TRAI Audit Wireless Report for Andhra Pradesh Circle

QE JAN-MAR 2017

Audit Done by:

Regional Office , HYDERABAD(TRAI)

Submitted to:

TRAI HQ
NEW DELHI

1 EXECUTIVE SUMMARY-2G

The objective assessment of Quality of Service (QoS) carried out by TRAI gives an insight into the overall performance of various operators in the AP circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

1.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	BTSs Accumulated down time (Not available for service)	Worst affected BTSs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.07	0.07	99.37	0.07	0.22	0.36	1.933	97.71
Airtel	0.06	0.01	98.03	0.9	1	0.96	2.21	97.18
BSNL	1.14	1.69	98.08	0.61	1.3	0.62	2.47	98
Idea	0.04	0.02	99.05	0.77	0.82	0.72	2.78	97.18
RCOM	0.22	1.31	99.51	0.01	0.13	0.14	0.43	99.48
Tata	0.02	0	99.18	0.05	0.087	0.41	2.71	98.07
Telenor	0.04	0.01	99.59	0.07	0.06	0.62	1.51	98.52
Vodafone	0.04	0.11	99.81	0.08	0.19	0.36	2.76	99.27
Tata CDMA	0.03	0	99.43	0	0.013	0.11	0.81	98.25

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

Following are the parameter wise observations for wireless operators for AP circle:

BTSs Accumulated Downtime:
All Telecom Service providers met the bench mark. Minimum BTS Accumulated downtime was recorded for Tata Docomo at 0.02% and Maximum to BSNL 1.14%

Worst Affected BTSs Due to Downtime:
All Operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for TATA CDMA at 0.00% and Maximum for BSNL 1.69%

Call Set-up Success Rate (CSSR):
All Telecom Service Providers met the benchmark. The maximum CSSR was observed for Vodafone with 99.81%.

SDCCH/ Paging Chl. Congestion:
All operators met the benchmark on SDCCH / Paging Channel Congestion. TATA CDMA recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All Telecom Service Providers met the benchmark on TCH congestion Tata CDMA, RCOM performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Tata Docomo 0.11%.]

Worst Affected Cells Having More than 3% TCH Drop:

All Telecom Service Providers met the benchmark. R Com recorded the best performed at 0.43%.]

%age of connection with good voice quality

All operators met the benchmark for the parameter. Best performance was recorded by R Com at 99.48%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

1.1.1 PMR DATA – JANUARY 2017 FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	BTSs Accumulated down time (Not available for service)	Worst affected BTSs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.07	0.1	99.29	0.08	0.33	0.35	2.02	97.68
Airtel	0.05	0.01	97.78	0.81	0.96	1.01	2.05	97.15
BSNL	1	1.9	98.17	0.61	1.23	0.633	2.51	98
Idea	0.04	0.03	99.17	0.68	0.75	0.7	2.62	97.21
RCOM	0.21	1.54	99.83	0.01	0.1	0.14	0.36	99.48
Tata	0.02	0	99.01	0.07	0.16	0.43	2.71	97.97
Telenor	0.04	0	99.55	0.12	0.06	0.64	1.51	98.42
Vodafone	0.04	0.12	99.87	0.06	0.13	0.37	2.83	99.26
Tata CDMA	0.02	0	99.49	0	0	0.11	0.83	98.25

1.1.2 PMR DATA –FEBRUARY 2017 FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	BTSs Accumulated down time (Not available for service)	Worst affected BTSs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.08	0.1	99.31	0.07	0.2	0.36	2.05	97.7
Airtel	0.06	0	98.16	0.96	1.03	0.95	2.35	97.15
BSNL	1.15	1.4	97.9	0.692	1.34	0.611	2.43	98
Idea	0.03	0.01	98.82	0.91	0.97	0.73	2.93	97.16
RCOM	0.27	1.68	98.77	0.01	0.1	0.14	0.46	99.48
Tata	0.03	0	99.21	0.05	0.07	0.41	2.59	98.07
Telenor	0.04	0.03	99.59	0.07	0.06	0.62	1.56	98.53
Vodafone	0.03	0.1	99.78	0.08	0.22	0.35	2.69	99.27
TATA CDMA	0.03	0	99.38	0	0.03	0.11	0.8	98.25

1.1.3   PMR DATA – MARCH 2017 FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	BTSs Accumulated down time (Not available for service)	Worst affected BTSs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	$\leq 2\%$	$\leq 2\%$	$\geq 95\%$	$\leq 1\%$	$\leq 2\%$	$\leq 2\%$	$\leq 3\%$	$\geq 95\%$
Aircel	0.06	0	99.52	0.05	0.14	0.35	1.73	97.74
Airtel	0.06	0.02	98.16	0.92	1	0.93	2.24	97.23
BSNL	1.28	1.77	98.17	0.53	1.33	0.611	2.48	98
Idea	0.04	0.02	99.15	0.73	0.74	0.72	2.79	97.16
RCOM	0.18	0.71	99.92	0.01	0.18	0.13	0.46	99.49
Tata	0.02	0	99.33	0.03	0.03	0.4	2.82	98.16
Telenor	0.05	0	99.63	0.03	0.05	0.6	1.46	98.62
Vodafone	0.04	0.1	99.79	0.1	0.21	0.35	2.77	99.28
TATA CDMA	0.04	0	99.42	0	0.01	0.11	0.79	98.25

1.2 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	Node Bs down time (Not available for service)	Worst affected Node Bs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl./RRC Congestion	TCH / Circuit switched RAB Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.13	0.96	99.02	0.44	0.28	0.24	2.82	99.8
Airtel	0.07	0.07	98.72	0.015	0	0.33	2.08	98.8
BSNL	0.71	1.49	98.98	0.74	0.55	0.48	2.06	99.79
Idea	0.04	0.02	99.87	0.08	0.08	0.17	1.04	99.73

Following are the parameter wise observations for wireless operators for Gujarat circle:

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for Vodafone at 0.04%.

Worst affected Node Bs due to downtime:

All operators met the benchmark. Minimum worst affected Node Bs due to downtime was recorded for TATA 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.77%.

RRC Congestion:

All operators met the benchmark. Minimum RRC congestion was recorded for Airtel 3G at 0.01%.

Circuit Switched RAB Congestion:

All operators met the benchmark. Minimum Circuit Switched RAB congestion was recorded for Airtel at 0.03%.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Airtel 3Gand Vodafone at 0.19%.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Best performance was recorded for Vodafone 3G at 1.25%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for TATA 3G at 99.71%.

Below are the month wise summary tables for each network parameter basis PMR data.

1.2.1 PMR DATA – JANUARY 2017 FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	Node Bs down time (Not available for service)	Worst affected Node Bs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl./RRC Congestion	TCH / Circuit switched RAB Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.16	1.88	99.07	0.4	0.3	0.2	2.96	99.8
Airtel	0.04	0.04	99.36	0.02	0.0002	0.33	2.31	98.81
BSNL	0.61	1.63	99.11	0.76	0.48	0.47	2.14	99.79
Idea	0.03	0	99.84	0.15	0.11	0.18	1.1	99.72

1.2.2 PMR DATA –FEBRUARY 2017 FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	Node Bs down time (Not available for service)	Worst affected Node Bs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl./RRC Congestion	TCH / Circuit switched RAB Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.16	1.01	98.9	0.44	0.41	0.2	2.78	99.8
Airtel	0.08	0.12	98.83	0.01	0.0001	0.32	2.31	98.83
BSNL	0.7	1.7	99.25	0.63	0.46	0.48	1.9	99.79
Idea	0.04	0.04	99.87	0.06	0.08	0.18	1.09	99.73

1.2.3 PMR DATA – MARCH 2017 FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	Node Bs down time (Not available for service)	Worst affected Node Bs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl./RRC Congestion	TCH / Circuit switched RAB Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Bench Mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.06	0	99.09	0.47	0.13	0.32	2.73	99.81
Airtel	0.08	0.04	97.97	0.0148	0.0025	0.33	1.62	98.77
BSNL	0.82	1.15	98.57	0.83	0.72	0.49	2.13	99.78
Idea	0.04	0.01	99.89	0.03	0.06	0.16	0.94	99.73

Below are the month wise summary tables for each network parameter basis PMR and Live data.

1.3   LIVE CALLING DATA – CONSOLIDATED

Calling Operator	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
Total No. of calls Attempted	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100
Calls got connected to agent with in 90 sec.	100	100	100	100	100	100	100	100	100
%age of calls got answered	100%	100%	100%	100%	100%	100%	100%	100%	100%

Resolution of billing complaints

As per the consumers (live calling exercise) all of the operators met the benchmark of resolving 100% complaints within 6 weeks.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark of 95% .

Customer Care / Helpline Assessment (voice to voice)

All operators met the benchmark for Customer Care / Helpline assessment (voice to voice).

Level 1 Service

As per the live calling results, all of the operators met the TRAI benchmark for level 1 service with calls being answered.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests.

1.4 BILLING AND CUSTOMER CARE – CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints			Response to customer for assistance			
						Customer Care		Termination / closure	
	Metering and Billing credibility-Post paid	Metering and Billing credibility-Prepaid	Billing Complaints-% complaints resolved in 4 weeks	Billing Complaints- % complaints resolved in 6 weeks	% of cases where credit / waiver is received with in one week	Percentage of calls answered by the IVR	Percentage of calls answered by the Operators (voice to voice)	% age requests for termination / closure of service compiled with in 7 days	Time taken for refund of deposits after closures
Bench Mark	$\leq$ 0.1%	$\leq$ 0.1%	$\geq$ 98%	$\geq$ 100%	$\geq$ 100%	$\geq$ 95%	$\geq$ 95%	100%	100%
Aircel	0.02	0	100	100	100	97.25	98.05	100	100
Airtel	0.01	0.001	100	100	100	100	92	100	100
BSNL	0	0	100	100	100	97.63	95.63	100	100
Idea	0.07	0.011	100	100	100	98.33	98.84	100	100
RCOM	0.09	0.03	100	100	100	99.37	97.16	100	69
Tata	0	0	98	100	100	97.29	93.91	100	100
Telenor	NA	0.006	100	100	100	99.57	99.78	NA	NA
Vodafone	0.09	0.05	100	100	100	100	99	100	100
TATA CDMA	0	0	98	100	100	100	98.72	100	100

NA: Not applicable

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed Telenor don't have post -paid connection.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, all operators met the benchmark of charging disputes. Aircel,BSNL, TATA CDMA and TATA GSM performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and resolving 100% complaints within 6 weeks.

Response Time to customer for assistance - % of cases in which advance waiver is received within one week

ALL Operators are meeting the bench mark.

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark of 95% IVR call being attended.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Airtel & TATA GSM are not meeting the benchmark.

1.5 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

Inter Operator call Assessment		Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
To ↓	From →									
Aircel		100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel		100%	100%	100%	100%	100%	100%	100%	100%	100%
BSNL		100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea		100%	100%	100%	100%	100%	100%	100%	100%	100%
RCOM		100%	100%	100%	100%	100%	100%	100%	100%	100%
TATA		100%	100%	100%	100%	100%	100%	100%	100%	100%
Telenor		100%	100%	100%	100%	100%	100%	100%	100%	100%
Vodafone		100%	100%	100%	100%	100%	100%	100%	100%	100%
TATA CDMA		100%	100%	100%	100%	100%	100%	100%	100%	100%

In the inter-operator call assessment, all operators performed satisfactory.

1.6 COMPARISON BETWEEN AUDITED DATA AND OPERATOR'S DATA FOR PMR 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection maintainance (Retainability)					
	BTSs Accumulated down time (Not available for service)		Worst affected BTSs due to downtime		Call set-up Success Rate (Within licensee's own network)		SDCCH / paging Chl. Congestion		TCH Congestion		Call Drop Rate (%age)		Worst affected cells having more than 3% TCH drop		%age of connection with good voice quality	
Bench Mark	< 2%		< 2%		> 95%		< 1%		< 2%		< 2%		< 3%		> 95%	
	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD
Aircel	0.07	0.07	0.03	0.07	99.37	99.37	0.07	0.07	0.22	0.22	0.35	0.36	1.94	1.933	97.71	97.71
Airtel	0.06	0.06	0.01	0.01	98.03	98.03	0.9	0.9	1	1	0.97	0.96	2.21	2.21	97.18	97.18
BSNL	1.12	1.14	1.71	1.69	98.08	98.08	0.61	0.61	1.3	1.3	0.62	0.62	2.47	2.47	98	98
Idea	0.04	0.04	0.02	0.02	99.05	99.05	0.77	0.77	0.82	0.82	0.71	0.72	2.78	2.78	97.18	97.18
RCOM	0.22	0.22	1.31	1.31	99.51	99.51	0.01	0.01	0.13	0.13	0.14	0.14	0.42	0.43	99.48	99.48
Tata	0.02	0.02	0	0	99.19	99.18	0.05	0.05	0.09	0.087	0.41	0.41	2.71	2.71	98.06	98.07
Telenor	0.04	0.04	0.01	0.01	99.59	99.59	0.08	0.07	0.06	0.06	0.62	0.62	1.51	1.51	98.52	98.52
Vodafone	0.04	0.04	0.11	0.11	99.81	99.81	0.08	0.08	0.19	0.19	0.36	0.36	2.76	2.76	99.27	99.27
Tata CDMA	0.03	0.03	0	0	99.43	99.43	0	0	0.02	0.013	0.11	0.11	0.81	0.81	98.25	98.25

1.7 COMPARISON BETWEEN AUDITED DATA AND OPERATOR'S DATA FOR PMR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection maintainance (Retainability)		
	Node Bs down time (Not available for service)	Worst affected Node Bs due to downtime	Call set-up Success Rate (Within licensee's own network)	SDCCH / paging Chl./RRC Congestion	TCH/ Circuit switched RAB Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality

Bench Mark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%	
	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD	Operators	ROHYD
Aircel	0.13	0.13	0.96	0.96	99.02	99.02	0.43	0.44	0.28	0.28	0.24	0.24	2.82	2.82	99.8	99.8
Airtel	0.07	0.07	0.07	0.07	98.72	98.72	0.02	0.015	0	0	0.33	0.33	2.08	2.08	98.8	98.8
BSNL	0.7	0.71	1.47	1.49	99	98.98	0.7	0.74	0.5	0.55	0.4	0.48	2.03	2.06	99.7	99.79
Idea	0.05	0.04	0.02	0.02	99.86	99.87	0.08	0.08	0.08	0.08	0.17	0.17	1.04	1.04	99.73	99.73

2   PARAMETER DESCRIPTION& DETAILED FINDINGS -

2.1   BTS ACCUMULATED DOWNTIME

2.1.1   PARAMETER DESCRIPTION

⮑ The parameter of network availability would be measured from following sub-parameters

  1. BTSs Accumulated downtime (not available for service)

  2. Worst affected BTSs due to downtime

1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.

2. **Computation Methodology –**
   BTS accumulated downtime (not available for service) = **Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100**

3. **TRAI Benchmark –**

   a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

➲ The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

➲ All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

➲ Any outage as a result of force majeure were not considered at the time of calculation

➲ Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

➲ List of operating sites with cell details and ids are taken from the operator.

➲ When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

2.1.2   KEY FINDINGS - CONSOLIDATED
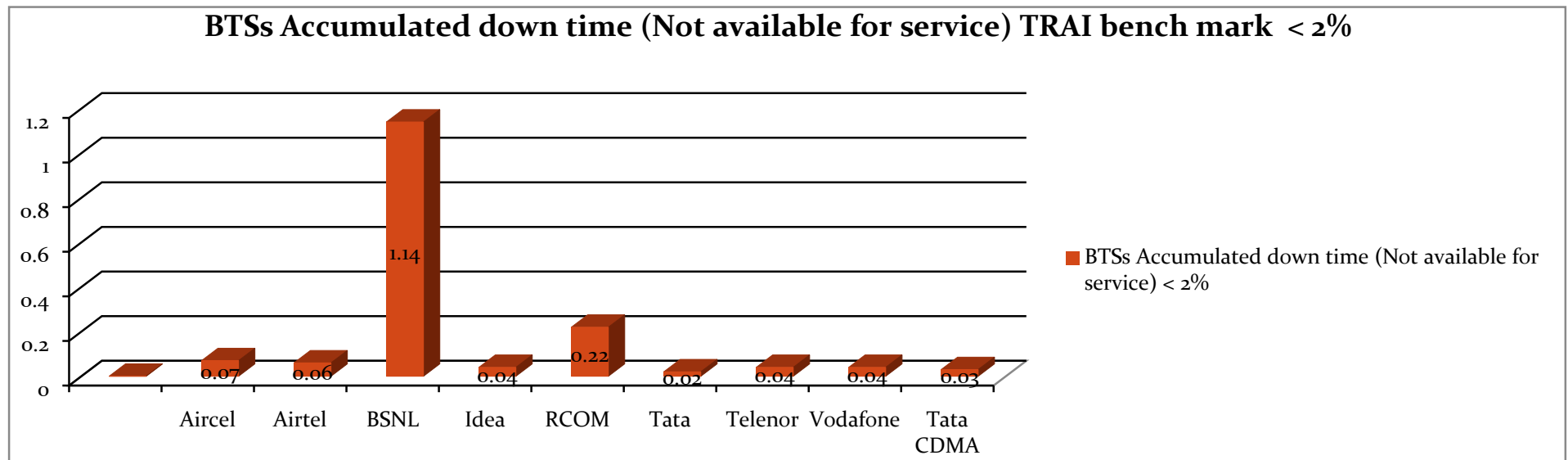
BTSs Accumulated down time (Not available for service) TRAI bench mark < 2%

Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for BTS accumulated downtime as per audit/PMR data.

2.1.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)
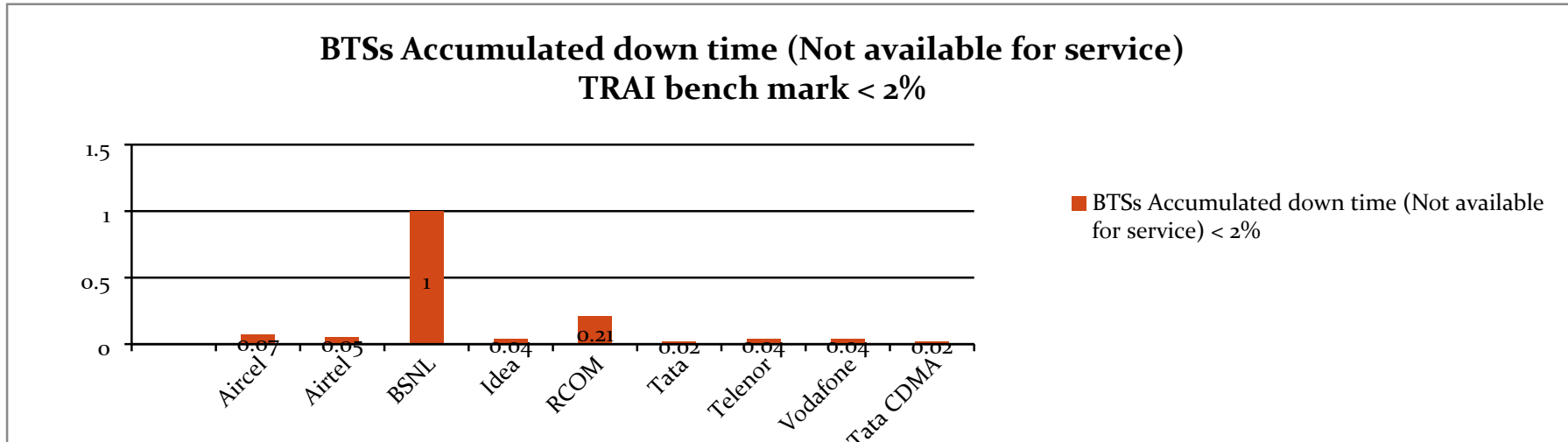
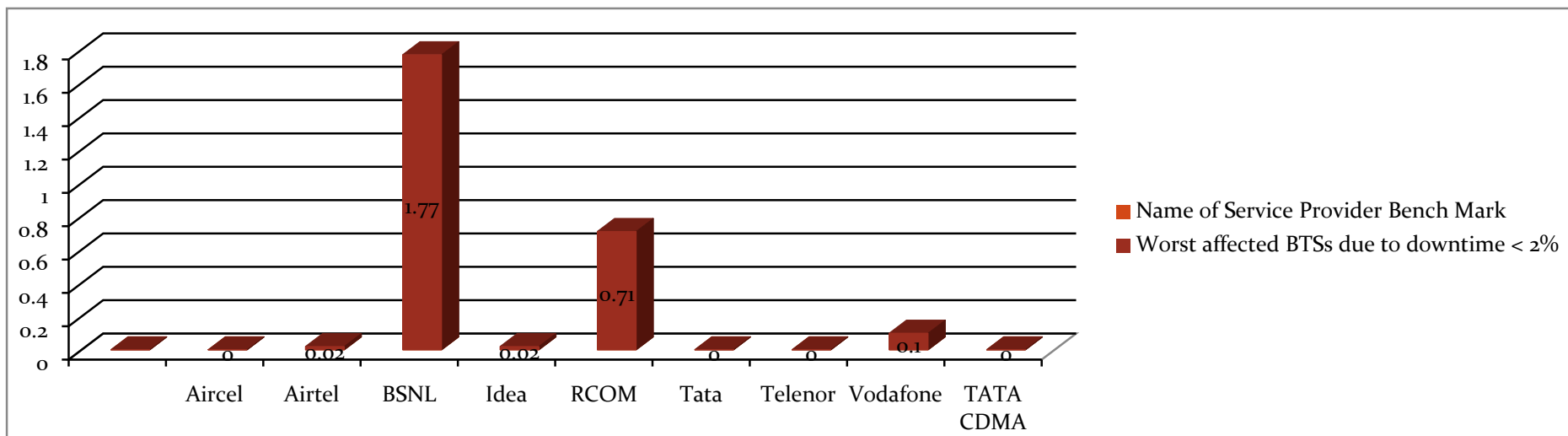*Data Source: Operations and Maintenance Center (OMC) of the operators*

2.1.2.2   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)

BTSs Accumulated down time (Not available for service) < 2%

Legend: BTSs Accumulated down time (Not available for service) < 2%

Values: Aircel, Airtel 0.08, BSNL 1.15, Idea 0.06, RCOM 0.27, Tata 0.03, Telenor 0.03, Vodafone 0.04, TATA CDMA 0.03
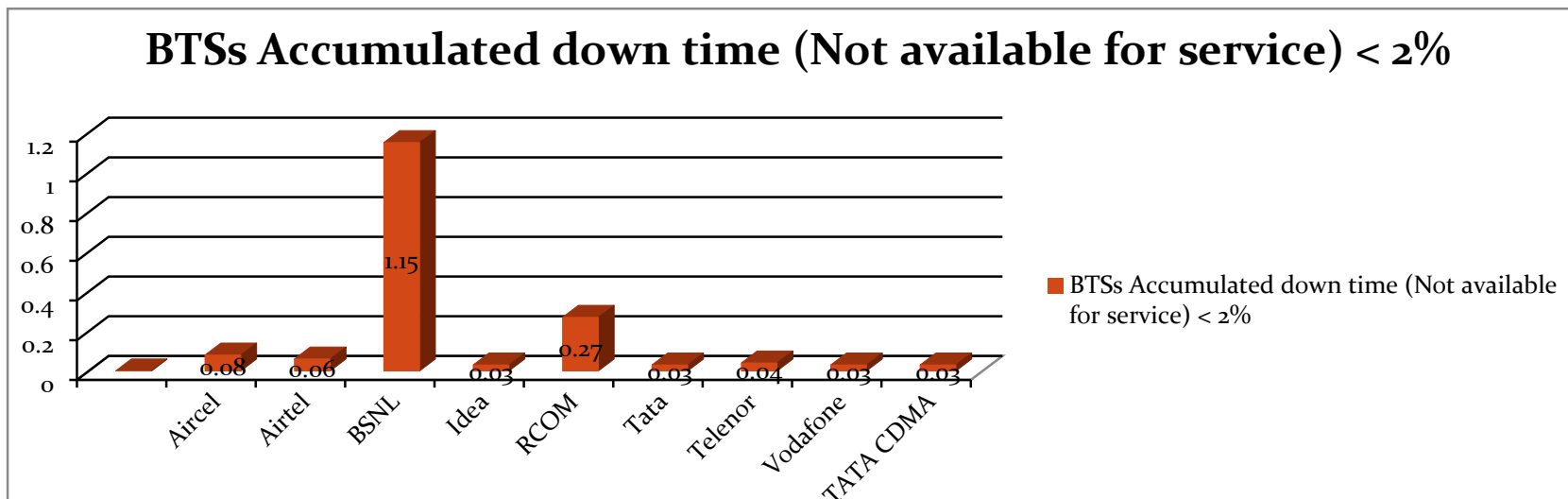
Data Source: Operations and Maintenance Center (OMC) of the operator

2.1.2.3   KEY FINDINGS – MONTH 3 (MARCH-2017)

BTSs Accumulated down time (Not available for service) < 2%

Legend: BTSs Accumulated down time (Not available for service) < 2%

Values: Aircel, Airtel 0.06, BSNL 0.06, Idea 1.28, RCOM 0.04, Tata 0.18, Telenor 0.02, Vodafone 0.05, TATA CDMA 0.04, 0.04
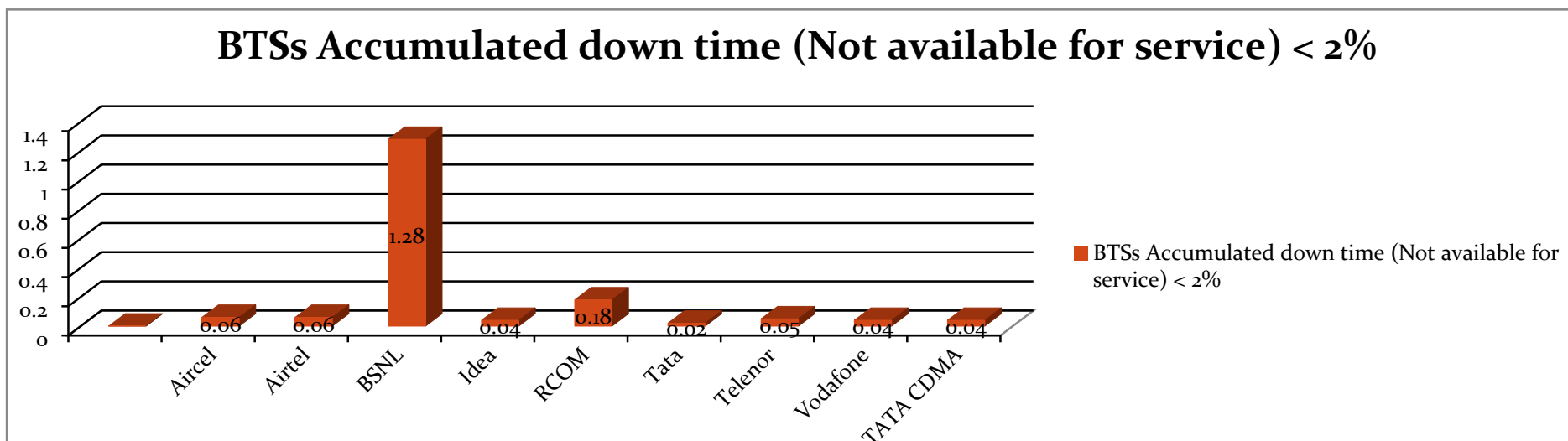
Data Source: Operations and Maintenance Center (OMC) of the operators

2.2   WORST AFFECTED BTS DUE TO DOWNTIME

2.2.1   PARAMETER DESCRIPTION

- **Definition** – **Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

  For measuring the parameter "Percentage of worst affected BTSs due to downtime" the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology** –

  Worst affected BTSs due to downtime = (**Number of BTSs having accumulated downtime greater than 24 hours in a month** /**Number of BTS in Licensed Service Area) * 100**

- **TRAI Benchmark** –

  a.   Worst affected BTSs due to downtime ≤ 2%

- **Audit Procedure** –

  i.   The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii.   All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

  iii.   Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv.   Any outage as a result of force majeure was not considered at the time of calculation.

  v.   List of operating sites with cell details and ids are taken from the operator.

  vi.   All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

2.2.2   KEY FINDINGS– CONSOLIDATED
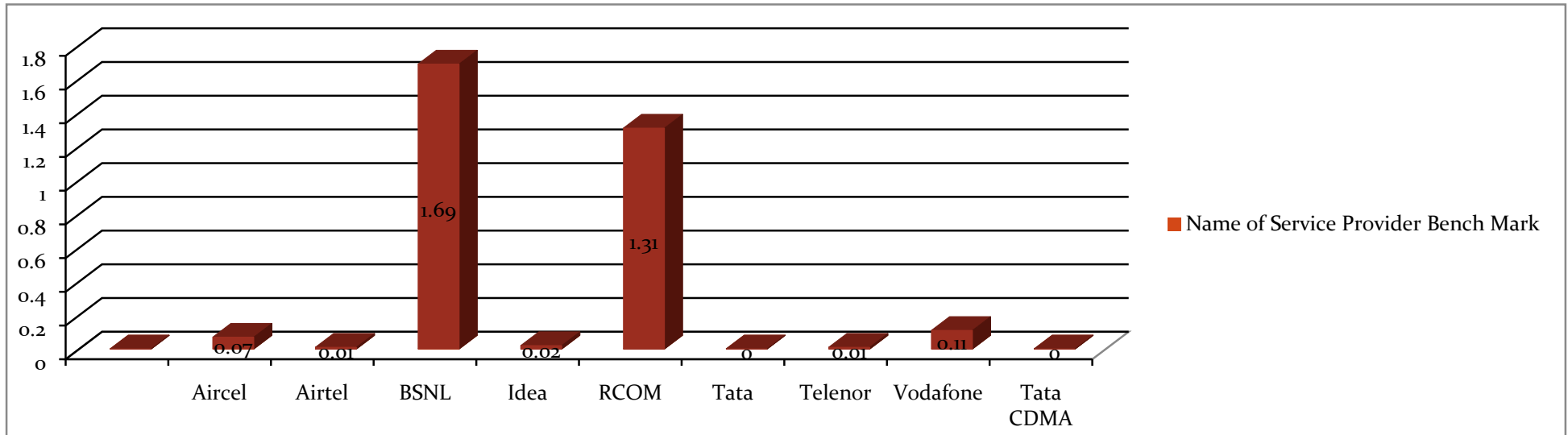
Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

Significant difference was observed between PMR & live measurement data for Telenor,Reliance GSM & CDMA and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

2.2.2.1 KEY FINDINGS – MONTH 1 (JANUARY 2017)
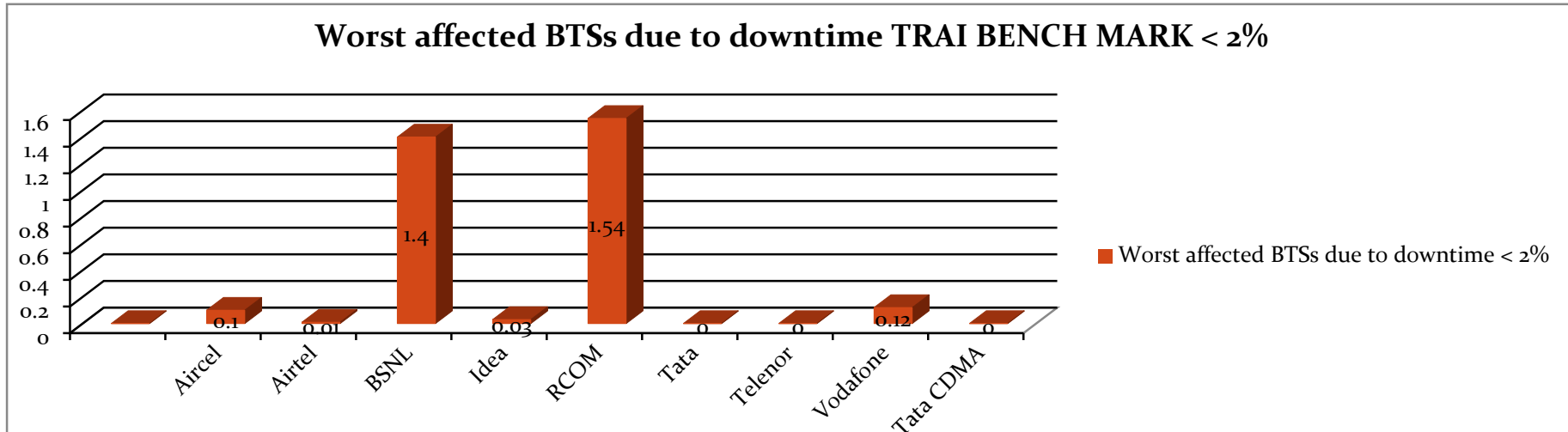
Worst affected BTSs due to downtime TRAI BENCH MARK < 2%

Chart legend: ■ Worst affected BTSs due to downtime < 2%

Values: Aircel 0.1, Airtel 0.01, BSNL 1.4, Idea 0.03, RCOM 1.54, Tata 0, Telenor 0, Vodafone 0.12, Tata CDMA 0

2.2.2.2 KEY FINDINGS – MONTH 2 9FEBRUARY 2017)

Chart legend: ■ Name of Service Provider Bench Mark

Values: Aircel 0.1, Airtel 0, BSNL 1.4, Idea 0.01, RCOM 1.68, Tata 0, Telenor 0.03, Vodafone 0.1, TATA CDMA 0
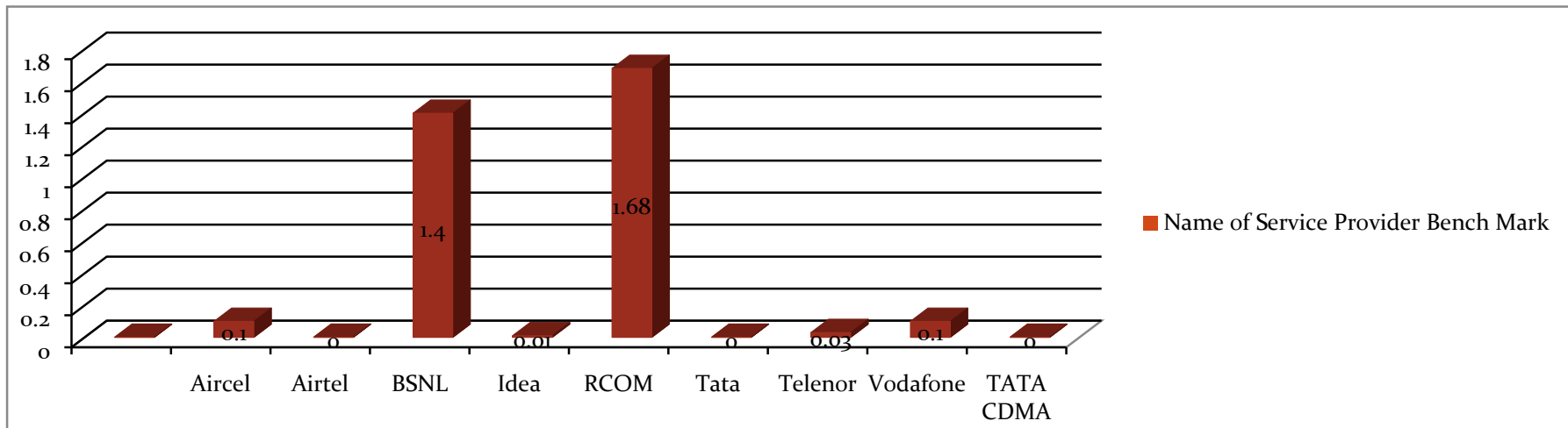
Data Source: Operations and Maintenance Center (OMC) of the operators

2.2.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

Data Source: Operations and Maintenance Center (OMC) of the operators

2.3   CALL SET UP SUCCESS RATE

2.3.1   PARAMETER DESCRIPTION

1. **Definition:** The ratio of successful calls established to total calls is known as Call Set-Up Success Rate (CSSR).
2. **Computation Methodology-**

(Calls Established / Total Call Attempts) * 100

Call Established means the following events have happened in call setup:-

- ↳   call attempt is made

- ↳   the TCH is allocated

- ↳   the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark**≥ 95%
4. **Audit Procedure** –

- ↳   The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

- ↳   CSSR calculation should be measured using OMC generated data only

- ↳   Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week

- ↳   Counter data is extracted from the NOC of the operators.

- ↳   Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.

- ↳   The numerator and denominator values are derived from adding the counter values from the MSC.

2.3.2   KEY FINDINGS - CONSOLIDATED
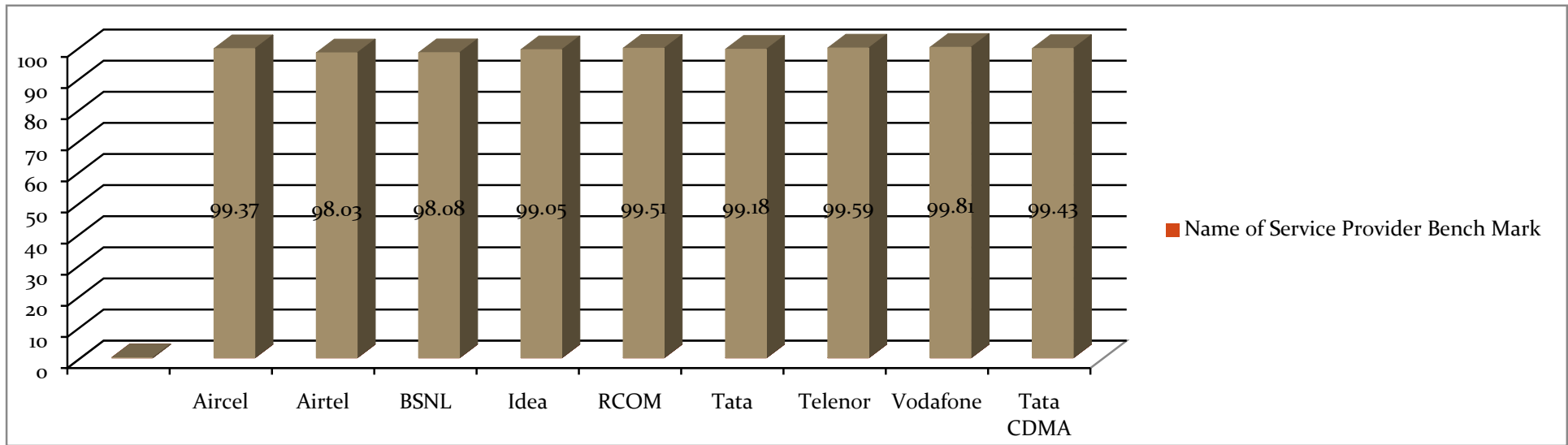
Bar chart with values: Aircel 99.37, Airtel 98.03, BSNL 98.08, Idea 99.05, RCOM 99.51, Tata 99.18, Telenor 99.59, Vodafone 99.81, Tata CDMA 99.43. Legend: Name of Service Provider Bench Mark

Data Source: Network Operations Center(NOC) of the operators

All operators met the TRAI benchmark as per audit/PMR data.

2.3.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)

call setup success Rate (with in licensee's own network) TRAI Bench mark > 95%

Bar chart with values: Aircel 99.29, Airtel 97.78, BSNL 98.17, Idea 99.17, RCOM 99.83, Tata 99.01, Telenor 99.55, Vodafone 99.87, Tata CDMA 99.49. Legend: Name of Service Provider Bench Mark
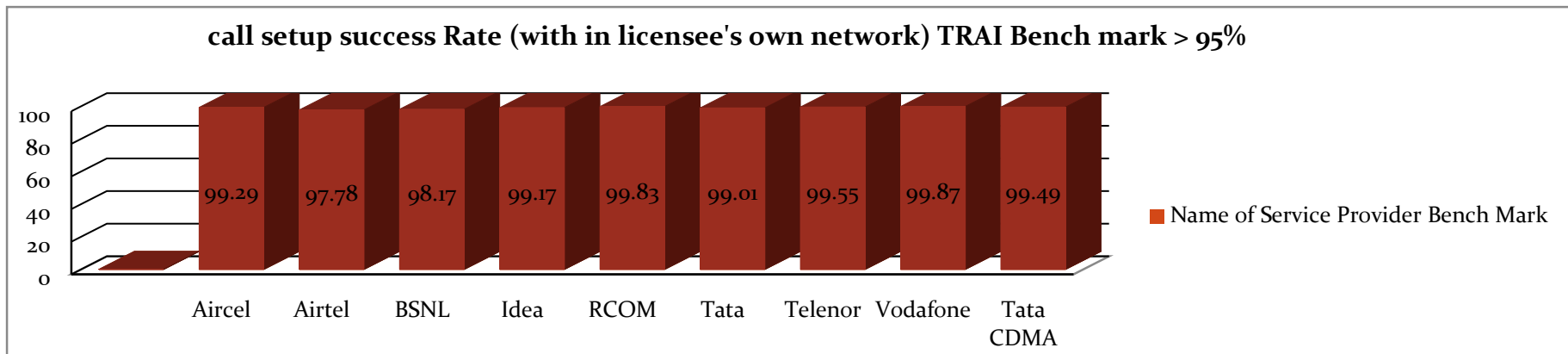
Data Source: Network Operations Center(NOC) of the operators

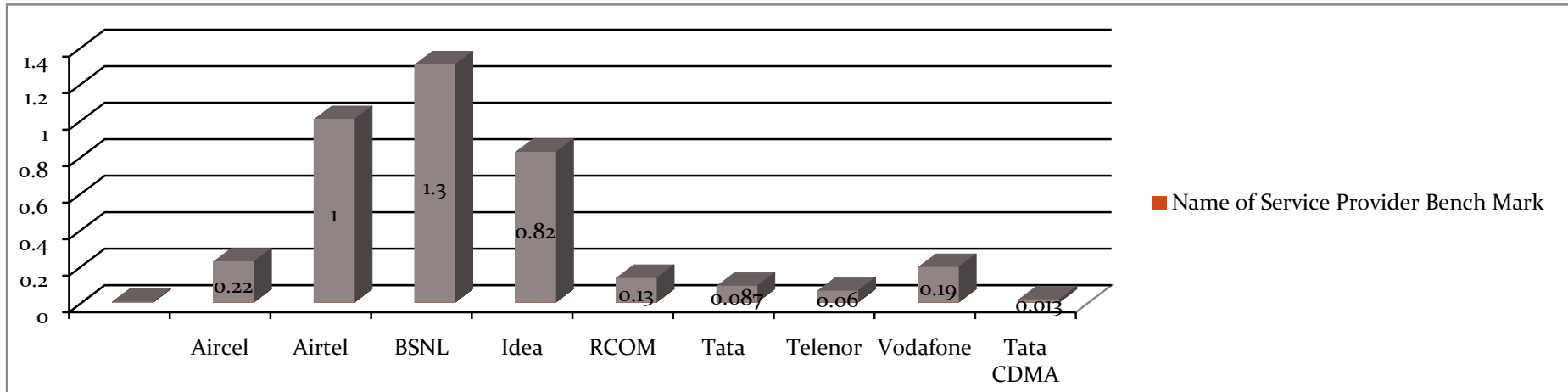## 2.3.2.2   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)
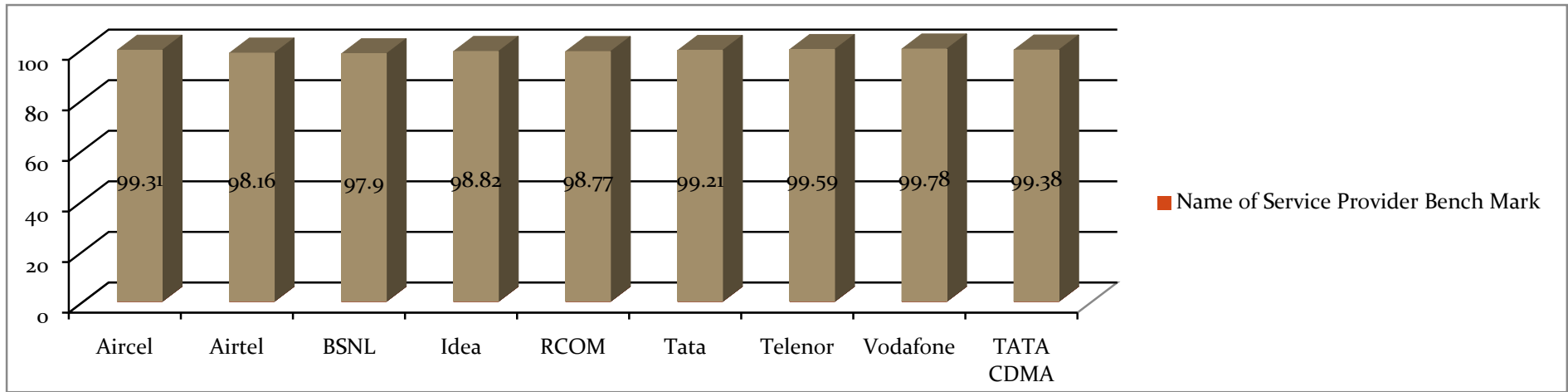
Data Source: Network Operations Center(NOC) of the operators

2.3.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)
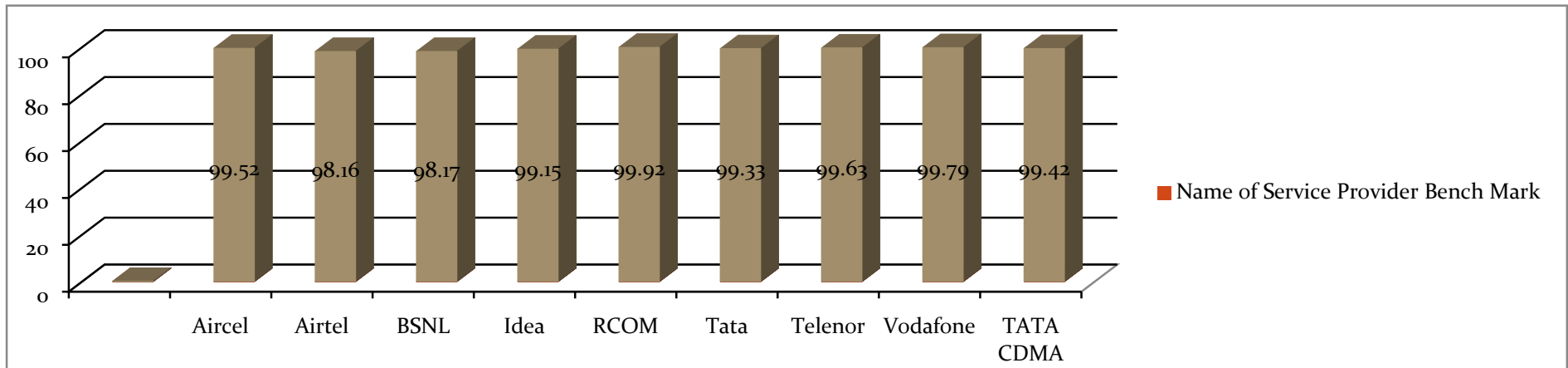
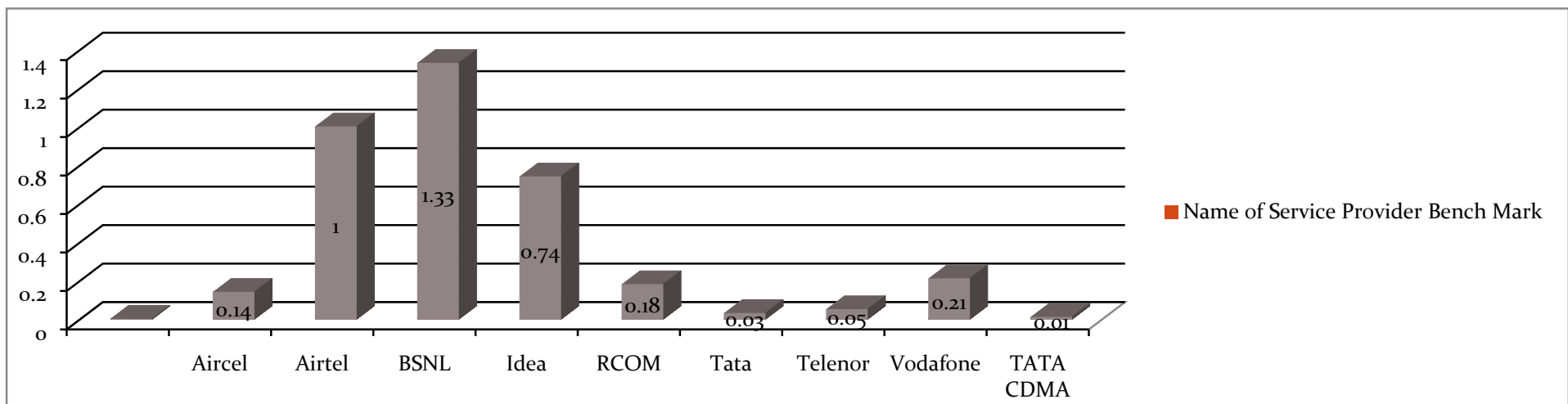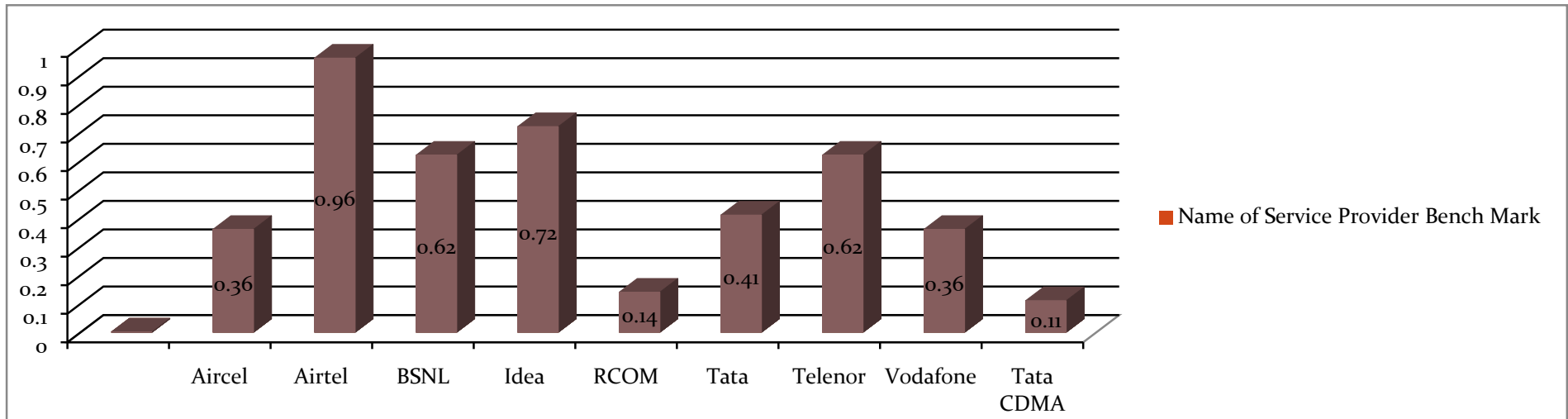*Data Source: Network Operations Center(NOC) of the operators*

2.4   NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

2.4.1   PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:

    - SDCCH Level: Stand-alone dedicated control channel

    - TCH Level: Traffic Channel

    - POI Level: Point of Interconnect

2. **Computational Methodology:**

    - **SDCCH / TCH Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) +.......+ (A_n \times C_n)] / (A_1 + A_2 +...+ A_n)$**

        - Where:-A_1 = Number of attempts to establish SDCCH / TCH made on day 1

        - C_1 = Average SDCCH / TCH Congestion % on day 1

        - A_2 = Number of attempts to establish SDCCH / TCH made on day 2

        - C_2 = Average SDCCH / TCH Congestion % on day 2

        - A_n = Number of attempts to establish SDCCH / TCH made on day n

        - C_n = Average SDCCH / TCH Congestion % on day n

    - **POI Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) +.......+ (A_n \times C_n)] / (A_1 + A_2 +...+ A_n)$**

        - Where:-A_1 = POI traffic offered on all POIs (no. of calls) on day 1

        - C_1 = Average POI Congestion % on day 1

        - A_2 = POI traffic offered on all POIs (no. of calls) on day 2

        - C_2 = Average POI Congestion % on day 2

        - A_n = POI traffic offered on all POIs (no. of calls) on day n

- Cn = Average POI Congestion % on day n

3. **Benchmark:**

   ↳ SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

4. **Audit Procedure** –

   ↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted

   ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

2.4.2   KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)
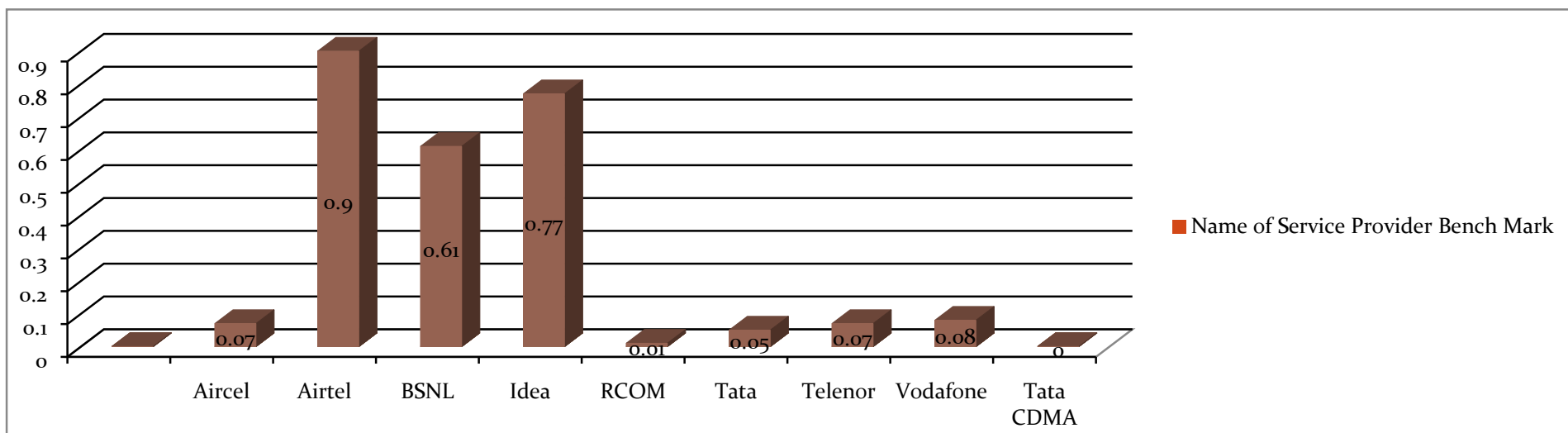
Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark as per PMR/audit Data.

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

2.4.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)
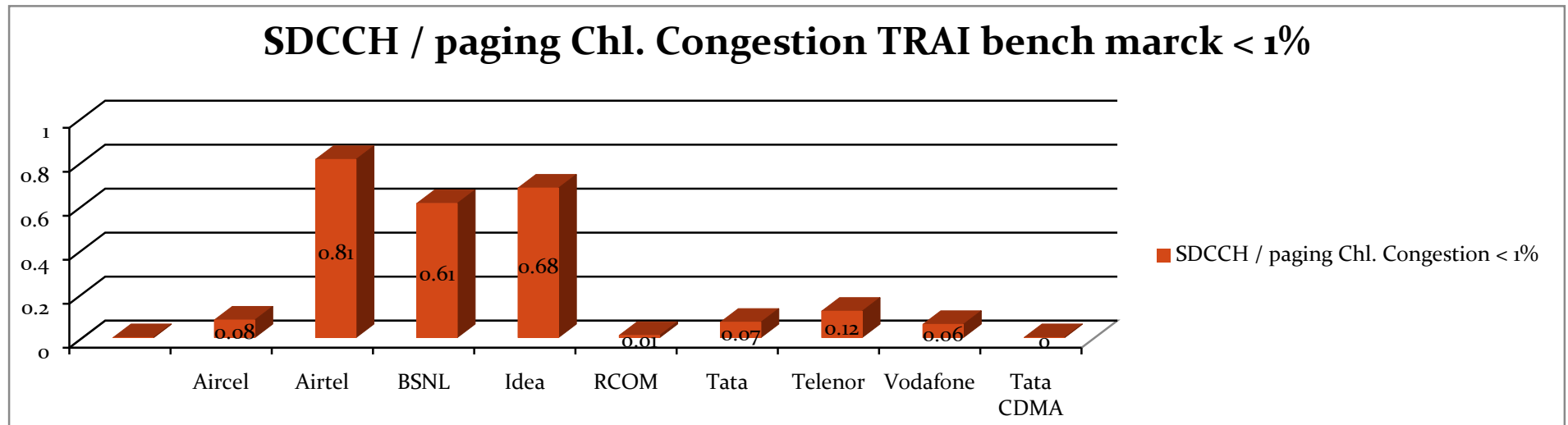
SDCCH / paging Chl. Congestion TRAI bench marck < 1%

Legend: SDCCH / paging Chl. Congestion < 1%

Values: Aircel (—), Airtel 0.81, BSNL 0.61, Idea 0.68, RCOM 0.01, Tata 0.07, Telenor 0.12, Vodafone 0.06, Tata CDMA 0

Data Source: Network Operations Center(NOC) of the operators

2.4.2.1   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)

Legend: Name of Service Provider Bench Mark

Values: Aircel (—), Airtel 0.96, BSNL 0.692, Idea 0.91, RCOM 0.01, Tata 0.05, Telenor 0.07, Vodafone 0.08, TATA CDMA 0
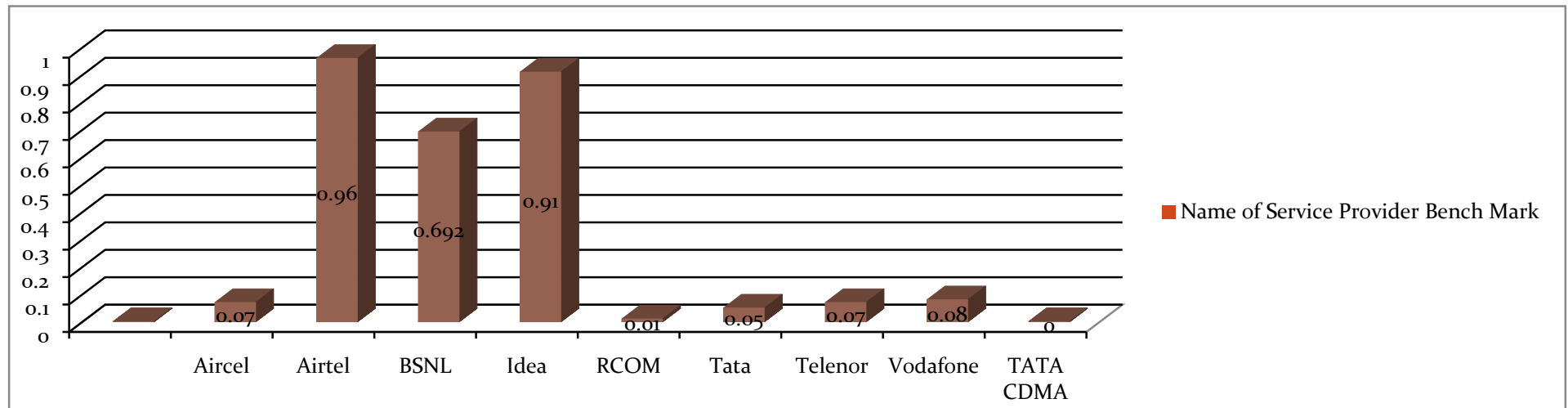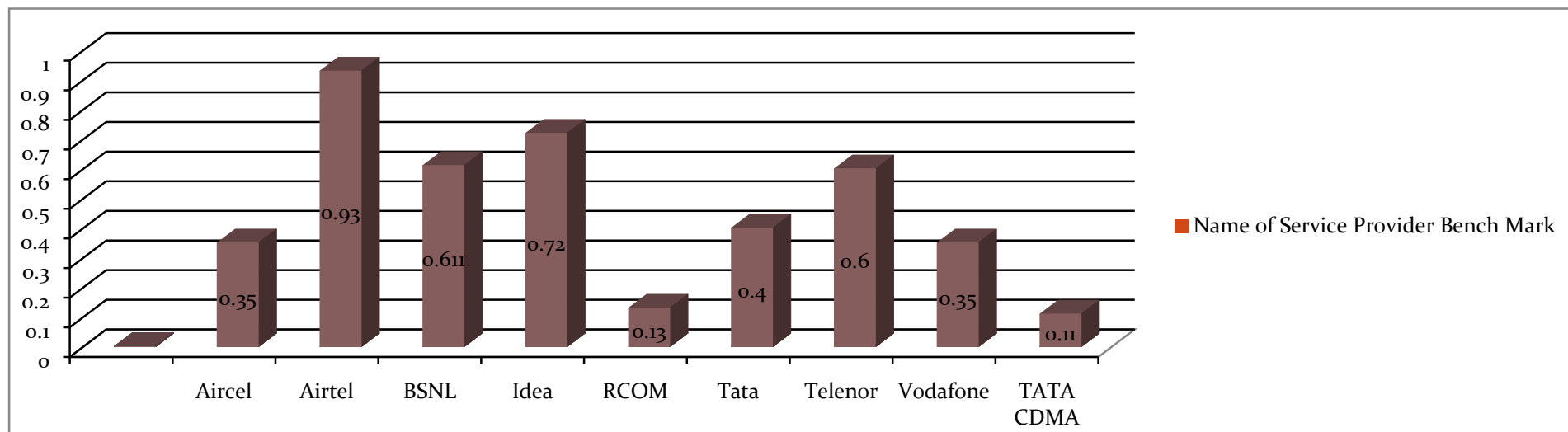
Data Source: Network Operations Center(NOC) of the operators

2.4.2.2   KEY FINDINGS – MONTH 3 (MARCH 2017)
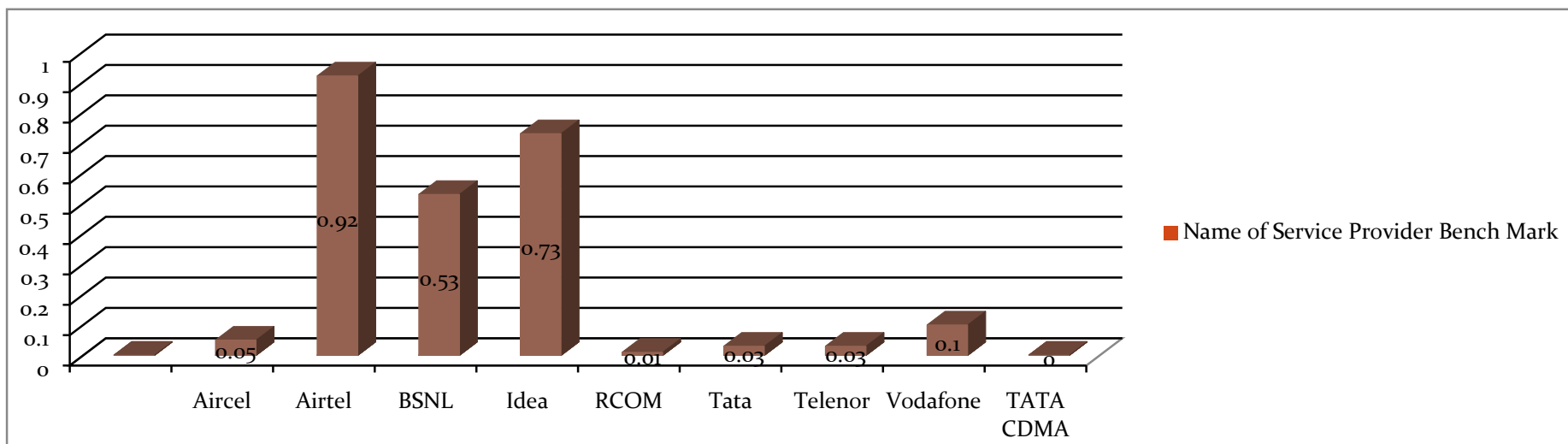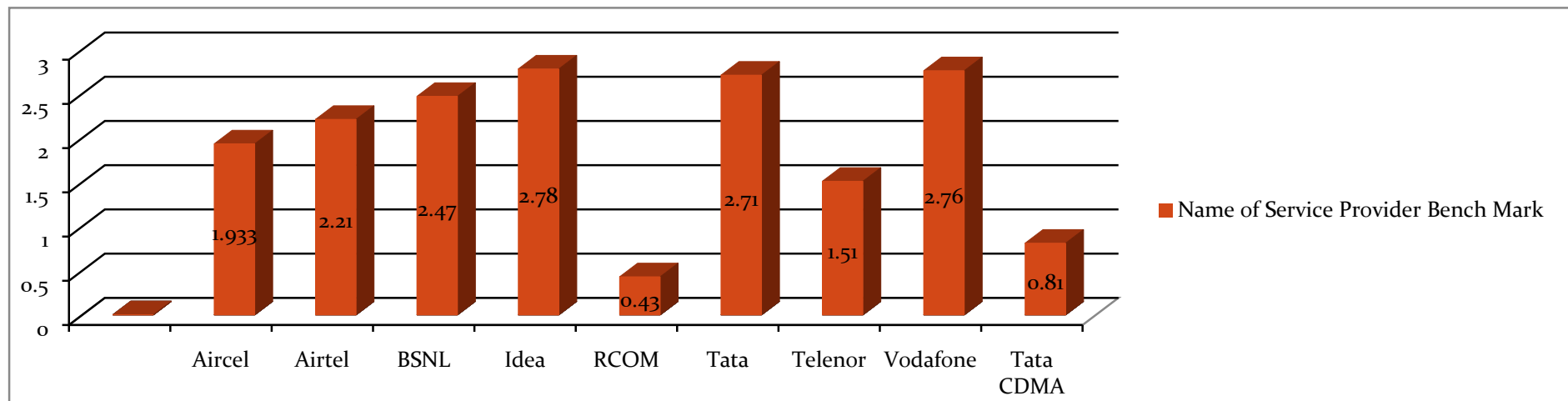

Data Source: Network Operations Center(NOC) of the operators

2.4.3   KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark as per audit/PMR report.

Significant difference was observed between PMR & live measurement data for Airtel, RelianceGSM, Vodafone, Telenor and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

2.4.3.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)
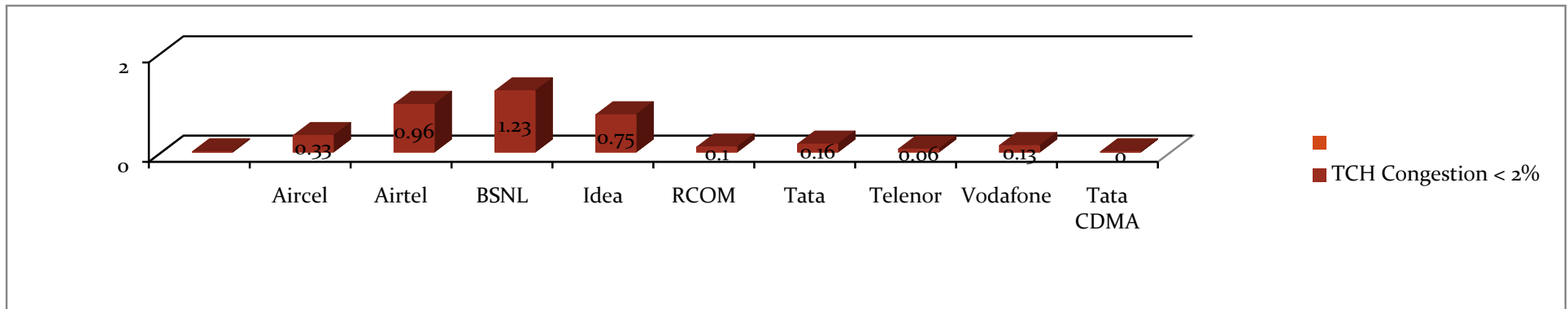
Data Source: Network Operations Center(NOC) of the operators

2.4.3.2 KEY FINDINGS – MONTH 2 (FEBRUARY 2017)
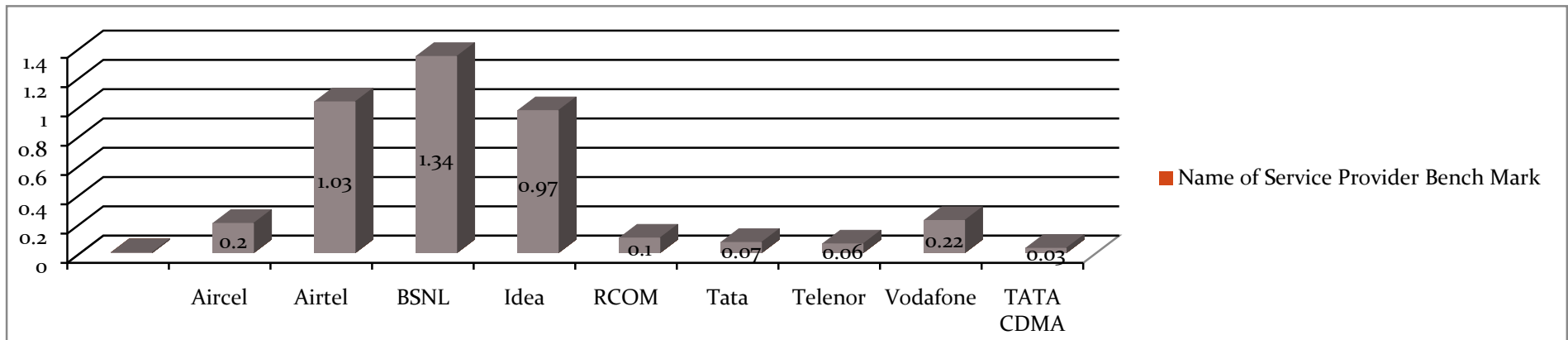
Data Source: Network Operations Center(NOC) of the operators

2.4.3.3 KEY FINDINGS – MONTH 3 (MARCH 2017)

Data Source: Network Operations Center(NOC) of the operators

2.5 CALL DROP RATE

2.5.1 PARAMETER DESCRIPTION

1. **Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.

   - ↳ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss

   - ↳ **Total calls established** = All calls that have TCH allocation during busy hour

2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**

3. **TRAI Benchmark** –

   - ↳ Call drop rate ≤ 2%

4. **Audit Procedure** –

   - ↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used

   - ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.
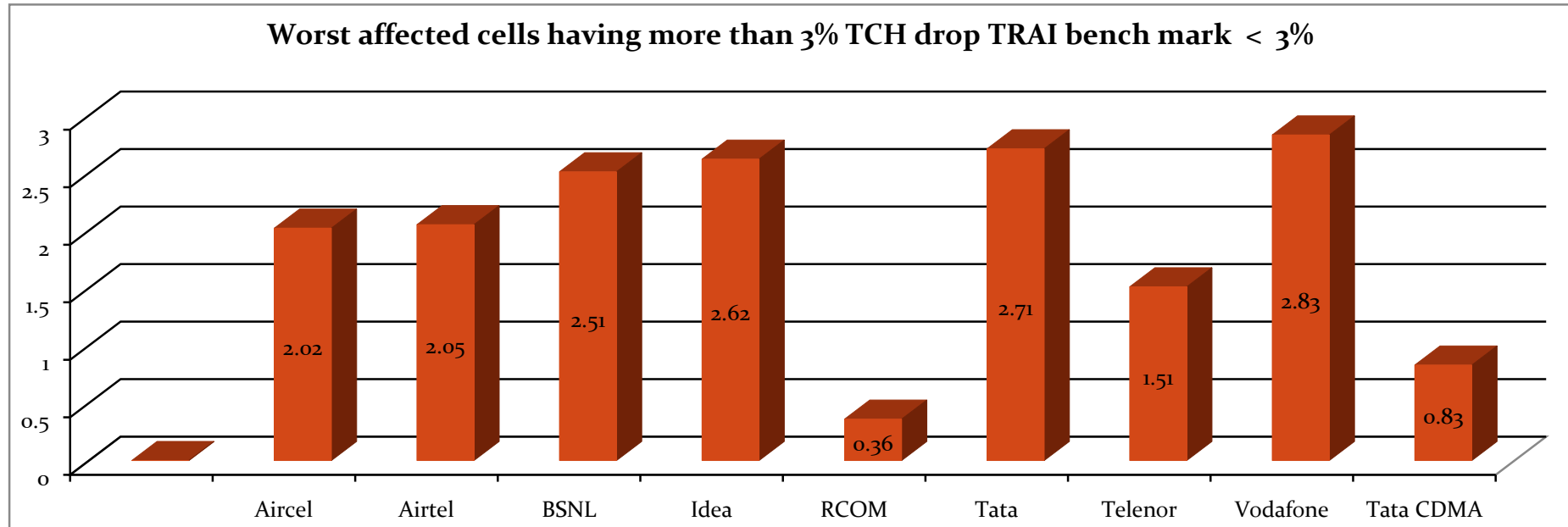
2.5.2   KEY FINDINGS - CONSOLIDATED

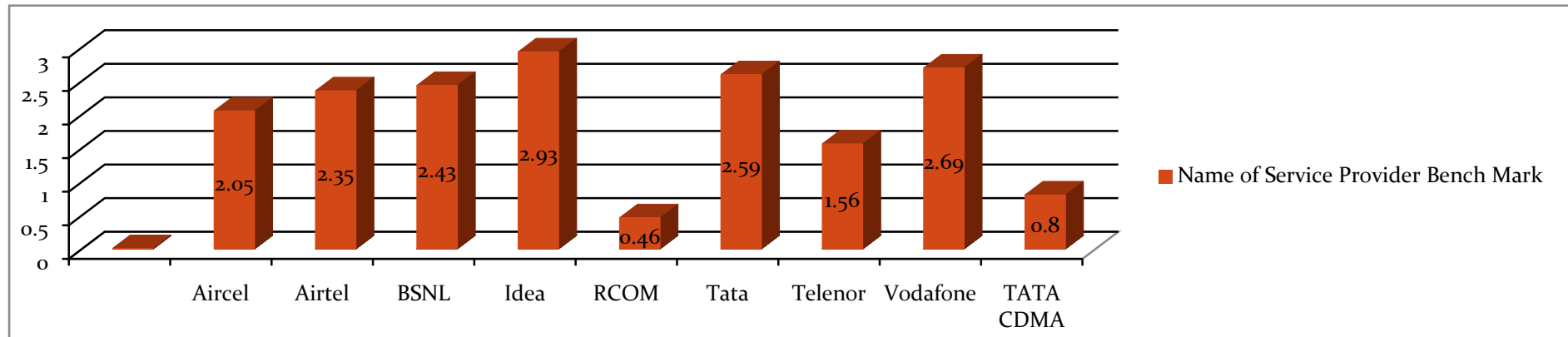*Data Source: Network Operations Center(NOC) of the operators*
All operators met the benchmark for call drop rate during audit.

2.5.2.1   KEY FINDINGS – MONTH 1(JANUARY 2017)
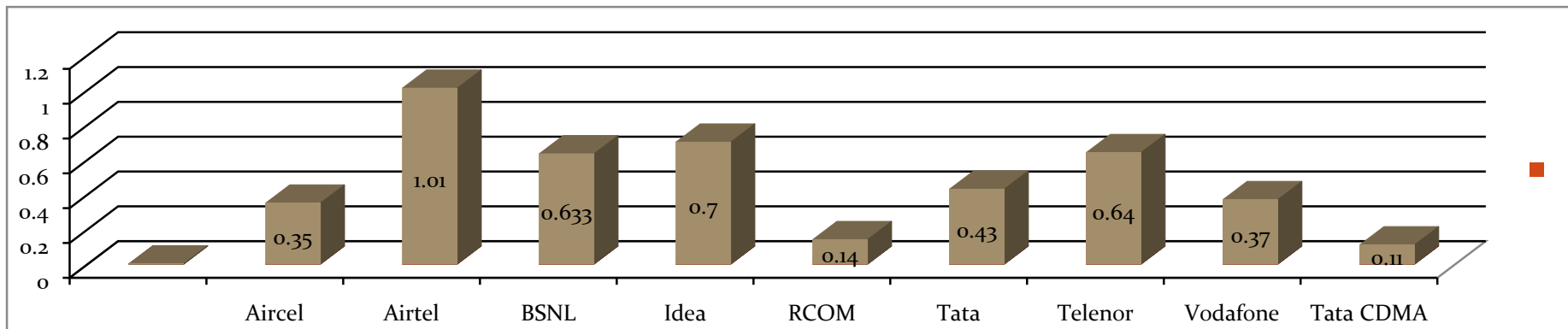
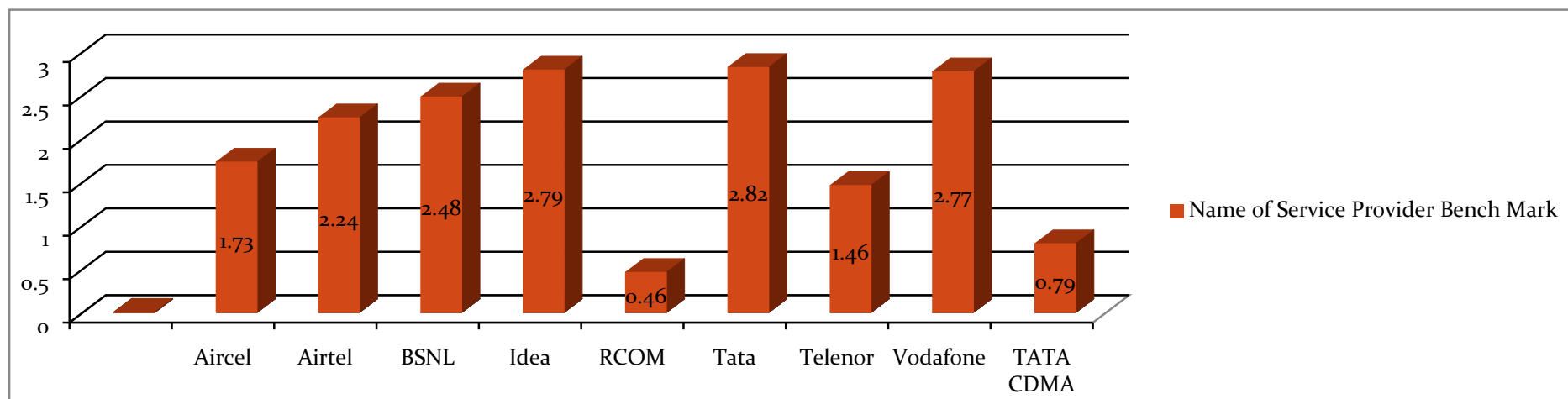*Data Source: Network Operations Center(NOC) of the operators*

2.5.2.2   KEY FINDINGS – MONTH 2(FEBRUARY 2017)
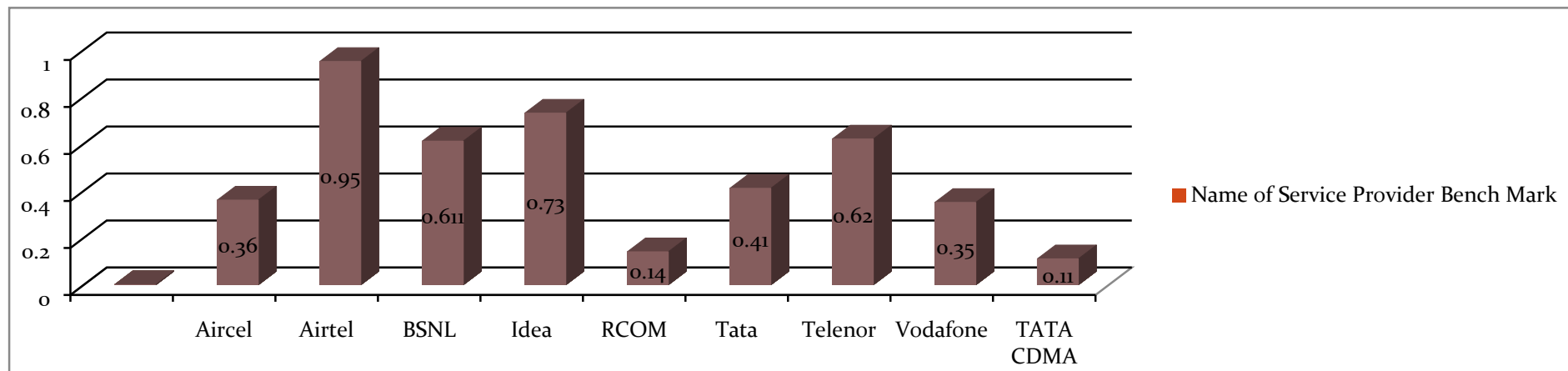
Data Source: Network Operations Center(NOC) of the operator

2.5.2.3   KEY FINDINGS – MONTH 3(MARCH 2017)

Data Source: Network Operations Center(NOC) of the operators

2.6   CELLS HAVING GREATER THAN 3% TCH DROP

2.6.1   PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.
2. **Computational Methodology:** (**Total number of cells having more than 3% TCH drop during CBBH**/ **Total number of cells in the network) x 100**
3. **TRAI Benchmark –**
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%
4. **Audit Procedure –**
   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

2.6.2   KEY FINDINGS - CONSOLIDATED

Data Source: Network Operations Center(NOC) of the operators

Telenor failed to meet the TRAI benchmark.

Significant difference was observed between PMR & live measurement data for TATACDMA, Telenor and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

2.6.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)

Worst affected cells having more than 3% TCH drop TRAI bench mark < 3%

Operator	Value
Aircel	
Airtel	2.02
BSNL	2.05
Idea	2.51
RCOM	2.62
Tata	0.36
Telenor	2.71
Vodafone	1.51
Tata CDMA	2.83
	0.83

2.6.2.2   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)

| Operator	Value
Aircel	2.05
Airtel	2.35
BSNL	2.43
Idea	2.93
RCOM	0.46
Tata	2.59
Telenor	1.56
Vodafone	2.69
TATA CDMA	0.8

■ Name of Service Provider Bench Mark

Data Source: Network Operations Center(NOC) of the operators

2.6.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

Data Source: Network Operations Center(NOC) of the operators

2.7 VOICE QUALITY

2.7.1 PARAMETER DESCRIPTION

1. **Definition:**
   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

2. **Computational Methodology:**

   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

3. **TRAI Benchmark:≥** 95%

4. **Audit Procedure** –
   a. A sample of calls would be taken randomly from the total calls established.
   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

2.7.2 KEY FINDINGS
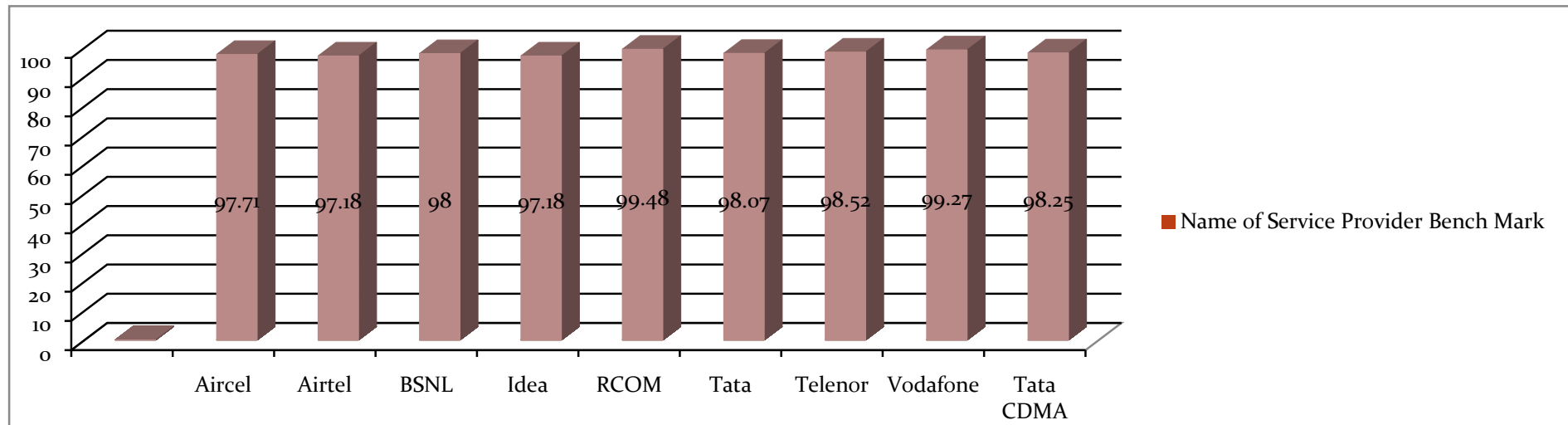
Service Provider	Value
Aircel	97.71
Airtel	97.18
BSNL	98
Idea	97.18
RCOM	99.48
Tata	98.07
Telenor	98.52
Vodafone	99.27
Tata CDMA	98.25

Legend: ■ Name of Service Provider Bench Mark

Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark for Voice quality as per PMR and live data.

2.7.3   KEY FINDINGS- MONTH 1 (JANUARY 2017)
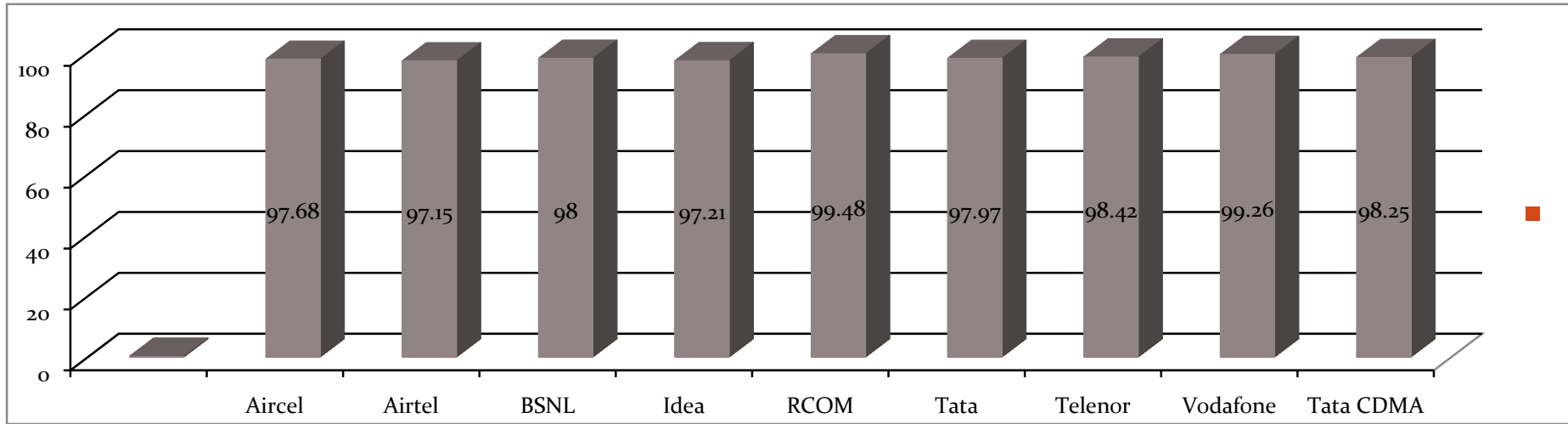
Data Source: Network Operations Center(NOC) of the operators

2.7.3.1   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)
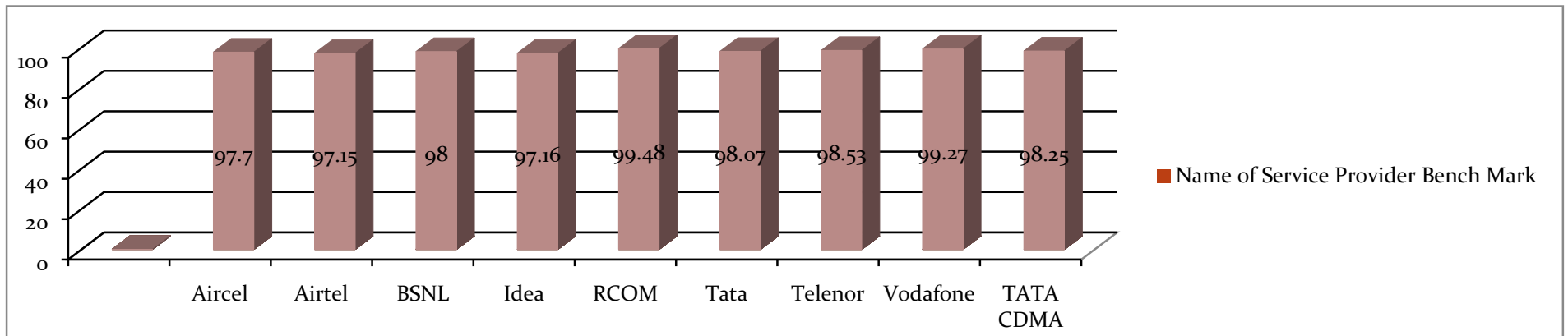
Data Source: Network Operations Center(NOC) of the operators

2.7.3.2   KEY FINDINGS – MONTH 3 (MARCH 2017)
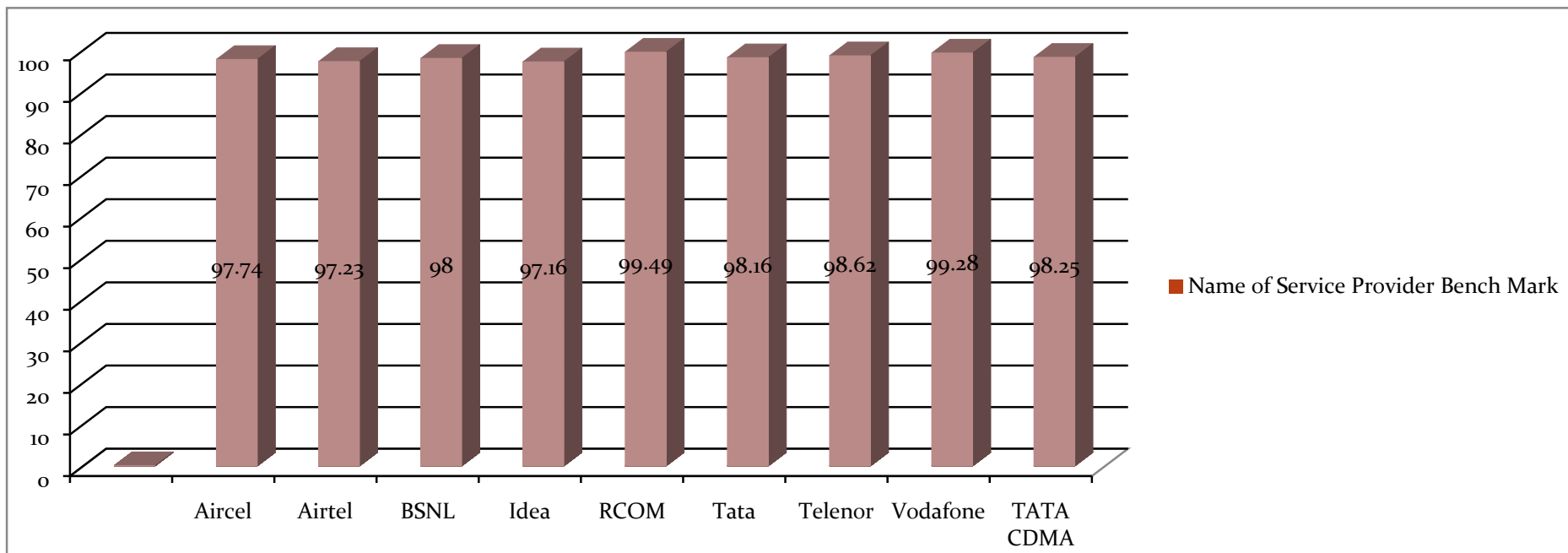
Data Source: Network Operations Center(NOC) of the operators

3   PARAMETER DESCRIPTION & DETAILED FINDINGS -

3.1   NODE BS DOWNTIME

3.1.1   PARAMETER DESCRIPTION

- ➲ The parameter of network availability would be measured from following sub-parameters

    1. Node Bs downtime (not available for service)

    2. Worst affected Node Bs due to downtime

- ➲ **Definition - Node Bs downtime (not available for service):** In the case of 3G networks, instead of BTS the nomenclature is Node B. The measurement methodology for the parameter Node B Accumulated downtime (not available for service) will be similar to the existing parameter for BTSs Accumulated downtime (not available for service).

- ➲ **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
- ➲ **Source of Data:** Network Operation Center (NOC) or a Central Server
- ➲ **Computation Methodology** –

  Node Bs downtime (not available for service) = **Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100**

  3. TRAI Benchmark –

    a. Node Bs downtime (not available for service) ≤ 2%

  4. Audit Procedure –

- ➲ The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

➲ All the Node Bs in service area was considered. Planned outages due to network up gradation, routine maintenance were not considered.

➲ Any outage as a result of force majeure were not considered at the time of calculation

➲ Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

➲ List of operating sites with cell details and ids are taken from the operator.

     ➲ When there is any outage a performance report gets generated in line with that cell resulting and master base of the Node Bsdowntime and worst affected Node Bs due to downtime.

3.1.2   KEY FINDINGS – CONSOLIDATED
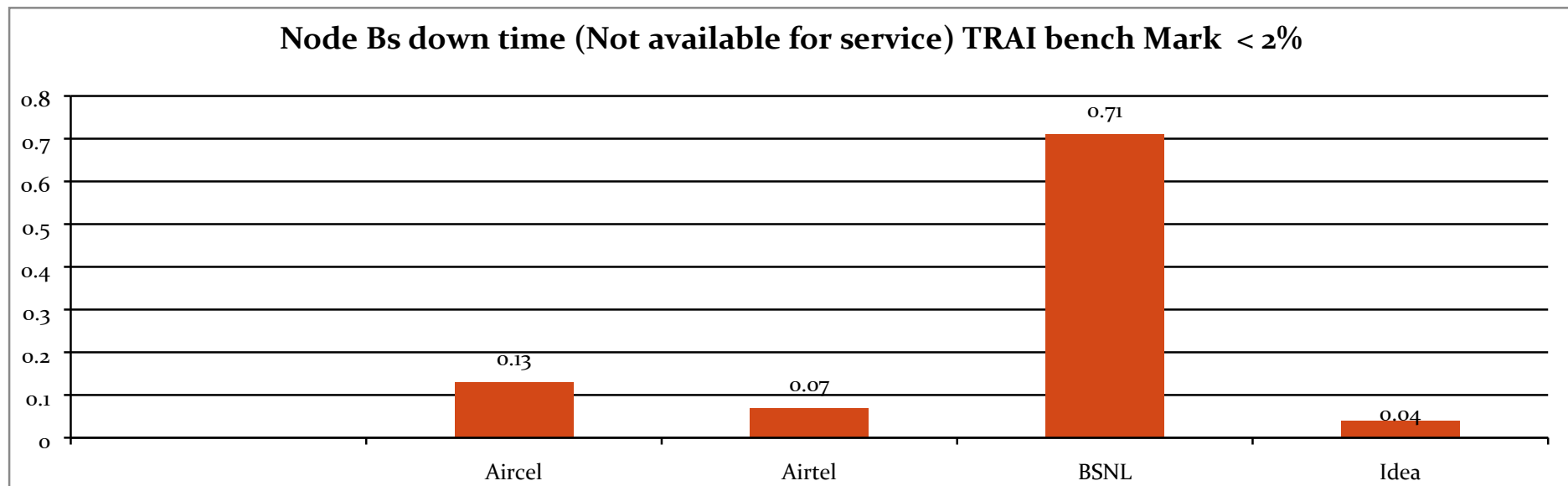
Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for Node Bs downtime.

3.1.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)

Node Bs Accumulated down time (Not available for service) < 2%

Operator	Value
Aircel	0.16
Airtel	0.04
BSNL	0.61
Idea	0.03
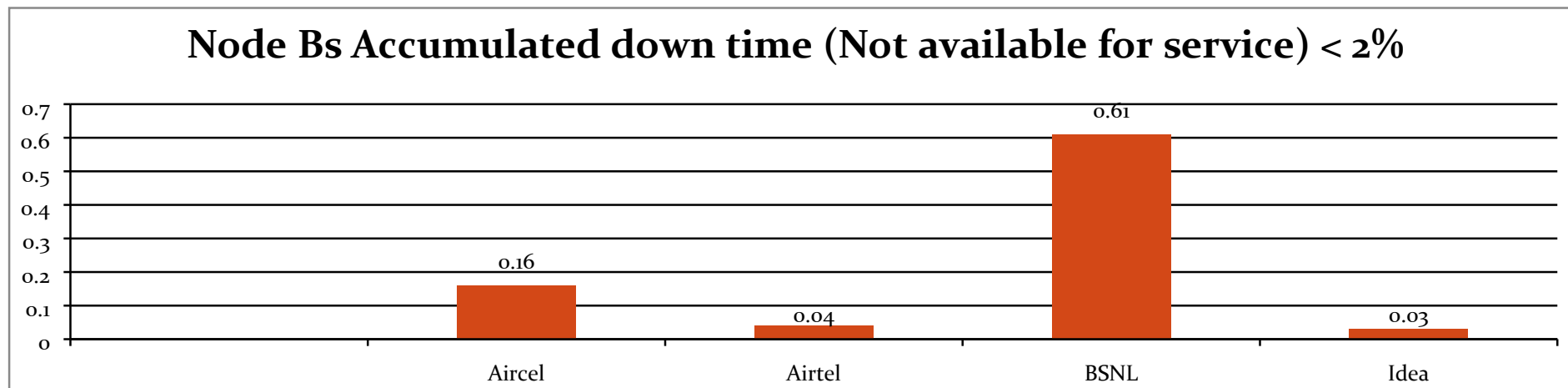
Data Source: Operations and Maintenance Center (OMC) of the operators

3.1.2.2   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)
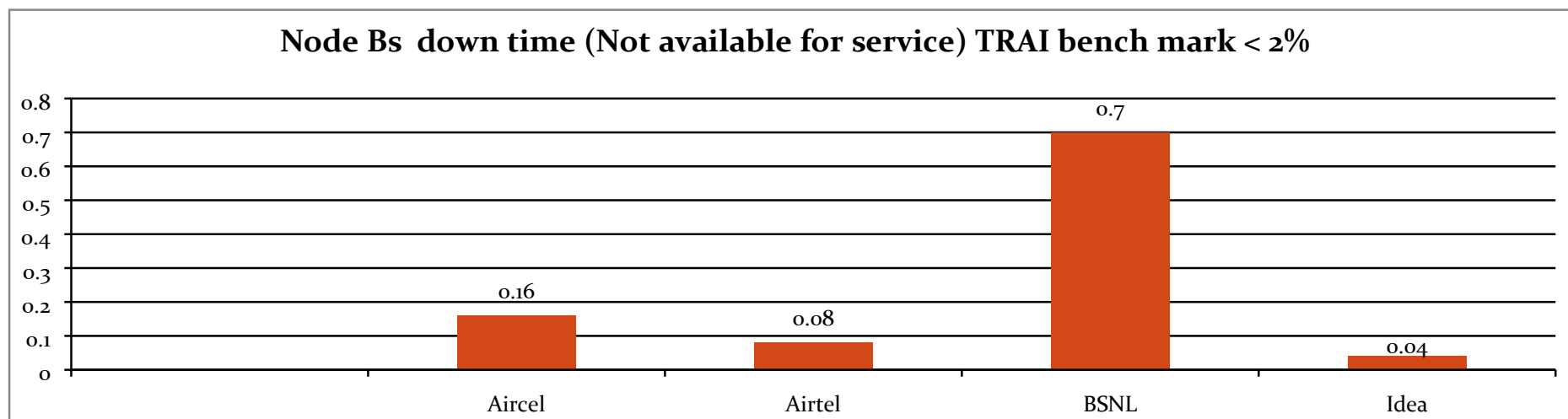
Node Bs down time (Not available for service) TRAI bench mark < 2%

Operator	Value
Aircel	0.16
Airtel	0.08
BSNL	0.7
Idea	0.04

Data Source: Operations and Maintenance Center (OMC) of the operator

Node Bs down time (Not available for service) TRAI Bench Mark < 2%
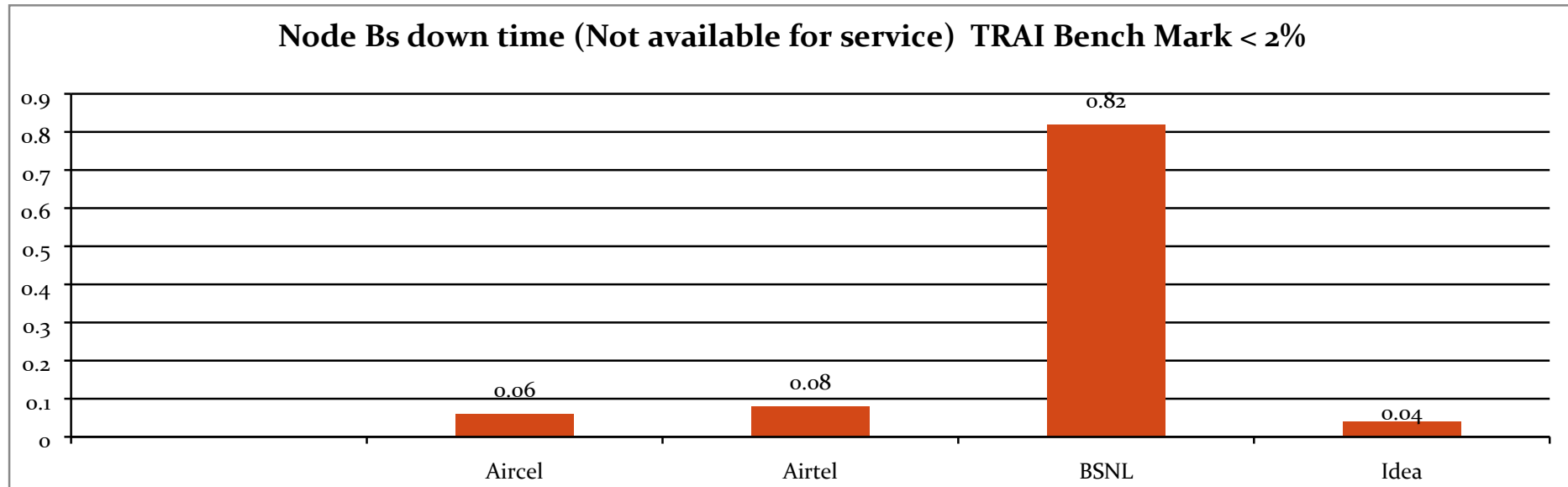
Data Source: Operations and Maintenance Center (OMC) of the operators

3.2   WORST AFFECTED NODE BS DUE TO DOWNTIME

3.2.1   PARAMETER DESCRIPTION

- **Definition – Worst Affected Node Bs due to downtime** shall basically measure percentage of Node Bs having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

    For measuring the parameter "Percentage of worst affected Node Bs due to downtime" the downtime of each Node B lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology** –

  Worst affected Node Bs due to downtime = (Number of Node Bs having accumulated downtime greater than 24 hours in a month /Number of Node Bs in Licensed Service Area) * 100
- **TRAI Benchmark** –

  b. Worst affected Node Bss due to downtime ≤ 2%

- **Audit Procedure** –

    i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

    ii. All the Node Bs in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

    iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

    iv. Any outage as a result of force majeure was not considered at the time of calculation.

    v. List of operating sites with cell details and ids are taken from the operator.

    vi. All the Node Bs having down time greater than 24 hours is assessed and values of Node Bs accumulated downtime is computed in accordance.

3.2.2   KEY FINDINGS – CONSOLIDATED
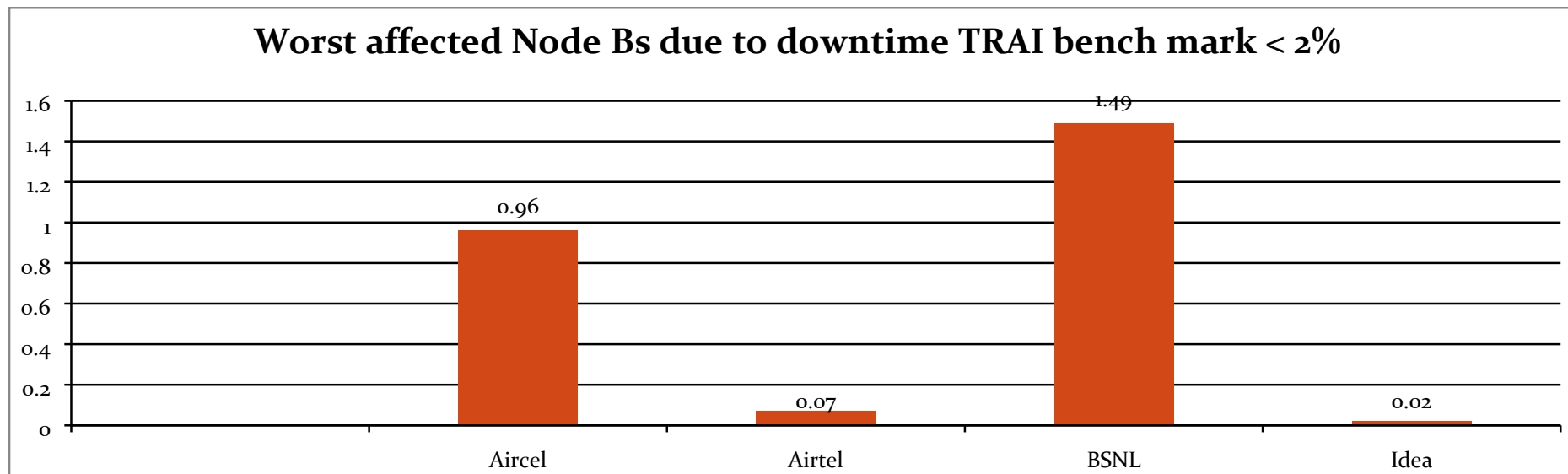
Worst affected Node Bs due to downtime TRAI bench mark < 2%

Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

Significant difference was observed between PMR &live measurement data for Airtel and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

3.2.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)
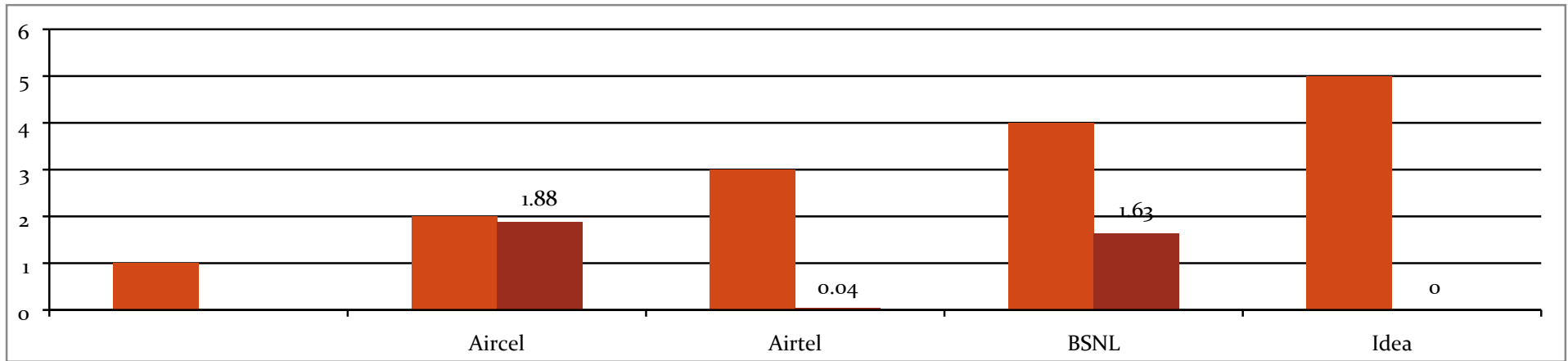
Data Source: Operations and Maintenance Center (OMC) of the operators

3.2.2.2   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)

Worst affected Node Bs due to downtime < 2%
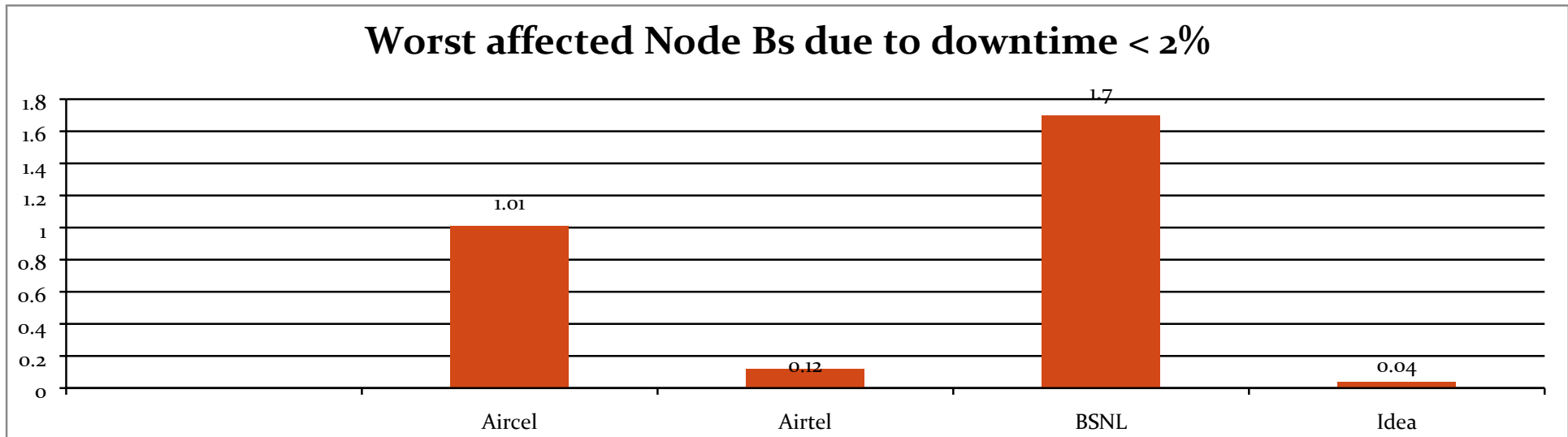
Data Source: Operations and Maintenance Center (OMC) of the operators

3.2.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

Worst affected Node Bs due to downtime TRAI bench mark < 2%
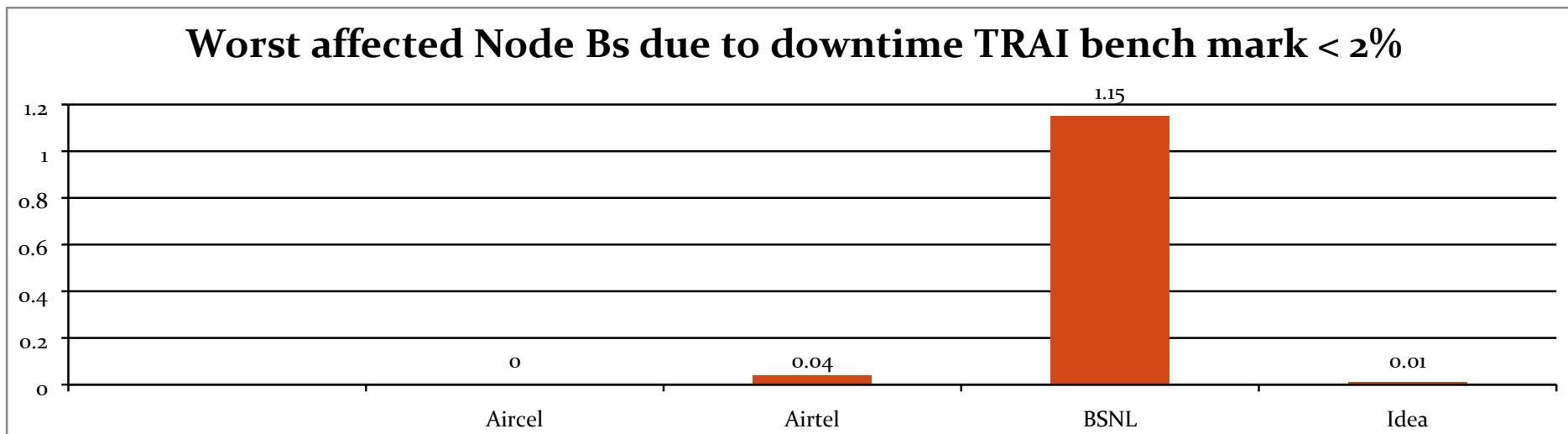
Data Source: Operations and Maintenance Center (OMC) of the operators

Call Set Up Success Rate

3.2.3   PARAMETER DESCRIPTION

1. **Definition:** This parameter is same for 2G Networks as well as 3G Networks. However, the network elements involved in both the networks are different. Call Set-up Success Rate is defined as the ratio of Established Calls to Call Attempts. For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. However, any RAB abnormal release after RAB Assignment Response or Alerting/Connect message is to be considered as a dropped call.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computation Methodology-**
   (RRC Established / Total RRC Attempts) * 100

   RRC Established means the following events have happened in RRC setup:-

   - RRC attempt is made
   - The RRC established
   - The RRC is routed to the outward path of the concerned MSC

5. **TRAI Benchmark≥** 95%

6. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
   - CSSR calculation should be measured using OMC generated data only
   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week

- ↻ Counter data is extracted from the NOC of the operators.

- ↻ Total calls established include all calls established excluding RAB congestion.

  - ↬ The numerator and denominator values are derived from adding the counter values from the MSC.
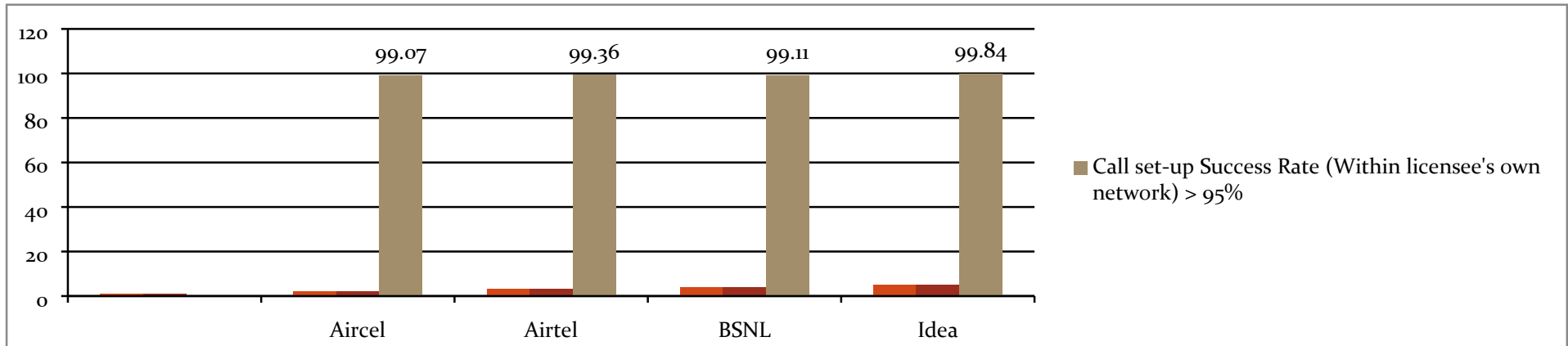
3.2.4   KEY FINDINGS - CONSOLIDATED
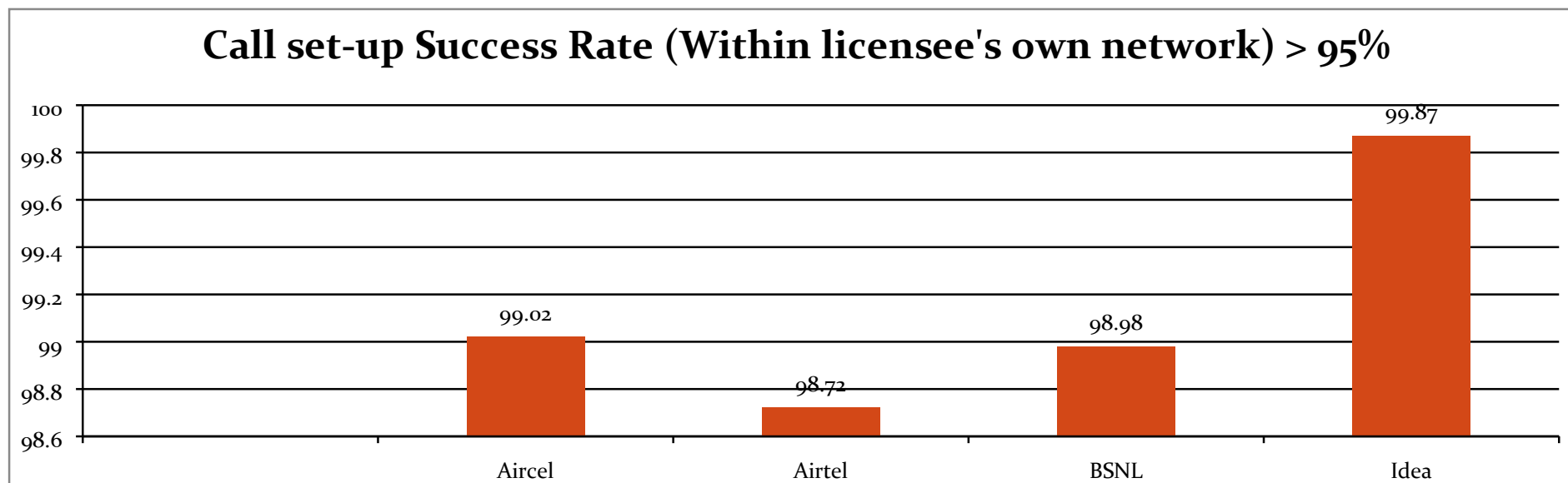
Call set-up Success Rate (Within licensee's own network) > 95%

Source: Network Operations Center(NOC) of the operators

All operators met the TRAI benchmark as per audit/PMR data.

3.2.4.1 KEY FINDINGS – MONTH 1 (JANUARY 2017)

Source: Network Operations Center(NOC) of the operators

3.2.4.2 KEY FINDINGS – MONTH 2 (FEBRUARY 2017)
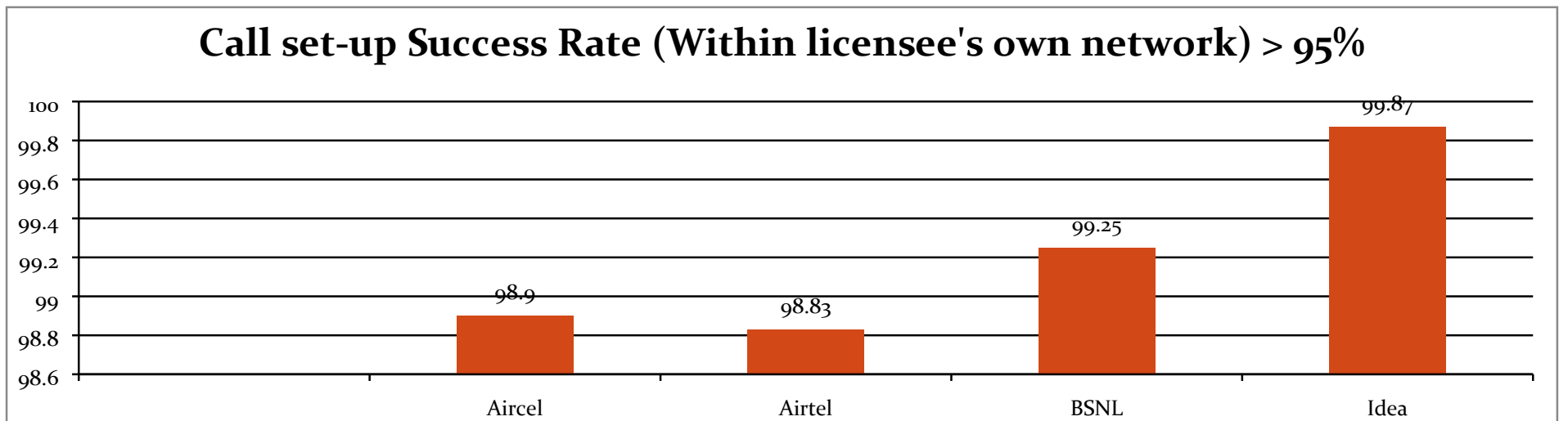
Data Source: Network Operations Center(NOC) of the operators

3.2.4.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

Call set-up Success Rate (Within licensee's own network) > 95%

Aircel: 99.09
Airtel: 97.97
BSNL: 98.57
Idea: 99.89
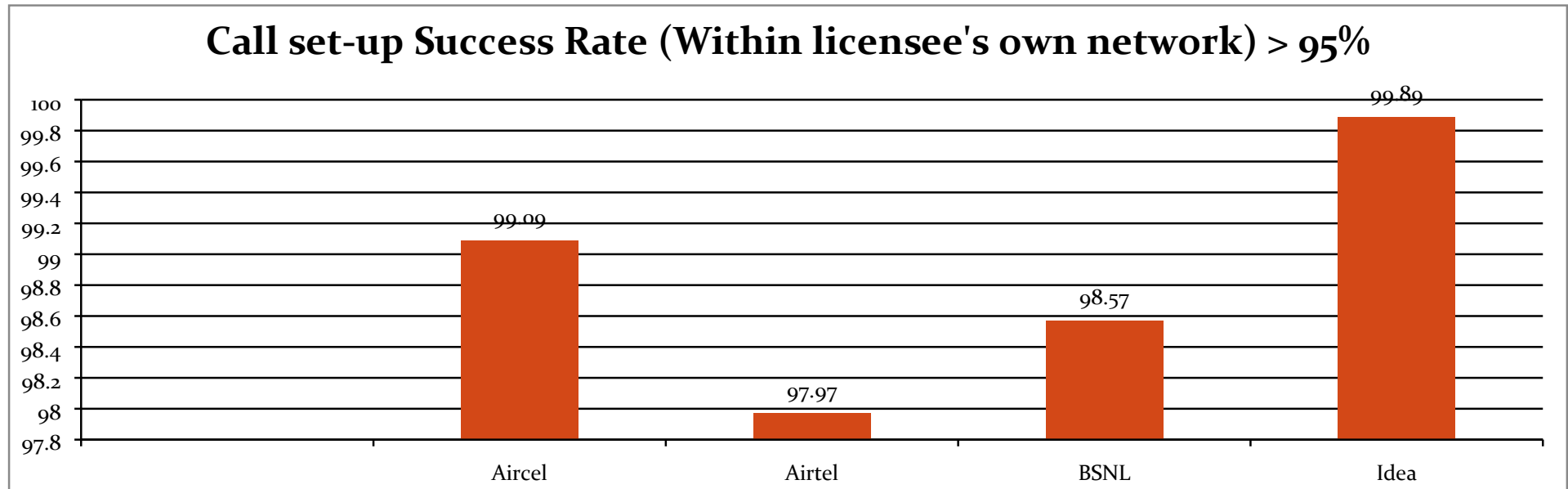
Data Source: Network Operations Center(NOC) of the operators

3.3 NETWORK CHANNEL CONGESTION- RRC CONGESTION/ CIRCUIT SWITCHED RAB CONGESTION

3.3.1 PARAMETER DESCRIPTION

1. **Definition(RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition(Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.

   ↳ RRC Level: Stand-alone dedicated control channel

   ↳ RAB Level: Traffic Channel

   ↳ POI Level: Point of Interconnect

4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**

   ↳ **RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An)**

      • Where:-A1 = Number of attempts to establish RRC/ RAB made on day 1

      • C1 = Average RRC / RAB Congestion % on day 1

      • A2 = Number of attempts to establish RRC / RAB made on day 2

      • C2 = Average RRC / RAB Congestion % on day 2

      • An = Number of attempts to establish RRC / RAB made on day n

      • Cn = Average RRC / RAB Congestion % on day n

   ↳ **POI Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An)**

- Where:-A_1 = POI traffic offered on all POIs (no. of calls) on day 1

- C_1 = Average POI Congestion % on day 1

- A_2 = POI traffic offered on all POIs (no. of calls) on day 2

- C_2 = Average POI Congestion % on day 2

- A_n = POI traffic offered on all POIs (no. of calls) on day n

- C_n = Average POI Congestion % on day n

7. **Benchmark:**

   ↳ RRC Congestion: ≤ 1%, RAB Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

8. **Audit Procedure** –

   ➲ Audit of the details of RRC and RAB congestion percentages computed by the operator (using OMC–Switch data only) would be conducted

   ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only RRC

3.3.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)
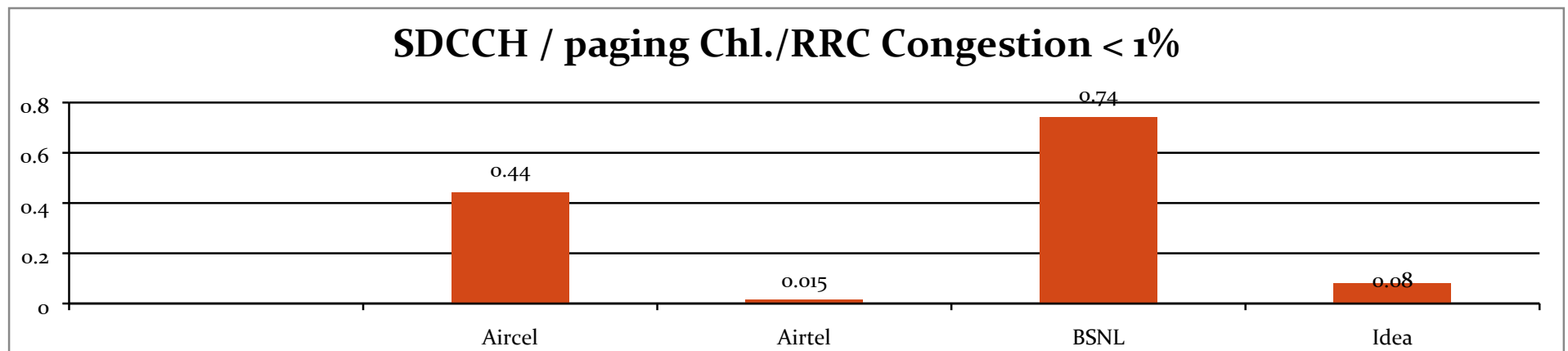
SDCCH / paging Chl./RRC Congestion < 1%

Aircel	Airtel	BSNL	Idea
0.44	0.015	0.74	0.08

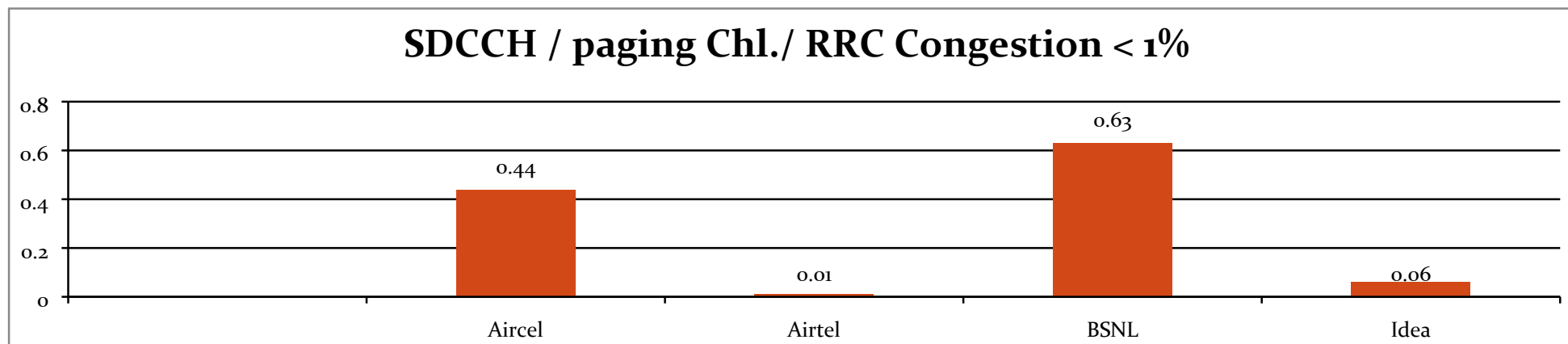*Data Source: Network Operations Center(NOC) of the operators*

All operators met the benchmark for RRC congestion.

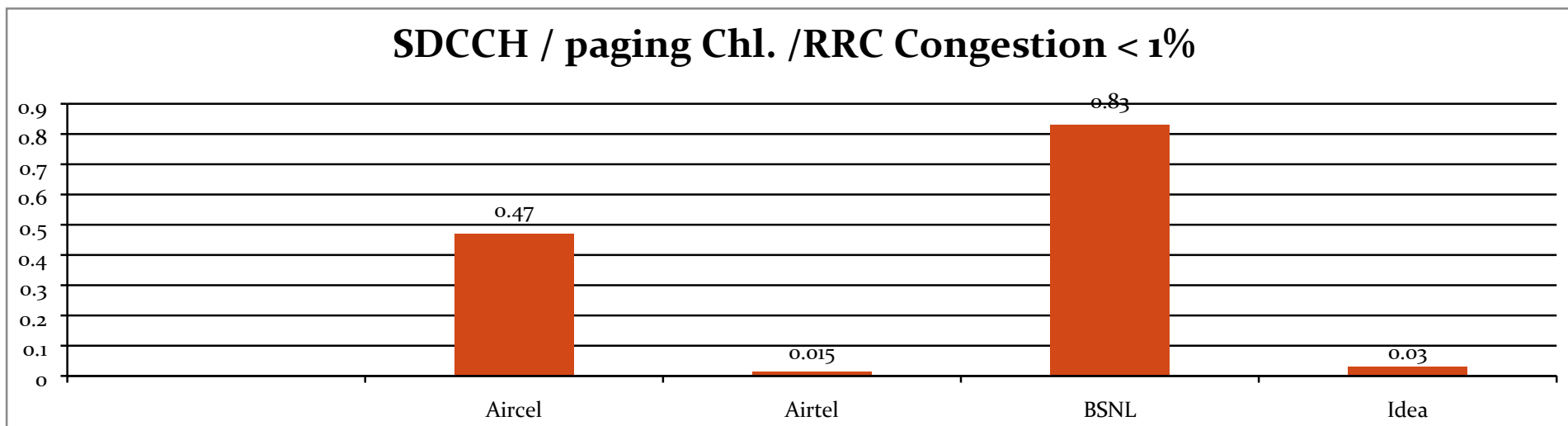## 3.3.2.1 KEY FINDINGS – MONTH 1 (JANUARY 2017)
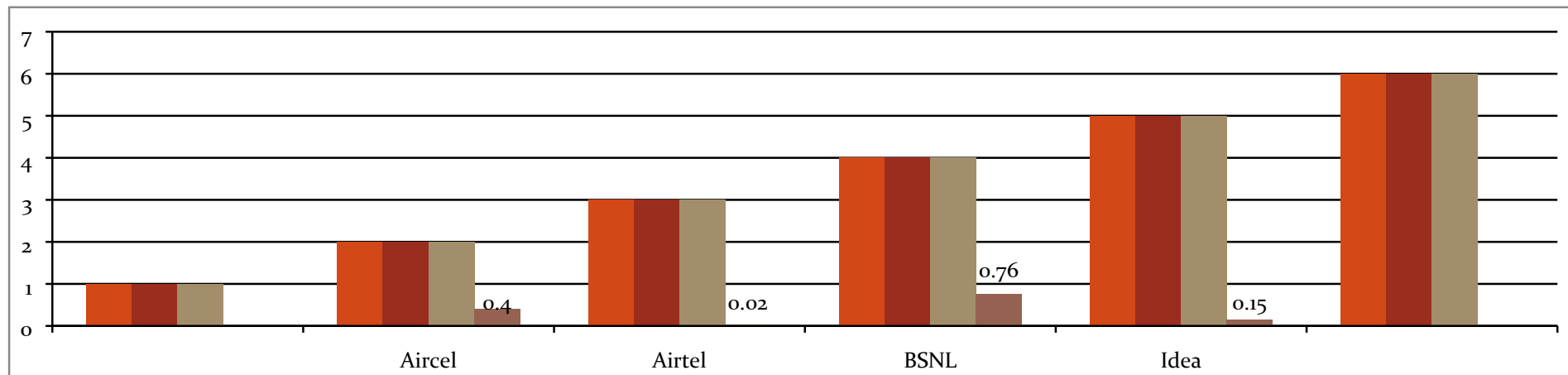
Source: Network Operations Center(NOC) of the operators

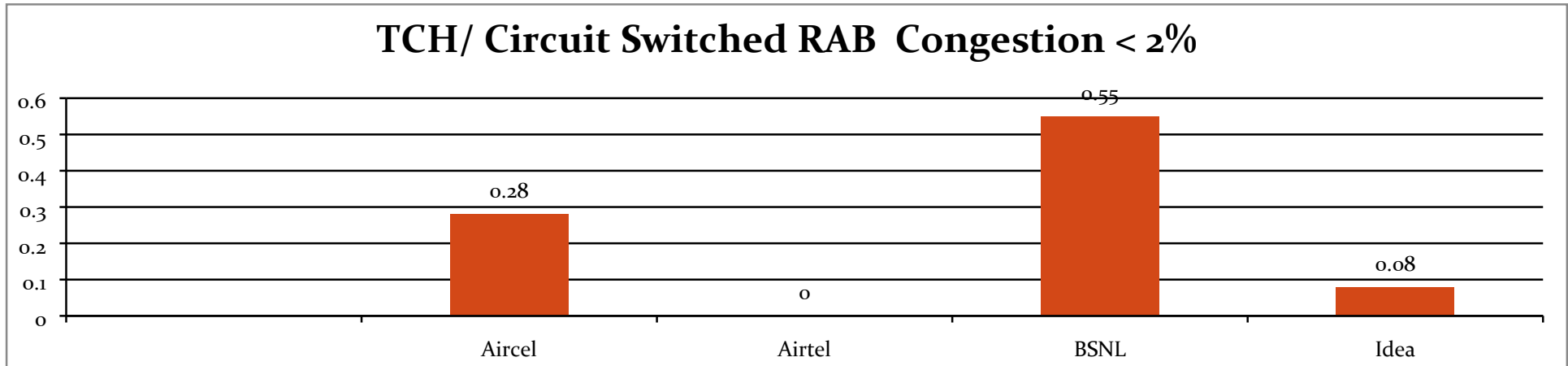## 3.3.2.2 KEY FINDINGS – MONTH 2 (FEBRUARY 2017)
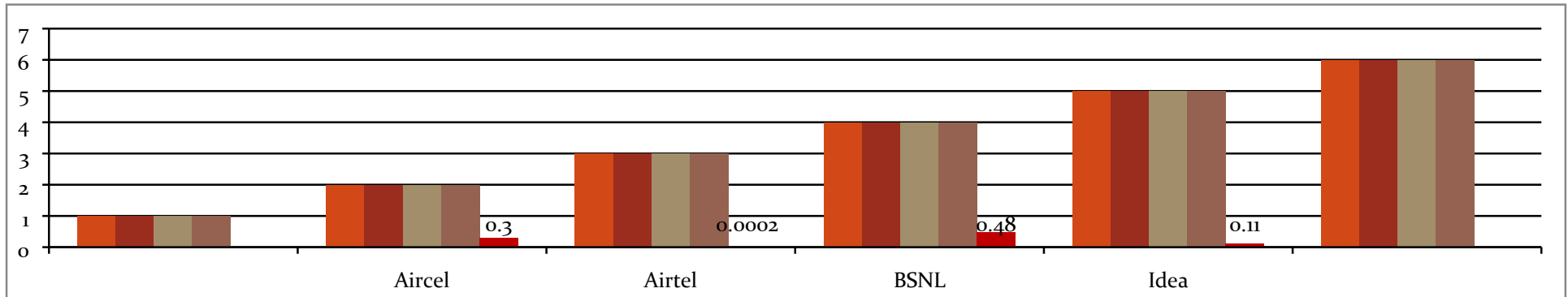

Data Source: Network Operations Center(NOC) of the operators

3.3.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

SDCCH / paging Chl. /RRC Congestion < 1%

Data Source: Network Operations Center(NOC) of the operators

3.3.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

TCH/ Circuit Switched RAB Congestion < 2%

|	Aircel	Airtel	BSNL	Idea
Value	0.28	0	0.55	0.08

Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark as per audit/PMR report.

3.3.3.1 KEY FINDINGS – MONTH 1 (JANUARY 2017)

	Aircel	Airtel	BSNL	Idea	
	1	3	4	5	6
	0.3	0.0002	0.48	0.11	

Data Source: Network Operations Center(NOC) of the operators

3.3.3.2 KEY FINDINGS – MONTH 2 (FEBRUARY 2017)

TCH / Circuit Switched RAB Congestion < 2%

Operator	Value
Aircel	0.41
Airtel	0.0001
BSNL	0.46
Idea	0.08
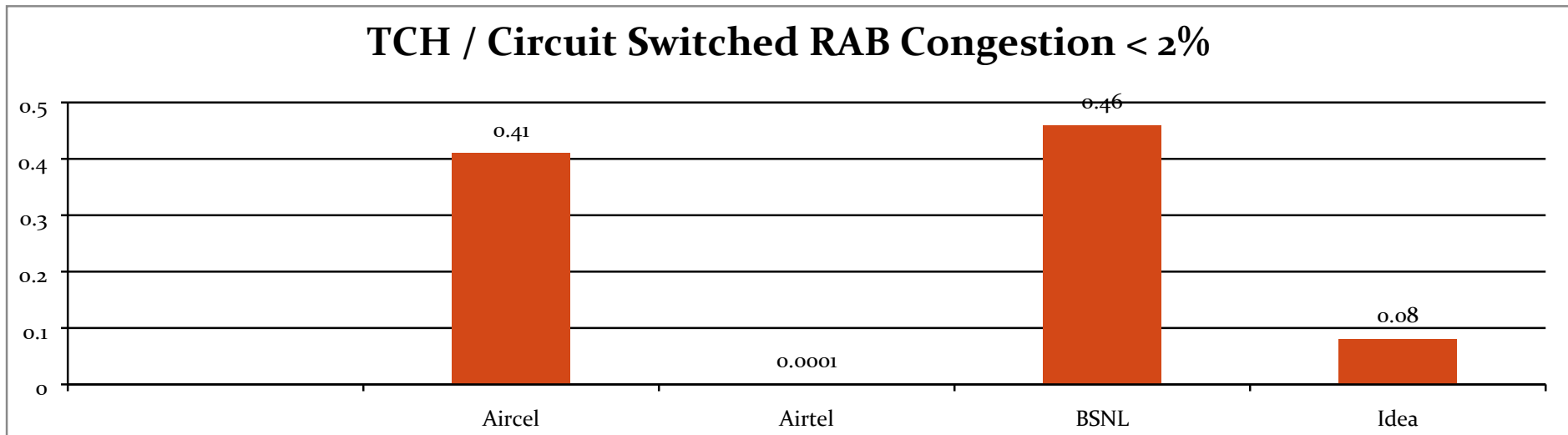
Data Source: Network Operations Center(NOC) of the operators

3.3.3.3 KEY FINDINGS – MONTH 3 (MARCH 2017)

TCH/ Circuit Switched RAB Congestion < 2%

Operator	Value
Aircel	0.13
Airtel	0.0025
BSNL	0.72
Idea	0.06
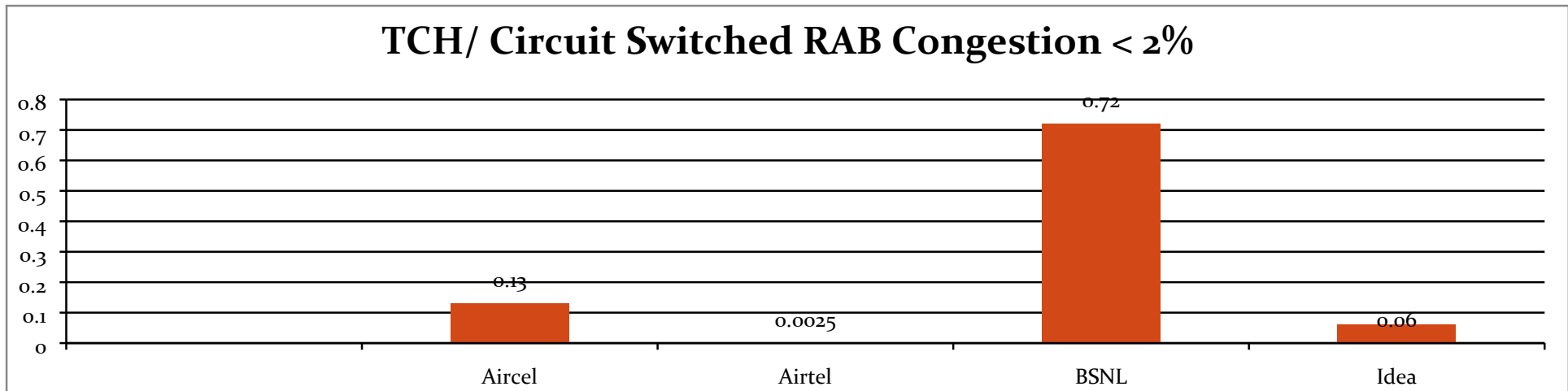
Data Source: Network Operations Center(NOC) of the operators

3.4   CIRCUIT SWITCHED VOICE DROP RATE

3.4.1   PARAMETER DESCRIPTION

1. **Definition** - The Call Drop Rate measures the inability of Network to maintain a call and is defined as the ratio of abnormal speech disconnects with respect to all speech disconnects (both normal and abnormal). In 3G Networks, a normal disconnect is initiated from the Mobile Switching Centre (MSC) at completion of the call by a RAB Disconnect message. An abnormal RAB disconnect can be initiated by either UTRAN or CN and includes Radio Link Failures, Uplink (UL) or Downlink (DL) interference or any other reason.

    ↳ **Total No. of voice RAB abnormally released** = All calls ceasing unnaturally i.e. due to handover or due to radio loss

    ↳ **No. of voice RAB normally released** = All calls that have RAB allocation during busy hour

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released)x 100

Key Performance Indicator Term	Definition
#RAB Normal Release(CSV)	Number of voice RAB normally Released
#RAB Abnormal Release(CSV)	Number of voice RAB abnormallyReleased

5. **TRAI Benchmark** –

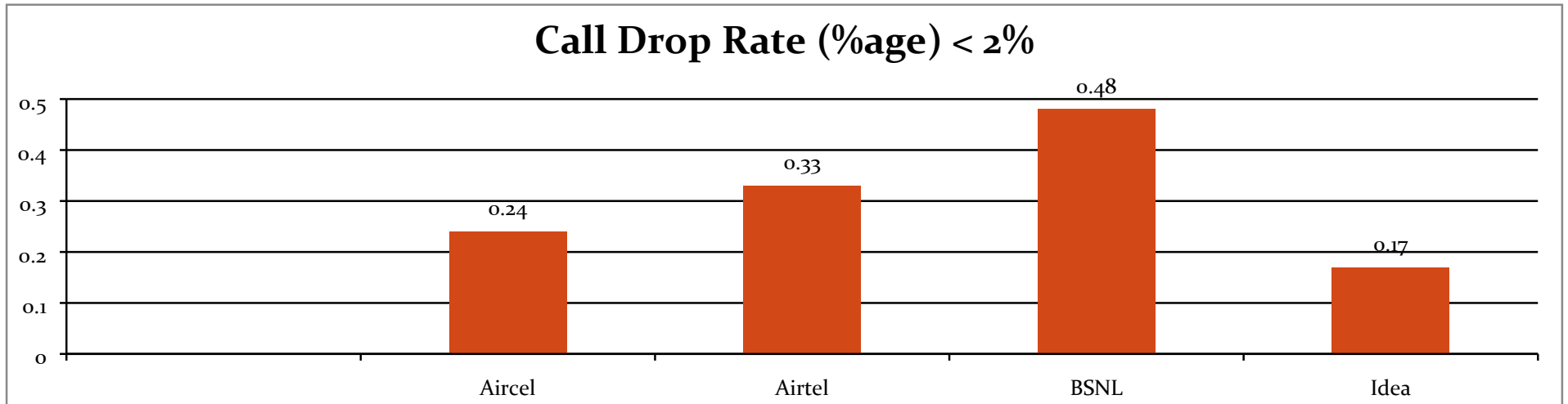   ↳ Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure** –

    ➲ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used

    ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.
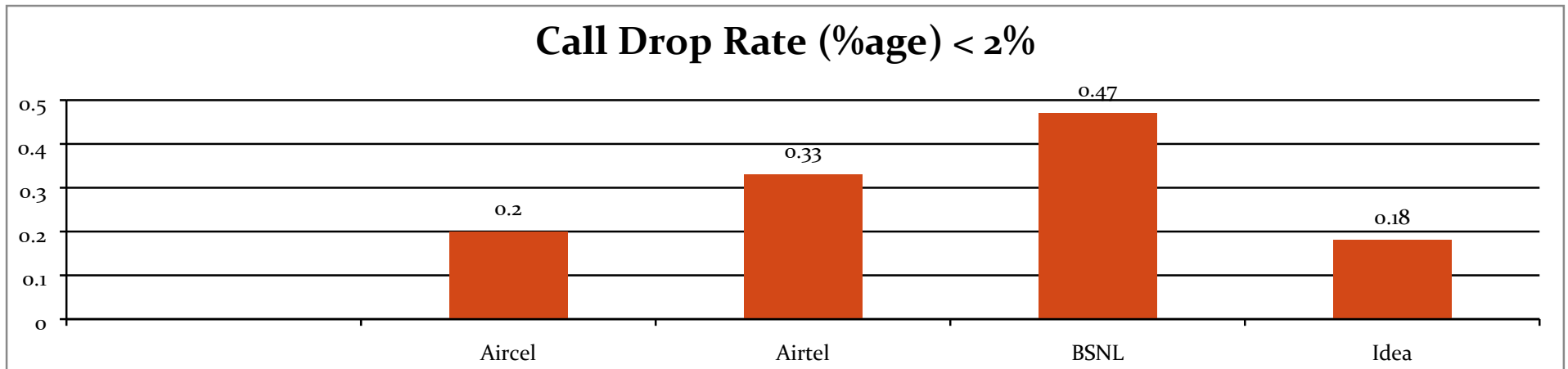
    ↳

3.4.2   KEY FINDINGS – CONSOLIDATED

Call Drop Rate (%age) < 2%

| Operator	Value
Aircel	0.24
Airtel	0.33
BSNL	0.48
Idea	0.17

Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark for call drop rate during audit.

### 3.4.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)

Call Drop Rate (%age) < 2%

Operator	Value
Aircel	0.2
Airtel	0.33
BSNL	0.47
Idea	0.18

Data Source: Network Operations Center(NOC) of the operators

3.4.2.2 KEY FINDINGS – MONTH 2 9FEBRUARY 2017)

Call Drop Rate (%age) < 2%

	Aircel	Airtel	BSNL	Idea
Value	0.2	0.32	0.48	0.18
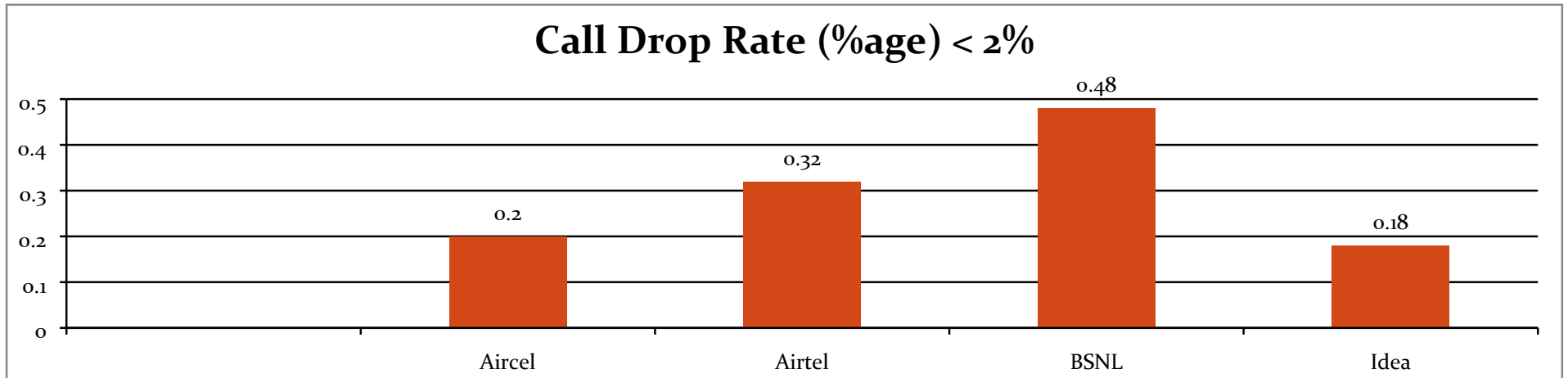
Data Source: Network Operations Center(NOC) of the operators

3.4.2.3 KEY FINDINGS – MONTH 3 (MARCH 2017)

Call Drop Rate (%age) < 2%

	Aircel	Airtel	BSNL	Idea
Value	0.32	0.33	0.49	0.16
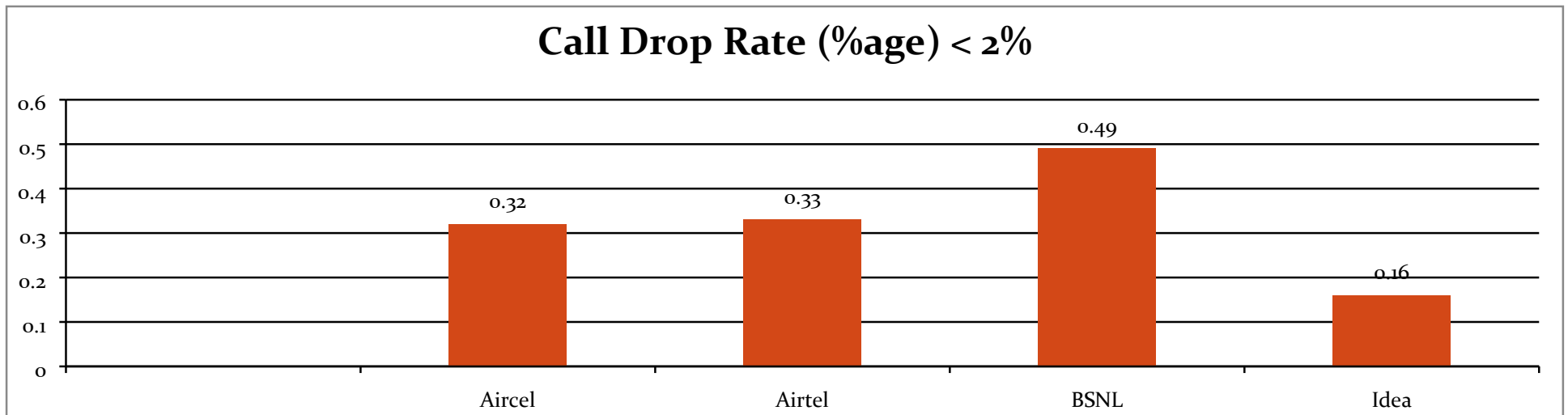
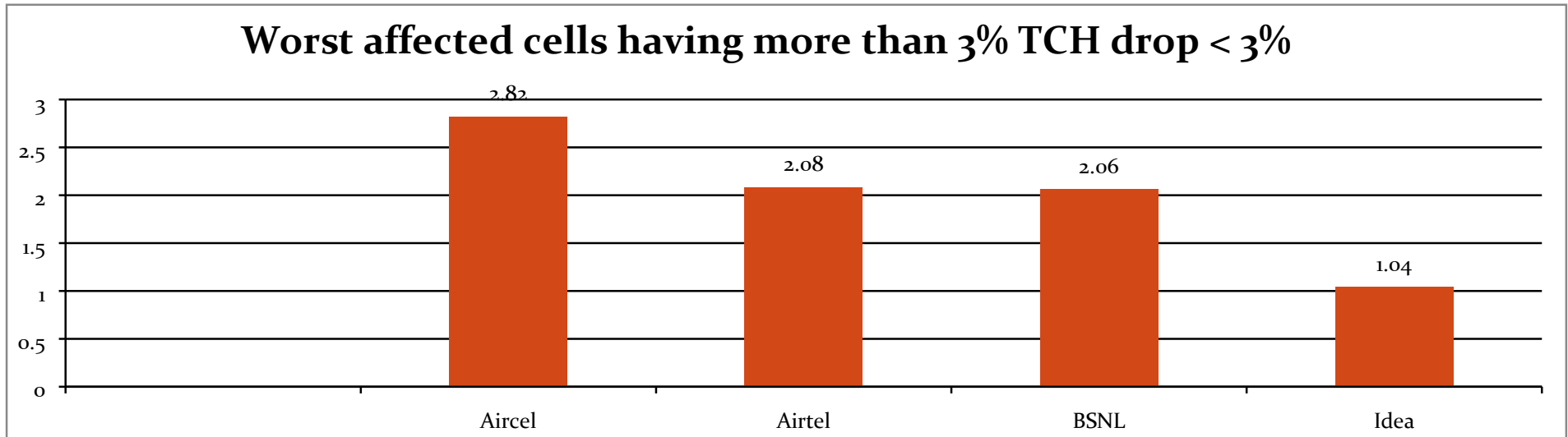*Data Source: Network Operations Center(NOC) of the operators*

3.5   WORST AFFECTED CELLS HAVING MORE THAN 3% CIRCUIT SWITCHED VOICE DROP RATE

3.5.1   PARAMETER DESCRIPTION

1. **Definition- Cells having more than 3% circuit switch voice quality:**The existing parameter has been amended to cover 3G Networks to assess worst affected cells having more than 3% CSV Drop Rate.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (**Number of cells having CSV drop rate > 3% during CBBH in a month**/ **Total number of cells in the licensed area) x 100**

5. **TRAI Benchmark –**

   ↪ Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure –**

   ➲ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.
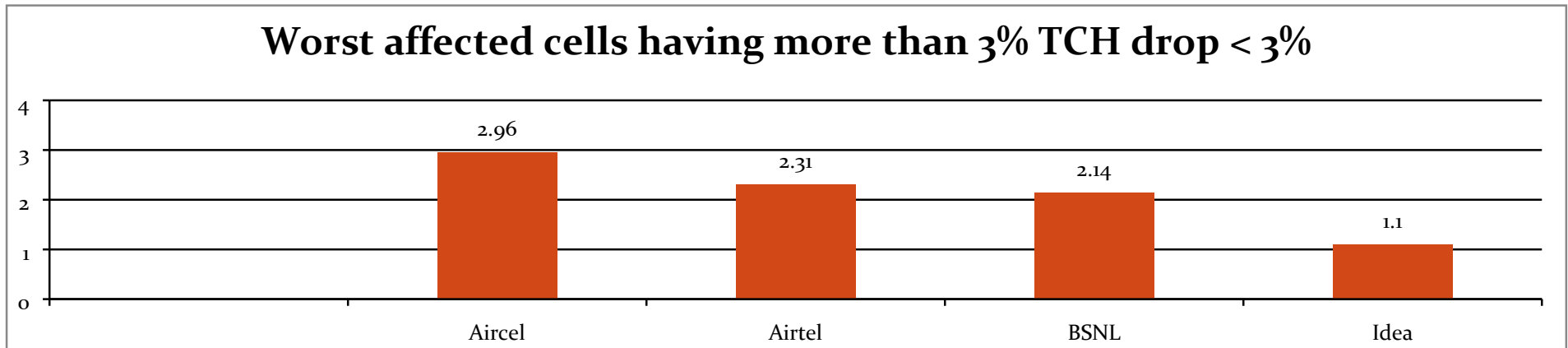
3.5.2 KEY FINDINGS – CONSOLIDATED

Worst affected cells having more than 3% TCH drop < 3%

Source: Network Operations Center(NOC) of the operators

All operators met the benchmark during audit.

3.5.2.1 KEY FINDINGS – MONTH 1 (JANUARY 2017)
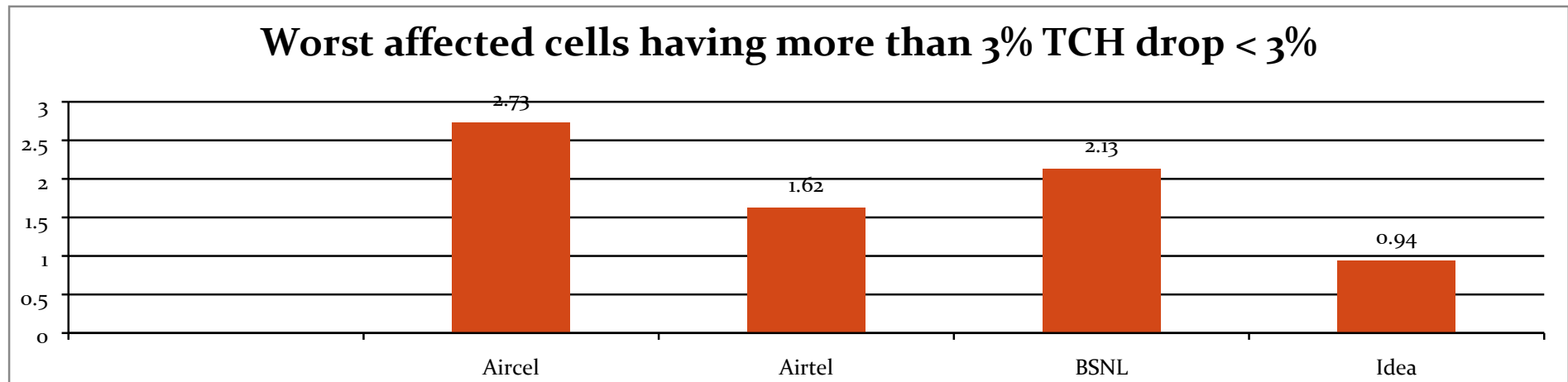
Worst affected cells having more than 3% TCH drop < 3%

Source: Network Operations Center(NOC) of the operator

Worst affected cells having more than 3% TCH drop < 3%
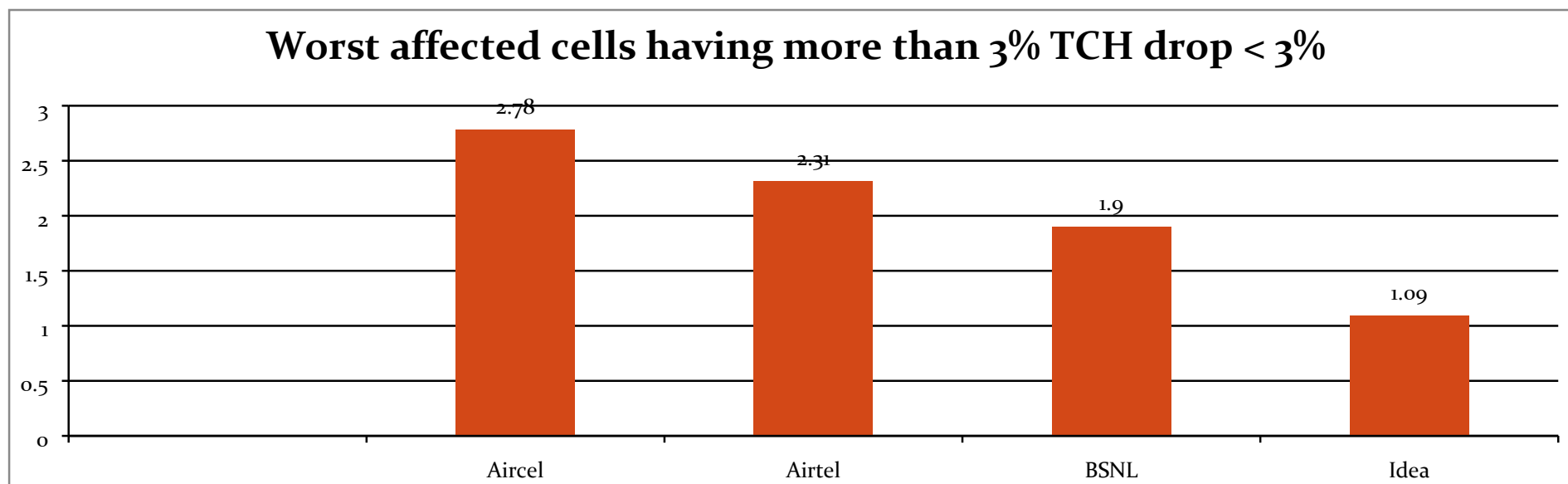
Data Source: Network Operations Center(NOC) of the operators

3.5.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

Worst affected cells having more than 3% TCH drop < 3%

Data Source: Network Operations Center(NOC) of the operators

3.6   CIRCUIT SWITCH VOICE QUALITY

3.6.1   PARAMETER DESCRIPTION

5. **Definition:**

   ✎ for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)

   ✎ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

6. **Computational Methodology:**

   ✎ **% Connections with good voice quality = (No. of voice samples with good voice quality** / **Total number of samples) x 100**
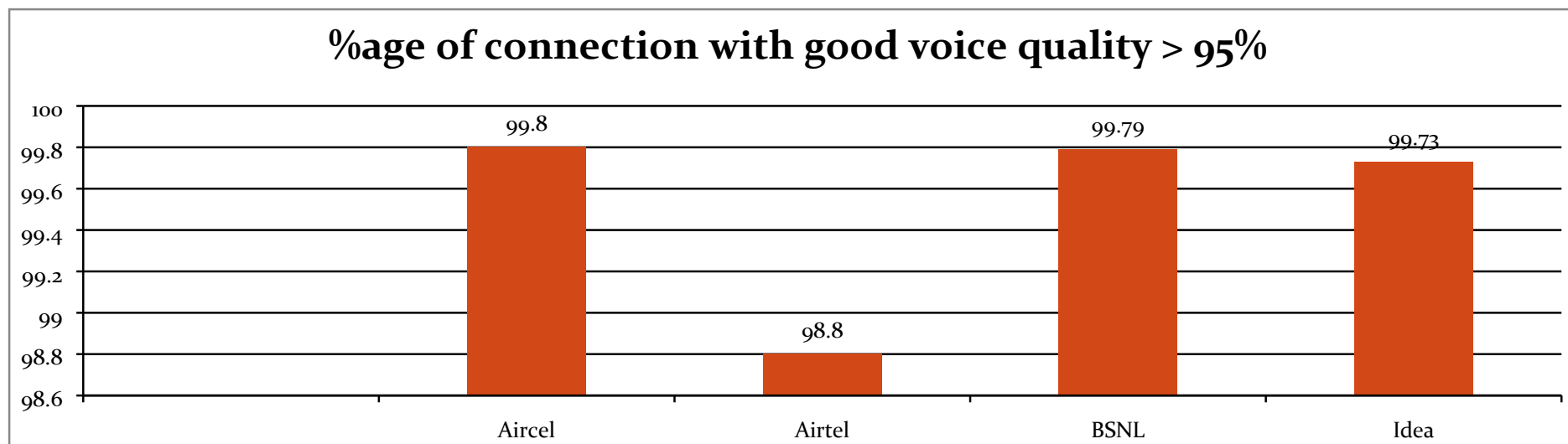
7. **TRAI Benchmark:≥** 95%

8. **Audit Procedure** –

   a.   A sample of calls would be taken randomly from the total calls established.

b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

3.6.2   KEY FINDINGS

%age of connection with good voice quality > 95%

Source: Network Operations Center(NOC) of the operators

All operators met the benchmark for circuit switch Voice quality in live audit.

3.6.2.1   KEY FINDINGS – MONTH 1 (JANUARY 2017)
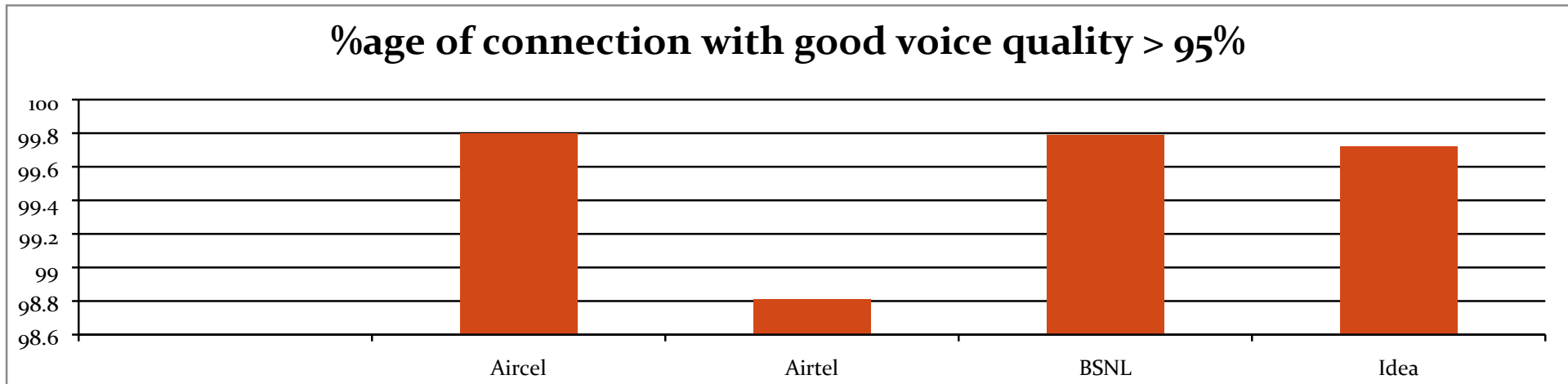
%age of connection with good voice quality > 95%

3.6.2.2   KEY FINDINGS – MONTH 2 (FEBRUARY 2017)

%age of connection with good voice quality > 95%
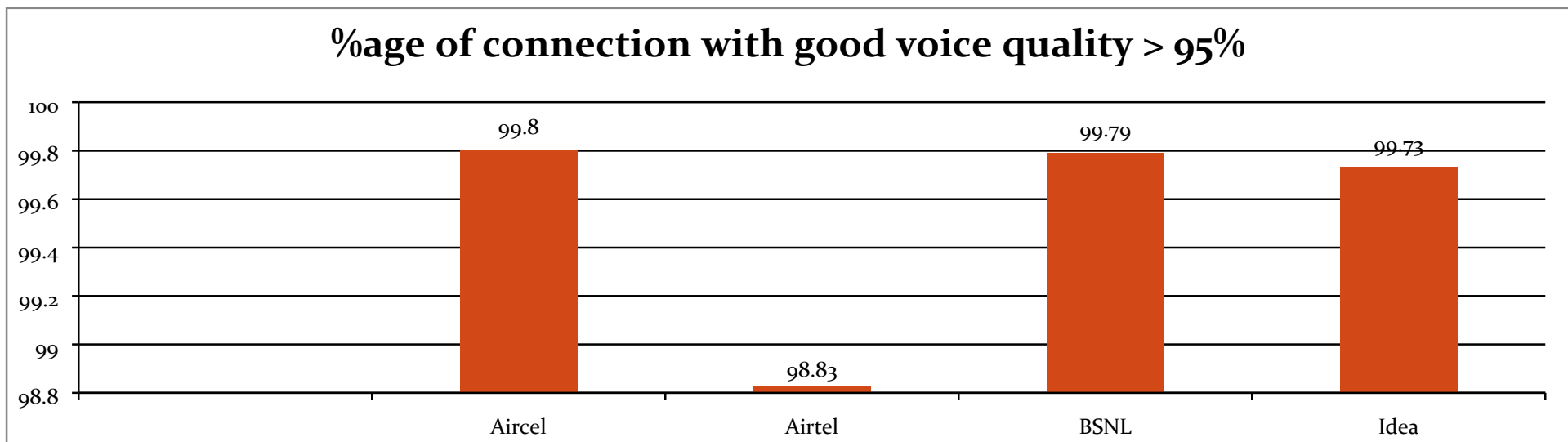
Data Source: Network Operations Center(NOC) of the operators

3.6.2.3   KEY FINDINGS – MONTH 3 (MARCH 2017)

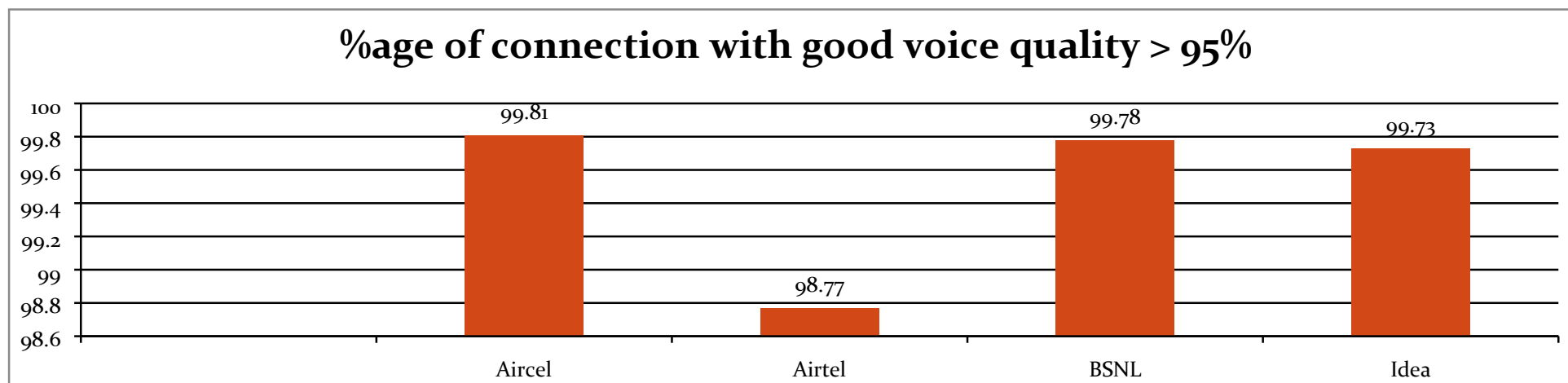# %age of connection with good voice quality > 95%

Data Source: Network Operations Center(NOC) of the operators

4   PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

4.1   METERING AND BILLING CREDIBILITY

The billing complaintsfor postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

4.1.1   PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20thDecember, 2009 were covered.The types of billing complaints covered are listed below.

- ↬ Payments made and not credited to the subscriber account

- ↬ Payment made on time but late payment charge levied wrongly

- ↬ Wrong roaming charges

- ↬ Double charges

↳ Charging for toll free services

↳ Local calls charged/billed as STD/ISD or vice versa

↳ Calls or messages made disputed

↳ Validity related complaints

↳ Credit agreed to be given in resolution of complaint, but not accounted in the bill

↳ Charging for services provided without consent

↳ Charging not as per tariff plans or top up vouchers/ special packs etc.

↳ Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

➲ Computational Methodology:

↳ **Billing complaints per 100 bills issued (Post-paid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100

↳ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

↳ **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

↳ **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100

➲ TRAI Benchmark: <= 0.1%

➲ Audit Procedure:

↳ Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted

    ➲ For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter

○ For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

4.1.2   KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)
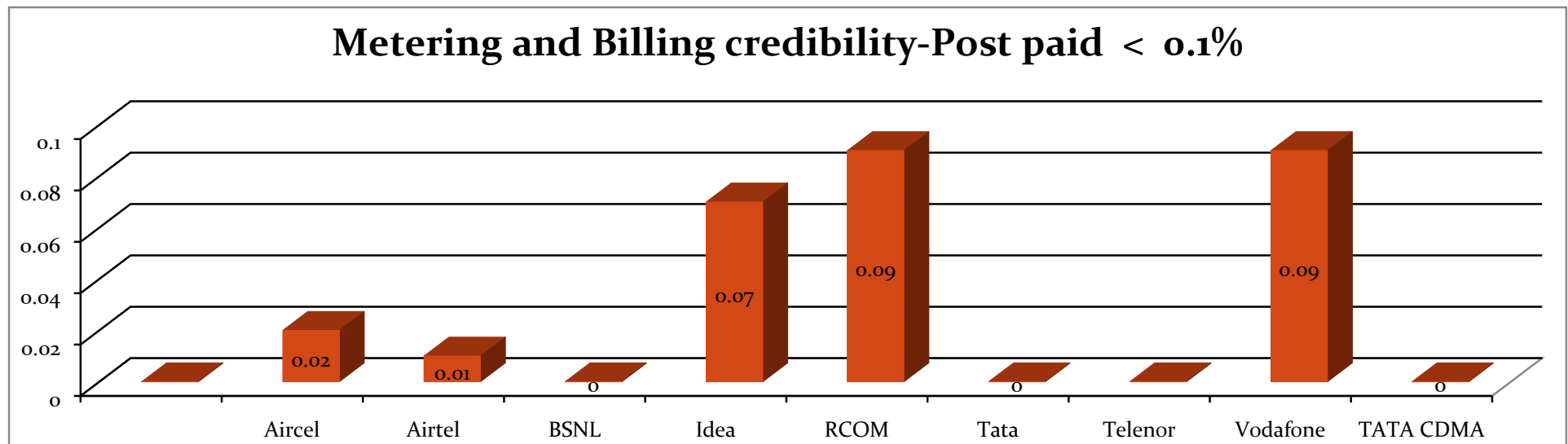
Data Source: Billing Center of the operators

Idea failed to meet the benchmark for metering and billing credibility of postpaid subscribers.

4.1.3   KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)
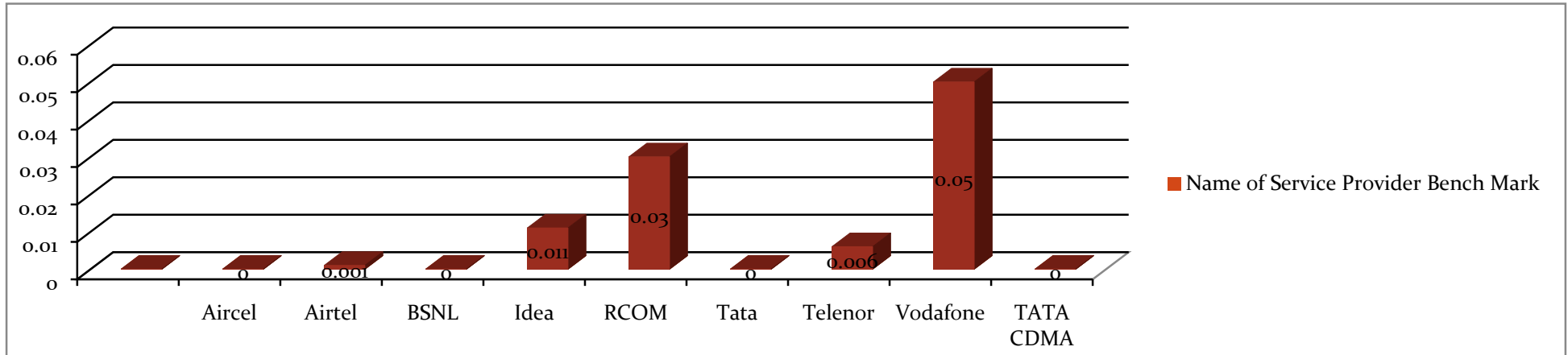
Data Source: Billing Center of the operators

All operators met the benchmark for metering and billing credibility of prepaid subscribers.

4.2   RESOLUTION OF BILLING/ CHARGING COMPLAINTS

4.2.1   PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to -calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks **=**

> number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter   X 100
>
> ---
>
> number of billing/charging, credit / validity complaints received during the quarter

Resolution of billing complaints within 6 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks **=**

> number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter   X 100
>
> ---
>
> number of billing/charging, credit / validity complaints received during the quarter

- ✎ **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.

- ✎ The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.

- ➲ *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

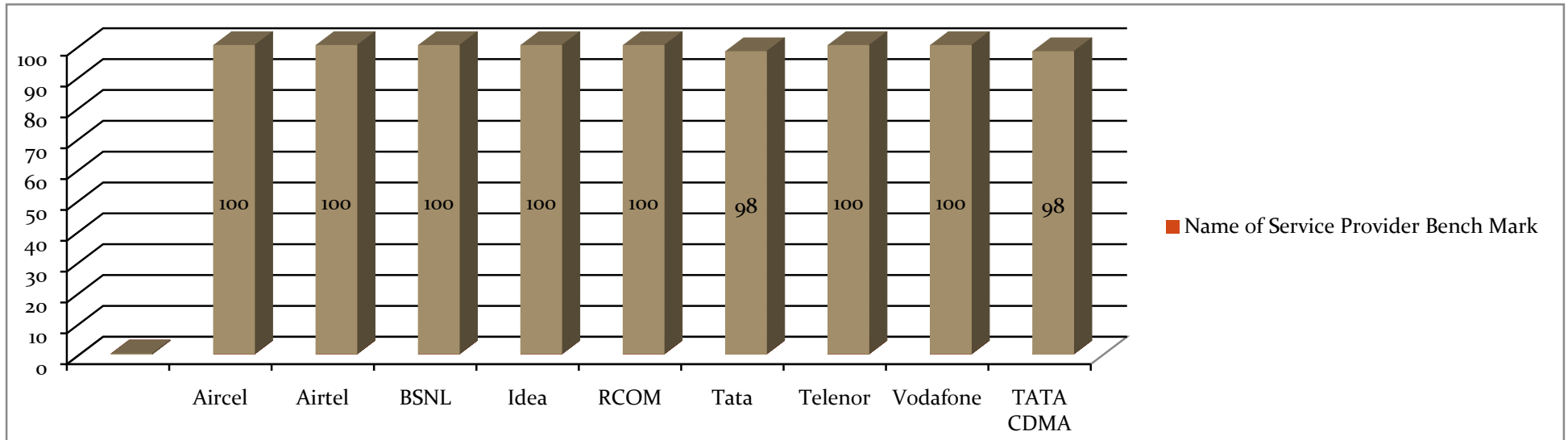### 4.2.2 KEY FINDINGS- WITHIN 4 WEEKS

Data Source: Billing Center of the operators

All failed to meet the benchmark for resolution of billing complaints within 4 weeks in live calling. However,all operators met the benchmark for resolution of billing complaints within 4 weeks in PMR data.
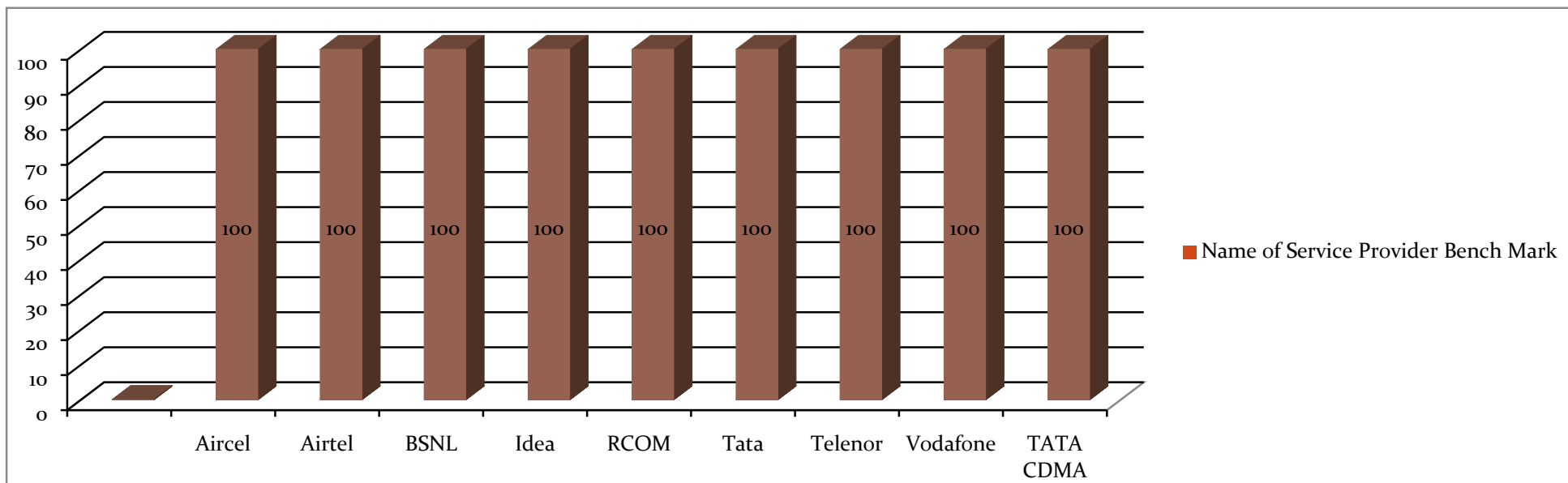
4.2.3   KEY FINDINGS WITHIN 6 WEEKS

Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks as well as within 6 weeks.

4.3   PERIOD OF APPLYING CREDIT/WAVIER

4.3.1   PARAMETER DESCRIPTION

- ➲ Computational Methodology:
  - ✤ **Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100**

- ➲ TRAI Benchmark:
  - ✤ Period of applying credit waiver within 7 days: 100%

- ➲ Audit Procedure:
  - ✤ Operator to provide details of:-
    - ‣ List of all eligible cases along with
      - ➲ Date of applying credit waiver to all the eligible cases.
      - ➲ Date of resolution of complaint for all eligible cases

4.3.2   KEY FINDINGS
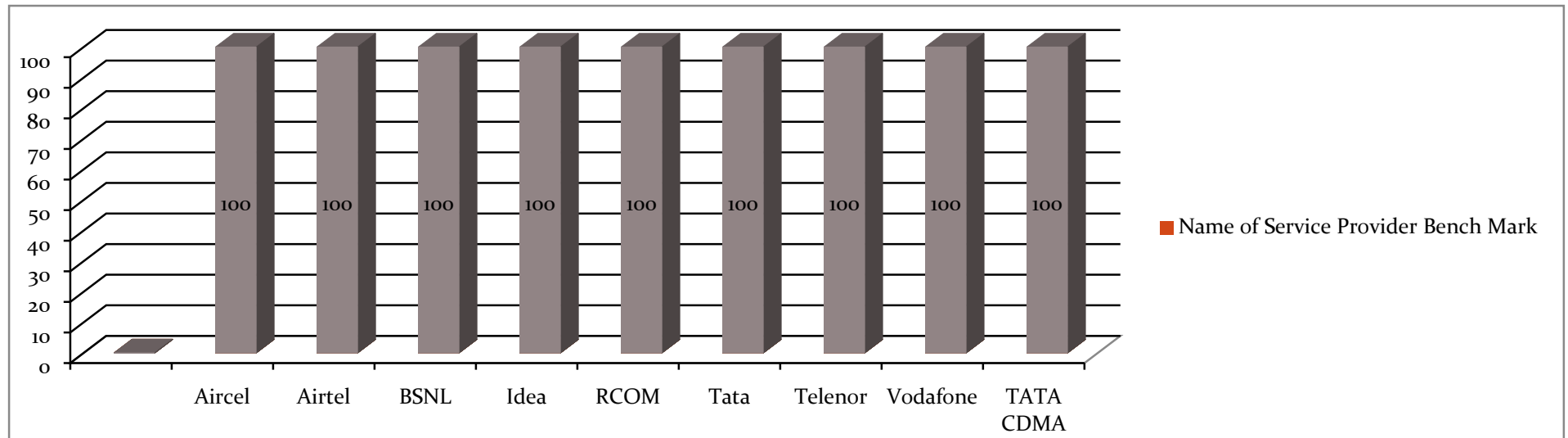
Data Source: Billing Center of the operators

4.4   CALL CENTRE PERFORMANCE-IVR

4.4.1   PARAMETER DESCRIPTION

- ⮞ Computational Methodology:

  - ↳ **Call centre performance IVR = (Number of calls connected and answered by IVR/ All calls attempted to IVR) * 100**

- ⮞ TRAI Benchmark: >= 95%

- ⮞ Audit Procedure:

  - ↳ Operators provide details of the following from their central call centre/ customer service database:

    - ‣ Total calls connected and answered by IVR

    - ‣ Total calls attempted to IVR

  - ↳ Also live calling is done to test the calls connected and answered by IVR

4.4.2   KEY FINDINGS
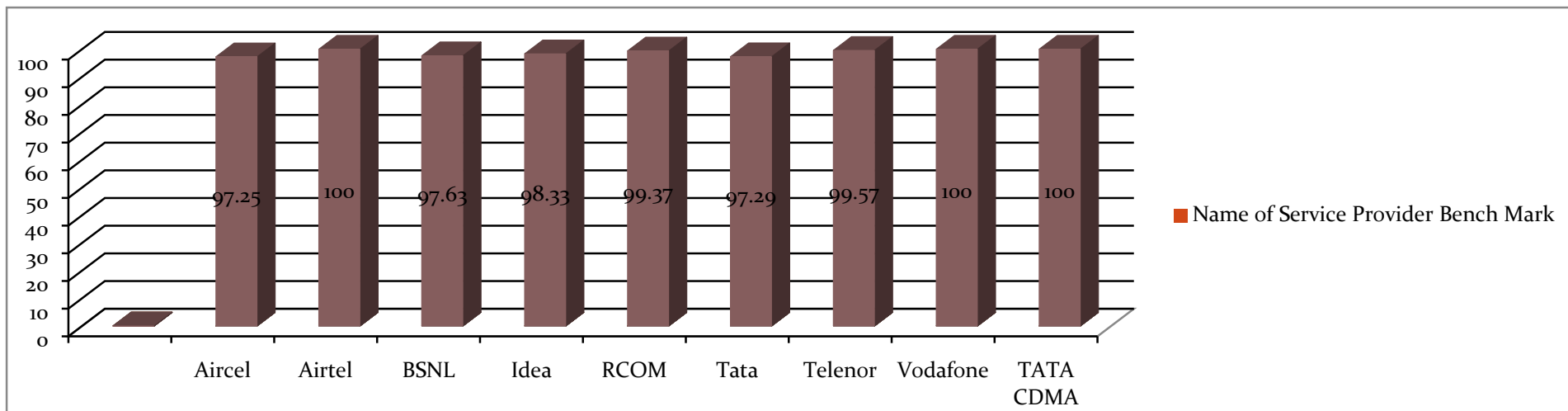
Data Source: Customer Service Center of the operators

As per 3 days live, all operators met the benchmark.

4.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

4.5.1 PARAMETER DESCRIPTION

- ➲ Computational Methodology:
  - ✎ Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- ➲ Audit Procedure:
  - ✎ Operators provide details of the following from their central call centre/ customer service database:
    - ‣ Total calls connected and answered by operator within 90 seconds
    - ‣ Total calls attempted to connect to the operator
  - ✎ Also live calling was done to test the calls answered within 90 seconds by the operator

Benchmark: 95% calls to be answered within 90 seconds

4.5.2 KEY FINDINGS
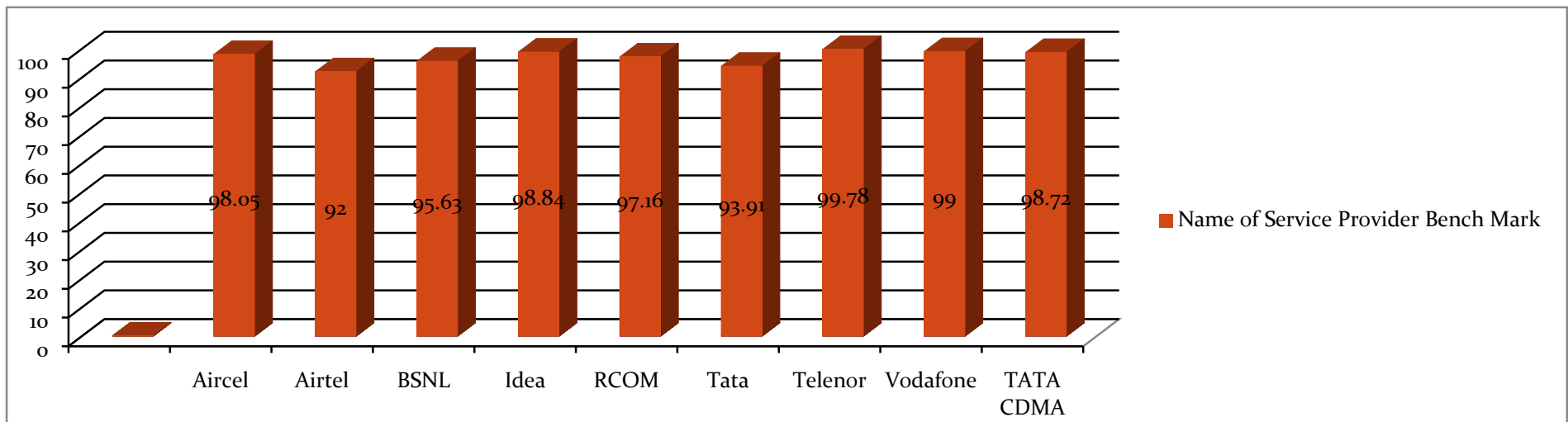
Data Source: Customer Service Center of the operators

Reliance GSM, Airtel and Tata GSM failed to meet the benchmark as per audit. However, as per live calling done to customers, the performance of TATA GSM, Airtel and Reliance GSMwas far inferior to the PMR data.

4.6   TERMINATION/CLOSURE OF SERVICE

4.6.1   PARAMETER DESCRIPTION

- ⮂ Computational Methodology:

  - ↳ **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**

- ⮂ TRAI Benchmark:

  - ↳ Termination/Closure of Service: <=7 days

- ⮂ Audit Procedure:

  - ↳ Operator provide details of the following from their central billing/CS database:

    - ⮂ Date of lodging the closure request (all requests in given period)

    - ⮂ Date of closure of service

4.6.2   KEY FINDINGS
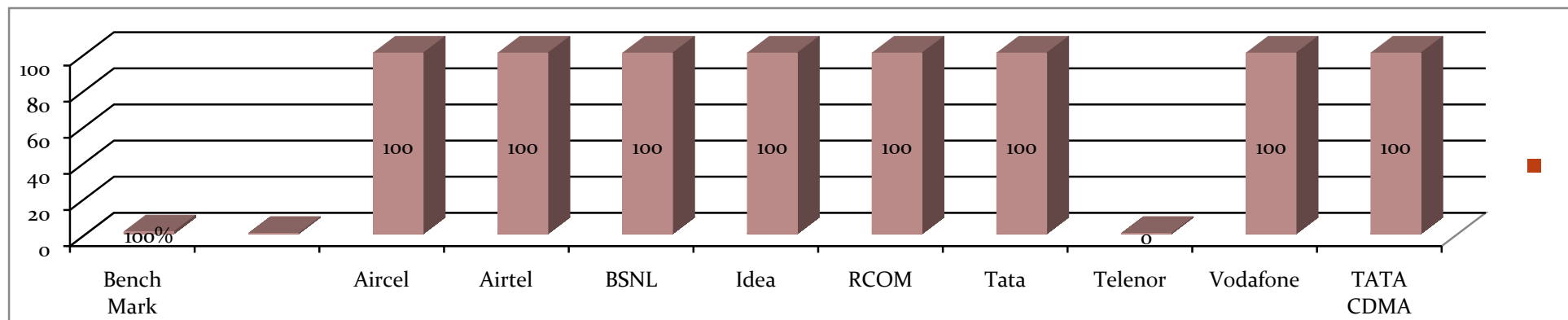
Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

4.7   REFUND OF DEPOSITS AFTER CLOSURE

4.7.1   PARAMETER DESCRIPTION

- ➲ Computational Methodology:
  - ↳ **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**
  - ↳ Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.
- ➲ TRAI Benchmark:
  - ↳ Time taken for refund for deposit after closures: 100% within 60 days
- ➲ Audit Procedure:
  - ↳ Operator provide details of the following from their central billing/refund database:
    - ‣ Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
    - ‣ Dates of refund pertaining to all closure request received during the relevant quarter

4.7.2   KEY FINDINGS
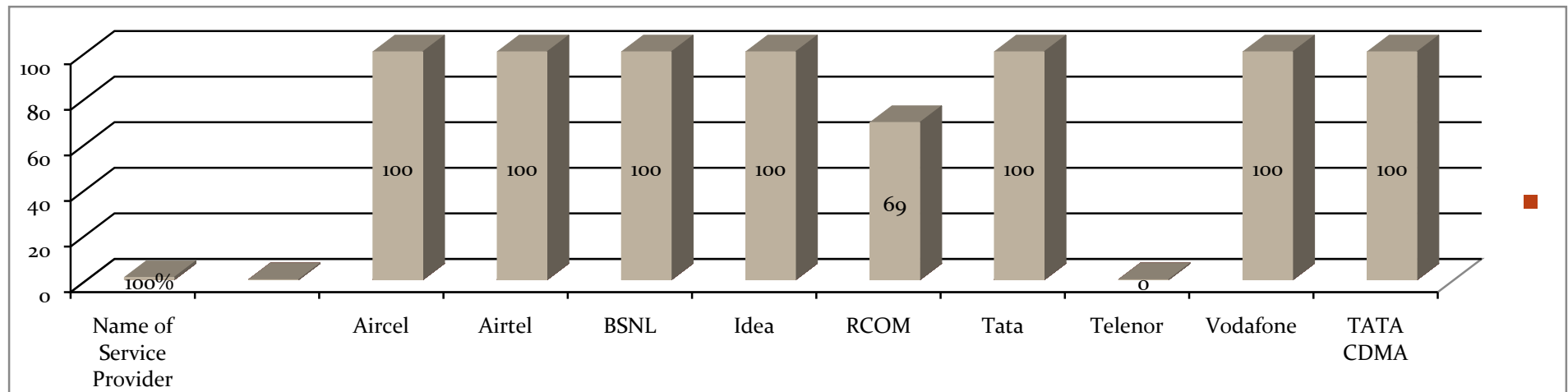
Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter except RCOM is 69%.

5 ANNEXURE– CONSOLIDATED-2G

5.1 NETWORK AVAILABILITY

1. Network Availability										
Audit Results for Network Availability - PMR data										

	Bench Mark	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
Number of BTSs in the licensed service area		1943	12649	7670	10430	3099	4720	3379	8769	1139
Sum of downtime of BTSs in a month (in hours)		967	5259	35395	2746	4911	761	1079	2448	244
BTSs accumulated downtime (not available for service)	≤ 2%	0.07	0.06	1.14	0.04	0.22	0.02	0.04	0.04	0.03
Number of BTSs having accumulated downtime > 24 hours		1	1	67	2	41	0	0.3	10	0
Worst affected BTSs due to downtime	≤ 2%	0.07	0.01	1.69	0.02	1.31	0	0.01	0.11	0

Data Source: Operations and Maintenance Center (OMC) of the operators

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

5.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

2. Connection Establishment (Accessibility)										
Audit Results for CSSR, SDCCH and TCHcongestion - PMR data										

	Bench Mark	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
CSSR	$\geq 95\%$	99.37	98.03	98.08	99.05	99.51	99.18	99.59	99.81	99.43
SDCCH / Paging channel congestion	$\leq 1\%$	0.07	0.9	0.61	0.77	0.01	0.05	0.07	0.08	0
TCH congestion	$\leq 2\%$	0.22	1	1.3	0.82	0.13	0.087	0.06	0.19	0.013

Data Source: Network Operations Center(NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

5.3 CONNECTION MAINTENANCE (RETAINABILITY)

3. Connection Maintenance (Retainability)
Audit Results for Call drop rate and for number of cells having more than 3% TCH - PMR data

Call Drop rate	Bench Mark	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
Call drop rate	≤ 2%	0.36	0.96	0.62	0.72	0.14	0.41	0.62	0.36	0.11
Worst affected cells having more than 3% TCH	≤ 3%	1.933	2.21	2.47	2.78	0.43	2.71	1.51	2.76	0.81

Data Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

5.4 VOICE QUALITY

Audit Results for Voice Quality - PMR data

Voice Quality	Bench Mark	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
%age call with good voice quality	≥ 95%	97.71	97.18	98	97.18	99.48	98.07	98.52	99.27	98.25

Data Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

5.5   POI CONGESTION

POI Congestion	Bench Mark	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
POI congestion	≤ 0.5%	0	0	0	0	0	0	1	0	0

Data Source: Network Operations Center(NOC) of the operators

6 ANNEXURE – CONSOLIDATED-3G

6.1 NETWORK AVAILABILITY

1. Network Availability					
Audit Results for Network Availability - PMR data					
	Bench Mark	Aircel	Airtel	BSNL	Idea
Node Bs downtime (not available for service)	≤ 2%	0.06	0.08	0.82	0.04
Worst affected Node Bs due to downtime	≤ 2%	0	0.04	1.15	0.01

Source: Operations and Maintenance Center (OMC) of the operators

6.2   CONNECTION ESTABLISHMENT (ACCESSIBILITY)

2. Connection Establishment (Accessibility)					
Audit Results for CSSR, RRC and TCH RAB congestion - PMR data					
	Bench Mark	Aircel	Airtel	BSNL	Idea
CSSR	≥ 95%	99.09	97.97	98.57	99.89
SDCCH / Paging channel RRC congestion	≤ 1%	0.47	0.0148	0.83	0.03
TCH / Circuit Switched RAB congestion	≤ 2%	0.13	0.0025	0.72	0.06

Source: Network Operations Center(NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

6.3   CONNECTION MAINTENANCE (RETAINABILITY)

3. Connection Maintenance (Retainability)					
Audit Results for Call drop rate and for number of cells having more than 3% TCH - PMR data					
Call Drop rate	Bench Mark	Aircel	Airtel	BSNL	Idea
Call drop rate	≤ 2%	0.32	0.33	0.49	0.16
Worst affected cells having more than 3% TCH	≤ 3%	2.73	1.62	2.13	0.94

Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

6.3.1 VOICE QUALITY

Audit Results for Voice Quality - PMR data					
Voice Quality	**Bench Mark**	**Aircel**	**Airtel**	**BSNL**	**Idea**
%age call with good voice quality	**≥ 95%**	99.81	98.77	99.78	99.73

Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

6.4 POI CONGESTION

POI Congestion	**Bench Mark**	**Aircel**	**Airtel**	**BSNL**	**Idea**
POI congestion	**≤ 0.5%**	0	0	0	0

Source: Network Operations Center(NOC) of the operators

6.5   LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Calling Operator	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Telenor	Vodafone	TATA CDMA
Total No. of calls Attempted	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100
Calls got connected to agent with in 90 sec.	100	100	100	100	100	100	100	100	100
%age of calls got answered	100%	100%	100%	100%	100%	100%	100%	100%	100%

Data Source: Live calls made by auditors from operator's network