



INDEPENDENT DRIVE TEST REPORT

For

Chennai to Vijayawada Railway

2019

MAY

SOUTH ZONE

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2% except Airtel VoLTE. All TSPs have met the Call Setup Success Rate (CSSR) of 95%.

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Chennai to Vijayawada Railway Route from 07:30 AM to 03:00 PM; 9th May 2019. The drive test covered an drive route of 433 KMs over a period of one day. Approximately 215 calls were made for each of the 9 networks: four 2G networks, three 3G networks and two LTE network covering 5 unique TSPs.

Overview

Voice 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. on 9th May 2019 covering various locations in Chennai to Vijayawada Railway Route. The performance of Airtel, BSNL, Tata, Jio and Vodafone Idea Limited (VIL(Idea)) 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; areas where previous Drive tests showed network issues; etc.

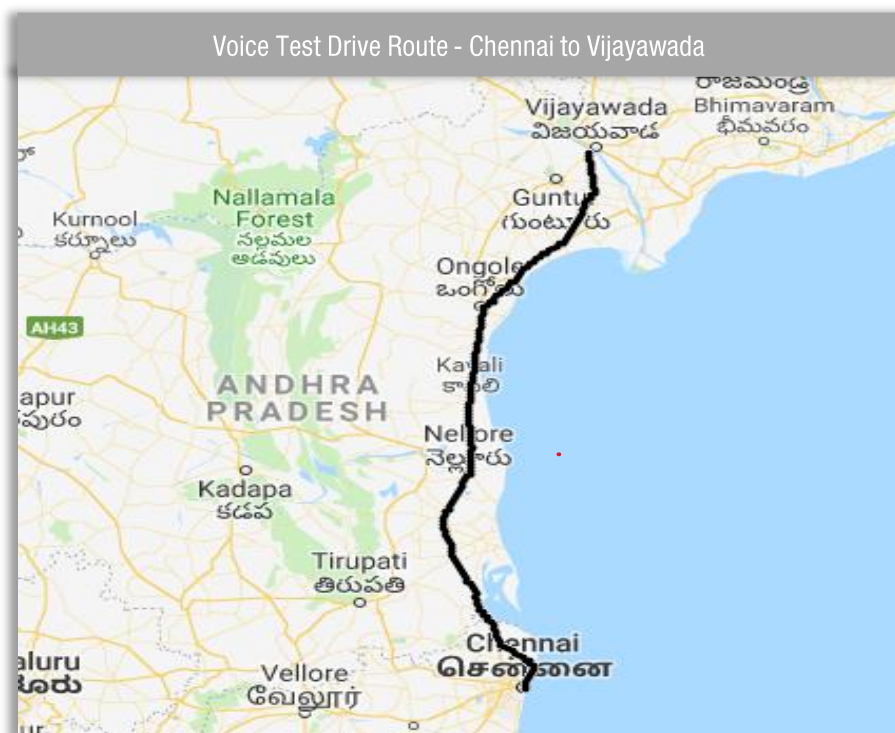
The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services in terms of **Voice:** Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Drive Test Details For Chennai to Vijayawada Railway Route:

Independent Drive test was conducted for a period of one day on 9th May 2019 in Chennai to Vijayawada Railway Route from 07:30 AM to 03:00 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 433 KMs over a period of one day on 9th May 2019 . Approximately 215 calls were made for each of the 9 networks: four 2G (Lock Mode) networks, three 3G (Dual mode) networks and two VoLTE network covering 5 unique TSPs.

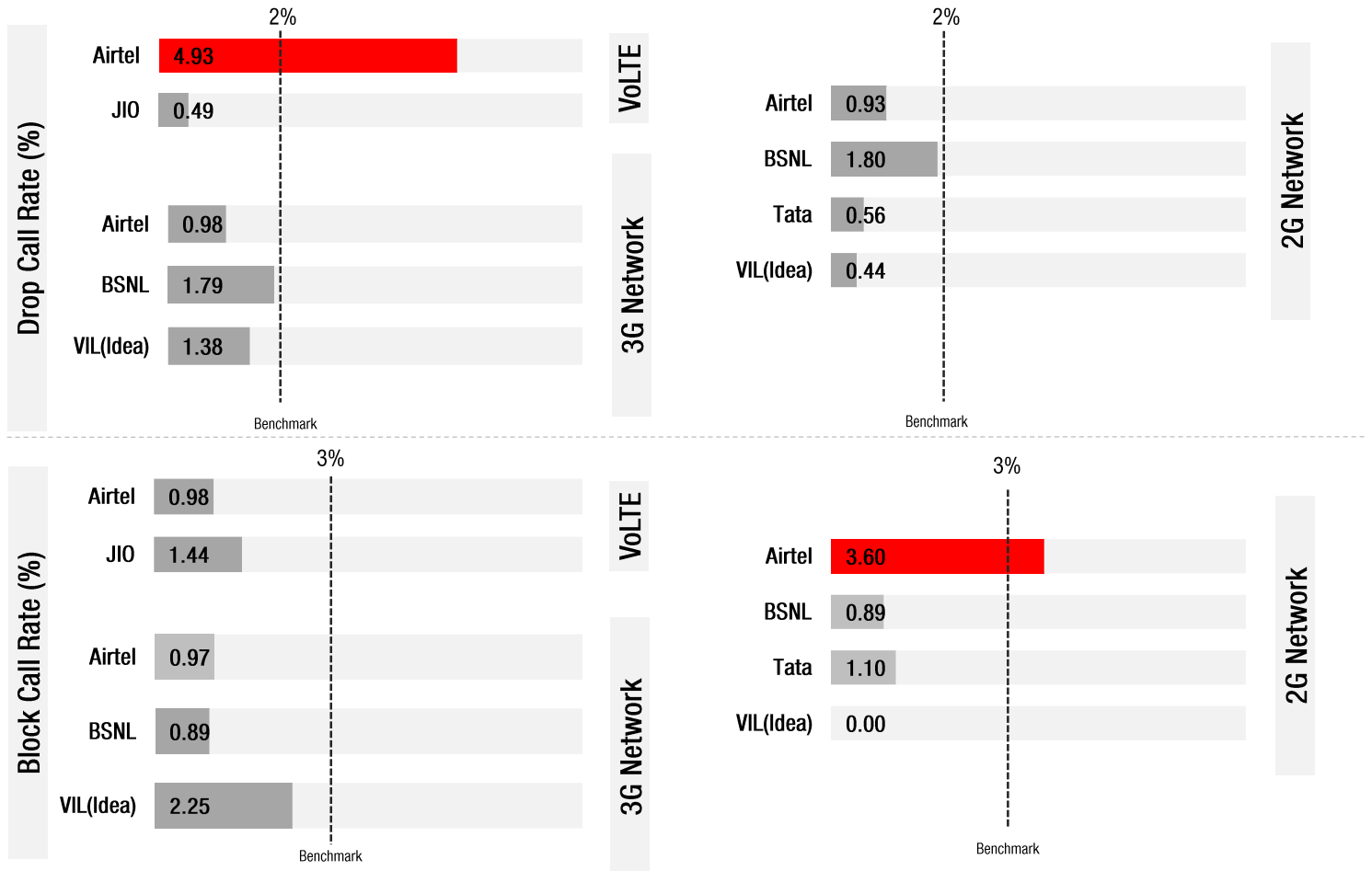
* In case of multiple call failure in similar geo location in given period of 60secs has been counted as one call failure



Voice Calls

Key Observations

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



| KPI | 2G Networks | | | |
|------------------------|-------------|-------|-------|---------------------------|
| | Airtel | BSNL | Tata | Vodafone Idea Ltd Idea |
| SDCCH Congestion(<=1%) | 2.70% | 0.44% | 0.55% | 0.00% |
| TCH Congestion (<=2%) | 0.90% | 0.45% | 0.55% | 0.00% |

| KPI | 3G Networks | | |
|------------------------------|-------------|-------|---------------------------|
| | Airtel | BSNL | Vodafone Idea Ltd Idea |
| CSFB Failure % | 0.00% | NA | 0.45% |
| SDCCH Congestion% | 0.49% | 0.00% | 0.45% |
| RRC Congestion% | 0.00% | 0.45% | 0.90% |
| SDCCH & RRC Congestion(<=1%) | 0.49% | 0.45% | 1.35% |
| TCH Congestion % | 0.00% | 0.00% | 0.00% |
| RAB Congestion % | 0.48% | 0.44% | 0.45% |
| TCH & RAB Congestion (<=2%) | 0.48% | 0.44% | 0.45% |

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

*NA = Not Applicable Not meeting Benchmark

Voice Calls

Key Observations

Coverage

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

| TSPs | 2G | | | |
|-----------|--------|--------|--------|-----------|
| | Airtel | BSNL | Tata | VIL(Idea) |
| Coverage% | 62.04% | 83.11% | 64.50% | 77.73% |

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

| TSPs | 3G | | | VoLTE | |
|------------|--------|--------|-----------|--------|--------|
| | Airtel | BSNL | VIL(Idea) | Airtel | Jio |
| Coverage % | 61.32% | 81.63% | 76.82% | 88.00% | 95.41% |

c) Percentage of time spent on 3G network:

| TSPs | 3G | | |
|-------------------|--------|--------|-----------|
| | Airtel | BSNL | VIL(Idea) |
| Time Spent on 3G% | 46.99% | 33.72% | 40.21% |

d) Percentage of RLT \geq 48:

| TSPs | 2G | | | |
|----------------|--------|-------|-------|-----------|
| | Airtel | BSNL | Tata | VIL(Idea) |
| %RLT \geq 48 | 0.00% | 8.56% | 0.00% | 0.00% |

e) Average CST Second

| TSPs | 2G | | | |
|--------|--------|------|------|-----------|
| | Airtel | BSNL | Tata | VIL(Idea) |
| Second | 2.52 | 2.53 | 2.77 | 2.65 |

| TSPs | 3G | | | VOLTE | |
|--------|--------|------|-----------|--------|------|
| | Airtel | BSNL | VIL(Idea) | Airtel | Jio |
| Second | 4.5 | 2.75 | 3.69 | 3.63 | 0.67 |

Summary

City Level Summary

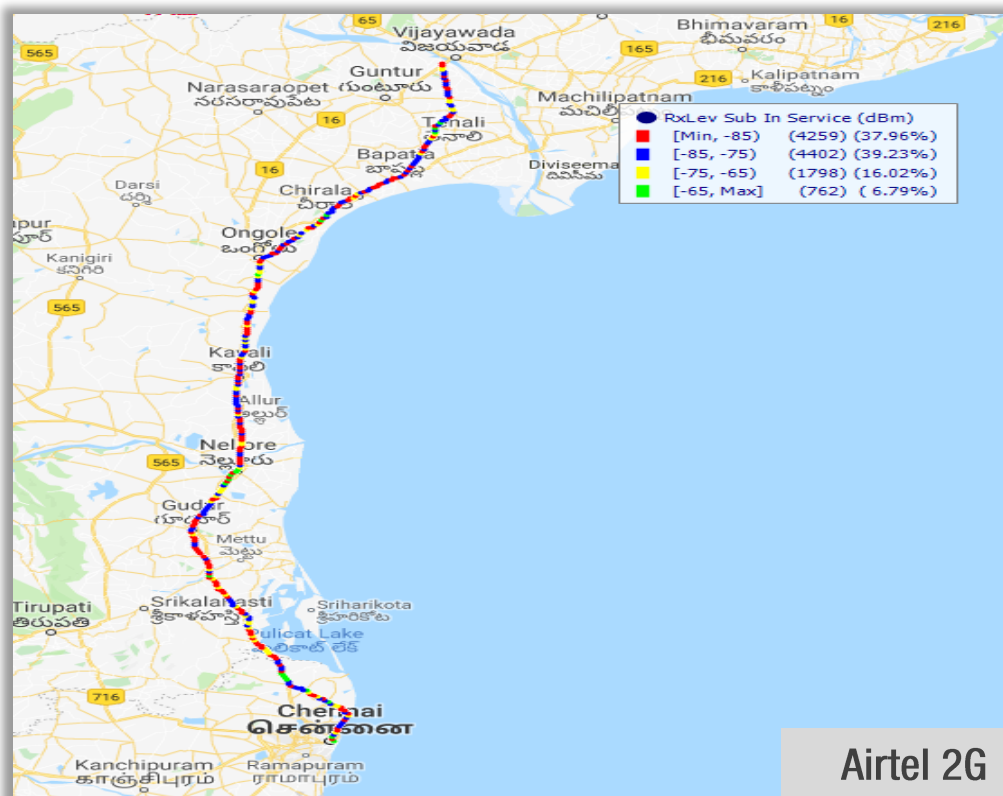
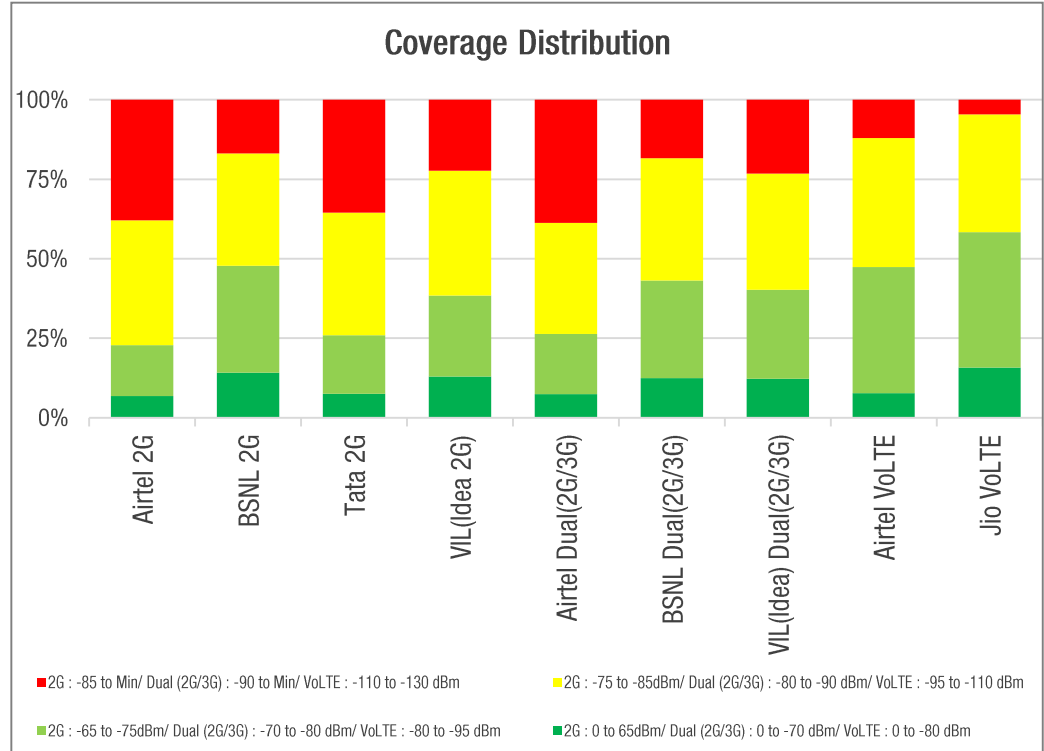
| Voice Call | 2G | | | |
|-----------------------|--------|--------|--------|-----------|
| | Airtel | BSNL | Tata | VIL(Idea) |
| Call Attempt | 222 | 224 | 182 | 228 |
| Blocked Call Rate (%) | 3.60% | 0.89% | 1.10% | 0.00% |
| CSSR% (Accessibility) | 96.40% | 99.11% | 98.90% | 100.00% |
| Drop Call Rate (%) | 0.93% | 1.80% | 0.56% | 0.44% |
| Mobility HOSR (%) | 97.51% | 97.60% | 99.08% | 97.81% |
| Rx Quality (%) | 91.08% | 95.95% | 94.43% | 94.74% |

| Voice Call | 3G | | | VoLTE | |
|-----------------------|--------|--------|-----------|--------|--------|
| | Airtel | BSNL | VIL(Idea) | Airtel | Jio |
| Call Attempt | 206 | 225 | 222 | 205 | 209 |
| Blocked Call Rate (%) | 0.97% | 0.89% | 2.25% | 0.98% | 1.44% |
| CSSR% (Accessibility) | 99.03% | 99.11% | 97.75% | 99.02% | 98.56% |
| Drop Call Rate (%) | 0.98% | 1.79% | 1.38% | 4.93% | 0.49% |
| Mobility HOSR (%) | 99.47% | 99.78% | 99.57% | 99.90% | 99.05% |
| Rx Quality (%) | 90.02% | 96.01% | 90.71% | 82.10% | 79.41% |

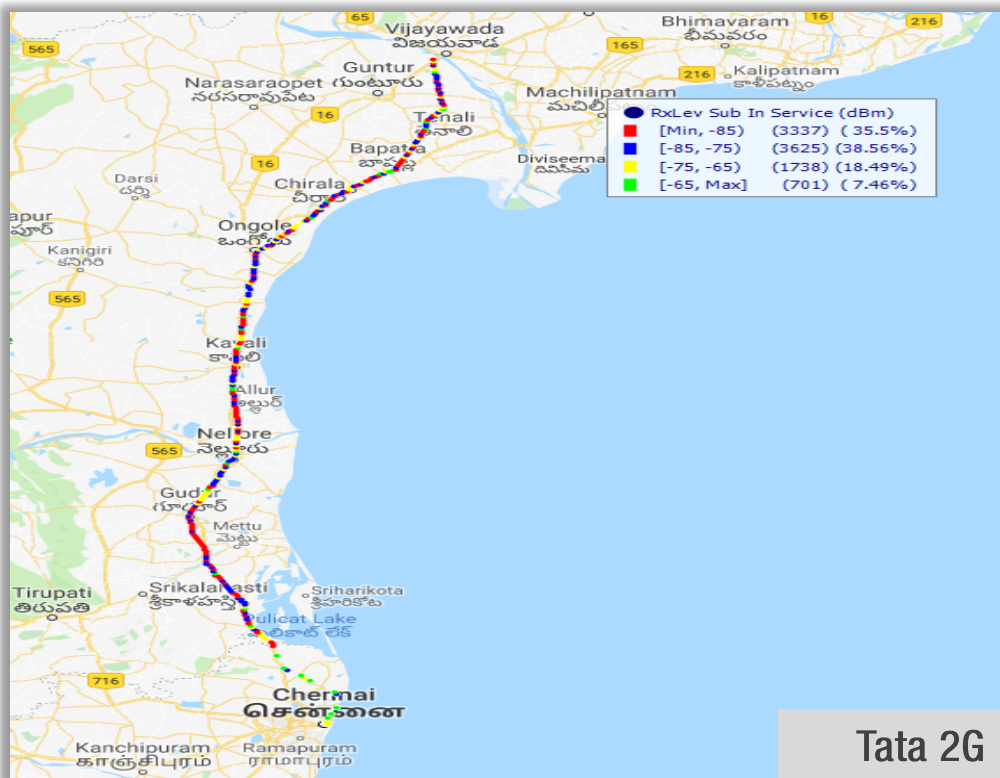
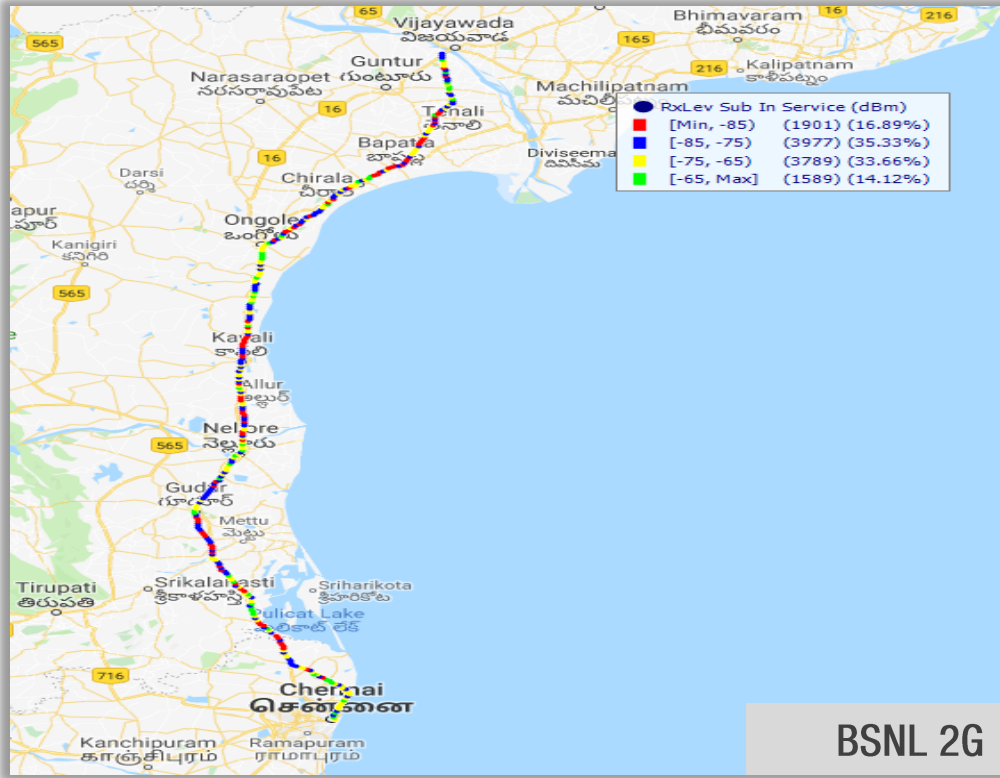
I. Coverage Details

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 ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110 dBm. The details are as follows.

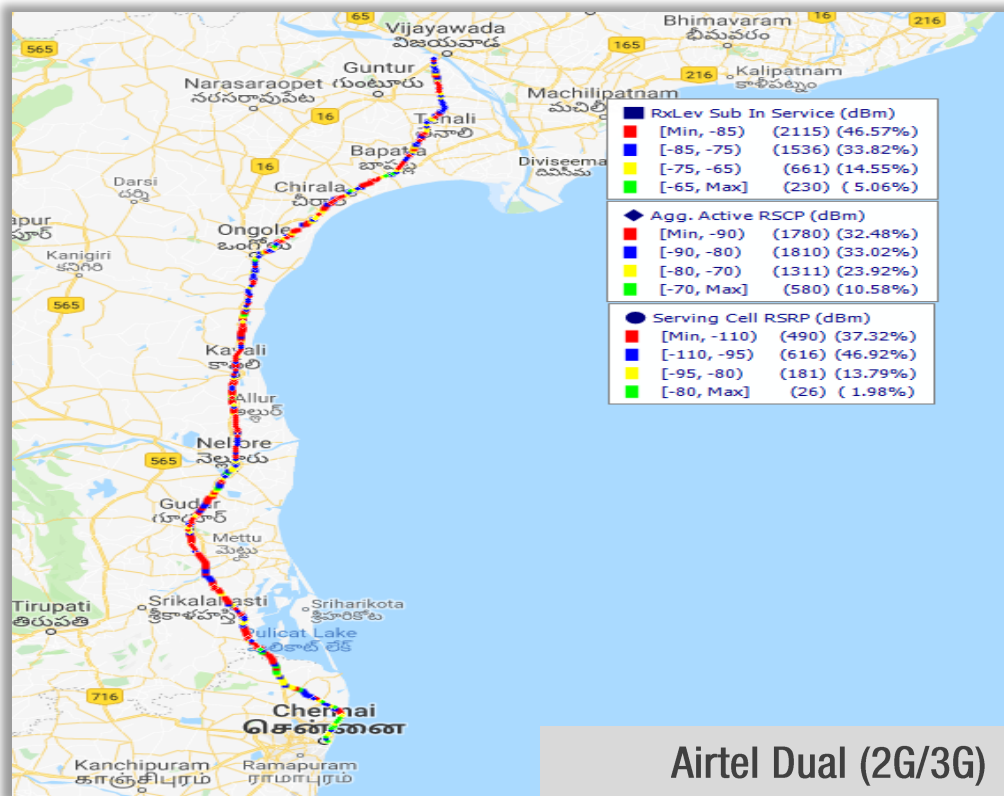
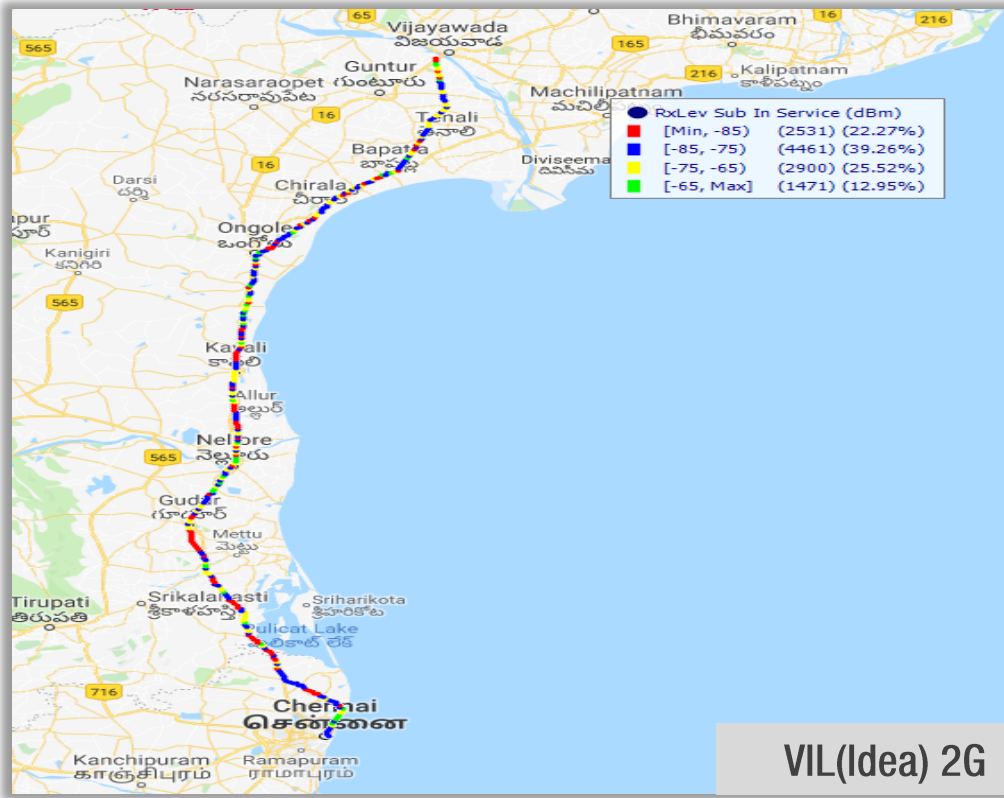
| TSP | Coverage Rate |
|-----------------------|---------------|
| Airtel 2G | 62.04% |
| BSNL 2G | 83.11% |
| Tata 2G | 64.50% |
| VIL(Idea) 2G | 77.73% |
| Airtel Dual(2G/3G) | 61.32% |
| BSNL Dual(2G/3G) | 81.63% |
| VIL(Idea) Dual(2G/3G) | 76.82% |
| Airtel VoLTE | 88.00% |
| Jio VoLTE | 95.41% |



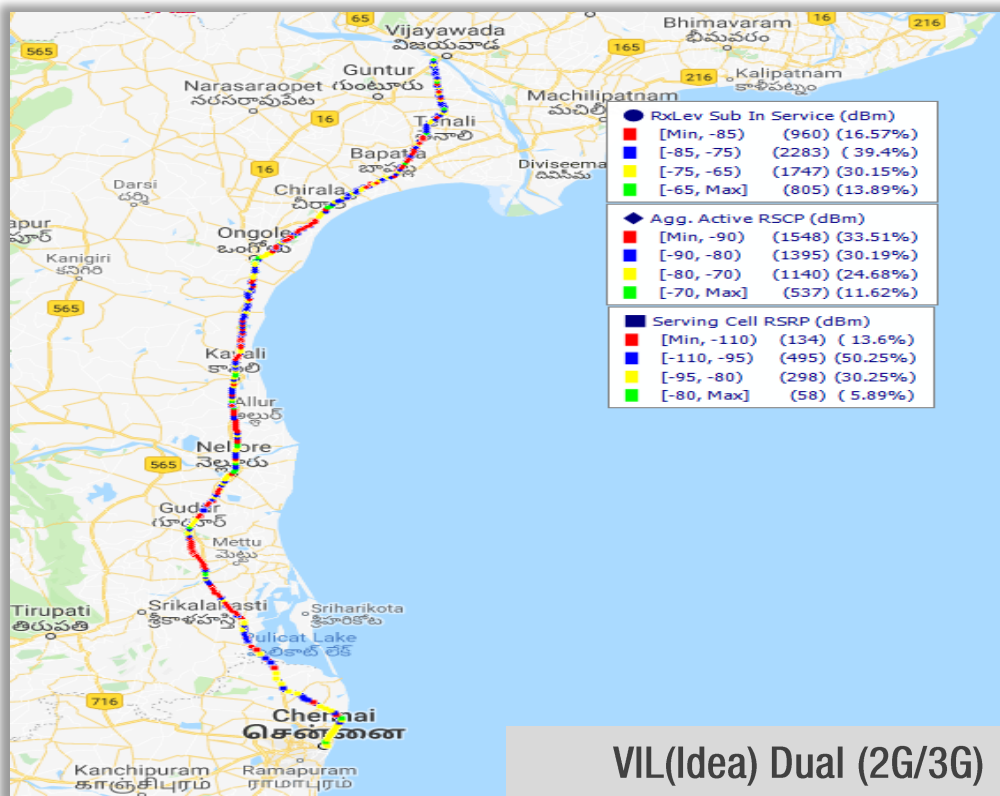
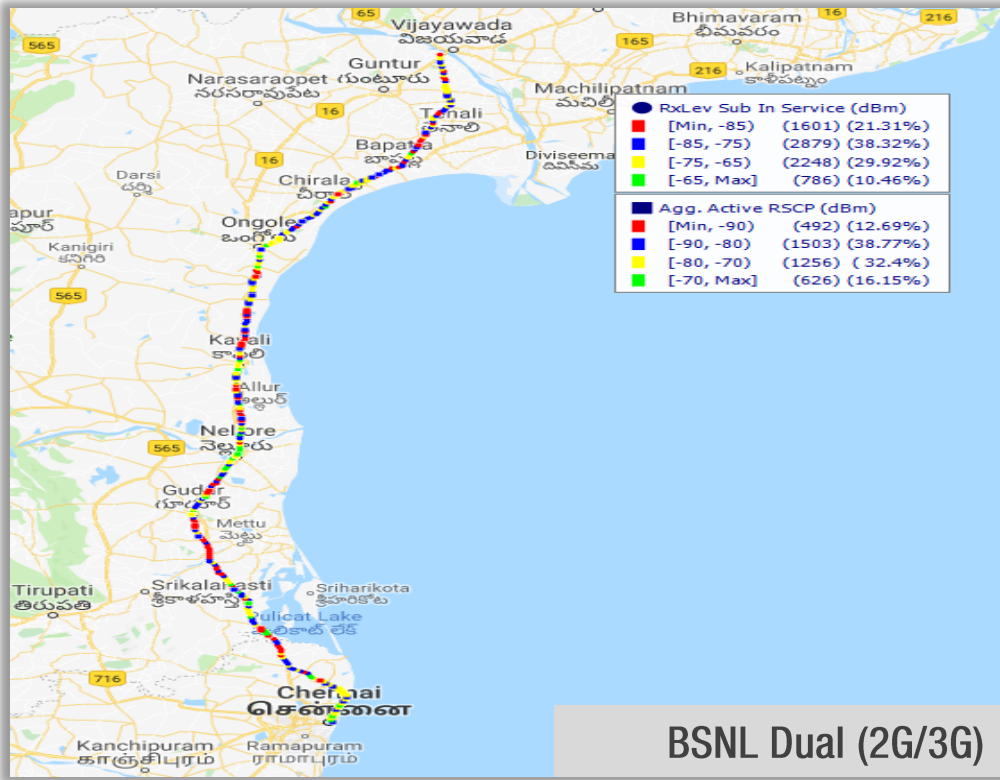
I. Coverage Details (contd.)



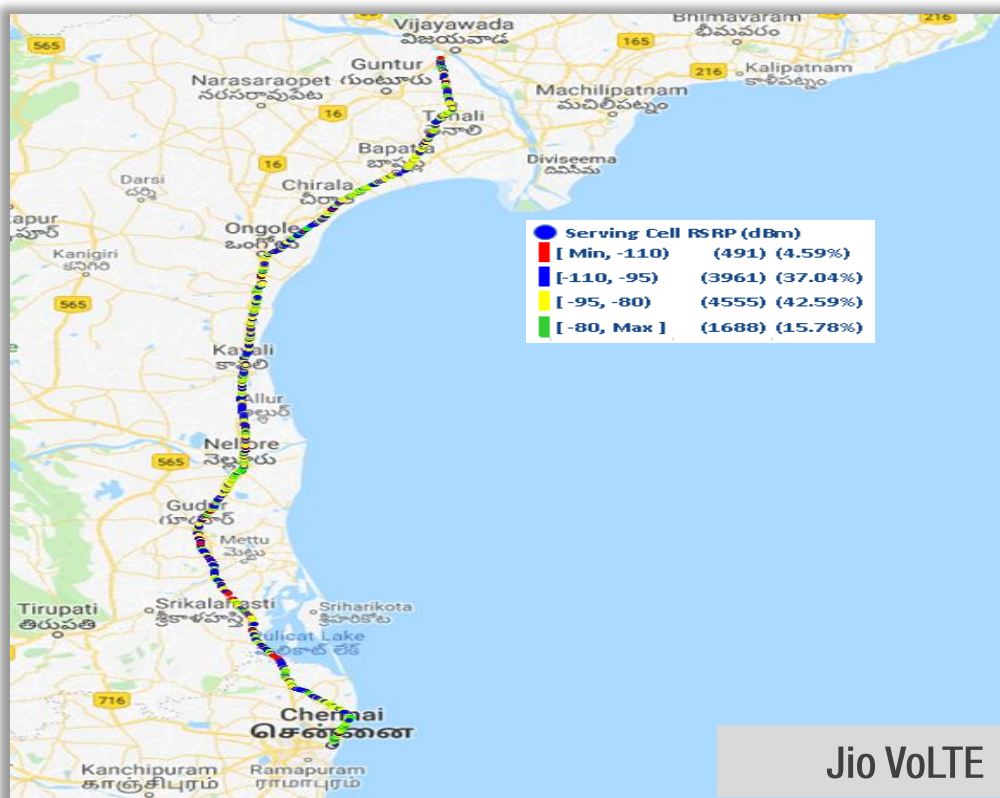
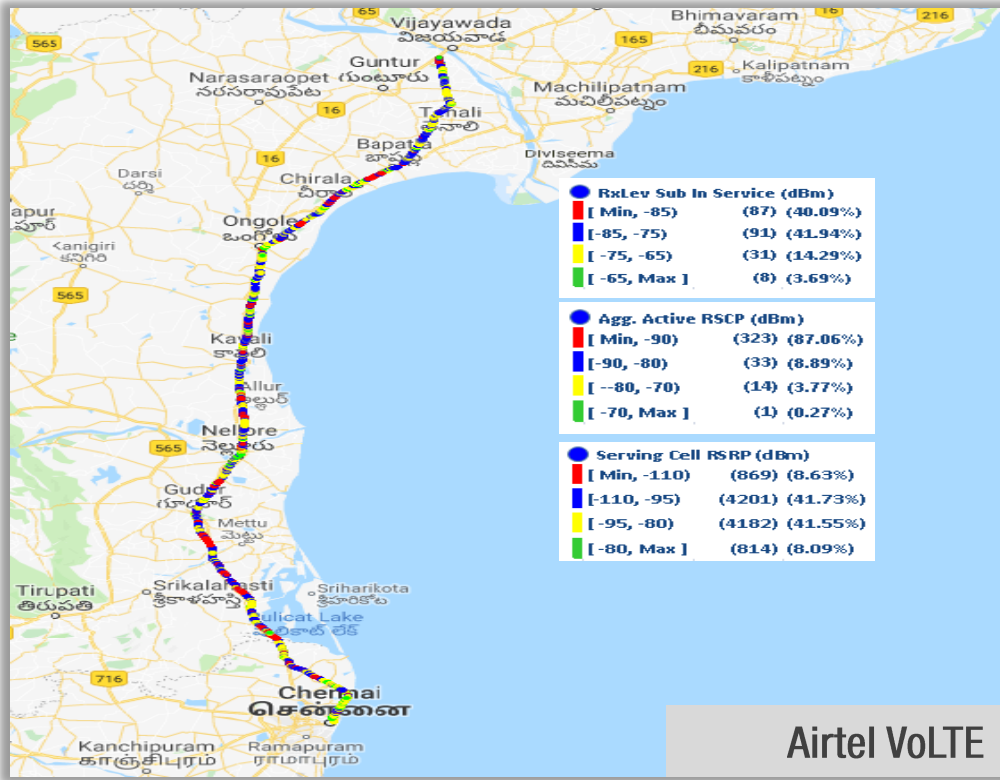
I. Coverage Details (contd.)



I. Coverage Details (contd.)



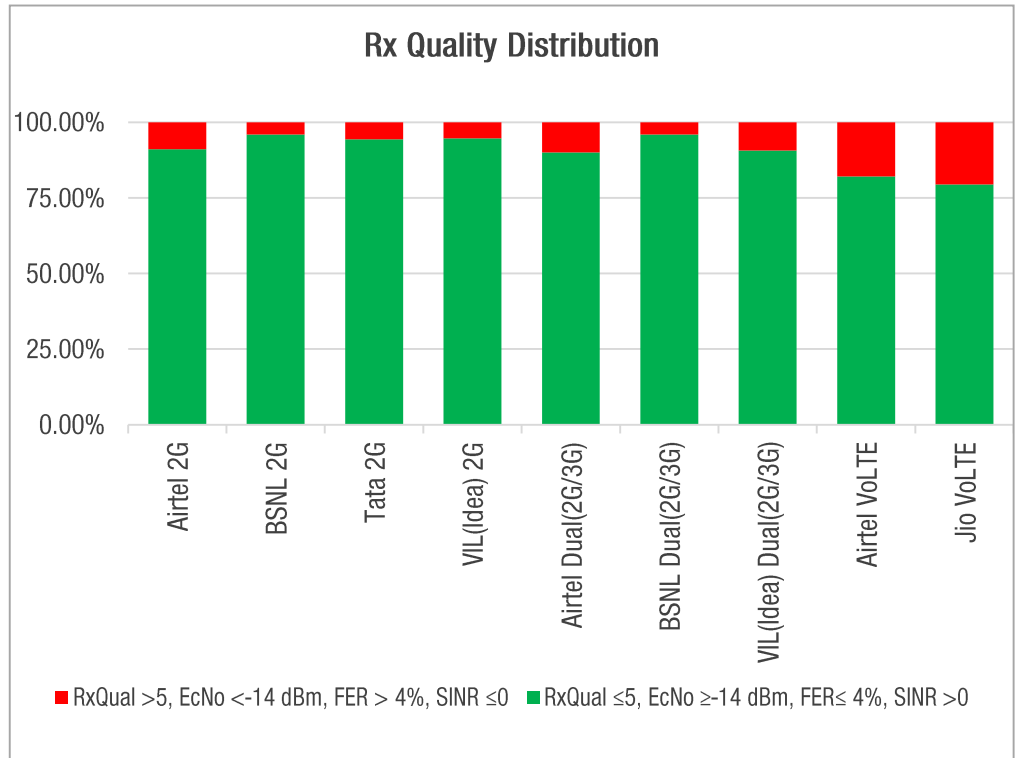
I. Coverage Details (contd.)



II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP sand SINR > 0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.

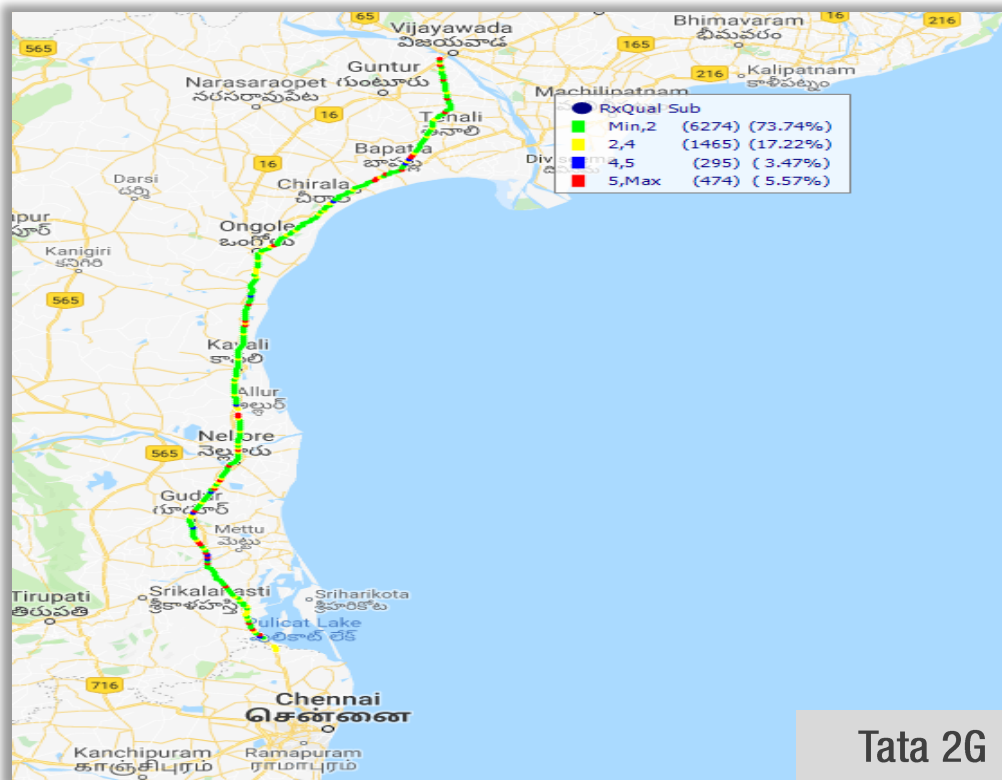
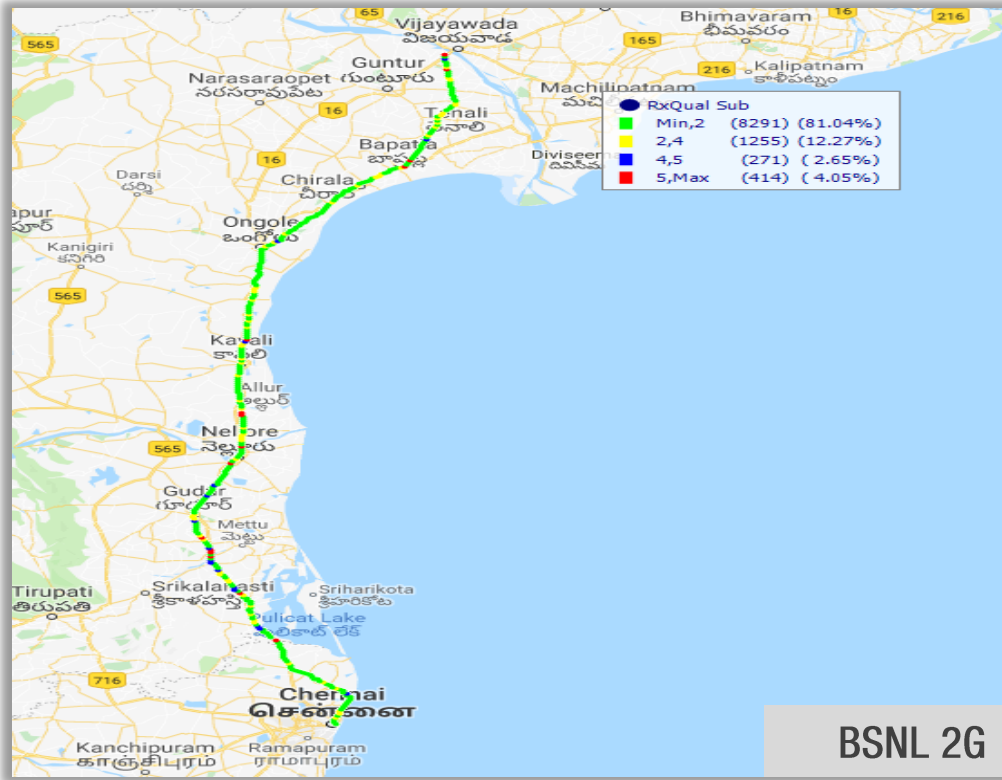
| TSP | Rx Quality |
|-----------------------|------------|
| Airtel 2G | 91.08% |
| BSNL 2G | 95.95% |
| Tata 2G | 94.43% |
| VIL(Idea) 2G | 94.74% |
| Airtel Dual(2G/3G) | 90.02% |
| BSNL Dual(2G/3G) | 96.01% |
| VIL(Idea) Dual(2G/3G) | 90.71% |
| Airtel VoLTE | 82.10% |
| Jio VoLTE | 79.41% |



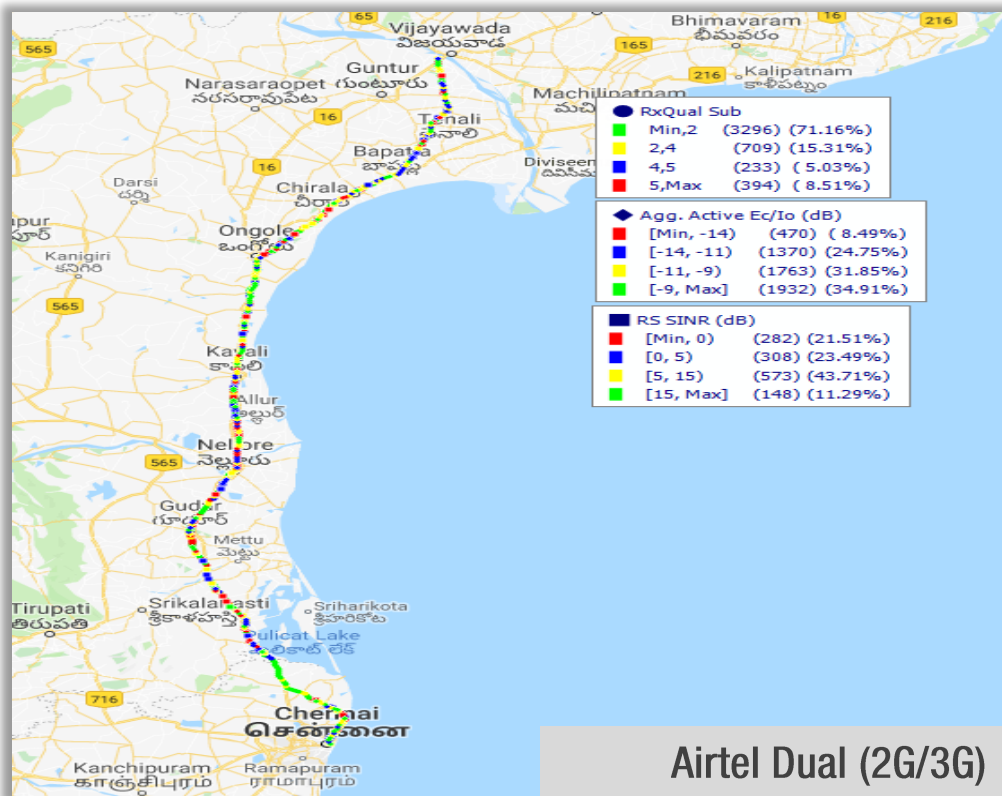
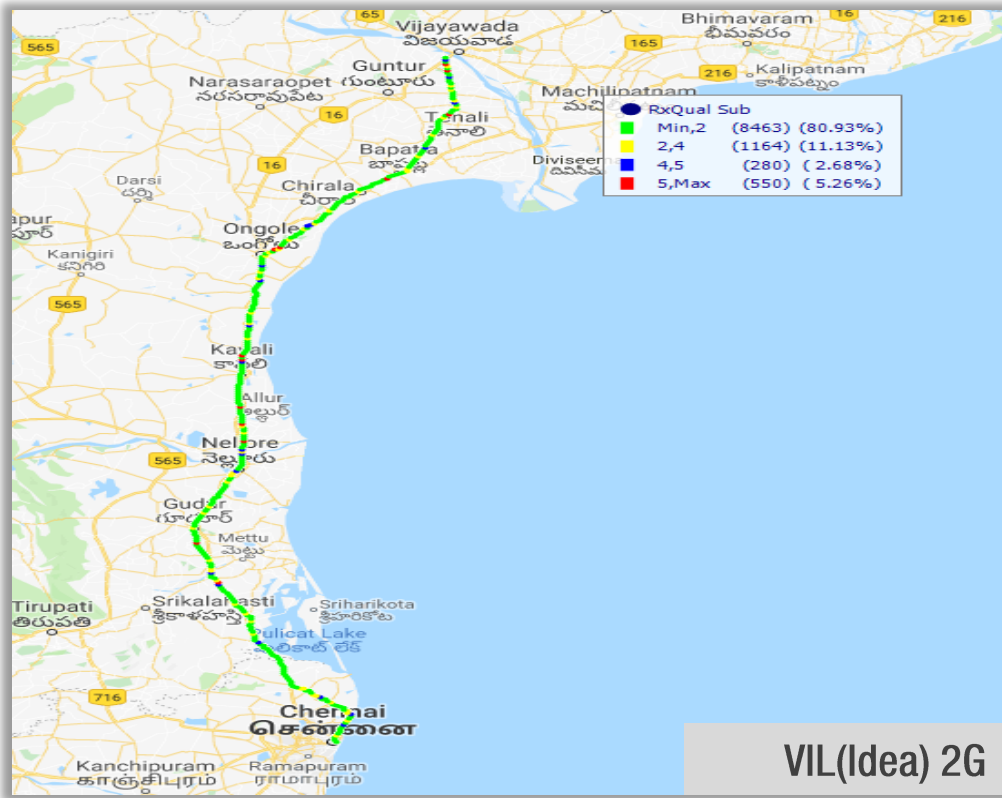
— TSPs not meeting the Benchmark



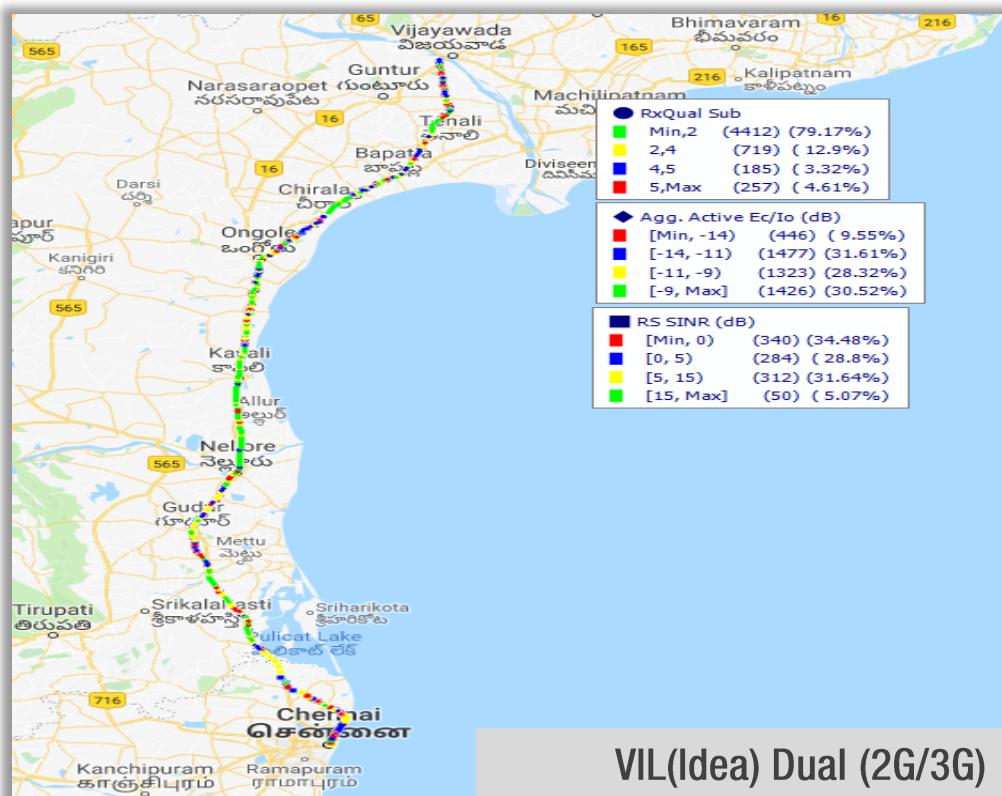
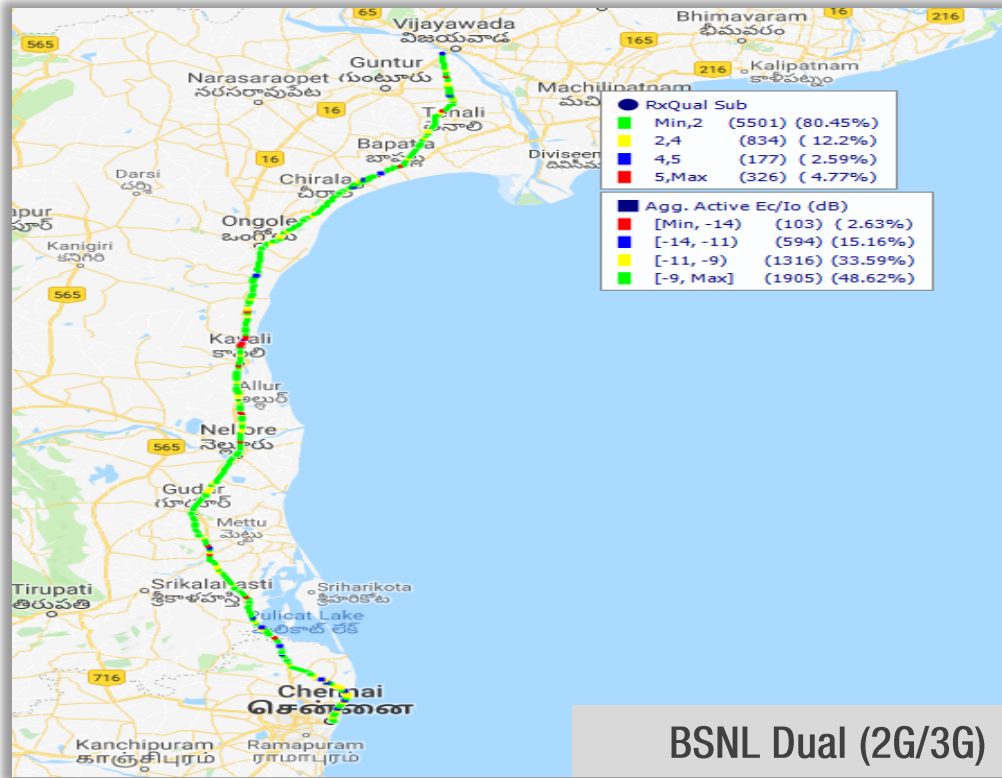
II. Quality Details (contd.)



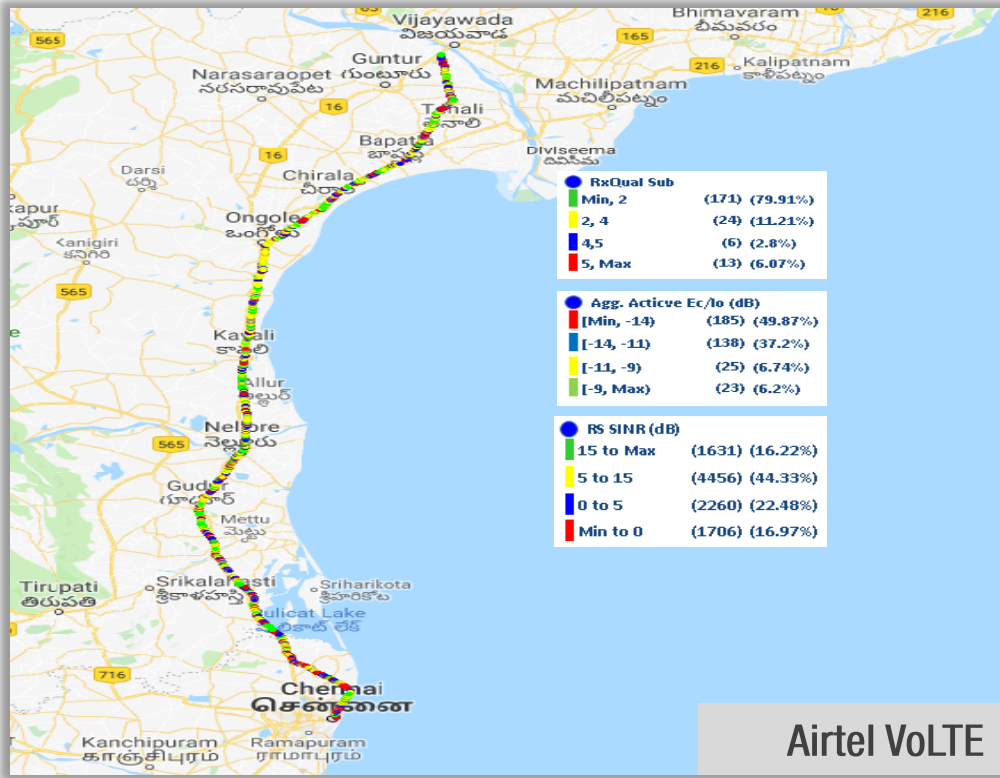
II. Quality Details (contd.)



II. Quality Details (contd.)

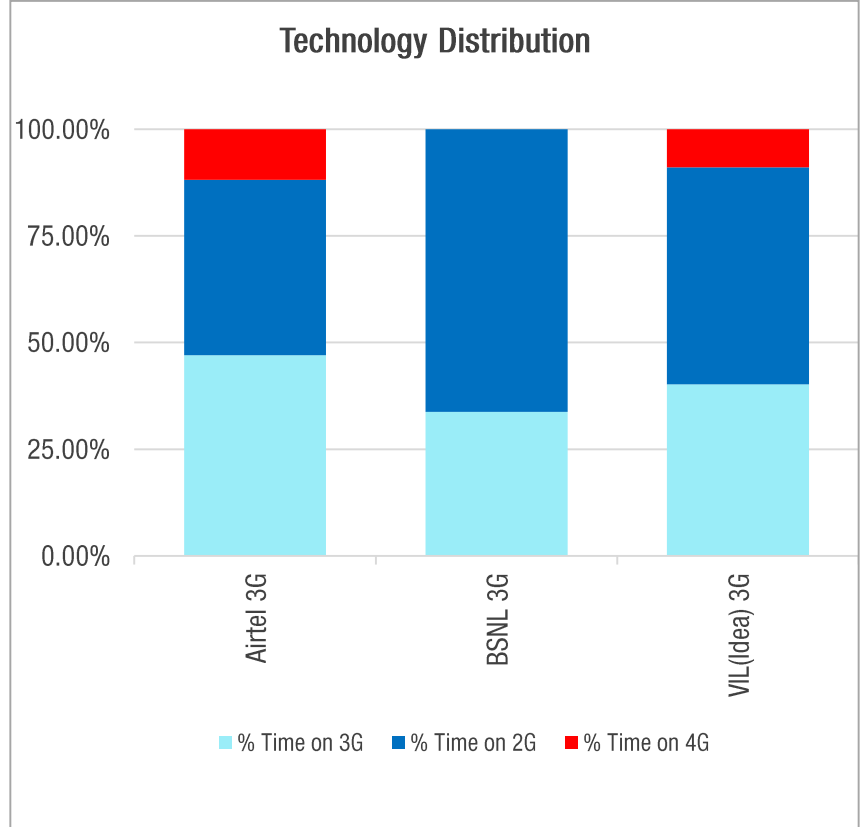


II. Quality Details (contd.)



III. Technology Details

| TSP | % Time on 3G |
|--------------|--------------|
| Airtel 3G | 46.99% |
| BSNL3G | 33.72% |
| VIL(Idea) 3G | 40.21% |



III. Technology Details_(contd.)

