

# Operator Assisted Drive Test Report Patna, Arrah & Sasaram Cities, Bihar July, 2024 (RO, Kolkata)

## Key Performance Indicators (KPIs):

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

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

**BSNL**- Drop Call Rate in 2G & 3G network, Block Call Rate in 3G network, Rx Quality in 3G (Ec/Io) 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, Arrah and Sasaram Cities and surrounding areas including National Highways 139 & 39 on 18<sup>th</sup> and 19<sup>th</sup> July 2024 from 08.30 AM to 08.00 PM. The drive test covered drive route of 375 KMs (approx) over a period of two days. Approximately 509 + 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 City**, popularly known as Patna Saheb or Patna Sahib, is a city and one of the 6 Sub-divisions (Tehsil) in Patna district, Bihar, India. Patna City is an old area of Patna. Patna City history belongs to Patliputra..

**Arrah** is a city in Bhojpur district in the state of Bihar, India. It is located near the confluence of the Ganges and Soane rivers, 36 miles from Patna..

**Sasaram** is a historical city and a municipal corporation region in the Rohtas district of Bihar state in eastern India.

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.

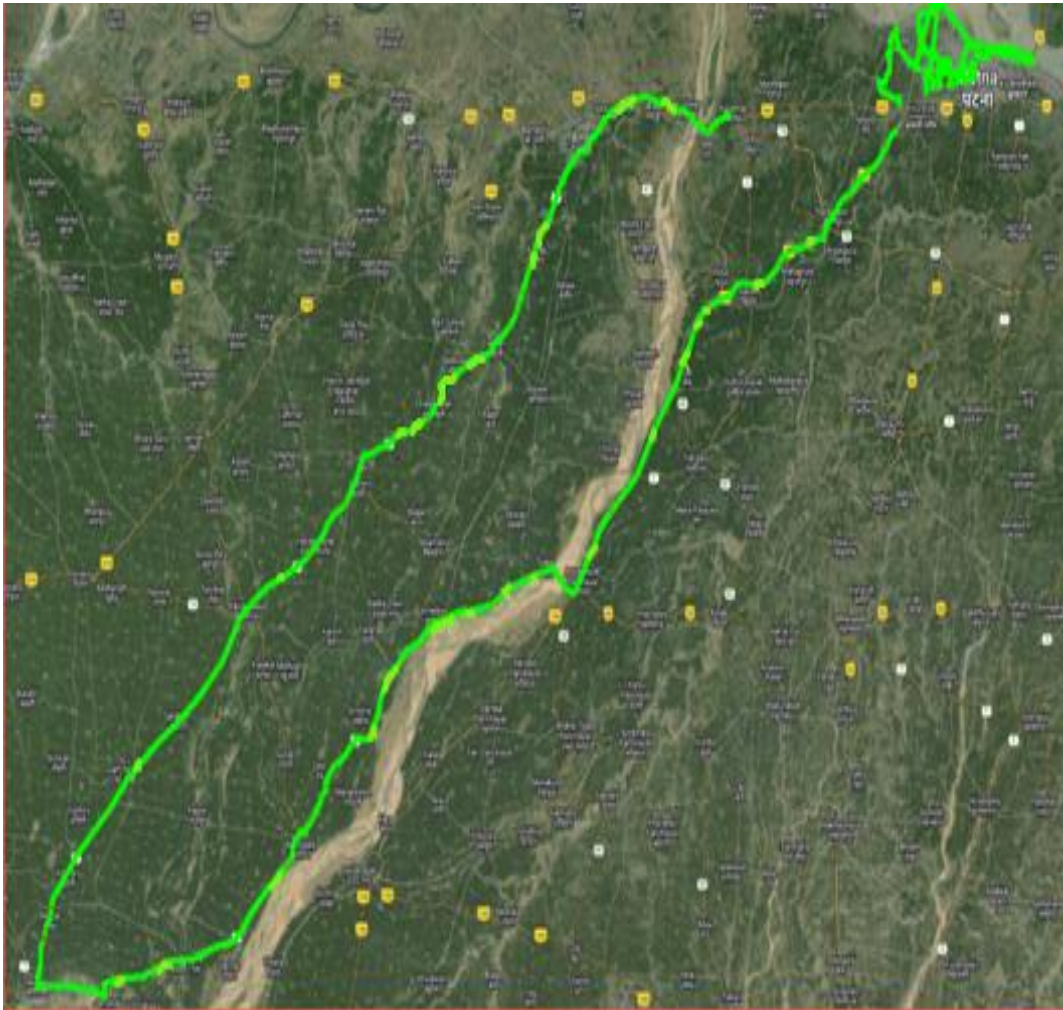
**Voice Tests:** Calls were made for 90 secs duration with wait time of 5 secs between call in all technologies. Three 2G networks, one 3G network, Three 4G networks covering 4 unique TSPs were tested.

**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: Patna, Arrah and Sasaram Districts

**DAY-1**– Patna High Court– Raj Bhawan– Patna Airport– Bihar Police Bhawan – State Institute of Health and Family Welfare– IGIMS Out Patient Department– BSEB Colony Rajbansi Nagar– City Centre Mall– District Patna Medical College Hospital – Marine Drive Police Chowki – St. Xavier’s College of Management– Patliputra Railway Station – Army Public School – International School of Management Patna – Danapur Railway Station.

**DAY-2** – NIT Patna (Bihta Campus) – Arrah Bus Stand – Kendriya Vidyalaya Arrah – Udwant Nagar Block Office – BRC Charpokhary –BSS College Bachri Piro – Bikramganj Chowk – Sanjhauli PO – Nokha College – Agrer Thana – Sasaram Bus Stand – Ambedkar College of Education – Ayarkotha Bus Stand – Sabadala Bus Stand – Utkramit Madhyamik Vidyalaya Amiyawar - Middle School Sikariyan – Kaithi High School – Patna AIIMS

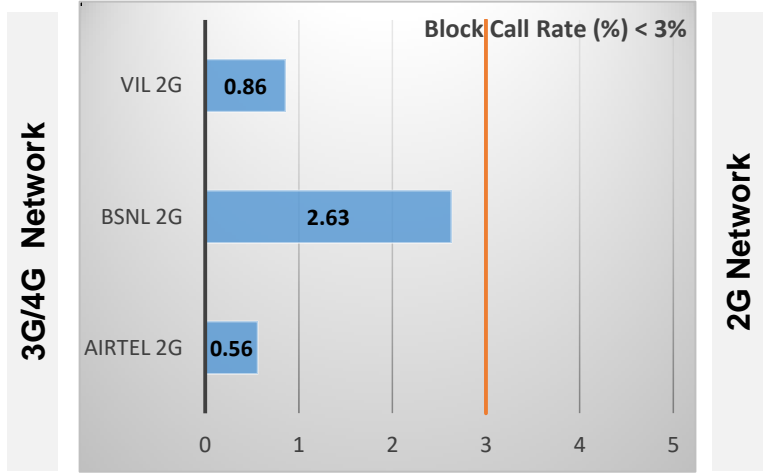
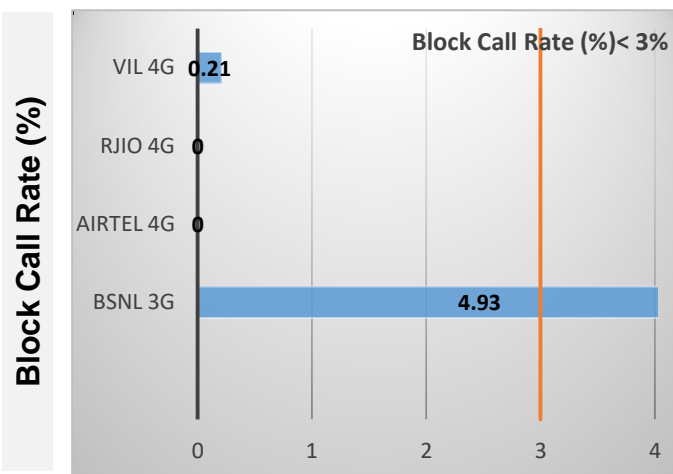
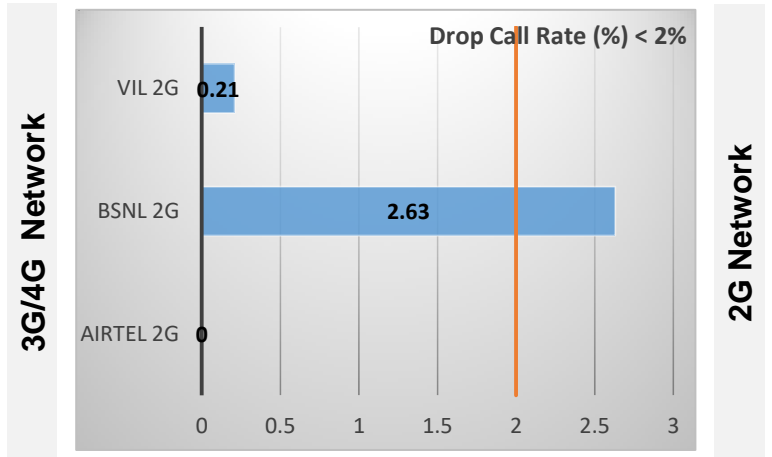
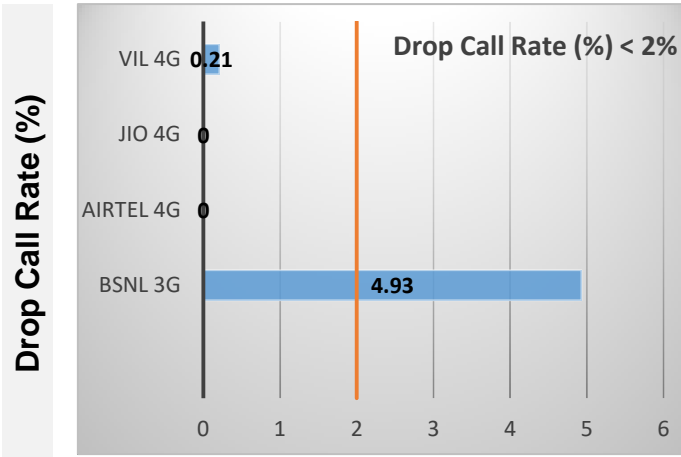
## Data Service Test- Static Locations

Static Locations
Patna High Court
Danapur Railway Station
NIT Patna (Bihta Campus)

# 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 %	0.0	2.63	0.21	4.93	0.0	0.0	0.21
Block Call Rate %	0.56	2.63	0.86	4.93	0.0	0.0	0.21

- 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 (3G) network

### Coverage

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

TSPs	2G		
	AIRTEL	BSNL	VIL
Coverage %	84.42	81.37	93.34

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

TSPs	3G	4G		
	BSNL	AIRTEL	RJIO	VIL
Coverage	54.36	97.47	98.57	98.10

# Summary

## City Level Summary- Voice

Voice Call	2G		
	AIRTEL	BSNL	VIL
Call Attempt	539	581	466
Blocked Call Rate (%)	0.56	2.63	0.86
CSSR% (Accessibility)	98.14	98.1	99.1
Drop Call Rate (%)	0.00	2.63	0.21
Mobility HOSR (%)	95.66	95.67	99.36
Rx Quality (%)	96.52	95.73	96.65

Voice Call	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Call Attempt	385	537	581	476
Blocked Call Rate (%)	4.93	0	0	0.21
CSSR% (Accessibility)	95.06	99.62	100	99.8
Drop Call Rate (%)	4.93	0	0	0.21
Mobility HOSR (%)	100	98.87	99.09	99.93
Rx Quality (%)	63.70	83.51	98.81	91.47

# Summary-Data Services Dynamic

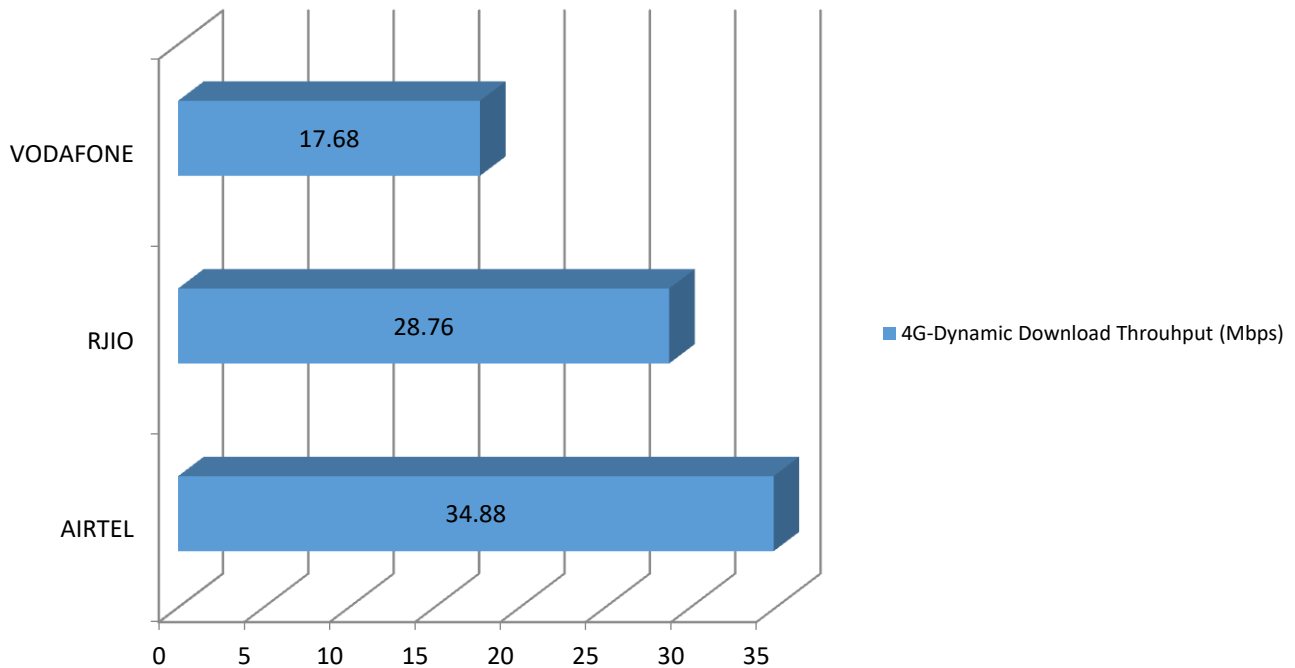
## Key Observations

Dynamic Data was tested for 375 Kms. Download Throughput was tested.

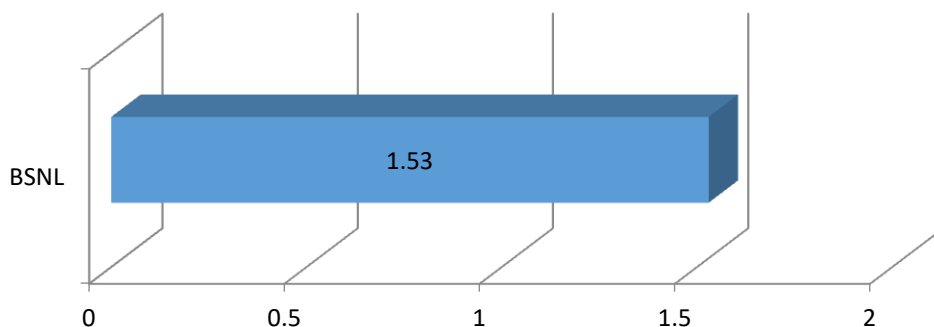
### Data Download Performance (Average Throughput in Mbps) - Dynamic Data Testing

#### 4G/3G Network:

#### 4G-Dynamic Download Throughput (Mbps)



#### 3G-Dynamic Download Throughput (Mbps)



# Summary-Data Services Static

## City Level Summary-

Average Data Services Static	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	152.40	41.75	70.8
Upload Throughput (kbps)	72.72	33	51.3
Web Browsing Delay (sec)	111.91	56.77	21.7
Latency (msec)	426.45	325	217

Average Data Services Static	3G/ 4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	1.96	8.23	20.96	16
Upload Throughput in Mbps	1.51	3.67	5.96	10
Video streaming delay (sec)	25	0.00	0.42	5.7
Web Browsing Delay (secs)	23.75	6.07	1.95	3
Latency (msec)	192	64.61	61.67	88



# Summary-Data Services Static

## Location Level Summary-

Location:-Patna High Court	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	219	41	76.97
Upload Throughput (kbps)	80.06	10	52
Web Browsing Delay (sec)	77.4	127.5	25
Latency (msec)	352.9	178	247

Location:-Patna High Court	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	3.55	6.06	26.39	23.8
Upload Throughput in Mbps	3.06	0.75	6.84	24
Video streaming delay (secs)	23.2	0.0	0.35	6.0
Web Browsing Delay (secs)	20.5	6.28	1.78	3
Latency (msec)	124	68.57	59	89

Location:-Danapur Railway Station	2G		
	AIRTEL	BSNL	VIL
Download throughput in (kbps)	146.47	61	67.90
Upload Throughput in (kbps)	80.39	42	53
Web Browsing Delay (secs)	109.01	26.6	19
Latency (msec)	413.9	218	194

Location:- Danapur Railway Station	4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in (mbps)	2.45	5.41	24.3	15.3
Upload Throughput in (mbps)	1.01	0.71	5.93	2.7
Video streaming delay (secs)	32.6	0.0	0.37	4
Web Browsing Delay (secs)	31.4	5.88	1.95	3
Latency (msec)	298	63.77	62	74

# Summary-Data Services Static

## Location Level Summary-

Location:-NIT Bihta Campus	2G		
	AIRTEL	BSNL	VIL
Download Throughput (kbps)	91.73	21	67.63
Upload Throughput (kbps)	57.72	20	49
Web Browsing Delay (sec)	149.33	52.7	21
Latency (msec)	512.55	700	211

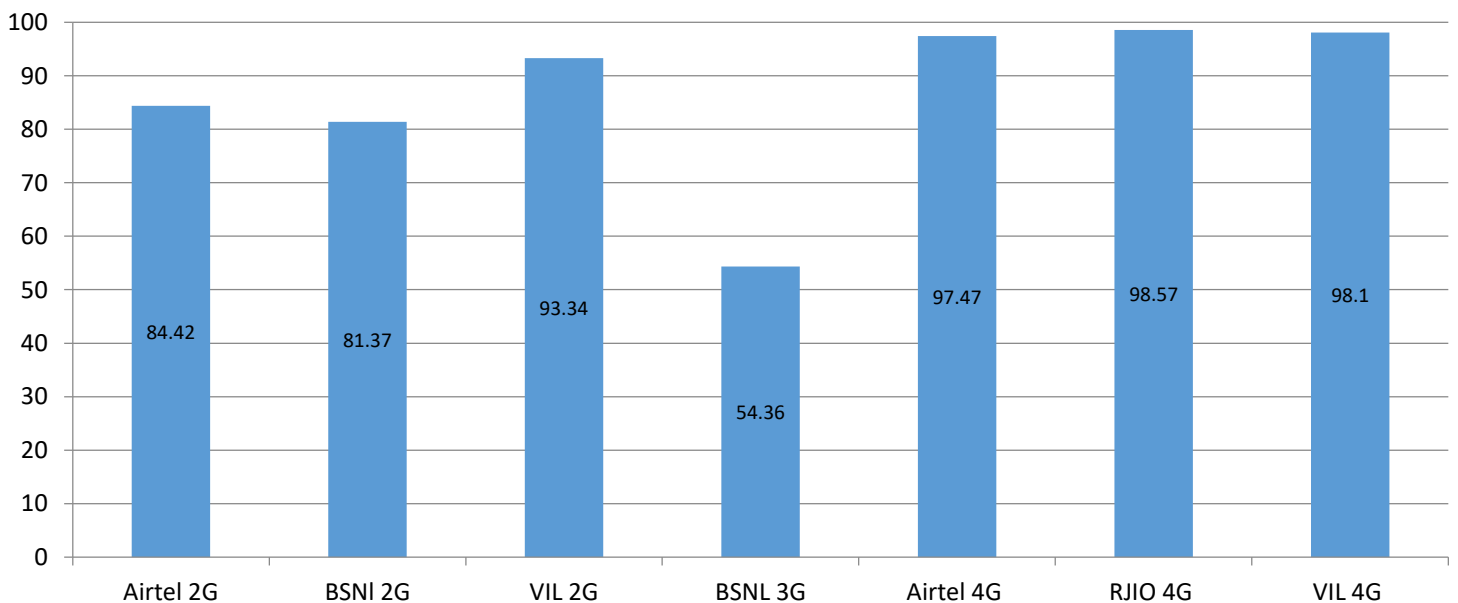
Location:-NIT Bihta Campus	3G/4G			
	BSNL 3G	AIRTEL 4G	RJIO 4G	VIL 4G
Download throughput in Mbps	0.96	16.4	12.2	8.8
Upload Throughput in Mbps	0.08	9.81	5.1	3.5
Video streaming delay (secs)	21.8	0.0	0.54	7.0
Web Browsing Delay (secs)	21.7	6.04	2.13	3
Latency (msec)	125	61.5	64	101

# 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  $\geq -85$  dBm, RSCP is  $\geq -90$  dBm & RSRP  $\geq -110$ dBm. The details are as follows.

TSP	Coverage Rate %
AIRTEL 2G	84.42
BSNL 2G	81.37
VIL 2G	93.34
BSNL 3G	54.36
AIRTEL 4G	97.47
RJIO 4G	98.57
VIL 4G	98.10

## Coverage Rate %



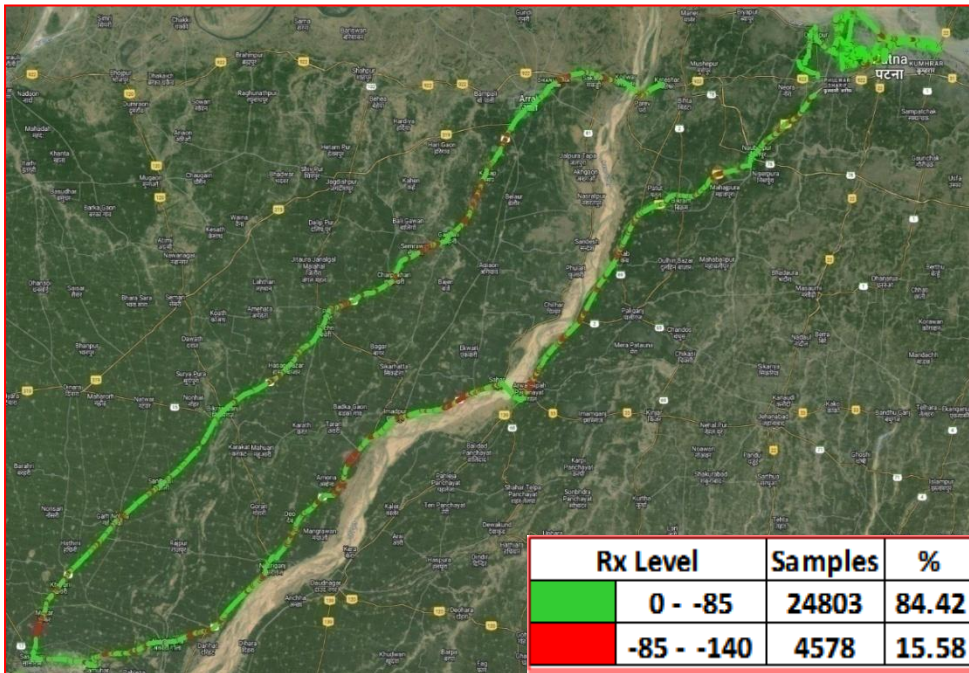
**Note- Coverage** is the percentage of samples having signal strength more than the threshold value ( 2G  $\geq -85$  dbm, 3G  $\geq -90$  dbm and 4G  $\geq -110$  dbm). However, these samples are only for the portion of the OADT routes where TSPs have coverage i.e 'no coverage' routes have been excluded.

# I. Coverage Details

## AIRTEL

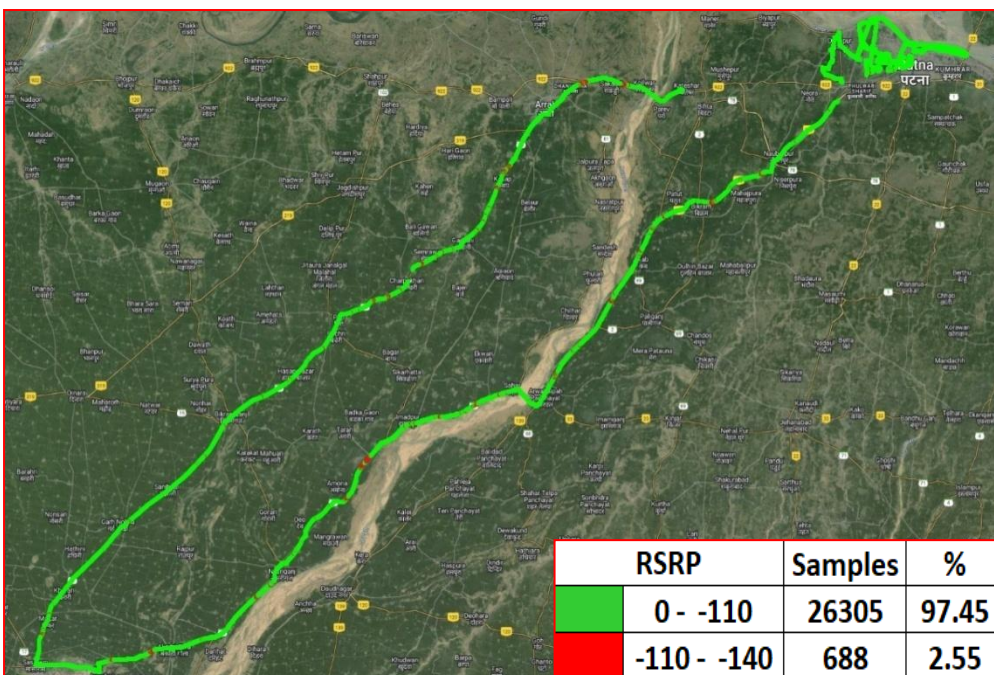
Technology	Coverage Rate %
2G	84.42
4G	97.47

### 2G



Overall Rx Level	Sample %
[Max >=-75]	53.56
[-75 >=-85)	30.86
[-85 >=-95)	14.22
[-95 >=Min)	1.36
<b>Total</b>	<b>100</b>

### 4G



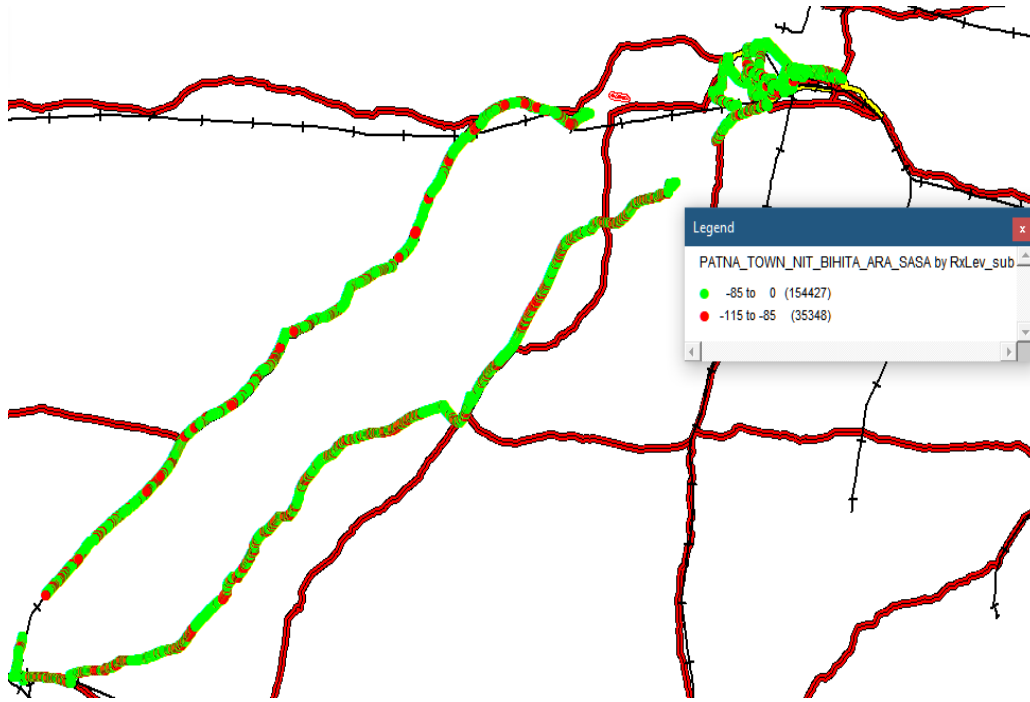
Overall RSRP	Sample %
[Max >=-80]	18.09
[-80 >=-90)	34.01
[-90 >=-110)	45.36
[-110 >=Min)	2.55
<b>Total</b>	<b>100</b>

# I. Coverage Details

## BSNL

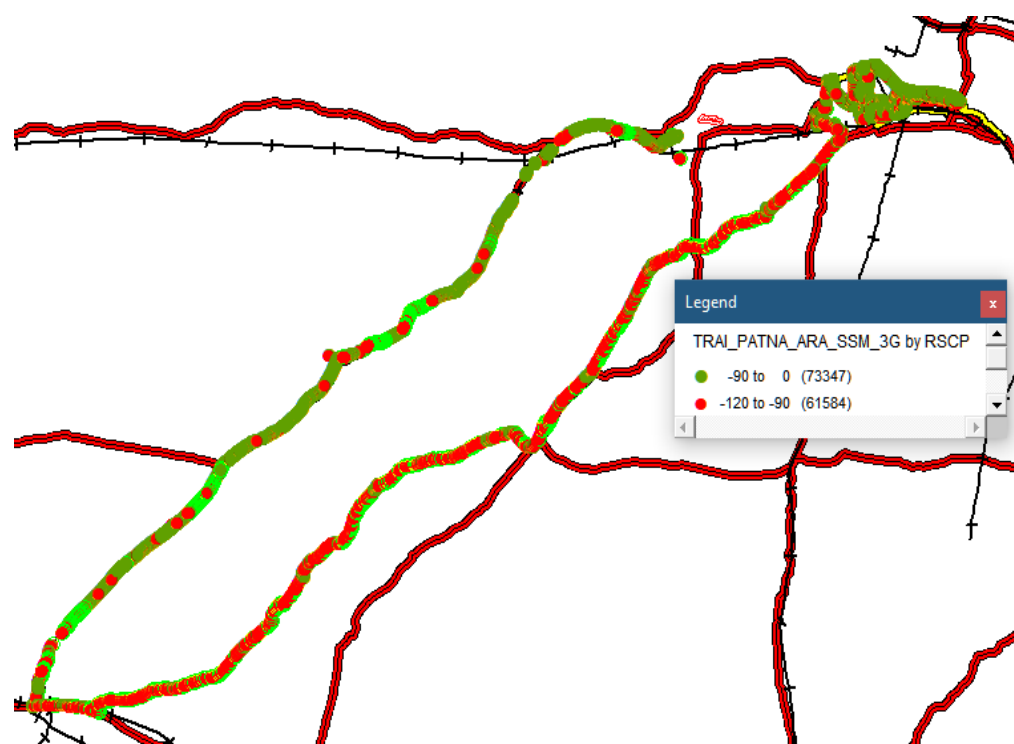
Technology	Coverage Rate %
2G	81.37
3G	54.36

### 2G



Overall Rx Level	Sample %
[Max >=-75]	65.48
[-75 >=-85]	15.89
[-85 >=-95]	13.45
[-95 >=Min]	5.18
<b>Total</b>	<b>100</b>

### 3G



Overall RSCP	Sample %
[Max >=-70]	16.98
[-70 >=-80]	16.65
[-80 >=-90]	20.73
[-90 >=Min]	45.64
<b>Total</b>	<b>100</b>

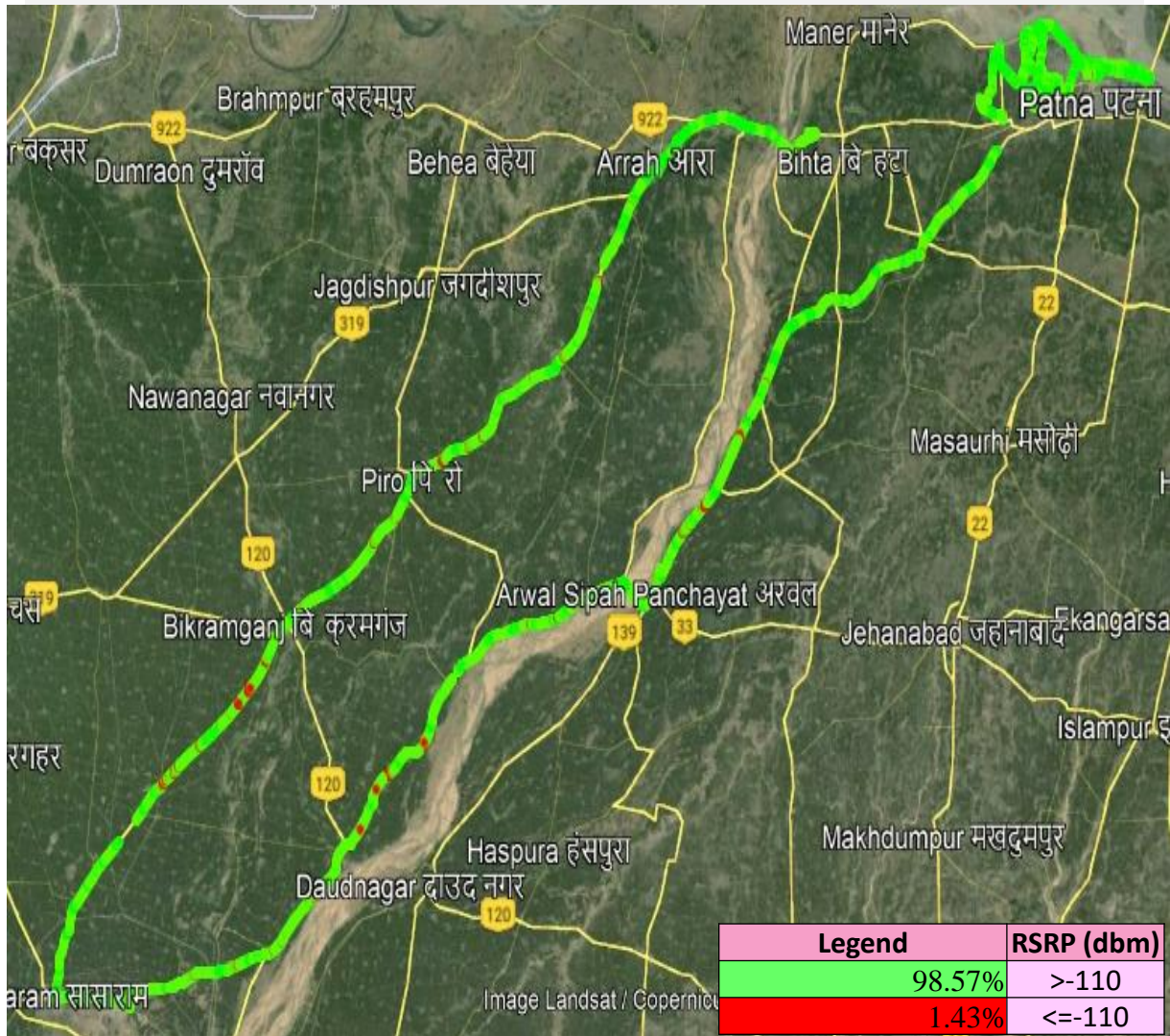


# I. Coverage Details

## RJIO

Technology	Coverage Rate %
4G	98.57

### 4G



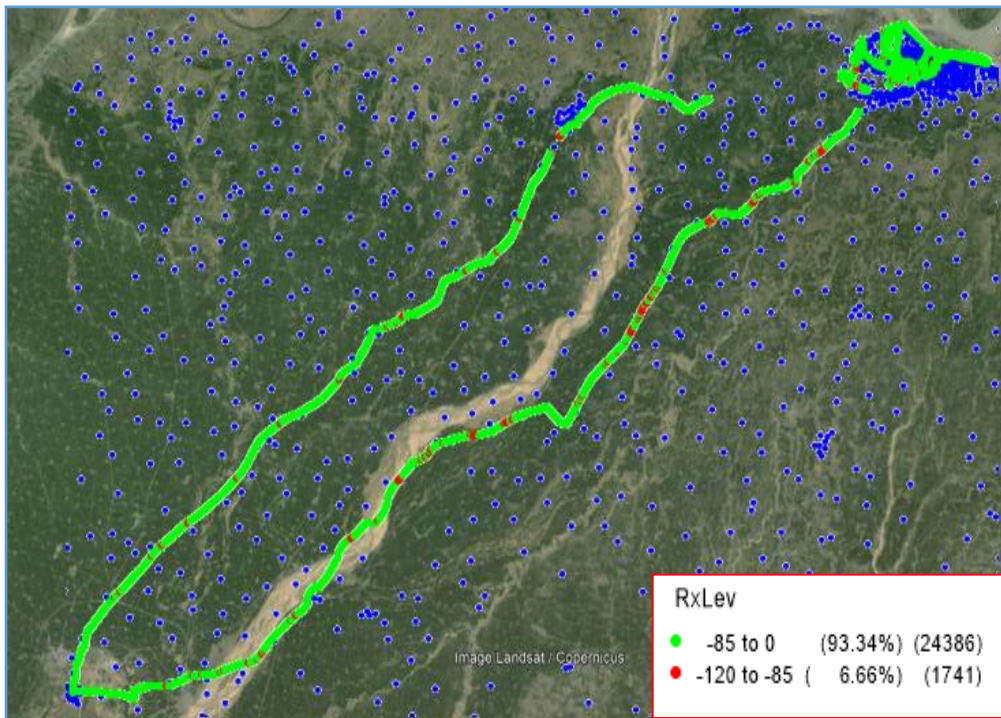
Overall RSRP	Sample %
[Max >= -80]	38.43
[-80 >= -90)	31.23
[-90 >= -110)	28.91
[-110 >= Min)	1.43
<b>Total</b>	<b>100</b>

# I. Coverage Details

## VIL

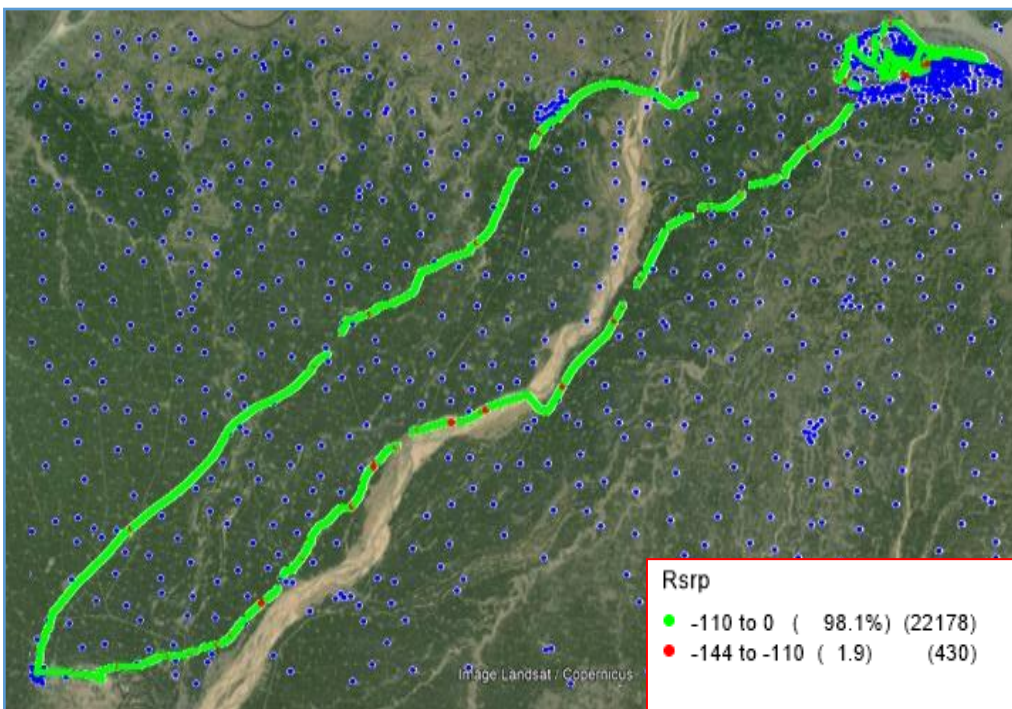
Technology	Coverage Rate %
2G	93.34
4G	98.10

### 2G



Overall Rx Level	Sample %
[Max >=-75]	70.57
[-75 >=-85)	22.77
[-85 >=-95)	6.36
[-95 =Min)	0.31
<b>Total</b>	<b>100</b>

### 4G



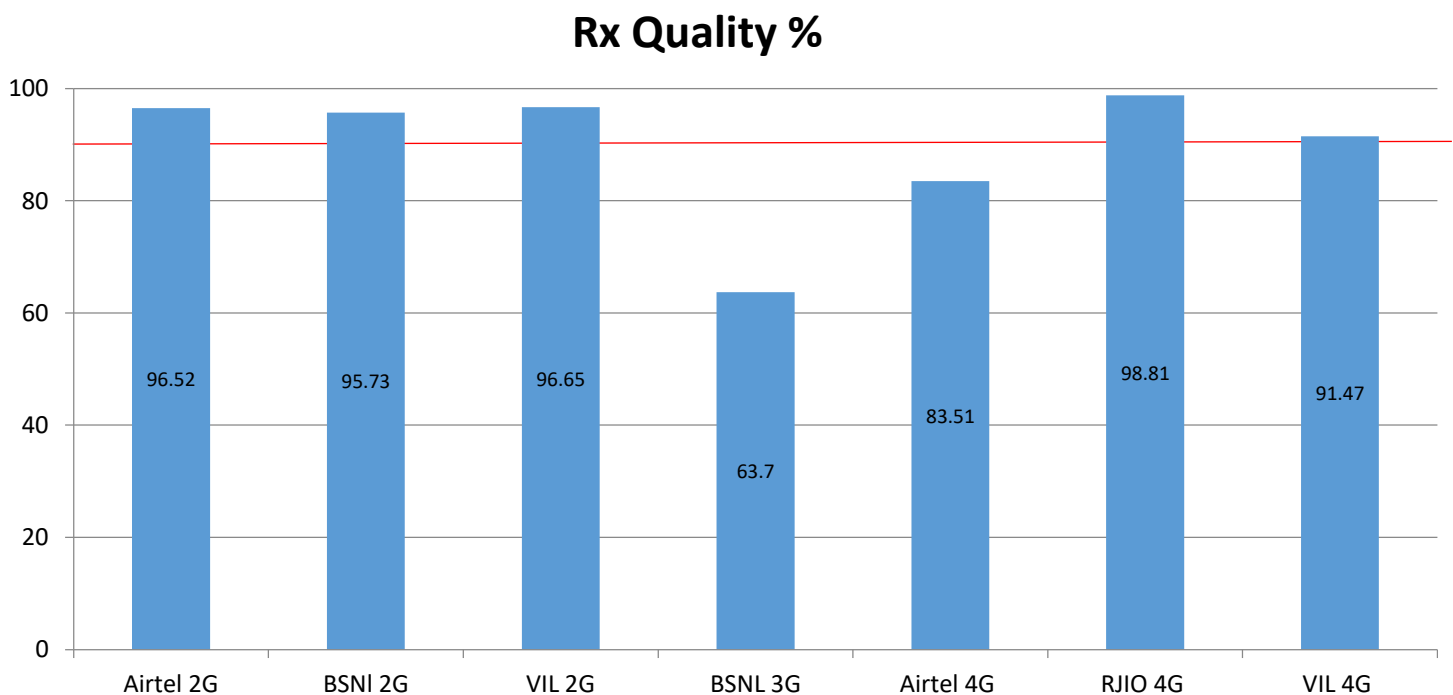
Overall RSRP	Sample %
[Max >=-80]	18.78
[-80 >=-90)	29.56
[-90 >=-110)	49.76
[-110 >=Min)	1.90
<b>Total</b>	<b>100</b>



## II. Quality Details

For measuring voice quality, as per the QoS norms, Rx Quality  $\leq 5$  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	96.52
BSNL 2G	95.73
VIL 2G	96.65
BSNL 3G	63.70
AIRTEL 4G	83.51
RJIO 4G	98.81
VIL 4G	91.47



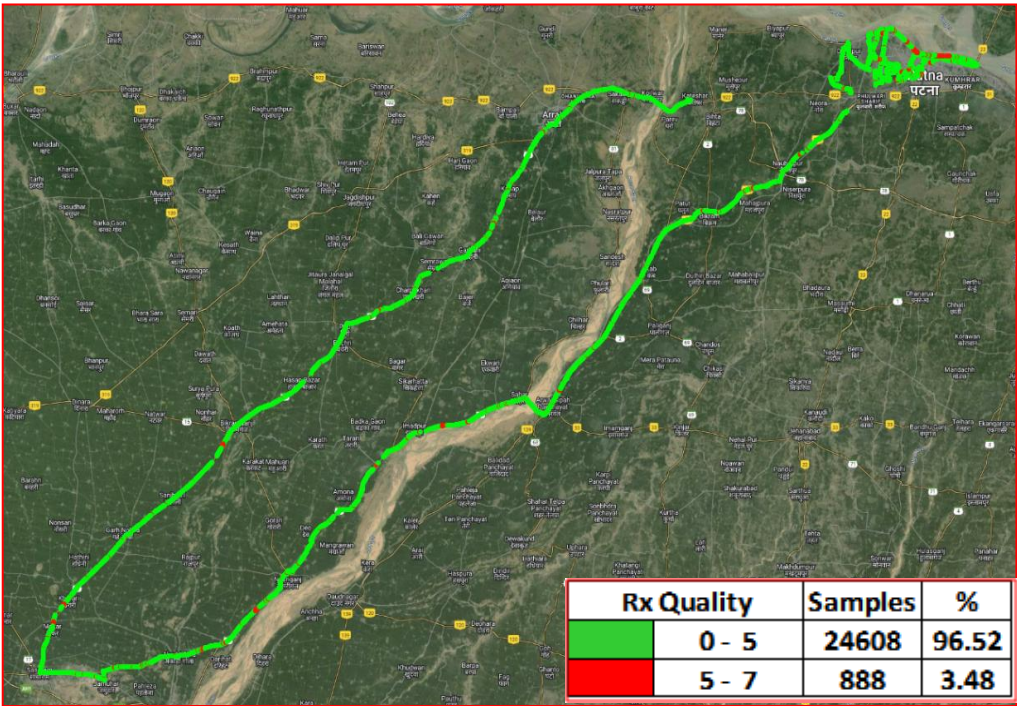


# II. Quality Details

## AIRTEL

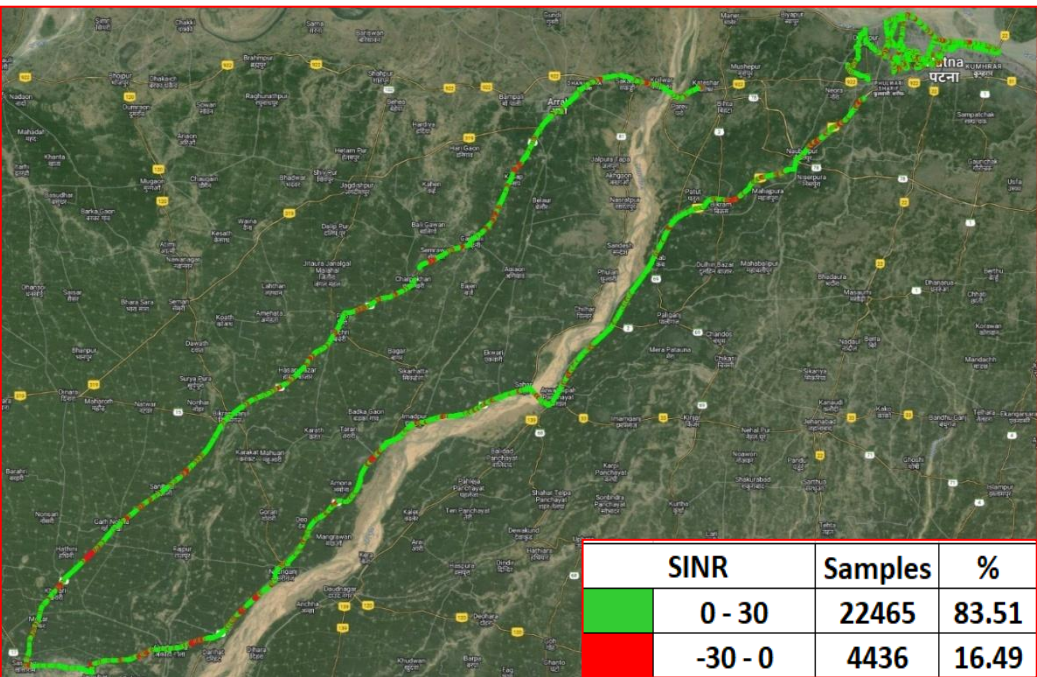
Technology	Rx Quality %
2G	96.52
4G	83.51

### 2G



Overall Rx Quality	Sample %
(Min <=2)	79.13
(2 <=3)	6.47
(3 <=4)	6.65
(4 <=5)	4.26
(5 <=Max)	3.48
<b>Total</b>	<b>100</b>

### 4G



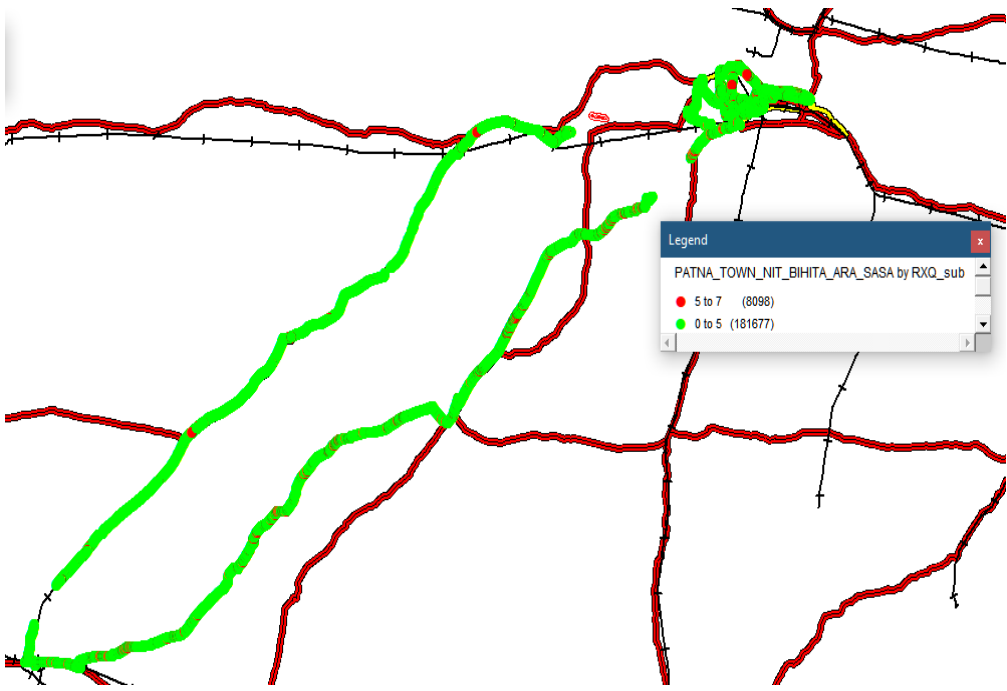
Overall SINR	Sample %
(Min <=0)	16.49
(0 <=5)	30.08
(5 <=10)	28.32
(10 <=15)	15.35
(15 <=Max)	9.75
<b>Total</b>	<b>100</b>

# II. Quality Details

## BSNL

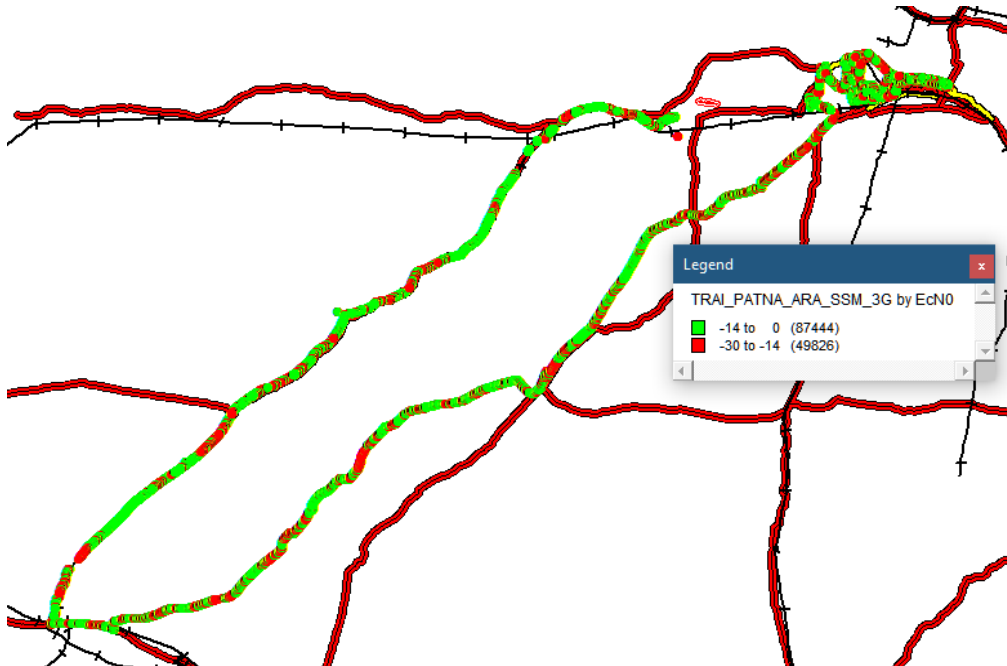
Technology	Rx Quality %
2G	95.73
3G	63.70

### 2G



Overall Rx Quality	Sample %
(Min <=2)	91.31
(2 <=3)	1.33
(3 <=4)	1.46
(4 <=5)	1.63
(5 <=Max)	4.27
Total	100

### 3G



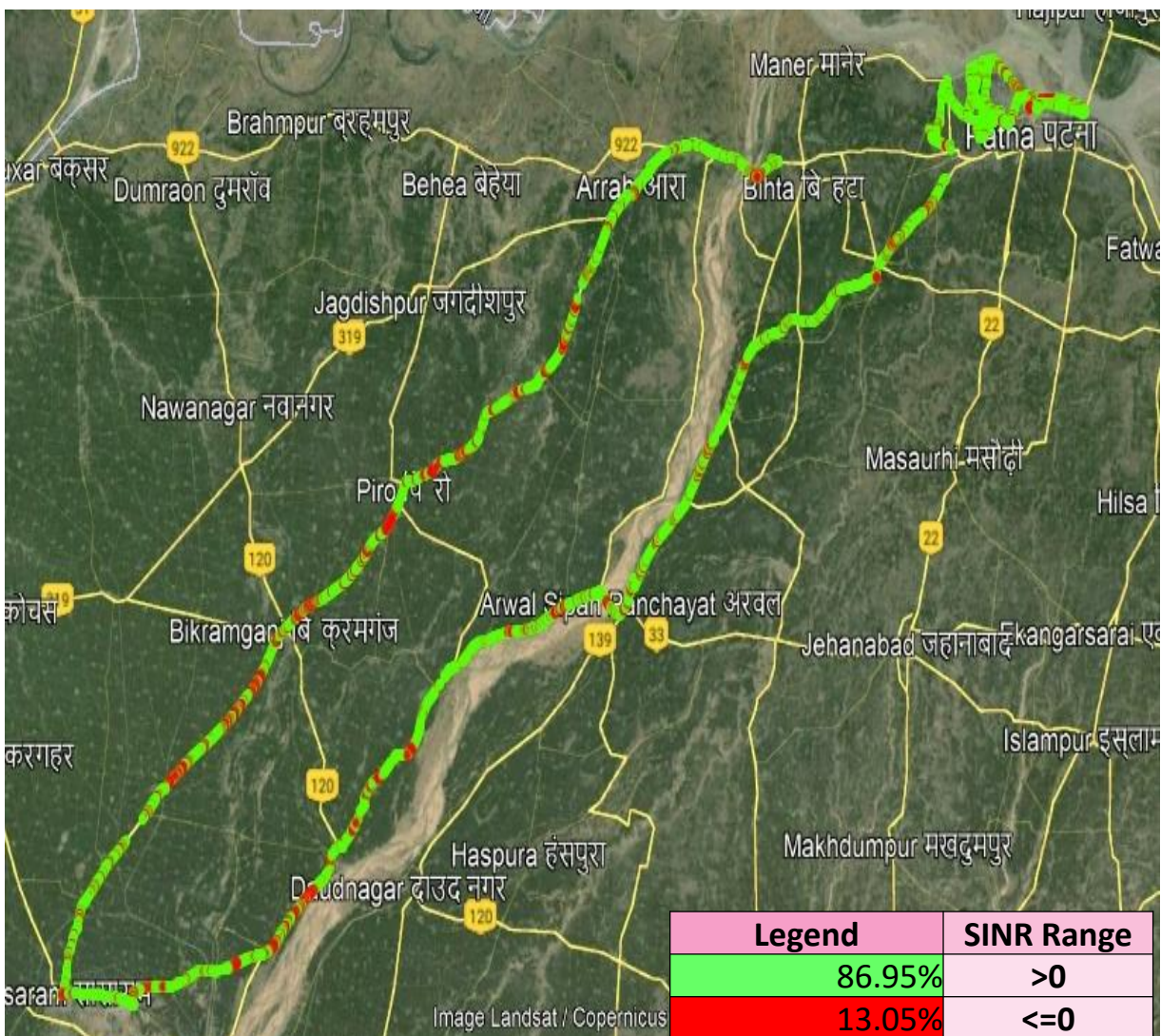
Overall SINR	Sample %
(Min <=0)	13.79
(0 <=5)	10.02
(5 <=10)	18.35
(10 <=15)	21.54
(15 <=Max)	36.3
Total	100



## II. Quality Details

### RJIO

Technology	Rx Quality %
4G	98.81
<b>4G</b>	



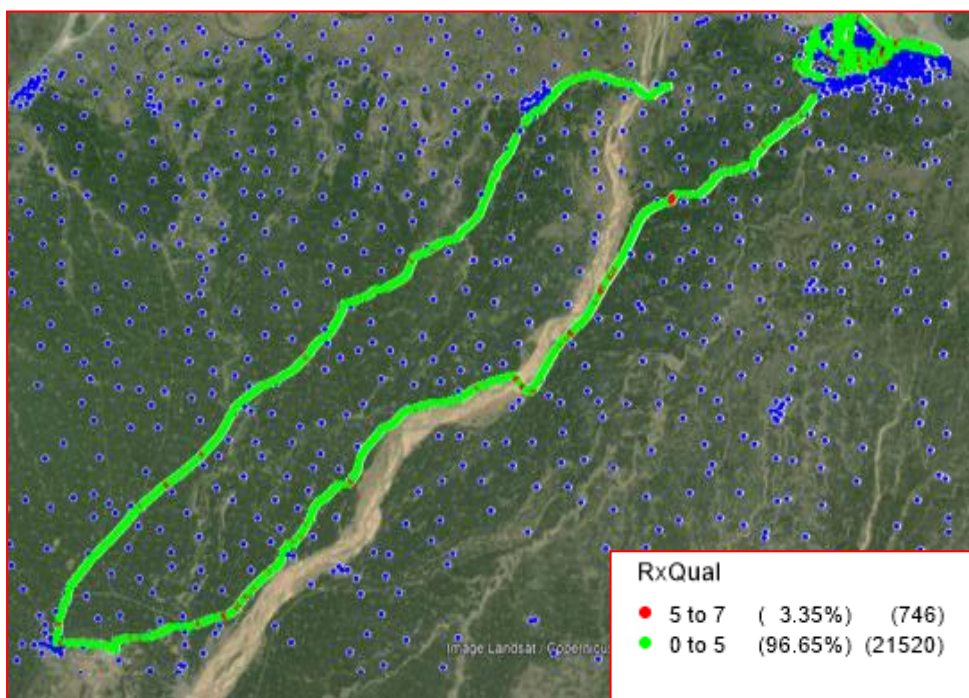
Overall SINR	Sample %
(Min <=0)	13.05
(0 <=5)	24.13
(5 <=10)	27.10
(10 <=15)	20.95
(15 <=Max)	14.77
<b>Total</b>	<b>100</b>

## II. Quality Details

### VIL

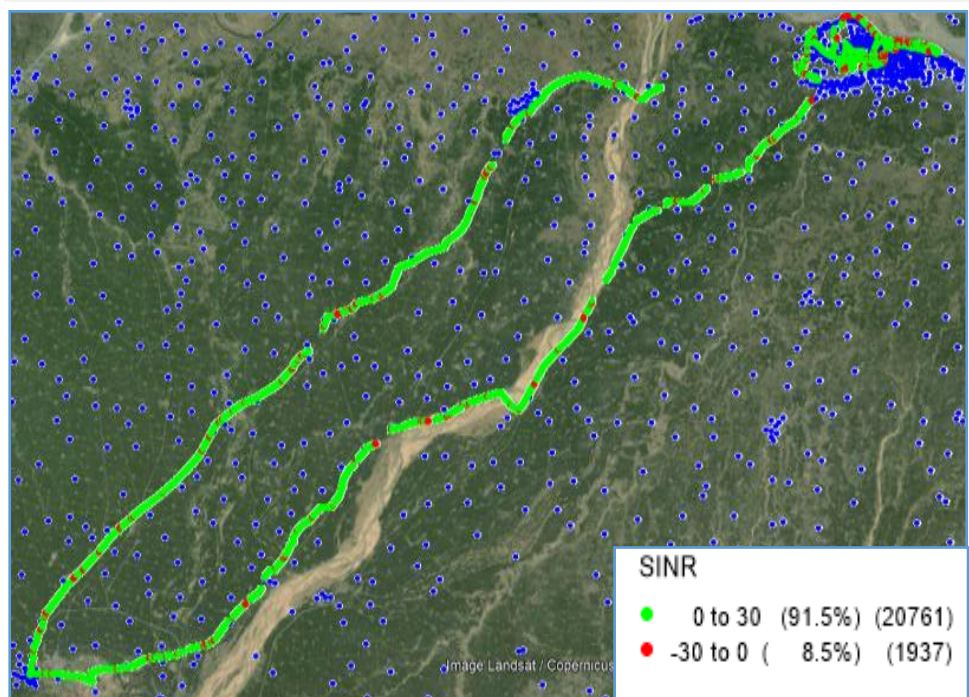
Technology	Rx Quality %
2G	96.65
4G	91.47

#### 2G



Overall Rx Quality	Sample %
(Min <=2)	80.73
(2 <=3)	7.03
(3 <=4)	5.65
(4 <=5)	3.23
(5 <=Max)	3.35
<b>Total</b>	<b>100</b>

#### 4G



Overall SINR	Sample %
(Min <=0)	8.53
(0 <=5)	20.09
(5 <=10)	25.50
(10 <=15)	20.38
(15 <=Max)	25.50
<b>Total</b>	<b>100</b>



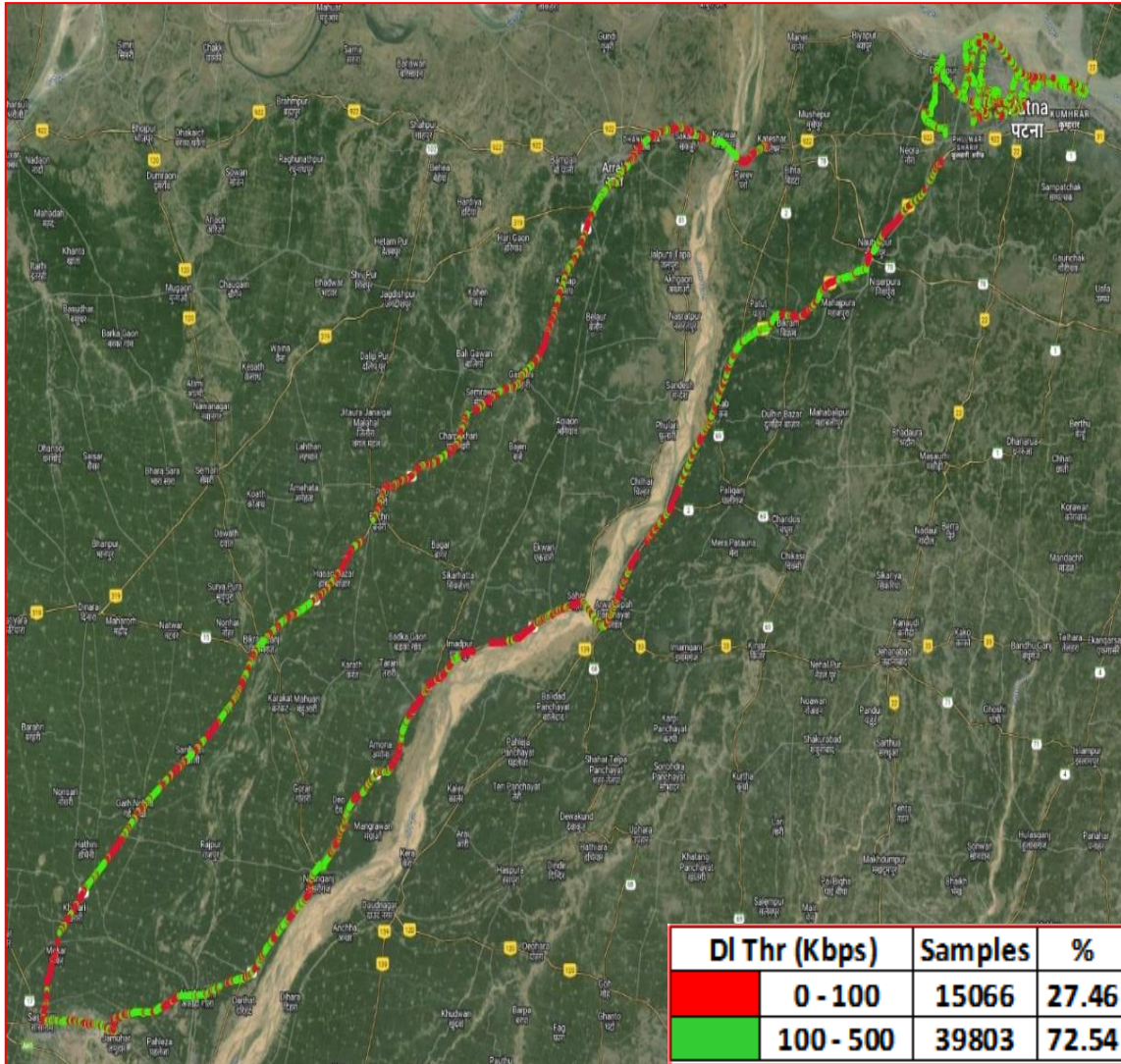
# IV. Dynamic Data Test- 2G DL Details

## AIRTEL

### Dynamic Data Testing Complete 375 Kms

Data KPIs - Overall	2G
Average Download Throughput (Kbps)	160.23

### 2G



AVG. DOWNLOAD SPEED (Kbps)	160.23
% FILE TRANSFER COMPLETE	100
DL throughput	<b>Sample %</b>
0 to 50 Kbps	16.31
50 to 100 Kbps	11.15
100 to 200 Kbps	31.31
200 to 300 Kbps	40.44
>300 Kbps	0.79
<b>Total</b>	<b>100</b>

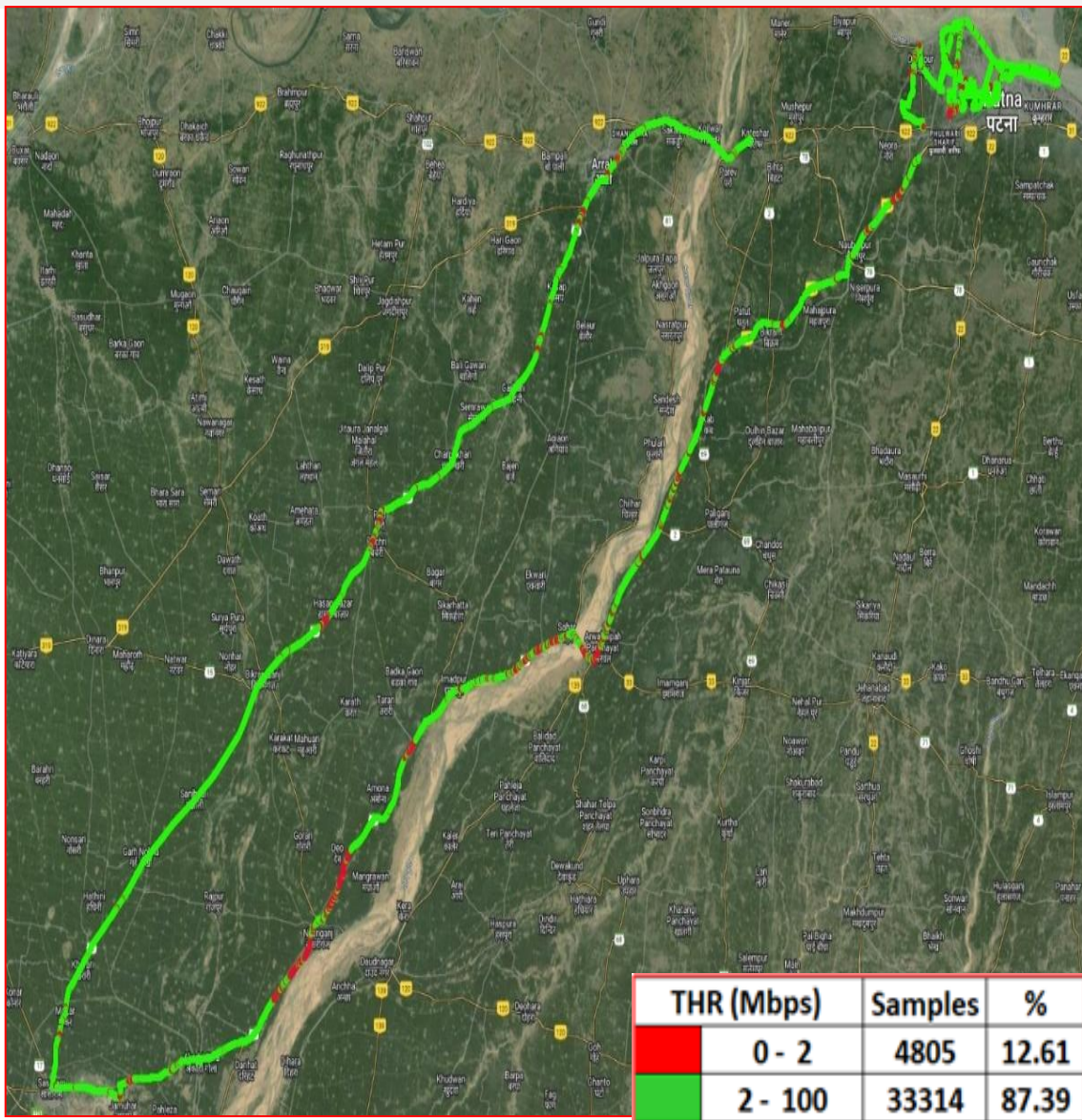
# IV. Dynamic Data Test- 4G DL Details

## AIRTEL

### Dynamic Data Testing Complete 375 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	34.88

### 4G



AVG. DOWNLOAD SPEED (Mbps)	34.88
% FILE TRANSFER COMPLETE	100
DL throughput	<b>Sample %</b>
0 to 1 Mbps	5.07
1 to 2 Mbps	7.53
2 to 5 Mbps	10.91
5 to 10 Mbps	7.69
>10 Mbps	68.80
<b>Total</b>	<b>100</b>



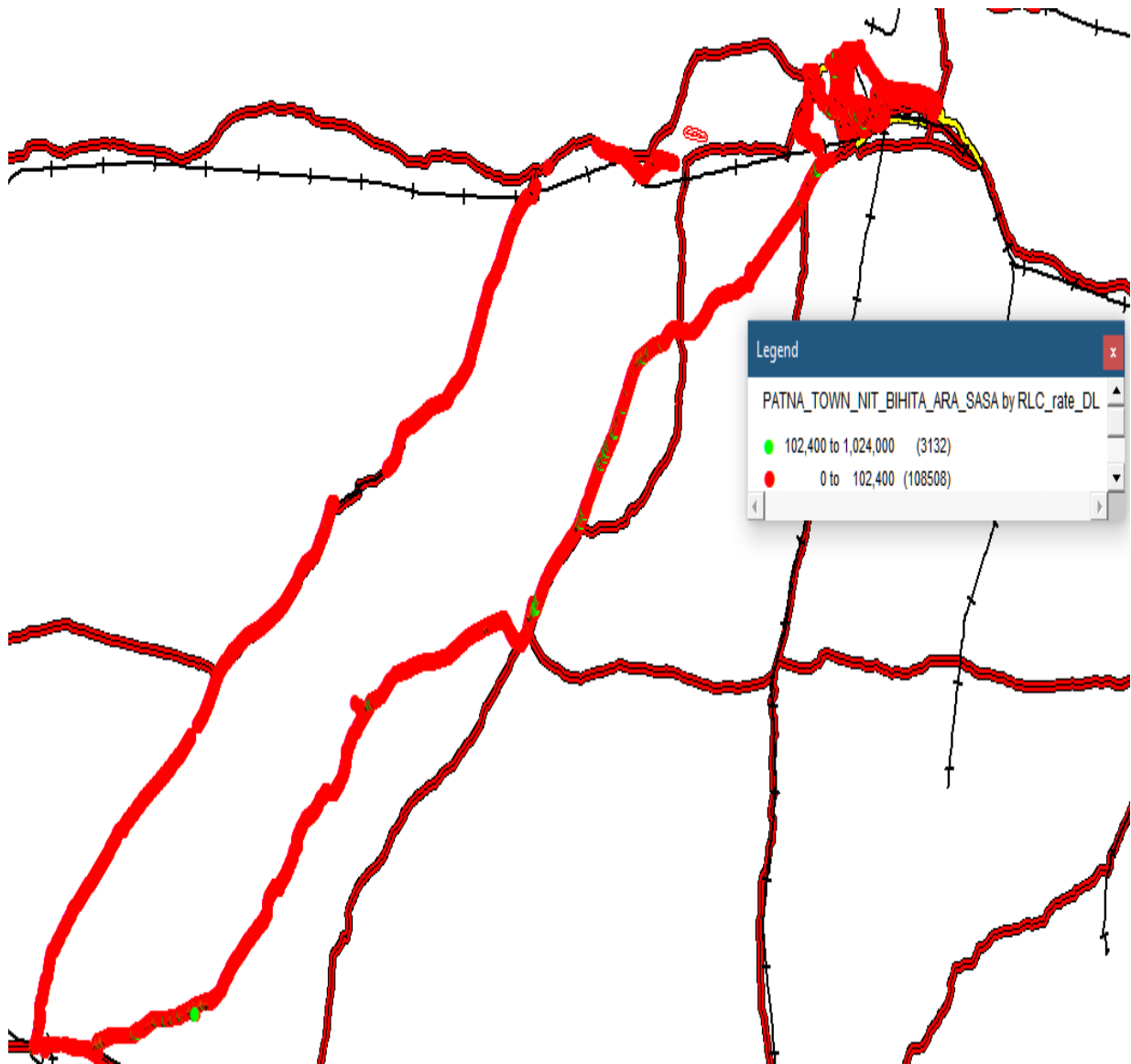
# IV. Dynamic Data Test- 2G DL Details

**BSNL**

**Dynamic Data Testing Complete 375 Kms**

Data KPIs - Overall	<b>2G</b>
Average Download Throughput (Kbps)	82.62

**2G**



AVG. DOWNLOAD SPEED (Kbps)	82.62
% FILE TRANSFER COMPLETE	94.92
DL throughput	<b>Sample %</b>
0 to 50 Kbps	94.58
50 to 100 Kbps	2.73
100 to 200 Kbps	2.34
200 to 300 Kbps	0.25
>300 Kbps	0.1
<b>Total</b>	<b>100</b>

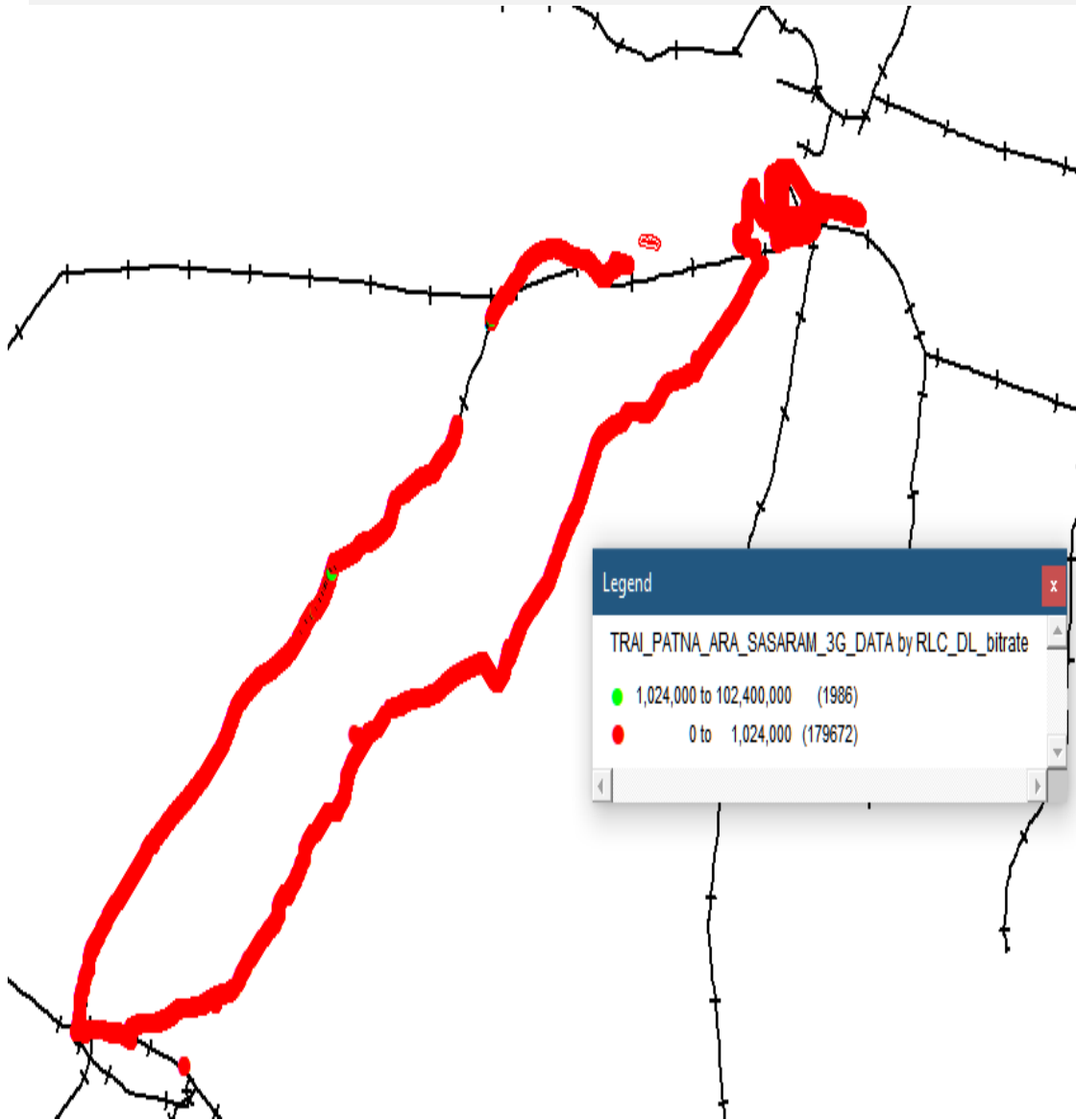
# IV. Dynamic Data Test- 3G DL Details

## BSNL

### Dynamic Data Testing Complete 375 Kms

Data KPIs - Overall	<b>3G</b>
Average Download Throughput (Mbps)	1.53

### 3G



AVG. DOWNLOAD SPEED (Mbps)	1.53
% FILE TRANSFER COMPLETE	91.9
<b>DL throughput</b>	<b>Sample %</b>
0 to 0.5 Mbps	96.65
0.5 to 1 Mbps	0.74
1 to 2 Mbps	0.98
2 to 5 Mbps	1.21
>5 Mbps	0.42
<b>Total</b>	<b>100</b>



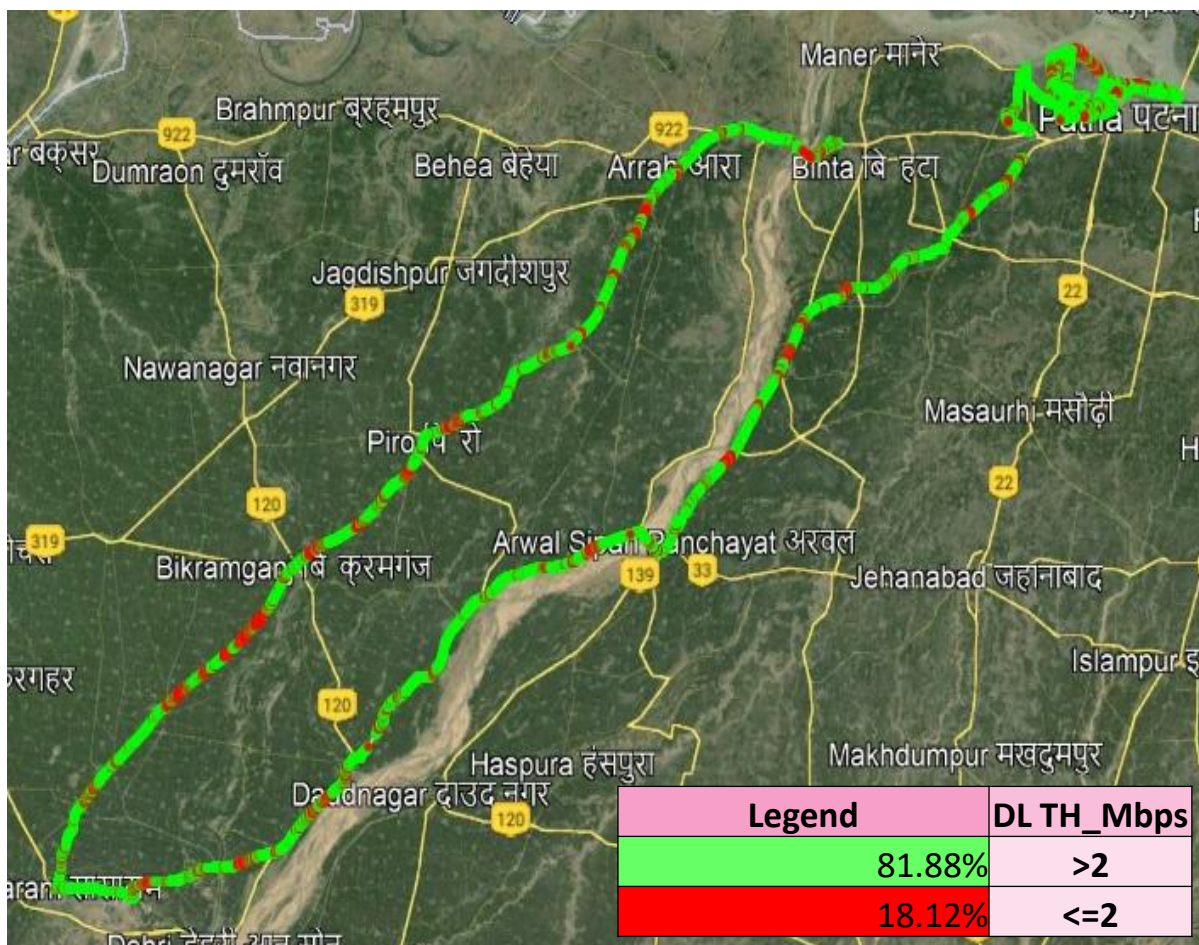
## IV. Dynamic Data Test- 4G DL Details

### RJIO

#### Dynamic Data Testing Complete 375 Kms

Data KPIs - Overall	4G
Average Download Throughput (Mbps)	28.76

#### 4G



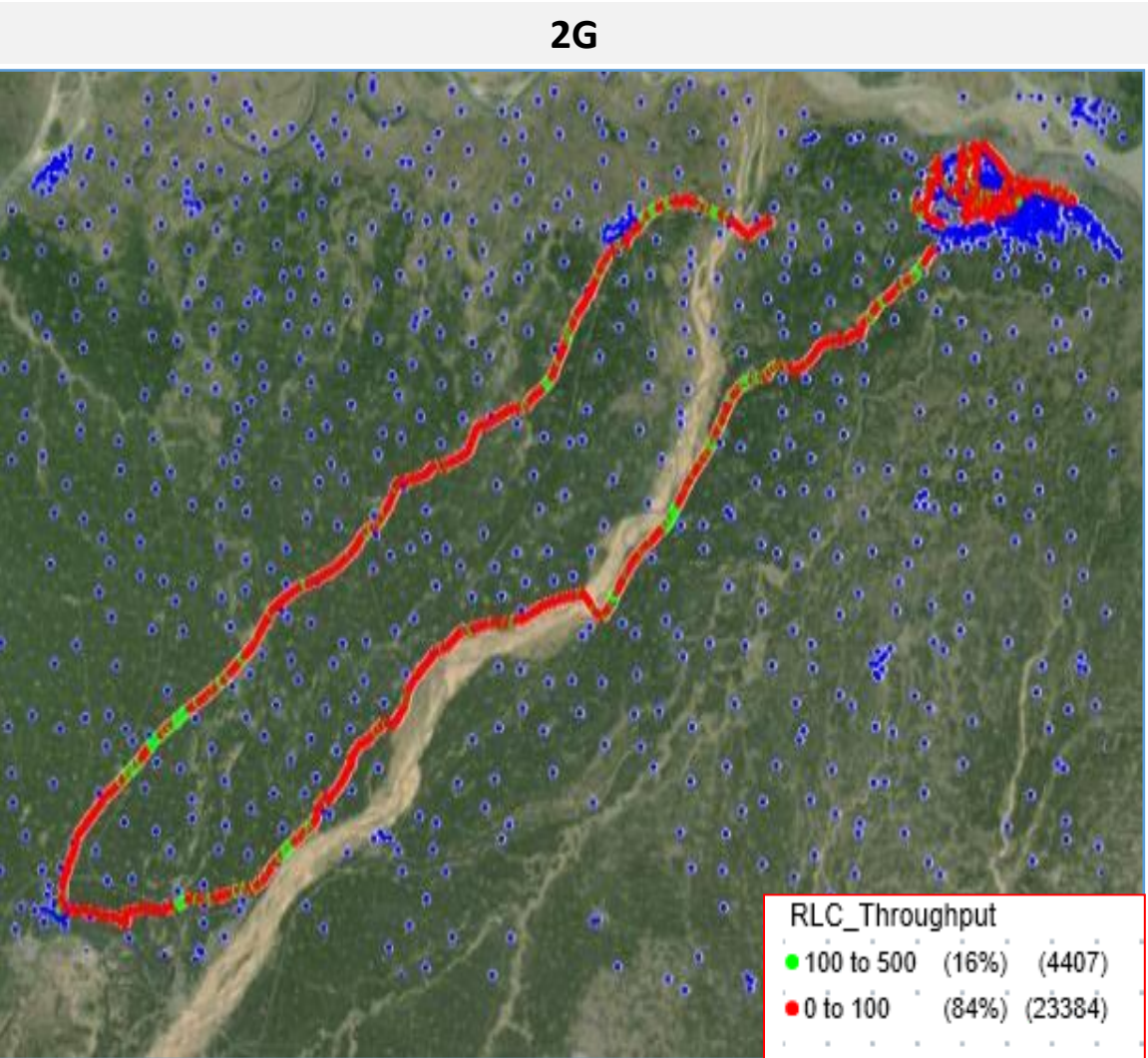
AVG. DOWNLOAD SPEED (Mbps)	28.76
% FILE TRANSFER COMPLETE	100.00
DL throughput	<b>Sample %</b>
0 to 1 Mbps	12.64
1 to 2 Mbps	5.48
2 to 5 Mbps	14.03
5 to 10 Mbps	18.31
>10 Mbps	49.54
<b>Total</b>	<b>100</b>

# IV. Dynamic Data Test- 2G DL Details

## VIL

### Dynamic Data Testing Complete 375 Kms

Data KPIs – Overall	2G
Average Download Throughput (Kbps)	69.96



AVG. DOWNLOAD SPEED (Kbps)	69.96
% FILE TRANSFER COMPLETE	100
DL throughput	<b>Sample %</b>
0 to 50 Kbps	54.00
50 to 100 Kbps	30.15
100 to 200 Kbps	14.51
200 to 300 Kbps	1.35
>300 Kbps	0.00
<b>Total</b>	<b>100</b>



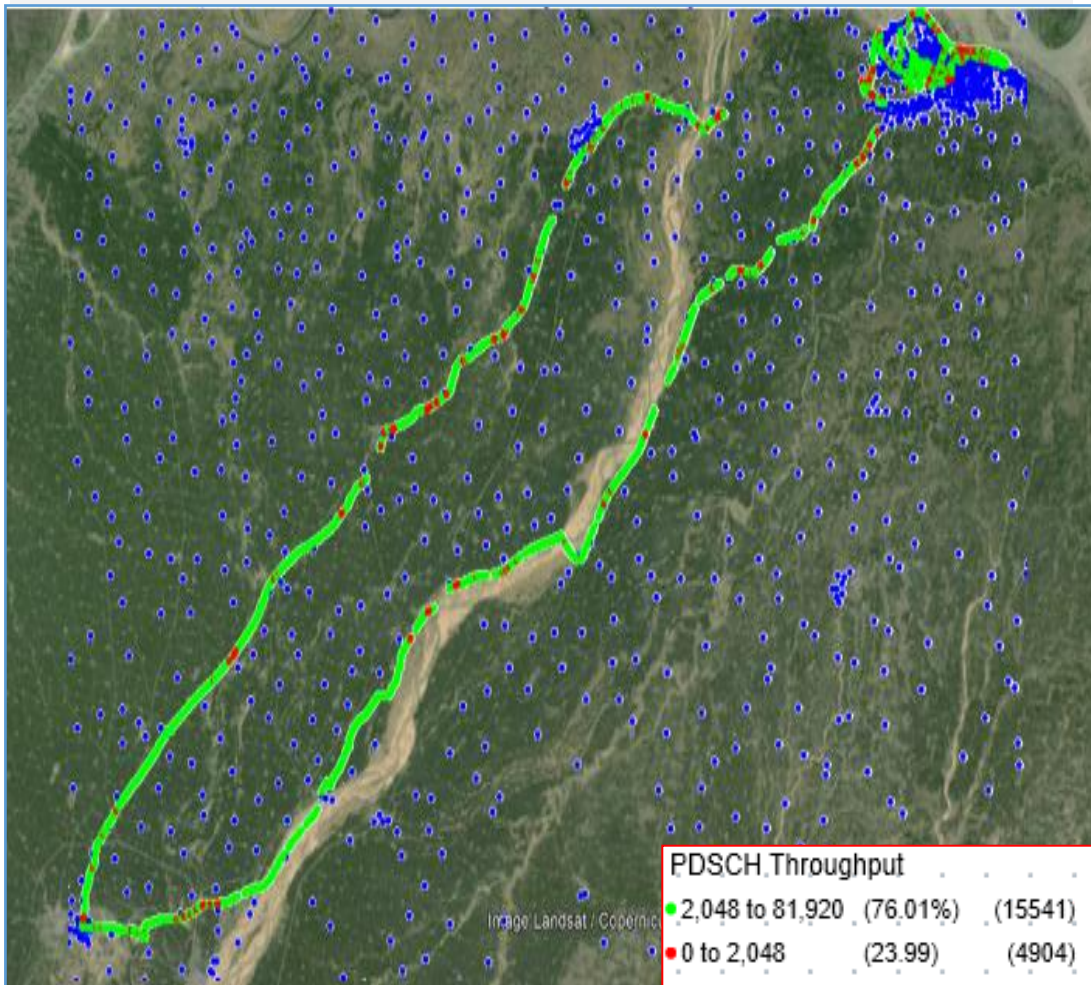
# IV. Dynamic Data Test- 4G DL Details

## VIL

### Dynamic Data Testing Complete 375 Kms

Data KPIs – Overall	4G
Average Download Throughput (Mbps)	17.68

### 4G



AVG. DOWNLOAD SPEED (Mbps)	17.68
% FILE TRANSFER COMPLETE	100
DL throughput	<b>Sample %</b>
0 to 1 Mbps	14.69
1 to 2 Mbps	9.29
2 to 5 Mbps	15.69
5 to 10 Mbps	20.73
>10 Mbps	39.59
<b>Total</b>	<b>100</b>