

**For Immediate Release**

**Information note to the Press (Press Release No. 90/2019)**

**Telecom Regulatory Authority of India**

**TRAI Releases Report on Independent Drive Tests conducted in six cities viz. Ambala, Bikaner, Gorakhpur, Kanpur, Patna & Rewa**

**New Delhi, 14 October, 2019:** TRAI, through its agency, conducted Independent Drive Tests (IDT) in six cities viz. Ambala, Bikaner, Gorakhpur, Kanpur, Patna & Rewa. Drive tests were conducted to assess the network quality provided by cellular mobile telephone service providers for voice and data services. The details of drive tests conducted are given below: -

**Cities**

| <b>S. No</b> | <b>City</b> | <b>Licensed Service Area (LSA)</b> | <b>Period of Conducting IDT</b>                           | <b>Summary of Results of IDT</b> |
|--------------|-------------|------------------------------------|---|----------------------------------|
| 1)           | Ambala      | Haryana                            | 5 <sup>th</sup> to 7 <sup>th</sup> February 2019          | Annexure-A                       |
| 2)           | Bikaner     | Rajasthan                          | 11 <sup>th</sup> to 14 <sup>th</sup> February 2019        | Annexure-B                       |
| 3)           | Gorakhpur   | UP -East                           | 19 <sup>th</sup> to 21 <sup>st</sup> February 2019        | Annexure-C                       |
| 4)           | Kanpur      | UP -East                           | 29 <sup>th</sup> January to 1 <sup>st</sup> February 2019 | Annexure-D                       |
| 5)           | Patna       | Bihar                              | 22 <sup>nd</sup> to 25 <sup>th</sup> January 2019         | Annexure-E                       |
| 6)           | Rewa        | MP                                 | 21 <sup>st</sup> to 23 <sup>rd</sup> January 2019         | Annexure-F                       |

2. The Key Performance Indicators (KPIs) were assessed for the networks of all telecom service providers operating in the region. KPIs for voice services are Coverage; Call Setup Success Rate (CSSR); Drop Call Rate; Block Call Rate, Handover Success Rate; Rx Quality. KPIs for data services are Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency. The complete report is available at TRAI website [www.analytics.trai.gov.in](http://www.analytics.trai.gov.in)
3. The key findings of Drive test are summarized below:
  - (i) Ambala City: All the TSPs have met the  $\leq 2\%$  of Drop Call Rate. All the TSPs have met the  $\approx 95\%$  of CSSR except Tata 2G. Maximum throughput has been observed in 3G & 4G network of VIL(Vodafone) & RJio respectively.

- (ii) Bikaner City: All the TSPs have met the  $\leq 2\%$  of Drop Call Rate and  $\geq 95\%$  of CSSR. Maximum throughput has been observed in 3G & 4G network of BSNL & RJio respectively.
- (iii) Gorakhpur City: All the TSPs have met the  $\leq 2\%$  of Drop Call Rate and  $\geq 95\%$  of CSSR. Maximum throughput has been observed in 3G & 4G network of VIL(Idea) & RJio respectively.
- (iv) Kanpur City: All the TSPs have met the  $\leq 2\%$  of Drop Call Rate and  $\geq 95\%$  of CSSR. Maximum throughput has been observed in 3G & 4G network of BSNL & Airtel respectively.
- (v) Patna City: All the TSPs have met the  $\leq 2\%$  of Drop Call Rate and  $\geq 95\%$  of CSSR. Maximum throughput has been observed in 3G & 4G network of BSNL & Airtel respectively.
- (vi) Rewa City: All the TSPs have met the  $\leq 2\%$  of Drop Call Rate except BSNL 3G and VIL(Idea) 3G. All the TSPs have met the  $\geq 95\%$  of CSSR. Maximum throughput has been observed in 3G & 4G network of VIL(Vodafone) & Airtel respectively.
4. The complete report is available at TRAI website [www.analytics.trai.gov.in](http://www.analytics.trai.gov.in)  
In case of any clarification, please contact, Shri. Asit Kadayan, Advisor (QoS) at  
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(S.K. Gupta)  
Secretary  
14/11/2018

**Report on Independent Drive Test conducted in  
Ambala from 5<sup>th</sup> to 7<sup>th</sup> February 2019**

The drive test in the city of Ambala in Haryana LSA was conducted for a period of 3 days during 5<sup>th</sup> to 7<sup>th</sup> February 2019. It covered a route of approximately 310 KMs and data tests conducted on 4 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone)), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

| Voice Call            | 2G      |        |        |                   |          |
|-----------------------|---------|--------|--------|-------------------|----------|
|                       | Airtel  | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                       |         |        |        | Idea              | Vodafone |
| Call Attempt          | 345     | 509    | 373    | 352               | 401      |
| Blocked Call Rate (%) | 0.00%   | 0.79%  | 5.09%  | 1.70%             | 2.24%    |
| CSSR% (Accessibility) | 100.00% | 99.21% | 94.91% | 98.30%            | 97.76%   |
| Drop Call Rate (%)    | 0.00%   | 0.79%  | 0.00%  | 1.73%             | 1.53%    |
| Mobility HOSR (%)     | 98.41%  | 99.64% | 98.75% | 96.96%            | 97.87%   |
| Rx Quality (%)        | 97.87%  | 96.73% | 97.93% | 97.42%            | 96.54%   |

| Voice Call            | 3G      |        |        |                   |          | VoLTE  |
|-----------------------|---------|--------|--------|-------------------|----------|--------|
|                       | Airtel  | BSNL   | Tata   | Vodafone Idea Ltd |          | Jio    |
|                       |         |        |        | Idea              | Vodafone |        |
| Call Attempt          | 378     | 378    | 385    | 371               | 363      | 349    |
| Blocked Call Rate (%) | 0.00%   | 1.06%  | 4.68%  | 1.35%             | 2.48%    | 0.29%  |
| CSSR% (Accessibility) | 100.00% | 98.94% | 95.32% | 98.65%            | 97.52%   | 99.71% |
| Drop Call Rate (%)    | 1.06%   | 1.07%  | 0.00%  | 1.64%             | 1.13%    | 1.15%  |
| Mobility HOSR (%)     | 99.85%  | 99.59% | 99.79% | 99.79%            | 99.44%   | 99.20% |
| Rx Quality (%)        | 95.92%  | 95.52% | 98.06% | 86.82%            | 87.59%   | 87.67% |

| Data Services Static       | 2G     |        |        |                   |          |
|----------------------------|--------|--------|--------|-------------------|----------|
|                            | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                            |        |        |        | Idea              | Vodafone |
| Download Throughput (kbps) | 146.26 | 104.82 | 104.78 | 56.04             | 110.17   |
| Upload Throughput (kbps)   | 102.76 | 97.33  | 83.40  | 46.26             | 105.57   |
| Web Browsing Delay (sec)   | 29.13  | 27.98  | 32.91  | 37.21             | 29.37    |
| Latency(msec)              | 267    | 241    | 340    | 350               | 241      |

| Data Services Static        | 3G     |       |       |                   |          | 4G     |       |                   |          |
|-----------------------------|--------|-------|-------|-------------------|----------|--------|-------|-------------------|----------|
|                             | Airtel | BSNL  | Tata  | Vodafone Idea Ltd |          | Airtel | Jio   | Vodafone Idea Ltd |          |
|                             |        |       |       | Idea              | Vodafone |        |       | Idea              | Vodafone |
| Download Throughput (Mbps)  | 2.3    | 2.12  | 1.96  | 1.76              | 4.77     | 5.01   | 5.96  | 4.74              | 5.67     |
| Upload Throughput (Mbps)    | 0.74   | 1.57  | 0.71  | 1.2               | 3.25     | 2.34   | 2.86  | 6.26              | 7.45     |
| Web Browsing Delay (sec)    | 18.41  | 14.05 | 18.31 | 13.35             | 13       | 12.68  | 12.53 | 12.26             | 12.83    |
| Video Streaming Delay (sec) | 7.5    | 7.25  | 6.37  | 3.19              | 4.67     | 2.84   | 4.64  | 3.67              | 4.68     |
| Latency(sec)                | 142    | 104   | 229   | 92                | TO       | 105    | 108   | 109               | 103      |

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**Report on Independent Drive Test conducted in  
Bikaner from 11<sup>th</sup> to 14<sup>th</sup> February 2019**

The drive test in the city of Bikaner in Rajasthan LSA was conducted for a period of 4 days during 11<sup>th</sup> to 14<sup>th</sup> February 2019. It covered a route of approximately 440 KMs and data tests conducted on 7 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone), and Rjio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

| Voice Call            | 2G            |        |               |                   |          |
|-----------------------|---------------|--------|---------------|-------------------|----------|
|                       | Airtel        | BSNL   | Tata          | Vodafone Idea Ltd |          |
|                       |               |        |               | Idea              | Vodafone |
| Call Attempt          | 617           | 648    | 544           | 494               | 619      |
| Blocked Call Rate (%) | 0.44%         | 0.31%  | 0.55%         | 0.61%             | 0.00%    |
| CSSR% (Accessibility) | 99.56%        | 99.69% | 99.45%        | 99.39%            | 100.00%  |
| Drop Call Rate (%)    | 0.11%         | 0.77%  | 0.00%         | 0.81%             | 0.00%    |
| Mobility HOSR (%)     | 97.00%        | 94.02% | 98.29%        | 99.77%            | 98.74%   |
| Rx Quality (%)        | <b>90.64%</b> | 97.75% | <b>94.83%</b> | 98.26%            | 98.39%   |

| Voice Call            | 3G            |        |        |                   |          | VoLTE         |
|-----------------------|---------------|--------|--------|-------------------|----------|---------------|
|                       | Airtel        | BSNL   | Tata   | Vodafone Idea Ltd |          | Jio           |
|                       |               |        |        | Idea              | Vodafone |               |
| Call Attempt          | 626           | 628    | 586    | 553               | 643      | 564           |
| Blocked Call Rate (%) | 0.64%         | 0.96%  | 2.56%  | 1.08%             | 0.31%    | 1.42%         |
| CSSR% (Accessibility) | 99.36%        | 99.04% | 97.44% | 98.92%            | 99.69%   | 98.58%        |
| Drop Call Rate (%)    | 0.16%         | 1.29%  | 0.00%  | 0.18%             | 0.31%    | 0.90%         |
| Mobility HOSR (%)     | 99.81%        | 98.74% | 99.96% | 100.00%           | 99.81%   | 99.71%        |
| Rx Quality (%)        | <b>93.19%</b> | 96.22% | 96.35% | 95.38%            | 96.40%   | <b>85.59%</b> |

| Data Services Static       | 2G     |        |       |                   |          |
|----------------------------|--------|--------|-------|-------------------|----------|
|                            | Airtel | BSNL   | Tata  | Vodafone Idea Ltd |          |
|                            |        |        |       | Idea              | Vodafone |
| Download Throughput (kbps) | 103.85 | 107.03 | 86.88 | 133.69            | 110.11   |
| Upload Throughput (kbps)   | 107.09 | 81.71  | 103.8 | 130.21            | 146.67   |
| Web Browsing Delay (sec)   | 30.64  | 32.03  | 28.8  | 31.83             | 28.21    |
| Latency(msec)              | 306    | 391    | 289   | 233               | 216      |

| Data Services Static        | 3G     |       |       |               |          | 4G     |      |                   |          |
|-----------------------------|--------|-------|-------|---------------|----------|--------|------|-------------------|----------|
|                             | Airtel | BSNL  | Tata  | Vodafone Idea |          | Airtel | Jio  | Vodafone Idea Ltd |          |
|                             |        |       |       | Idea          | Vodafone |        |      | Idea              | Vodafone |
| Download Throughput (Mbps)  | 2.59   | 4.10  | 2.29  | 3.81          | 2.50     | 6.56   | 6.96 | 4.06              | 3.32     |
| Upload Throughput (Mbps)    | 0.61   | 1.36  | 0.54  | 1.86          | 1.40     | 2.27   | 6.09 | 3.77              | 4.82     |
| Web Browsing Delay (sec)    | 13.69  | 11.78 | 17.55 | 12.25         | 15.72    | 9.16   | 8.86 | 9.93              | 12.71    |
| Video Streaming Delay (sec) | 3.21   | 2.67  | 3.44  | 1.47          | 1.44     | 2.89   | 3.85 | 1.29              | 1.71     |
| Latency (sec)               | 257    | 136   | 296   | 162           | 147      | 106    | 81   | 109               | 99       |

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**Report on Independent Drive Test conducted in  
Gorakhpur from 19<sup>th</sup> to 21<sup>st</sup> February 2019**

The drive test in the city of Gorakhpur in UP -East LSA was conducted for a period of 3 days during 19<sup>th</sup> to 21<sup>st</sup> February 2019. It covered a route of approximately 285 KMs and data tests conducted on 6 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

| Voice Call            | 2G     |        |        |                   |          |
|-----------------------|--------|--------|--------|-------------------|----------|
|                       | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                       |        |        |        | Idea              | Vodafone |
| Call Attempt          | 504    | 434    | 446    | 467               | 468      |
| Blocked Call Rate (%) | 0.40%  | 2.07%  | 2.91%  | 2.36%             | 0.00%    |
| CSSR% (Accessibility) | 99.60% | 97.93% | 97.09% | 97.64%            | 100.00%  |
| Drop Call Rate (%)    | 0.40%  | 1.18%  | 0.46%  | 0.44%             | 0.00%    |
| Mobility HOSR (%)     | 98.46% | 92.54% | 99.05% | 96.64%            | 98.92%   |
| Rx Quality (%)        | 90.81% | 96.14% | 93.36% | 98.31%            | 95.22%   |

| Voice Call            | 3G     |        |                   |          | VoLTE  |        |
|-----------------------|--------|--------|-------------------|----------|--------|--------|
|                       | Airtel | BSNL   | Vodafone Idea Ltd |          | Airtel | Jio    |
|                       |        |        | Idea              | Vodafone |        |        |
| Call Attempt          | 451    | 472    | 460               | 475      | 422    | 490    |
| Blocked Call Rate (%) | 0.22%  | 2.33%  | 2.83%             | 1.68%    | 0.71%  | 0.20%  |
| CSSR% (Accessibility) | 99.78% | 97.67% | 97.17%            | 98.32%   | 99.29% | 99.80% |
| Drop Call Rate (%)    | 0.00%  | 1.08%  | 0.45%             | 0.43%    | 0.24%  | 0.41%  |
| Mobility HOSR (%)     | 99.62% | 99.61% | 97.68%            | 99.90%   | 99.96% | 99.54% |
| Rx Quality (%)        | 93.24% | 94.24% | 87.39%            | 82.78%   | 81.44% | 87.37% |

| Data Services Static       | 2G     |        |        |                   |          |
|----------------------------|--------|--------|--------|-------------------|----------|
|                            | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                            |        |        |        | Idea              | Vodafone |
| Download Throughput (kbps) | 101.21 | 117.52 | 104.63 | 110.66            | 158.57   |
| Upload Throughput (kbps)   | 111.78 | 82.12  | 100    | 150.06            | 116.32   |
| Web Browsing Delay (sec)   | 25.46  | 29.21  | 26.28  | 32.16             | 31.29    |
| Latency(msec)              | 509    | 239    | 596    | 333               | 177      |

| Data Services Static        | 3G     |       |                   |          | 4G     |      |                   |          |
|-----------------------------|--------|-------|-------------------|----------|--------|------|-------------------|----------|
|                             | Airtel | BSNL  | Vodafone Idea Ltd |          | Airtel | Jio  | Vodafone Idea Ltd |          |
|                             |        |       | Idea              | Vodafone |        |      | Idea              | Vodafone |
| Download Throughput (Mbps)  | 2.27   | 3.02  | 3.10              | 0.17     | 8.19   | 9.18 | 3.54              | 4.64     |
| Upload Throughput (Mbps)    | 0.14   | 0.17  | 2.36              | 2.38     | 0.82   | 5.82 | 4.49              | 4.28     |
| Web Browsing Delay (sec)    | 6.93   | 12.40 | 11.73             | 20.24    | 4.66   | 7.78 | 10.32             | 12.80    |
| Video Streaming Delay (sec) | 4.63   | 4.41  | 2.22              | 2.47     | 2.15   | 2.85 | 2.05              | 1.16     |
| Latency (sec)               | 108    | 136   | 100               | 96       | 98     | 76   | 96                | 83       |

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**Annexure-D**

**Report on Independent Drive Test conducted in Kanpur from 29<sup>th</sup> January to 1<sup>st</sup> February 2019**

The drive test in the city of Kanpur in UP - East LSA was conducted for a period of 4 days on 29<sup>th</sup> January to 1<sup>st</sup> February 2019. It covered a route of approximately 434 KMs and data tests conducted on 6 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

| Voice Call            | 2G     |        |        |                   |          |
|-----------------------|--------|--------|--------|-------------------|----------|
|                       | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                       |        |        |        | Idea              | Vodafone |
| Call Attempt          | 801    | 797    | 879    | 790               | 702      |
| Blocked Call Rate (%) | 0.25%  | 0.50%  | 2.62%  | 2.66%             | 0.00%    |
| CSSR% (Accessibility) | 99.75% | 99.50% | 97.38% | 97.34%            | 100.00%  |
| Drop Call Rate (%)    | 0.00%  | 0.88%  | 0.12%  | 0.78%             | 0.14%    |
| Mobility HOSR (%)     | 99.09% | 92.42% | 99.13% | 99.14%            | 99.52%   |
| Rx Quality (%)        | 96.41% | 97.70% | 95.67% | 98.08%            | 95.05%   |

| Voice Call            | 3G     |        |                   |          | VoLTE  |        |
|-----------------------|--------|--------|-------------------|----------|--------|--------|
|                       | Airtel | BSNL   | Vodafone Idea Ltd |          | Airtel | Jio    |
|                       |        |        | Idea              | Vodafone |        |        |
| Call Attempt          | 755    | 777    | 756               | 788      | 676    | 744    |
| Blocked Call Rate (%) | 0.40%  | 1.67%  | 2.12%             | 1.40%    | 0.30%  | 0.13%  |
| CSSR% (Accessibility) | 99.60% | 98.33% | 97.88%            | 98.60%   | 99.70% | 99.87% |
| Drop Call Rate (%)    | 0.00%  | 0.65%  | 0.81%             | 0.64%    | 0.15%  | 0.00%  |
| Mobility HOSR (%)     | 99.92% | 99.45% | 99.73%            | 99.92%   | 99.98% | 99.49% |
| Rx Quality (%)        | 96.06% | 94.03% | 93.72%            | 84.14%   | 82.67% | 85.54% |

| Data Services Static       | 2G     |        |        |                   |          |
|----------------------------|--------|--------|--------|-------------------|----------|
|                            | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                            |        |        |        | Idea              | Vodafone |
| Download Throughput (Kbps) | 112.17 | 140.01 | 136.5  | 128.07            | 139.17   |
| Upload Throughput (kbps)   | 64.02  | 121.39 | 111.83 | 129.95            | 136.63   |
| Web Browsing Delay (sec)   | 38.19  | 41.3   | 27.86  | 28.81             | 26.59    |
| Latency (msec)             | 688    | 302    | 592    | 288               | 216      |

  

| Data Services Static        | 3G     |       |                   |          | 4G     |      |                   |          |
|-----------------------------|--------|-------|-------------------|----------|--------|------|-------------------|----------|
|                             | Airtel | BSNL  | Vodafone Idea Ltd |          | Airtel | Jio  | Vodafone Idea Ltd |          |
|                             |        |       | Idea              | Vodafone |        |      | Idea              | Vodafone |
| Download Throughput (Mbps)  | 2.61   | 4.67  | 3.89              | 4.68     | 12.98  | 7.15 | 4.45              | 4.08     |
| Upload Throughput (Mbps)    | 1.05   | 1.56  | 1.88              | 2.09     | 4.80   | 4.52 | 4.42              | 4.36     |
| Web Browsing Delay (sec)    | 10.39  | 13.10 | 10.55             | 11.13    | 9.07   | 8.85 | 10.35             | 12.64    |
| Video Streaming Delay (sec) | 1.82   | 4.01  | 3.41              | 1.05     | 1.12   | 1.12 | 2.89              | 3.81     |
| Latency (msec)              | 130    | 176   | 128               | 115      | 118    | 77   | 91                | 130      |

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**Report on Independent Drive Test conducted in  
Patna from 22<sup>nd</sup> to 25<sup>th</sup> January 2019**

The drive test in the city of Patna in Bihar LSA was conducted for a period of 4 days during 22<sup>nd</sup> to 25<sup>th</sup> January 2019. It covered a route of approximately 370 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata Vodafone Idea Ltd (VIL (Idea & Vodafone), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

| Voice Call            | 2G      |        |        |                   |          |
|-----------------------|---------|--------|--------|-------------------|----------|
|                       | Airtel  | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                       |         |        |        | Idea              | Vodafone |
| Call Attempt          | 935     | 872    | 824    | 1008              | 855      |
| Blocked Call Rate (%) | 0.00%   | 0.11%  | 1.33%  | 0.20%             | 1.05%    |
| CSSR% (Accessibility) | 100.00% | 99.89% | 98.67% | 99.80%            | 98.95%   |
| Drop Call Rate (%)    | 0.75%   | 0.57%  | 0.49%  | 0.10%             | 1.65%    |
| Mobility HOSR (%)     | 97.23%  | 93.48% | 96.47% | 97.83%            | 97.25%   |
| Rx Quality (%)        | 98.01%  | 96.94% | 97.98% | 97.96%            | 92.10%   |

| Voice Call            | 3G     |        |        |                   |          | VoLTE  |
|-----------------------|--------|--------|--------|-------------------|----------|--------|
|                       | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          | Jio    |
|                       |        |        |        | Idea              | Vodafone |        |
| Call Attempt          | 858    | 873    | 831    | 888               | 917      | 833    |
| Blocked Call Rate (%) | 0.47%  | 0.57%  | 0.84%  | 0.34%             | 2.29%    | 0.48%  |
| CSSR% (Accessibility) | 99.53% | 99.43% | 99.16% | 99.66%            | 97.71%   | 99.52% |
| Drop Call Rate (%)    | 0.82%  | 1.50%  | 0.49%  | 0.56%             | 0.22%    | 0.00%  |
| Mobility HOSR (%)     | 99.97% | 96.73% | 99.91% | 99.87%            | 99.94%   | 99.60% |
| Rx Quality (%)        | 94.95% | 96.35% | 96.78% | 86.83%            | 86.50%   | 86.06% |

| Data Services Static       | 2G     |        |       |                   |          |
|----------------------------|--------|--------|-------|-------------------|----------|
|                            | Airtel | BSNL   | Tata  | Vodafone Idea Ltd |          |
|                            |        |        |       | Idea              | Vodafone |
| Download Throughput (Kbps) | 116.47 | 126.06 | 88.33 | 92.35             | 105.84   |
| Upload Throughput (Kbps)   | 113.40 | 105.55 | 95.76 | 99.53             | 98.14    |
| Web Browsing Delay (sec)   | 29.84  | 43.97  | 24.78 | 26.14             | 28.87    |
| Latency (msec)             | 579    | 427    | 619   | 411               | 486      |

| Data Services Static        | 3G     |       |       |                   |          | 4G     |           |      |
|-----------------------------|--------|-------|-------|-------------------|----------|--------|-----------|------|
|                             | Airtel | BSNL  | Tata  | Vodafone Idea Ltd |          | Airtel | VIL(Idea) | Jio  |
|                             |        |       |       | Idea              | Vodafone |        |           |      |
| Download Throughput (Mbps)  | 1.28   | 3.41  | 2.17  | 1.59              | 2.13     | 6.96   | 2.14      | 2.20 |
| Upload Throughput (Mbps)    | 0.40   | 1.65  | 0.50  | 0.63              | 0.49     | 3.16   | 2.42      | 3.12 |
| Web Browsing Delay (sec)    | 14.55  | 12.23 | 14.10 | 15.42             | 18.58    | 10.22  | 12.81     | 9.58 |
| Video Streaming Delay (sec) | 3.63   | 3.45  | 2.26  | 5.95              | 3.35     | 2.20   | 4.46      | 2.23 |
| Latency (msec)              | 141    | 110   | 131   | 109               | 166      | 98     | 107       | 346  |

*for*

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**Report on Independent Drive Test conducted in  
Rewa from 21<sup>st</sup> to 23<sup>rd</sup> January 2019**

The drive test in the city of Rewa in Madhya Pradesh LSA was conducted for a period of 3 days during 21<sup>st</sup> to 23<sup>rd</sup> January 2019. It covered a route of approximately 307 KMs and data tests conducted on 6 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

| Voice Call            | 2G     |        |        |                   |          |
|-----------------------|--------|--------|--------|-------------------|----------|
|                       | Airtel | BSNL   | Tata   | Vodafone Idea Ltd |          |
|                       |        |        |        | Idea              | Vodafone |
| Call Attempt          | 412    | 470    | 498    | 418               | 459      |
| Blocked Call Rate (%) | 0.24%  | 2.55%  | 2.21%  | 0.00%             | 0.00%    |
| CSSR% (Accessibility) | 99.76% | 97.45% | 97.79% | 100.00%           | 100.00%  |
| Drop Call Rate (%)    | 0.49%  | 0.66%  | 0.21%  | 1.44%             | 0.65%    |
| Mobility HOSR (%)     | 98.34% | 97.29% | 99.27% | 99.44%            | 99.39%   |
| Rx Quality (%)        | 96.64% | 98.17% | 97.89% | 97.28%            | 98.29%   |

| Voice Call            | 3G     |        |         |                   | VoLTE    |        |        |
|-----------------------|--------|--------|---------|-------------------|----------|--------|--------|
|                       | Airtel | BSNL   | Tata    | Vodafone Idea Ltd |          | Airtel | Jio    |
|                       |        |        |         | Idea              | Vodafone |        |        |
| Call Attempt          | 464    | 386    | 449     | 472               | 481      | 467    | 480    |
| Blocked Call Rate (%) | 1.08%  | 1.55%  | 1.56%   | 0.64%             | 2.70%    | 0.64%  | 0.21%  |
| CSSR% (Accessibility) | 98.92% | 98.45% | 98.44%  | 99.36%            | 97.30%   | 99.36% | 99.79% |
| Drop Call Rate (%)    | 0.00%  | 3.95%  | 0.00%   | 2.99%             | 0.43%    | 0.00%  | 0.21%  |
| Mobility HOSR (%)     | 99.91% | 99.65% | 100.00% | 99.80%            | 99.58%   | 99.81% | 99.67% |
| Rx Quality (%)        | 95.28% | 95.90% | 97.23%  | 94.52%            | 91.59%   | 80.11% | 90.47% |

| Data Services Static       | 2G     |        |       |                   |          |
|----------------------------|--------|--------|-------|-------------------|----------|
|                            | Airtel | BSNL   | Tata  | Vodafone Idea Ltd |          |
|                            |        |        |       | Idea              | Vodafone |
| Download Throughput (Kbps) | 97.89  | 138.11 | 90.60 | 111.83            | 120.58   |
| Upload Throughput (kbps)   | 85.24  | 134.80 | 84.62 | 128.62            | 136.96   |
| Web Browsing Delay (sec)   | 23.39  | 43.28  | 24.49 | 22.84             | 41.10    |
| Latency (msec)             | 418    | 248    | 530   | 281               | 288      |

| Data Services Static        | 3G     |       |       |                   |          | 4G     |      |                   |          |
|-----------------------------|--------|-------|-------|-------------------|----------|--------|------|-------------------|----------|
|                             | Airtel | BSNL  | Tata  | Vodafone Idea Ltd |          | Airtel | Jio  | Vodafone Idea Ltd |          |
|                             |        |       |       | Idea              | Vodafone |        |      | Idea              | Vodafone |
| Download Throughput (Mbps)  | 1.45   | 2.21  | 2.27  | 3.32              | 3.37     | 8.65   | 5.87 | 6.82              | 5.59     |
| Upload Throughput (Mbps)    | 0.51   | 1.53  | 0.51  | 1.79              | 2.07     | 5.83   | 4.47 | 5.14              | 5.49     |
| Web Browsing Delay (sec)    | 12.65  | 12.43 | 12.21 | 11.60             | 11.33    | 8.72   | 9.32 | 9.43              | 7.99     |
| Video Streaming Delay (sec) | 5.16   | 2.28  | 4.26  | 1.76              | 1.84     | 1.81   | 3.40 | 2.39              | 1.85     |
| Latency (msec)              | 244    | 150   | 284   | 305               | 350      | 146    | 117  | 91                | 96       |

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## Definitions

**Call Attempt:** An attempt to achieve a connection to device attached to a telecommunication network.

**Block Call  $\leq 3\%$ :** A call that is not connected because there is no free channel in radio access network to serve a call attempt.

**CSSR (Call Setup Success Rate)  $\geq 95\%$ :** Ratio of Established Calls to Call Attempts.

**Drop Call Rate  $\leq 2\%$ :** An ability to maintain a call once it has been correctly established.

**Hand over Success Rate (HOSR)  $\geq 95\%$ :** Ratio between successful handovers to handover requested. (Handover is a process by which a mobile telephone call is transferred from one base station to another as the subscriber passes the boundary of a cell).

**Rx Quality  $> 95\%$ :** Measure of quality of voice.

**Download Throughput:** Data transmission rate for downloading a test file from a test server to a test device.

**Upload Throughput:** Data transmission rate for uploading a test file from a test device to test server.

**Web browsing delay (secs):** Average time taken to fully load the website tested.

**Video Steaming delay (secs):** Average time taken to fully download the video tested.

**Latency (m secs):** Time taken for a packet to reach the receiving endpoint after transmitted from the sending point.

**Time Out (TO):** Observation cannot be taken due to Time out.

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