



TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Bihar LSA

January 2026

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1. Introduction

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

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

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

2. Executive Summary (LSA)

2.1 Drive test details

This report covers the findings of the IDT undertaken in Bihar License Service Area (LSA) during the month of January-2026 under the supervision of TRAI Regional Office (RO) Kolkata. 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	Areas under Samastipur district	City	272.2	21-Jan-2026	22-Jan-2026
2	Samastipur	Inter Operator Calling	1 Location	22-Jan-2026	22-Jan-2026
3	Areas under Samastipur district	Hotspot	10 Locations	20-Jan-2026	23-Jan-2026
4	Areas under Samastipur district	Walk Test	1.9	20-Jan-2026	22-Jan-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 and walk tests as per the legends shown on the map.

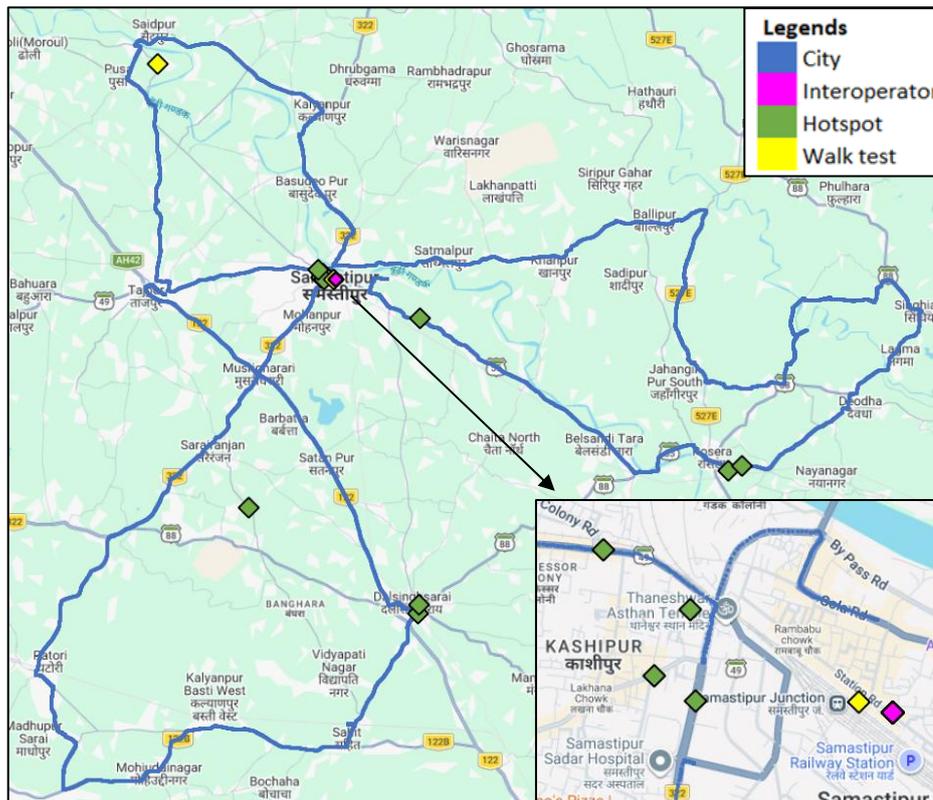


Figure-1: Drive test routes.

2.3 Summary of areas covered

a) City- Musrigharari, Sarairanjan, Patori, Mohiuddinagar, Sahit, Dalsinghsarai, Satampur, Barbatta, Tajpur, Pusa, Saidpur, Kalyanpur, Basudeopur, Satmalpur, Khanpur, Ballipur, Singhia ii, Lagma, Deodha, Rosera, Belsandi Tara and Mohanpur etc.

b) Hotspot

1. Dalsingh Sarai Railway Station
2. District Court Samastipur
3. Government Bus Stand Uttarayan Samastipur
4. Government Engineering College (GEC) Samastipur
5. Govt. ITI Samastipur Mordewa
6. Head Post Office Sakra Bazar Uttarayan Samastipur
7. Subdivisional Civil Court Dalsinghsarai
8. Sub-Divisional Hospital Rosera Sahiar Dih
9. UR College Jarahi Khaira
10. V2 Mall 08 Tajpur Rd Professor Colony Kashipur Samastipur

c) Walk Test

1. Dr. Rajendra Prasad Central Agriculture University Pusa
2. Samastipur Junction Railway Station

2.4 Telecom service providers detected frequency bands

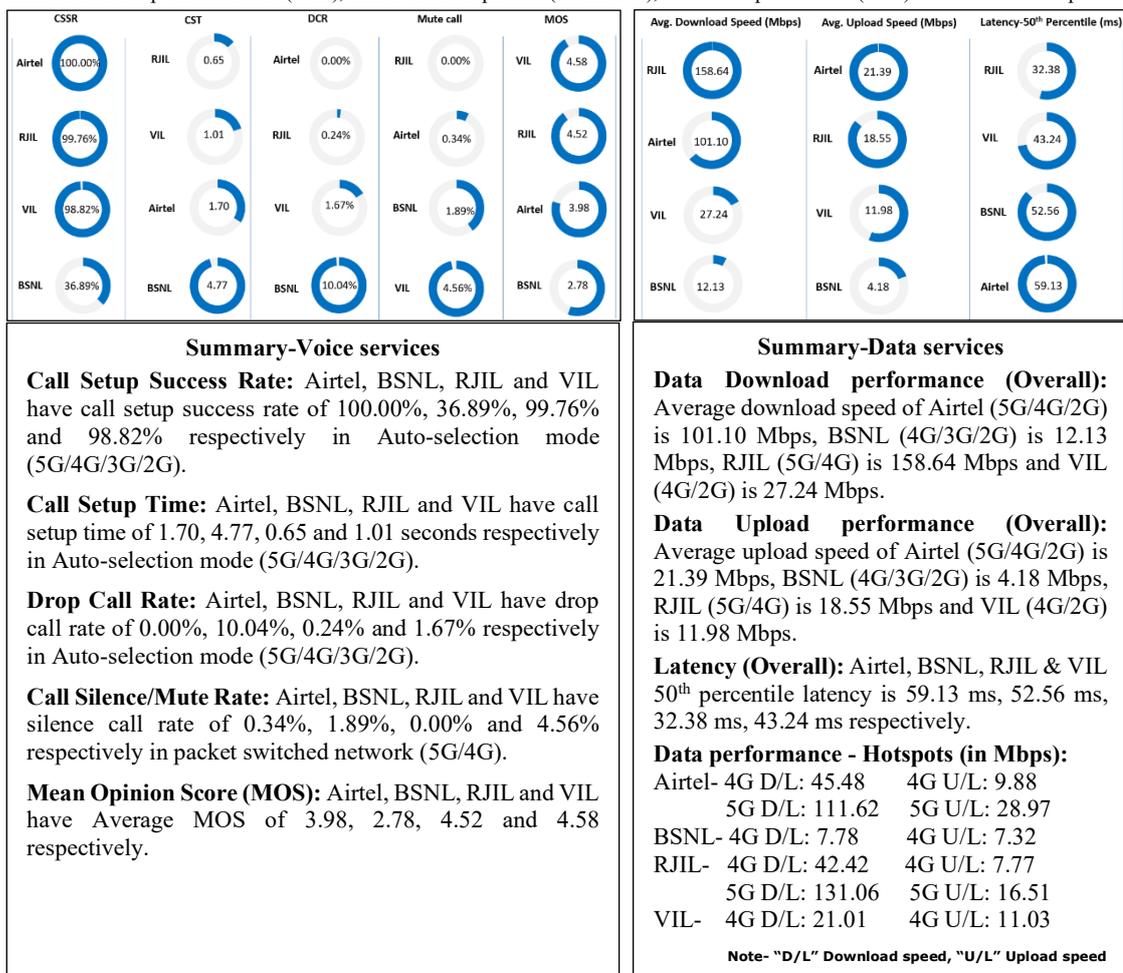
Technologies covered during the IDT and frequency bands in use are summarised in table below:

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	1800,2100,2500

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.



- The poor Signal Strength in auto-selection mode (5G/4G/3G/2G) during **voice** testing has been observed in 3.42%, 51.32%, 2.20% & 7.10% of the **city IDT route** (Areas under Samastipur district in Bihar LSA) in case of Airtel, BSNL, RJIL & VIL respectively {refer **figure- 39 to 42** 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 16.52%, 37.25%, 13.10% & 11.92% of the **city IDT route** (Areas under Samastipur district in Bihar LSA) in case of Airtel, BSNL, RJIL & VIL respectively {refer **figure- 43 to 46** as per the **Section 6.1** under Para-6(Annexure)}.

QoS Performance Analysis- Bihar LSA

3. QoS performance analysis-LSA level

3.1 Overview

This section provides summary of overall QoS performance of the telecom service provider's network in the LSA by aggregating the results of drive tests conducted in the LSA during the month of January-2026 covering city drive, hotspots and walk test. (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	276	570	286
Call Setup Success Rate %	100.00	27.37	99.65
Drop Call Rate %	0.36	15.38	0.35
Call Setup Time-Average (Second)	5.65	2.98	2.91
Handover Success Rate %	99.05	99.71	96.80

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

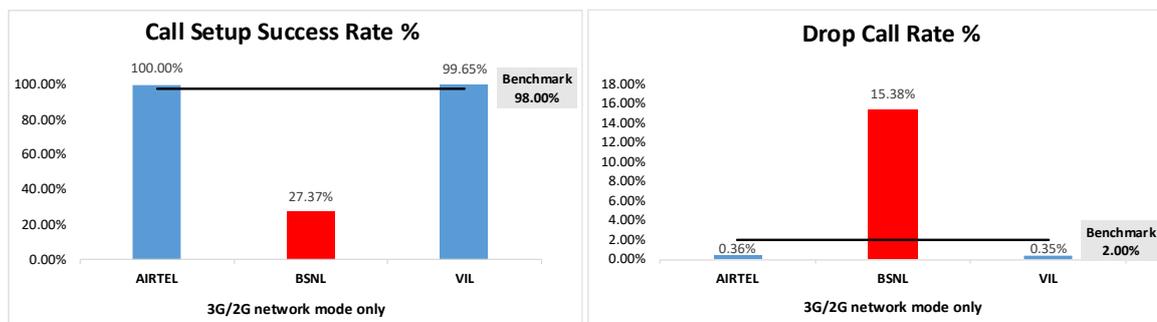


Figure-2: Call setup success rate and drop call rate performance.

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	35	NA
2G	369	94	303

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	419	675	422	424
Call Setup Success Rate %	100.00	36.89	99.76	98.82
Drop Call Rate %	0.00	10.04	0.24	1.67
Call Setup Time-Average (Second)	1.70	4.77	0.65	1.01
Handover Success Rate %	100.00	99.72	99.88	99.63

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

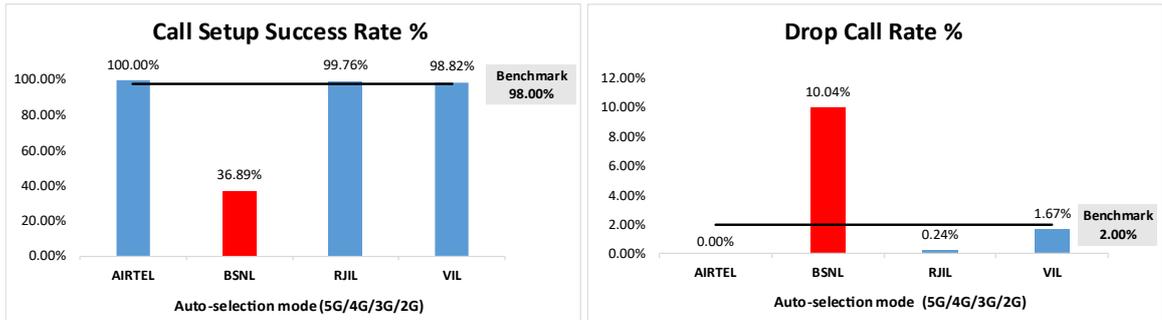


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	290	212	290	285
Number of silence call for >4 Sec	1	4	0	13
Silence Call Rate %	0.34	1.89	0.00	4.56
Number of silence instances for >4 Sec	1	5	0	14
Number of silence instances for >3 Sec	4	5	1	25
Number of silence instances for >2 sec	9	15	6	76
RTP Jitter (4G & 5G) in ms	5.58	8.41	15.48	14.82
Packet loss Rate Downlink %	0.57	4.67	0.49	0.67
Packet loss Rate Uplink %	0.23	5.73	0.36	0.86

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	378	NA
4G	772	147	517	402
3G	NA	16	NA	NA
2G	0	80	NA	9

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

Note-
<ul style="list-style-type: none"> • 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	2512	1223	2546	2553
Speech Quality (Average MOS)	3.98	2.78	4.52	4.58
Number of samples with MOS >=4 to <5 (Excellent)	2073	284	2266	2367
Number of samples with MOS >=3 to <4 (Good)	338	178	189	118
Number of samples with MOS >=2 to <3 (Fair)	51	459	57	22
Number of samples with MOS >=1 to <2 (Poor)	50	302	34	46
%age of samples with MOS >=4 to <5 (Excellent)	82.52%	23.22%	89.00%	92.71%
%age of samples with MOS >=3 to <4 (Good)	13.46%	14.55%	7.42%	4.62%
%age of samples with MOS >=2 to <3 (Fair)	2.03%	37.53%	2.24%	0.86%
%age of samples with MOS >=1 to <2 (Poor)	1.99%	24.69%	1.34%	1.80%

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

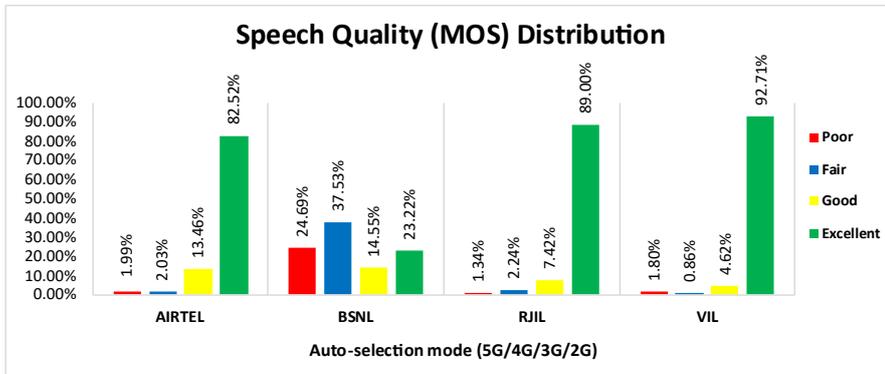


Figure- 4: Distribution of samples in MOS range.

(d) Inter-service provider voice call performance: To check the performance of inter-service provider call setup success rate, total 29 to 38 inter operator calls were attempted at one location which is Hotel Santosh nearby Samastipur railway station. The Call setup success rate and call setup time observations are as below.

Call Setup Success Rate %				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	71.05	100.00	100.00
BSNL	100.00	NA	81.82	100.00
RJIL	100.00	75.00	NA	96.97
VIL	100.00	100.00	100.00	NA

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

Note-
<ul style="list-style-type: none"> • 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	2.74	1.09	1.45
BSNL	7.74	NA	6.37	7.43
RJIL	2.04	8.79	NA	1.88
VIL	1.51	2.48	1.60	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	101.10	12.13	158.64	27.24
	80th Percentile	165.28	22.75	276.24	44.14
	20th Percentile	33.03	0.14	24.72	8.92
Upload Throughput (Mbits/s)	Average	21.39	4.18	18.55	11.98
	80th Percentile	41.63	6.61	33.09	18.34
	20th Percentile	3.70	1.22	2.79	4.43
Latency (ms)	50th Percentile	59.13	52.56	32.38	43.24

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

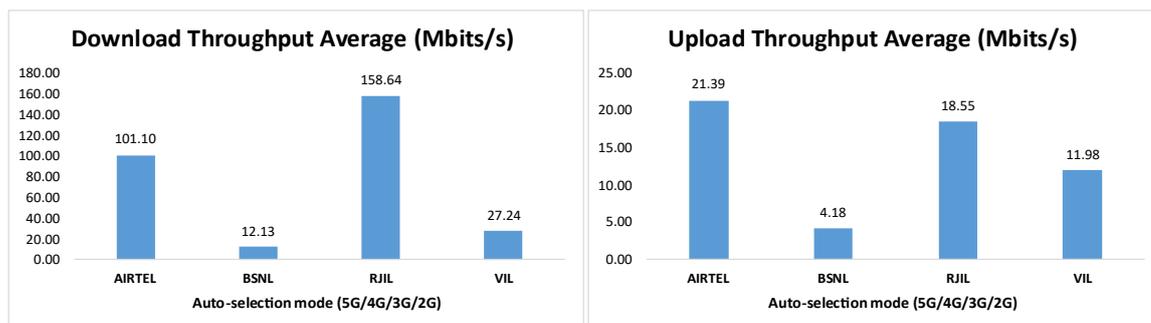


Figure- 5: Download and Upload throughput

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	479	NA
4G	824	153	254	444
3G	NA	16	NA	NA
2G	3	70	NA	29

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 drive, hotspots and walk test 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 on 21st January 2026 and 22nd January 2026 in areas under Samastipur district. (Refer Table-1)

4.2.1 Drive test route

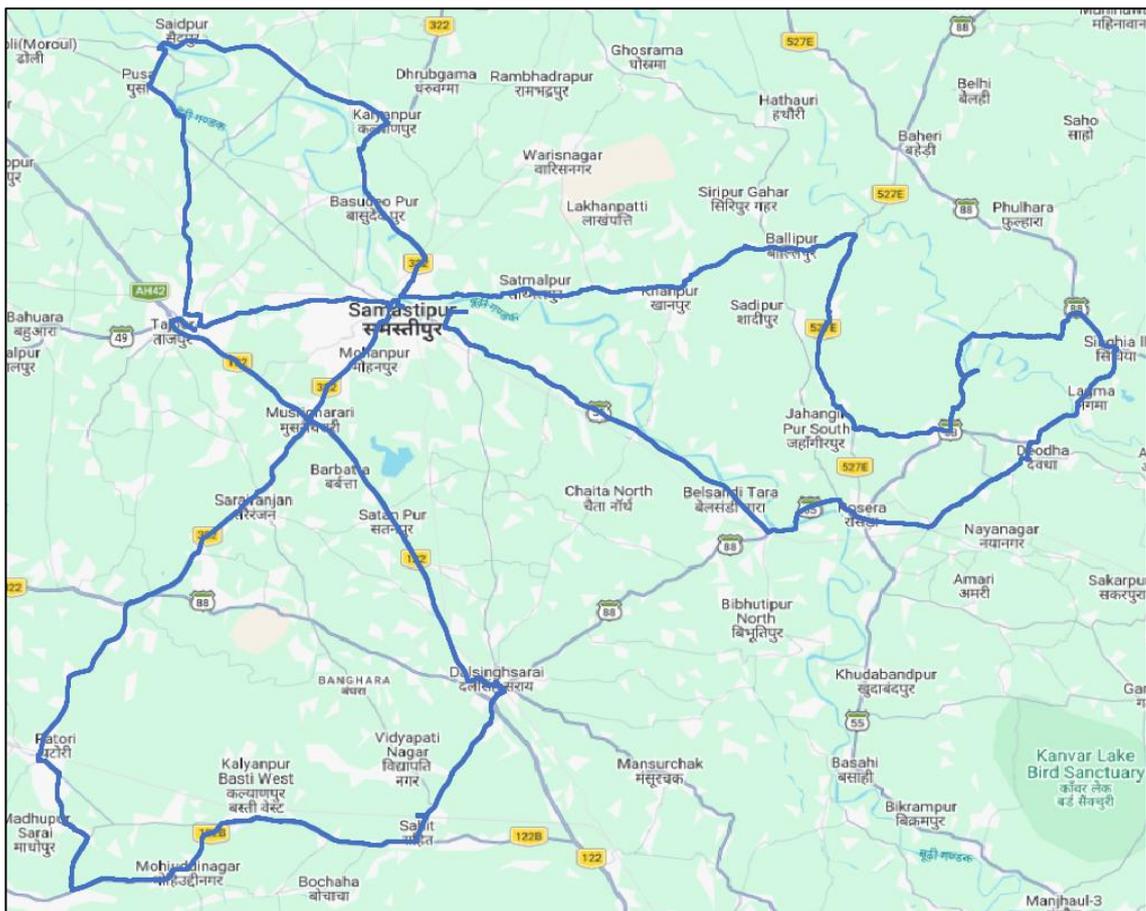


Figure- 6: Drive test routes

4.2.2 Area Covered

Musrigharari, Sarairanjan, Patori, Mohiuddinagar, Sahit, Dalsinghsarai, Satampur, Barbatta, Tajpur, Pusa, Saidpur, Kalyanpur, Basudeopur, Satmalpur, Khanpur, Ballipur, Singhia ii, Lagma, Deodha, Rosera, Belsandi Tara and Mohanpur etc.

4.2.3 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	276	570	286
Call Setup Success Rate %	100.00	27.37	99.65
Drop Call Rate %	0.36	15.38	0.35
Call Setup Time-Average (Second)	5.65	2.98	2.91
Handover Success Rate %	99.05	99.71	96.80

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

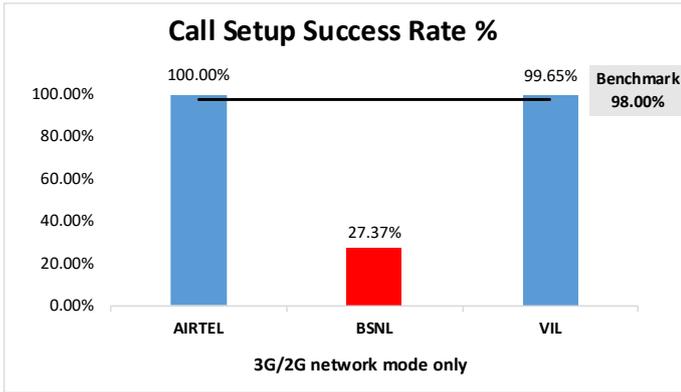


Figure-7: Performance for call setup success rate.

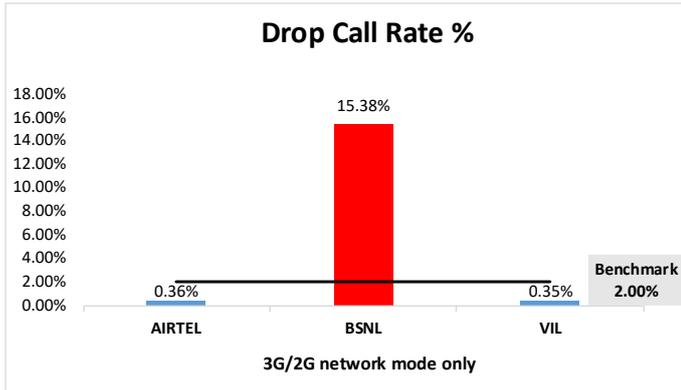


Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	32.84%	NA
2G	99.97%	55.61%	99.99%
Limited Service	0.03%	11.55%	0.01%

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

Note-

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

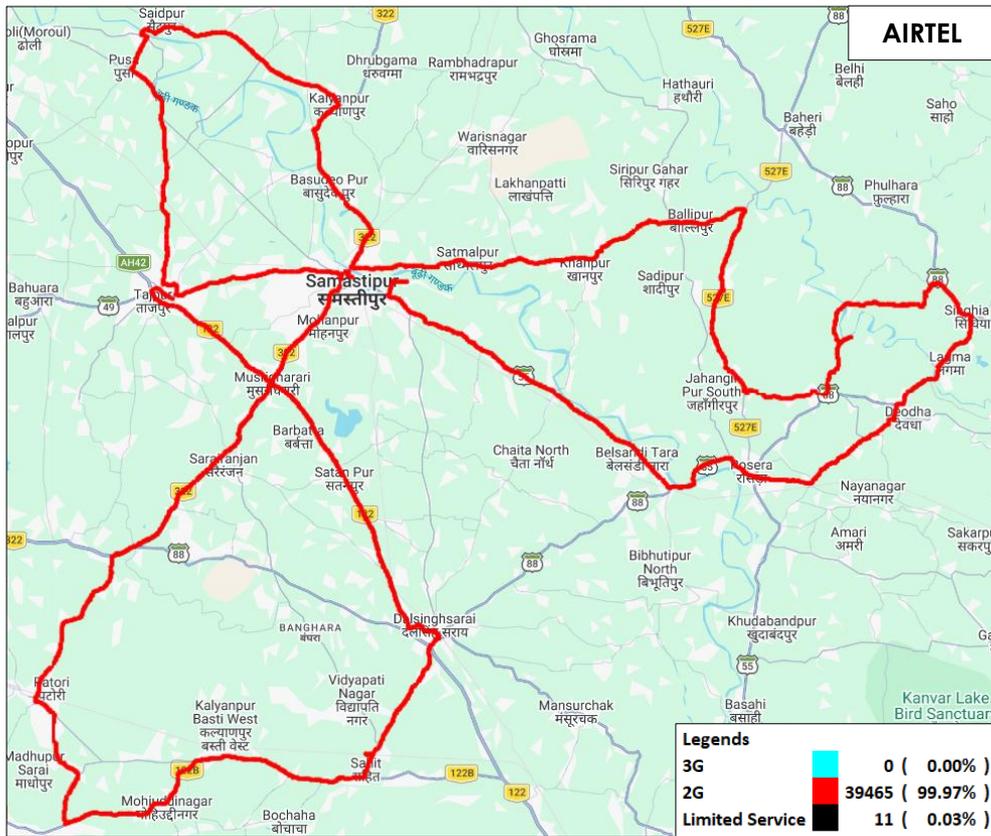


Figure-9: Serving technology plots 3G/2G network mode - AIRTEL.

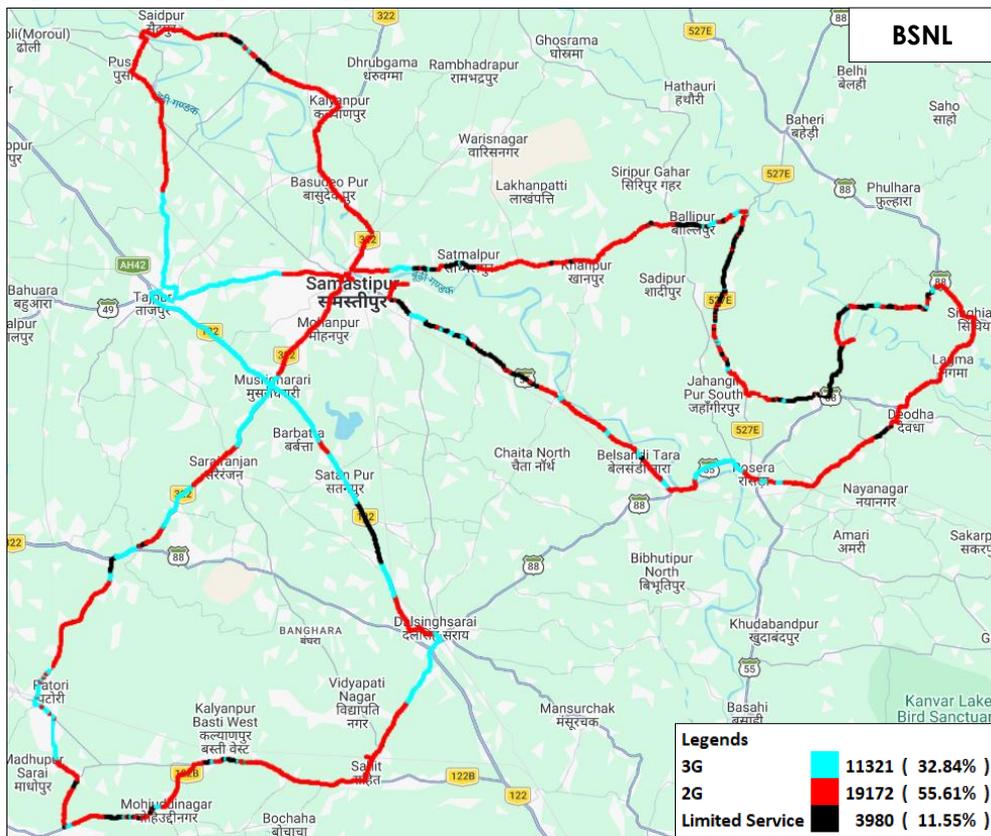


Figure-10: Serving technology plots 3G/2G network mode - BSNL.

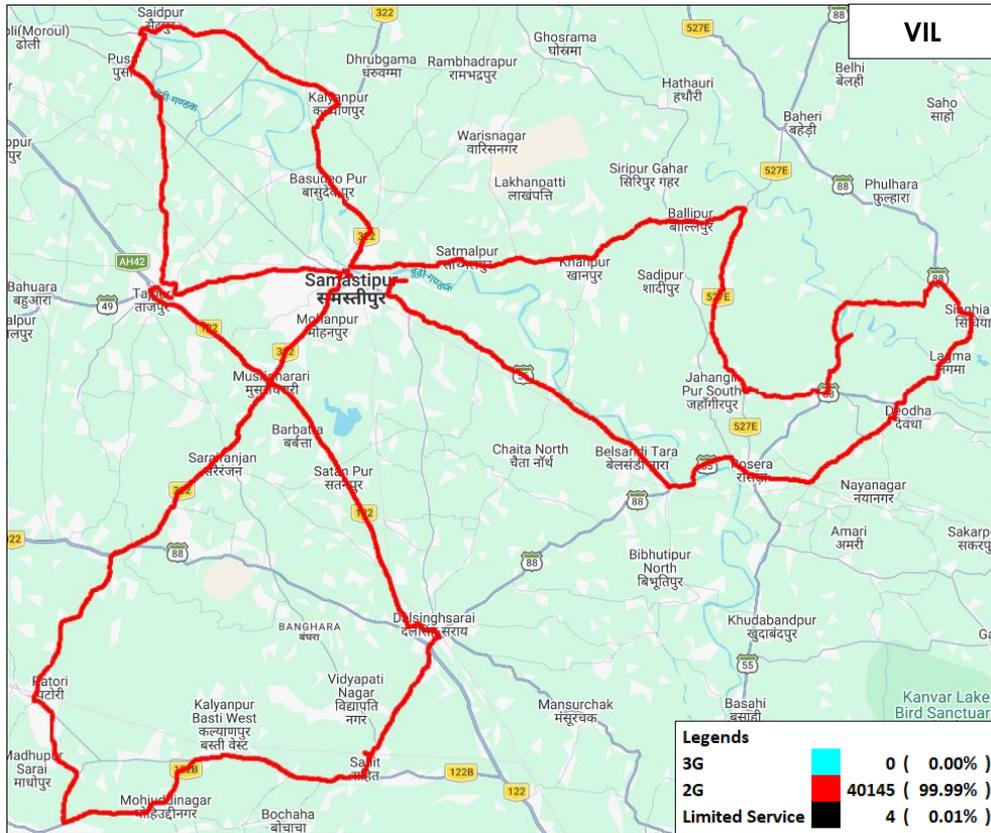


Figure-11: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 36, 37 & 38 for map view)

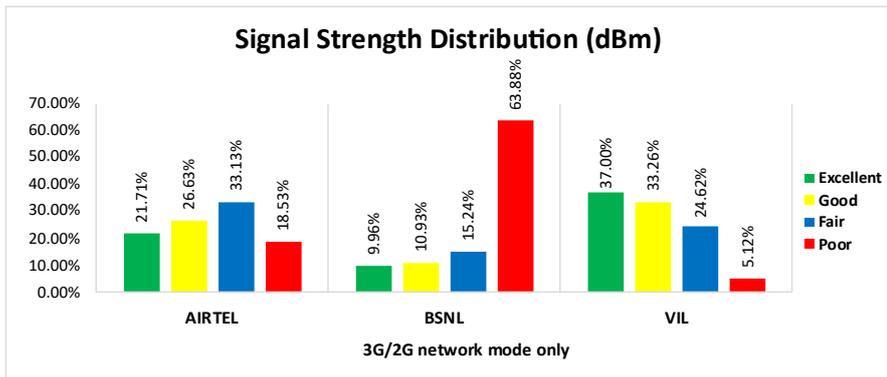


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 22% of samples falling in the excellent signal strength category.
- BSNL has 10% of samples falling in the excellent signal strength category.
- VIL has 37% of samples falling in the excellent signal strength category.

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	294	540	296	299
Call Setup Success Rate %	100.00	30.37	99.66	98.66
Drop Call Rate %	0.00	14.63	0.00	1.69
Call Setup Time Average (Second)	1.70	5.2	0.67	1.04
Handover Success Rate %	100.00	99.70	99.87	99.63

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

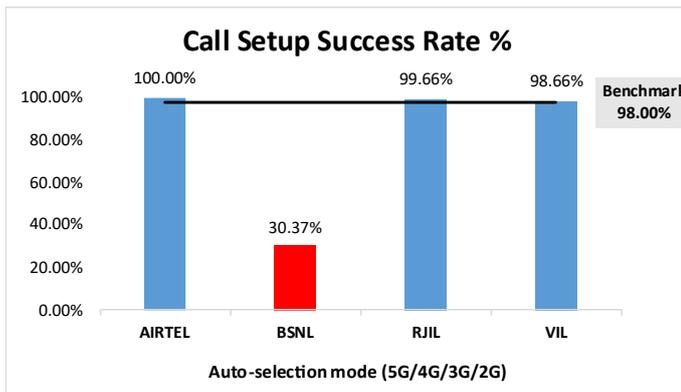


Figure-13: Performance for call setup success rate.

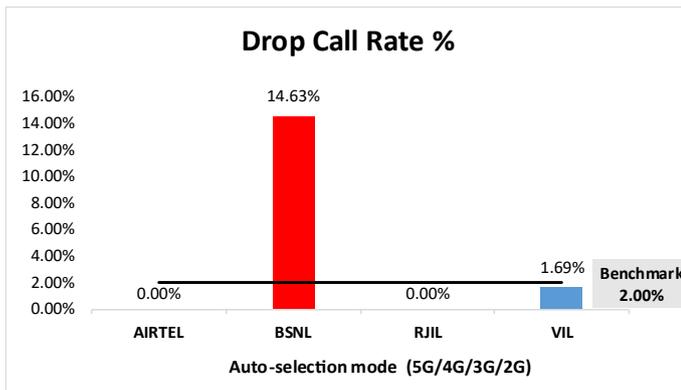


Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	290	212	290	285
Number of silence call for >4 Sec	1	4	0	13
Silence Call Rate %	0.34	1.89	0.00	4.56
Number of silence instances for >4 Sec	1	5	0	14
Number of silence instances for >3 Sec	4	5	1	25
Number of silence instances for >2 sec	9	15	6	76
RTP Jitter (4G & 5G) in ms	5.58	8.41	15.48	14.82
Packet loss Rate Downlink %	0.57	4.67	0.49	0.67
Packet loss Rate Uplink %	0.23	5.73	0.36	0.86

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	2512	1223	2546	2553
Speech Quality (Average MOS)	3.98	2.78	4.52	4.58
Number of samples with MOS >=4 to <5 (Excellent)	2073	284	2266	2367
Number of samples with MOS >=3 to <4 (Good)	338	178	189	118
Number of samples with MOS >=2 to <3 (Fair)	51	459	57	22
Number of samples with MOS >=1 to <2 (Poor)	50	302	34	46
%age of samples with MOS >=4 to <5 (Excellent)	82.52%	23.22%	89.00%	92.71%
%age of samples with MOS >=3 to <4 (Good)	13.46%	14.55%	7.42%	4.62%
%age of samples with MOS >=2 to <3 (Fair)	2.03%	37.53%	2.24%	0.86%
%age of samples with MOS >=1 to <2 (Poor)	1.99%	24.69%	1.34%	1.80%

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

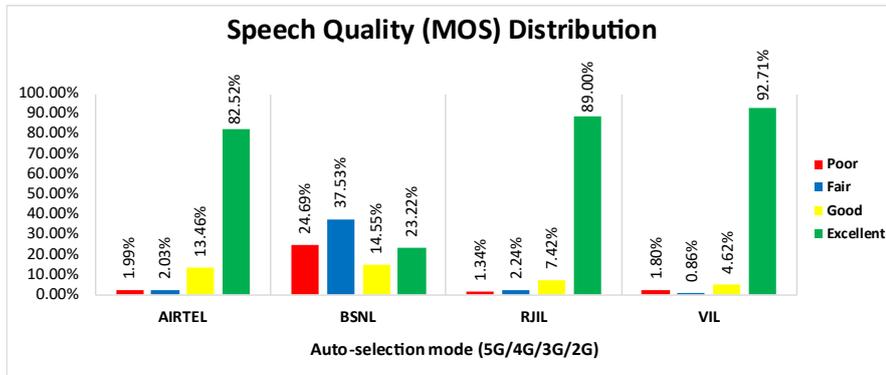


Figure-15: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	6.45%	NA	61.38%	NA
4G	93.55%	49.32%	38.60%	98.63%
3G	NA	5.16%	NA	NA
2G	0.00%	36.55%	NA	1.36%
Limited Service	0.00%	8.97%	0.02%	0.01%

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

Note-
<ul style="list-style-type: none"> NA- Service provider doesn't provide services in respective technology.

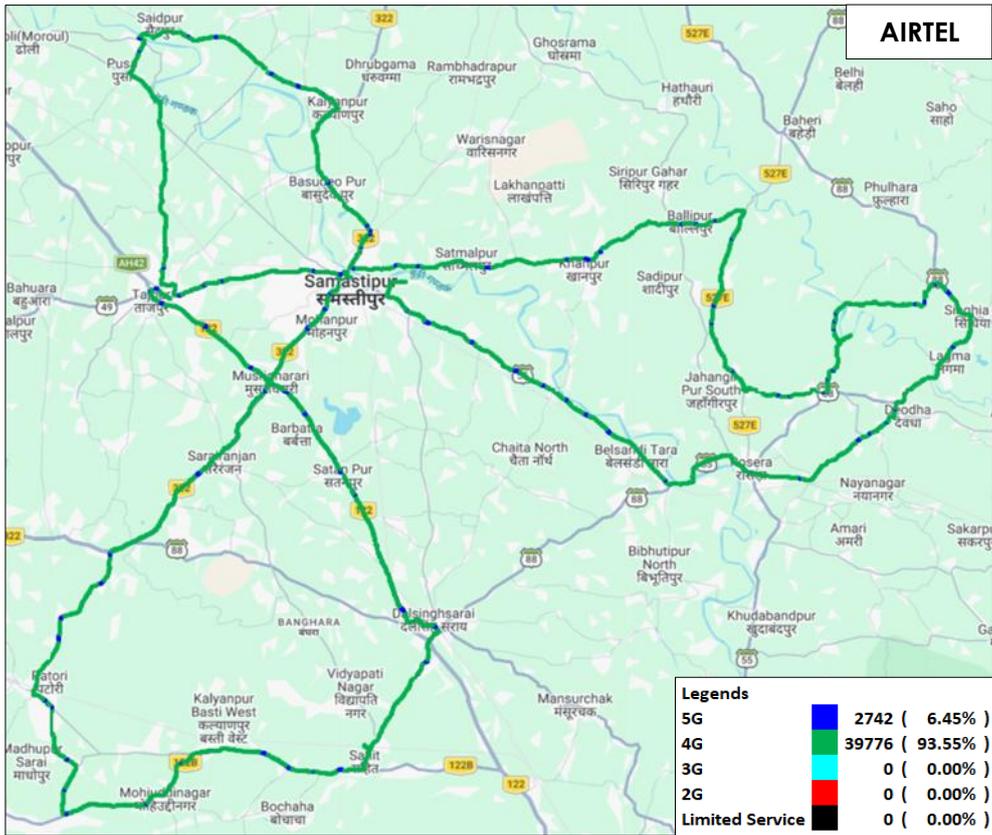


Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

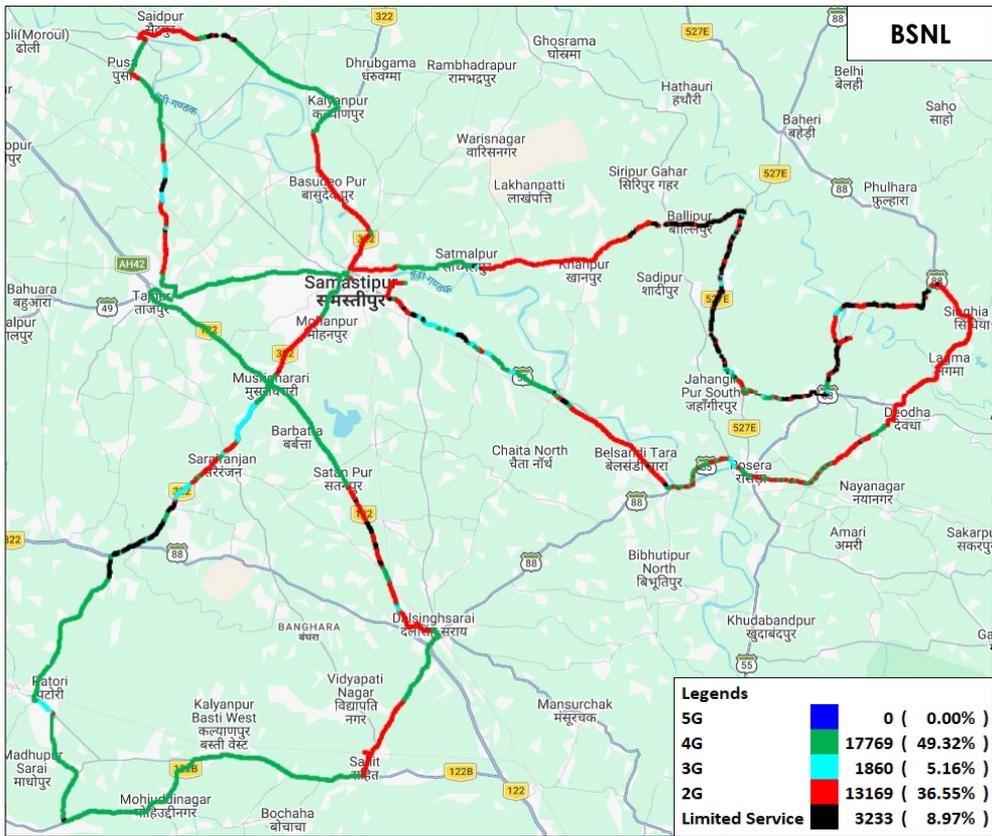


Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL (4G being rolled out).

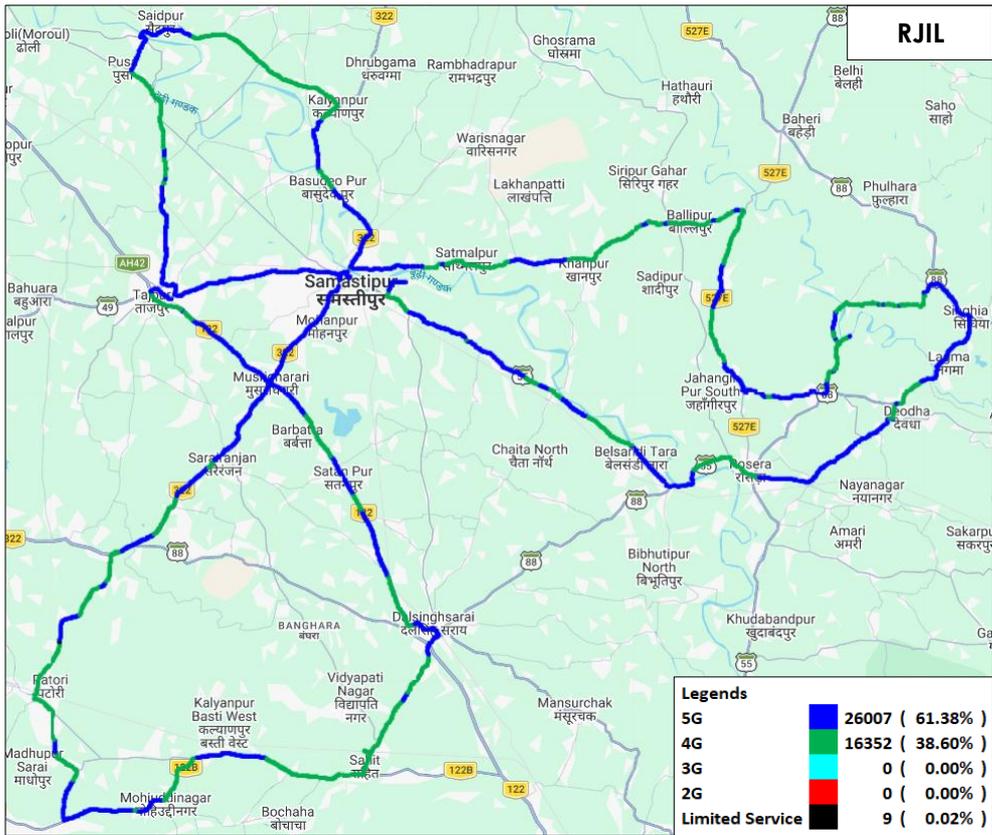


Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

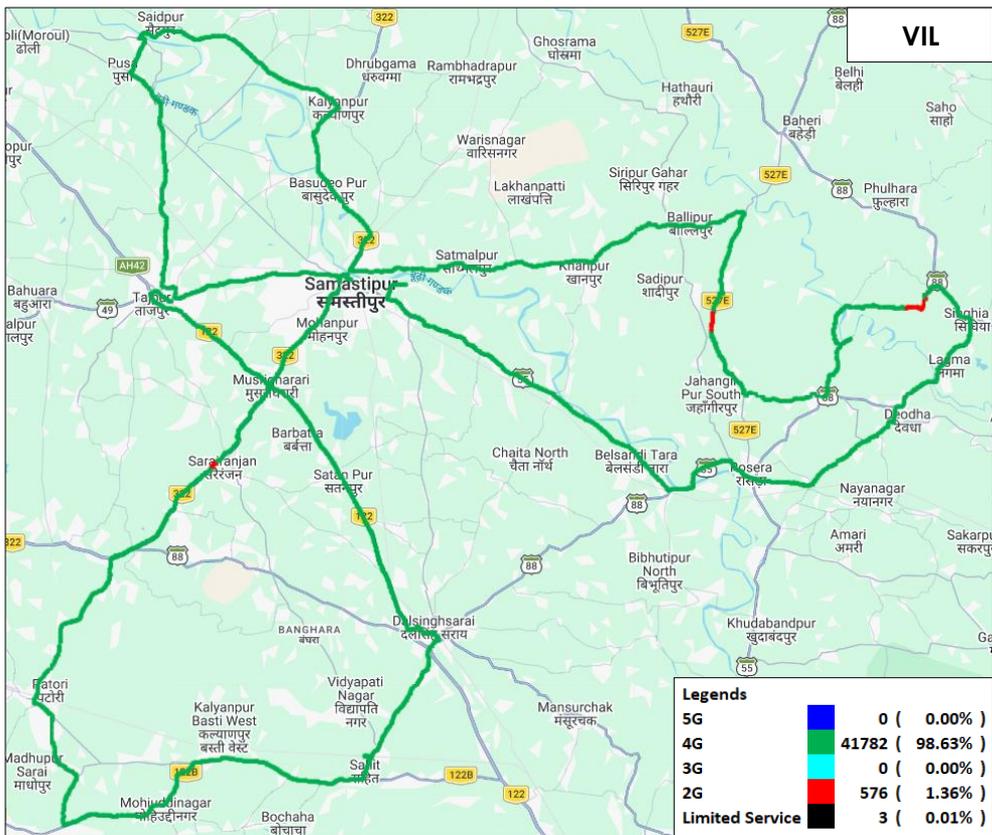


Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-39, 40, 41 & 42 for map view)

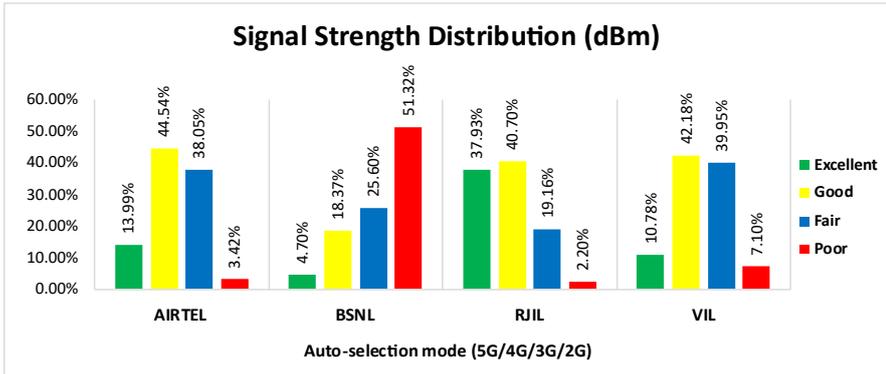


Figure-20: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 14% of samples falling in the excellent signal strength category.
- BSNL has 5% of samples falling in the excellent signal strength category.
- RJIL has 38% of samples falling in the excellent signal strength category.
- VIL has 11% of samples falling in the excellent signal strength category.

4.2.4 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	97.32	8.31	173.23	25.32
	80th Percentile	162.64	15.24	292.13	38.54
	20th Percentile	30.69	0.04	30.44	7.81
Upload Throughput (Mbits/s)	Average	20.45	2.94	19.88	12.54
	80th Percentile	37.58	4.86	37.15	18.66
	20th Percentile	3.68	1.21	3.12	4.45
Latency (ms)	50th Percentile	59.29	56.68	30.86	44.51

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

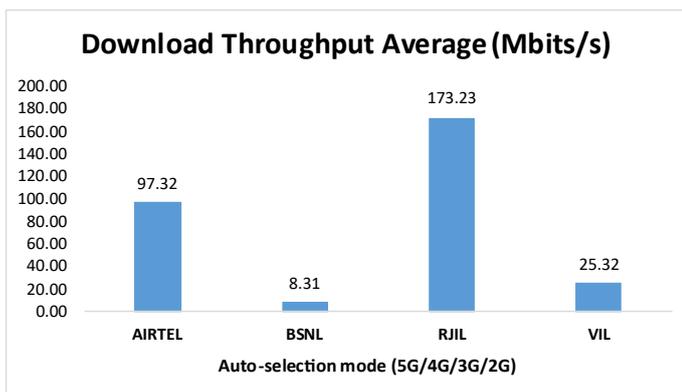


Figure- 21: Download throughput.

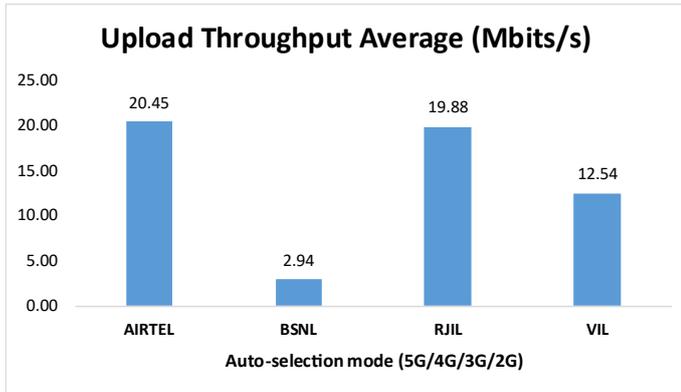


Figure- 22: Upload throughput

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	76.72%	NA	90.30%	NA
4G	23.15%	70.68%	9.70%	98.71%
3G	NA	7.27%	NA	NA
2G	0.09%	9.09%	NA	1.29%
Limited Service	0.04%	12.96%	0.00%	0.00%

Table-20: Time spent on technology during drive test.

Note-

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

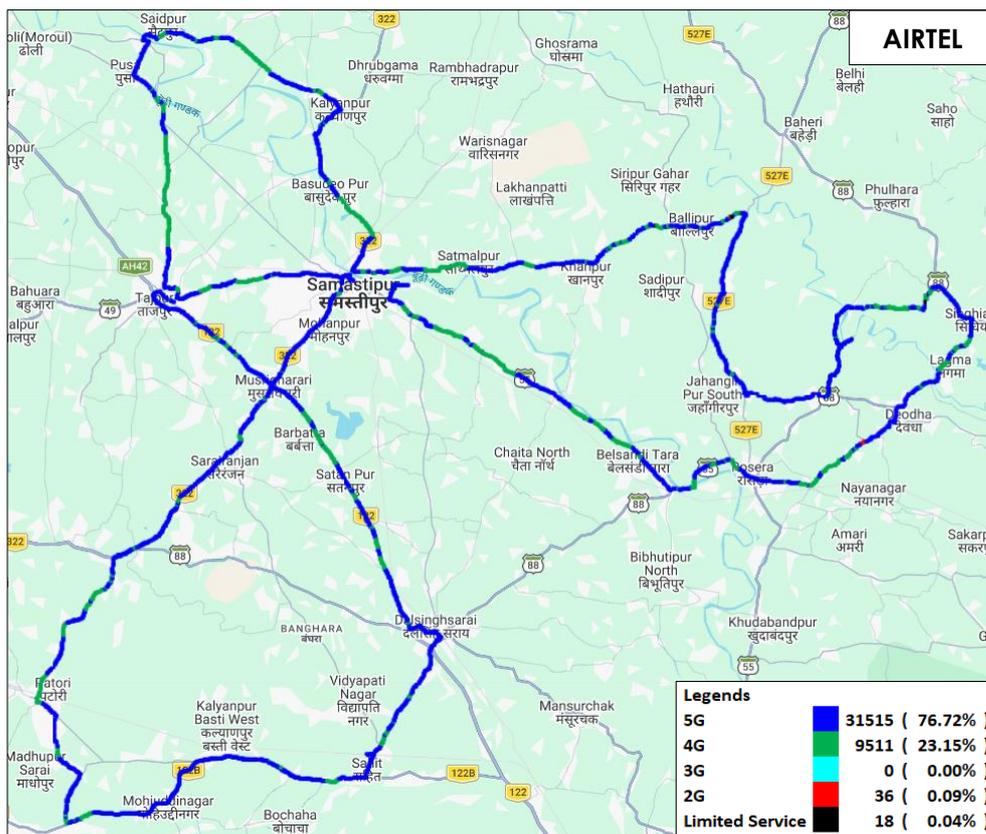


Figure-23: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

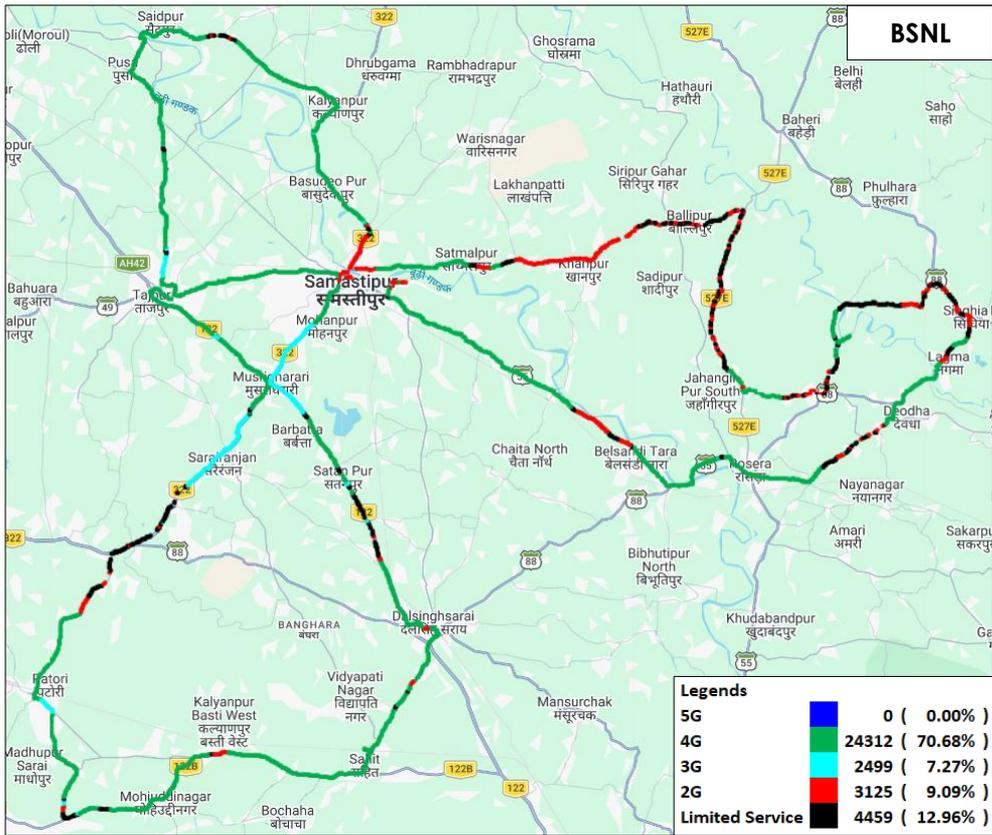


Figure-24: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - BSNL (4G being rolled out).

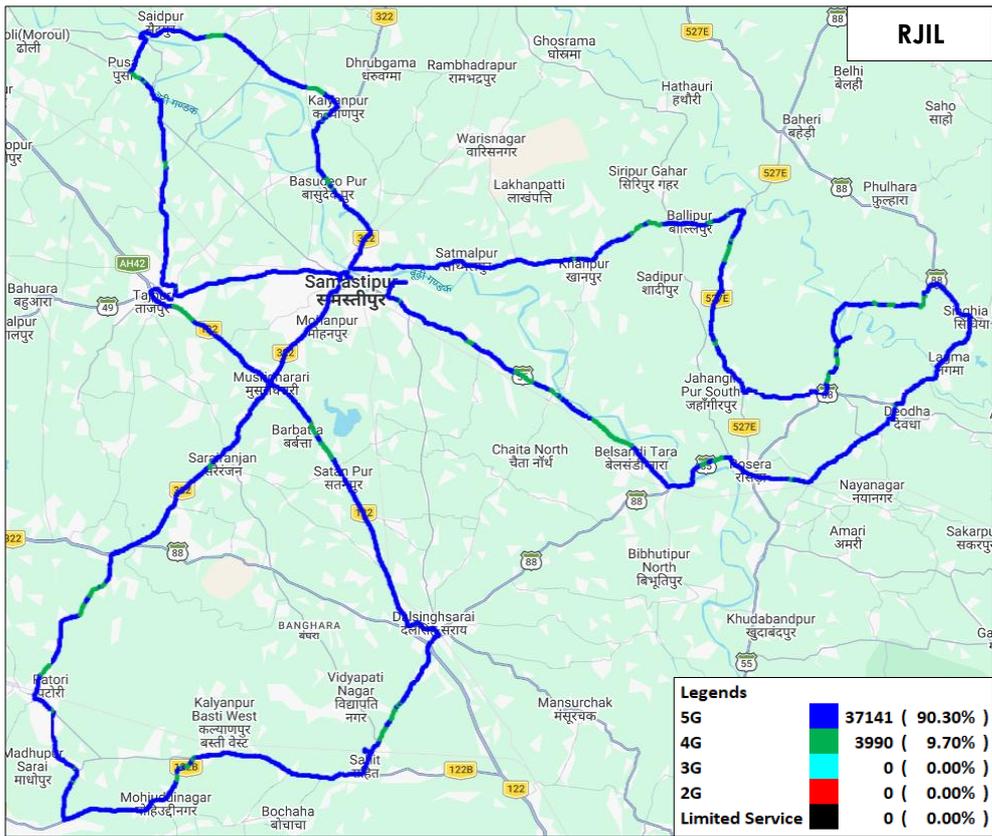


Figure-25: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

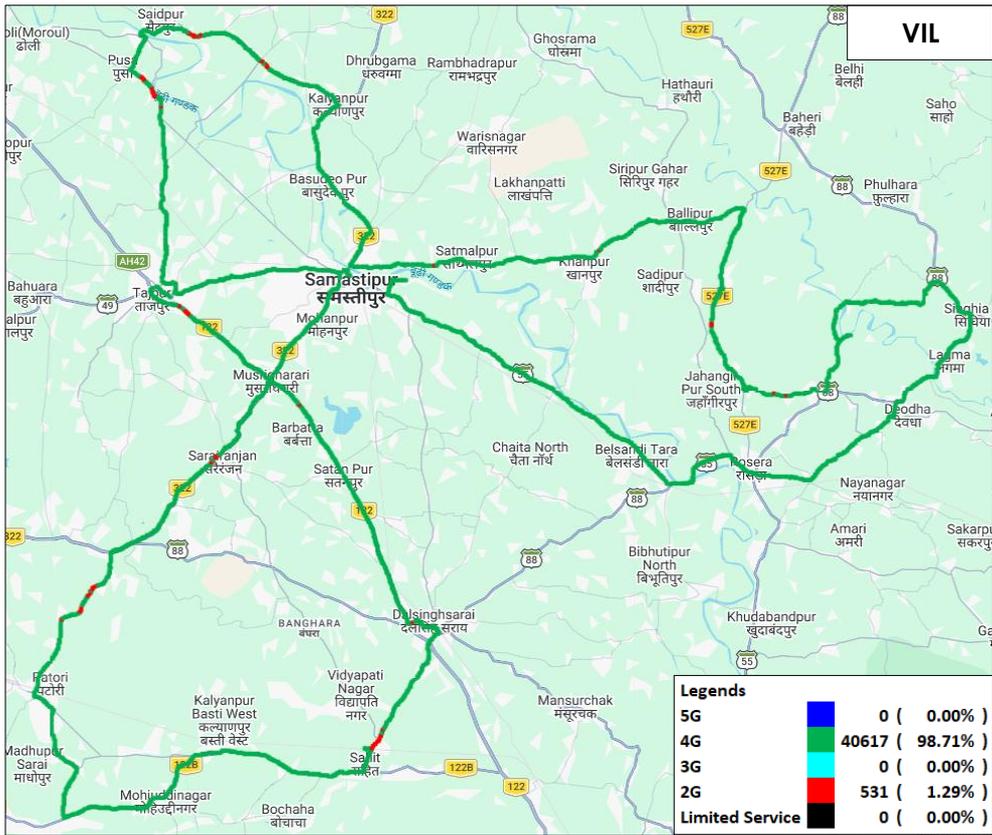


Figure-26: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

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

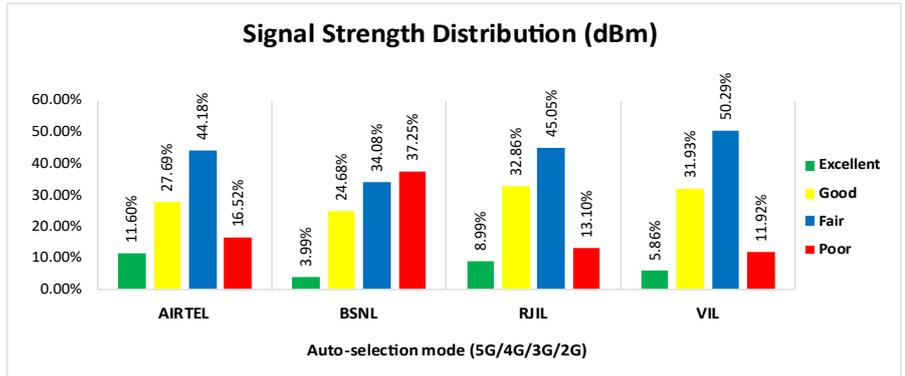


Figure-27: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 12% of samples falling in the excellent signal strength category.
- BSNL has 4% of samples falling in the excellent signal strength category.
- RJIL has 9% of samples falling in the excellent signal strength category.
- VIL has 6% of samples falling in the excellent signal strength category.

4.3 Hotspots

Hotspot testing has been done on 20th January 2026 and 23rd January 2026. Ten locations have been tested in areas under Samastipur district. (Refer Table-1)

4.3.1 Locations

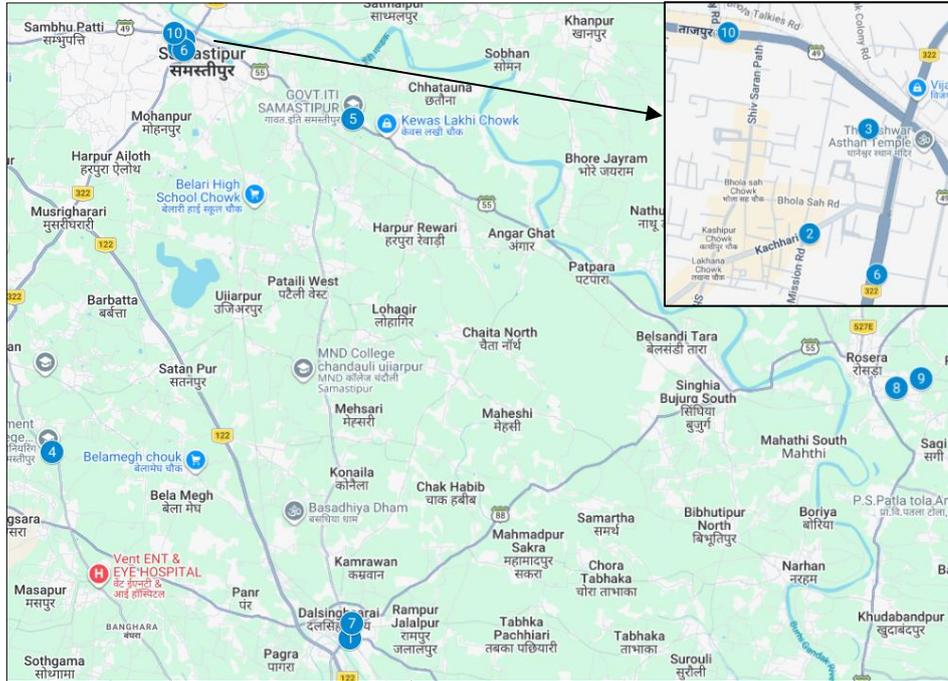


Figure- 28: Hotspot locations

4.3.2 Hotspot covered

1. Dalsingh Sarai Railway Station
2. District Court Samastipur
3. Government Bus Stand Uttarayan Samastipur
4. Government Engineering College (GEC) Samastipur
5. Govt. ITI Samastipur Mordewa
6. Head Post Office Sakra Bazar Uttarayan Samastipur
7. Subdivisional Civil Court Dalsinghsarai
8. Sub-Divisional Hospital Rosera Sahiar Dih
9. UR College Jarahi Khaira
10. V2 Mall 08 Tajpur Rd Professor Colony Kashipur Samastipur

4.3.3 Voice performance

Overall Voice Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	100	100	100	100
Call Setup Success Rate %	100.00	65.00	100.00	99.00
Drop Call Rate %	0.00	1.54	0.00	2.02
Call Setup Time-Average (Second)	1.70	3.91	0.60	0.94

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

Dalsingh Sarai 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	60.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.74	4.85	0.59	0.87

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

District Court Samastipur				
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)	1.69	2.37	0.70	0.95

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

Government Bus Stand Uttarayan Samastipur				
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)	1.69	2.50	0.60	0.90

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

Government Engineering College (GEC) Samastipur				
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	30.00	100.00	90.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.71	18.87	0.58	0.93

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

Govt. ITI Samastipur Mordewa				
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	10.00	100.00	100.00
Drop Call Rate %	0.00	100.00	0.00	10.00
Call Setup Time-Average (Second)	1.66	4.18	0.57	0.97

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

Head Post Office Sakra Bazar Uttarayan Samastipur				
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)	1.74	2.63	0.54	0.85

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

Subdivisional Civil Court Dalsinghsarai				
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	60.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.63	6.76	0.59	0.88

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

Sub-Divisional Hospital Rosera Sahiar Dih				
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	40.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.67	5.28	0.61	1.13

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

UR College Jarahi Khaira				
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	50.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	10.00
Call Setup Time-Average (Second)	1.73	3.69	0.64	0.94

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

V2 Mall 08 Tajpur Rd Professor Colony Kashipur Samastipur				
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)	1.72	2.43	0.62	0.93

Table-31: 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)	120.47	15.91	121.68	42.06
Download Throughput 80th Percentile (Mbit/s)	196.05	27.32	213.31	65.18
Download Throughput 20th Percentile (Mbit/s)	45.90	9.08	26.91	23.16
Download Session Setup Success Rate %	100.00	88.00	100.00	100.00
Upload Throughput Average (Mbits/s)	23.30	8.60	13.53	7.41
Upload Throughput 80th Percentile (Mbit/s)	42.52	16.49	22.38	11.31
Upload Throughput 20th Percentile (Mbit/s)	4.69	1.80	2.41	3.09
Upload Session Setup Success Rate %	100.00	90.00	100.00	100.00
Web Browsing Delay (Second)	7.15	5.58	5.21	5.43
Youtube Initial Buffer Delay (Second)	2.18	2.09	1.56	0.85
Latency (ms) - 50th Percentile	59.08	51.97	36.03	41.90
Jitter (ms)	10.99	52.63	12.92	8.07
Packet Loss Rate%	16.73	17.14	4.79	1.05
Packet Loss Rate- 90th percentile	58.78	84.88	3.40	2.06

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

Dalsingh Sarai Railway Station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	257.64	15.03	116.92	58.97
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	68.13	7.24	22.26	20.97
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.55	4.74	3.94	6.16
Youtube Initial Buffer Delay (Second)	2.58	1.62	0.62	0.74
Latency (ms) - 50th Percentile	51.65	49.38	26.24	38.85
Jitter (ms)	2.23	1.83	7.93	16.15
Packet Loss Rate%	0.70	0.20	0.20	5.90

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

District Court Samastipur				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	72.50	29.27	69.50	28.64
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	13.51	17.47	3.53	6.49
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	9.01	6.38	5.44	5.94
Youtube Initial Buffer Delay (Second)	4.29	1.07	1.49	0.84
Latency (ms) - 50th Percentile	71.20	54.47	42.87	37.15
Jitter (ms)	5.66	2.62	6.74	4.23
Packet Loss Rate%	3.00	0.10	0.10	0.10

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

Government Bus Stand Uttarayan Samastipur				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	99.21	9.39	55.39	66.88
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	30.56	11.86	28.72	6.51
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	8.77	3.87	5.51	5.97
Youtube Initial Buffer Delay (Second)	3.42	1.50	0.91	0.93
Latency (ms) - 50th Percentile	50.51	47.72	42.43	46.82
Jitter (ms)	8.77	5.14	7.22	9.05
Packet Loss Rate%	1.20	1.10	0.20	0.50

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

Government Engineering College (GEC) Samastipur				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	62.50	-	223.19	59.82
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	29.74	-	24.08	12.92
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	7.54	-	4.06	5.00
Youtube Initial Buffer Delay (Second)	1.96	-	0.67	0.71
Latency (ms) - 50th Percentile	70.55	-	40.67	43.00
Jitter (ms)	10.65	-	7.57	5.49
Packet Loss Rate%	1.30	100.00	0.00	0.00

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

Note- Respective data tests were failed.

Govt. ITI Samastipur Mordewa				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	24.24	0.78	230.16	10.36
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.01	1.76	10.59	2.23
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.02	10.18	3.69	4.44
Youtube Initial Buffer Delay (Second)	0.81	-	0.61	1.38
Latency (ms)- 50th Percentile	59.25	56.19	23.45	36.79
Jitter (ms)	7.61	8.08	2.41	8.35
Packet Loss Rate%	0.40	21.80	0.00	2.30

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

Note- Youtube tests were failed.

Head Post Office Sakra Bazar Uttarayan Samastipur				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	108.68	30.69	9.33	26.93
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.78	12.68	2.05	7.66
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.57	6.08	6.65	6.24
Youtube Initial Buffer Delay (Second)	-	1.10	6.64	0.83
Latency (ms) - 50th Percentile	106.30	49.47	36.89	39.34
Jitter (ms)	24.53	3.12	30.15	11.22
Packet Loss Rate%	51.20	0.00	2.00	0.40

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

Note- " " Youtube tests were failed.

Subdivisional Civil Court Dalsinghsarai				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	169.71	16.91	75.56	35.65
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	23.50	5.04	6.52	2.05
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	8.09	3.65	4.14	6.00
Youtube Initial Buffer Delay (Second)	1.22	1.46	2.78	0.99
Latency (ms) - 50th Percentile	94.06	59.15	26.12	35.70
Jitter (ms)	19.14	2.47	13.42	4.83
Packet Loss Rate%	74.80	41.60	40.70	0.10

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

Sub-Divisional Hospital Rosera Sahiar Dih				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	189.36	9.36	222.93	67.55
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	6.63	1.31	17.20	5.71
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.00	3.93	4.50	5.03
Youtube Initial Buffer Delay (Second)	0.77	7.76	0.64	0.73
Latency (ms) - 50th Percentile	53.52	57.55	32.37	46.73
Jitter (ms)	10.61	41.32	4.56	5.48
Packet Loss Rate%	33.10	5.70	0.00	0.10

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

UR College Jarahi Khaira				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	39.59	12.45	18.93	11.26
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	3.09	2.13	1.62	3.82
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	8.37	6.12	14.35	3.50
Youtube Initial Buffer Delay (Second)	1.28	5.05	-	0.90
Latency (ms) - 50th Percentile	58.17	52.56	41.60	57.80
Jitter (ms)	12.68	2.90	45.64	10.23
Packet Loss Rate%	0.60	0.30	4.60	1.00

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

V2 Mall 08 Tajpur Rd Professor Colony Kashipur Samastipur				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	181.26	16.26	194.89	54.58
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	47.00	17.93	18.69	5.79
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.69	5.82	4.51	4.94
Youtube Initial Buffer Delay (Second)	2.72	1.17	0.65	0.91
Latency (ms) - 50th Percentile	46.56	49.13	36.86	43.77
Jitter (ms)	8.05	404.86	3.58	5.66
Packet Loss Rate%	1.00	0.60	0.10	0.10

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)	111.62	-	131.06	-
	Upload Throughput Average (Mbits/s)	28.97	-	16.51	-
4G	Download Throughput Average (Mbits/s)	45.48	7.78	42.42	21.01
	Upload Throughput Average (Mbits/s)	9.88	7.32	7.77	11.03

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

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

Dalsingh Sarai Railway Station					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	262.50	-	121.47	-
	Upload Throughput Average (Mbits/s)	63.60	-	25.48	-
4G	Download Throughput Average (Mbits/s)	71.91	0.03	26.37	23.24
	Upload Throughput Average (Mbits/s)	16.36	1.21	6.68	19.10

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

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

District Court Samastipur					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	116.95	-	75.56	-
	Upload Throughput Average (Mbits/s)	16.67	-	7.54	-
4G	Download Throughput Average (Mbits/s)	29.61	22.15	17.31	11.85
	Upload Throughput Average (Mbits/s)	3.89	17.06	4.44	10.87

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

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

Government Bus Stand Uttarayan Samastipur					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	49.92	-	80.29	-
	Upload Throughput Average (Mbits/s)	16.62	-	34.95	-
4G	Download Throughput Average (Mbits/s)	24.58	6.36	47.86	56.81
	Upload Throughput Average (Mbits/s)	3.15	6.03	8.13	23.40

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

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

Government Engineering College (GEC) Samastipur					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	33.71	-	236.32	-
	Upload Throughput Average (Mbits/s)	29.30	-	12.95	-
4G	Download Throughput Average (Mbits/s)	95.22	-	82.78	14.95
	Upload Throughput Average (Mbits/s)	19.60	-	22.26	16.11

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

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

Govt. ITI Samastipur Mordewa					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	239.71	-
	Upload Throughput Average (Mbits/s)	-	-	15.26	-
4G	Download Throughput Average (Mbits/s)	46.25	0.32	87.76	5.13
	Upload Throughput Average (Mbits/s)	23.44	1.2	5.34	1.57

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

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

Head Post Office Sakra Bazar Uttarayan Samastipur					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	82.87	-	13.03	-
	Upload Throughput Average (Mbits/s)	18.62	-	3.24	-
4G	Download Throughput Average (Mbits/s)	22.47	18.07	27.45	14.66
	Upload Throughput Average (Mbits/s)	3.65	18.53	6.68	13.66

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

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

Subdivisional Civil Court Dalsinghsarai					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	180.70	-	61.80	-
	Upload Throughput Average (Mbits/s)	35.77	-	7.27	-
4G	Download Throughput Average (Mbits/s)	19.97	0.04	20.99	11.12
	Upload Throughput Average (Mbits/s)	2.73	1.22	4.48	2.51

Table-50: Overall Summary of 5G only & 4G only data download & upload speed.

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

Sub-Divisional Hospital Rosera Sahiar Dih					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	154.95	-	196.51	-
	Upload Throughput Average (Mbits/s)	8.27	-	25.96	-
4G	Download Throughput Average (Mbits/s)	52.40	0.04	74.19	35.91
	Upload Throughput Average (Mbits/s)	12.45	1.22	10.52	6.60

Table-51: Overall Summary of 5G only & 4G only data download & upload speed.

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

UR College Jarahi Khaira					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	46.66	-	93.59	-
	Upload Throughput Average (Mbits/s)	1.63	-	5.56	-
4G	Download Throughput Average (Mbits/s)	45.23	0.04	12.04	6.69
	Upload Throughput Average (Mbits/s)	1.34	1.22	1.66	8.18

Table-52: Overall Summary of 5G only & 4G only data download & upload speed.

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

V2 Mall 08 Tajpur Rd Professor Colony Kashipur Samastipur					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	132.48	-	192.35	-
	Upload Throughput Average (Mbits/s)	48.37	-	26.88	-
4G	Download Throughput Average (Mbits/s)	47.15	19.88	27.4	29.73
	Upload Throughput Average (Mbits/s)	12.20	18.16	7.49	8.35

Table-53: 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 from 20th January 2026 to 22nd January 2026. Two locations have been tested in areas under Samastipur district. (Refer Table-1)

4.4.1 Walk test locations

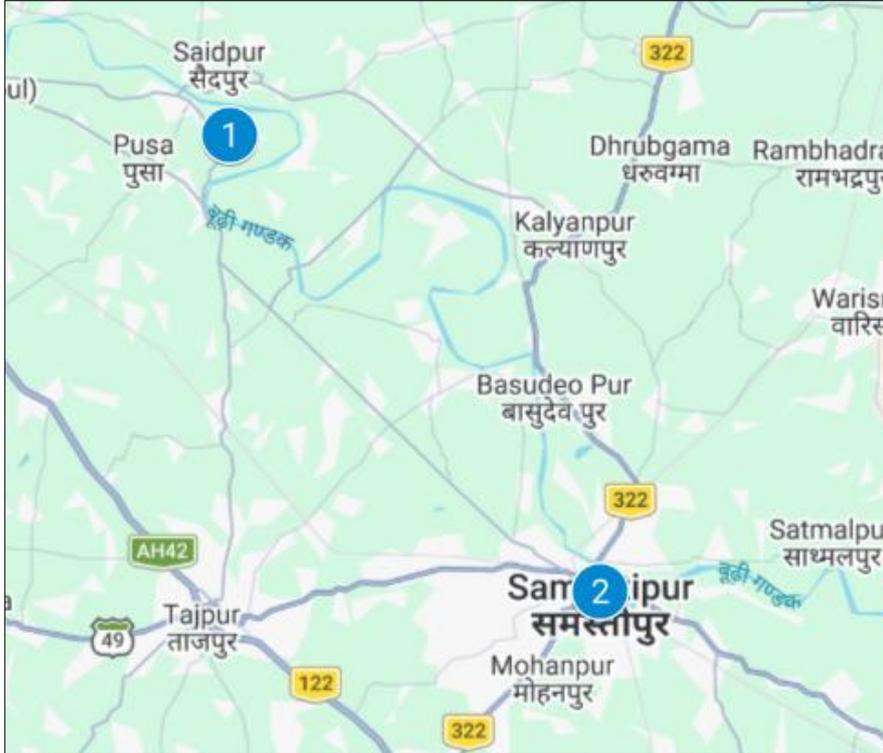


Figure-29: Walk test locations.

4.4.2 Walk test covered

1. Dr. Rajendra Prasad Central Agriculture University Pusa
2. Samastipur Junction Railway Station

4.4.3 Voice performance

i) Dr. Rajendra Prasad Central Agriculture University Pusa

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

Dr. Rajendra Prasad Central Agriculture University Pusa				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	12	12	12	12
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Sec)	1.68	3.20	0.62	1.01
Handover Success Rate %	100.00	-	100.00	-

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

Note- "-"Handover did not attempt.

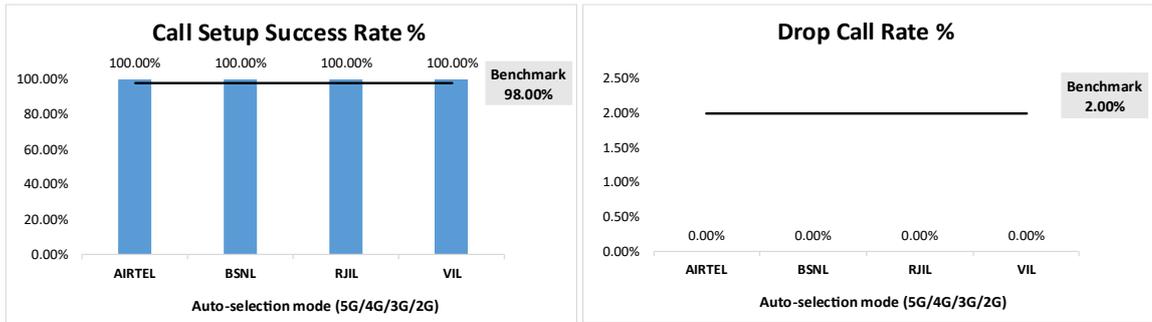


Figure- 30: Performance for call setup success rate and drop call rate.

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

Dr. Rajendra Prasad Central Agriculture University Pusa				
Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	7.51%	NA	2.15%	NA
4G	92.49%	0.18%	97.74%	100.00%
3G	NA	1.19%	NA	NA
2G	0.00%	98.63%	NA	0.00%
Limited service	0.00%	0.00%	0.12%	0.00%

Table-55: Time spent on technology during walk test.

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

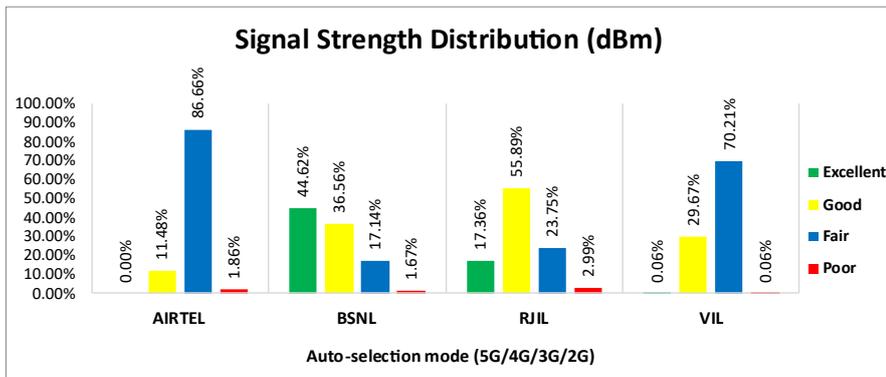


Figure-31: Signal strength distribution auto-selection mode (5G/4G/3G/2G).

ii) Samastipur Junction Railway Station

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

Samastipur Junction Railway Station				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	13	23	14	13
Call Setup Success Rate %	100.00	34.78	100.00	100.00
Drop Call Rate %	0.00	0.00	7.14	0.00
Call Setup Time-Average (Sec)	1.69	5.31	0.63	0.93
Handover Success Rate %	100.00	100.00	100.00	100.00

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

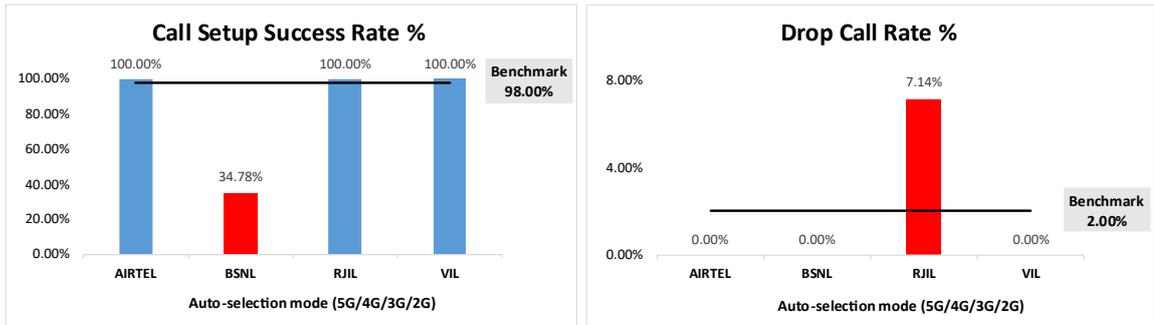


Figure- 32: Performance for call setup success rate and drop call rate.

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

Samastipur Junction Railway Station				
Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	2.44%	NA	100.00%	NA
4G	97.56%	99.89%	0.00%	100.00%
3G	NA	0.00%	NA	NA
2G	0.00%	0.00%	NA	0.00%
Limited service	0.00%	0.11%	0.00%	0.00%

Table-57: Time spent on technology during walk test.

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

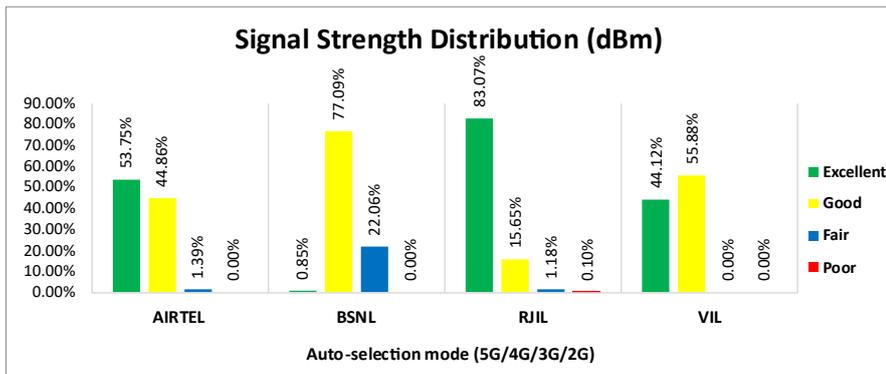


Figure-33: Signal strength distribution auto-selection mode (5G/4G/3G/2G).

4.4.4 Data performance

i) Dr. Rajendra Prasad Central Agriculture University Pusa

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

Dr. Rajendra Prasad Central Agriculture University Pusa				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	73.47	37.91	8.66	28.36
Download Throughput 80th Percentile	123.57	39.35	11.63	37.54
Download Throughput 20th Percentile	39.42	37.42	1.73	17.94
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	4.72	5.05	1.72	9.09
Upload Throughput 80th Percentile	6.15	5.35	2.00	9.50
Upload Throughput 20th Percentile	3.22	4.20	1.30	6.51
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms)-50th Percentile	79.23	49.08	80.01	42.93

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

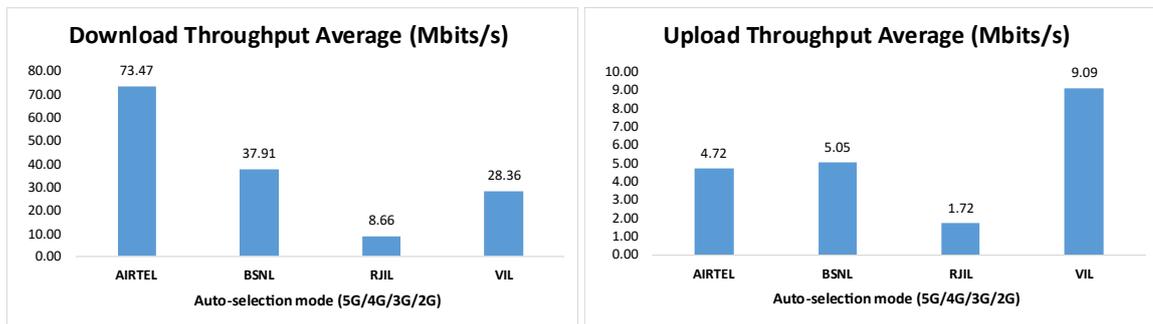


Figure- 34: Download and Upload throughput.

ii) Samastipur Junction Railway Station

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

Samastipur Junction Railway Station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	151.83	9.57	81.41	20.31
Download Throughput 80th Percentile	191.00	12.48	110.63	25.14
Download Throughput 20th Percentile	120.11	8.45	47.43	17.18
Download Session Setup Success Rate %	100.00	76.92	100.00	100.00
Upload Throughput Average (Mbits/s)	53.14	3.03	20.54	17.86
Upload Throughput 80th Percentile	77.33	3.68	26.36	19.72
Upload Throughput 20th Percentile	10.61	1.22	13.30	13.69
Upload Session Setup Success Rate %	100.00	91.67	100.00	100.00
Latency (ms)-50th Percentile	46.95	54.42	36.97	37.96

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

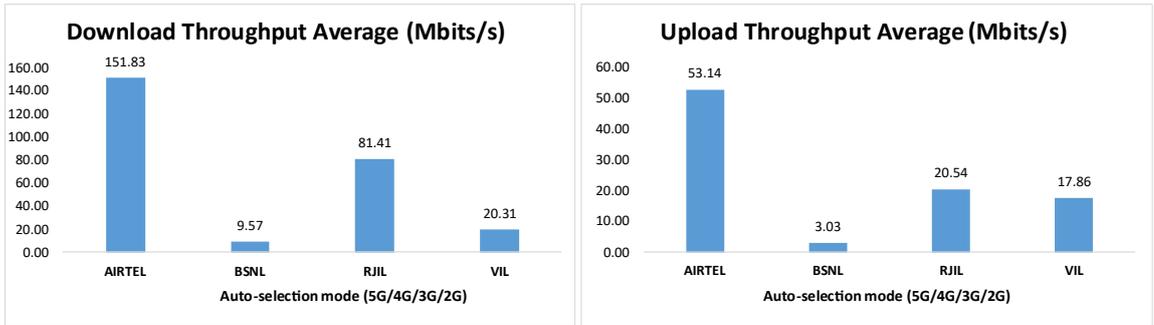


Figure- 35: Download and Upload throughput.

5. Voice & Data Key findings

5.1 Overall Voice

1. Call Setup Success Rate:

- a) Airtel, BSNL and VIL have 100.00%, 27.37% and 99.65% call setup success rate respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL and VIL have 100.00%, 36.89%, 99.76% and 98.82% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)
- c) Airtel had a 100.00% call setup success when calling RJIL and VIL whereas call blocking was observed when calling BSNL. (refer table-9)
- d) BSNL had a 100.00% call setup success when calling Airtel and VIL whereas call blocking was observed when calling RJIL. (refer table-9)
- e) RJIL had a 100.00% call setup success when calling Airtel whereas call blocking was observed when calling BSNL and VIL. (refer table-9)
- f) VIL had 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 5.65, 2.98 and 2.91 seconds respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL & VIL call setup time is 1.70, 4.77, 0.65 & 1.01 seconds respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. Call Silence/Mute Rate:

In packet switched network (4G/5G) Airtel, BSNL, RJIL and VIL have 0.34%, 1.89%, 0.00% and 4.56% silence call rate respectively. Further Airtel, BSNL, RJIL & VIL downlink RTP packet loss is 0.57%, 4.67%, 0.49% and 0.67% respectively. In uplink Airtel, BSNL, RJIL & VIL RTP packet loss is 0.23%, 5.73%, 0.36% & 0.86% respectively. (refer table-6)

4. Drop Call Rate:

- a) Airtel, BSNL and VIL drop call rate is 0.36%, 15.38% and 0.35% respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL and VIL drop call rate is 0.00%, 10.04%, 0.24% and 1.67% 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 101.10 Mbps, 12.13 Mbps, 158.64 Mbps and 27.24 Mbps respectively. (refer table-11)
- b) Airtel, BSNL, RJIL and VIL average upload speeds are 21.39 Mbps, 4.18 Mbps, 18.55 Mbps and 11.98 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 120.47 Mbps, 15.91 Mbps, 121.68 Mbps and 42.06 Mbps respectively. (refer table-32)
- b) Airtel, BSNL, RJIL and VIL average upload speeds are 23.30 Mbps, 8.60 Mbps, 13.53 Mbps and 7.41 Mbps respectively. (refer table-32)

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

- a) Airtel, BSNL, RJIL and VIL have 100.00%, 88.00%, 100.00% & 100.00% download session setup success rate respectively. (refer table-32)
- b) Airtel, BSNL, RJIL and VIL have 100.00%, 90.00%, 100.00% & 100.00% upload session setup success rate respectively. (refer table-32)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 100.00% call setup success rate and 0.36% drop call rate have been observed in 3G/2G network mode for LSA/city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-3 & 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 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 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 all hotspot locations. 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 both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table- 54 & 56)

Data

- Airtel has 101.10 Mbps average download speed & 21.39 Mbps average upload speed for LSA. (refer table-11)
- Airtel has 97.32 Mbps average download speed & 20.45 average upload speed across the measured routes for city drive. (refer table-19)
- District Court Samastipur, Government Bus Stand Uttarayan Samastipur, Government Engineering College (GEC) Samastipur, Govt. ITI Samastipur Mordewa and UR College Jarahi Khaira have less download speed (less than 100 Mbps) out of total 10 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 35, 36, 37 & 41)
- District Court Samastipur, Govt. ITI Samastipur Mordewa, Head Post Office Sakra Bazar Uttarayan Samastipur, Sub-Divisional Hospital Rosera Sahiar Dih and UR College Jarahi Khaira have less upload speed (less than 20 Mbps) out of total 10 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 37, 38, 40 & 41)
- Dr. Rajendra Prasad Central Agriculture University Pusa has less download speed (less than 100 Mbps) out of total 2 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table-58)
- Dr. Rajendra Prasad Central Agriculture University Pusa has less upload speed (less than 20 Mbps) out of total 2 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table-58)

2. BSNL:

Voice

- 27.37% call setup success rate and 15.38% drop call rate have been observed in 3G/2G network mode for LSA/city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3 & 13)
- 36.89% call setup success rate and 10.04% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 30.37% call setup success rate and 14.63% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-15)
- 65.00% call setup success rate and 1.54% 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-21)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Dr. Rajendra Prasad Central Agriculture University Pusa walk test location. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table- 54)
- 34.78% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Samastipur Junction Railway Station walk test location. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table- 56)

Data

- BSNL has 12.13 Mbps average download speed & 4.18 Mbps average upload speed for LSA. (refer table-11)
- BSNL has 8.31 Mbps average download speed & 2.94 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- Government Bus Stand Uttarayan Samastipur, Government Engineering College (GEC) Samastipur, Govt. ITI Samastipur Mordewa and Sub-Divisional Hospital Rosera Sahiar Dih have less download speed (less than 10 Mbps) out of total 10 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-35, 36, 37 & 40)
- Government Engineering College (GEC) Samastipur, Govt. ITI Samastipur Mordewa and Sub-Divisional Hospital Rosera Sahiar Dih have less upload speed (less than 2 Mbps) out of total 10 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-36, 37 & 40)
- Samastipur Junction Railway Station has less download speed (less than 10 Mbps) out of total 2 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table-59).

3. RJIL:

Voice

- 99.76% call setup success rate and 0.24% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)

- 99.66% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-15)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. 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) at Dr. Rajendra Prasad Central Agriculture University Pusa walk test location. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table- 54)
- 100.00% call setup success rate and 7.14% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Samastipur Junction Railway Station walk test location. Performance is not meeting the benchmark of 2.00% for drop call rate. (refer table- 56)

Data

- RJIL has 158.64 Mbps average download speed & 18.55 Mbps average upload speed for LSA. (refer table-11)
- RJIL has 173.23 Mbps average download speed & 19.88 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- District Court Samastipur, Government Bus Stand Uttarayan Samastipur, Head Post Office Sakra Bazar Uttarayan Samastipur, Subdivisional Civil Court Dalsinghsarai and UR College Jarahi Khaira have less download speed (less than 100 Mbps) out of total 10 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 35, 38, 39, & 41)
- District Court Samastipur, Govt. ITI Samastipur Mordewa, Head Post Office Sakra Bazar Uttarayan Samastipur, Subdivisional Civil Court Dalsinghsarai, Sub-Divisional Hospital Rosera Sahiar Dih, UR College Jarahi Khaira and V2 Mall 08 Tajpur Rd Professor Colony Kashipur Samastipur have less upload speed (less than 20 Mbps) out of total 10 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 37, 38, 39, 40, 41 & 42)
- Both walk test locations have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-58 & 59).
- Dr. Rajendra Prasad Central Agriculture University Pusa has less upload speed (less than 20 Mbps) out of total 2 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table-58).

4. VIL:

Voice

- 99.65% call setup success rate and 0.35% drop call rate have been observed in 3G/2G network mode for LSA/city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-3 & 13)
- 98.82% call setup success rate and 1.67% 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)
- 98.66% call setup success rate and 1.69% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-15)

- 99.00% call setup success rate and 2.02% 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 2.00% for drop call rate. (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 both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table- 54 & 56)

Data

- VIL has 27.24 Mbps average download speed & 11.98 Mbps average upload speed for LSA. (refer table-11)
- VIL has 25.32 Mbps average download speed & 12.54 Mbps average upload speed across the measured routes for city drive. (refer table-19)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

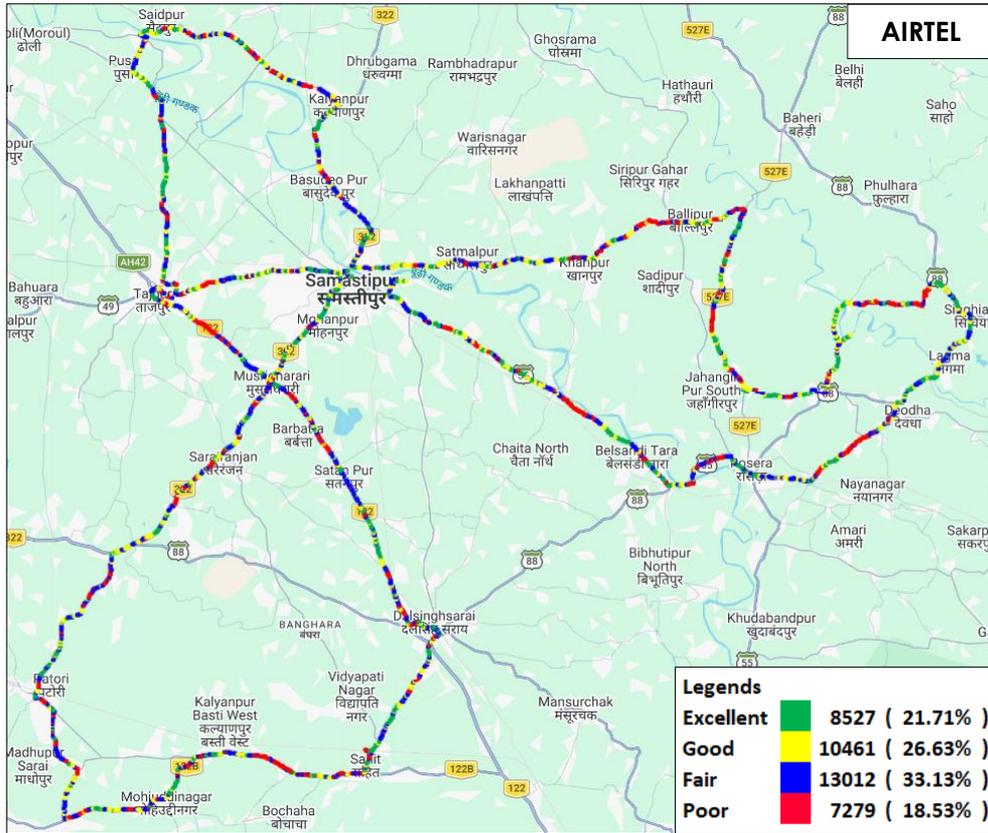


Figure-36: Signal strength 3G/2G network mode voice - AIRTEL.

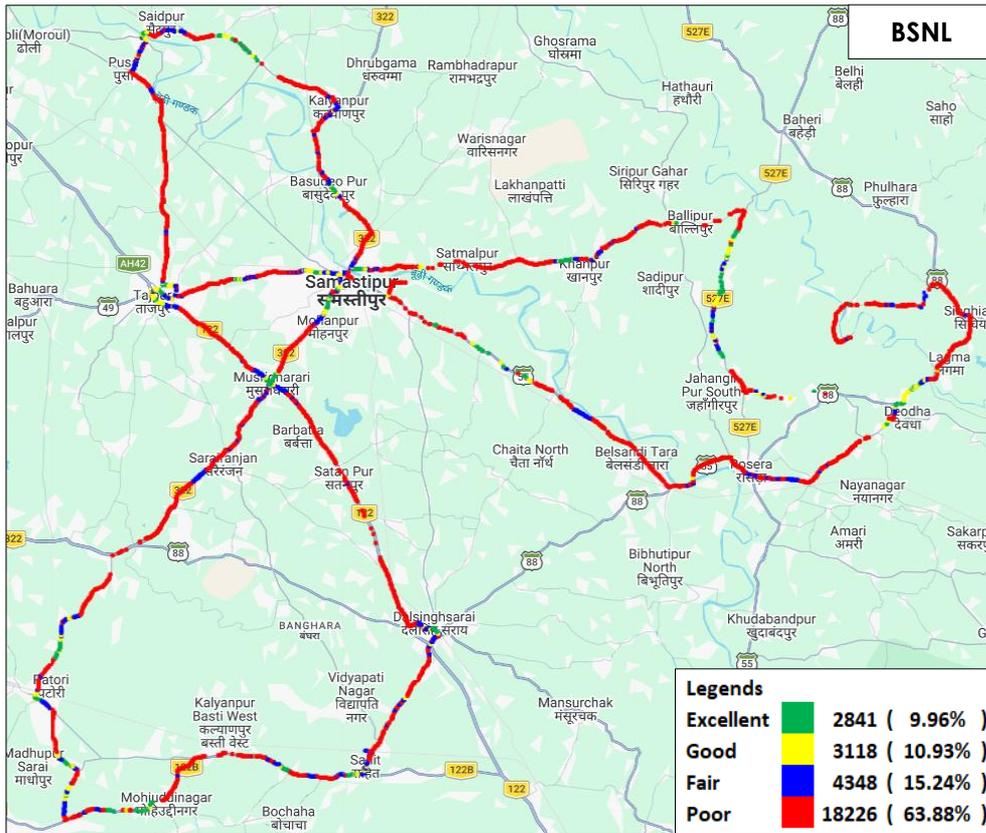


Figure-37: Signal strength 3G/2G network mode voice - BSNL.

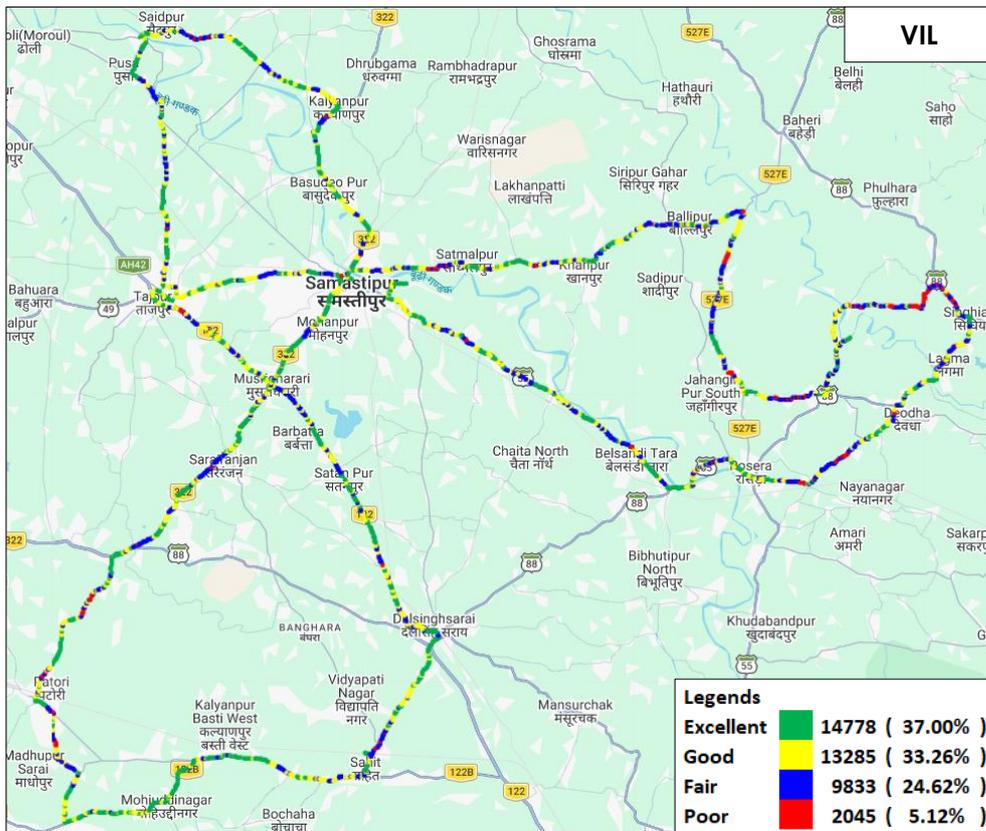


Figure-38: Signal strength 3G/2G network mode voice - VIL.

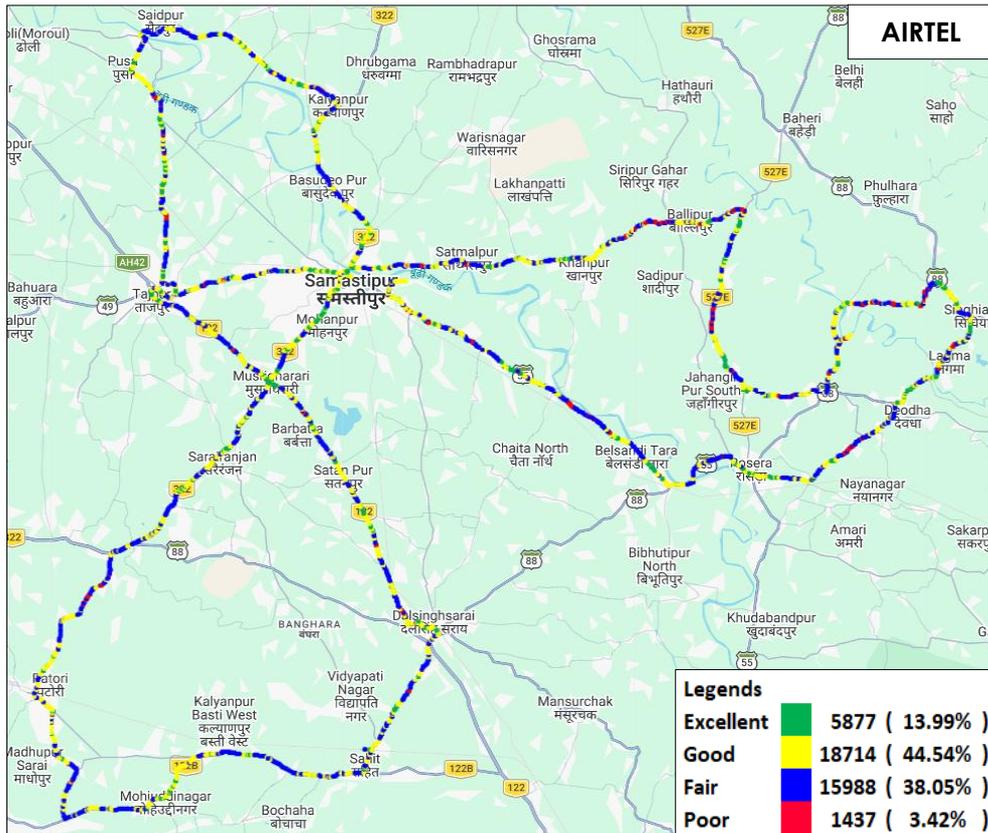


Figure-39: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

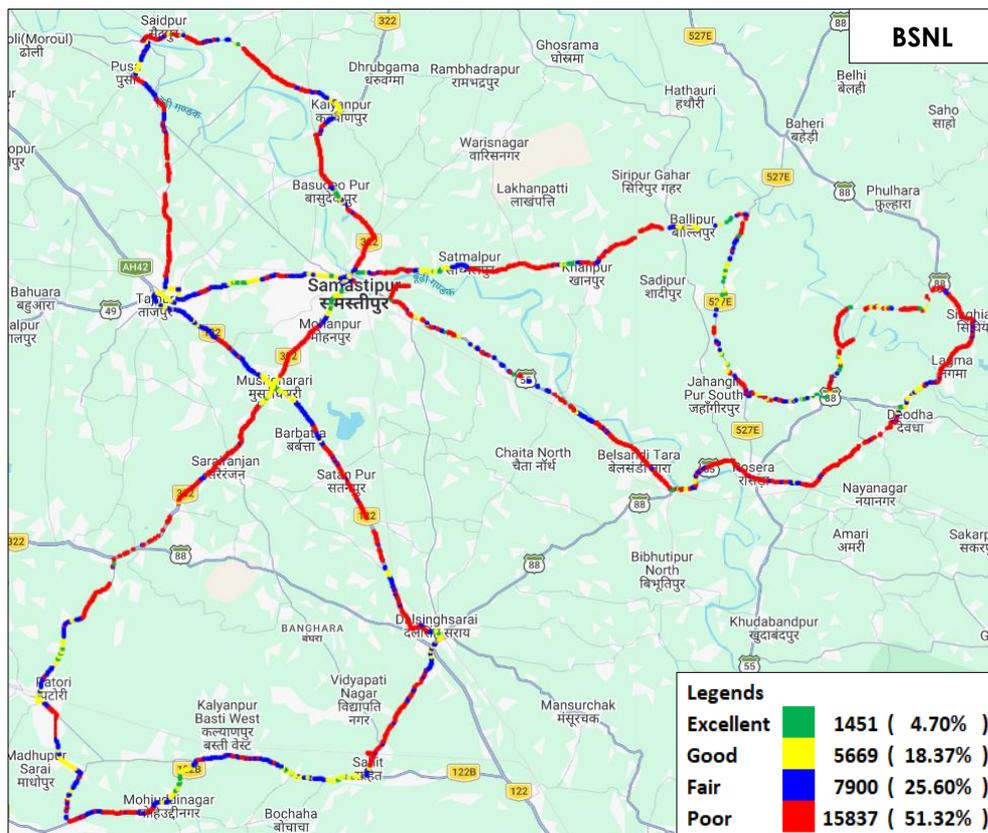


Figure-40: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL (4G being rolled out).

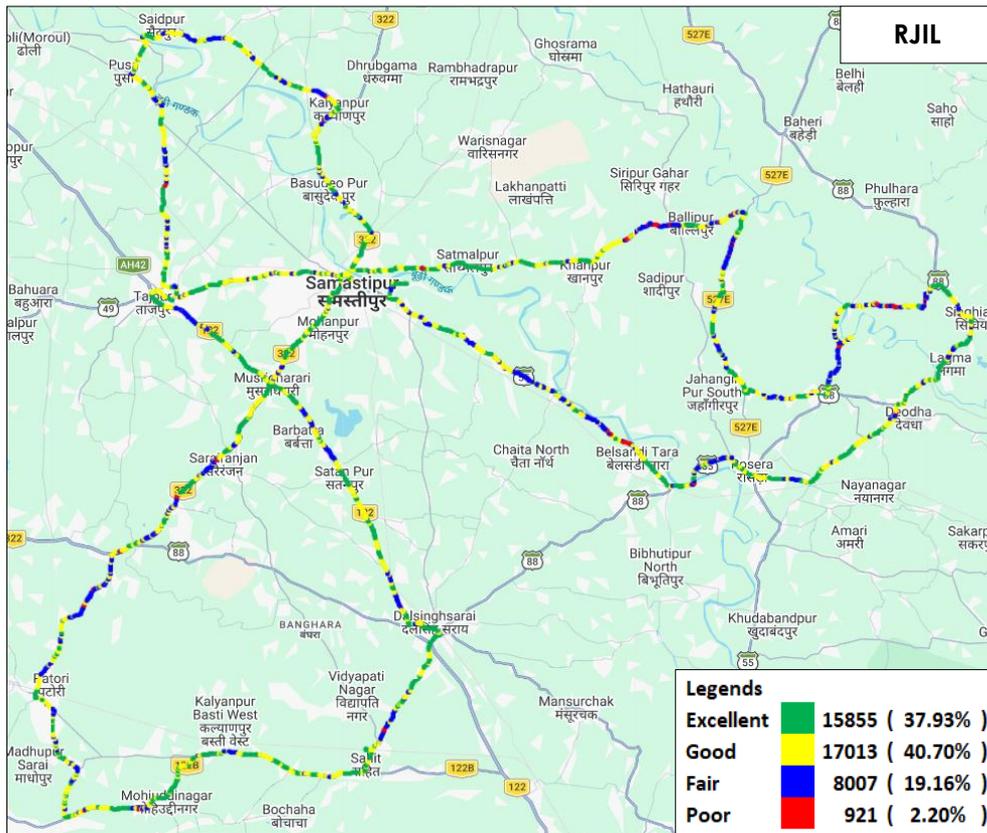


Figure-41: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

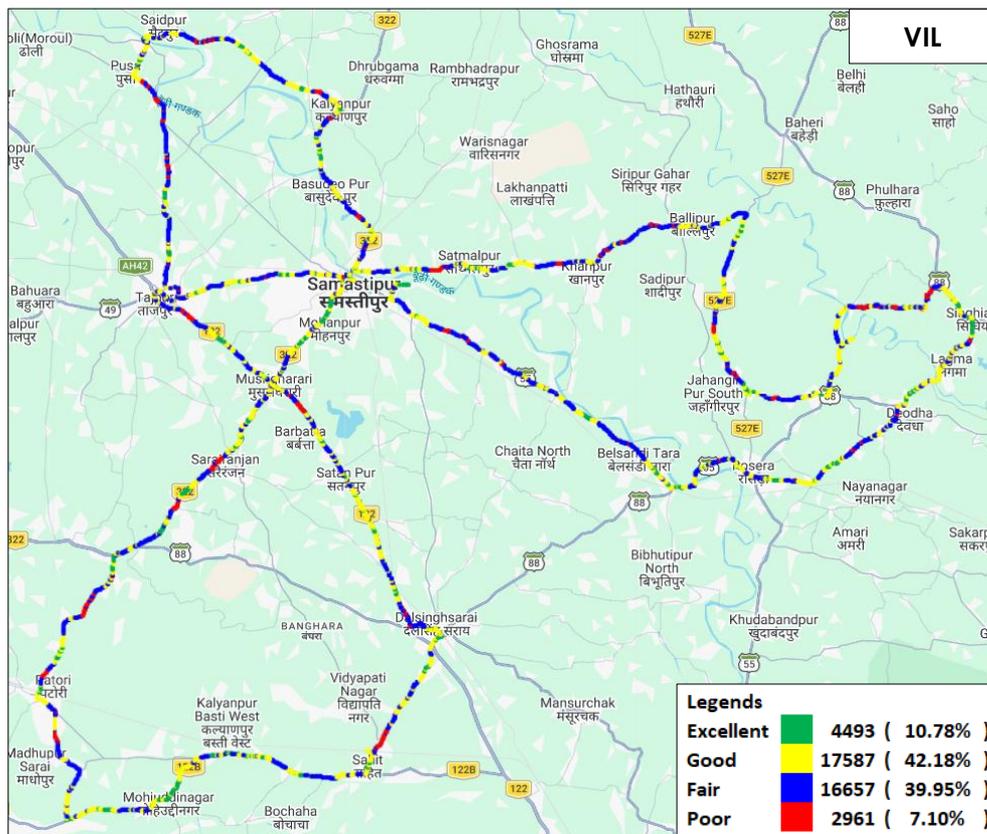


Figure-42: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.

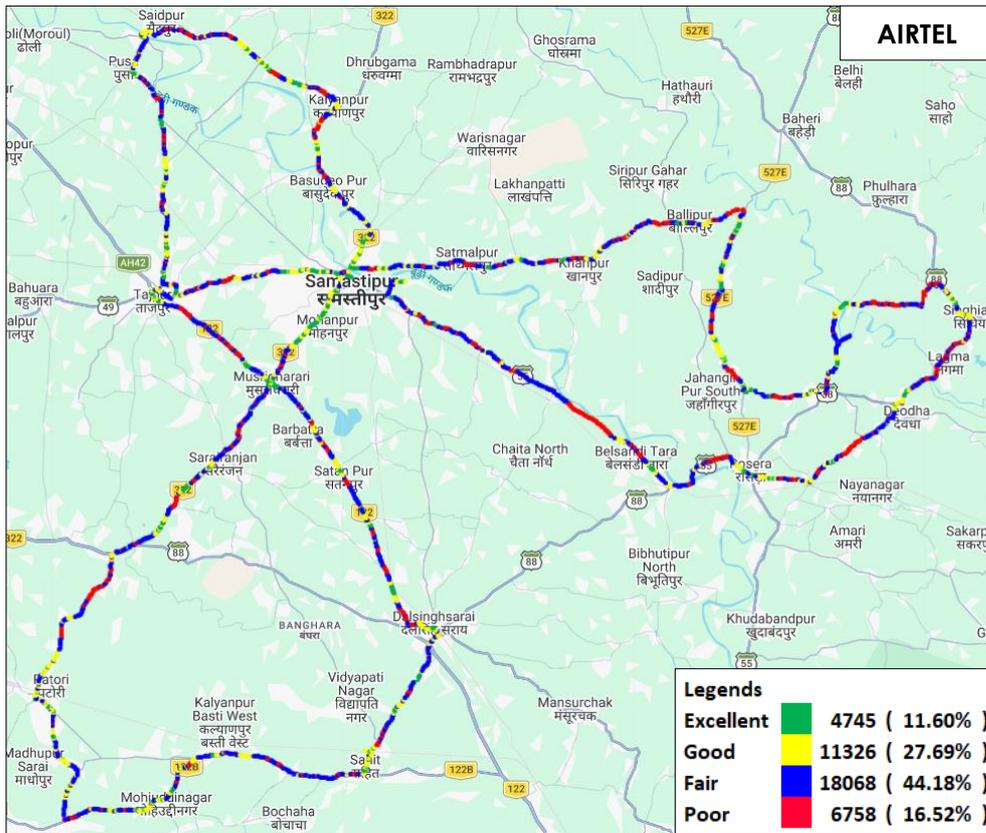


Figure-43: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

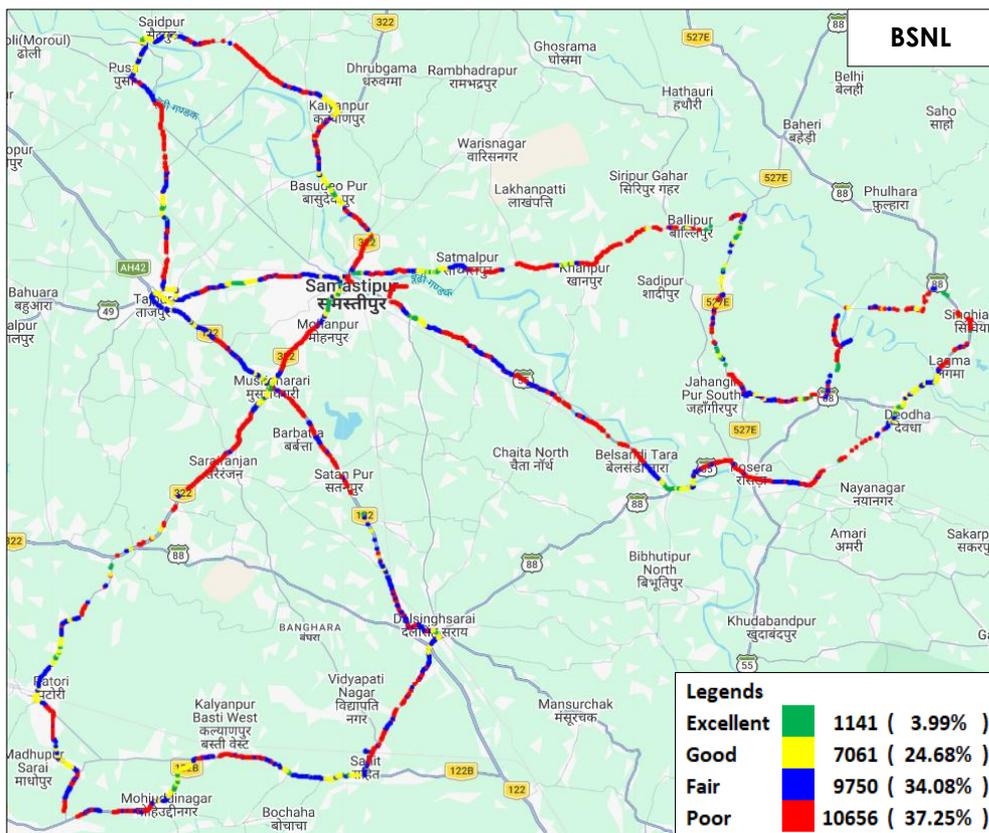


Figure-44: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL (4G being rolled out).

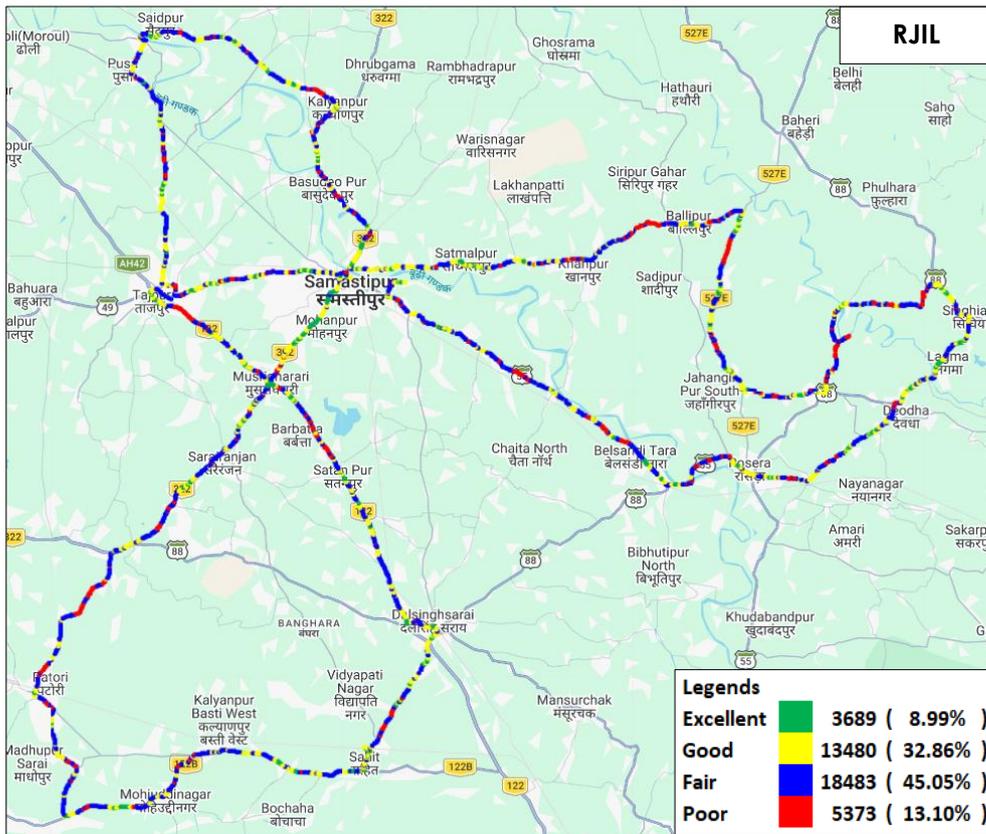


Figure-45: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.

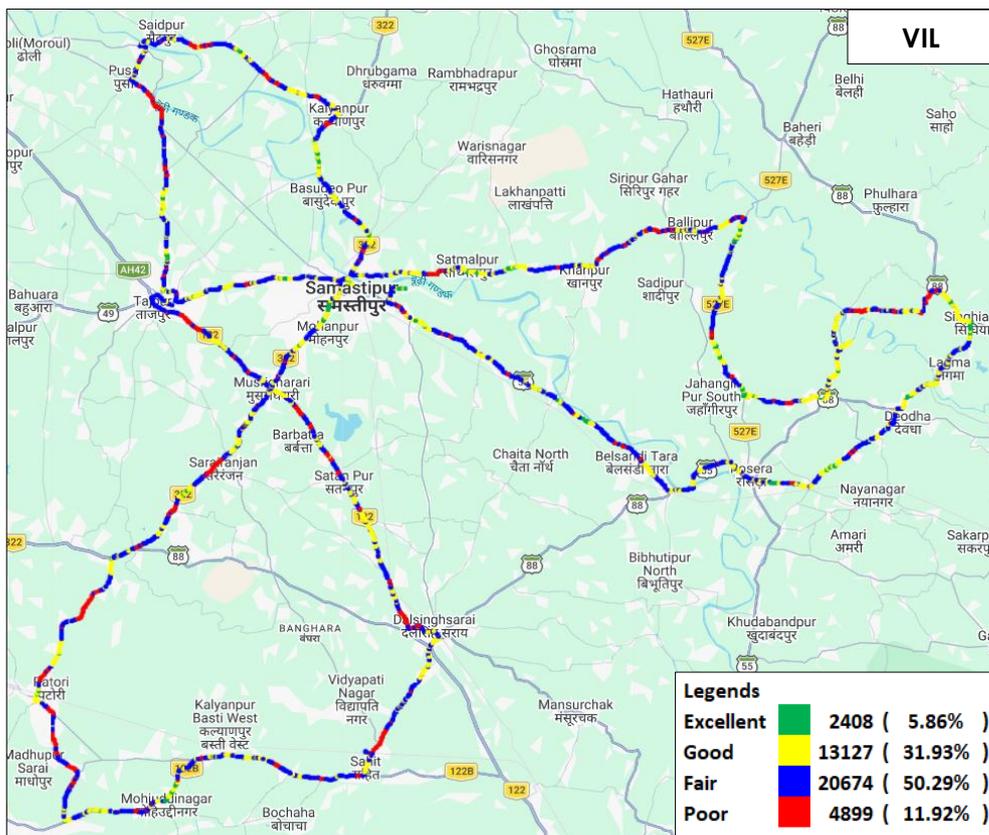


Figure-46: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

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	<ul style="list-style-type: none"> • 3G/2G auto mode- switch Call • 5G/4G/3G/2G auto mode- switch Call • 5G/4G MOS Call 	30 Sec
Call Duration		120 Sec
Wait/ Guard Time		15 Sec

Table-60: Voice test detail

<p>Note-</p> <ul style="list-style-type: none"> • There is 15 sec wait time after locking and before starting first call in 3G/2G call. • 10 calls to be made at each Hotspot location. • Minimum 10 Calls to be made during the walk test. Call count will be increased based on walk test distance. • Speech quality (MOS) has been measured only in city drive & highway by making Mobile to Mobile call. • 180 Sec calls were made only in highway & railway route drive.

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

Latency & Jitter (TWAMP-UDP)		25 count- Dynamic 500 count- Hotspot Payload- 512 bytes in all drive
Packet Loss Rate (TWAMP-UDP & TCP)		500 counts (TWAMP-UDP) 500 counts (TCP) at each hotspot Payload- 512 bytes in all drive

Table-61: 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.
 - Delhi-based TRAI server was used for HTTP Download, HTTP Upload, TCP and TWAMP testing for Airtel, BSNL and RJIL.
 - VIL server was used for HTTP Download, HTTP Upload, TCP & TWAMP testing, for VIL.

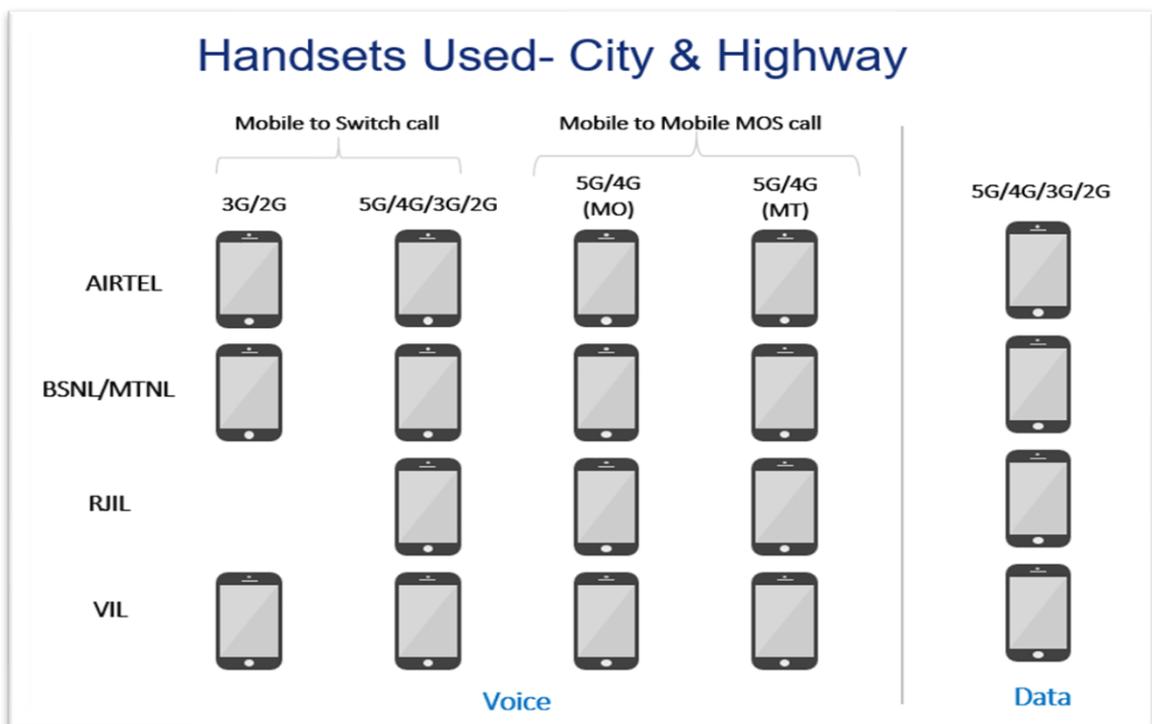


Figure-47: Number of handsets used in city & highway drive
MO: Mobile originating
MT: Mobile terminating

Handsets Used- Railway/Metro/Walk Test/ Hotspot & Coastal Area

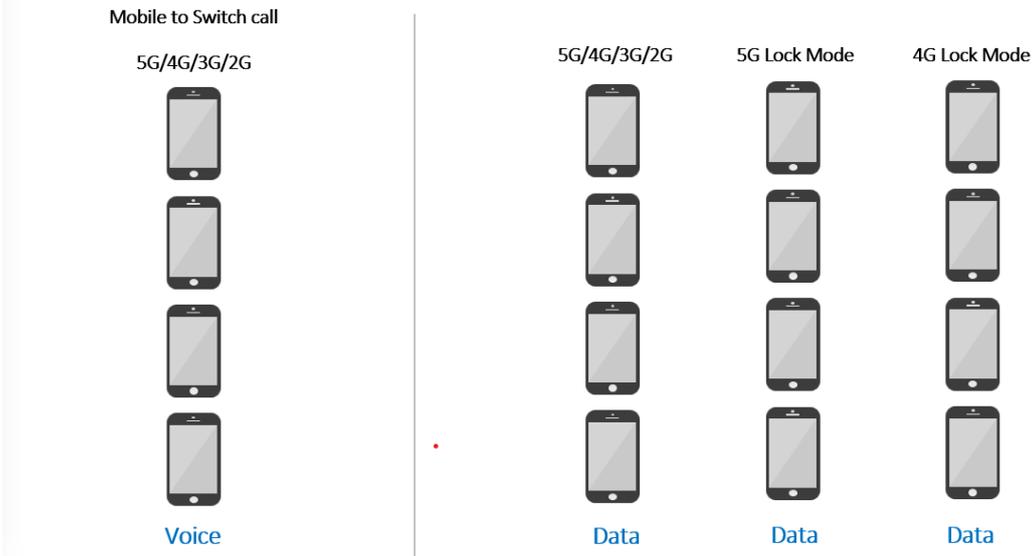


Figure-48: Number of handsets used in railway/metro/walktest/hotspot & coastal area

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)

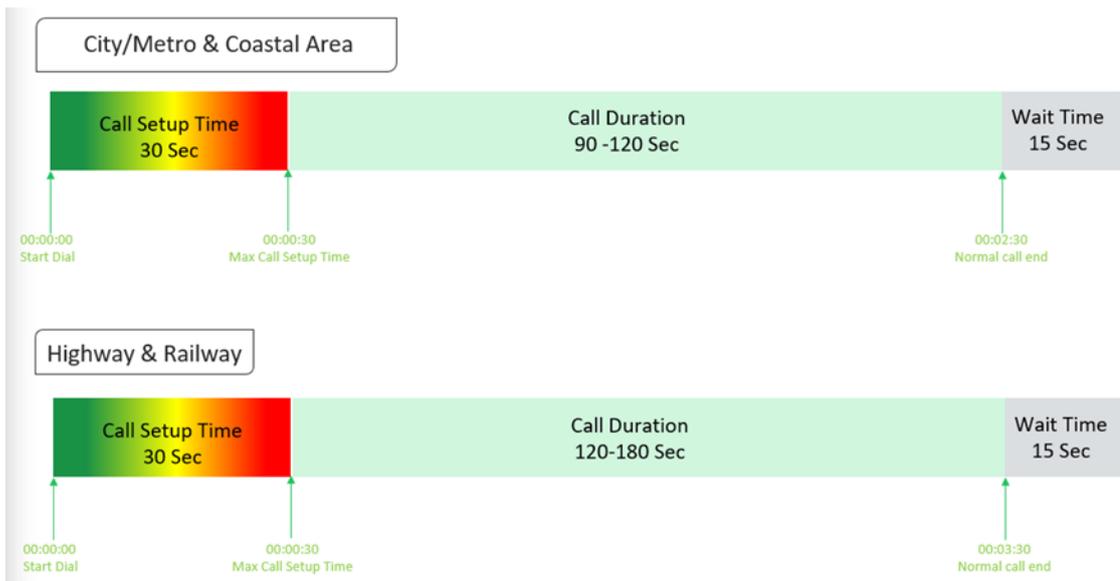


Figure-49: Voice test script for city/railway/metro/highway & coastal area

- 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-50: 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

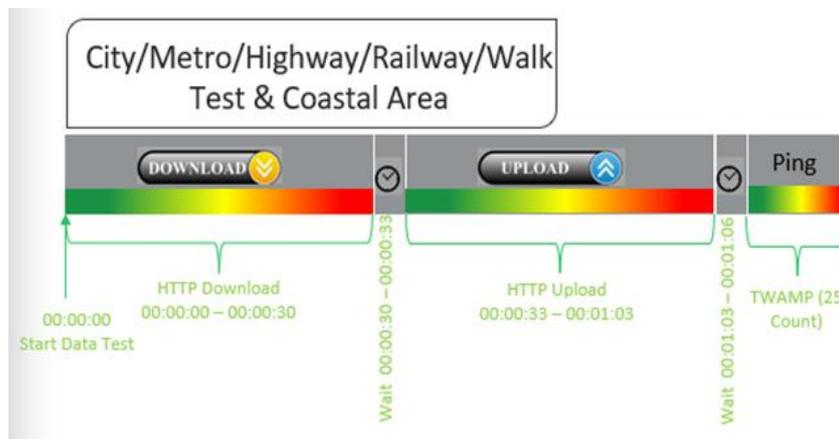


Figure-51: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

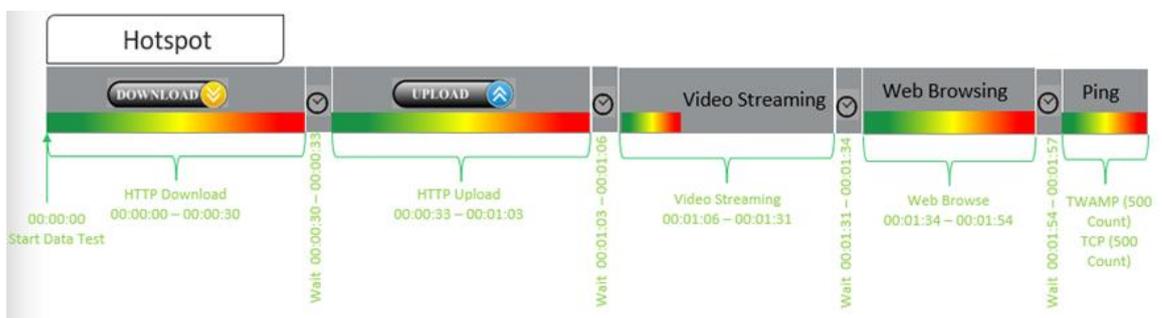


Figure-52: Data test script used at hotspot

- 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	<p>(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:</p> <ul style="list-style-type: none"> (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. <p>CSSR = (Total Call Established/ Total Call Attempt) *100</p> <p>As per QoS Regulation 2024 benchmark value is >=98%</p>
Drop Call Rate	<p>Drop call 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</p> <p>Drop Call Rate = (Total Drop Call/Total Call Established) *100</p> <p>As per QoS Regulation 2024 benchmark value is <=2%</p>
Call Setup Time	<p>Time taken from call initiate to call alerting/ringing.</p> <p>Call Setup Time = T2- T1</p> <p>T2- Ringing (VoLTE/VoNR) & Alerting (for WCDMA & GSM), T1- Invite (VoLTE/VoNR) & CM Service Request (for WCDMA & GSM)</p>
Voice Quality (MOS)	<p>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:</p> <p>Excellent: MOS ≥ 4 and < 5 Good : MOS ≥ 3 and < 4 Fair : MOS ≥ 2 and < 3 Poor : MOS ≥ 1 and < 2</p>
Handover Success Rate	<p>Handover Success Rate = Count of successful handovers (All Technology Handover combined) / Total count of Handover Attempt (All Technology Handover combined) *100</p> <p>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.</p>
Silence Call	<p>A call which has ≥ 4 sec continuous RTP gap is considered as a Silence Call.</p> <p>Silence call rate = (count of silence call / Total calls established) *100</p> <p>If a call observes multiple silence count ≥ 4 sec in a particular established call it has been taken as one silent event.</p>

Jitter	<p>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: $D(i,j) = (R_j - R_i) - (S_j - S_i)$</p> <p>The interarrival jitter is calculated continuously as each data packet i is received from source $SSRC_n$, using this difference D for that packet and the previous packet $i-1$ in order of arrival (not necessarily in sequence), according to the formula $J(i) = J(i-1) + (D(i-1,i) - J(i-1))/16$ or 8</p>																																		
Downlink Packet Drop Rate	<p>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).</p>																																		
Uplink Packet Drop Rate	<p>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).</p>																																		
Signal Strength	<p>Signal strength is the signal power level received by the wireless user.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Parameter Name</th> <th rowspan="2">Technology</th> <th colspan="4">Signal Strength (dBm)</th> </tr> <tr> <th style="background-color: #90EE90;">Excellent</th> <th style="background-color: #FFFF00;">Good</th> <th style="background-color: #ADD8E6;">Fair</th> <th style="background-color: #FF0000;">Poor</th> </tr> </thead> <tbody> <tr> <td>Rx Level</td> <td>GSM</td> <td>0 to \geq -65</td> <td><-65 to \geq -75</td> <td><-75 to \geq -85</td> <td><-85 to min</td> </tr> <tr> <td>RSCP</td> <td>WCDMA</td> <td>0 to \geq -70</td> <td><-70 to \geq -80</td> <td><-80 to \geq -90</td> <td><-90 to min</td> </tr> <tr> <td>RSRP</td> <td>LTE</td> <td>0 to \geq -80</td> <td><-80 to \geq -95</td> <td><-95 to \geq -110</td> <td><-110 to min</td> </tr> <tr> <td>SS_RSRP</td> <td>NR</td> <td>0 to \geq -80</td> <td><-80 to \geq -95</td> <td><-95 to \geq -110</td> <td><-110 to min</td> </tr> </tbody> </table>	Parameter Name	Technology	Signal Strength (dBm)				Excellent	Good	Fair	Poor	Rx Level	GSM	0 to \geq -65	<-65 to \geq -75	<-75 to \geq -85	<-85 to min	RSCP	WCDMA	0 to \geq -70	<-70 to \geq -80	<-80 to \geq -90	<-90 to min	RSRP	LTE	0 to \geq -80	<-80 to \geq -95	<-95 to \geq -110	<-110 to min	SS_RSRP	NR	0 to \geq -80	<-80 to \geq -95	<-95 to \geq -110	<-110 to min
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RSCP	WCDMA	0 to \geq -70	<-70 to \geq -80	<-80 to \geq -90	<-90 to min																														
RSRP	LTE	0 to \geq -80	<-80 to \geq -95	<-95 to \geq -110	<-110 to min																														
SS_RSRP	NR	0 to \geq -80	<-80 to \geq -95	<-95 to \geq -110	<-110 to min																														

Table-62: Network performance parameter and definition voice

7.2.2 Network Performance Parameters Data tests

Parameter Name	Definition
Download Speed (Mbps)	<p>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.</p> <p>Download Speed = Total bytes transferred during download / Total time for transfer</p> <ul style="list-style-type: none"> 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)	<p>The upload speed is the data transmission rate that is achieved for uploading a test file from a test device to a test server.</p> <p>Upload Speed = Total bytes transferred during upload / Total time for transfer.</p> <ul style="list-style-type: none"> 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	<p>(total download session established (successfully connected to server)/ total download session attempt) *100. This KPI has been calculated for Hotspot only.</p>

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 ping) >90 ms considered as packet loss and included in packet loss rate. * Packet loss rate is calculated based on ICMP * 90th percentile for Packet loss rate has been reported in overall Hotspot performance summary.

Table-63: 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.