भादूविप्रा
TRAI

TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Madhya Pradesh LSA

November 2025

Contents

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 Madhya Pradesh License Service Area (LSA) during the month of November-2025 under the supervision of TRAI Regional Office (RO) Bhopal. 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	Durg-Bhilai	City	341.6	19-Nov-2025	21-Nov-2025
2	Durg-Bhilai	Inter Operator Calling	15.8	22-Nov-2025	22-Nov-2025
3	Durg-Bhilai	Hotspot	12 Locations	21-Nov-2025	22-Nov-2025
4	Durg-Bhilai	Walk test	4.7	19-Nov-2025	19-Nov-2025
5	Raipur to Jagdalpur	Highway	297.8	17-Nov-2025	17-Nov-2025
6	Bhopal to Ratlam	Railway	280.7	25-Nov-2025	25-Nov-2025

Table-1: Drive test summary

2.2 Drive test routes

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

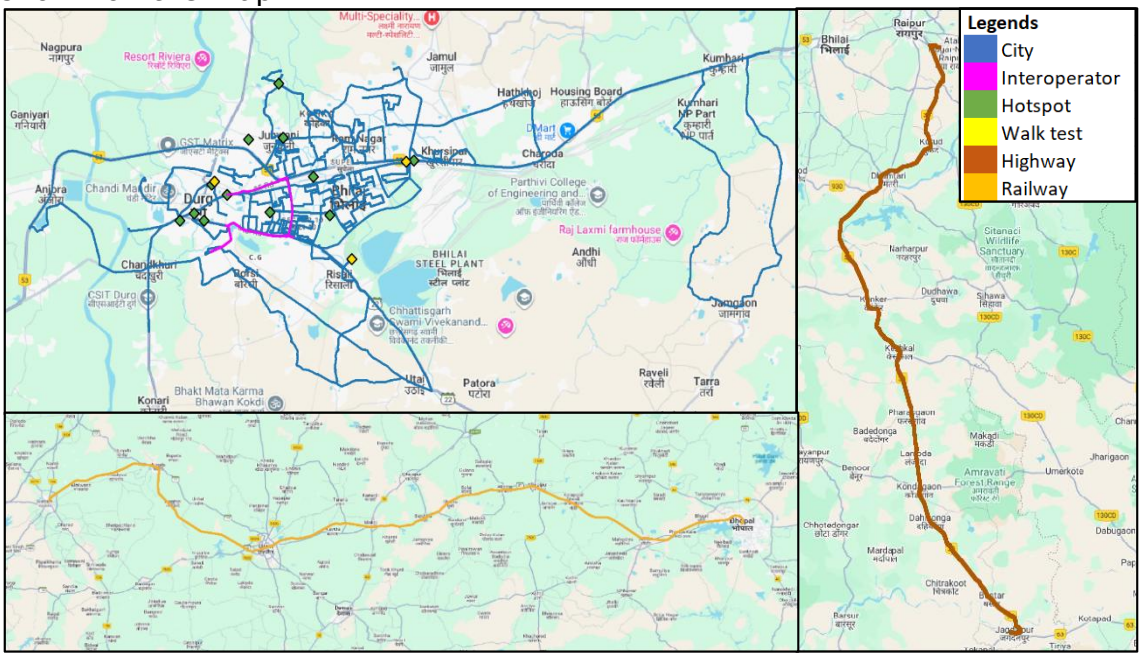


Figure-1: Drive test routes

2.3 Summary of areas covered

a) City- Nearby Anjora, Chandkhuri, Minakshi Nagar, dhaora, Utai, Risali, Katulbod, Nehru Nagar, Ram Nagar, Junwani, Khursipar, Charoda, Hathkoj, Kumhari, Runi, Ameri and Jamgaon. etc.

b) Hotspot

1. Bhilai Bus Stand
2. Bhilai Railway Station
3. Civic Centre Bhilai
4. Durg Bus Stand
5. Durg Collectorate
6. Durg Railway Station
7. Govt. V.Y.T. Post Graduate Autonomous College Durg
8. Indian Institute of Technology Bhilai
9. Pt. Ravishankar Shukla Stadium Durg
10. Sector 9 Hospital Bhilai
11. Shree Shankaracharya Medical Collage
12. TI Mall Bhilai

c) Walk Test

1. Bhilai Powerhouse Railway Station
2. Durg Railway Station
3. Maitri Baag Zoo Bhilai

d) Highway- Raipur to Jagdalpur passing through Kurud, Purur, Charama, Kanker, Kondagaon, Joba Sonarpal and Bastar etc.

e) Railway- Bhopal to Ratlam passing through Sant Hirdaram Nagar, Sehore, Kalapipal, Shujalpur, Akodia, Kali Sindh, Berchha, Maksi, Tarana Road, Ujjain Jn, Nagda Jn & Khachrod.

2.4 Telecom service providers detected frequency bands

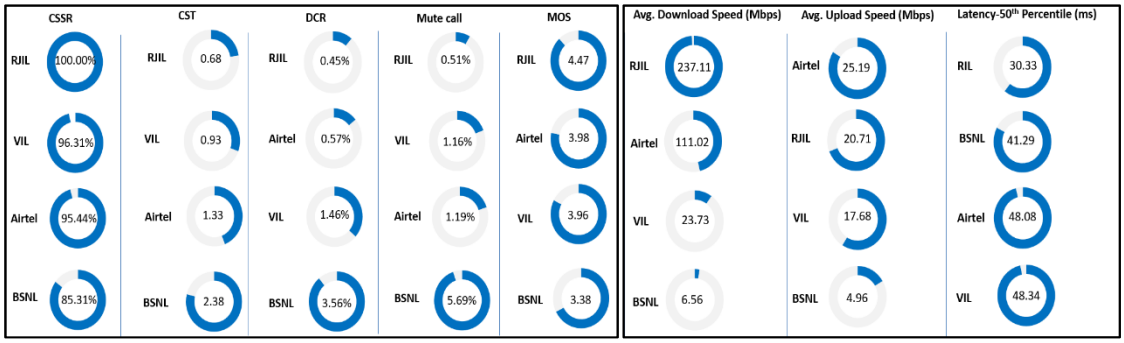
Technologies covered during the IDT and frequency bands in use are summarised in table below:

S.no.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	1800
2	Bharti Airtel Ltd.	4G	850,1800,2100,2300
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	900
10	Vodafone Idea Ltd.	4G	900,1800,2100,2300,2500

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.



Summary-Voice services

Call Setup Success Rate: Airtel, BSNL, RJIL and VIL have 95.44%, 85.31%, 100.00% and 96.31% 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 1.33, 2.38, 0.68 and 0.93 seconds respectively in Auto-selection mode (5G/4G/3G/2G).

Drop Call Rate: Airtel, BSNL, RJIL and VIL have drop call rate of 0.57%, 3.56%, 0.45% and 1.46% respectively in Auto-selection mode (5G/4G/3G/2G).

Call Silence/Mute Rate: Airtel, BSNL, RJIL and VIL have silence call rate of 1.19%, 5.69%, 0.34% and 1.16% respectively in packet switched network (4G/5G).

Mean Opinion Score (MOS): Airtel, BSNL, RJIL and VIL have average MOS of 3.98, 3.38, 4.47 and 3.96 respectively.

Summary-Data services

Data Download performance (Overall): Average download speed of Airtel (5G/4G/2G) is 111.02 Mbps, BSNL (4G/3G/2G) is 6.56 Mbps, RJIL (5G/4G) is 237.11 Mbps and VIL (4G/2G) is 23.73 Mbps.

Data Upload performance (Overall): Average upload speed of Airtel (5G/4G/2G) is 25.19 Mbps, BSNL (4G/3G/2G) is 4.96 Mbps, RJIL (5G/4G) is 20.71 Mbps and VIL (4G/2G) is 17.68 Mbps.

Latency (Overall): Airtel, BSNL, RJIL and VIL 50th percentile latency is 48.08 ms, 41.29 ms, 30.33 ms & 48.34 ms respectively.

Data performance - Hotspots (in Mbps):

Airtel- 4G D/L: 33.93 4G U/L: 7.21
5G D/L: 172.39 5G U/L: 40.51
BSNL- 4G D/L: 11.43 4G U/L: 4.67
RJIL- 4G D/L: 55.15 4G U/L: 15.18
5G D/L: 259.24 5G U/L: 15.61
VIL- 4G D/L: 24.08 4G U/L: 12.63

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

- Poor signal strength level has been observed on 0.87%, 2.36%, 0.87% & 3.18% of the route covered during the drive test for Airtel, BSNL, VIL and RJIL correspondingly for city drive.
- Poor signal strength level has been observed on 20.86%, 26.29%, 7.16% & 24.58% of the route covered during the drive test for Airtel, BSNL, VIL and RJIL correspondingly for highway drive.
- Poor signal strength level has been observed on 6.92%, 33.98%, 2.70% & 10.77% of the route covered during the drive test for Airtel, BSNL, VIL and RJIL correspondingly for railway drive.

QoS Performance Analysis- Madhya Pradesh 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 Madhya Pradesh LSA during the month of November-2025 covering city drive, hotspots, walk test, highway and railway. (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	630	637	640
Call Setup Success Rate %	92.22	97.65	93.13
Drop Call Rate %	0.69	1.61	0.67
Call Setup Time-Average (Second)	4.85	3.86	3.37
Handover Success Rate %	98.70	99.82	97.36

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

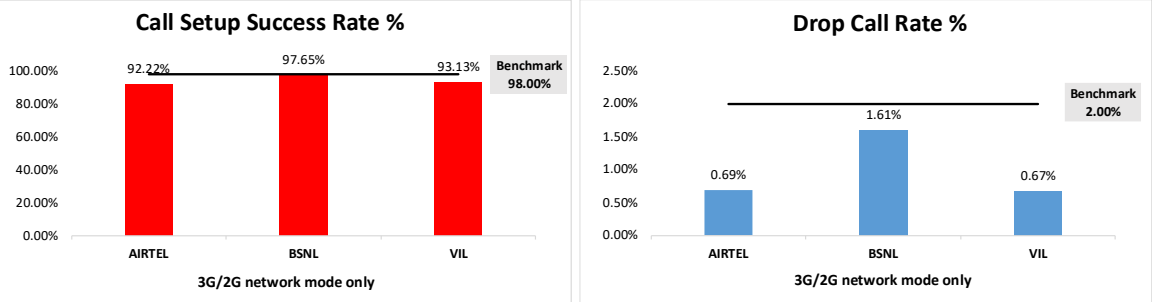


Figure-2: Call setup success rate and drop call rate performance.

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	226	NA
2G	658	192	521

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	922	987	895	922
Call Setup Success Rate %	95.44	85.31	100.00	96.31
Drop Call Rate %	0.57	3.56	0.45	1.46
Call Setup Time-Average (Second)	1.33	2.38	0.68	0.93
Handover Success Rate %	99.70	99.47	99.83	99.85

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

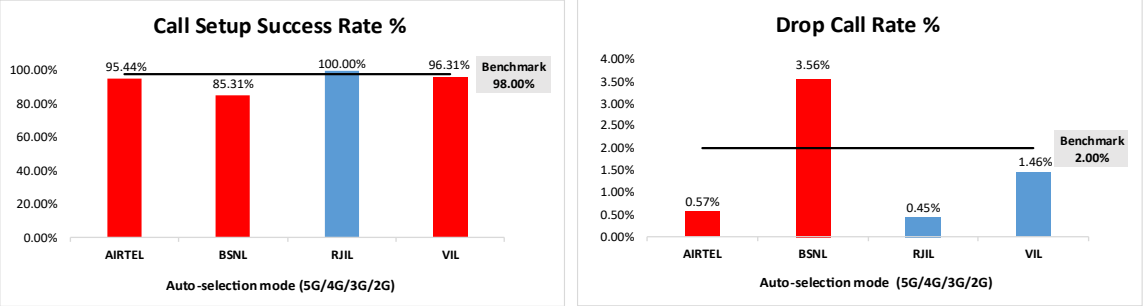


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	586	633	592	603
Number of silences call for >4 Sec	7	36	3	7
Silence Call Rate %	1.19	5.69	0.51	1.16
Number of silence instances for >4 Sec	7	44	4	8
Number of silence instances for >3 Sec	15	72	6	23
Number of silence instances for >2 sec	32	138	20	56
RTP Jitter (4G & 5G) in ms	4.71	8.92	11.33	14.28
Packet loss Rate Downlink %	1.03	4.54	0.71	1.19
Packet loss Rate Uplink %	0.79	4.17	0.49	0.99

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	632	NA
4G	1901	736	2760	1643
3G	NA	35	NA	NA
2G	5	86	NA	59

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	3872	3924	4135	3932
Speech Quality (Average MOS)	3.98	3.38	4.47	3.96
Number of samples with MOS >=4 to <5 (Excellent)	3217	1726	3634	2796
Number of samples with MOS >=3 to <4 (Good)	506	1077	322	896
Number of samples with MOS >=2 to <3 (Fair)	80	600	84	121
Number of samples with MOS >=1 to <2 (Poor)	69	521	95	119
%age of samples with MOS >=4 to <5 (Excellent)	83.08%	43.99%	87.88%	71.11%
%age of samples with MOS >=3 to <4 (Good)	13.07%	27.45%	7.79%	22.79%
%age of samples with MOS >=2 to <3 (Fair)	2.07%	15.29%	2.03%	3.08%
%age of samples with MOS >=1 to <2 (Poor)	1.78%	13.28%	2.30%	3.03%

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

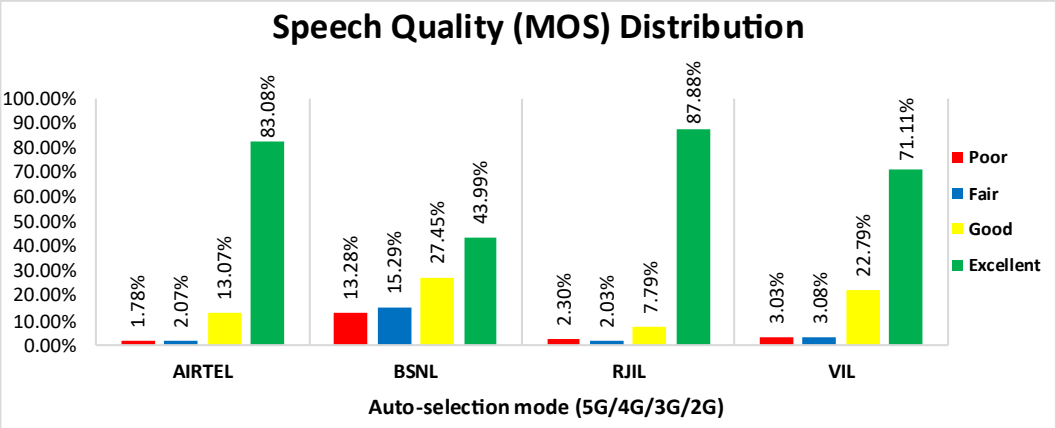


Figure- 4: Distribution of samples in MOS range.

(d) Inter-service provider voice call performance: To check the performance of inter-service providers call setup success rate, total 21 to 35 inter operator calls were attempted. 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	95.24	100.00	100.00
BSNL	95.65	NA	96.88	100.00
RJIL	100.00	96.77	NA	100.00
VIL	100.00	96.88	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	1.75	2.62	2.62
BSNL	3.58	NA	4.50	3.44
RJIL	1.90	2.82	NA	2.07
VIL	1.67	3.05	2.63	NA

Table-10: Call setup time across service providers

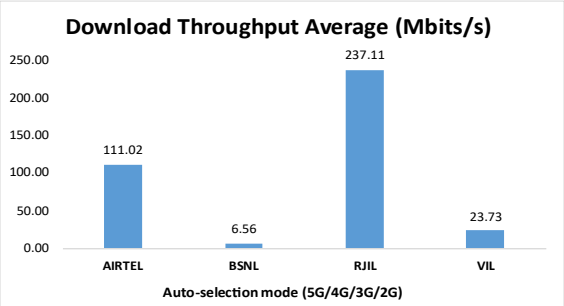
Note-
- NA- Only inter-operator calls were measured during test.

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	111.02	6.56	237.11	23.73
	80th Percentile	197.92	9.29	399.67	35.56
	20th Percentile	13.93	2.33	55.96	9.48
Upload Throughput (Mbits/s)	Average	25.19	4.96	20.71	17.68
	80th Percentile	48.04	8.39	36.74	31.62
	20th Percentile	4.87	1.80	3.31	4.45
Latency (ms)	50th Percentile	48.08	41.29	30.33	48.34

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



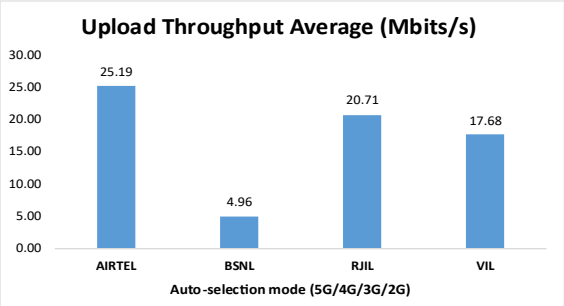


Figure- 5: Download and Upload throughput

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	1286	NA
4G	1891	807	512	1505
3G	NA	76	NA	NA
2G	32	48	NA	18

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, walk test, highway and railway 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 19th November 2025 to 21st November 2025 in Durg-Bhilai. (Refer Table-1)

4.2.1 Drive test route

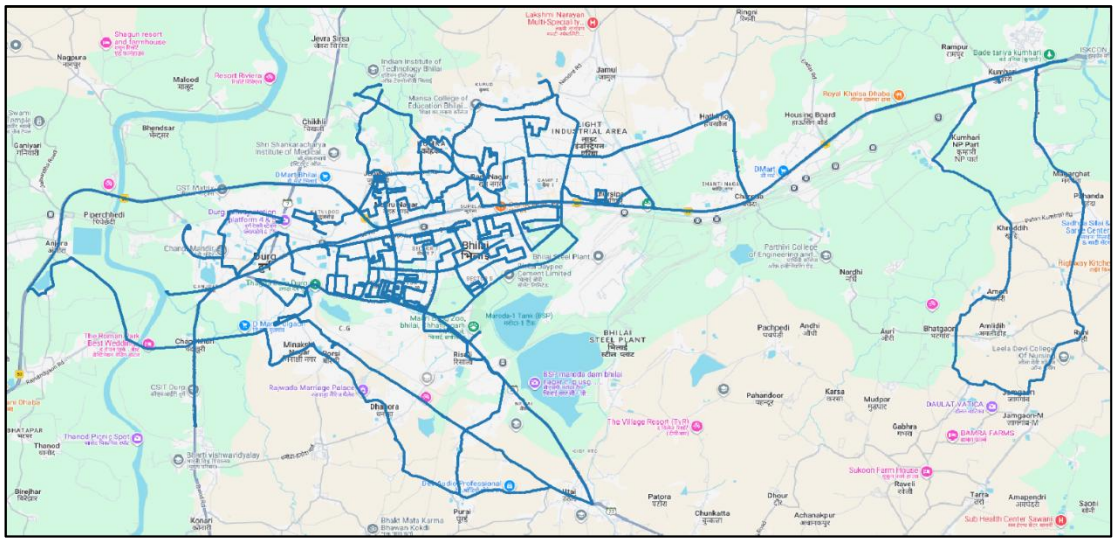


Figure- 6: Drive test routes

4.2.2 Areas covered

Nearby Anjora, Chandkhuri, Minakshi Nagar, dhaora, Utai, Risali, Katulbod, Nehru Nagar, Ram Nagar, Junwani, Khursipar, Charoda, Hathkoj, Kumhari, Runi, Ameri and Jamgaon 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	486	516	505
Call Setup Success Rate %	99.59	98.26	97.62
Drop Call Rate %	0.21	0.39	0.41
Call Setup Time-Average (Second)	4.74	3.83	3.34
Handover Success Rate %	98.37	99.94	97.14

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

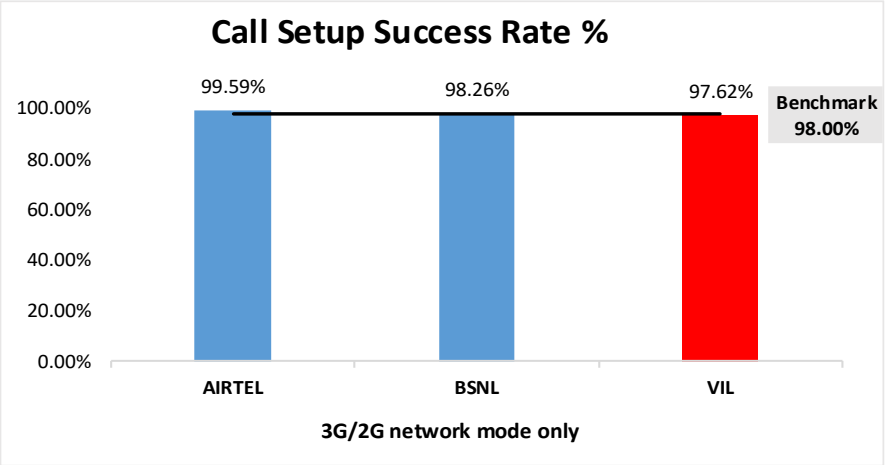


Figure-7: Performance for call setup success rate.

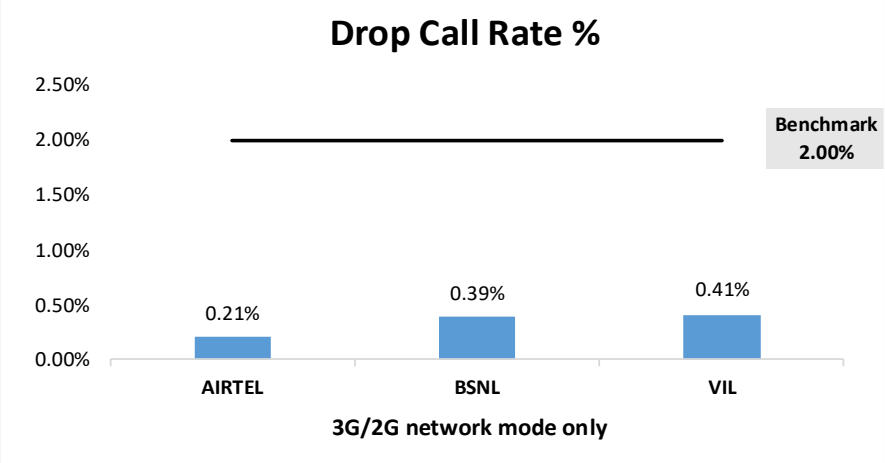


Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	83.43%	NA
2G	99.97%	16.55%	99.73%
Limited Service	0.03%	0.02%	0.27%

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

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

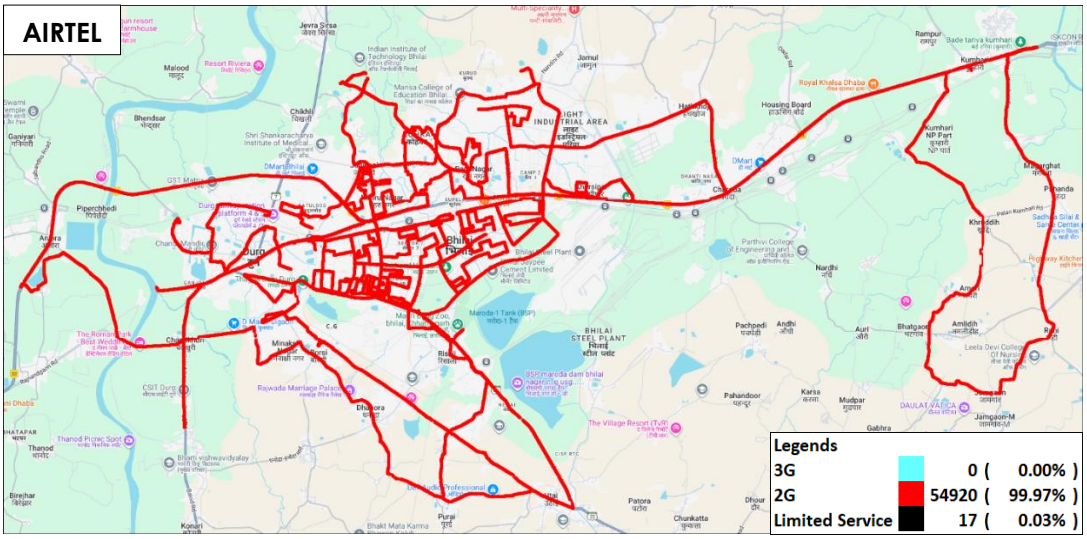


Figure-9: Serving technology plots 3G/2G network mode – AIRTEL

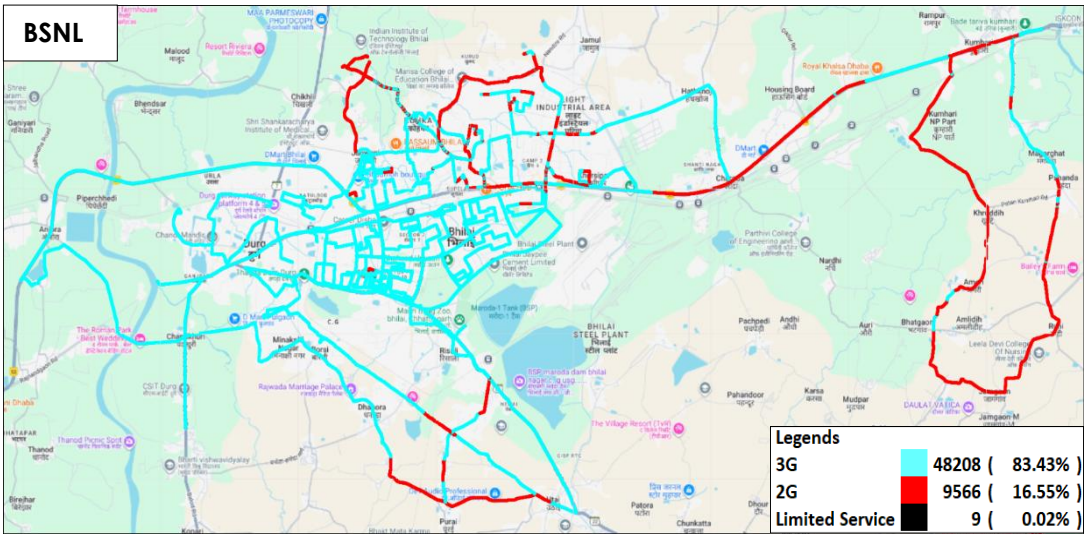


Figure-10: Serving technology plots 3G/2G network mode –BSNL.

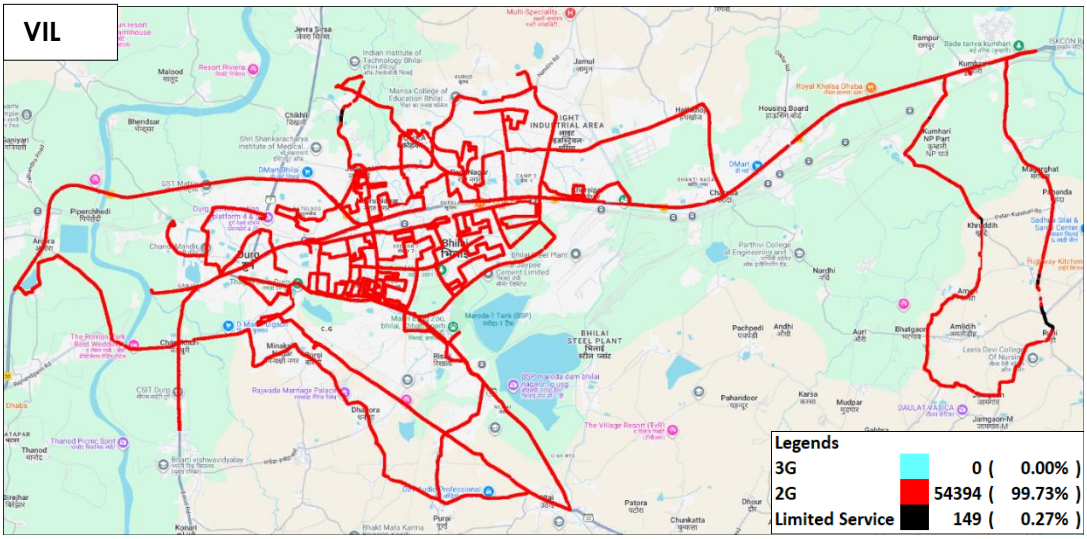


Figure-11: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 52, 53 & 54 for map view)

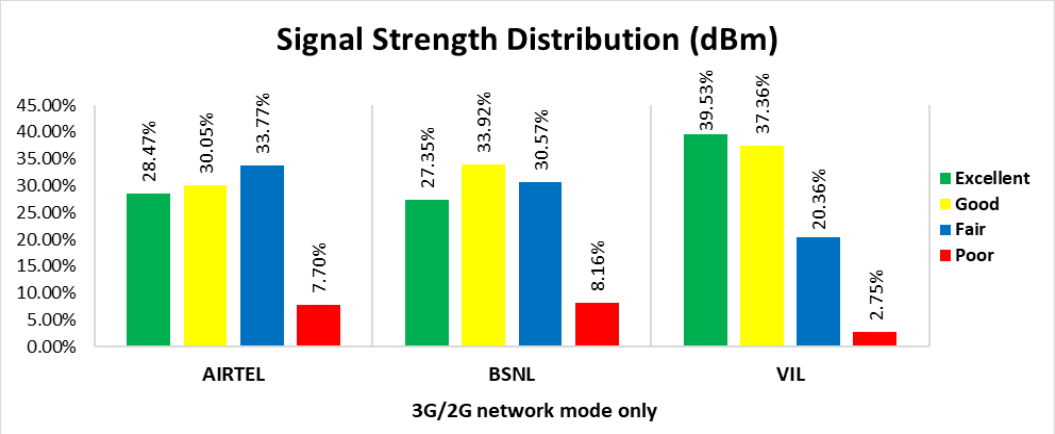


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 28% of samples falling in the excellent signal strength category.
- BSNL has 27% of samples falling in the excellent signal strength category.
- VIL has 40% 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	516	545	516	515
Call Setup Success Rate %	99.03	88.07	100.00	99.81
Drop Call Rate %	0.00	0.00	0.19	0.19
Call Setup Time Average (Second)	1.25	2.09	0.65	0.81
Handover Success Rate %	99.82	100.00	99.78	99.89

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

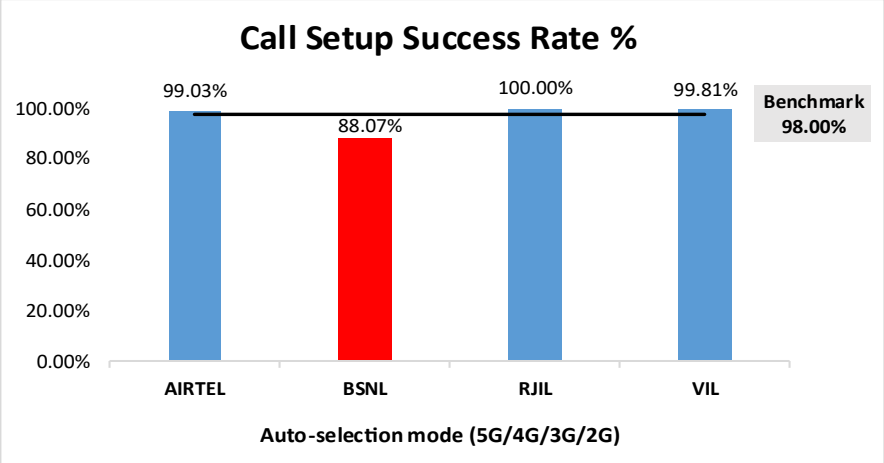


Figure-13: Performance for call setup success rate.

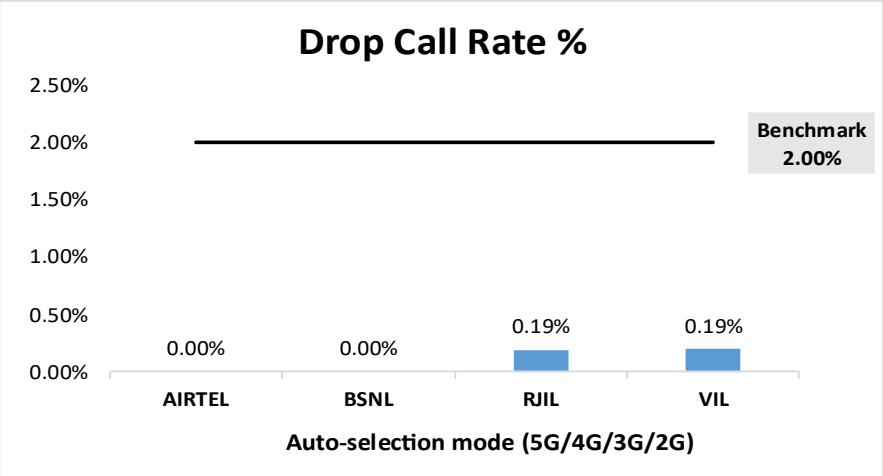


Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	496	501	496	500
Number of silences call for >4 Sec	3	23	1	3
Silence Call Rate %	0.60	4.59	0.20	0.60
Number of silence instances for >4 Sec	3	27	1	3
Number of silence instances for >3 Sec	5	48	1	15
Number of silence instances for >2 sec	14	102	13	39
RTP Jitter (4G & 5G) in ms	4.36	8.93	11.06	14.44
Packet loss Rate Downlink %	0.57	4.54	0.61	0.97
Packet loss Rate Uplink %	0.32	3.98	0.39	0.68

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

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-16	2907	2731	2893	2906
Speech Quality (Average MOS)	4.02	3.49	4.49	3.99
Number of samples with MOS >=4 to <5 (Excellent)	2468	1331	2564	2116
Number of samples with MOS >=3 to <4 (Good)	363	777	216	641
Number of samples with MOS >=2 to <3 (Fair)	48	315	59	70
Number of samples with MOS >=1 to <2 (Poor)	28	308	54	79
%age of samples with MOS >=4 to <5 (Excellent)	84.90%	48.74%	88.63%	72.81%
%age of samples with MOS >=3 to <4 (Good)	12.49%	28.45%	7.47%	22.06%
%age of samples with MOS >=2 to <3 (Fair)	1.65%	11.53%	2.04%	2.41%
%age of samples with MOS >=1 to <2 (Poor)	0.96%	11.28%	1.87%	2.72%

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

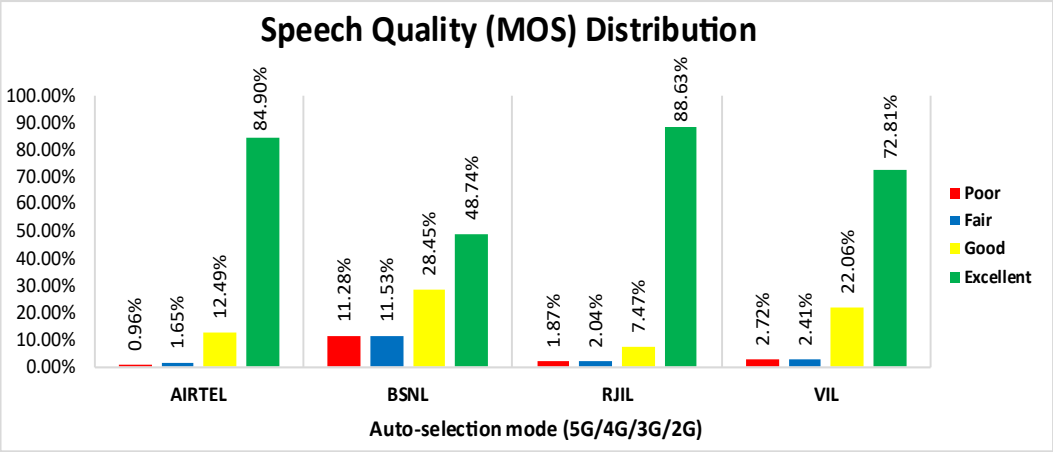


Figure-15: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	10.90%	NA	16.43%	NA
4G	89.10%	99.30%	83.56%	99.21%
3G	NA	0.18%	NA	NA
2G	0.00%	0.50%	NA	0.79%
Limited Service	0.00%	0.02%	0.01%	0.00%

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

Note-

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

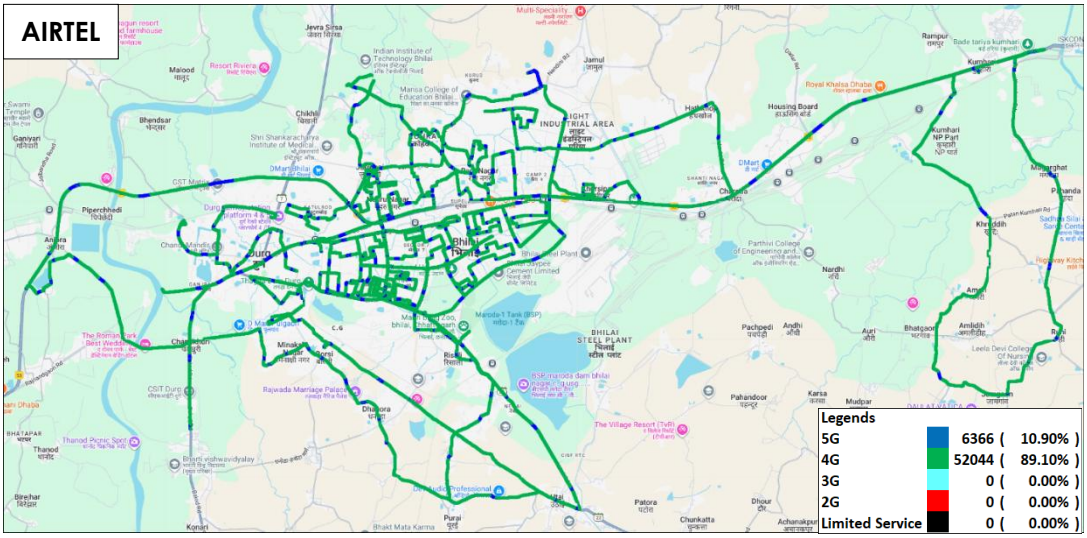


Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -AIRTEL.

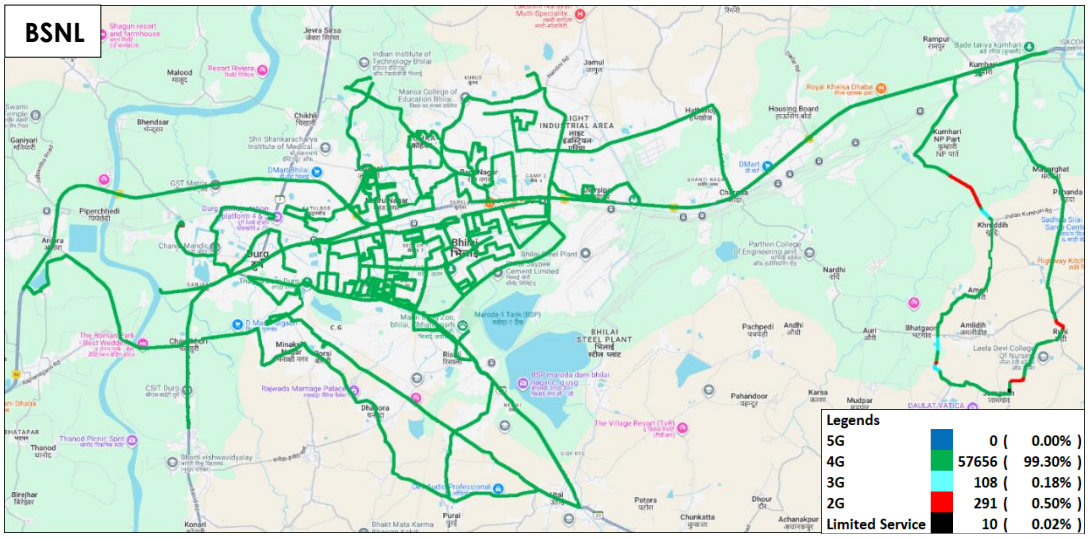


Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -BSNL.

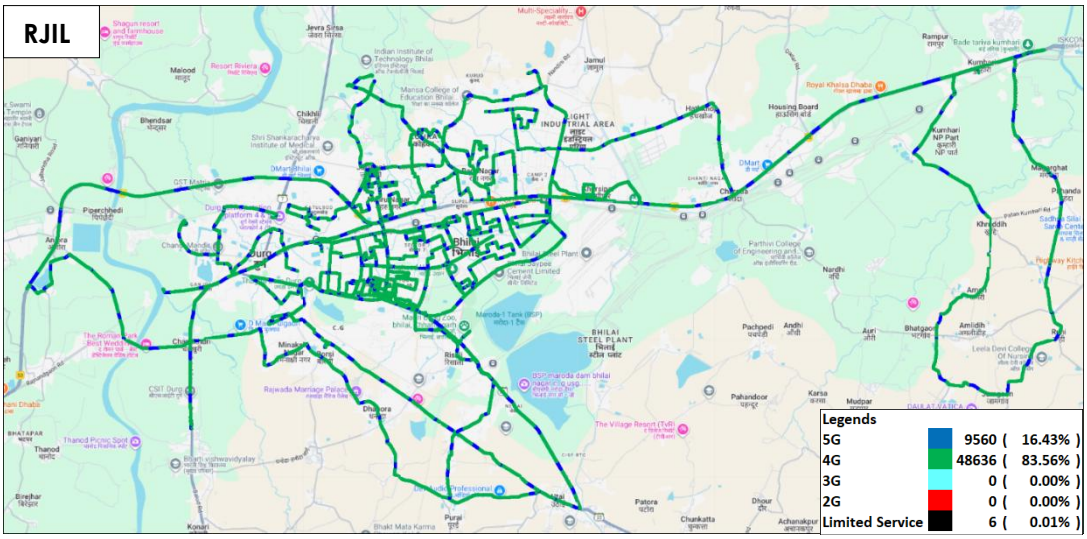


Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.

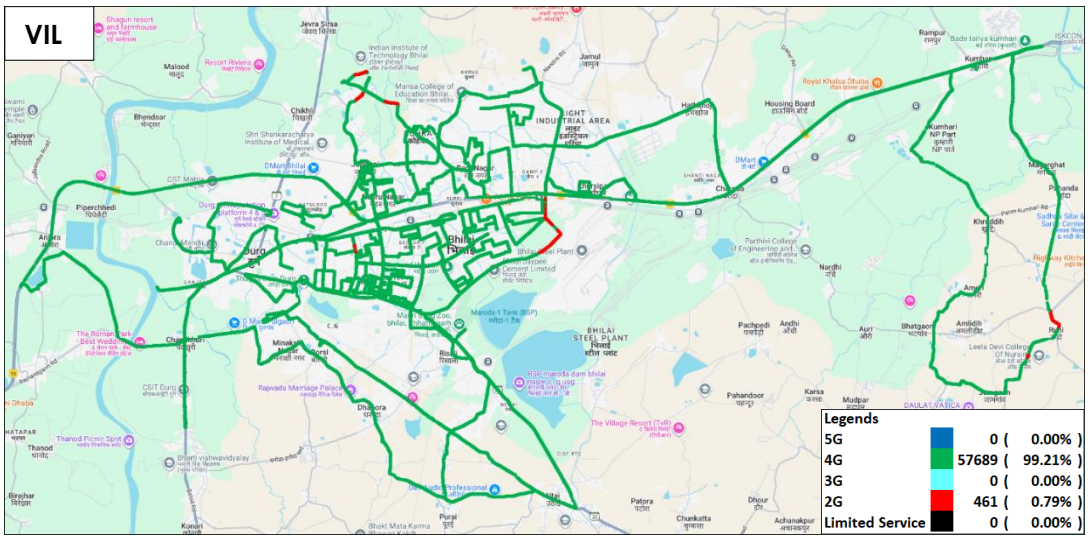


Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) – VIL

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-55, 56, 57 & 58 for map view)

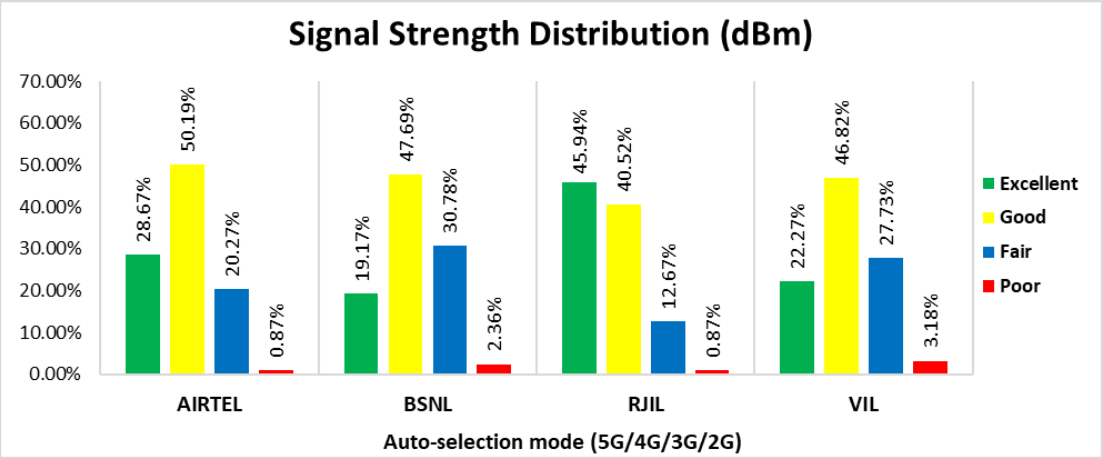


Figure-20: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 29% of samples falling in the excellent signal strength category.
- BSNL has 19% of samples falling in the excellent signal strength category.
- RJIL has 46% of samples falling in the excellent signal strength category.
- VIL has 22% 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	138.07	7.01	298.00	26.88
	80th Percentile	223.88	9.52	465.70	36.20
	20th Percentile	47.81	2.52	129.29	16.76
Upload Throughput (Mbits/s)	Average	29.41	5.55	24.26	20.41
	80th Percentile	51.33	9.32	43.37	33.27
	20th Percentile	7.83	1.99	4.78	7.81
Latency (ms)	50th Percentile	45.60	40.38	28.98	46.93

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

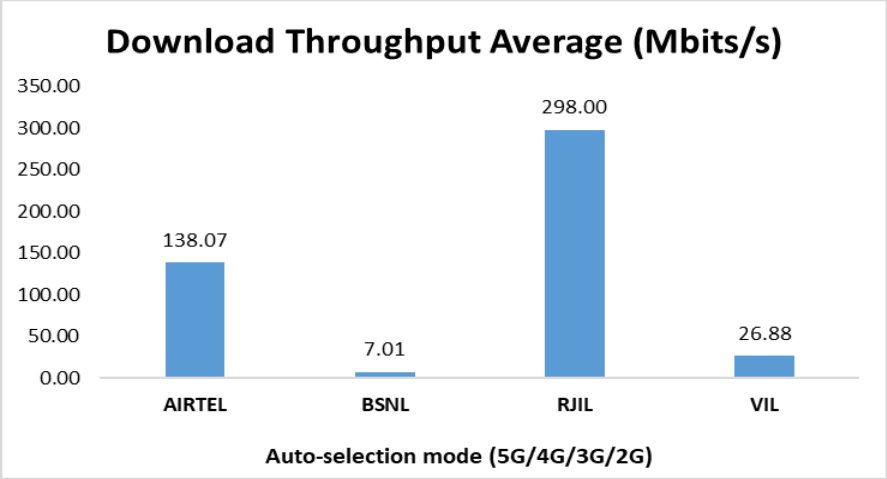


Figure- 21: Download throughput

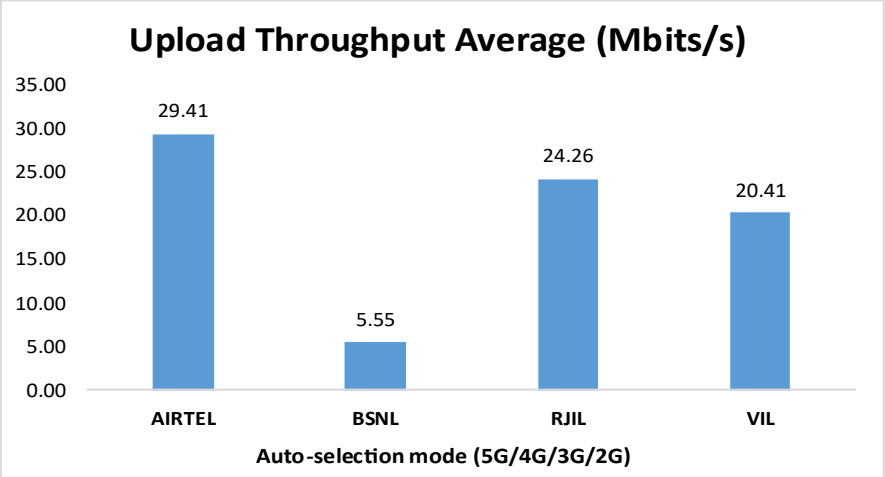


Figure- 22: Upload throughput

4.3 Hotspots

Hotspot testing has been done from 21st November 2025 to 22nd November 2025. Twelve locations have been tested in the city.

4.3.1 Locations

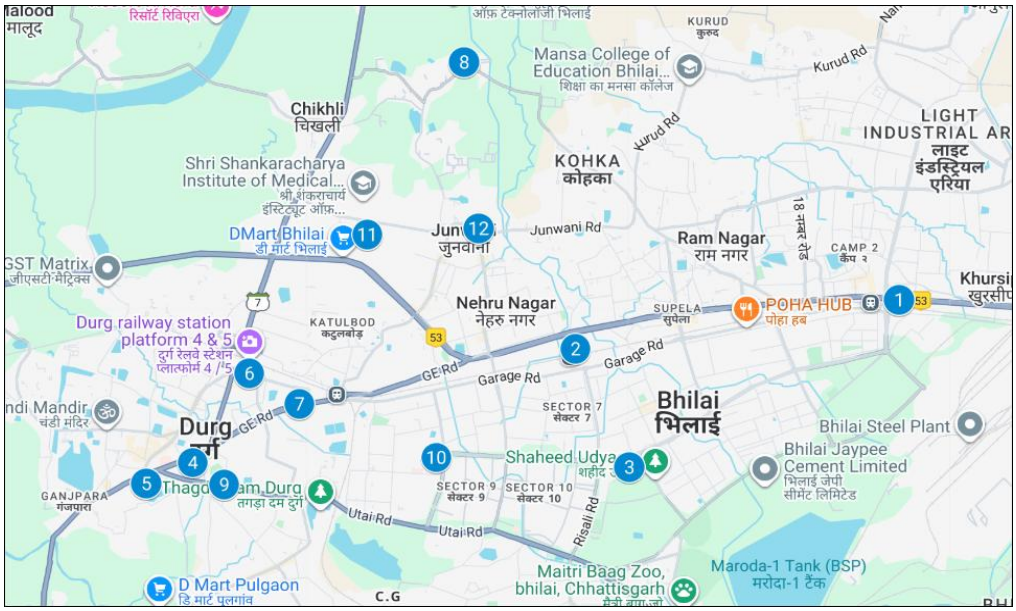


Figure- 23: Hotspot locations

4.3.2 Hotspot covered

1. Bhilai Bus Stand
2. Bhilai Railway Station
3. Civic Centre Bhilai
4. Durg Bus Stand
5. Durg Collectorate
6. Durg Railway Station
7. Govt. V.Y.T. Post Graduate Autonomous College Durg
8. Indian Institute of Technology Bhilai
9. Pt. Ravishankar Shukla Stadium Durg
10. Sector 9 Hospital Bhilai
11. Shree Shankaracharya Medical Collage
12. TI Mall Bhilai

4.3.3 Voice performance

Overall Voice Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	120	120	120	120
Call Setup Success Rate %	100.00	91.67	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.32	2.27	0.58	0.77

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

Bhilai Bus Stand				
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)	1.30	1.63	0.54	0.81

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

Bhilai 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	80.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.21	1.63	0.59	0.77

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

Civic Centre Bhilai				
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)	1.21	3.95	0.67	0.84

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

Durg Bus Stand				
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)	2.21	1.67	0.56	0.75

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

Durg Collectorate				
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)	1.24	1.66	0.54	0.71

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

Durg 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	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.28	1.87	0.60	0.64

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

Govt. V.Y.T. Post Graduate Autonomous College Durg				
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)	1.24	1.78	0.51	0.79

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

Indian Institute Of Technology Bhilai				
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)	1.26	1.86	0.51	0.95

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

Pt. Ravishankar Shukla Stadium Durg				
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)	1.24	3.09	0.55	0.80

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

Sector 9 Hospital Bhilai				
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)	1.29	1.99	0.52	0.68

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

Shree Shankaracharya Medical Collage				
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)	1.22	4.80	0.77	0.80

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

TI Mall Bhilai				
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)	1.18	1.71	0.60	0.67

Table-32: 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)	154.19	7.70	177.81	27.57
Download Throughput 80th Percentile (Mbit/s)	265.08	11.14	275.57	37.38
Download Throughput 20th Percentile (Mbit/s)	48.44	3.83	80.33	14.60
Download Session Setup Success Rate %	100.00	98.33	96.67	100.00
Upload Throughput Average (Mbits/s)	33.00	3.32	16.65	20.67
Upload Throughput 80th Percentile (Mbit/s)	60.02	4.83	18.91	37.19
Upload Throughput 20th Percentile (Mbit/s)	7.66	1.83	6.45	4.13
Upload Session Setup Success Rate %	98.33	98.33	96.67	100.00
Web Browsing Delay (Second)	7.16	5.77	4.35	4.51
Youtube Initial Buffer Delay (Second)	2.72	2.12	0.80	1.34
Latency (ms) - 50th Percentile	48.26	41.61	31.22	49.19
Jitter (ms)	6.61	140.82	118.63	11.61
Packet Loss Rate%	13.34	12.28	4.44	1.12
Packet Loss Rate- 90th percentile	71.00	45.04	6.38	2.16

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

Bhilai Bus Stand				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	62.96	4.77	216.73	31.24
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	40.95	0.56	30.87	36.95
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.32	8.11	4.41	5.41
Youtube Initial Buffer Delay (Second)	3.18	-	0.62	0.93
Latency (ms) - 50th Percentile	50.46	47.01	29.54	49.20
Jitter (ms)	9.54	5.03	13.48	9.04
Packet Loss Rate%	0.70	0.80	0.70	0.40

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

Note- "-"Youtube test were failed.

Bhilai Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	163.29	5.04	140.53	34.16
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	15.55	1.27	14.20	22.05
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.40	5.17	4.44	5.87
Youtube Initial Buffer Delay (Second)	0.81	3.01	0.63	0.78
Latency (ms) - 50th Percentile	29.56	40.69	26.90	54.71
Jitter (ms)	2.65	4.56	2.83	12.37
Packet Loss Rate%	49.00	27.20	0.20	0.90

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

Civic Centre Bhilai				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	272.39	4.27	219.98	34.82
Download Session Setup Success Rate %	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	52.75	1.20	11.55	31.57
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.79	16.62	4.24	3.35
Youtube Initial Buffer Delay (Second)	1.22	-	0.65	0.94
Latency (ms) – 50th Percentile	55.95	40.95	27.20	48.65
Jitter (ms)	5.06	16.19	3.80	4.89
Packet Loss Rate%	0.90	1.80	0.00	0.00

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

Note- "-"Youtube test were failed.

Durg Bus Stand				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	5.06	7.35	103.70	37.81
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	7.56	3.73	3.35	24.67
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	10.67	2.07	5.34	4.92
Youtube Initial Buffer Delay (Second)	8.32	2.25	1.09	0.84
Latency (ms) - 50th Percentile	218.46	39.88	42.43	48.47
Jitter (ms)	22.58	2.14	28.17	3.51
Packet Loss Rate%	100.00	0.10	6.10	0.00

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

Durg Collectorate				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	101.97	10.37	359.18	12.26
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	7.76	2.52	13.72	6.67
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	8.30	4.75	4.18	2.20
Youtube Initial Buffer Delay (Second)	2.85	1.83	0.59	1.13
Latency (ms)- 50th Percentile	51.47	48.10	33.24	50.81
Jitter (ms)	5.86	8.37	5.73	7.08
Packet Loss Rate%	0.20	4.10	0.00	0.30

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

Durg Railway Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	257.57	11.84	35.85	35.02
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	41.32	3.99	13.00	46.96
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.85	7.02	4.35	1.95
Youtube Initial Buffer Delay (Second)	1.28	2.55	1.00	1.08
Latency (ms) - 50th Percentile	47.91	37.97	34.90	46.59
Jitter (ms)	3.84	9.94	27.22	4.24
Packet Loss Rate%	0.00	0.90	0.10	0.10

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

Govt. V.Y.T. Post Graduate Autonomous College Durg				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	226.11	19.02	487.49	27.16
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	63.30	6.09	59.57	5.40
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.42	8.01	1.97	2.48
Youtube Initial Buffer Delay (Second)	0.69	2.23	0.79	3.07
Latency (ms)- 50th Percentile	34.62	41.28	32.93	51.91
Jitter (ms)	2.63	3.03	2.66	9.21
Packet Loss Rate%	0.10	0.50	0.00	0.90

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

Indian Institute Of Technology Bhilai				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	44.58	8.87	106.34	8.64
Download Session Setup Success Rate %	100.00	100.00	60.00	100.00
Upload Throughput Average (Mbits/s)	4.61	5.43	10.62	1.95
Upload Session Setup Success Rate %	100.00	100.00	60.00	100.00
Web Browsing Delay (Second)	7.64	5.31	4.99	6.37
Youtube Initial Buffer Delay (Second)	4.41	1.33	0.97	3.58
Latency (ms) - 50th Percentile	52.99	44.24	26.85	49.09
Jitter (ms)	9.72	2.44	1315.87	31.78
Packet Loss Rate%	0.90	48.20	42.40	2.00

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

Pt. Ravishankar Shukla Stadium Durg				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	40.62	0.92	73.42	22.27
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	17.25	2.60	4.96	9.74
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.55	9.91	5.03	5.40
Youtube Initial Buffer Delay (Second)	4.30	1.75	0.97	1.02
Latency (ms) - 50th Percentile	49.92	39.94	36.33	49.73
Jitter (ms)	8.10	20.55	10.96	21.15
Packet Loss Rate%	0.00	29.40	1.70	1.70

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

Sector 9 Hospital Bhilai				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	250.97	10.37	135.76	41.13
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	55.62	2.86	11.40	45.61
Upload Session Setup Success Rate %	80.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.27	2.43	3.97	3.79
Youtube Initial Buffer Delay (Second)	2.10	1.89	0.54	0.79
Latency (ms) - 50th Percentile	36.90	38.55	28.39	47.00
Jitter (ms)	5.13	4.34	2.44	15.88
Packet Loss Rate%	7.60	7.30	0.10	6.70

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

Shree Shankaracharya Medical Collage				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	332.81	2.47	139.29	25.85
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	56.17	1.79	6.19	12.69
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	7.79	6.90	4.19	5.96
Youtube Initial Buffer Delay (Second)	2.00	3.96	0.92	1.02
Latency (ms) - 50th Percentile	48.55	48.64	33.45	48.55
Jitter (ms)	2.17	1745.15	22.39	7.94
Packet Loss Rate%	0.60	25.90	1.70	0.30

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

TI Mall Bhilai				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	91.89	5.05	86.87	20.50
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	37.73	3.03	17.92	3.72
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.96	4.11	4.61	4.84
Youtube Initial Buffer Delay (Second)	4.25	1.63	0.95	1.68
Latency (ms) - 50th Percentile	42.71	40.58	29.50	51.85
Jitter (ms)	6.39	6.11	11.88	12.35
Packet Loss Rate%	0.10	1.20	0.30	0.10

Table-45: 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)**	172.39	-	259.24	-
	Upload Throughput Average (Mbits/s)	40.51	-	15.61	-
4G	**Download Throughput Average (Mbits/s)**	33.93	11.43	55.15	24.08
	Upload Throughput Average (Mbits/s)	7.21	4.67	15.18	12.63

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

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

Bhilai Bus Stand					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	57.34	-	359.04	-
	Upload Throughput Average (Mbits/s)	45.78	-	28.82	-
4G	**Download Throughput Average (Mbits/s)**	5.55	8.31	24.93	39.47
	Upload Throughput Average (Mbits/s)	6.19	2.57	11.63	7.66

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

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

Bhilai Railway Station					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	120.79	-	355.60	-
	Upload Throughput Average (Mbits/s)	12.51	-	20.98	-
4G	Download Throughput Average (Mbits/s)	20.17	4.64	78.56	6.76
	Upload Throughput Average (Mbits/s)	6.24	1.97	11.43	6.39

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

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

Civic Centre Bhilai					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	413.51	-	241.37	-
	Upload Throughput Average (Mbits/s)	69.60	-	11.33	-
4G	Download Throughput Average (Mbits/s)	74.43	7.32	104.03	35.85
	Upload Throughput Average (Mbits/s)	14.61	2.01	25.59	8.40

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

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

Durg Bus Stand					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	80.79	-	247.07	-
	Upload Throughput Average (Mbits/s)	39.11	-	11.19	-
4G	Download Throughput Average (Mbits/s)	19.76	30.98	20.78	29.10
	Upload Throughput Average (Mbits/s)	4.73	15.23	5.86	7.77

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

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

Durg Collectorate					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	91.25	-	356.08	-
	Upload Throughput Average (Mbits/s)	13.76	-	21.58	-
4G	Download Throughput Average (Mbits/s)	15.97	15.50	34.93	28.78
	Upload Throughput Average (Mbits/s)	2.19	5.66	6.70	12.02

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

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

Durg Railway Station					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	237.87	-	62.71	-
	Upload Throughput Average (Mbits/s)	47.78	-	15.04	-
4G	Download Throughput Average (Mbits/s)	48.82	11.78	65.65	35.81
	Upload Throughput Average (Mbits/s)	13.14	2.38	20.75	44.29

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

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

Govt. V.Y.T. Post Graduate Autonomous College Durg					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	262.84	-	518.12	-
	Upload Throughput Average (Mbits/s)	64.33	-	17.41	-
4G	Download Throughput Average (Mbits/s)	31.87	31.77	151.57	17.73
	Upload Throughput Average (Mbits/s)	4.82	8.27	25.78	16.83

Table-53: Overall Summary of 5G only & 4G only data download & upload speed.

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

Indian Institute Of Technology Bhilai					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	40.63	-	36.00	-
	Upload Throughput Average (Mbits/s)	2.69	-	2.44	-
4G	Download Throughput Average (Mbits/s)	5.83	10.36	1.56	7.42
	Upload Throughput Average (Mbits/s)	1.32	4.57	1.80	1.29

Table-54: Overall Summary of 5G only & 4G only data download & upload speed.

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

Pt. Ravishankar Shukla Stadium Durg					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	48.46	-	119.50	-
	Upload Throughput Average (Mbits/s)	18.11	-	4.83	-
4G	Download Throughput Average (Mbits/s)	25.24	1.89	21.25	19.82
	Upload Throughput Average (Mbits/s)	4.75	3.54	4.63	6.08

Table-55: Overall Summary of 5G only & 4G only data download & upload speed.

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

Sector 9 Hospital Bhilai					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	223.38	-	492.92	-
	Upload Throughput Average (Mbits/s)	57.66	-	27.77	-
4G	Download Throughput Average (Mbits/s)	91.20	7.48	108.43	40.10
	Upload Throughput Average (Mbits/s)	10.20	3.04	51.65	29.13

Table-56: Overall Summary of 5G only & 4G only data download & upload speed.

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

Shree Shankaracharya Medical Collage					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	319.06	-	218.16	-
	Upload Throughput Average (Mbits/s)	41.37	-	4.45	-
4G	Download Throughput Average (Mbits/s)	17.70	2.29	9.78	11.90
	Upload Throughput Average (Mbits/s)	5.39	1.35	5.28	2.63

Table-57: Overall Summary of 5G only & 4G only data download & upload speed.

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

TI Mall Bhilai					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	133.39	-	76.36	-
	Upload Throughput Average (Mbits/s)	63.10	-	18.82	-
4G	Download Throughput Average (Mbits/s)	50.66	4.82	40.31	16.26
	Upload Throughput Average (Mbits/s)	12.47	2.68	11.05	2.29

Table-58: 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 19th November 2025. Three locations have been tested in the city.

4.4.1 Walk test locations

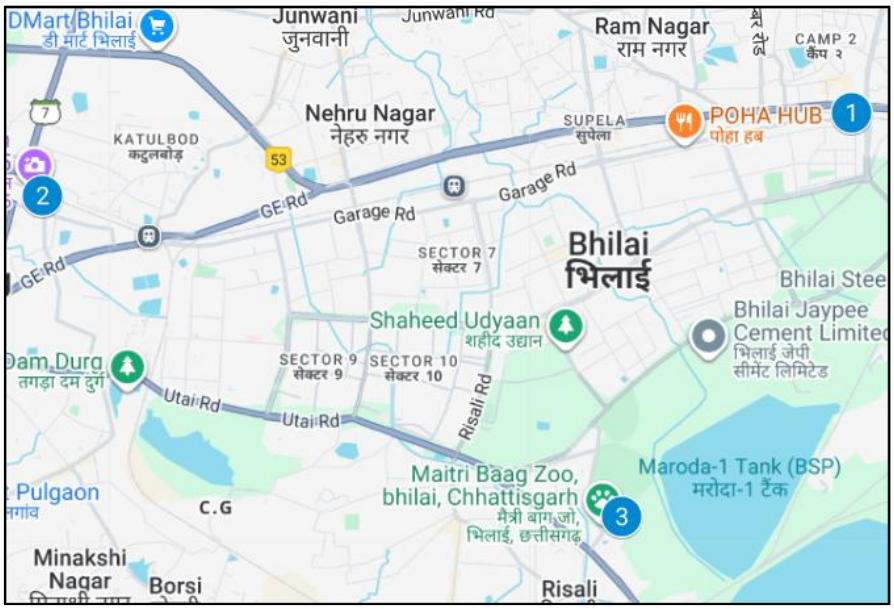


Figure-24: Walk Test locations.

4.4.2 Walk Test Covered

1. Bhilai Power House Railway Station
2. Durg Railway Station
3. Maitri Baag Zoo Bhilai

4.4.3 Voice Performance

Bhilai Power House Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	11	11	11
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)	1.23	2.29	0.53	0.79

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

Durg Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	13	14	13	13
Call Setup Success Rate %	100.00	85.71	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.23	1.73	0.59	0.78

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

Maitri Baag Zoo Bhilai				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	23	24	23	22
Call Setup Success Rate %	100.00	87.50	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.39	2.88	0.90	0.76

Table-61: 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)

Bhilai Power House Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	66.70	3.72	330.79	35.49
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	19.93	7.19	32.45	43.83
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms) - 50th Percentile	48.92	40.12	33.98	46.14

Table-62: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Durg Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	200.98	3.21	216.07	36.07
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	58.39	4.94	32.52	42.31
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms) - 50th Percentile	37.79	40.04	35.48	46.46

Table-63: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Maitri Baag Zoo Bhilai				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	87.04	2.46	24.40	18.06
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	3.05	4.04	2.10	5.09
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms) - 50th Percentile	59.84	40.00	305.49	47.44

Table-64: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

4.5 Highway

Drive test has been conducted on 17th November 2025 covering one Highway route. (Refer Table-1)

4.5.1 Drive test route

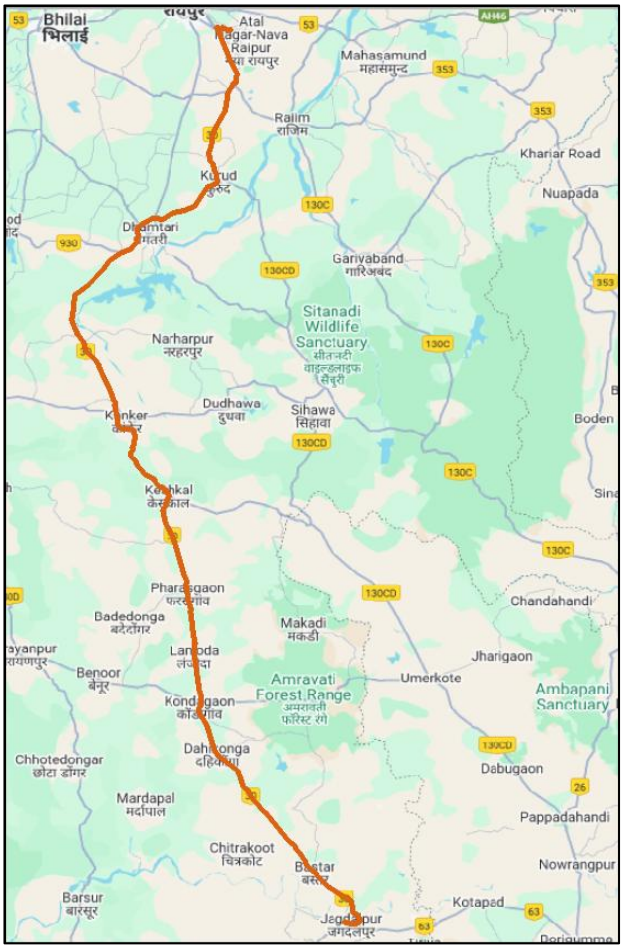


Figure-25: Drive test route Highway.

4.5.2 Routes Covered

Raipur to Jagdalpur passing through Kurud, Purur, Charama, Kanker, Kondagaon, Joba Sonarpal and Bastar etc.

4.5.3 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	144	121	135
Call Setup Success Rate %	67.36	95.04	76.30
Drop Call Rate %	3.09	6.96	1.94
Call Setup Time-Average (Second)	5.39	3.99	3.47
Handover Success Rate %	99.64	99.23	98.88

Table-65: Summary of voice call performance in 3G/2G network mode only.

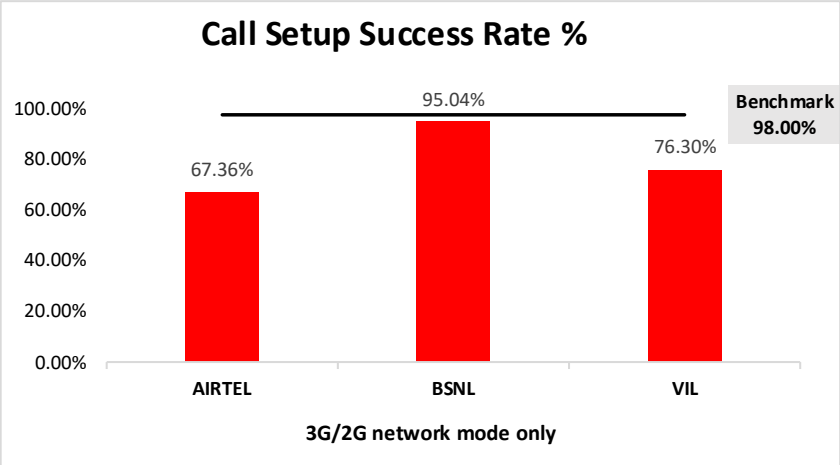


Figure-26: Performance for call setup success rate.

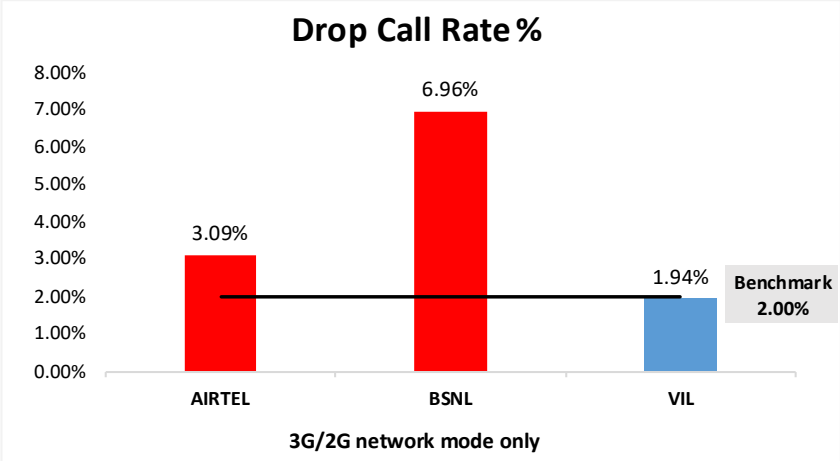


Figure-27: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	**BSNL**	**VIL**
3G	NA	59.41%	NA
2G	94.15%	39.68%	96.05%
Limited Service	5.85%	0.91%	3.95%

Table-66: Time spent on technology during drive test 3G/2G network mode only.

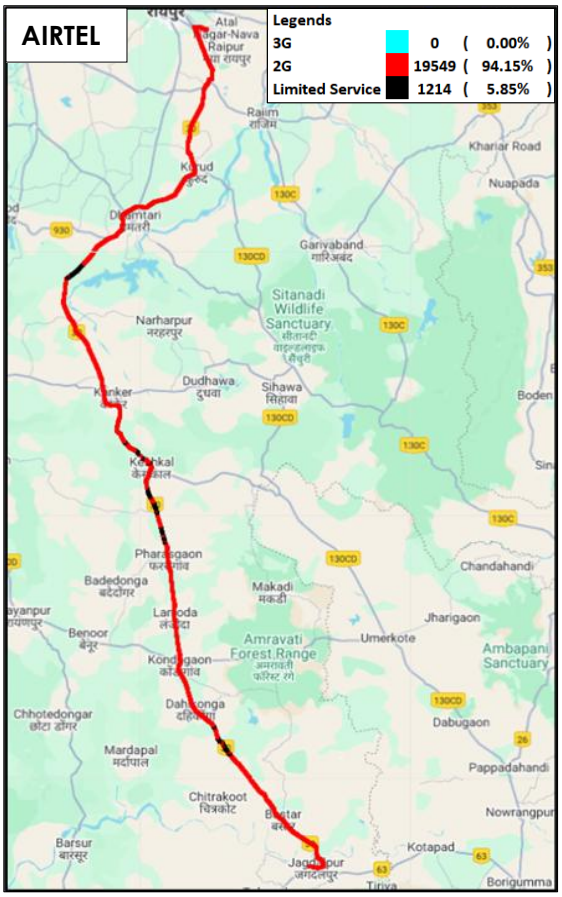


Figure-28: Serving technology plots 3G/2G network mode – AIRTEL.

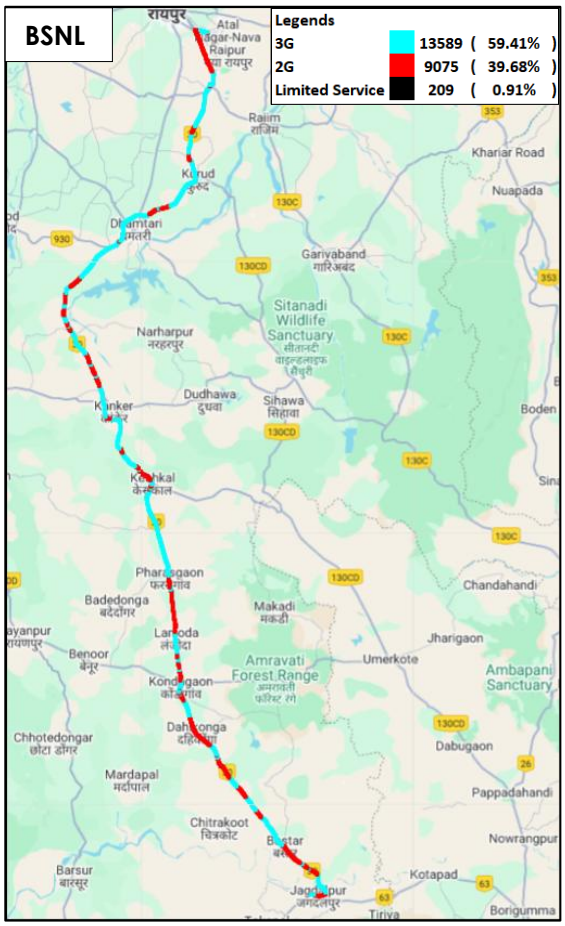


Figure-29: Serving technology plots 3G/2G network mode – BSNL.

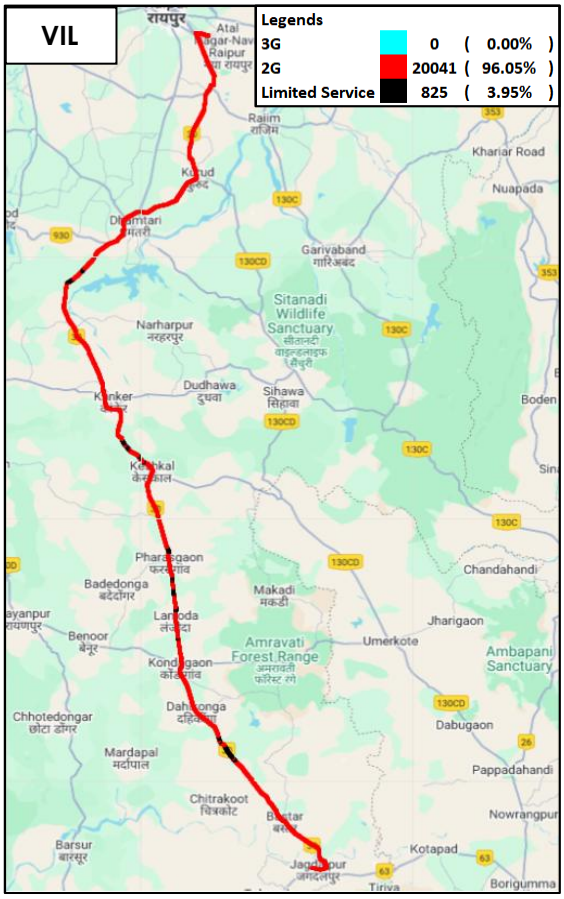


Figure 30: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure-59, 60 & 61 for map view)

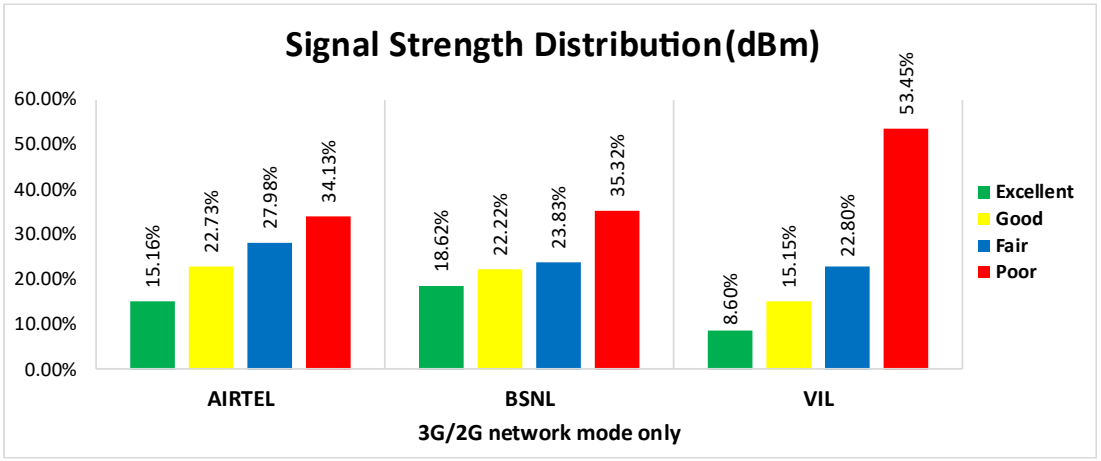


Figure-31: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 15% of samples falling in the excellent signal strength category.
- BSNL has 19% of samples falling in the excellent signal strength category.
- VIL has 9% 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	142	142	114	139
Call Setup Success Rate %	75.35	78.87	100.00	80.58
Drop Call Rate %	4.67	8.04	0.88	8.93
Call Setup Time Average (Second)	1.58	3.32	0.68	1.23
Handover Success Rate %	99.87	99.14	99.95	99.86

Table-67: Summary of voice call performance in network auto-selection mode.

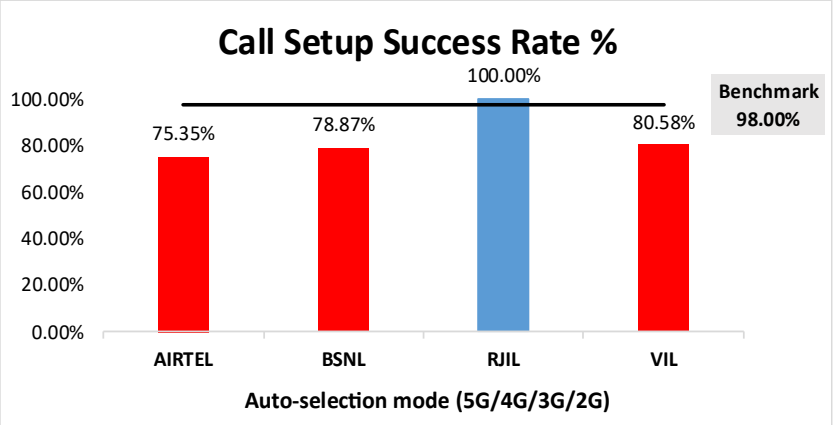


Figure-32: Performance for call setup success rate.

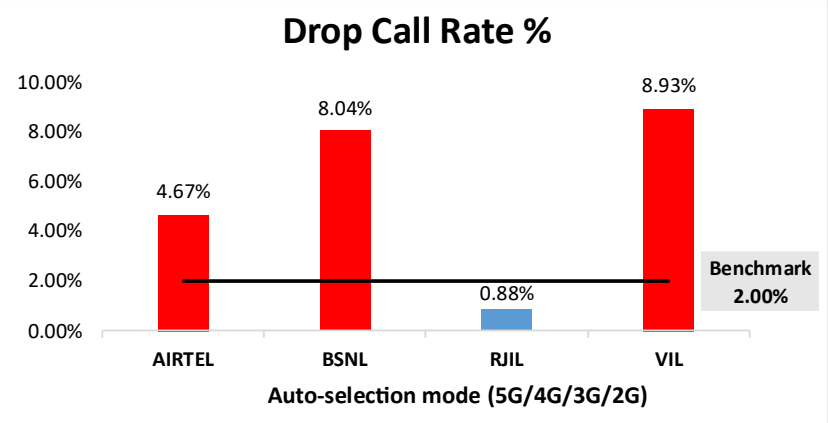


Figure-33: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	90	132	96	103
Number of silence call for >4 Sec	4	13	2	4
Silence Call Rate %	4.44	9.85	2.08	3.88
Number of silence instances for >4 Sec	4	17	3	5
Number of silence instances for >3 Sec	10	24	5	8
Number of silence instances for >2 sec	18	36	7	17
RTP Jitter (4G & 5G) in ms	5.71	8.91	12.05	13.76
Packet loss Rate Downlink %	3.85	4.56	1.21	2.45
Packet loss Rate Uplink %	3.65	5.08	1.04	2.76

Table-68: Summary of silence instances & packet loss rate for mobile to mobile call.

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

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

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-68	965	1193	1242	1026
Speech Quality (Average MOS)	3.88	3.11	4.43	3.89
Number of samples with MOS >=4 to <5 (Excellent)	749	395	1070	680
Number of samples with MOS >=3 to <4 (Good)	143	300	106	255
Number of samples with MOS >=2 to <3 (Fair)	32	285	25	51
Number of samples with MOS >=1 to <2 (Poor)	41	213	41	40
%age of samples with MOS >=4 to <5 (Excellent)	77.62%	33.11%	86.15%	66.28%
%age of samples with MOS >=3 to <4 (Good)	14.82%	25.15%	8.53%	24.85%
%age of samples with MOS >=2 to <3 (Fair)	3.32%	23.89%	2.01%	4.97%
%age of samples with MOS >=1 to <2 (Poor)	4.25%	17.85%	3.30%	3.90%

Table-69: Summary of speech quality (MOS) samples.

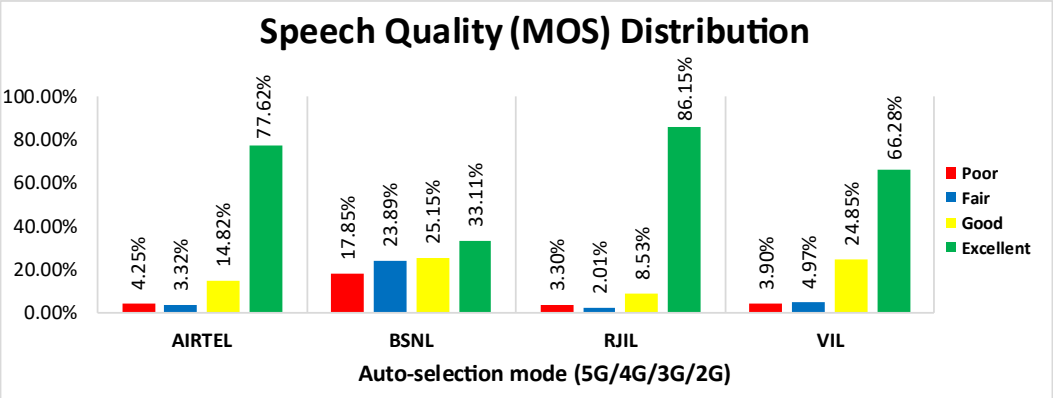


Figure-34: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	2.47%	NA	5.11%	NA
4G	89.51%	67.20%	94.89%	85.31%
3G	NA	14.85%	NA	NA
2G	0.18%	16.27%	NA	8.63%
Limited Service	7.84%	1.68%	0.00%	6.06%

Table-70: Time spent on technology during drive test.

Note-

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

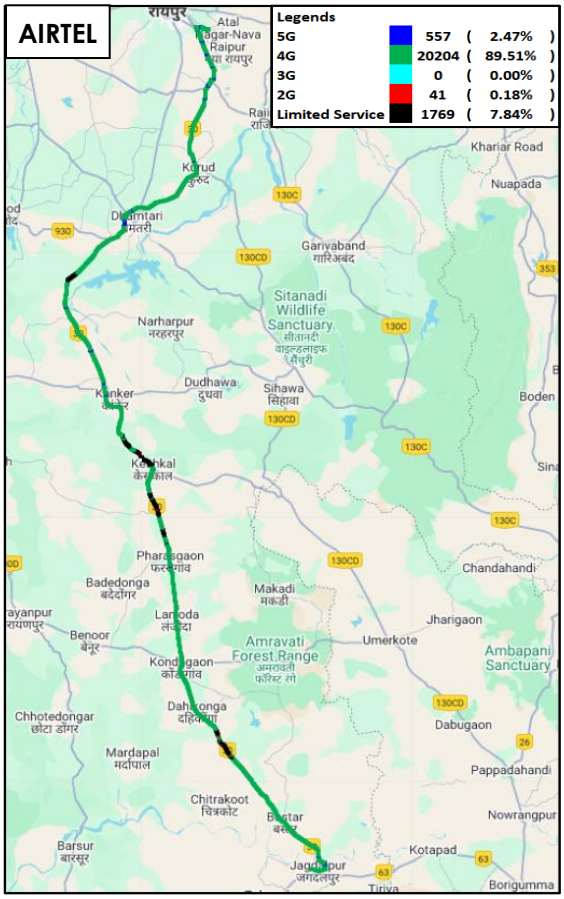


Figure-35: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL

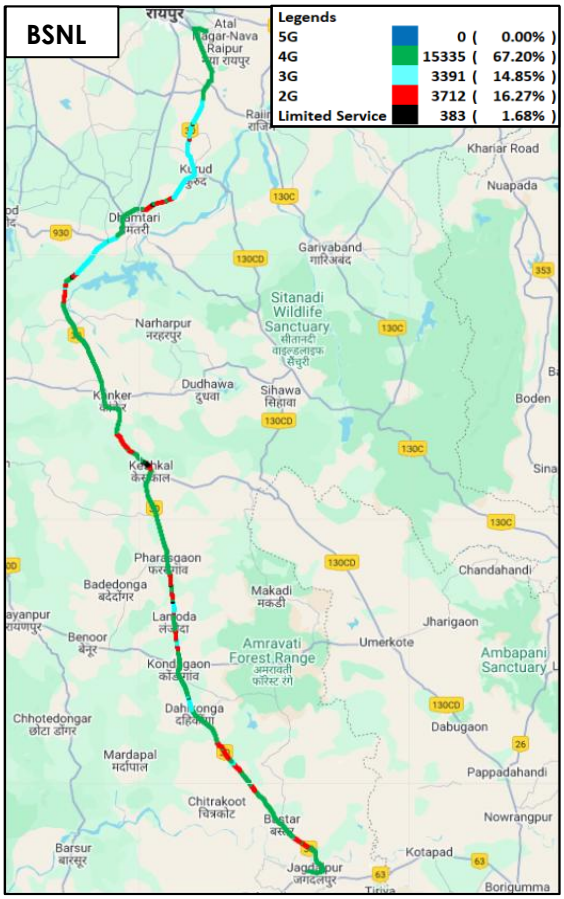


Figure-36: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-BSNL.

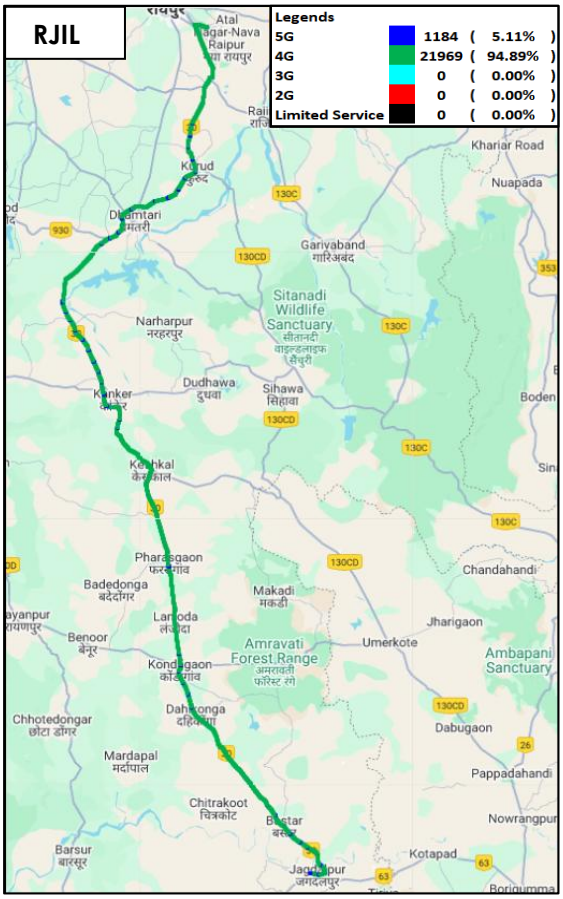


Figure-37: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.

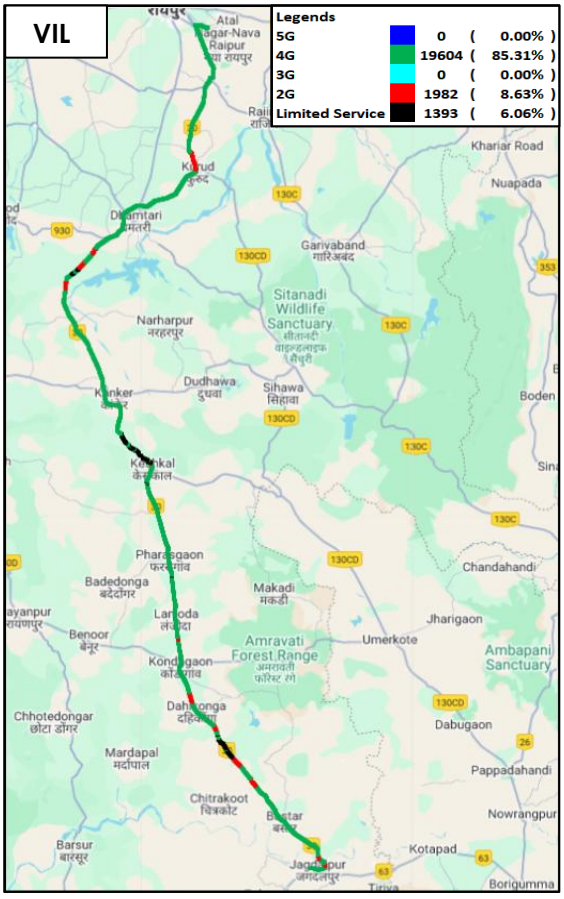


Figure-38: Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-62, 63, 64 & 65 for map view)

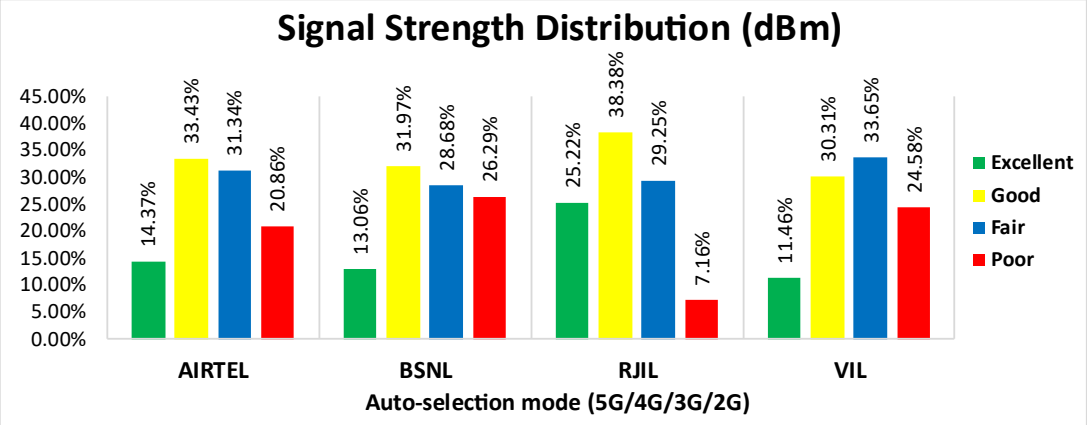


Figure-39: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 14% of samples falling in the excellent signal strength category.
- BSNL has 13% of samples falling in the excellent signal strength category.
- RJIL has 25% of samples falling in the excellent signal strength category.
- VIL has 11% of samples falling in the excellent signal strength category.

4.5.4 Data performance

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

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	70.84	4.23	186.05	20.83
	80th Percentile	125.34	5.86	362.15	33.28
	20th Percentile	3.63	1.76	12.90	6.91
Upload Throughput (Mbits/s)	Average	14.17	4.49	15.82	13.40
	80th Percentile	23.17	8.12	28.00	24.17
	20th Percentile	2.10	1.63	2.08	3.20
Latency (ms)	50th Percentile	57.86	42.15	32.99	48.93

Table-71: Summary of Data performance in network auto-selection mode.

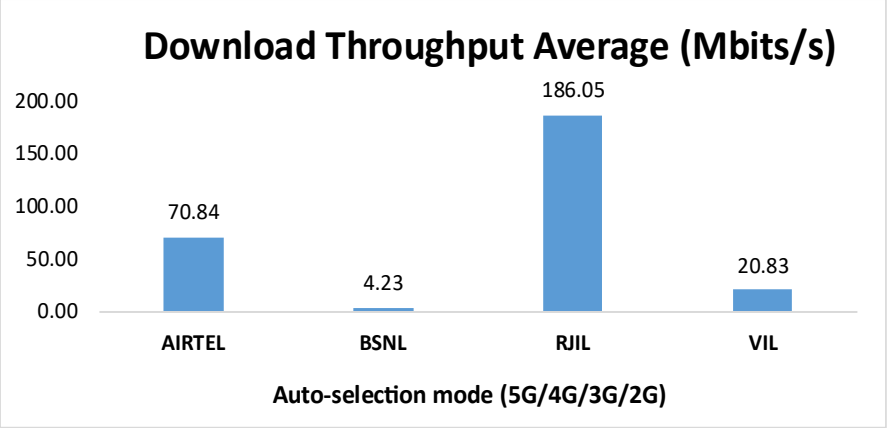


Figure 40: Download throughput.

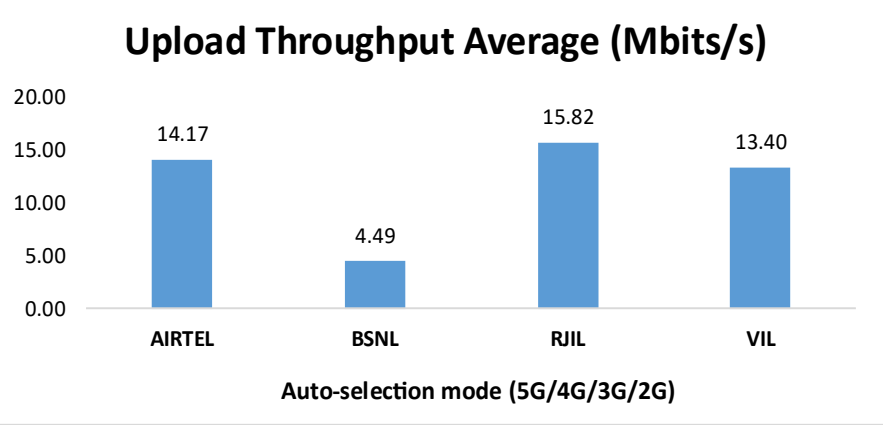


Figure-41: Upload throughput.

4.6 Railway

Drive test has been conducted on 25th November 2025 covering one Railway route. (Refer Table-1)

4.6.1 Drive test route

Figure-42: Drive test route coastal

4.6.2 Routes Covered

Bhopal to Ratlam passing through Sant Hirdaram Nagar, Sehore, Kalapipal, Shujalpur, Akodia, Kali Sindh, Berchha, Maksi, Tarana Road, Ujjain Jn, Nagda Jn & Khachrod.

4.6.3 Voice Performance

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

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	98	131	98	102
Call Setup Success Rate %	97.96	73.28	100.00	94.12
Drop Call Rate %	0.00	21.88	2.04	2.08
Call Setup Time Average (Second)	1.43	2.85	0.97	1.52
Handover Success Rate %	99.75	98.39	99.81	99.85

Table-72: Summary of voice call performance in network auto-selection mode.

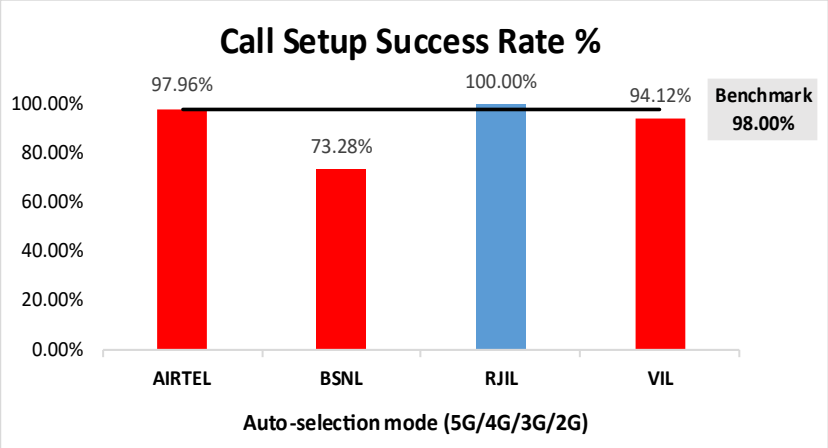


Figure-43: Performance for call setup success rate.

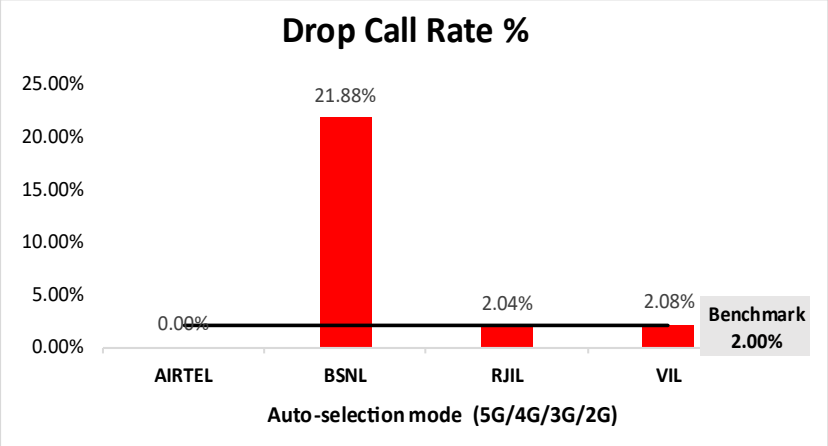


Figure-44: Performance for drop call rate.

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

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	4.60%	NA	7.86%	NA
4G	95.39%	64.05%	92.14%	92.66%
3G	NA	9.10%	NA	NA
2G	0.00%	24.10%	NA	7.34%
Limited Service	0.01%	2.75%	0.00%	0.00%

Table-73: Time spent on technology during drive test.

Note-

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

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

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

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

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

(c) Network Signal Strength Distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-66, 67, 68 & 69 for map view)

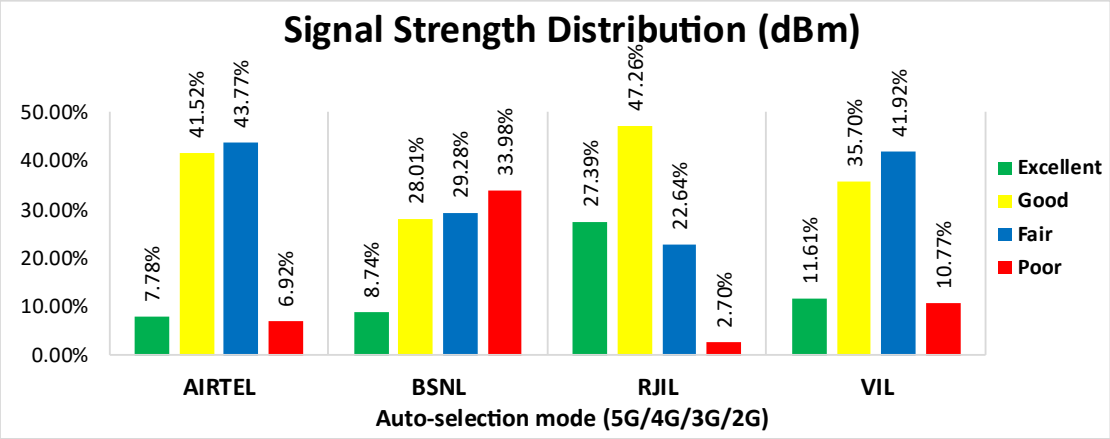


Figure-49: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 8% of samples falling in the excellent signal strength category.
- BSNL has 9% of samples falling in the excellent signal strength category.
- RJIL has 27% of samples falling in the excellent signal strength category.
- VIL has 12% of samples falling in the excellent signal strength category.

4.6.4 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	43.76	8.37	100.41	12.53
	80th Percentile	74.33	14.03	172.90	22.17
	20th Percentile	1.32	1.61	14.33	1.87
Upload Throughput (Mbits/s)	Average	13.18	3.68	12.72	6.76
	80th Percentile	22.95	5.87	25.17	10.18
	20th Percentile	2.20	1.22	2.24	1.81
Latency (ms)	50th Percentile	55.43	44.12	32.70	50.10

Table-74: Summary of Data performance in network auto-selection mode.

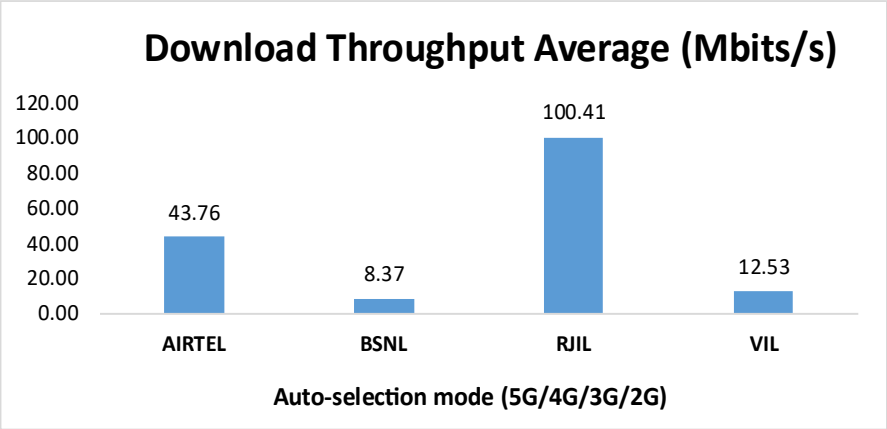


Figure-50: Download throughput

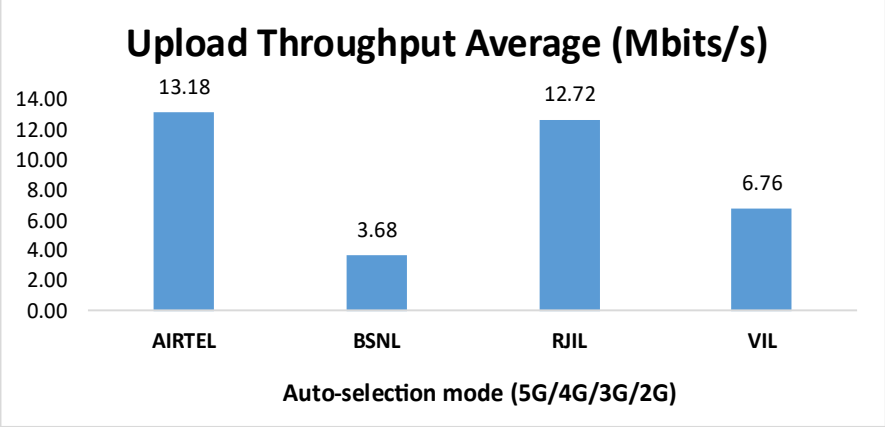


Figure-51: Upload throughput

5. Voice & Data Key findings

5.1 Overall Voice

1. **Call Setup Success Rate:**
   a) Airtel, BSNL and VIL have 92.22%, 97.65% and 93.13% call setup success rate respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL and VIL have 95.44%, 85.31%, 100.00% and 96.31% 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 VIL whereas call blocking was observed when calling Airtel & RJIL. (refer table-9)

   e) RJIL had a 100.00% call setup success when calling Airtel & VIL whereas call blocking was observed when calling BSNL. (refer table-9)

   f) VIL had a 100.00% call setup success when calling Airtel & RJIL whereas call blocking was observed when calling BSNL. (refer table-9)

2. **Call Setup Time**:
   a) Airtel, BSNL and VIL call setup time is 4.85, 3.86 & 3.37 seconds respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL & VIL call setup time is 1.33, 2.38, 0.68 & 0.93 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, Airtel, VIL & RJIL have 5.69%, 1.19% 1.16% & 0.51% silence call rate respectively. Further BSNL has higher RTP packet loss rate in downlink (4.54%) compared to VIL (1.19%), Airtel (1.03%) & RJIL (0.71%). In uplink the RTP packet loss rate is higher for BSNL (4.17%) compared to VIL (0.99%), Airtel (0.79%) & RJIL (0.49%). (refer table-6)

4. **Drop Call Rate**:
   a) Airtel, BSNL and VIL drop call rate is 0.69%, 1.61% and 0.67% respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL and VIL drop call rate is 0.57%, 3.56%, 0.45% and 1.46% 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 111.02 Mbps, 6.56 Mbps, 237.11 Mbps and 23.73 Mbps respectively. (refer table-11)

   b) Airtel, BSNL, RJIL and VIL average upload speeds are 25.19 Mbps, 4.96 Mbps, 20.71 Mbps and 17.68 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 154.19 Mbps, 7.70 Mbps, 177.81 Mbps and 27.57 Mbps respectively. (refer table-33)

   b) Airtel, BSNL, RJIL and VIL average upload speeds are 33.00 Mbps, 3.32 Mbps, 16.65 Mbps and 20.67 Mbps respectively. (refer table-33)

3. **Data session setup success rate (static i.e. while stationary):**
   a) Airtel, BSNL, RJIL and VIL have 100.00%, 98.33%, 96.67% and 100.00% download session setup success rate respectively. (refer table-33)

   b) Airtel, BSNL, RJIL and VIL have 98.33%, 98.33%, 96.67% and 100.00% upload session setup success rate respectively. (refer table-33)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 92.22% call setup success rate and 0.69% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting with benchmark of 98.00% for call setup success rate. (refer table-3)

- 95.44% call setup success rate and 0.57% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting with benchmark of 98.00% for call setup success rate. (refer table-5)

- 99.59% call setup success rate and 0.21% drop call rate have been observed in 3G/2G network mode for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)

- 99.03% 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-20)

- 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 walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-59, 60 & 61)

- 67.36% call setup success rate and 3.09% drop call rate have been observed in 3G/2G network mode for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-65)

- 75.35% call setup success rate and 4.67% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-67)

- 97.96% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across the railway route. Performance is not meeting with benchmark of 98.00% for call setup success rate. (refer table-72)

Data

- Airtel has 111.02 Mbps average download speed & 25.19 Mbps average upload speed for LSA. (refer table-11)

- Airtel has 138.07 Mbps average download speed & 29.41 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- Bhilai Bus Stand, Durg Bus Stand, Indian Institute of Technology Bhilai, Pt. Ravishankar Shukla Stadium Durg and TI Mall Bhilai have less download speed (less than 100 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (Refer table-34, 37, 41, 42 & 45)

- Bhilai Railway Station, Durg Bus Stand, Durg Collectorate, Indian Institute Of Technology Bhilai and Pt. Ravishankar Shukla Stadium Durg have less upload speed (less than 20 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (Refer table-35, 37, 38, 41 & 42)

- All Walk test locations have less download speed (less than 100 Mbps) except Durg Railway Station for auto-selection mode (5G/4G/3G/2G). (refer table-62 & 64)

- All Walk test locations have less upload speed (less than 20 Mbps) except Durg Railway Station for auto-selection mode (5G/4G/3G/2G). (refer table-62 & 64)

- Airtel has 70.84 Mbps average download speed & 14.17 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

- Airtel has 43.76 Mbps average download speed & 13.18 Mbps average upload speed across measured routes for railway drive. (refer table-74)

2. BSNL:

Voice

- 97.65% call setup success rate and 1.61% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting with benchmark of 98.00% for call setup success rate. (refer table-3)

- 85.31% call setup success rate and 3.56% 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)

- 98.26% call setup success rate and 0.39% drop call rate have been observed in 3G/2G network mode for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-13)

- 88.07% 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 not meeting the benchmark of 98.00% for call setup success rate. (refer table-15)

- 91.67% 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-20)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Bhilai Power House Railway Station walk test location. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-59)

- 85.71% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Durg Railway Station walk test location. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-60)

- 87.50% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Maitri Baag Zoo Bhilai walk test location. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-61)

- 95.04% call setup success rate and 6.96% drop call rate have been observed in 3G/2G network mode for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-65)

- 78.87% call setup success rate and 8.04% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-67)

- 73.28% call setup success rate and 21.88% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across the railway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-72)

Data

- BSNL has 6.56 Mbps average download speed & 4.96 Mbps average upload speed for LSA. (refer table-11)

- BSNL has 7.01 Mbps average download speed & 5.55 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- Bhilai Bus Stand, Bhilai Railway Station, Civic Centre Bhilai, Durg Bus Stand, Indian Institute Of Technology Bhilai, Pt. Ravishankar Shukla Stadium Durg, Shree Shankaracharya Medical Collage and TI Mall Bhilai have less download speed (less than 10 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 35, 36, 37, 41, 42, 44 & 45)

- Bhilai Bus Stand, Bhilai Railway Station, Civic Centre Bhilai and Shree Shankaracharya Medical Collage have less upload speed (less than 2 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 35, 36 & 44)

- All walktest locations have less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 62, 63 & 64)

- BSNL has 4.23 Mbps average download speed & 4.49 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

- BSNL has 8.37 Mbps average download speed & 3.68 Mbps average upload speed across measured routes for railway drive. (refer table-74)

3. RJIL:

Voice

- 100.00% call setup success rate and 0.45% 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 0.19% 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-20)

- 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 walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-59, 60 & 61)

- 100.00% call setup success rate and 0.88% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-67)

- 100.00% call setup success rate and 2.04% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across the railway route. Performance is not meeting the benchmark of 2.00% for drop call rate. (refer table-72)

Data

- RJIL has 237.11 Mbps average download speed & 20.71 Mbps average upload speed for LSA. (refer table-11)
- RJIL has 298.00 Mbps average download speed & 24.26 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- Durg Railway Station, Pt. Ravishankar Shukla Stadium Durg and TI Mall Bhilai have less download speed (less than 100 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table- 39, 42 & 45)
- Bhilai Railway Station, Civic Centre Bhilai, Durg Bus Stand, Durg Collectorate, Durg Railway Station, Indian Institute Of Technology Bhilai, Pt. Ravishankar Shukla Stadium Durg, Sector 9 Hospital Bhilai, Shree Shankaracharya Medical Collage and TI Mall Bhilai have less upload speed (less than 20 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-35, 36, 37, 38, 39, 41, 42, 43, 44 & 45)
- Maitri Baag Zoo Bhilai walk test location has less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-64)
- Maitri Baag Zoo Bhilai walk test location has less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-64)
- RJIL has 186.05 Mbps average download speed & 15.82 Mbps average upload speed across the measured routes for highway drive. (refer table-71)
- RJIL has 100.41 Mbps average download speed & 12.72 Mbps average upload speed across measured routes for railway drive. (refer table-74)

4. VIL:

Voice

- 93.13% call setup success rate and 0.67% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting the benchmark of 98.00% call setup success rate. (refer table-3)
- 96.31% call setup success rate and 1.46% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting with benchmark of 98.00% for call setup success rate. (refer table-5)
- 97.62% call setup success rate and 0.41% drop call rate have been observed in 3G/2G network mode for city drive. Performance is not meeting the benchmark of 98.00% for call setup success rate (refer table-13)
- 99.81% call setup success rate and 0.19% 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-20)
- 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 walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-59, 60 & 61)

- 76.30% call setup success rate and 1.94% drop call rate have been observed in 3G/2G network mode for highway drive. Performance is not meeting the benchmark of 98.00% for call setup success rate (refer table-65)

- 80.58% call setup success rate and 8.93% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00 & 2.00% respectively. (refer table-67)

- 94.12% call setup success rate and 2.08% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) across the railway route. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-72)

Data

- VIL has 23.73 Mbps average download speed & 17.68 Mbps average upload speed for LSA. (refer table-11)

- VIL has 26.88 Mbps average download speed & 20.41 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- Indian Institute Of Technology Bhilai has less download speed (less than 10 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table- 41)

- Indian Institute Of Technology Bhilai has less upload speed (less than 2 Mbps) out of total 12 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-41)

- VIL has 20.83 Mbps average download speed & 13.40 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

- VIL has 12.53 Mbps average download speed & 6.76 Mbps average upload speed across measured routes for railway drive. (refer table-74)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

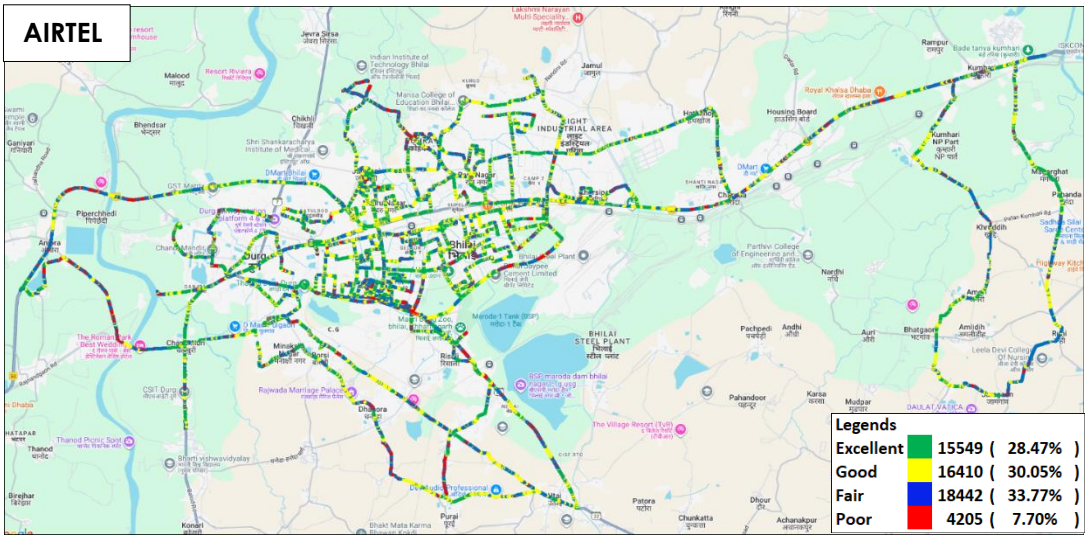


Figure-52: Signal strength 3G/2G network mode – AIRTEL.

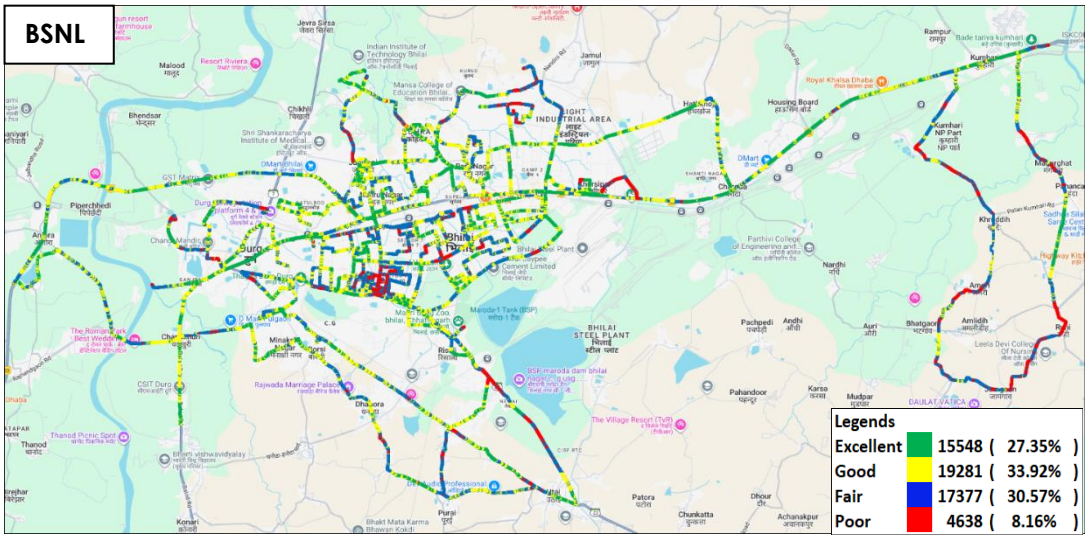


Figure-53: Signal strength 3G/2G network mode – BSNL.

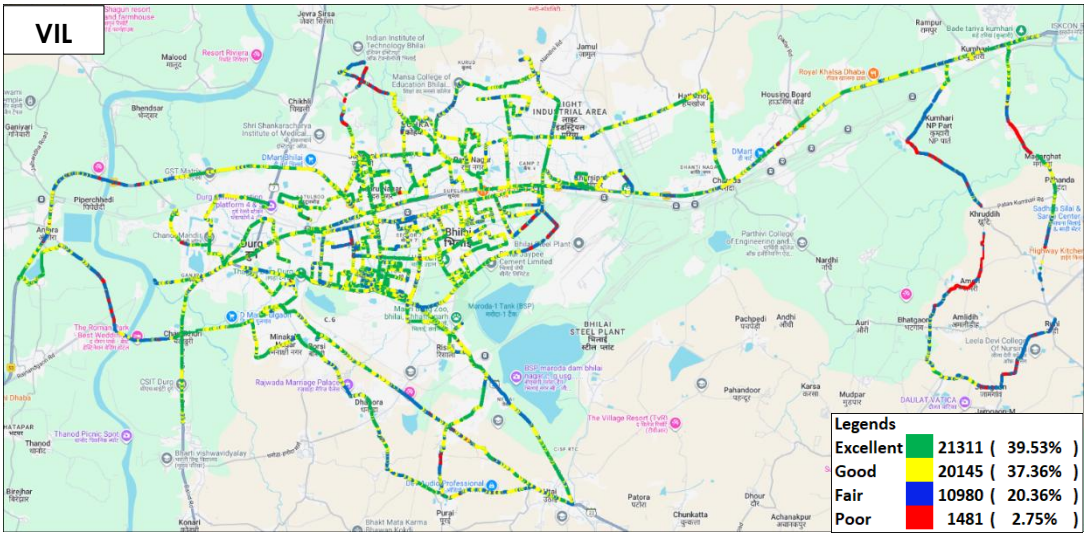


Figure-54: Signal strength 3G/2G network mode – VIL.

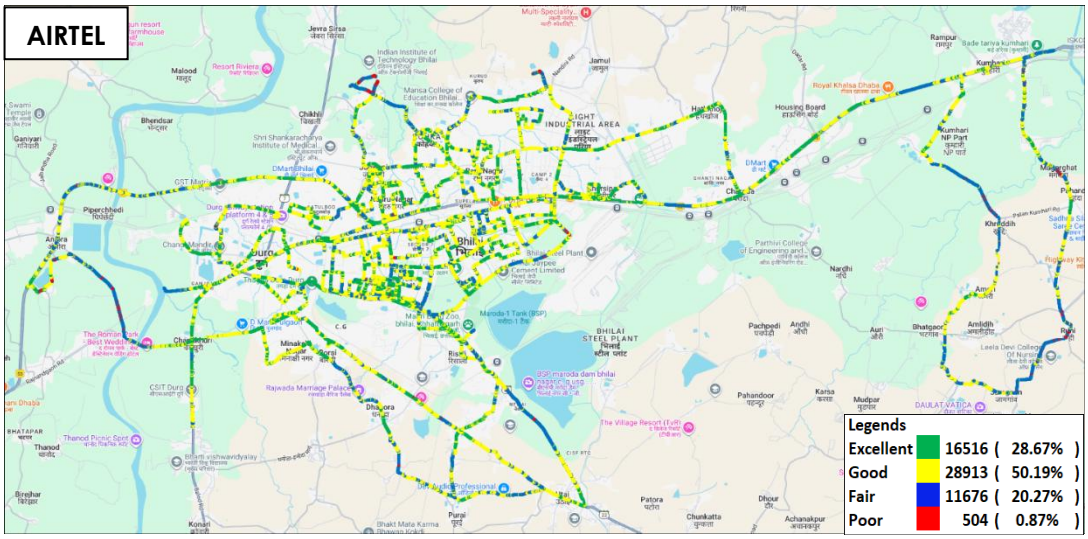


Figure-55: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

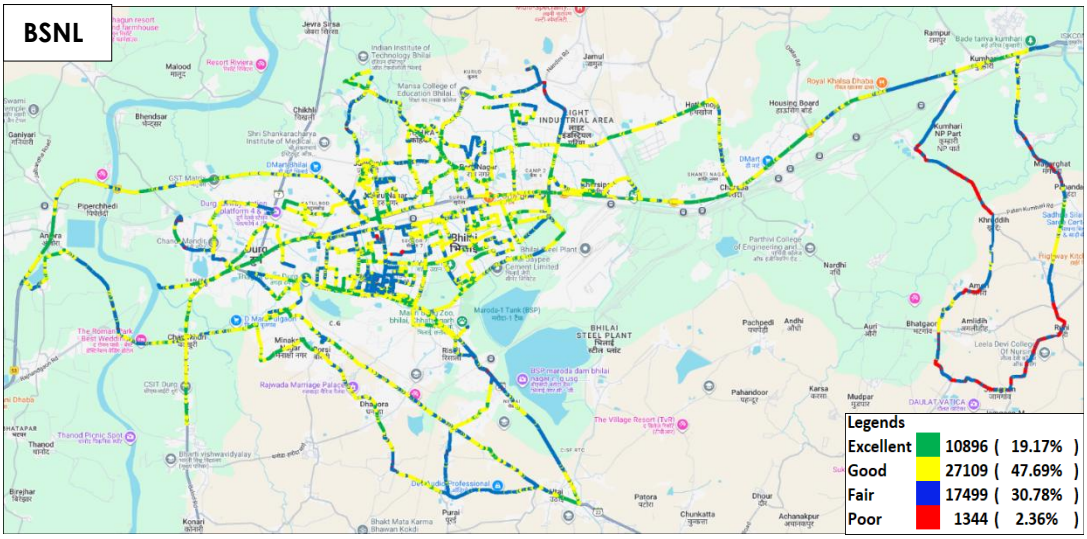


Figure-56: Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.

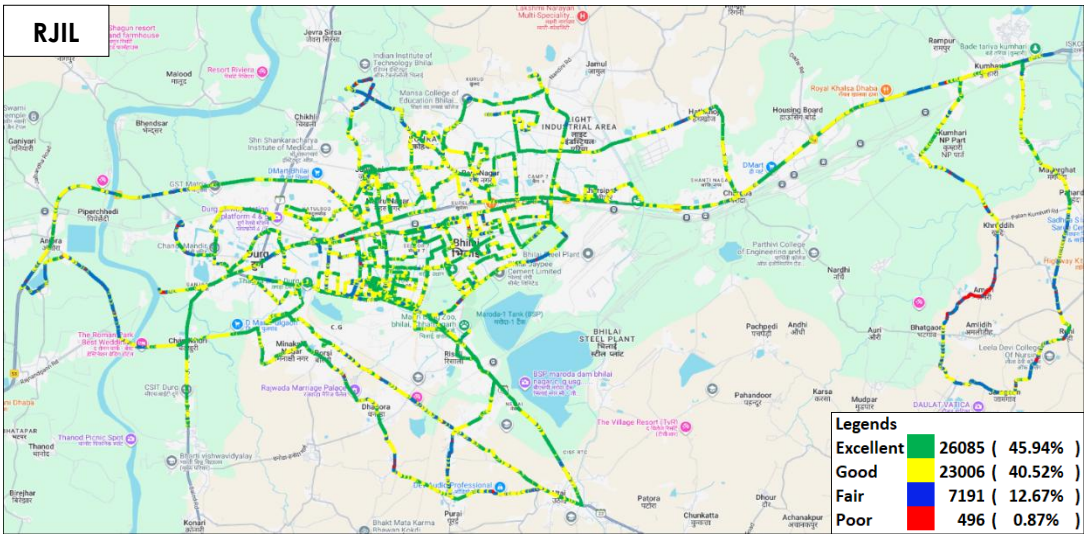


Figure-57: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

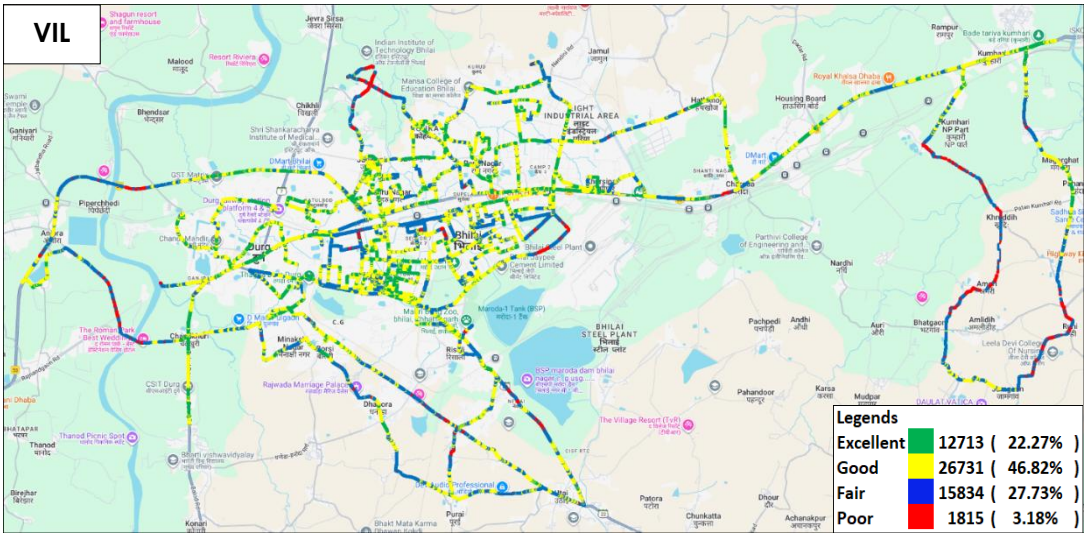


Figure-58: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

6.1.2 Highway

i) Raipur to Jagdalpur

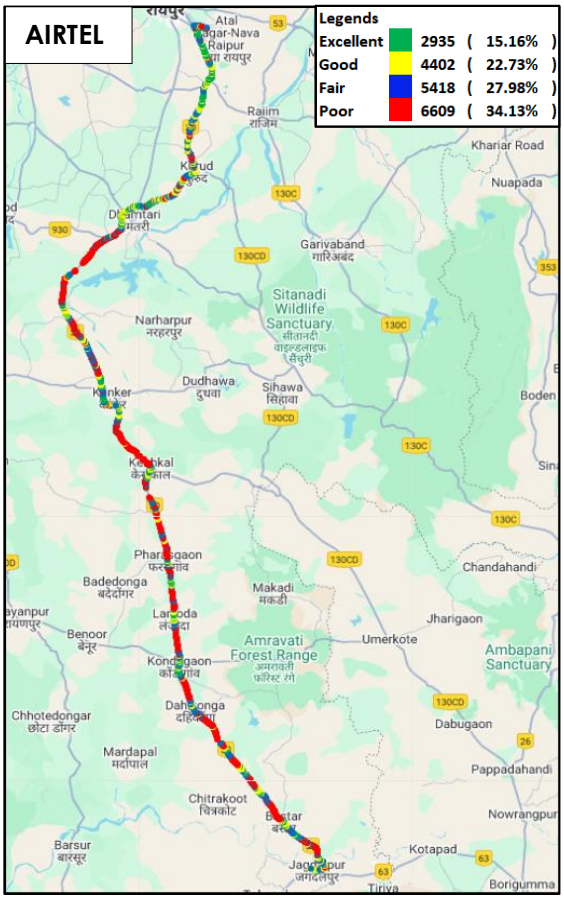


Figure-59: Signal strength 3G/2G network mode – AIRTEL.

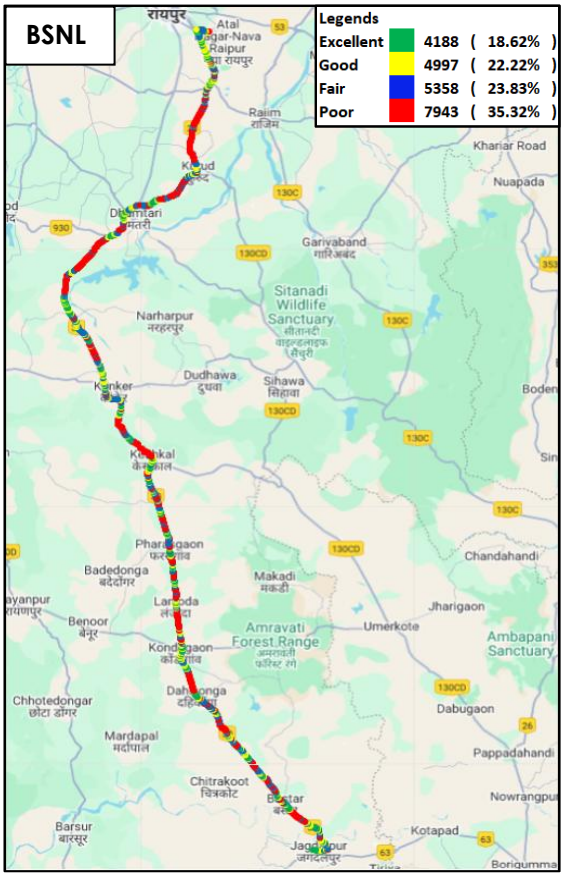


Figure-60: Signal strength 3G/2G network mode – BSNL.

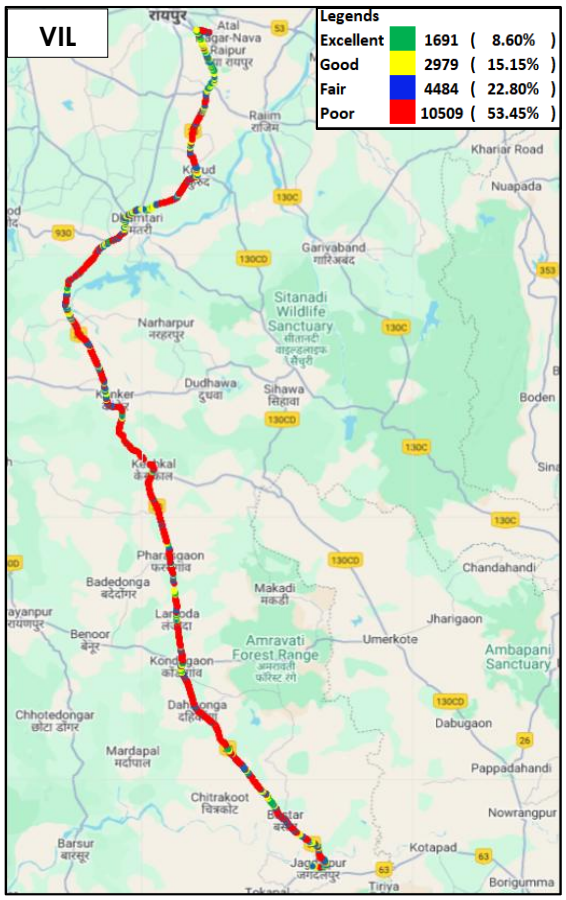


Figure-61: Signal strength 3G/2G network mode – VIL.

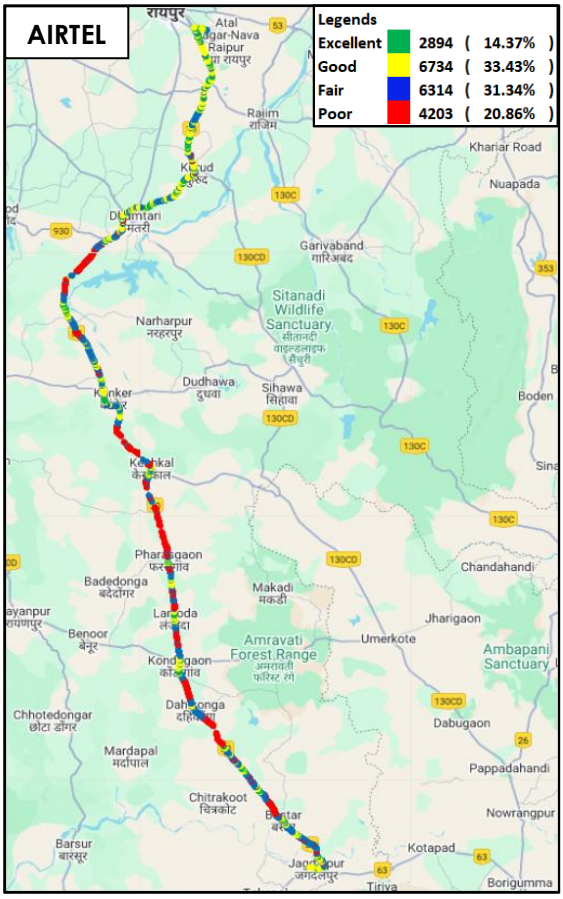


Figure-62: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

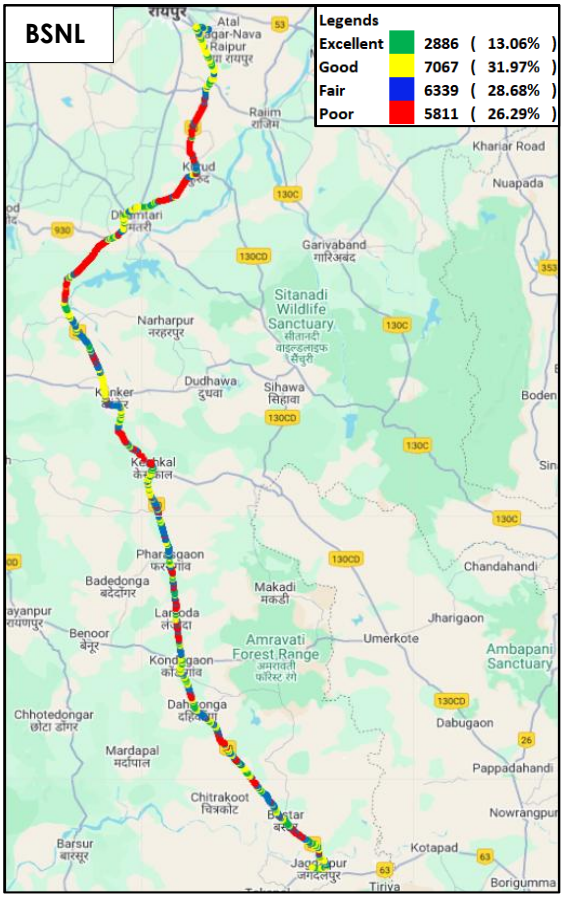


Figure-63: Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.

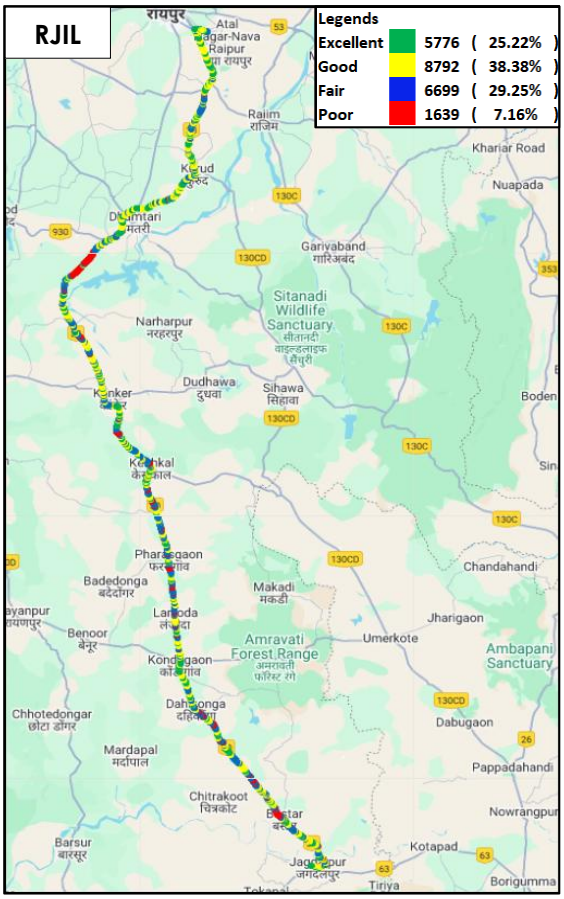


Figure-64: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

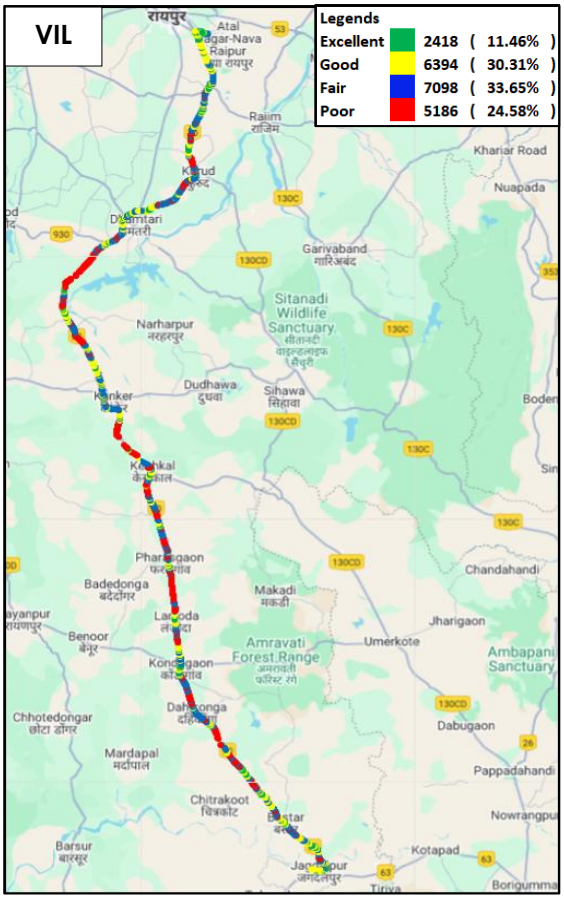


Figure-65: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

6.1.3 Railway

i) Bhopal to Ratlam

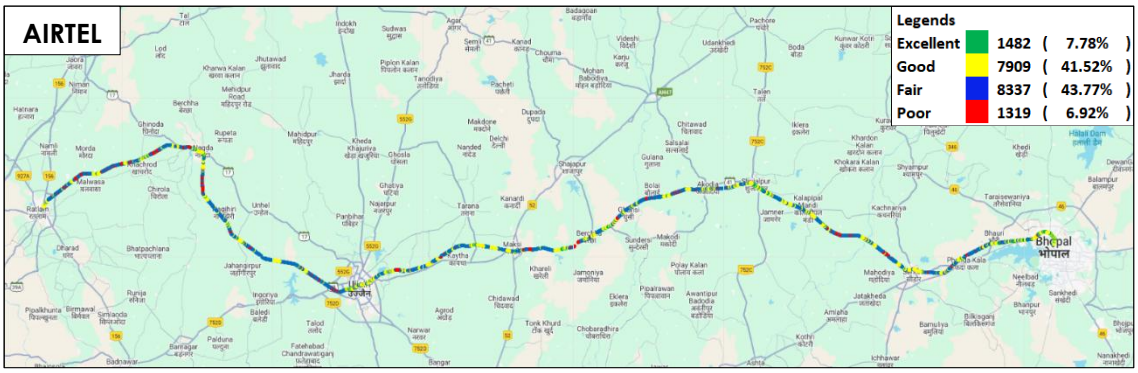


Figure-66: Signal strength auto-selection mode 5G/4G/3G/2G –AIRTEL.

Figure-67: Signal strength auto-selection mode 5G/4G/3G/2G -BSNL

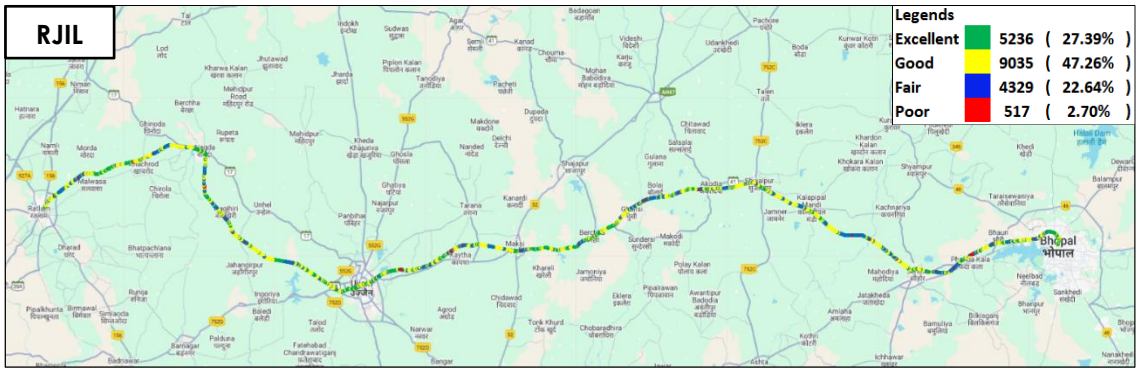


Figure-68: Signal strength auto-selection mode 5G/4G/3G/2G - RJIL

Figure-69: Signal strength auto-selection mode 5G/4G/3G/2G – VIL

7. Appendix

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

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

7.1 Appendix-I

7.1.1 Drive test setup

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

Table-75: Voice test detail

Note-

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

Data Test		
Test Type	**Technology**	**Detail**
HTTP 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, www.sbi.co.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-76: 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, Upload, TCP and TWAMP testing for Airtel and BSNL.
- RJIL server was used for FTP Download, FTP Upload, TCP and TWAMP testing, for RJIL.
- VIL server was used for HTTP Download and HTTP Upload, for VIL.
- Delhi-based TRAI server was used for TCP and TWAMP testing for VIL.

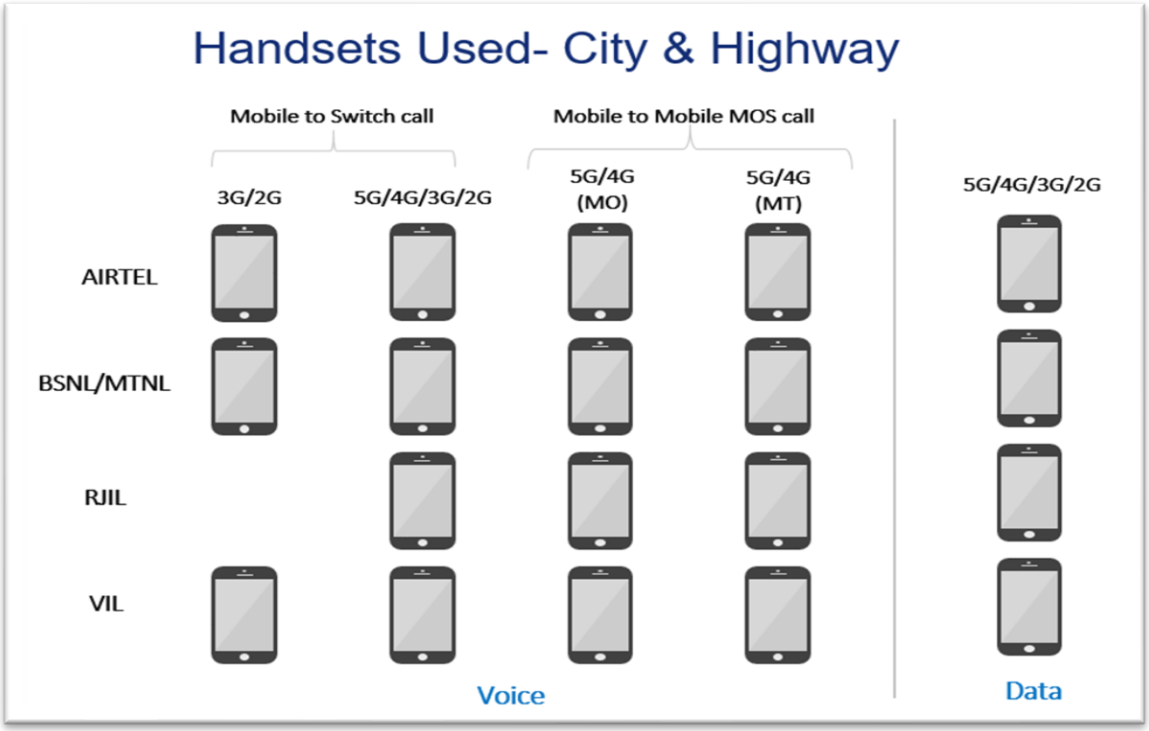


Figure-70: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

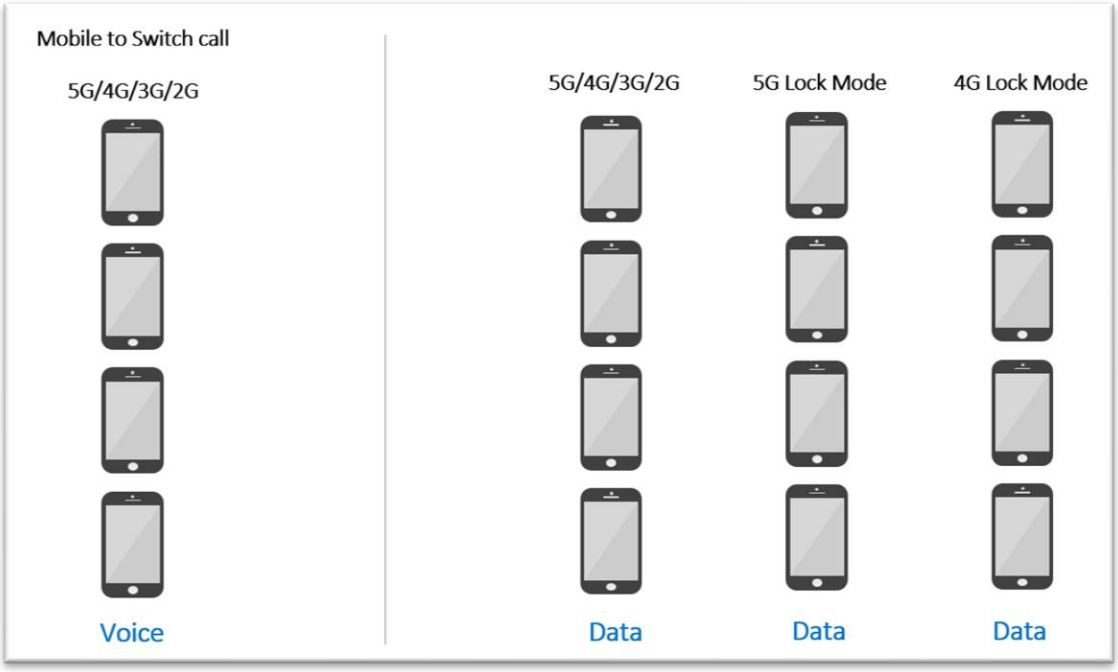


Figure-71: Number of handsets used in railway/metro/walktest/hotspot/ coastal area

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)

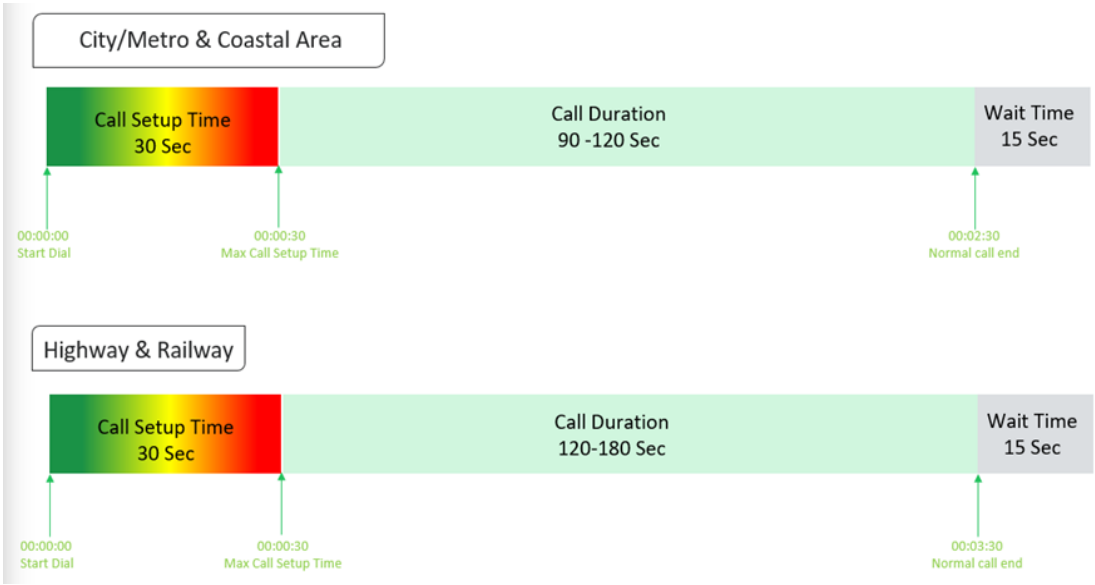


Figure-72: Voice test script for city/railway/metro/highway & coastal area

- 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-73: 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

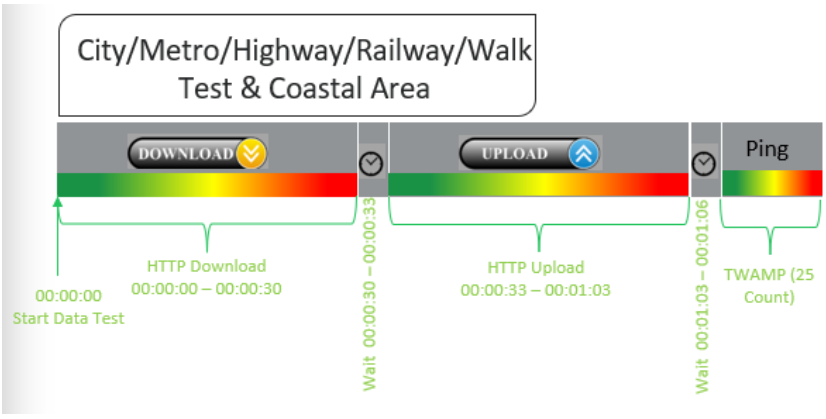


Figure-74: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

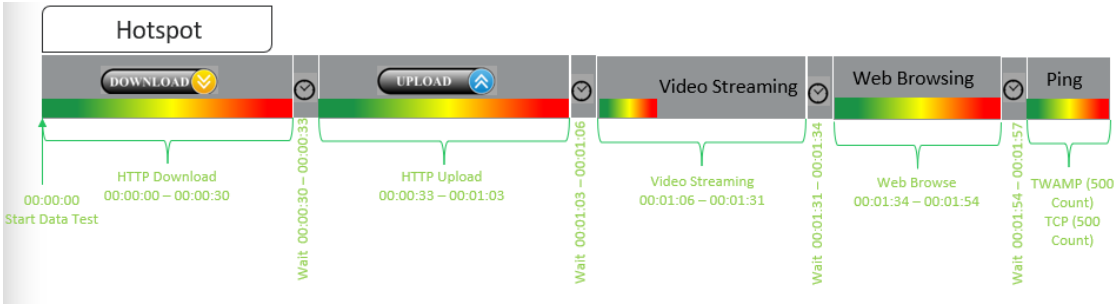


Figure-75: Data test script used at hotspot

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

7.2 Appendix-II

7.2.1 Network Performance Parameters for Voice calls

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

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

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

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

Table-77: 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-78: 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
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Date: 2025.12.06 16:50:20 +05'30'