भादूविप्रा
TRAI

TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Maharashtra LSA

September 2026

Contents

1. Introduction 3
2. Executive Summary (LSA) 3
2.1 Drive test details 3
2.2 Drive test routes 4
2.3 Summary of areas covered 4
2.4 Telecom service providers detected frequency bands 5
2.5 Key finding of Independent Drive Test 6
3. QoS performance analysis-LSA level 8
3.1 Overview 9
3.2 Voice performance 9
3.3 Data performance 12
4. Detailed QoS performance analysis 14
4.1 Overview 14
4.2 City 14
4.2.1 Drive test route 14
4.2.2 Areas covered 14
4.2.3 Voice performance 15
4.2.4 Data performance 29
4.3 Hotspots 37
4.3.1 Locations 37
4.3.2 Hotspot covered 37
4.3.3 Voice performance 37
4.3.4 Data performance (Auto-selection mode 5G/4G/3G/2G) 40
4.3.5 Data performance (5G Only & 4G Only Download & Upload Speed) 44
4.4 Walk Test 47
4.4.1 Walk test locations 47
4.4.2 Walk Test Covered 47
4.4.3 Voice Performance 47
4.4.4 Data Performance 48
4.5 Highway 50
4.5.1 Drive test route 50
4.5.2 Routes Covered 50
4.5.3 Voice performance 50
4.5.4 Data performance 63

5. Voice & Data Key findings 69
5.1 Overall Voice 69
5.2 Overall Data 69
5.3 Operator wise Key Findings 70
6. Annexure 74
6.1 Route wise coverage map 74
6.1.1 City 74
6.1.2 Highway 80
7. Appendix 84
7.1 Appendix-I 84
7.1.1 Drive test setup 84
7.1.2 Drive test Methodology 86
7.2 Appendix-II 88
7.2.1 Network Performance Parameters for Voice calls 88
7.2.2 Network Performance Parameters Data tests 89

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 Maharashtra License Service Area (LSA) during the month of September-2026 under the supervision of TRAI Regional Office (RO) Bengaluru. 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	Ratnagiri District	City	346.1	8-Sep-2026	11-Sep-2026
2	Ratnagiri	Inter Operator Calling	1 Location	11-Sep-2026	11-Sep-2026
3	Ratnagiri District	Hotspot	11 Locations	8-Sep-2026	11-Sep-2026
4	Ratnagiri District	Walk test	7.6	8-Sep-2026	11-Sep-2026
5	Ratnagiri to Kolhapur	Highway	131.8	10-Sep-2026	10-Sep-2026

Table-1: Drive test summary.

2.2 Drive test routes

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

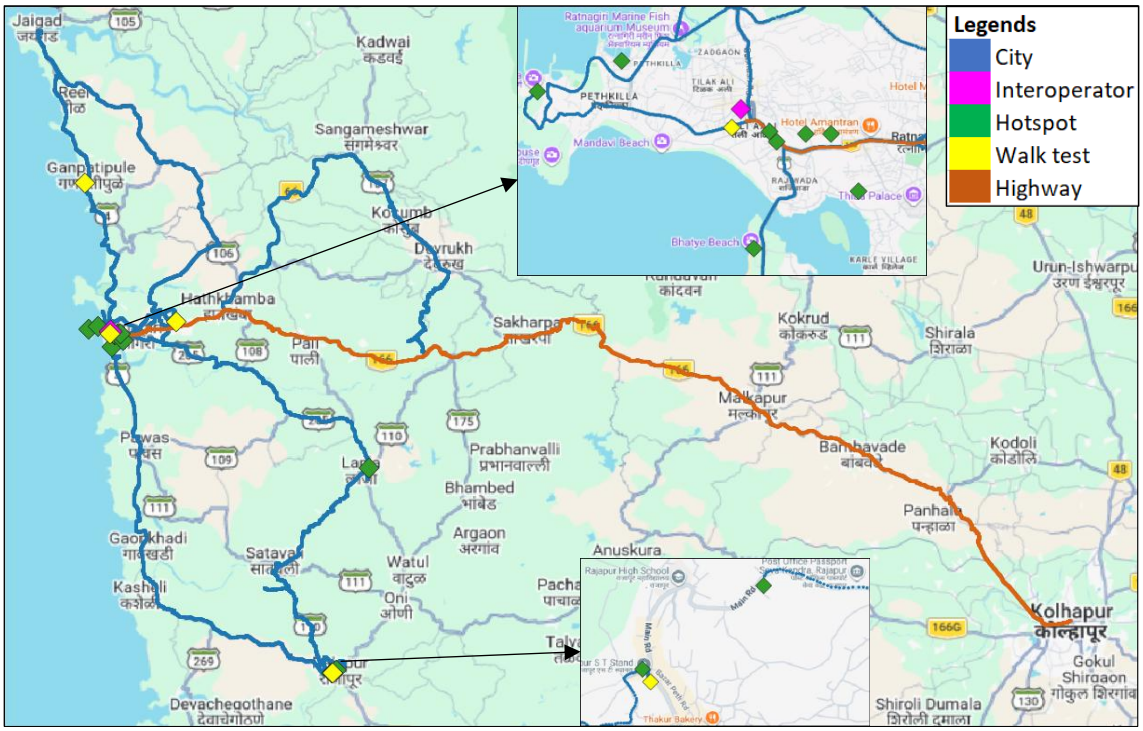


Figure-1: Drive test routes.

2.3 Summary of areas covered

a) City- Devale, Kosumb, Navadi, Kurdhunda, Hathkhamba, Mirjole, Jakadevi, Jaigad, Undi, Ganpatipule, Basani, Tilak Ali, Bhatye, Purnagad, Adivare, Rajapur, Dasur, Satavali, Lanja, Punas and Nachane etc.

b) Hotspot

1. Bhatye Beach
2. District Collector Office Ratnagiri
3. Lanja St Bus Stand / Main Town Centre
4. Rajapur Government Hospital
5. Rajapur St Bus Stand
6. Ratnadurg Fort / Bhagwati Fort
7. Ratnagiri Fish Market and Fisherman Docking Station
8. Ratnagiri St Bus Stand
9. Superintendent of Police Office Ratnagiri
10. Thiba Point
11. Zilla Parishad Ratnagiri

c) Walk Test

1. Ganpatipule Beach
2. Rajapur Market Area
3. Ratnagiri Main Market
4. Ratnagiri Railway Station

d) Highway- Teli Aali, Karwanchiwadi, Nanij, Kondgaon, Amba, Malkapur, Bambavade and Kerle etc.

2.4 Telecom service providers detected frequency bands

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

S.no.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	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	1800,2100,2300
11	Vodafone Idea Ltd.	5G	3500

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

2.5 Key findings of Independent Drive Test

1. **Drive Test Area:** The overall mobile network performance across Ratnagiri District (Maharashtra LSA) for the key Parameters has been summarized below:

a) Coverage Gap – The signal strength observed during voice testing on the drive test route in auto-selection mode (5G/4G/3G/2G). (refer figure- 29 to 32)

Parameter	AIRTEL	BSNL	RJIL	VIL
Total Number of Samples captured on Drive test route	33673	40900	42801	38305
Number of Samples having poor signal strength	7800	10960	8344	11117
Number of Samples having limited service (No Coverage)	5692	1484	1184	4823

b) Dropped Calls - The TSP-wise details of dropped calls in auto selection mode (5G/4G/3G/2G). (refer figure-15 to 18)

Parameter	AIRTEL	BSNL	RJIL	VIL
Number of successful Calls Established	301	338	387	339
Number of dropped Calls	15	32	10	12

c) Call Silence Instance – The TSP-wise details of Call silence instance in Auto-selection mode (5G/4G). (refer figure-19 to 22)

Parameter	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider network)	282	310	355	306
Number of silences calls for >3 Sec	13	10	20	6
Total number of silence instances for >3 Sec	15	11	23	6

d) Packet loss rate Downlink & Uplink- The TSP-wise details of packet loss rate in downlink & uplink for Auto-selection mode (5G/4G).

Parameter	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider network)	282	310	355	306
Packet loss Rate Downlink %	4.86	4.58	4.77	2.36
Packet loss Rate Uplink %	3.46	5.34	3.68	2.10

e) Data Download and Upload Throughput-

i) Data Download Throughput: The TSP-wise details of **Average Download (DL) throughput** against declared typical DL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure- 34 to 37)

Parameter	Measured in	AIRTEL (upto 5G)	BSNL (upto 4G)	RJIL (upto 5G)	VIL (upto 4G)
Typical Download Throughput declared by TSP	(Mbits/s)	23.00	5.00	15.00	15.00
Average Download Throughput measured during IDT	(Mbits/s)	113.81	4.42	134.77	38.93

ii) Data Upload Throughput: The TSP-wise details of **Average Upload (UL) throughput** against declared typical UL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure-38 to 41)

Parameter	Measured in	AIRTEL (upto 5G)	BSNL (upto 4G)	RJIL (upto 5G)	VIL (upto 4G)
Typical Upload Throughput declared by TSP	(Mbits/s)	10.00	3.00	7.00	8.00
Average Upload Throughput measured during IDT	(Mbits/s)	17.46	2.62	11.40	8.50

2. **Drive Test Route:** The overall mobile network performance on Ratnagiri to Kolhapur highway route (Maharashtra LSA) for the key Parameters has been summarized below:

a) Coverage Gap- The signal strength observed during voice testing on the drive test route in auto-selection mode (5G/4G/3G/2G). (refer figure- 72 to 75)

Parameter	AIRTEL	BSNL	RJIL	VIL
Total Number of Samples captured on Drive test route	11280	11135	11954	11656
Number of Samples having poor signal strength	1531	3507	509	1313
Number of Samples having limited service (No Coverage)	333	381	100	185

b) Dropped Calls - The TSP-wise details of dropped calls in auto selection mode (5G/4G/3G/2G). (refer figure-58 to 61)

Parameter	AIRTEL	BSNL	RJIL	VIL
Number of successful Calls Established	56	57	59	62
Number of dropped Calls	6	14	2	7

c) Call Silence Instance- The TSP-wise details of Call silence instance in Auto-selection mode (5G/4G). (refer figure-62 to 65)

Parameter	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider network)	55	59	62	61
Number of silences calls for >3 Sec	2	1	2	1
Total number of silence instances for >3 Sec	3	1	6	1

d) Packet loss rate Downlink & Uplink- The TSP-wise details of packet loss rate in downlink & uplink for Auto-selection mode (5G/4G).

Parameter	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider network)	55	59	62	61
Packet loss Rate Downlink %	3.96	2.48	1.07	1.97
Packet loss Rate Uplink %	2.27	3.26	2.03	1.01

e) Data Download and Upload Throughput-

i) Data Download Throughput: The TSP-wise details of **Average Download (DL) throughput** against declared typical DL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure- 77 to 80)

Parameter	Measured in	AIRTEL (upto 5G)	BSNL (upto 4G)	RJIL (upto 5G)	VIL (upto 4G)
Typical Download Throughput declared by TSP	(Mbits/s)	23.00	5.00	15.00	15.00
Average Download Throughput measured during IDT	(Mbits/s)	124.67	6.77	269.13	53.05

ii) Data Upload Throughput: The TSP-wise details of **Average Upload (UL) throughput** against declared typical UL Throughput for month, in Auto-selection mode (5G/4G/3G/2G). (refer figure- 81 to 84)

Parameter	Measured in	AIRTEL (upto 5G)	BSNL (upto 4G)	RJIL (upto 5G)	VIL (upto 4G)
Typical Upload Throughput declared by TSP	(Mbits/s)	10.00	3.00	7.00	8.00
Average Upload Throughput measured during IDT	(Mbits/s)	19.77	6.57	12.27	14.17

QoS Performance Analysis- Maharashtra 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 Maharashtra LSA during the month of September-2026 covering city drive, hotspots, walk test and highway. (Refer Table 1)

3.2 Voice performance

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

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	608	519	491
Call Setup Success Rate %	55.59	75.92	81.06
Drop Call Rate %	2.66	9.90	3.52
Call Setup Time-Average (Second)	5.15	3.47	3.05
Handover Success Rate %	98.90	99.88	97.27

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

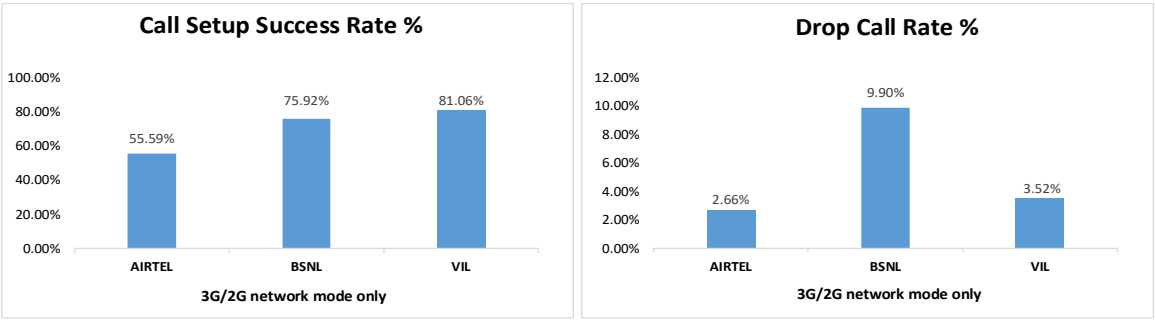


Figure-2: Call setup success rate and drop call rate performance.

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	165	NA
2G	273	96	293

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	752	741	658	704
Call Setup Success Rate %	70.48	75.84	94.83	82.10
Drop Call Rate %	3.96	10.32	2.08	3.29
Call Setup Time-Average (Second)	0.77	2.63	0.80	1.40
Handover Success Rate %	100.00	99.29	99.88	99.58

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

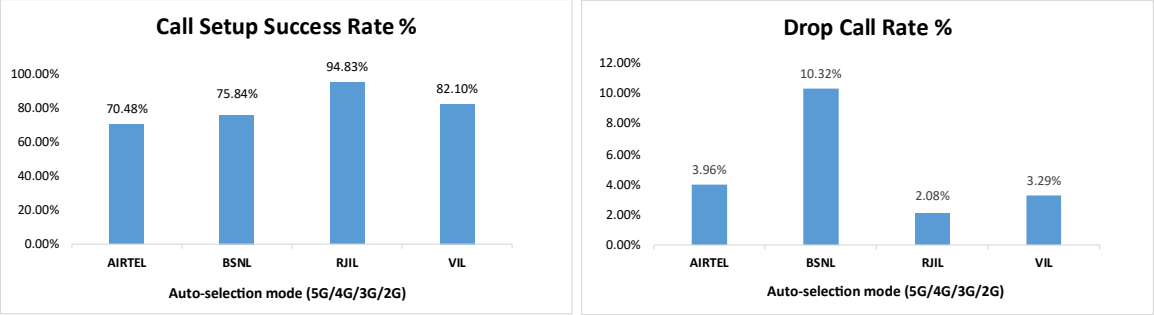


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G – Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	337	369	417	367
Number of silences call for >4 Sec	14	9	17	4
Silence Call Rate %	4.15	2.44	4.08	1.09
Number of silence instances for >4 Sec	16	10	22	4
Number of silence instances for >3 Sec	18	12	29	7
Number of silence instances for >2 sec	30	21	59	13
RTP Jitter (4G & 5G) in ms	6.65	4.33	15.11	9.21
Packet loss Rate Downlink %	4.71	4.40	4.44	2.30
Packet loss Rate Uplink %	3.27	5.19	3.44	1.92

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	19	NA	401	0
4G	681	341	672	622
3G	NA	98	NA	NA
2G	48	96	NA	68

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	2304	2237	2940	2683
Speech Quality (Average MOS)	3.82	2.79	4.29	3.87
Number of samples with MOS >=4 to <5 (Excellent)	1698	432	2414	1829
Number of samples with MOS >=3 to <4 (Good)	392	406	231	649
Number of samples with MOS >=2 to <3 (Fair)	79	914	107	112
Number of samples with MOS >=1 to <2 (Poor)	135	485	188	93
%age of samples with MOS >=4 to <5 (Excellent)	73.70%	19.31%	82.11%	68.17%
%age of samples with MOS >=3 to <4 (Good)	17.01%	18.15%	7.86%	24.19%
%age of samples with MOS >=2 to <3 (Fair)	3.43%	40.86%	3.64%	4.17%
%age of samples with MOS >=1 to <2 (Poor)	5.86%	21.68%	6.39%	3.47%

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

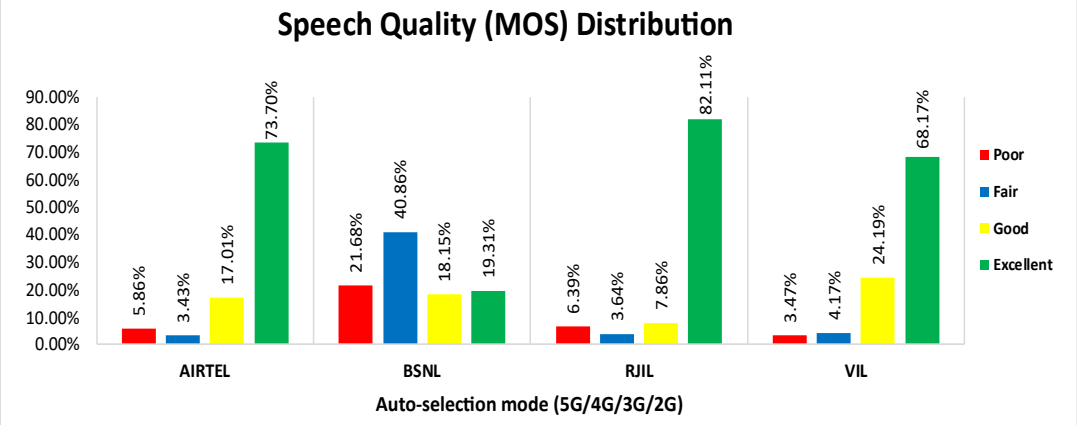


Figure- 4: Distribution of samples in MOS range.

(d) Inter-service provider voice call performance: To check the performance of inter-service providers call setup success rate, total 15 inter operator calls were attempted at one location which is Chhaya guest house Ratnagiri. The call setup success rate and call setup time observation is as below.

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

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

Note-

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

Call setup time average (seconds)				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	4.57	1.27	1.71
BSNL	2.10	NA	1.64	3.21
RJIL	1.60	4.85	NA	1.49
VIL	1.86	4.40	1.86	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	134.37	5.05	159.11	44.98
	80th Percentile	239.38	7.98	340.92	71.45
	20th Percentile	16.48	1.00	4.54	9.32
Upload Throughput (Mbits/s)	Average	19.65	4.25	12.62	12.46
	80th Percentile	35.03	6.83	22.88	20.78
	20th Percentile	2.35	0.84	1.05	1.67
Latency (ms)	50th Percentile	30.29	39.89	37.47	28.18

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

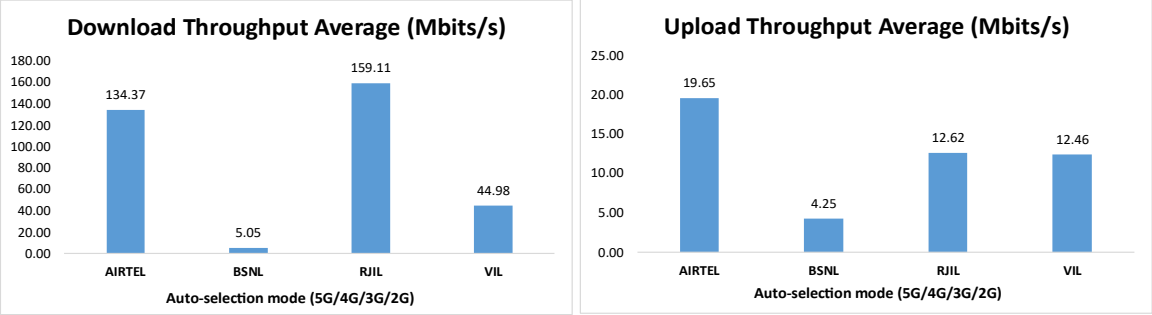


Figure- 5: Download and Upload throughput.

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	47	NA	426	0
4G	681	304	671	711
3G	NA	113	NA	NA
2G	55	42	NA	57

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

4.2 City

Drive test has been conducted from 8th September 2026 to 11th September 2026 in Ratnagiri District. (Refer Table-1)

4.2.1 Drive test route

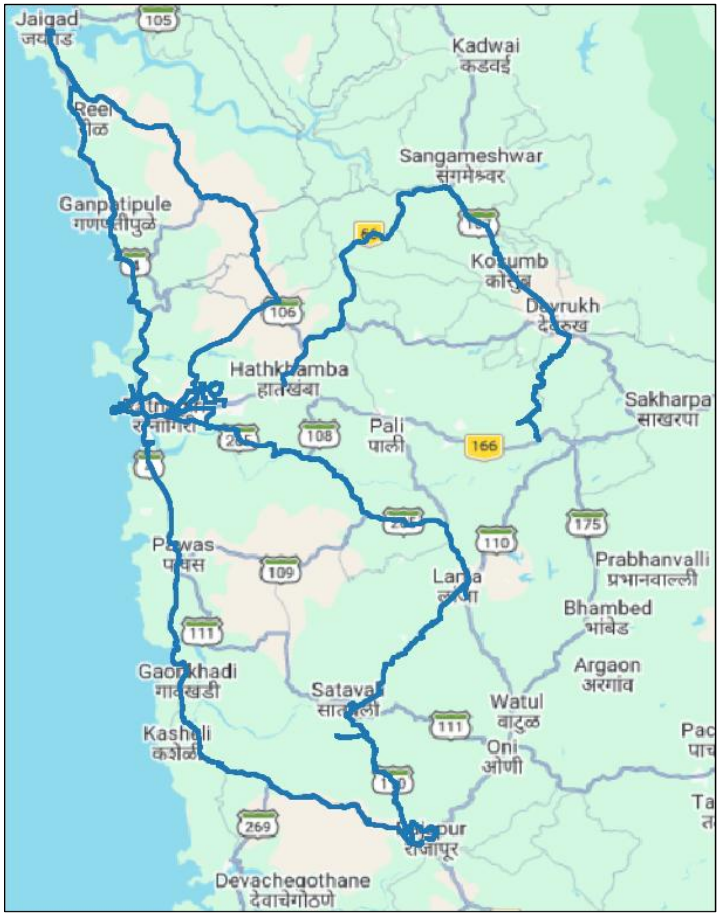


Figure- 6: Drive test routes.

4.2.2 Areas covered

Devale, Kosumb, Navadi, Kurdhunda, Hathkhamba, Mirjole, Jakadevi, Jaigad, Undi, Ganpatipule, Basani, Tilak Ali, Bhatye, Purnagad, Adivare, Rajapur, Dasur, Satavali, Lanja, Punas and Nachane 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	495	442	427
Call Setup Success Rate %	49.29	76.24	78.69
Drop Call Rate %	3.28	7.72	2.68
Call Setup Time-Average (Second)	5.16	3.56	3.04
Handover Success Rate %	98.82	99.83	98.10

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

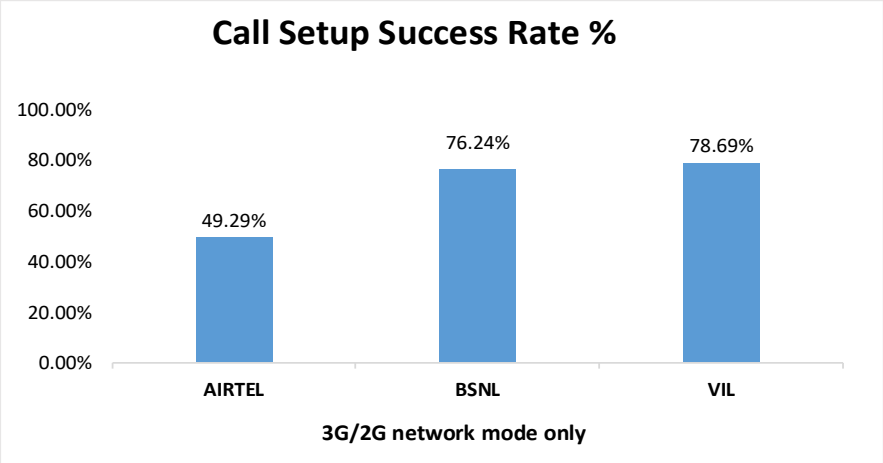


Figure-7: Performance for call setup success rate.

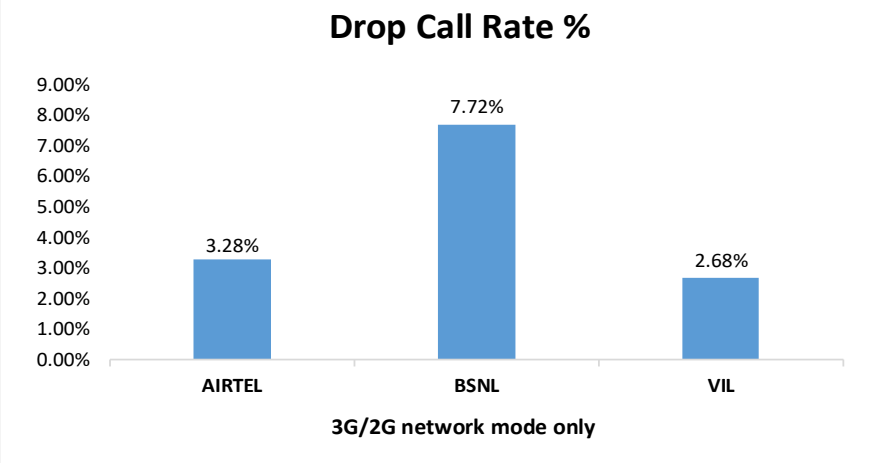


Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	76.68%	NA
2G	86.31%	21.44%	90.80%
Limited Service	13.69%	1.87%	9.20%

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- 90, 91 & 92 for map view)

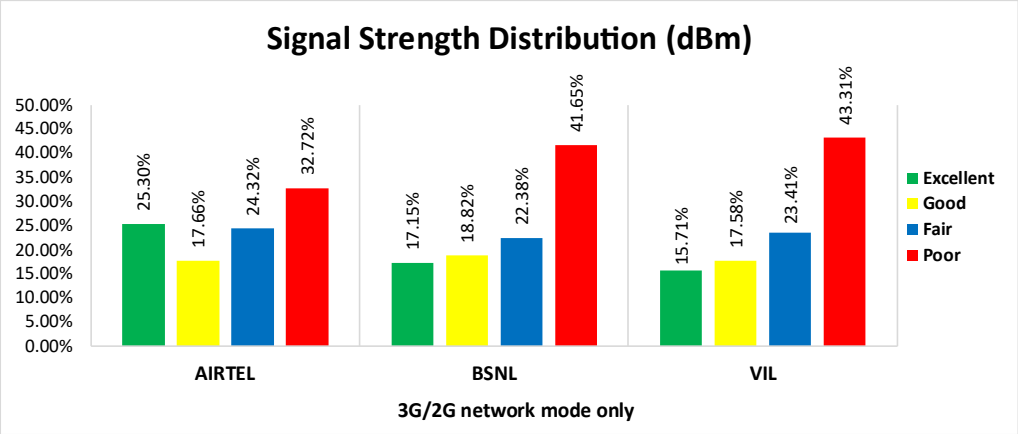


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 25% of samples falling in the excellent signal strength category.
- BSNL has 17% of samples falling in the excellent signal strength category.
- VIL has 16% 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	491	479	416	454
Call Setup Success Rate %	61.30	70.56	93.03	74.67
Drop Call Rate %	4.98	9.47	2.58	3.54
Call Setup Time Average (Second)	0.87	3.11	0.90	1.59
Handover Success Rate %	100.00	99.67	99.83	99.37

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

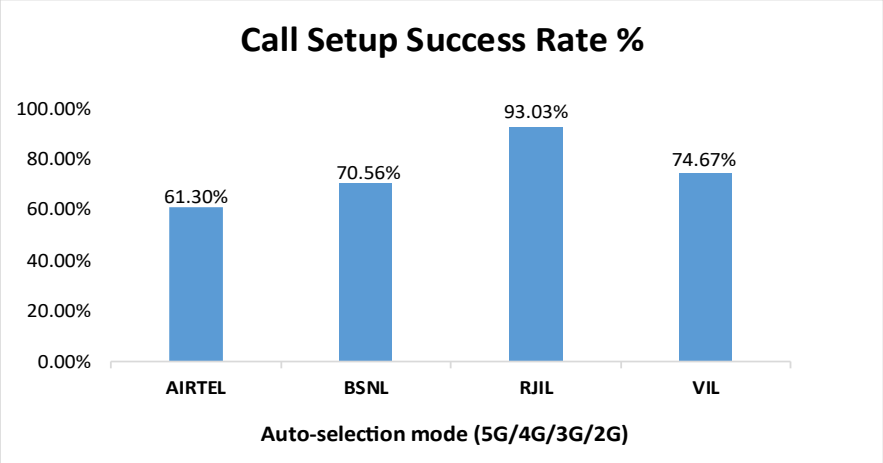


Figure-13: Performance for call setup success rate.

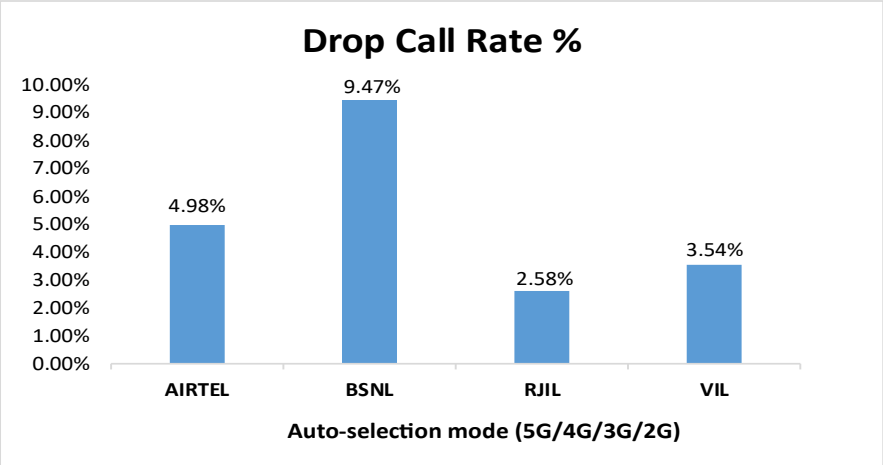


Figure-14: Performance for drop call rate.

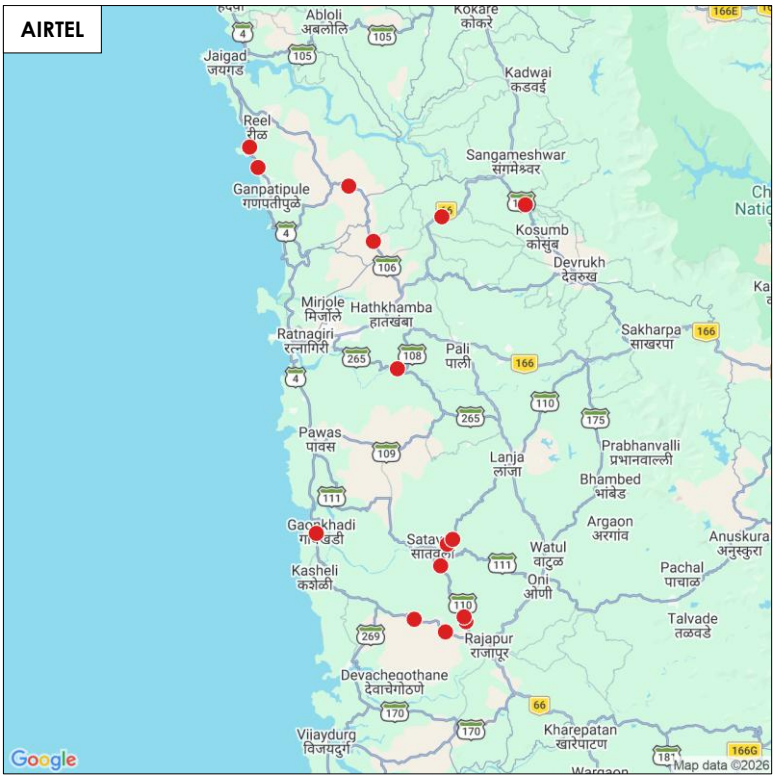


Figure-15: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

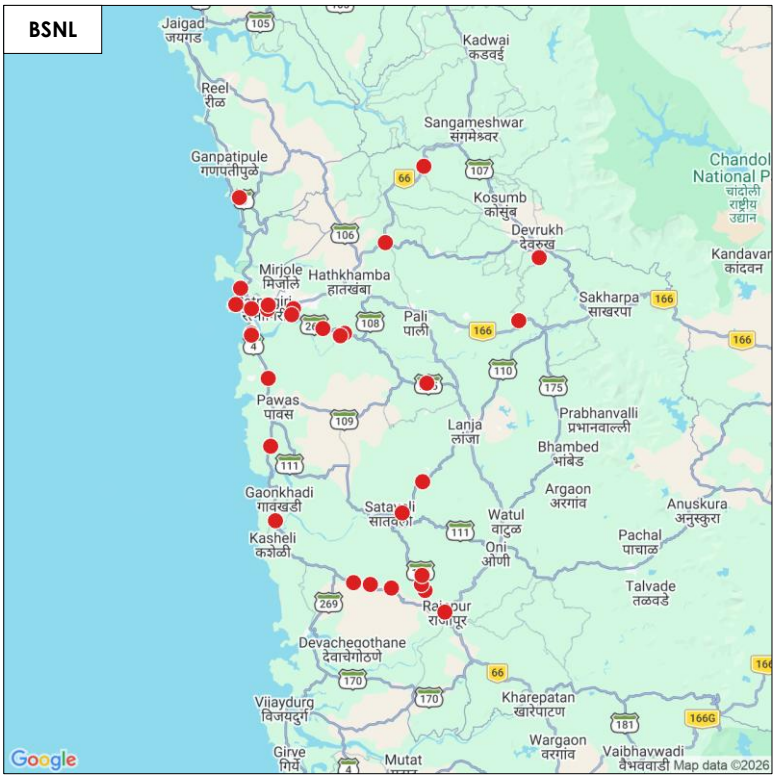


Figure-16: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

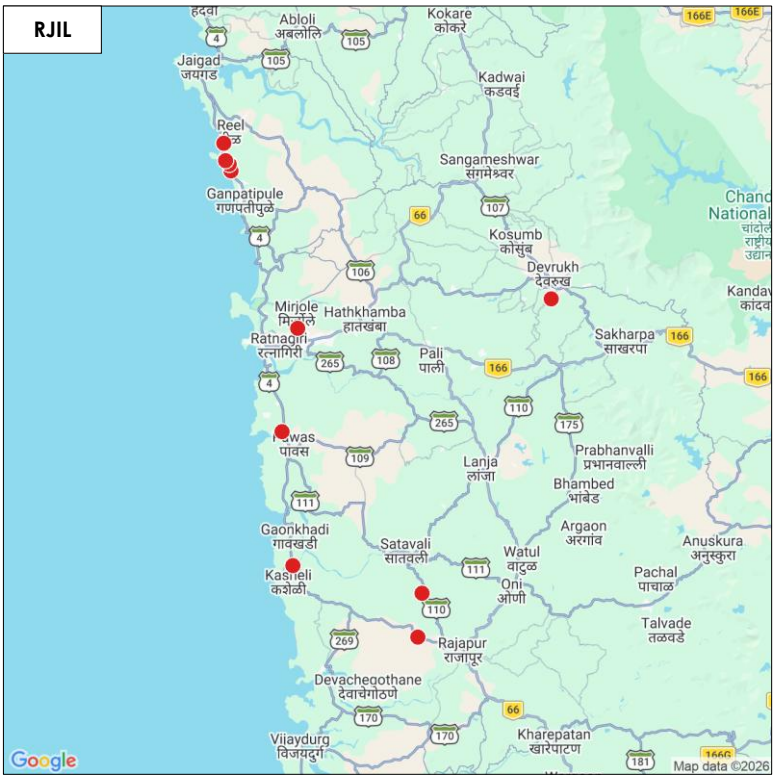


Figure-17: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

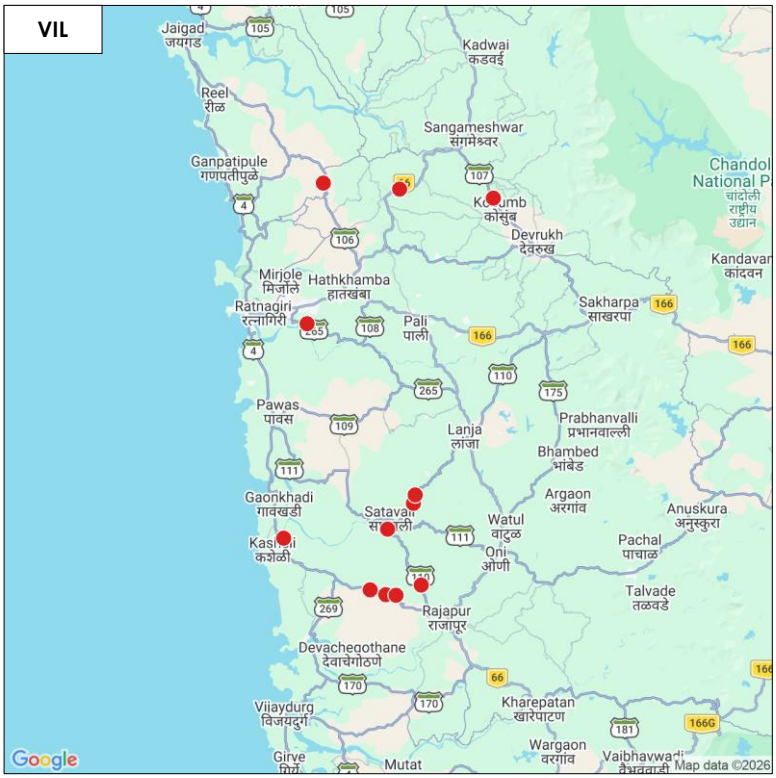


Figure-18: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - VIL.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G – Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	282	310	355	306
Number of silences call for >4 Sec	12	9	15	4
Silence Call Rate %	4.26	2.90	4.23	1.31
Number of silence instances for >4 Sec	14	10	16	4
Number of silence instances for >3 Sec	15	11	23	6
Number of silence instances for >2 sec	25	18	48	11
RTP Jitter (4G & 5G) in ms	7.00	4.36	15.26	9.36
Packet loss Rate Downlink %	4.86	4.58	4.77	2.36
Packet loss Rate Uplink %	3.46	5.34	3.68	2.10

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

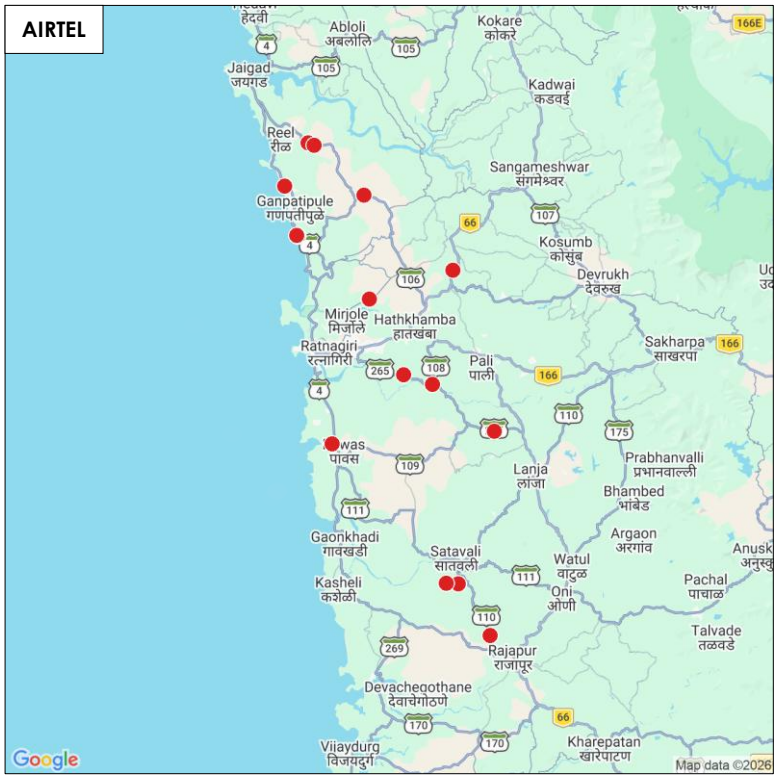


Figure-19: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode) - AIRTEL.

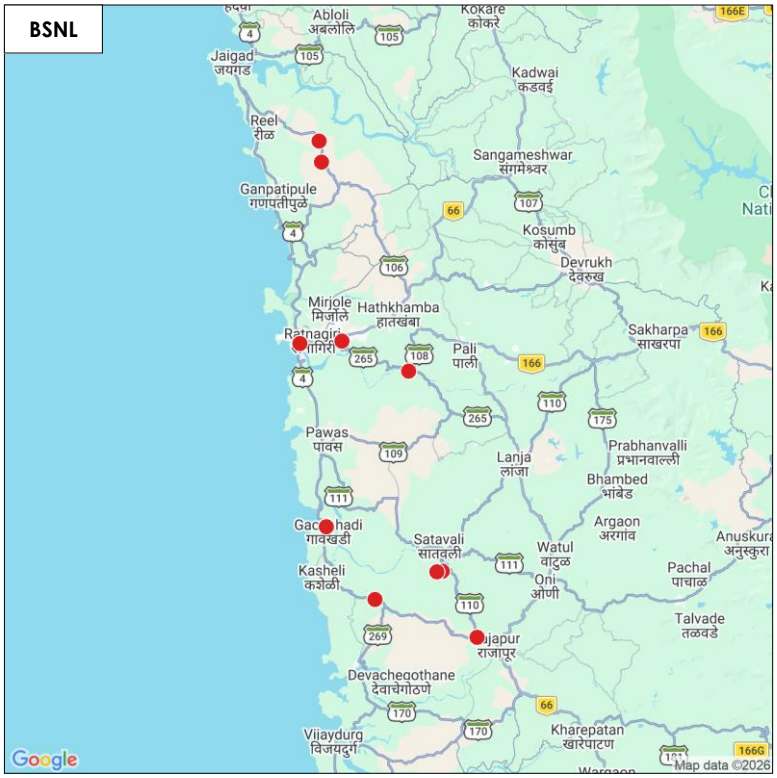


Figure-20: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode) - BSNL.

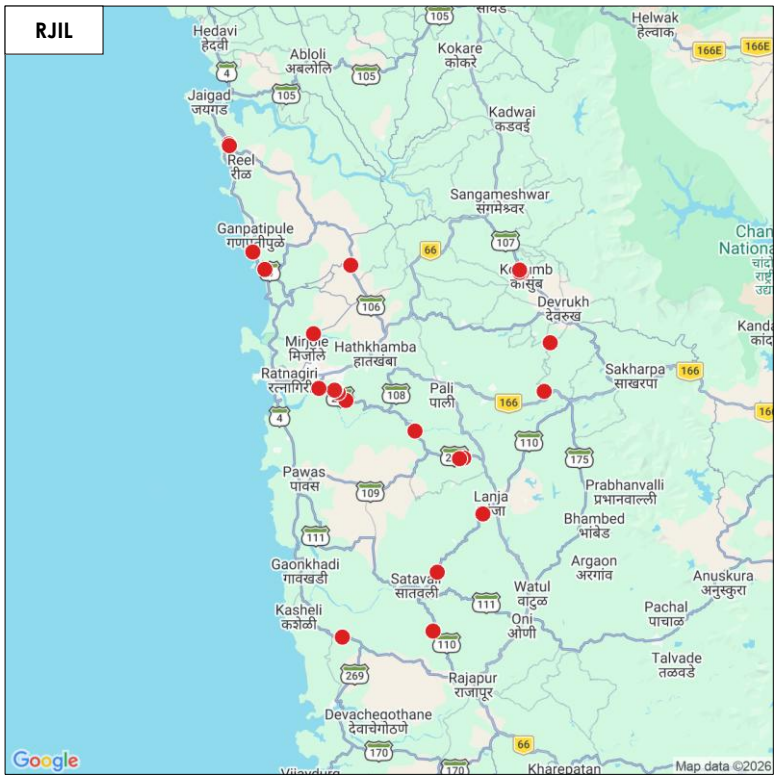


Figure-21: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode) - RJIL.



Figure-22: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode) - VIL.

(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	1630	1703	2196	1942
Speech Quality (Average MOS)	3.82	2.83	4.24	3.86
Number of samples with MOS >=4 to <5 (Excellent)	1190	379	1766	1308
Number of samples with MOS >=3 to <4 (Good)	297	314	187	486
Number of samples with MOS >=2 to <3 (Fair)	43	626	91	77
Number of samples with MOS >=1 to <2 (Poor)	100	384	152	71
%age of samples with MOS >=4 to <5 (Excellent)	73.01%	22.25%	80.42%	67.35%
%age of samples with MOS >=3 to <4 (Good)	18.22%	18.44%	8.52%	25.03%
%age of samples with MOS >=2 to <3 (Fair)	2.64%	36.76%	4.14%	3.96%
%age of samples with MOS >=1 to <2 (Poor)	6.13%	22.55%	6.92%	3.66%

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

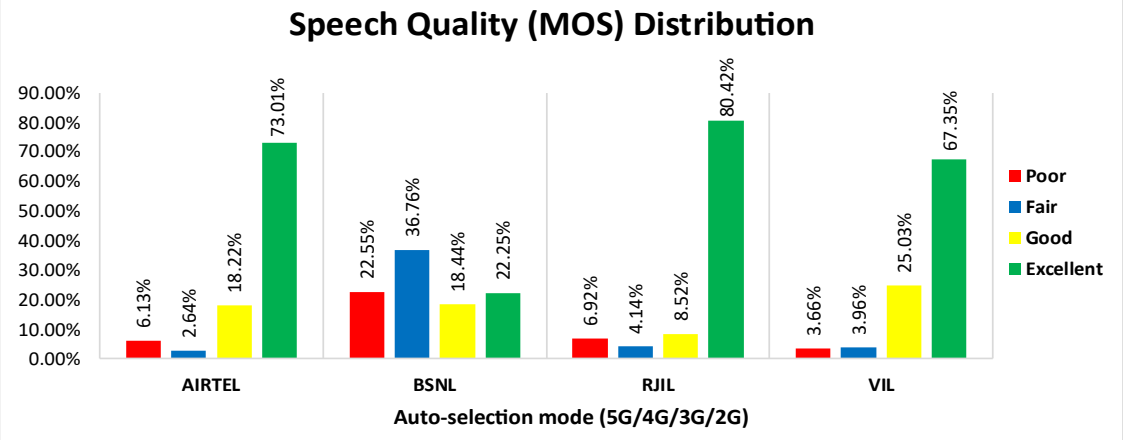


Figure-23: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	2.90%	NA	42.33%	0.96%
4G	79.53%	56.16%	55.05%	77.49%
3G	NA	25.31%	NA	NA
2G	3.97%	15.12%	NA	10.61%
Limited Service	13.60%	3.40%	2.62%	10.95%

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

Note-

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



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



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



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



Figure-27: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-93, 94, 95 & 96 for map view)

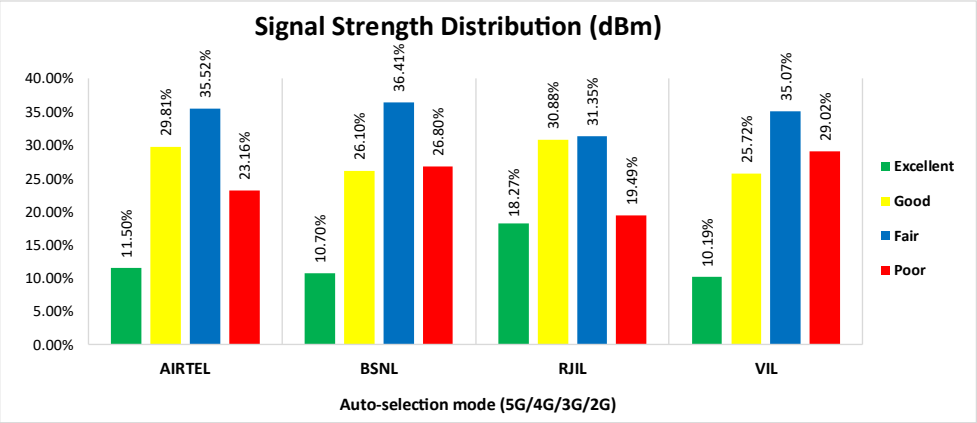


Figure-28: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 12% of samples falling in the excellent signal strength category.
- BSNL has 11% of samples falling in the excellent signal strength category.
- RJIL has 18% of samples falling in the excellent signal strength category.
- VIL has 10% of samples falling in the excellent signal strength category.

(h) Coverage Gap observed



Figure-29: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.



Figure-30: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - BSNL.



Figure-31: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - RJIL.



Figure-32: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - VIL.

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	113.81	4.42	134.77	38.93
	80th Percentile	219.34	6.93	304.66	69.42
	20th Percentile	7.51	0.45	3.26	6.32
Upload Throughput (Mbits/s)	Average	17.46	2.62	11.40	8.50
	80th Percentile	31.59	3.04	18.10	15.08
	20th Percentile	1.55	0.83	0.89	1.12
Latency (ms)	50th Percentile	33.37	44.77	37.67	29.15

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

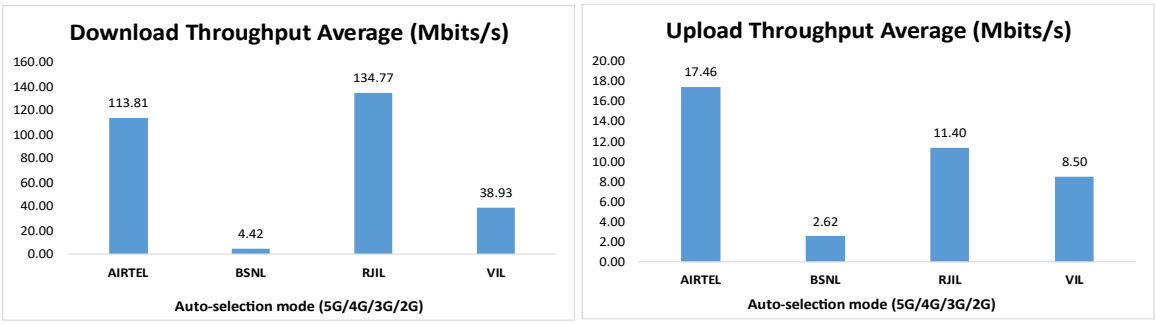


Figure- 33: Download & Upload throughput.

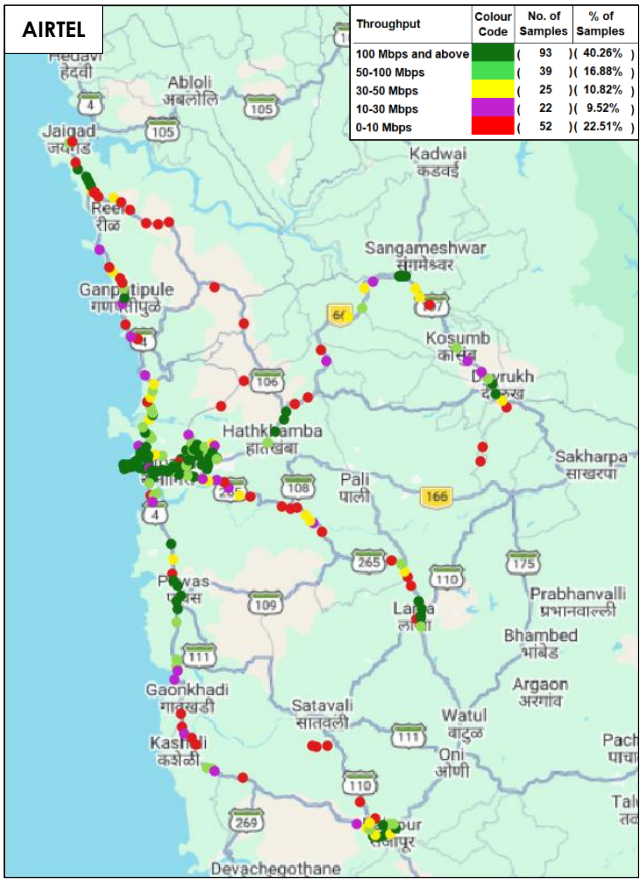


Figure-34: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

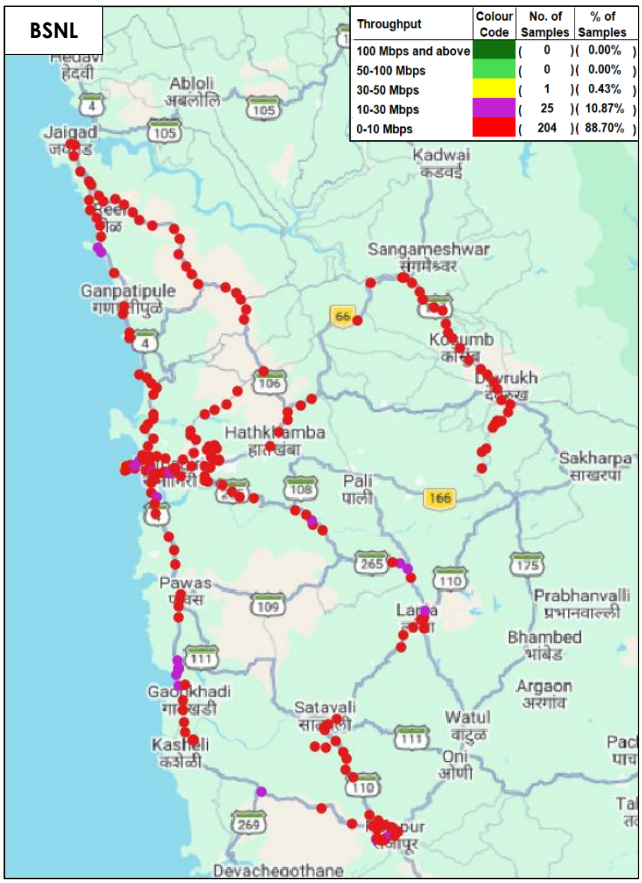


Figure-35: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - BSNL.

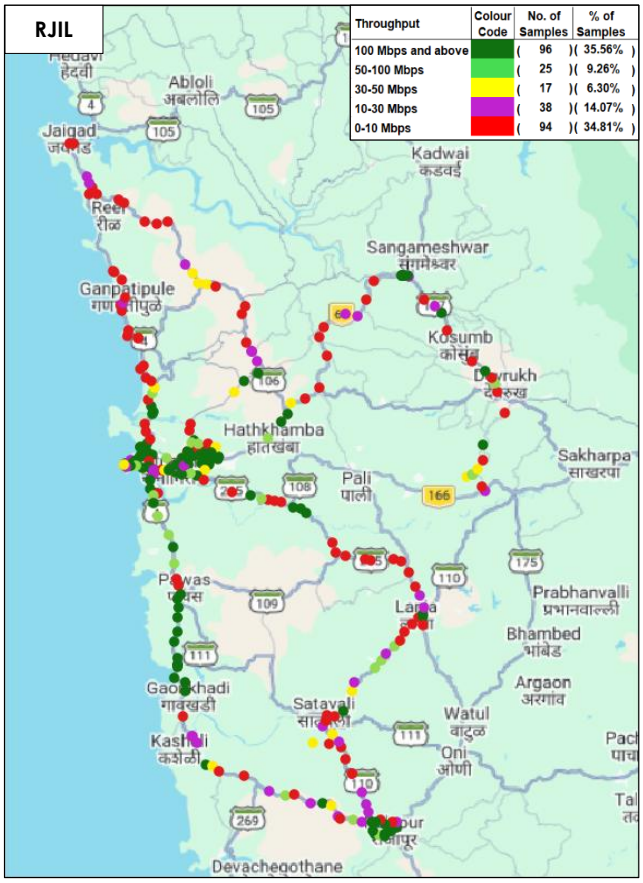


Figure-36: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

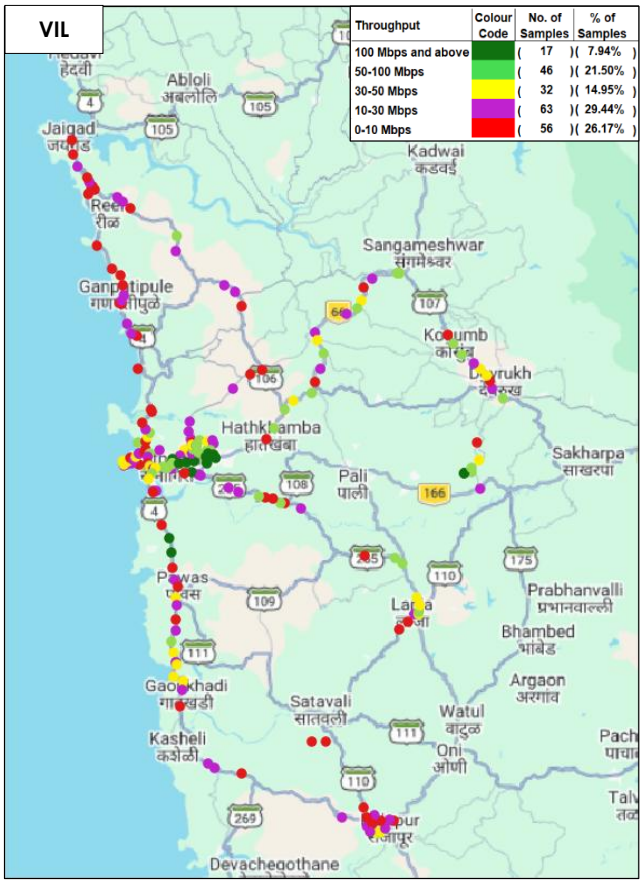


Figure-37: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.

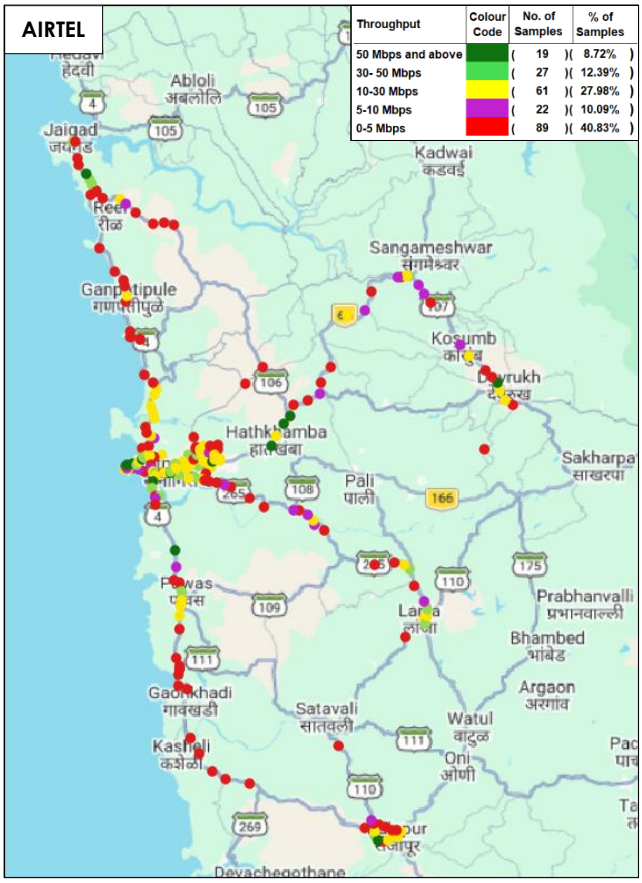


Figure-38: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

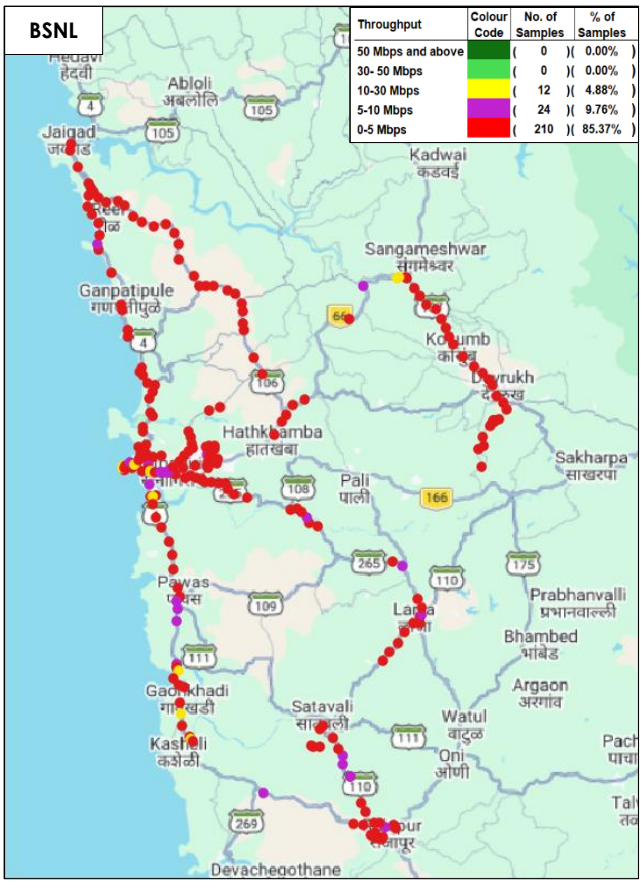


Figure-39: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - BSNL.

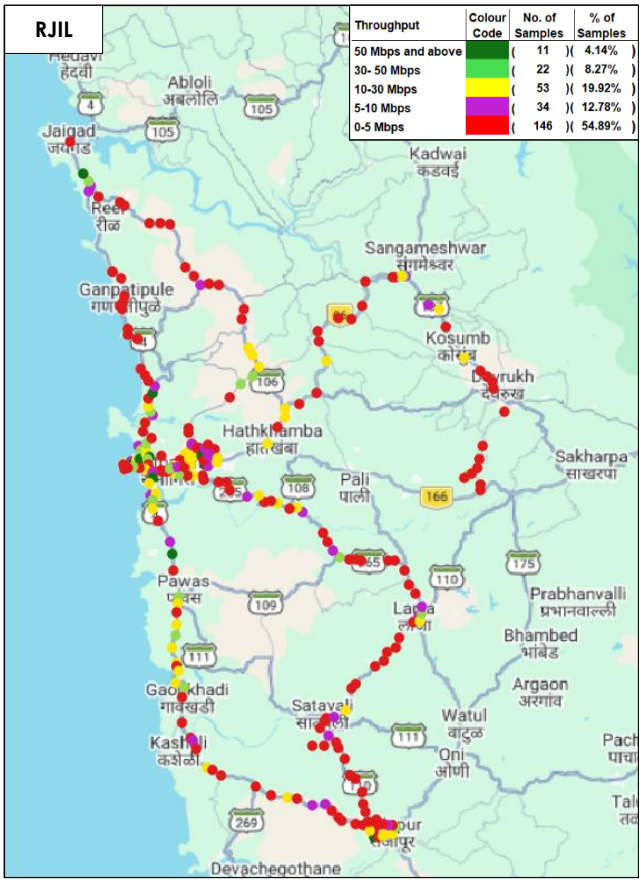


Figure-40: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

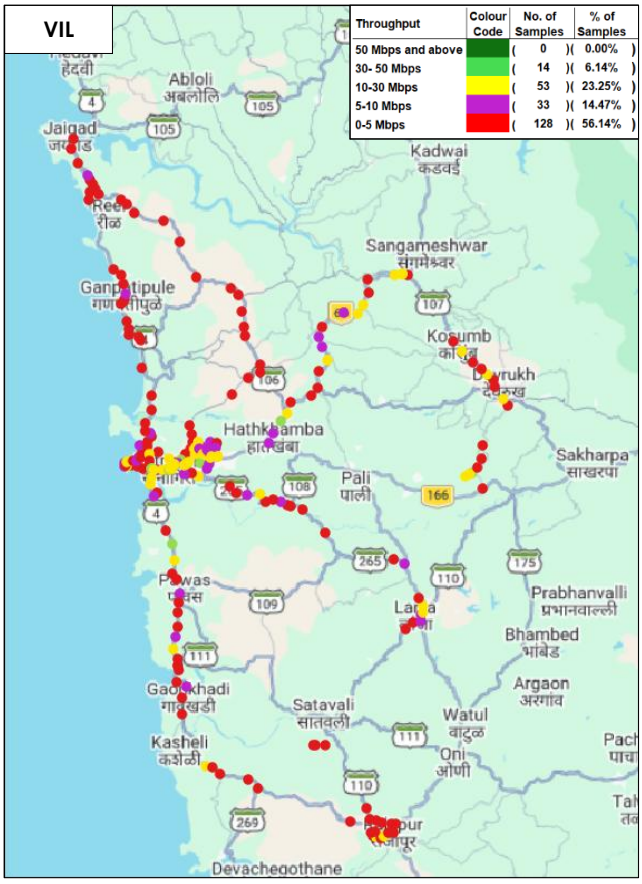


Figure-41: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.

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

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	36.78%	NA	45.75%	9.88%
4G	36.12%	47.15%	48.97%	64.43%
3G	NA	43.21%	NA	NA
2G	2.71%	2.96%	NA	4.39%
Limited Service	24.39%	6.69%	5.27%	21.31%

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

Note-

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

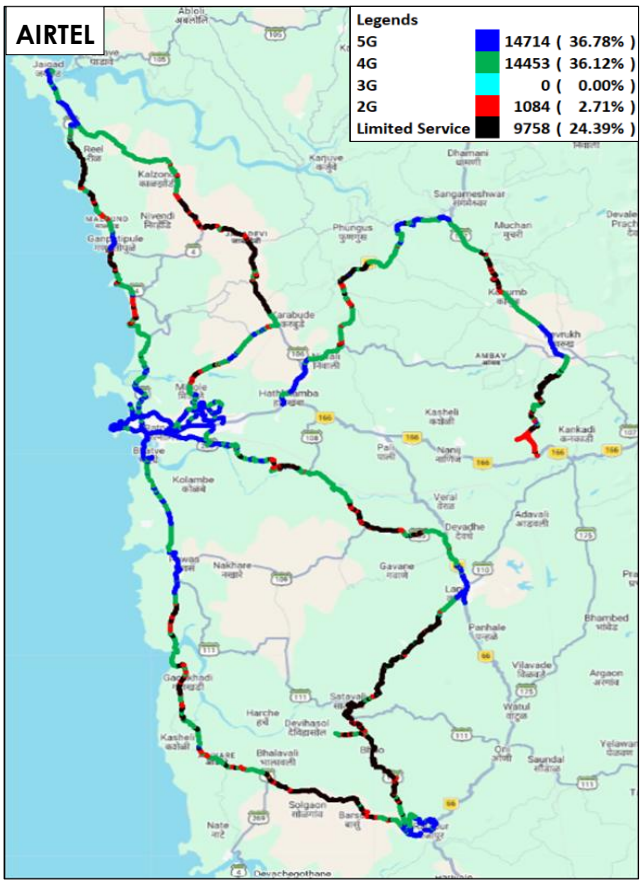


Figure-42: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - AIRTEL.



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



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



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

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-97, 98, 99 & 100 for map view)

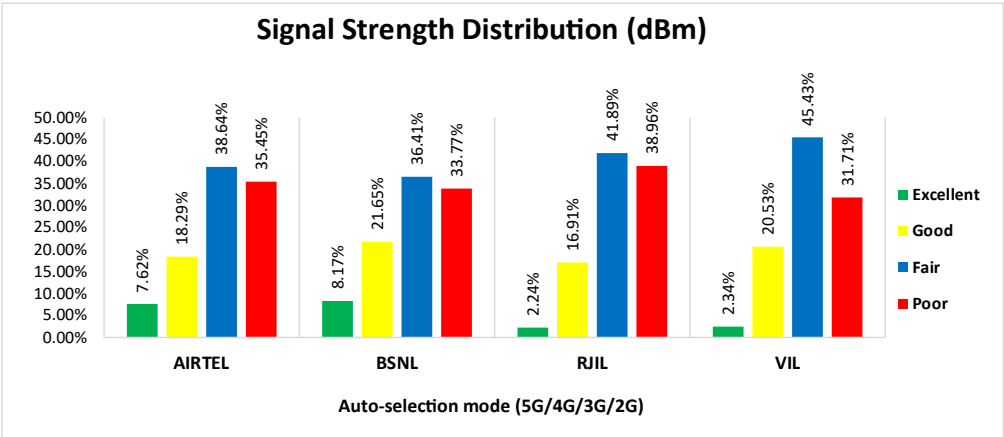


Figure-46: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 8% of samples falling in the excellent signal strength category.
- BSNL has 8% of samples falling in the excellent signal strength category.
- RJIL has 2% of samples falling in the excellent signal strength category.
- VIL has 2% of samples falling in the excellent signal strength category.

4.3 Hotspots

Hotspot testing has been done from 8th September 2026 to 11th September 2026. Eleven locations have been tested in the Ratnagiri District. (Refer Table-1)

4.3.1 Locations

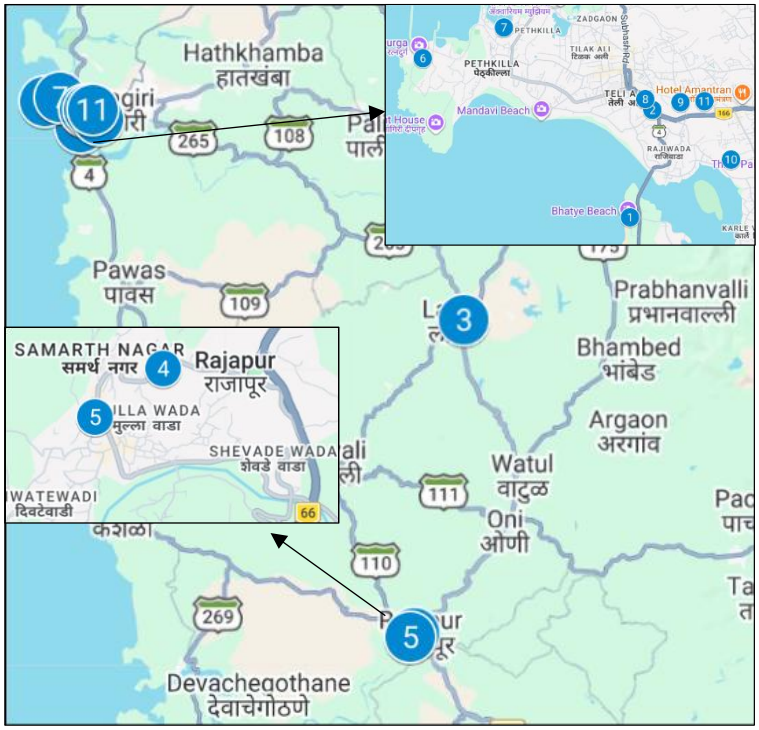


Figure- 47: Hotspot locations.

4.3.2 Hotspot covered

1. Bhatye Beach
2. District Collector Office Ratnagiri
3. Lanja St Bus Stand / Main Town Centre
4. Rajapur Government Hospital
5. Rajapur St Bus Stand
6. Ratnadurg Fort / Bhagwati Fort
7. Ratnagiri Fish Market and Fisherman Docking Station
8. Ratnagiri St Bus Stand
9. Superintendent of Police Office Ratnagiri
10. Thiba Point
11. Zilla Parishad Ratnagiri

4.3.3 Voice performance

Overall Voice Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	110	110	110	110
Call Setup Success Rate %	100.00	93.64	100.00	100.00
Drop Call Rate %	0.00	2.91	0.00	0.00
Call Setup Time-Average (Second)	0.50	1.51	0.65	0.87

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

Bhatye Beach				
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)	1.00	1.09	0.64	0.92

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

District Collector Office Ratnagiri				
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)	0.59	1.00	0.47	0.76

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

Lanja St Bus Stand / Main Town Centre				
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)	0.42	1.41	0.55	0.88

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

Rajapur Government Hospital				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.52	1.02	0.49	0.86

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

Rajapur St 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)	0.45	1.03	0.54	0.98

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

Ratnadurg Fort / Bhagwati Fort				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	30.00	100.00	100.00
Drop Call Rate %	0.00	33.33	0.00	0.00
Call Setup Time-Average (Second)	0.36	7.58	0.59	0.86

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

Ratnagiri Fish Market and Fisherman Docking 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)	0.45	1.03	1.41	0.98

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

Ratnagiri St 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)	0.56	2.84	0.48	0.84

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

Superintendent of Police Office Ratnagiri				
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)	0.30	1.16	0.63	0.86

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

Thiba Point				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	20.00	0.00	0.00
Call Setup Time-Average (Second)	0.44	1.61	0.53	0.84

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

Zilla Parishad Ratnagiri				
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)	0.44	1.11	0.76	0.74

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)	182.51	6.03	147.12	37.96
Download Throughput 80th Percentile (Mbit/s)	310.96	9.91	274.90	60.73
Download Throughput 20th Percentile (Mbit/s)	15.57	1.84	6.99	16.08
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	18.95	6.56	12.89	14.86
Upload Throughput 80th Percentile (Mbit/s)	33.41	11.14	27.97	29.76
Upload Throughput 20th Percentile (Mbit/s)	4.01	1.64	1.66	3.04
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.41	5.42	5.42	5.44
Youtube Initial Buffer Delay (Second)	1.49	2.03	1.71	1.76
Latency (ms) – 50th Percentile	27.61	38.00	38.61	27.37
Jitter (ms)	54.52	19.43	46.87	12.13
Packet Loss Rate%	15.36	8.49	8.58	2.09
Packet Loss Rate- 90th percentile	66.34	16.02	16.94	2.34

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

Bhatye Beach				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	136.96	13.94	199.79	51.72
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	8.04	20.83	10.56	17.57
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.40	3.61	4.29	4.61
Youtube Initial Buffer Delay (Second)	0.75	0.87	0.79	0.83
Latency (ms) – 50th Percentile	25.31	35.22	36.10	29.39
Jitter (ms)	9.76	2.40	5.48	8.24
Packet Loss Rate%	0.40	0.10	6.50	0.40

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

District Collector Office Ratnagiri				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	3.97	7.90	6.92	43.87
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	29.26	10.14	1.40	32.81
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	9.90	3.04	10.47	6.48
Youtube Initial Buffer Delay (Second)	2.22	1.44	-	0.70
Latency (ms) – 50th Percentile	127.36	35.99	77.46	20.80
Jitter (ms)	114.50	2.78	41.90	11.61
Packet Loss Rate%	70.30	20.10	27.10	0.20

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

Note- "-" Youtube tests were failed.

Lanja St Bus Stand / Main Town Centre				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	242.43	12.68	351.98	65.14
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	37.95	6.42	44.70	36.33
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.17	5.27	4.03	6.47
Youtube Initial Buffer Delay (Second)	0.75	1.25	0.77	0.65
Latency (ms) – 50th Percentile	25.72	35.77	31.54	18.97
Jitter (ms)	274.32	47.95	3.12	28.83
Packet Loss Rate%	0.30	1.20	1.20	0.20

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

Rajapur Government Hospital				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	392.43	8.07	486.76	65.34
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	29.63	2.73	28.36	6.06
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.13	8.18	4.17	5.71
Youtube Initial Buffer Delay (Second)	0.77	1.26	0.72	0.85
Latency (ms) – 50th Percentile	22.95	39.47	32.16	26.57
Jitter (ms)	2.05	4.78	3.29	5.68
Packet Loss Rate%	0.10	0.20	0.00	0.10

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

Rajapur St Bus Stand				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	244.87	3.50	241.94	22.50
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	28.58	2.64	29.02	2.90
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.48	3.49	4.21	4.78
Youtube Initial Buffer Delay (Second)	0.81	3.60	0.94	1.09
Latency (ms)- 50th Percentile	23.23	32.77	34.86	28.94
Jitter (ms)	4.16	2.87	3.84	7.92
Packet Loss Rate%	0.60	0.30	0.10	5.50

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

Ratnadurg Fort / Bhagwati Fort				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	586.25	3.62	16.22	9.43
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	46.38	5.99	6.55	7.29
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	5.31	8.21	6.69	5.51
Youtube Initial Buffer Delay (Second)	2.53	0.92	5.91	8.24
Latency (ms) – 50th Percentile	21.94	-	45.56	23.96
Jitter (ms)	2.16	-	42.17	3.70
Packet Loss Rate%	0.10	51.20	3.00	12.00

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

Note- "-" Ping tests were failed.

Ratnagiri Fish Market and Fisherman Docking Station				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	53.89	5.77	58.14	6.43
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	5.02	15.03	5.70	3.81
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.46	4.60	6.00	4.06
Youtube Initial Buffer Delay (Second)	1.51	1.77	2.10	6.38
Latency (ms)- 50th Percentile	30.31	45.64	500.11	32.05
Jitter (ms)	14.19	4.42	23.42	17.10
Packet Loss Rate%	0.60	3.20	29.00	1.10

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

Ratnagiri St Bus Stand				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	143.91	5.64	4.70	39.93
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	14.74	1.75	1.34	28.82
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.26	5.37	14.54	6.53
Youtube Initial Buffer Delay (Second)	1.95	4.00	-	1.04
Latency (ms) – 50th Percentile	26.44	35.55	65.14	39.43
Jitter (ms)	89.61	13.59	68.15	5.74
Packet Loss Rate%	2.60	0.30	9.40	0.10

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

Note- "-" Youtube tests were failed.

Superintendent of Police Office Ratnagiri				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	9.12	1.72	51.29	48.29
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.95	2.32	3.43	14.22
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	10.36	5.23	4.89	4.77
Youtube Initial Buffer Delay (Second)	-	3.27	1.50	0.71
Latency (ms) – 50th Percentile	90.74	63.23	39.48	21.95
Jitter (ms)	42.27	25.01	63.53	17.68
Packet Loss Rate%	62.30	10.90	16.70	0.40

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

Note- "-" Youtube tests were failed.

Thiba Point				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	78.85	1.76	194.44	29.49
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	5.28	2.15	8.36	10.90
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	6.37	4.67	4.23	5.99
Youtube Initial Buffer Delay (Second)	2.79	9.29	0.91	1.03
Latency (ms) – 50th Percentile	44.83	35.30	34.81	33.62
Jitter (ms)	9.21	50.55	2.74	15.35
Packet Loss Rate%	0.50	1.10	0.00	1.20

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

Zilla Parishad Ratnagiri				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	114.88	2.10	6.16	35.48
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.63	2.20	2.39	2.74
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	13.36	7.59	3.55	4.53
Youtube Initial Buffer Delay (Second)	-	2.47	1.68	3.07
Latency (ms) – 50th Percentile	75.41	59.86	54.12	27.69
Jitter (ms)	40.86	39.91	259.04	11.54
Packet Loss Rate%	31.20	4.80	1.40	1.80

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

Note- "-" Youtube tests were failed.

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)	161.40	-	166.04	30.78
	Upload Throughput Average (Mbits/s)	26.96	-	14.65	15.78
4G	Download Throughput Average (Mbits/s)	35.97	7.57	26.24	29.74
	Upload Throughput Average (Mbits/s)	4.88	8.70	7.64	10.59

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

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

Bhatye Beach					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	151.31	-	199.97	56.39
	Upload Throughput Average (Mbits/s)	8.81	-	14.01	15.81
4G	Download Throughput Average (Mbits/s)	35.58	9.85	36.65	54.12
	Upload Throughput Average (Mbits/s)	5.02	24.41	18.12	16.02

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

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

District Collector Office Ratnagiri					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	3.14	-	18.13	-
	Upload Throughput Average (Mbits/s)	13.79	-	1.44	-
4G	Download Throughput Average (Mbits/s)	1.44	7.00	2.94	20.00
	Upload Throughput Average (Mbits/s)	3.02	11.19	1.32	5.41

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

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

Lanja St Bus Stand / Main Town Centre					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	205.99	-	258.63	-
	Upload Throughput Average (Mbits/s)	66.17	-	18.28	-
4G	Download Throughput Average (Mbits/s)	52.10	14.81	17.94	32.14
	Upload Throughput Average (Mbits/s)	5.27	11.23	8.96	21.14

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

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

Rajapur Government Hospital					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	283.09	-	522.91	-
	Upload Throughput Average (Mbits/s)	45.35	-	44.34	-
4G	Download Throughput Average (Mbits/s)	77.30	10.79	61.59	19.34
	Upload Throughput Average (Mbits/s)	4.28	3.78	14.24	5.61

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

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

Rajapur St Bus Stand					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	297.80	-	294.40	-
	Upload Throughput Average (Mbits/s)	39.07	-	39.13	-
4G	Download Throughput Average (Mbits/s)	90.52	2.50	33.75	38.38
	Upload Throughput Average (Mbits/s)	10.43	4.37	8.06	4.94

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

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

Ratnadurg Fort / Bhagwati Fort					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	508.10	-	1.96	-
	Upload Throughput Average (Mbits/s)	88.98	-	3.64	-
4G	Download Throughput Average (Mbits/s)	32.15	17.98	86.26	27.88
	Upload Throughput Average (Mbits/s)	8.62	5.58	21.47	12.90

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

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

Ratnagiri Fish Market and Fisherman Docking Station					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	44.67	-	64.29	-
	Upload Throughput Average (Mbits/s)	11.88	-	12.33	-
4G	Download Throughput Average (Mbits/s)	14.87	6.14	2.67	4.69
	Upload Throughput Average (Mbits/s)	5.30	6.63	0.49	1.28

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

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

Ratnagiri St Bus Stand					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	25.29	-	25.65	-
	Upload Throughput Average (Mbits/s)	9.25	-	2.07	-
4G	Download Throughput Average (Mbits/s)	24.97	15.33	7.53	34.19
	Upload Throughput Average (Mbits/s)	3.00	20.51	3.29	15.13

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

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

Superintendent of Police Office Ratnagiri					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	62.16	19.16
	Upload Throughput Average (Mbits/s)	3.09	-	1.55	23.69
4G	Download Throughput Average (Mbits/s)	20.66	1.01	27.93	32.58
	Upload Throughput Average (Mbits/s)	3.01	2.06	5.13	16.98

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

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

Thiba Point					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	102.67	-	308.91	29.49
	Upload Throughput Average (Mbits/s)	3.43	-	20.30	14.33
4G	Download Throughput Average (Mbits/s)	19.53	0.30	6.07	34.47
	Upload Throughput Average (Mbits/s)	2.60	2.95	1.99	9.26

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

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

Zilla Parishad Ratnagiri					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	225.37	-	5.07	27.48
	Upload Throughput Average (Mbits/s)	5.05	-	1.38	9.80
4G	Download Throughput Average (Mbits/s)	23.53	2.28	5.34	25.35
	Upload Throughput Average (Mbits/s)	2.72	1.76	0.96	7.84

Table-56: 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 8th September 2026 and 11th September 2026. Four locations have been tested in Ratnagiri District. (Refer Table-1)

4.4.1 Walk test locations



Figure-48: Walk Test locations.

4.4.2 Walk Test Covered

1. Ganpatipule Beach
2. Rajapur Market Area
3. Ratnagiri Main Market
4. Ratnagiri Railway Station

4.4.3 Voice Performance

Ganpatipule Beach				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	18	23	23	22
Call Setup Success Rate %	100.00	86.96	100.00	100.00
Drop Call Rate %	0.00	0.00	4.35	0.00
Call Setup Time-Average (Second)	0.78	1.92	0.66	0.83

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

Rajapur Market Area				
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	92.86	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	0.60	1.09	0.56	0.86

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

Ratnagiri Main Market				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	17	20	17	17
Call Setup Success Rate %	100.00	75.00	100.00	100.00
Drop Call Rate %	0.00	33.33	0.00	0.00
Call Setup Time-Average (Second)	0.43	1.23	0.61	1.02

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

Ratnagiri Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	15	16	15	15
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	25.00	0.00	0.00
Call Setup Time-Average (Second)	0.42	1.47	0.56	0.95

Table-60: 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)

Ganpatipule Beach				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	162.41	-	1.75	25.95
Download Session Setup Success Rate %	77.78	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	6.75	-	1.60	9.49
Upload Session Setup Success Rate %	83.33	0.00	100.00	100.00
Latency (ms) – 50th Percentile	41.86	-	53.95	25.77

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

Note- "-" DL, UL and Ping tests were failed.

Rajapur Market Area				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	317.10	5.12	202.32	41.87
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	35.60	6.93	24.81	15.45
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms) – 50th Percentile	26.48	38.15	36.20	26.77

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

Ratnagiri Main Market				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	138.37	3.94	75.01	36.19
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	28.11	7.99	8.60	14.40
Upload Session Setup Success Rate %	100.00	91.67	100.00	100.00
Latency (ms) – 50th Percentile	24.68	40.01	45.35	39.99

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

Ratnagiri Railway Station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	151.21	2.57	166.32	151.07
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	44.35	5.48	39.53	54.09
Upload Session Setup Success Rate %	100.00	91.67	100.00	100.00
Latency (ms) – 50th Percentile	24.70	33.95	37.47	20.26

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

4.5 Highway

Drive test has been conducted on 10th September 2026 covering one highway route. (Refer Table-1)

4.5.1 Drive test route

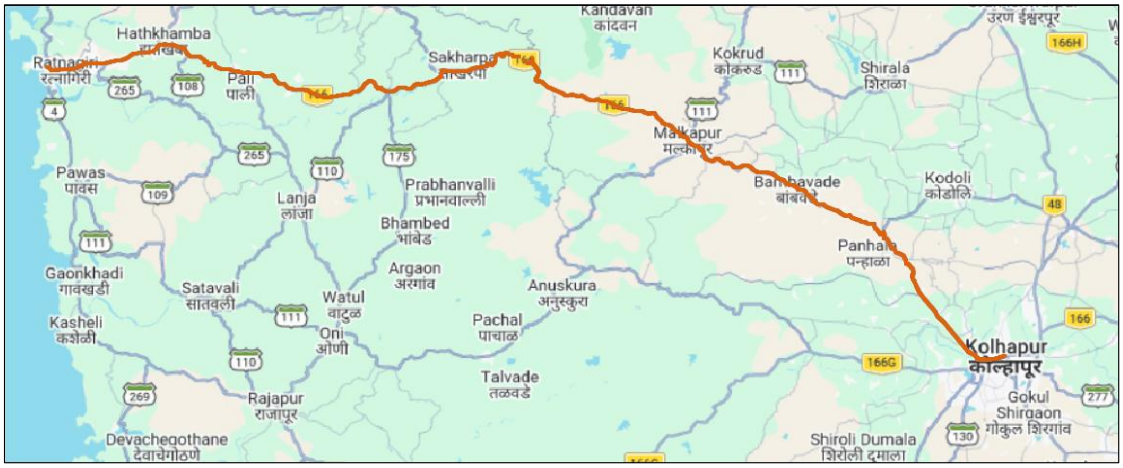


Figure-49: Drive test route Highway.

4.5.2 Routes Covered

Teli Aali, Karwanchiwadi, Nanij, Kondgaon, Amba, Malkapur, Bambavade and Kerle 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	113	77	64
Call Setup Success Rate %	83.19	74.03	96.88
Drop Call Rate %	1.06	22.81	8.06
Call Setup Time-Average (Second)	5.14	2.95	3.12
Handover Success Rate %	99.12	100.00	95.85

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

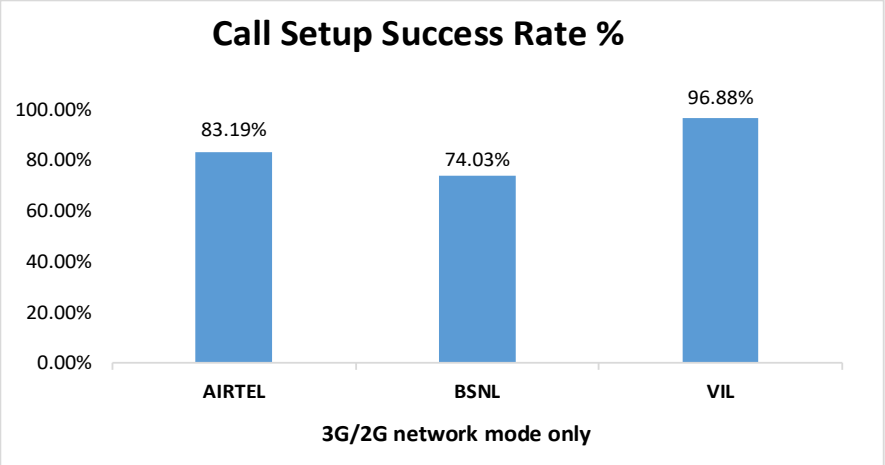


Figure-50: Performance for call setup success rate.

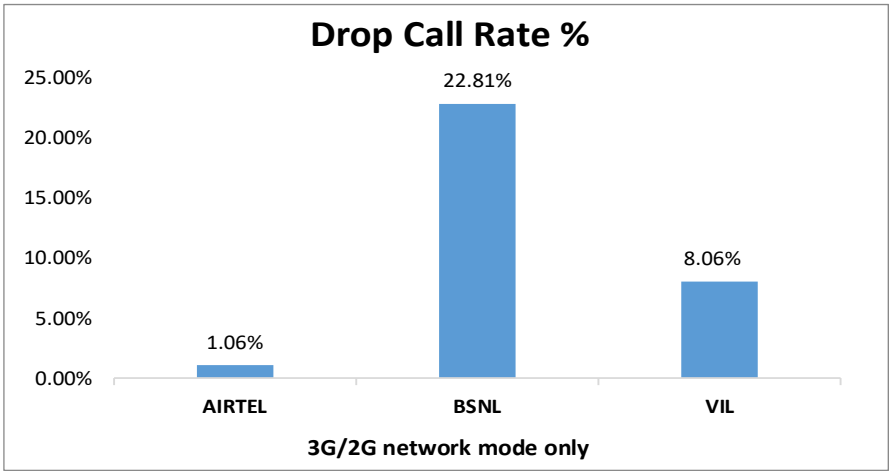


Figure-51: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	**BSNL**	**VIL**
3G	NA	88.42%	NA
2G	98.89%	8.95%	98.11%
Limited Service	1.11%	2.64%	1.89%

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

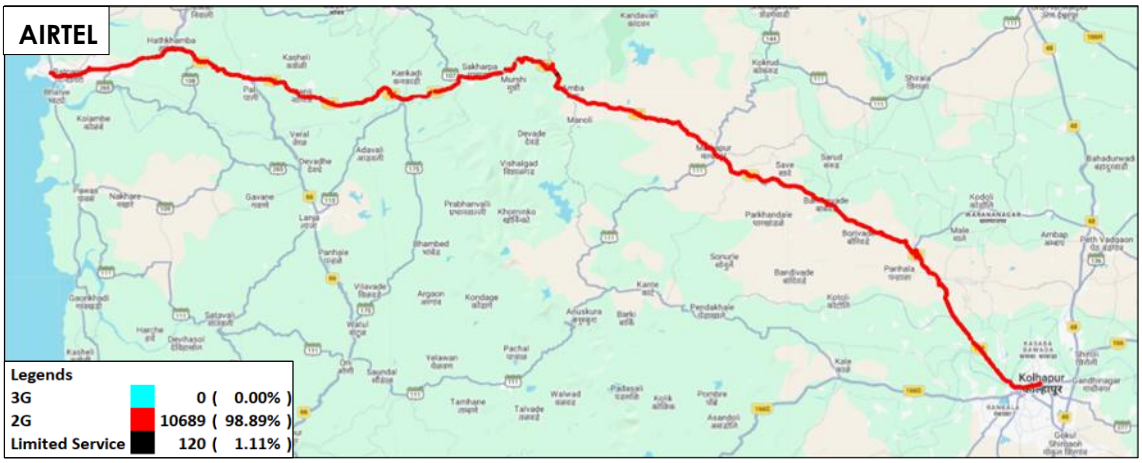


Figure-52: Serving technology plots 3G/2G network mode - AIRTEL.



Figure-53: Serving technology plots 3G/2G network mode - BSNL.

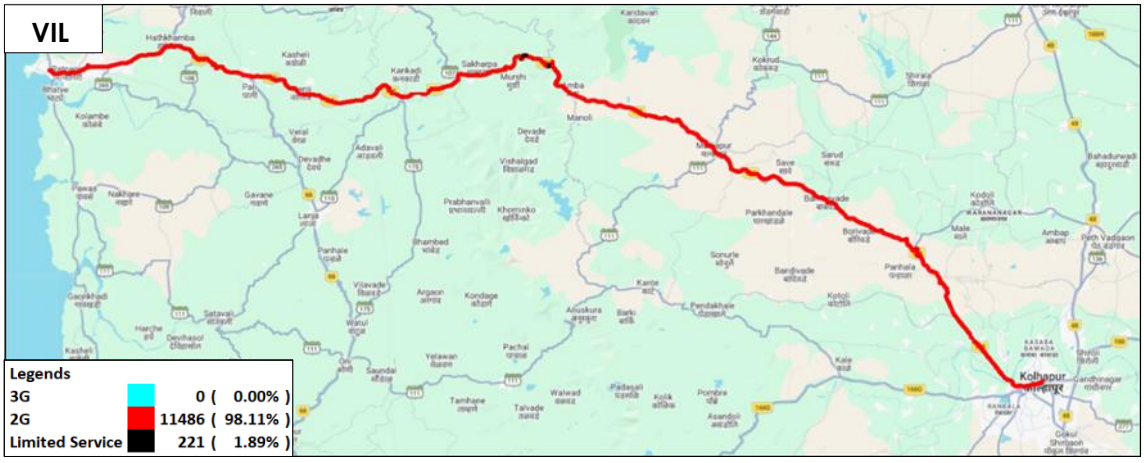


Figure-54: Serving technology plots 3G/2G network mode - VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure-101, 102 & 103 for map view)

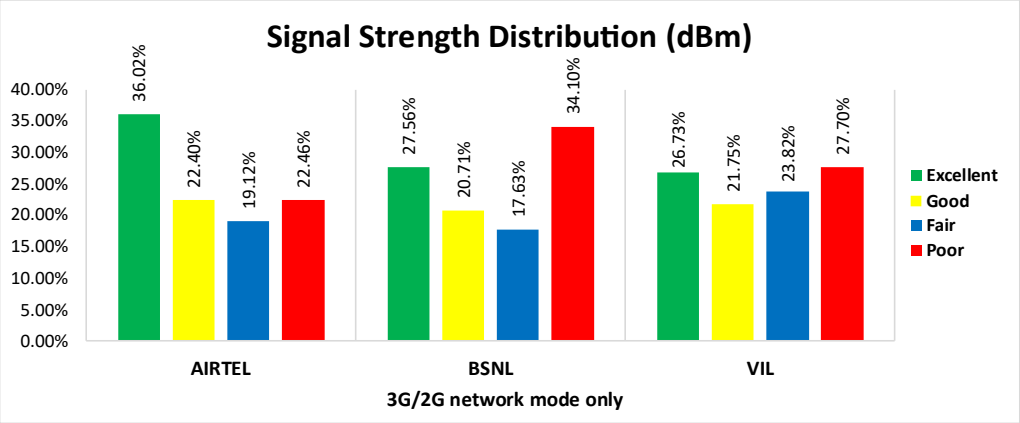


Figure-55: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 36% of samples falling in the excellent signal strength category.
- BSNL has 28% of samples falling in the excellent signal strength category.
- VIL has 27% 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	88	79	64	73
Call Setup Success Rate %	63.64	72.15	92.19	84.93
Drop Call Rate %	10.71	24.56	3.39	11.29
Call Setup Time Average (Second)	0.93	3.08	0.68	1.81
Handover Success Rate %	100.00	97.67	100.00	100.00

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

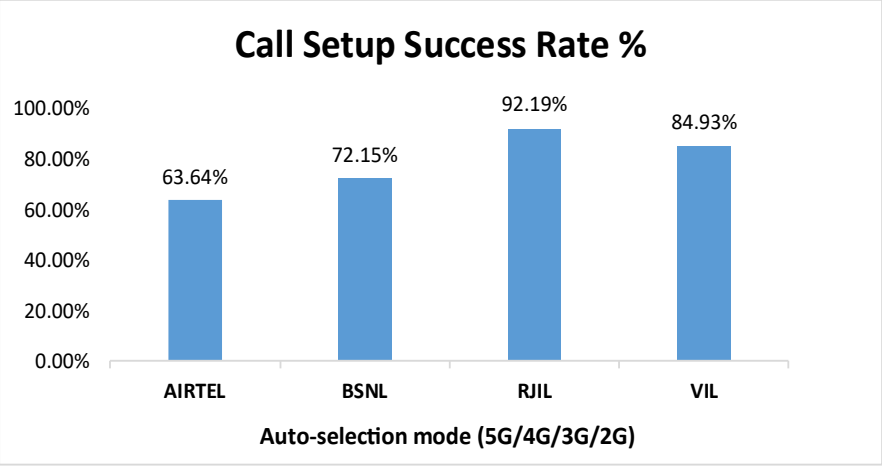


Figure-56: Performance for call setup success rate.

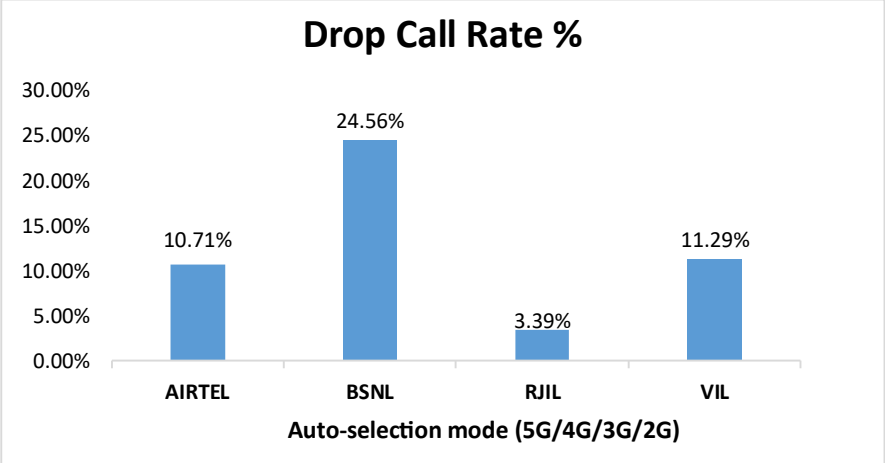


Figure-57: Performance for drop call rate.

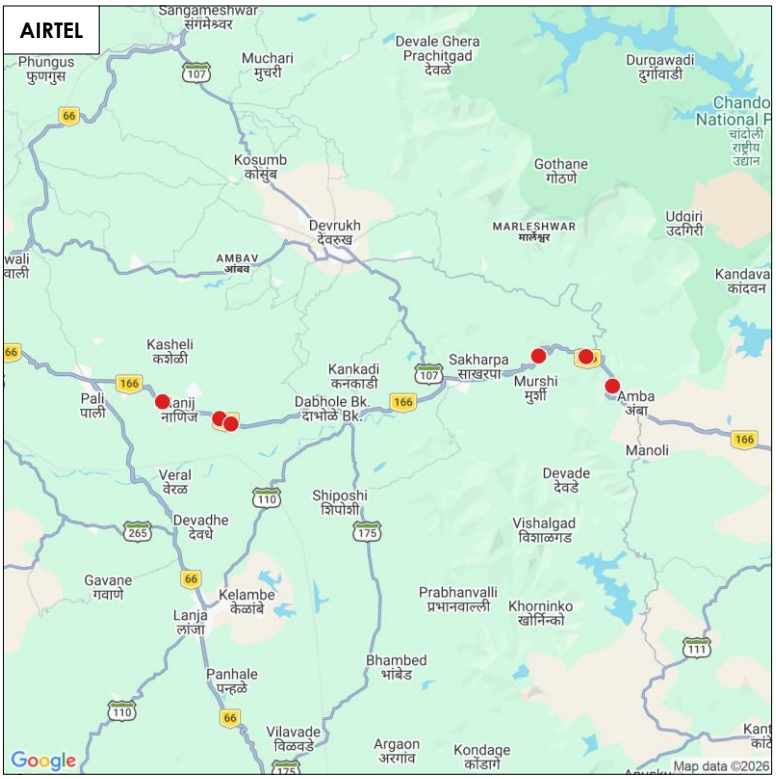


Figure-58: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

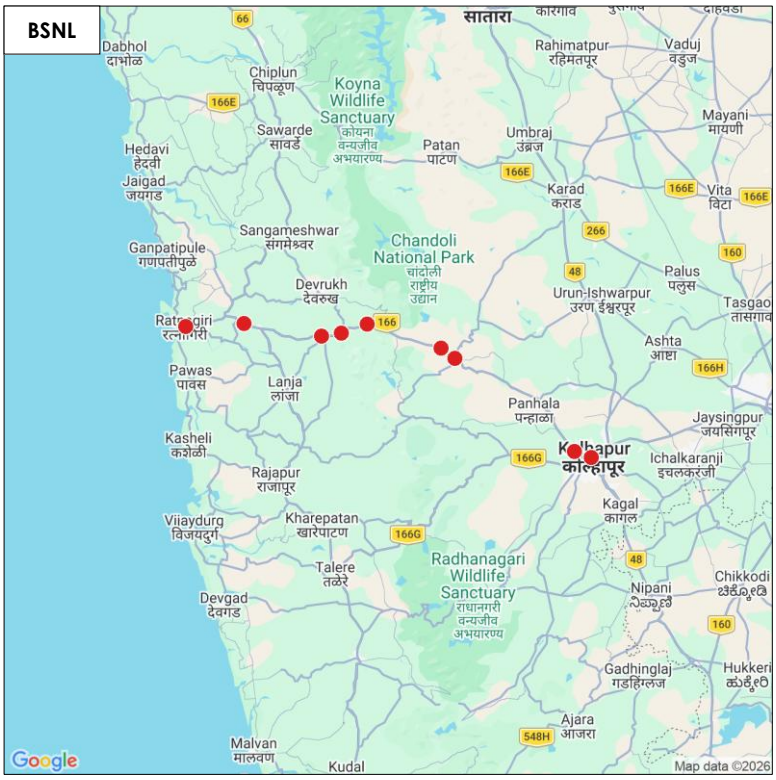


Figure-59: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

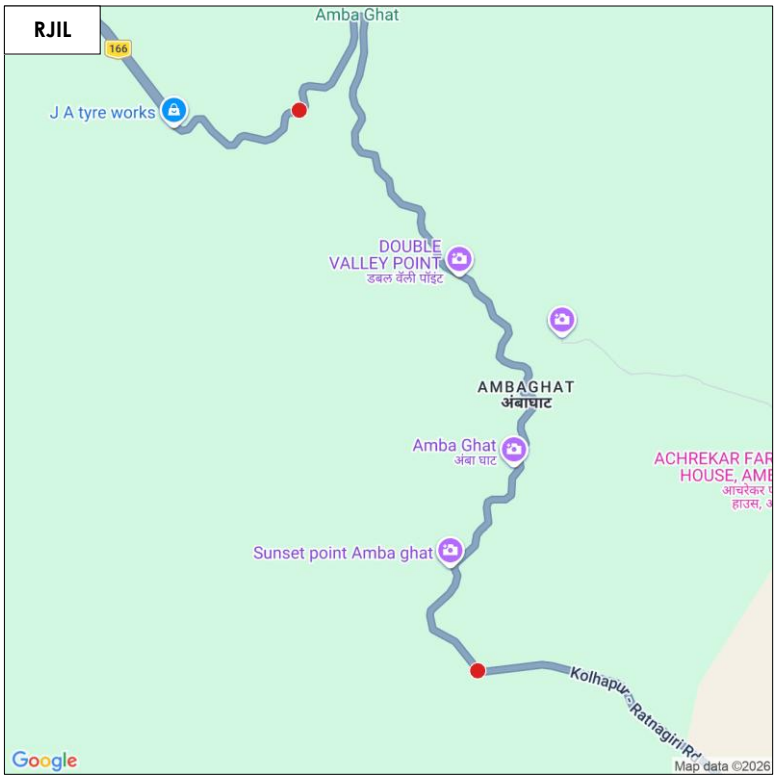


Figure-60: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

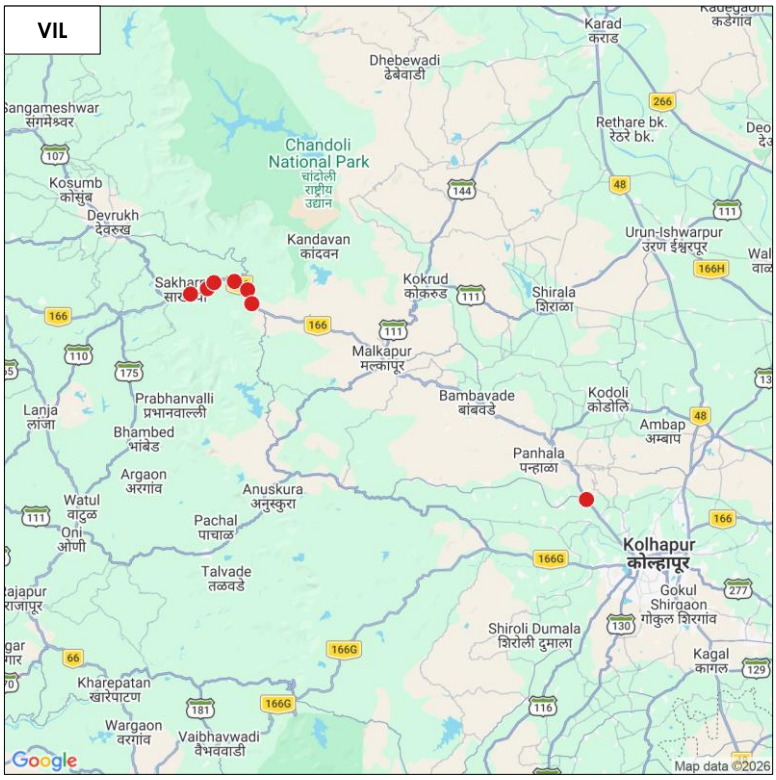


Figure-61: Drop call locations in auto-selection mode (5G/4G/3G/2G) voice - VIL.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G – Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	55	59	62	61
Number of silence call for >4 Sec	2	0	2	0
Silence Call Rate %	3.64	0.00	3.23	0.00
Number of silence instances for >4 Sec	2	0	6	0
Number of silence instances for >3 Sec	3	1	6	1
Number of silence instances for >2 sec	5	3	11	2
RTP Jitter (4G & 5G) in ms	5.73	4.15	14.38	8.79
Packet loss Rate Downlink %	3.96	2.48	1.07	1.97
Packet loss Rate Uplink %	2.27	3.26	2.03	1.01

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

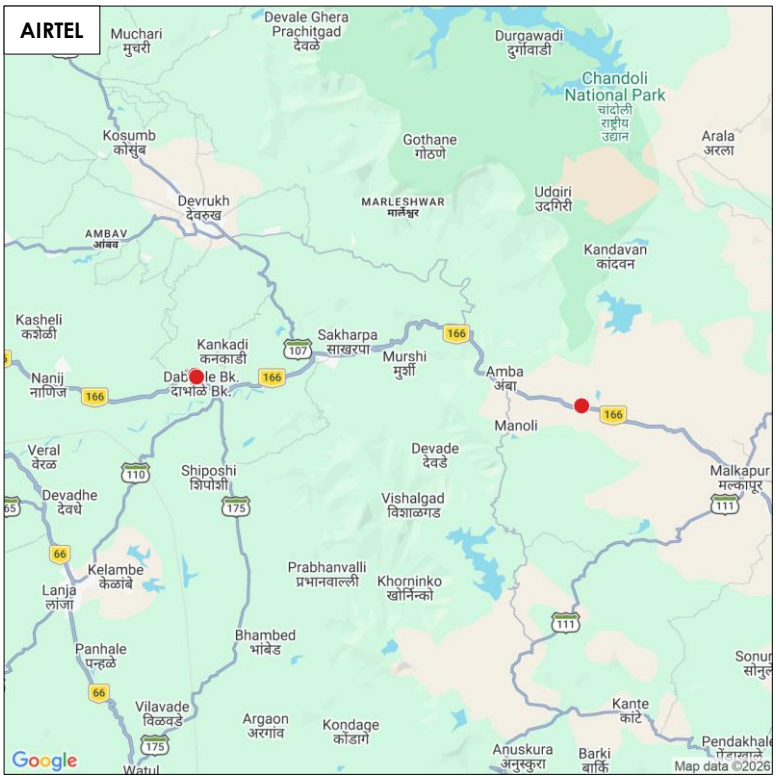


Figure-62: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-AIRTEL.

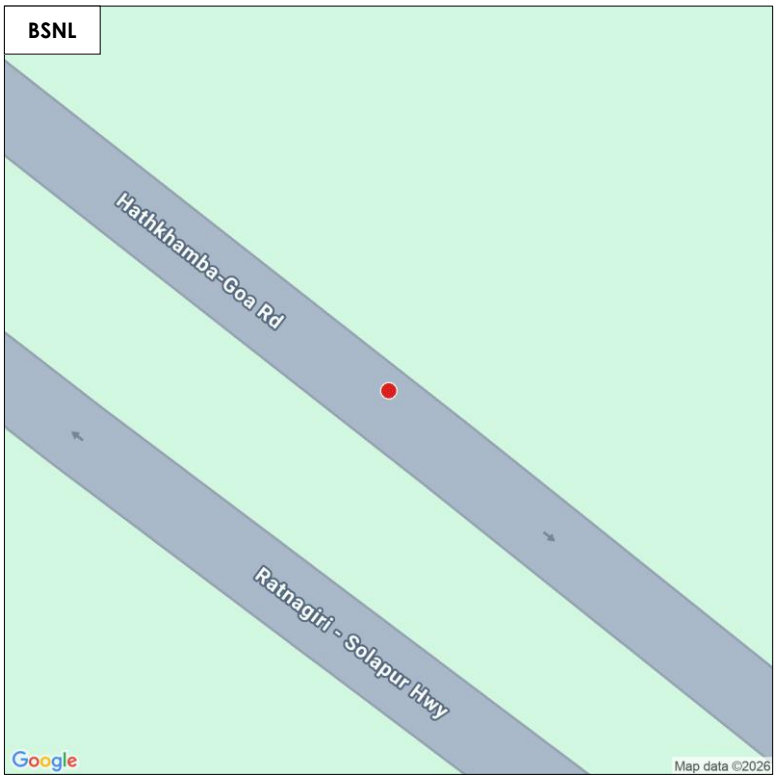


Figure-63: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-BSNL.

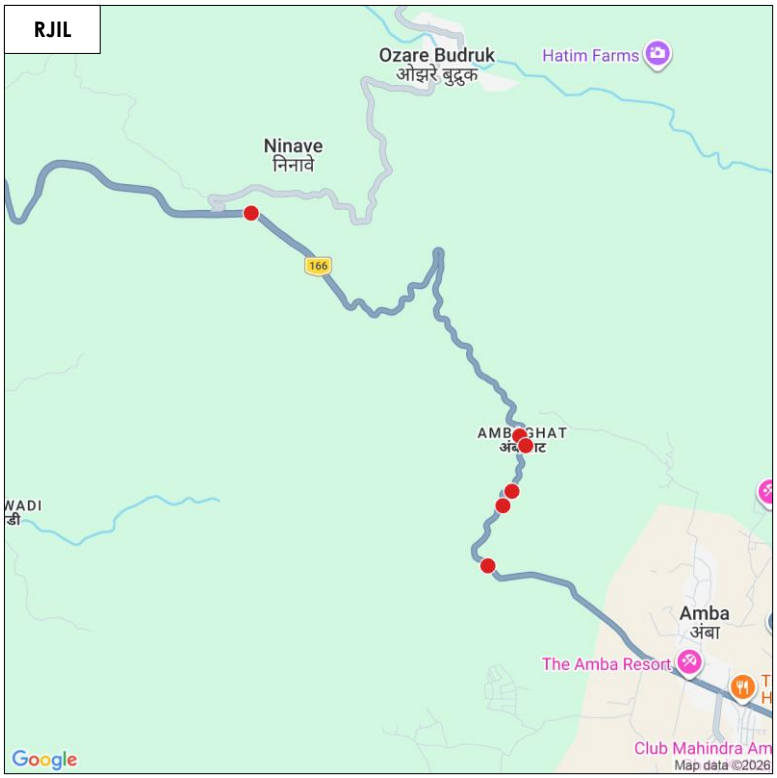


Figure-64: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-RJIL.



Figure-65: Number of silence instances for >3 Sec Mobile-to-Mobile (5G/4G-Open Mode)-VIL.

(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-74	674	534	744	741
Speech Quality (Average MOS)	3.82	2.66	4.42	3.90
Number of samples with MOS >=4 to <5 (Excellent)	508	53	648	521
Number of samples with MOS >=3 to <4 (Good)	95	92	44	163
Number of samples with MOS >=2 to <3 (Fair)	36	288	16	35
Number of samples with MOS >=1 to <2 (Poor)	35	101	36	22
%age of samples with MOS >=4 to <5 (Excellent)	75.37%	9.93%	87.10%	70.31%
%age of samples with MOS >=3 to <4 (Good)	14.09%	17.23%	5.91%	22.00%
%age of samples with MOS >=2 to <3 (Fair)	5.34%	53.93%	2.15%	4.72%
%age of samples with MOS >=1 to <2 (Poor)	5.19%	18.91%	4.84%	2.97%

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

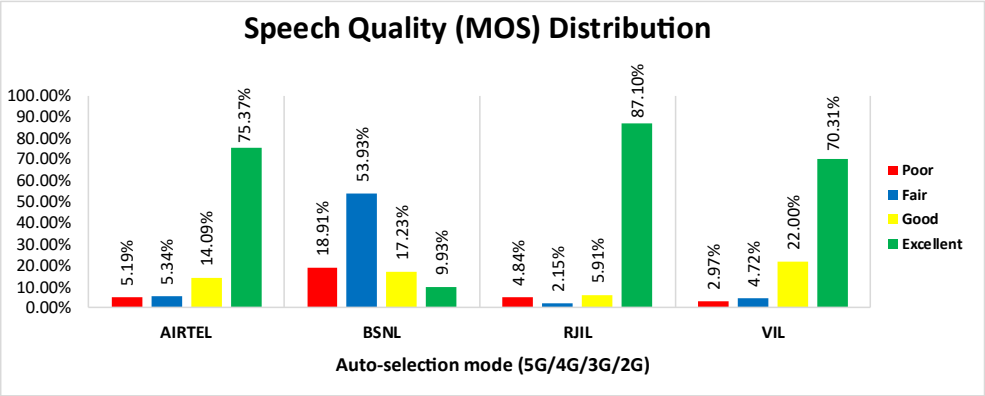


Figure-66: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	3.97%	NA	62.11%	0.17%
4G	91.16%	36.45%	37.07%	86.86%
3G	NA	42.43%	NA	NA
2G	2.09%	17.86%	NA	11.44%
Limited Service	2.77%	3.26%	0.82%	1.52%

Table-70: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) voice.

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

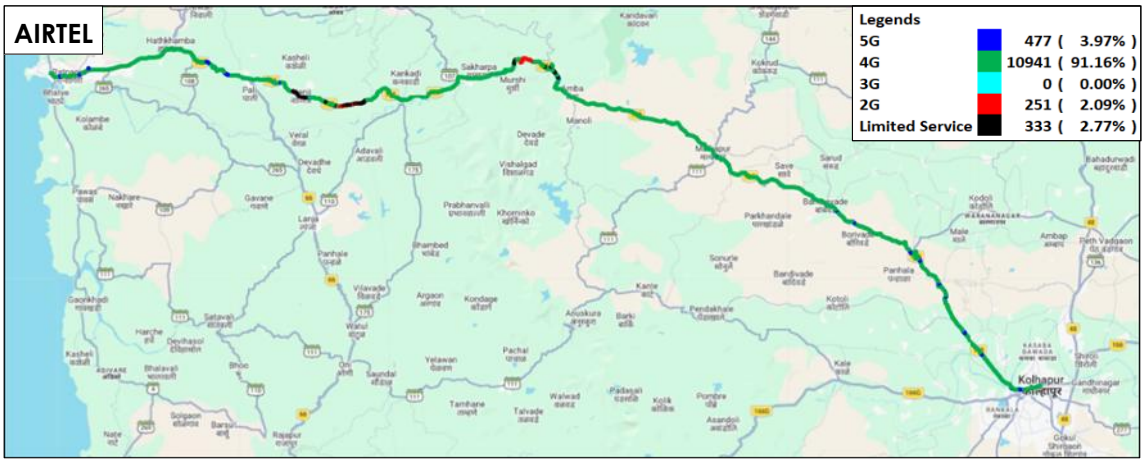


Figure-67: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

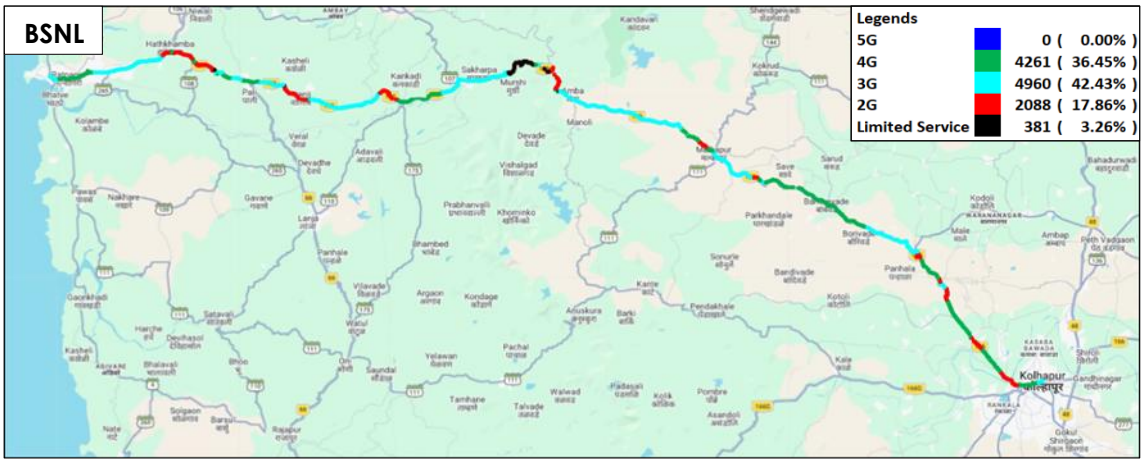


Figure-68: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

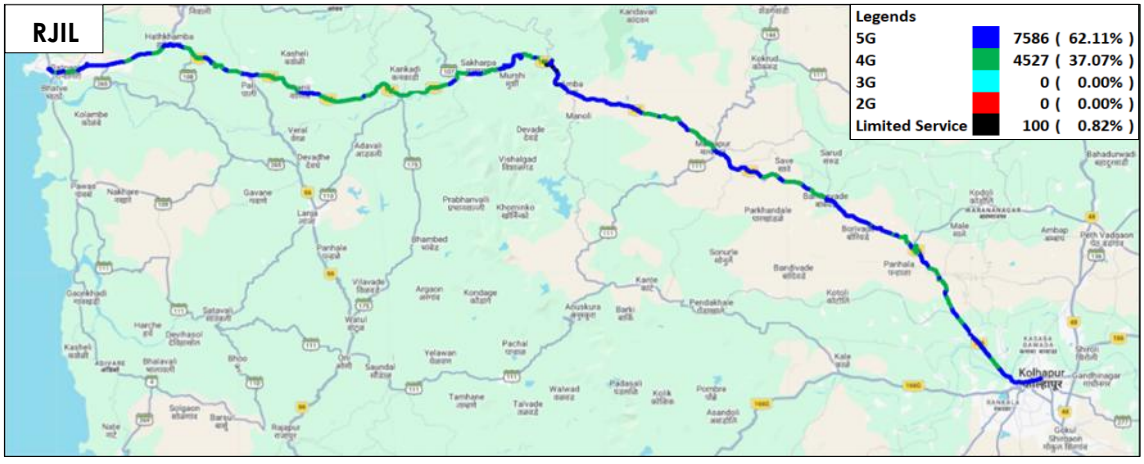


Figure-69: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

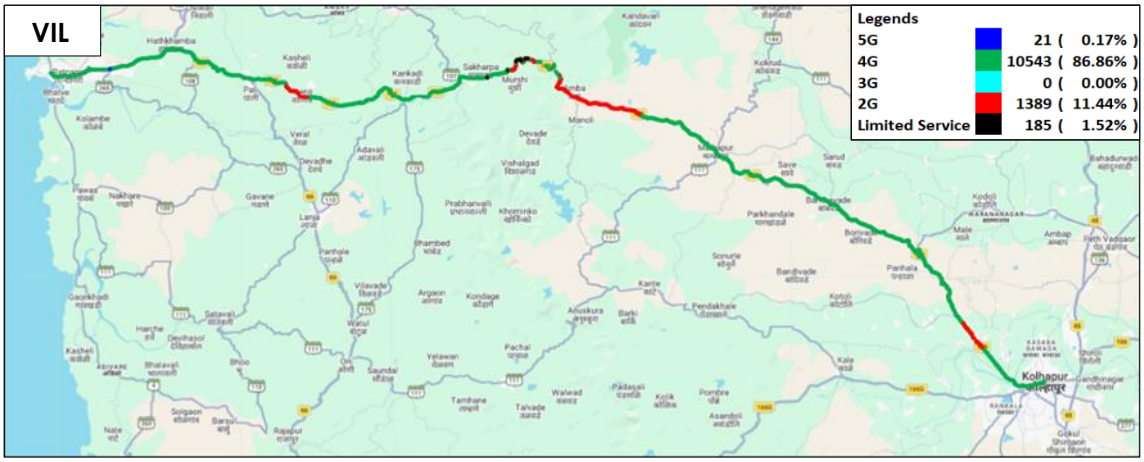


Figure-70: Serving technology plots in auto-selection mode (5G/4G/3G/2G) voice - VIL.

(g) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) voice. (Refer figure-104, 105, 106 & 107 for map view)

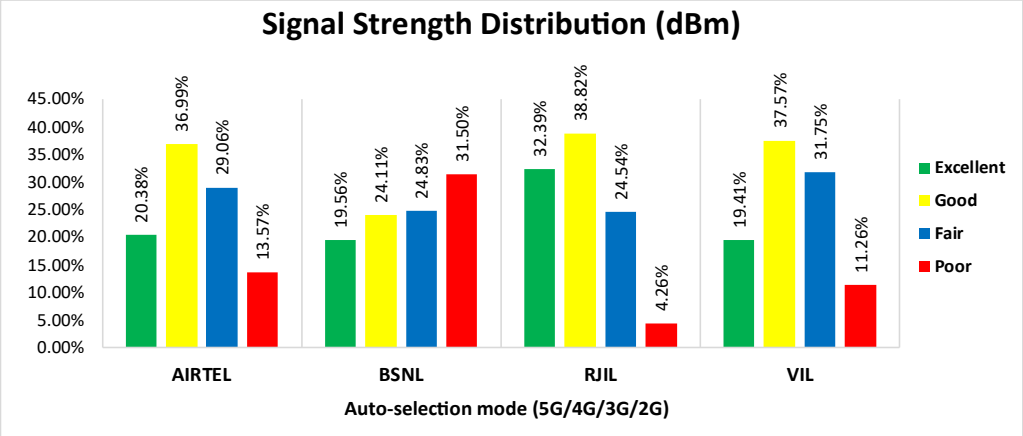


Figure-71: Signal strength distribution auto-selection mode (5G/4G/3G/2G) voice.

Observations:

- Airtel has 20% of samples falling in the excellent signal strength category.
- BSNL has 20% of samples falling in the excellent signal strength category.
- RJIL has 32% of samples falling in the excellent signal strength category.
- VIL has 19% of samples falling in the excellent signal strength category.

(h) Coverage Gap observed

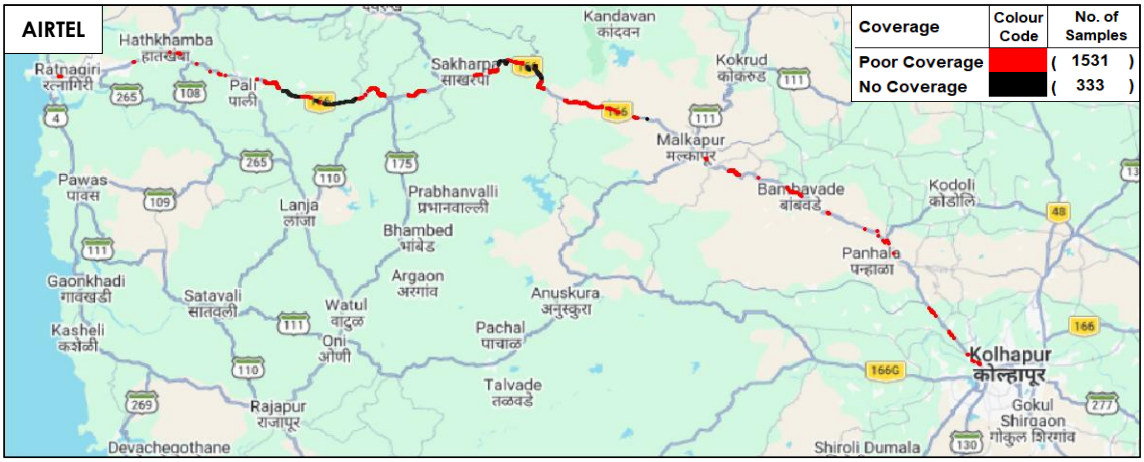


Figure-72: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

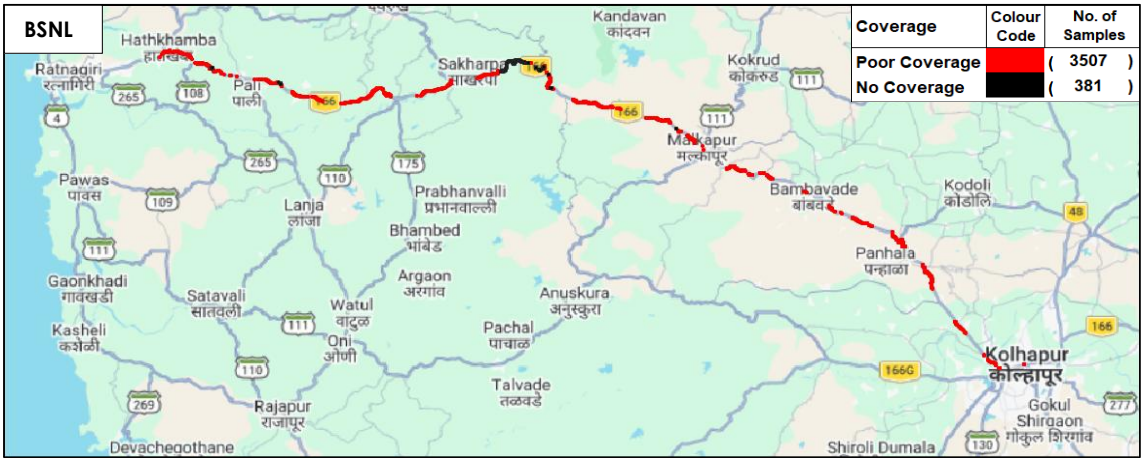


Figure-73: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - BSNL.

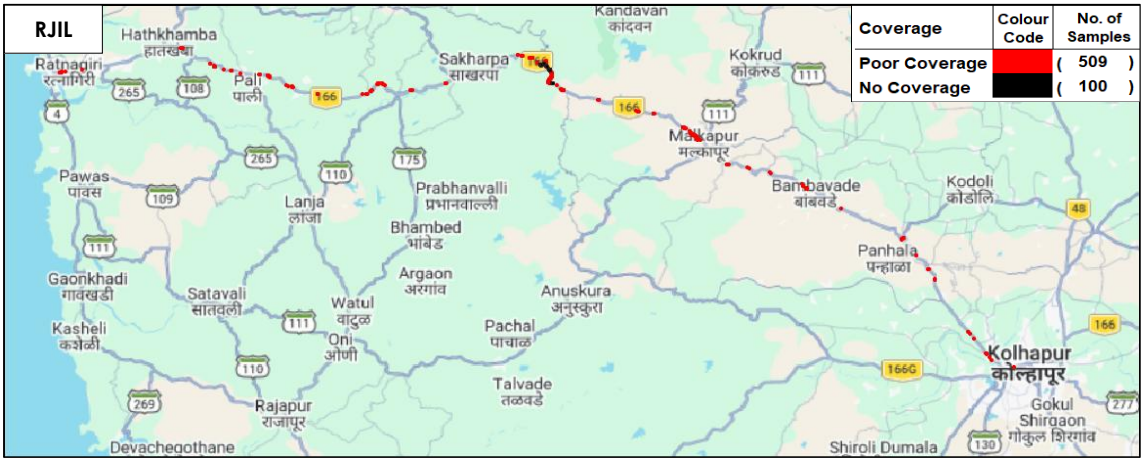


Figure-74: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - RJIL.

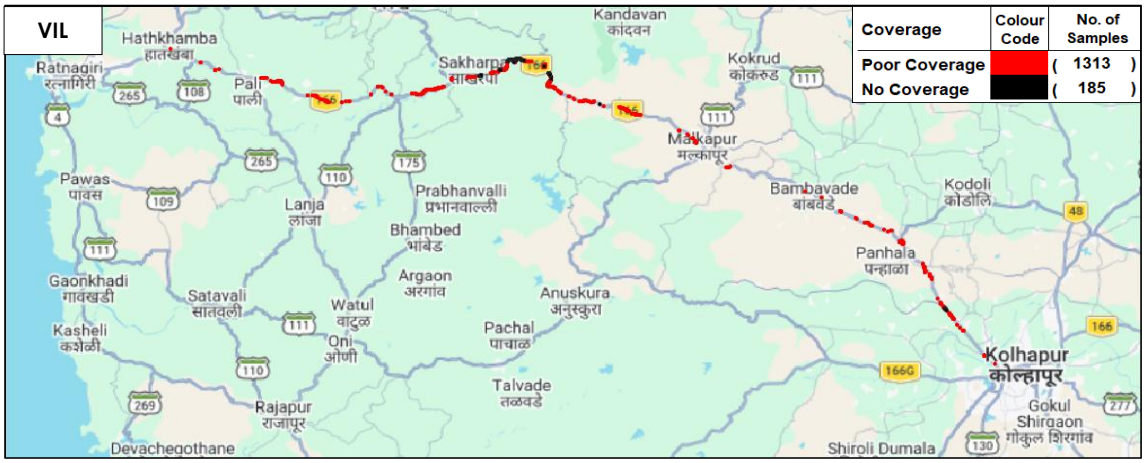


Figure-75: Poor coverage & no coverage locations in auto-selection mode (5G/4G/3G/2G) voice - VIL.

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	124.67	6.77	269.13	53.05
	80th Percentile	221.23	10.75	530.81	99.36
	20th Percentile	32.81	2.49	21.33	8.42
Upload Throughput (Mbits/s)	Average	19.77	6.57	12.27	14.17
	80th Percentile	31.21	11.70	21.14	19.80
	20th Percentile	3.44	1.46	1.77	2.81
Latency (ms)	50th Percentile	33.61	39.53	29.95	30.90

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

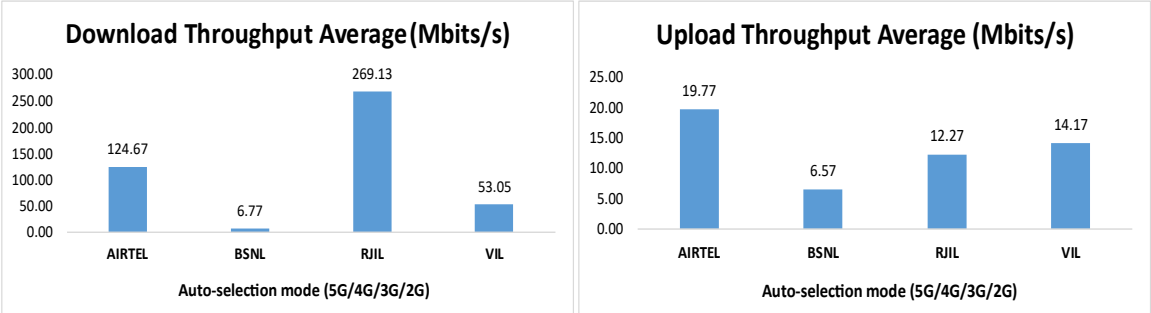


Figure-76: Download & Upload throughput.

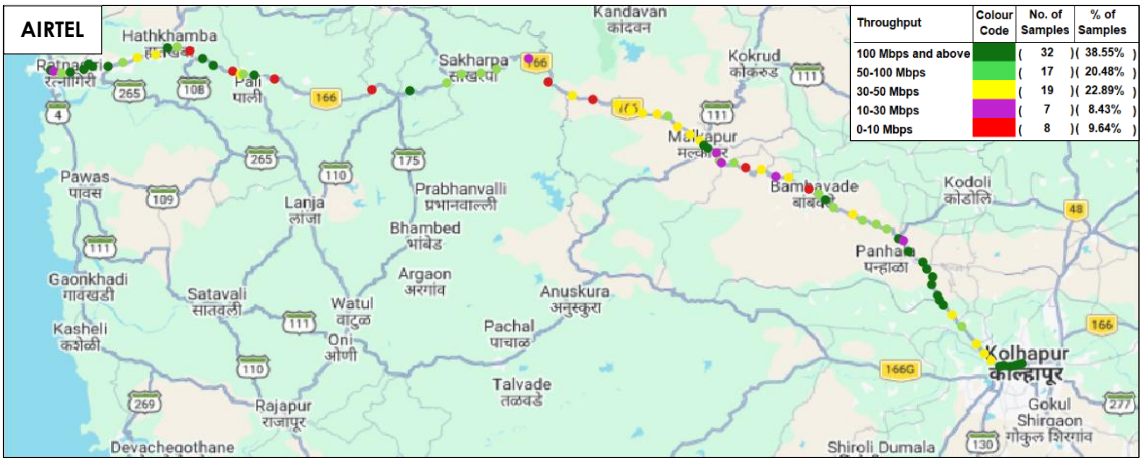


Figure-77: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

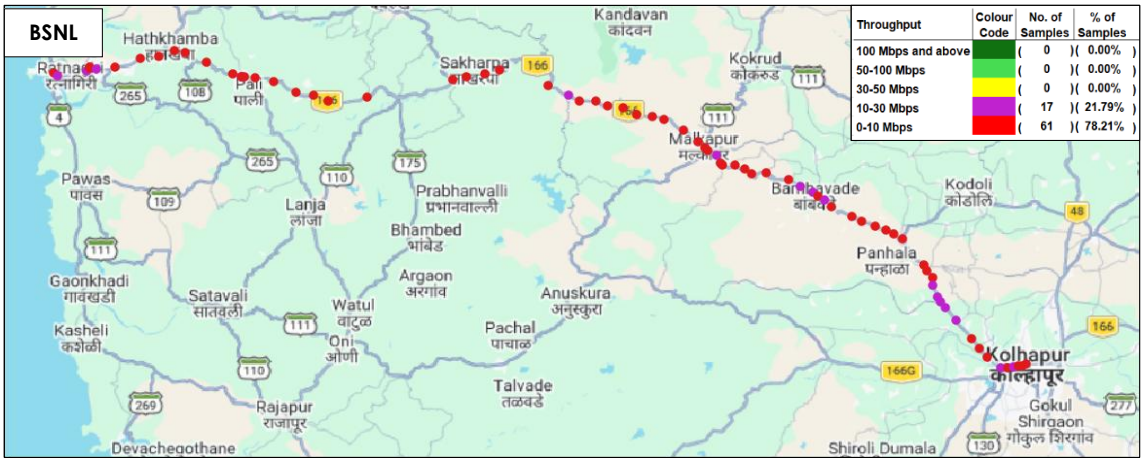


Figure-78: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - BSNL.

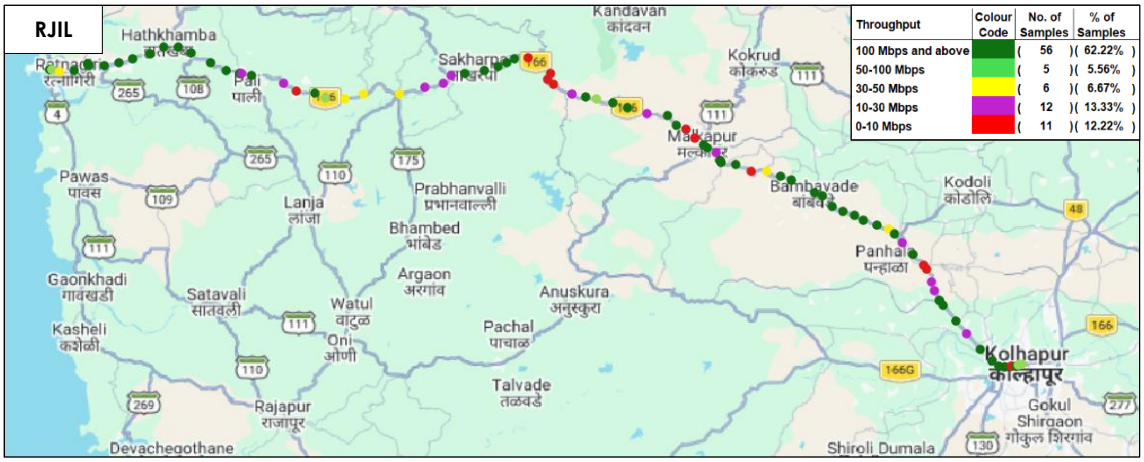


Figure-79: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

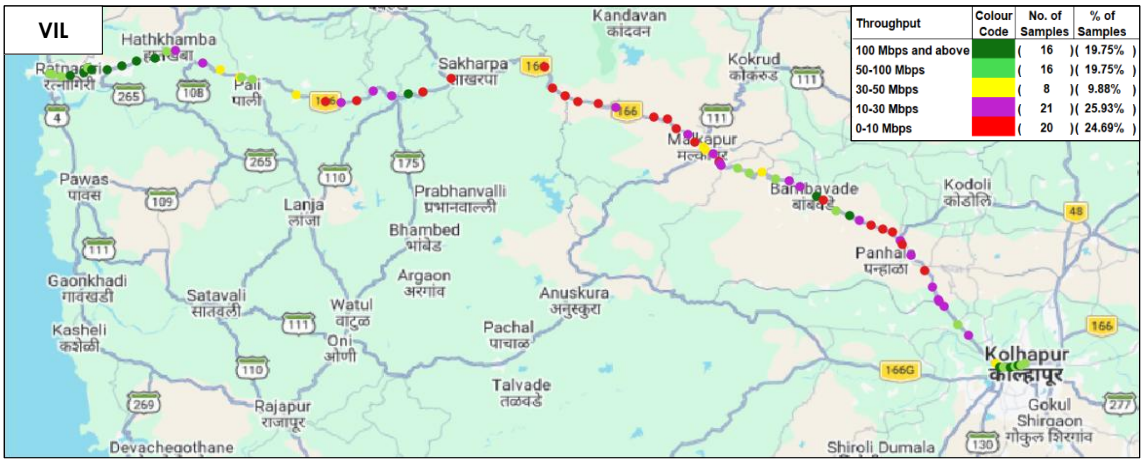


Figure-80: Download throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.



Figure-81: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - AIRTEL.

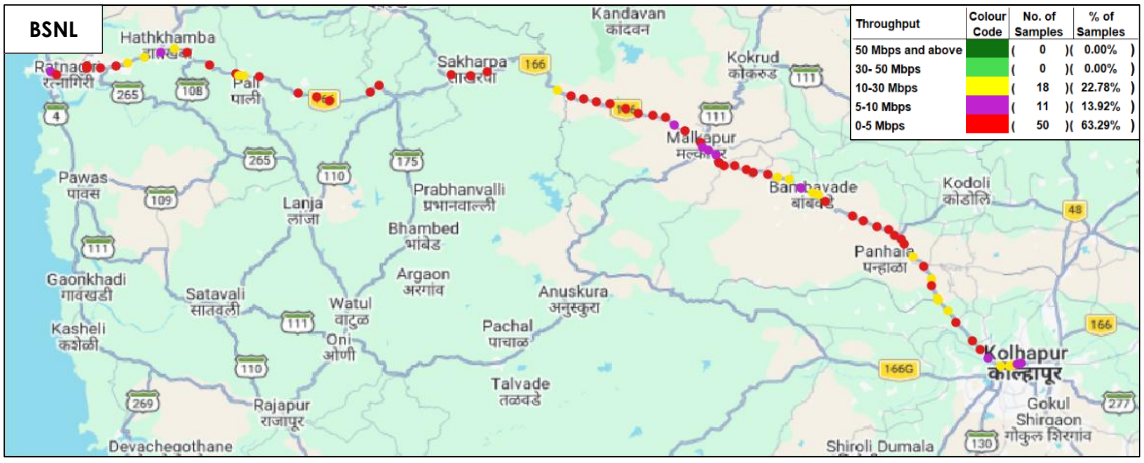


Figure-82: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - BSNL.



Figure-83: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - RJIL.

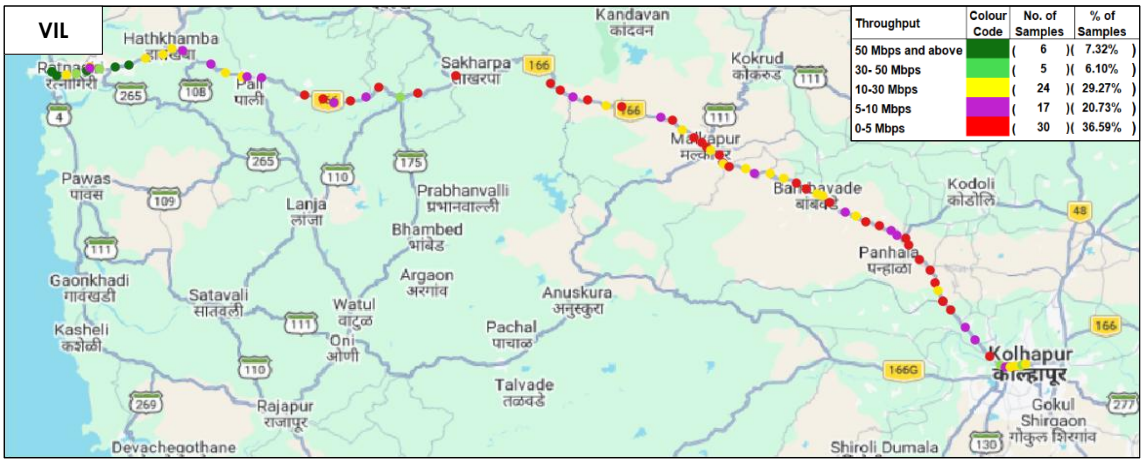


Figure-84: Upload throughput distribution auto-selection mode (5G/4G/3G/2G) - VIL.

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

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	40.90%	NA	67.08%	18.35%
4G	51.91%	54.41%	32.54%	75.16%
3G	NA	36.26%	NA	NA
2G	1.18%	3.50%	NA	0.99%
Limited Service	6.01%	5.82%	0.37%	5.50%

Table-72: Time spent on technology during drive test in auto-selection mode (5G/4G/3G/2G) data.

Note-

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



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

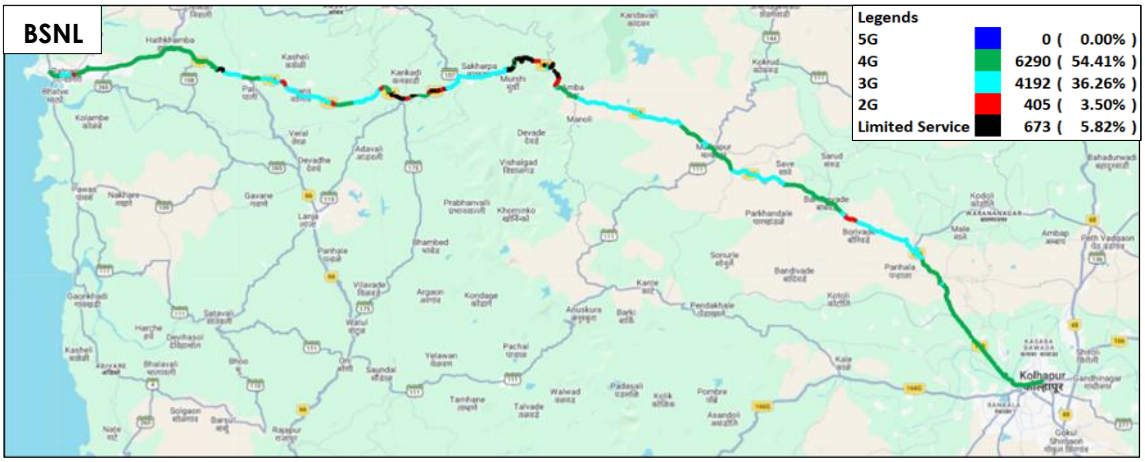


Figure-86: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - BSNL.

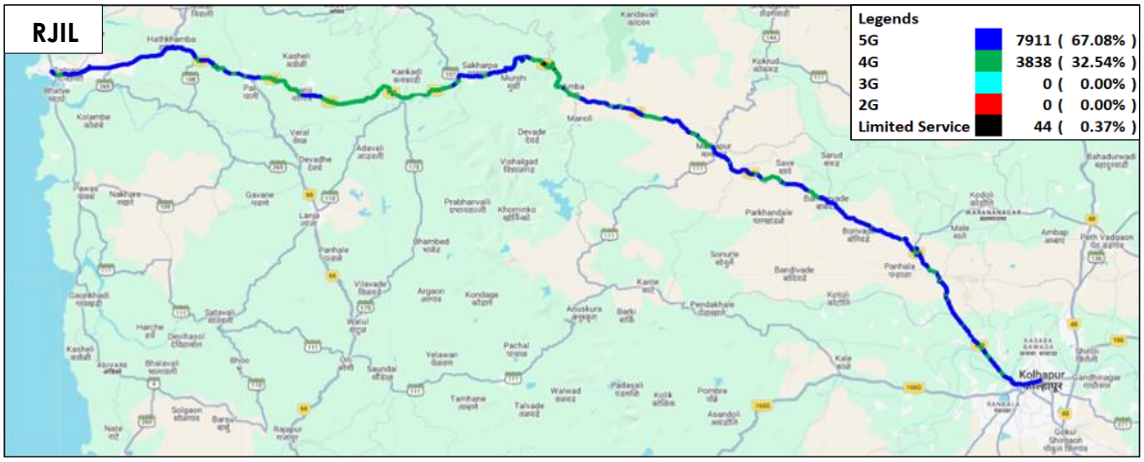


Figure-87: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - RJIL.

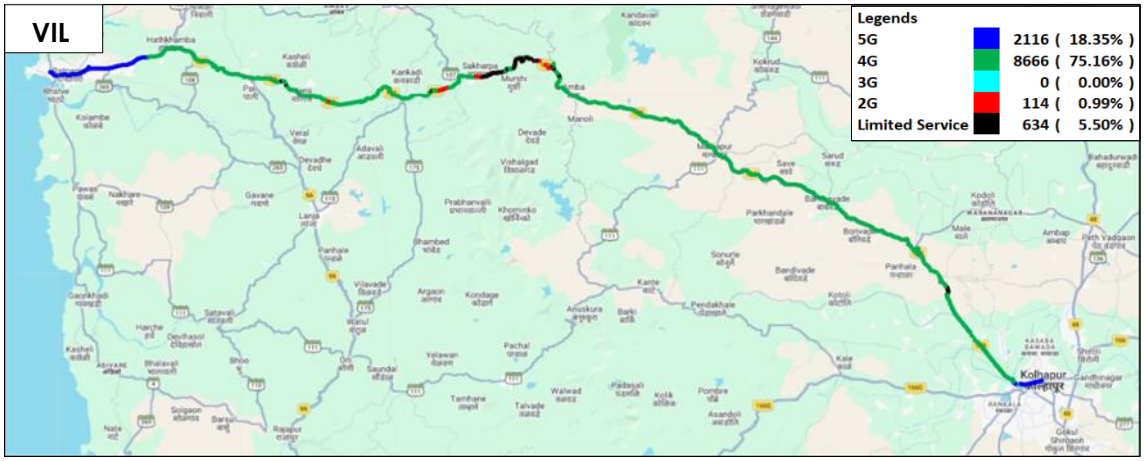


Figure-88: Serving technology plots in auto-selection mode (5G/4G/3G/2G) data - VIL.

(c) Network Signal Strength Distribution: The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G) data. (Refer figure-108, 109, 110 & 111 for map view)

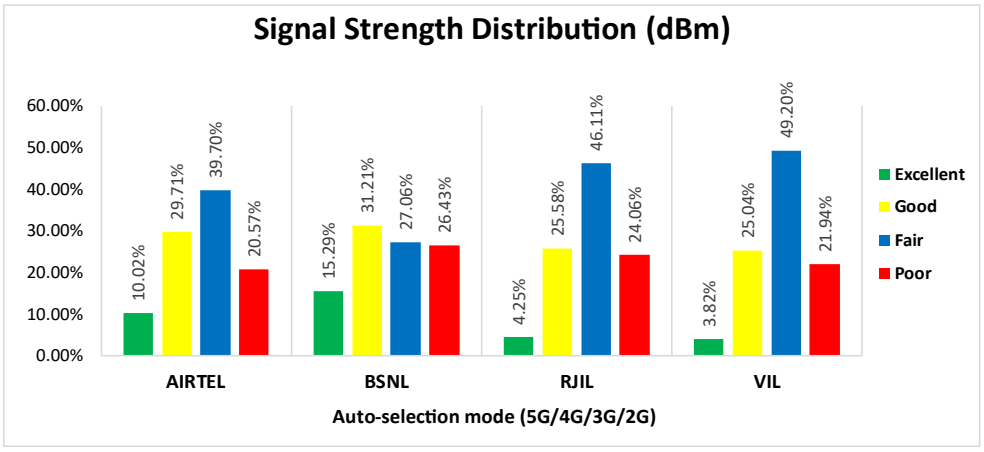


Figure-89: Signal strength distribution auto-selection mode (5G/4G/3G/2G) data.

Observations:

- Airtel has 10% of samples falling in the excellent signal strength category.
- BSNL has 15% of samples falling in the excellent signal strength category.
- RJIL has 4% of samples falling in the excellent signal strength category.
- VIL has 4% of samples falling in the excellent signal strength category.

5. Voice & Data Key findings

5.1 Overall Voice

1. **Call Setup Success Rate:**
   a) Airtel, BSNL and VIL have 55.59%, 75.92% and 81.06% call setup success rate respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL and VIL have 70.48%, 75.84%, 94.83% and 82.10% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

   c) All Operators have 100.00% call setup success rate while calling on peer service provider's network for inter-operator calls. (refer table-9)

2. **Call Setup Time**:
   a) Airtel, BSNL and VIL call setup time is 5.15, 3.47 & 3.05 seconds respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL & VIL call setup time is 0.77, 2.63, 0.80 & 1.40 seconds respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. **Call Silence/Mute Rate**: In packet switched network (4G/5G) Airtel, RJIL, BSNL & VIL have 4.15%, 4.08%, 2.44% & 1.09% silence call rate respectively. Further Airtel has higher RTP packet loss rate in downlink (4.71%) compared to RJIL (4.44%), BSNL (4.40%) & VIL (2.30%). In uplink the RTP packet loss rate is higher for BSNL (5.19%) compared to RJIL (3.44%), Airtel (3.27%) & VIL (1.92%). (refer table-6)

4. **Drop Call Rate**:
   a) Airtel, BSNL and VIL drop call rate is 2.66%, 9.90% and 3.52% respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL and VIL drop call rate is 3.96%, 10.32%, 2.08% and 3.29% 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 134.37 Mbps, 5.05 Mbps, 159.11 Mbps and 44.98 Mbps respectively. (refer table-11)

   b) Airtel, BSNL, RJIL and VIL average upload speeds are 19.65 Mbps, 4.25 Mbps, 12.62 Mbps and 12.46 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 182.51 Mbps, 6.03 Mbps, 147.12 Mbps and 37.96 Mbps respectively. (refer table-33)

   b) Airtel, BSNL, RJIL and VIL average upload speeds are 18.95 Mbps, 6.56 Mbps, 12.89 Mbps and 14.86 Mbps respectively. (refer table-33)

3. **Data session setup success rate (static i.e. while stationary):**
   a) All operators have 100.00% download session setup success rate. (refer table-33)

   b) All operators have 100.00% upload session setup success rate. (refer table-33)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 55.59% call setup success rate and 2.66% drop call rate have been observed in 3G/2G network mode for LSA. (refer table-3)
- 70.48% call setup success rate and 3.96% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)
- 49.29% call setup success rate and 3.28% drop call rate have been observed in 3G/2G network mode for city drive. (refer table-13)
- 61.30% call setup success rate and 4.98% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (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. (refer table-21)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at all walk test locations. (refer table-57 to 60)
- 83.19% call setup success rate and 1.06% drop call rate have been observed in 3G/2G network mode for highway drive. (refer table-65)
- 63.64% call setup success rate and 10.71% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-67)

Data

- Airtel has 134.37 Mbps average download speed & 19.65 Mbps average upload speed for LSA. (refer table-11)
- Airtel has 113.81 Mbps average download speed & 17.46 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- District Collector Office Ratnagiri, Ratnagiri Fish Market and Fisherman Docking Station, Superintendent of Police Office Ratnagiri and Thiba Point have less download speed (less than 100 Mbps) out of total 11 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-35, 40, 42 & 43)
- Bhatye Beach, Ratnagiri Fish Market and Fisherman Docking Station, Ratnagiri St Bus Stand, Superintendent of Police Office Ratnagiri, Thiba Point and Zilla Parishad Ratnagiri have less upload speed (less than 20 Mbps) out of total 11 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 40, 41, 42, 43 & 44)
- Ganpatipule Beach has less upload speed (less than 20 Mbps) out of total 4 walk test locations for auto-selection mode (5G/4G/3G/2G). (refer table- 61)
- Airtel has 124.67 Mbps average download speed & 19.77 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

2. BSNL:

Voice

- 75.92% call setup success rate and 9.90% drop call rate have been observed in 3G/2G network mode for LSA. (refer table-3)

- 75.84% call setup success rate and 10.32% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 76.24% call setup success rate and 7.72% drop call rate have been observed in 3G/2G network mode for city drive. (refer table-13)

- 70.56% call setup success rate and 9.47% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (refer table-15)

- 93.64% call setup success rate and 2.91% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-21)

- 86.96% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Ganpatipule Beach walk test location. (refer table-57)

- 92.86% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Rajapur Market Area walk test location. (refer table-58)

- 75.00% call setup success rate and 33.33% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Ratnagiri Main Market walk test location. (refer table- 59)

- 100.00% call setup success rate and 25.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Ratnagiri Railway Station walk test location. (refer table-60)

- 74.03% call setup success rate and 22.81% drop call rate have been observed in 3G/2G network mode for highway drive. (refer table-65)

- 72.15% call setup success rate and 24.56% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-67)

Data

- BSNL has 5.05 Mbps average download speed & 4.25 Mbps average upload speed for LSA. (refer table-11)

- BSNL has 4.42 Mbps average download speed & 2.62 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- All hotspot locations have less download speed (less than 10 Mbps) except Bhatye Beach and Lanja St Bus Stand / Main Town Centre for auto-selection mode (5G/4G/3G/2G). (refer table-35, 37, 38, 39, 40, 41, 42, 43 & 44)

- Ratnagiri St Bus Stand has less upload speed (less than 2 Mbps) out of total 11 hotspots locations for auto-selection mode (5G/4G/3G/2G). (refer table-41)

- All Walk test locations have less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-61 to 64)

- BSNL has 6.77 Mbps average download speed & 6.57 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

3. RJIL:

Voice

- 94.83% call setup success rate and 2.08% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 93.03% call setup success rate and 2.58% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (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. (refer table-21)

- 100.00% call setup success rate and 4.35% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Ganpatipule Beach walk test location. (refer table-57)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at Rajapur Market Area, Ratnagiri Main Market & Ratnagiri Railway Station walk test locations. (refer table-58 to 60)

- 92.19% call setup success rate and 3.39% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-67)

Data

- RJIL has 159.11 Mbps average download speed & 12.62 Mbps average upload speed for LSA. (refer table-11)

- RJIL has 134.77 Mbps average download speed & 11.40 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- District Collector Office Ratnagiri, Ratnadurg Fort / Bhagwati Fort, Ratnagiri Fish Market and Fisherman Docking Station, Ratnagiri St Bus Stand, Superintendent of Police Office Ratnagiri and Zilla Parishad Ratnagiri have less download speed (less than 100 Mbps) out of total 11 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-35, 39, 40, 41, 42 & 44)

- Bhatye Beach, District Collector Office Ratnagiri, Ratnadurg Fort / Bhagwati Fort, Ratnagiri Fish Market and Fisherman Docking Station, Ratnagiri St Bus Stand, Superintendent of Police Office Ratnagiri, Thiba Point and Zilla Parishad Ratnagiri have less upload speed (less than 20 Mbps) out of total 11 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 35, 39, 40, 41, 42, 43 & 44)

- Ganpatipule Beach and Ratnagiri Main Market have less download speed (less than 100 Mbps) out of total 4 Walk Test locations for auto-selection mode (5G/4G/3G/2G). (refer table-61 & 63)

- Ganpatipule Beach and Ratnagiri Main Market have less upload speed (less than 20 Mbps) out of total 4 Walk Test locations for auto-selection mode (5G/4G/3G/2G). (refer table-61 & 63)

- RJIL has 269.13 Mbps average download speed & 12.27 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

4. VIL:

Voice

- 81.06% call setup success rate and 3.52% drop call rate have been observed in 3G/2G network mode for LSA. (refer table-3)

- 82.10% call setup success rate and 3.29% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 78.69% call setup success rate and 2.68% drop call rate have been observed in 3G/2G network mode for city drive. (refer table-13)

- 74.67% call setup success rate and 3.54% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. (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. (refer table-21)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) at all walk test locations. (refer table-57 to 60)

- 96.88% call setup success rate and 8.06% drop call rate have been observed in 3G/2G network mode for highway drive. (refer table-65)

- 84.93% call setup success rate and 11.29% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-67)

Data

- VIL has 44.98 Mbps average download speed & 12.46 Mbps average upload speed for LSA. (refer table-11)

- VIL has 38.93 Mbps average download speed & 8.50 Mbps average upload speed across the measured routes for city drive. (refer table-19)

- All hotspot locations have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-34 to 44)

- Bhatye Beach, Rajapur Government Hospital, Rajapur St Bus Stand, Ratnadurg Fort / Bhagwati Fort, Ratnagiri Fish Market and Fisherman Docking Station, Superintendent of Police Office Ratnagiri, Thiba Point and Zilla Parishad Ratnagiri have less upload speed (less than 20 Mbps) out of total 11 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-34, 37, 38, 39, 40, 42, 43 & 44)

- Ganpatipule Beach, Rajapur Market Area and Ratnagiri Main Market have less download speed (less than 100 Mbps) out of total 4 Walk Test locations for auto-selection mode (5G/4G/3G/2G). (refer table- 61, 62 & 63)

- Ganpatipule Beach, Rajapur Market Area and Ratnagiri Main Market have less upload speed (less than 20 Mbps) out of total 4 Walk Test locations for auto-selection mode (5G/4G/3G/2G). (refer table-61, 62 & 63)

- VIL has 53.05 Mbps average download speed & 14.17 Mbps average upload speed across the measured routes for highway drive. (refer table-71)

6. Annexure

6.1 Route wise coverage map

6.1.1 City



Figure-90: Signal strength 3G/2G network mode voice - AIRTEL.



Figure-91: Signal strength 3G/2G network mode voice - BSNL.



Figure-92: Signal strength 3G/2G network mode voice - VIL.

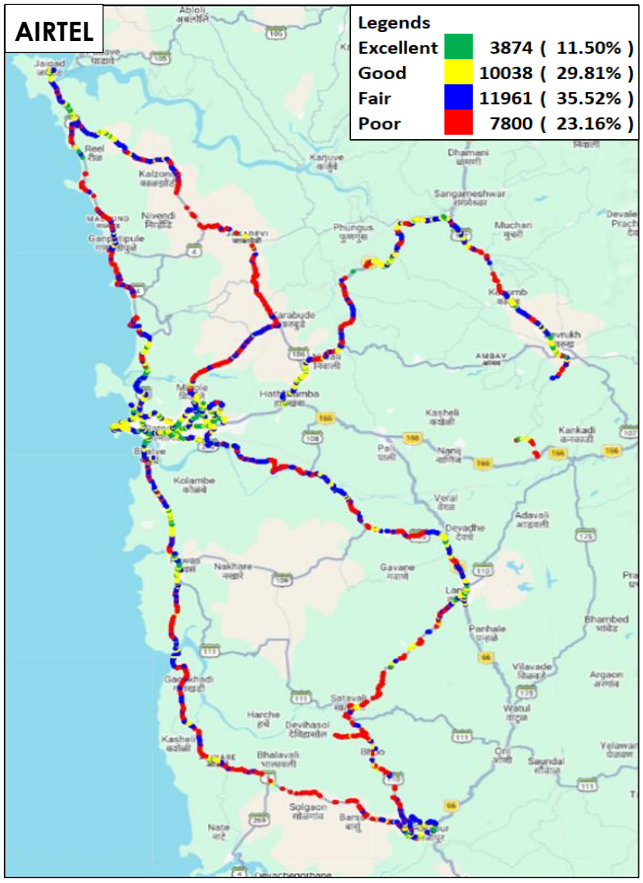


Figure-93: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.



Figure-94: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL.



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



Figure-96: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.



Figure-97: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

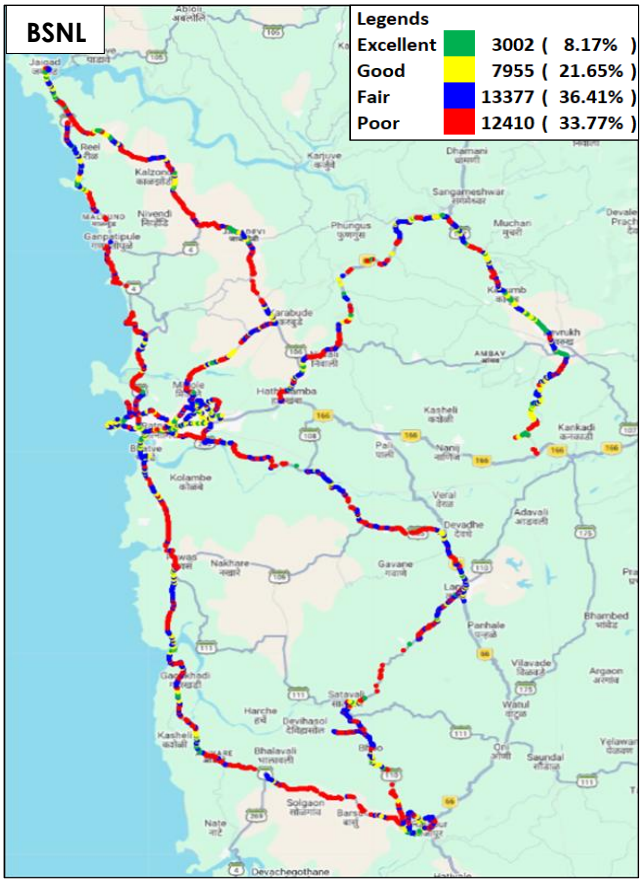


Figure-98: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL.



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



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

6.1.2 Highway

i) Ratnagiri to Kolhapur

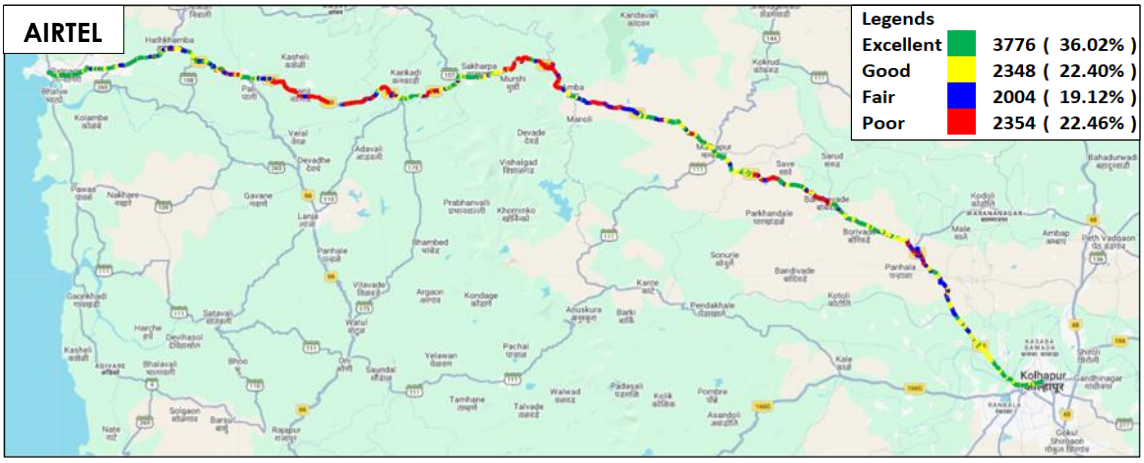


Figure-101: Signal strength 3G/2G network mode voice - AIRTEL.

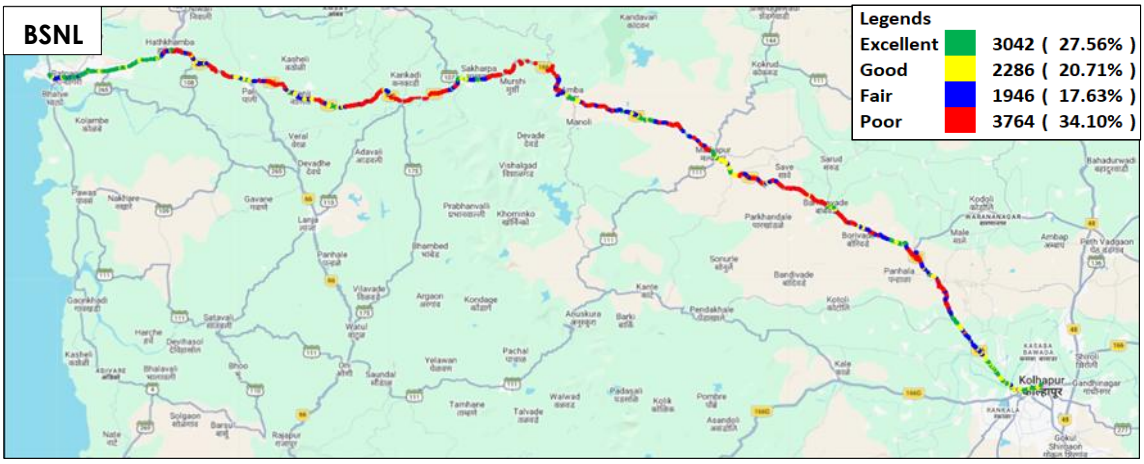


Figure-102: Signal strength 3G/2G network mode voice - BSNL.

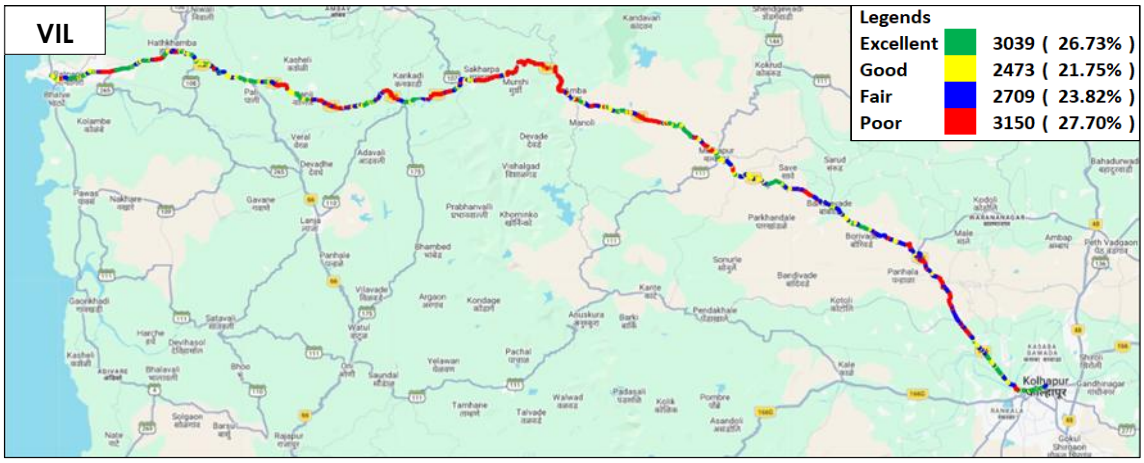


Figure-103: Signal strength 3G/2G network mode voice - VIL.

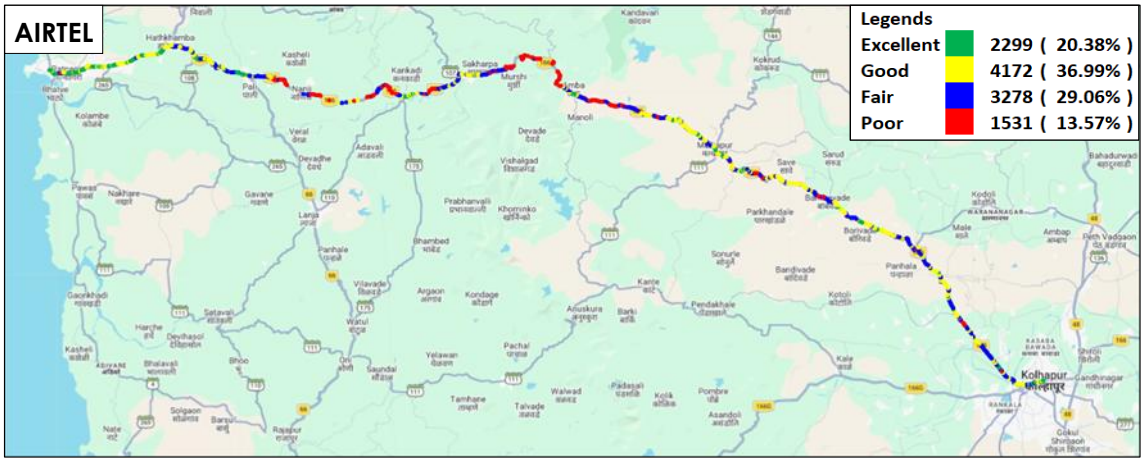


Figure-104: Signal strength auto-selection mode (5G/4G/3G/2G) voice - AIRTEL.

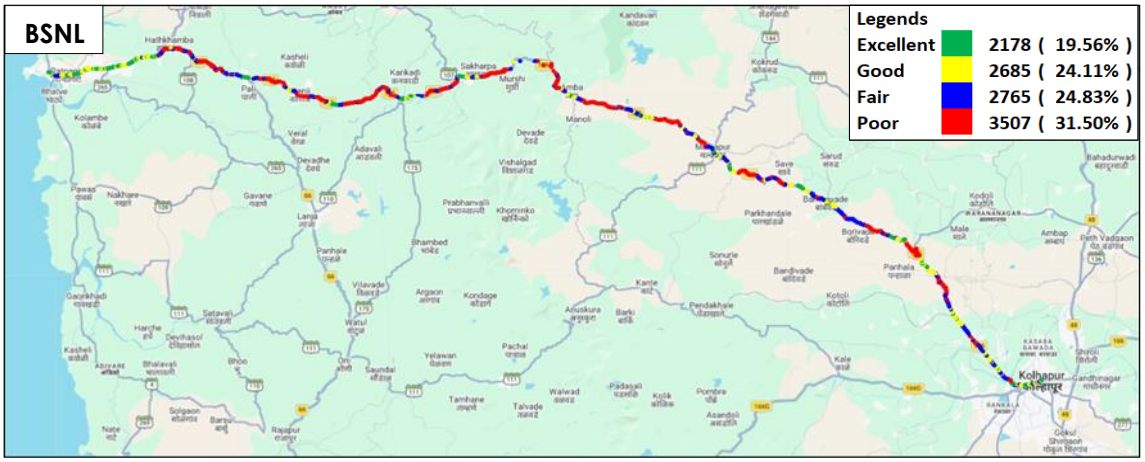


Figure-105: Signal strength auto-selection mode (5G/4G/3G/2G) voice - BSNL.

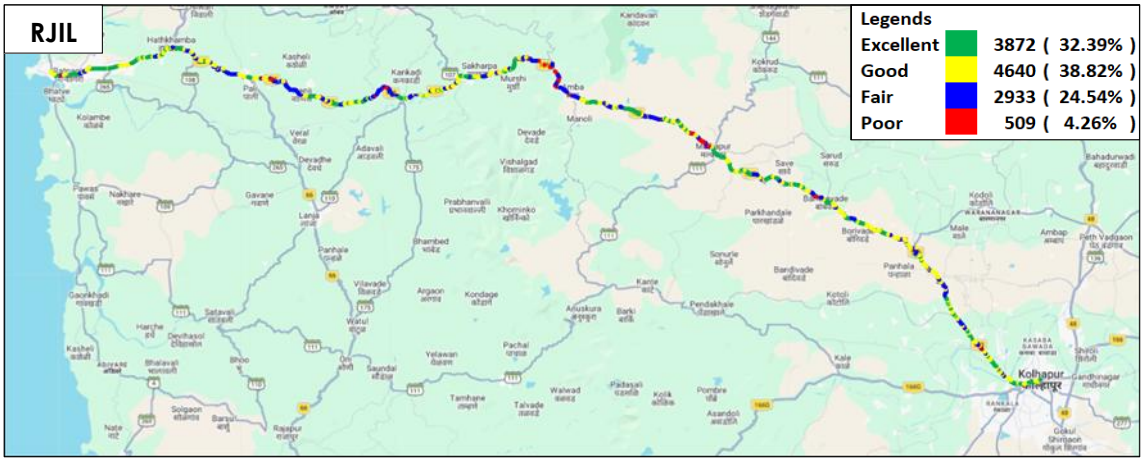


Figure-106: Signal strength auto-selection mode (5G/4G/3G/2G) voice - RJIL.

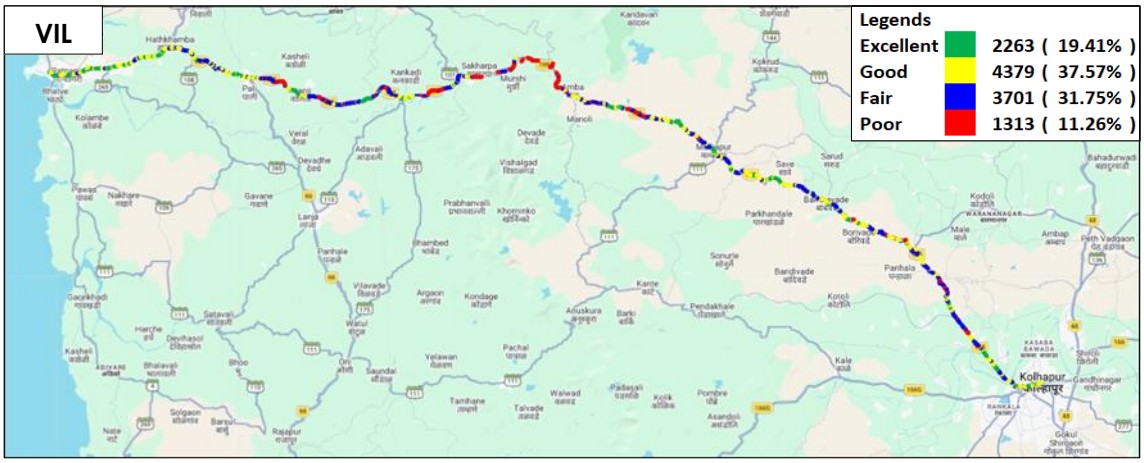


Figure-107: Signal strength auto-selection mode (5G/4G/3G/2G) voice - VIL.

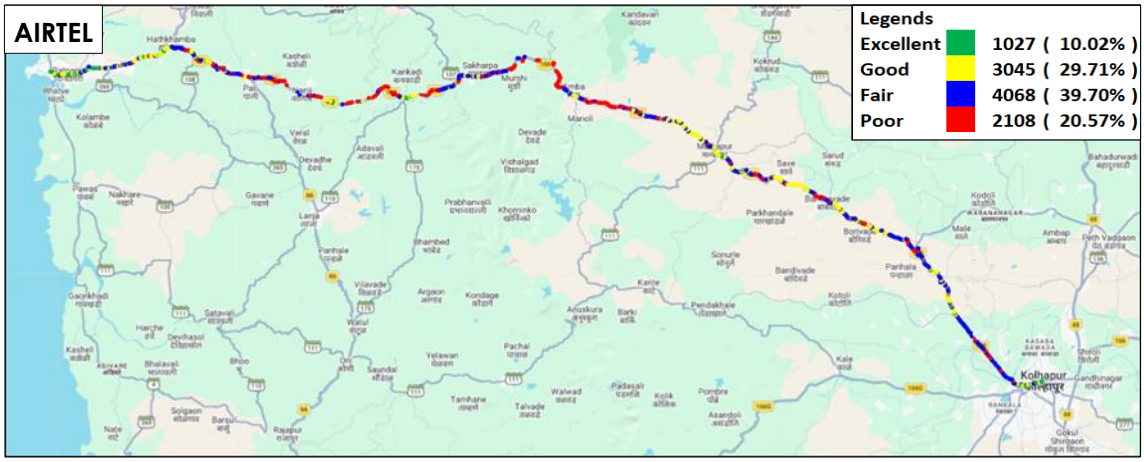


Figure-108: Signal strength auto-selection mode (5G/4G/3G/2G) data - AIRTEL.

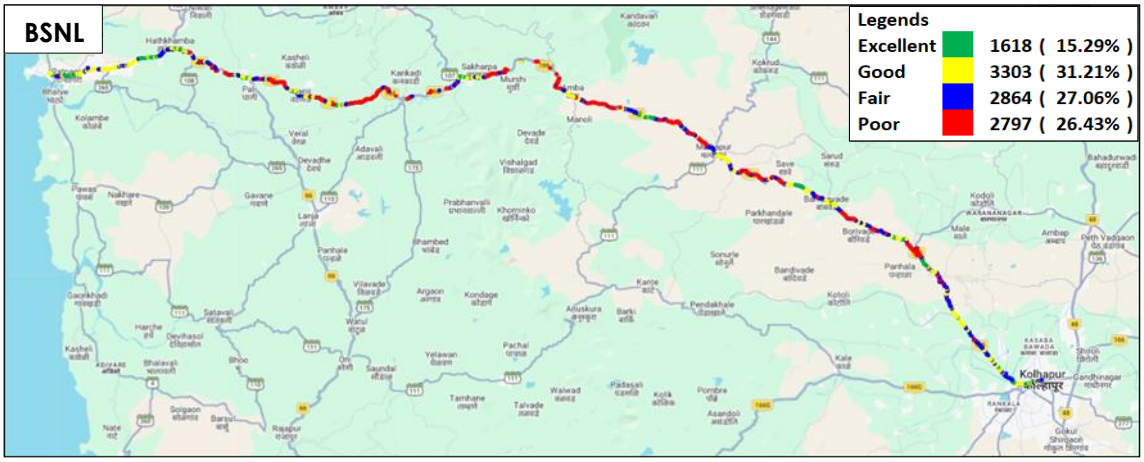


Figure-109: Signal strength auto-selection mode (5G/4G/3G/2G) data - BSNL.

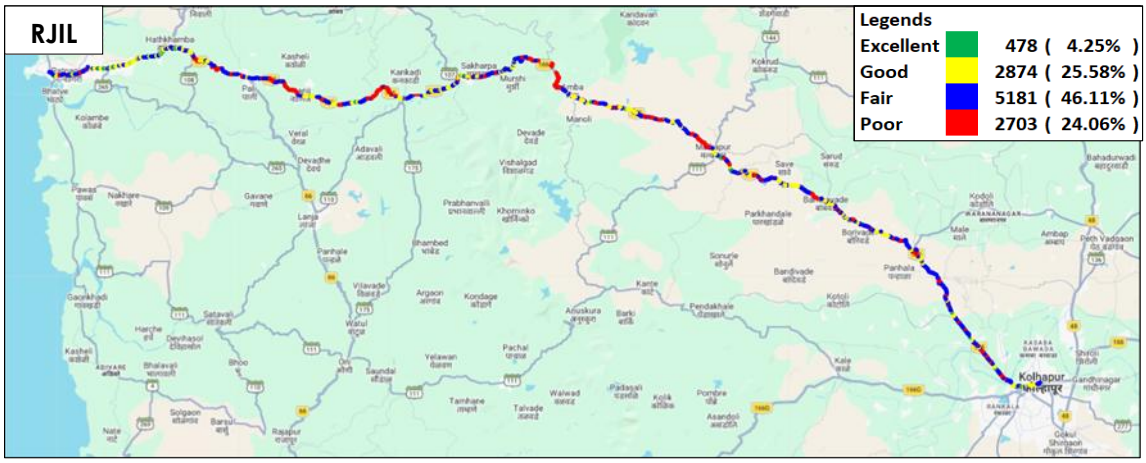


Figure-110: Signal strength auto-selection mode (5G/4G/3G/2G) data - RJIL.

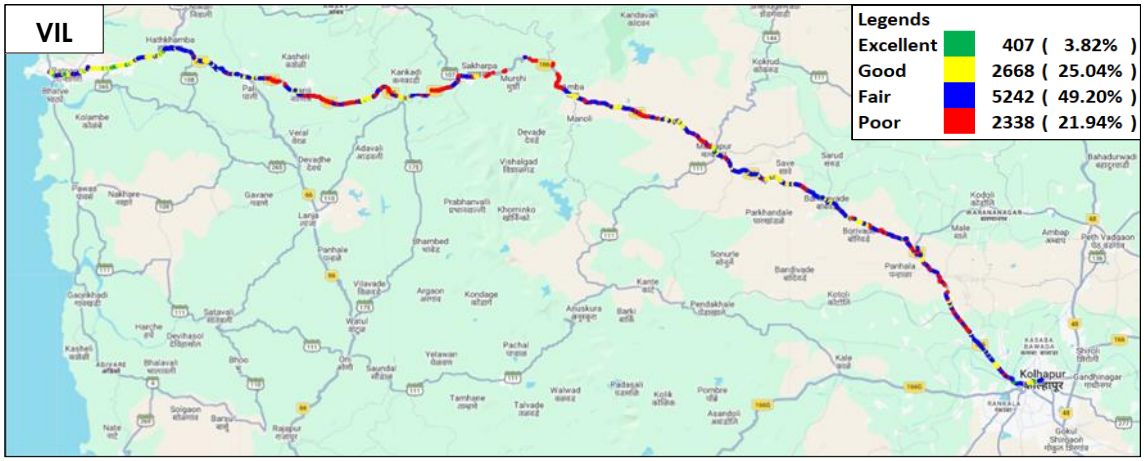


Figure-111: Signal strength auto-selection mode (5G/4G/3G/2G) data - VIL.

7. Appendix

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

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

7.1 Appendix-I

7.1.1 Drive test setup

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

Table-73: 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 in highway route drive.

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

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

Table-74: Data test detail

Note-

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

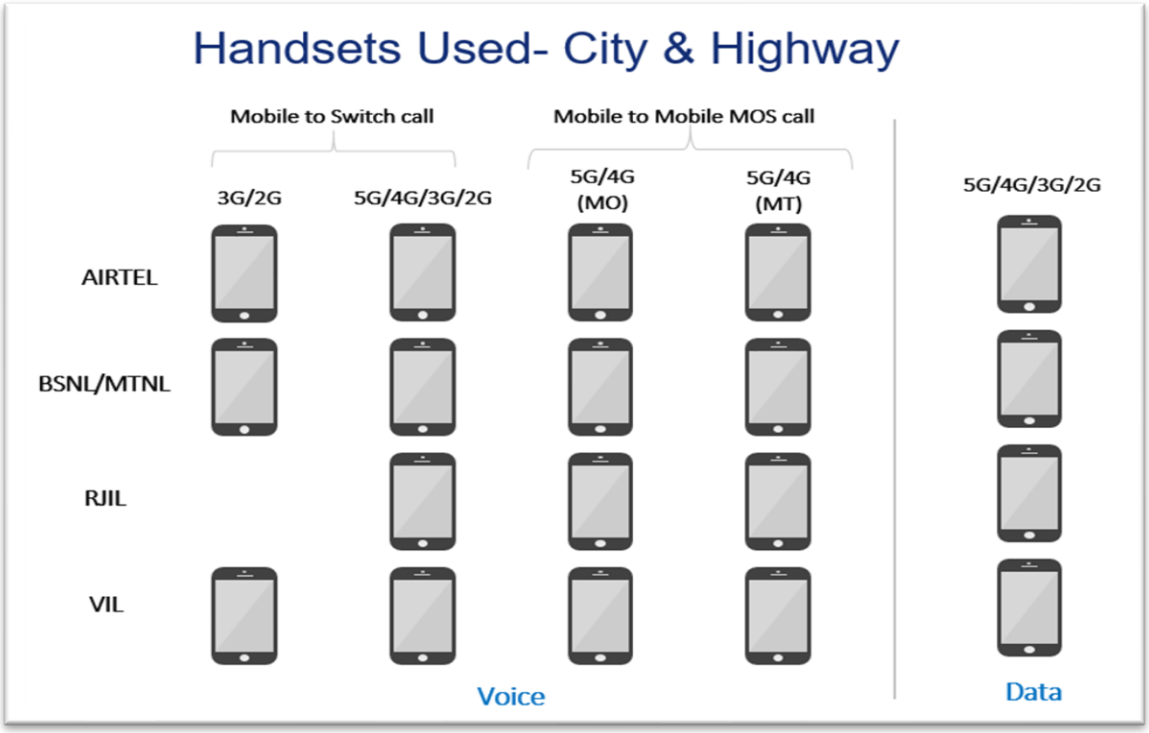


Figure-112: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

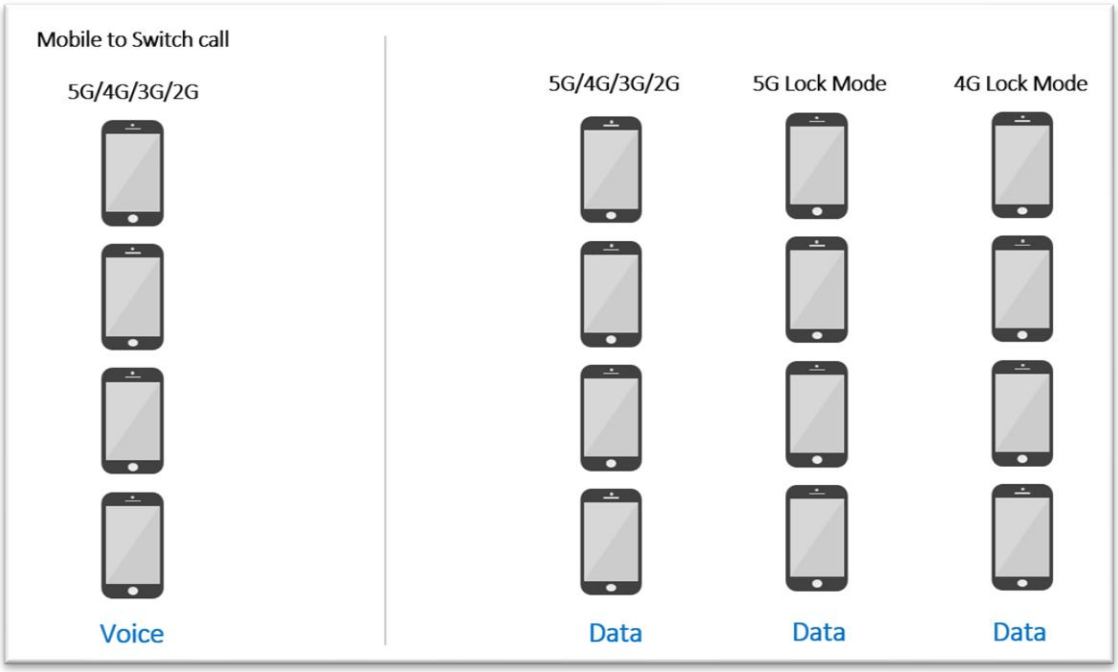


Figure-113: Number of handsets used in railway/metro/walktest/hotspot/ coastal area

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)

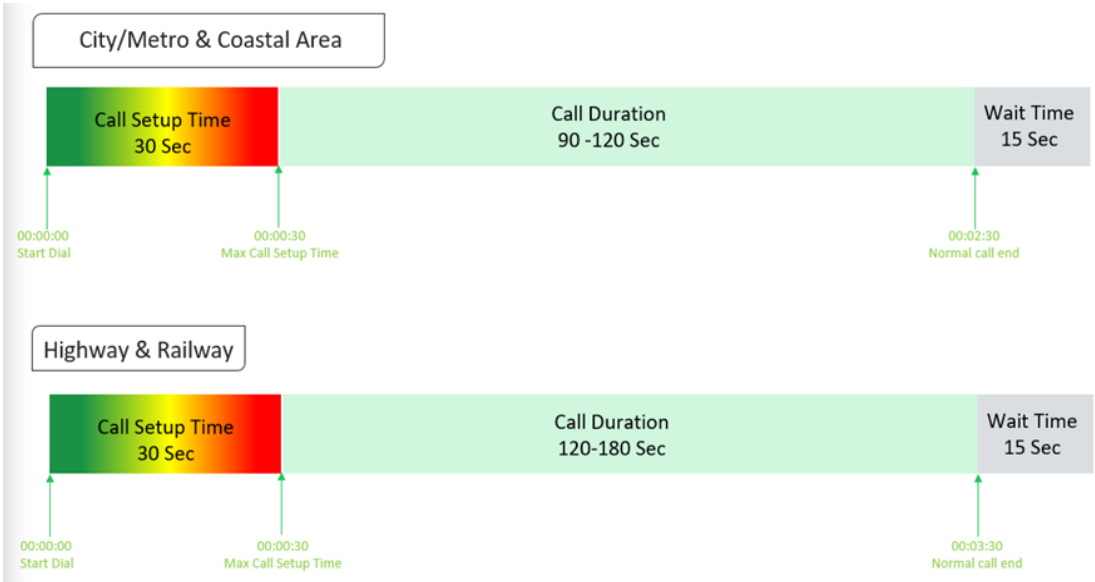


Figure-114: Voice test script for city/railway/metro/highway & coastal area

- 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-115: 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

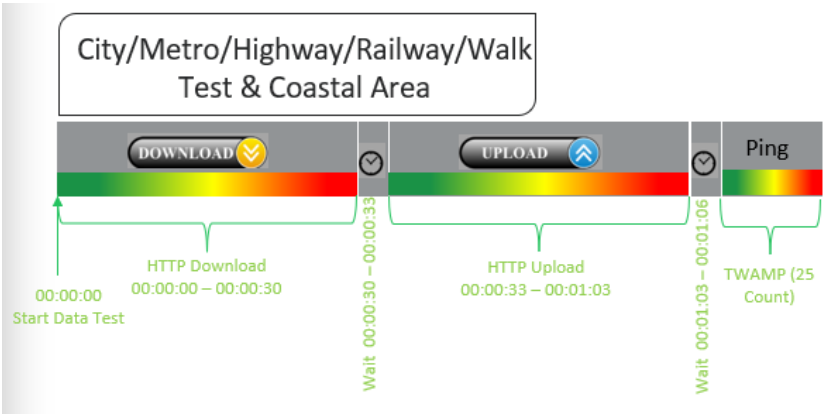


Figure-116: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

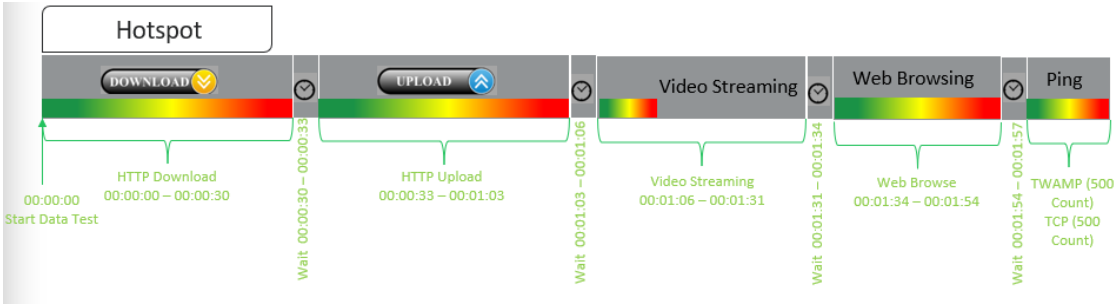


Figure-117: Data test script used at hotspot

- 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-75: 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-76: 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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