E/CAR/WG/32 — WP/28
09/06/10

International Civil Aviation Organization
North American, Central American and Caribbean Office (NACC)
Thirty-Second Eastern Caribbean Working Group Meeting (E/CAR/WG/32)
Sint Maarten, Netherlands Antilles, 15 to 18 June 2010

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**

NEW E/CAR AFS NETWORK

(Presented by Trinidad and Tobago)

SUMMARY

This Working Paper informs on the development of the new Eastern Caribbean AFS Network

References:

- First Coordination Meeting of the ATN Ground-Ground and Ground-Air Applications Projects Meeting
- 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	*This working paper is related to Strategic Objectives A – Safety and D – Efficiency.*

1. Introduction

1.1

1.1 Despite the recent upgrade of the existing Eastern Caribbean Aeronautical Fixed Services (E/CAR AFS) Network, this network cannot support the data communications protocols and services requirements that are necessary for the Aeronautical Telecommunications Network (ATN) using the Internet Protocol Suite (IPS).

1.2 Further to information previously presented at the ATN Task Force on the Initial Transition Plan for the Evolutionary Development of the ATN in the CAR/SAM Regions and incorporating the CAR/SAM ATN Ground/Ground and AMHS Transition Plans, the AMHS Transition Plan addresses issues of network incompatibility, timely coordination and management of the AMHS addressing scheme, upgrading of backbone circuits and the network along with security management.

1.3 The use of AMHS over TCP/IP for this region was adopted by the CAR/SAM Regional ATN Task Force and recommended the initial use of IPv4 since AMHS applications do not yet support IPv6 internally in their communication stacks although IPv6 is available. IPv4 was recommended during the initial period within the CAR/SAM region and IPv6 should be used for Inter-Region AMHS connection. During the transition phase dual stack (IPv4 and IPv6) applications would be introduced. Eventually a full transition to IPv6 would be implemented.

2. Discussion

2.1 Emerging form Draft Decision ATM/CNS/6/1on the formation of the New CNS/ATM Subgroup, the ATN/TF re-engineered as the Coordination Meeting of the ATN Ground-Ground and Ground-Air Applications Projects Meeting was held in Lima, Peru, 19-20 May 2010. The IP Routing Policy presented in **Appendix A** was discussed and recommended for adoption and implementation in the CAR/SAM Regions. The Meeting agreed that IPv4 is being implemented in the Regions with future requirements for IPV6. It was noted that IPV6 is already implemented in Europe.

2.2 In October 2009 the E/CAR AFS Network service provider presented a proposal to the TTCAA for a new ECAR AFS network based on discussions on the telecommunications infrastructural plans for the region and in response to concerns raised on the network's ability to adapt to newer technologies. This new network based on CISCO routers would be capable of supporting ATN and AMHS in an IP environment, takes advantage of modern IP network elements and protocols thereby providing one platform for both voice and data services. This network will be fully redundant with a simplified design that provides redundancy and scalability via the use of Metro Ethernet Links and CISCO routers.

2.3 Following Draft Conclusion 31/7 at the E/CAR/WG/31 Meeting and the E/CAR/DCA/22 Meeting, on December 11th 2009 the TTCAA accepted a proposal from Telecommunications Services of Trinidad and Tobago (TSTT) to deliver a new ECAR AFS network based on MPLS and IPLC circuits and CISCO routers (version 4.02). Delivery was estimated at five months from contract award. **Appendix B** shows the circuit design and **Appendix C** the tentative voice and data communication for each State. At the E/CAR/NTG/01 meeting States were requested to provide the number of voice extensions required and the locations of the extensions.

2.4 **Appendix D** lists the chronology of events to date of the new network which is now anticipated to be delivered in the fourth quarter of 2010.

2.5 The existing AFTN was supplied with an AMHS gateway. Due to advances in ATN and AMHS policy, the AHMS gateway supplied is now obsolete. Trinidad and Tobago plans to implement measures to ensure a smooth transition from AFTN to AMHS within the Eastern Caribbean. The initial plan to maintain AFTN within the Eastern Caribbean and provide an AMHS gateway between Piarco and Atlanta was revisited and revised based on recently (2010) circulated ICAO Document 9896 – *Manual on the Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocols*. The new E/CAR network which is based on CISCO routers (IPv4 certified) will provide the infrastructure required for the ATN and will support full E/CAR AHMS upgrade.

2.6 In order to meet the mandate to implement the new ICAO flight plan model template by 15 November 2012, Trinidad and Tobago has plans to upgrade the Piarco AFTN since the existing AFTN does not meet the requirements of the new format. The intent is to combine the upgrade to AMHS and the new ICAO flight plan model. The upgrade needs to be implemented within the second to third quarter of 2011 to facilitate the testing and planning required for the flight plan template transition.

Additional AFTN/AMHS terminals

2.7 Anguilla, Antigua, Dominica, Grenada and Montserrat have requested a second AFTN/AMHS workstation. The design of the new network can easily accommodate an expansion in the number of workstations on States. Trinidad and Tobago would be happy to install the software (unlimited licences purchased) on any additional workstation that is provided by the State for the sole purpose of AFTN/AMHS. At the E/CAR/NTG/01 meeting States were requested to identify the location of any additional AFTN workstations.

Clean and reliable power

2.8 The CNS Committee Report at the E/CAR/DCA/21 Meeting addressed the unreliability of commercial power available at most E/CAR AFS equipment installations as one of the factors affecting the performance of the AFS Network. Operational reliability of air navigation services is adversely affected by fluctuations and disruptions in commercial power. While individual uninterruptible power system (UPS) may be provided to support the end user equipment, if commercial power is interrupted for any appreciable period of time, the UPS batteries, depending on the capacity, may become depleted at which time the equipment is no longer powered and becomes unserviceable.

2.9 States were urged then as now, to provide standby electrical generating systems with conditioned uninterruptible power systems to ensure that air navigation services and its associated ATM/CNS support are provided with reliable power. The cost of sending a UPS between a State and Trinidad and Tobago and then from Trinidad and Tobago to the maintenance support entity and back is quite costly. Power surges may damage a UPS and the equipment it supports.

Maintaining proper environmental conditions

2.10 Manufacturers recommend that electronic equipment be housed in a dust free, static and climate controlled environment to obtain optimal operating parameters for Mean Time Between Failures (MTBF) and life cycle management of the equipment. Most of the AFS/AFTN equipment is housed in environments that are not ideally recommended. States are urged to re-examine the environmental conditions under which air navigation services equipment is housed and operated and rectify as necessary.

2.12 The CISCO routers for the new AFS network are not accommodating to inadequate electrical environmental conditions hence the recommendation for a Memorandum of Understanding (MoU) between States and Trinidad and Tobago. This MoU would cover electrical and environmental conditions that need to be provided and maintained for the AFS equipment. Should any AFS equipment failure be attributed to down-graded or improperly maintained electrical and environmental factors, the State would bear the cost of replacing/repairing the damaged equipment including all freight and customs charges and the contractor’s manpower rate to re-install the equipment. Delegates representing their respective States should bring this matter to the early attention of administrations owing to the possible financial implications and for the continued operations of the new equipment.

Backup telephones

2.13 After the new network is commissioned and proven reliable, the backup telephones will be disconnected and removed. Since assuming responsibility for the ECAR AFS Network and the backup telephones, unexplained/unused lines in Grenada and Montserrat have been discontinued. Presently there is an outstanding query into a line in Tortola. LIME invoices have been received for Anguilla, Antigua, Barbados, Dominica, Grenada, Montserrat and Saint Lucia. No invoices, despite queries to LIME, have been received for Saint Kitts/Nevis and Saint Vincent and the Grenadines. States are reminded once again to monitor the use of the backup telephones which are to be used in the event of failure of the E/CAR AFS service.

3. Suggested Action

3.1 The Meeting is invited to:

a) take note of the information presented in this paper;

b) approve the recommendation for the MoU;

c) confirm the speech and data requirement information; and

d) take any other action that the meeting considers appropriate.

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APPENDIX A
IPv4 ADDRESSING SCHEME FOR CAR/SAM REGIONS

Net	No.	Subnet	Admin & local host	Via	LINKS	IPv4 address
10.31.224.0/19	1	10.31.224.0/30	Anguilla	E/CAR	Anguilla	10 . 31 . 224 . 0/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 1/30
					Vacant	10 . 31 . 224 . 2/30
					Vacant	10 . 31 . 224 . 3/30
	2	10.31.224.4/30	Antigua	E/CAR	Antigua	10 . 31 . 224 . 4/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 5/30
					Vacant	10 . 31 . 224 . 6/30
					vacant	10 . 31 . 224 . 7/30
	3	10.31.224.8/30	Aruba	MEVA	Aruba	10 . 31 . 224 . 8/30
					Jamaica (Kingston)	10 . 31 . 224 . 9/30
					Aruba	10 . 31 . 224 . 10/30
					Curacao	10 . 31 . 224 . 11/30
	4	10.31.224.12/30	Bahamas/Nassau	MEVA	Bahamas/Nassau	10 . 31 . 224 . 12/30
					Haiti(Port-au-Prince)	10 . 31 . 224 . 13/30
					Bahamas/Nassau	10 . 31 . 224 . 14/30
					United States of America(Miami)	10 . 31 . 224 . 15/30
	5	10.31.224.16/30	Barbados	E/CAR	Barbados	10 . 31 . 224 . 16/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 17/30
					Vacant	10 . 31 . 224 . 18/30
					Vacant	10 . 31 . 224 . 19/30
	6	10.31.224.20/30	Belice/Belice	CAMSAT	Belice/Belice	10 . 31 . 224 . 20/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 21/30
					vacant	10 . 31 . 224 . 22/30
					vacant	10 . 31 . 224 . 23/30
	7	10.31.224.24/30	British Virgins Islands/Tortola	MEVA	British Virgins Islands/Tortola	10 . 31 . 224 . 24/30
					United States of America(Miami)	10 . 31 . 224 . 25/30
					vacant	10 . 31 . 224 . 26/30
					vacant	10 . 31 . 224 . 27/30
	8	10.31.224.28/30	Cayman I.	MEVA	Cayman I.	10 . 31 . 224 . 28/30
					Jamaica (Kingston)	10 . 31 . 224 . 29/30
					Cayman I.	10 . 31 . 224 . 30/30
					Cuba(La Habana)	10 . 31 . 224 . 31/30
	9	10.31.224.32/30	Costa Rica (San Jose)	CAMSAT	Costa Rica (San Jose)	10 . 31 . 224 . 32/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 33/30
					vacant	10 . 31 . 224 . 34/30
					vacant	10 . 31 . 224 . 35/30
	10	10.31.224.36/30	Cuba/La Habana	MEVA	Cuba(La Habana)	10 . 31 . 224 . 36/30
					Haiti(Port-au-Prince)	10 . 31 . 224 . 37/30
					Cuba(La Habana)	10 . 31 . 224 . 38/30
					United States of America(Miami)	10 . 31 . 224 . 39/30
	11	10.31.224.40/30	Cuba/La Habana	MEVA	Cuba(La Habana)	10 . 31 . 224 . 40/30
					Jamaica (Kingston)	10 . 31 . 224 . 41/30
					Cuba(La Habana)	10 . 31 . 224 . 42/30
					Cayman I.	10 . 31 . 224 . 43/30
	12	10.31.224.44/30	Cuba/La Habana	MEVA	Cuba(La Habana)	10 . 31 . 224 . 44/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 45/30
					vacant	10 . 31 . 224 . 46/30
					vacant	10 . 31 . 224 . 47/30
	13	10.31.224.48/30	Cuba/La Habana	TBD	Cuba(La Habana)	10 . 31 . 224 . 48/30
					Mexico (Merida)	10 . 31 . 224 . 49/30
					vacant	10 . 31 . 224 . 50/30
					vacant	10 . 31 . 224 . 51/30

Net	No.	Subnet	Admin & local host	Via	LINKS	IPv4 address
10.31.224.0/19	14	10.31.224.52/30	Curacao	MEVA	Curacao	10 . 31 . 224 . 52/30
					Aruba	10 . 31 . 224 . 53/30
					Curacao	10 . 31 . 224 . 54/30
					Dominican Republic (Santo Domingo)	10 . 31 . 224 . 55/30
	15	10.31.224.56/30	Curacao	MEVA	Curacao	10 . 31 . 224 . 56/30
					Haiti(Port-au-Prince)	10 . 31 . 224 . 57/30
					Curacao	10 . 31 . 224 . 58/30
					Jamaica (Kingston)	10 . 31 . 224 . 59/30
	16	10.31.224.60/30	Curacao	MEVA	Curacao	10 . 31 . 224 . 60/30
					Puerto Rico (San Juan)	10 . 31 . 224 . 61/30
					vacant	10 . 31 . 224 . 62/30
					vacant	10 . 31 . 224 . 63/30
	17	10.31.224.64/30	Dominican Republic/ Santo Domingo	MEVA	Dominican Republic (Santo Domingo)	10 . 31 . 224 . 64/30
					Haiti(Port-au-Prince)	10 . 31 . 224 . 65/30
					Dominican Republic (Santo Domingo)	10 . 31 . 224 . 66/30
					Puerto Rico (San Juan)	10 . 31 . 224 . 67/30
	18	10.31.224.68/30	Dominican Republic/ Santo Domingo	MEVA	Dominican Republic (Santo Domingo)	10 . 31 . 224 . 68/30
					Curacao	10 . 31 . 224 . 69/30
					Dominican Republic (Santo Domingo)	10 . 31 . 224 . 70/30
					United States of America(Miami)	10 . 31 . 224 . 71/30
	19	10.31.224.72/30	Dominica	E/CAR	Dominica	10 . 31 . 224 . 72/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 73/30
					vacant	10 . 31 . 224 . 74/30
					vacant	10 . 31 . 224 . 75/30
	20	10.31.224.76/30	El Salvador/San Salvador	CAMSAT	El Salvador	10 . 31 . 224 . 76/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 77/30
					vacant	10 . 31 . 224 . 78/30
					vacant	10 . 31 . 224 . 79/30
	21	10.31.224.80/30	French Antilles (Martinique)/ Fort-de-France	E/CAR	French Antilles (Martinique)/Fort-de-France	10 . 31 . 224 . 80/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 81/30
					vacant	10 . 31 . 224 . 82/30
					vacant	10 . 31 . 224 . 83/30
	22	10.31.224.84/30	French Antilles (Guadeloupe)/ Point-a-Pitre	E/CAR	French Antilles (Guadeloupe)/Point-a-Pitre	10 . 31 . 224 . 84/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 85/30
					vacant	10 . 31 . 224 . 86/30
					vacant	10 . 31 . 224 . 87/30
	23	10.31.224.88/30	Grenada	E/CAR	Grenada	10 . 31 . 224 . 88/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 89/30
					vacant	10 . 31 . 224 . 90/30
					vacant	10 . 31 . 224 . 91/30
	24	10.31.224.92/30	Guatemala (La Aurora)	CAMSAT	Guatemala (La Aurora)	10 . 31 . 224 . 92/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 93/30
					vacant	10 . 31 . 224 . 94/30
					vacant	10 . 31 . 224 . 95/30
	25	10.31.224.96/30	Haiti / Port-au-Prince	MEVA	Haiti(Port-au-Prince)	10 . 31 . 224 . 96/30
					Jamaica (Kingston)	10 . 31 . 224 . 97/30
					vacant	10 . 31 . 224 . 98/30
					vacant	10 . 31 . 224 . 99/30
	26	10.31.224.100/30	Honduras/ Tegucigalpa (Cocesna)	CAMSAT	Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 100/30
					Honduras(San Pedro Sula)	10 . 31 . 224 . 101/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 102/30
					Nicaragua (Managua)	10 . 31 . 224 . 103/30
	27	10.31.224.104/30	Honduras/ Tegucigalpa (Cocesna)	CAMSAT	Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 104/30
					Panama	10 . 31 . 224 . 105/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 106/30

Net	No.	Subnet	Admin & local host	Via	LINKS	IPv4 address
10.31.224.0/19	28	10.31.224.108/30	Honduras/ Tegucigalpa (Cocesna)	CAMSAT	Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 108/30
					United States of America(Miami)	10 . 31 . 224 . 109/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 110/30
					NAM/(Atlanta)	10 . 31 . 224 . 111/30
	29	10.31.224.112/30	Honduras/ Tegucigalpa (Cocesna)	MEVA	Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 112/30
					Mexico(Merida)	10 . 31 . 224 . 113/30
					vacant	10 . 31 . 224 . 114/30
					vacant	10 . 31 . 224 . 115/30
	30	10.31.224.116/30	Honduras/San Pedro Sula	CAMSAT	Honduras/San Pedro Sula	10 . 31 . 224 . 116/30
					Honduras(COCESNA) Tegucigalpa	10 . 31 . 224 . 117/30
					vacant	10 . 31 . 224 . 118/30
					vacant	10 . 31 . 224 . 119/30
	31	10.31.224.120/30	Mexico/Merida	TBD	Mexico(Merida)	10 . 31 . 224 . 120/30
					NAM/(Atlanta)	10 . 31 . 224 . 121/30
					vacant	10 . 31 . 224 . 122/30
					vacant	10 . 31 . 224 . 123/30
	32	10.31.224.124/30	Montserrat	E/CAR	Montserrat	10 . 31 . 224 . 124/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 125/30
					vacant	10 . 31 . 224 . 126/30
					vacant	10 . 31 . 224 . 127/30
	33	10.31.224.128/30	Puerto Rico/San Juan	E/CAR	Puerto Rico (San Juan)	10 . 31 . 224 . 128/30
					United States of America(Miami)	10 . 31 . 224 . 129/30
					Puerto Rico (San Juan)	10 . 31 . 224 . 130/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 131/30
	34	10.31.224.132/30	Puerto Rico/San Juan	MEVA REDDIG	Puerto Rico (San Juan)	10 . 31 . 224 . 132/30
					SAM (Caracas)	10 . 31 . 224 . 133/30
					vacant	10 . 31 . 224 . 134/30
					vacant	10 . 31 . 224 . 135/30
	35	10.31.224.136/30	Saint Kitts & Nevis Saint Kitts	E/CAR	Saint Kitts & Nevis / Saint Kitts	10 . 31 . 224 . 136/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 137/30
					vacant	10 . 31 . 224 . 138/30
					vacant	10 . 31 . 224 . 139/30
	36	10.31.224.140/30	Saint Kitts & Nevis Nevis	E/CAR	Saint Kitts & Nevis / Nevis	10 . 31 . 224 . 140/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 141/30
					vacant	10 . 31 . 224 . 142/30
					vacant	10 . 31 . 224 . 143/30
	37	10.31.224.144/30	Saint Lucia	E/CAR	Saint Lucia	10 . 31 . 224 . 144/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 145/30
					vacant	10 . 31 . 224 . 146/30
					vacant	10 . 31 . 224 . 147/30
	38	10.31.224.148/30	Sint Marteen	MEVA	Sint Marteen	10 . 31 . 224 . 148/30
					United States of America(Miami)	10 . 31 . 224 . 149/30
					vacant	10 . 31 . 224 . 150/30
					vacant	10 . 31 . 224 . 151/30

Net	No.	Subnet	Admin & local host	Via	LINKS	IPv4 address
10.31.224.0/19	39	10.31.224.152/30	Sint Marteen	E/CAR	Sint Marteen	10 . 31 . 224 . 152/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 153/30
					vacant	10 . 31 . 224 . 154/30
					vacant	10 . 31 . 224 . 155/30
	40	10.31.224.156/30	Saint Vincent & the Grenadines	E/CAR	Saint Vincent & the Grenadines	10 . 31 . 224 . 156/30
					Trinidad & Tobago (Piarco)	10 . 31 . 224 . 157/30
					vacant	10 . 31 . 224 . 158/30
					vacant	10 . 31 . 224 . 159/30
	41	10.31.224.160/30	Turks & Caicos/ Grand Turk	MEVA	Turks & Caicos/Grand Turk	10 . 31 . 224 . 160/30
					United States of America(Miami)	10 . 31 . 224 . 161/30
					vacant	10 . 31 . 224 . 162/30
					vacant	10 . 31 . 224 . 163/30
	42	10.31.224.164/30	Trinidad & Tobago/SAM (Venezuela)	E/CAR	Trinidad & Tobago (Piarco)	10 . 31 . 224 . 164/30
					SAM (Caracas)	10 . 31 . 224 . 165/30
					vacant	10 . 31 . 224 . 166/30
					vacant	10 . 31 . 224 . 167/30
	43	10.31.224.168/30	CAR/SAM (TBD)	E/CAR	CAR	10 . 31 . 224 . 168/30
					SAM (Caracas)	10 . 31 . 224 . 169/30
					vacant	10 . 31 . 224 . 170/30
					vacant	10 . 31 . 224 . 171/30
		vacant	vacant	E/CAR		
		vacant				
				E/CAR		
	2048	2048	10.31.31.255/30	E/CAR		10 . 31 . 248 . 1 52/30
						10 . 31 . 249 . 153/30
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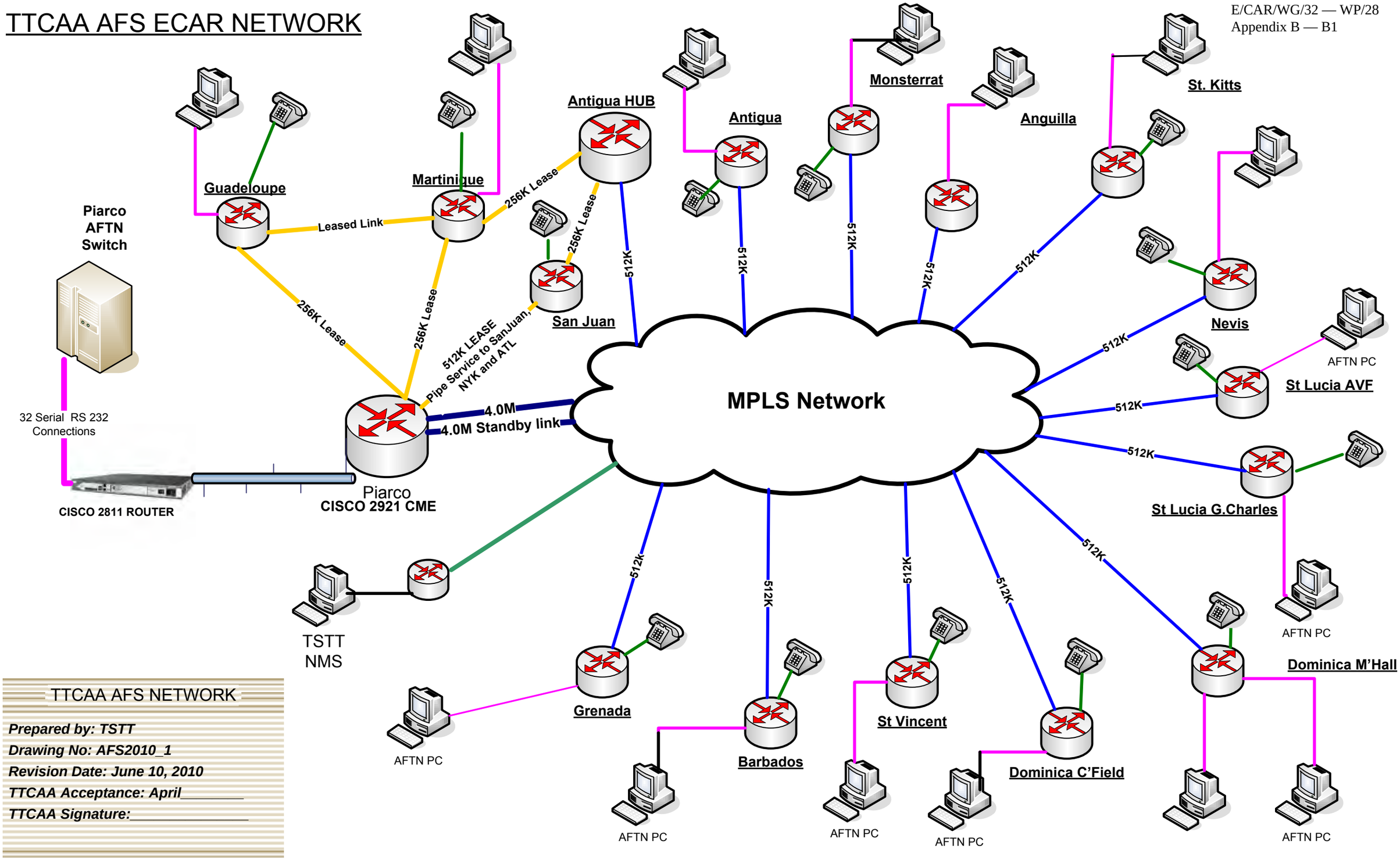
TTCAA AFS ECAR NETWORK



TTCAA AFS NETWORK

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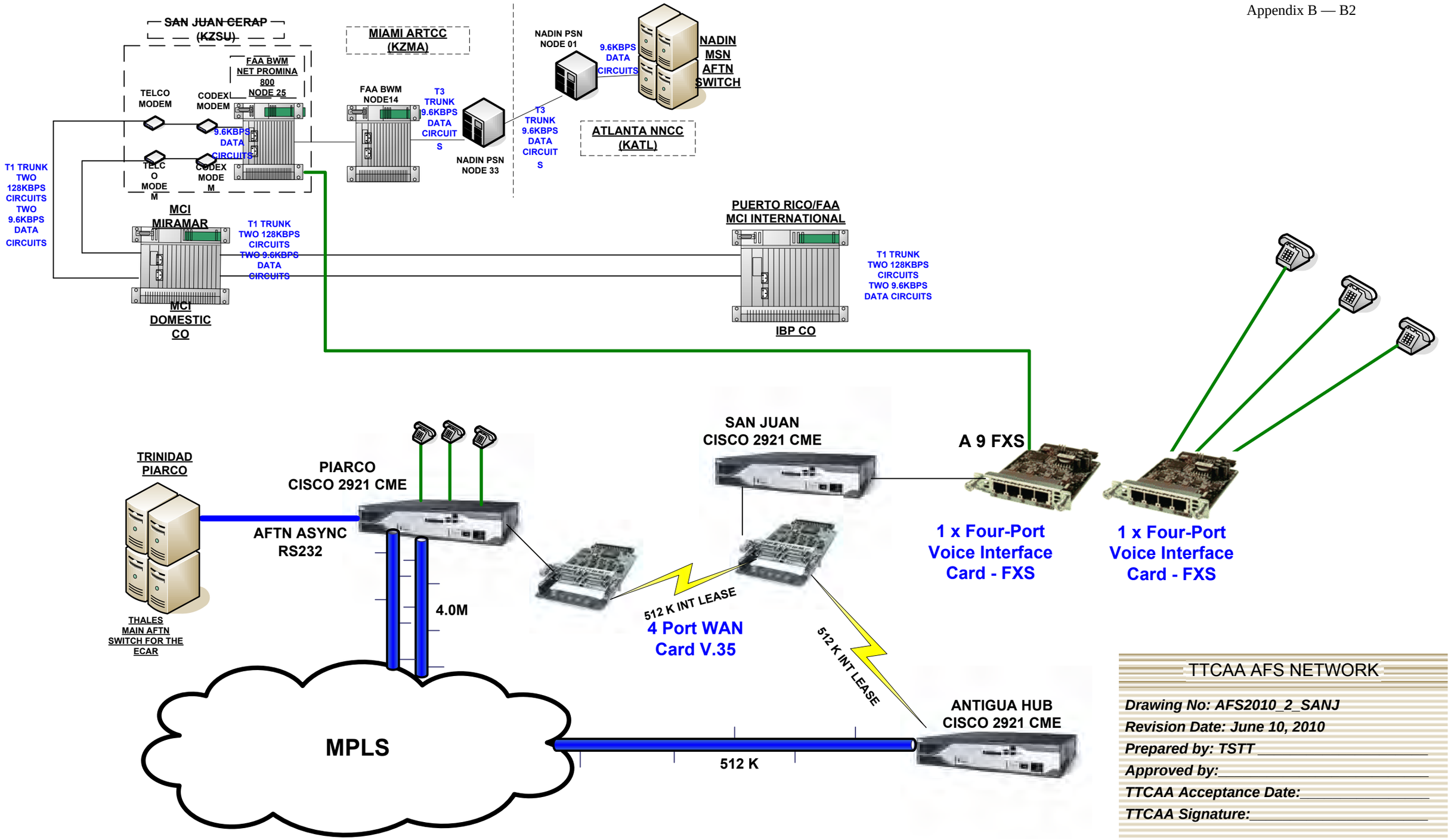
Drawing No: AFS2010_1
Revision Date: June 10, 2010
TTCAA Acceptance: April_____
TTCAA Signature:_____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CODEX MODEM
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FAA BWM NODE14
T3 TRUNK 9.6KBPS DATA CIRCUITS
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PUERTO RICO/FAA MCI INTERNATIONAL
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AFTN ASYNC RS232
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MPLS
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SAN JUAN CISCO 2921 CME
A 9 FXS
1 x Four-Port Voice Interface Card - FXS
1 x Four-Port Voice Interface Card - FXS
512 K INT LEASE
ANTIGUA HUB CISCO 2921 CME
512 K
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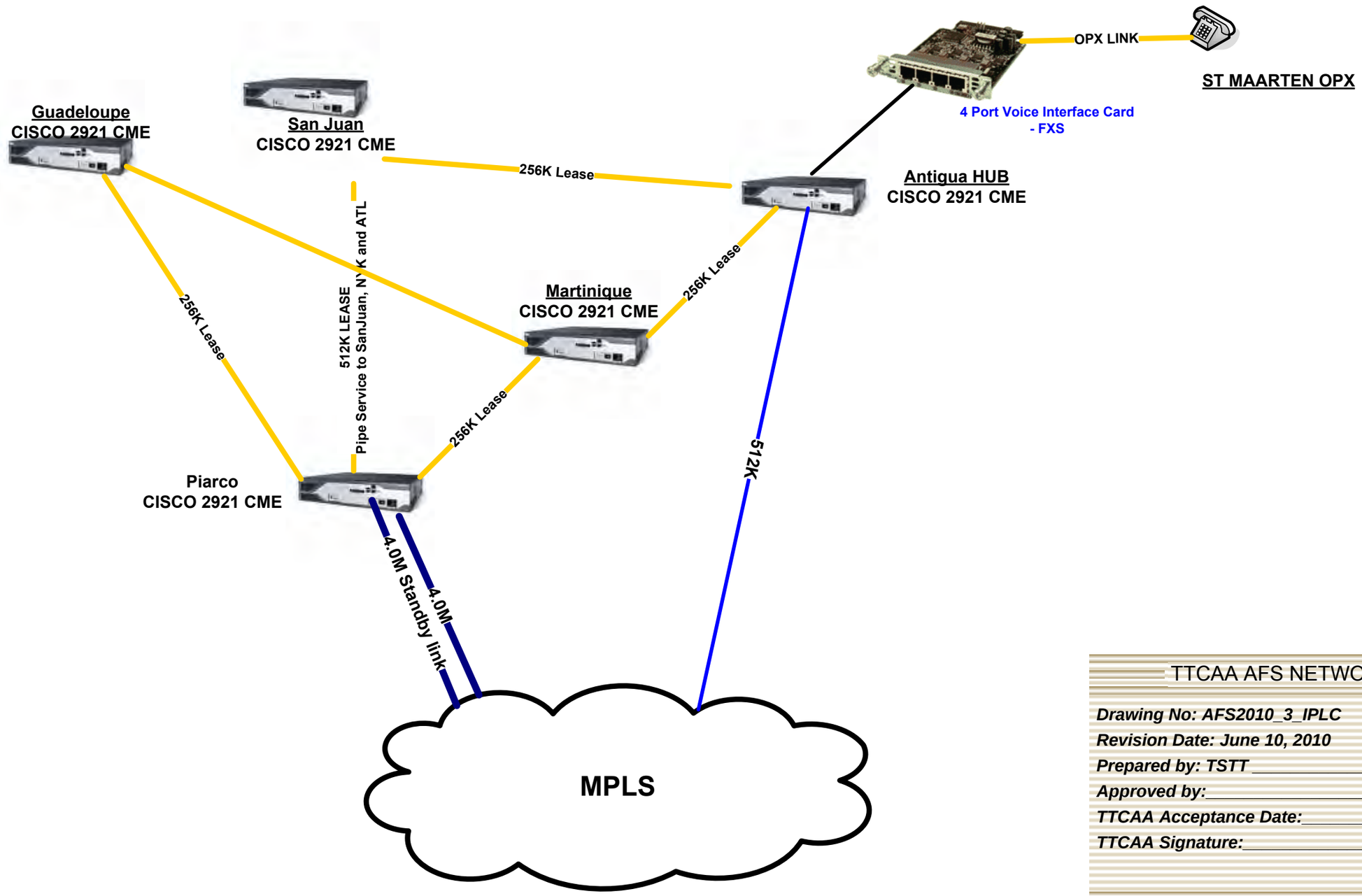
Revision Date: June 10, 2010
Prepared by: TSTT
Approved by:
TTCAA Acceptance Date:
TTCAA Signature:



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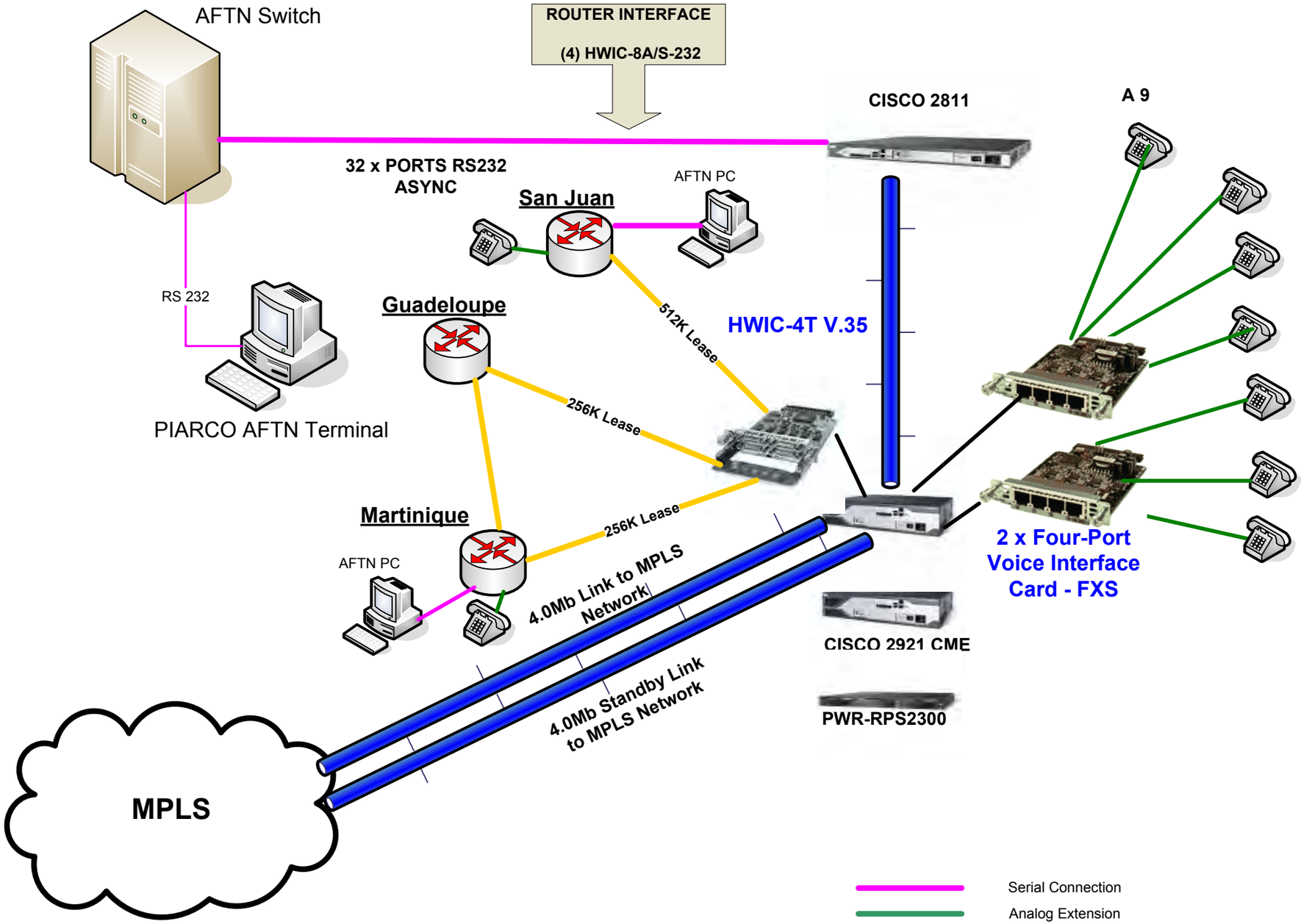

Serial Connection
Analog Extension
IP netwok
Wan Links

TTCAA AFS NETWORK

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Revision Date: June 10, 2010
Prepared by: TSTT _____
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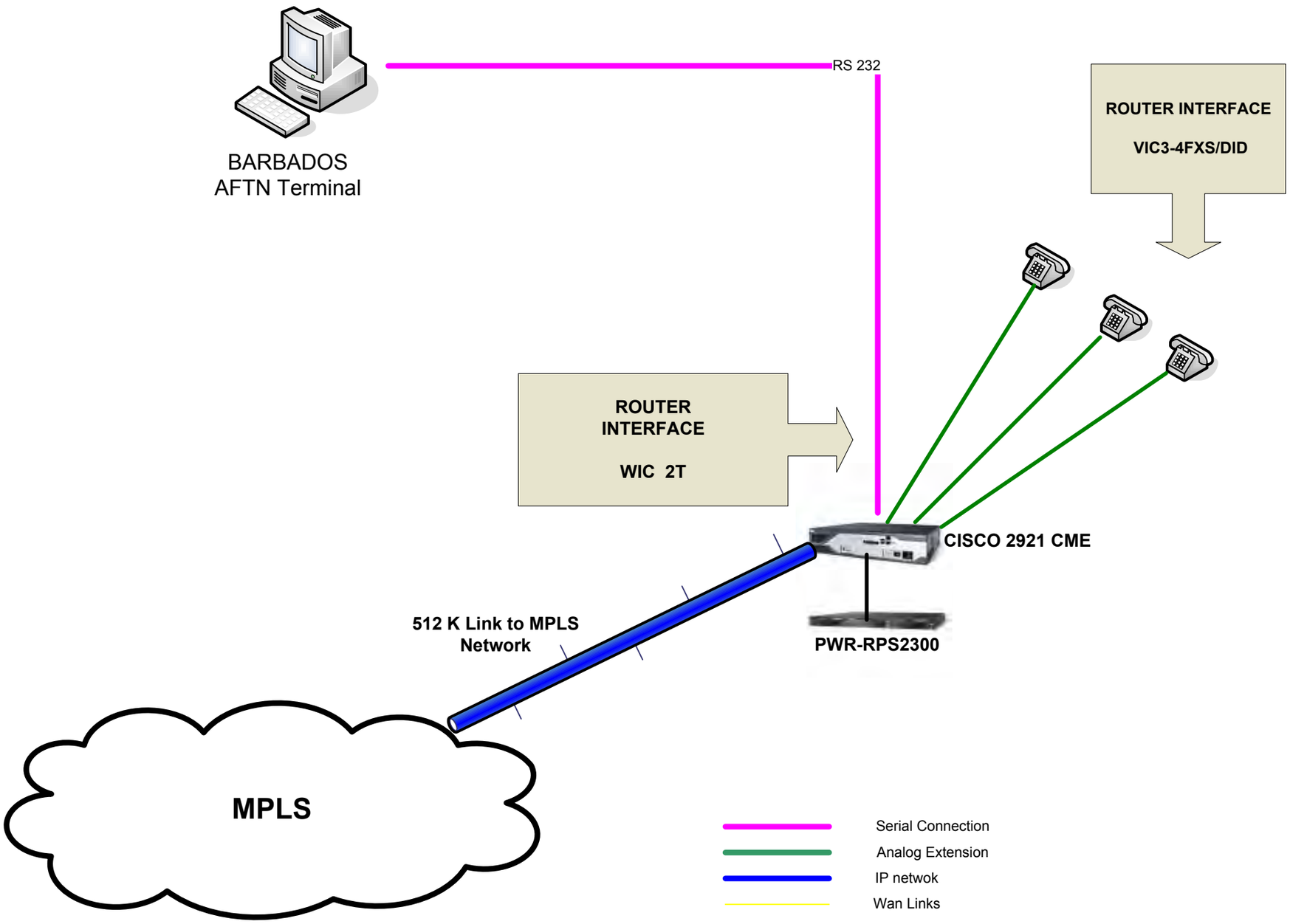
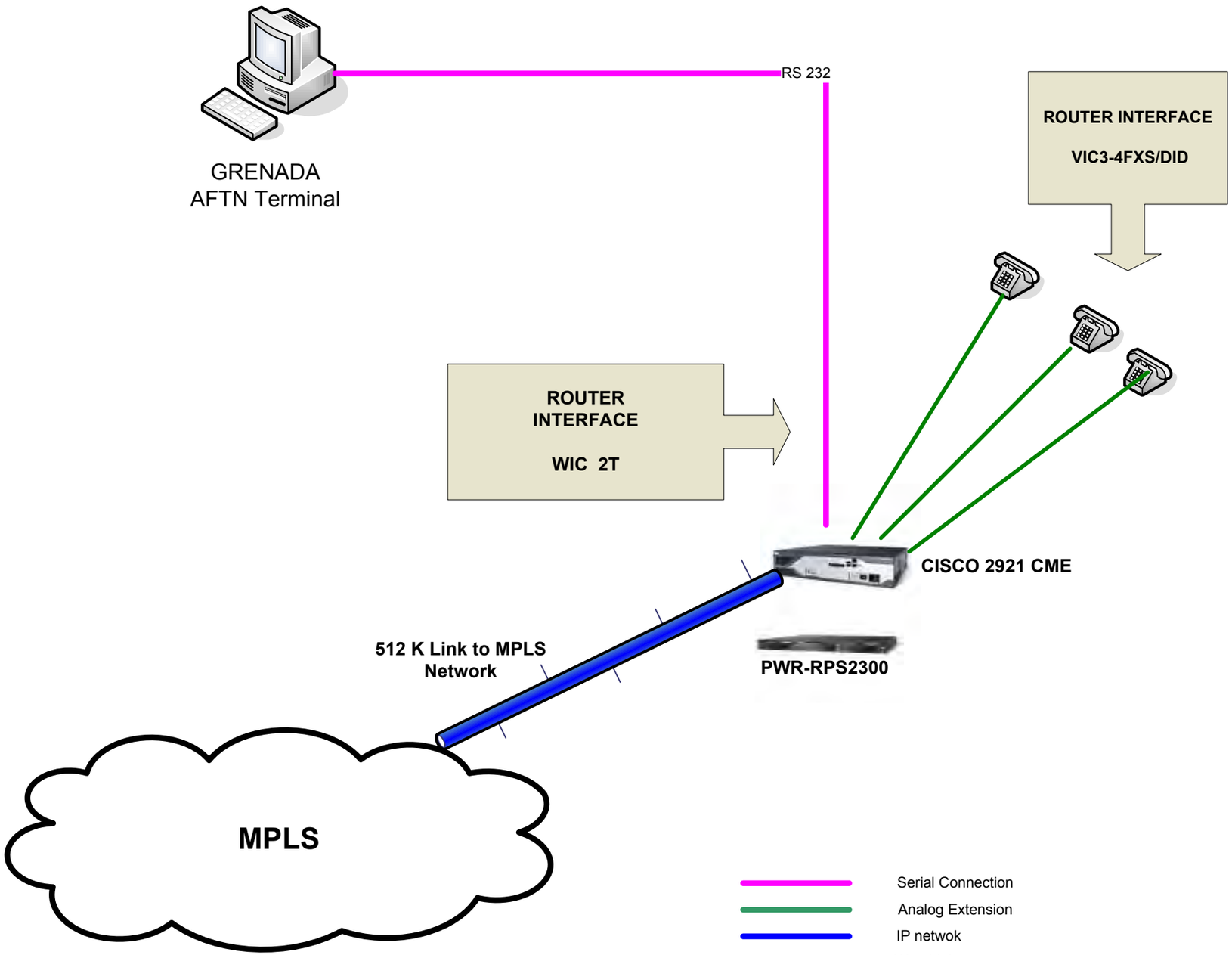
TTCAA BARBADOS – GRANTLEY ADAMS INTL CODE: BGI



TTCAA AFS NETWORK

Drawing No: AFS2010_5_BAR
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA GRENADA – MAURICE BISHOP INT'L CODE: GND



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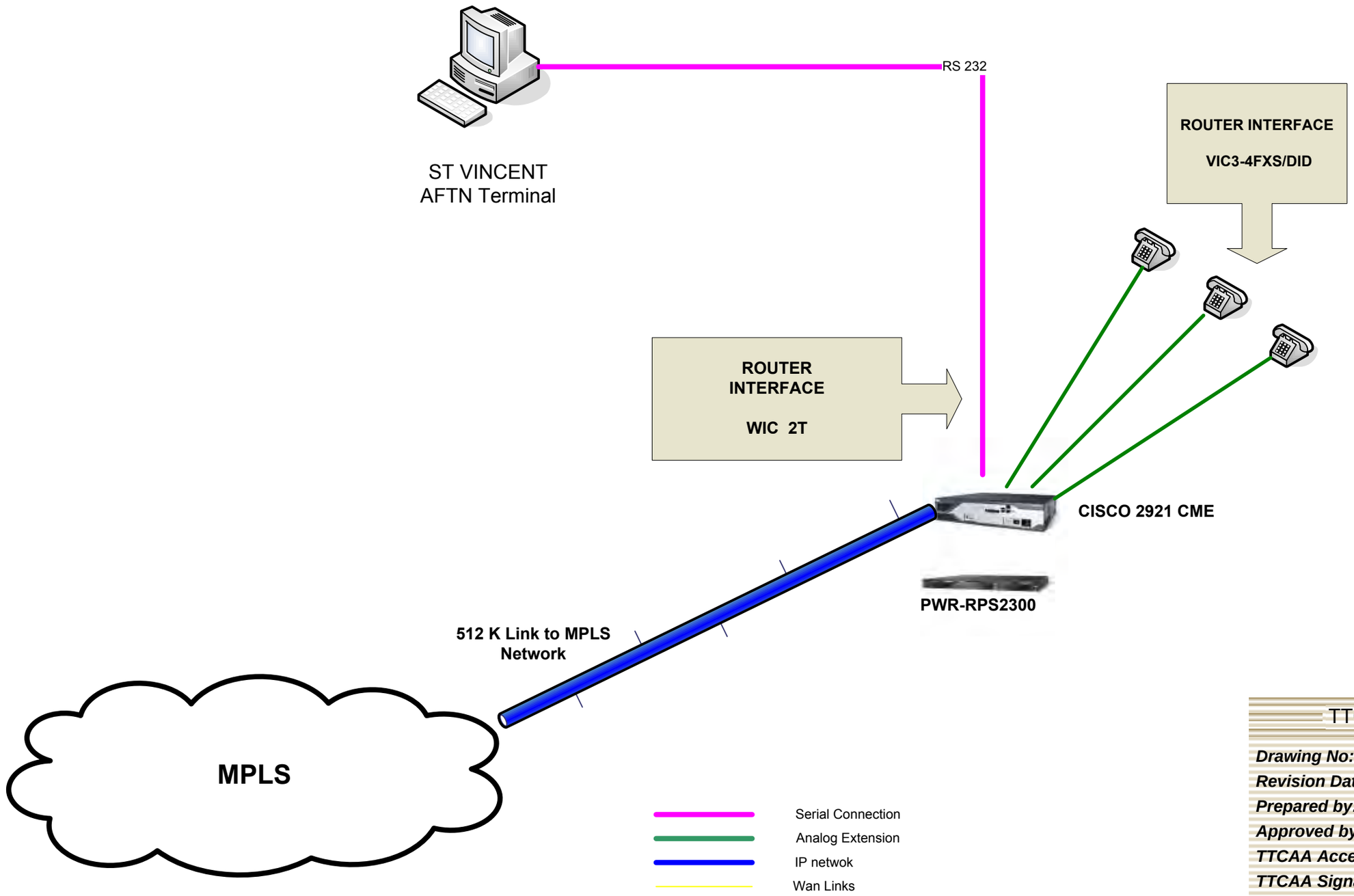
Drawing No: AFS2010_6_GND
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA ST VINCENT – E T JOSHUA INT'L CODE: SVD



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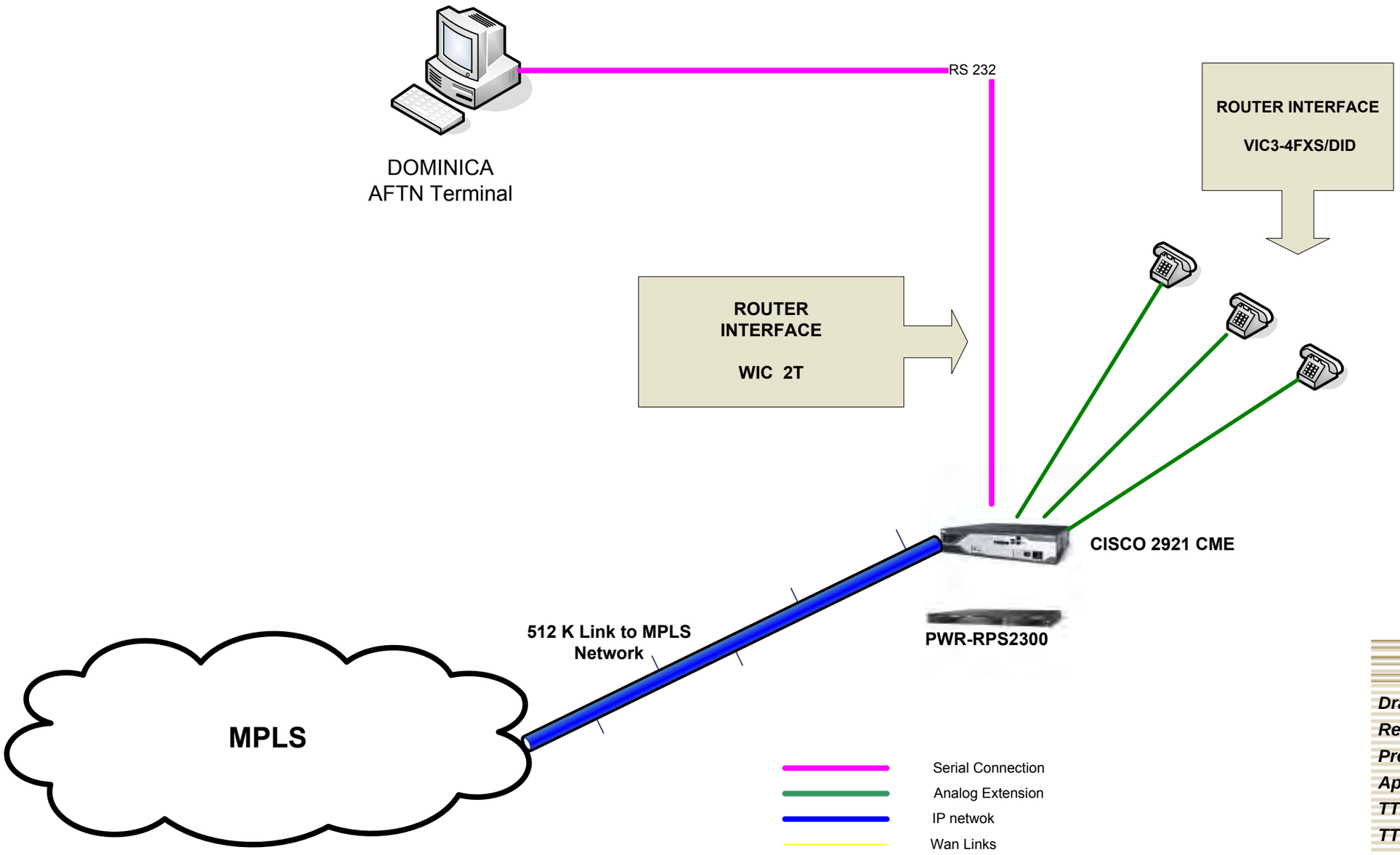
Drawing No: AFS2010_7_SVD
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA DOMINICA - MELVILLE HALL CODE: DOM



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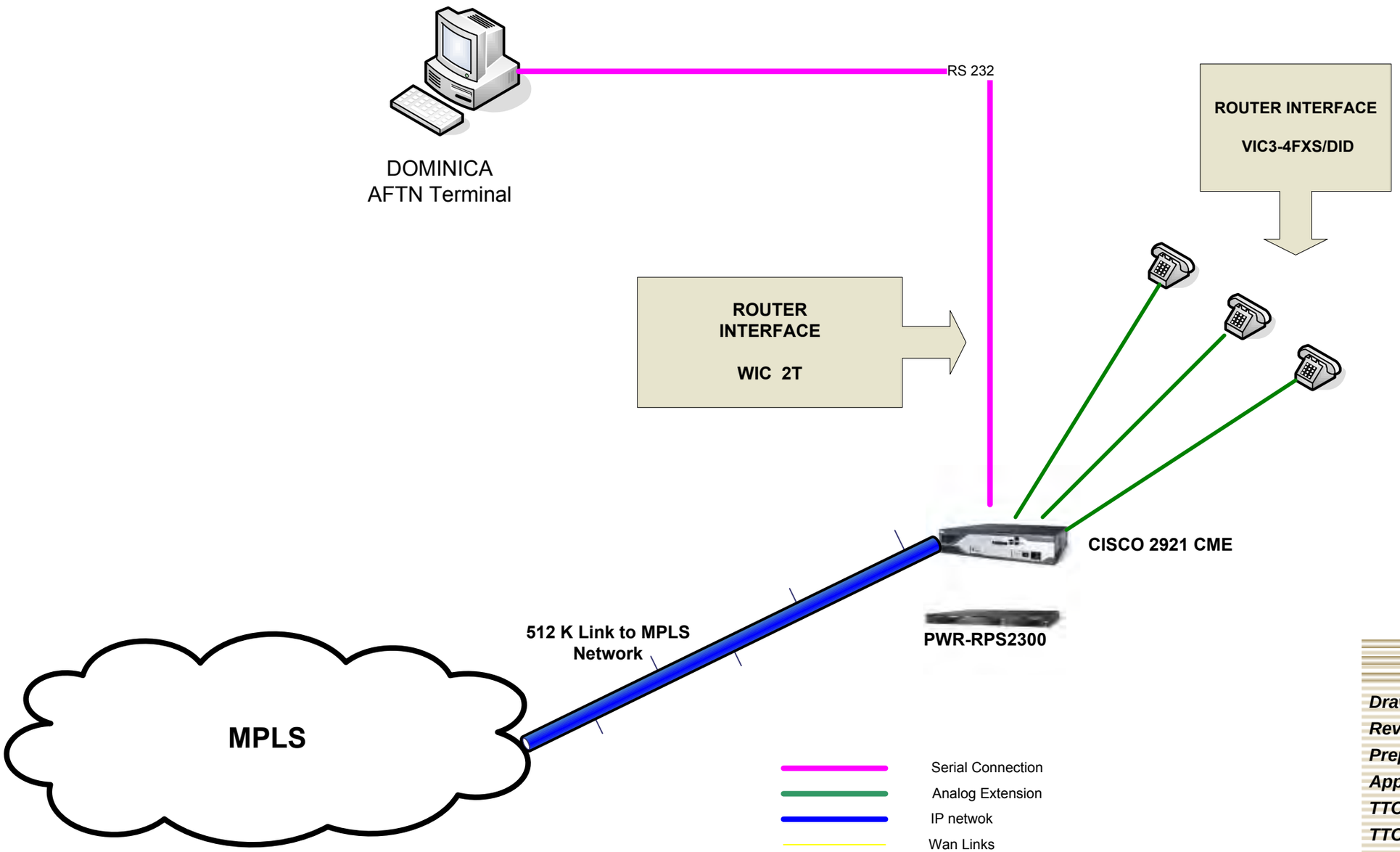
Drawing No: AFS2010_8_DOM1
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA DOMINICA - CANE FARM CODE: DCF



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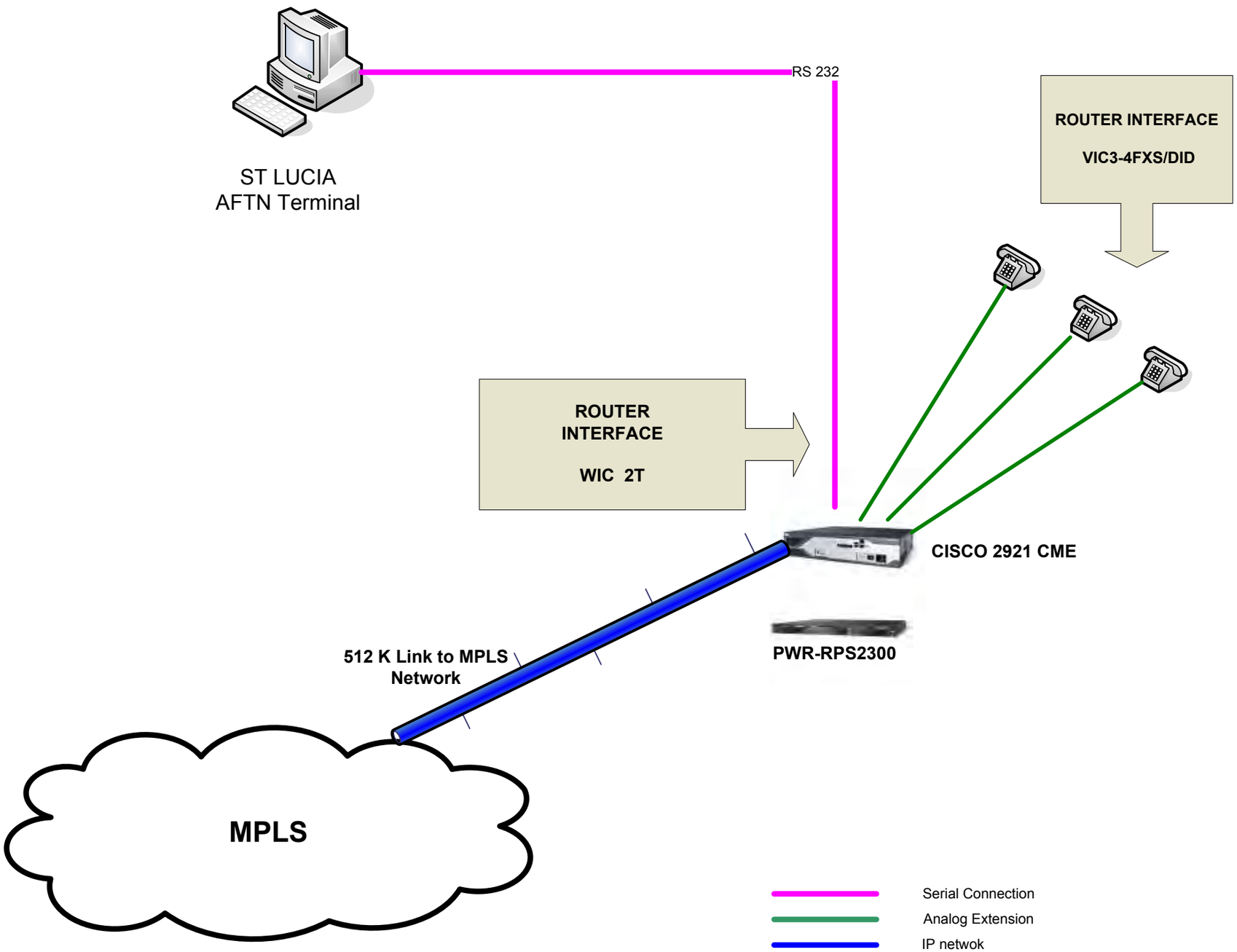
Drawing No: AFS2010_9_DOM2
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA ST LUCIA – HEWANORRA CODE: UVF



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Drawing No: AFS2010_10_SLU1
Revision Date: June 10, 2010
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Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

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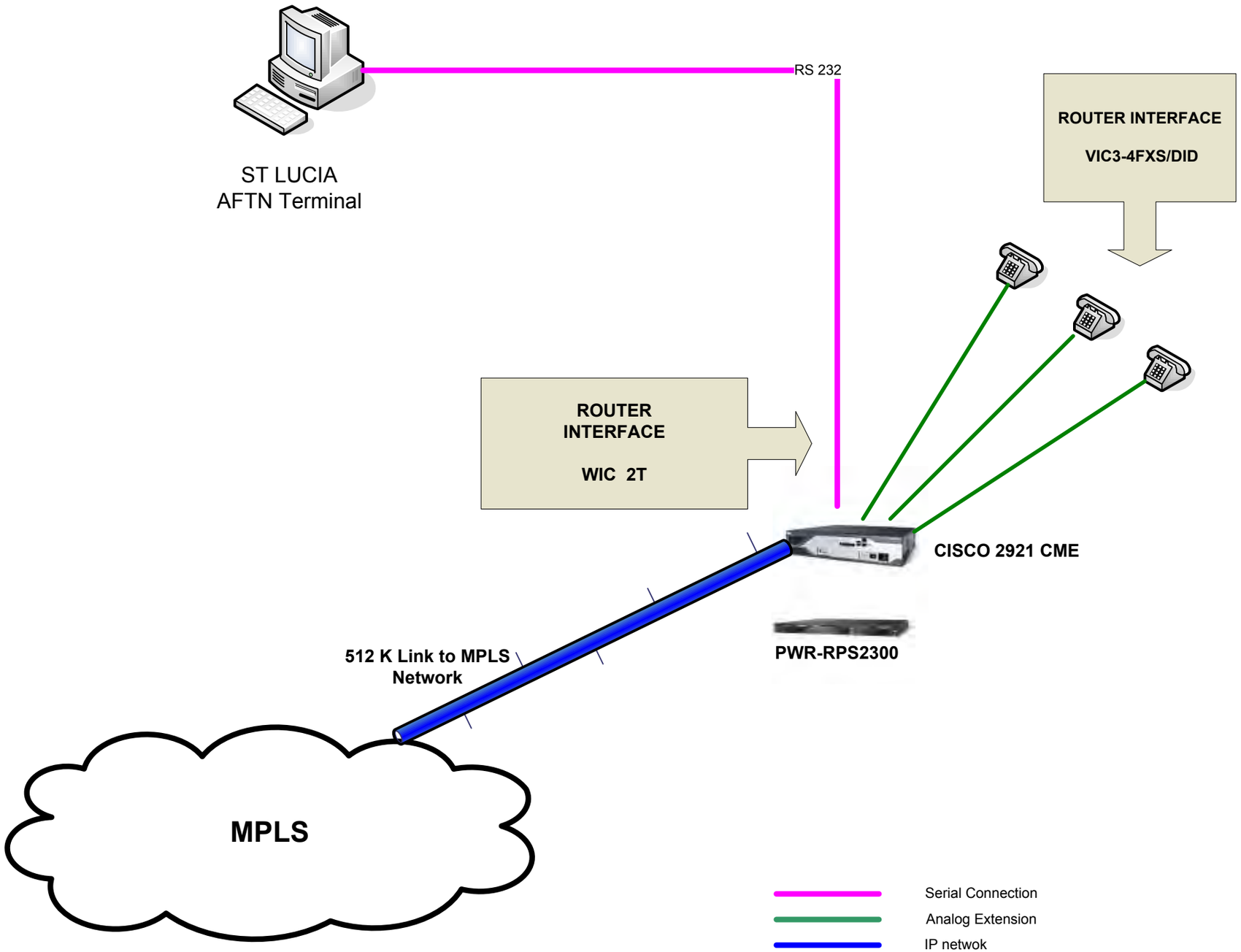

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Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
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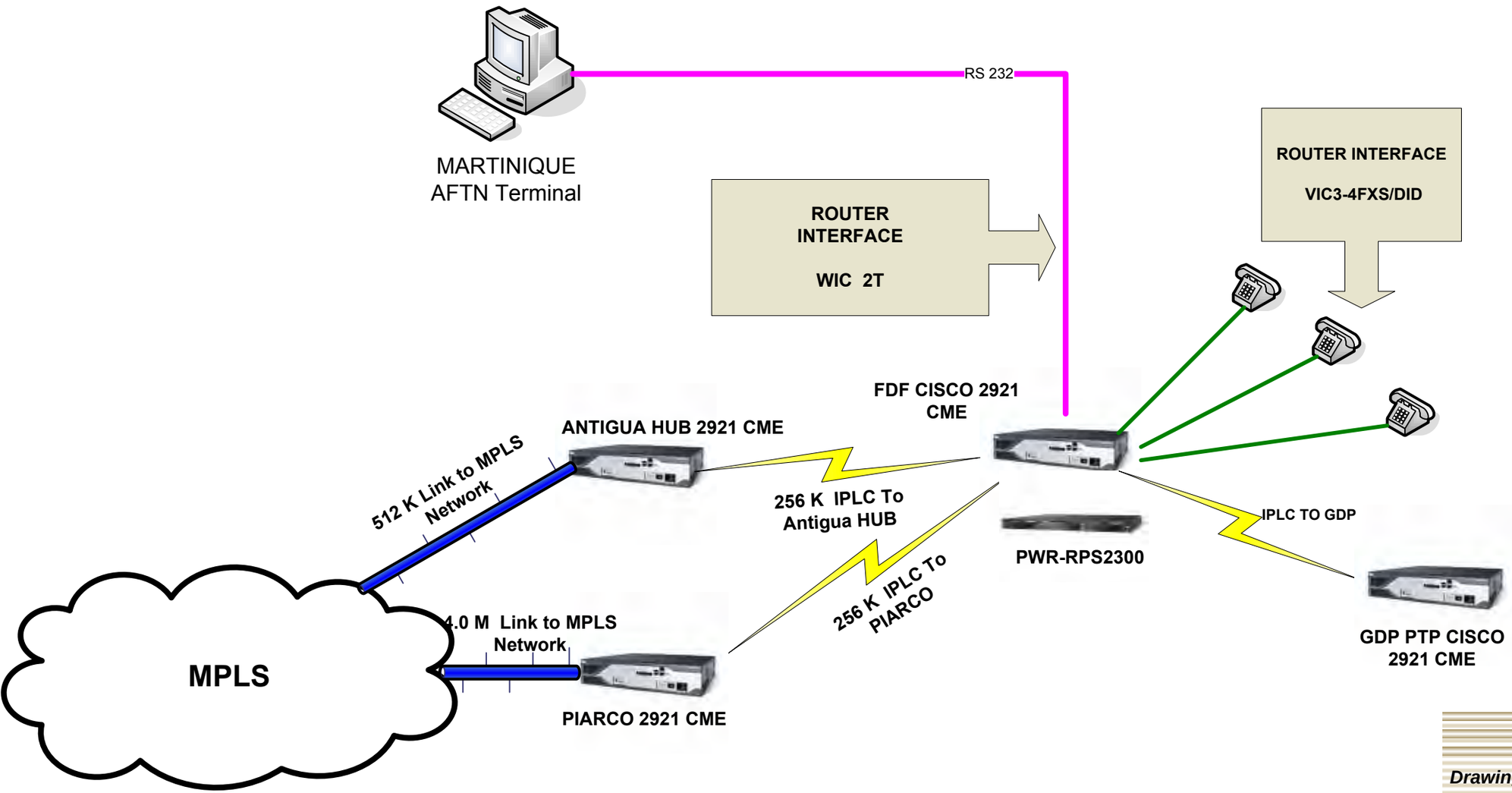
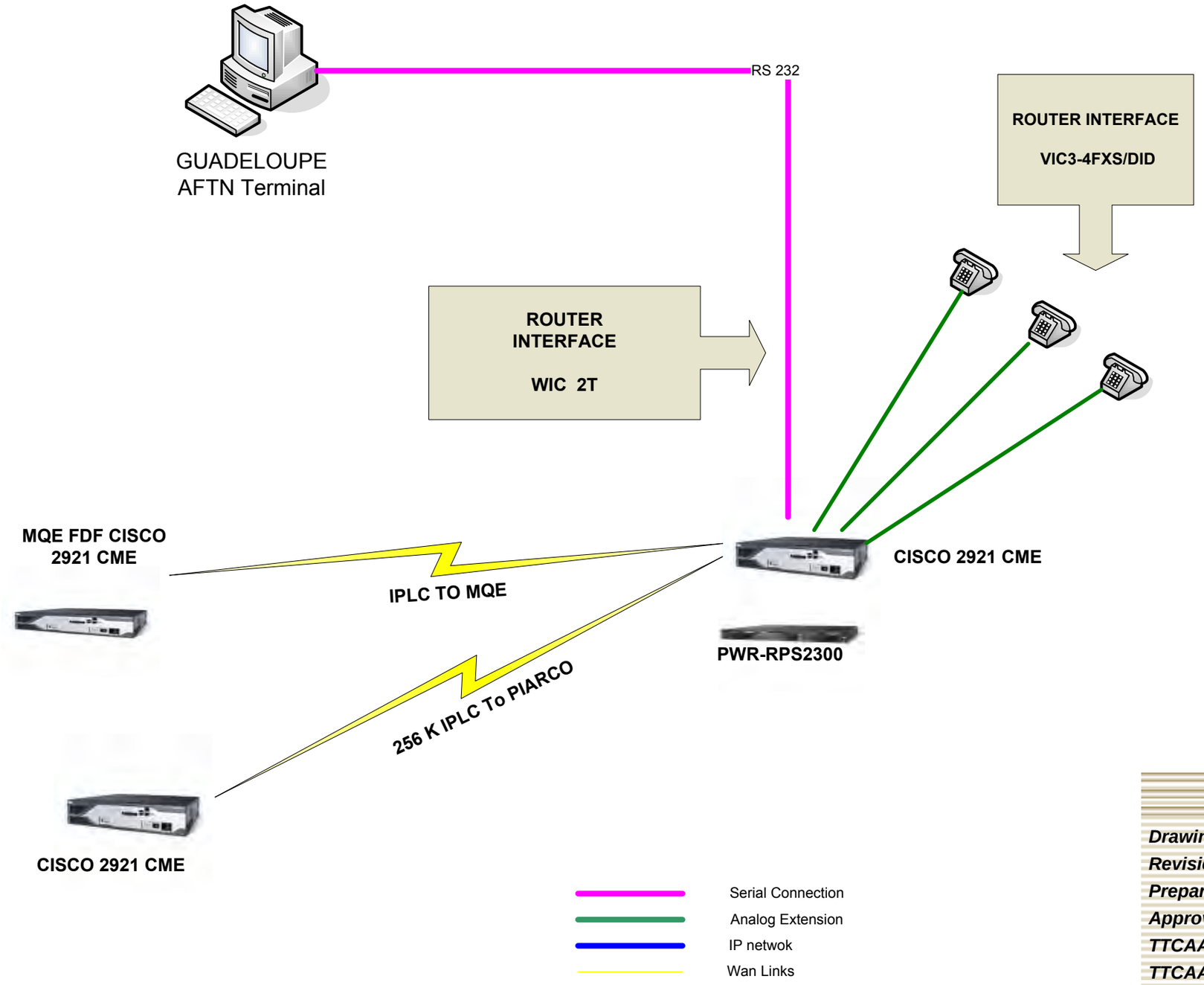


Serial Connection
Analog Extension
IP netwok
Wan Links

TTCAA AFS NETWORK

Drawing No: AFS2010_12_MQE
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA GUADELOUPE – POINTE-A-PITRE CODE: PTP



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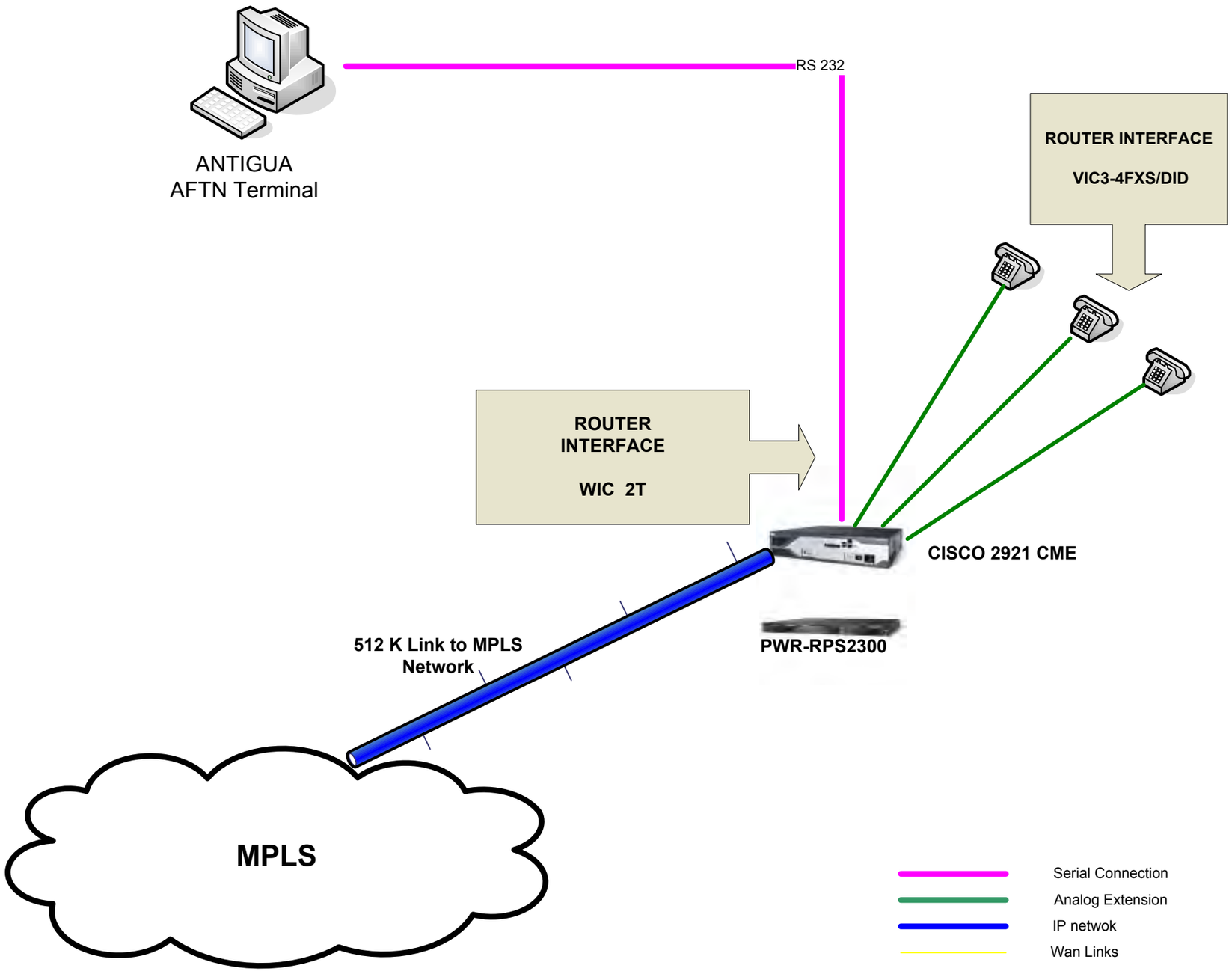
Drawing No: AFS2010_13_GDP
Revision Date: May 12, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA ANTIGUA – V C BIRD INT'L CODE: ANU



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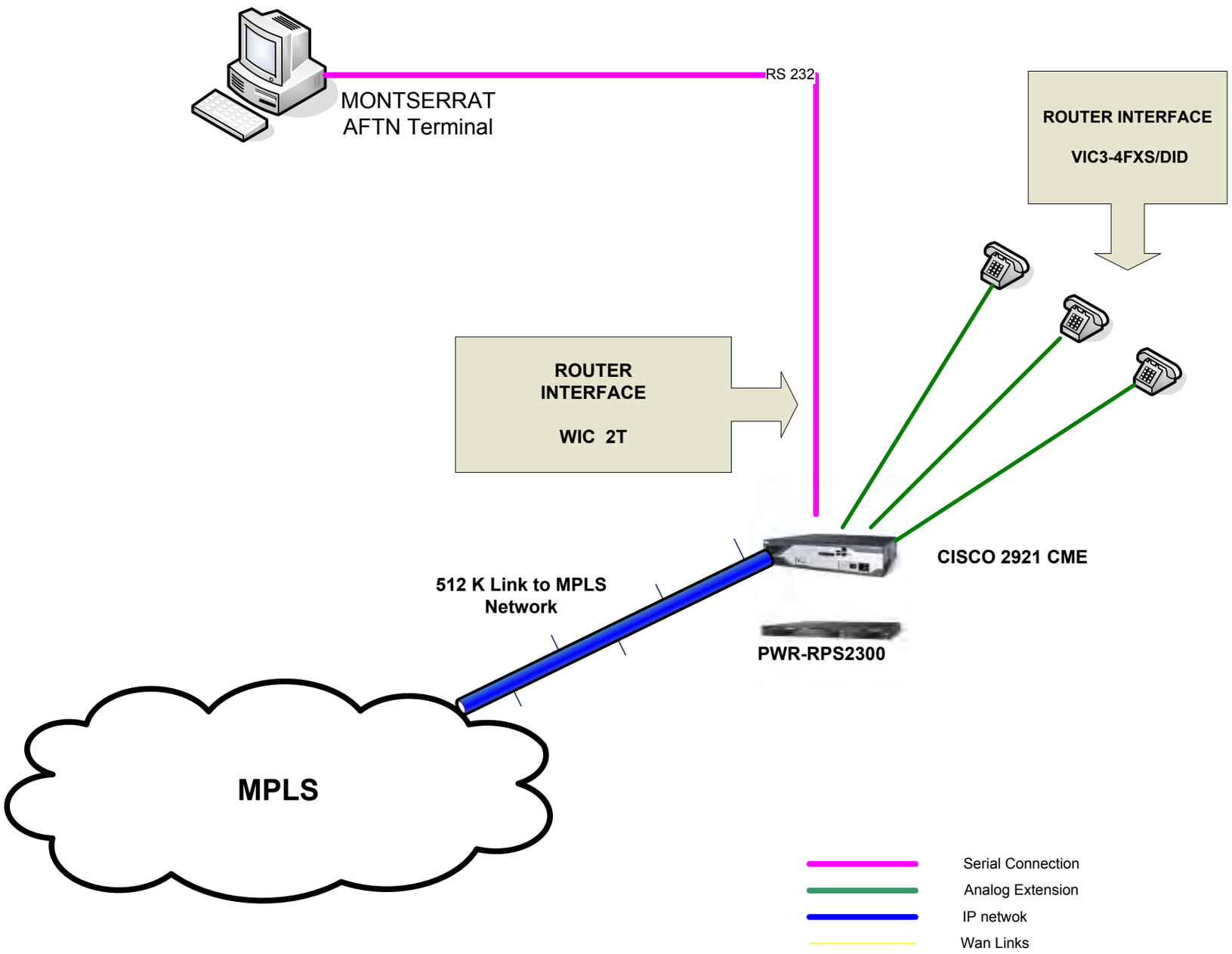
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

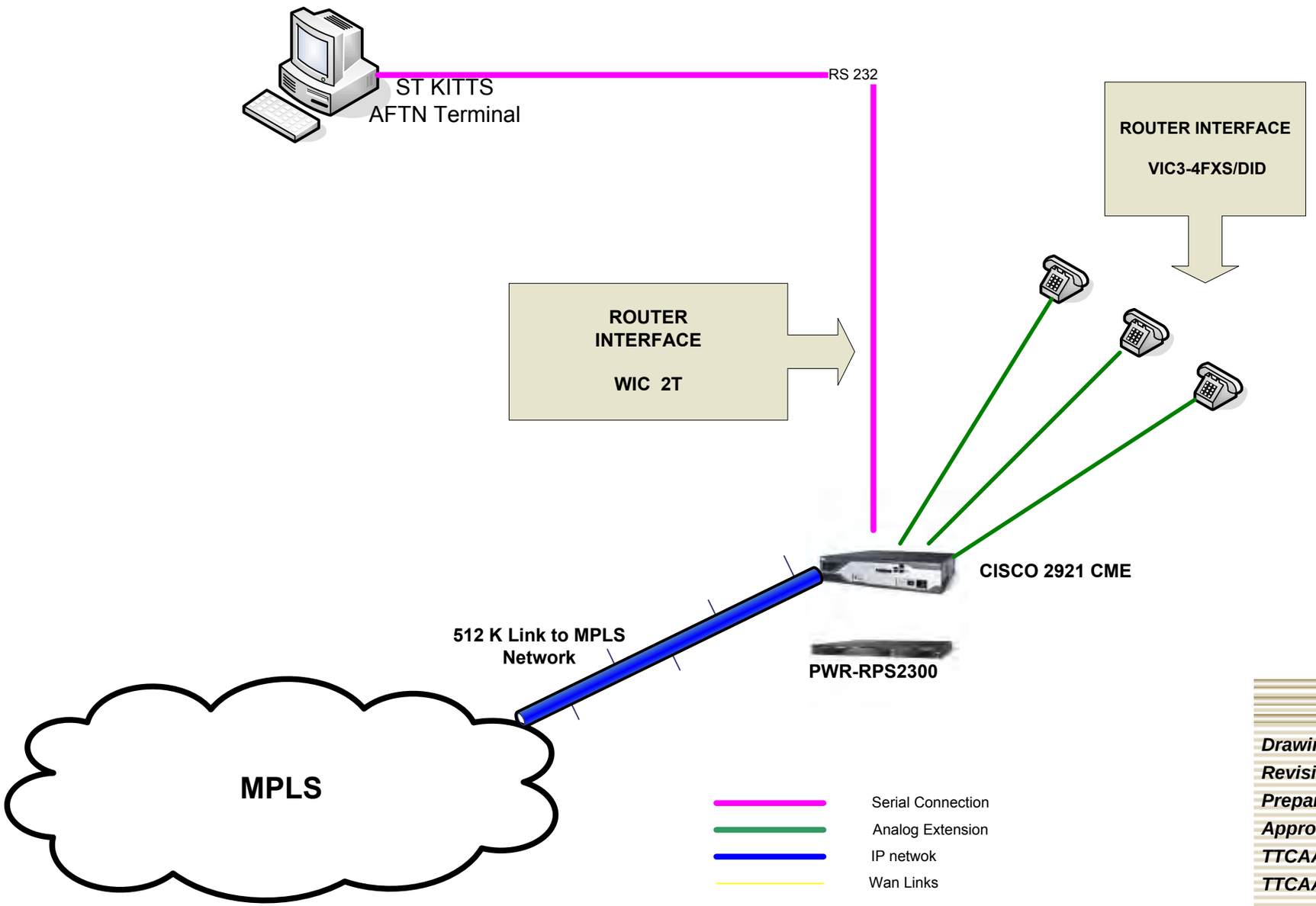
TTCAA MONTSERRAT – W H BRAMBLE CODE: MNI



TTCAA AFS NETWORK

Drawing No: AFS2010_15_MONS
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA ST KITTS – ROBERT L BRADSHAW CODE: SKB



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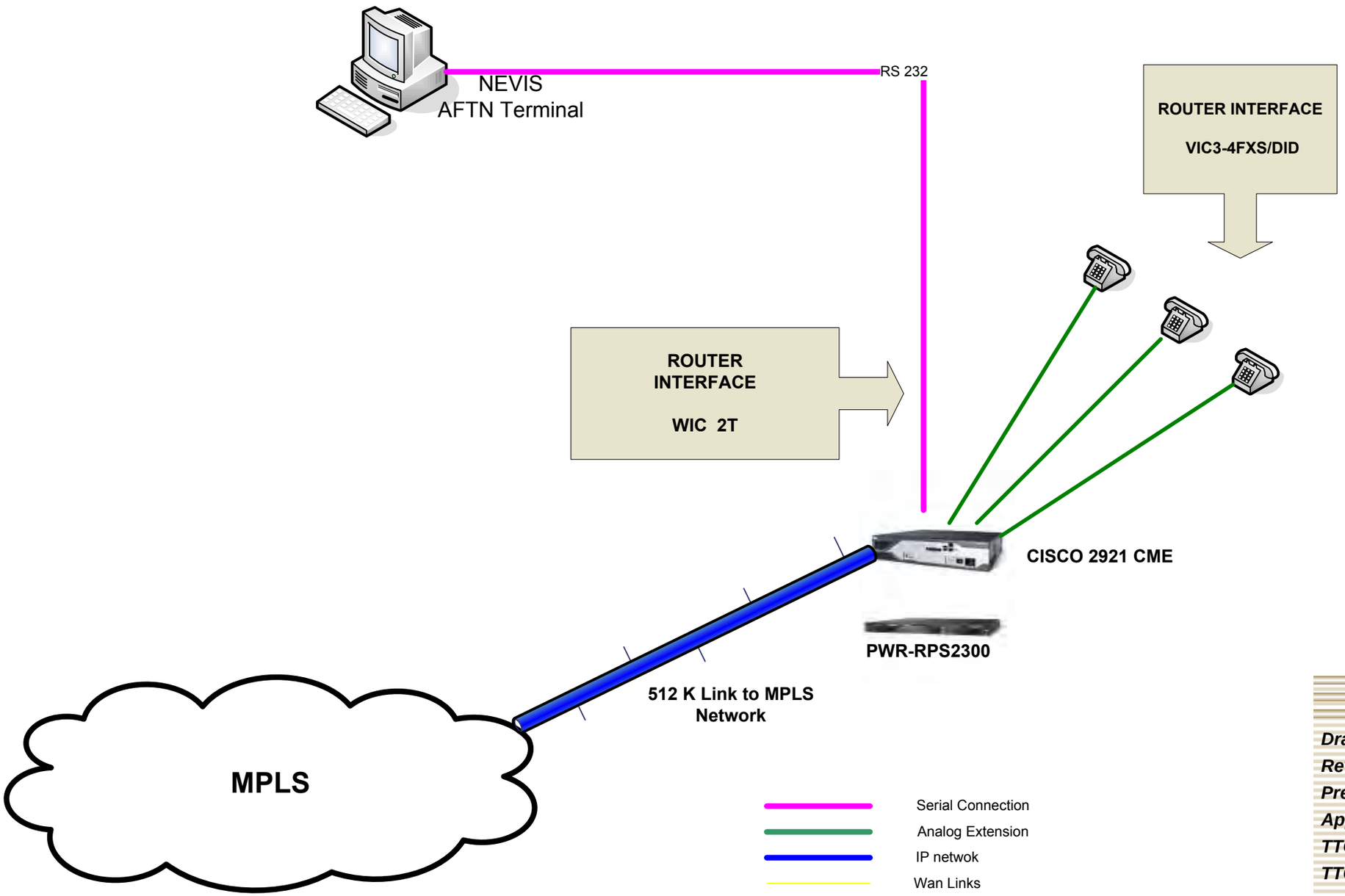
Drawing No: AFS2010_16_SKB
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

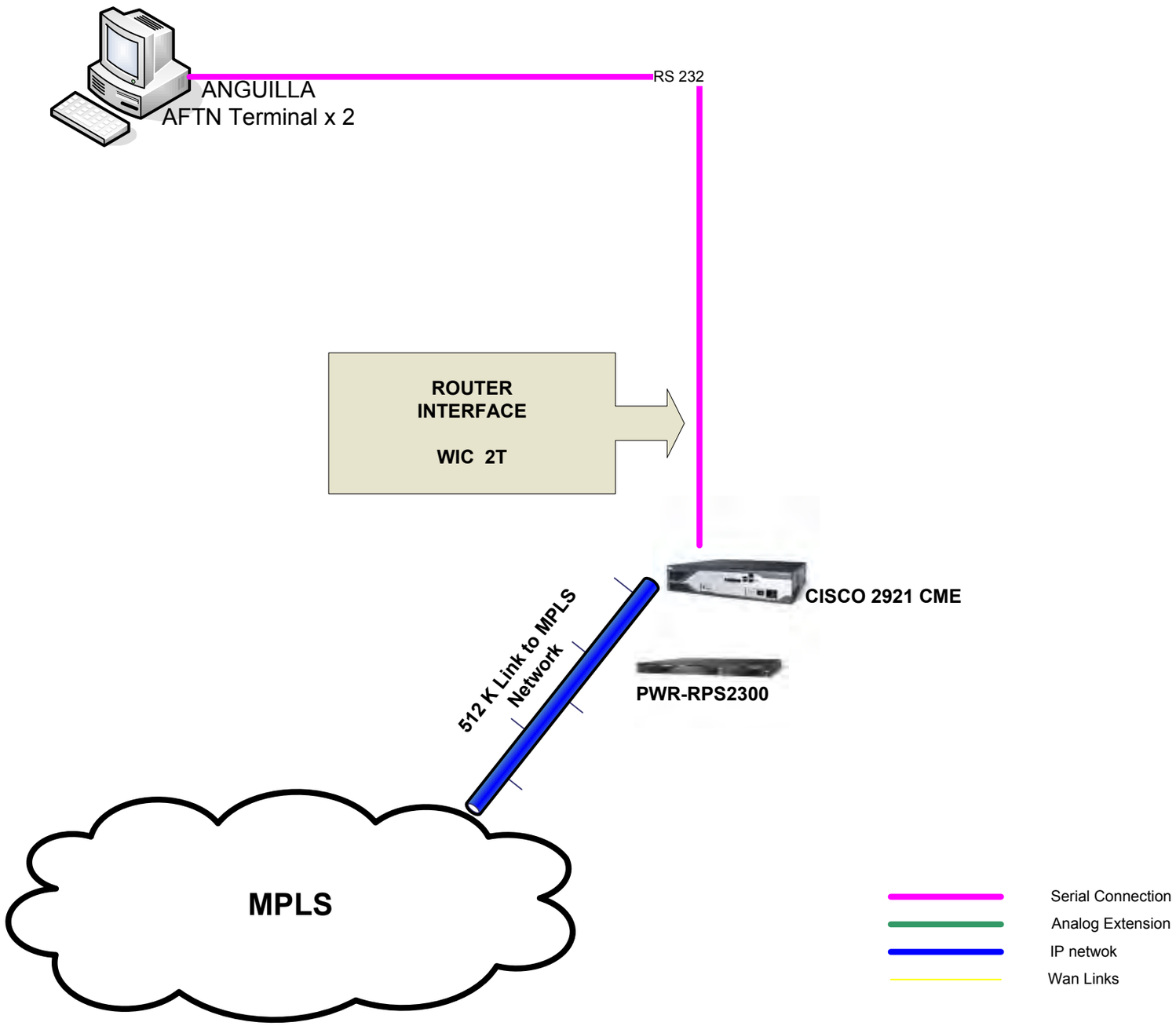
TTCAA NEVIS – VANCE ARMORY CODE: NEV



TTCAA AFS NETWORK

Drawing No: AFS2010_17_NEVIS
Revision Date: June 10, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

TTCAA ANGUILLA – WALLBLAKE CODE: AXA



TTCAA AFS NETWORK

Drawing No: AFS2010_18_ANG
Revision Date: May 12, 2010
Prepared by: TSTT _____
Approved by: _____
TTCAA Acceptance Date: _____
TTCAA Signature: _____

APPENDIX C

Site	Destination	ATS/ DS	AFTN	Data Rate AFTN	RADAR	Data Rate RADAR
TRINIDAD PIARCO ACC						
	Anguilla (Wallblake TWR)		2	9.6	1	19.2
	Antigua (V. C. Bird APP)	√	2	9.6	1	19.2
	Barbados (Grantley Adams APP)	√	2	9.6	1	19.2
	Dominica (Melville Hall TWR)	√	1	9.6	1	19.2
	Dominica (Canefield TWR)		1	9.6	1	19.2
	Grenada (Maurice Bishop APP)	√	2	9.6	1	19.2
	Guadeloupe (Point-a-Pitre APP	√	1	9.6	1	19.2
	Martinique APP	√	1	9.6	1	19.2
	Montserrat (John A. Osbourne TWR)		2	9.6	1	19.2
	Nevis		1	9.6	1	19.2
	New York ACC	√				
	San Juan ACC	√	1	9.6	1	19.2
	Saint Kitts (Robert L. Bradshaw TWR)		1	9.6	1	19.2
	Saint Lucia (George Charles TWR)		1	9.6	1	19.2
	Saint Lucia (Hewanorra APP)	√	1	9.6	1	19.2
	Saint Vincent (E. T. Joshua APP)	√	1	9.6	1	19.2
ANGUILLA WALLBLAKE TWR						
	Antigua (V. C. Bird APP)					
	Sint Maarten (Julianna APP)					
	Sint Maarten(Grand Case Airport)					
	San Juan ACC					
	Saint Kitts (Robert L. Bradshaw TWR)					
	Trinidad (Piarco ACC)		2	9.6	1	19.2
ANTIGUA V. C. BIRD APP						
	Anguilla (Wallblake TWR)					
	Barbados (Grantley Adams APP)	√				
	Dominica (Melville Hall TWR)	√				
	Dominica (Canefield TWR)					
	Guadeloupe (Pointe-a-Pitre APP)	√				
	Martinique APP	√				
	Montserrat (John A. Osbourne TWR)	√				
	Nevis	√				
	San Juan ACC	√				
	Saint Kitts (Robert L. Bradshaw TWR)	√				

Site	Destination	ATS/ DS	AFTN	Data Rate AFTN	RADAR	Data Rate RADAR
	Saint Lucia (George Charles TWR)					
	Saint Lucia (Hewanorra APP)	√				
	Sint Maarten (Juliana APP)	√				
	Saint Vincent (E. T. Joshua APP)	√				
	Trinidad (Piarco ACC)	√	2	9.6	1	19.2
BARBADOS GRANTLEY ADAMS APP						
	Antigua (V.C. Bird APP)	√				
	Grenada (Maurice Bishop APP)	√				
	Guadeloupe (Point-a-Pitre APP)	√				
	Martinique APP	√				
	San Juan ACC					
	Saint Lucia (Geoge Charles APP)	√				
	Saint Lucia (Hewanorra APP)	√				
	Saint Vincent (E. T. Joshua APP)	√				
	Trinidad (Piarco ACC)	√	2	9.6	1	19.2
DOMINICA CANEFIELD TWR						
	Antigua (V. C. Bird APP)					
	Guadeloupe (Point-a-Pitre APP)	√				
	Trinidad (Piarco ACC)		1	9.6	1	19.2
	Dominica (Melville Hall TWR)	√				
	San Juan ACC					
DOMINICA MELVILLE HALL TWR						
	Antigua (V. C. Bird APP)	√				
	Guadeloupe (Point-a-Pitre APP)	√				
	Trinidad (Piarco ACC)	√	1	9.6	1	19.2
	San Juan ACC					
	Martinique APP	√				
	Anguilla (Wallblake TWR)					
	Dominica (Canefield TWR)	√				
GRENADA MAURICE BISHOP APP						
	Barbados (Grantley Adams APP)	√				
	Saint Lucia (George Charles TWR)					
	Saint Lucia (Hewanorra APP)	√				
	Martinique APP	√				
	Saint Vincent (E. T. Joshua APP)	√				

Site	Destination	ATS/ DS	AFTN	Data Rate AFTN	RADAR	Data Rate RADAR
	Trinidad (Piarco ACC)	√	2	9.6	1	19.2
GUADELOUPE POINT-A-PITRE APP						
	Antigua (V. C. Bird APP)	√				
	Barbados (Grantley Adams APP)					
	Dominica (Melville Hall TWR)	√				
	Dominica (Canefield TWR)	√				
	Montserrat (John A. Osbourne TWR)					
	Saint Kitts (Robert L. Bradshaw TWR)					
	Sint Marten (Juliana APP)					
	Martinique APP	√				
	Saint Lucia (Hewanorra APP)					
	San Juan ACC	√				
	Trinidad (Piarco ACC)	√	1	9.6	1	19.2
MARTINIQUE APP						
	Antigua (V. C. Bird APP)					
	Barbados (Grantley Adams APP)	√				
	Grenada (Maurice Bishop APP)					
	Saint Lucia (George Charles TWR)	√				
	Saint Lucia (Hewanorra APP)	√				
	Saint Vincent (E. T. Joshua APP)	√				
	Guadeloupe (Point-a-Pitre APP)	√				
	Dominica (Melville Hall TWR)					
	Sint Marten (Juliana APP)					
	San Juan ACC					
	Trinidad (Piarco ACC)	√	1	9.6		19.2
MONTSERRAT JOHN A. OSBOURNE TWR						
	Anguilla (WALLBLAKE TWR)					
	Antigua (V. C. Bird APP)	√				
	Nevis	√				
	Saint Kitts (Robert L. Bradshaw TWR)	√				
	Sint Marten (Juliana APP) [dial plan 7011]					
	Guadeloupe (Point-a-Pitre APP)					
	Trinidad (Piarco ACC)		2	9.6	1	19.2
NEVIS						
	Antigua (V. C. Bird APP)	√				

Site	Destination	ATS/ DS	AFTN	Data Rate AFTN	RADAR	Data Rate RADAR
	Montserrat (John A. Osbourne TWR)	√				
	Trinidad (Piarco ACC)		1	9.6	1	19.2
	Saint Kitts (Robert L. Bradshaw TWR)	√				
SAN JUAN ACC						
	Anguilla					
	Antigua (V. C. Bird APP)	√				
	Guadeloupe (Pointe-a-Pitre APP)	√				
	Saint Kitts (Robert L. Bradshaw TWR)	√				
	Sint Marten (Juliana APP)					
	Trinidad (Piarco ACC)	√	1	9.6	1	19.2
SAINT KITTS ROBERT L. BRADSHAW TWR						
	Antigua (V. C. Bird APP)	√				
	Nevis	√				
	Guadeloupe (Pointe-a-Pitre APP)					
	San Juan ACC	√				
	Sint. Marten (Juliana APP)	√				
	Montserrat (John A. Osbourne TWR)	√				
	Trinidad (Piarco ACC)		1	9.6	1	19.2
SAINT LUCIA GEORGE CHARLES TWR						
	Antigua (V. C. Bird APP)					
	Barbados (Grantley Adams APP)	√				
	Grenada (Maurice Bishop APP)					
	Saint Vincent (E. T. Joshua APP)	√				
	Saint Lucia (Hewanorra APP)	√				
	Martinique APP	√				
	Trinidad (Piarco ACC)		1	9.6	1	19.2
SAINT LUCIA HEWANORRA APP						
	Antigua (V. C. Bird APP)	√				
	Barbados (Grantley Adams APP)	√				
	Grenada (Maurice Bishop APP)	√				
	St Vincent (E. T. Joshua APP)	√				
	Saint Lucia (George Charles TWR)	√				
	Guadeloupe (Pointe-a-Pitre APP)					
	Martinique APP	√				
	Trinidad (Piarco ACC)	√	1	9.6	1	19.2

Site	Destination	ATS/ DS	AFTN	Data Rate AFTN	RADAR	Data Rate RADAR
SINT MARTEN JULIANA APP						
	Antigua (V. C. Bird APP)	√				
	Anguilla (Wallblake TWR)					
	Montserrat (John A. Osbourne TWR)					
	Martinique APP					
	Saint Kitts (Robert L. Bradshaw TWR)	√				
	Guadeloupe (Pointe-a-Pitre APP)					
	San Juan ACC					
	Trinidad (Piarco ACC)					
SAINT VINCENT E. T. JOSHUA APP						
	Antigua (V. C. Bird APP)	√				
	Barbados (Grantley Adams APP)	√				
	Grenada (Maurice Bishop APP)	√				
	Saint Lucia (George Charles TWR)					
	Saint Lucia (Hewanorra APP)	√				
	Martinique APP	√				
	San Juan ACC					
	Trinidad (Piarco ACC)	√	1	9.6	1	19.2

NOTE: All AIS offices must talk to Piarco AIS office

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APPENDIX D

1. Mid July 2010 – TSTT's site visit to Martinique and Guadeloupe.

2. June 10th 2010 – TTCAA has committed to provide TSTT with a final version of the speech and data connectivity inclusive of Anguilla and St. Maarten's requirements. TTCAA to accept redesign version 4.04. TSTT has committed to provide the draft transition plan from old to new network.

3. June 7th 2010 – ECCAA confirms voice and data requirements.

4. June 4th 2010- TSTT to provide report of site surveys with action items for States. TTCAA to follow up with action items to prepare site for installation.

5. May 27th 2010 – No response from French on voice requirements, no response on redesign of new network. SNA/AG requested a teleconference to discuss. Date of 31st May 2010 to be rescheduled pending SNA/AG's convenience. Awaiting response from United States on voice and data connectivity.

6. May 26th 2010 – Meeting with TSTT to review the findings of the site surveys. TTCAA presented the IPv4 router addressing scheme as developed at the ATN/TF on 21th May 2010. TSTT confirms that St. Maarten can be connected (voice) via an OPX.

7. May 24th, 2010 – Reminder sent to States on confirmation of voice circuit connectivity sent on May 13th 2010.

8. May 24th, 2010 - A request was made to FAA United States to investigate the possibility of facilitating voice connectivity between St. Maarten and Antigua in San Juan. San Juan connects to St. Maarten via MEVA II.

9. May 14th 2010 – Final NTG report sent to Directors, ICAO and States advised.

2.27 The Traffic Matrix that was previously sent to States for verification or amendment was explained. The traffic matrix shows the voice connectivity required and the number of data connections. States were also asked to provide the number of voice extensions required and the locations of the extensions, similarly the location for any additional AFTN workstations. With the assistance of the United States, the Meeting examined the information presented in the Traffic Matrix and compared it to the ATS Direct Speech information in FASID Table CNS 1C. The information in both documents does not match. As such, it is imperative that States verify their ATS Direct Speech Circuits in order to implement the new E/CAR AFS Network. States requested a 2-week period to complete this exercise and send the information to the Rapporteur of E/CAR NTG no later than 23 April 2010.

2.28 Trinidad and Tobago noted that delays to the implementation date of the new network initially proposed for second quarter 2010 are to be expected based on the site surveys to be conducted and the receipt of information on speech and data requirements. A firmer timeline for completion of the new network will be supplied by Trinidad and Tobago upon completion of the site surveys since site conditions encountered and the time to resolve will have an impact on the delivery date.

10. May 13th, 2010 TSTT requested that TTCAA reconfirm the number of voice circuits previously requested per State based on information obtained during the site surveys completed thus far on the present network.

11. May 13th 2010 - After TTCAA review, draft sent out to ECAR on May 13th 2010 to verify – Anguilla speech circuits and St. Maarten speech and data circuits with the exception of speech to Antigua were removed.

12. May 11th 2010 – SNA/AG response to network version 4.02 queried a circuit between Martinique and Guadeloupe.

13. May 11th 2010 - Version 4.04 sent to NTG members for comments. The major change is the redundant IPLC at Martinique and San Juan to Antigua.

14. May 7th 2010 – Email to French Antilles requesting confirmation of voice circuits to Martinique and Guadeloupe.

15. May 6th 2001 - Received Speech and Data requirements from ECCAA as submitted on document dated May 11 2010

16. May 4th 2010 – Initial response received from Anguilla on speech and data requirements

17. May 4th 2010 – Email sent to St. Maarten advising of visit on May 11, 2010. A confirmation to facilitate visit is received on May 10th 2010. This is the first and only response from St. Maarten to the NTG.

18. April 27th 2010 – TSTT submits redesign of network with redundant IPLC at San Juan and Martinique to Antigua (version 4.04).

19. April 23rd 2010 – Barbados confirms speech and data circuits submitted on Appendix C of WP/08 at NTG meeting.

20. April 22nd 2010 – TTCAA advises TSTT to hold on placing the order for the IPLC to St. Maarten until after the site visit and further responses from States on connectivity. TSTT to also find out about whether St. Maarten can connect to Antigua via OPX as exists in old network.

21. April 19th 2010 – May 10th 2010 - Site survey schedule as follows:

DATE	**STATE**	**STATUS**
Monday April 19, 2010	Piarco , (POS) TRINIDAD	Completed
Monday May 3, 2010	Grantley Adams , (BGI) BARBADOS	Completed
Tuesday May 4, 2010	Maurice Bishop , (GND) GRENADA	Completed
Wednesday May 5, 2010	E T Joshua , (SVD) ST VINCENT	Completed
Thursday May 6, 2010	V C Bird , (ANU) ANTIGUA	Completed
Friday May 7, 2010	W H Bramble , (MNI) MONTSERRAT	Completed
Monday May 10, 2010	Wallblake , (AXA) ANGUILLA	Completed
Tuesday May 11, 2010	Princess Julianna , (STX) SINT MAARTEN	Completed
Wednesday May 12, 2010	RL Bradshaw, SAINT KITTS	Completed

DATE	STATE	STATUS
Thursday May 13, 2010	George F Charles , (SLU) SAINT LUCIA	Completed
Friday May 14, 2010	Hewanorra , (SLU) SAINT LUCIA	Completed
Monday May 17, 2010	Canefield , DOMINICA	Completed
Tuesday May 18, 2010	Melville Hall , DOMINICA	Completed
July 2010	Martinique	
July 2010	Guadeloupe	

22. April 15th 2010, Draft NTG report sent to States and ICAO for comments. Comments received only from ICAO.

23. April 6th -7th, 2010 - E/CAR/NTG/1 Meeting held in Trinidad Meeting reviewed the System Design Document (SDD) that was submitted by TSTT on 22/02/2010. Two major comments which will cause delays to the completion date initially given for the project of May 2010:

- Site survey to States should be conducted by TSTT
- Redundant IPLC added to States that did not have MPLS capability and redesign of parts of the solution proposed

24. March 29th 2010 – Submission of French Antilles data requirements in WP/03 of TNG/1.

25. March 10th 2010- Email to States requesting contact person per installation site to arrange access to the site and to identify the termination point of the circuit

26. March 10th 2010 – Meeting date changed from 20-31 March 2010 to 6-7 April 2010

27. March 8th 2010 – Email to States - draft agenda for the first ECAR NTG Meeting and the System Design Document for the near term AFS network replacement (MPLS solution) for review and comments.

28. February 17th 2010 – Letter of invitation to NTG meeting sent to States with the following appendices:

- Terms of Reference
- Proposal for a near term solution for the E/CAR AFS Network replacement (MPLS Network)
- Bill of Materials (BOM)
- Voice connectivity and data circuits (AFTN and Radar)
- Site contact and exact location of service

29. December 11th 2009 – TTCAA accepted a proposal from Telecommunications Services of Trinidad and Tobago (TSTT) to deliver a new ECAR AFS network based on MPLS and IPLC circuits and CISCO routers (version 4.02).

30. December 8th - 11th, 2009 - At E/CAR/DCA/22 meeting the ToR and States membership of the E/CAR/NTG were agreed in response to E/CAR/WG/32 – 31/7 - to assist TTCAA in the implementation of new ECAR AFS network.

31. December 2nd 2009 – Email sent to States requesting names of technical experts to participate in NTG.

32. October 5th - 8th, 2009 - The following draft conclusion was proposed at the E/CAR/WG/31 and ratified by the DCAs prior to the E/CAR/DCA/22 Meeting: Draft Conclusion 31/7- Renewal of E/CAR AFS Network:

- Due to the current status of the E/CAR AFS Network with its maintenance difficulties (equipment, spare parts, logistics) and the need of a telecommunication network capable of supporting the future Air Navigation services and systems (AIDC, AMHS, Surveillance data sharing, etc), that:

  a) an E/CAR Network Technical Group (E/CAR/NTG) be formed to study, analyze and follow-up on the planning, documentation and implementation of the renewal of the E/CAR AFS Network;

  b) TTCAA conduct the renewal process of the E/CAR Network, assisted with the E/CAR/NTG and the ICAO NACC Regional Office

— END —