



- Agenda Item 2: Air Navigation Matters**
2.3 Other Specific Air Navigation Developments
2.3.4 Communications, Navigation and Surveillance (CNS)
• **E/CAR NTG activities**

E/CAR AFS NETWORK PERFORMANCE

(Presented by Trinidad and Tobago)

SUMMARY	
This Working Paper provides an analysis of the ECAR AFS network performance over the past ten months. It presents information on the recent updates to the network and identifies improvements/common network points of failure of the system.	
References:	
• First Meeting of the Eastern Caribbean Network Technical Group (E/CAR/NTG/1) • Thirty-First Eastern Caribbean Working Group Meeting (E/CAR/WG/31) • Twenty Second Meeting of Directors of Civil Aviation of the Eastern Caribbean (E/CAR/DCA/22)	
Strategic Objectives	<i>This working paper is related to Strategic Objectives A – Safety and D – Efficiency.</i>

1. Introduction

1.1 The Eastern Caribbean Aeronautical Fixed Services (E/CAR AFS) Network is configured to handle direct and switched voice circuits and Aeronautical Fixed Telecommunications Network (AFTN) data. Voice circuits are digitally compressed 8 Kbps and AFTN traffic is carried at 9600 bps using X.25 interface protocol to Atlanta and 2400 bits per second (bps), asynchronous protocol to the Eastern Caribbean. The switched voice network provides connectivity among users via bandwidth utilization on demand. The Network is in excess of ten (10) years old.

1.2 The E/CAR AFS Network is contractually maintained and administered by Telecommunication Services of Trinidad and Tobago (TSTT) and their sub-contractor NET Federal Inc., the manufacturer of the PROMINA multiplexer equipment.

1.3 Due to the concerns for the faulty and degraded services provided by the E/CAR AFS network in both data and voice circuits, the E/CAR/WG/31 Meeting, formulated Conclusion 31/5, 31/6 and 31/7. The following paragraphs describe the urgent actions and immediate recovery actions carried out by Trinidad and Tobago Civil Aviation Authority (TTCAA)

2. Discussion

Equipment upgrade

2.1 In 2009 TSTT recommended an upgrade of the Network's PROMINA equipment in order to bring the network up to current versions of software and hardware. As a pre-requisite to the upgrade, TSTT conducted site visits to all of the points of the ECAR Network during the period November 2 - 13, 2009. The objectives of these visits were to carry out an assessment of all PROMINA Node equipment which included verification of the physical condition of the equipment, confirmation of software version installed, verification of remote access facilities to access all nodes, provide an overview of the equipment for local civil aviation technical personnel and based on actual observation, amend as necessary the existing network drawings for each point.

2.2 The discussions for and the implementation of the upgrade which started in August 2009 was completed in March 2010 with one outstanding hub in Barbados to be completed in June 2010. Table 1-1 below lists the status of the Promina upgrade:

STATE	Status of Promina Upgrade
Anguilla	Not Applicable
Antigua	Promina upgrade completed: Airport – March 16th 2010. Hub – March 17th 2010
Barbados	Promina upgrade completed Airport – March 22nd 2010. Hub –to be completed by 15 th June 2010
Dominica	Node replaced 10-Feb-2010
Grenada	Replacement completed 12-Feb-2010
Guadeloupe	Promina upgrade completed March 25 th 2010
Martinique	Promina upgrade completed March 24 th 2010
Montserrat	Promina upgrade completed March 18 th 2010
Nevis	Not Applicable. No Promina equipment on site therefore N/A- OPX from St. Kitts
St Lucia	Promina upgrade completed March 22 nd 2010 (H)
St. Kitts	Node replaced 10-Dec-2009
San Juan	Not Applicable
St Vincent	Promina upgrade completed March 24 th 2010
Trinidad	Promina upgrade completed on February 12 th 2010

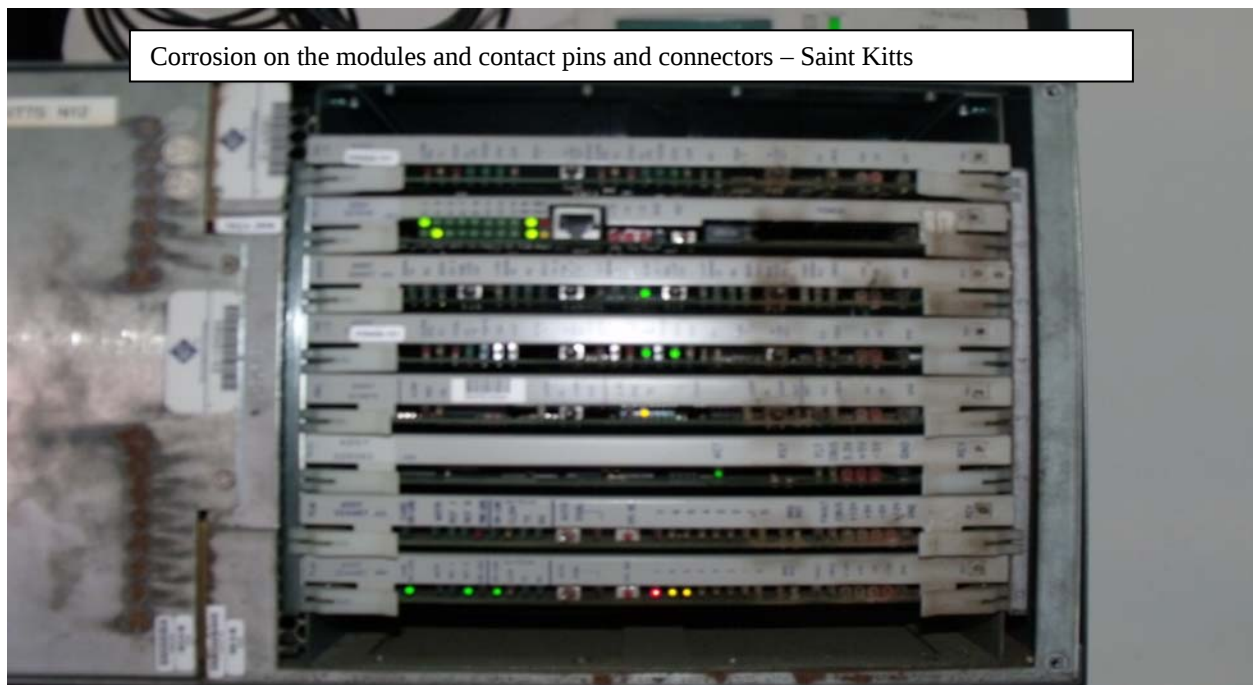
Table 1-1

Analysis of failures for the period July 2009 to May 2010

2.3 **Appendix A** shows the performance of each State over the period July 2009 to May 2010. An analysis of the results shows a significant improvement in the performance of both voice and data circuits.

2.4 During the third quarter of 2009 there were frequent recurrent outages on voice and data services. Core node failure at Piarco resulted in outages on December 1, 2009 and January 29, 2010. In October 2009, a solution was implemented to replace an X.25 device via the Antigua hub. That implementation has since stabilized the operation of that part of the network. Between November 15, 2009 and February 18, 2010 three defective nodes were replaced and four software and hardware upgrades completed.

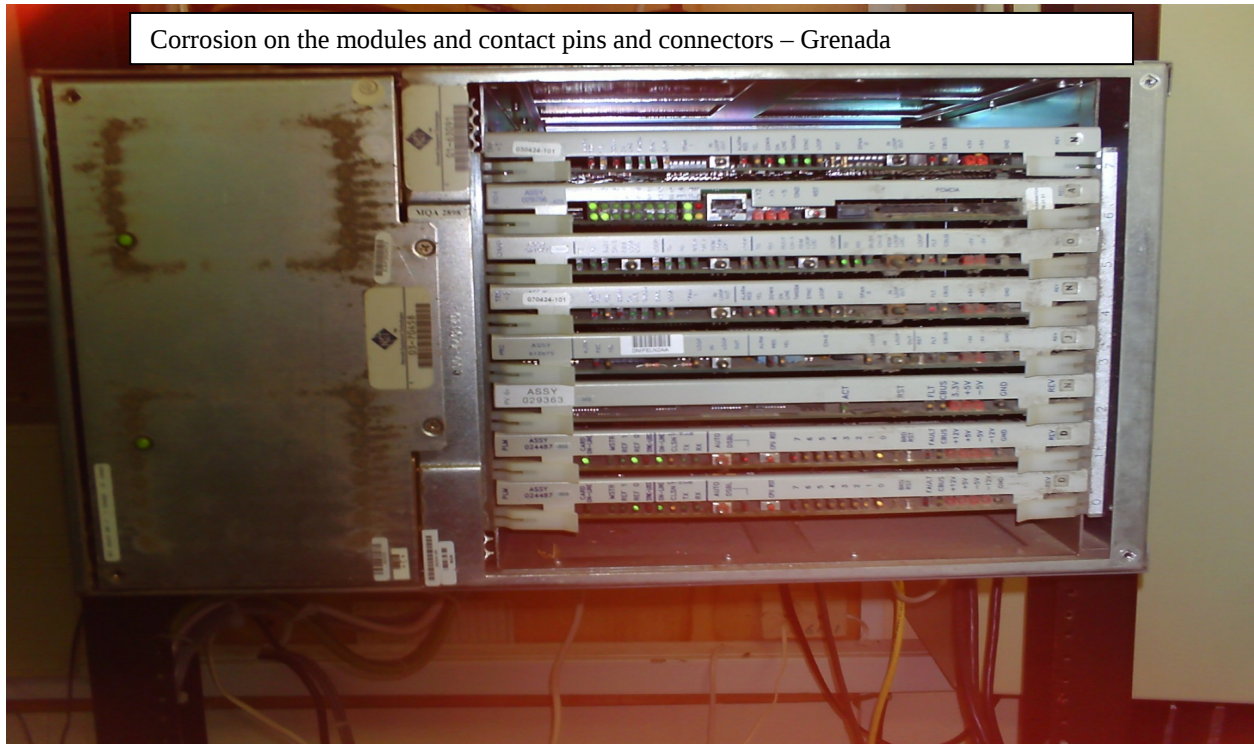
2.5 One of the contributing factors to failures experienced within the Eastern Caribbean is improperly maintained environmental conditions as discovered during the site surveys:



Corrosion on the modules and contact pins and connectors – Dominica



Corrosion on the modules and contact pins and connectors – Grenada



2.5 Voice traffic issues to San Juan and to New York via San Juan have been significantly reduced via configuration changes on the bandwidth manager node off domain 25 of the FAA network, upgrade and configuration adjustments to N1 (domain 100) at Piarco and improved collaboration between the FAA, TTCAA, Promina MUX vendor NET and TSTT. The face-to-face discussions and sharing of information at the E/CAR/NTG meeting clarified many misunderstandings of the configuration of the E/CAR AFS Network and its interconnectivity and continuity of services to the FAA's network.

2.6 Several failures in the third and fourth quarters of 2009 were attributed to faulty Promina equipment. Failures reduced as upgrades were completed. Failures during the second quarter 2010 in Martinique are attributed to ‘last mile’ problem and/or outstanding upgrade to Barbados’s hub. The short term solution proposed by TSTT is to connect Martinique directly to Piarco. Other States also connected off the Barbados hub show intermittent failures but not as severe as Martinique which is why ‘last mile’ problems suspected in Martinique.

Fault reporting and feedback

2.7 In October 2009, TSTT sought to address shortcomings and present short and long term solutions for an improved network. The result is an improved fault ticketing system, reporting procedure adjusted to implement one number direct reporting for all faults on the ECAR network, via 800-4NOC all reports are logged and identified personnel are notified and updated on the progress of faults. The benefits are improved response times, efficiency of fault dispatch locally and in ECAR states and improved fault analysis and information gathering.

2.8 The immediate benefits are seen by Trinidad and Tobago as the coordination point for fault reports and resolution. Plans are being developed to have a real time fault reporting and resolution/feedback web-based system available to all users.

2.9 A response time to faults of less than ten (10) minutes was contractually agreed between NET Federal and TSTT. Upon completion of outstanding Barbados Hub upgrade (June 2010), feedback will be automatic and accessible via portal access.

Staff Resourcing & Technical Support

2.10 TSTT has dedicated a team consisting of five (5) engineers/technicians and a Project Manager to the maintenance and implementation of the existing E/CAR AFS network in addition to the contractual support from the equipment vendor (NET Federal Inc).

Spares Acquisition

2.11 Parts have been acquired to maintain the upgrade of software and hardware for the Promina multiplexers across the network.

On-going Improvement

2.12 A strict maintenance schedule is to be maintained to avoid deterioration in operation with the next scheduled routine / preventive maintenance carded for September 2010. Trinidad and Tobago and its partnership with TSTT will continue its improvement by continued collaboration with member states on the existing E/CAR AFS Network and the planned implementation of the new network.

2.13 Trinidad and Tobago proposes to introduce an email fault reporting system for those States that prefer this method. The procedure to fax the fault report to the Piarco AIS will also continue to be valid. The email addresses are:

ais@caa.gov.tt	Accessed 24/7 by the Piarco AIS Supervisor who will contact the TTCAA Technician/Engineer.
telecoms.ttcaa@gmail.com	Accessed by the Telecommunications and Electronics Technicians/Engineers during regular working hours – Mon thru Fri 8:00am to 4:15 pm, excluding weekends and public holidays.

2.14 **Appendix B** is an electronic version (editable format) of the fault report form that was approved at the E/CAR/WG/29 meeting. States are asked to note that regardless of the medium used to report a fault, the fault numbering system needs to be continuous.

3. **Suggested Action**

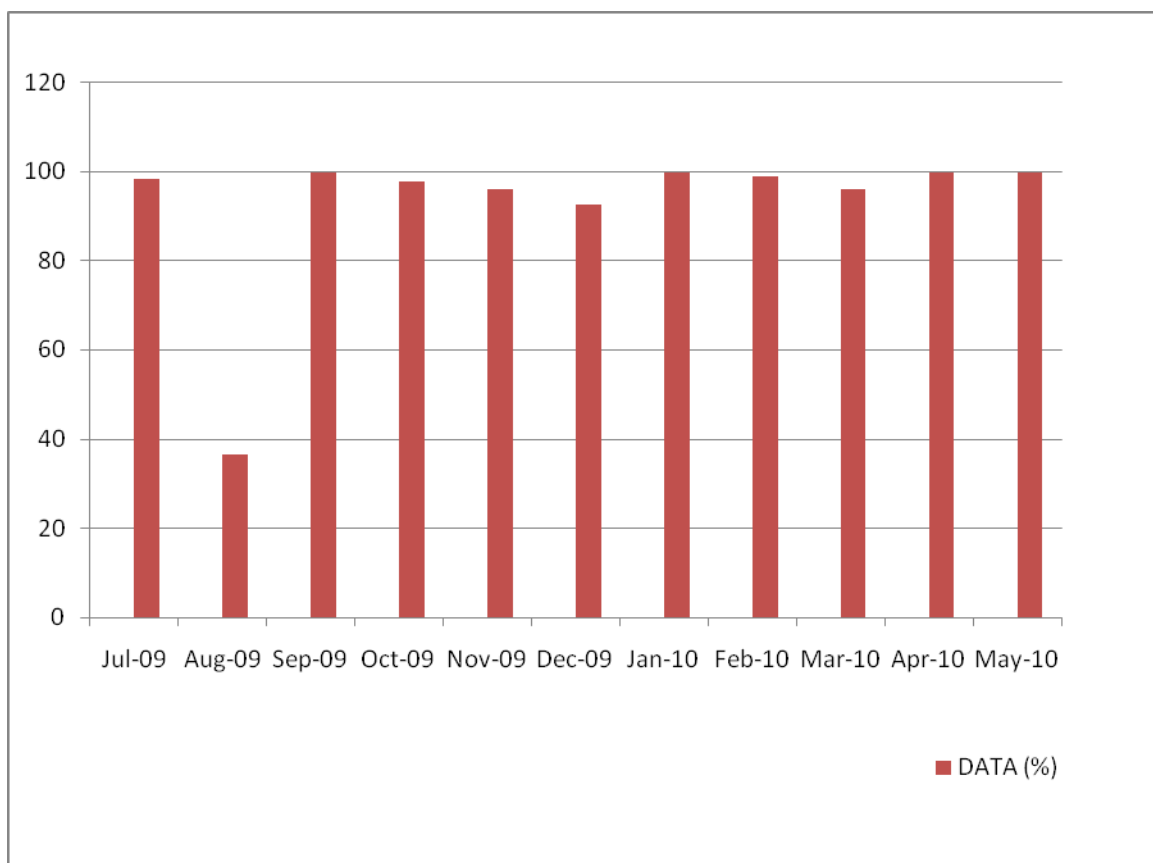
3.1 The Meeting is invited to:

- a) take note of the information presented in this paper;
- b) approve the added fault reporting method; and
- c) take any other action that the meeting considers appropriate.

APPENDIX A

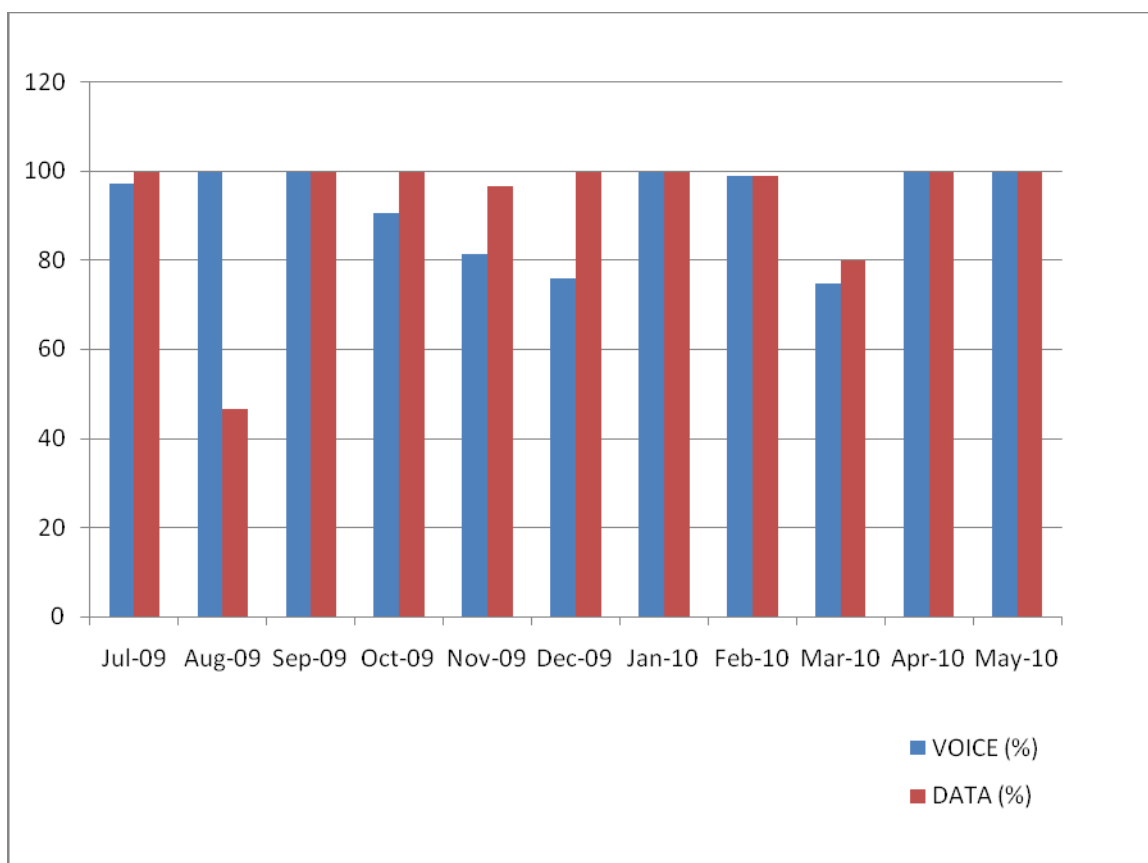
ANGUILLA

PERIOD	VOICE (%)	DATA (%)
Jul-09		98.50
Aug-09		36.60
Sep-09		100.00
Oct-09		97.70
Nov-09		96.10
Dec-09		92.70
Jan-10		100.00
Feb-10		99.00
Mar-10		96.10
Apr-10		99.80
May-10		100.00



ANTIGUA

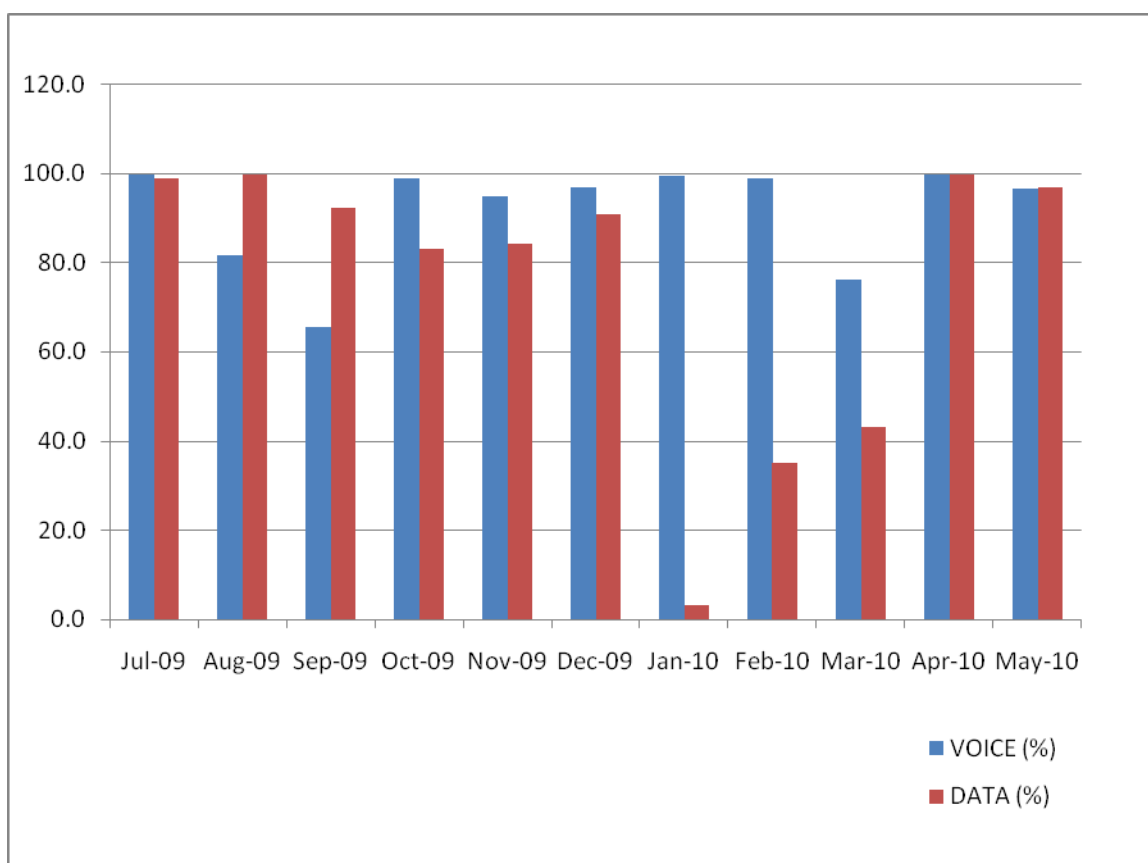
PERIOD	VOICE (%)	DATA (%)
Jul-09	97.2	100.0
Aug-09	99.9	46.6
Sep-09	100.0	100.0
Oct-09	90.6	100.0
Nov-09	81.5	96.7
Dec-09	75.9	100.0
Jan-10	100.0	100.0
Feb-10	99.0	99.0
Mar-10	74.9	80.1
Apr-10	100.0	99.8
May-10	100.0	100.0



— A3 —

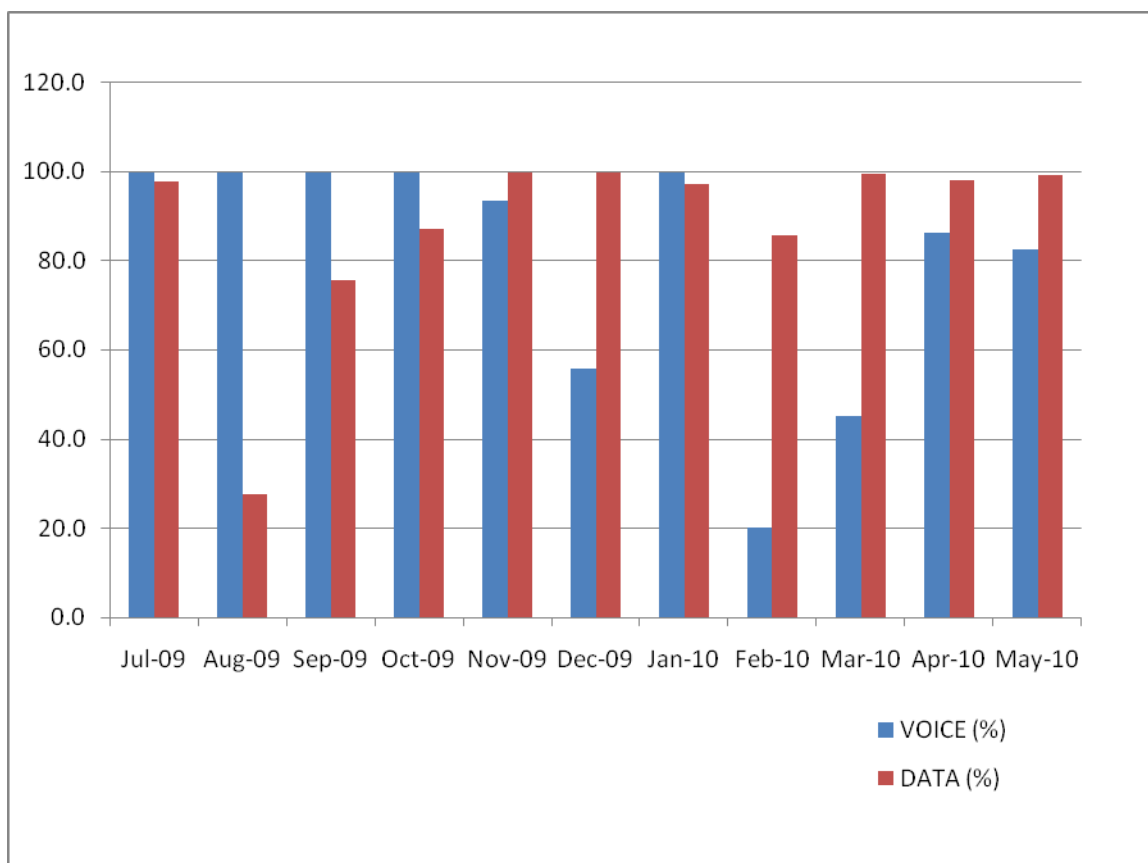
BARBADOS

PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	99.0
Aug-09	81.7	100.0
Sep-09	65.7	92.5
Oct-09	98.9	83.2
Nov-09	95.0	84.30
Dec-09	97.1	90.9
Jan-10	99.5	3.2
Feb-10	99.0	35.1
Mar-10	76.3	43.3
Apr-10	100.0	100.0
May-10	96.7	96.9



DOMINICA

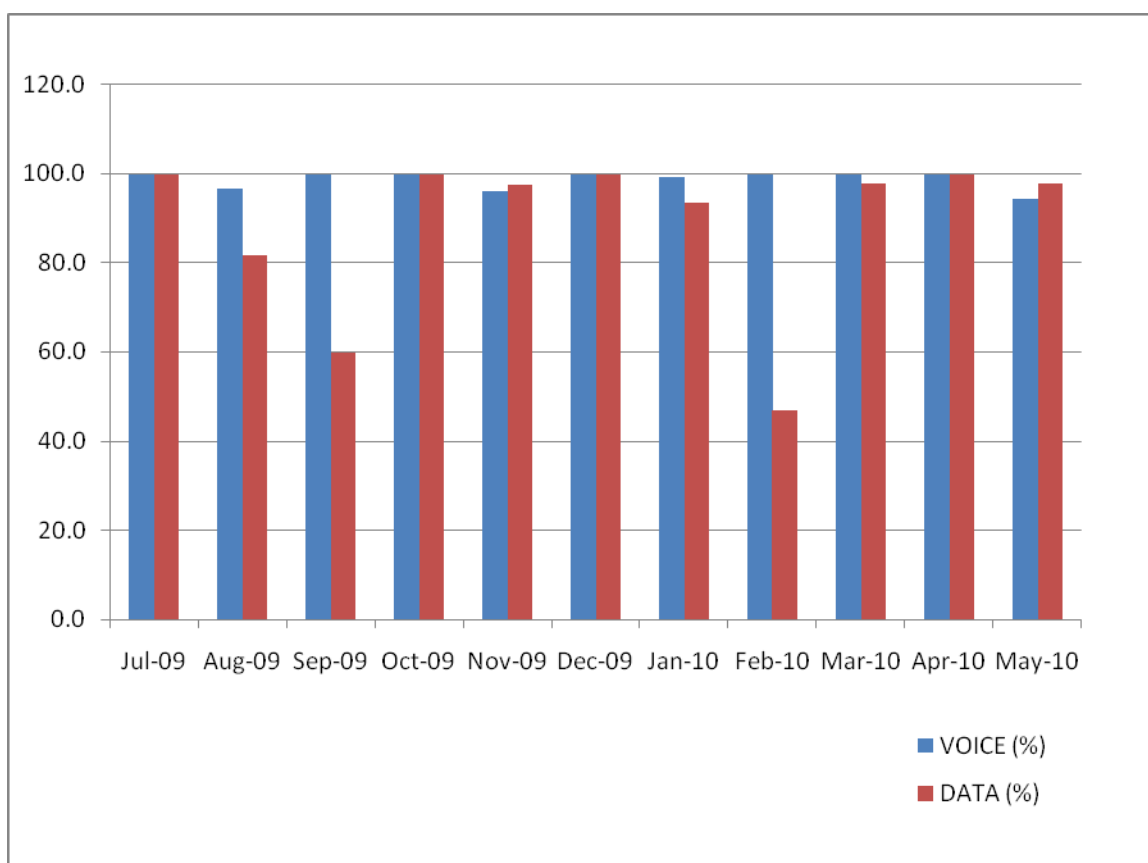
PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	97.7
Aug-09	100.0	27.7
Sep-09	100.0	75.7
Oct-09	100.0	87.2
Nov-09	93.5	100.0
Dec-09	55.7	99.8
Jan-10	100.0	97.4
Feb-10	20.0	85.8
Mar-10	45.2	99.7
Apr-10	86.2	98.0
May-10	82.7	99.3



— A5 —

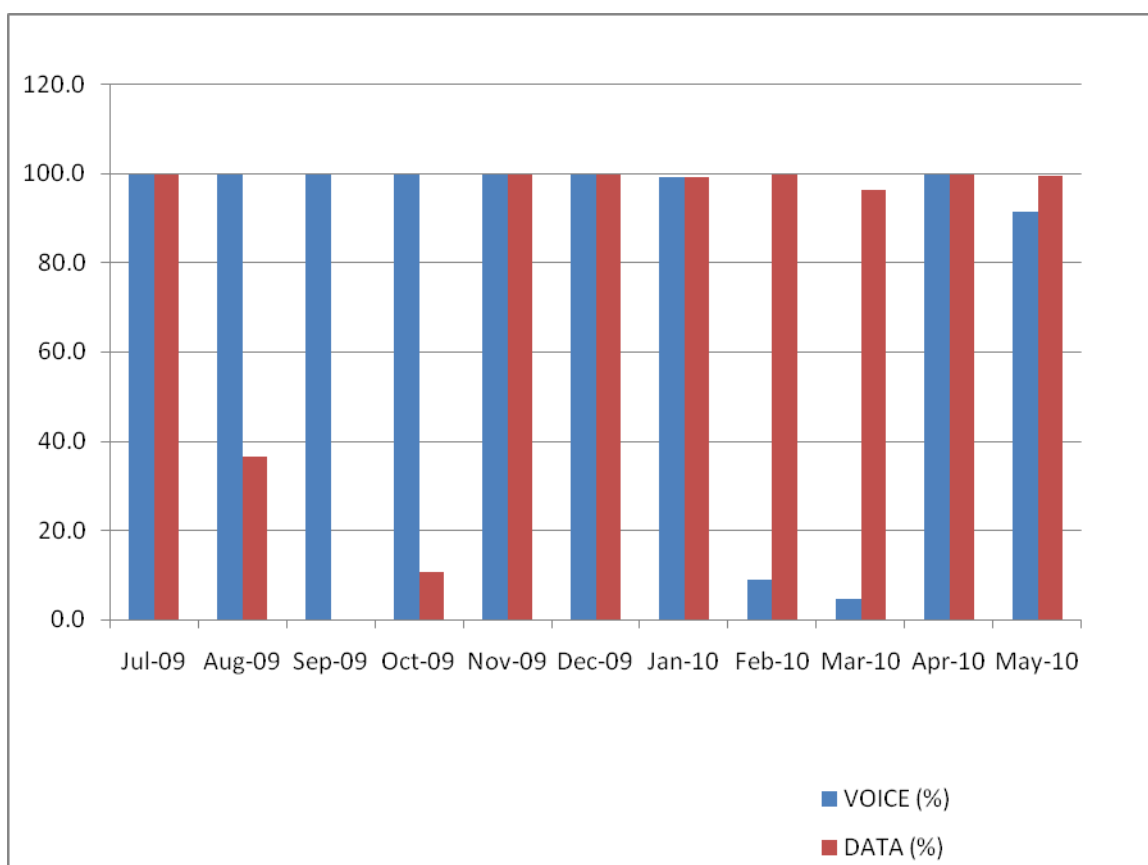
GRENADA

PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	100.0
Aug-09	96.8	81.7
Sep-09	100.0	60.0
Oct-09	100.0	100.0
Nov-09	96.2	97.5
Dec-09	100.0	100.0
Jan-10	99.2	93.6
Feb-10	100.0	47.0
Mar-10	100.0	97.9
Apr-10	100.0	100.0
May-10	94.3	97.7



GUADELOUPE

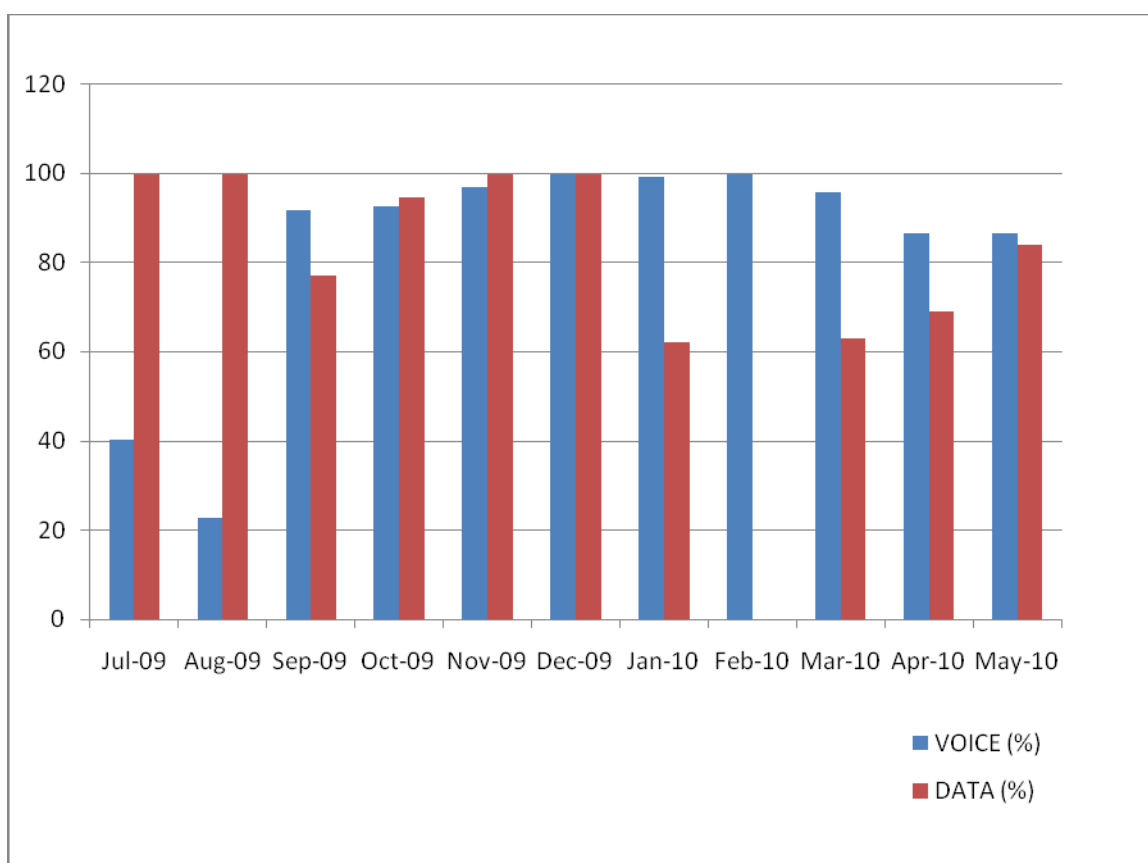
PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	100.0
Aug-09	100.0	36.6
Sep-09	100.0	0.0
Oct-09	100.0	10.6
Nov-09	100.0	100.0
Dec-09	100.0	100.0
Jan-10	99.2	99.2
Feb-10	9.0	100.0
Mar-10	4.5	96.4
Apr-10	100.0	100.0
May-10	91.5	99.7



— A7 —

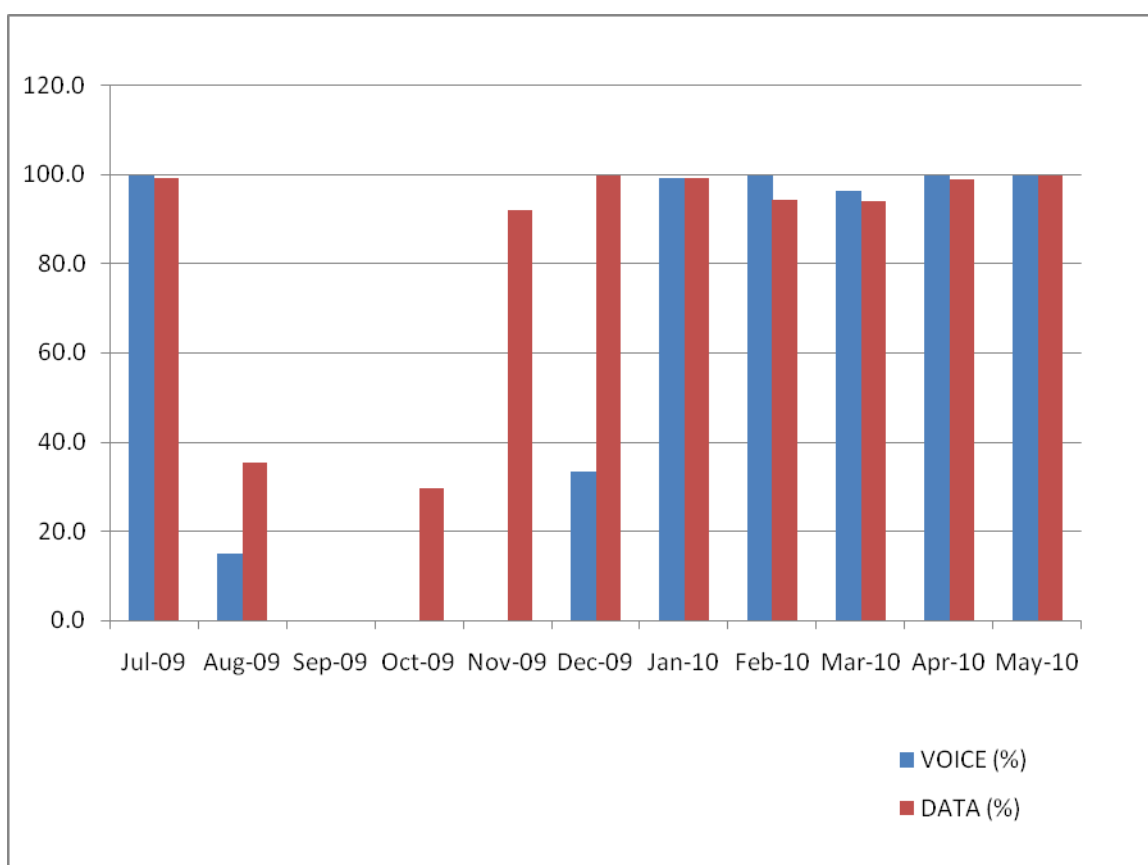
MARTINIQUE

PERIOD	VOICE (%)	DATA (%)
Jul-09	40.4	100.0
Aug-09	22.6	100.0
Sep-09	91.7	77.0
Oct-09	92.8	94.7
Nov-09	96.9	100.0
Dec-09	100.0	100.0
Jan-10	99.2	62.2
Feb-10	100.0	0.0
Mar-10	95.9	63.1
Apr-10	86.5	69.2
May-10	86.6	84.1



MONTSERRAT

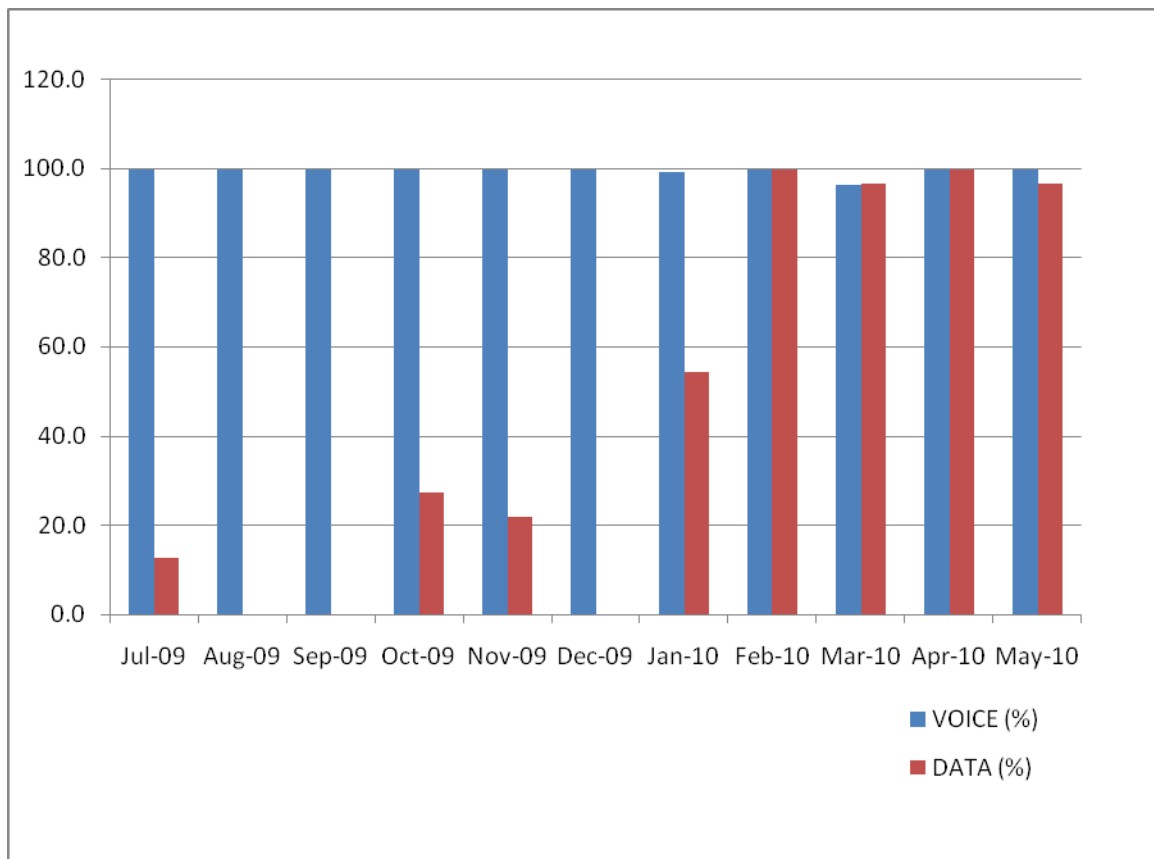
PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	99.4
Aug-09	15.1	35.4
Sep-09	0.0	0.0
Oct-09	0.0	29.5
Nov-09	0.0	92.2
Dec-09	33.5	100.0
Jan-10	99.2	99.2
Feb-10	100.0	94.5
Mar-10	96.4	94.1
Apr-10	100.0	99.1
May-10	100.0	100.0



— A9 —

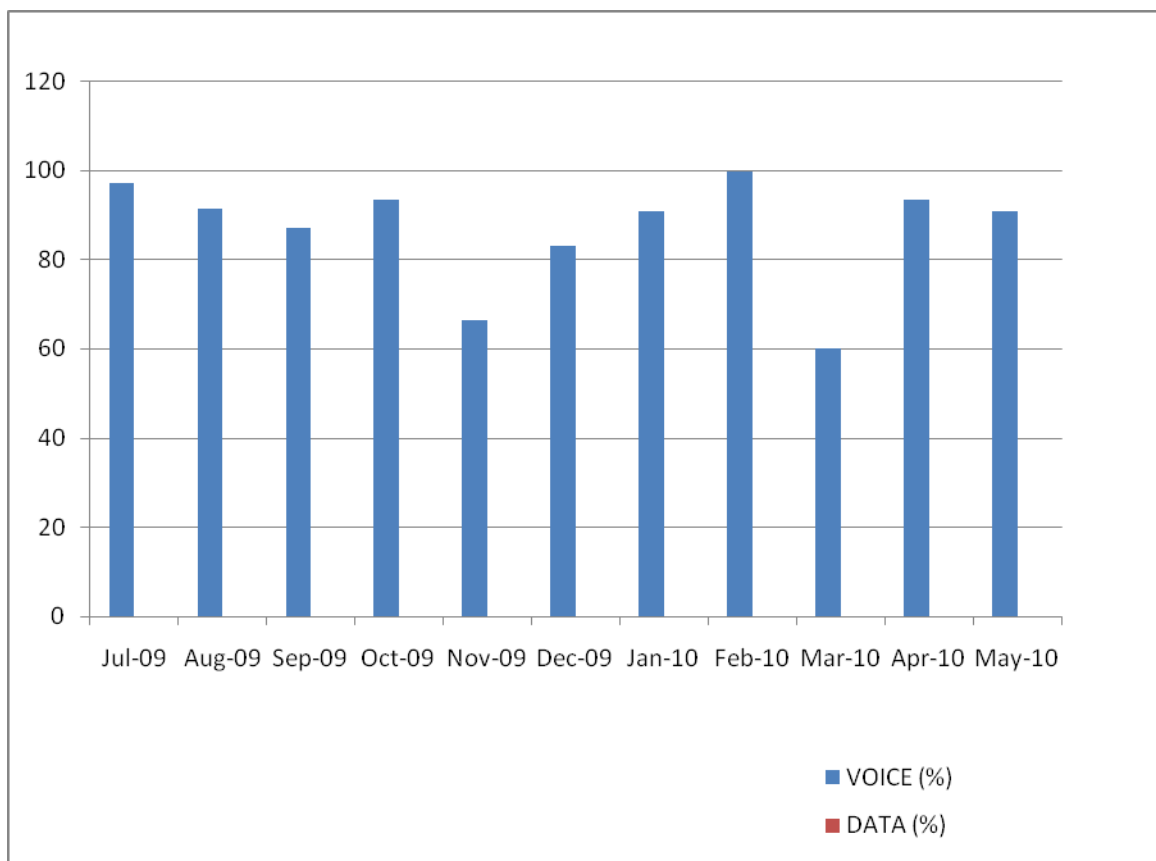
NEVIS

PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	12.8
Aug-09	100.0	0.0
Sep-09	100.0	0.0
Oct-09	100.0	27.2
Nov-09	100.0	21.8
Dec-09	100.0	0.0
Jan-10	99.2	54.3
Feb-10	100.0	100.0
Mar-10	96.4	96.6
Apr-10	100.0	99.8
May-10	100.0	96.8



SAN JUAN

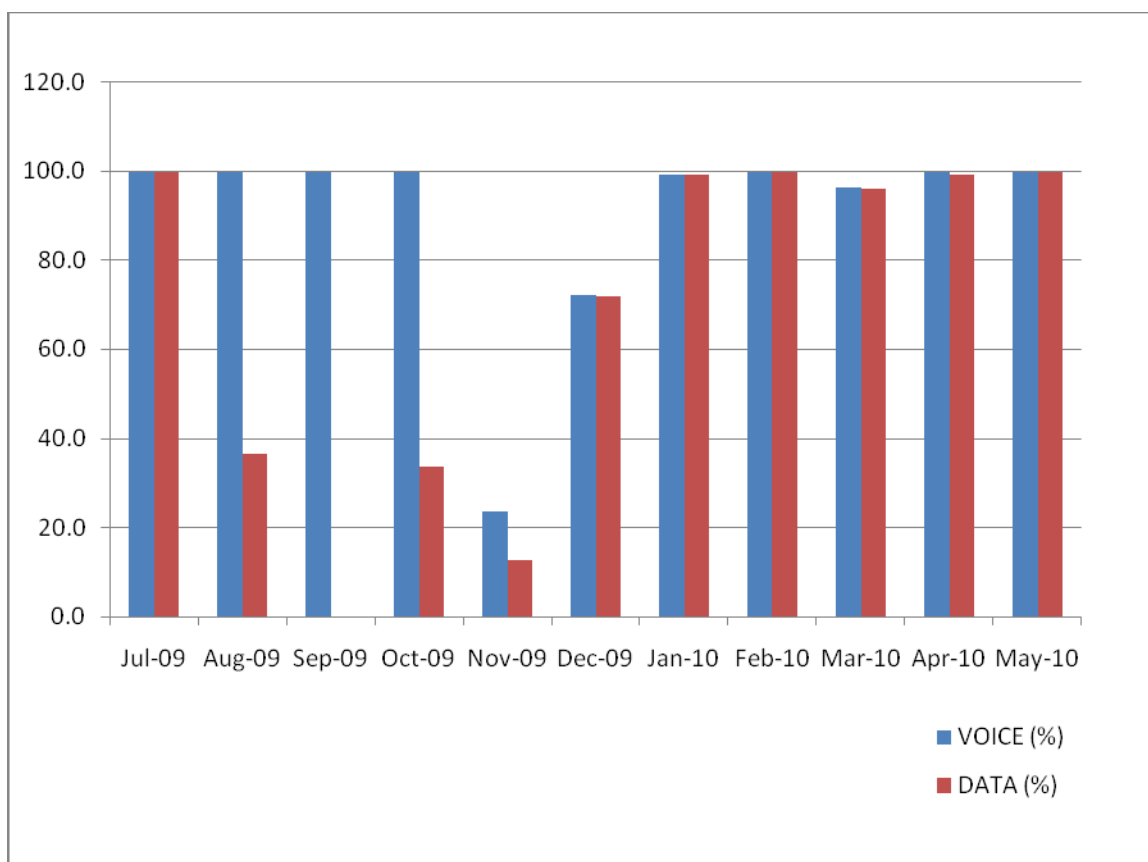
PERIOD	VOICE (%)	DATA (%)
Jul-09	97.4	
Aug-09	91.5	
Sep-09	87.2	
Oct-09	93.5	
Nov-09	66.6	
Dec-09	83.3	
Jan-10	91.0	
Feb-10	100.0	
Mar-10	60.1	
Apr-10	93.6	
May-10	90.9	



— A11 —

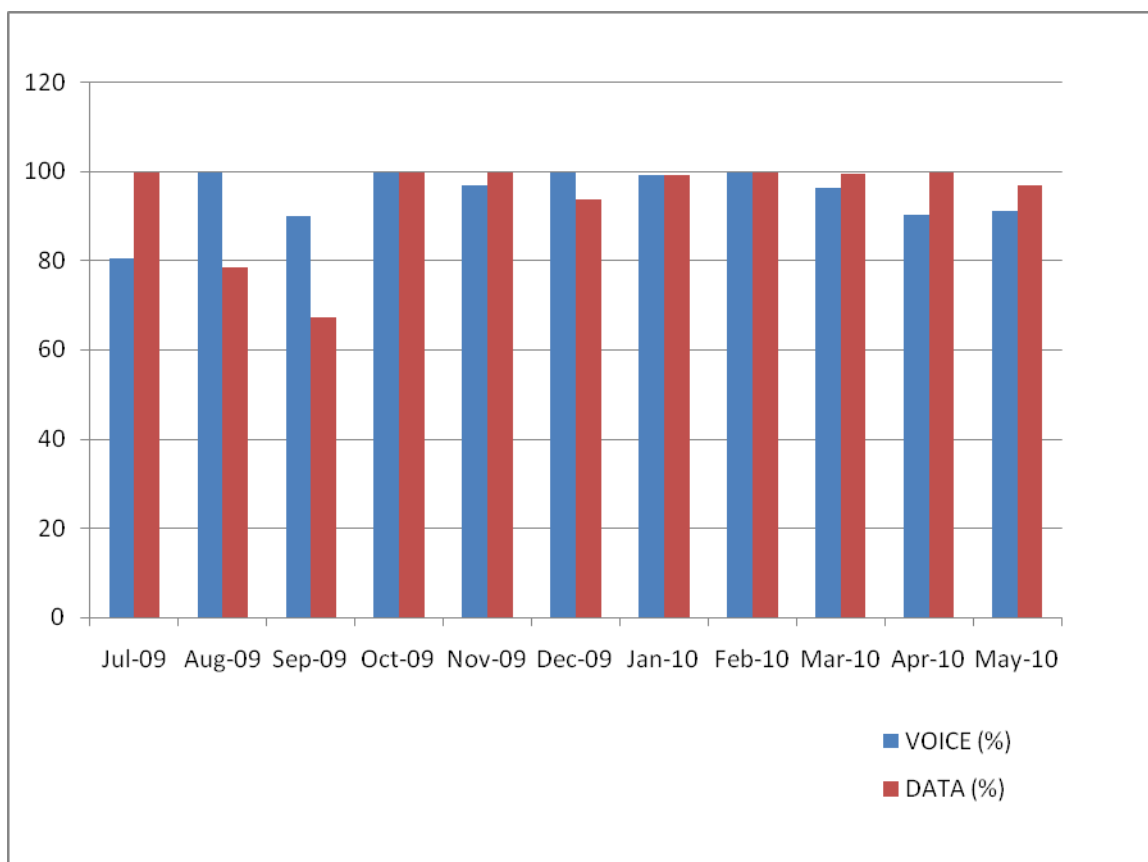
SAINT KITTS

PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	100.0
Aug-09	100.0	36.6
Sep-09	100.0	0.0
Oct-09	100.0	33.6
Nov-09	23.7	12.6
Dec-09	72.1	72.0
Jan-10	99.2	99.2
Feb-10	100.0	100.0
Mar-10	96.4	96.1
Apr-10	100.0	99.3
May-10	100.0	100.0



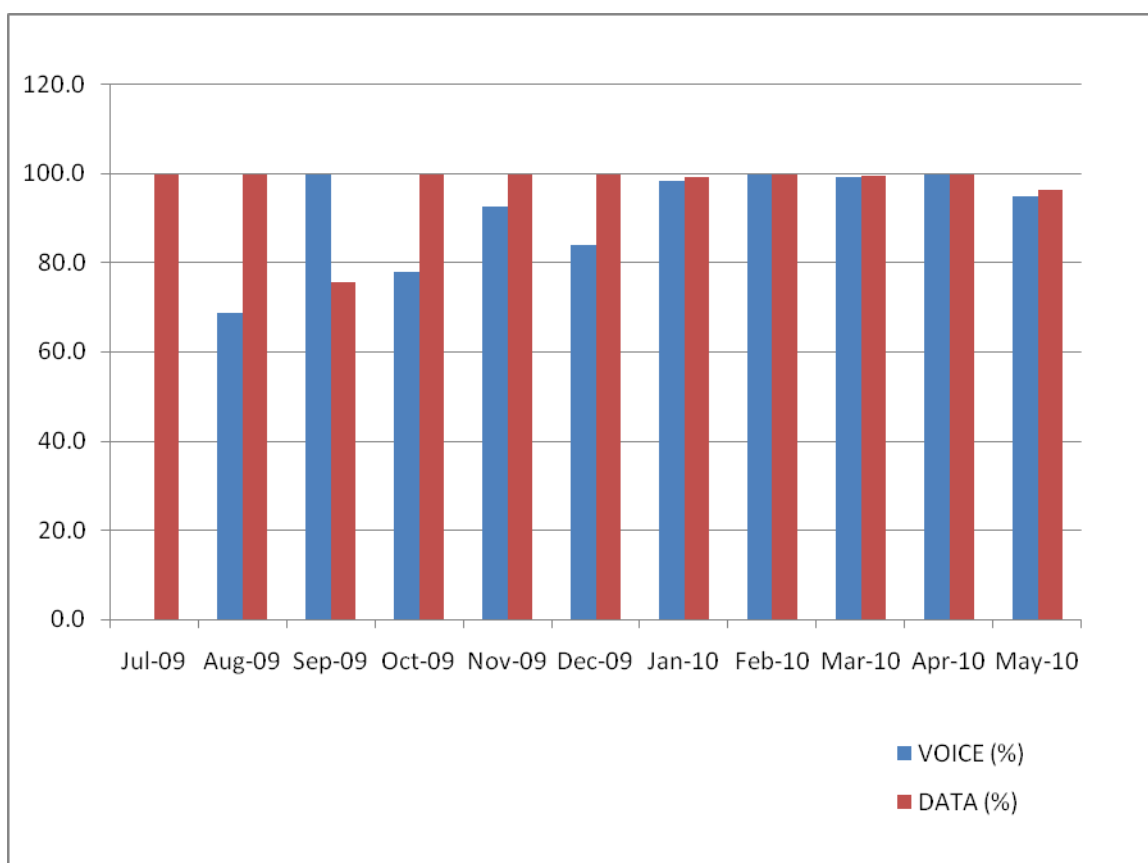
SAINT LUCIA

PERIOD	VOICE (%)	DATA (%)
Jul-09	80.6	100.0
Aug-09	99.9	78.5
Sep-09	90.0	67.3
Oct-09	100.0	100.0
Nov-09	96.9	100.0
Dec-09	100.0	93.9
Jan-10	99.2	99.2
Feb-10	100.0	100.0
Mar-10	96.3	99.7
Apr-10	90.5	99.8
May-10	91.1	97.1



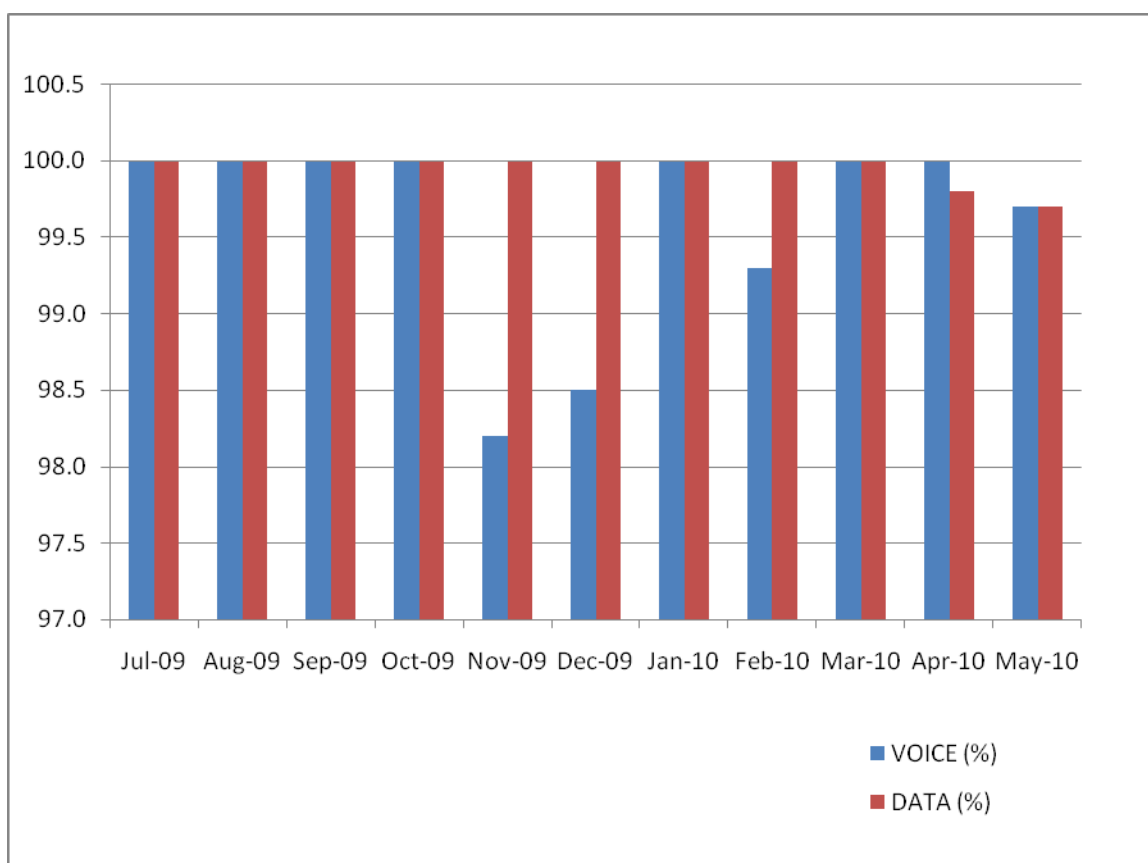
SAINT VINCENT AND THE GRENADINES

PERIOD	VOICE (%)	DATA (%)
Jul-09	0.0	100.0
Aug-09	68.7	99.8
Sep-09	100.0	75.8
Oct-09	78.0	100.0
Nov-09	92.8	100.0
Dec-09	84.1	100.0
Jan-10	98.3	99.2
Feb-10	100.0	100.0
Mar-10	99.4	99.7
Apr-10	100.0	99.8
May-10	94.9	96.5

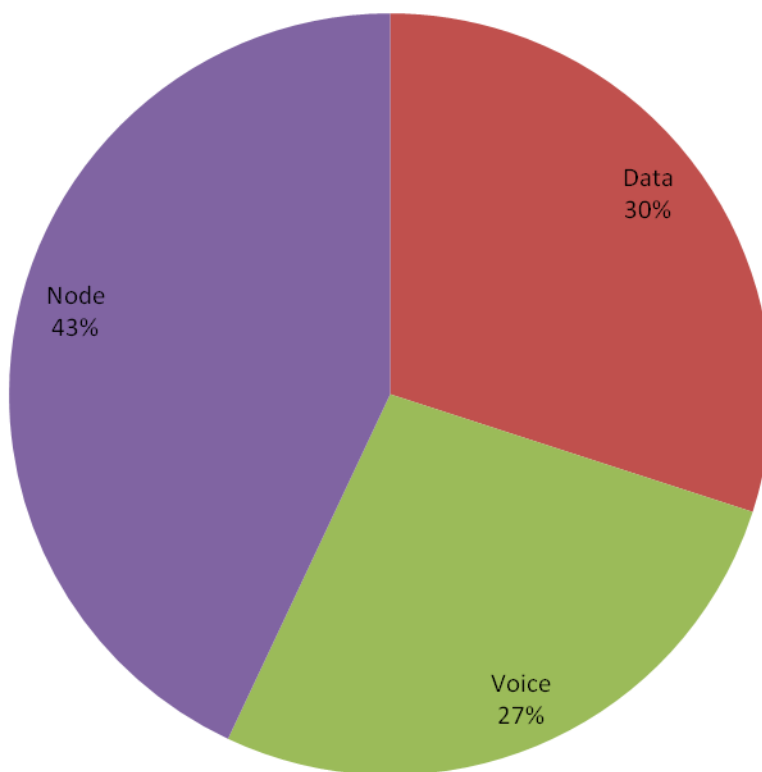


TRINIDAD & TOBAGO

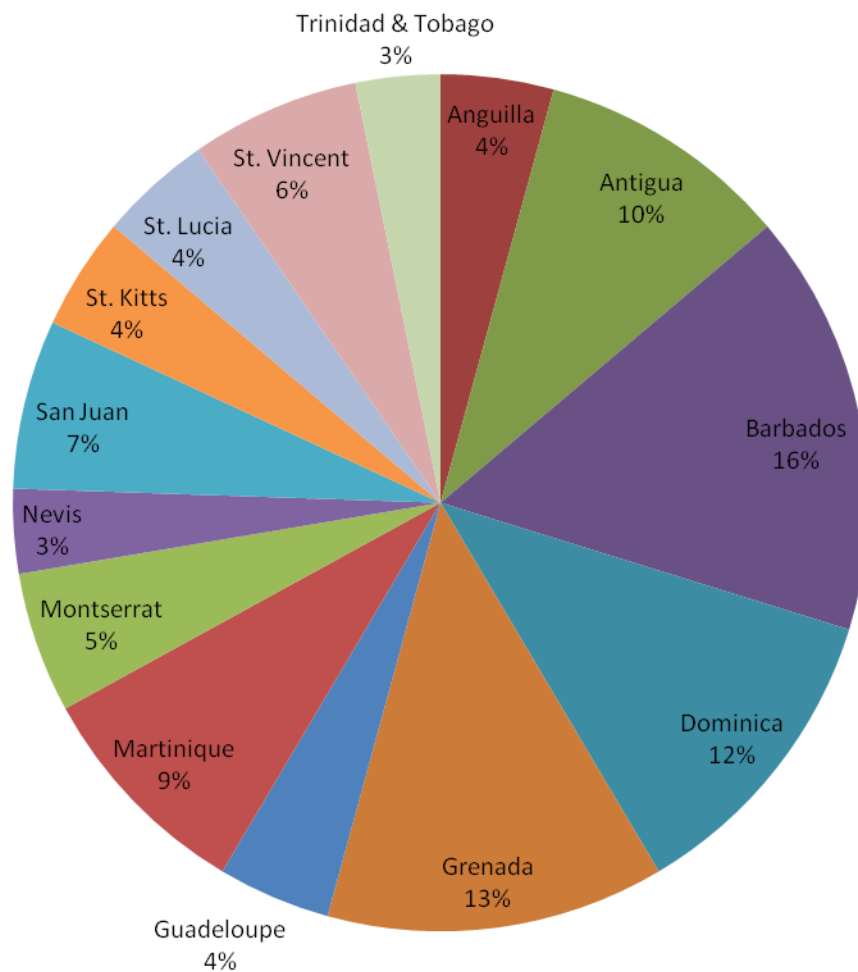
PERIOD	VOICE (%)	DATA (%)
Jul-09	100.0	100.0
Aug-09	100.0	100.0
Sep-09	100.0	100.0
Oct-09	100.0	100.0
Nov-09	98.2	100.0
Dec-09	98.5	100.0
Jan-10	100.0	100.0
Feb-10	99.3	100.0
Mar-10	100.0	100.0
Apr-10	100.0	99.8
May-10	99.7	99.7



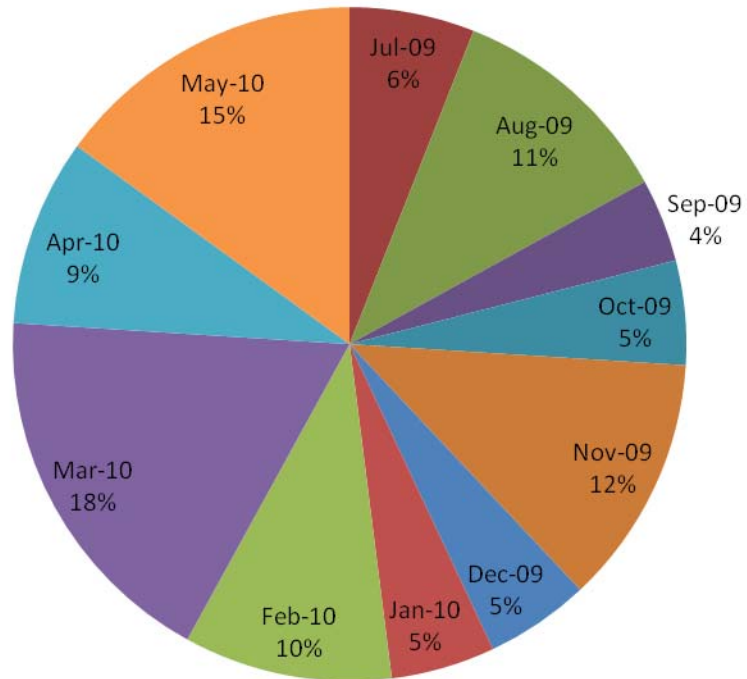
TYPES OF FAULTS FOR THE PERIOD JULY 2009 to MAY 2010



PERCENTAGE OF FAULTS PER STATE FOR THE PERIOD JULY 2009 to MAY 2010



**PERCENTAGE OF TOTAL FAULTS FOR THE PERIOD
JULY 2009 to MAY 2010**



APPENDIX B

FAULT REPORT – AFS/AMS NETWORKS
EASTERN CARIBBEAN AND FRENCH ANTILLES

INITIATOR

STATE:

FAULT NUMBER: (designator/mm/###):

SERVICE:

SPEECH

☐

DATA

☐

FAULT DISCOVERY (yy/mm/dd - UTC)

NAME OF FAULT INITIATOR:

FAULT: (Give details below of fault symptoms and service affected)

TTCAA NOTIFICATION (yy/mm/dd - UTC)

TTCAA

ACKNOWLEDGEMENT OF REPORT (yy/mm/dd - UTC)

NAME/SIGNATURE:

RESOLUTION ACTION: (Give details of resolution below)

CIRCUIT RE-ESTABLISHED: (yy/mm/dd - UTC):

INITIATOR'S ACKNOWLEDGEMENT OF CLOSED REPORT

NAME:

DATE/TIME: (yy/mm/dd – UTC):