19)
- VIL has 12.92 Mbps average download speed & 5.79 Mbps average upload speed across measured routes for Anantnag and Pahalgam city drive. (refer table-27)

- Betaab Valley View Point has less download speed (less than 10 Mbps) out of total 6 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-38)
- Betaab Valley View Point has less upload speed (less than 2 Mbps) out of total 6 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-38)
- VIL has 14.27 Mbps average download speed & 5.90 Mbps average upload speed across measured routes for Srinagar to Pahalgam highway route. (refer table-58)
- VIL has 13.80 Mbps average download speed & 5.09 Mbps average upload speed across measured routes for Srinagar to Gulmarg highway route. (refer table-66)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

i) Srinagar & Gulmarg City

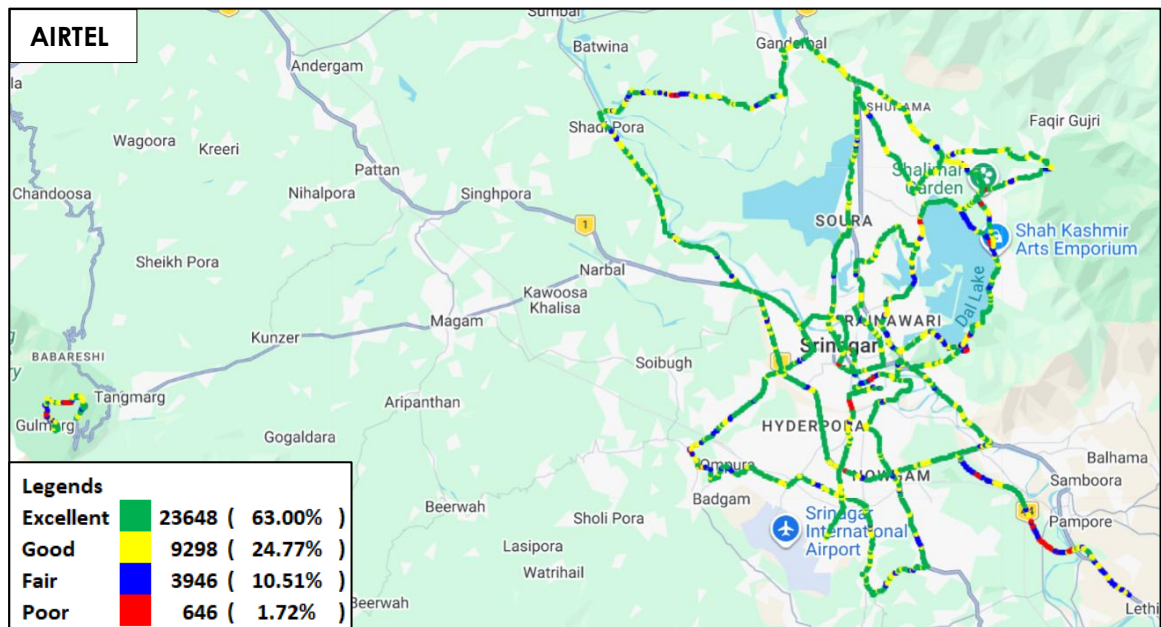


Figure-96: Signal strength 3G/2G network mode voice - AIRTEL.

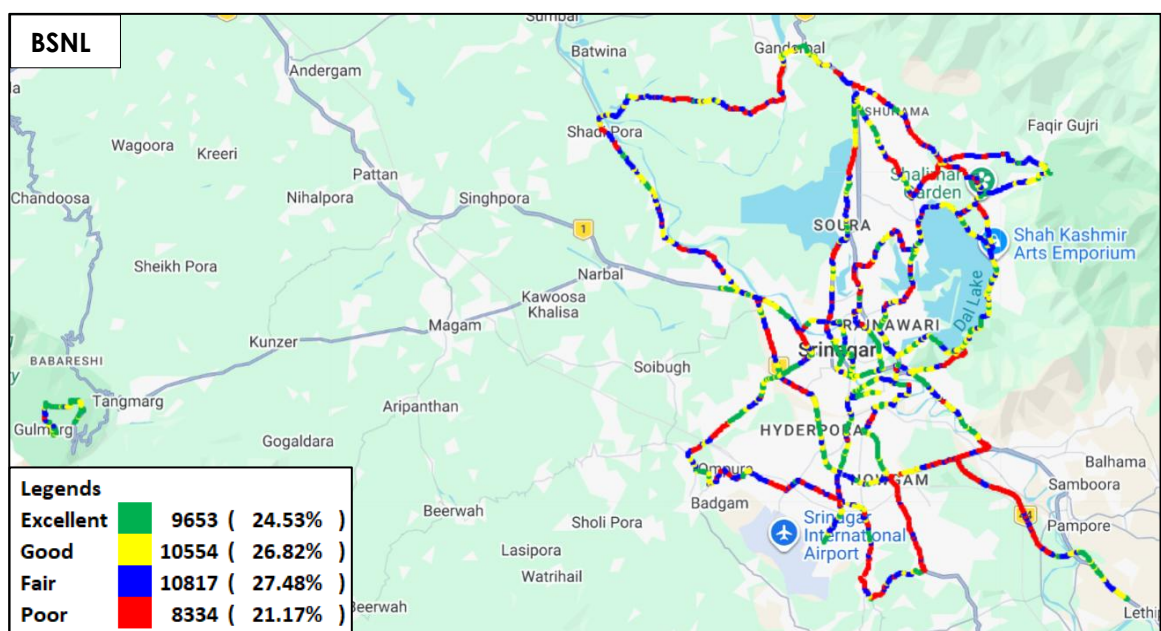


Figure-97: Signal strength 3G/2G network mode voice - BSNL.

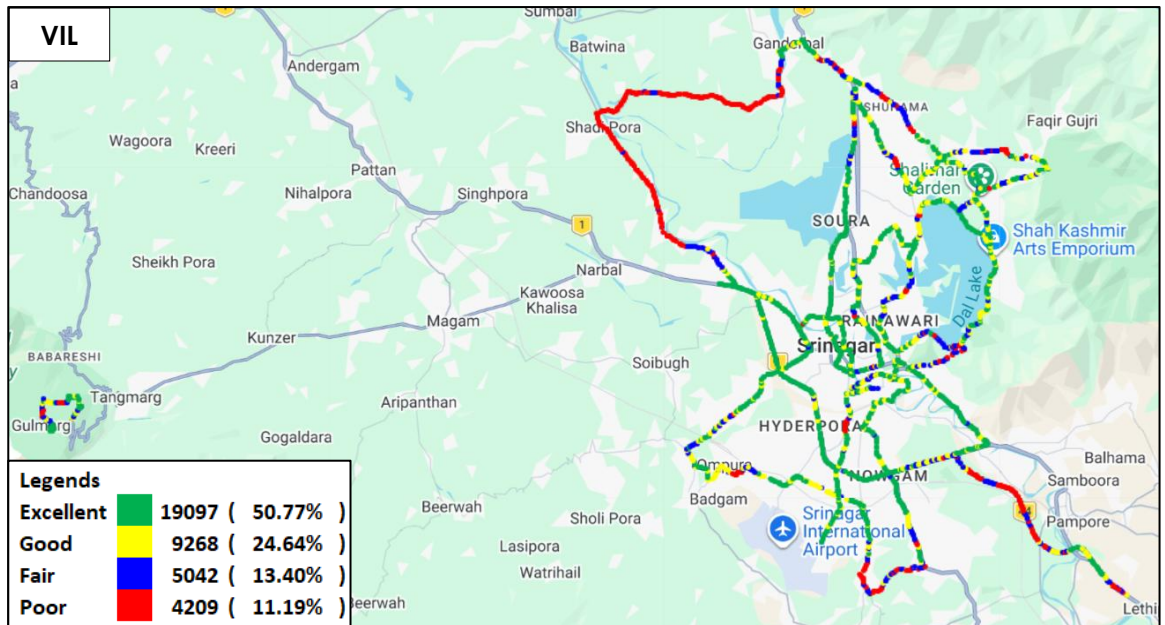


Figure-98: Signal strength 3G/2G network mode voice - VIL.

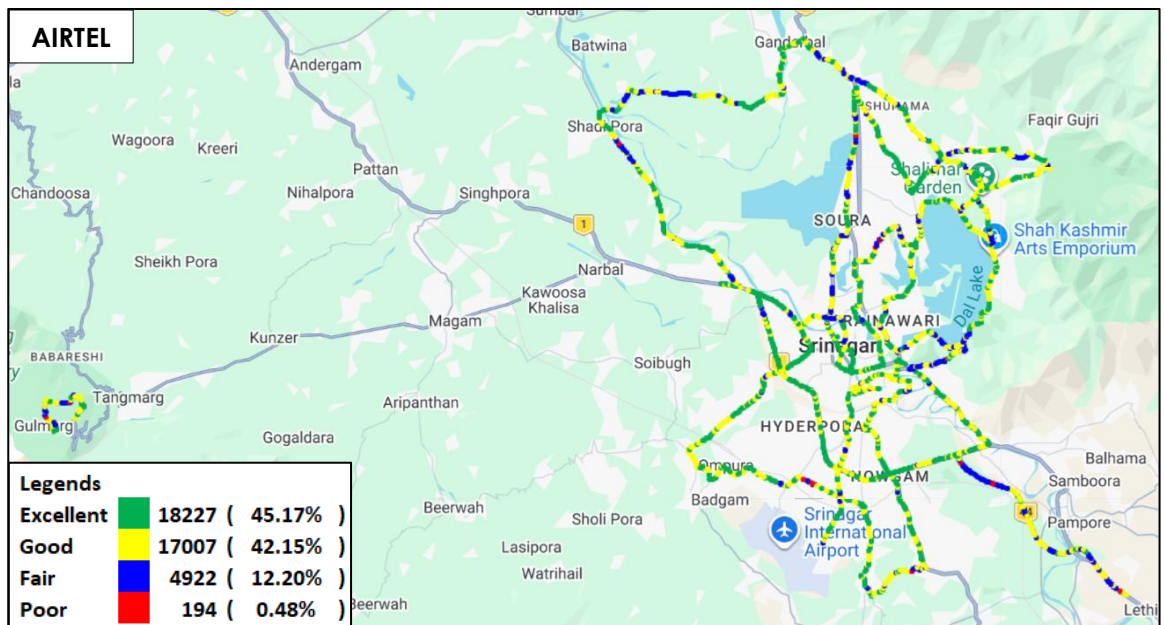


Figure-99: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

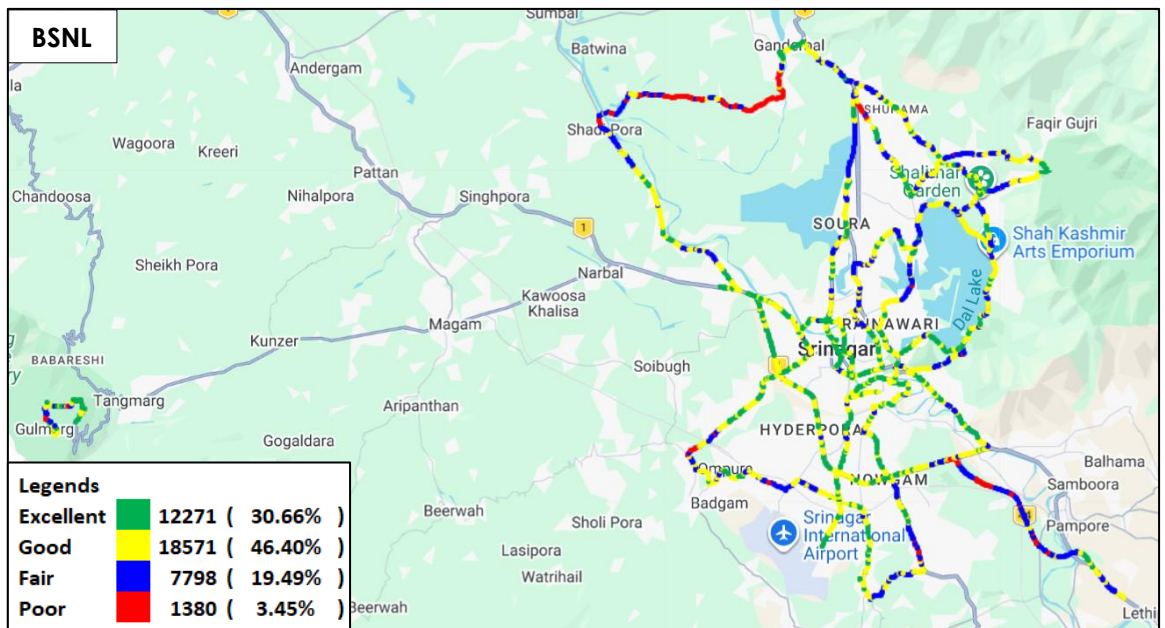


Figure-100: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL.

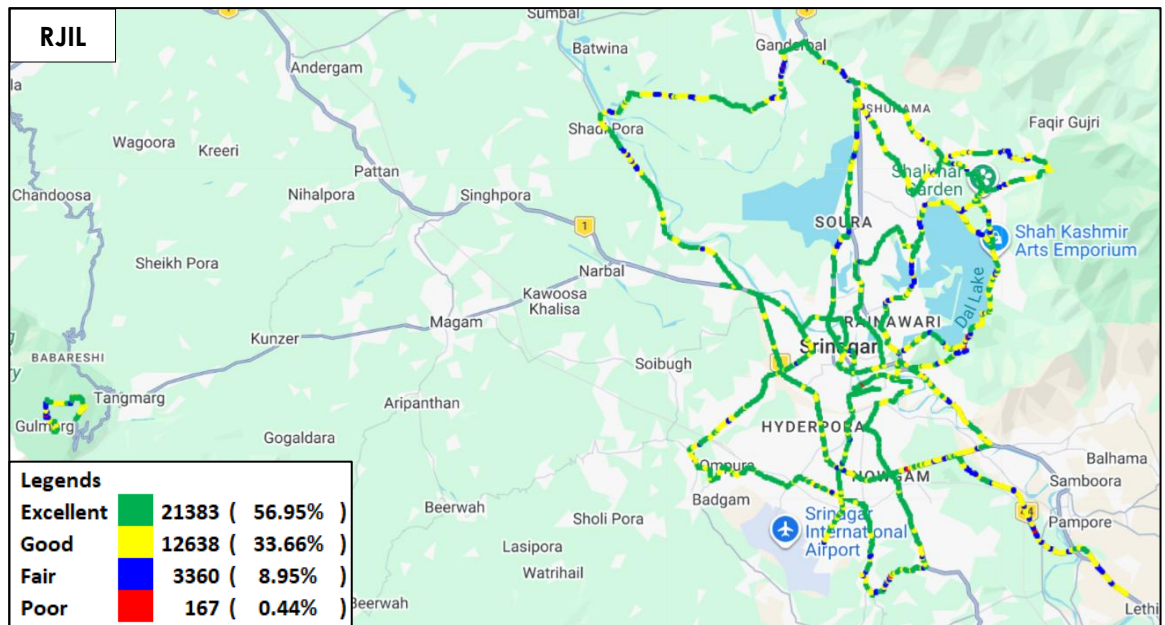


Figure-101: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

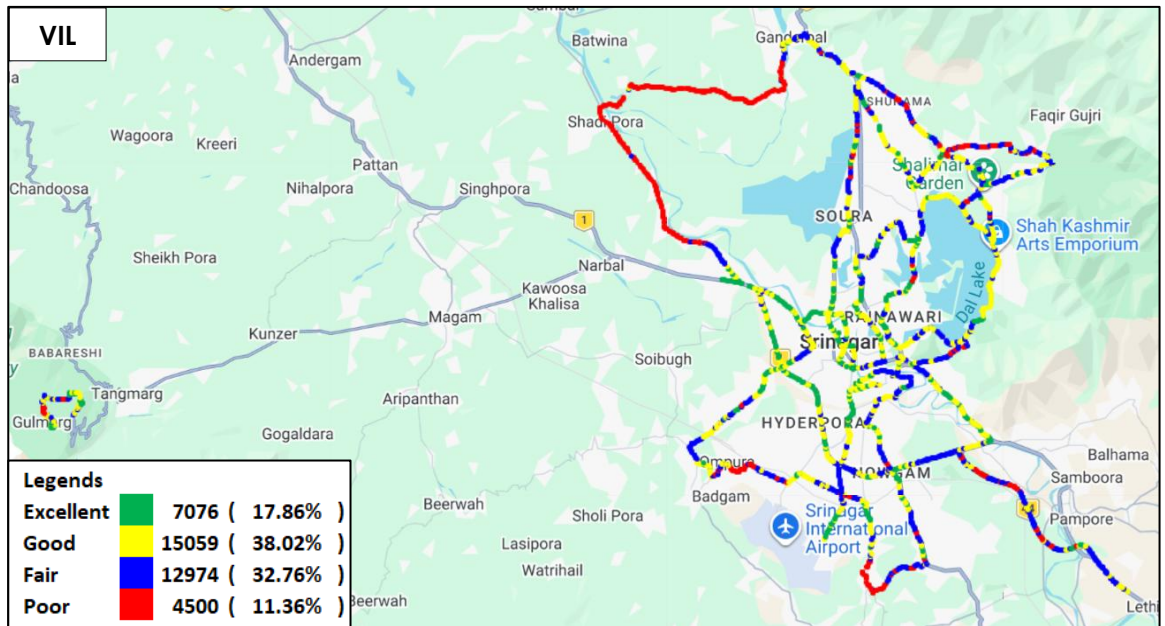


Figure-102: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.

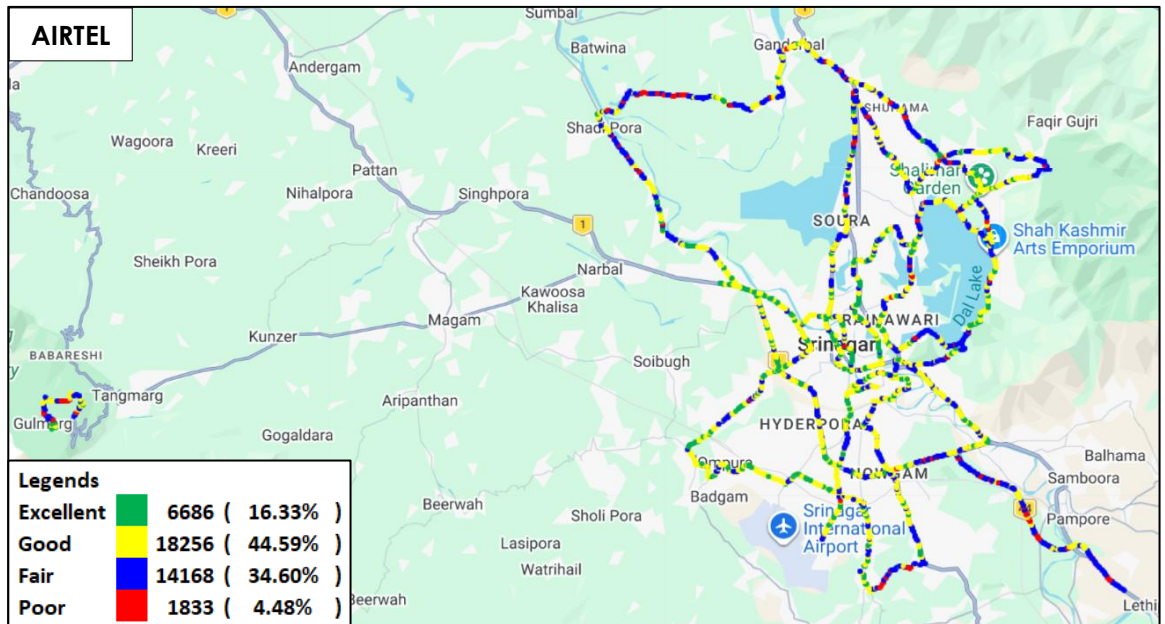


Figure-103: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

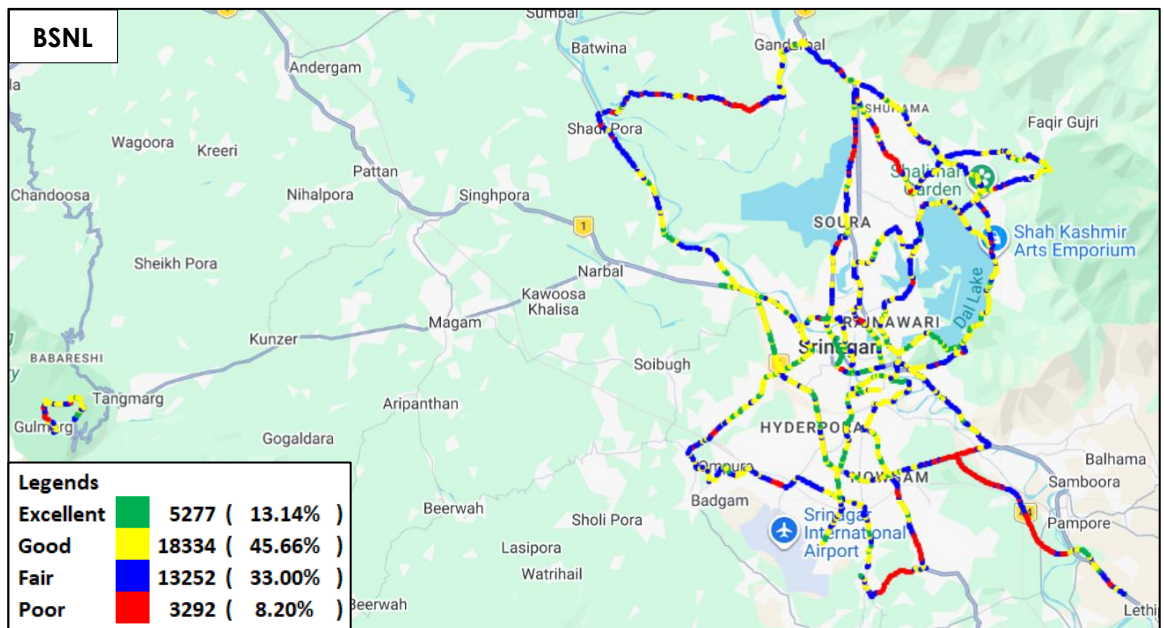


Figure-104: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL.

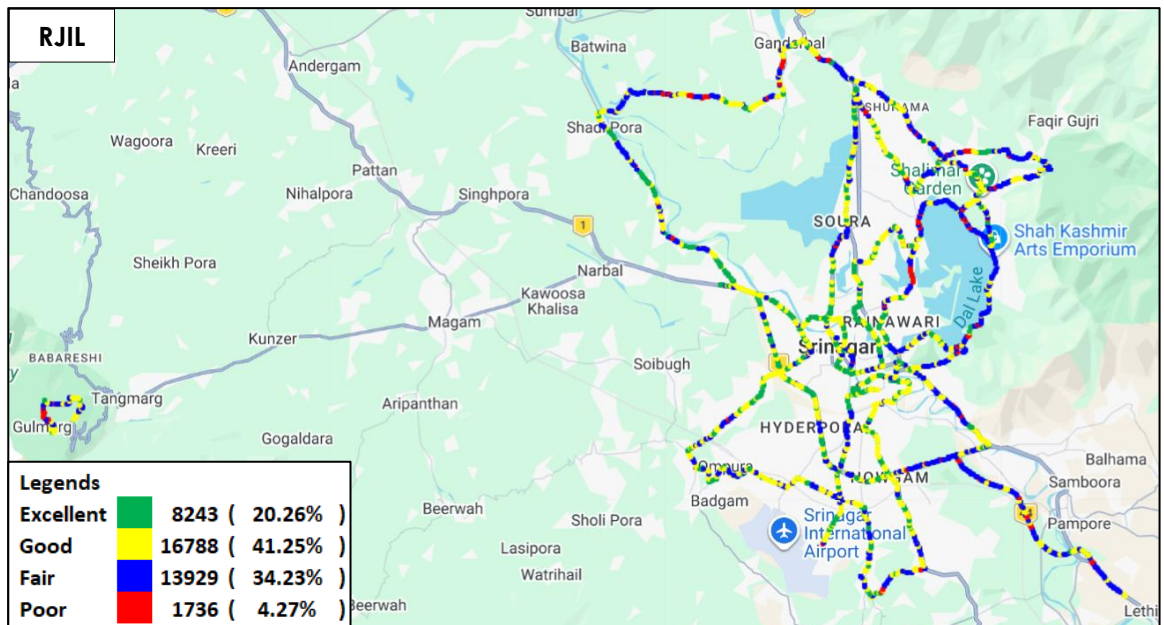


Figure-105: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.

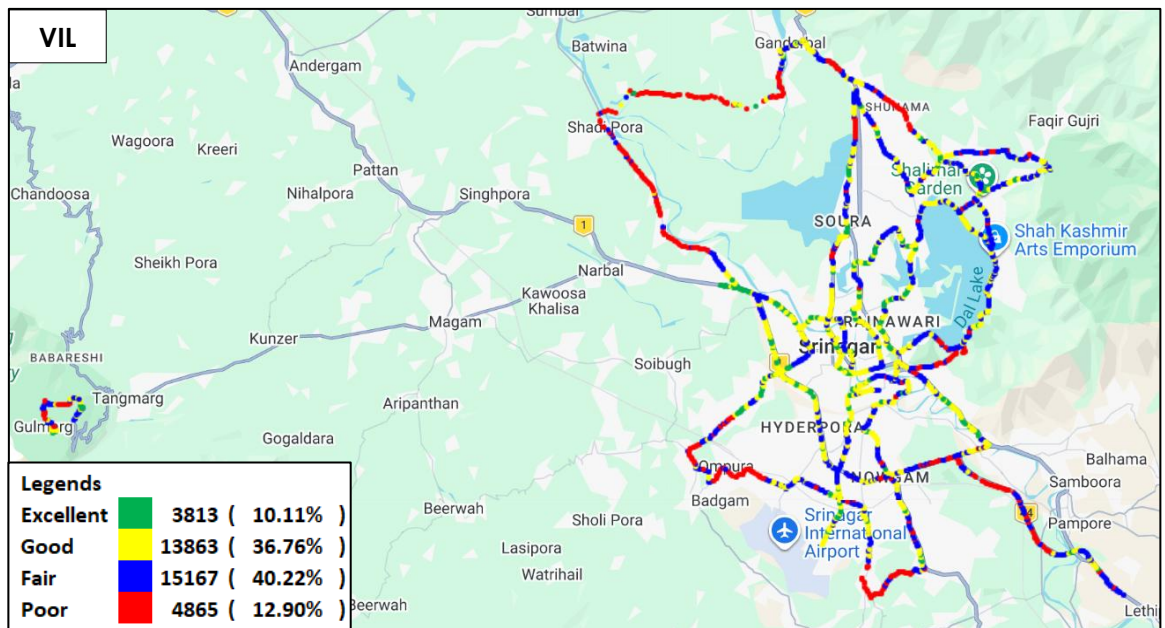


Figure-106: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

ii) Anantnag & Pahalgam City

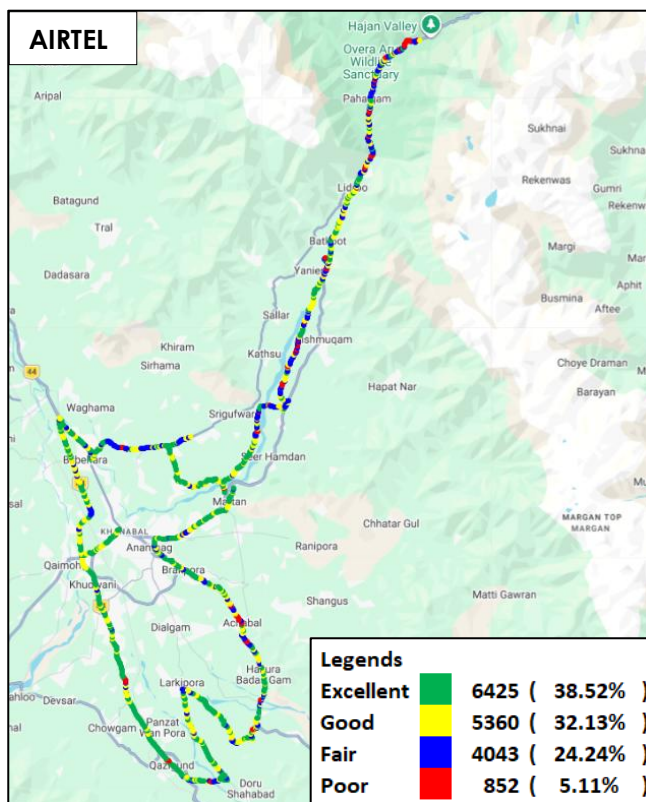


Figure-107: Signal strength 3G/2G network mode voice - AIRTEL.

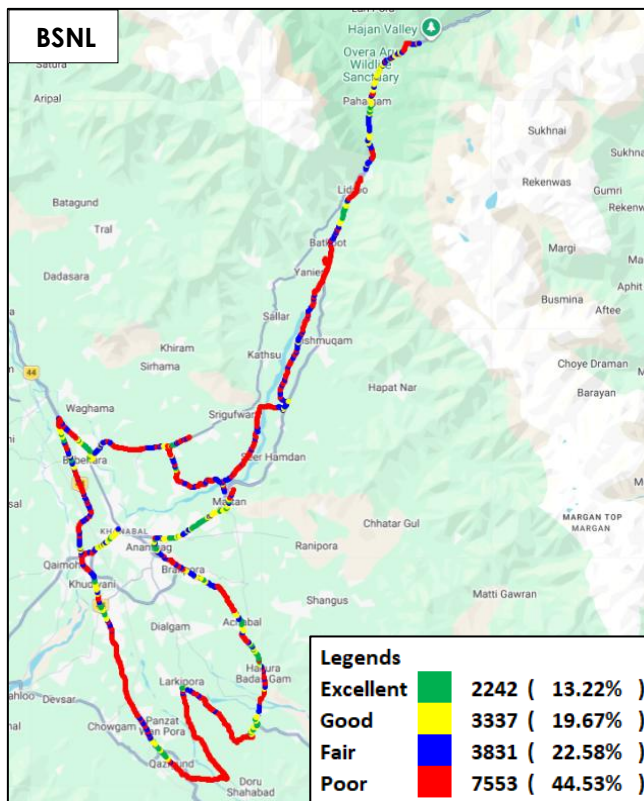


Figure-108: Signal strength 3G/2G network mode voice - BSNL.

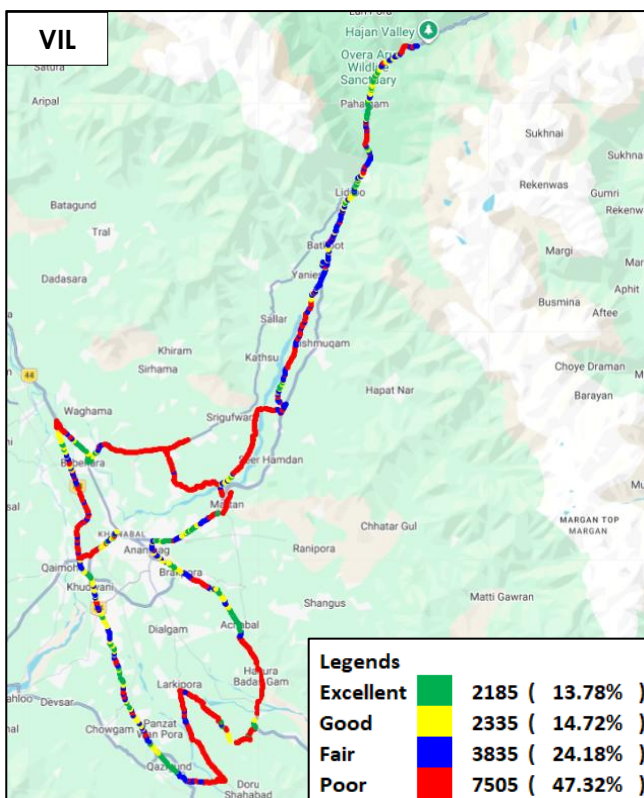


Figure-109: Signal strength 3G/2G network mode voice - VIL.

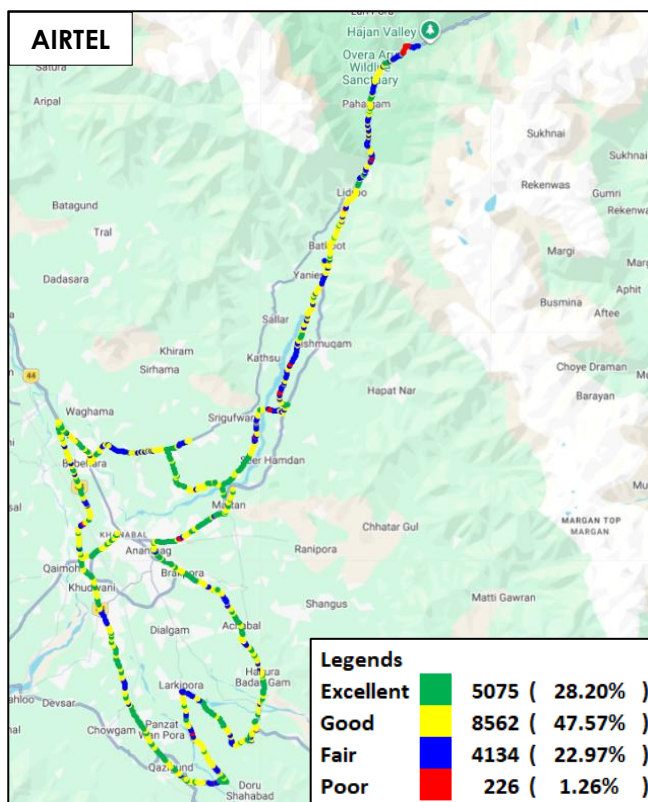


Figure-110: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

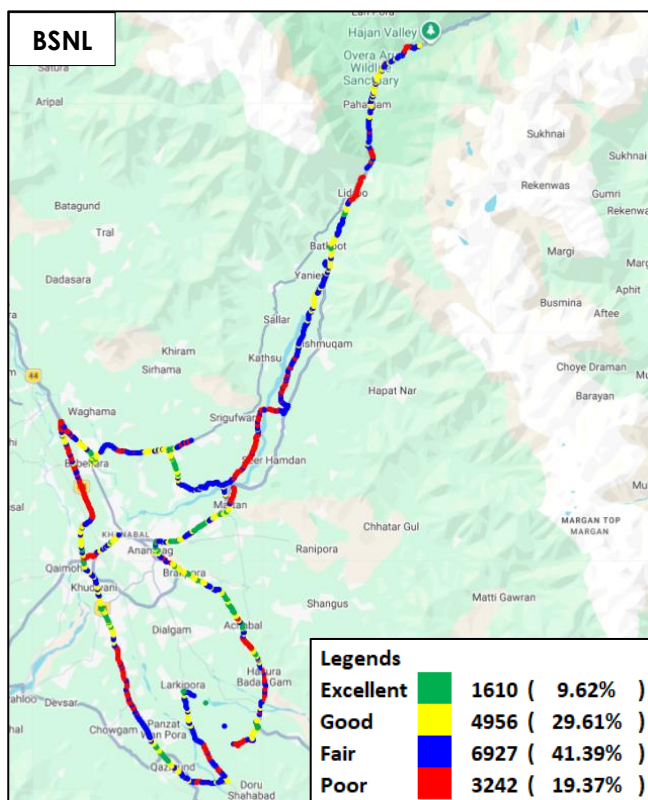


Figure-111: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL.

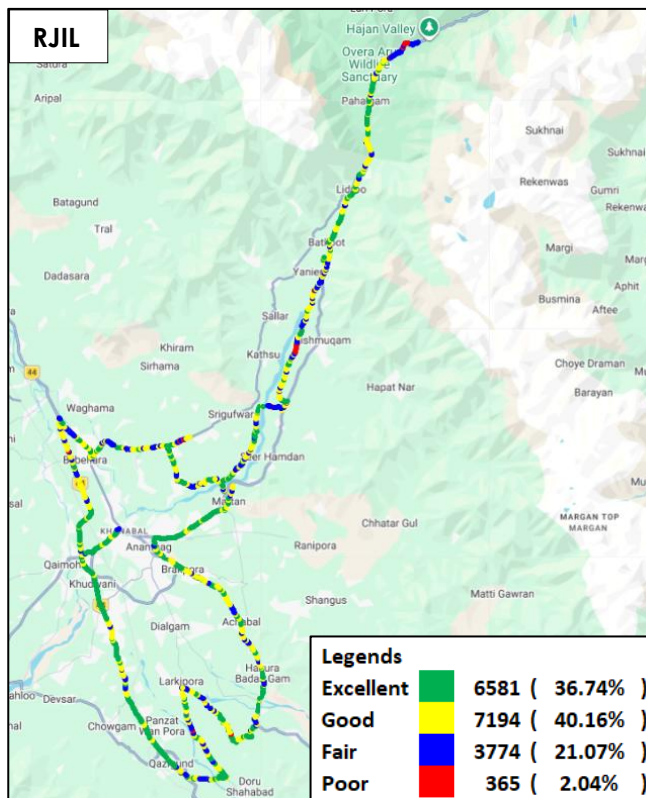


Figure-112: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

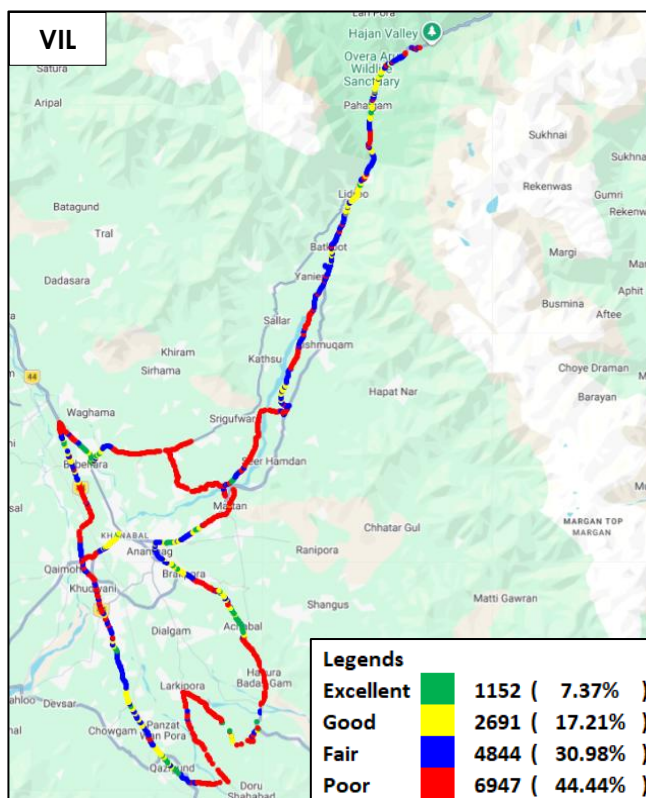


Figure-113: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.

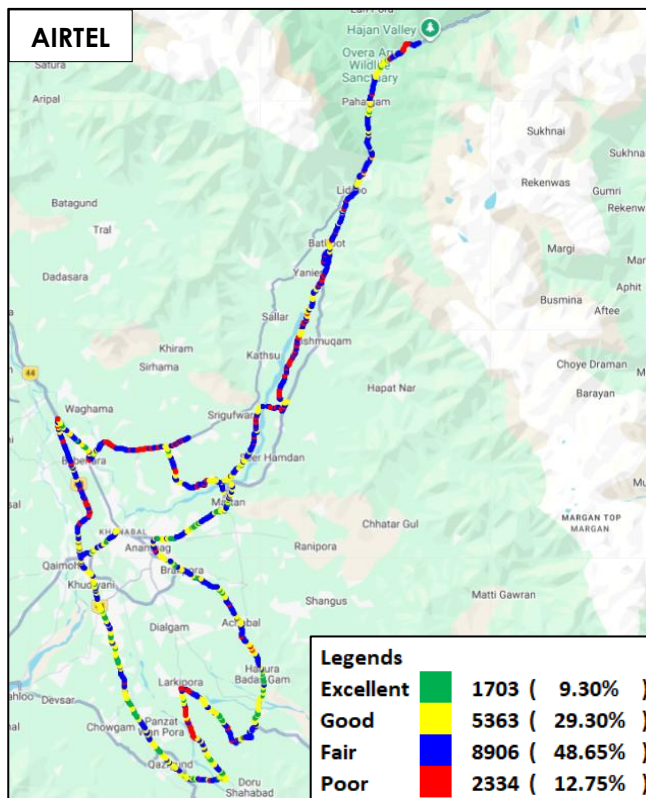


Figure-114: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

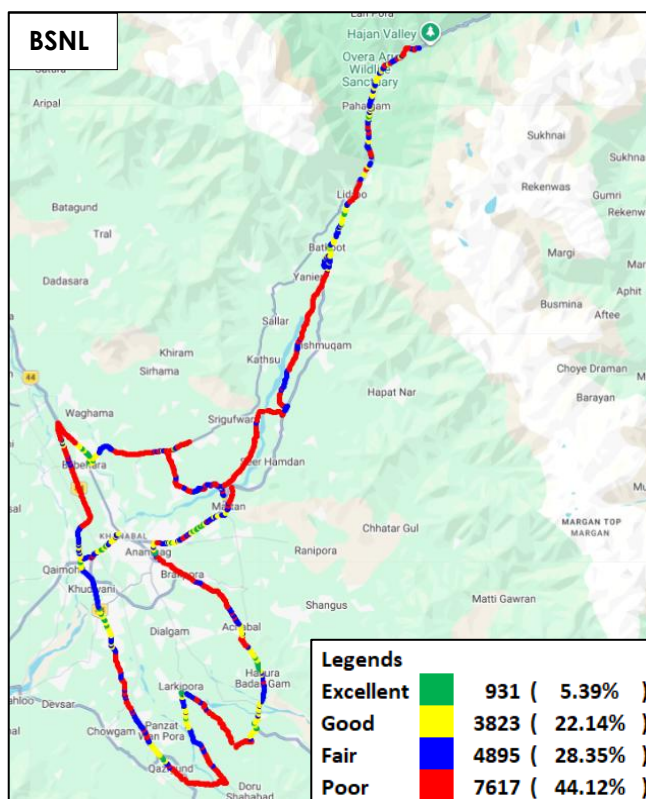


Figure-115: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL.

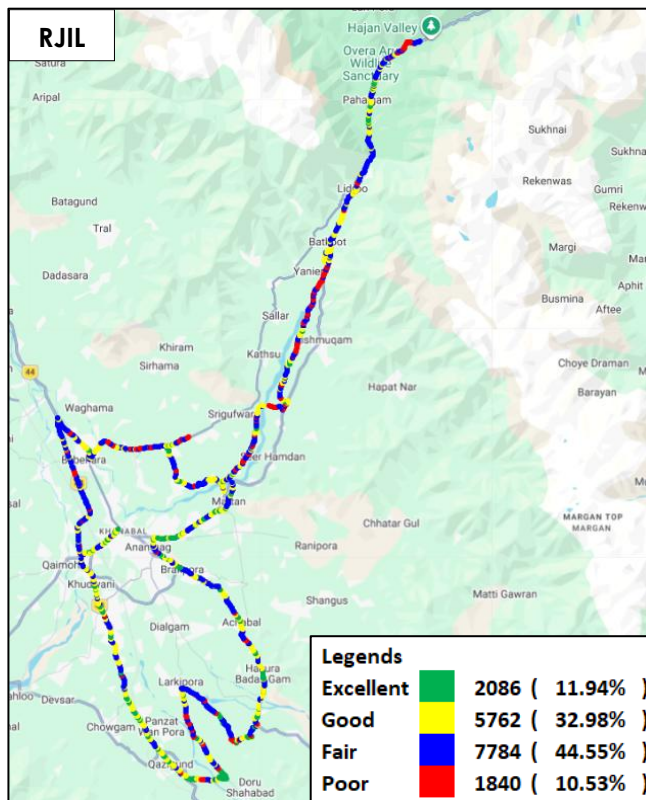


Figure-116: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.

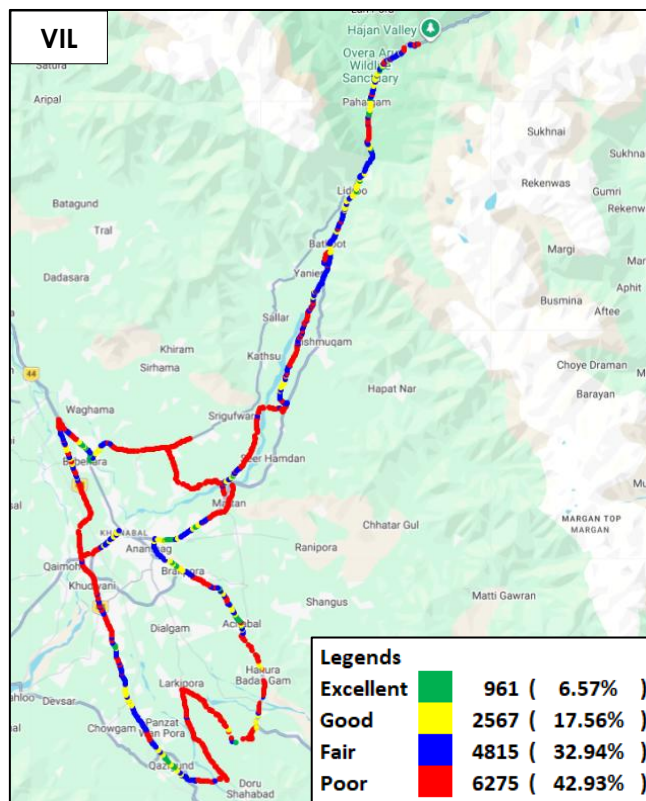


Figure-117: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

6.2.1 Highway

i) Srinagar to Pahalgam

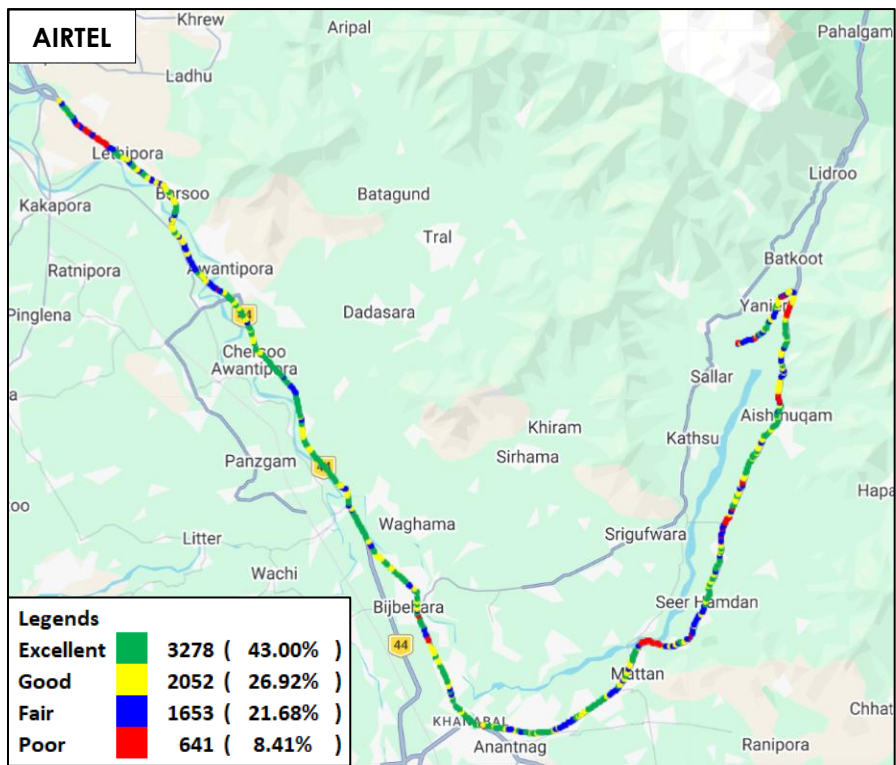


Figure-118: Signal strength 3G/2G network mode voice - AIRTEL.

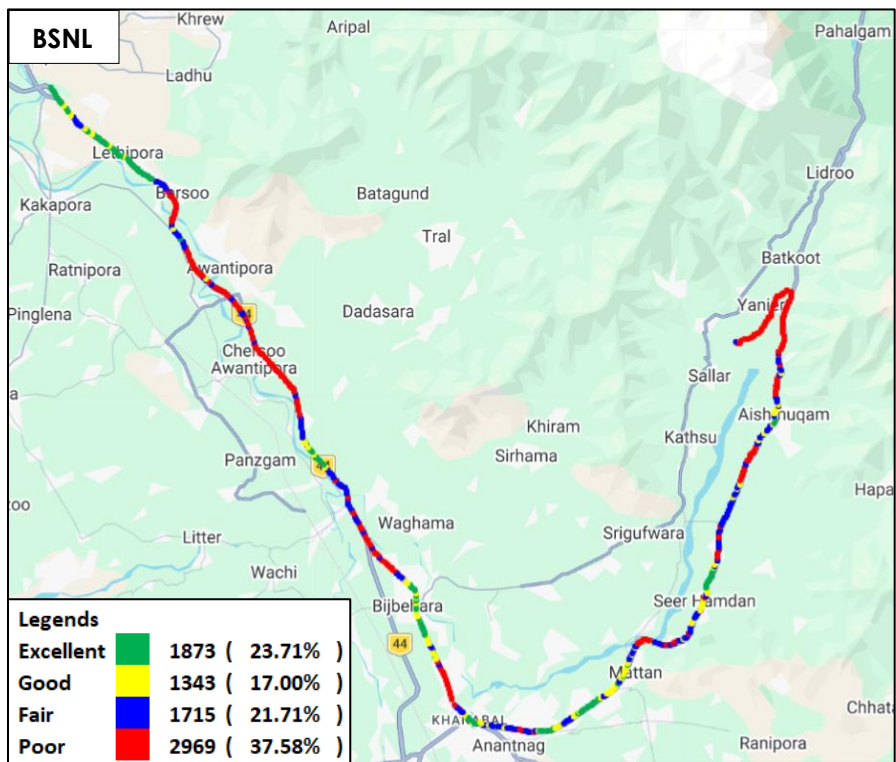


Figure-119: Signal strength 3G/2G network mode voice - BSNL.

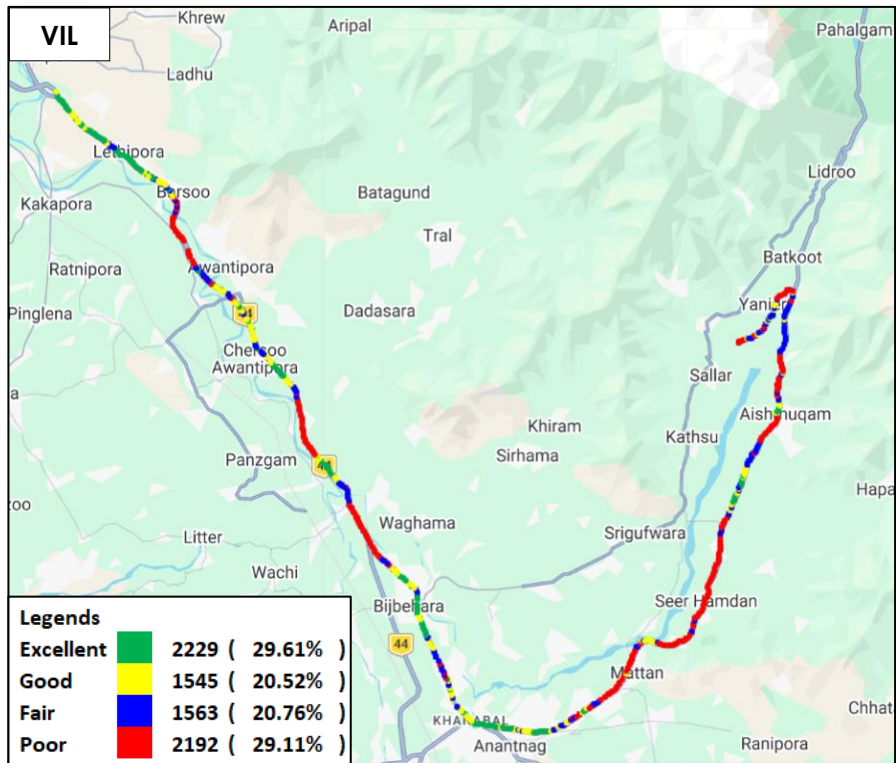


Figure-120: Signal strength 3G/2G network mode voice - VIL.

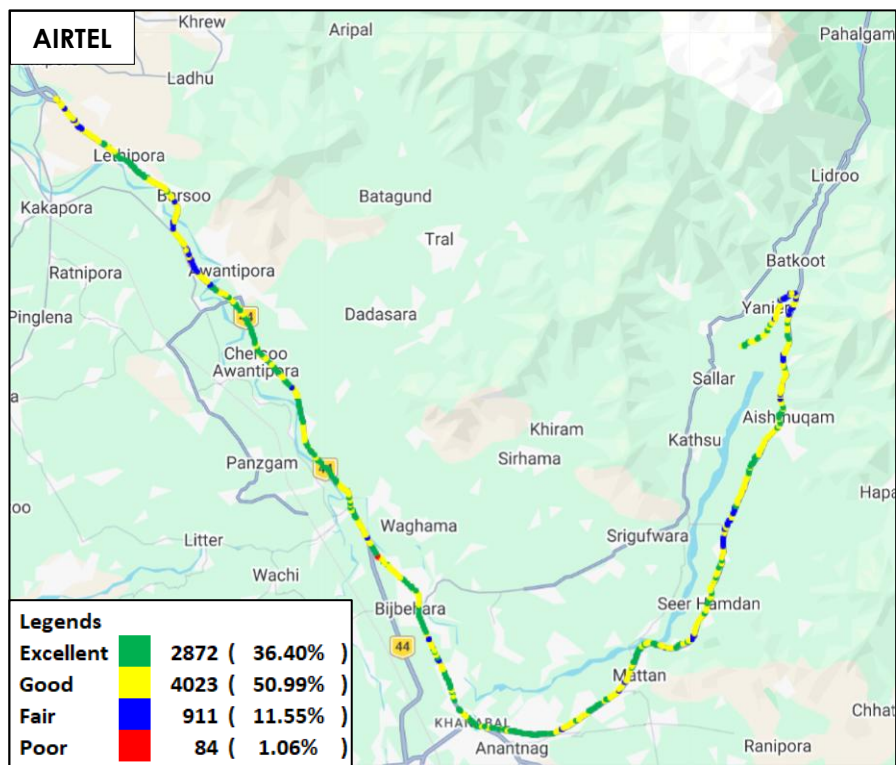


Figure-121: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

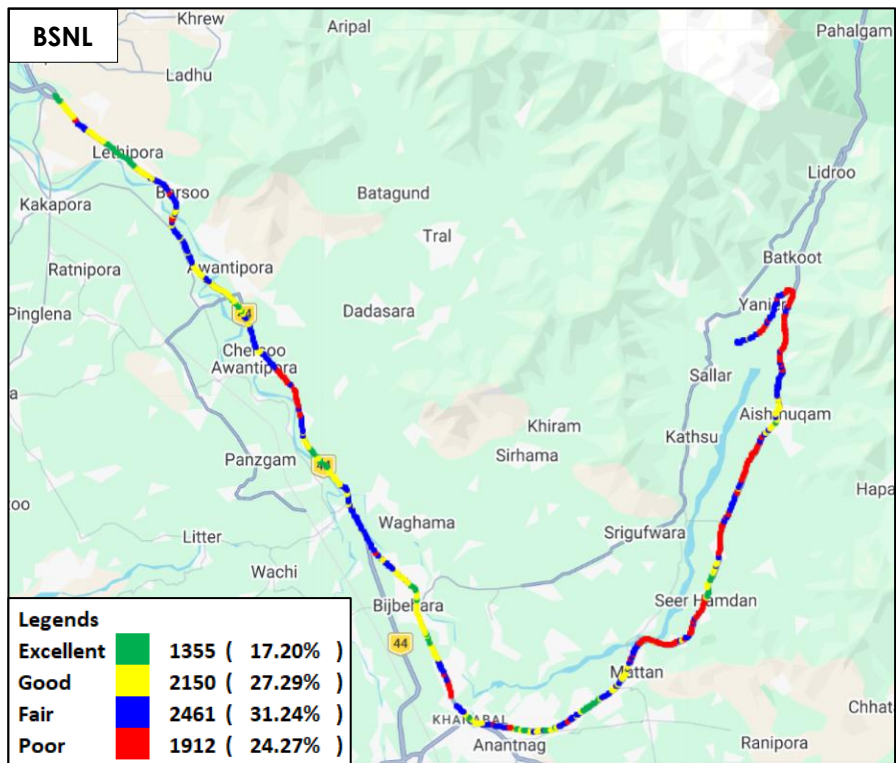


Figure-122: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL.

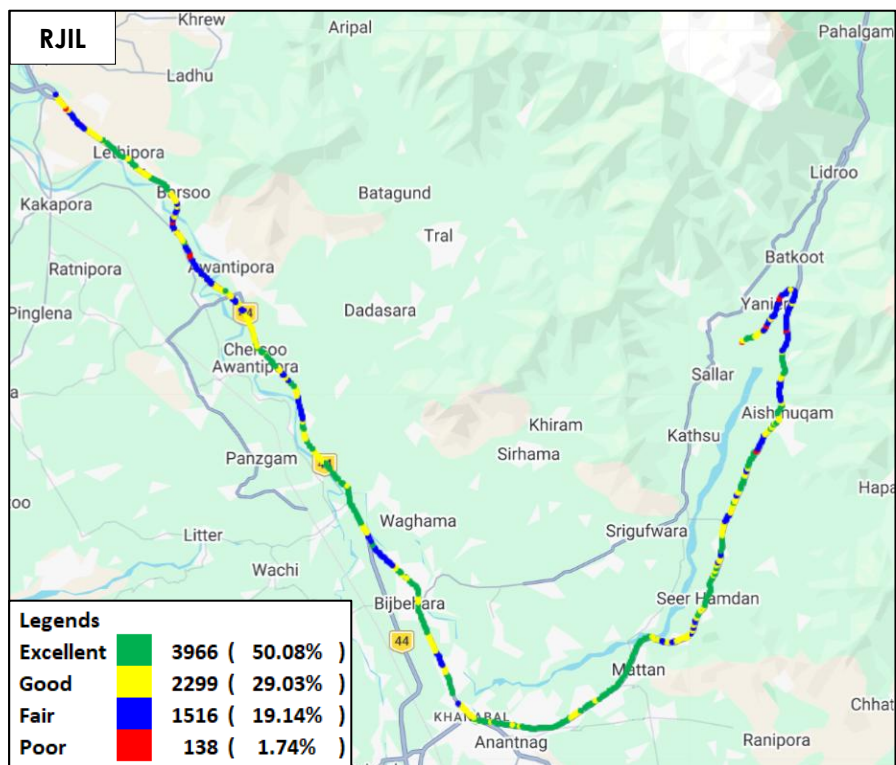


Figure-123: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

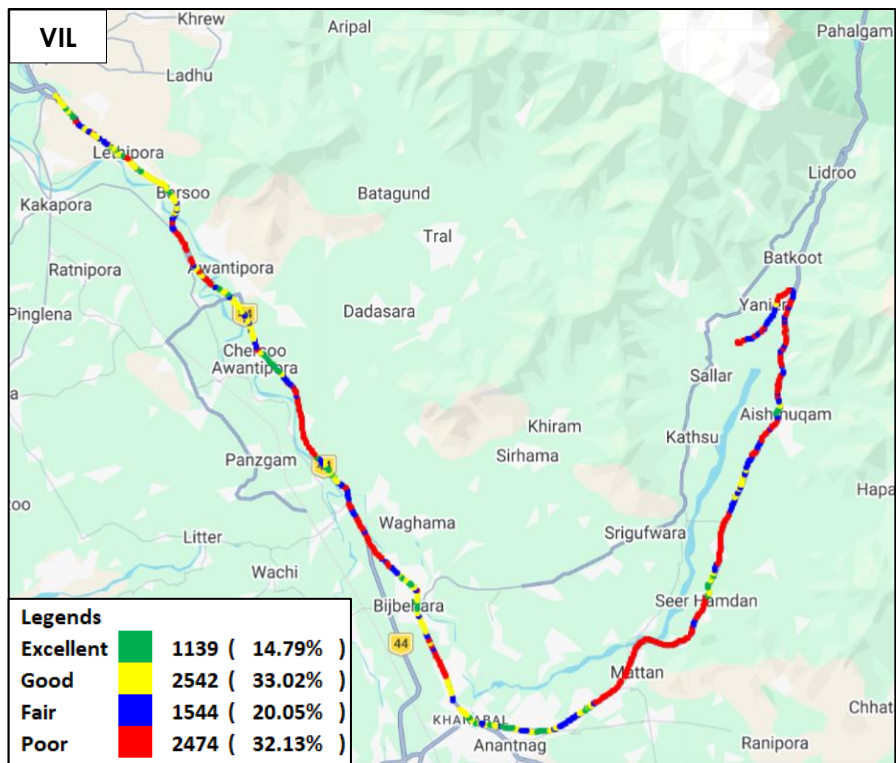


Figure-124: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.

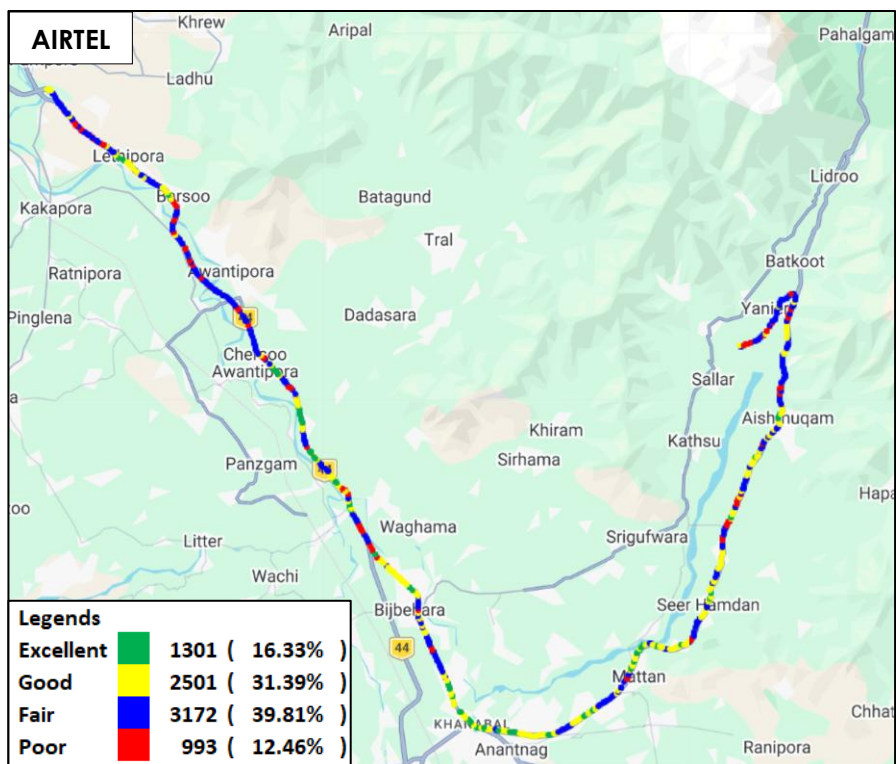


Figure-125: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

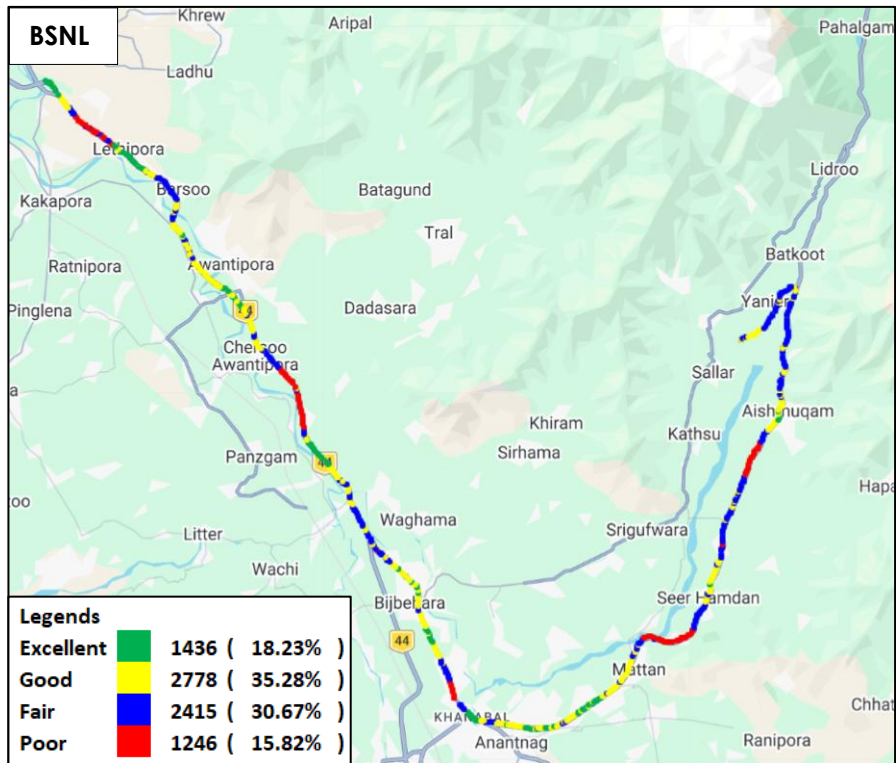


Figure-126: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL.

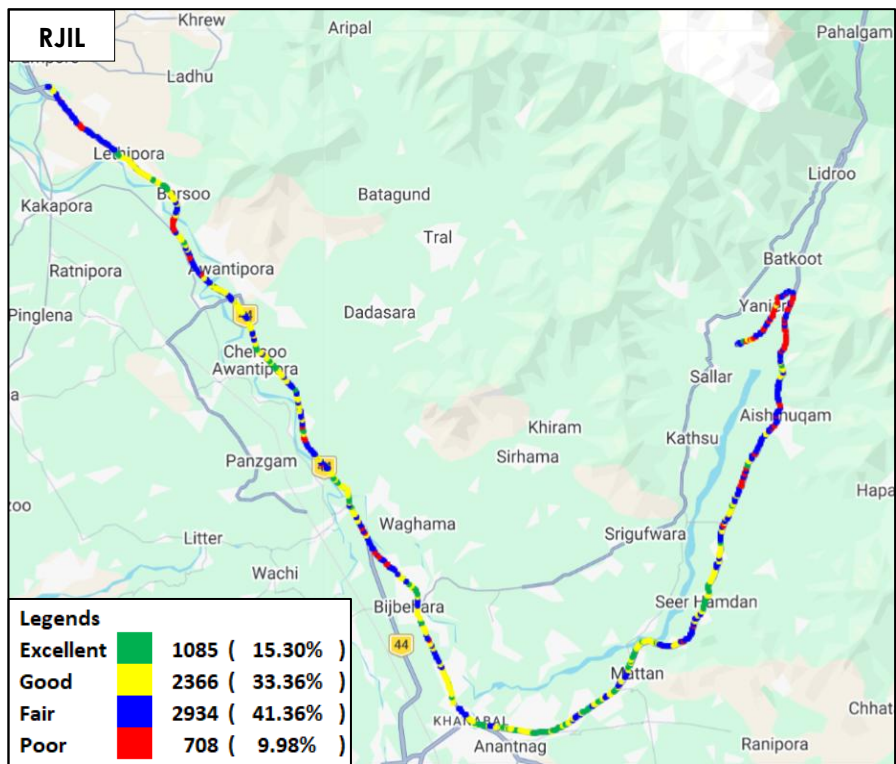


Figure-127: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.

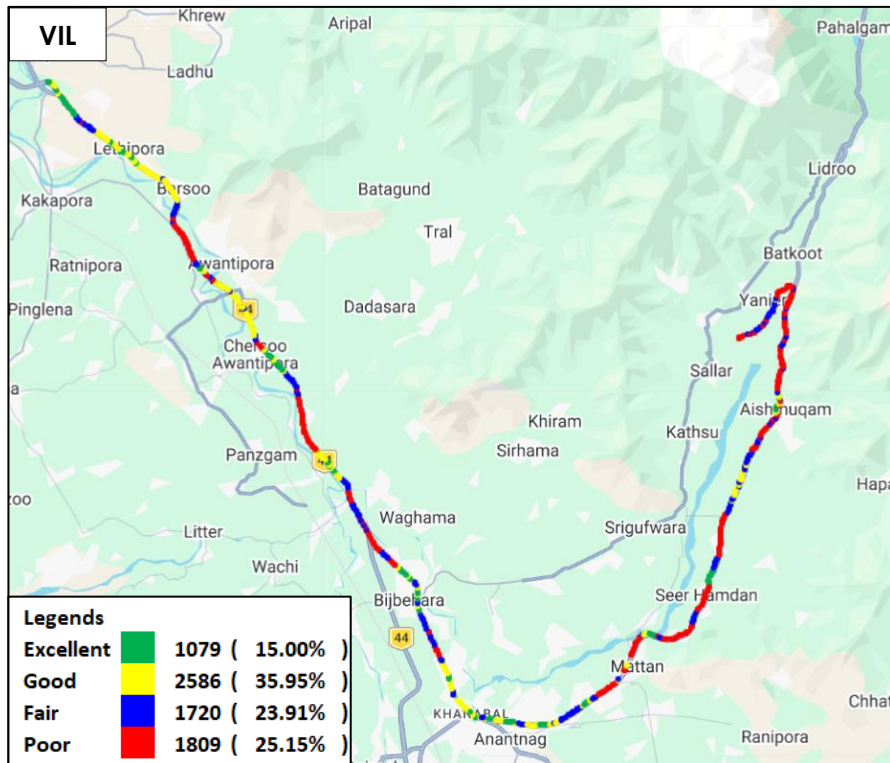


Figure-128: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

ii) Srinagar to Gulmarg

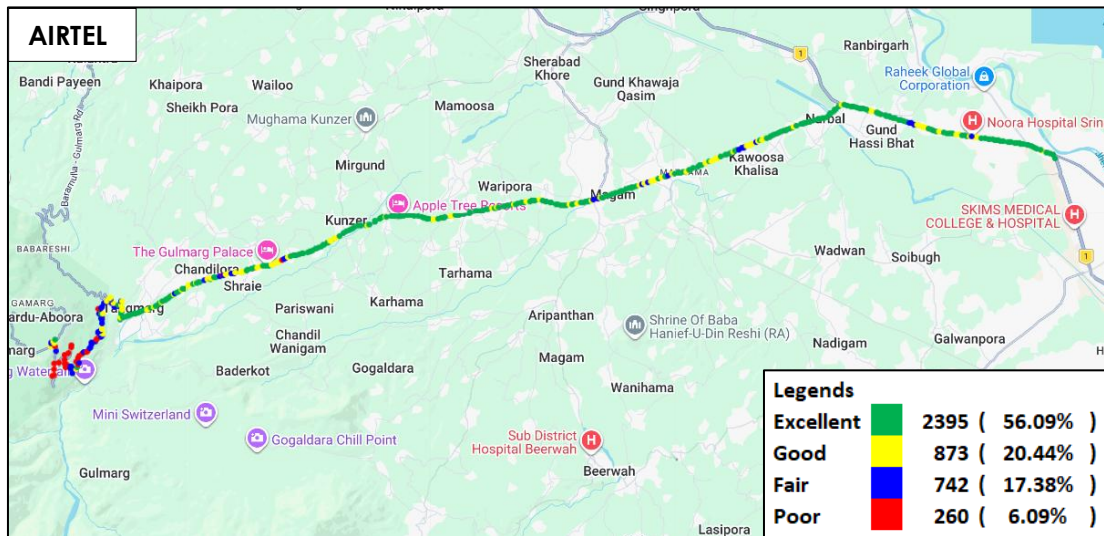


Figure-129: Signal strength 3G/2G network mode voice - AIRTEL.



Figure-130: Signal strength 3G/2G network mode voice - BSNL.

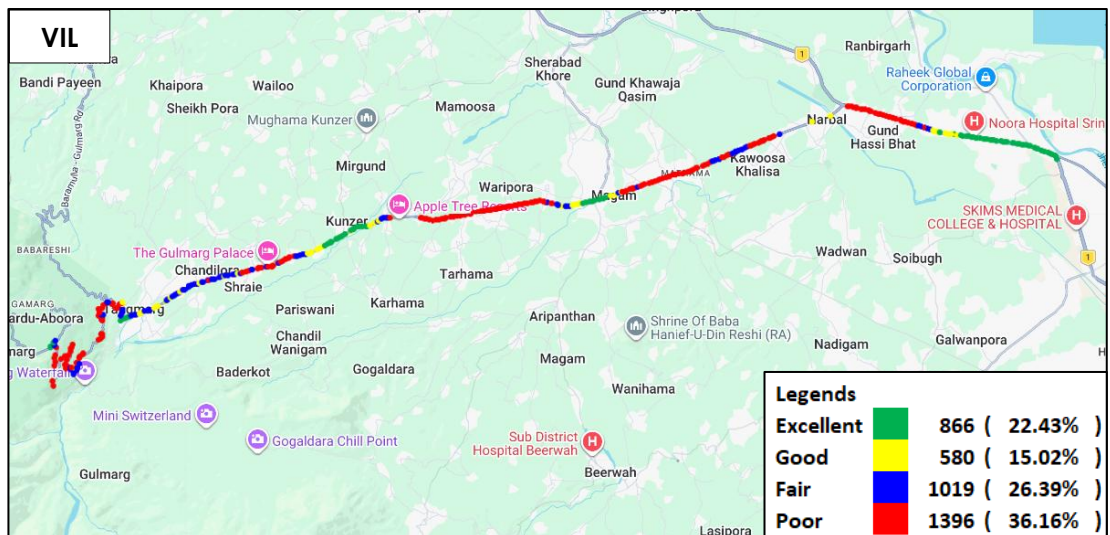


Figure-131: Signal strength 3G/2G network mode voice - VIL.



Figure-132: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

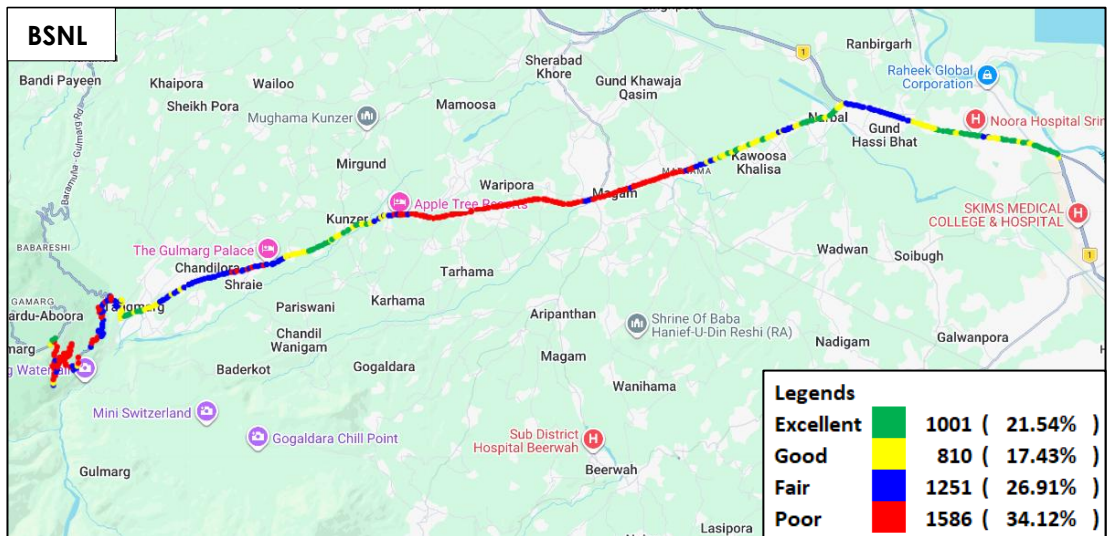


Figure-133: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL.

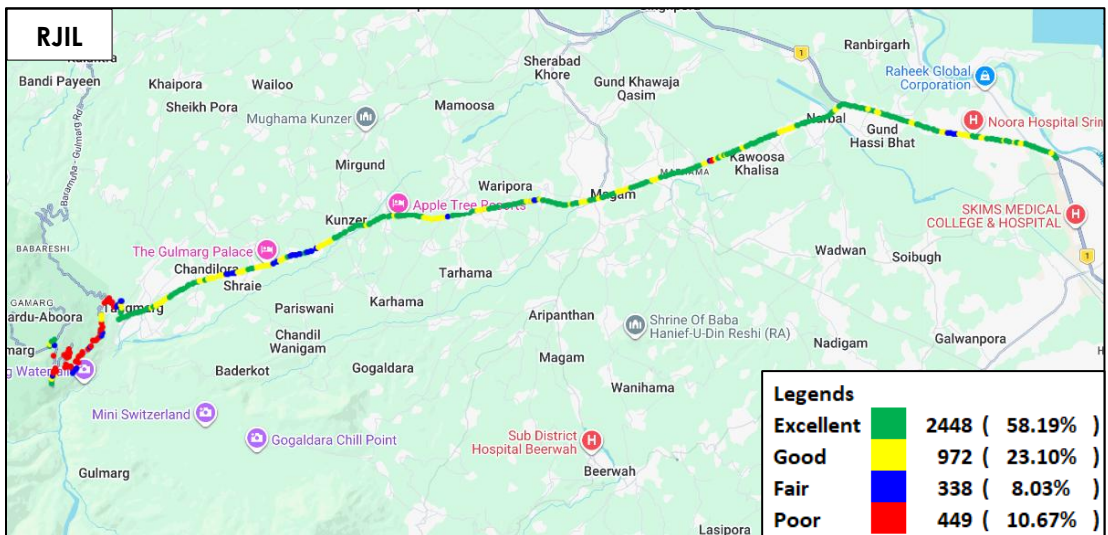


Figure-134: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

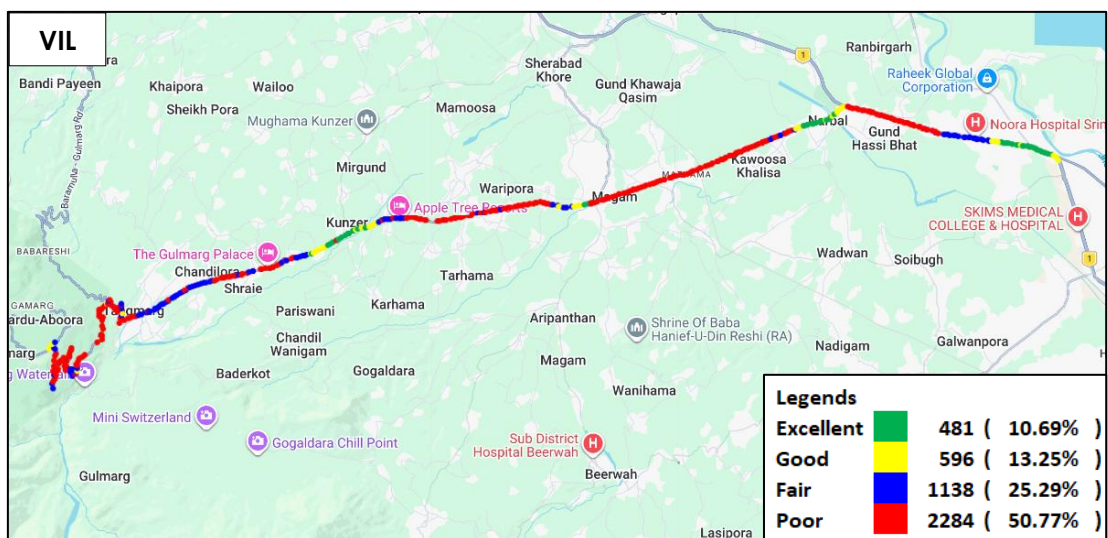


Figure-135: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.



Figure-136: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.



Figure-137: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL.

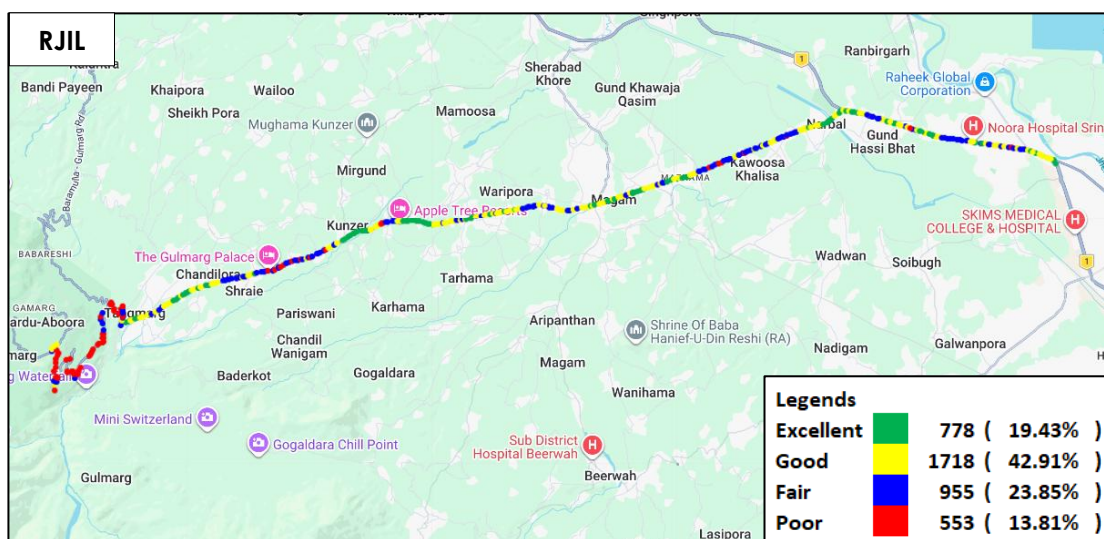


Figure-138: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.



Figure-139: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

7. Appendix

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

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

7.1 Appendix-I

7.1.1 Drive test setup

Voice Call		
Call details	Technology	Detail
Call Setup Timeout	• 3G/2G auto mode- switch Call • 5G/4G/3G/2G auto mode- switch Call • 5G/4G MOS Call	30 Sec
Call Duration		90/180 seconds
Wait/ Guard Time		15 Sec

Table-68: Voice test detail

Note-

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

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

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

Table-69: Data test detail

Note-

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

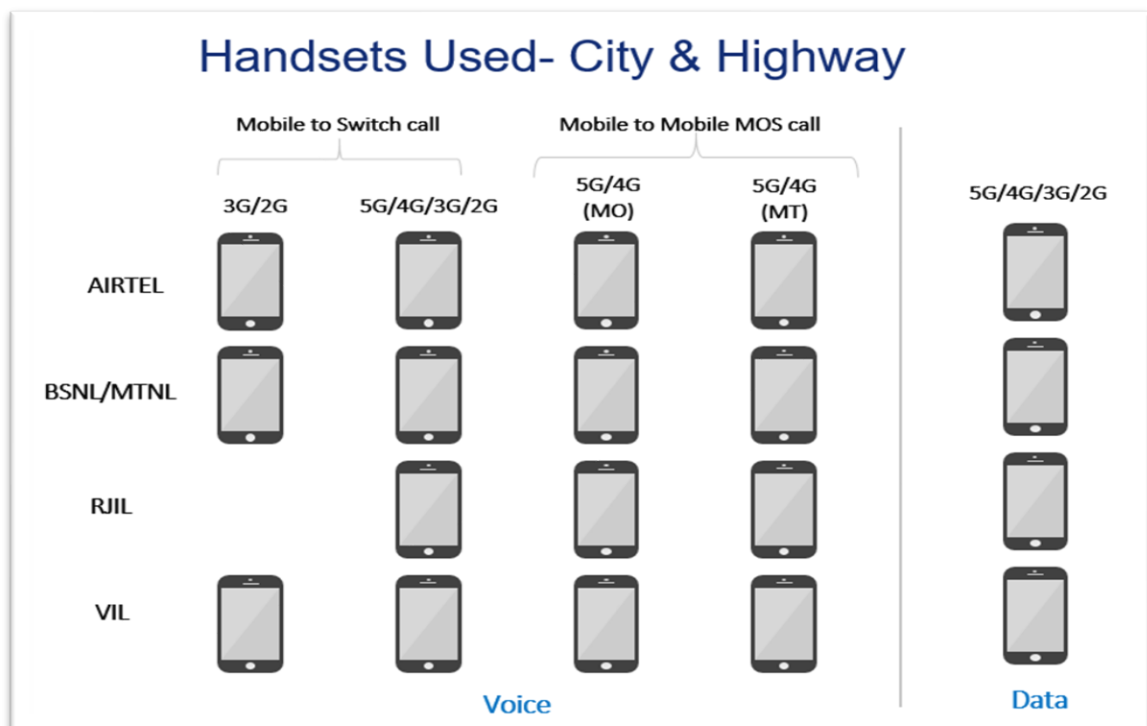


Figure-140: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

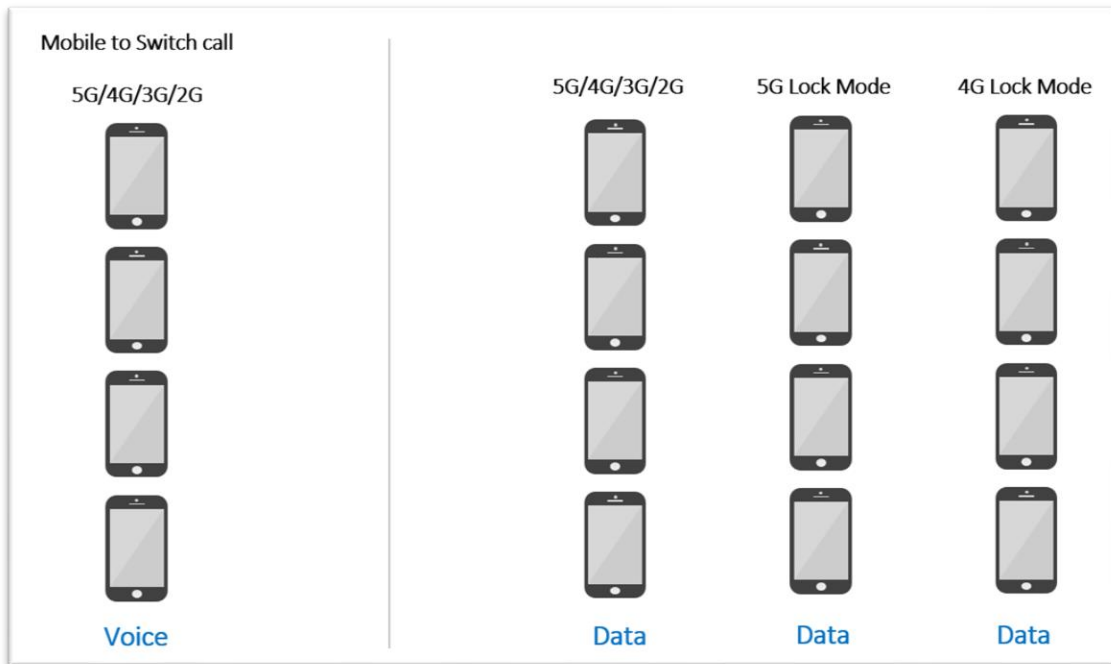


Figure-141: Number of handsets used in railway/metro/walktest/hotspot/coastal area.

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

7.1.2 Drive test Methodology

(a) Dynamic voice testing (on the move)

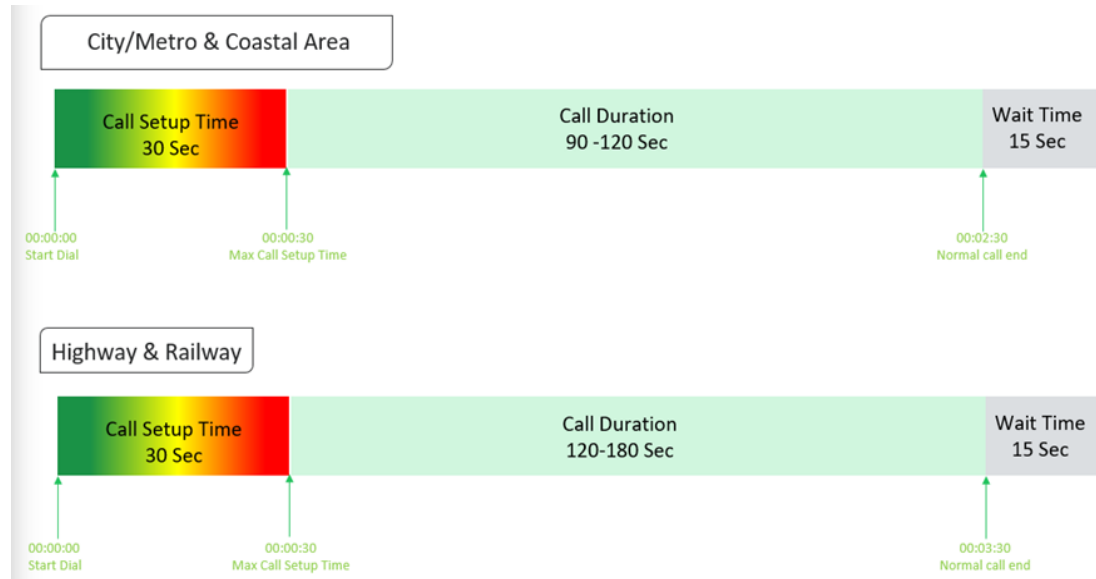


Figure-142: Voice test script for city/railway/metro/highway & coastal area

- 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-143: 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

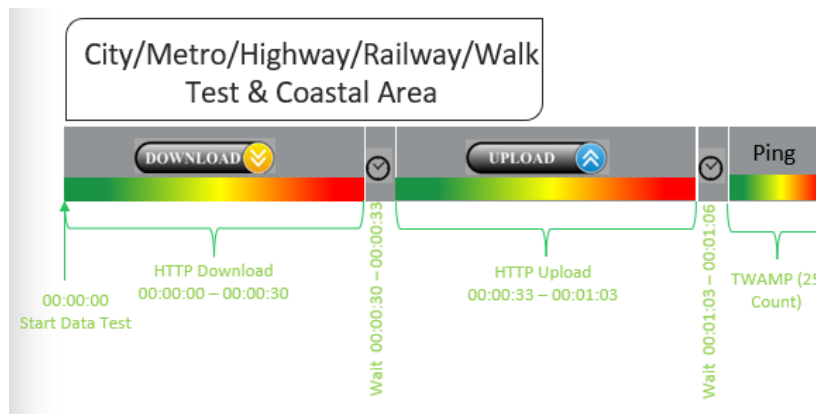


Figure-144: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

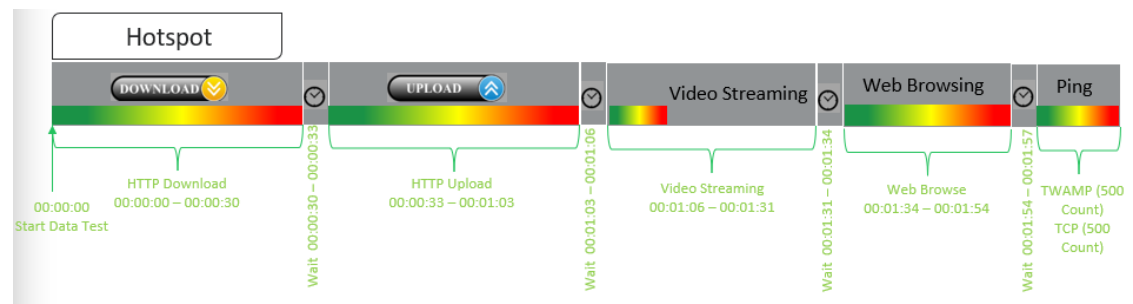


Figure-145: Data test script used at hotspot

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

7.2 Appendix-II

7.2.1 Network Performance Parameters for Voice calls

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

Jitter	The inter arrival jitter is the difference in the relative transit time for two packets. The relative transit time is the difference between a packet's Real-time Transport Protocol (RTP) timestamp and the receiver's clock at the time of arrival, measured in the same units. If S_i is the RTP timestamp from packet i, and R_i is the time of arrival in RTP timestamps units for packet i, then for two packets i and j the inter-arrival jitter D can be expressed as: $D(i,j) = (R_j - R_i) - (S_j - S_i)$ The interarrival jitter is calculated continuously as each data packet i is received from source $SSRC_n$, using this difference D for that packet and the previous packet $i-1$ in order of arrival (not necessarily in sequence), according to the formula $J(i) = J(i-1) + (D(i-1,i) - J(i-1))/16 \text{ or } 8$																																		
Downlink Packet Drop Rate	Number of RTP (Real-time Transport Protocol) Packets lost divided by total RTP packet received (against each source_SSRC and sequence number) at call originating handset. This KPI is calculated from MOS call for packet call only (VoNR/VoLTE)																																		
Uplink Packet Drop Rate	Number of RTP (Real-time Transport Protocol) Packets lost divided by total RTP packet received (against each source_SSRC and sequence number) at call terminating handset. This KPI is calculated from MOS call for packet call only (VoNR/VoLTE).																																		
Signal Strength	Signal strength is the signal power level received by the wireless user. <table><tr><th rowspan="2">Parameter Name</th><th rowspan="2">Technology</th><th colspan="4">Signal Strength (dBm)</th></tr><tr><th>Excellent</th><th>Good</th><th>Fair</th><th>Poor</th></tr><tr><td>Rx Level</td><td>GSM</td><td>0 to ≥ -65</td><td><-65 to ≥ -75</td><td><-75 to ≥ -85</td><td><-85 to min</td></tr><tr><td>RSCP</td><td>WCDMA</td><td>0 to ≥ -70</td><td><-70 to ≥ -80</td><td><-80 to ≥ -90</td><td><-90 to min</td></tr><tr><td>RSRP</td><td>LTE</td><td>0 to ≥ -80</td><td><-80 to ≥ -95</td><td><-95 to ≥ -110</td><td><-110 to min</td></tr><tr><td>SS_RSRP</td><td>NR</td><td>0 to ≥ -80</td><td><-80 to ≥ -95</td><td><-95 to ≥ -110</td><td><-110 to min</td></tr></table>	Parameter Name	Technology	Signal Strength (dBm)				Excellent	Good	Fair	Poor	Rx Level	GSM	0 to ≥ -65	<-65 to ≥ -75	<-75 to ≥ -85	<-85 to min	RSCP	WCDMA	0 to ≥ -70	<-70 to ≥ -80	<-80 to ≥ -90	<-90 to min	RSRP	LTE	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min	SS_RSRP	NR	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min
Parameter Name	Technology			Signal Strength (dBm)																															
		Excellent	Good	Fair	Poor																														
Rx Level	GSM	0 to ≥ -65	<-65 to ≥ -75	<-75 to ≥ -85	<-85 to min																														
RSCP	WCDMA	0 to ≥ -70	<-70 to ≥ -80	<-80 to ≥ -90	<-90 to min																														
RSRP	LTE	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min																														
SS_RSRP	NR	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min																														

Table-70: Network performance parameter and definition voice

7.2.2 Network Performance Parameters Data tests

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

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

Table-71: Network performance parameter and definition Data

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

Hardik
Rajeshbhai
Patel

Digitally signed by
Hardik Rajeshbhai Patel
Date: 2026.06.26
12:30:47 +05'30'