Operator Assisted Drive Test Report
Bhagalpur City & Munger City
July, 2023
(RO, Kolkata)

Key Performance Indicators (KPIs):
The following TSPs could not meet the KPIs benchmark as stated below—

AIRTEL- Rx Quality (SINR) in 4G network.
BSNL-Drop Call Rate in 2G & 3G network, Block Call Rate in 2G network, Call Set up Success Rate (CSSR%) in 2G network and Rx Quality in 2G & 3G (Ec/Io) network.
RJIO-Rx Quality (SINR) in 4G network.
VIL- Rx Quality (SINR) in 4G network.
It is observed that 2G & 4G coverage of VIL and 3G coverage of BSNL on some portions of the OADT routes are inadequate.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Bhagalpur & Munger Cities and surrounding areas including National Highways (131B, 33, 333, 333A) on 20th July 2023 and 21st July 2023 from 08.30 AM to 08.30 PM. The drive test covered drive route of 417 KMs (approx) over a period of 2 days. Approximately 551+ calls were made for each of the 7 networks: three 2G networks, one 3G network and three 4G networks covering four TSPs.

Overview   **Voice Summary**   **Data Summary**

Overview

Bhagalpur, historically known as Champa Nagri, is a city in the Indian state of Bihar, situated on the southern bank of the Ganges river. It is the third largest city of Bihar by population and also serves the headquarters of Bhagalpur district, Bhagalpur division & Eastern Range.

Munger is a city and a Municipal Corporation situated in the Indian state of Bihar. It is the administrative headquarters of Munger district and Munger Division.Munger was one of the major cities in Eastern India and undivided Bengal during Mughal period and British Raj.

The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services in terms of:

Voice: Coverage, Quality, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Data: Download Throughputs and Data File Success Rate.

Voice Tests: Calls were made for 90 secs duration with wait time of 5 secs between call in all technologies. Three 2G networks, one 3G network, Three 4G networks covering 4 unique TSPs were tested.

Data Tests: Dynamic Data Service Testing was performed along same route in all technologies. 500 KB file for 2G, 20MB file for 3G and 40MB file for 4G were downloaded from FTTP server in TSP's own server. Static Data Service Testing was also performed. Three 2G (Lock Mode) networks, one 3G (Lock Mode) network, Three LTE (Lock Mode) networks covering 4 unique TSPs were tested.

Service	Static Data Service Testing- Specifications
Download	2G (Locked) - 500KB, 3G (Locked) - 20 MB, 4G (Locked) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Locked) - 5 MB, 4G (Locked) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Steaming	130 secs Clip
Latency	32 Bytes on www.google.com

Technology/ TSP	AIRTEL	BSNL	RJIO	VODAFONE-IDEA
2G	YES	YES	NO	YES
3G	NO	YES	NO	NO
4G	YES	NO	YES	YES
TOOL USED	TEMS	NIMO	X-CAL	TEMS

Voice & Dynamic Data Test Drive Route

Drive Routes: Bhagalpur & Munger

DAY-1–Bhagalpur railway station car parking–Bhagalpur Municipality corporation–Tilkamanji Chowk-Bhagalpur Govt. Polytechnic College-Bihar Agriculture University-Airport Bhagalpur-District Court Bhagalpur-Bhagalpur bus stand-Babarganj Police station-Post office (Mirjanhat)-Gokul Chowk-Post office Nathnagar-Nathnagar Police Station-Haridaspur Panchayat Bhawan-Akbarnagar Police Station-Sultanganj-Asarganj Thana-Asarganj Post office-Tarapur-Sangrampur-Ganta More Hatia-Kharagpur, Munger-Bariarpur-Munger University.

DAY-2–Munger Railway station-Munger fort-Munger district court-Munger University-Sitakund dih Mandir-Munger Zero Mile -Bahachaki Panchayat-Surajgarha Police Station-Lakhisarai District Court-Jamui B.Ed college-Jhajha railway station-Katoria-Kakwara-Banka sadar Hospital-Amarpur-Sarkari School Garhel-Sadar Hospital Bhagalpur.
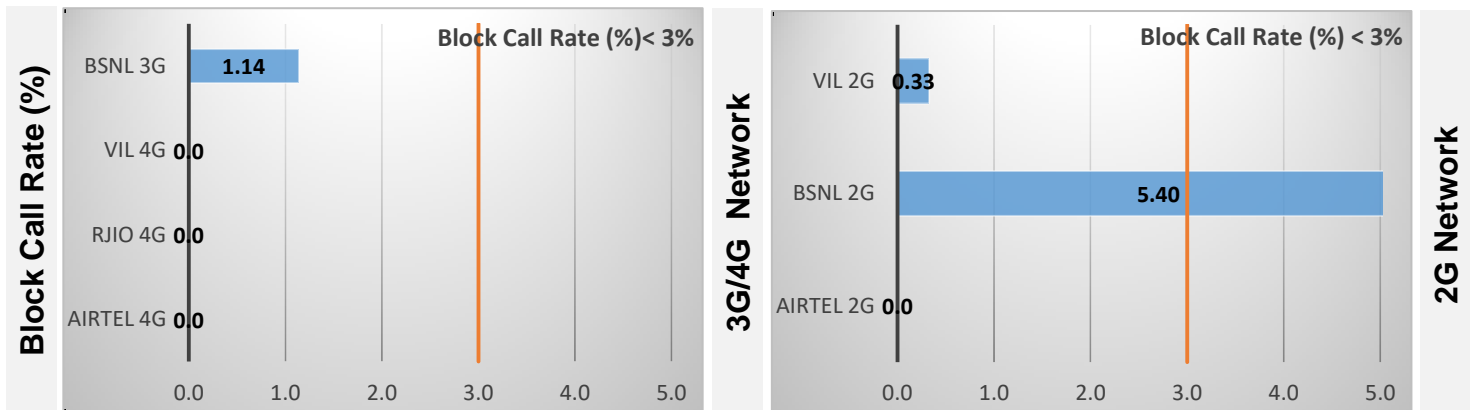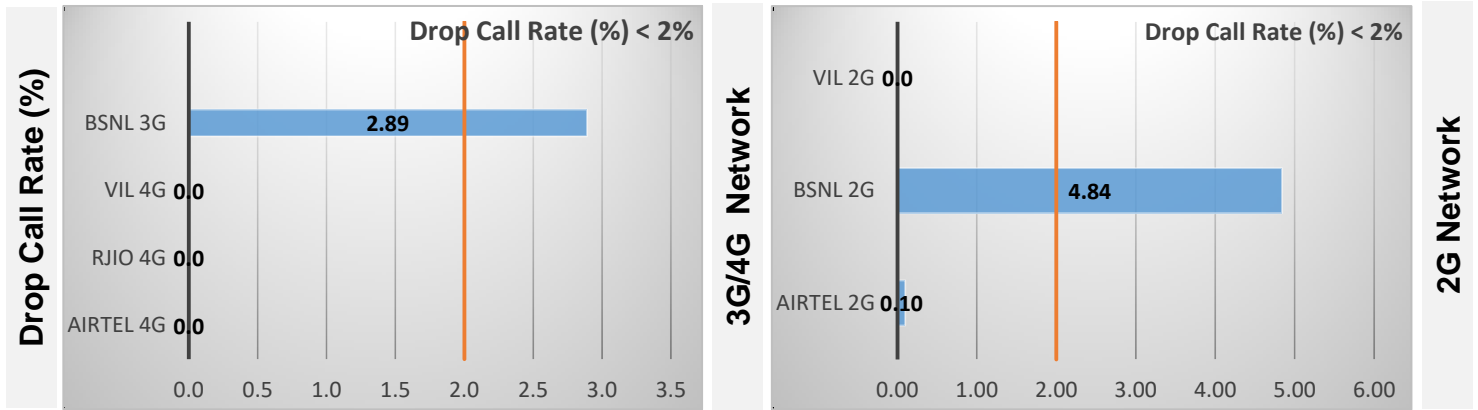
Data Service Test- Static Locations

Static Locations
Bhagalpur Railway Station
Munger Railway Station

Voice Calls

QoS compliance of the TSPs for Voice across technologies 2G/3G/4G-VoLTE:

KPIs	2G			3G	4G-VoLTE		
	AIRTEL	**BSNL**	**VIL**	**BSNL**	**AIRTEL**	**RJIO**	**VIL**
Drop Call Rate %	0.10	4.84	0.0	2.89	0.0	0.0	0.0
Block Call Rate %	0.0	5.40	0.33	1.14	0.0	0.0	0.0

a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) except BSNL (2G & 3G) network.

b) All TSPs have met the 3% QOS benchmark of Block Call Rate (BCR%) except BSNL (2G) network.

Voice Calls

Coverage

a) **Percentage of coverage samples for 2G ≥ -85 dBm.**

TSPs	2G		
	AIRTEL	**BSNL**	**VIL**
Coverage %	97.90	73.07	74.72

b) **Percentage of coverage samples for 3G ≥ -90 dBm & 4G ≥ -110 dBm.**

TSPs	3G	4G		
	BSNL	**AIRTEL**	**RJIO**	**VIL**
Coverage	48.34	95.39	98.57	93.76

Summary

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	722	578	609
Blocked Call Rate (%)	0.0	5.40	0.33
CSSR% (Accessibility)	99.60	94.60	99.67
Drop Call Rate (%)	0.10	4.84	0.0
Mobility HOSR (%)	98.89	95.45	98.58
Rx Quality (%)	96.80	94.48	97.93

Voice Call	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Call Attempt	173	749	637	395
Blocked Call Rate (%)	1.14	0.0	0.0	0.0
CSSR% (Accessibility)	98.86	100	100	100
Drop Call Rate (%)	2.89	0.0	0.0	0.0
Mobility HOSR (%)	100	98.70	99.55	99.95
Rx Quality (%)	69.16	71.70	85.36	92.32

Summary-Data Services Dynamic
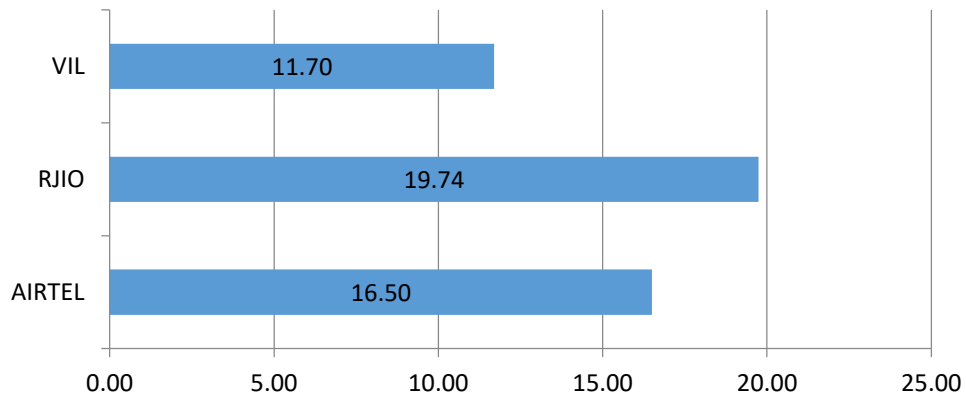
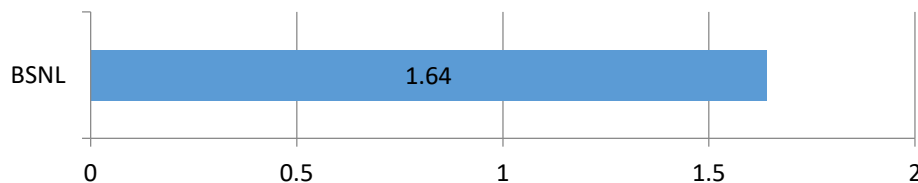Dynamic Data was tested for 417 Kms. Download Throughput was tested.

Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

4G/3G Network:

4G-Dynamic Download Average Throuhput (Mbps)

Operator	Throughput
VIL	11.70
RJIO	19.74
AIRTEL	16.50

(X-axis: 0.00, 5.00, 10.00, 15.00, 20.00, 25.00)

3G-Dynamic Download Average Throuhput (Mbps)

Operator	Throughput
BSNL	1.64

(X-axis: 0, 0.5, 1, 1.5, 2)

Summary-Data Services Static

Average Data Services Static	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	102.50	57.47	225.80
Upload Throughput (kbps)	97.50	4.0	93.20
Web Browsing Delay (sec)	48.0	23.50	16.0
Latency (msec)	572	375	268

Average Data Services Static	3G/ 4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	1.08	24.24	7.26	18.10
Upload Throughput in Mbps	0.04	13.93	3.57	9.15
Video streaming delay (secs)	14.0	30.16	0.46	3.50
Web Browsing Delay (secs)	5.50	3.61	3.33	3.50
Latency (msec)	94.5	75.5	58	81.50

Location:-Bhagalpur Railway Station	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	101	79.18	204.40
Upload Throughput (kbps)	96.0	0.0	108.40
Web Browsing Delay (sec)	49.0	27.0	15.0
Latency (msec)	577	568	191

Location:-Bhagalpur Railway Station	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	1.73	23.12	8.57	13.70
Upload Throughput in Mbps	0.05	13.75	3.47	9.10
Video streaming delay (secs)	12.0	30.56	0.40	4.0
Web Browsing Delay (secs)	5.30	3.90	3.48	5.0
Latency (msec)	90	77	63	93

Location:- Munger Railway Station	2G		
	AIRTEL	BSNL	VIL
Download throughput in (kbps)	104	35.77	247.20
Upload Throughput in (kbps)	99.0	8.0	78.0
Web Browsing Delay (secs)	47.0	20.0	17.0
Latency (msec)	567	182	345

Location:- Munger Railway Station	4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	0.44	25.37	5.96	22.50
Upload Throughput in (mbps)	0.04	14.12	3.68	9.20
Video streaming delay (secs)	16.0	29.76	0.53	3.0
Web Browsing Delay (secs)	5.80	3.33	3.19	2.0
Latency (msec)	99	74	53	70

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110dBm. The details are as follows.

TSP	Coverage Rate %
AIRTEL 2G	97.90
BSNL 2G	73.07
VIL 2G	74.72
BSNL 3G	48.34
AIRTEL 4G	95.39
RJIO 4G	98.57
VIL 4G	93.76

Coverage Rate %
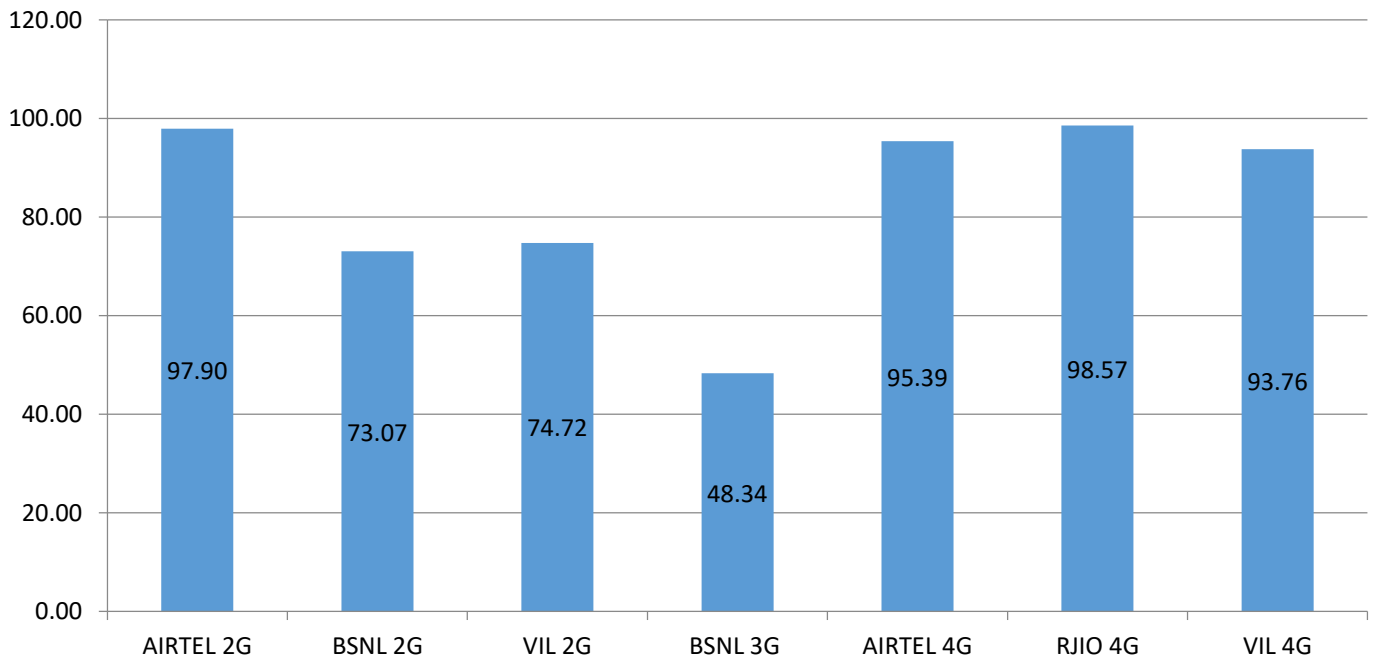
Note- Coverage is the percentage of samples having signal strength more than the threshold value (2G >= -85 dbm, 3G>= -90 dbm and 4G >= -110 dbm). However, these samples are only for the portion of the OADT routes where TSPs have coverage i.e 'no coverage' routes have been excluded.
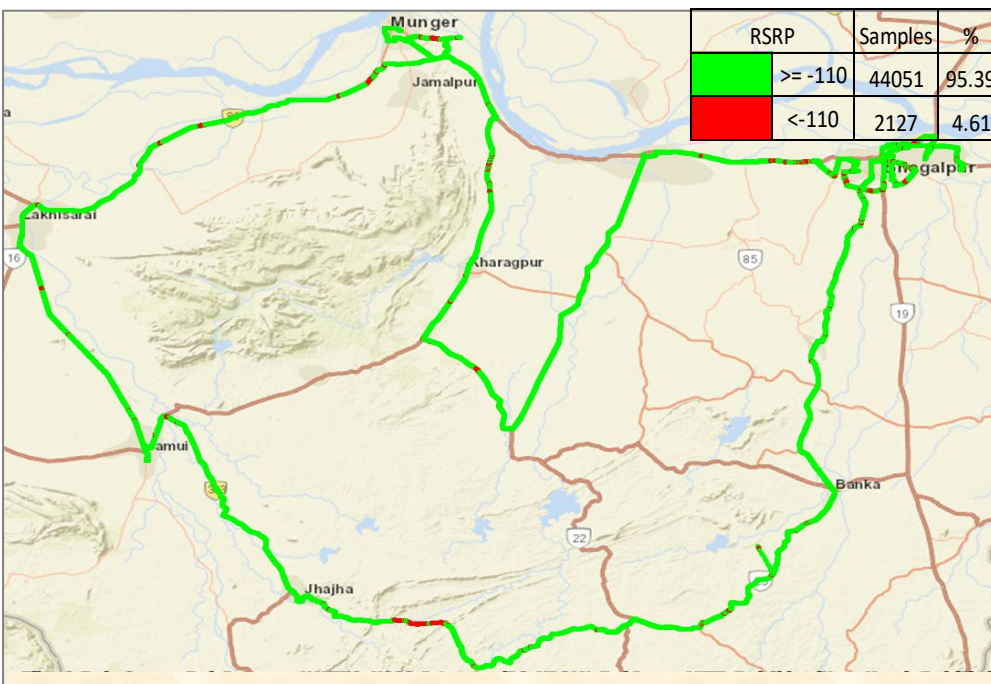
AIRTEL

Technology	Coverage Rate %
2G	97.90
4G	95.39

2G

Rx Lev		Sample	%
	>=-85	43988	97.89
	<-85	950	2.11
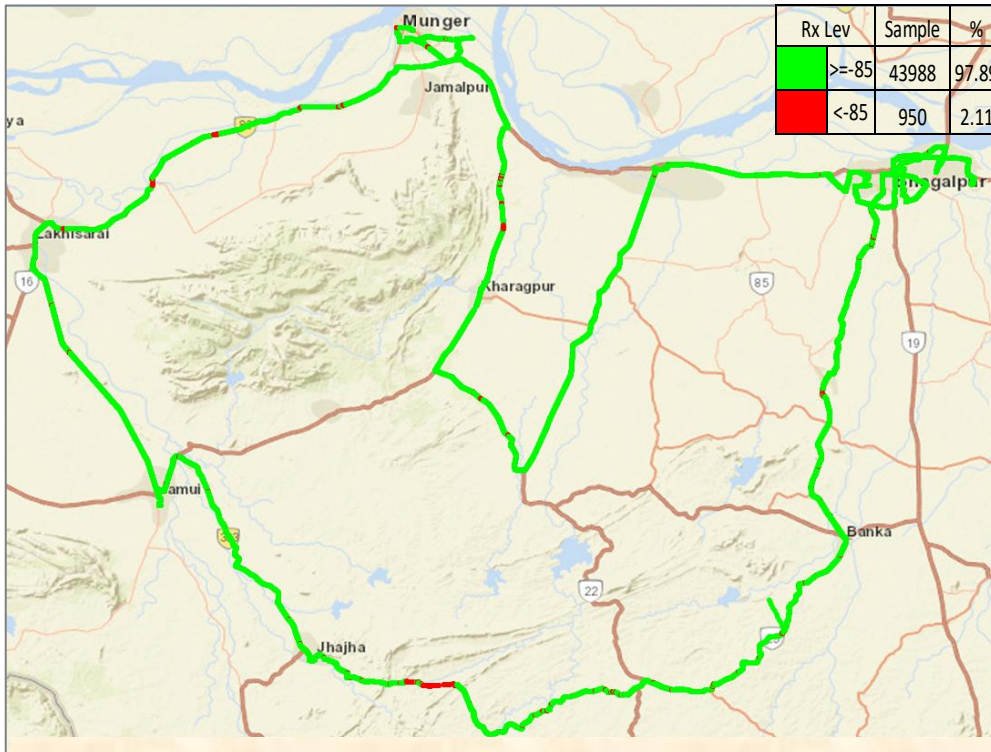
Overall Rx Level	Sample %
[Max >=-75]	42.02
[-75 >=-85)	33.34
[-85 >=-95)	22.53
[-95 >=Min)	2.11
Total	**100**

4G

RSRP		Samples	%
	>= -110	44051	95.39
	<-110	2127	4.61

Overall RSRP	Sample %
[Max >=-80]	12.21
[-80 >=-90)	26.42
[-90 >=-110)	56.77
[-110 >=Min)	4.61
Total	**100**

BSNL

Technology	Coverage Rate %
2G	73.07
3G	48.34

2G
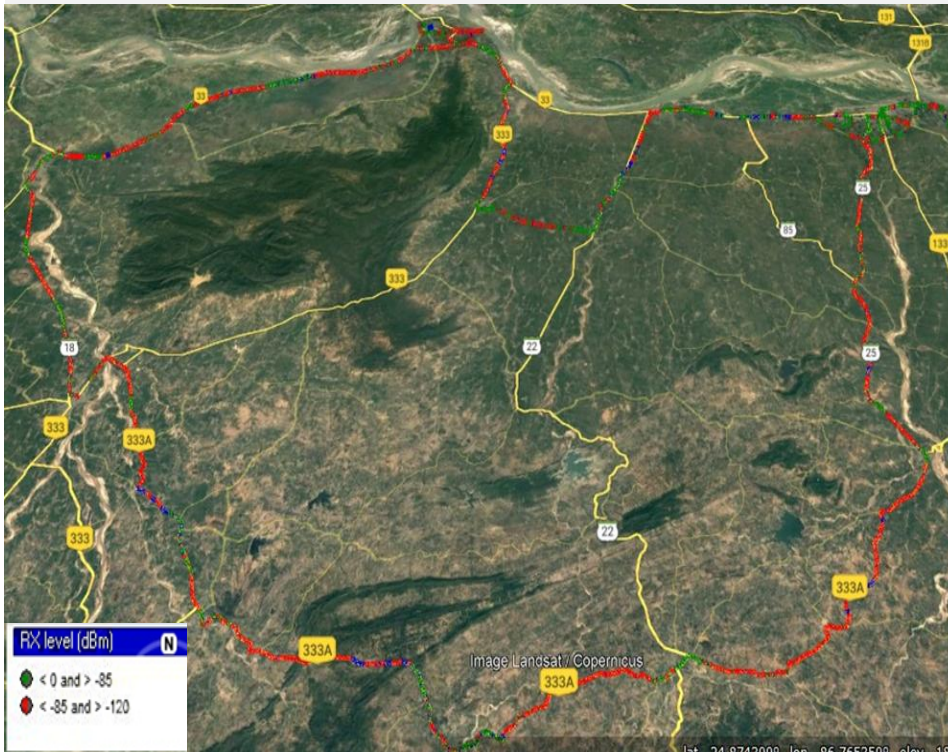
Overall RxLevel	Sample %
[Max >=-75]	10.65
[-75 >=-85)	16.28
[-85 >=-95)	11.99
[-95 >=Min)	61.08
Total	**100**

3G

Overall RSCP	Sample %
[Max >=-70]	20.22
[-70 >=-80)	13.92
[-80 >=-90)	17.52
[-90 >=Min)	48.34
Total	**100**

RJIO

Technology	Coverage Rate %
4G	98.57

4G
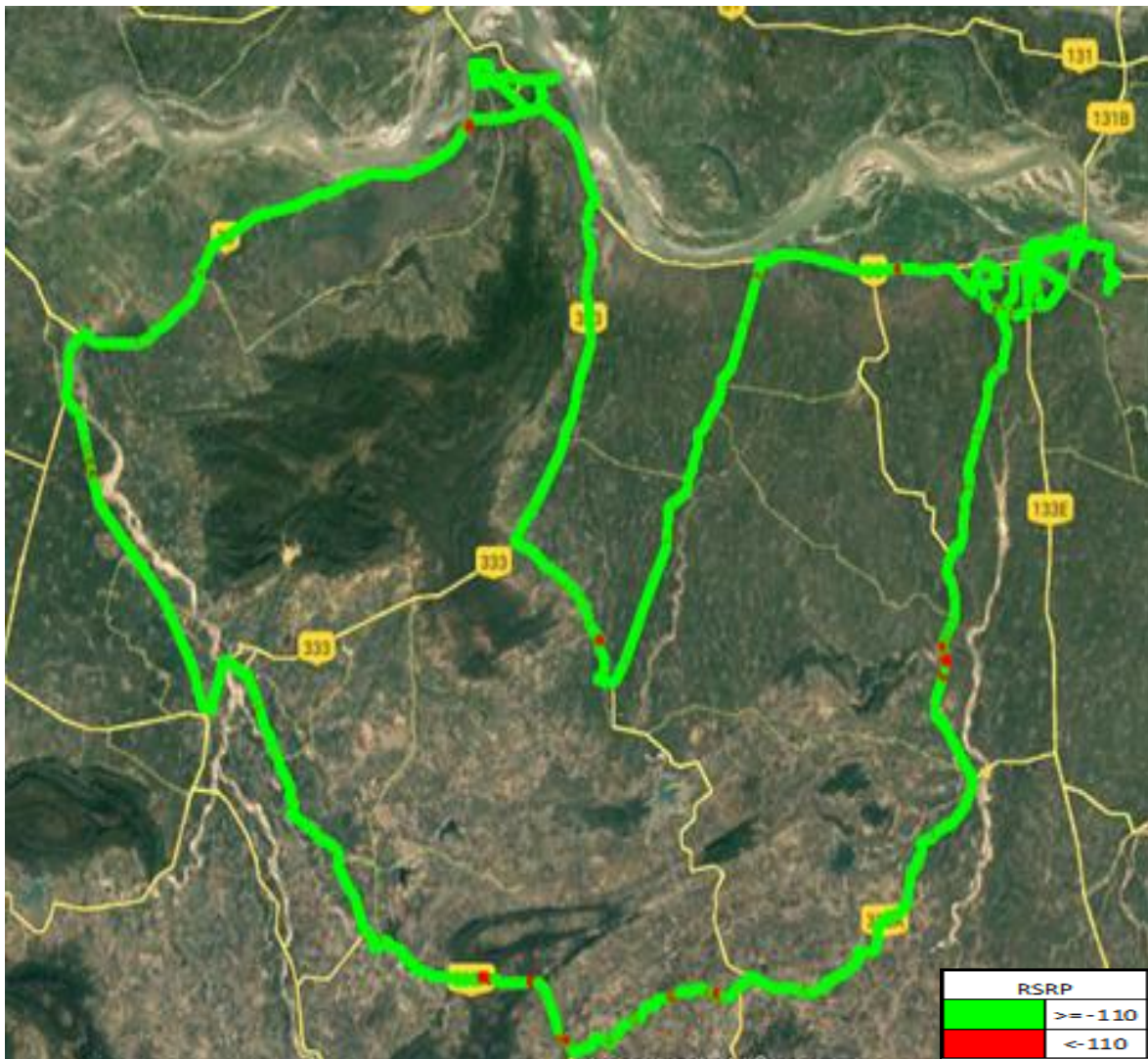
Overall RSRP	Sample %
[Max >=-80]	32.93
[-80 >=-90)	30.22
[-90>=-110)	35.43
[-110 >=Min)	1.43
Total	**100**

VIL

Technology	Coverage Rate %
2G	74.72
4G	93.76

2G

RxLevSub_dBm
- -85 to 0   (75%) (21217)
- -120 to -85 (25%) (7178)
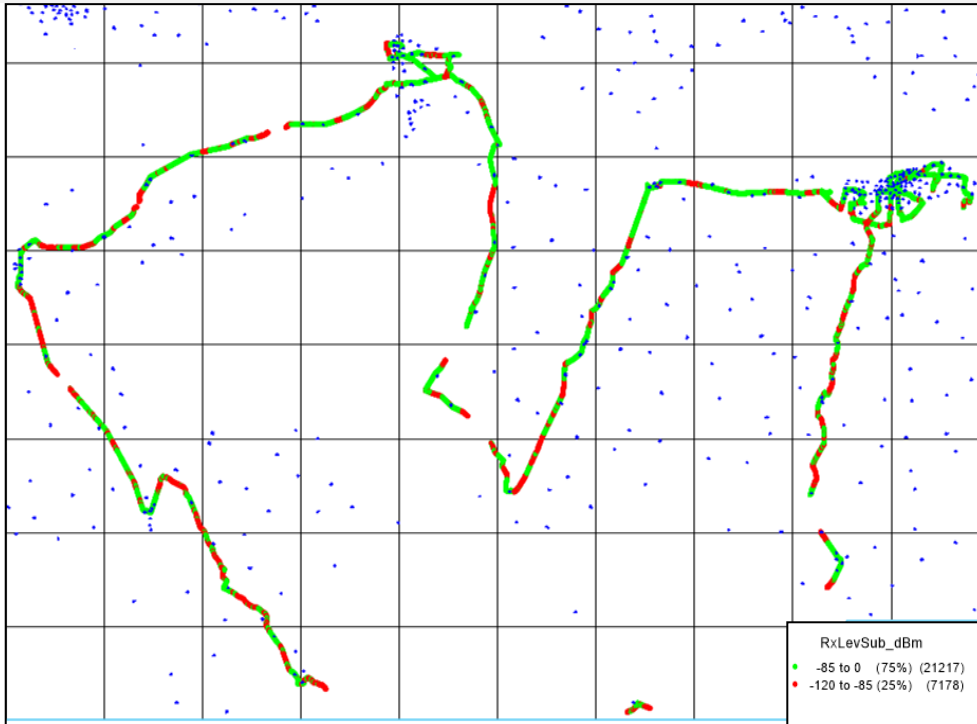
Overall RxLevel	Sample %
[Max >=-75]	45.97
[-75 >=-85)	28.76
[-85 >=-95)	19.86
[-95 =Min)	5.42
Total	**100**

4G

RSRP_dBm
- -110 to 0   (94%) (18474)
- -140 to -110 (06%)   (1229)
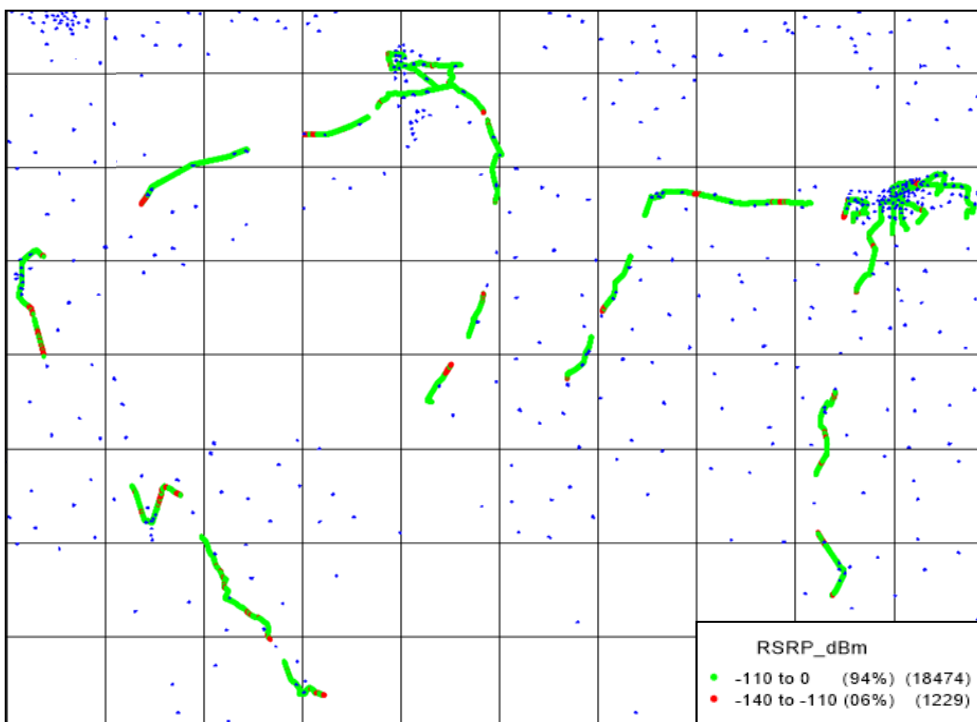
Overall RSRP	Sample %
[Max >=-80]	15.42
[-80 >=-90)	28.47
[-90>=-110)	49.87
[-110 >=Min)	6.24
Total	**100**

For measuring voice quality, as per the QoS norms, Rx Quality<=5 for GSM, Ec/No >= -14 dBm for 3G sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP	Rx Quality %
AIRTEL 2G	96.80
BSNL 2G	94.48
VIL 2G	97.93
BSNL 3G	69.16
AIRTEL 4G	71.70
RJIO 4G	85.36
VIL 4G	92.32

Rx Quality %
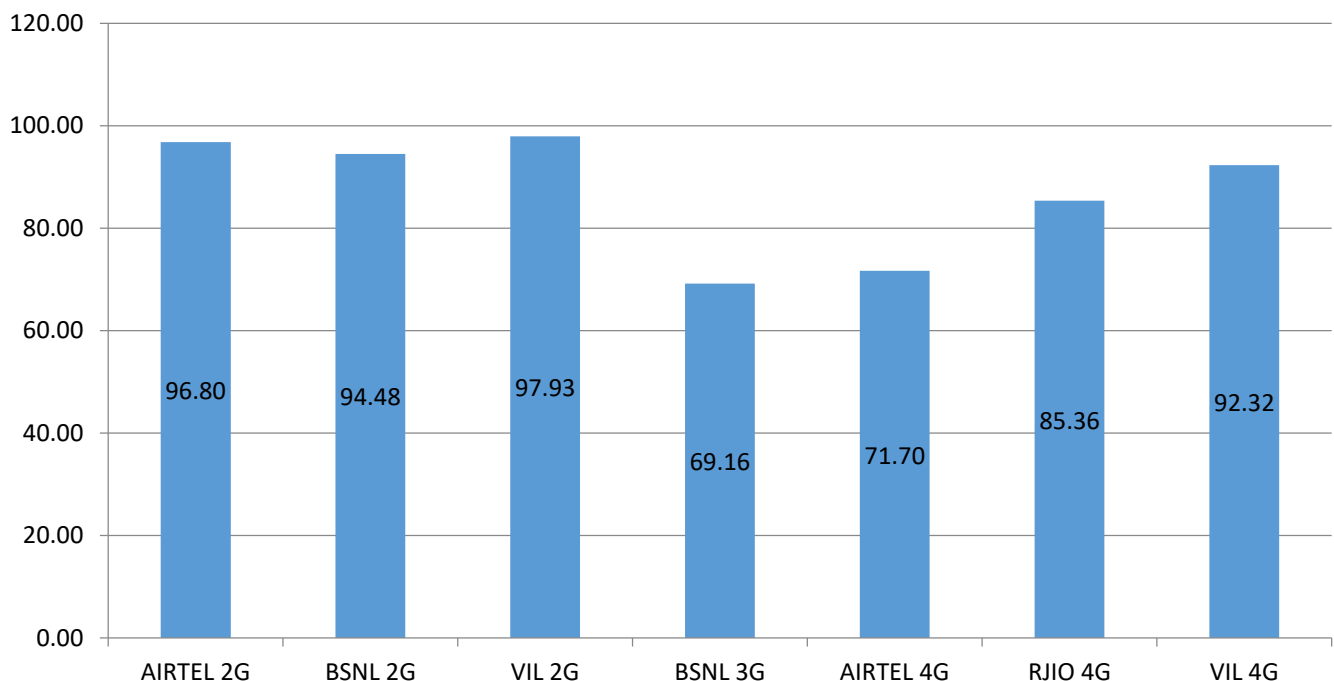
AIRTEL

Technology	Rx Quality %
2G	96.80
4G	71.70

2G

Rx Qual		Sample	%
	<=5	43988	96.8
	>5	950	3.2
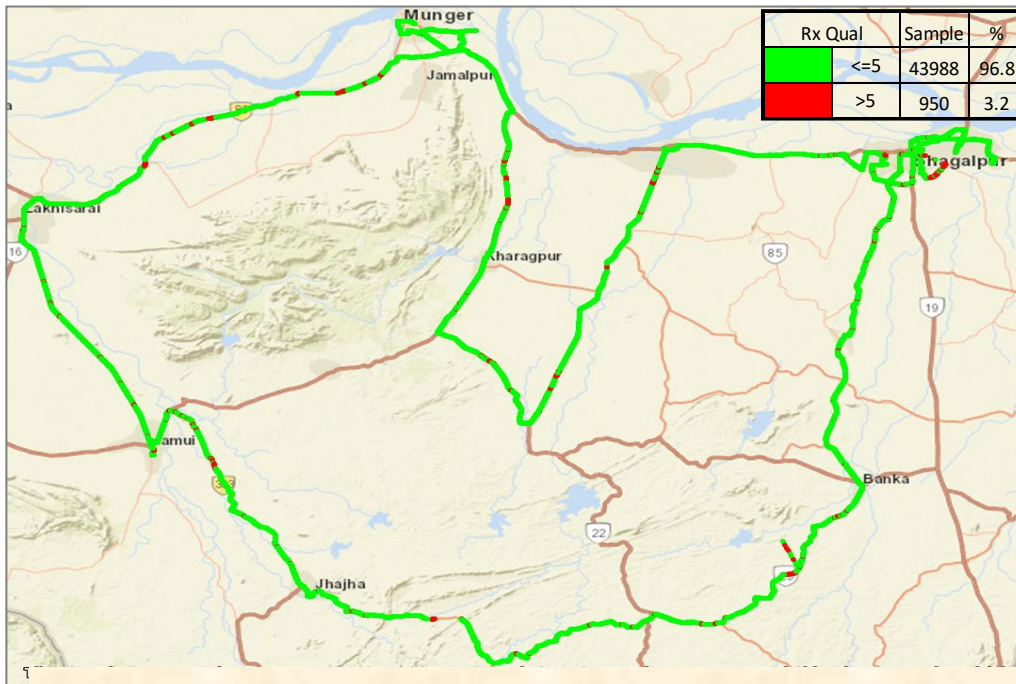
Overall Rx Quality	Sample %
(Min <=2)	85.2
(2 <=3)	5.9
(3 <=4)	3.4
(4 <=5)	2.2
(5 <=Max)	3.2
Total	100

4G

SINR		Samples	%
	>0	33087	71.7
	<=0	13083	28.3
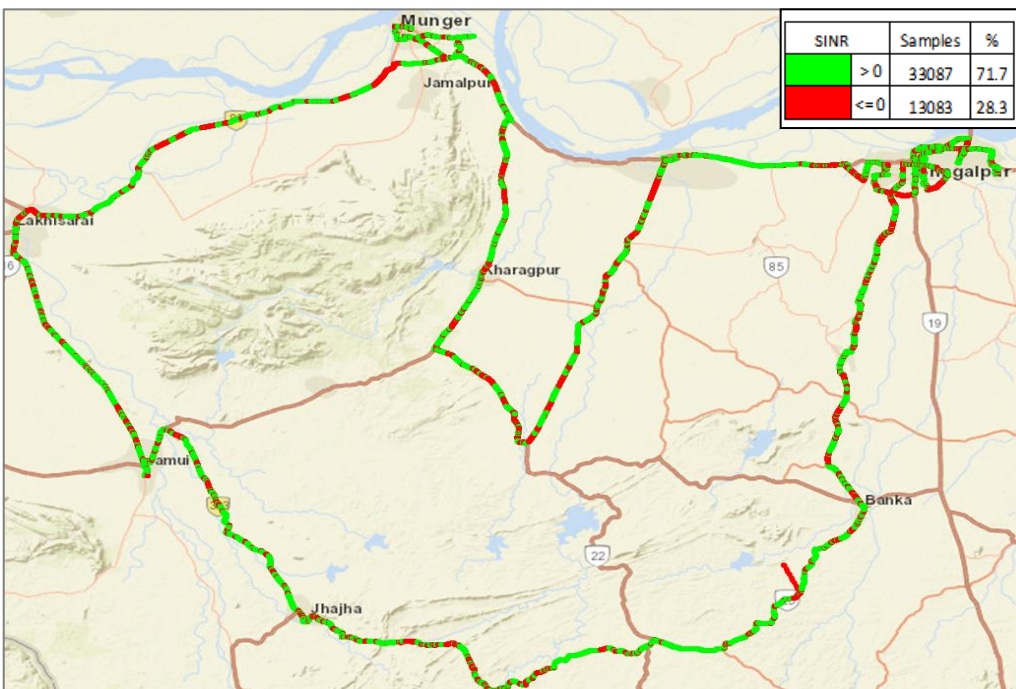
Overall SINR	Sample %
(Min <=0)	28.3
(0 <=5)	32.2
(5 <=10)	20.2
(10 <=15)	12.6
(15 <=Max)	6.7
Total	100

BSNL

Technology	Rx Quality %
2G	94.48
3G	69.16

2G

Overall Rx Quality	Sample %
(Min <=2)	89.54
(2 <=3)	1.48
(3 <=4)	1.62
(4 <=5)	1.84
(5 <=Max)	5.52
Total	**100**

3G

Overall EcNo	Sample %
(Max <=-6)	15.43
(-6 <=-9)	9.96
(-9 <=-11)	20.33
(-11 <=-14)	23.45
(-14 <= Min)	30.83
Total	**100**

RJIO

Technology	Rx Quality %
4G	85.36

4G
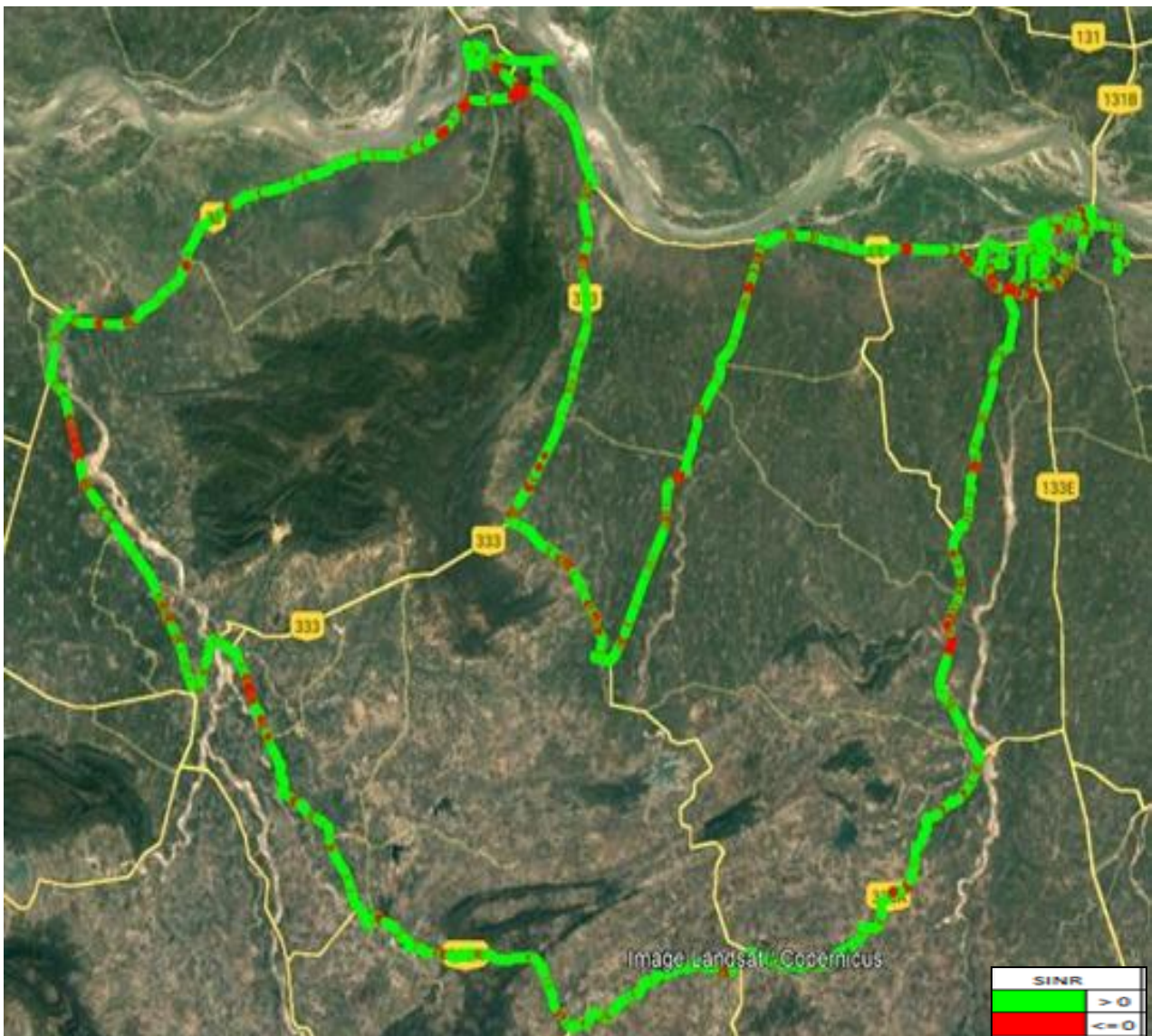
Overall SINR	Sample %
(Min <=0)	14.64
(0 <=5)	25.01
(5 <=10)	25.61
(10 <=15)	18.83
(15 <=Max)	15.92
Total	100

VIL

Technology	Rx Quality %
2G	97.93
4G	92.32

2G
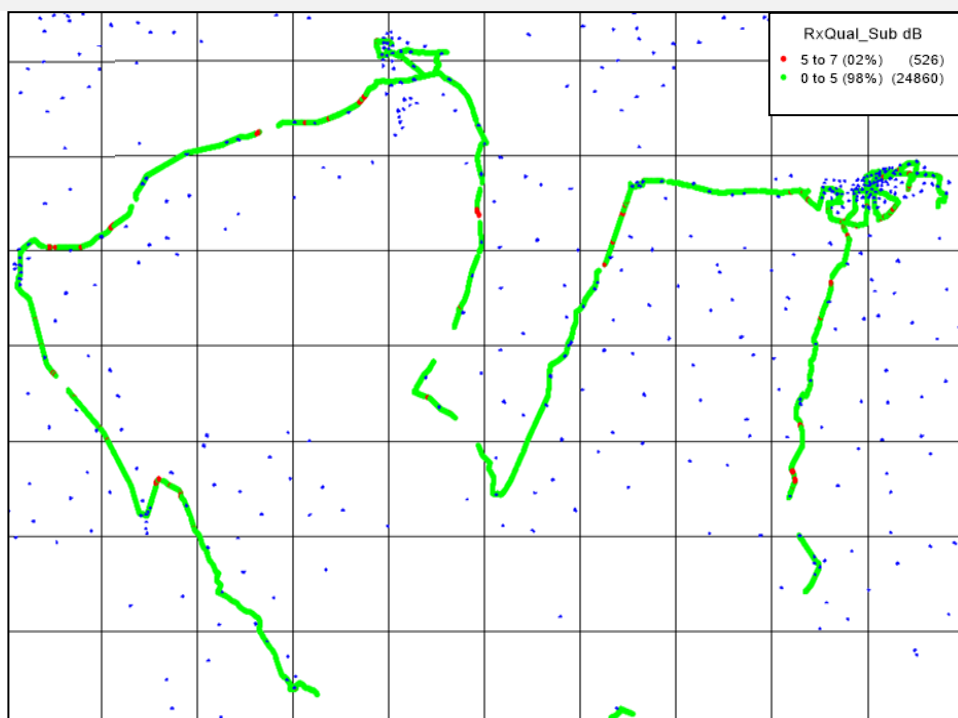
Overall Rx Quality	Sample %
(Min <=2)	88.04
(2 <=3)	3.97
(3 <=4)	4.32
(4 <=5)	1.60
(5 <=Max)	2.07
Total	100

4G
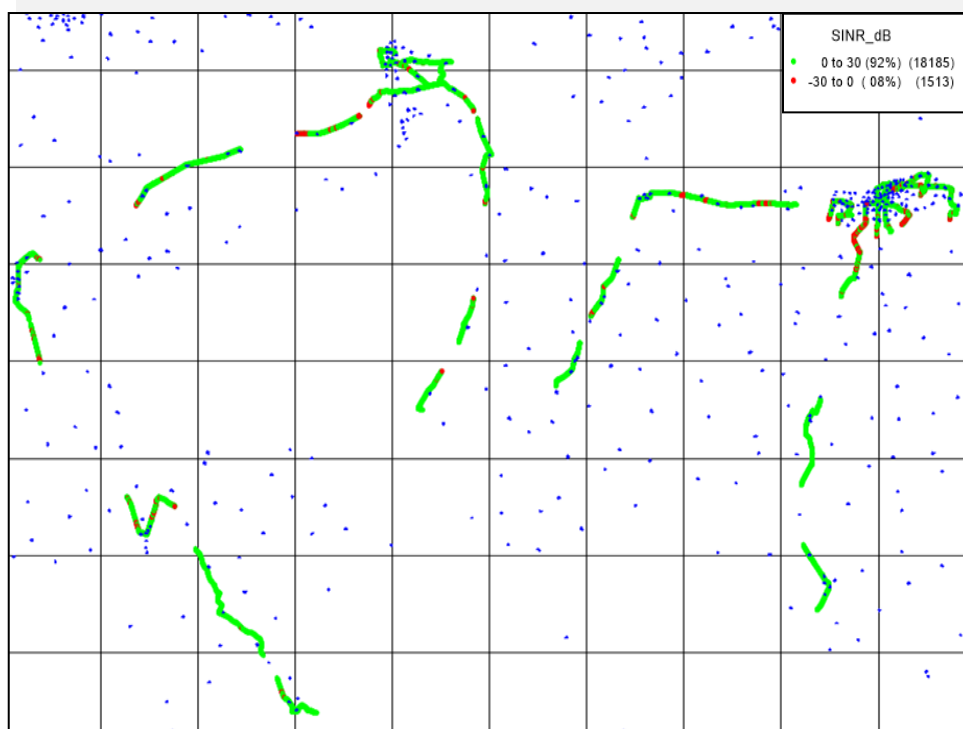
Overall SINR	Sample %
(Min <=0)	7.68
(0 <=5)	17.83
(5 <=10)	24.71
(10 <=15)	21.14
(15 <=Max)	28.64
Total	100

AIRTEL

Dynamic Data Testing Complete 417 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	124 .0

2G

2G DL		Samples	%
(green)	>100	39999	62.62
(red)	<=100	1992	37.38
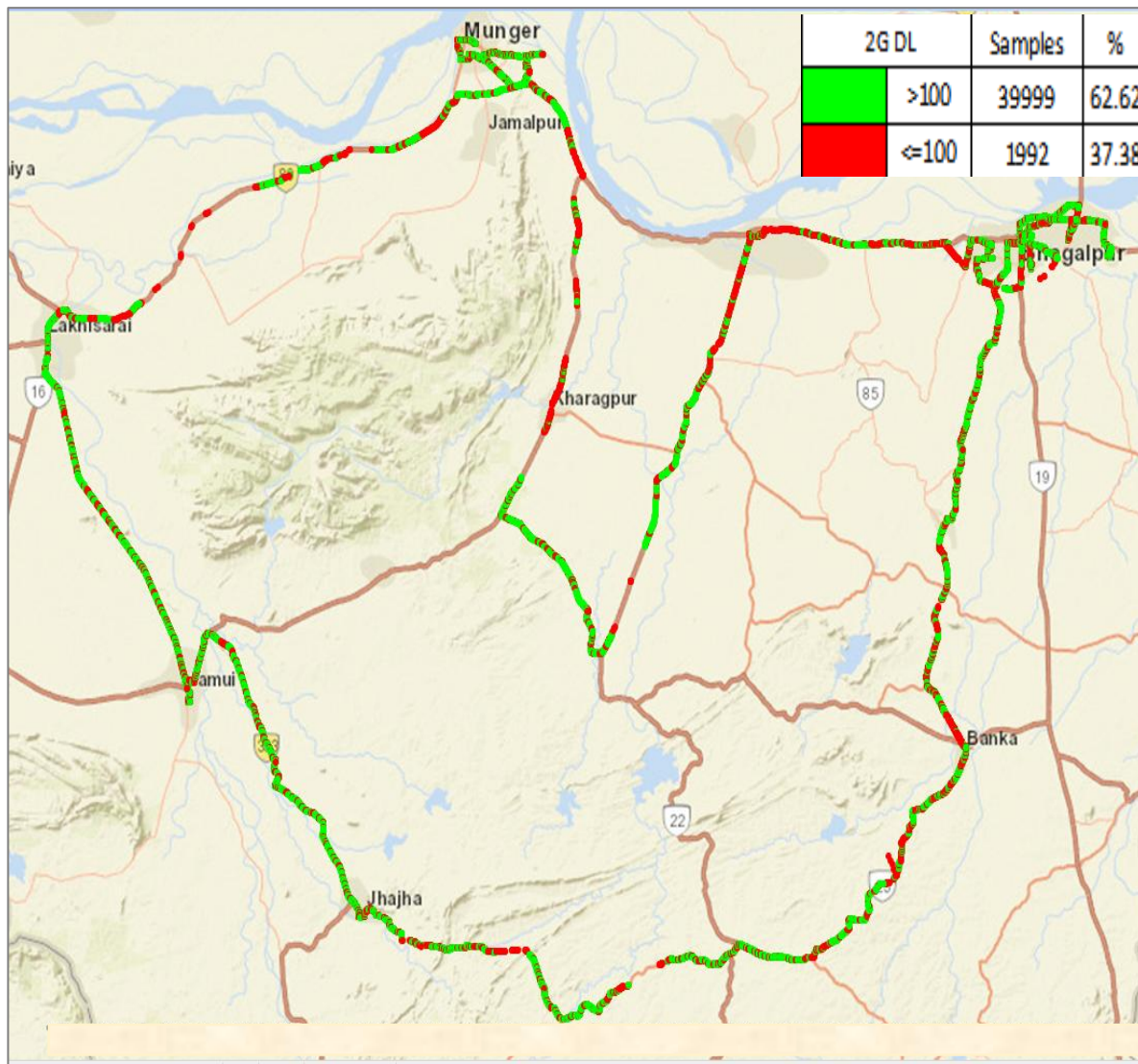
AVG. DOWNLOAD SPEED (Kbps)	124 .0
% FILE TRANSFER COMPLETE	100.0
DL throughput	Sample %
0 to 50 Kbps	37.38
50 to 100 Kbps	18.83
100 to 200 Kbps	21.09
200 to 300 Kbps	22.18
>300 Kbps	0.53
Total	**100**

AIRTEL

Dynamic Data Testing Complete 417 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	16.50

4G

4G DL		Samples	%
🟩	>2	27450	93.2
🟥	<2	1999	6.8
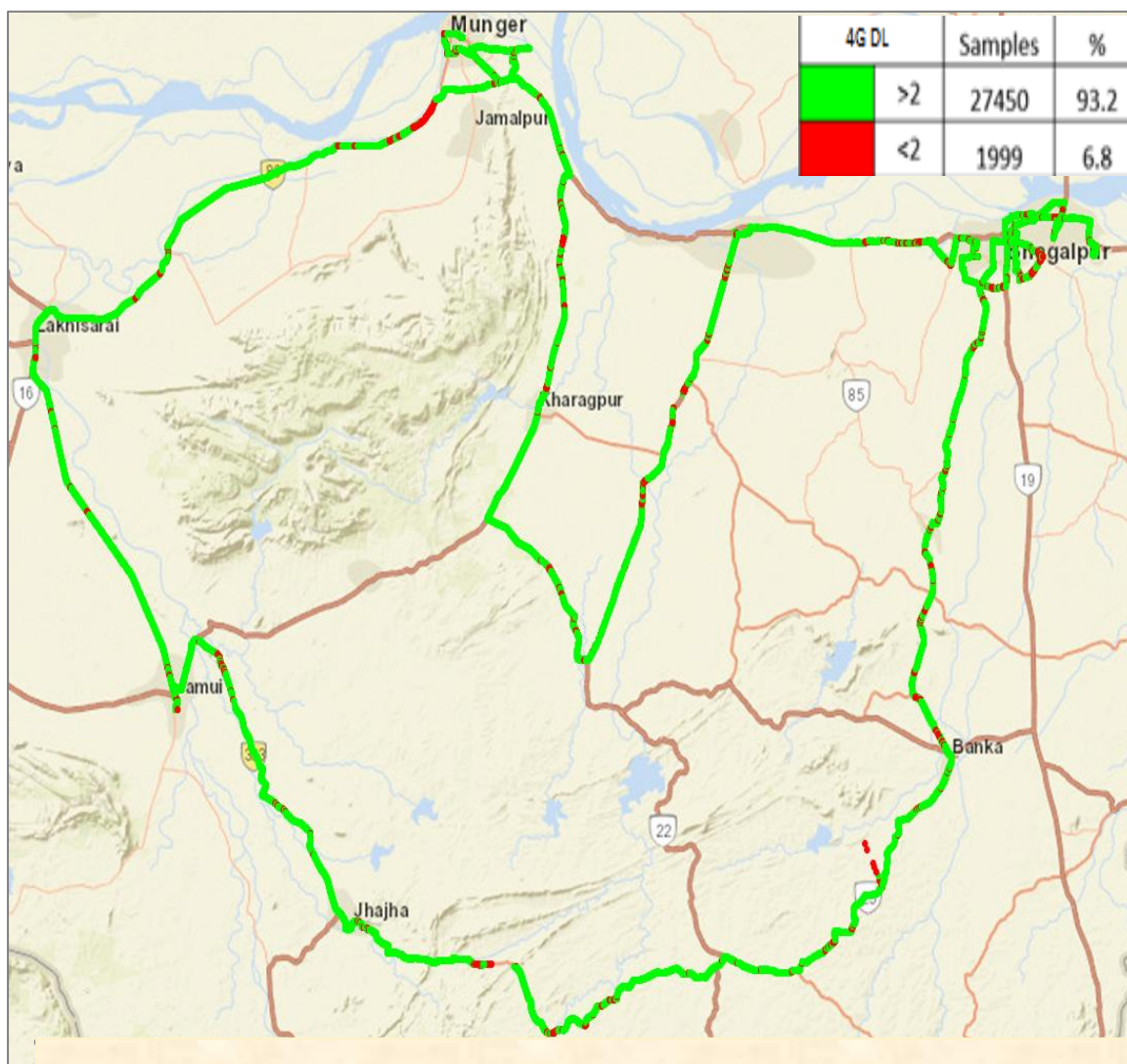
AVG. DOWNLOAD SPEED (Mbps)	16.50
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 1 Mbps	6.79
1 to 2 Mbps	6.15
2 to 5 Mbps	17.08
5 to 10 Mbps	17.62
>10 Mbps	52.35
Total	100

BSNL

Dynamic Data Testing Complete 417 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	42.36

2G
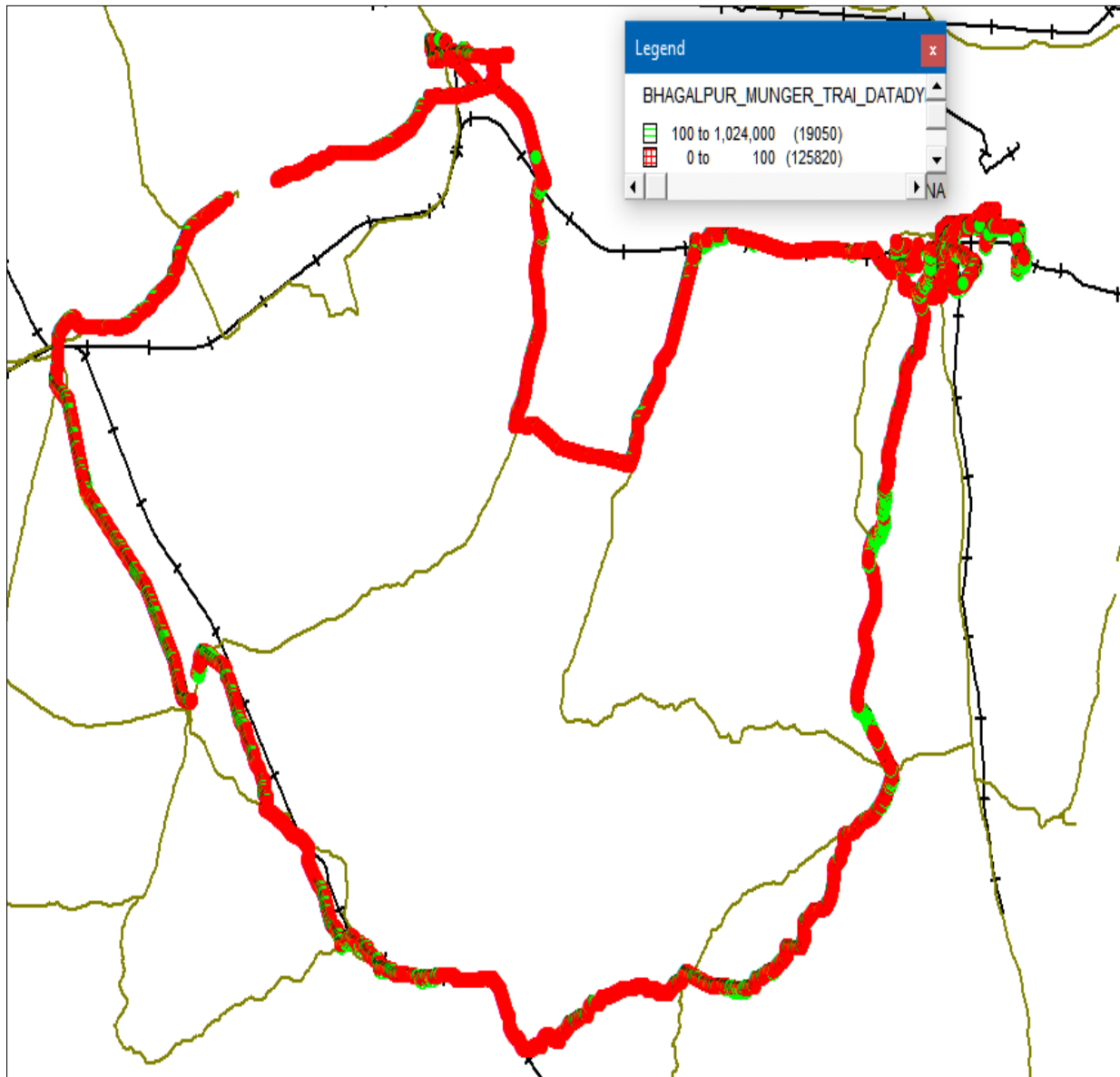
AVG. DOWNLOAD SPEED (Kbps)	42.36
% FILE TRANSFER COMPLETE	85.13
DL throughput	Sample %
0 to 50 Kbps	75.04
50 to 100 Kbps	15.57
100 to 200 Kbps	8.11
200 to 300 Kbps	0.26
>300 Kbps	0.02
Total	100

BSNL

Dynamic Data Testing Complete 417 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	1.64

3G
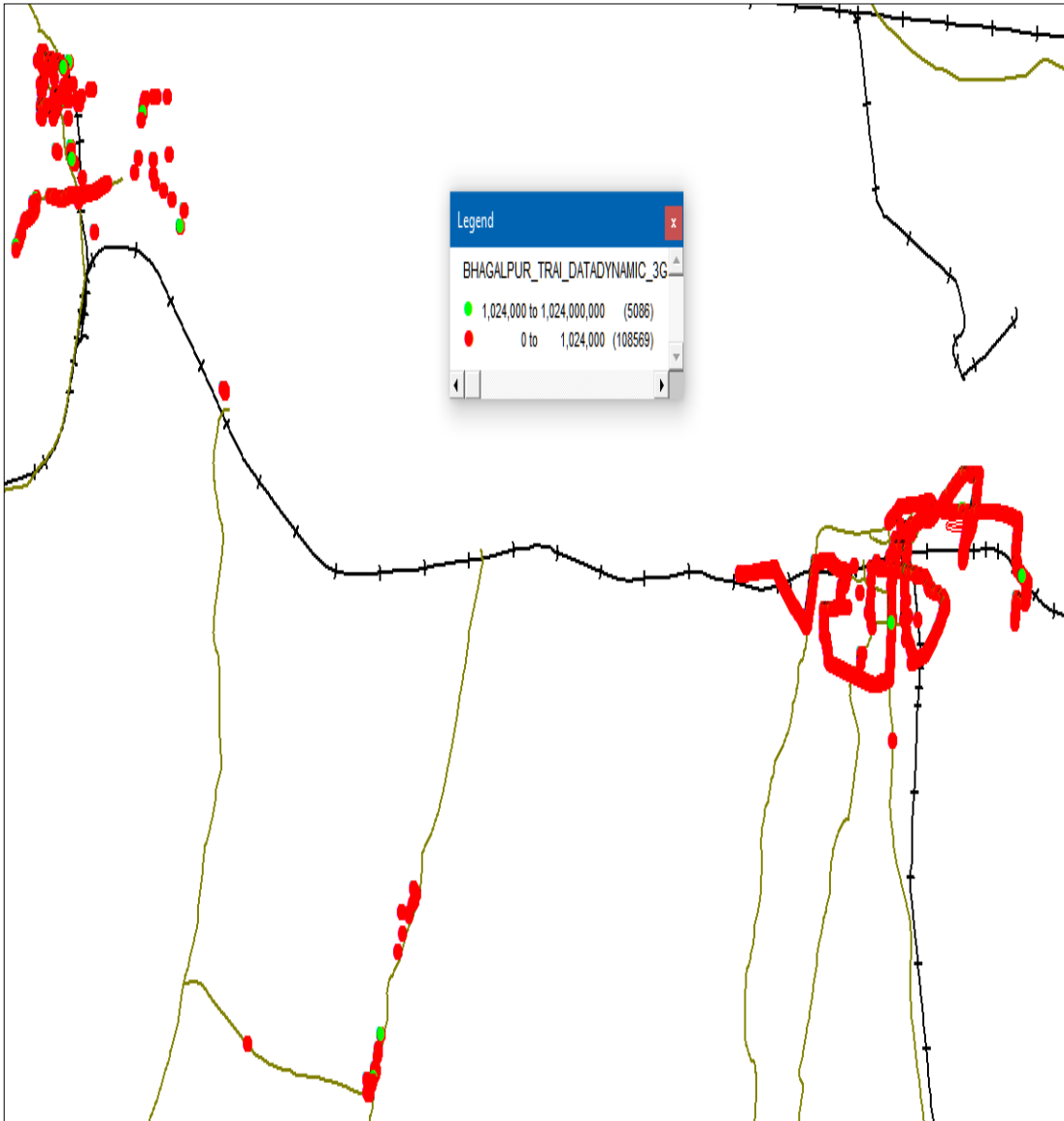
AVG. DOWNLOAD SPEED (Mbps)	1.64
% FILE TRANSFER COMPLETE	95.77
DL throughput	Sample %
0 to 0.5 Mbps	30.83
0.5 to 1 Mbps	15.44
1 to 2 Mbps	19.98
2 to 5 Mbps	24.96
>5 Mbps	8.79
Total	**100**

RJIO

Dynamic Data Testing Complete 417 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	19.74

4G
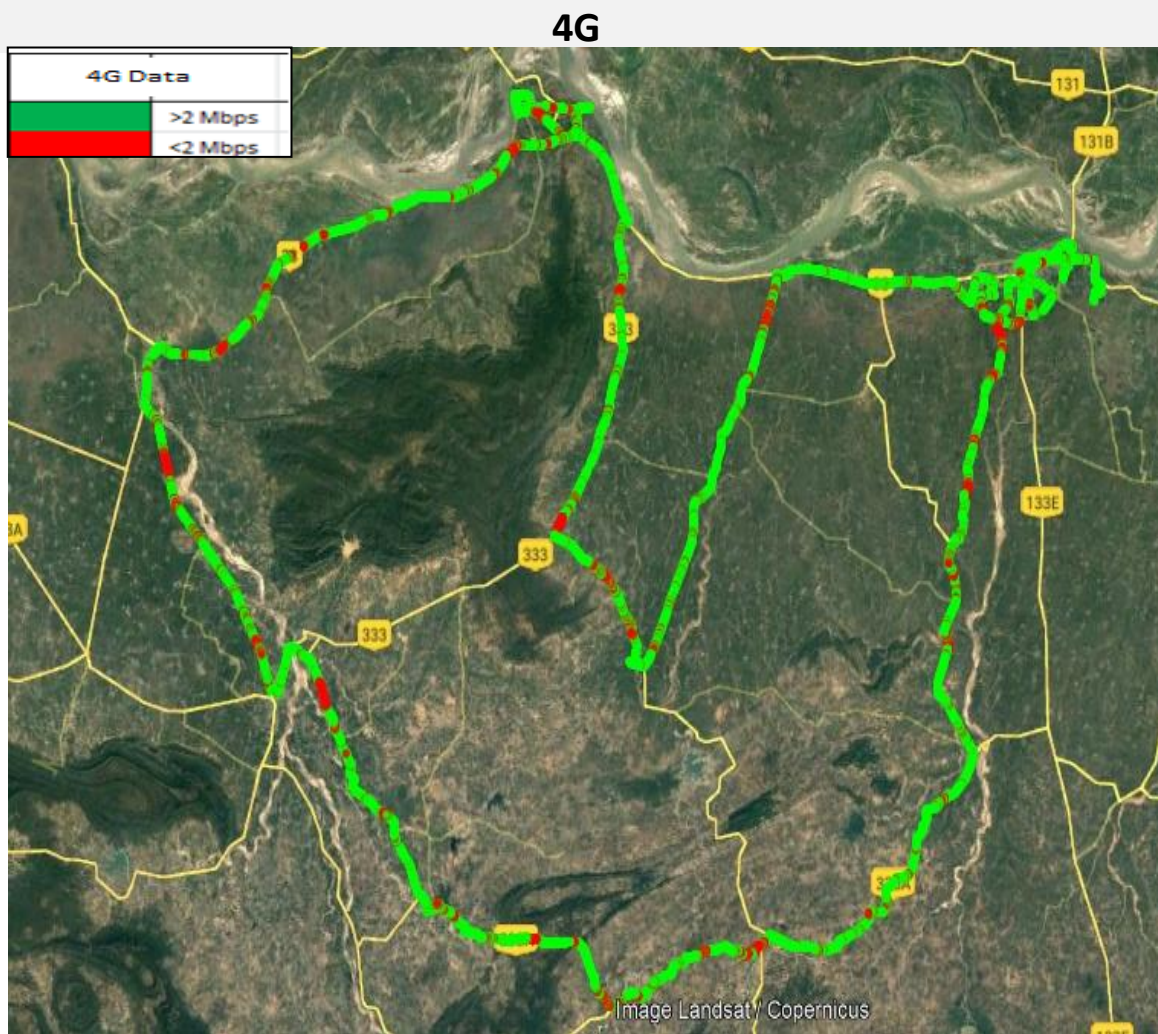
AVG. DOWNLOAD SPEED (Mbps)	19.74
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 1 Mbps	16.36
1 to 2 Mbps	7.50
2 to 5 Mbps	18.33
5 to 10 Mbps	20.44
>10 Mbps	37.37
Total	**100**

VIL

Dynamic Data Testing Complete 417 Kms

Data KPIs – Overall	2G
Average Download Throughput (Kbps)	135.20

2G
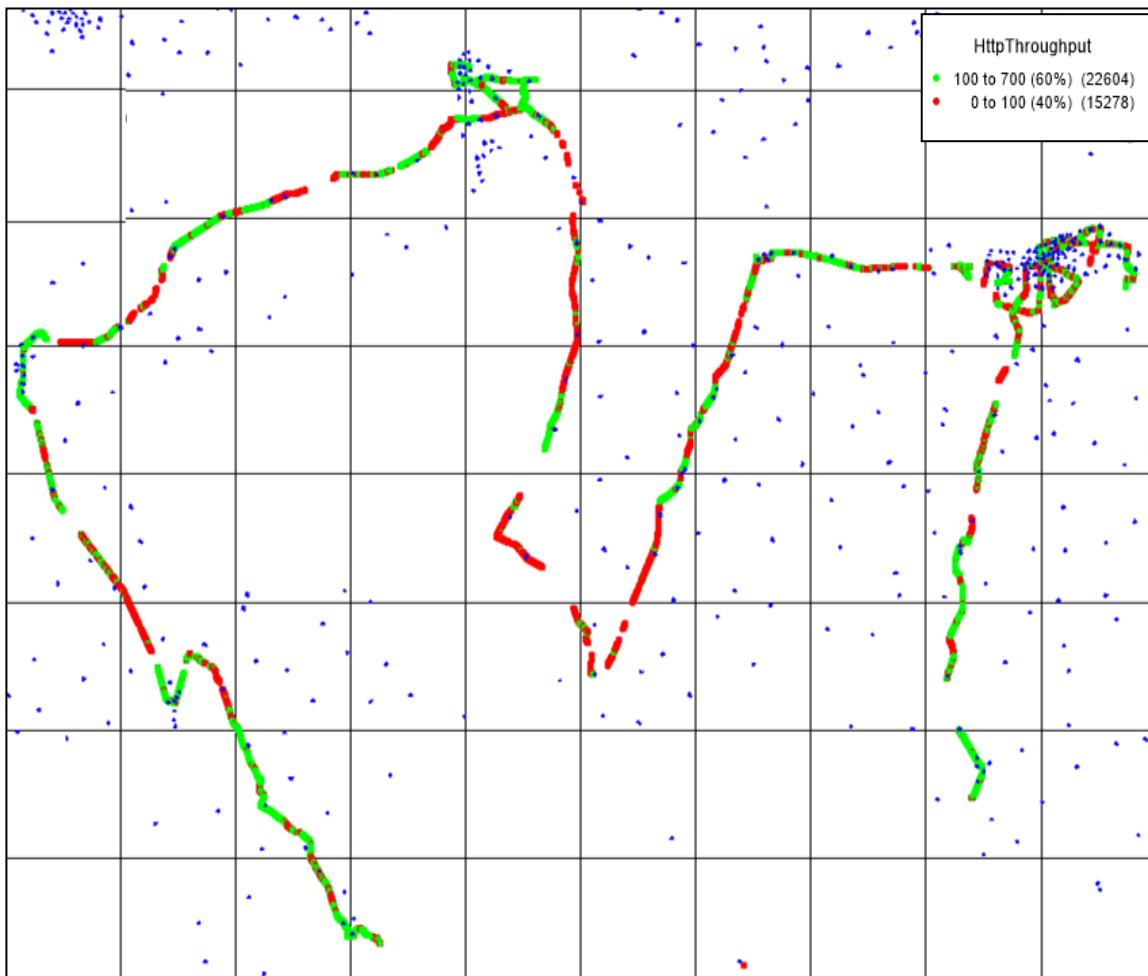
AVG. DOWNLOAD SPEED (Kbps)	135.20
% FILE TRANSFER COMPLETE	73.46
DL throughput	Sample %
0 to 50 Kbps	22.30
50 to 100 Kbps	18.03
100 to 200 Kbps	29.32
200 to 300 Kbps	28.88
>300 Kbps	1.47
Total	100

VIL

Dynamic Data Testing Complete 417 Kms

Data KPIs – Overall	4G
Average Download Throughput (Mbps)	11.70

4G

PDSCH Throughput

- 2,048 to 95,000 (84%) (26449)
- 0 to 2,048 (16%) (5060)
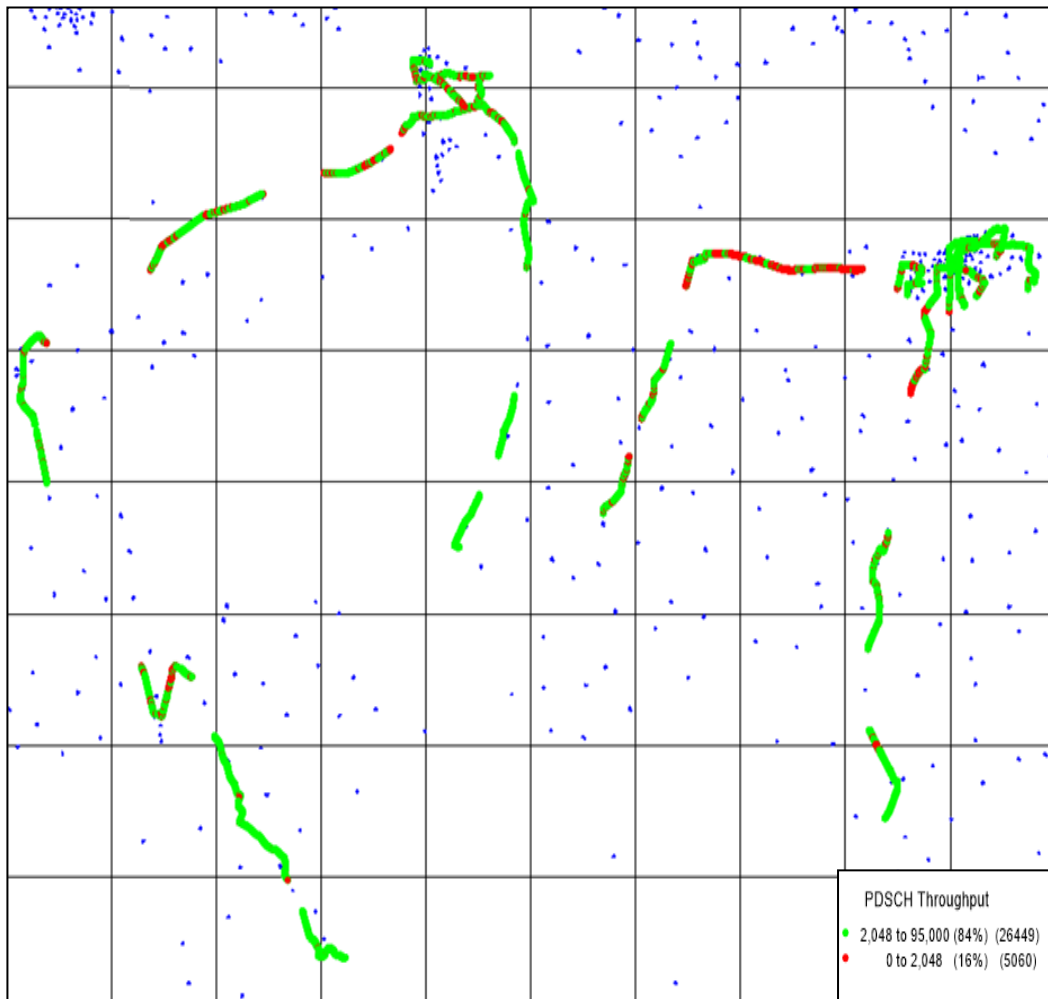
AVG. DOWNLOAD SPEED (Mbps)	11.70
% FILE TRANSFER COMPLETE	98.85
DL throughput	Sample %
0 to 1 Mbps	9.21
1 to 2 Mbps	6.85
2 to 5 Mbps	22.96
5 to 10 Mbps	16.85
>10 Mbps	44.13
Total	**100**