

Operator Assisted Drive Test Report Patna-Muzaffarpur-Motihari-Raxaul August, 2023 (RO, Kolkata)

Key Performance Indicators (KPIs):

The following TSPs could not meet the KPIs benchmark as stated below—

AIRTEL- Rx Quality in 2G & 4G (SINR) network.

BSNL-Drop Call Rate in 2G & 3G network, Rx Quality in 3G (Ec/Io) network.

RJIO-Rx Quality in 4G (SINR) network.

VIL- Rx Quality in 4G (SINR) network.

The Operator Assisted Drive Test has been carried out by Regional Office, Kolkata with the help of Service Providers in Patna-Muzaffarpur-Motihari-Raxaul and surrounding areas including National Highways (22, 527D) on 29th August 2023 and 30th August 2023 from 08.30 AM to 08.30 PM. The drive test covered drive route of 559 KMs (approx) over a period of 2 days. Approximately 550+ 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

Patna historically known as Pataliputra, is the capital and largest city of the state of Bihar in India. The modern city of Patna is mainly on the southern bank of the river Ganges.

Muzaffarpur is a city located in Muzaffarpur district in the Tirhut region of the Indian state of Bihar. It serves as the headquarters of the Tirhut division, the Muzaffarpur district and the Muzaffarpur Railway District. It is the fourth most populous city in Bihar.

Motihari is a city and headquarters of East Champaran district in the Indian state of Bihar. It is located 80 kilometres west of Muzaffarpur and 152 kilometres northwest of the state capital Patna.

Raxaul is a sub-divisional town in the East Champaran district of the Indian state of Bihar. It is situated at the India-Nepal border with Birgunj city (Nepal). Raxaul is a major railway junction.

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.

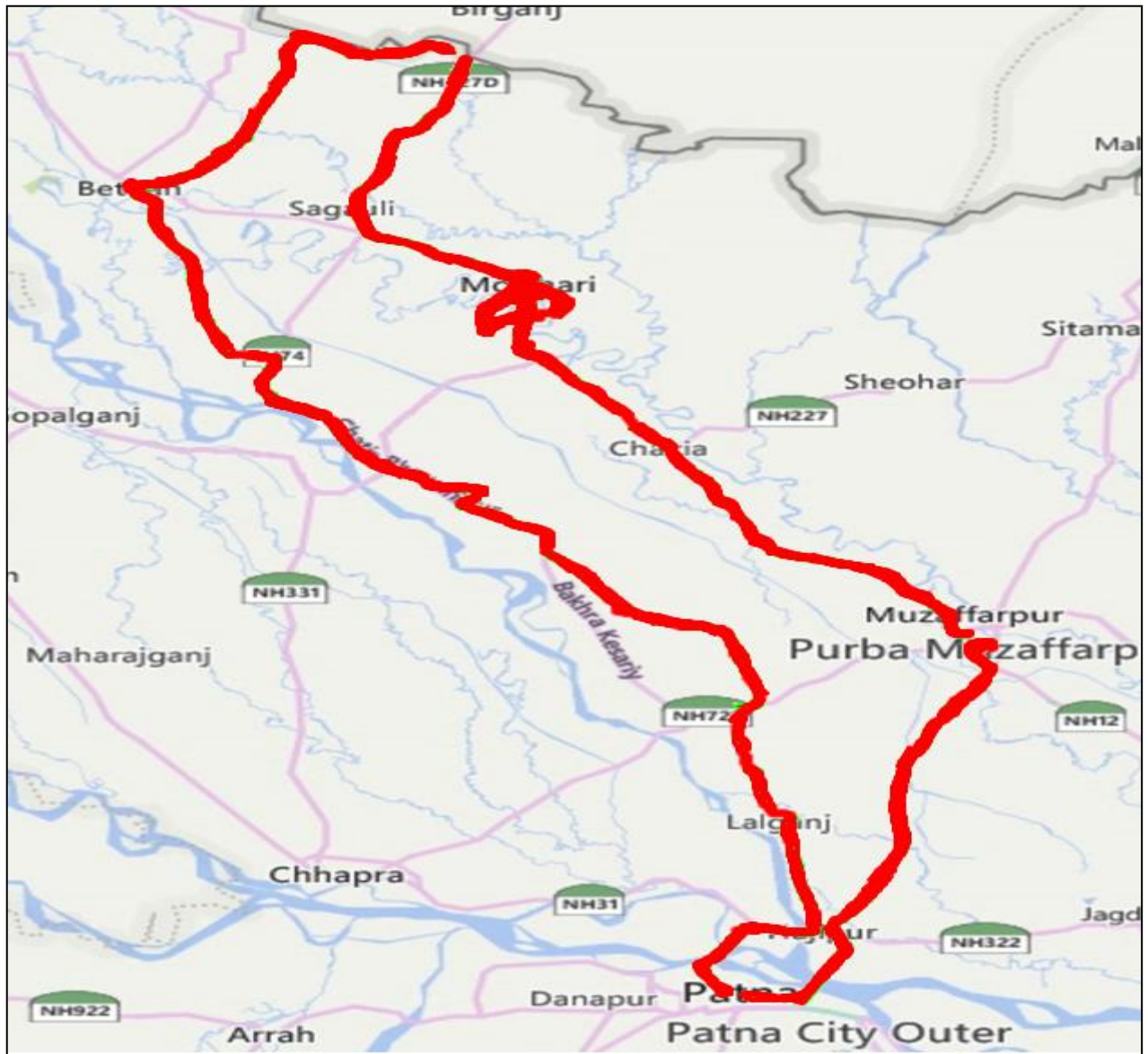
Data Tests: Dynamic Data Service Testing was performed along same route in all technologies. 500 KB file for 2G, 20MB file for 3G and 40MB file for 4G were downloaded from FTTP server in TSP's own server. Static Data Service Testing was also performed. Three 2G (Lock Mode) networks, one 3G (Lock Mode)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

Overview

Voice & Dynamic Data Test Drive Route



Drive Routes: Patna- Muzaffarpur-Motihari-Raxaul

DAY-1—Patna Railway Junction—Nalanda Medical College Hospital—Mahatma Gandhi Setu—Saifpur—Hajipur Bus Stand —Ramdayalu Singh College —Muzaffarpur Railway Station — Kanti-Motipur Block Office—Sofia Unani Medical College —Damodarpur-Kishunpur—Motihari-Bapu Dham Railway Station, Motihari—Mani Hospital, Motihari—Sadar Hospital—Motihari Eng. College —Zila School Motihari.

DAY-2—Karpuri Thakur College Motihari—Sugaully Block—Ramgarhwa—Raxaul—Mother Teresa Hospital- Nepal Border- Sihpur—Bairiya Birt- Siswa —Bhelahi-Sikta Police Station—Ekdari Mangalpur- Govt. Primary School Baritala- Bettiah Railway Station- Bettiah Airport—Taj Hospital Jagdishpur—Nawadih Post Office—B D Office Paharpur- Maguraha—Areraj- Sangrampur Hospital- Digha Bridge- Sanjay Gandhi Zoo.

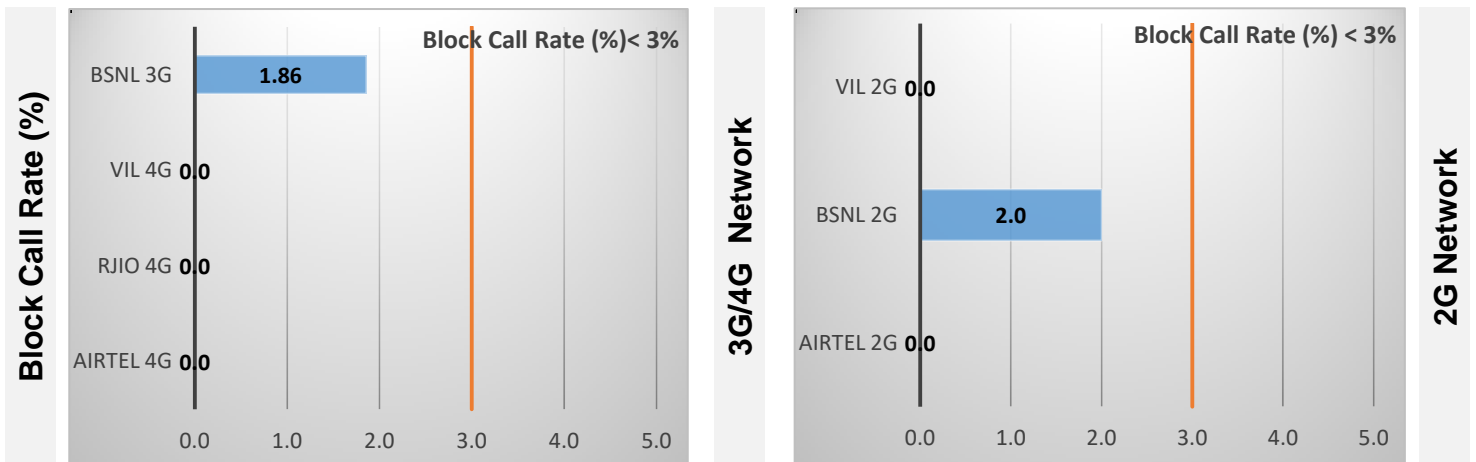
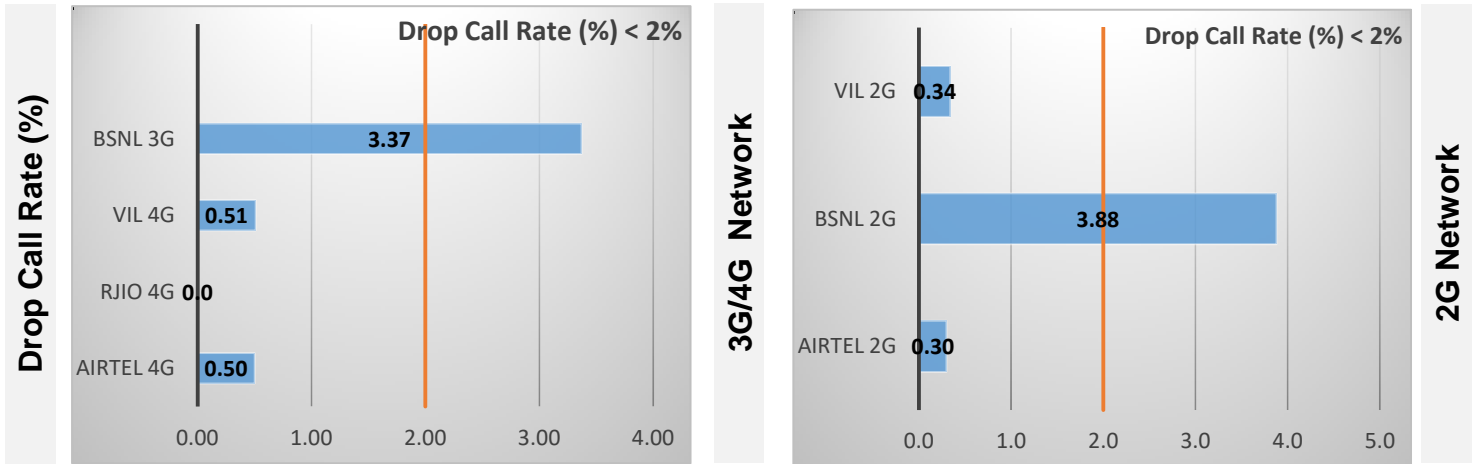
Data Service Test- Static Locations

Static Locations
Patna Railway Junction
Zila School Motihari
Karpuri Thakur College Motihari

Voice Calls

Key Observations

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 %	0.30	3.88	0.34	3.37	0.50	0.0	0.51
Block Call Rate %	0.0	2.0	0.0	1.86	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%).

Coverage

a) Percentage of coverage samples for 2G \geq -85 dBm.

TSPs	2G		
	AIRTEL	BSNL	VIL
Coverage %	95.99	75.50	74.0

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

TSPs	3G	4G		
	BSNL	AIRTEL	RJIO	VIL
Coverage	44.26	96.59	97.43	94.56

Summary

City Level Summary- Voice

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	673	618	296
Blocked Call Rate (%)	0.0	2.0	0.0
CSSR% (Accessibility)	99.40	98.0	100
Drop Call Rate (%)	0.30	3.88	0.34
Mobility HOSR (%)	97.89	97.06	95.96
Rx Quality (%)	92.30	98.05	96.0

Voice Call	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Call Attempt	368	873	633	390
Blocked Call Rate (%)	1.86	0.0	0.0	0.0
CSSR% (Accessibility)	98.10	98.74	100	100
Drop Call Rate (%)	3.37	0.50	0.0	0.51
Mobility HOSR (%)	99.59	99.70	98.43	100
Rx Quality (%)	70.60	89.90	85.80	90.05

Summary-Data Services Dynamic

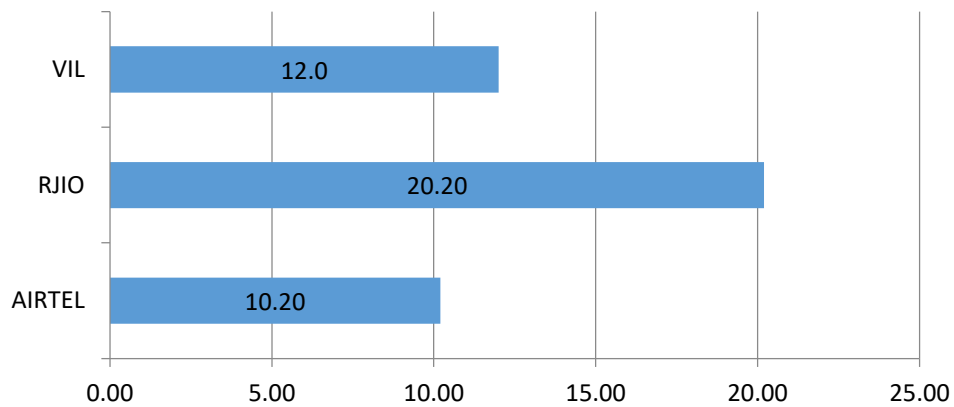
Key Observations

Dynamic Data was tested for 559 Kms. Download Throughput was tested.

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

4G/3G Network:

4G-Dynamic Download Average Throughput (Mbps)



3G-Dynamic Download Average Throughput (Mbps)



Summary-Data Services Static

City Level Summary-

Average Data Services Static	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	101.50	27.33	207.80
Upload Throughput (kbps)	53.0	10.60	92.70
Web Browsing Delay (sec)	43.50	78.90	20.50
Latency (msec)	488.50	1079	190

Average Data Services Static	3G/ 4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	1.52	23.01	17.78	10.0
Upload Throughput in Mbps	0.34	17.87	5.47	9.50
Video streaming delay (secs)	14.0	1.95	0.52	8.50
Web Browsing Delay (secs)	5.50	1.50	2.95	6.0
Latency (msec)	128	74	53.67	82.5

Summary-Data Services Static

Location Level Summary-

Location:-Patna Railway Junction	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	103.0	28.0	175.40
Upload Throughput (kbps)	56.0	10.0	75.40
Web Browsing Delay (sec)	45.0	42.70	22.0
Latency (msec)	457	1096	170

Location:-Patna Railway Junction	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	1.42	33.72	7.14	12.0
Upload Throughput in Mbps	0.12	26.43	4.24	13.0
Video streaming delay (secs)	13.0	1.90	0.64	8.0
Web Browsing Delay (secs)	5.40	2.0	3.70	7.0
Latency (msec)	131	85	71	75

Location:- Zila School Motihari	2G		
	AIRTEL	BSNL	VIL
Download throughput in (kbps)	100.0	26.0	***
Upload Throughput in (kbps)	50.0	12.0	***
Web Browsing Delay (secs)	42.0	146.0	***
Latency (msec)	520	1047	***

Location:- Zila School Motihari	4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	0.76	12.30	34.26	***
Upload Throughput in (mbps)	0.11	9.32	5.73	***
Video streaming delay (secs)	16.0	2.0	0.44	***
Web Browsing Delay (secs)	5.40	1.0	2.78	***
Latency (msec)	123	63	44	***

*** VIL did not submit data

Summary-Data Services Static

Location Level Summary-

Location:-Karpuri Thakur College Motihari	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	***	28.0	240.20
Upload Throughput (kbps)	***	10.0	110.0
Web Browsing Delay (sec)	***	48.0	19.0
Latency (msec)	***	1096	210

Location:-Karpuri Thakur College Motihari	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	2.39	***	11.94	8.0
Upload Throughput in Mbps	0.79	***	6.45	6.0
Video streaming delay (secs)	15.0	***	0.47	9.0
Web Browsing Delay (secs)	5.40	***	2.36	5.0
Latency (msec)	131	***	46	90

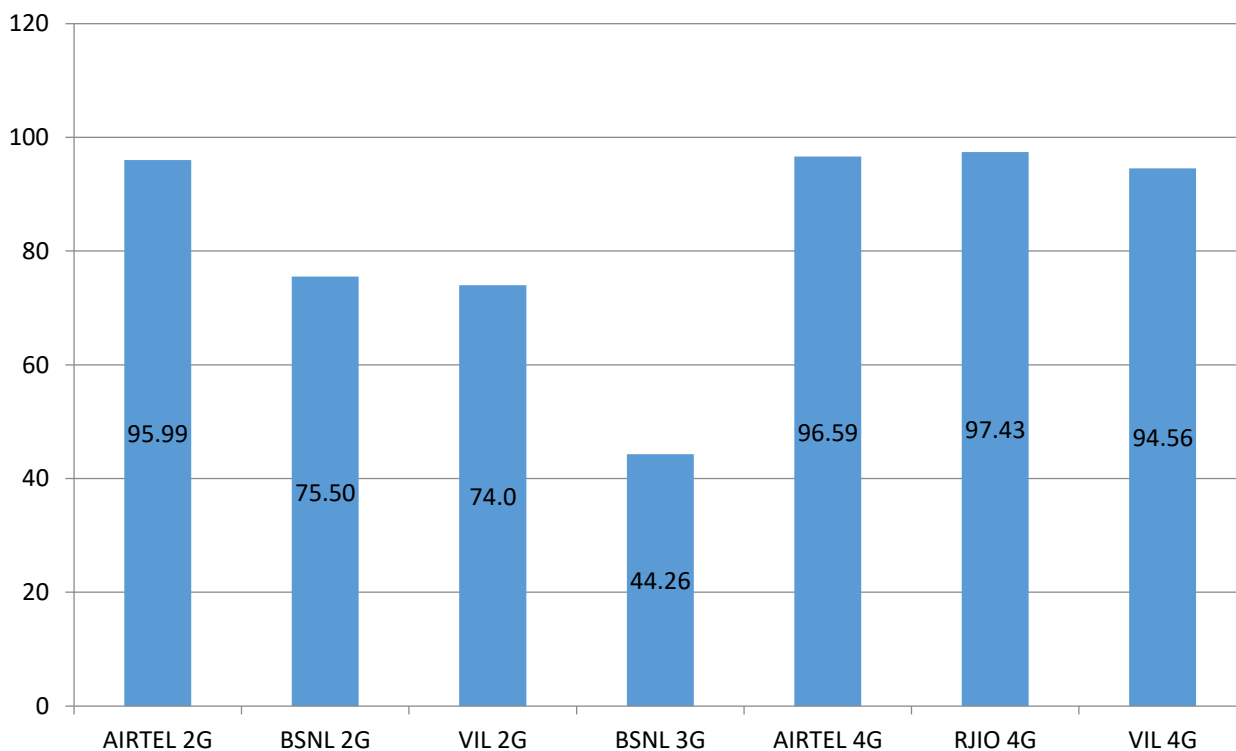
*** AIRTEL did not submit data

I. Coverage Details

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 ≥ -110 dBm. The details are as follows.

TSP	Coverage Rate %
AIRTEL 2G	95.99
BSNL 2G	75.50
VIL 2G	74.0
BSNL 3G	44.26
AIRTEL 4G	96.59
RJIO 4G	97.43
VIL 4G	94.56

Coverage Rate %



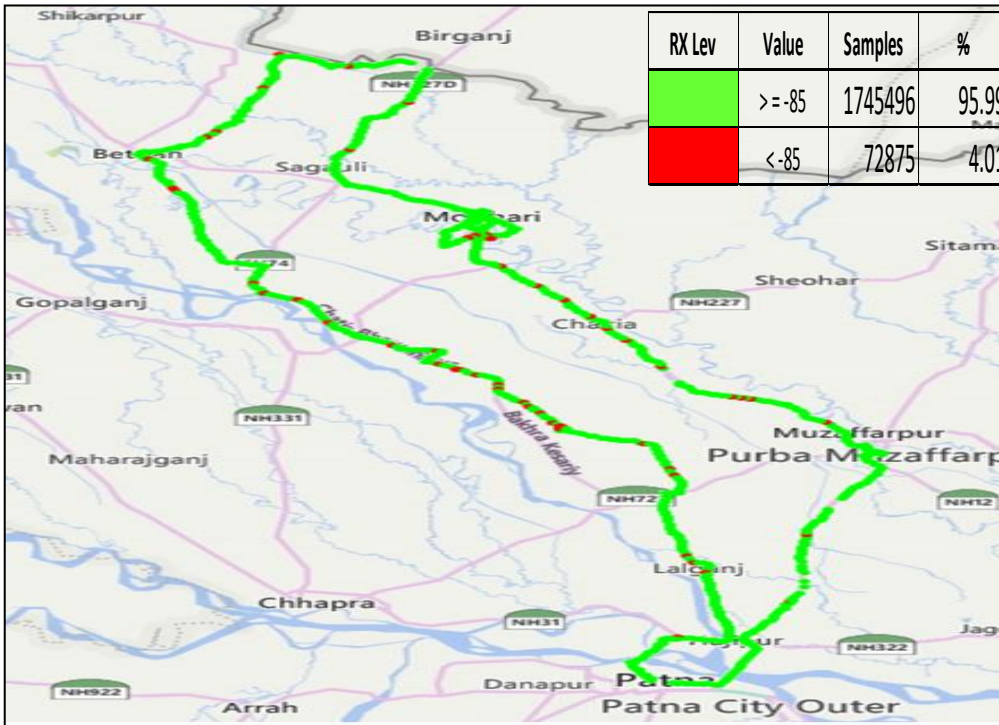
Note- Coverage is the percentage of samples having signal strength more than the threshold value (2G ≥ -85 dbm, 3G ≥ -90 dbm and 4G ≥ -110 dbm). However, these samples are only for the portion of the OADT routes where TSPs have coverage i.e 'no coverage' routes have been excluded.

I. Coverage Details

AIRTEL

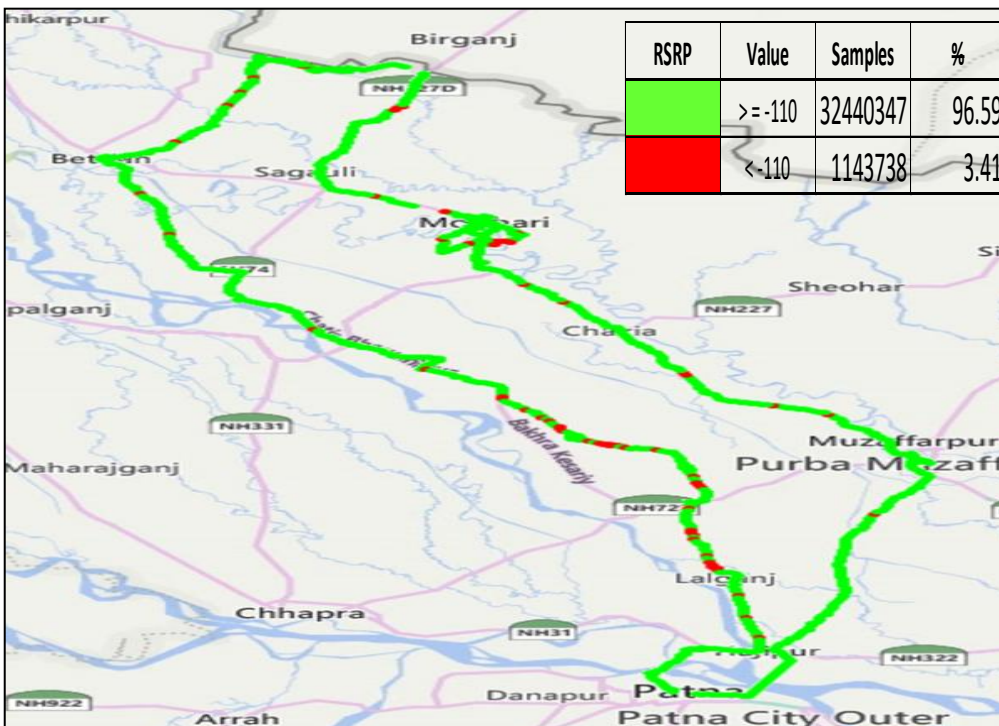
Technology	Coverage Rate %
2G	95.99
4G	96.59

2G



Overall Rx Level	Sample %
[Max >=-75]	32.0
[-75 >=-85)	25.0
[-85 >=-95)	38.99
[-95 >=Min)	4.01
Total	100

4G



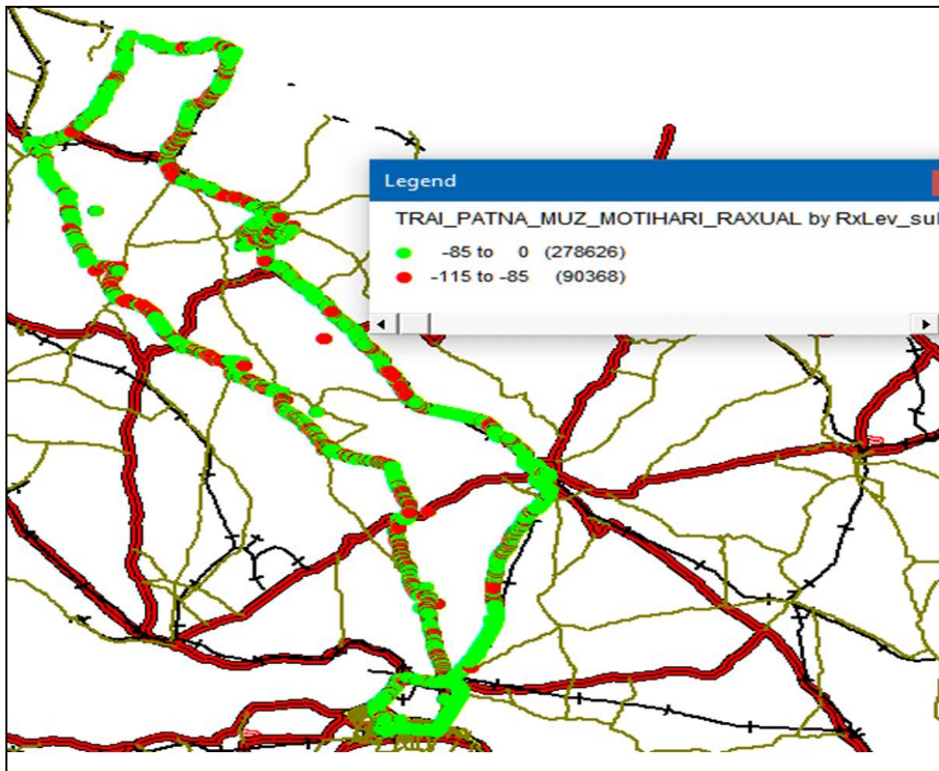
Overall RSRP	Sample %
[Max >=-80]	54.47
[-80 >=-90)	10.81
[-90 >=-110)	31.31
[-110 >=Min)	3.41
Total	100

I. Coverage Details

BSNL

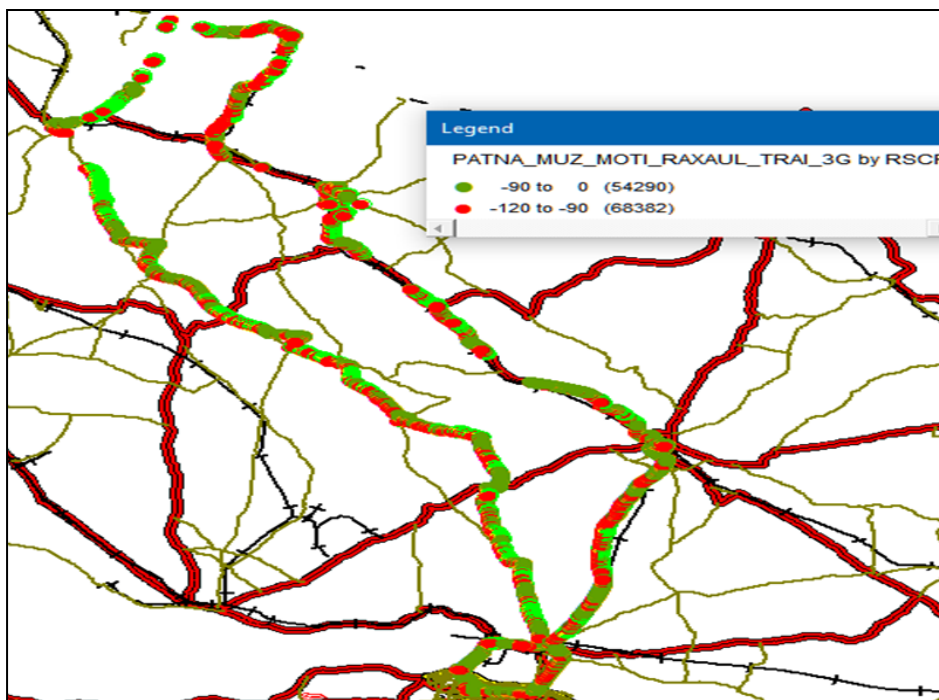
Technology	Coverage Rate %
2G	75.50
3G	44.26

2G



Overall RxLevel	Sample %
[Max >=-75]	57.70
[-75 >=-85)	17.80
[-85 >=-95)	15.91
[-95 >=Min)	8.59
Total	100

3G



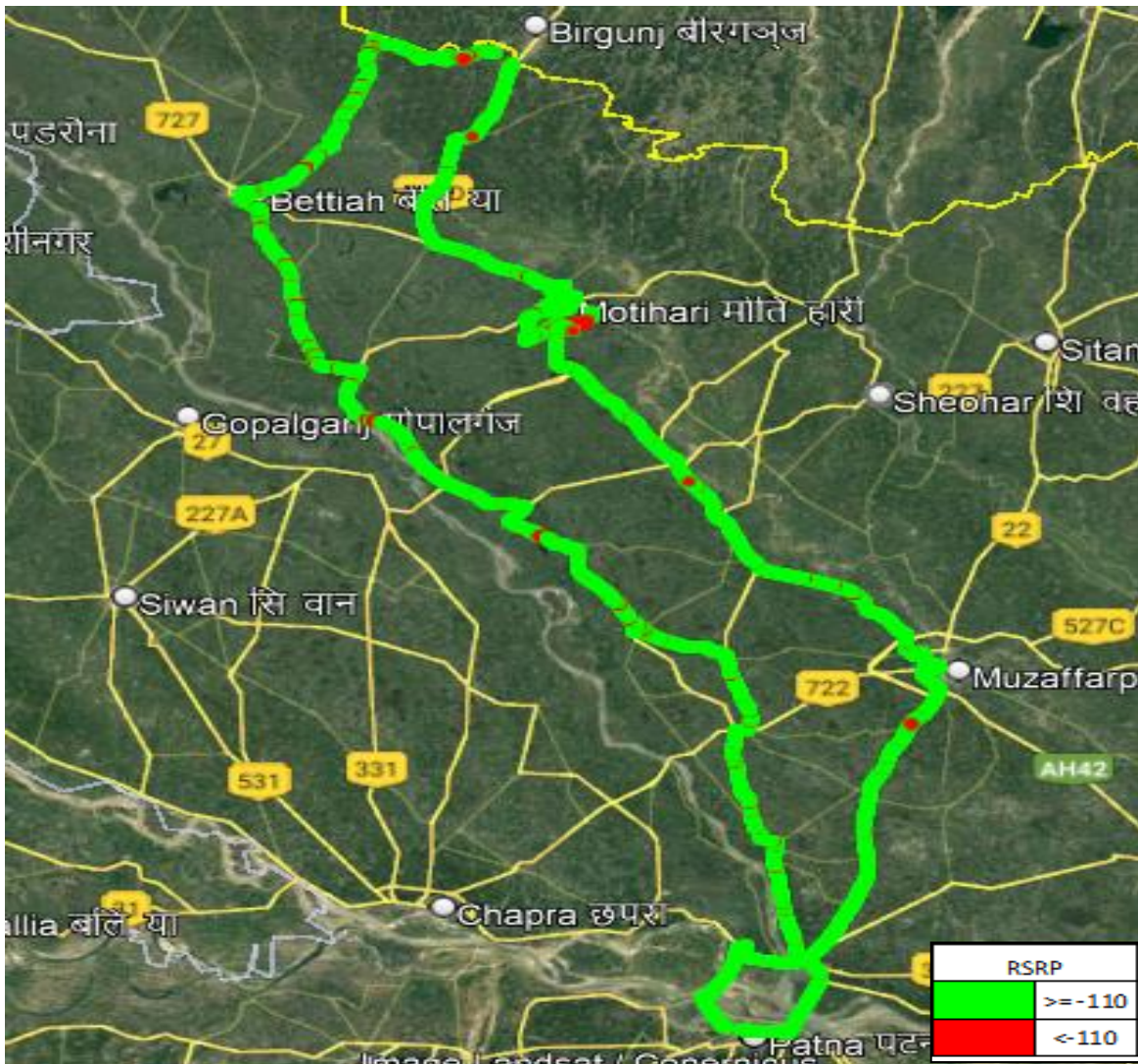
Overall RSCP	Sample %
[Max >=-70]	9.28
[-70 >=-80)	12.70
[-80 >=-90)	22.28
[-90 >=Min)	55.74
Total	100

I. Coverage Details

RJIO

Technology	Coverage Rate %
4G	97.43

4G



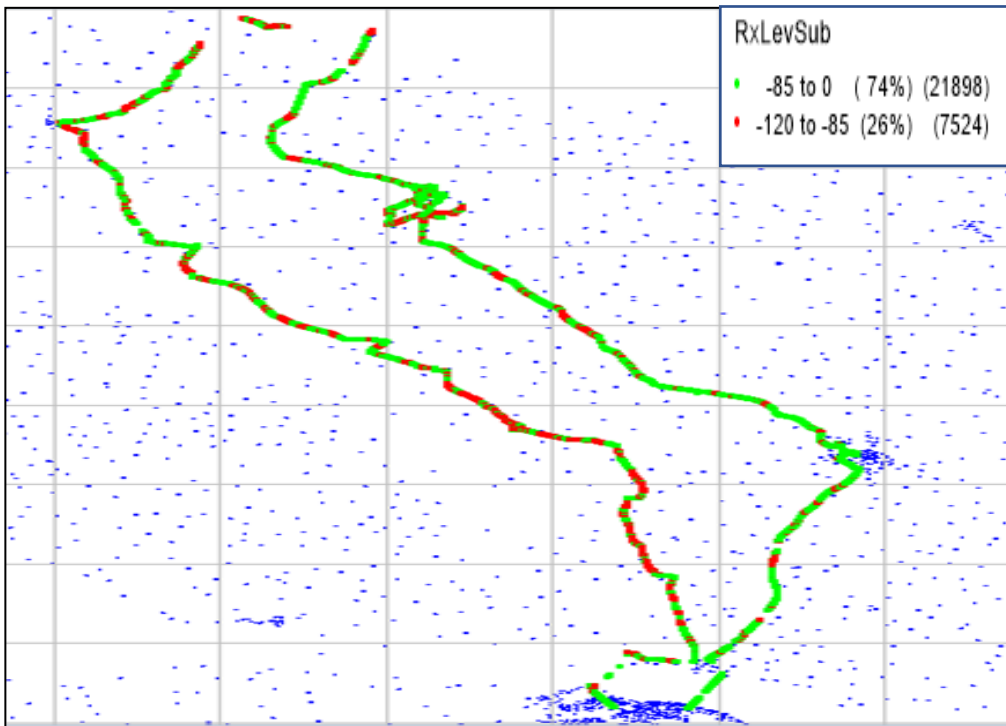
Overall RSRP	Sample %
[Max >=-80]	29.17
[-80 >=-90)	30.19
[-90 >=-110)	38.07
[-110 >=Min)	2.57
Total	100

I. Coverage Details

VIL

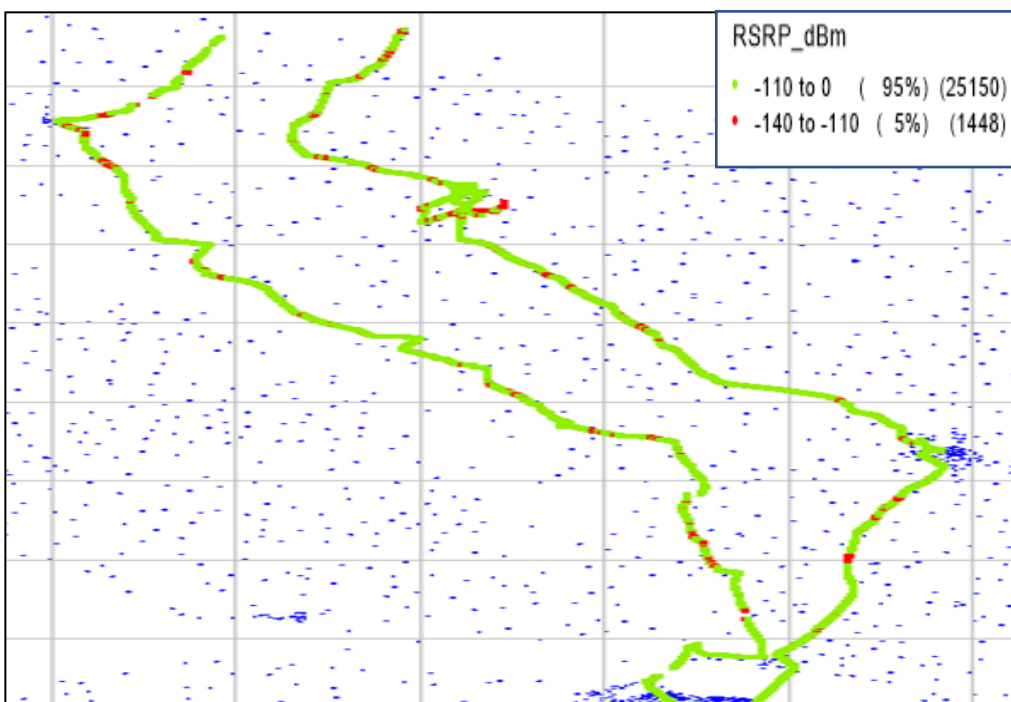
Technology	Coverage Rate %
2G	74.0
4G	94.56

2G



Overall RxLevel	Sample %
[Max >=-75]	38.44
[-75 >=-85)	35.98
[-85 >=-95)	20.20
[-95 =Min)	5.38
Total	100

4G



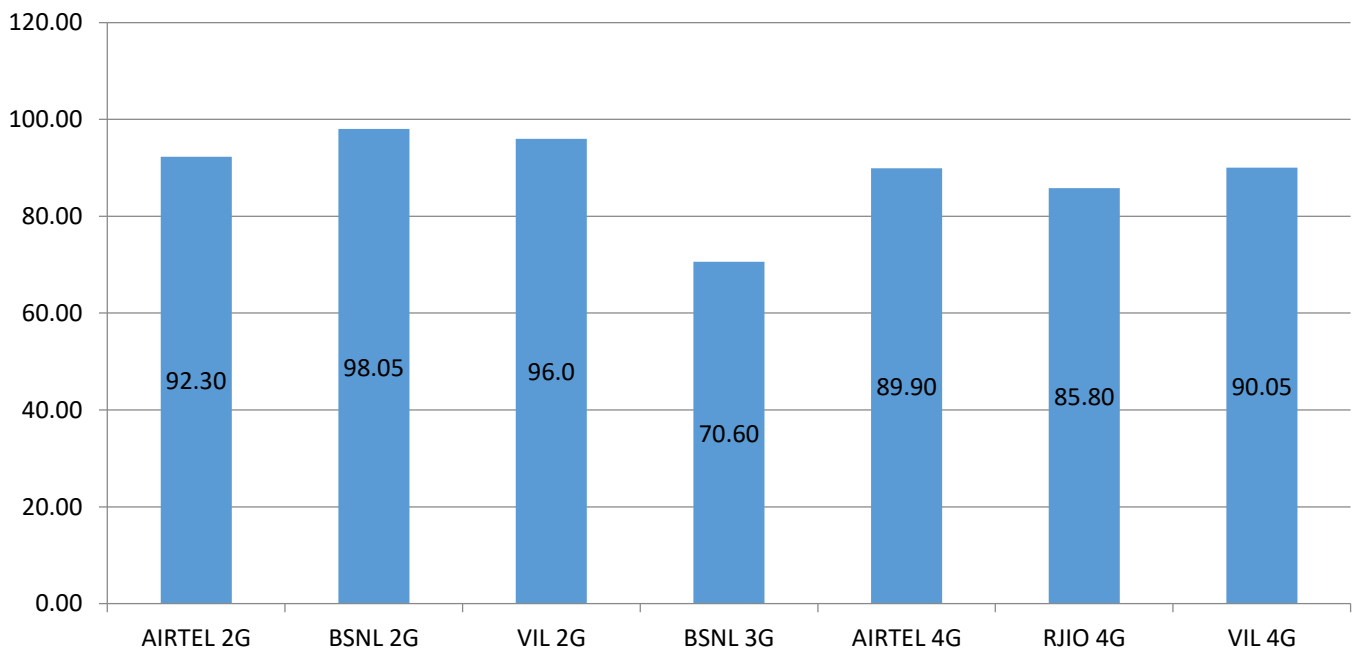
Overall RSRP	Sample %
[Max >=-80]	13.90
[-80 >=-90)	27.68
[-90 >=-110)	52.98
[-110 >=Min)	5.44
Total	100

II. Quality Details

For measuring voice quality, as per the QoS norms, Rx Quality ≤ 5 for GSM, $E_c/N_o \geq -14$ dBm for 3G and $SINR > 0$ 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 $\geq 95\%$.

TSP	Rx Quality %
AIRTEL 2G	92.30
BSNL 2G	98.05
VIL 2G	96.0
BSNL 3G	70.60
AIRTEL 4G	89.90
RJIO 4G	85.80
VIL 4G	90.05

Rx Quality %

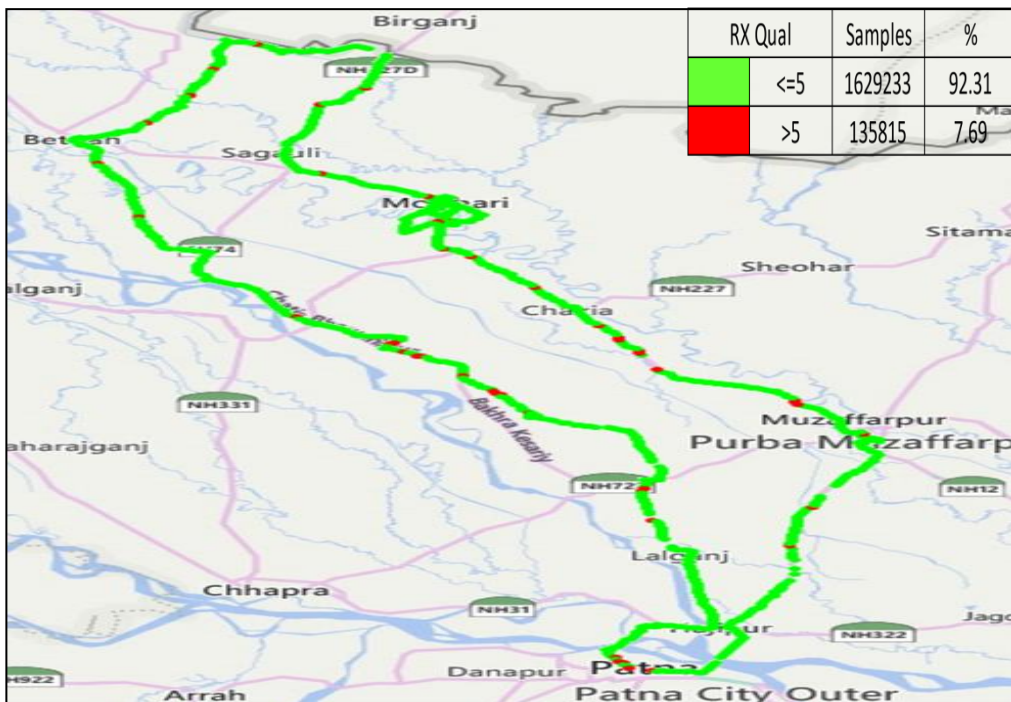


II. Quality Details

AIRTEL

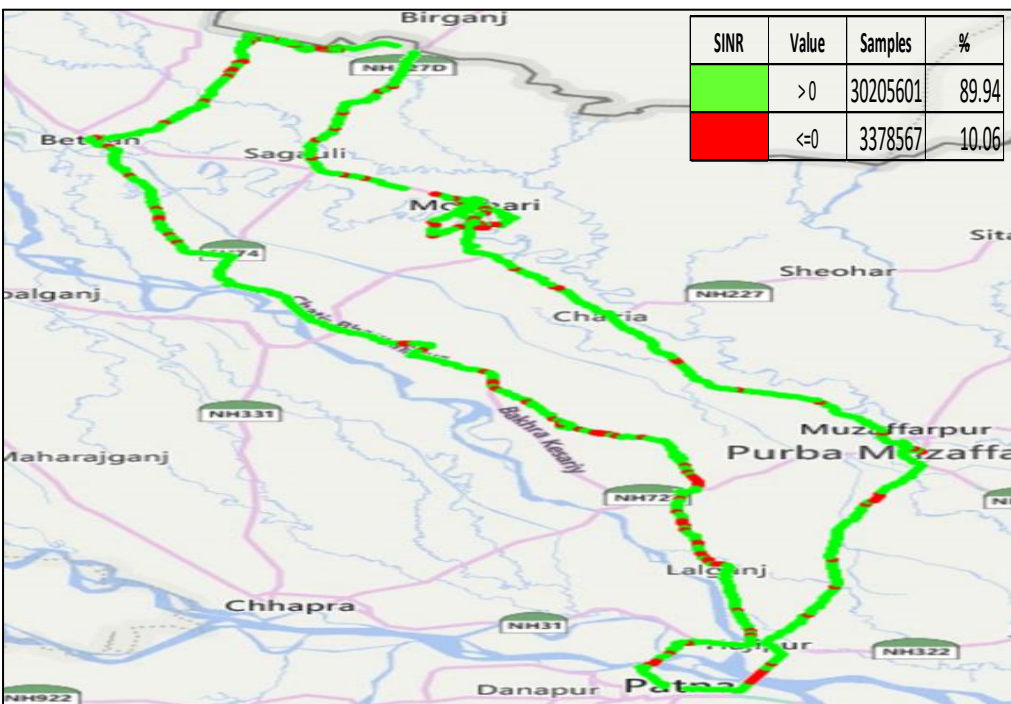
Technology	Rx Quality %
2G	92.30
4G	89.90

2G



Overall Rx Quality	Sample %
(Min <=2)	66.40
(2 <=3)	7.0
(3 <=4)	7.0
(4 <=5)	11.90
(5 <=Max)	7.70
Total	100

4G



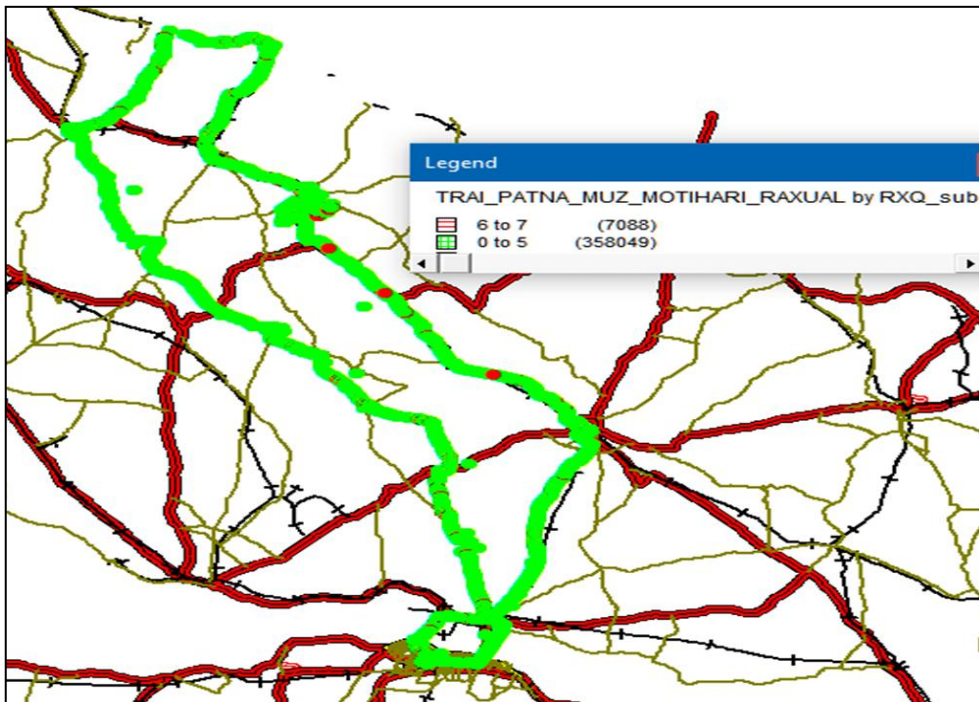
Overall SINR	Sample %
(Min <=0)	10.10
(0 <=5)	64.20
(5 <=10)	13.10
(10 <=15)	7.20
(15 <=Max)	5.40
Total	100

II. Quality Details

BSNL

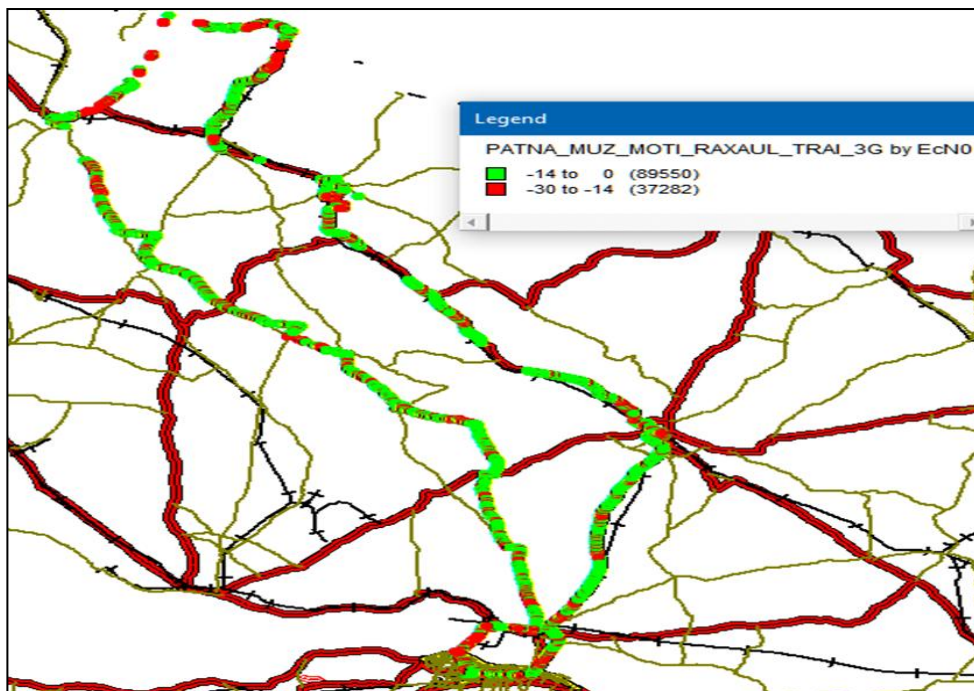
Technology	Rx Quality %
2G	98.05
3G	70.60

2G



Overall Rx Quality	Sample %
(Min <=2)	93.83
(2 <=3)	0.96
(3 <=4)	1.03
(4 <=5)	1.22
(5 <=Max)	2.96
Total	100

3G



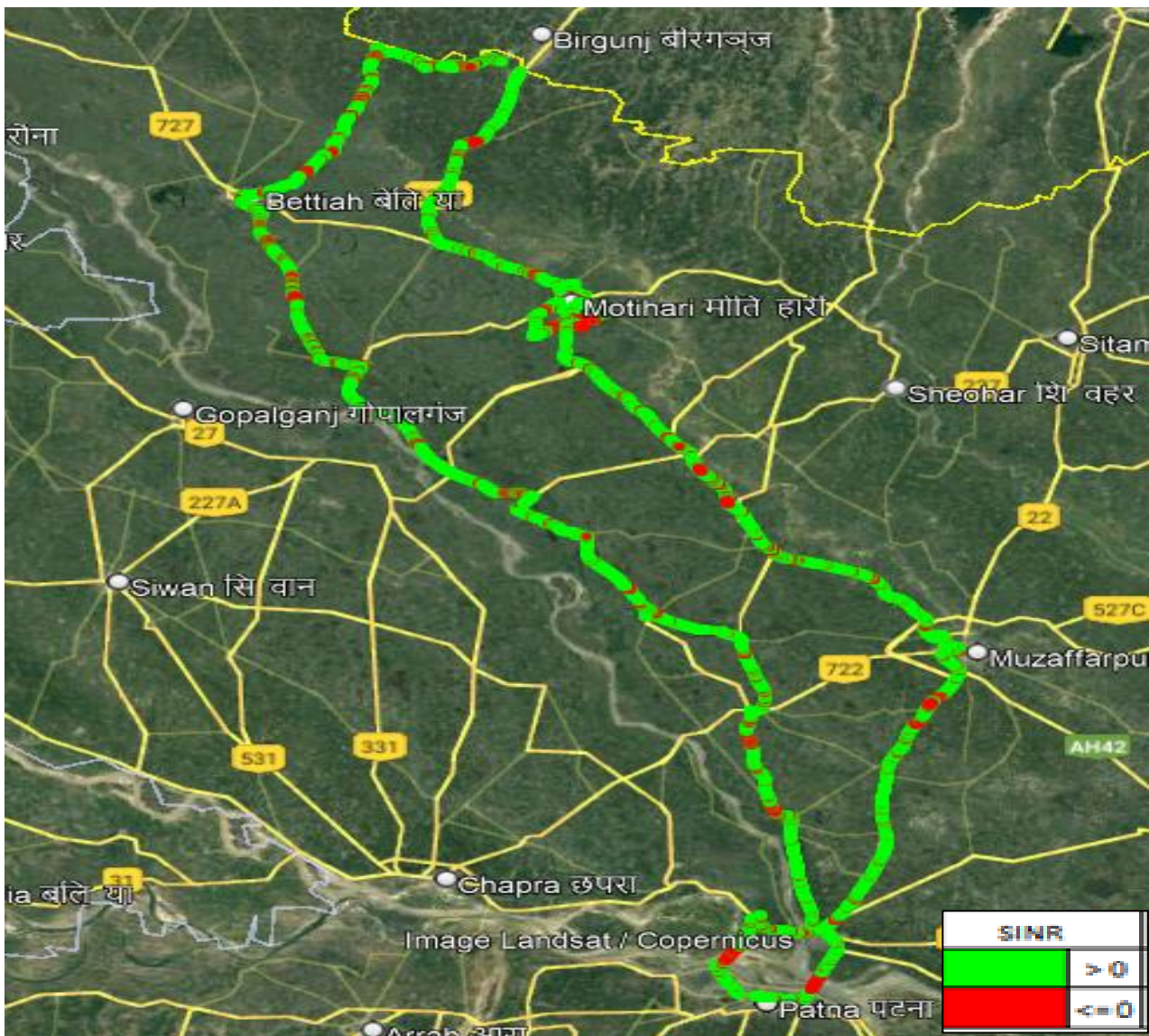
Overall EcNo	Sample %
(Max <=-6)	13.76
(-6 <=-9)	14.32
(-9 <=-11)	21.20
(-11 <=-14)	21.33
(-14 <= Min)	29.39
Total	100

II. Quality Details

RJIO

Technology	Rx Quality %
4G	85.80

4G



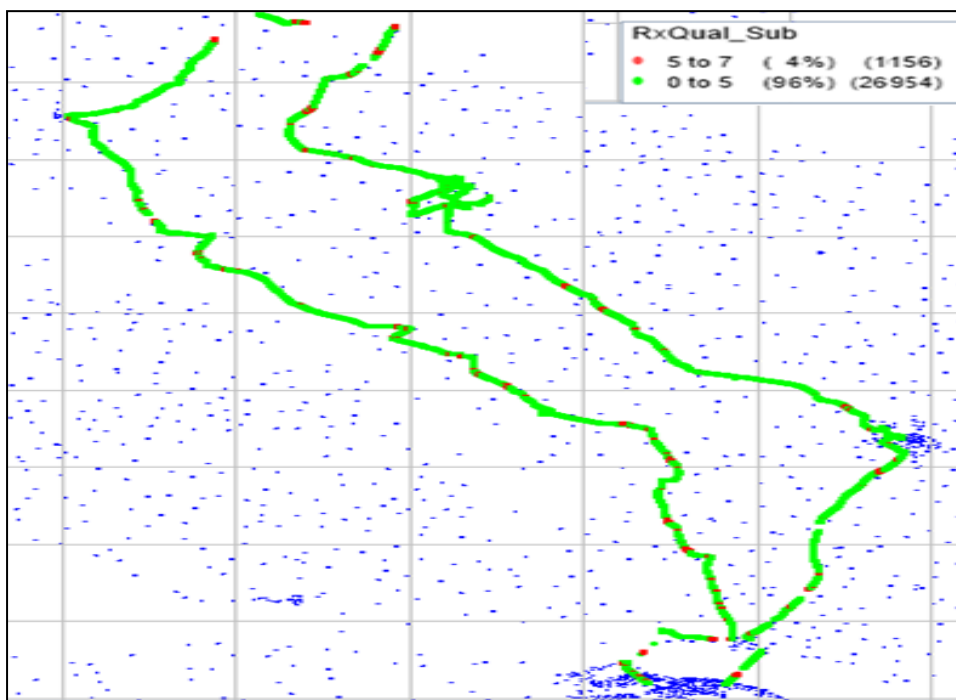
Overall SINR	Sample %
(Min <=0)	19.06
(0 <=5)	20.97
(5 <=10)	23.83
(10 <=15)	21.94
(15 <=Max)	14.20
Total	100

II. Quality Details

VIL

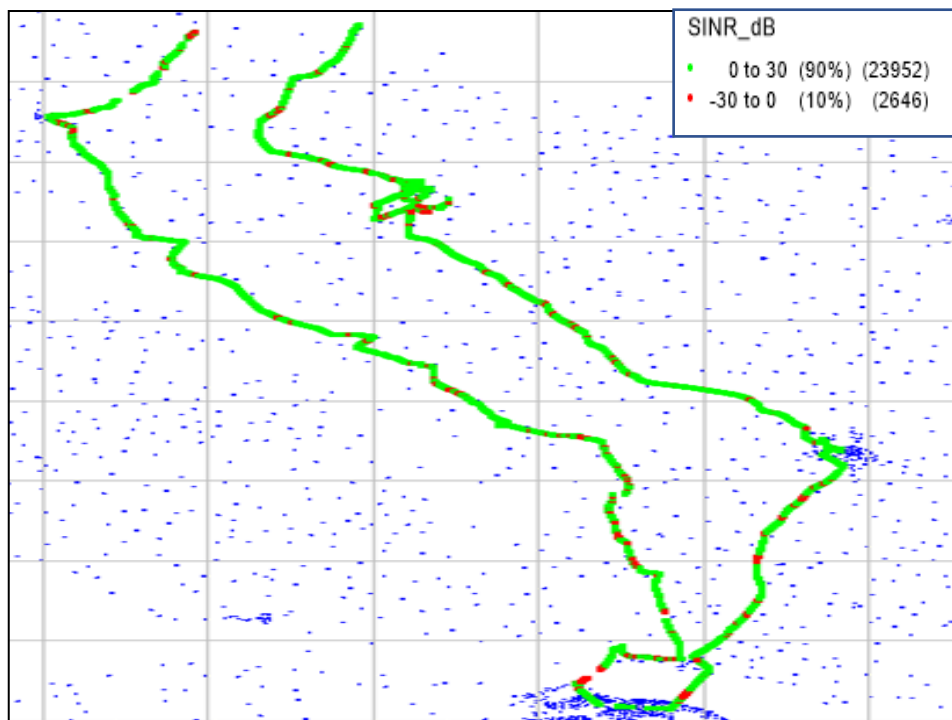
Technology	Rx Quality %
2G	96.0
4G	90.05

2G



Overall Rx Quality	Sample %
(Min <=2)	78.53
(2 <=3)	7.63
(3 <=4)	6.67
(4 <=5)	3.06
(5 <=Max)	4.11
Total	100

4G



Overall SINR	Sample %
(Min <=0)	9.95
(0 <=5)	22.47
(5 <=10)	28.03
(10 <=15)	19.64
(15 <=Max)	19.92
Total	100

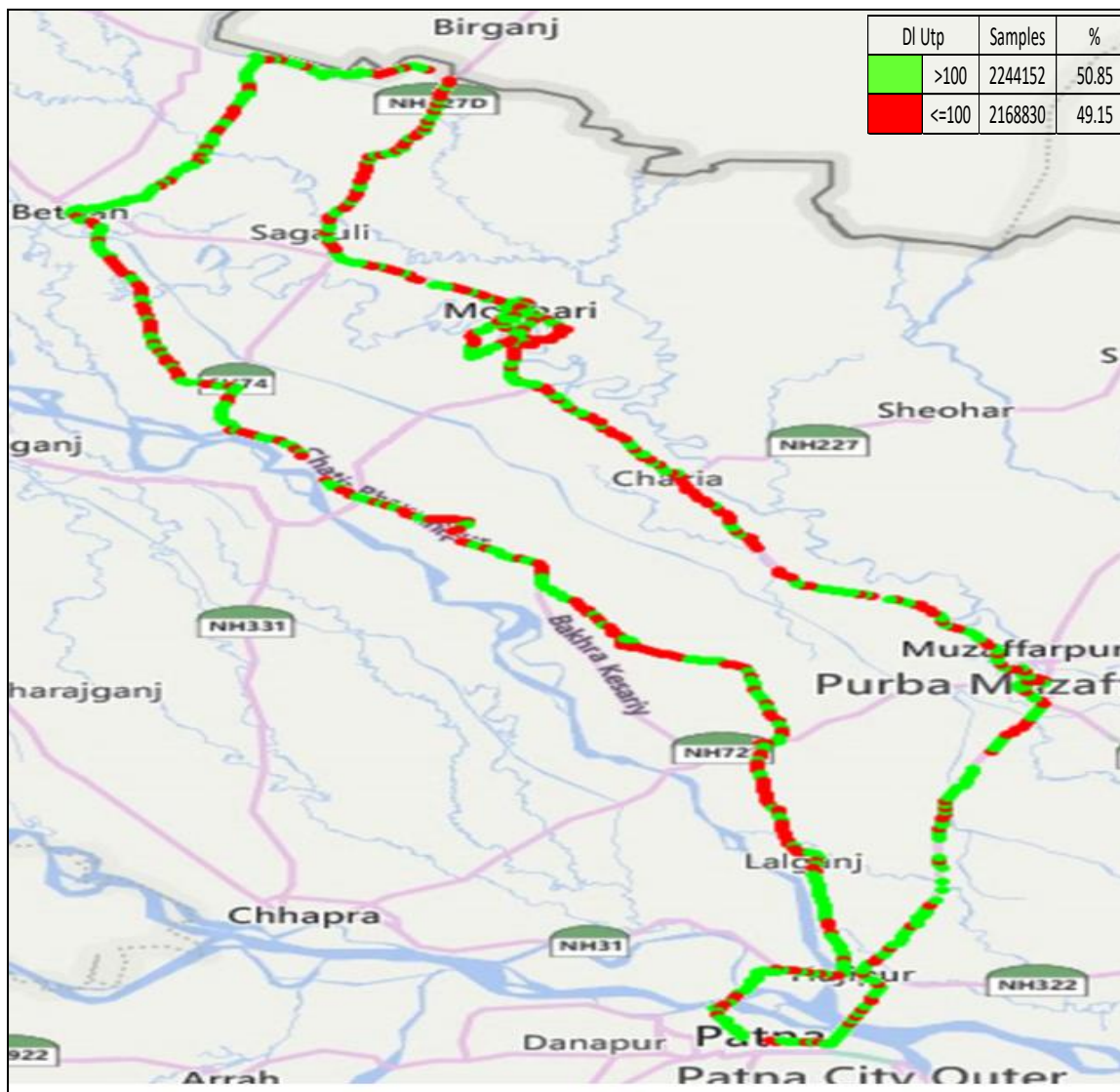
IV. Dynamic Data Test- 2G DL Details

AIRTEL

Dynamic Data Testing Complete 559 Kms

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

2G



AVG. DOWNLOAD SPEED (Kbps)	124 .0
% FILE TRANSFER COMPLETE	96.30
DL throughput	Sample %
0 to 50 Kbps	39.39
50 to 100 Kbps	9.76
100 to 200 Kbps	20.50
200 to 300 Kbps	28.53
>300 Kbps	1.82
Total	100

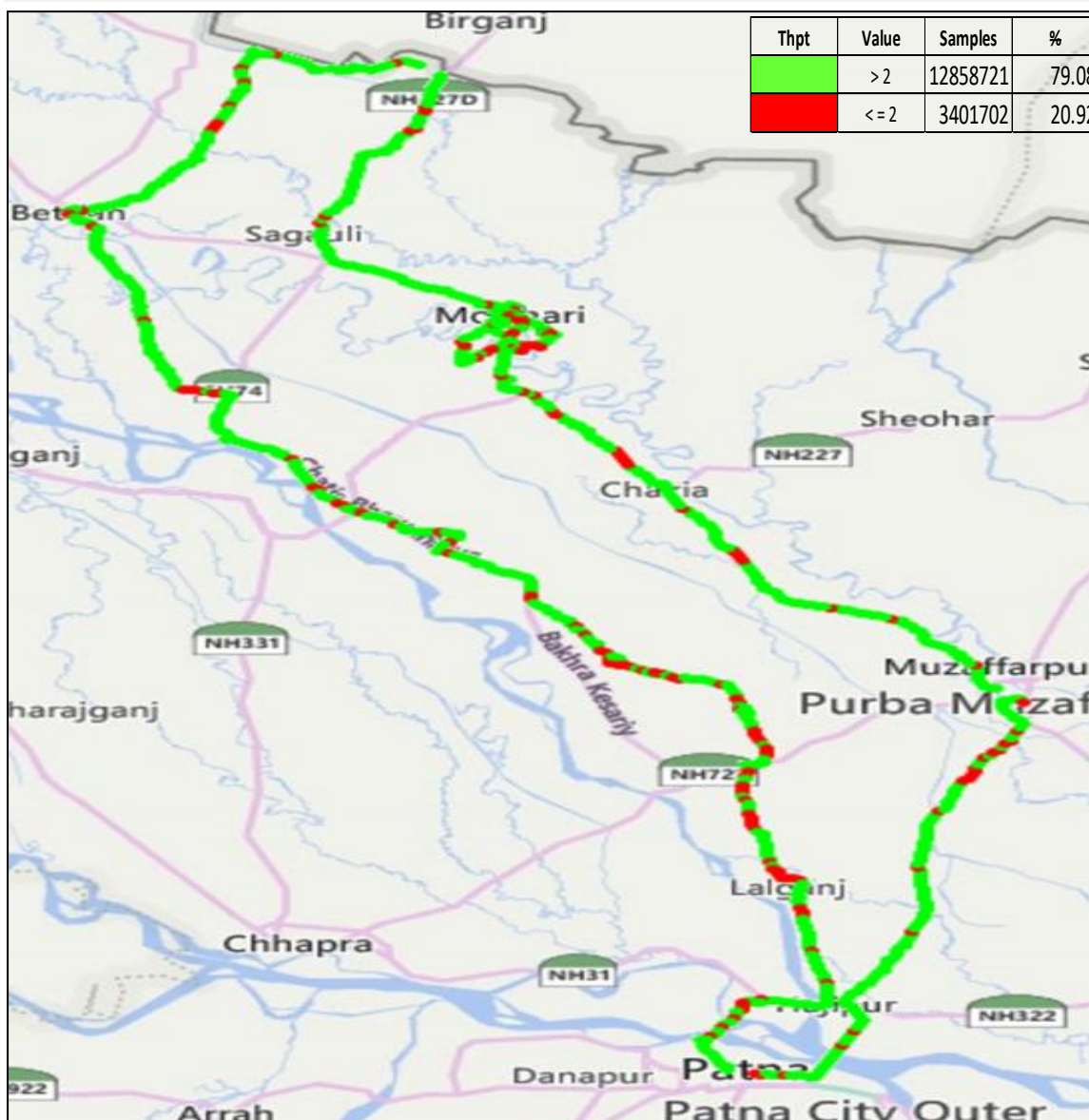
IV. Dynamic Data Test- 4G DL Details

AIRTEL

Dynamic Data Testing Complete 559 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	10.20

4G



AVG. DOWNLOAD SPEED (Mbps)	10.20
% FILE TRANSFER COMPLETE	98.20
DL throughput	Sample %
0 to 1 Mbps	17.99
1 to 2 Mbps	2.93
2 to 5 Mbps	21.36
5 to 10 Mbps	19.23
>10 Mbps	38.49
Total	100

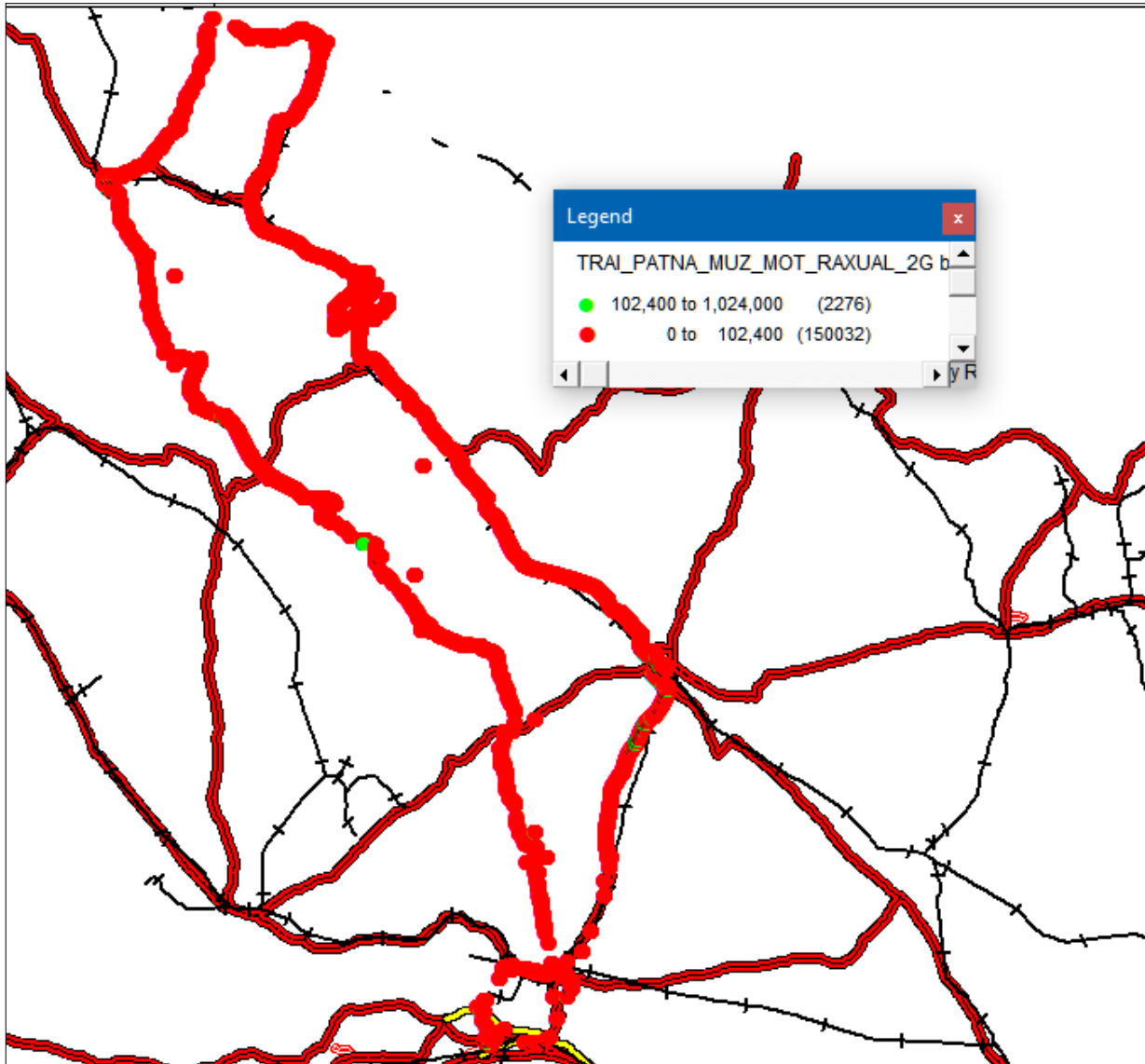
IV. Dynamic Data Test- 2G DL Details

BSNL

Dynamic Data Testing Complete 559 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	32.24

2G



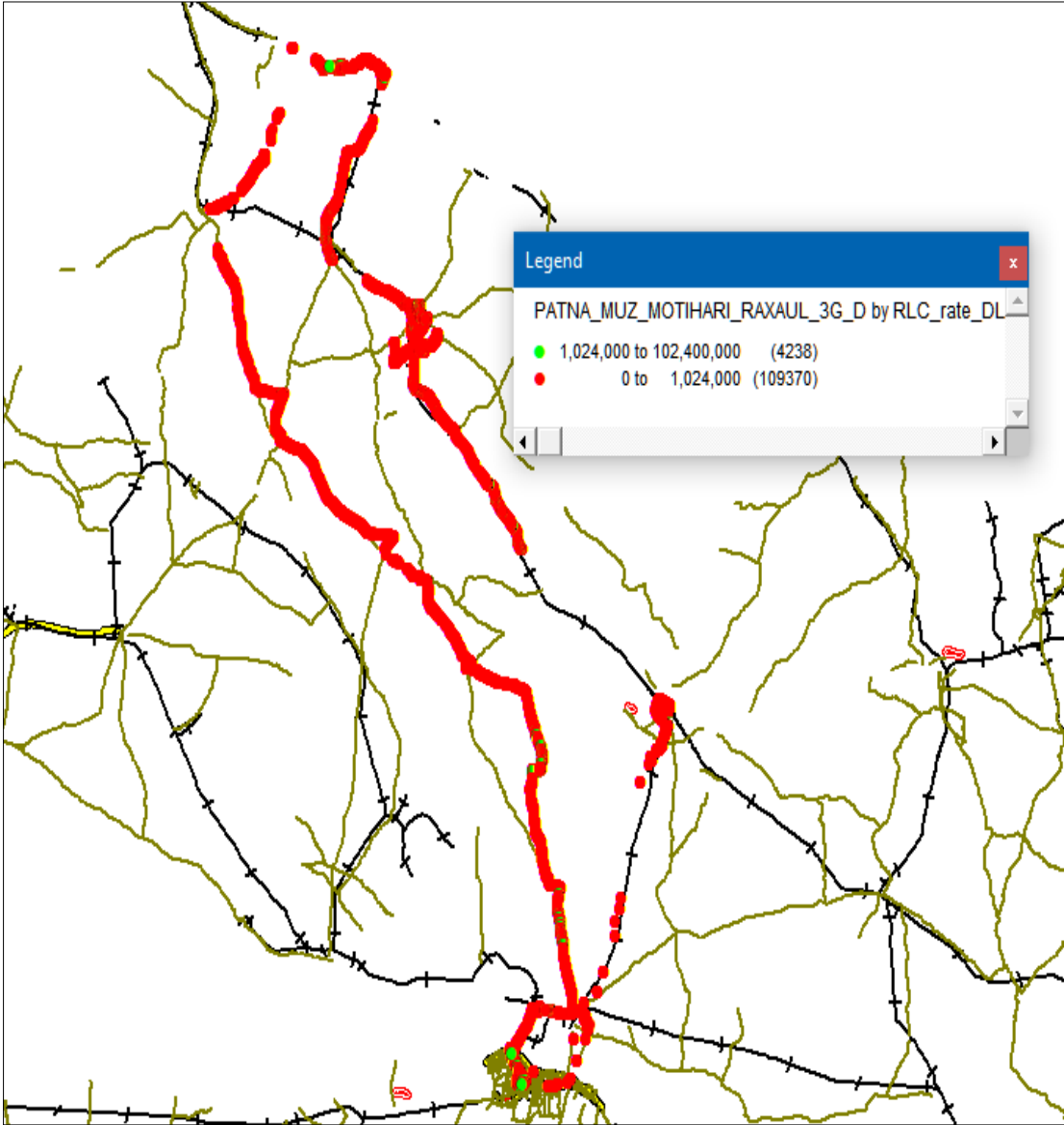
AVG. DOWNLOAD SPEED (Kbps)	32.24
% FILE TRANSFER COMPLETE	65.06
DL throughput	Sample %
0 to 50 Kbps	97.45
50 to 100 Kbps	1.05
100 to 200 Kbps	1.19
200 to 300 Kbps	0.31
>300 Kbps	0
Total	100

IV. Dynamic Data Test- 3G DL Details

BSNL

Dynamic Data Testing Complete 559 Kms

Data KPIs - Overall	3G
Average Download Throughput (Mbps)	1.04
3G	



AVG. DOWNLOAD SPEED (Mbps)	1.04
% FILE TRANSFER COMPLETE	94.61
DL throughput	Sample %
0 to 0.5 Mbps	94.62
0.5 to 1 Mbps	1.65
1 to 2 Mbps	2.72
2 to 5 Mbps	0.79
>5 Mbps	0.22
Total	100

IV. Dynamic Data Test- 4G DL Details

RJIO

Dynamic Data Testing Complete 559 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	20.20

4G



AVG. DOWNLOAD SPEED (Mbps)	20.20
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 1 Mbps	15.70
1 to 2 Mbps	7.62
2 to 5 Mbps	20.02
5 to 10 Mbps	22.32
>10 Mbps	34.34
Total	100

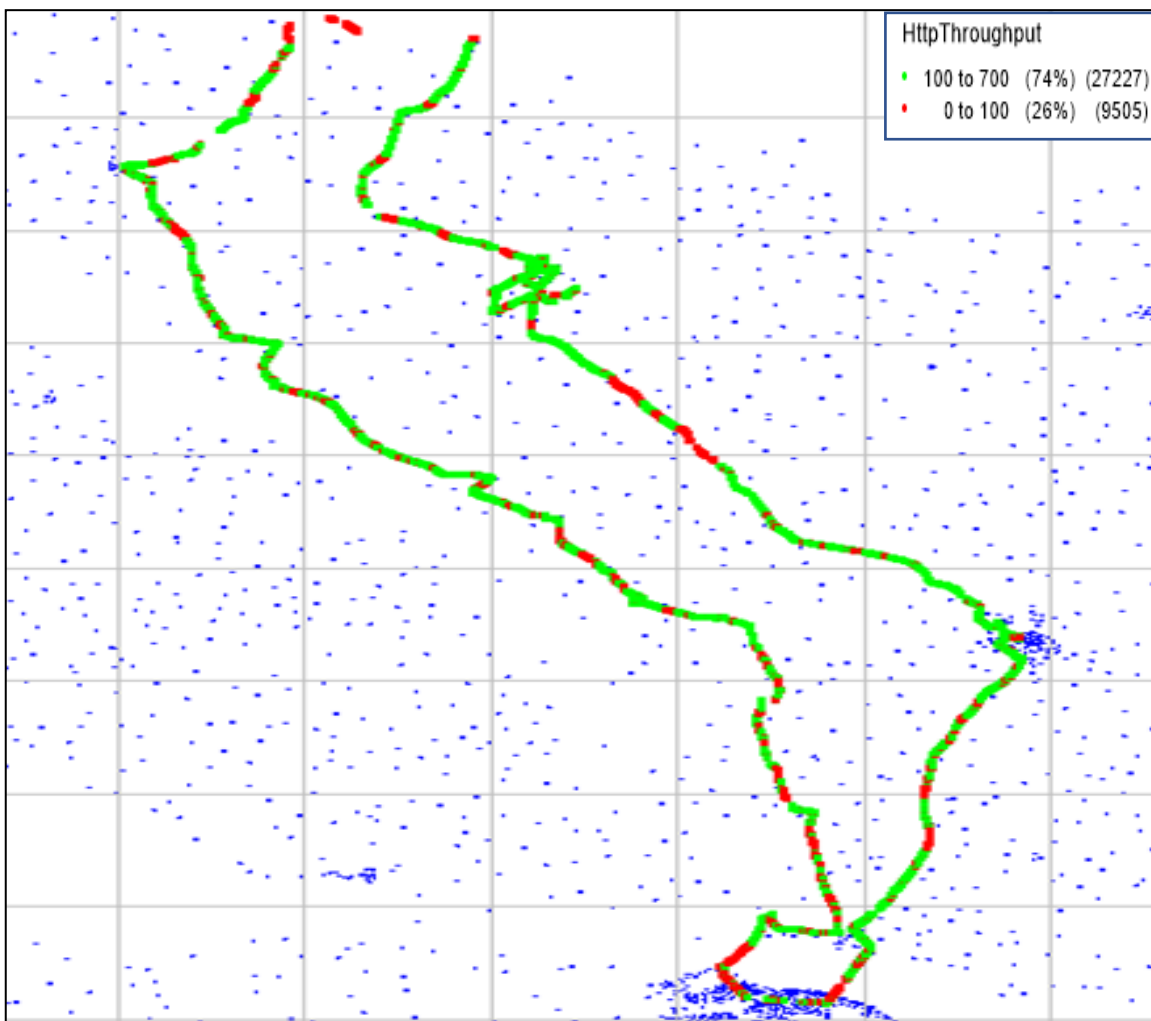
IV. Dynamic Data Test-2G DL Details

VIL

Dynamic Data Testing Complete 559 Kms

Data KPIs – Overall	2G
Average Download Throughput (Kbps)	182 .0

2G



AVG. DOWNLOAD SPEED (Kbps)	182.0
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 50 Kbps	16.22
50 to 100 Kbps	9.66
100 to 200 Kbps	43.61
200 to 300 Kbps	28.75
>300 Kbps	1.77
Total	100

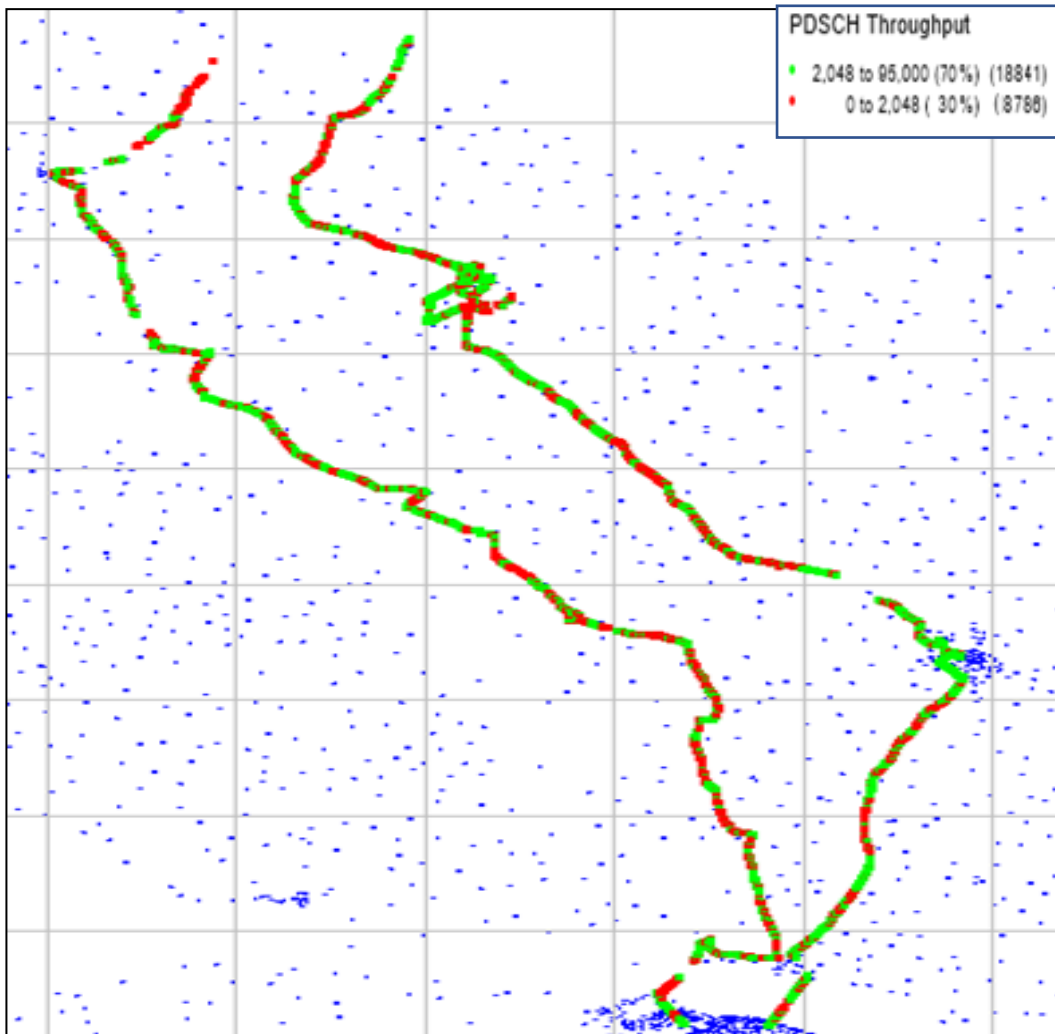
IV. Dynamic Data Test- 4G DL Details

VIL

Dynamic Data Testing Complete 559 Kms

Data KPIs – Overall	4G
Average Download Throughput (Mbps)	12.0

4G



AVG. DOWNLOAD SPEED (Mbps)	12.0
% FILE TRANSFER COMPLETE	100
DL throughput	Sample %
0 to 1 Mbps	13.04
1 to 2 Mbps	18.76
2 to 5 Mbps	22.69
5 to 10 Mbps	20.87
>10 Mbps	24.63
Total	100