



# INDEPENDENT DRIVE TEST REPORT

*For*

# Shillong

April 2018

EAST ZONE

**Key Performance Indicators: Only 45% of TSPs have met the Drop Call Rate (DCR) benchmark of 2% . All TSPs have met the Call Setup Success Rate (CSSR) of 95% except BSNL 3G.**

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Shillong City & adjoining areas from 9:00 AM to 9:00 PM; 19<sup>th</sup> April to 21<sup>st</sup> April 2018. The drive test covered an drive route of 236 KMs & 6 hotspot over a period of 3 days. Approximately 475 calls were made for each of the 9 networks: Four 2G networks, four 3G networks and one LTE network covering 5 unique TSPs.

Overview

Voice Summary

Data Summary

# Overview

## 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 so as 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 audit and assessment of Quality of Service through independent agencies to verify the Quality of Service claimed. The Audit agencies conduct sample 'Drive tests' across various cities in the country as part of audit and assessment of the TSPs' performance.

In view of complaints on call drops and other network quality issues, on behalf of TRAI, an Independent Drive Test (IDT) was conducted by PhiMetrics Technologies Pvt. Ltd. From **19th April to 21st April 2018** covering various locations in Shillong City & surrounding region. The performance of **Airtel, BSNL, Idea, Vodafone and Jio** were monitored across various technologies (2G, 3G and 4G). The drive test route was defined on the basis of several factors that include - areas from where call drop complaints are commonly received; areas of heavy usage; residential areas away from arterial roads; office areas; areas where previous Drive tests showed network issues; etc.

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, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

**Date:** Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency

## Drive Test Details For Shillong:

Independent Drive test was conducted for a period of 3 days from 19th April to 21st April 2018 in Shillong city & surrounding areas from 9:00 AM to 9:00 PM. Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies.

**Voice Tests:** The drive test covered a drive route of approximately 236 KMs over a period of 2 days from 19th April to 20th April 2018 . Approximately 475 calls were made for each of the 9 networks: four 2G (Lock Mode) networks, four 3G (Dual mode) networks and one VoLTE network covering 5 unique TSPs.

\* In case of multiple call failure in similar geo location in given period of 60sec has been counted as one call failure

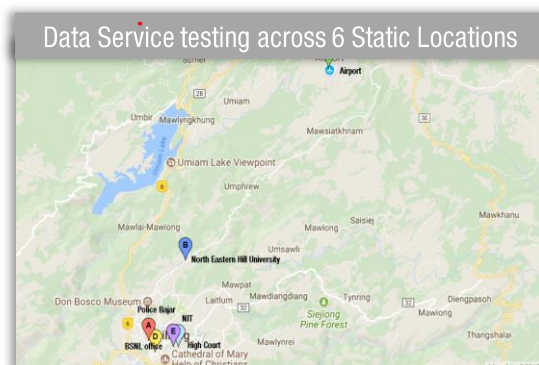
**Data Tests:** Data Tests were performed at 6 static locations for one day on 21st April 2018; four 2G (Lock mode) networks, four 3G (Dual mode) networks and four 4G (Free mode) networks covering 5 unique TSPs were tested.

\* For Voice and Data KPI's, 2G measurement is done with UE locked on 2G, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.

\* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

\* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

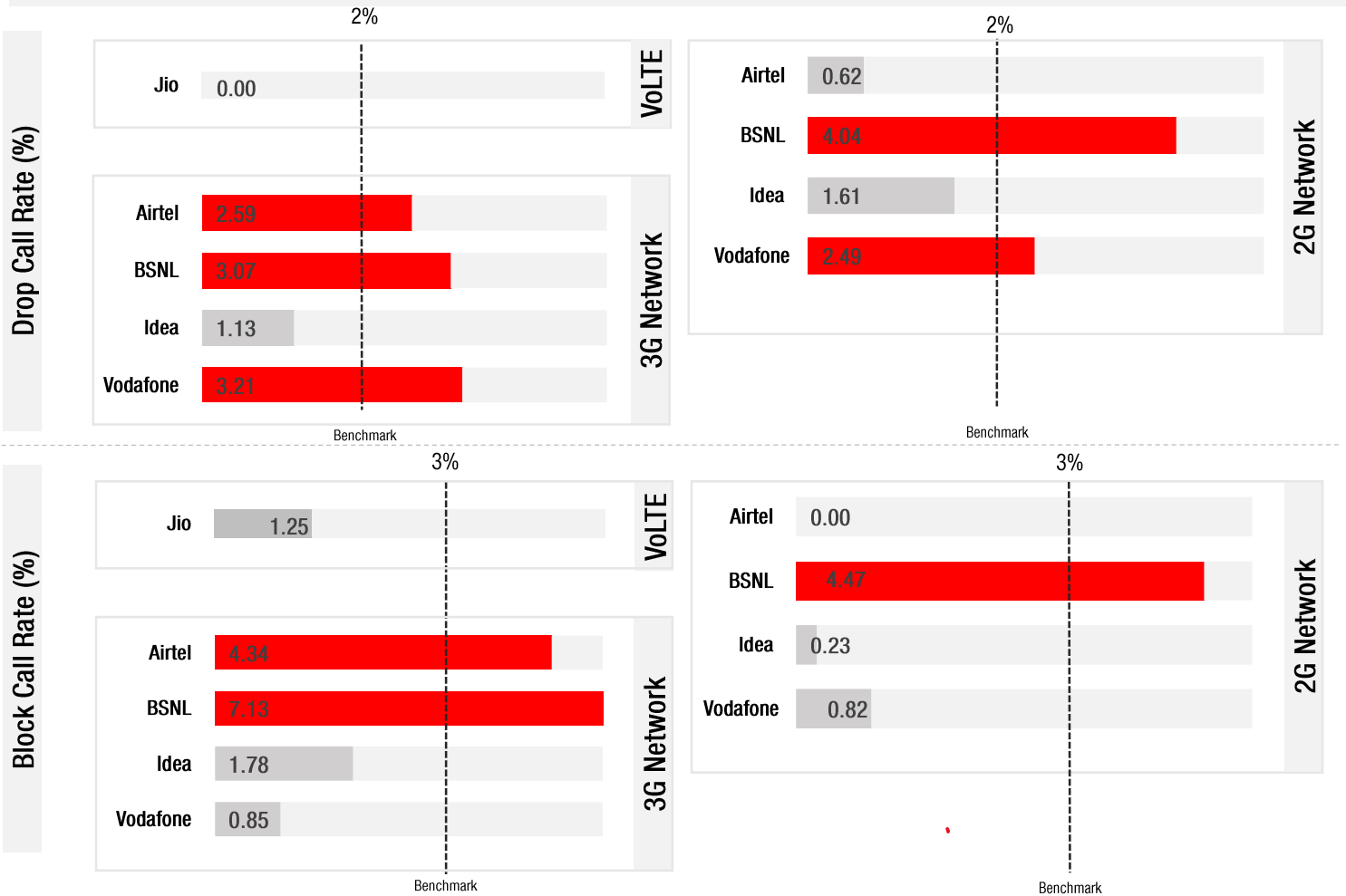
Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com



# Voice Calls

## Key Observations

QoS compliance of the TSPs in Shillong for Voice across technologies 2G/3G/4G-VoLTE is given below:



KPI	2G Networks			
	Airtel	BSNL	Idea	Vodafone
SDCCH Congestion%	0.00%	0.81%	0.00%	0.00%
TCH Congestion %	0.00%	3.66%	0.23%	0.82%

KPI	3G Networks*			
	Airtel	BSNL	Idea	Vodafone
SDCCH Congestion%	0.00%	0.41%	0.00%	0.00%
RRC Congestion%	3.10%	3.26%	0.45%	0.43%
SDCCH & RRC Congestion%	3.10%	3.67%	0.45%	0.43%
TCH Congestion %	0.00%	2.85%	0.00%	0.00%
RAB Congestion %	1.24%	0.61%	1.33%	0.42%
TCH & RAB Congestion %	1.24%	3.46%	1.33%	0.42%

\* Calls may move to 2G network, hence both technologies are covered

- a) Only 45% of TSPs have met the 2% QoS benchmark of Drop Call Rate (DCR%).
- b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's except Airtel 3G, BSNL 2G & BSNL 3G.

Not meeting Benchmark

# Voice Calls

## Key Observations

### Coverage

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

TSPs	2G			
	Airtel	BSNL	Idea	Vodafone
Coverage%	82.03%	59.30%	60.61%	69.09%

b) Percentage of coverage samples for 2G  $\geq$  -85 dBm, 3G  $\geq$  -90 dBm & LTE  $\geq$  -110 dBm.

TSPs	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Coverage %	64.48%	66.11%	70.29%	71.90%	90.64%

c) Percentage of time spent on 3G network:

TSPs	3G			
	Airtel	BSNL	Idea	Vodafone
Time Spent on 3G%	94.03%	14.33%	48.71%	70.60%

d) Percentage of RLT  $\geq$ 48:

TSPs	2G			
	Airtel	BSNL	Idea	Vodafone
%RLT $\geq$ 48	12.16%	19.47%	0.00%	0.00%

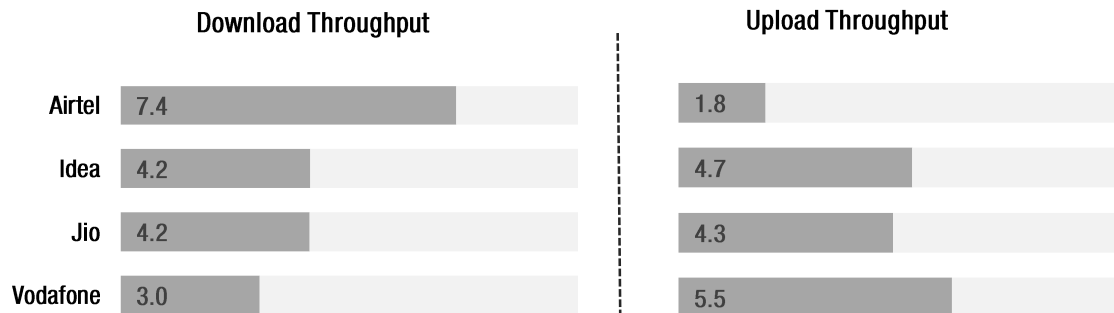
# Data Services

## Key Observations

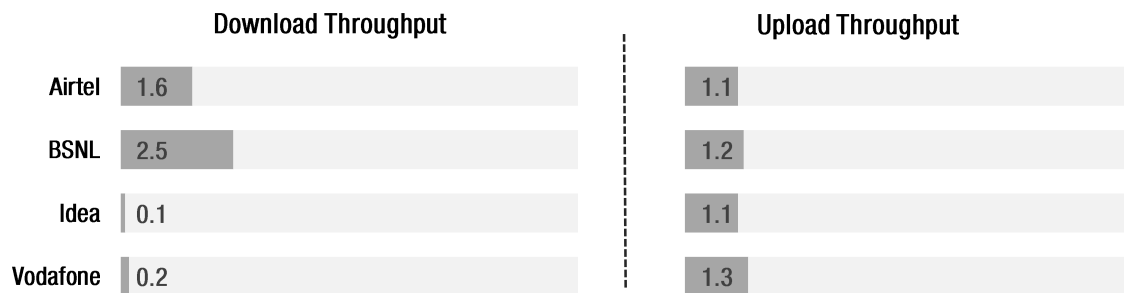
Data was tested at 6 locations viz Police Bajar, Northern Eastern Hill University, Airport, BSNL Office, NIT & High Court. Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

### Data Download and Upload Performance (Mbps)

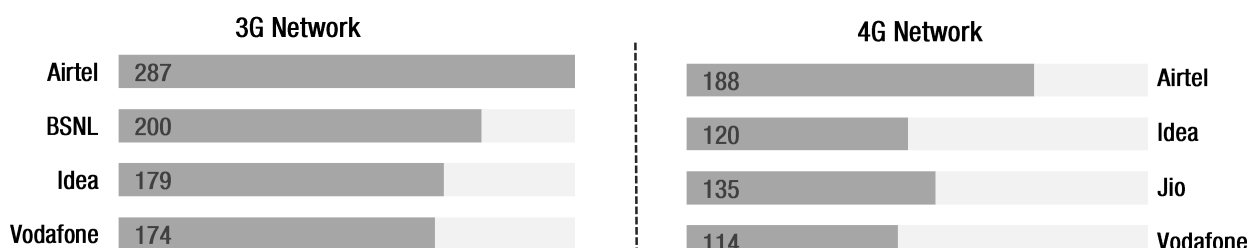
#### 4G Network:



#### 3G Network:



### Latency (msec)

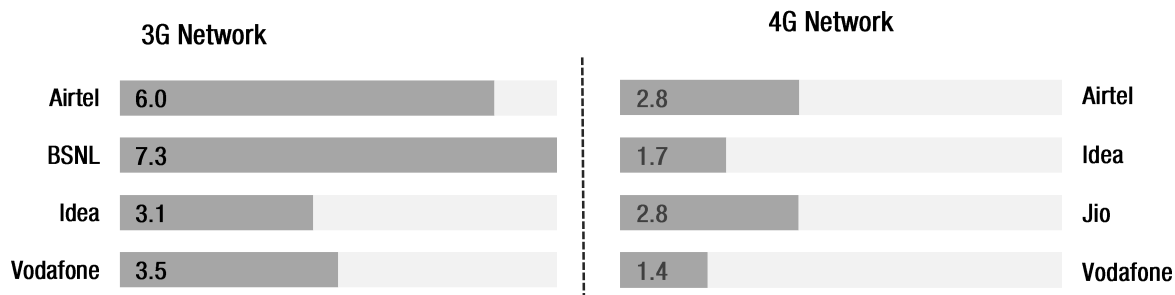


# Data Services

## Key Observations

### Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

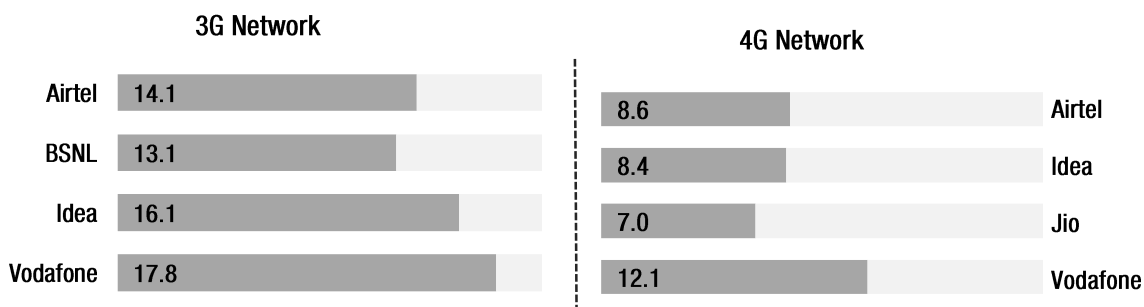


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

- Initial Start time
- Interruption time while playing the video.

Video Streaming	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Avg. Initial Start Time (sec)	3.3	7.3	2.3	3.5	2.8	1.6	2.6	1.4
Avg. Interruption Time (sec)	2.7	-	0.8	-	-	0.1	0.2	-

### Web Page Download Time (sec)



Web browsing experience is the average time taken to fully load the websites tested.

# Summary

## City Level Summary

Voice Call	2G			
	Airtel	BSNL	Idea	Vodafone
Call Attempt	487	492	436	486
Blocked Call Rate (%)	0.00%	4.47%	0.23%	0.82%
CSSR% (Accessibility)	100.00%	95.53%	99.77%	99.18%
Drop Call Rate (%)	0.62%	4.04%	1.61%	2.49%
Mobility HOSR (%)	96.28%	95.53%	98.88%	98.11%
Rx Quality (%)	94.73%	91.37%	95.75%	94.99%

Voice Call	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Call Attempt	484	491	450	471	481
Blocked Call Rate (%)	4.34%	7.13%	1.78%	0.85%	1.25%
CSSR% (Accessibility)	95.66%	92.87%	98.22%	99.15%	98.75%
Drop Call Rate (%)	2.59%	3.07%	1.13%	3.21%	0.00%
Mobility HOSR (%)	99.72%	98.46%	99.89%	99.65%	99.82%
Rx Quality (%)	73.91%	92.45%	93.48%	83.31%	79.91%

# Summary

## City Level Summary(contd.)

Data Services	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	132.6	108.0	116.5	114.8
Upload Throughput (kbps)	137.8	93.3	156.5	118.0
Web Browsing Delay (sec)	22.0	37.5	36.9	34.6
Latency (msec)	419	440	453	377

Data Services	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.6	2.5	0.1	0.2	7.4	4.2	4.2	3.0
Upload Throughput (Mbps)	1.1	1.2	1.1	1.3	1.8	4.7	4.3	5.5
Web Browsing Delay (sec)	14.1	13.1	16.1	17.8	8.6	8.4	7.0	12.1
Video Streaming Delay (sec)	6.0	7.3	3.1	3.5	2.8	1.7	2.8	1.4
Latency (msec)	287	200	179	174	188	120	135	114



# Summary

## City Level Summary(contd.)

Police Bajar	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	183.8	81.0	103.7	174.6
Upload Throughput (kbps)	154.4	121.1	129.8	154.7
Web Browsing Delay (sec)	28.6	33.3	39.5	34.5
Latency (msec)	412	431	576	-

Police Bajar	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.7	2.1	0.1	0.1	6.4	4.0	5.0	2.3
Upload Throughput (Mbps)	0.8	1.8	1.2	1.0	5.6	5.1	4.7	6.6
Web Browsing Delay (sec)	12.2	12.3	14.5	19.5	9.6	9.5	5.9	10.9
Video Streaming Delay (sec)	5.3	5.5	4.1	4.9	2.2	2.5	2.5	1.9
Latency (msec)	225	172	166	-	216	119	118	-

North Eastern Hill University	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	160.0	211.1	148.2	137.2
Upload Throughput (kbps)	150.2	122.4	195.1	161.3
Web Browsing Delay (sec)	17.3	40.8	44.9	23.3
Latency (msec)	410	496	493	327

North Eastern Hill University	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	4.1	3.1	0.1	0.2	10.7	10.7	4.8	6.7
Upload Throughput (Mbps)	2.1	2.4	0.9	0.9	1.1	5.3	3.3	6.2
Web Browsing Delay (sec)	9.4	11.4	16.2	18.3	8.1	5.9	5.4	11.0
Video Streaming Delay (sec)	2.9	4.1	2.4	2.8	2.2	1.0	1.1	0.7
Latency (msec)	235	154	160	124	198	114	128	114

# Summary

## City Level Summary(contd.)

Airport	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	79.6	108.4	178.6	104.3
Upload Throughput (kbps)	108.8	49.8	211.1	79.8
Web Browsing Delay (sec)	19.8	31.9	40.5	52.2
Latency (msec)	453	313	340	425

Airport	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	0.6	3.1	0.1	0.2	4.6	1.5	4.5	3.6
Upload Throughput (Mbps)	1.3	0.5	0.4	0.8	0.4	2.6	1.4	4.6
Web Browsing Delay (sec)	12.9	15.0	14.1	17.3	9.2	9.4	7.8	12.1
Video Streaming Delay (sec)	7.2	6.1	4.8	2.3	3.6	1.6	2.3	1.7
Latency (msec)	229	169	167	136	174	131	132	99

BSNL office	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	81.9	113.2	68.6
Upload Throughput (kbps)	-	107.1	143.6	84.4
Web Browsing Delay (sec)	-	50.2	25.0	19.5
Latency (msec)		392	539	362

BSNL office	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	0.8	-	0.1	0.2	14.9	2.8	3.2	0.2
Upload Throughput (Mbps)	0.6	1.3	1.2	1.9	0.6	5.9	6.6	1.9
Web Browsing Delay (sec)	14.3	10.7	17.5	15.0	6.1	9.1	8.6	20.3
Video Streaming Delay (sec)	14.9	5.2	1.5	2.2	1.6	1.5	1.6	1.8
Latency (msec)	380	149	161	182	138	119	105	102

# Summary

## City Level Summary(contd.)

NIT	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	26.5	113.8	27.0
Upload Throughput (kbps)	-	62.9	149.8	43.3
Web Browsing Delay (sec)	-	48.9	45.7	23.6
Latency (msec)	-	638	327	515

NIT	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	0.0	-	0.1	0.2	0.2	4.9	5.1	3.1
Upload Throughput (Mbps)	0.4	0.3	0.6	0.6	0.1	4.1	6.5	3.8
Web Browsing Delay (sec)	24.3	10.9	19.7	19.0	7.5	7.5	5.6	9.5
Video Streaming Delay (sec)	-	16.4	4.8	4.6	-	1.5	1.0	0.9
Latency (msec)	424	404	252	268	277	119	130	135

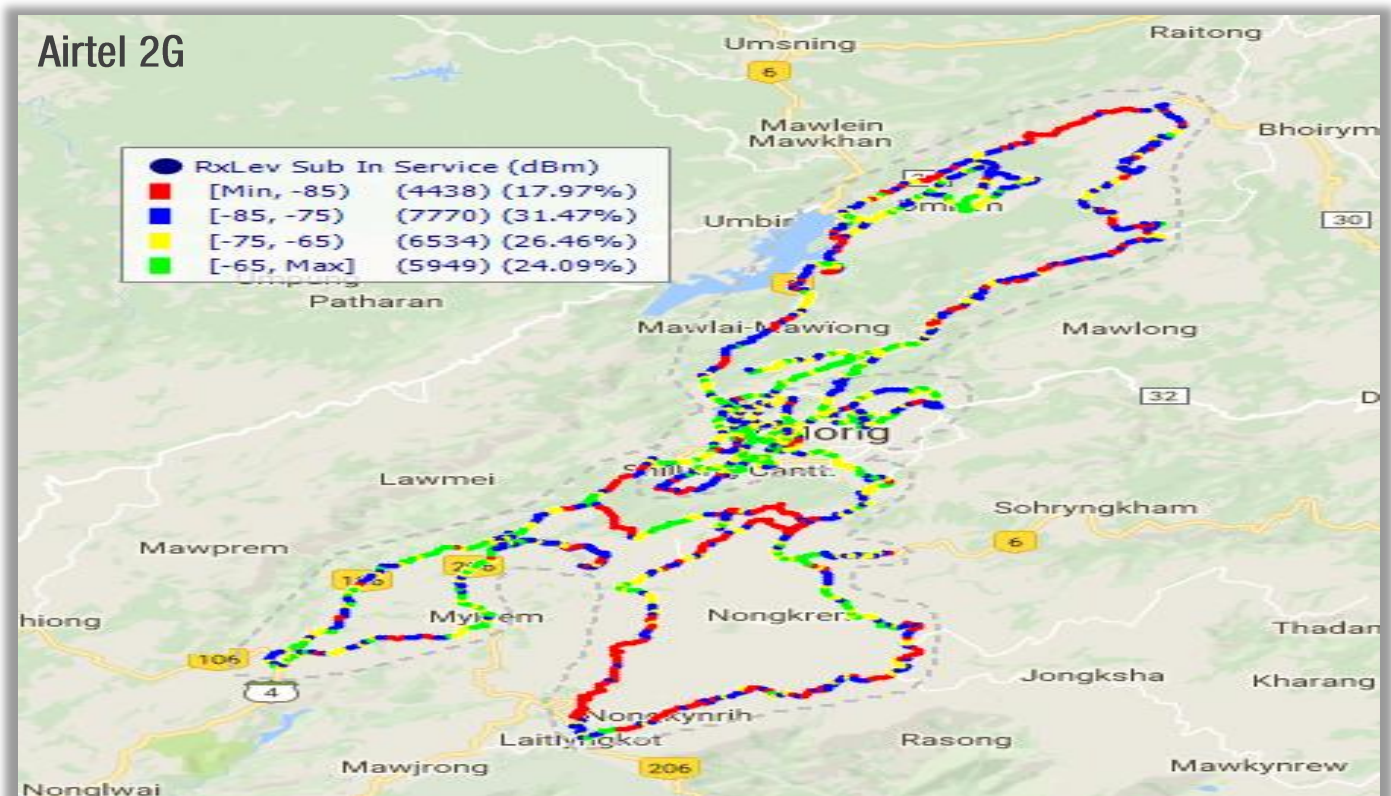
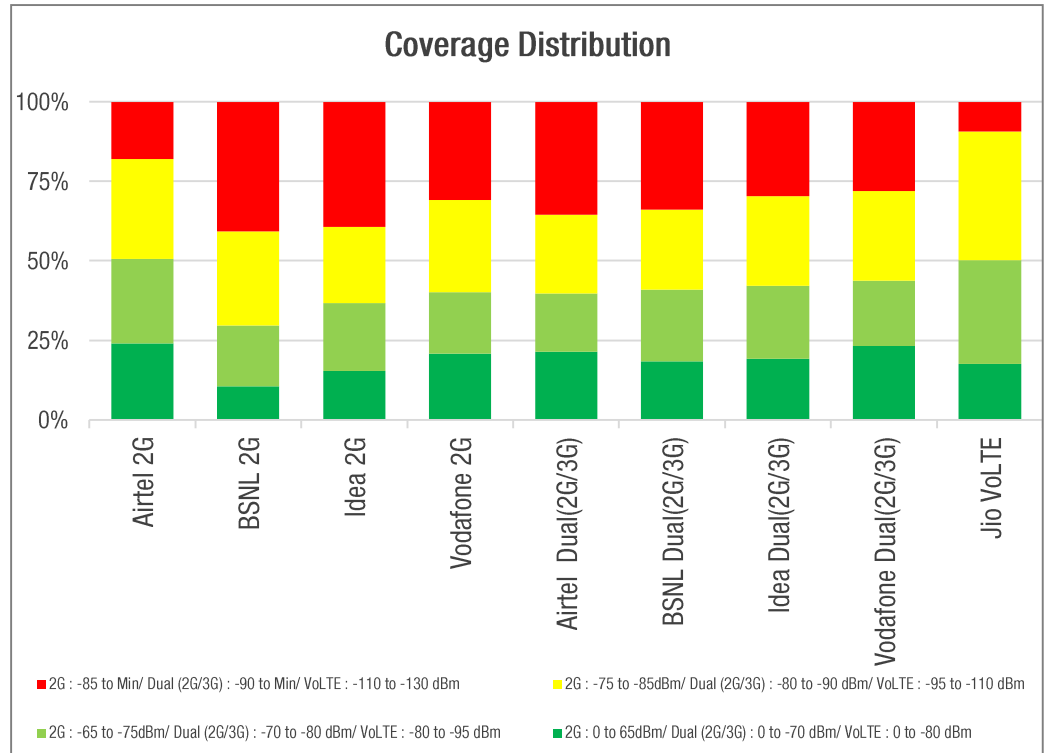
High Court	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	84.7	41.6	148.3
Upload Throughput (kbps)	-	96.4	109.8	159.4
Web Browsing Delay (sec)	-	19.1	23.0	46.8
Latency (msec)	-	427	442	302

High Court	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.0	0.2	0.1	0.2	2.6	1.1	2.3	2.3
Upload Throughput (Mbps)	0.9	0.2	2.1	2.4	1.6	5.3	3.4	9.8
Web Browsing Delay (sec)	14.3	22.7	14.3	17.6	10.3	9.0	8.7	9.9
Video Streaming Delay (sec)	-	13.3	1.2	4.0	4.6	1.9	8.4	1.6
Latency (msec)	285	205	161	174	187	121	194	121

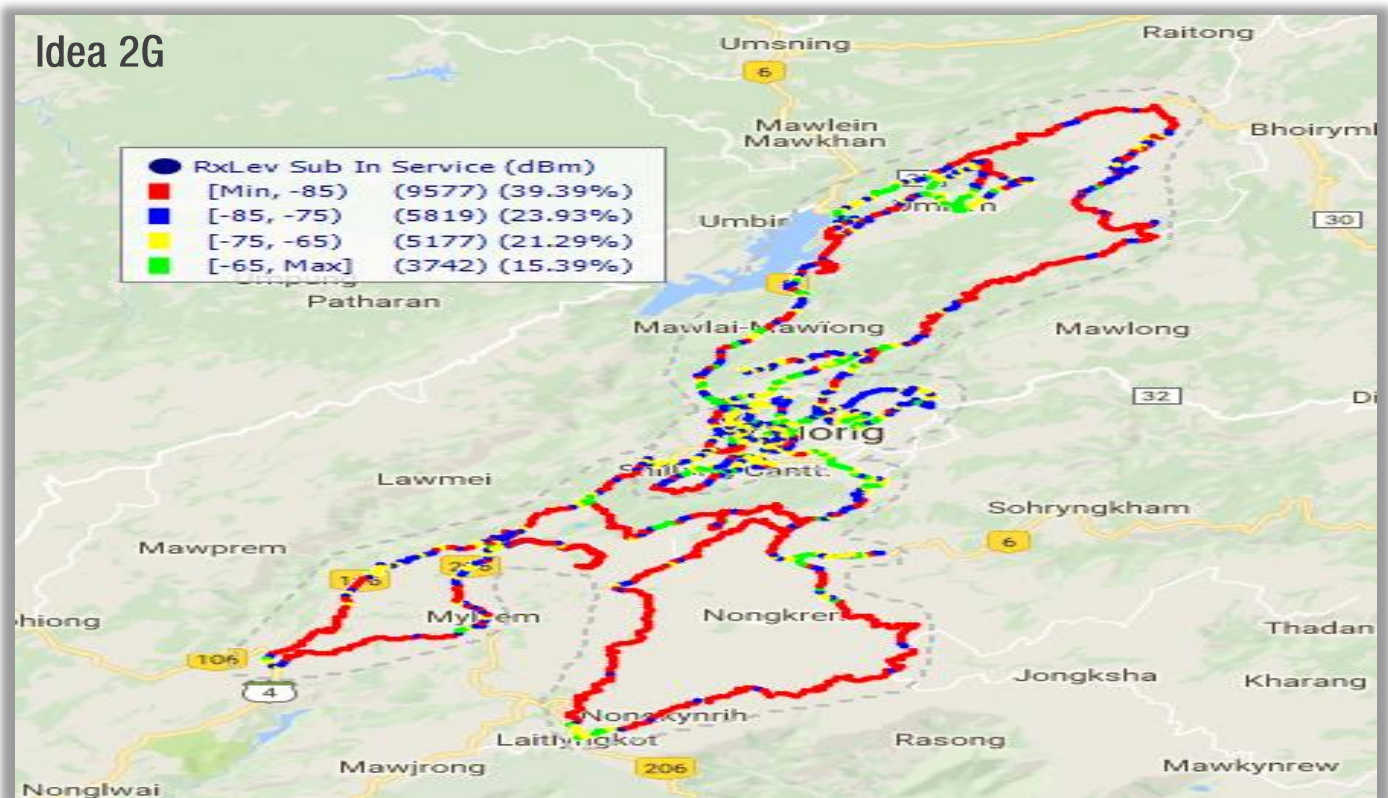
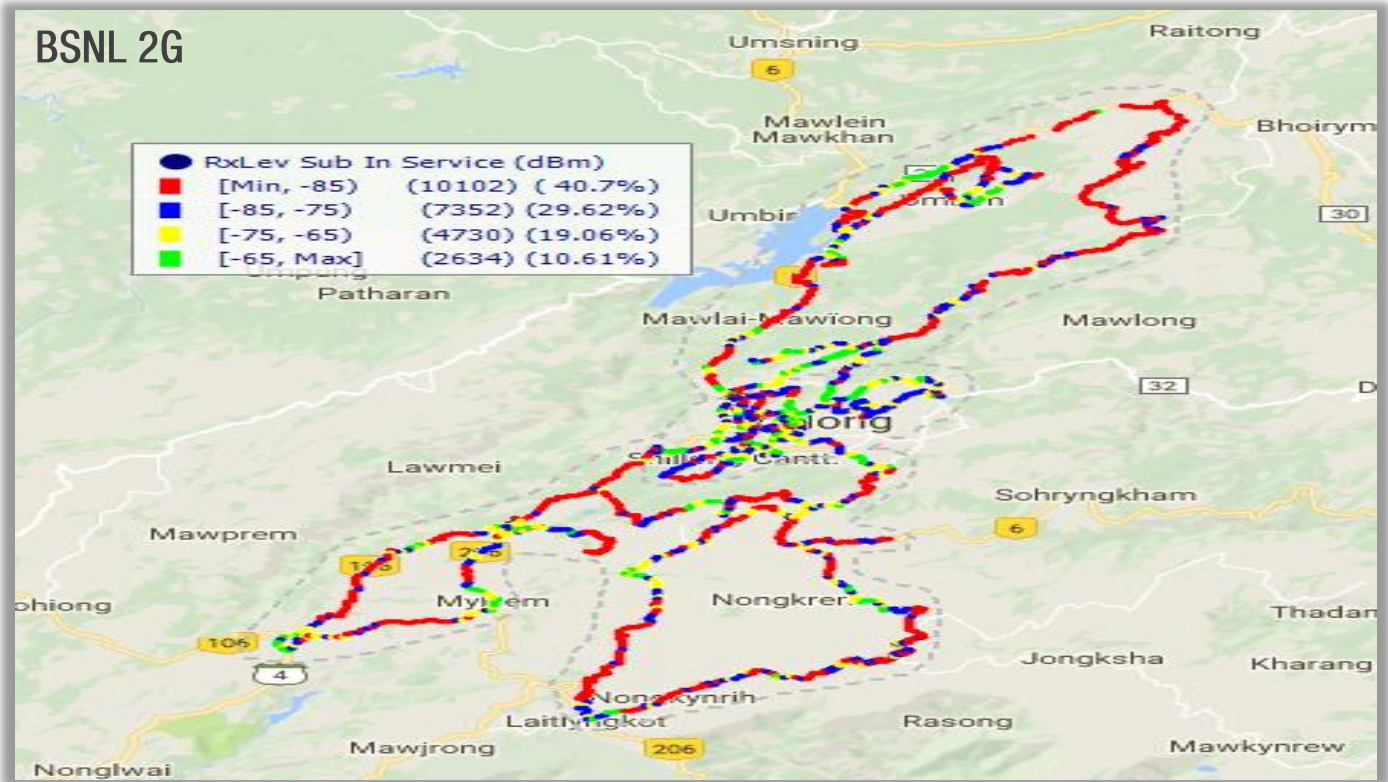
# I. Coverage Details

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call/data session. The Coverage rate of an TSP 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.

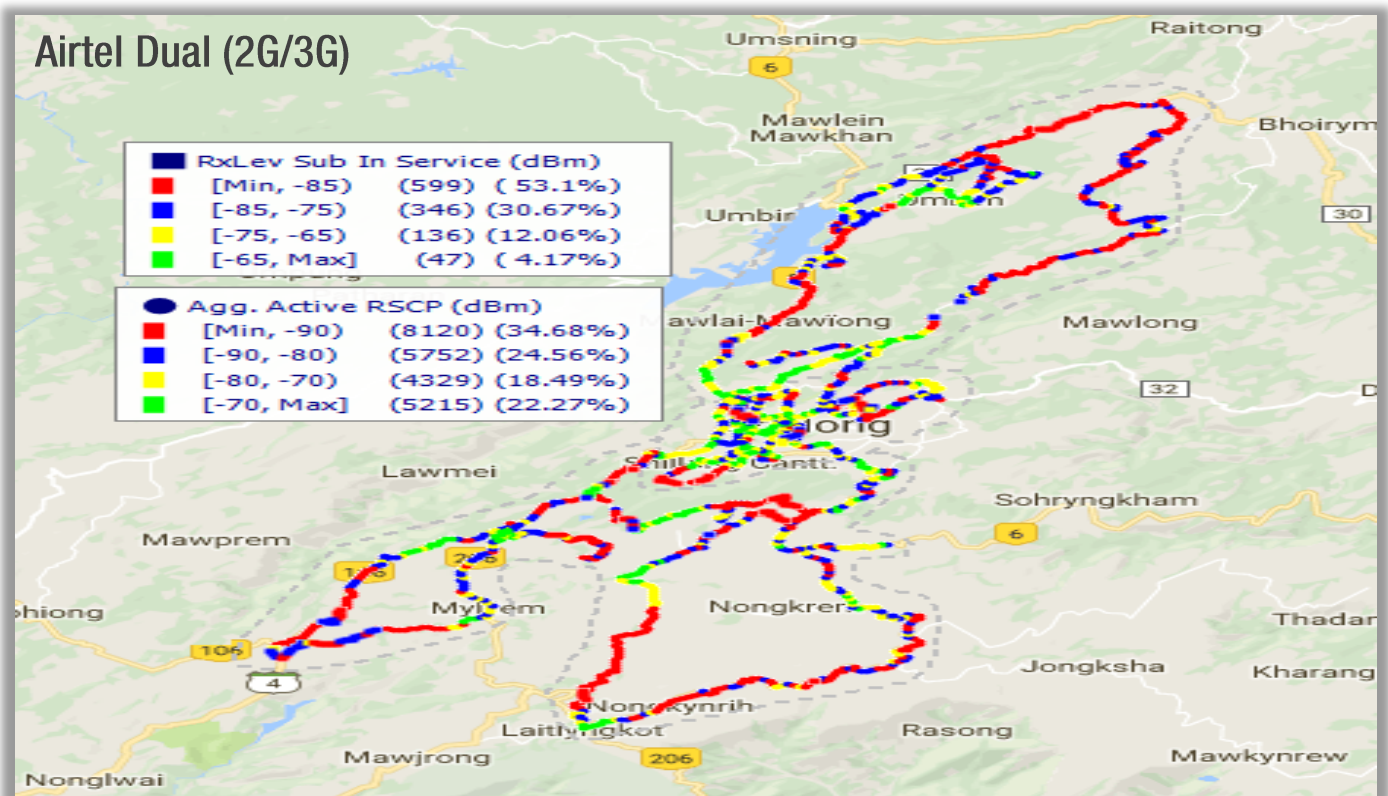
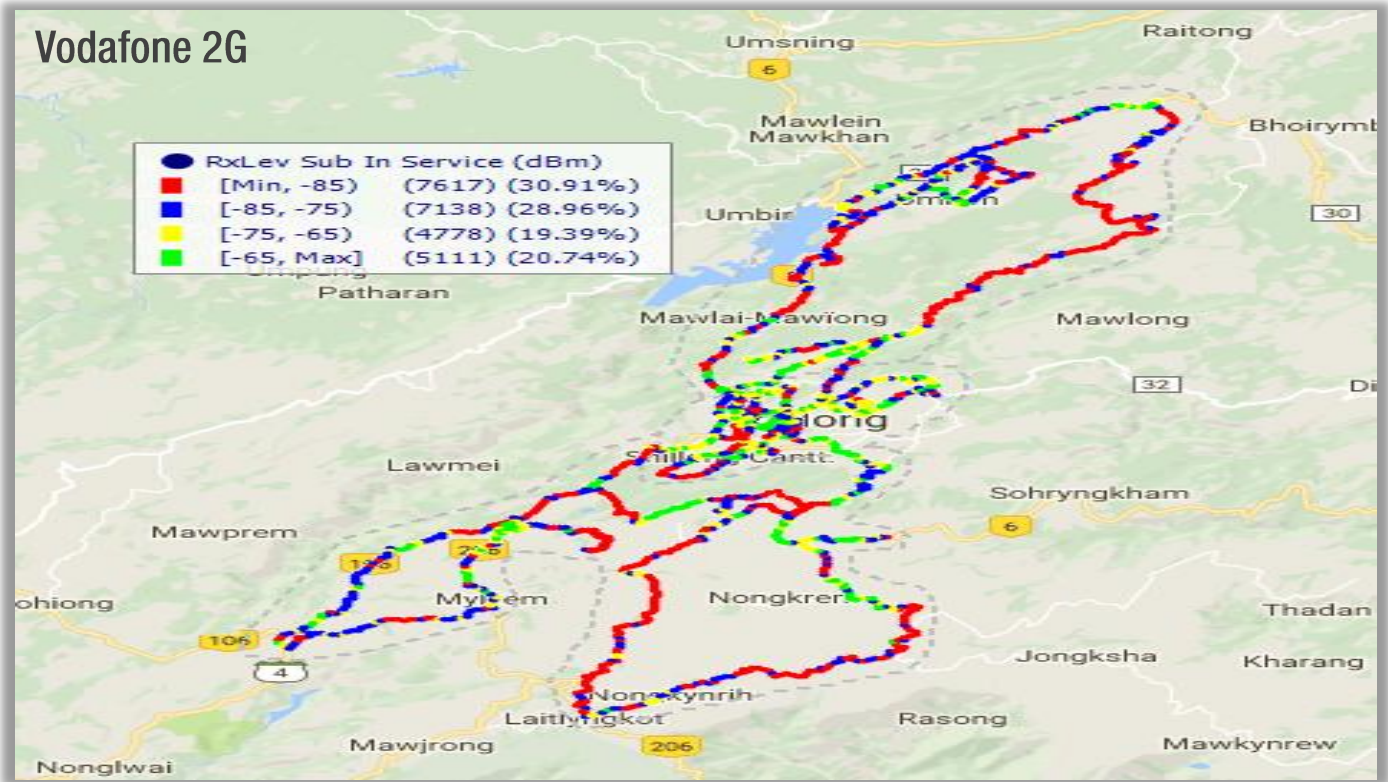
TSP	Coverage Rate
Airtel 2G	82.03%
BSNL 2G	59.30%
Idea 2G	60.61%
Vodafone 2G	69.09%
Airtel Dual(2G/3G)	64.48%
BSNL Dual(2G/3G)	66.11%
Idea Dual(2G/3G)	70.29%
Vodafone Dual(2G/3G)	71.90%
Jio VoLTE	90.64%



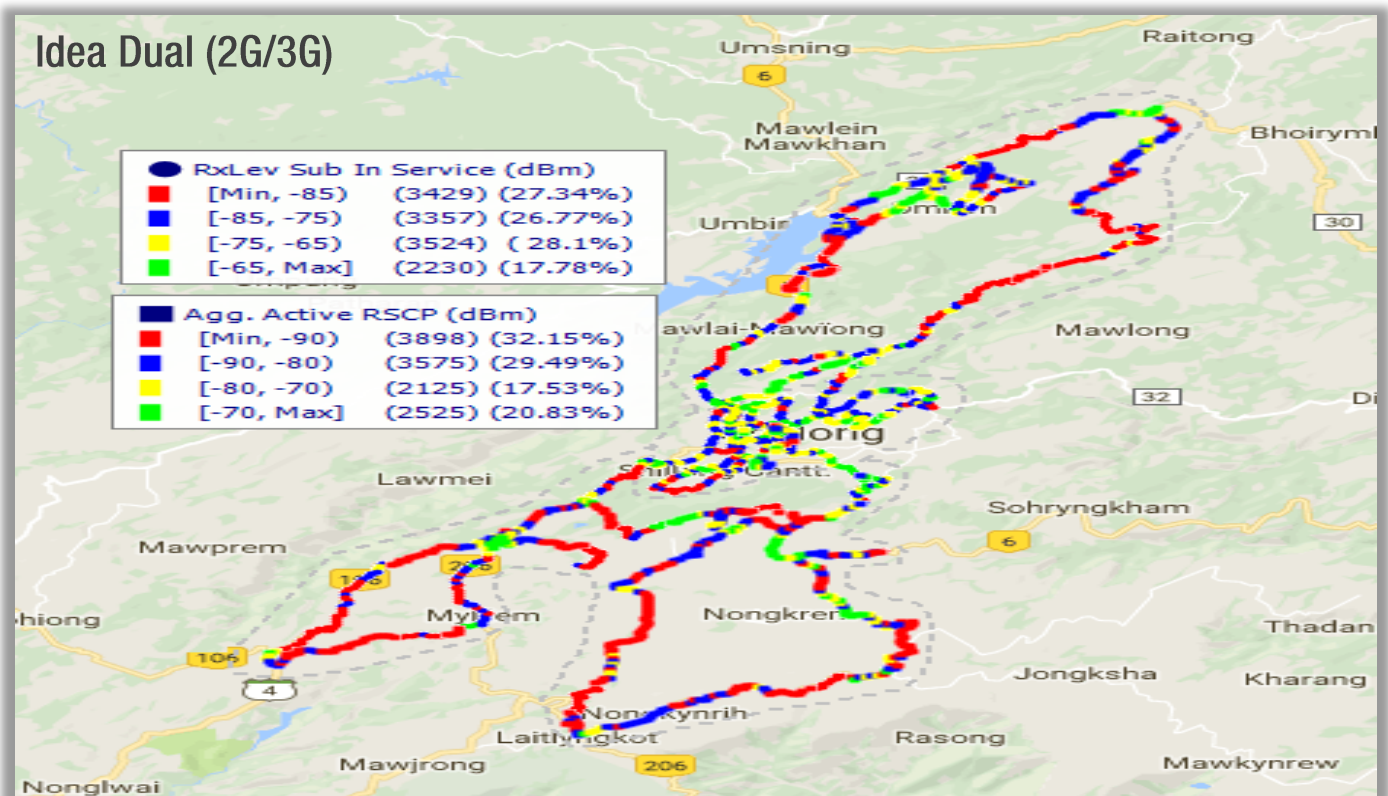
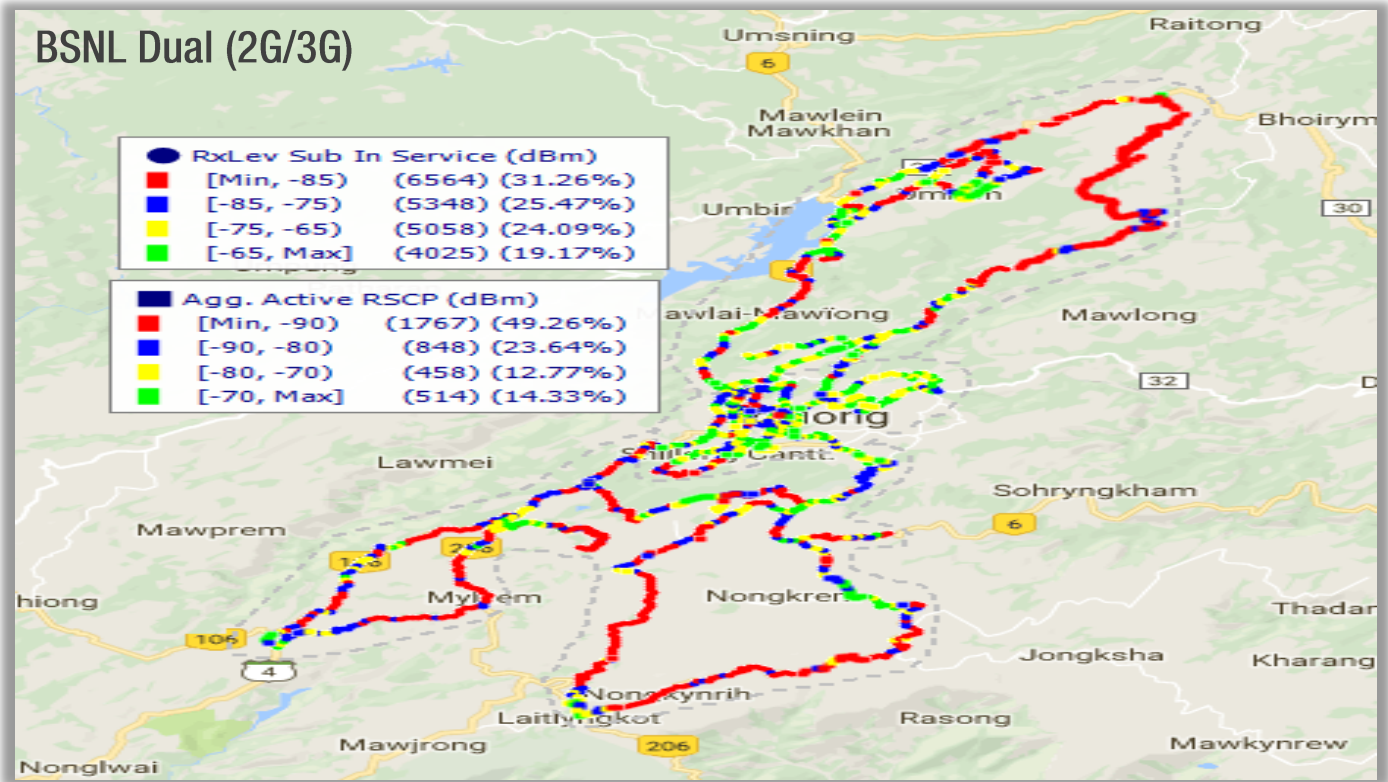
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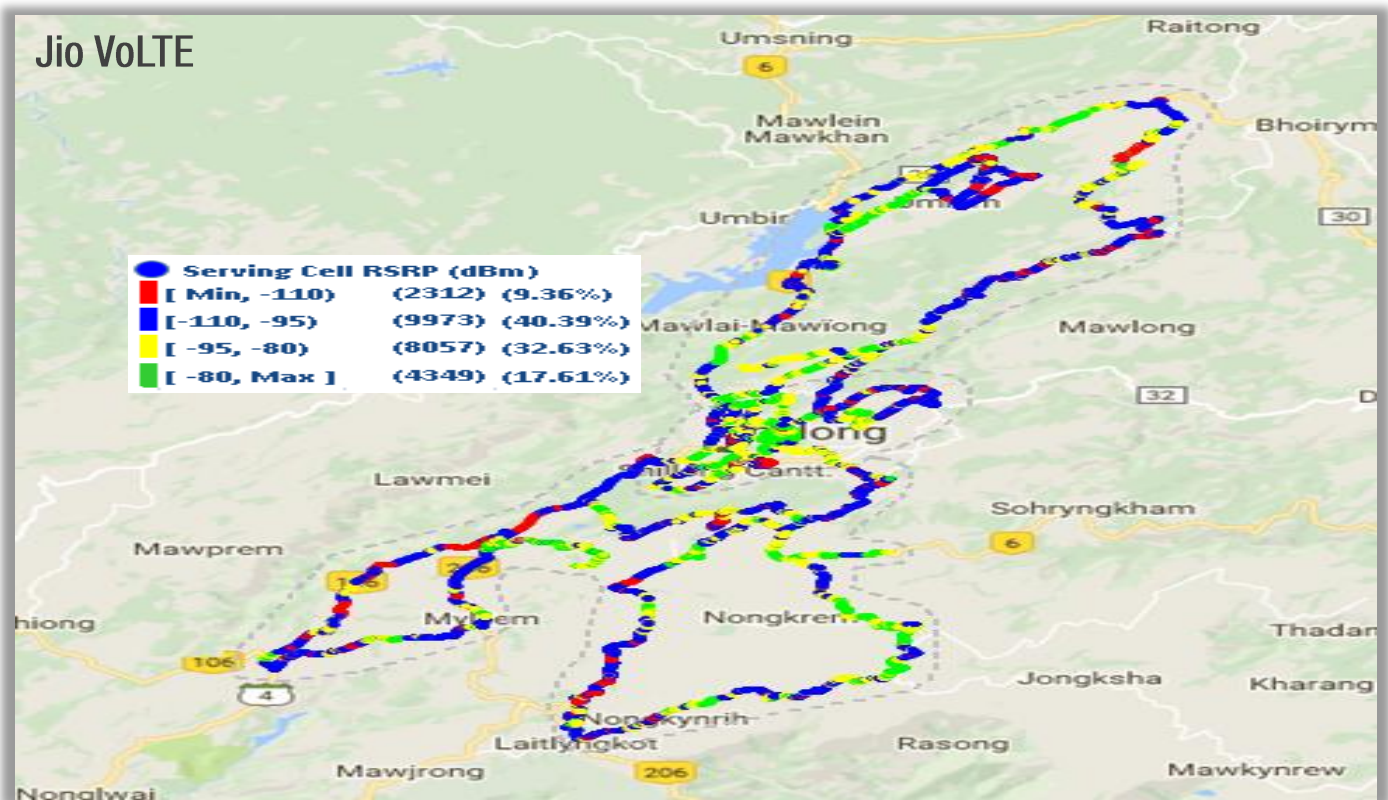
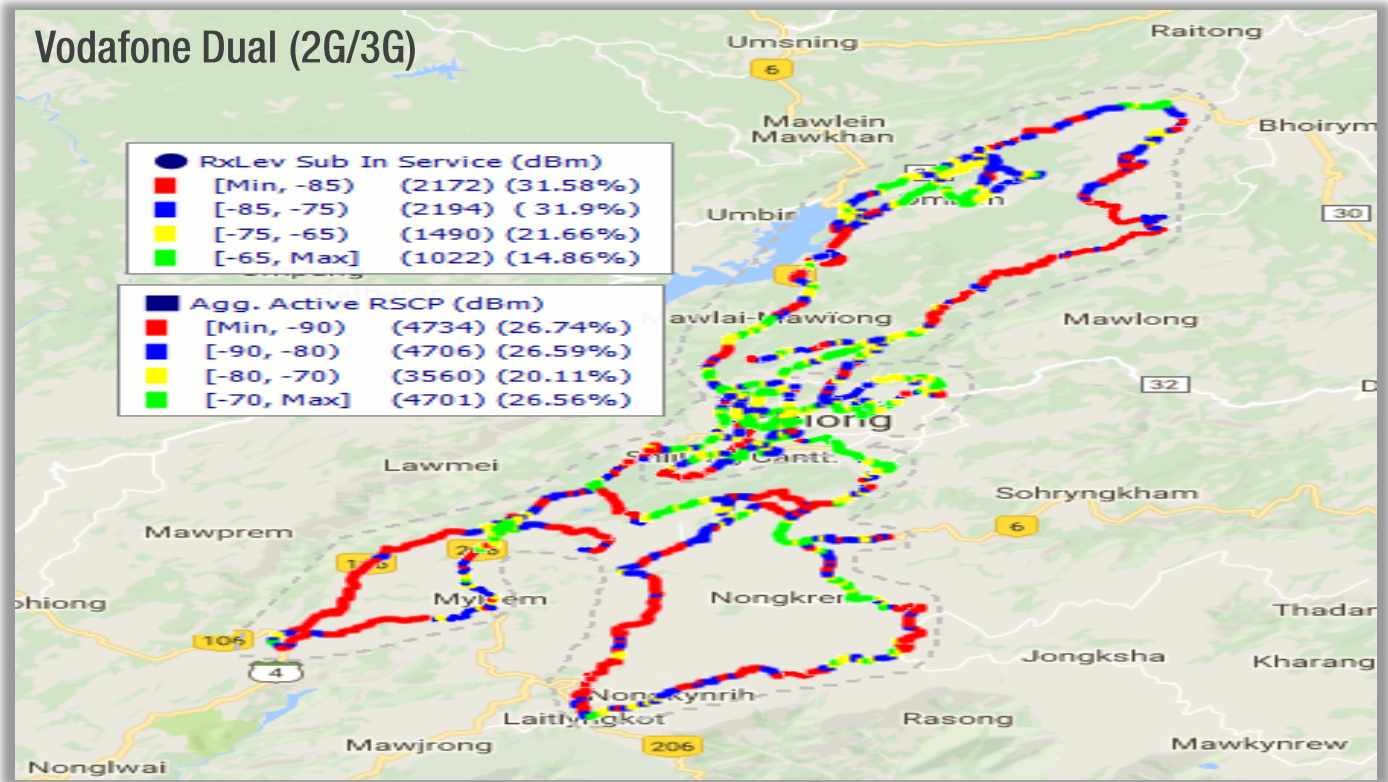
# I. Coverage Details (contd.)



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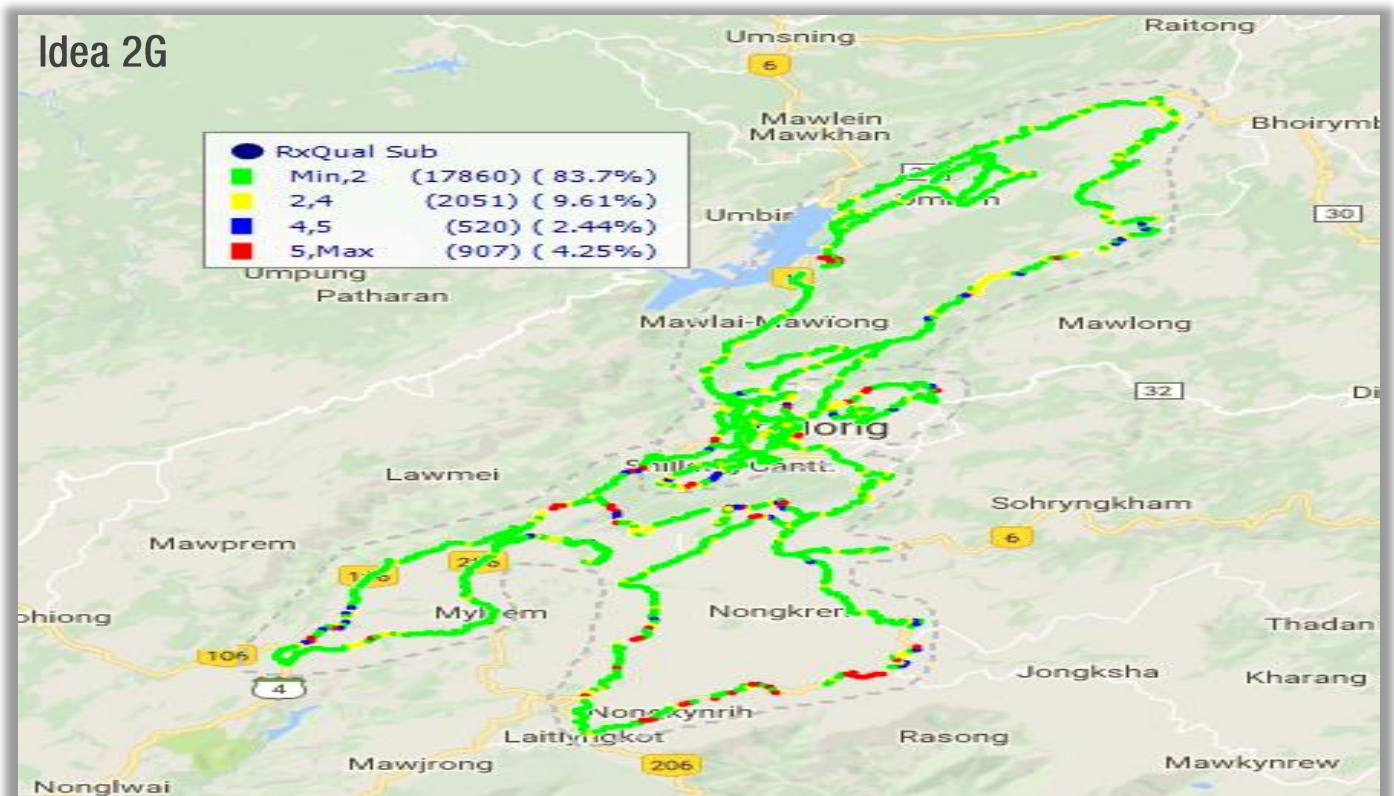
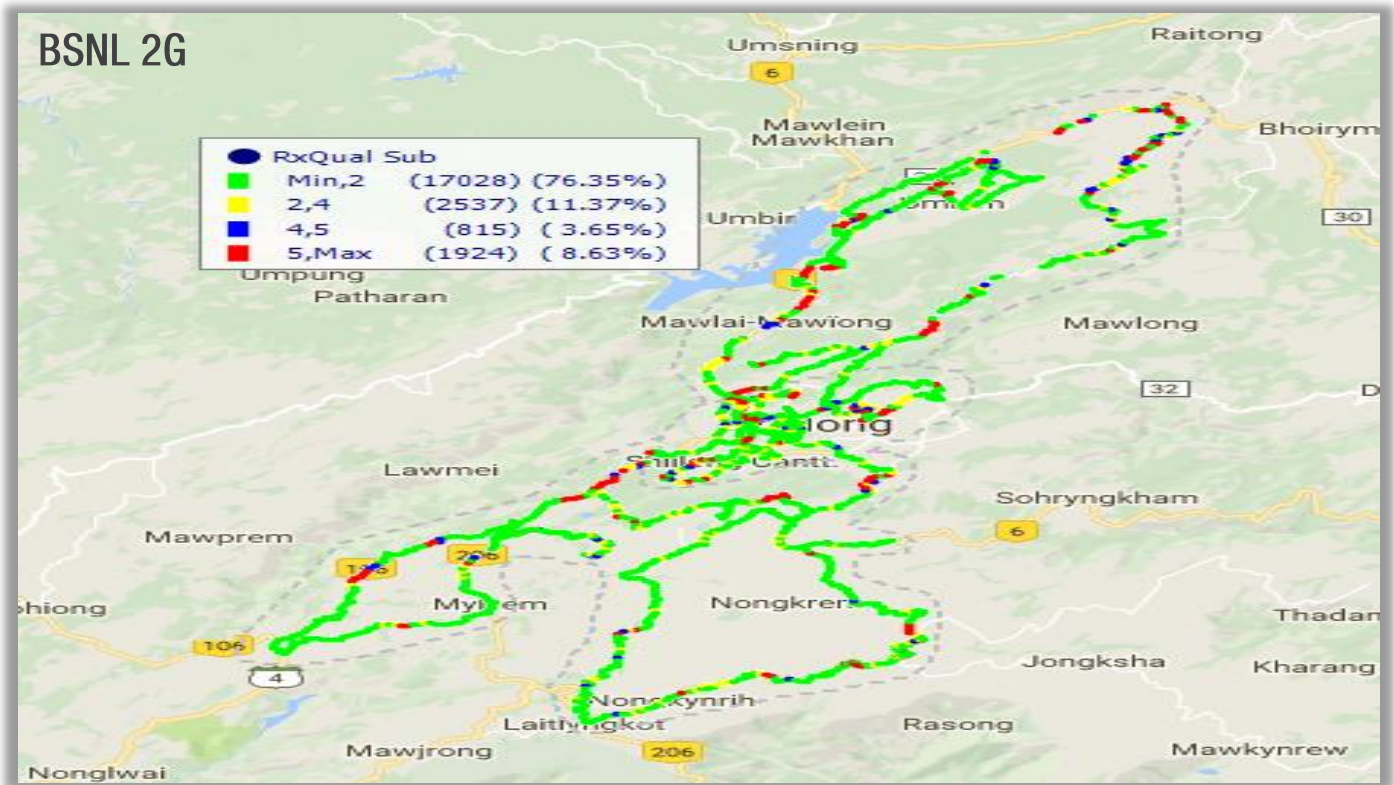
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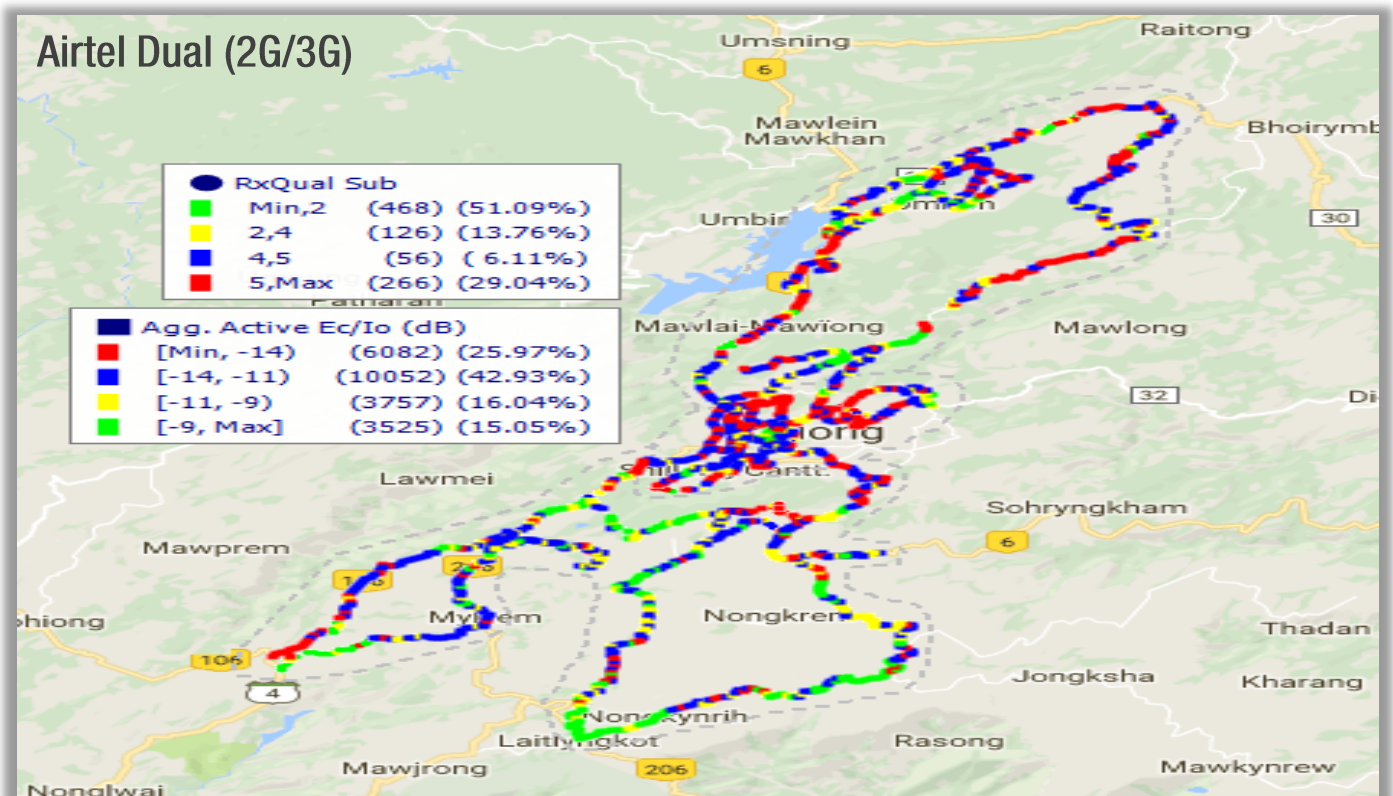
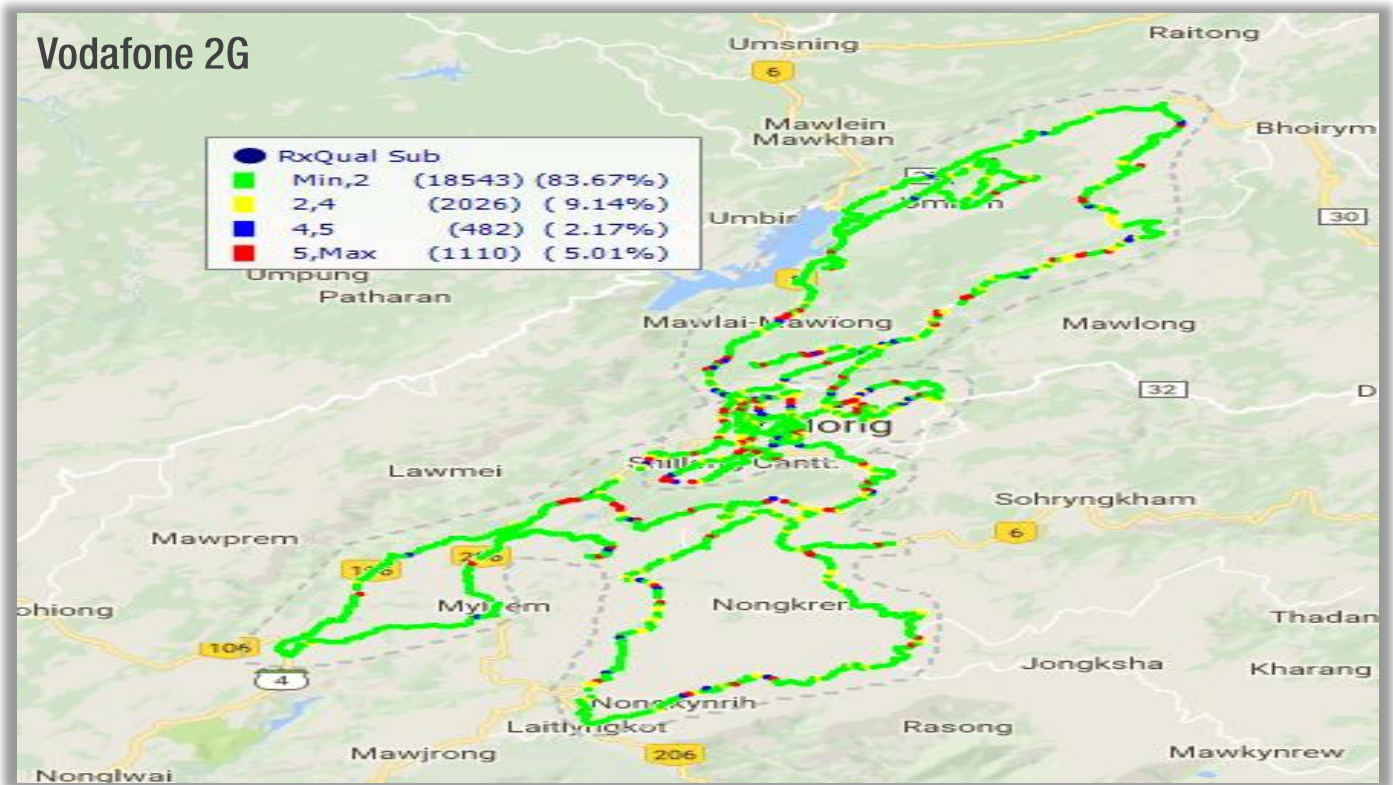




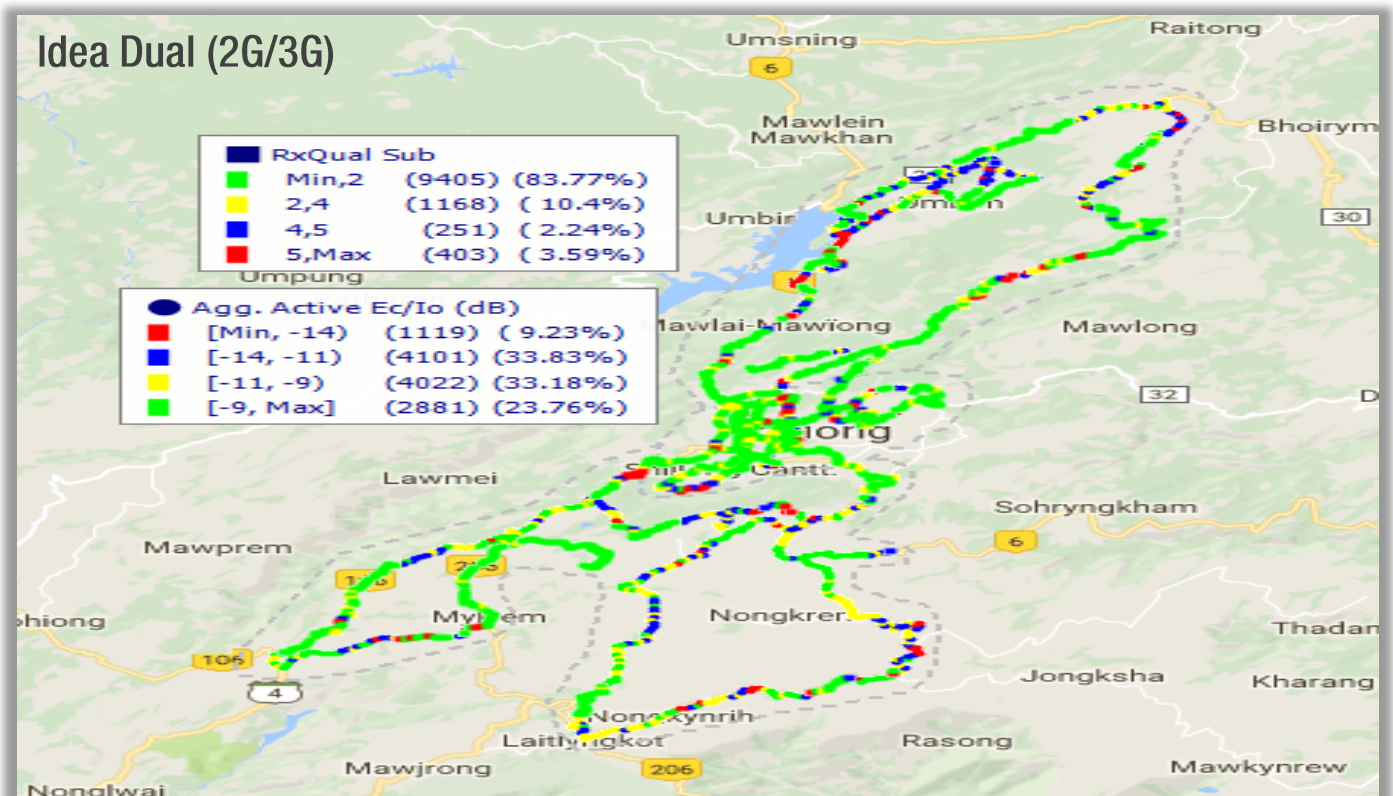
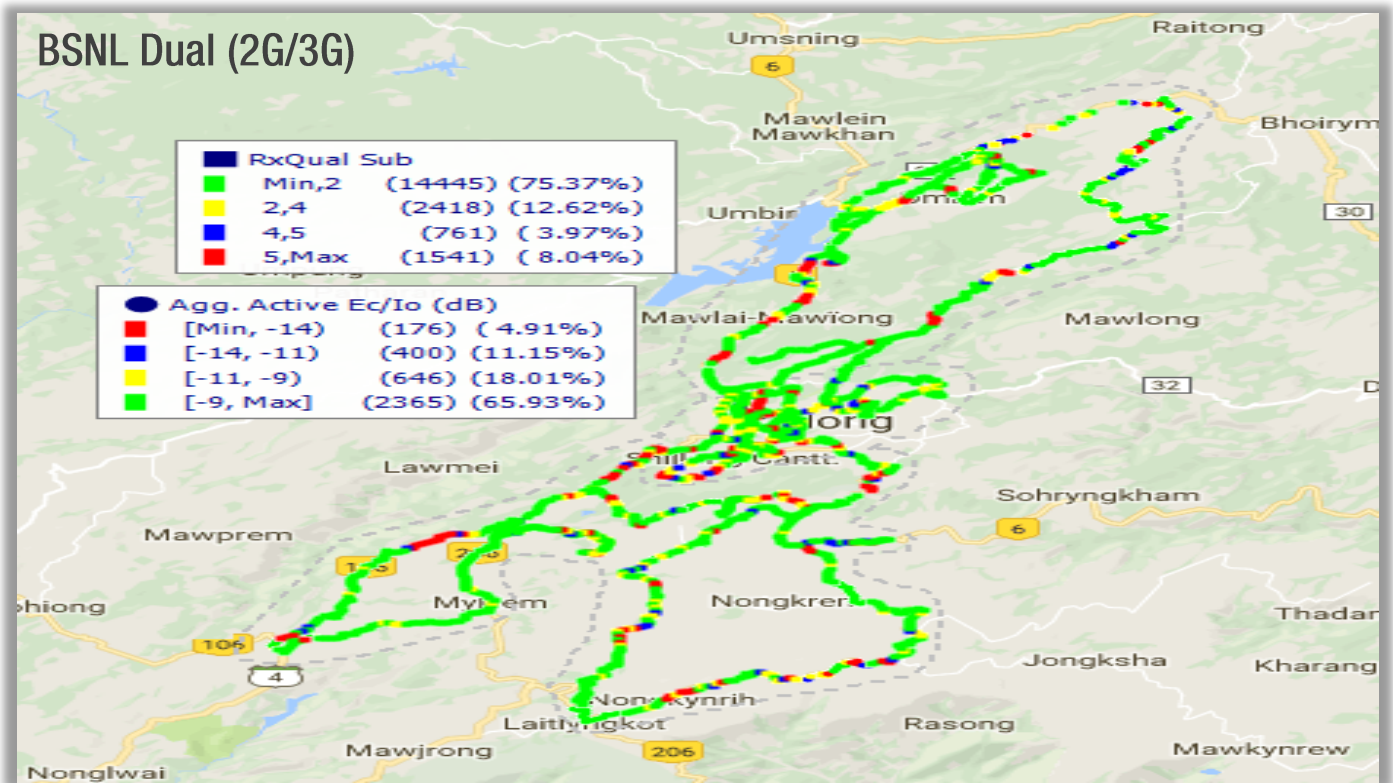
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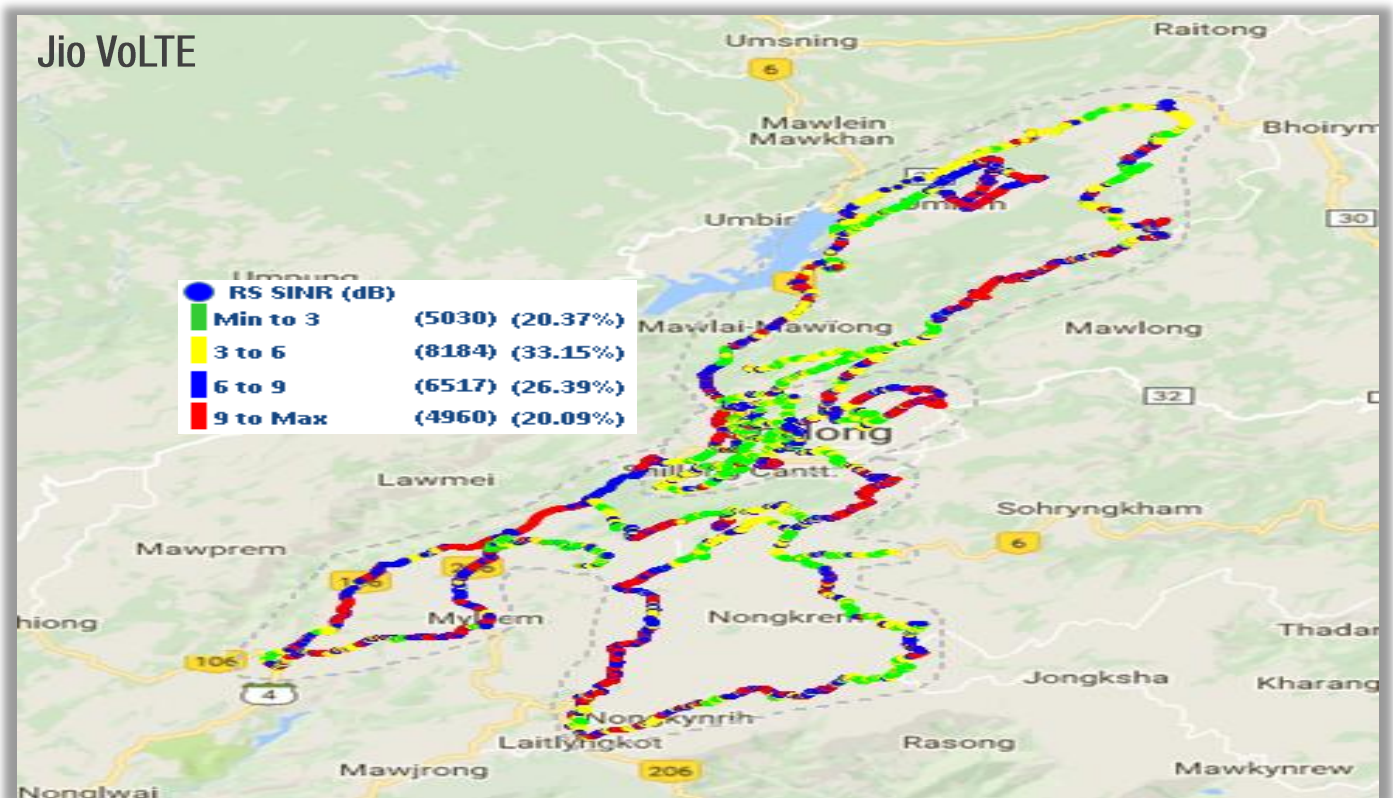
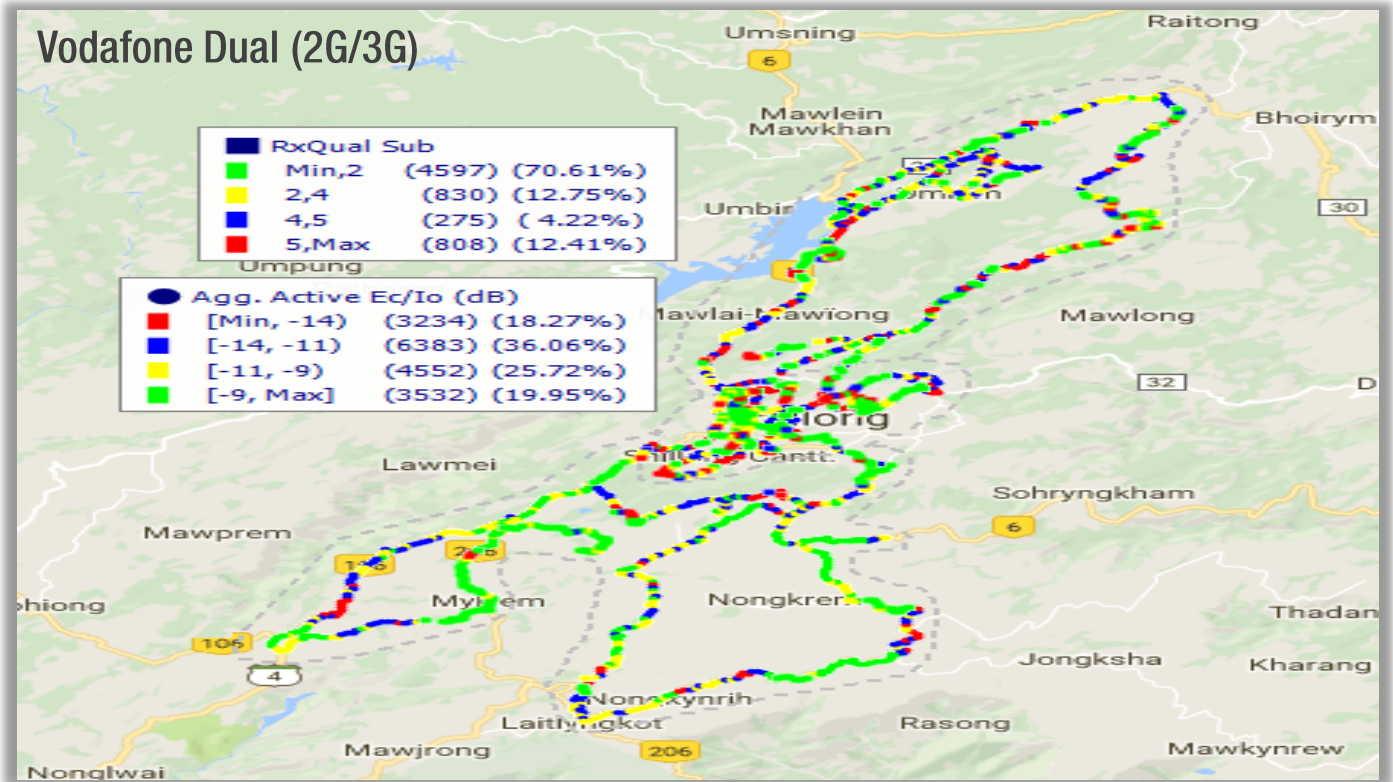
## II. Quality Details (contd.)



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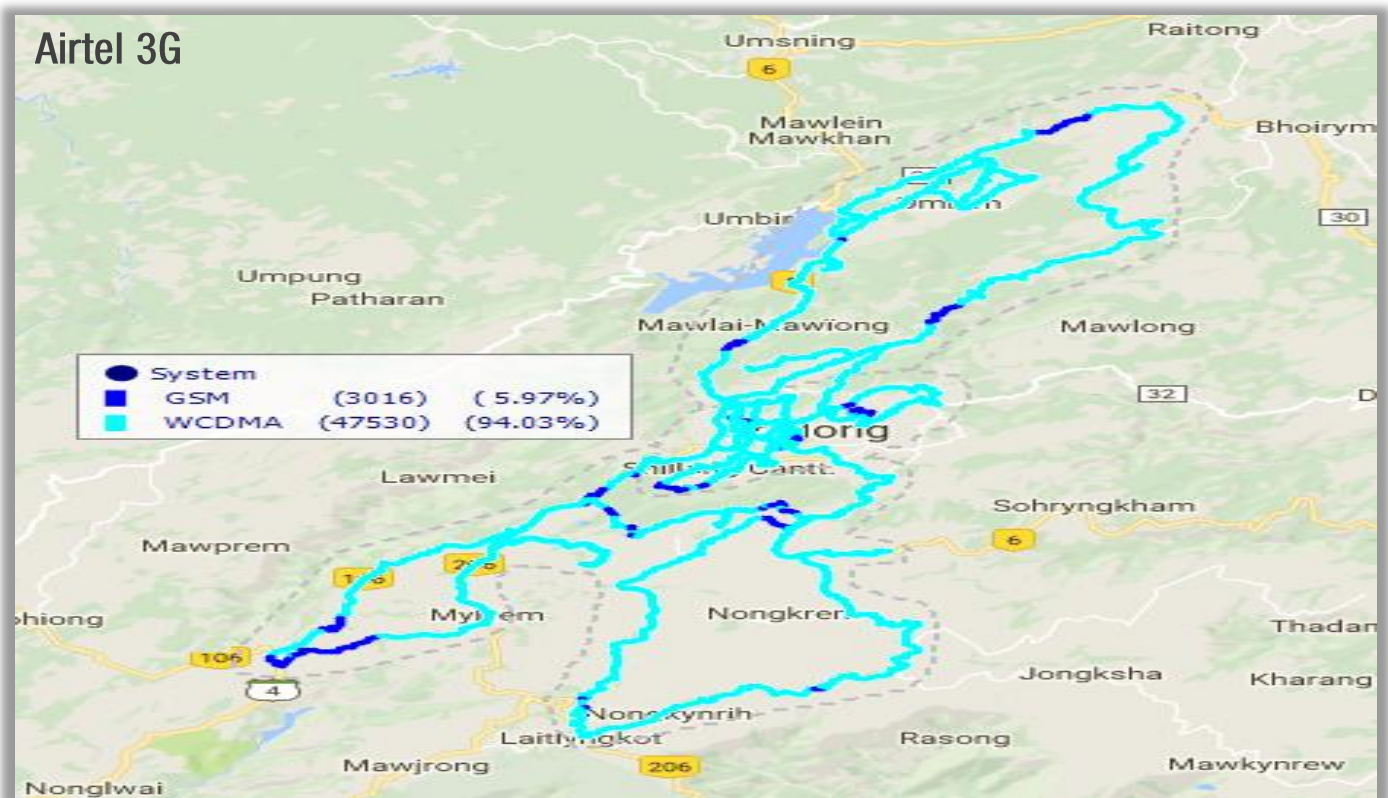
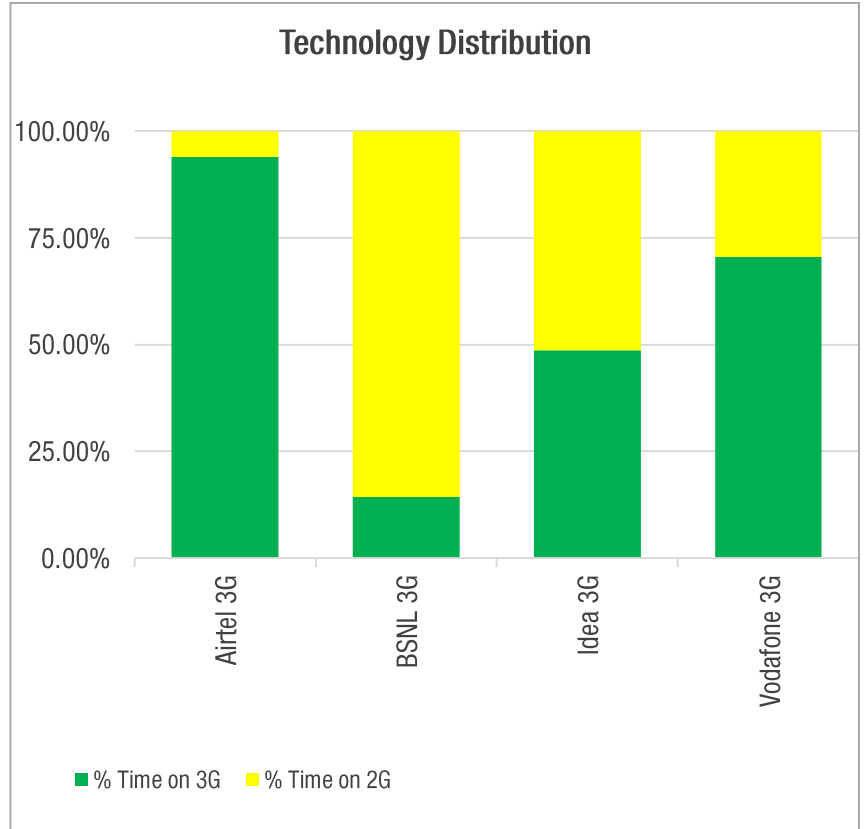


## II. Quality Details (contd.)



### III. Technology Details

TSP	% Time on 3G
Airtel 3G	94.03%
BSNL3G	14.33%
Idea 3G	48.71%
Vodafone 3G	70.60%



### III. Technology Details(contd.)

