



**TELECOM REGULATORY AUTHORITY OF INDIA**

**Regional Office – Bhopal**

**Operator Assisted Drive Test (OADT)**

**Raipur SSA (MP LSA)**

**Includes**

- 1. Raipur City**
- 2. Rural/ SDCC of Raipur SSA**
- 3. Highways/ Important Roads in Raipur SSA**

**29<sup>th</sup> November 2021 to 3<sup>rd</sup> December 2021**

## Overview

Telecom Regulatory Authority of India has been entrusted with the task of laying down the standards of quality of service to be provided by the service providers and ensuring its enforcement, and also TRAI is responsible for conducting the periodical audit of such services provided by the service providers to protect the interest of the consumers of telecommunications service

TRAI is regularly monitoring the performance of Telecom Service Providers (TSP) against the benchmarks for the various Quality of Service (QoS) parameters laid down by the Authority. TSPs submit Performance Monitoring Reports to TRAI every quarter. TRAI also undertakes audits and assessments of Quality of Service to verify the Quality of Service claimed.

**TRAI Regional Office Bhopal has conducted the drive test of Raipur SSA with the help of telecom Service Providers of MP LSA from 29<sup>th</sup> November 2021 to 3<sup>rd</sup> December 2021( 5 Day) covering various locations in Raipur SSA**

### **Technical Details for drive test in Raipur SSA:**

#### **A. Voice -**

- i. 2G – measurement – UE Locked in 2G
- ii. 3G – measurement – UE in Dual mode (2G and 3G)
- iii. 4G – measurement – UE in Free mode

Calls were made for the 90-sec duration with a wait time of 10 sec between calls in all technologies.

#### **B. Dynamic data – repeat data file download ( to check throughput on entire route)**

- I. 2G – measurement – UE Locked in 2G file size- 500KB
- II. 3G – measurement – UE in 3G File Size- 20MB
- III. 4G – measurement – UE in LTE File Size- 40MB

#### **C. Static Data: Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency**

- i. Download- 2G - 500KB ,3G - 20 MB, 4G - 40MB
- ii. Upload - 2G -100KB ,3G - 5 MB, 4G - 10MB
- iii. Web browsing - 3 links of e-commerce websites  
<https://www.amazon.in>, <https://www.flipkart.com>,  
<https://paytm.com>.
- iv. Video Streaming – 130 sec clip (only in 3G and LTE)
- v. Latency – 32 Bytes on [www.google.com](http://www.google.com).

### **Available network in Raipur SSA**

- 2G Network –Airtel, BSNL and VIL
- 3G Network – BSNL, VIL
- VoLTE Network – Airtel, RJio and VIL

### **Approximate Calls for Voice**

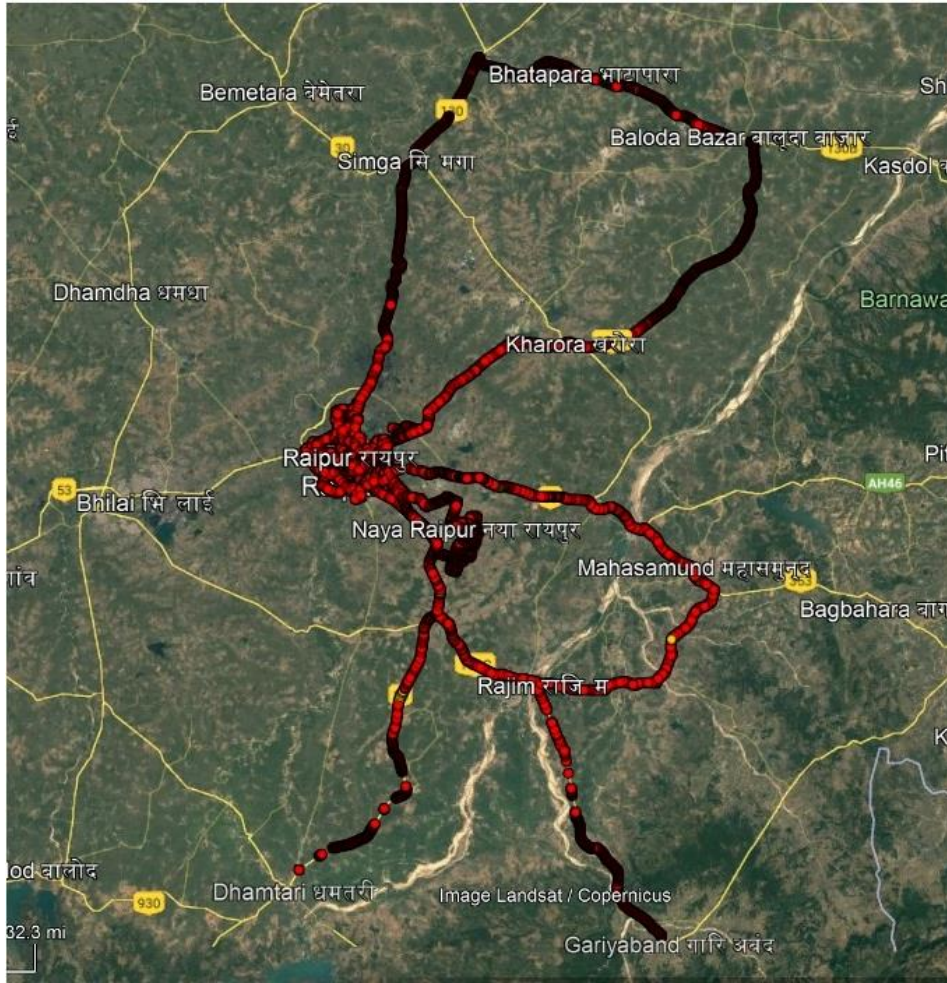
- Airtel - (2G-1086 +VoLTE- 1140 )- Total -2226
- BSNL- (2G-1058 +3G- 1046 )- Total -2104
- Jio- VoLTE- Total - 975
- VIL- (2G- 1003 + 3G-526+ VoLTE- 1028 ) Total 2557

### **Route KM Covered for Voice & data- 746 KMs**

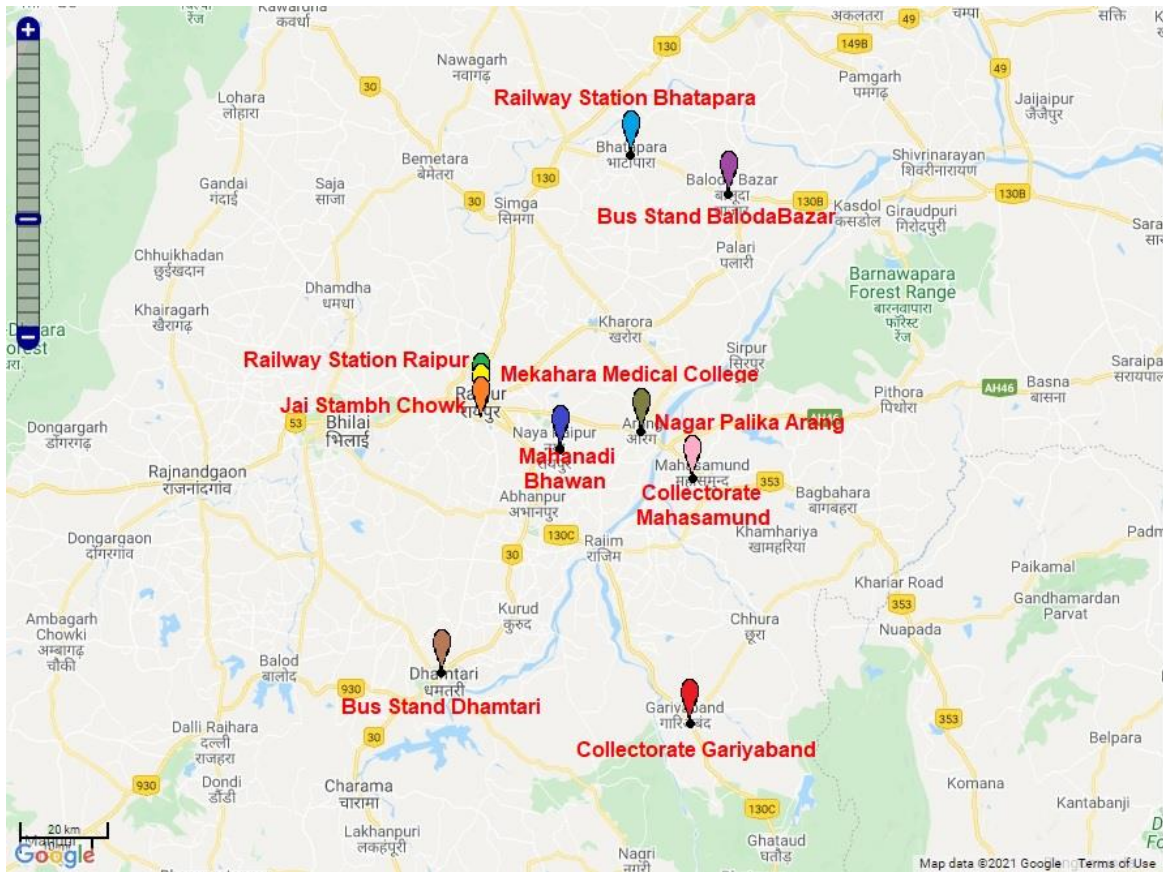
### **Hotspots locations for static Data Testing**

1. Raipur -1 Railway station
2. Raipur-2 Ambedkar medical college
3. Raipur -3 Jai stambh
4. Raipur-4 Mahanadi Naya Raipur
5. Arang
6. Mahasamund
7. Bhatapara
8. balodabazar
9. Gaiyaband
10. Dhamtari

### Voice & data drive test route (Map)

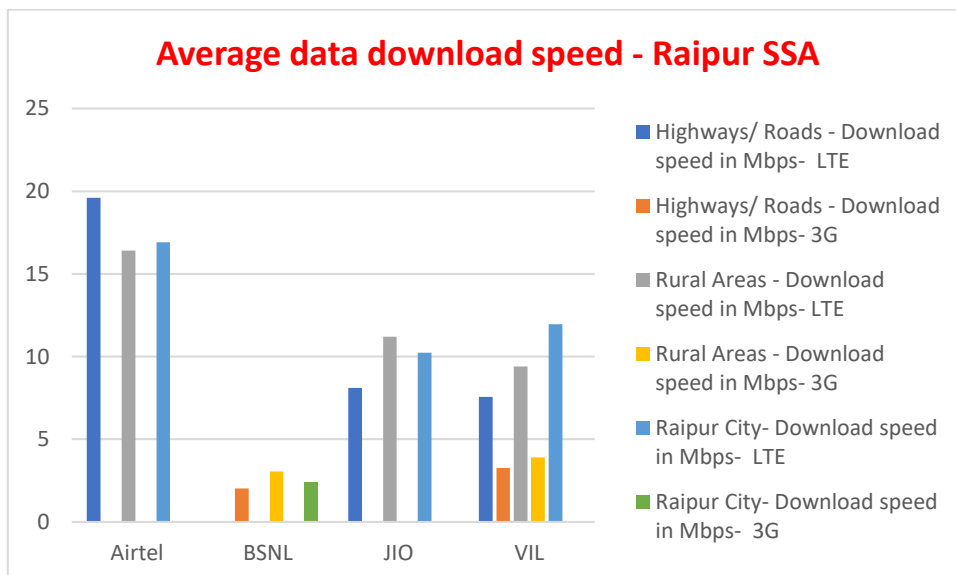


### Data testing hotspot locations (Map)



### Key observations from Drive test

- Drive test completed for the TSP Airtel, BSNL, JIO & VIL for all available technologies offered by TSPs in Raipur SSA.
- With Voice, data download was also tested throughout the drive test routes.
- In 10 locations (hotspots) static data testing was also conducted for all offered technologies. Data services were found satisfactory.
- TRAI Benchmark achievement by TSPs during the drive test- Most of the important benchmarks achieved by the TSPs Except Rx Quality in some technologies by few operators.



## Key observations from Drive test

### TRAI Benchmark

Block call rate %	≤3%
Drop call rate %	≤2%
CSSR %	≥95 %
SDCCH /RRC Congestion	≤1%
TCH/ RAB Congestion	≤2%
Down Link (DL) Packet Drop Rate or DL-PDR	≤2%
Mobility HOSR %-	≥95%
Good RX Quality %	≥95%
Value of radio link timeout (RLT)	≤ 48
PDP Context Activation Success Rate %	≥95 %

## Detailed observations

### Key observations of Voice Call

#### Voice call summary ( Raipur City)

TSP ( For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	461	451	NA	456
Block call rate %	0.43	0	NA	1.75
CSSR %	99.57	100	NA	98.25
Drop call rate %	0	0.22	NA	0.21
Mobility HOSR %	98.81	99.24	NA	96.84
RX Quality %	96.11	97.08	NA	97.38
Average CST (Sec)	3.28	4.03	NA	3.39

TSP ( For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	445	NA	NA
Block call rate %	NA	0	NA	NA
CSSR %	NA	100	NA	NA
Drop call rate %	NA	0	NA	NA
Mobility HOSR %	NA	100	NA	NA
RX Quality %	NA	91.99	NA	NA
Average CST(Sec)	NA	3.62	NA	NA

TSP ( For VolTE)	Airtel	BSNL	JIO	VIL
Call attempts	473	NA	455	481
Block call rate %	0.21	NA	0	0
CSSR %	99.79	NA	99.99	100
Drop call rate %	0	NA	0	0.22
Mobility HOSR %	100	NA	97.23	99.89
RX Quality %	90.24	NA	98.2	95.81
Average CST (Sec)	1.1	NA	0.81	1.72

Technology	Parameter	Airtel	BSNL	JIO	VIL
2G	SDCCH Congestion (<=1%)	0.22	0	NA	NA
	TCH Congestion (<=2%)	0.22	0	NA	NA
3G	CSFB Failure %	NA		NA	NA
	SDCCH Congestion %	NA	0	NA	NA
	RRC Congestion %	NA	0	NA	NA
	SDCCH and RRC Congestion % (<=1%)	NA	0	NA	NA
	TCH Congestion %	NA	0	NA	NA
	RAB Congestion %	NA	0	NA	NA
	TCH and RAB Congestion % (<=2%)	NA	0	NA	NA

### Coverage

#### 1. Percentage of Coverage sample of 2G >= - 85 dBm

TSP	Airtel	BSNL	JIO	VIL
Coverage %	80.63	95.39	NA	88.05

#### 2. Percentage of Coverage sample of 3G >= - 90 dBm

TSP	Airtel	BSNL	JIO	VIL
Coverage %	NA	85.10	NA	NA

#### 3. Percentage of Coverage sample of VoLTE >= -110 dBm

TSP	Airtel	BSNL	JIO	VIL
Coverage %	99.79	NA	99.82	96.51

#### 4. Percentage of time spent on 3G Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	NA	84.56	NA	NA

#### 5. Percentage of time spent on VoLTE Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	100	NA	100	97.24

#### 6. Percentage of RLT >= 48

TSP	Airtel	BSNL	JIO	VIL
Percentage of RLT >=48	0	0	NA	0



## Voice call summary

(Rural Area/ Forest Area e.g., Villages/ Tourist places/ Block or Tehsil)

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Call attempts	213	215	NA	184
Block call rate %	0.94	0	NA	1.63
CSSR %	99.6	99.53	NA	98.37
Drop call rate %	0	0.46	NA	0
Mobility HOSR %	100	100	NA	98.17
RX Quality %	98.27	98.92	NA	99.32
Average CST Sec	3.43	4.05	NA	2.99

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Call attempts	NA	213	NA	191
Block call rate %	NA	0	NA	1.04
CSSR %	NA	100	NA	98.96
Drop call rate %	NA	1.87	NA	0
Mobility HOSR %	NA	99.94	NA	99.96
RX Quality %	NA	92.54	NA	96.91
Average CST Sec	NA	3.44	NA	3.01

<b>TSP ( For VolTE)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Call attempts	236	NA	179	193
Block call rate %	0.42	NA	0	0
CSSR %	99.58	NA	100	100
Drop call rate %	0	NA	0	0.43
Mobility HOSR %	99.60	NA	97.25	99.47
RX Quality %	85.17	NA	99.17	95.93
Average CST Sec	0.66	NA	1.97	1.80

<b>Technology</b>	<b>Parameter</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
2G	SDCCH Congestion ( <=1%)	0	0	NA	NA
	TCH Congestion (<=2%)	0.94	0	NA	NA
3G	CSFB Failure %	NA	NA	NA	NA
	SDCCH Congestion %	NA	0	NA	NA
	RRC Congestion %	NA	0	NA	NA
	SDCCH and RRC Congestion % ( <=1%)	NA	0	NA	NA
	TCH Congestion %	NA	0	NA	NA
	RAB Congestion %	NA	0	NA	NA
TCH and RAB Congestion % (<=2%)	NA	0	NA	NA	

## Coverage

### 1. Percentage of Coverage sample of 2G >= - 85 dBm

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Coverage %	71.42	94.81	NA	85.97

### 2. Percentage of Coverage sample of 3G >= - 90 dBm

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Coverage %	NA	87.65	NA	90.76

### 3. Percentage of Coverage sample of VoLTE >= -110 dBm

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Coverage %	99.81	NA	99.88	94.02

### 4. Percentage of time spent on 3G Network

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Time spent %	NA	75.87	NA	97.08

### 5. Percentage of time spent on VoLTE Network

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Time spent %	100	NA	100	71.81

### 6. Percentage of RLT >= 48

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Percentage of RLT >=48	0	0	NA	0

## Voice call summary

(National Highway/ State Highway/ Important connecting roads)

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Call attempts	412	392	NA	363
Block call rate %	1.21	1.02	NA	1.65
CSSR %	98.79	96.93	NA	98.35
Drop call rate %	0	3.15	NA	0
Mobility HOSR %	98.23	90.80	NA	97.89
RX Quality %	96.71	93.81	NA	98.57
Average CST Sec	3.49	4.57	NA	3.12

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Call attempts	NA	388	NA	335
Block call rate %	NA	0.51	NA	1.49
CSSR %	NA	96.90	NA	98.51
Drop call rate %	NA	1.86	NA	0
Mobility HOSR %	NA	98.49	NA	99.89
RX Quality %	NA	86.39	NA	95.64
Average CST (Sec)	NA	4.71	NA	3.06

<b>TSP ( For VolTE)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Call attempts	431	NA	341	354
Block call rate %	0.93	NA	0	0.23
CSSR %	99.07	NA	100	99.77
Drop call rate %	0.47	NA	0	0.47
Mobility HOSR %	98.66	NA	97.23	99.03
RX Quality %	90.10	NA	97.3	95.33
Average CST(Sec)	0.68	NA	1.12	1.87

<b>Technology</b>	<b>Parameter</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
2G	SDCCH Congestion ( <=1%)	0.24	0.51	NA	NA
	TCH Congestion (<=2%)	0.97	0.51	NA	NA
3G	CSFB Failure %	NA	NA	NA	NA
	SDCCH Congestion %	NA	0.51	NA	NA
	RRC Congestion %	NA	0	NA	NA
	SDCCH and RRC Congestion % ( <=1%)	NA	0.51	NA	NA
	TCH Congestion %	NA	0	NA	NA
	RAB Congestion %	NA	0	NA	NA
	TCH and RAB Congestion % (<=2%)	NA	0	NA	NA

### Coverage

#### 1. Percentage of Coverage sample of 2G >= - 85 dBm

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Coverage %	56.48	63.81	NA	77.13

#### 2. Percentage of Coverage sample of 3G >= - 90 dBm

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Coverage %	NA	47.50	NA	60.27

#### 3. Percentage of Coverage sample of VoLTE >= -110 dBm

<b>TSP</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Coverage %	97.80	NA	97.59	83.50

#### 4. Percentage of time spent on 3G Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	NA	56.83	NA	74.2

#### 5. Percentage of time spent on VoLTE Network

TSP	Airtel	BSNL	JIO	VIL
Time spent %	99.99	NA	100	60.47

#### 6. Percentage of RLT >= 48

TSP	Airtel	BSNL	JIO	VIL
Percentage of RLT >=48	0	0	NA	0

### Summary Data report Dynamic

#### Raipur City

TSP ( For 2G)	Airtel	BSNL	JIO	VIL
Average Download throughput in Kbps	291.22	122	NA	25.45
PDP Success rate %	96.48	100	NA	98.19
PDP Drop Rate %	3.52	0.53	NA	1.81

TSP ( For 3G)	Airtel	BSNL	JIO	VIL
Average Download throughput in Mbps	NA	2.395	NA	NA
PDP Success rate %	NA	97.14	NA	NA
PDP Drop Rate %	NA	0.30	NA	NA

TSP ( For LTE )	Airtel	BSNL	JIO	VIL
Average Download throughput in Mbps	16.92	NA	10.23	11.96
PDP Success rate %	99.47	NA	100%	97.46
PDP Drop Rate %	0.53	NA	0%	2.54

#### Data speed samples(%)

TSP ( For 2G)	Total samples	< 100 Kbps	100-150Kbps	150-200Kbps	>200Kbps
Airtel	38082	47.83	18.17	22.14	11.86
BSNL	46116	40.91	12.72	17.59	28.78
JIO	NA	NA	NA	NA	NA
VIL	23870	94.73	2.97	1.14	1.16

<b>TSP ( For 3G )</b>	<b>Total samples</b>	<b>&lt; 1 Mbps</b>	<b>1-5 Mbps</b>	<b>5-10 Mbps</b>	<b>&gt;10Mbps</b>
Airtel	NA	NA	NA	NA	NA
BSNL	47122	40.03	12.45	17.21	28.17
JIO	NA	NA	NA	NA	NA
VIL	NA	NA	NA	NA	NA

<b>TSP ( For LTE )</b>	<b>Total samples</b>	<b>&lt; 2Mbps</b>	<b>2-5 Mbps</b>	<b>5-10 Mbps</b>	<b>&gt;10Mbps</b>
Airtel	9820993	18.54	6.91	10.53	64.02
BSNL	NA	NA	NA	NA	NA
JIO	45996	21.85	21.91	36.21	20.03
VIL	41618	33.90	9.87	15.72	40.51

**(Rural Area/ Forest Area e.g., Villages/ Tourist places/ Block or Tehsil)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Download throughput in Kbps	84.28	130	NA	34.9
PDP Success rate %	92.84	100	NA	96.46
PDP Drop Rate %	7.16	0	NA	3.54

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Download throughput in Mbps	NA	3.058	NA	3.9
PDP Success rate %	NA	100	NA	98.23
PDP Drop Rate %	NA	0	NA	1.77

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Download throughput in Mbps	16.4	NA	11.2	9.4
PDP Success rate %	100	NA	100	96.78
PDP Drop Rate %	0	NA	0	3.22

**Data speed samples %**

<b>TSP ( For 2G)</b>	<b>Total samples</b>	<b>&lt; 100 Kbps</b>	<b>100-150Kbps</b>	<b>150-200Kbps</b>	<b>&gt;200Kbps</b>
Airtel	15263	45.60	16.48	22.25	15.67
BSNL	22132	43.85	7.20	10.31	38.64
JIO	NA	NA	NA	NA	NA
VIL	9598	91.13	4.89	2.81	1.17

<b>TSP ( For 3G )</b>	<b>Total samples</b>	<b>&lt; 1 Mbps</b>	<b>1-5 Mbps</b>	<b>5-10 Mbps</b>	<b>&gt;10Mbps</b>
Airtel	NA	NA	NA	NA	NA
BSNL	21030	37.38	40.89	17.99	3.74
JIO	NA	NA	NA	NA	NA
VIL	8621	24.52	42.67	28.30	4.50

<b>TSP ( For LTE )</b>	<b>Total samples</b>	<b>&lt; 2Mbps</b>	<b>2-5 Mbps</b>	<b>5-10 Mbps</b>	<b>&gt;10Mbps</b>
Airtel	5093691	28.74	17.07	24.63	29.57
BSNL	NA	NA	NA	NA	NA
JIO	17970	26.86	20.11	34.04	18.99
VIL	11734	27.88	16.95	22.46	32.70

**National Highway/ State Highway/ Important connecting roads**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Download throughput in Kbps	98.54	73	NA	28.7
PDP Success rate %	95.54	100	NA	96.67
PDP Drop Rate %	4.46	2.16	NA	3.33

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Download throughput in Mbps	NA	2.026	NA	3.26
PDP Success rate %	NA	100	NA	98.52
PDP Drop Rate %	NA	3.03	NA	1.48

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Download throughput in Mbps	19.6	NA	8.1	7.56
PDP Success rate %	99.41	NA	100%	97.48
PDP Drop Rate %	0.59	NA	0%	2.52

**Data speed samples %**

<b>TSP ( For 2G)</b>	<b>Total samples</b>	<b>&lt; 100 Kbps</b>	<b>100-150Kbps</b>	<b>150-200Kbps</b>	<b>&gt;200Kbps</b>
Airtel	33911	46.68	14.35	19.00	19.97
BSNL	37865	65.79	7.78	8.10	18.33
JIO	NA	NA	NA	NA	NA
VIL	18349	93.24	4.74	1.48	0.54

<b>TSP ( For 3G )</b>	<b>Total samples</b>	<b>&lt; 1 Mbps</b>	<b>1-5 Mbps</b>	<b>5-10 Mbps</b>	<b>&gt;10Mbps</b>
Airtel	NA	NA	NA	NA	NA
BSNL	34317	46.78	35.75	15.45	2.02
JIO	NA	NA	NA	NA	NA
VIL	14186	33.22	41.60	21.49	3.69

<b>TSP ( For LTE )</b>	<b>Total samples</b>	<b>&lt; 2Mbps</b>	<b>2-5 Mbps</b>	<b>5-10 Mbps</b>	<b>&gt;10Mbps</b>
Airtel	9450599	18.91	9.27	11.50	60.32
BSNL	NA	NA	NA	NA	NA
JIO	34651	19.71	21.47	36.07	22.75
VIL	23406	34.20	18.93	23.40	23.47

### **Data Service Static ( on Hotspots)**

#### **Hotspot -1 (Location - Raipur Railway station)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	95.51	156	NA	44
Upload Throughput in Kbps	54.57	17	NA	35
Web browsing delay in second	29.19	0.023	NA	36.7
Latency in (msec)	492.6	425.65	NA	192

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	3.881	NA	NA
Upload Throughput in Mbps	NA	1.173	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	0.08	NA	NA
Latency in (msec)	NA	98.33	NA	NA

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	5.07	NA	8.15	26
Upload Throughput in Mbps	6.7	NA	4.56	11
Video streaming delay in sec	0.67	NA	0	0.65
Web browsing delay in second	2.18	NA	2.93	5.76
Latency in (msec)	71.69	NA	29	46

**Hotspot -2 (Location – Ambedkar(Mekahara) Medical Collage)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	101.87	210	NA	56
Upload Throughput in Kbps	64.61	75	NA	26
Web browsing delay in second	22.56	0.022	NA	42
Latency in (msec)	483.73	153.5	NA	147

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	5.404	NA	NA
Upload Throughput in Mbps	NA	1.324	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	0.07	NA	NA
Latency in (msec)	NA	59.23	NA	NA

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	11.4	NA	29.94	35
Upload Throughput in Mbps	7.3	NA	8.65	16
Video streaming delay in sec	0.39	NA	0	0.9
Web browsing delay in second	1.38	NA	2.1	5.45
Latency in (msec)	76.19	NA	57	68

**Hotspot -3 (Location - Jai Stambh Chowk)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	116.48	211	NA	56
Upload Throughput in Kbps	55.87	70	NA	39
Web browsing delay in second	20.72	0.0307	NA	42
Latency in (msec)	175.25	164.56	NA	123

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	6.457	NA	NA
Upload Throughput in Mbps	NA	1.376	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	0.03	NA	NA
Latency in (msec)	NA	60.88	NA	NA



<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	11.28	NA	8.51	28
Upload Throughput in Mbps	8.8	NA	5.09	17
Video streaming delay in sec	1.1	NA	0	0.4
Web browsing delay in second	1.93	NA	3.23	7.8
Latency in (msec)	74.13	NA	71	72

#### **Hotspot -4 (Location - Mahanadi Bhavan, Atal Nagar)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	159.69	208	NA	78
Upload Throughput in Kbps	70.58	113	NA	46
Web browsing delay in second	17.18	0.023	NA	57
Latency in (msec)	190.2	181.85	NA	147

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	5.066	NA	NA
Upload Throughput in Mbps	NA	1.42	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	0.03	NA	NA
Latency in (msec)	NA	47.34	NA	NA

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	17.2	NA	11.76	30
Upload Throughput in Mbps	10.12	NA	5.63	13
Video streaming delay in sec	0.58	NA	0	0.54
Web browsing delay in second	1.53	NA	2.87	4.7
Latency in (msec)	72.04	NA	61	82

#### **Hotspot -5 (Location - Arang Nagar Palika)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	111.95	227	NA	68
Upload Throughput in Kbps	30.37	104	NA	62
Web browsing delay in second	33.95	0.023	NA	58
Latency in (msec)	396.42	210.01	NA	158

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	6.174	NA	8.7
Upload Throughput in Mbps	NA	1.756	NA	3.4
Video streaming delay in sec	NA	NA	NA	0.85
Web browsing delay in second	NA	0.02	NA	6.45
Latency in (msec)	NA	419.70	NA	89

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	12.31	NA	25.11	43
Upload Throughput in Mbps	3.9	NA	10.06	17
Video streaming delay in sec	0.51	NA	0	0.56
Web browsing delay in second	1.77	NA	2.34	6.3
Latency in (msec)	76.66	NA	57	59

#### **Hotspot -6 (Location - Mahasamund Collectorate)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	46.68	223	NA	108
Upload Throughput in Kbps	33.01	109	NA	65
Web browsing delay in second	30.03	0.022	NA	46.9
Latency in (msec)	492.02	180.28	NA	156

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	6.260	NA	9.2
Upload Throughput in Mbps	NA	1.673	NA	4.5
Video streaming delay in sec	NA	NA	NA	0.87
Web browsing delay in second	NA	0.03	NA	6.7
Latency in (msec)	NA	203.73	NA	84

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	10.27	NA	93.85	43
Upload Throughput in Mbps	1.3	NA	11.38	12
Video streaming delay in sec	0.54	NA	0	0.8
Web browsing delay in second	1.95	NA	2.1	9.4
Latency in (msec)	83.5	NA	56	63

**Hotspot -7 (Location - Baloda bazar Bus Stand)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	124.8	193	NA	134
Upload Throughput in Kbps	59.44	110	NA	52
Web browsing delay in second	23.56	0.022	NA	47
Latency in (msec)	242.47	196.68	NA	146

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	4.848	NA	7.2
Upload Throughput in Mbps	NA	1.292	NA	4.8
Video streaming delay in sec	NA	NA	NA	0.9
Web browsing delay in second	NA	0.14	NA	8.6
Latency in (msec)	NA	175.36	NA	79

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	4.9	NA	15.68	27
Upload Throughput in Mbps	3.7	NA	16.34	16
Video streaming delay in sec	0.71	NA	0	0.68
Web browsing delay in second	1.97	NA	2.33	5.46
Latency in (msec)	86.95	NA	61	53

**Hotspot -8 (Location - Bhatapara Railway Station)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	115.71	237	NA	95
Upload Throughput in Kbps	64.52	96	NA	60
Web browsing delay in second	29.23	0.021	NA	45.8
Latency in (msec)	480.62	184.44	NA	129

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	9.898	NA	11.2
Upload Throughput in Mbps	NA	1.839	NA	5.6
Video streaming delay in sec	NA	NA	NA	0.76
Web browsing delay in second	NA	0.17	NA	6.45
Latency in (msec)	NA	227.23	NA	75

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	14.23	NA	45.93	32
Upload Throughput in Mbps	8.3	NA	5.02	15.3
Video streaming delay in sec	0.48	NA	0	0.6
Web browsing delay in second	1.88	NA	2.77	5.6
Latency in (msec)	125.7	NA	69	76

### **Hotspot -9 (Location - Gariyaband Collectorate)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	94.27	214	NA	89
Upload Throughput in Kbps	50.57	108	NA	47
Web browsing delay in second	32.03	0.020	NA	57
Latency in (msec)	528.97	161.33	NA	124

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	7.650	NA	11.7
Upload Throughput in Mbps	NA	1.701	NA	6.9
Video streaming delay in sec	NA	NA	NA	0.89
Web browsing delay in second	NA	0.17	NA	7.9
Latency in (msec)	NA	555.40	NA	81

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	9.65	NA	17.46	36.1
Upload Throughput in Mbps	4.5	NA	4.62	17
Video streaming delay in sec	0.53	NA	0	0.7
Web browsing delay in second	1.53	NA	2.98	6.1
Latency in (msec)	80.62	NA	72	63

### **Hotspot -10 (Location - Dhamtari Bus Stand)**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	71.51	225	NA	134
Upload Throughput in Kbps	55.69	107	NA	85
Web browsing delay in second	26.7	0.020	NA	53
Latency in (msec)	490.1	226.58	NA	148

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	6.808	NA	12.3
Upload Throughput in Mbps	NA	1.159	NA	7.6
Video streaming delay in sec	NA	NA	NA	2.5
Web browsing delay in second	NA	0.02	NA	8.5
Latency in (msec)	NA	420.65	NA	92

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	10	NA	11.72	38
Upload Throughput in Mbps	2.98	NA	4.19	14
Video streaming delay in sec	0.41	NA	0	0.7
Web browsing delay in second	1.91	NA	3.21	6.2
Latency in (msec)	95.08	NA	78	78

### **Summary Data report static**

<b>TSP ( For 2G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Kbps	103.82	210.4	NA	86.2
Upload Throughput in Kbps	53.92	90.9	NA	51.7
Web browsing delay in second	26.62	0.0226	NA	44.24
Latency in (msec)	397.2	208.488	NA	147

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	NA	6.245	NA	10.5
Upload Throughput in Mbps	NA	1.4713	NA	5.4
Video streaming delay in sec	NA	NA	NA	1.28
Web browsing delay in second	NA	0.076	NA	7.4
Latency in (msec)	NA	226.785	NA	83.3

<b>TSP ( For LTE )</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Download throughput in Mbps	10.63	NA	26.411	33.8
Upload Throughput in Mbps	5.8	NA	7.254	14.83
Video streaming delay in sec	0.53	NA	0	0.65
Web browsing delay in second	1.8	NA	2.686	627
Latency in (msec)	84.26	NA	61.1	66

### Streaming delay

<b>TSP ( For 3G)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Initial Start Time (Sec)	NA	NA	NA	0.8
Average Interruption time in Second	NA	NA	NA	0.6

<b>TSP ( For LTE)</b>	<b>Airtel</b>	<b>BSNL</b>	<b>JIO</b>	<b>VIL</b>
Average Initial Start Time (Sec)	0.41	NA	1.47	0.6
Average Interruption time in Second	0.52	NA	0	0.5

### Data speed testing by “traimyspeed” app

<b>Hotspot</b>		<b>Airtel</b>	<b>BSNL</b>	<b>RJio</b>	<b>VIL</b>
<b>Raipur Railway station</b>	<b>2G download in Mbps</b>	0.28	0.220	NA	68
	<b>2G upload in Mbps</b>	0.16	0.106	NA	46
	<b>3G download in Mbps</b>	NA	3.226	NA	NA
	<b>3G upload in Mbps</b>	NA	2.158	NA	NA
	<b>4G download in Mbps</b>	8.29	NA	10.35	46
	<b>4G upload in Mbps</b>	6.57	NA	5.96	19
<b>Mekahara Medical Collage</b>	<b>2G download in Mbps</b>	0.27	0.227	NA	89
	<b>2G upload in Mbps</b>	0.24	0.087	NA	53
	<b>3G download in Mbps</b>	NA	5.416	NA	NA
	<b>3G upload in Mbps</b>	NA	2.258	NA	NA
	<b>4G download in Mbps</b>	19.71	NA	29.94	56
	<b>4G upload in Mbps</b>	20.58	NA	8.65	21
<b>Jai Stambh Chowk</b>	<b>2G download in Mbps</b>	0.15	0.263	NA	0.25
	<b>2G upload in Mbps</b>	0.24	0.056	NA	0.17
	<b>3G download in Mbps</b>	NA	7.535	NA	NA
	<b>3G upload in Mbps</b>	NA	2.105	NA	NA
	<b>4G download in Mbps</b>	13.48	NA	8.51	37.36
	<b>4G upload in Mbps</b>	13.61	NA	5.09	9.47
<b>Mahanadi Bhavan, Atal</b>	<b>2G download in Mbps</b>	0.23	0.263	NA	0.23
	<b>2G upload in Mbps</b>	0.13	0.193	NA	0.13

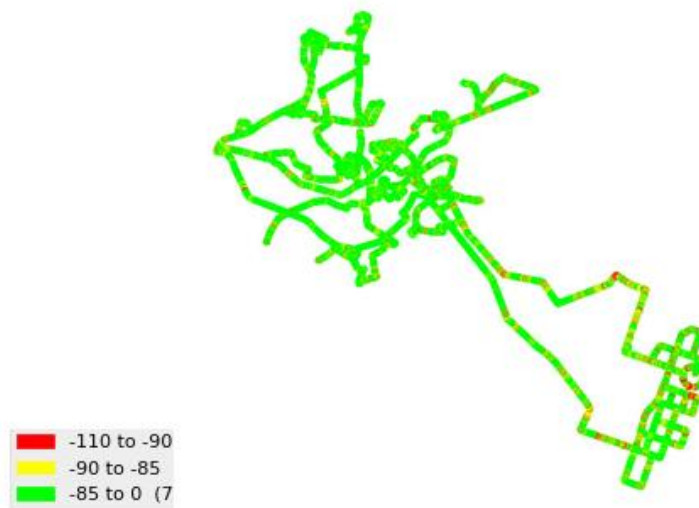
<b>Nagar, Naya Raipur</b>	<b>3G download in Mbps</b>	NA	4.438	NA	NA
	<b>3G upload in Mbps</b>	NA	1.896	NA	NA
	<b>4G download in Mbps</b>	25.15	NA	11.76	55.43
	<b>4G upload in Mbps</b>	16.76	NA	5.63	28.44
<b>Arang Nagar Palika</b>	<b>2G download in Mbps</b>	0.23	0.288	NA	0.25
	<b>2G upload in Mbps</b>	0.06	0.226	NA	0.13
	<b>3G download in Mbps</b>	NA	8.284	NA	7.22
	<b>3G upload in Mbps</b>	NA	2.266	NA	2.56
	<b>4G download in Mbps</b>	29.61	NA	25.11	46.56
	<b>4G upload in Mbps</b>	5.21	NA	10.06	28.98
<b>Mahasamund Collectorate</b>	<b>2G download in Mbps</b>	0.14	0.290	NA	0.16
	<b>2G upload in Mbps</b>	0.03	0.223	NA	0.15
	<b>3G download in Mbps</b>	NA	6.471	NA	9.41
	<b>3G upload in Mbps</b>	NA	2.068	NA	2.71
	<b>4G download in Mbps</b>	67.23	NA	93.85	29.78
	<b>4G upload in Mbps</b>	24.96	NA	11.38	5.02
<b>Baloda bazar Bus Stand</b>	<b>2G download in Mbps</b>	0.15	0.230	NA	0.16
	<b>2G upload in Mbps</b>	0.20	0.205	NA	0.19
	<b>3G download in Mbps</b>	NA	3.913	NA	9.64
	<b>3G upload in Mbps</b>	NA	2.115	NA	4.35
	<b>4G download in Mbps</b>	20.48	NA	15.68	40.20
	<b>4G upload in Mbps</b>	20.77	NA	16.34	23.28
<b>Bhatapara Railway Station</b>	<b>2G download in Mbps</b>	0.13	0.283	NA	0.16
	<b>2G upload in Mbps</b>	0.22	0.200	NA	0.10
	<b>3G download in Mbps</b>	NA	7.0	NA	10.00
	<b>3G upload in Mbps</b>	NA	2.363	NA	4.01
	<b>4G download in Mbps</b>	17.14	NA	45.93	31.18
	<b>4G upload in Mbps</b>	21.91	NA	5.02	31.72
<b>Gariyaband Collectorate</b>	<b>2G download in Mbps</b>	0.13	0.263	NA	0.23
	<b>2G upload in Mbps</b>	0.15	0.226	NA	0.21
	<b>3G download in Mbps</b>	NA	5.816	NA	8.95
	<b>3G upload in Mbps</b>	NA	1.803	NA	3.71
	<b>4G download in Mbps</b>	25.99	NA	17.46	45.79
	<b>4G upload in Mbps</b>	11.10	NA	4.62	24.77

<b>Dhamtari Bus Stand</b>	<b>2G download in Mbps</b>	0.13	0.270	NA	0.24
	<b>2G upload in Mbps</b>	0.21	0.150	NA	0.26
	<b>3G download in Mbps</b>	NA	6.973	NA	8.94
	<b>3G upload in Mbps</b>	NA	2.286	NA	2.50
	<b>4G download in Mbps</b>	17.86	NA	24.18	47.31
	<b>4G upload in Mbps</b>	17.64	NA	18.30	31.24

## Coverage plots

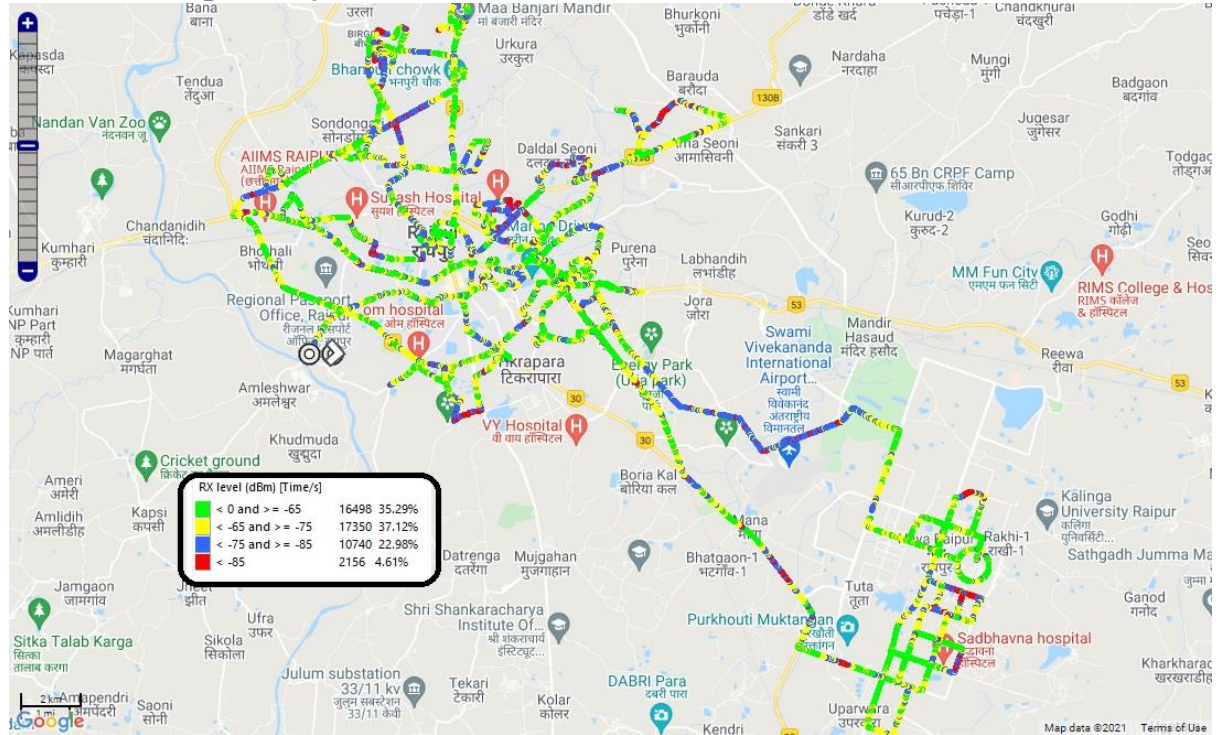
### Coverage Plot - 2G

**Airtel**

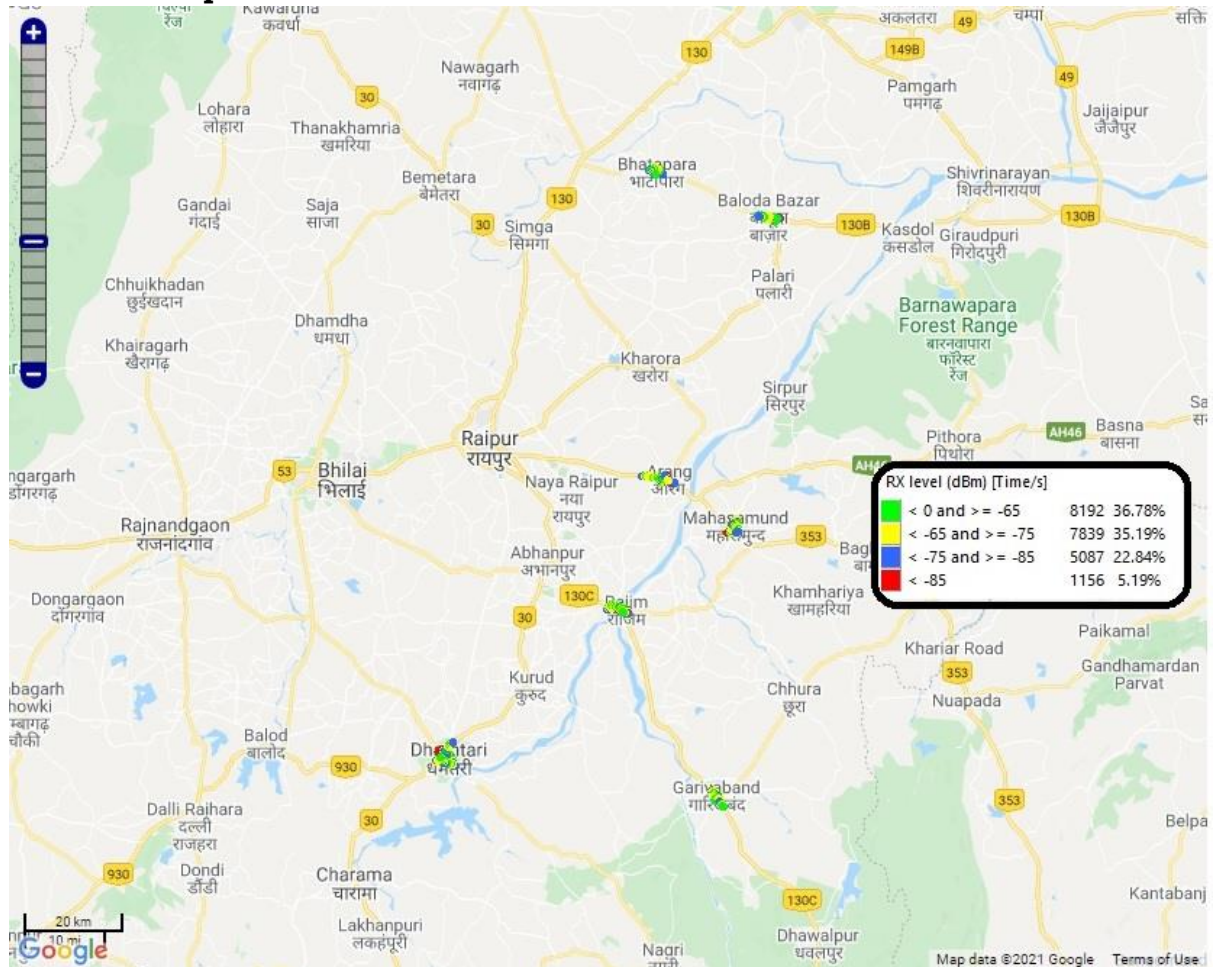




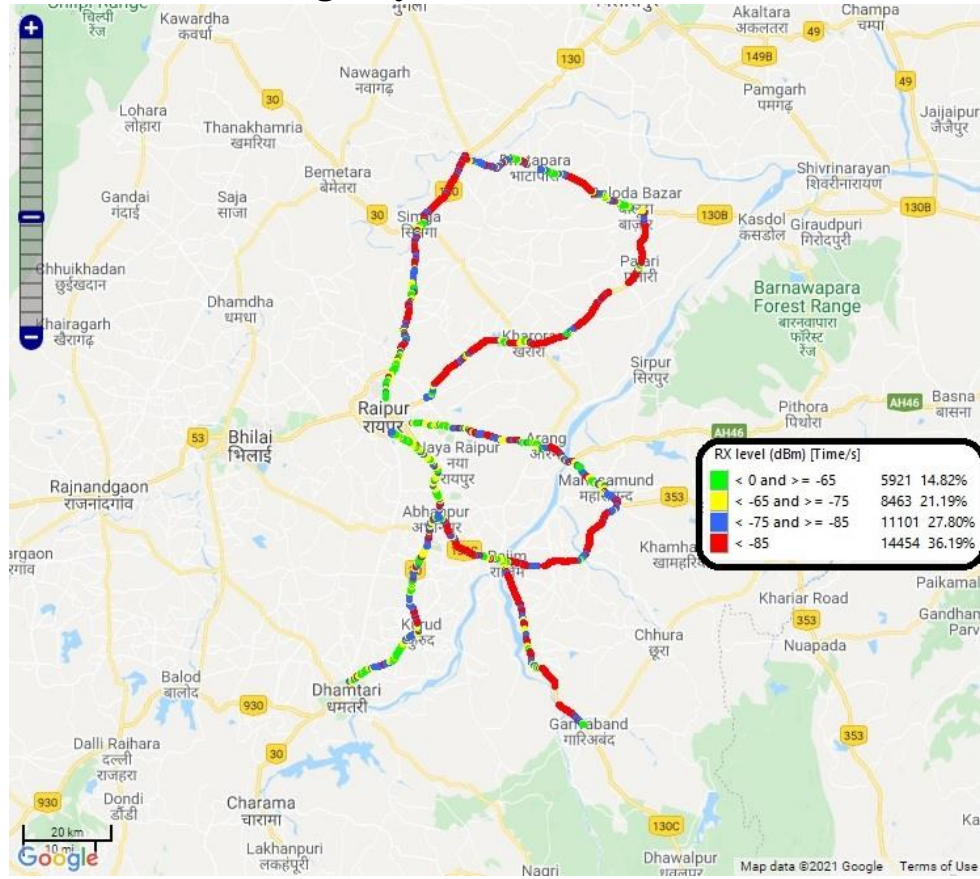
## BSNL 2G Raipur City



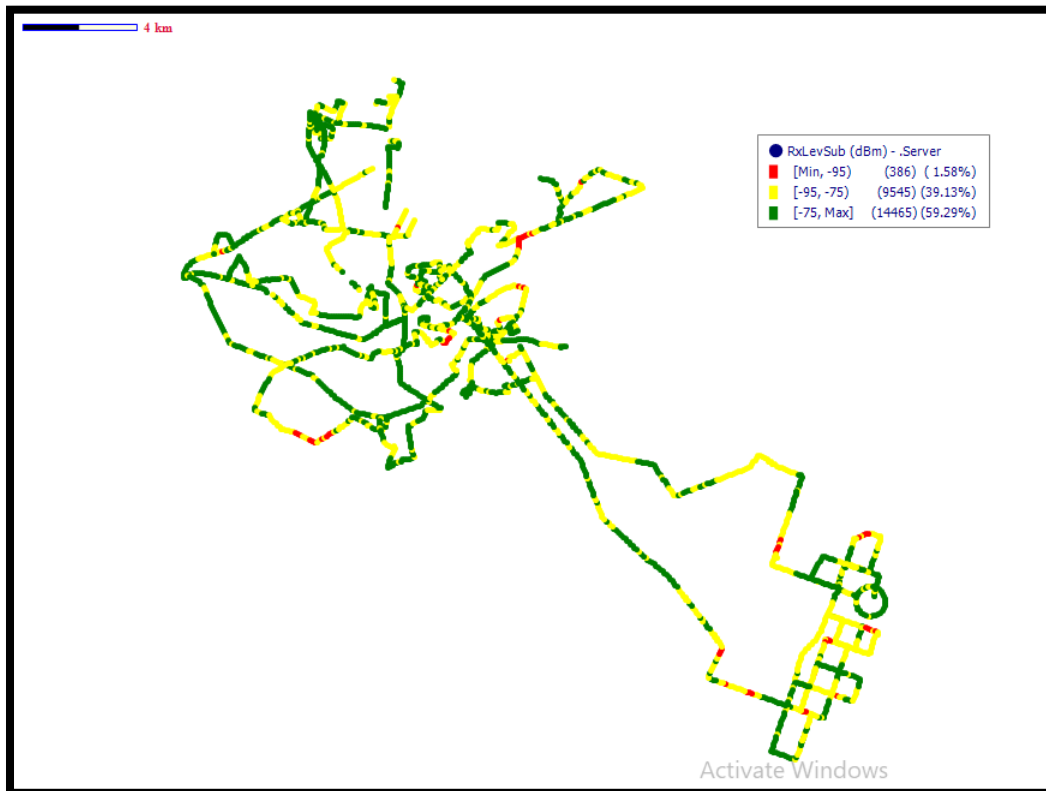
## BSNL 2G Raipur Rural



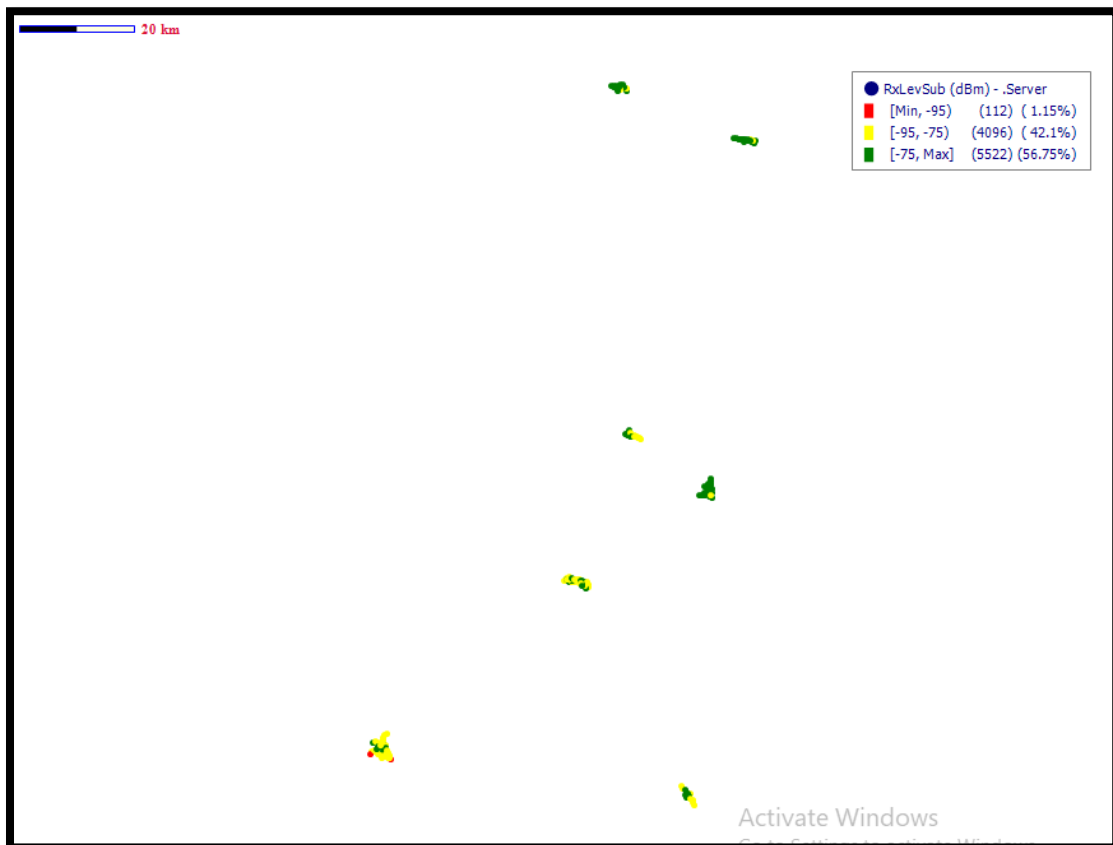
## BSNL 2G Roads / Highways



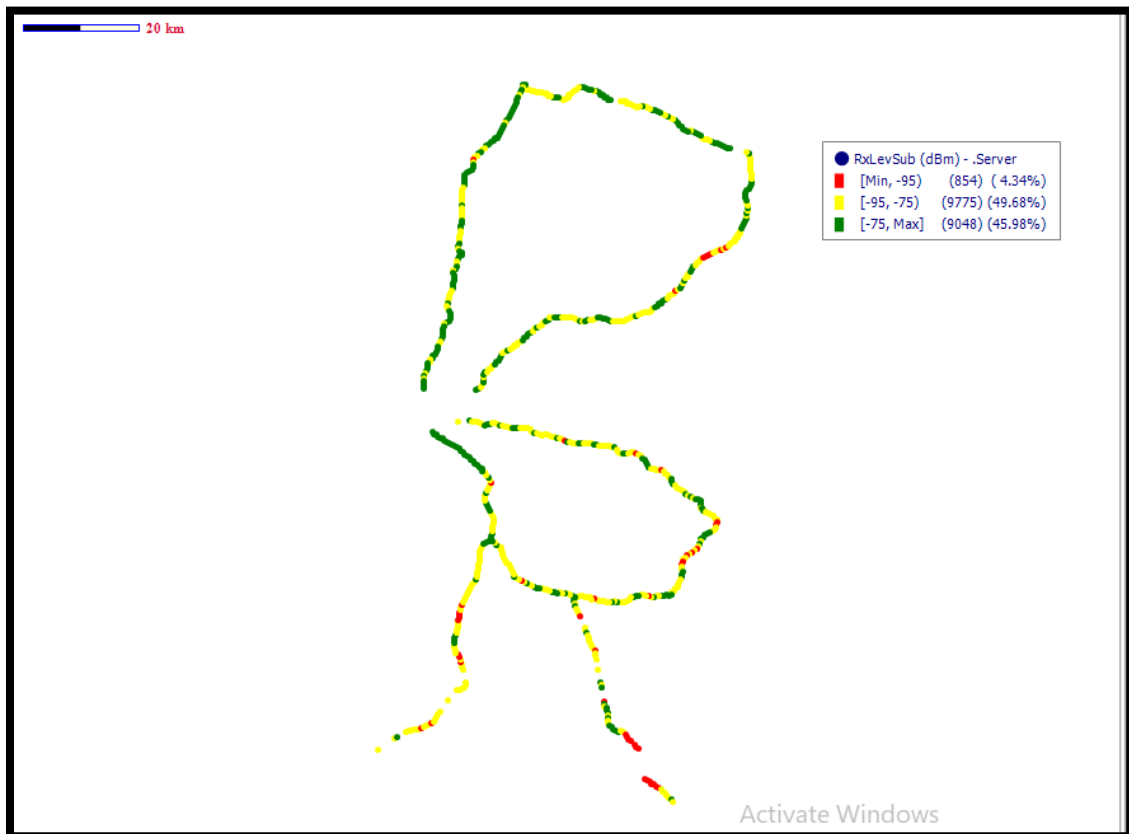
## VIL 2G Raipur City



### VIL 2G Raipur Rural

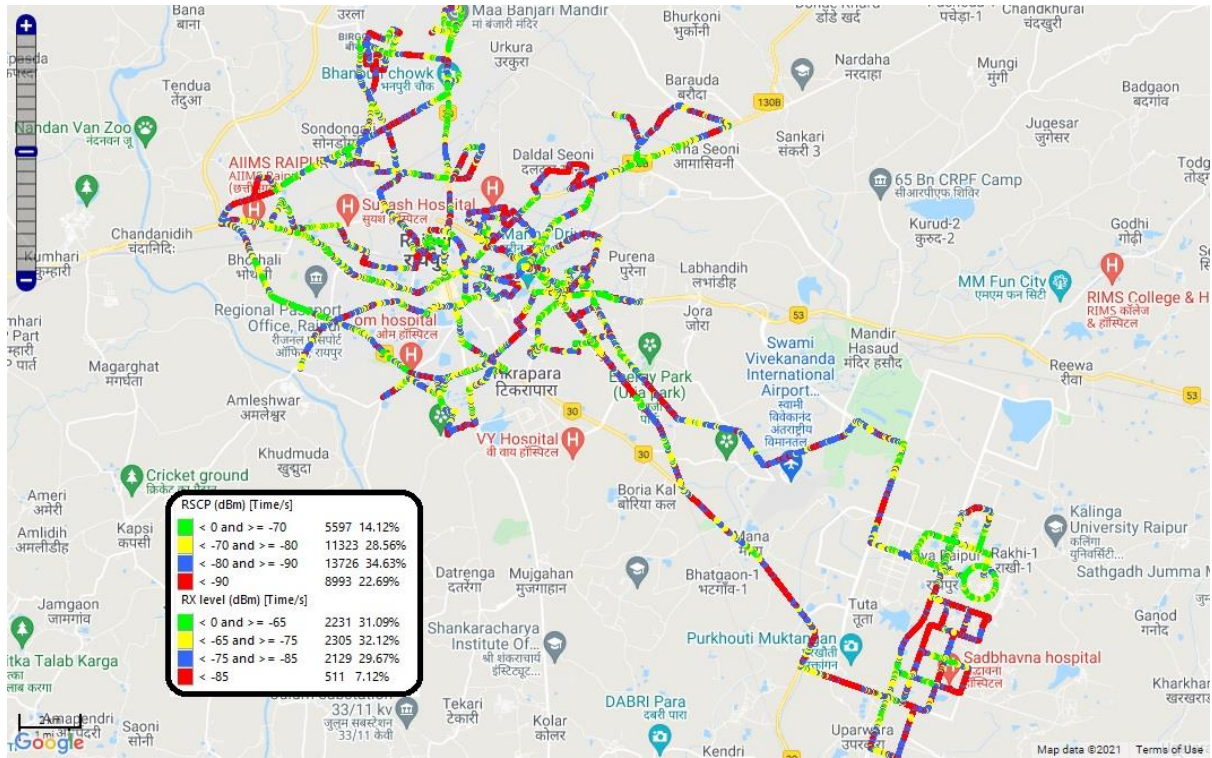


### VIL 2G Raipur Highway & Roads

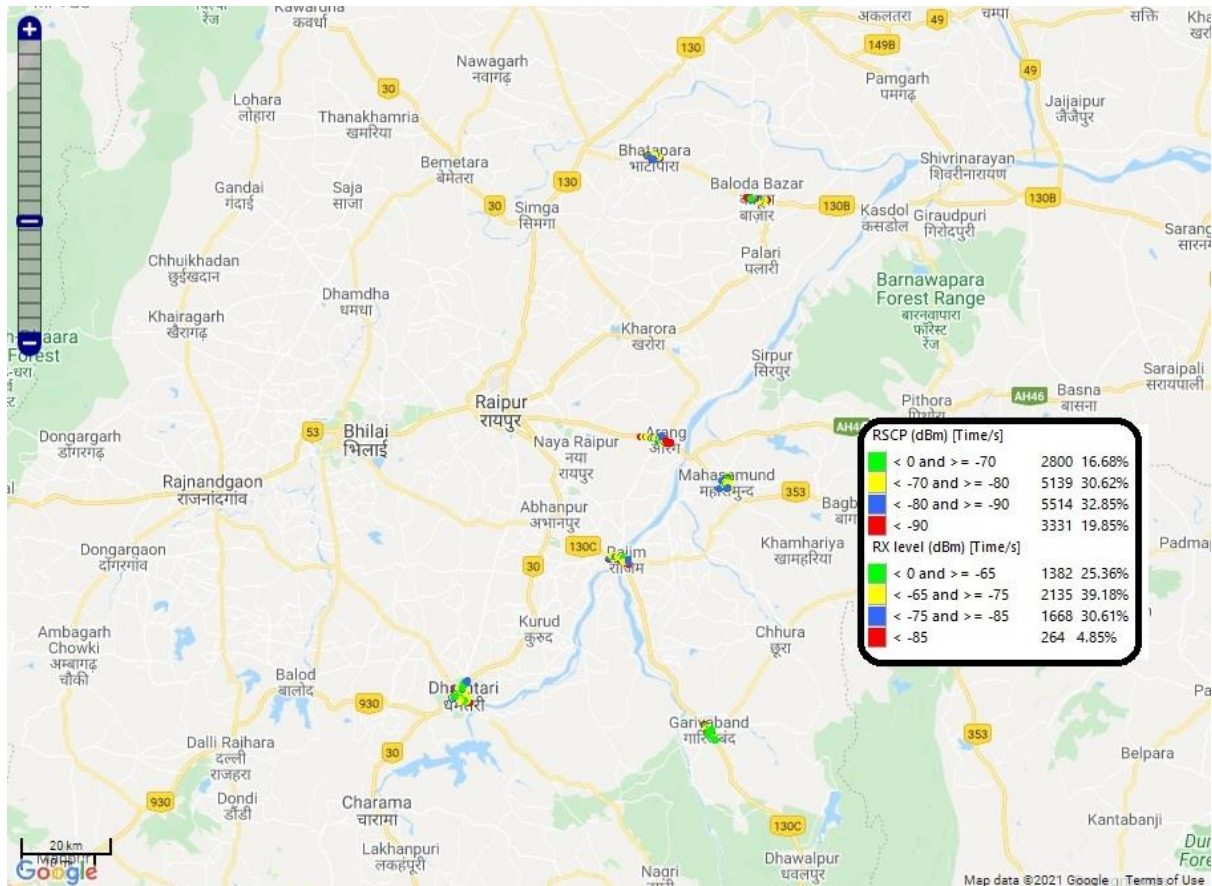


## Coverage -2G/3G dual

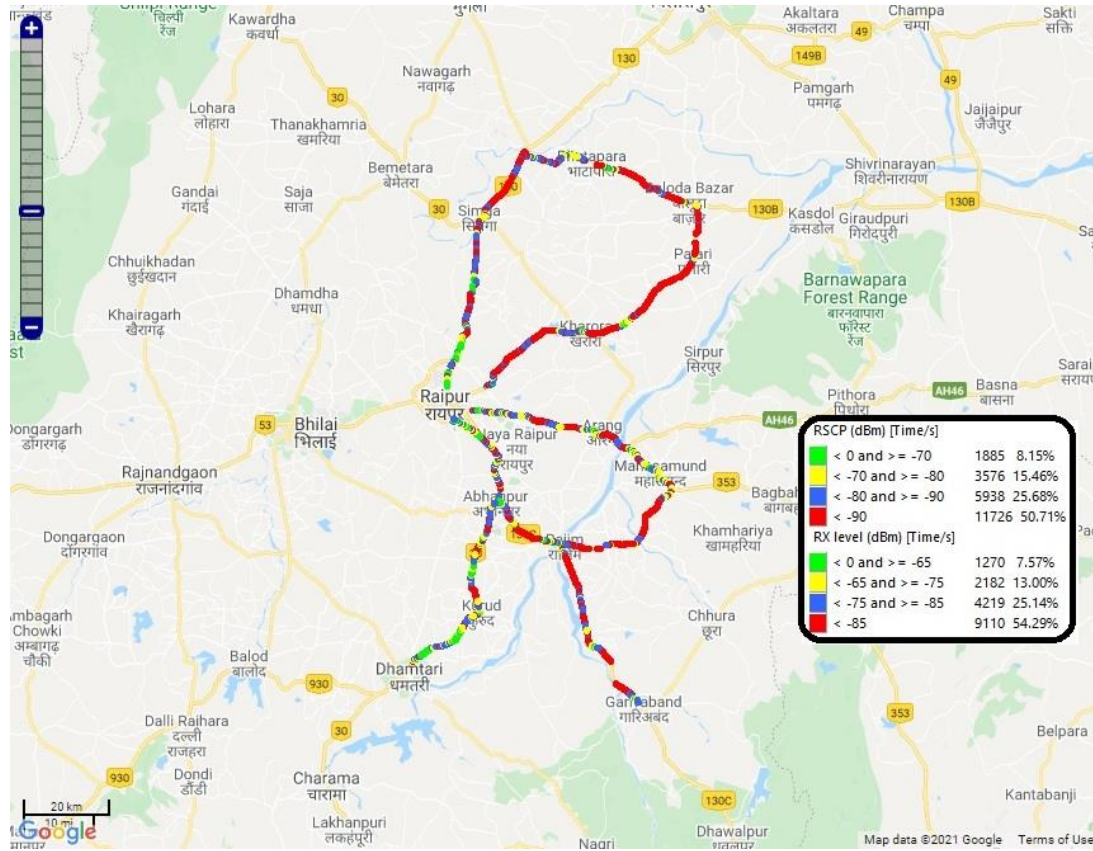
### BSNL 2G/3G dual -Raipur City



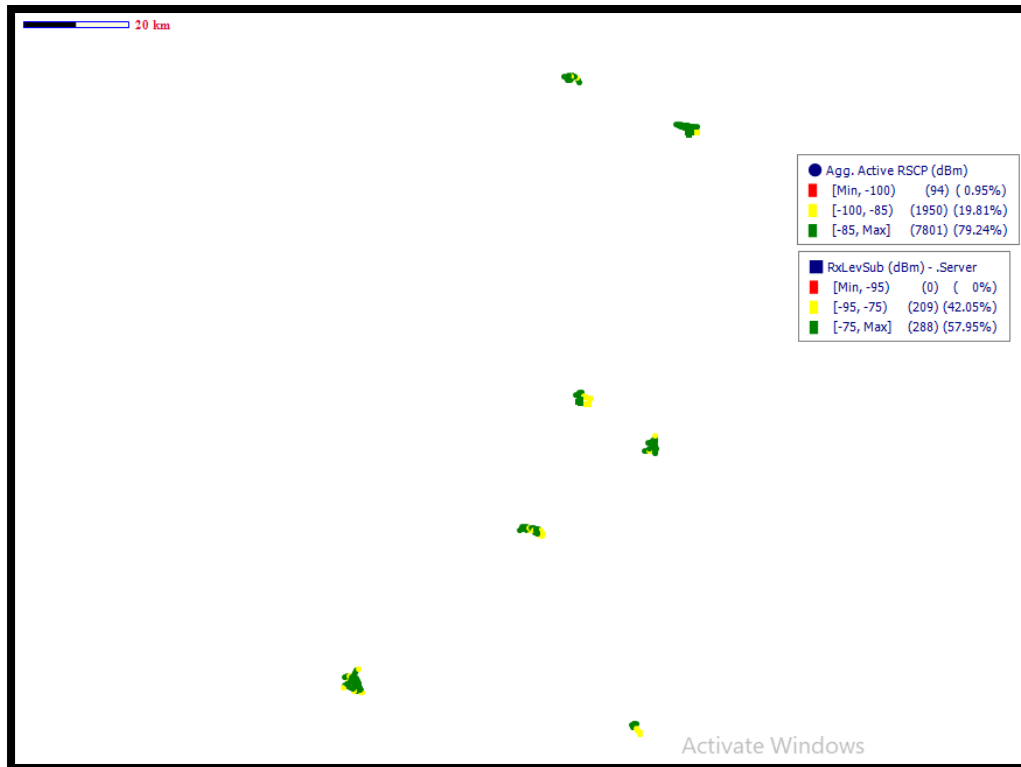
### BSNL 2G/3G dual Raipur Rural



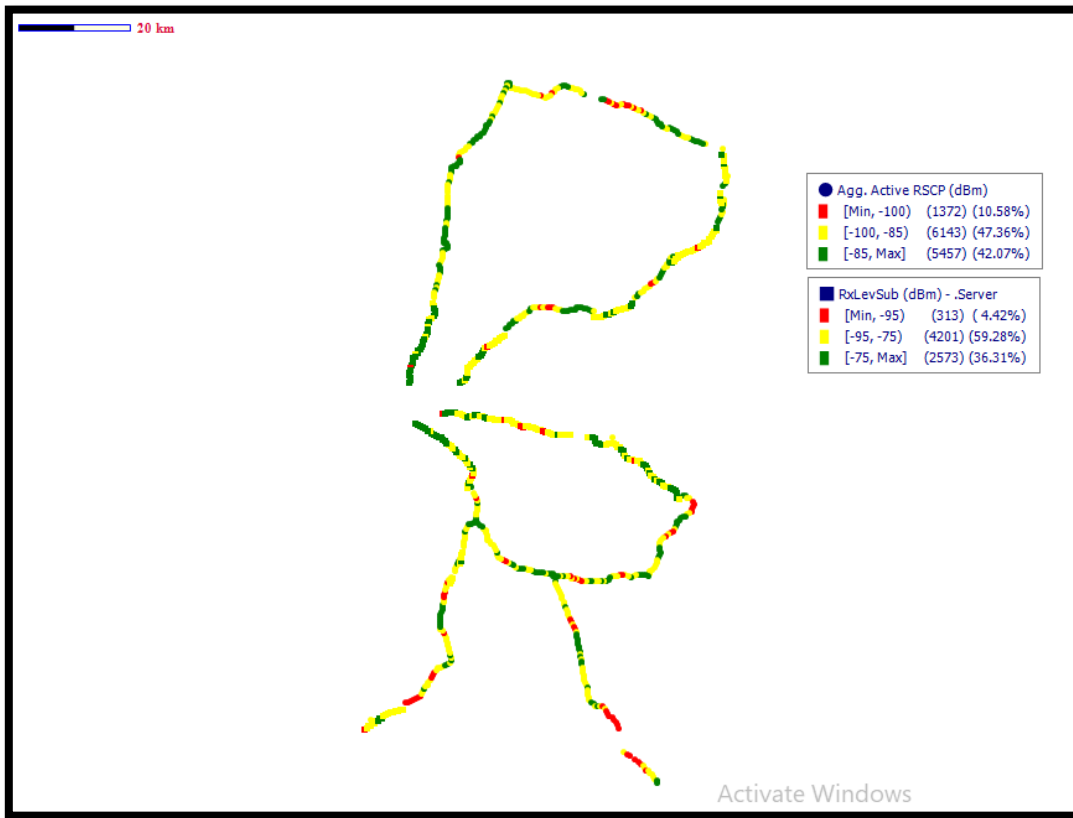
## BSNL 2G/3G dual Raipur roads / Highways



## VIL 2G/3G dual Raipur Rural



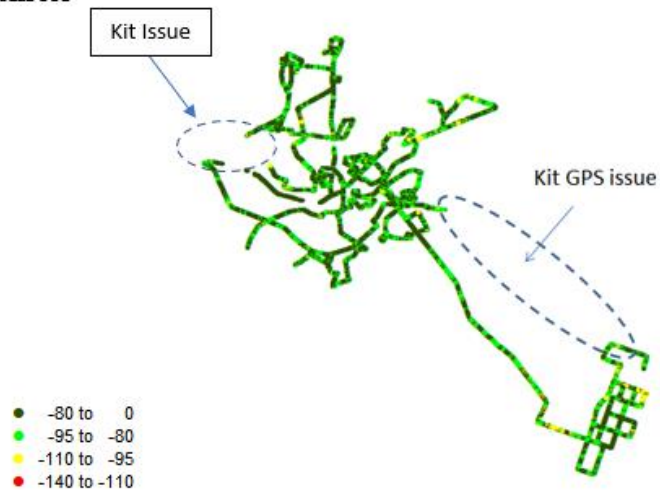
## VIL 2G/3G dual Raipur Highways / Roads



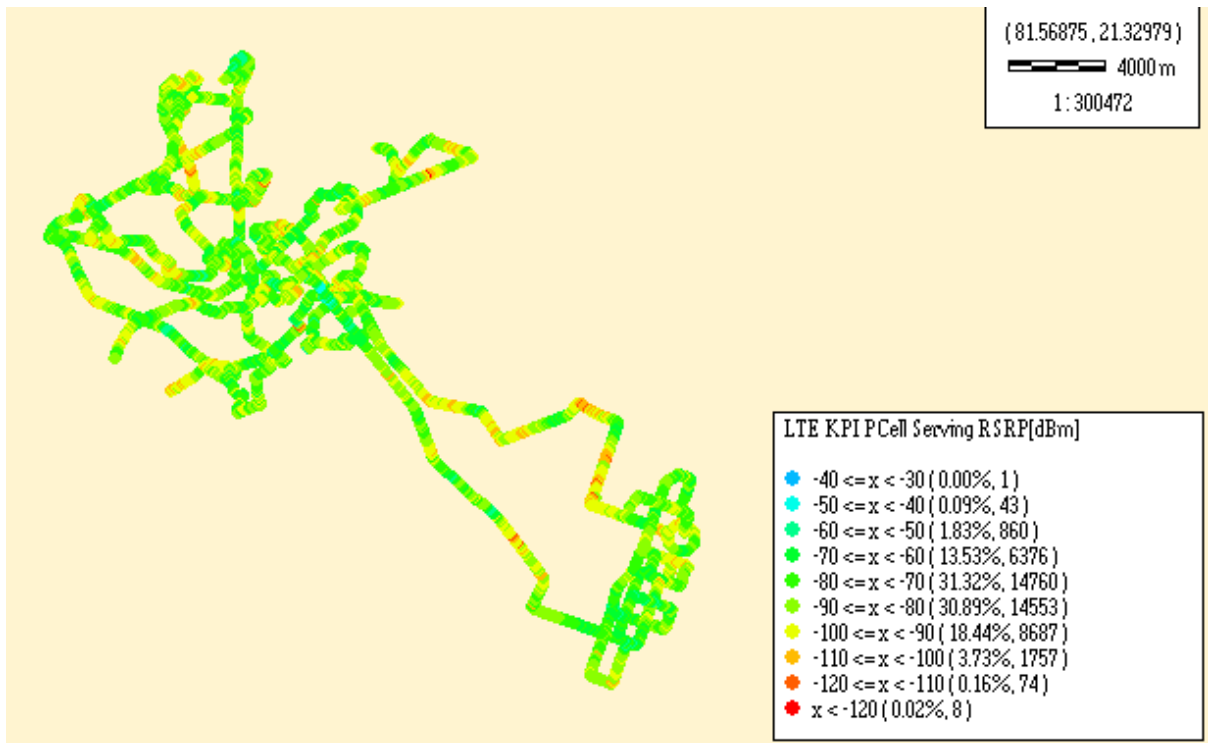
### Coverage plot - VoLTE (Free)

#### Airtel VoLTE

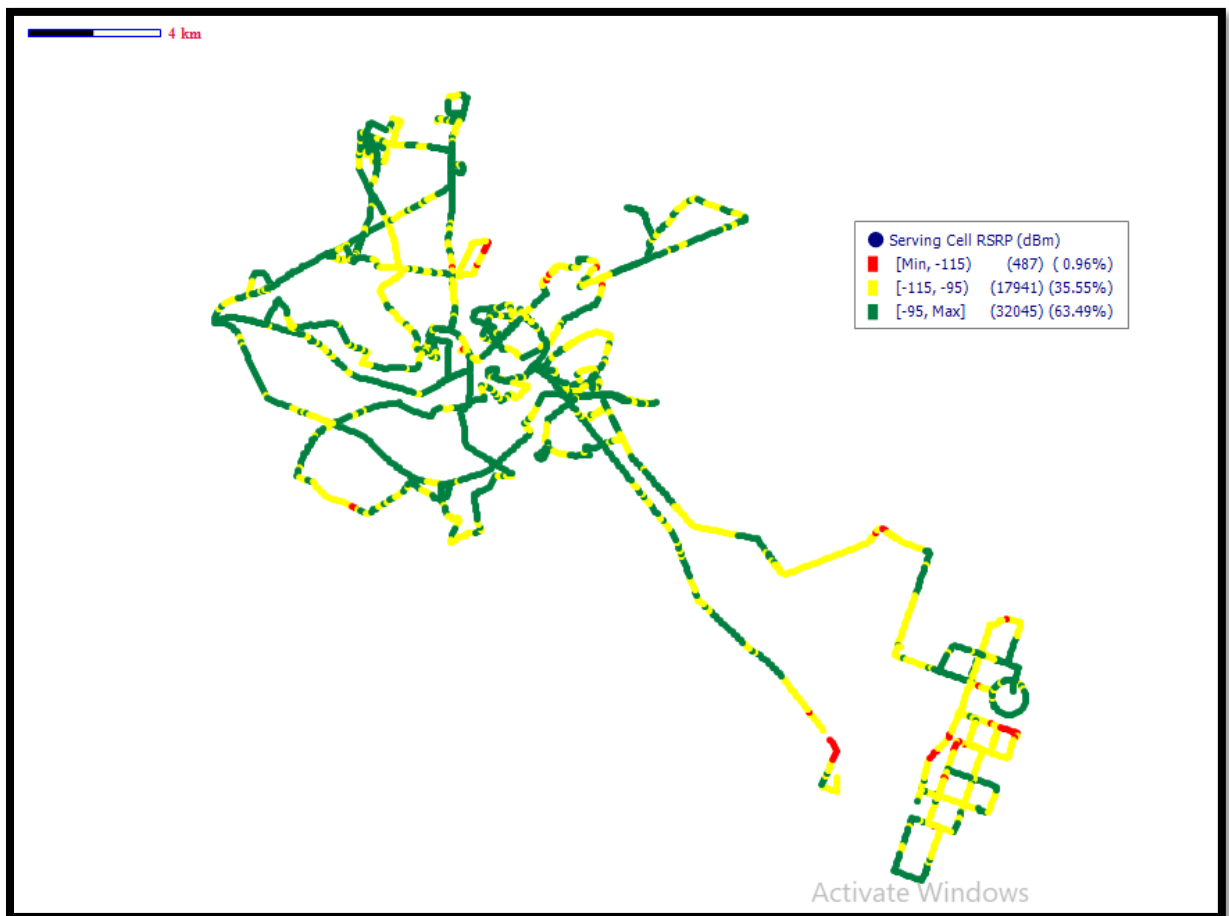
##### 3. VoLTE (Free) Airtel



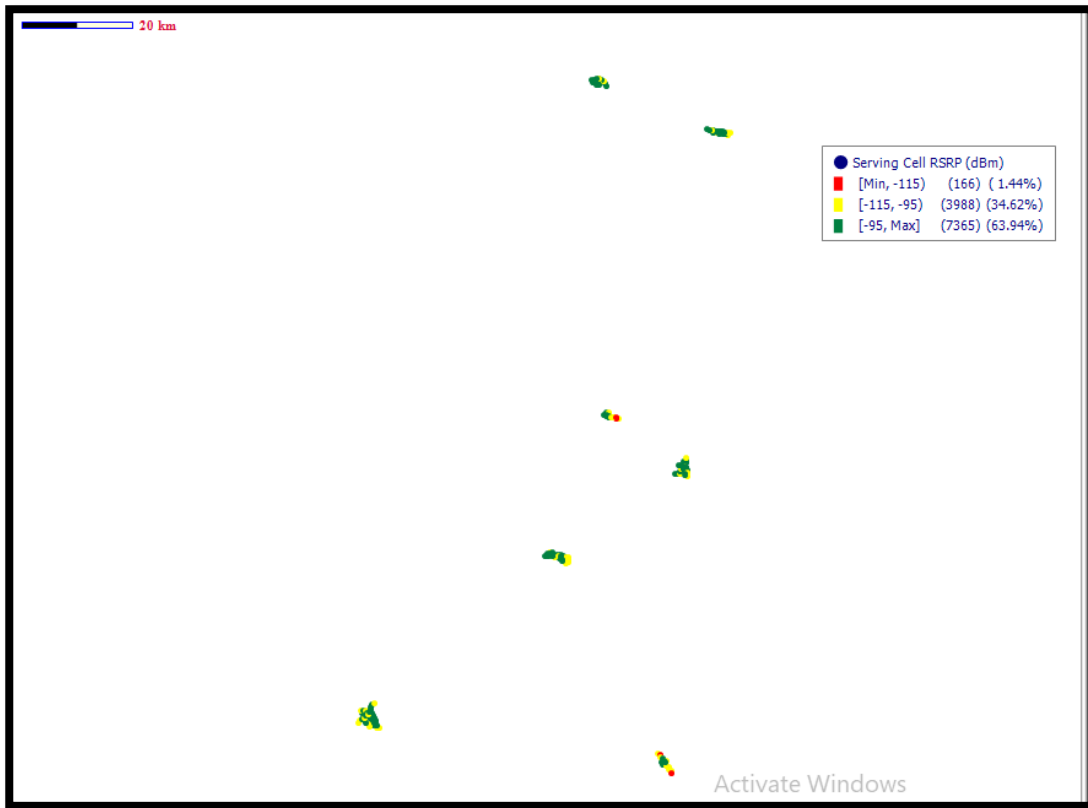
### JIO VoLTE



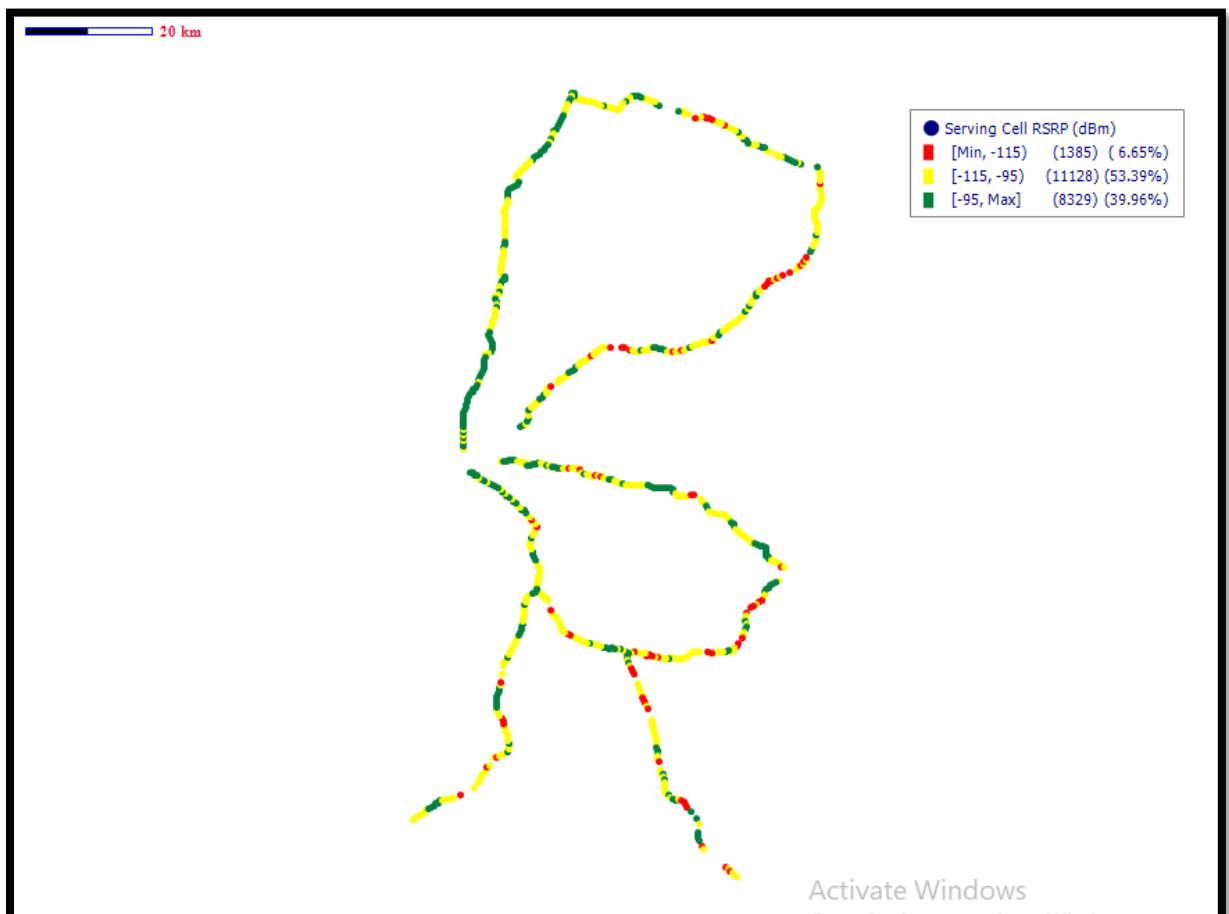
### VIL VoLTE Raipur City



### VIL VoLTE Raipur Rural



### VIL VoLTE Raipur Highway/ roads



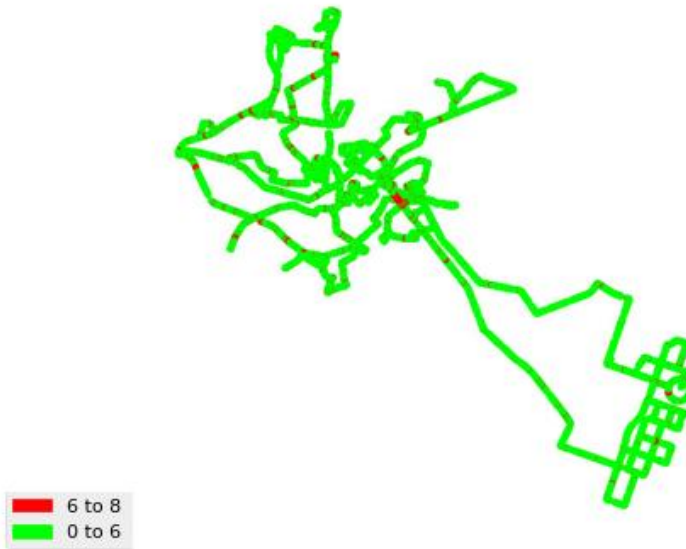


# Quality plots

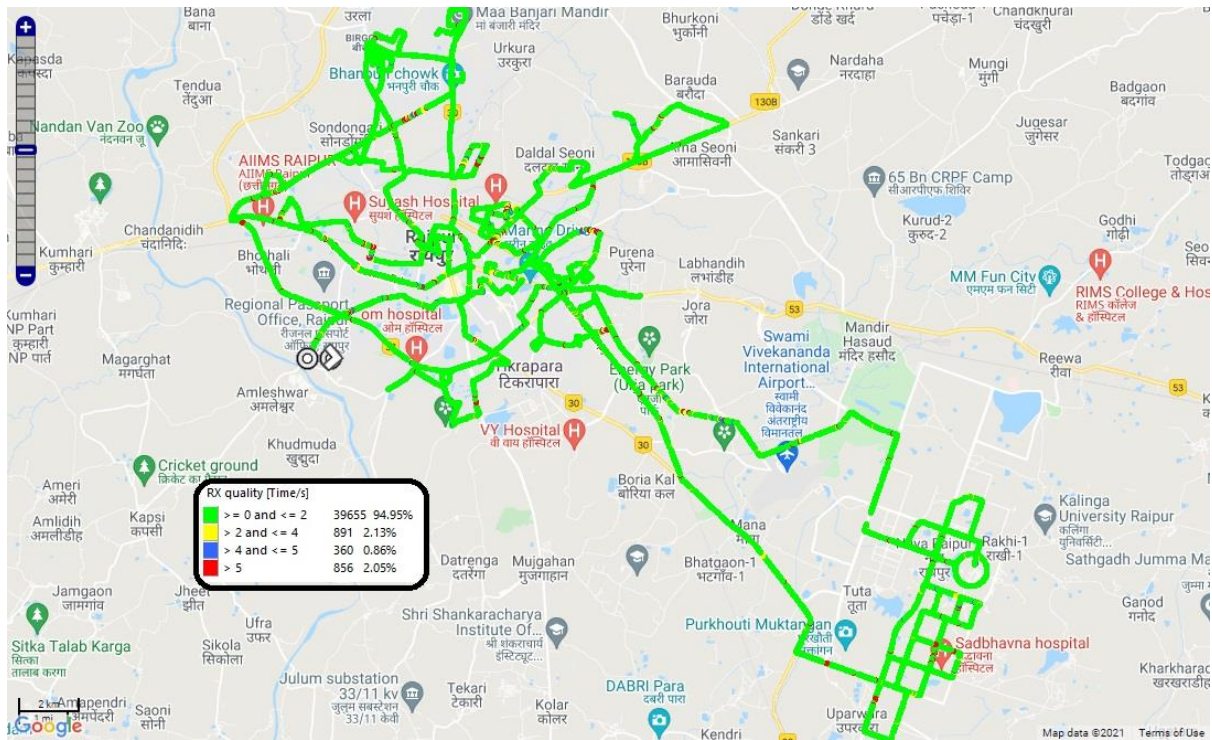
## Quality plots -2G

Airtel 2G

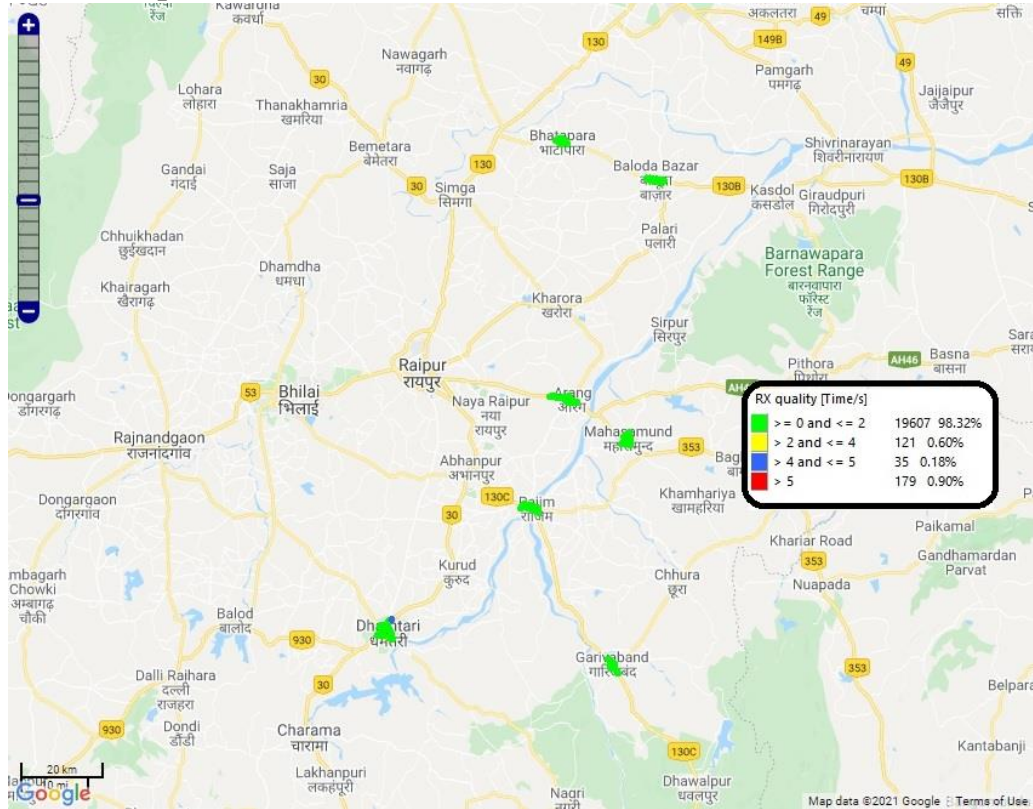
Airtel



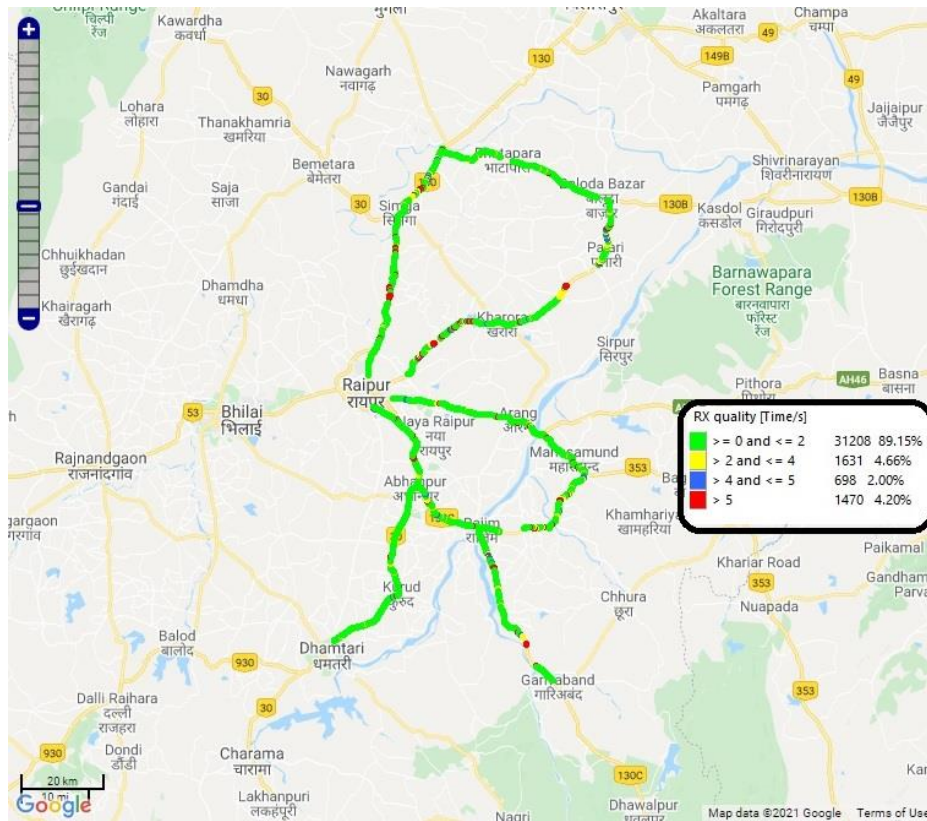
## BSNL 2G Raipur City



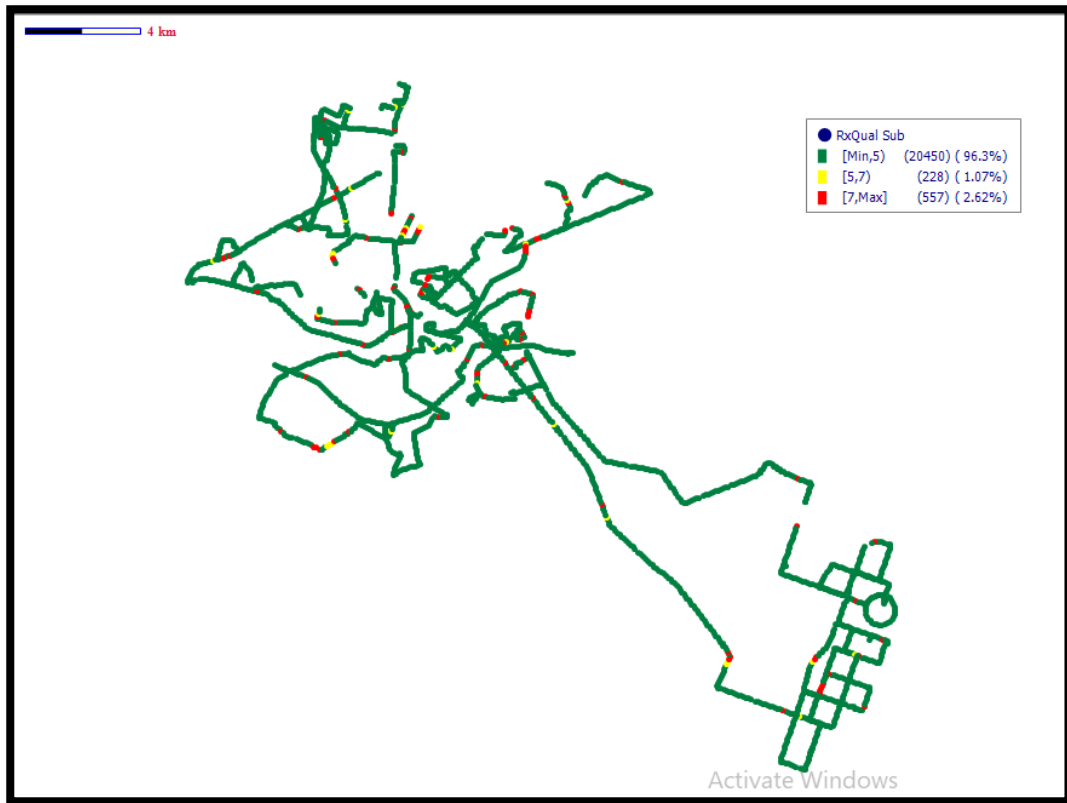
## BSNL 2G Raipur Rural



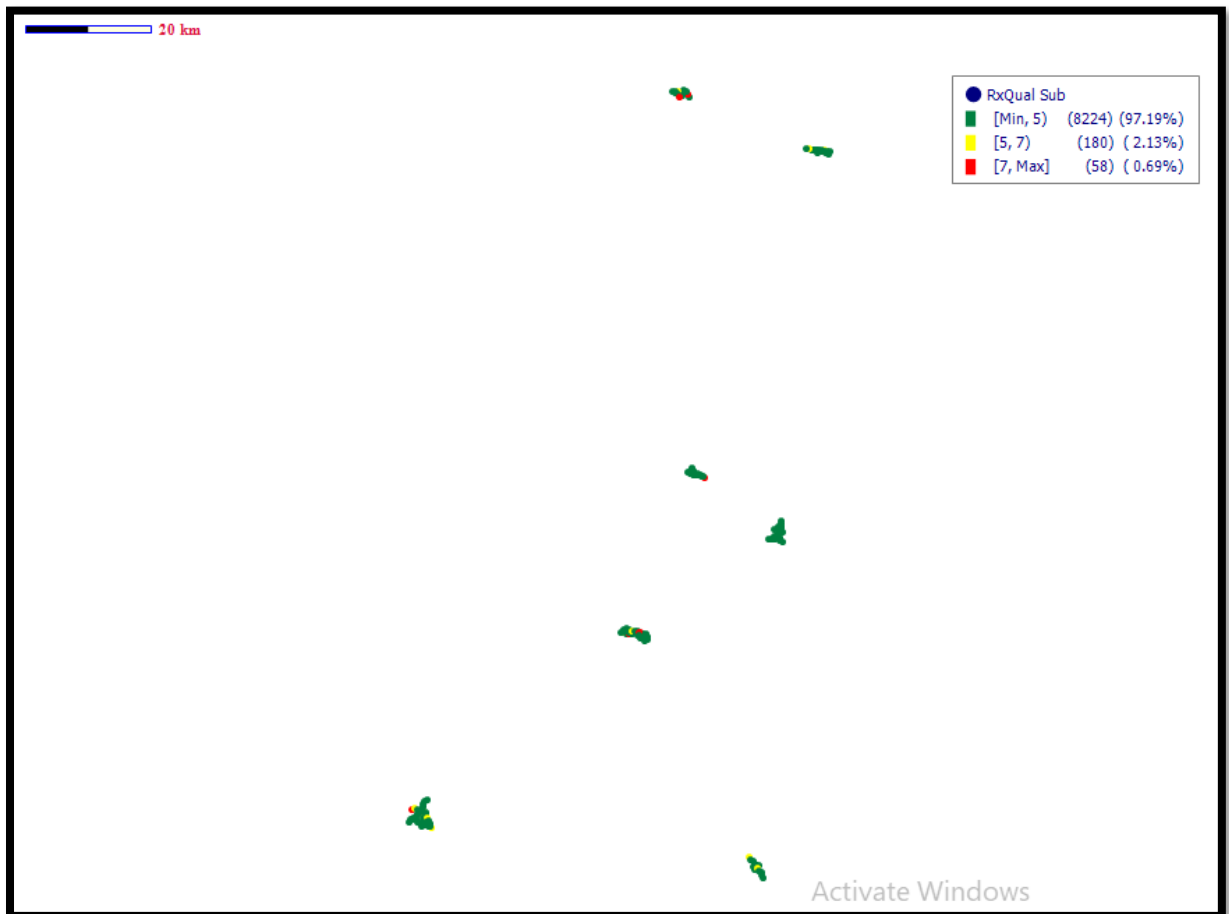
## BSNL 2G Highways/ roads



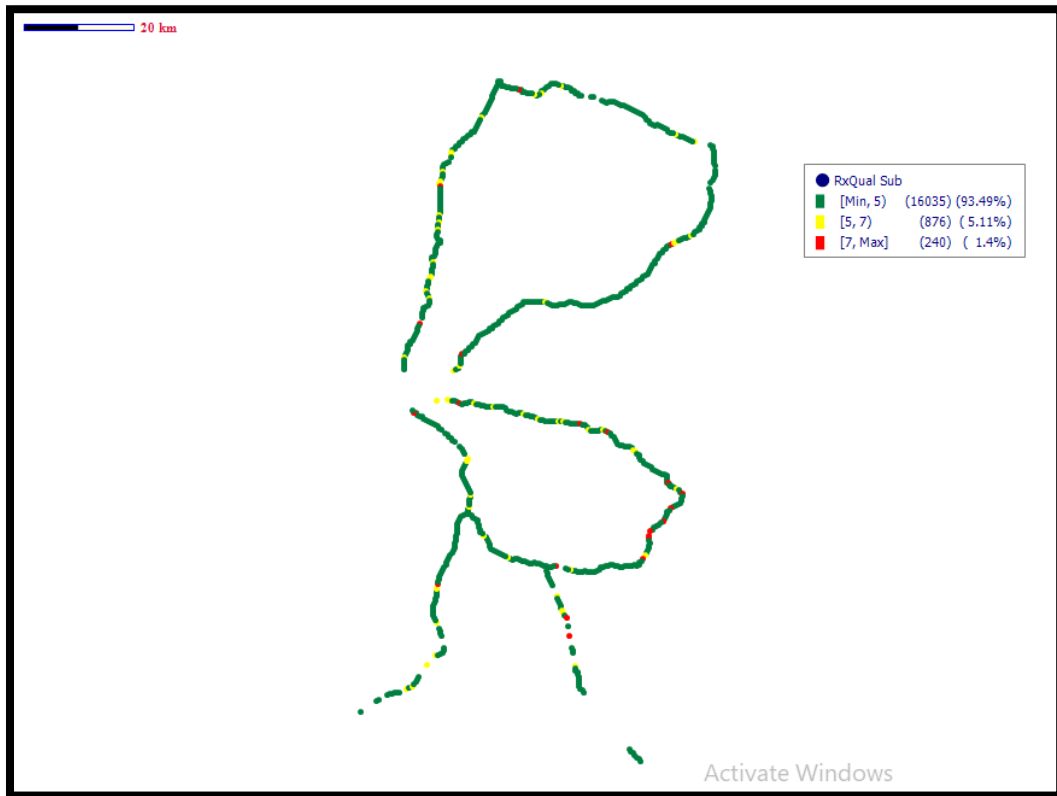
### VIL 2G Raipur City



### VIL 2G Raipur Rural

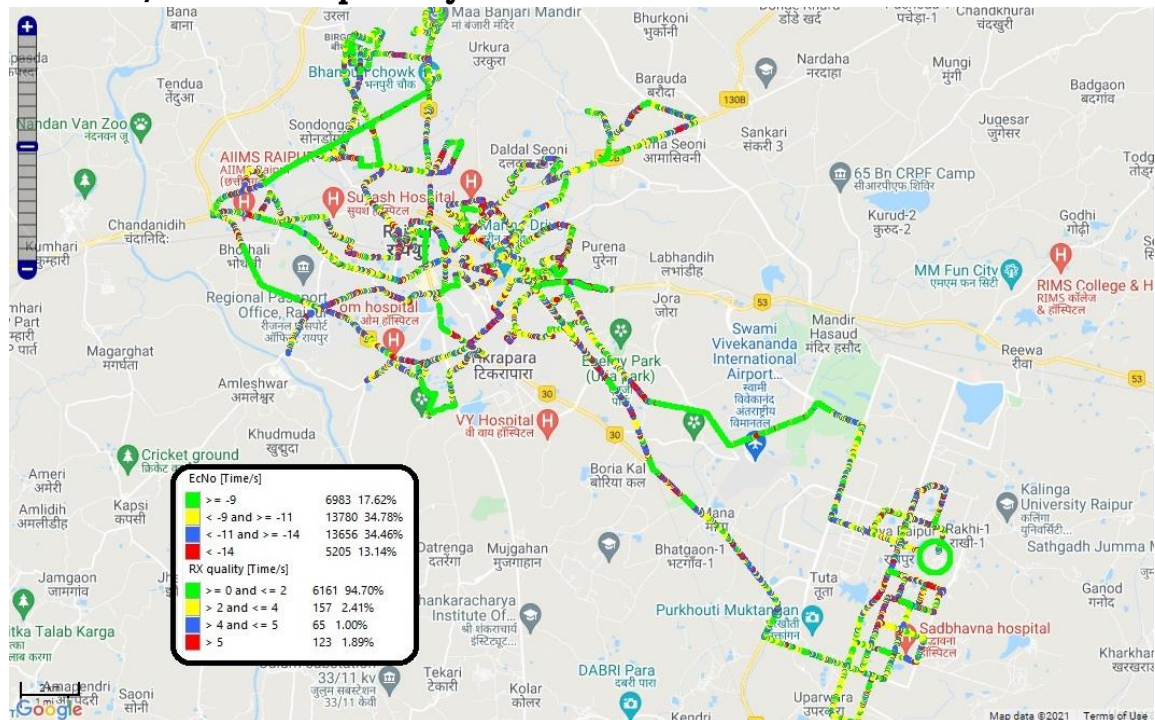


## VIL 2G Raipur Roads/ Highways

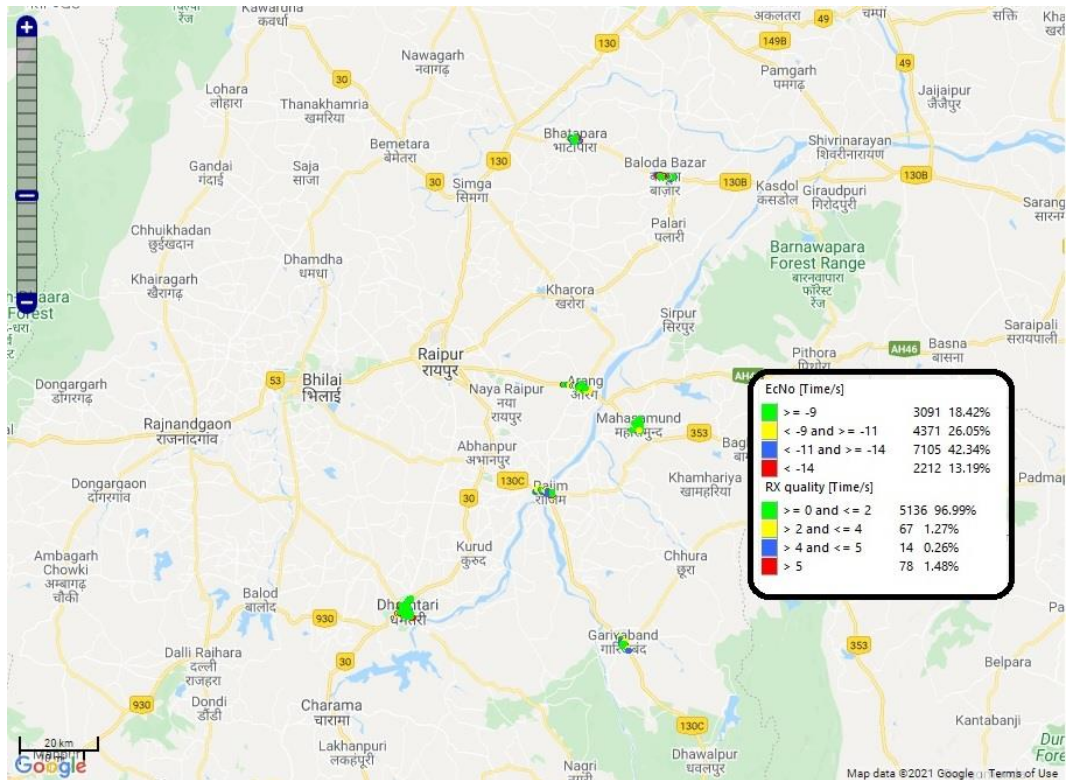


## Quality Plots -2G/3G dual

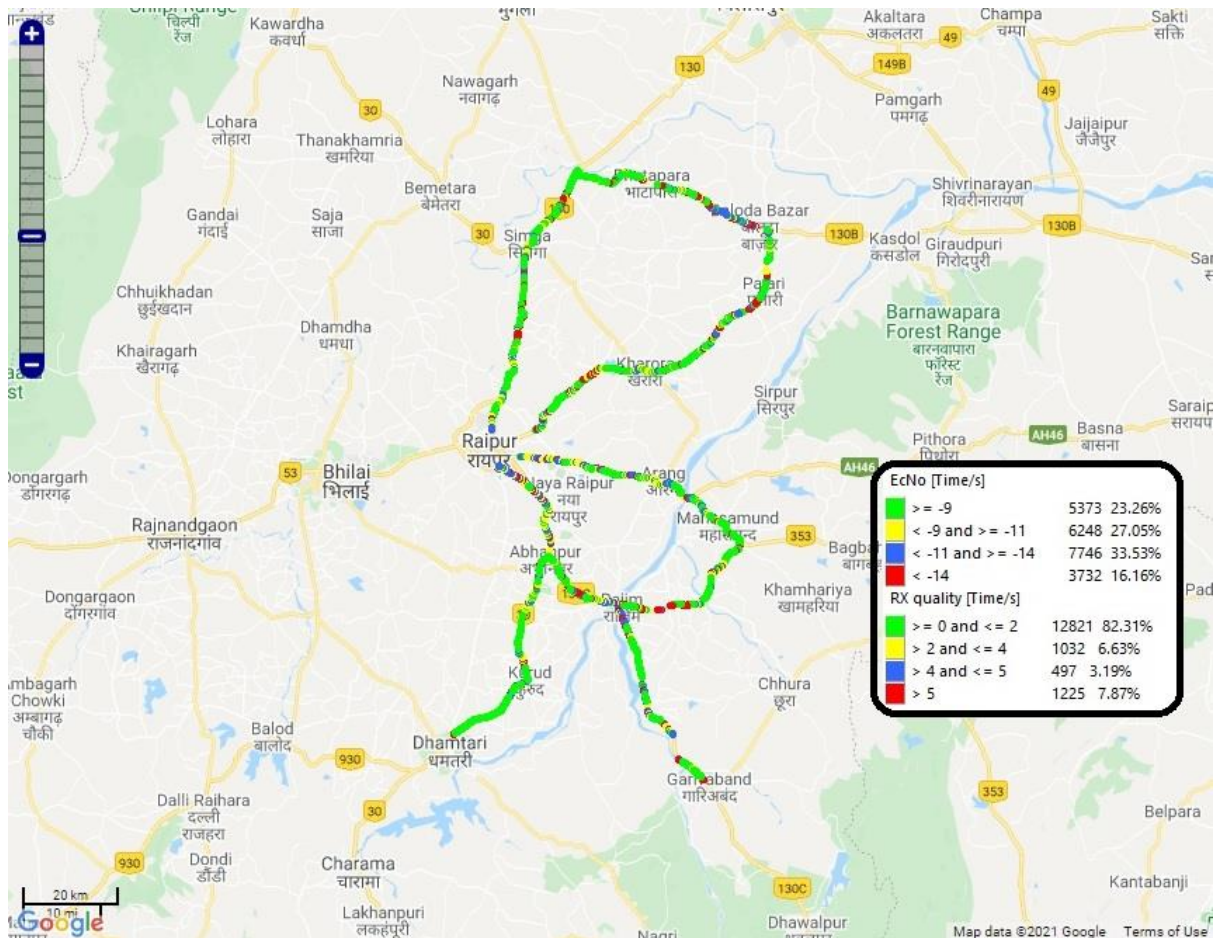
### BSNL 2G/3G dual Raipur City



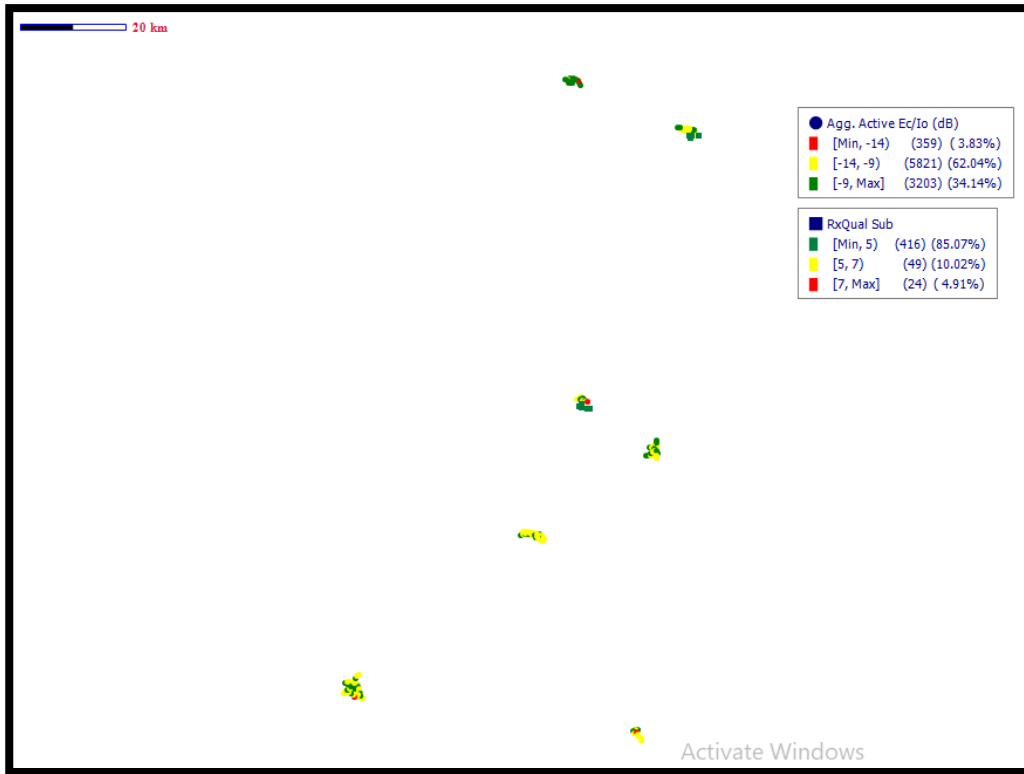
## BSNL 2G/3G dual Raipur Rural



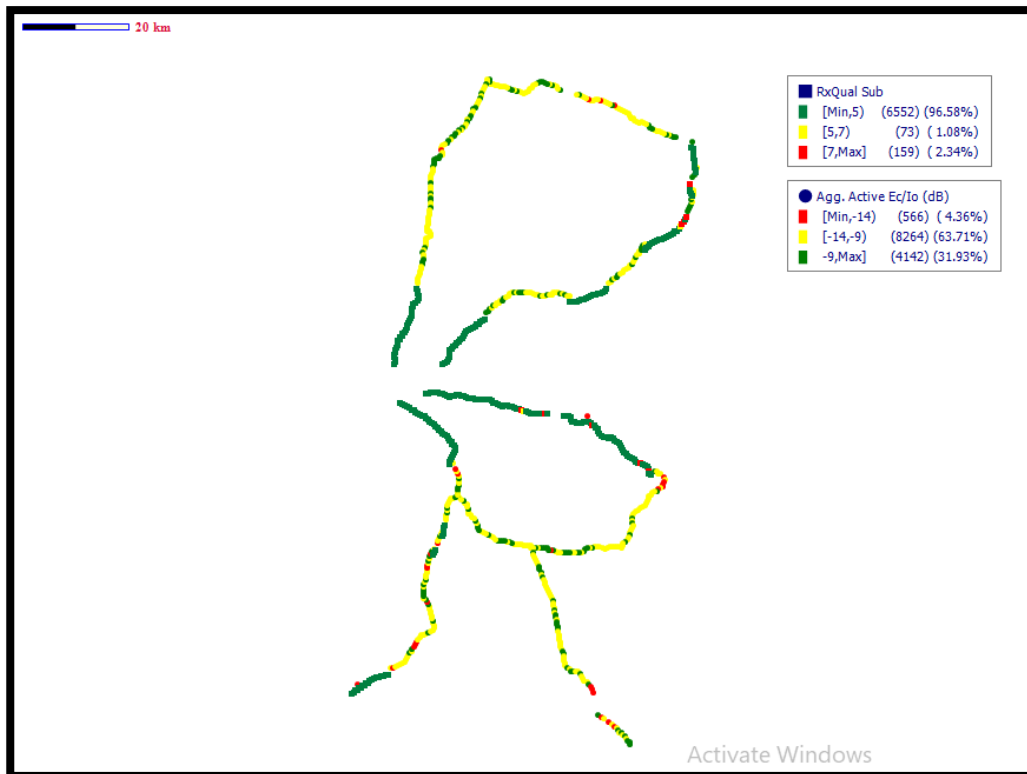
## BSNL 2G/3G Roads / Highways



### VIL 2G/3G dual Raipur Rural

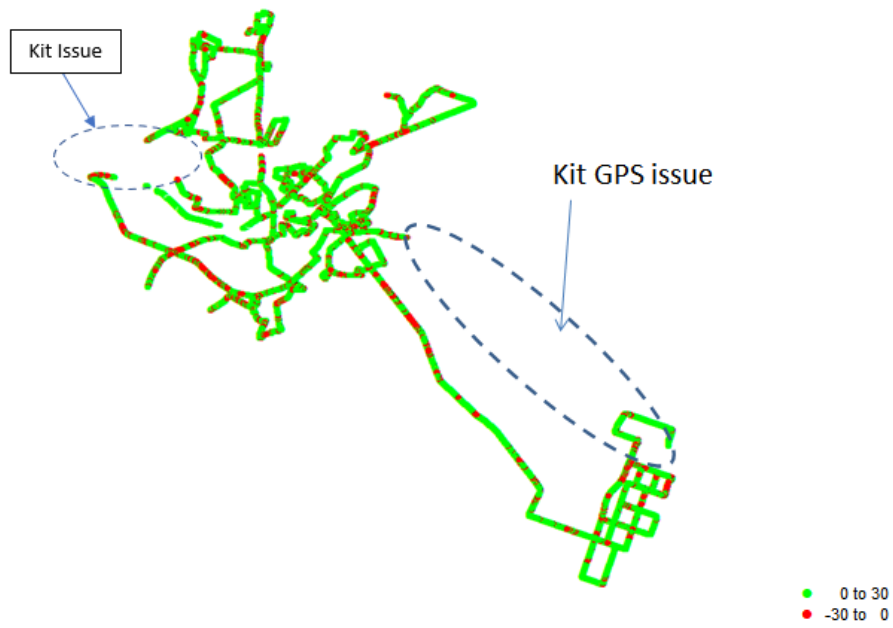


### VIL 2G/3G dual Raipur Highways / Roads



## Quality plots -VoLTE (Free)

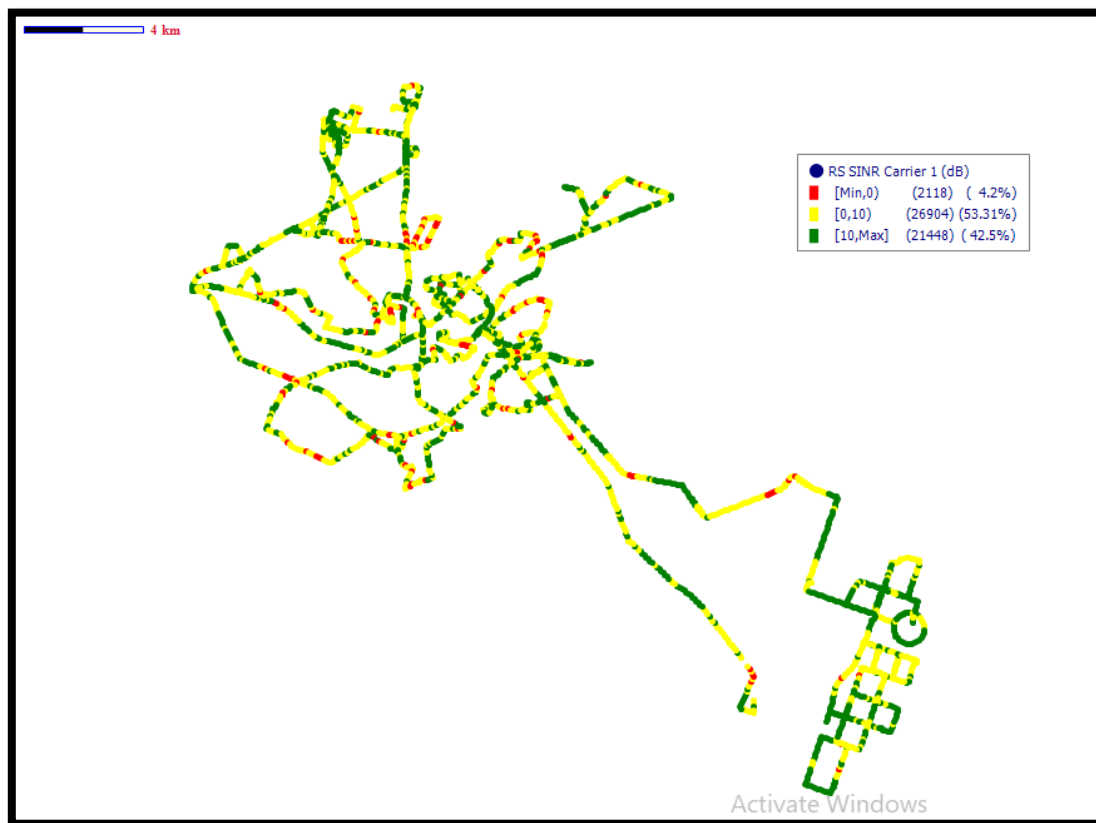
### Airtel VoLTE



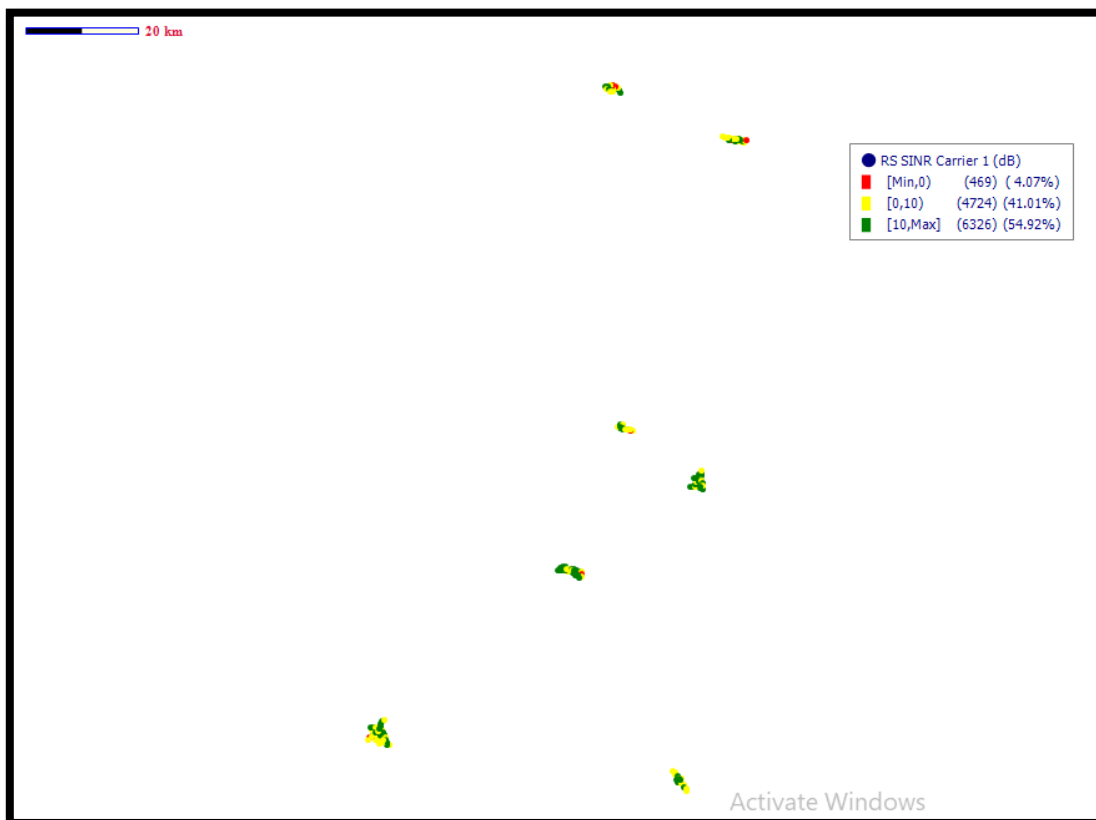
### JIO VOITE



### VIL VoLTE Raipur City

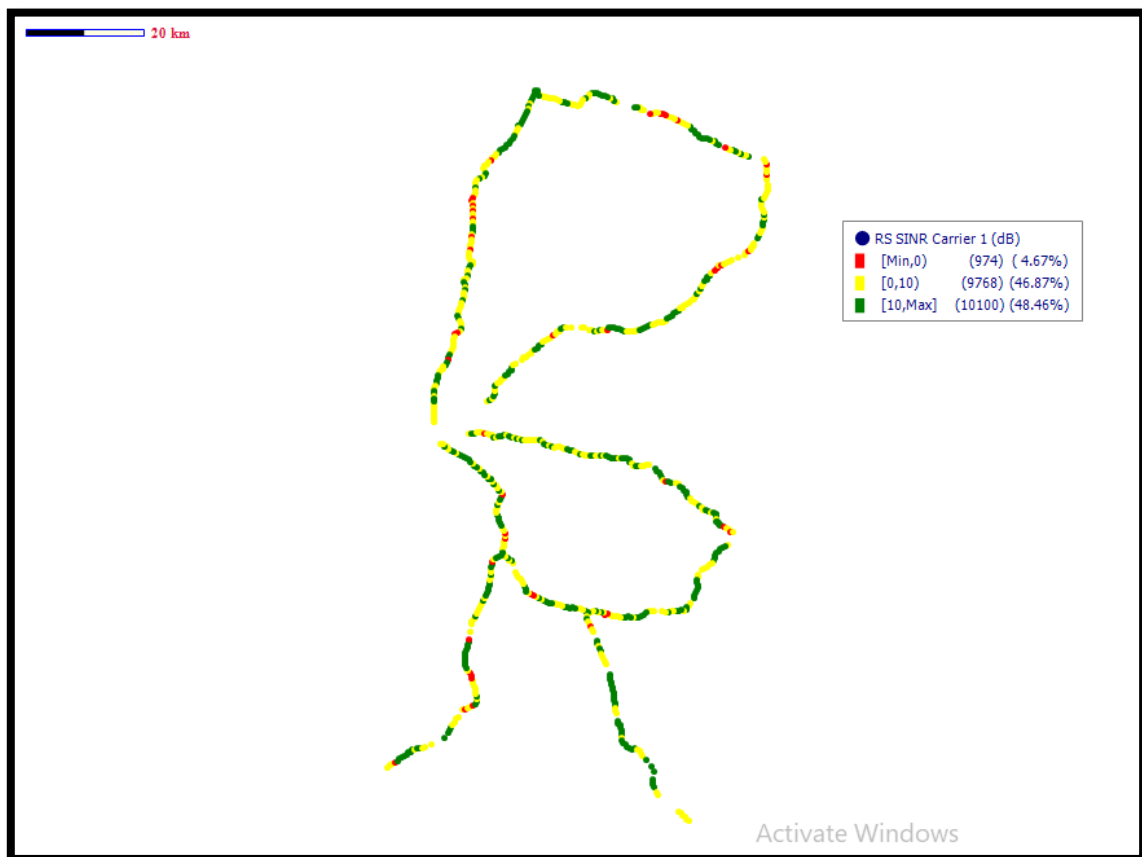


### VIL VoLTE Raipur Rural



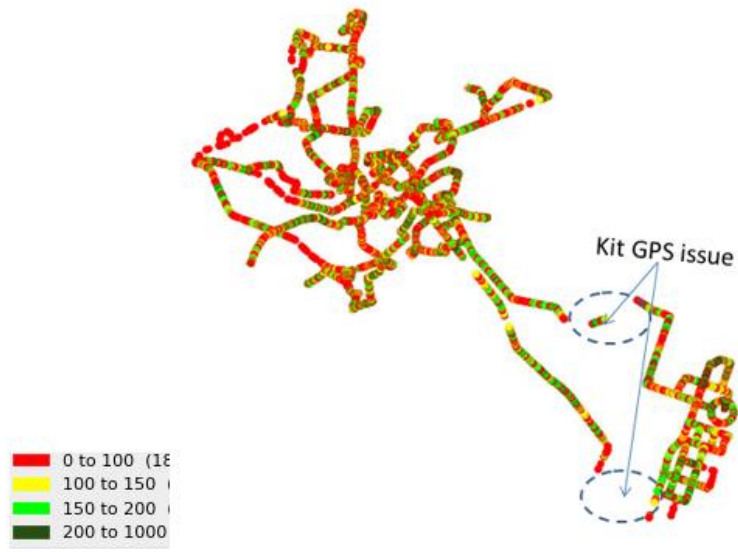


## VIL VoLTE Raipur Highways/ roads

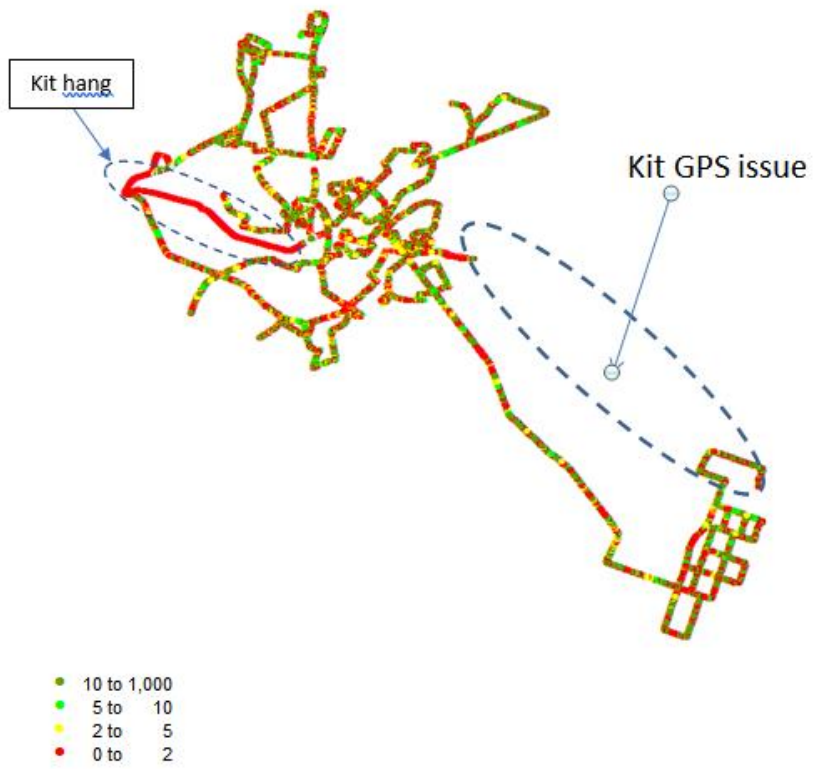


## Data plot

### Airtel 2G

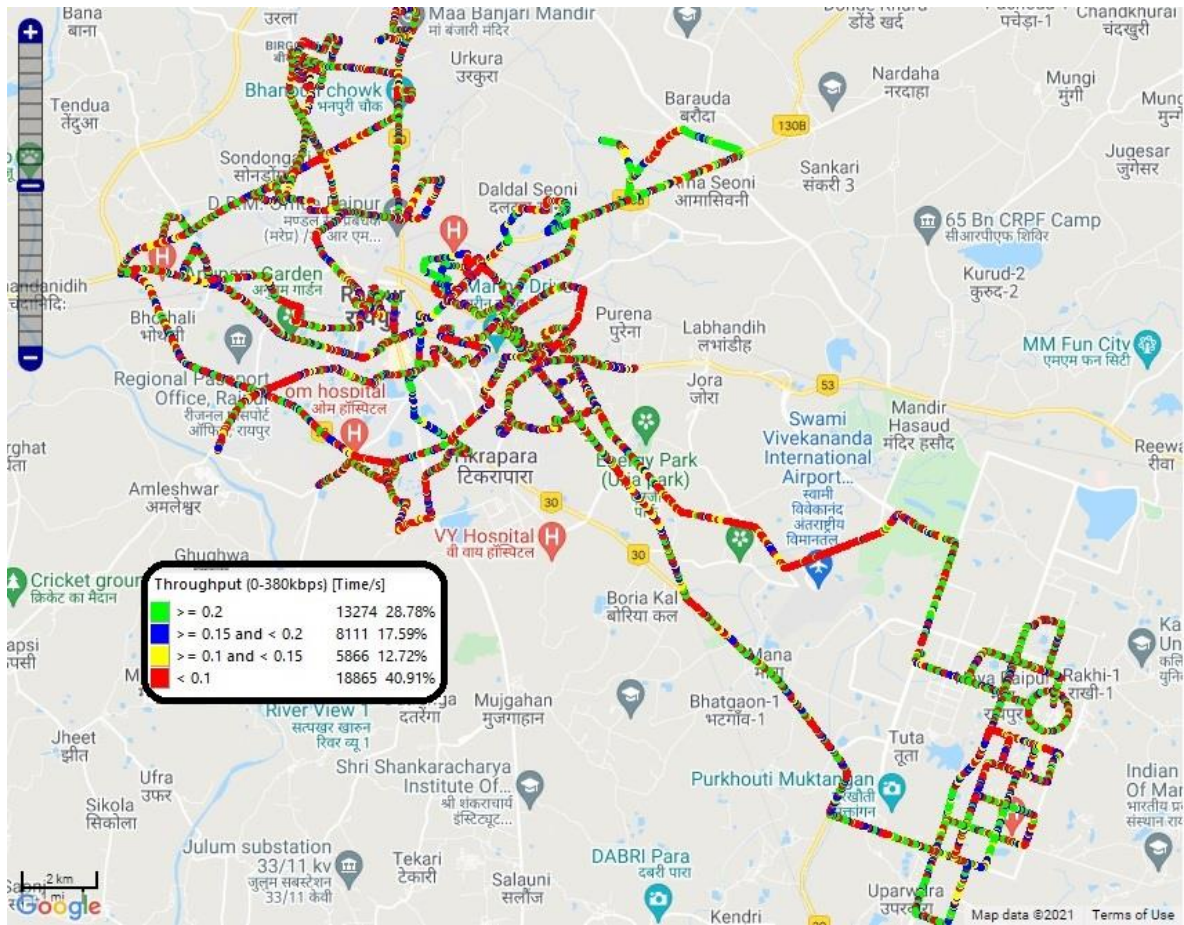


### Airtel LTE

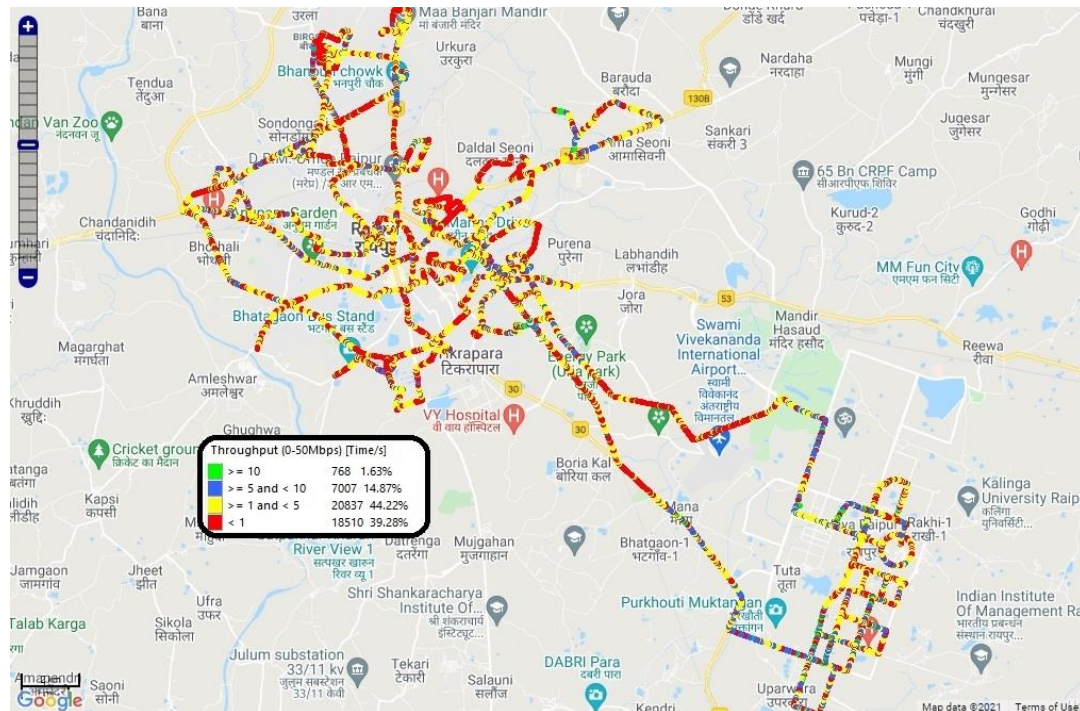


## BSNL 2G Data Plot:

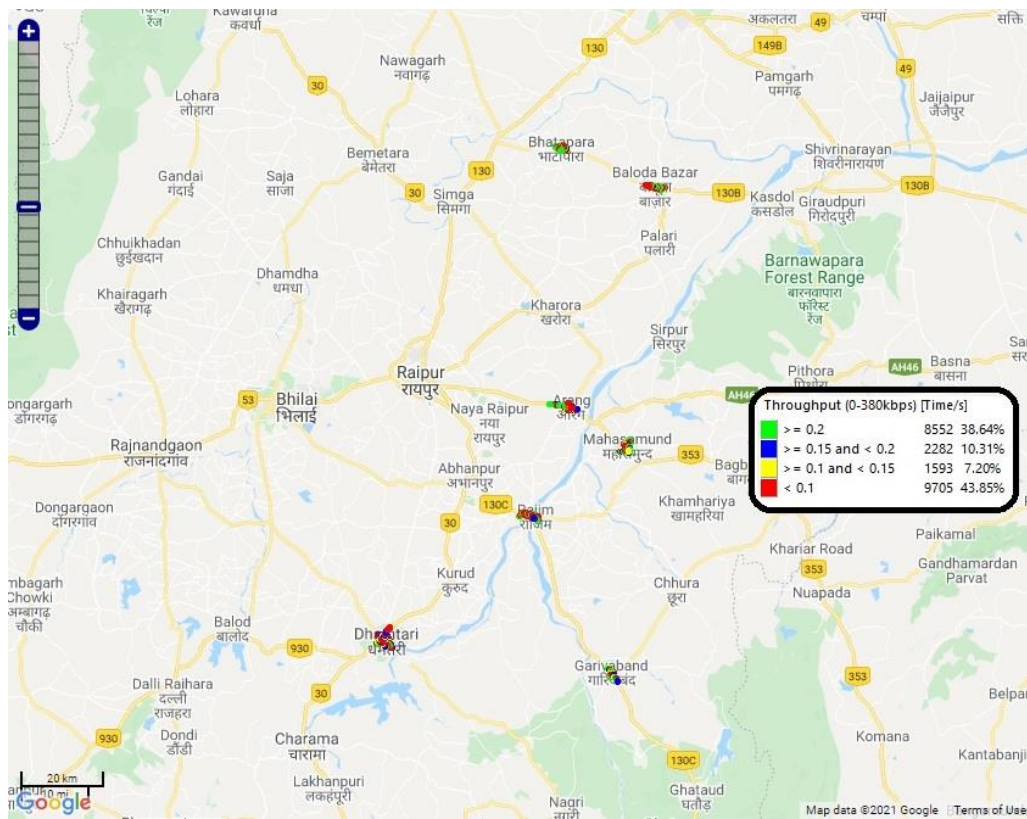
### Raipur City



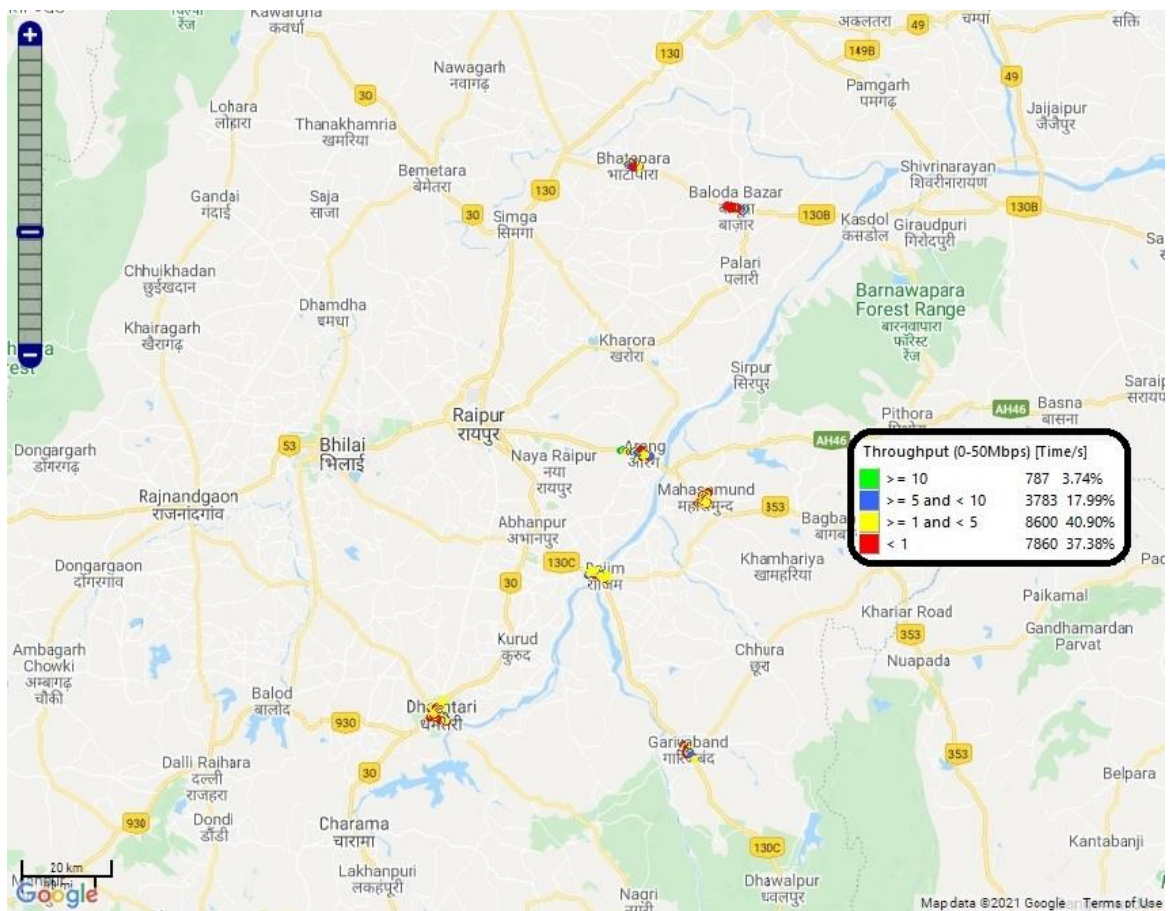
## BSNL 3G data Plot: Raipur City



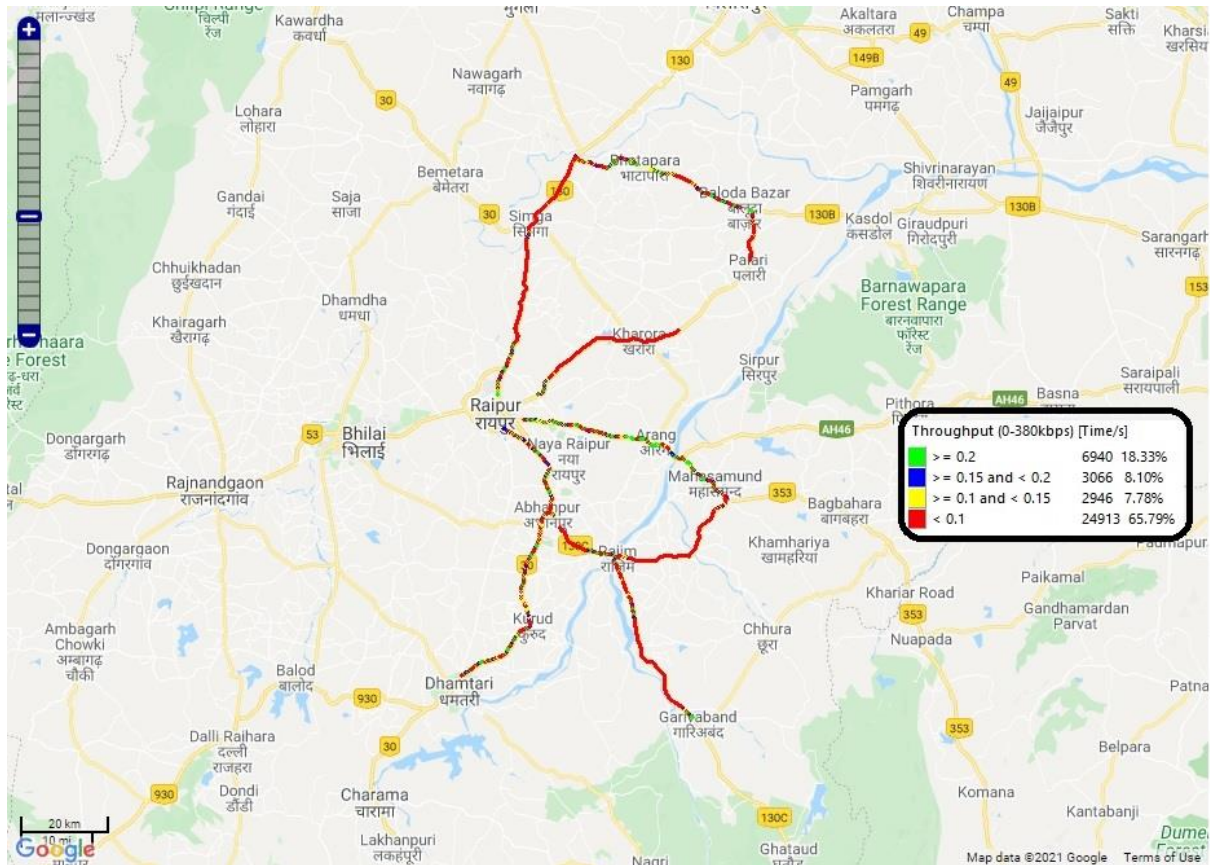
## BSNL Raipur Rural 2G



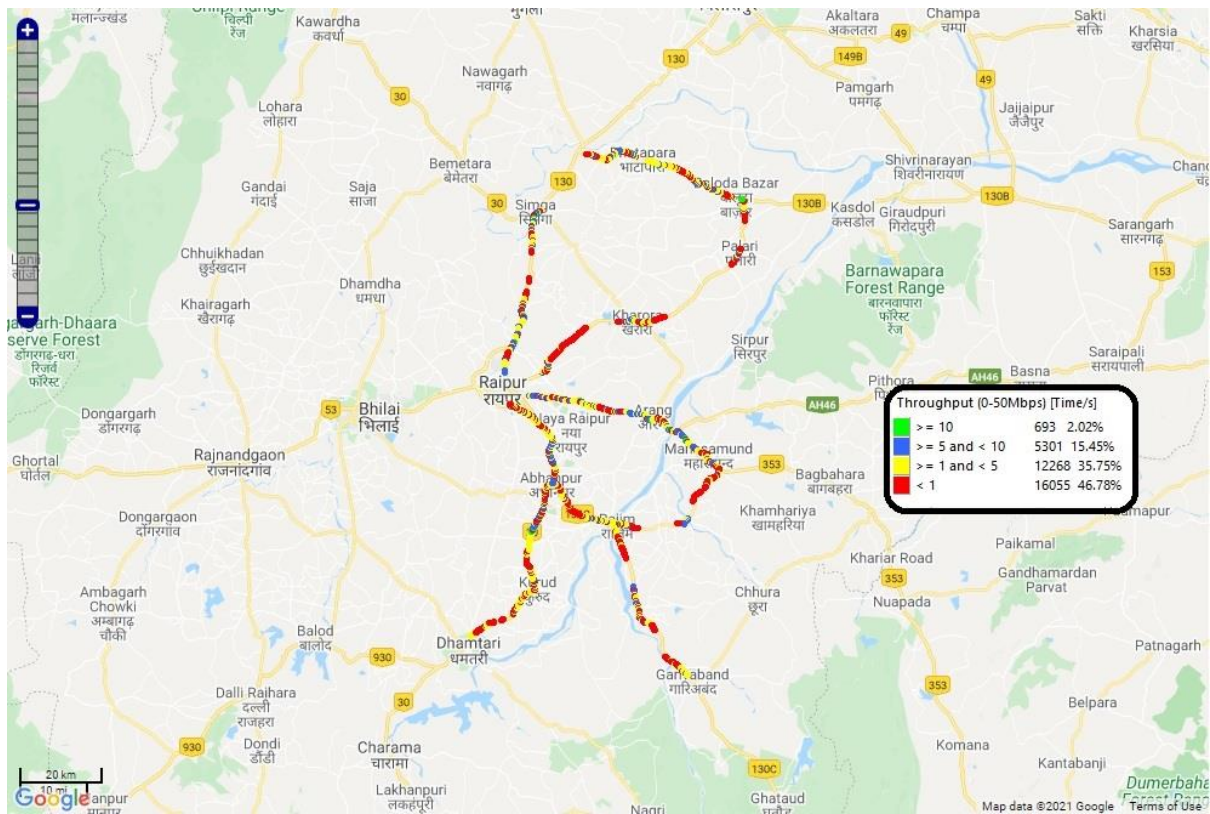
## BSNL Raipur Rural 3G



## BSNL Raipur Highway/ Roads 2G

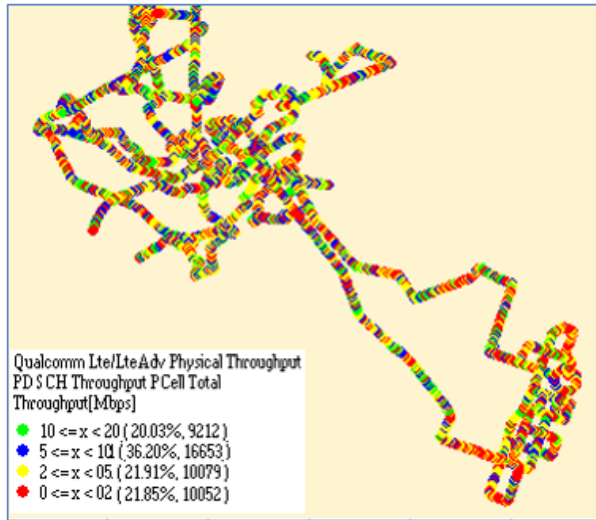


## BSNL Raipur Highway/ Roads 3G

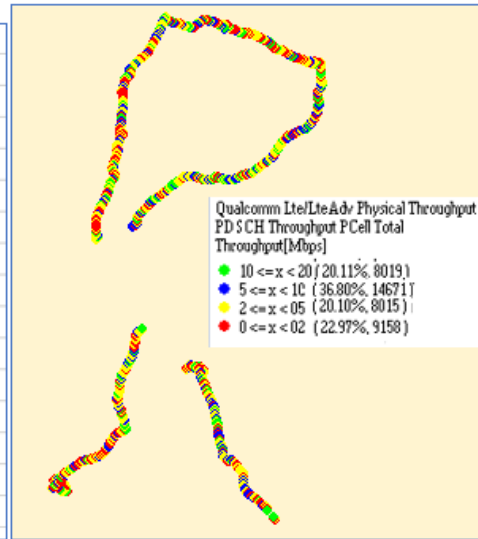


# JIO LTE

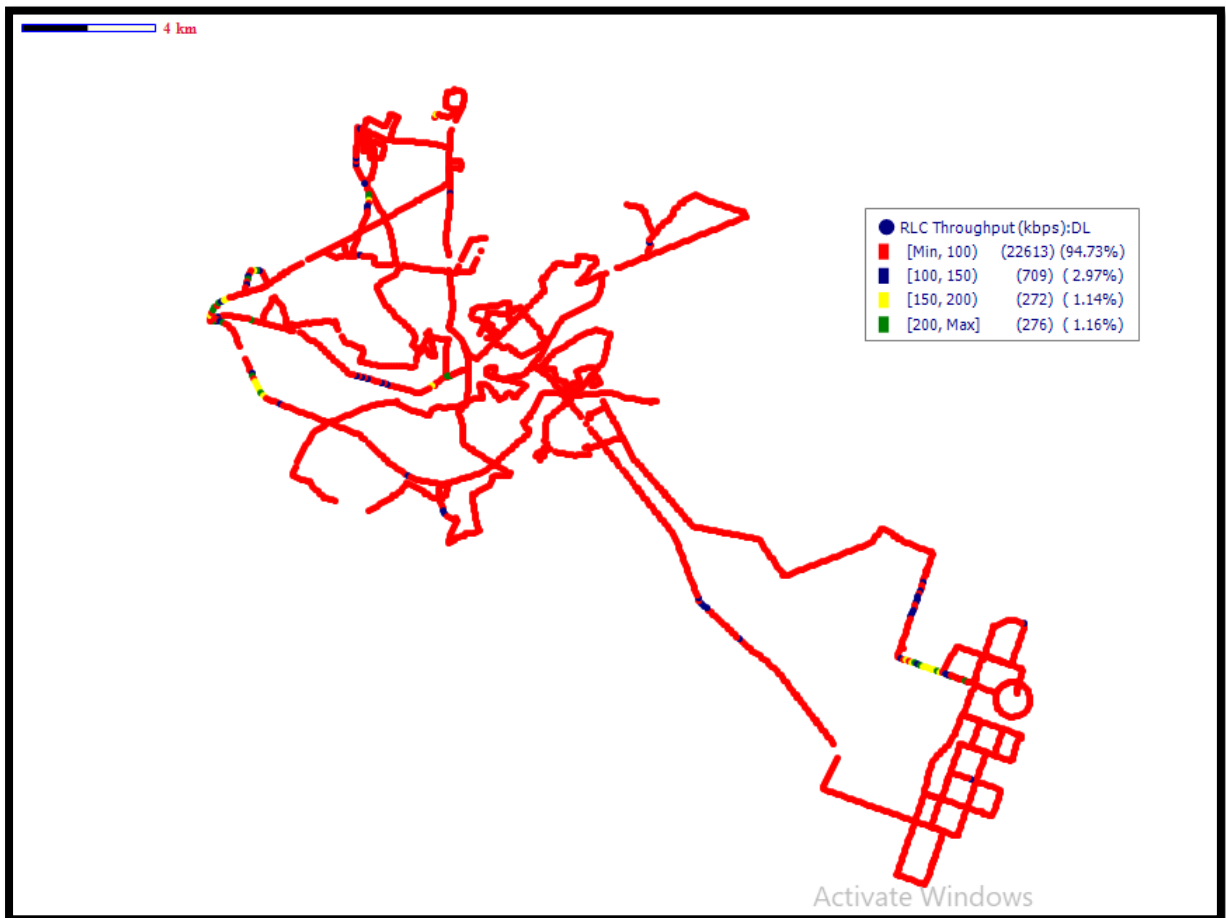
**Raipur City**



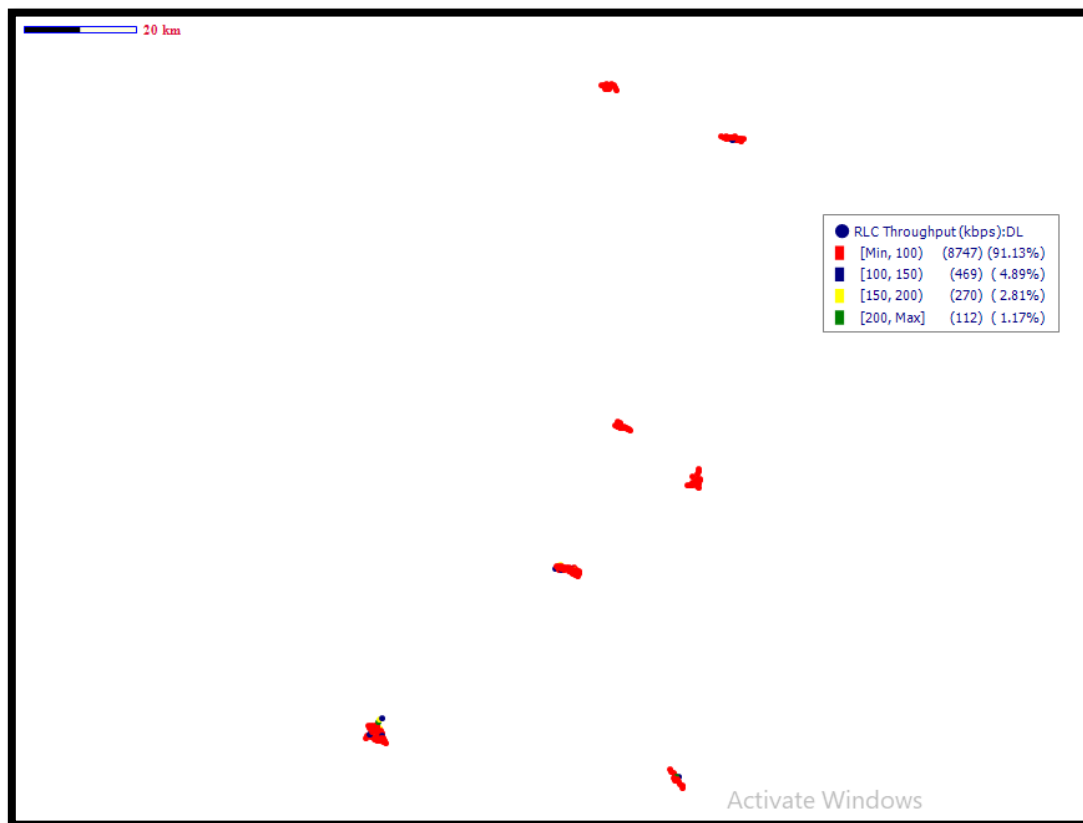
**Rural & Highway**



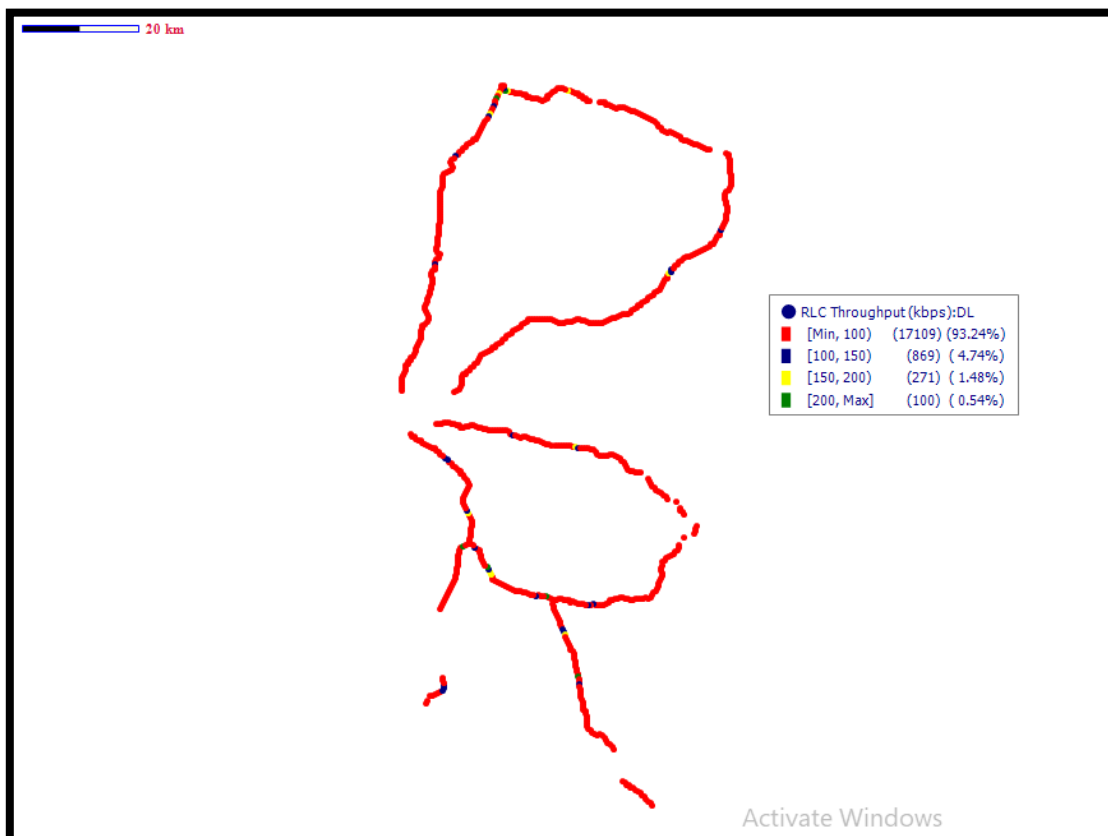
# VIL 2G Raipur City



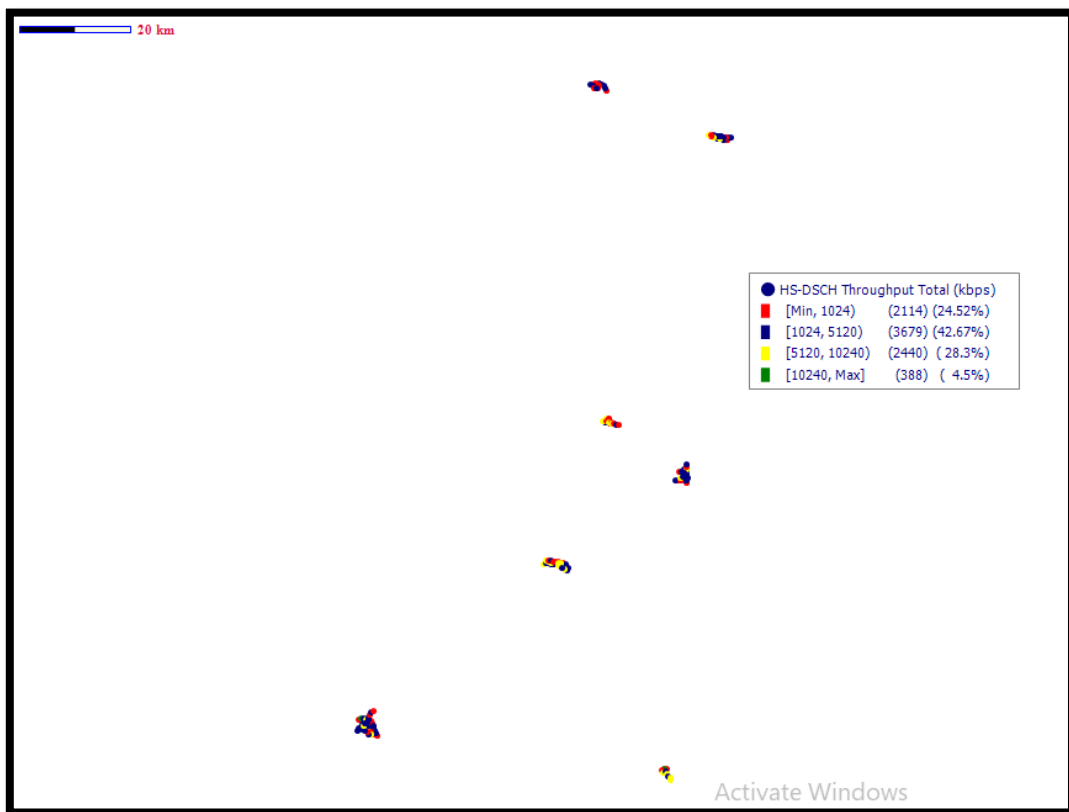
## VIL 2G Raipur Rural



## VIL 2G Raipur Highways/ roads



### VIL 3G Raipur Rural

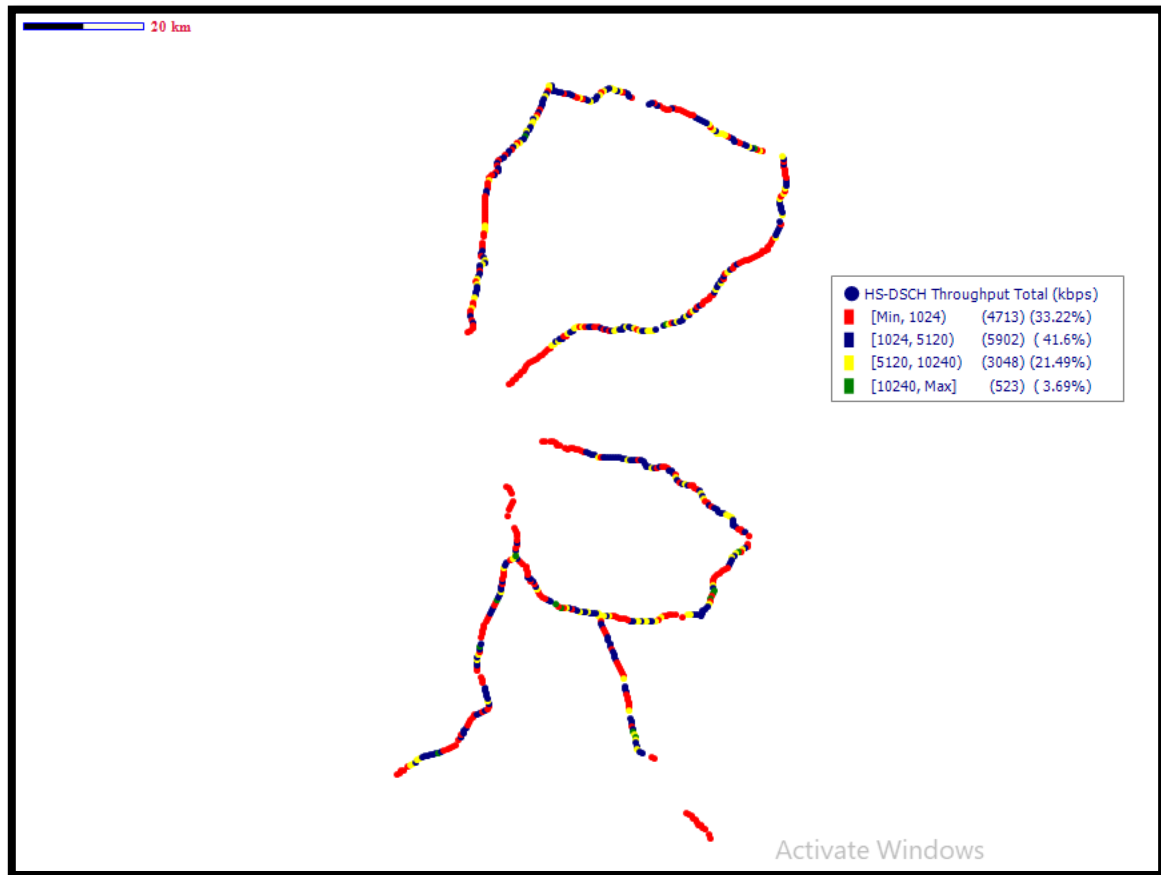


### VIL 3G Raipur Highways/ roads

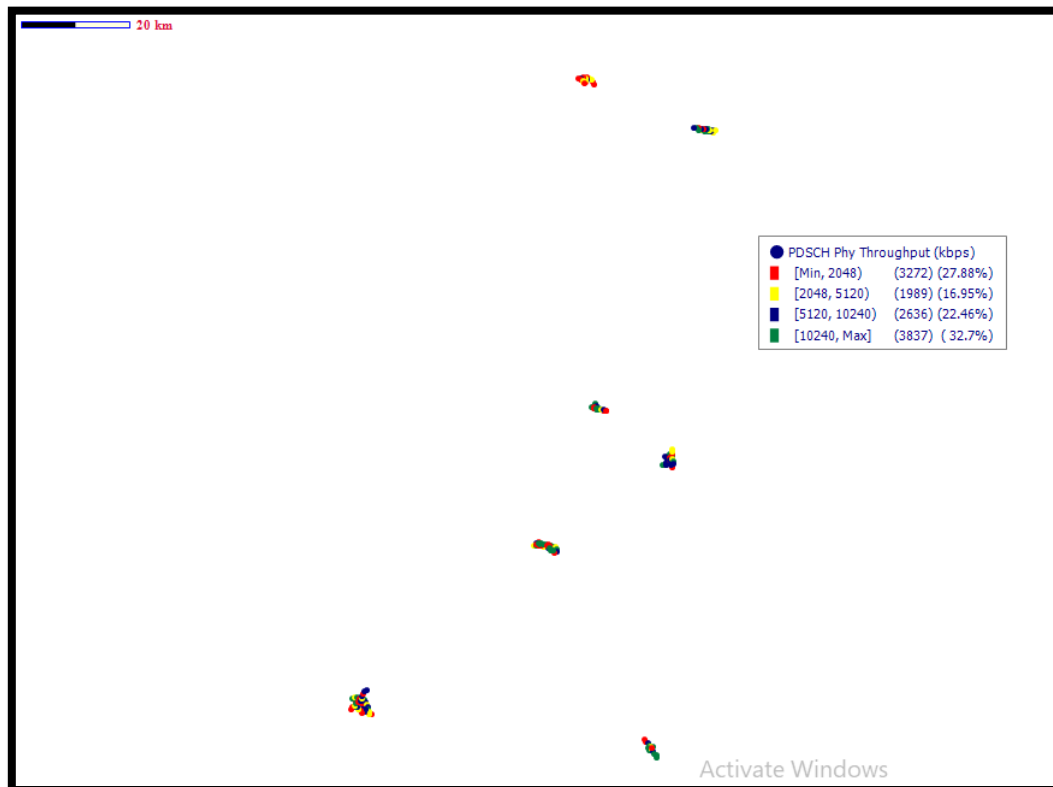




## VIL LTE Raipur City



## VIL LTE Raipur Rural



## VIL LTE Raipur Highways/ Roads

