

For Immediate Release

Information note to the Press (Press Release No. 32/2018)

Telecom Regulatory Authority of India

TRAI Releases Report on Independent Drive Test conducted in Bhiwani, Kanpur, Kota, Patna, Raipur and Ranchi cities

New Delhi: 05th March 2018: Telecom Regulatory Authority of India (TRAI) is regularly monitoring the performance of Telecom Service Providers (TSPs) against the prescribed benchmarks for the various Quality of Service (QoS) parameters laid down by the Authority. TRAI through its agency conducted Independent Drive Tests (IDT) in the city of Bhiwani in Haryana, Kanpur in UP East, Kota in Rajasthan, Patna & Ranchi in Bihar, and Raipur in MP License Service Area. 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 in the above cities are given below:-

S.No	City	Licensed Service	Period of Conducting IDT	Summary of Results of IDT
1)	Bhiwani	Haryana	4 th Oct to 6 th Oct 2017	Annexure-A
2)	Kanpur	UP East	11 th Dec to 15 th Dec 2017	Annexure-B
3)	Kota	Rajasthan	13 th Nov to 17 th Nov 2017	Annexure-C
4)	Patna	Bihar	18 th Dec to 22 nd Dec 2017	Annexure-D
5)	Raipur	MP	6 th Nov to 10 th Nov 2017	Annexure-E
6)	Ranchi	Bihar	6 th Oct to 12 th Oct 2017	Annexure-F

2. The Key Performance Indicators (KPIs) were assessed for voice services are Network Coverage, Call Setup Success Rate; Drop Call Rate; Block Call Rate, Handover Success Rate and Rx Quality. The KPIs for data services were Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency.

3. The key findings of Drive test are summarized below:

- (i) Most of the TSPs have met the Drop Call Rate (DCR) QoS bench mark of 2% except Tata CDMA in Bhiwani, Kota & Patna and Aircel, BSNL, Tata CDMA, & RCOM 3G in Ranchi.

(ii) Most of the TSPs have met the 3% of QoS benchmark of Call Block rate (CBR %) except Tata CDMA, RCOM 2G in Bhiwani, Tata in Kota and Tata CDMA Patna, Tata 2G in Kanpur, RCOM 3G in Ranchi.

(iii) Most of the TSPs have met the Rx QoS benchmark >95% of except Tata CDMA, RJio in Bhiwani, Airtel and Tata CDMA in Kota, Tata CDMA, Telenor 3G and RJio in Patna, Tata CDMA, Aircel 3G, BSNL 3G, RCOM 3G, Vodafone 3G, RJio, Airtel 2G, Tata 2G in Ranchi and BSNL 3G, Telenor 3G and RJio in Kanpur, Airtel 3G, Vodafone 3G and RJio in Raipur.

(iv) Download Throughput has been observed highest for Airtel 4G in Kota, RJio in Kanpur, Idea 4G in Raipur and Ranchi and Airtel in Patna and Bhiwani

4. The complete report is available at TRAI website 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, TRAI

**Report on Independent Drive Test conducted in
Bhiwani from 4th to 6th October 2017**

The drive test in the city of Bhiwani in Haryana LSA was conducted for a period of 3 days during 4th Oct to 6th Oct, 2017. It covered a route of approximately 285 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Idea, RCOM, Tata, Vodafone, Tata(CDMA), and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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						CDMA
	Airtel	BSNL	Idea	*RCOM	Tata	Vodafone	*Tata
Call Attempt*	472	467	453	406	457	461	209
Blocked Call Rate (%)	0.00%	0.64%	2.65%	4.68%	0.00%	0.43%	18.18%
CSSR% (Accessibility)	100.0%	99.4%	97.4%	95.3%	100.0%	99.6%	81.8%
Dropped Call Rate (%)	0.42%	0.65%	0.00%	1.55%	0.44%	0.00%	8.19%
Mobility HOSR(%)	100.0%	98.9%	100.0%	100.0%	100.0%	99.8%	100.0%
Rx Quality (%)	98.3%	98.0%	98.9%	96.5%	95.3%	99.0%	62.7%

Voice Call	3G					VoLTE
	Airtel	BSNL	Idea	Tata	Vodafone	Jio
Call Attempt	467	450	464	450	467	443
Blocked Call Rate (%)	0.43%	0.22%	0.86%	1.33%	0.00%	0.00%
CSSR% (Accessibility)	99.6%	99.8%	99.1%	98.7%	100.0%	100.0%
Dropped Call Rate (%)	0.65%	0.67%	0.22%	0.45%	0.21%	0.45%
Mobility HOSR(%)	100.0%	100.0%	99.8%	100.0%	100.0%	99.8%
Rx Quality (%)	96.9%	95.4%	97.5%	96.3%	99.0%	88.2%

*In RCOM & Tata CDMA calls did not initiate at the outskirts of Bhiwani city due to lack of coverage

Data Services	2G						CDMA
	Airtel	BSNL	Idea	RCOM	Tata	*Vodafone	Tata
Download Throughput (Kbps)	138.3	111.5	75.5	65.6	153.3	84.0	210.9
Upload Throughput (Kbps)	218.0	106.5	96.9	85.7	169.7	88.9	121.0
Web Browsing Delay (sec)	38.8	31.4	33.3	36.0	37.3	39.0	57.2
Latency (msec)	200	229	341	655	390	-	403

Data Services	3G					4G				
	Airtel	BSNL	Idea	Tata	Vodafone	Airtel	Idea	Jio	RCOM	*Vodafone
Download Throughput (Mbps)	3.0	2.4	1.9	4.2	1.6	11.2	2.6	3.3	3.7	9.1
Upload Throughput (Mbps)	1.7	1.2	1.3	2.6	2.3	8.7	4.2	1.9	1.7	6.4
Web Browsing Delay (sec)	7.9	10.9	9.3	5.4	10.6	4.6	6.2	9.5	7.5	8.0
Video Streaming Delay (sec)	2.8	3.1	3.7	1.6	1.2	0.6	2.6	5.0	1.8	0.9
Latency (msec)	111	78	129	118	-	98	123	113	168	-

**Vodafone has disabled ping in their network*

**Report on Independent Drive Test conducted in
Kanpur from 11th to 15th December 2017**

The drive test in the city of Kanpur in UP East LSA was conducted for a period of 5 days during 11th Dec to 15th Dec, 2017. It covered a route of approximately 670 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, Tata, Vodafone, Telenor, and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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						
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone
Call Attempt	1176	1202	1150	1195	1223	1154	1183
Blocked Call Rate (%)	2.0%	1.2%	1.3%	0.2%	9.2%	0.3%	0.0%
CSSR% (Accessibility)	98.0%	98.8%	98.7%	99.8%	90.8%	99.7%	100.0%
Drop Call Rate (%)	0.3%	0.1%	0.7%	0.2%	0.9%	0.1%	0.4%
Mobility HOSR (%)	98.5%	98.2%	94.3%	99.1%	97.8%	96.6%	98.8%
Rx Quality (%)	98.0%	97.8%	97.0%	98.4%	95.8%	99.1%	98.2%

Voice Call	3G							VoLTE
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone	Jio
Call Attempt	1157	1165	1202	1192	1054	1147	1195	1208
Blocked Call Rate (%)	2.1%	2.1%	0.6%	0.3%	0.5%	2.2%	0.3%	1.7%
CSSR% (Accessibility)	97.9%	97.9%	99.4%	99.7%	99.5%	97.8%	99.7%	98.3%
Drop Call Rate (%)	0.4%	0.3%	1.9%	0.8%	0.3%	0.00%	0.1%	0.1%
Mobility HOSR (%)	99.4%	99.7%	99.1%	99.6%	99.7%	100.0%	100.0%	99.7%
Rx Quality (%)	97.5%	95.9%	93.5%	98.2%	95.9%	94.69%	95.7%	91.0%

Data Services	2G						
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone *
Download Throughput (Kbps)	126.8	110.7	139.6	109.1	124.1	154.7	136.8
Upload Throughput (kbps)	120.8	121.4	176.3	92.3	138.3	148.7	107.5
Web Browsing Delay (sec)	27.2	22.0	25.6	26.4	34.8	31.3	22.4
Latency (msec)	404	688	379	312	558	332	-

Data Services	3G							4G				
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone*	Airtel	Idea	Jio	Telenor	Vodafone*
Download Throughput (Mbps)	1.5	4.3	1.3	4.5	3.5	4.1	5.3	3.2	9.1	11.0	4.7	8.5
Upload Throughput (Mbps)	1.5	1.1	0.8	2.7	1.2	1.1	2.3	4.3	5.0	5.2	3.8	6.2
Web Browsing Delay (sec)	11.4	9.1	14.0	6.1	8.5	9.7	8.1	7.9	5.3	5.9	7.4	5.5
Video Streaming Delay (sec)	Fail	1.2	4.9	0.9	2.1	1.5	1.5	1.1	0.8	1.0	1.0	1.2
Latency (msec)	131	118	221	121	124	130	-	105	138	110	120	-

**Vodafone has Disable the ping*

**Report on Independent Drive Test conducted in
Kota from 13th to 17th November 2017**

The drive test in the city of Kota in Rajasthan LSA was conducted for a period of 5 days during 13th to 17th Nov, 2017. It covered a route of approximately 685 KMS and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, Tata, Vodafone, Tata (CDMA) and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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						CDMA
	Aircel	Airtel	BSNL	Idea	Tata	Vodafone	Tata
Call Attempt	899	960	968	959	880	942	879
Blocked Call Rate (%)	1.7%	0.0%	1.4%	0.0%	2.0%	0.3%	11.0%
CSSR% (Accessibility)	98.3%	100.0%	98.6%	100.0%	98.0%	99.7%	89.0%
Drop Call Rate (%)	0.3%	0.8%	1.2%	0.5%	0.5%	0.3%	6.8%
Mobility HOSR (%)	99.0%	98.3%	96.8%	97.0%	99.2%	98.7%	100.0%
Rx Quality (%)	98.2%	96.3%	97.8%	97.4%	98.2%	98.5%	86.1%

Voice Call	3G				
	Aircel	Airtel	BSNL	Idea	Vodafone
Call Attempt	883	963	960	929	974
Blocked Call Rate (%)	1.6%	1.6%	0.6%	1.3%	2.2%
CSSR% (Accessibility)	98.4%	98.4%	99.4%	98.7%	97.8%
Drop Call Rate (%)	0.3%	0.9%	1.5%	0.5%	1.3%
Mobility HOSR (%)	98.2%	99.8%	99.4%	99.8%	100.0%
Rx Quality (%)	98.2%	93.7%	96.8%	96.3%	96.0%

Data Services	2G						CDMA
	Aircel	Airtel	BSNL	Idea	Tata	Vodafone	Tata
Download Throughput (Kbps)	95.3	161.2	142.2	159.5	Fail	127.0	1212.9
Upload Throughput (kbps)	84.1	176.5	98.7	91.0	191.9	128.4	387.3
Web Browsing Delay (sec)	23.7	17.7	25.2	35.8	20.0	22.6	15.9
Latency (msec)	584	283	536	235	532	296	172

Data Services	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	4.9	2.2	4.9	4.6	12.9	4.6	3.9	6.1
Upload Throughput (Mbps)	1.7	1.2	2.2	2.1	9.8	3.6	2.2	5.6
Web Browsing Delay (sec)	6.3	10.8	7.0	7.8	4.5	7.8	10.7	6.4
Video Streaming Delay (sec)	1.2	4.0	2.4	1.7	0.7	2.2	2.9	1.5
Latency (msec)	222	187	104	169	109	92	75	116

**Report on Independent Drive Test conducted in
Patna from 18th to 22nd December 2017**

The drive test in the city of Patna in Bihar LSA was conducted for a period of 5 days during 18th to 22nd Dec, 2017. It covered a route of approximately 630 KMS and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, Tata, Telenor, Vodafone, Tata (CDMA) and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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							CDMA
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone	Tata*
Call Attempt	1099	1115	1135	1121	1165	1122	1163	209
Blocked Call Rate (%)	0.5%	0.3%	0.4%	0.3%	0.3%	0.0%	0.0%	16.75%
CSSR% (Accessibility)	99.5%	99.7%	99.6%	99.7%	99.7%	100.0%	100.0%	83.3%
Drop Call Rate (%)	0.7%	0.4%	0.7%	0.2%	0.7%	0.2%	0.3%	27.0%
Mobility HOSR (%)	99.5%	97.0%	89.2%	97.9%	98.1%	97.4%	99.1%	100.0%
Rx Quality (%)	96.5%	96.2%	96.7%	98.4%	96.0%	98.2%	99.2%	64.61%

Tata CDMA has less call initiated due to poor coverage

Voice Call	3G							VoLTE
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone	Jio VoLTE
Call Attempt	1068	1116	1125	1135	1100	1023	1106	1095
Blocked Call Rate (%)	0.7%	0.5%	1.5%	1.3%	1.5%	1.56%	0.99%	0.18%
CSSR% (Accessibility)	99.3%	99.5%	98.5%	98.7%	98.5%	98.4%	99.0%	99.8%
Drop Call Rate (%)	0.9%	0.5%	1.4%	0.3%	0.6%	1.99%	0.6%	0.0%
Mobility HOSR (%)	99.9%	99.8%	95.4%	99.7%	99.9%	100.0%	99.8%	99.6%
Rx Quality (%)	96.4%	96.9%	96.4%	97.8%	96.7%	94.05%	95.94%	80.16%

Data Services	2G							CDMA
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone *	Tata*
Download Throughput (Kbps)	106.9	127.2	179.1	114.6	107.4	92.6	79.5	Fail
Upload Throughput (kbps)	96.9	136.6	127.7	116.6	103.7	95.8	92.8	Fail
Web Browsing Delay (sec)	18.3	25.8	23.0	25.8	18.8	24.7	22.2	Fail
Latency (msec)	316	404	357	332	502	550	-	Fail

Vodafone has Disable the ping & Tata CDMA has failed while data testing

Data Services	3G							4G			
	Aircel	Airtel	BSNL	Idea	Tata	Telenor	Vodafone*	Airtel	Idea	Jio	Telenor
Download Throughput (Mbps)	1.8	3.7	3.5	3.6	3.0	3.5	4.2	10.4	6.4	4.2	7.1
Upload Throughput (Mbps)	0.6	0.8	1.4	2.2	0.9	0.8	0.8	3.0	4.7	2.2	5.5
Web Browsing Delay (sec)	13.7	13.4	8.5	10.3	12.7	10.9	11.3	7.5	7.8	11.5	6.3
Video Streaming Delay (sec)	5.5	5.8	6.3	3.0	1.5	5.1	3.4	3.3	1.3	5.2	2.5
Latency (msec)	221	215	229	127	409	225	88	108	150	171	139

Report on Independent Drive Test conducted in Raipur from 6th to 10th November 2017

The drive test in the city of Raipur in MP LSA was conducted for a period of 5 days during 6th to 10th Nov, 2017. It covered a route of approximately 650 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Idea, Tata, Vodafone, Tata (CDMA) and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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					CDMA
	Airtel	BSNL	Idea	Tata	Vodafone	Tata
Call Attempt	879	916	894	818	881	902
Blocked Call Rate (%)	0.6%	1.9%	0.7%	0.5%	0.0%	2.1%
CSSR% (Accessibility)	99.4%	98.1%	99.3%	99.5%	100.0%	97.9%
Drop Call Rate (%)	0.2%	1.2%	0.3%	0.4%	0.0%	0.5%
Mobility HOSR (%)	97.7%	92.8%	99.0%	99.3%	98.8%	100.0%
Rx Quality (%)	95.9%	98.4%	97.7%	99.0%	99.4%	96.7%

Voice Call	3G					VoLTE
	Airtel	BSNL	Idea	Tata	Vodafone	Jio
Call Attempt	882	896	897	790	862	863
Blocked Call Rate (%)	0.3%	1.7%	1.4%	1.1%	1.0%	0.00%
CSSR% (Accessibility)	99.7%	98.3%	98.6%	98.9%	99.0%	100.0%
Drop Call Rate (%)	0.2%	1.0%	1.0%	1.7%	0.4%	0.0%
Mobility HOSR (%)	99.7%	99.5%	99.5%	99.9%	99.9%	99.8%
Rx Quality (%)	91.9%	97.9%	97.7%	97.3%	87.7%	79.41%

Data Services	2G					CDMA
	Airtel	BSNL	Idea	Tata	Vodafone	Tata
Download Throughput (Kbps)	127.2	90.2	134.2	142.2	114.1	420.0
Upload Throughput (Kbps)	158.0	81.9	128.7	103.3	92.6	544.9
Web Browsing Delay (sec)	28.8	20.2	25.9	24.1	21.3	37.5
Latency (msec)	525	454	202	405	371	241

Data Services	3G					4G		
	Airtel	BSNL	Idea	Tata	Vodafone	Airtel	Idea	Jio
Download Throughput (Mbps)	3.5	0.3	2.9	4.1	3.4	8.9	11.5	3.8
Upload Throughput (Mbps)	1.2	0.1	1.3	1.8	1.6	10.1	8.8	3.0
Web Browsing Delay (sec)	8.2	15.9	10.2	7.0	12.3	4.6	5.0	7.5
Video Streaming Delay (sec)	2.6	3.6	1.7	1.8	1.5	1.9	1.4	2.3
Latency (msec)	100	201	272	176	346	97	81	162

Report on Independent Drive Test conducted in Ranchi from 6th to 12th October 2017

The drive test in the city of Ranchi in Bihar LSA was conducted for a period of 5 days during 6th to 12th Oct, 2017. It covered a route of approximately 690 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCOM, Tata, Telenor, Vodafone, Tata (CDMA) and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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								CDMA
	*Aircel	Airtel	*BSNL	*Idea	*RCOM	*Tata	*Telenor	Vodafone	Tata
Call Attempt	805	969	781	898	647	680	866	942	913
Blocked Call Rate (%)	0.2%	1.2%	1.0%	0.2%	1.1%	1.9%	0.8%	0.2%	1.6%
CSSR% (Accessibility)	99.8%	98.8%	99.0%	99.8%	98.9%	98.1%	99.2%	99.8%	98.4%
Drop Call Rate (%)	2.7%	1.4%	3.0%	0.8%	1.6%	0.6%	0.7%	0.5%	10.4%
Mobility HOSR (%)	99.3%	94.8%	88.9%	99.4%	99.0%	95.0%	96.2%	98.8%	100.0%
Rx Quality (%)	96.7%	94.5%	97.0%	98.1%	95.8%	94.0%	97.0%	97.7%	87.0%

Voice Call	3G							VoLTE
	*Aircel	Airtel	*BSNL	*Idea	*RCOM	*Telenor	Vodafone	Jio
Call Attempt	766	964	781	889	721	857	936	920
Blocked Call Rate (%)	2.2%	0.9%	0.8%	0.7%	4.0%	1.8%	1.2%	0.9%
CSSR% (Accessibility)	97.8%	99.1%	99.2%	99.3%	96.0%	98.2%	98.8%	99.1%
Drop Call Rate (%)	15.6%	0.7%	2.6%	1.7%	4.2%	1.4%	1.1%	0.7%
Mobility HOSR (%)	98.7%	98.6%	95.1%	99.9%	99.9%	99.3%	100.0%	99.3%
Rx Quality (%)	83.4%	95.2%	94.7%	97.5%	92.0%	95.4%	94.8%	86.0%

* Calls in Aircel, BSNL, Idea, RCOM, Tata, & Telenor did not initiate at the outskirts of Ranchi City due to lack of coverage.

Data Services	2G								CDMA
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Telenor	*Vodafone	Tata
Download Throughput (Kbps)	140.2	96.5	121.9	171.8	144.9	116.4	140.7	85.8	1061.4
Upload Throughput (kbps)	93.5	132.0	114.1	168.6	197.9	80.9	38.7	91.8	482.0
Web Browsing Delay (sec)	20.9	31.2	20.9	19.6	23.5	22.5	25.1	22.4	27.4
Latency (msec)	289	684	390	295	232	278	370	-	184

Data Services	3G							4G			
	Aircel	Airtel	BSNL	Idea	RCOM	Telenor	*Vodafone	Airtel	Idea	Jio	Telenor
Download Throughput (Mbps)	3.7	4.8	0.7	5.4	1.8	6.2	6.6	4.5	15.3	6.4	6.5
Upload Throughput (Mbps)	0.9	1.7	2.7	3.4	1.3	2.0	2.1	3.3	6.9	2.8	5.0
Web Browsing Delay (sec)	14.1	8.4	11.2	6.9	9.4	7.9	11.0	5.2	4.4	8.4	10.9
Video Streaming Delay (sec)	1.6	2.3	4.3	1.4	3.0	1.7	1.5	2.0	1.4	1.9	2.1
Latency (msec)	310	228	103	143	112	171	-	117	111	129	192

* Vodafone has disabled ping in there network

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 (msecs): Time taken for a packet to reach the receiving endpoint after transmitted from the sending point.
