Proyectos de Infraestructura

ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DE EDUCACIÓN

TRASFONDO

La tecnología educativa, como recurso de apoyo para la educación, enriquece el proceso de enseñanza tradicional y mejora el aprendizaje.

El Departamento de Educación (DE) está encaminado a proveer los recursos necesarios, de manera que la integración del Internet y la tecnología a los métodos de enseñanza, estén diseñados para satisfacer las necesidades de esta sociedad en evolución.

OBJETIVOS PRINCIPALES

- **Proporcionar y mantener la infraestructura de tecnología necesaria, mejorar la enseñanza y el aprendizaje en todos los niveles escolares a través del uso de las mejores herramientas de instrucción disponibles en línea para impulsar el rendimiento académico máximo del estudiante.**

- **Impulsar la eficiencia, productividad y el ahorro de costos a través de la implementación de sistemas administrativos clave (oficina central, regiones, distritos y las escuelas).**

ROAD MAP

1998

DE Comienza a implantar una red de cmunicaciones para transmision de data, voz y video.

1999

Se añaden 780 escuelas adicionales y se incluyen 2 servidores por escuela 1,560 servidores.

2000

Se aprueban otras 100 escuelas y 4,600 servidores

2001

Se realizan varios proyectos de tecnologia como CITED, Proyecto 1000, infraestructura de la red de comunicacion de servidores, Ayuda y apoyo Help Desk a las oficinas regionales

2003

Plan de reconceptualization de la red y comienza a a proveer servicios de Internet y Telefonia

2004

Comunicion Satelital para promoveer servicios de banda ancha

2006

DE Realiza el proceso de implememntacion DLS en 1,525 escuelas

2010-2011

SE aumenta el ancho de banda de 695 escuelas y distritos a 3 Mpbs.

2013

DE inicia la actualizacion del plan tecnologico

2014

DE Federal avala en el Plan de Tecnologia para un periodo de 5 anos

2014-2019

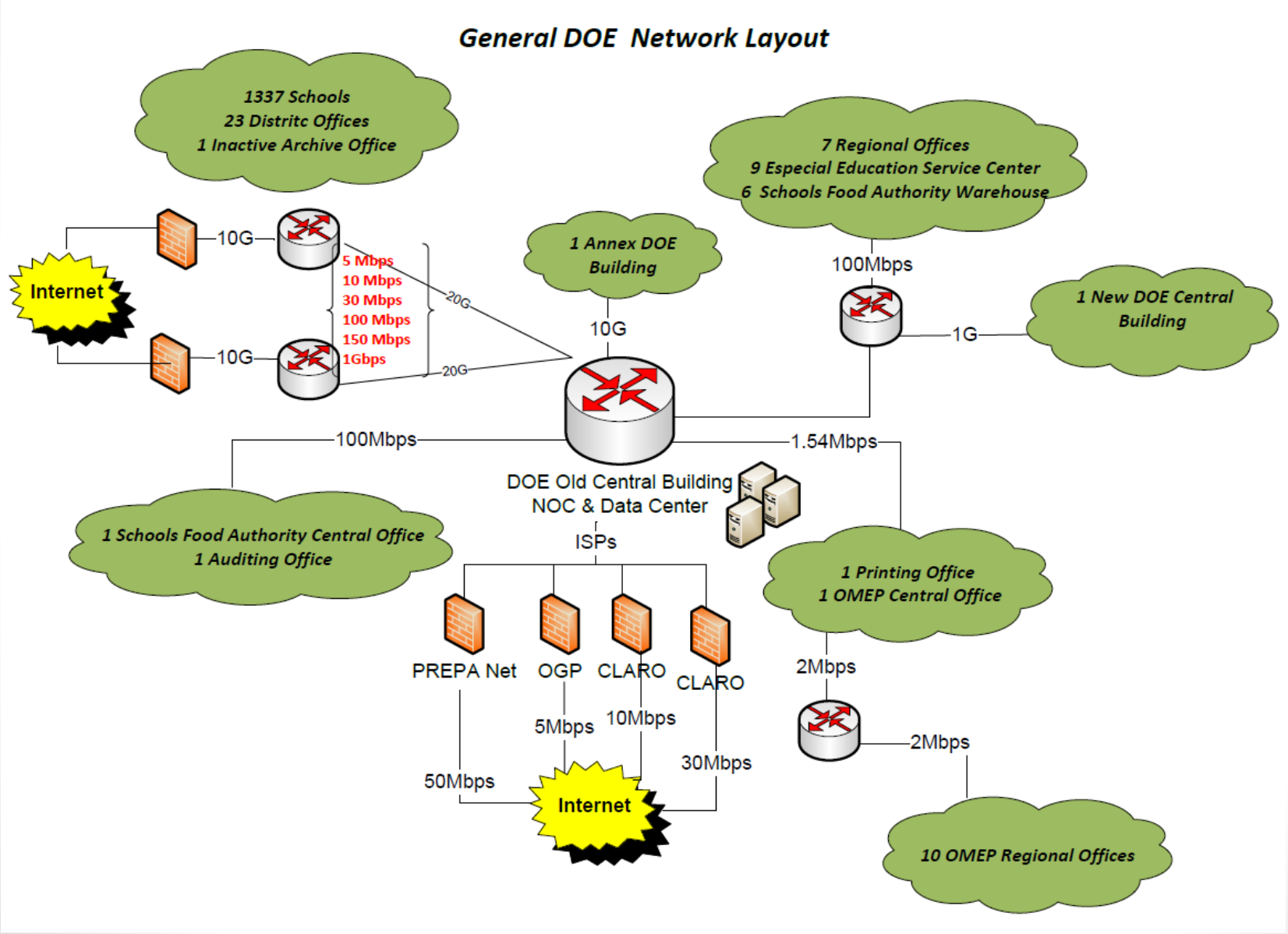
2015

DE Impementa WIFI en 1065 escuelas a nivel isla

PLAN DE TECNOLOGÍA

El Departamento de Educación (DE) cuenta con un plan tecnológico, aprobado por el Departamento de Educación de EE.UU., que describe cómo el DE tiene la intención de cumplir con desafíos relacionados al uso de las nuevas tecnologías, y a su vez, maximizar la gestión educativa a corto, mediano y largo plazo.

RED ACTUAL


General DOE Network Layout
1337 Schools
23 Distritc Offices
1 Inactive Archive Office
7 Regional Offices
9 Especial Education Service Center
6 Schools Food Authority Warehouse
1 Annex DOE Building
1 New DOE Central Building
Internet
10G
10G
5 Mbps
10 Mbps
30 Mbps
100 Mbps
150 Mbps
1Gbps
20G
20G
10G
100Mbps
1G
100Mbps
1.54Mbps
DOE Old Central Building
NOC & Data Center
1 Schools Food Authority Central Office
1 Auditing Office
ISPs
1 Printing Office
1 OMEP Central Office
PREPA Net
OGP
CLARO
CLARO
2Mbps
5Mbps
10Mbps
2Mbps
30Mbps
50Mbps
Internet
10 OMEP Regional Offices

Proyecto Conexiones Internas (ICP) 2012

OBJETIVOS DEL PROYECTO

Dar vida útil a los equipos de computadoras obsoletos, convertirlos en un terminal conectado a un servidor (*multipoint*).

El Diseño dispondrá de un sistema completo de infraestructura de cableado para el sistema de comunicación de datos de alta velocidad.

Proveer e instalar un sistema completo que consiste en instalar estaciones de trabajo, canales y sistemas de vía horizontal, horizontal Categoría 6 o la voz 5e y cableado de datos.

Habilitar laboratorios existentes de 750 escuelas a nivel isla, con los servidores de terminales (*terminal server*) para 3 salones laboratorios (aproximadamente 25 ordenadores por laboratorios académicos.

ESPECIFICACIONES DEL PROYECTO

Acceso conducto básico a Internet, incluyendo el cableado necesario, componentes de red, servicios de ISP y correo electrónico.

Servidores y sistemas operativos necesarios para gestionar redes.

Cableado interno y componentes necesarios para ampliar el acceso de datos dentro de una escuela o biblioteca

CRITERIOS DE EVALUACIÓN

ESTUDIO (*SITE SURVEY*)

Commonwealth of Puerto Rico
Department of Education
E-Rate FY2012 Internal Connections Project
Site Survey Report

School Information

School Size	Medium
School Code	12096
Erate Code	206459
School Name	Jesus T Pinero
Address	AVE ROSAS ESQ PATRIOTA POZO
City	Manati
Tel #1	787-854-2259
Tel #2	+1-787-854-8339
Survey Date	2/8/2016 9:40:15 AM

Current Information

Contact Information

Contact Person 1	ARMANDO RIVERA
Telephone Number	787-854-2259
Contact Person 2	ROLANDO RAMOS
Telephone Number	787-854-2259
Performed by	LUIS A RODRIGUEZ
School Personnel on Survey	ARMANDO RIVERA
Comments	N/A

General Information

Fire Evacuation Plan	No
Picture Taken?	No

Internet

Router	Other
Speed	Other

MDF1

Grounded	No
Cabinet have Lock and Key?	Yes no Key

Is the room secured?	Yes
Current Switches	Baystack
Current UPS	EATON 1500VA
Current UPS Status	Working
Electric Circuit	Dedicated Circuit
AMP	20 AMP
Cooling in Room?	Yes
Cabinet Replacement?	No
Used for Project?	No
Comments	N/A
Picture Taken?	Yes

MDF2

Grounded	No
Cabinet have Lock and Key?	Yes no Key
Is the room secured?	Yes
Current Switches	Other
Current UPS	Old UPS
Current UPS Status	Working
Internal / External Wireless Present?	Yes
Electric Circuit	Power Extension
AMP	20 AMP
Cabinet Replacement?	No
Cooling in Room?	Yes
Used for Project?	No
Comments	N/A
Picture Taken?	Yes

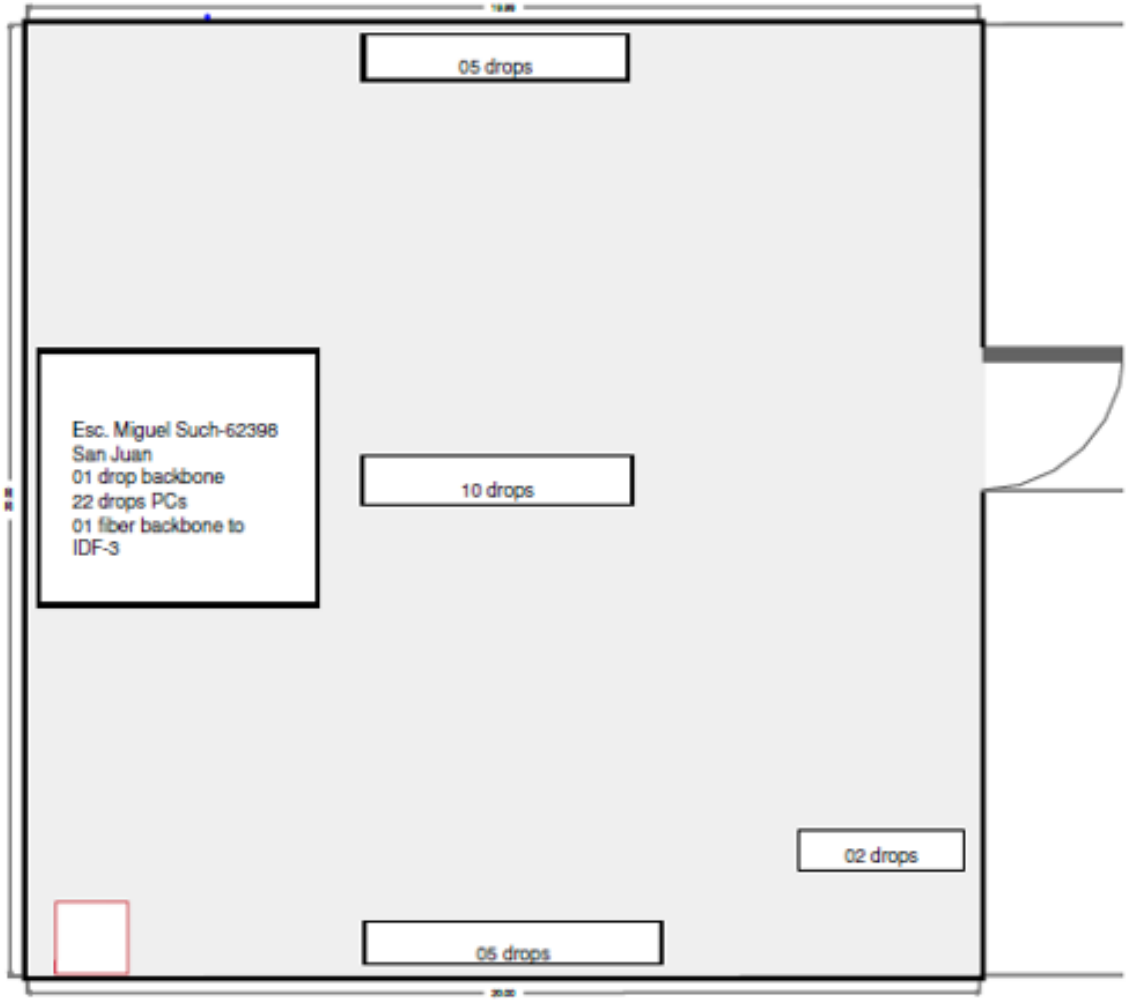
Room 1

Type	Lab
Room Name?	LABORATORIO COMPUTADORAS
Room Number	N/A
Current Drops	0
Need Certification?	Yes
Total number of PC	12
Is Current PC OS XP or Better?	Yes
Current Power Outlets?	22
New Power Outlets?	0
New Drops for PCs?	12
New Drops for Printers?	0
New Drops for Teacher?	0
Additional Drops	0
Drop Lengths Less than 295'?	Yes
Comments	N/A
Cooling in Room?	Yes
Cabinet needed?	Yes

ESTUDIO (*SITE SURVEY*)

Lab.Matemáticas

Anchura:	19.99 m
Largura:	20.00 m
Area:	399.74 m²
Perímetro:	79.97 m



INSTALACIÓN

Montar el Gabinete

Se instala la tuberia en el laboratorio

Se instalan los “*drops*”

Se verifica los equipos que estén bien instalados

Se certifica el cableado instalado

Seguridad de la Instalación

Funcionalidad

Limpieza

DIAGRAMA DE INSTALACIÓN

Commonwealth of Puerto Rico
Department of Education
E-Rate FY2012 Internal Connections Project

School: Jesus T Pinero School Code: 12096 School E-Rate Code: 206459

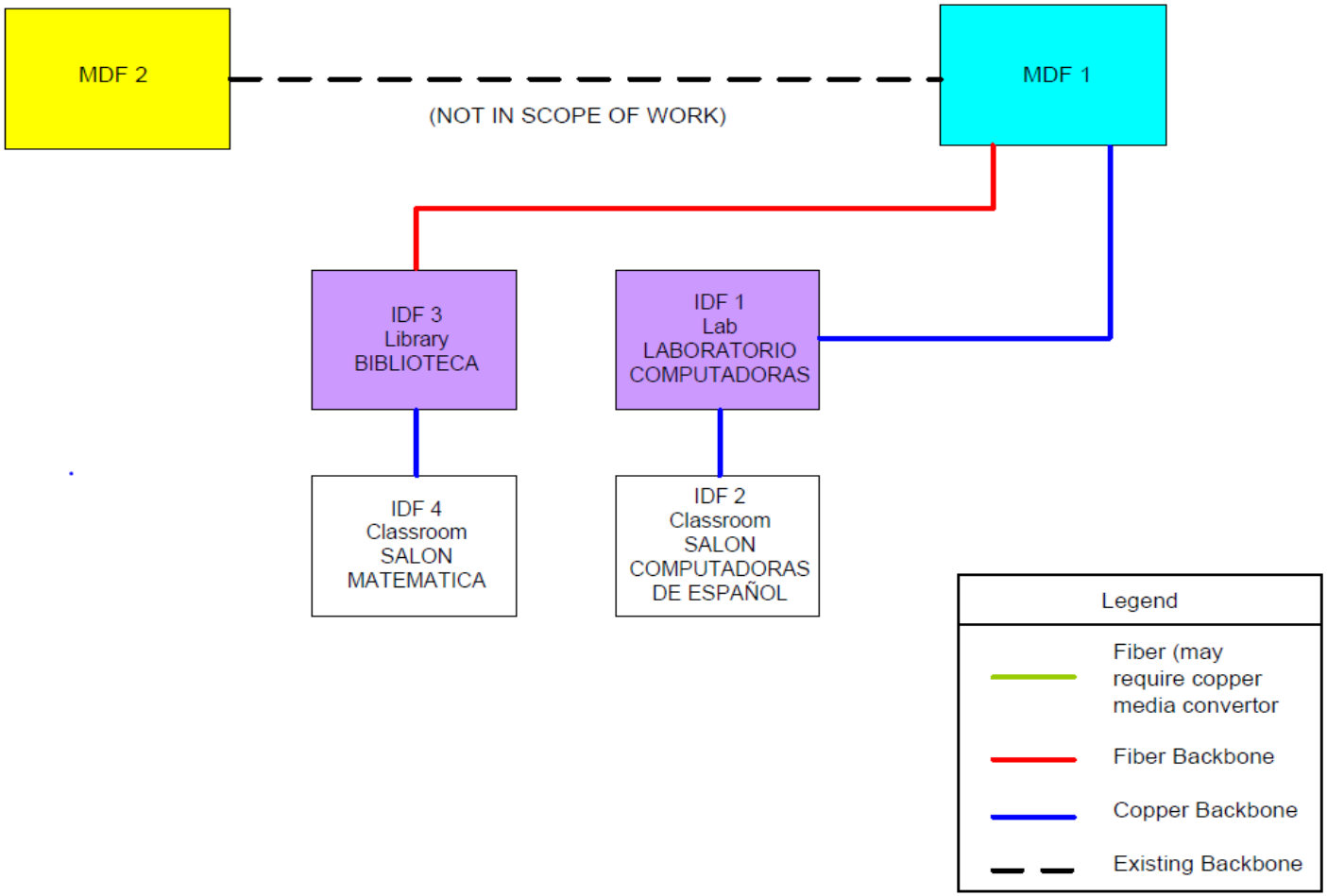
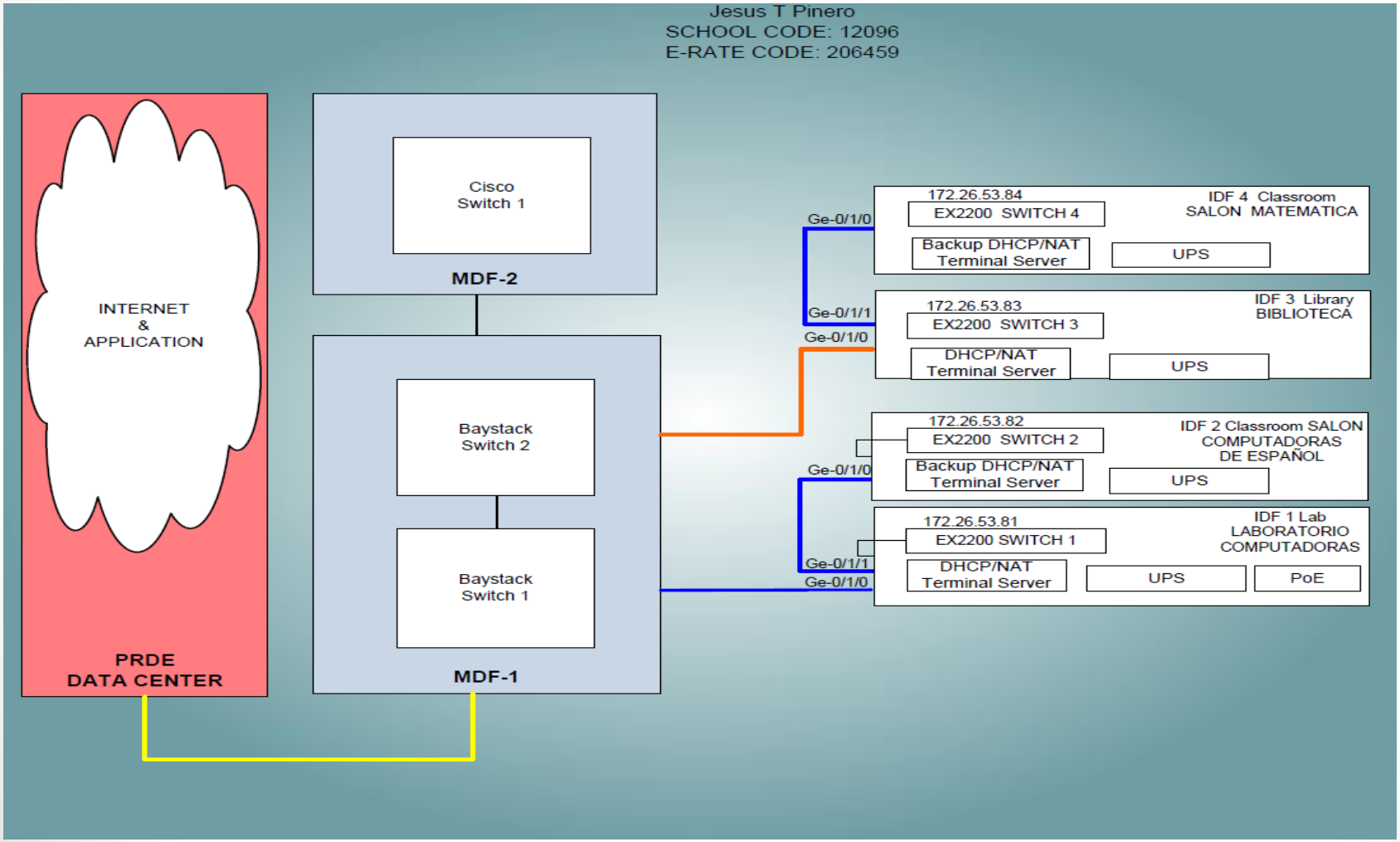


DIAGRAMA DE INSTALACIÓN



EQUIPOS INSTALADOS

MODELO DE LABORATORIO EN ESCUELA

PRUEBAS DE *"BACK BONE"*

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: BACK BONE IDF01 TO IDF02 — **Test Summary: PASS**

Date / Time: 02/05/2016 03:32:18pm
Headroom: 6.8 dB (NEXT 45-78)
Test Limit: TIA Cat 6 Channel
Cable Type: Cat 6 U/UTP

Operator: R.MARRERO [K/JOSE]
Software Version: 2.7700
Limits Version: 1.9400
NVP: 69.0%

Model: DTX-1800
Main S/N: 1812579
Remote S/N: 1812580
Main Adapter: DTX-CHA002
Remote Adapter: DTX-CHA002

Wire Map (T568B)
PASS

125 ft

Length (ft), Limit 328	[Pair 45]	125
Prop. Delay (ns), Limit 555		194
Delay Skew (ns), Limit 50		10
Resistance (ohms)	[Pair 12]	6.1
Insertion Loss Margin (dB)	[Pair 36]	23.3
Frequency (MHz)	[Pair 36]	250.0
Limit (dB)	[Pair 36]	35.9

Insertion Loss

PASS	MAIN	SR	MAIN	SR
	Worst Case Margin		Worst Case Value	
Worst Pair	45-78	12-78	45-78	12-78
NEXT (dB)	6.8	9.4	6.8	9.4
Freq. (MHz)	213.5	201.0	213.5	201.0
Limit (dB)	34.3	34.7	34.3	34.7
Worst Pair	78	12	78	36
PS NEXT (dB)	7.8	9.7	7.8	10.7
Freq. (MHz)	218.0	3.0	218.0	197.5
Limit (dB)	31.2	62.0	31.2	31.9

PASS	MAIN	SR	MAIN	SR
Worst Pair	45-78	78-45	45-78	78-45
ACR-F (dB)	16.2	16.1	16.5	16.3
Freq. (MHz)	224.0	224.0	240.5	241.0
Limit (dB)	16.3	16.3	15.6	15.6
Worst Pair	45	45	45	45
PS ACR-F (dB)	17.5	17.1	17.7	17.1
Freq. (MHz)	111.5	240.0	229.5	240.5
Limit (dB)	19.3	12.7	13.0	12.6

N/A	MAIN	SR	MAIN	SR
Worst Pair	12-78	12-78	45-78	12-78
ACR-N (dB)	11.7	12.1	28.3	30.1
Freq. (MHz)	3.0	3.0	213.5	201.0
Limit (dB)	61.5	61.5	1.5	3.1
Worst Pair	12	12	78	12
PS ACR-N (dB)	11.9	12.1	29.6	31.6
Freq. (MHz)	2.9	2.9	218.0	201.0
Limit (dB)	58.6	58.6	-2.0	0.2

PASS	MAIN	SR	MAIN	SR
Worst Pair	36	36	36	36
RL (dB)	6.5	5.8	8.2	7.3
Freq. (MHz)	117.0	158.0	247.5	247.5
Limit (dB)	11.3	10.0	8.1	8.1

Compliant Network Standards:
10BASE-T, 1000BASE-T, ATM-155, TR-16 Active, 100BASE-TX, ATM-25, 100VG-AnyLan, TR-16 Passive, 100BASE-T4, ATM-51, TR-4

NEXT | NEXT @ Remote | ACR-F | ACR-F @ Remote | ACR-N | ACR-N @ Remote | RL | RL @ Remote

LinkWare Version 5.0

Project: ESC.MIGUEL SUCH
Site: SAN JUAN

FLUKE networks

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PRUEBAS DE CABLEADO

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF02/PPB-18 — **Test Summary: PASS**

Date / Time: 02/05/2016 03:30:22pm
Headroom: 9.1 dB (NEXT 12-78)
Test Limit: TIA Cat 6 Channel
Cable Type: Cat 6 U/UTP

Operator: R.MARRERO [K/JOSE]
Software Version: 2.7700
Limits Version: 1.9400
NVP: 69.0%

Model: DTX-1800
Main S/N: 1812579
Remote S/N: 1812580
Main Adapter: DTX-CHA002
Remote Adapter: DTX-CHA002

Wire Map (T568B)
PASS

97 ft

Length (ft), Limit 328	[Pair 45]	97
Prop. Delay (ns), Limit 555		151
Delay Skew (ns), Limit 50		8
Resistance (ohms)	[Pair 12]	4.7
Insertion Loss Margin (dB)	[Pair 36]	25.9
Frequency (MHz)	[Pair 36]	250.0
Limit (dB)	[Pair 36]	35.9

Insertion Loss

PASS	MAIN	SR	MAIN	SR
	Worst Case Margin		Worst Case Value	
Worst Pair	12-78	12-78	12-36	45-78
NEXT (dB)	9.1	9.1	9.2	10.6
Freq. (MHz)	186.0	186.5	250.0	249.0
Limit (dB)	35.3	35.3	33.1	33.1
Worst Pair	12	78	12	78
PS NEXT (dB)	9.8	10.5	11.3	11.0
Freq. (MHz)	186.5	86.3	250.0	226.5
Limit (dB)	32.4	38.2	30.2	30.9

PASS	MAIN	SR	MAIN	SR
Worst Pair	78-45	45-78	45-36	36-45
ACR-F (dB)	17.7	17.7	20.0	20.0
Freq. (MHz)	5.6	5.6	244.5	246.5
Limit (dB)	48.3	48.3	15.5	15.4
Worst Pair	45	45	45	45
PS ACR-F (dB)	18.0	18.0	20.9	20.3
Freq. (MHz)	1.0	1.0	250.0	250.0
Limit (dB)	60.3	60.3	12.3	12.3

N/A	MAIN	SR	MAIN	SR
Worst Pair	12-78	12-78	12-36	45-78
ACR-N (dB)	16.8	17.0	35.1	36.6
Freq. (MHz)	3.5	6.9	250.0	249.0
Limit (dB)	60.2	54.0	-2.8	-2.7
Worst Pair	78	78	12	78
PS ACR-N (dB)	16.9	18.1	37.4	37.9
Freq. (MHz)	3.3	7.3	250.0	248.5
Limit (dB)	58.4	50.9	-5.8	-5.6

PASS	MAIN	SR	MAIN	SR
Worst Pair	36	45	36	45
RL (dB)	4.5	5.6	5.1	5.6
Freq. (MHz)	118.5	246.0	165.0	246.0
Limit (dB)	11.3	8.1	9.8	8.1

Compliant Network Standards:
10BASE-T, 1000BASE-T, ATM-155, TR-16 Active, 100BASE-TX, ATM-25, 100VG-AnyLan, TR-16 Passive, 100BASE-T4, ATM-51, TR-4

NEXT | NEXT @ Remote | ACR-F | ACR-F @ Remote | ACR-N | ACR-N @ Remote | RL | RL @ Remote

LinkWare Version 5.0

Project: ESC.MIGUEL SUCH
Site: SAN JUAN

FLUKE networks

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PRUEBAS DE “*DROPS*”

LINKWARE CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF02/PPB-17

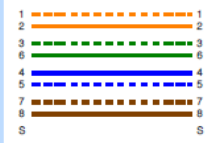
Test Summary: PASS

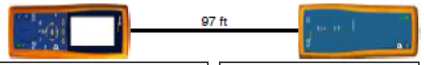
Date / Time: 02/05/2016 03:30:03pm
Headroom: 9.0 dB (NEXT 12-78)
Test Limit: TIA Cat 6 Channel
Cable Type: Cat 6 U/UTP

Operator: R.MARRERO [K/JOSE]
Software Version: 2.7700
Limits Version: 1.9400
NVP: 69.0%

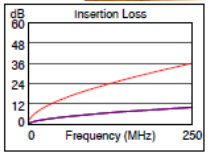
Model: DTX-1800
Main S/N: 1812579
Remote S/N: 1812580
Main Adapter: DTX-CHA002
Remote Adapter: DTX-CHA002

Wire Map (T568B)
PASS

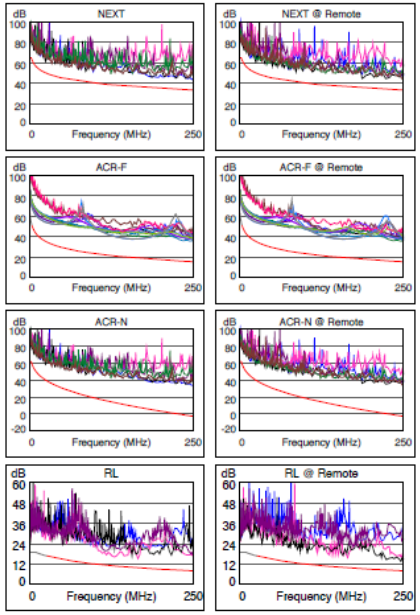




Length (ft), Limit 328	[Pair 45]	97
Prop. Delay (ns), Limit 555		151
Delay Skew (ns), Limit 50		8
Resistance (ohms)	[Pair 12]	4.9
Insertion Loss Margin (dB)	[Pair 36]	25.9
Frequency (MHz)	[Pair 36]	250.0
Limit (dB)	[Pair 36]	35.9



	Worst Case Margin		Worst Case Value	
PASS	MAIN	SR	MAIN	SR
Worst Pair	12-36	12-78	12-36	45-78
NEXT (dB)	9.1	9.0	9.1	10.6
Freq. (MHz)	250.0	186.5	250.0	249.0
Limit (dB)	33.1	35.3	33.1	33.1
Worst Pair	12	78	12	78
PS NEXT (dB)	10.0	10.5	11.2	11.1
Freq. (MHz)	186.0	86.3	250.0	226.5
Limit (dB)	32.4	38.2	30.2	30.9
PASS	MAIN	SR	MAIN	SR
Worst Pair	45-78	45-78	45-36	36-45
ACR-F (dB)	17.7	17.6	20.3	20.2
Freq. (MHz)	5.0	5.6	246.5	246.5
Limit (dB)	49.3	48.3	15.4	15.4
Worst Pair	45	45	45	45
PS ACR-F (dB)	18.0	18.1	20.8	20.3
Freq. (MHz)	1.3	1.0	250.0	250.0
Limit (dB)	58.3	60.3	12.3	12.3
N/A	MAIN	SR	MAIN	SR
Worst Pair	12-78	12-78	12-36	45-78
ACR-N (dB)	16.9	17.0	35.0	36.6
Freq. (MHz)	7.0	7.0	250.0	249.0
Limit (dB)	53.8	53.8	-2.8	-2.7
Worst Pair	78	78	12	78
PS ACR-N (dB)	17.0	18.2	37.3	37.8
Freq. (MHz)	3.4	7.4	250.0	248.0
Limit (dB)	58.0	50.7	-5.8	-5.6
PASS	MAIN	SR	MAIN	SR
Worst Pair	36	45	36	45
RL (dB)	4.7	5.5	5.3	5.5
Freq. (MHz)	118.5	246.0	165.0	246.0
Limit (dB)	11.3	8.1	9.8	8.1



Compliant Network Standards:
10BASE-T, 100BASE-TX, 100BASE-T4, 1000BASE-T, ATM-25, ATM-51, ATM-155, 100VG-AnyLan, TR-4, TR-16 Active, TR-16 Passive

LinkWare Version 5.0

Project: ESC.MIGUEL SUCH
Site: SAN JUAN

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LINKWARE CABLE TEST MANAGEMENT SOFTWARE

Cable ID: FIBRA PRTC TO IDF-1 H.5

Test Summary: PASS

Date / Time: 02/05/2016 03:00:32pm
Headroom: 1.39 dB (Loss)
Test Limit: TIA-568-C Multimode
Cable Type: OM3 Multimode 50

Operator: R.MARRERO [K/JOSE]
Software Version: 2.7700
Limits Version: 1.9400

Model: DTX-1800
Main S/N: 1812579

Loss R->M PASS

Date / Time: 02/05/2016 03:00:32pm
Cable Type: OM3 Multimode 50
Modal Bandwidth: 2000 MHz-km
MAIN: DTX-1800 (1812579 v2.7700)
Module: DTX-MFM (8725041)
Remote: DTX-1800R (1812580 v2.7700)
Module: DTX-MFM (8725040)

Propagation Delay (ns)	906	
Length (ft)	603	PASS
Limit 6562		
	850 nm	1300 nm
Result	PASS	PASS
Loss (dB)	1.35	0.32
Loss Limit (dB)	2.74	2.38
Loss Margin (dB)	1.39	2.06
Reference (dBm)	-21.43	-22.39

n = 1.4795
Number of Adapters: 2
Number of Splices: 2
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3.3
Patch Length2 (ft): 3.3
Reference Date: 02/05/2016 02:48:02pm
Method B

Compliant Network Standards:
FDDI, 10BASE-FL, 100BASE-FX
1000BASE-SX, 1000BASE-LX, 10GBASE-LX4
10GBASE-S, TokenRing 4 Fiber Optic, ATM 52 Fiber Optic
ATM 155 Fiber Optic, ATM 155SWL Fiber Optic, ATM 622 Fiber Optic
ATM 622SWL Fiber Optic, Fibre Channel 133, Fibre Channel 266
Fibre Channel 266SWL, Fibre Channel 100-MX-SN-I, Fibre Channel 200-MX-SN-I
Fibre Channel 400-MX-SN-I, Fibre Channel 1200-MX-SN-I

Fibre Channel 1200-MX-SN-I: This channel is certified for 1200 Megabytes per second Fibre Channel application over multimode fiber with short wavelength 850 nm laser source.

LinkWare Version 5.0

Project: ESC.MIGUEL SUCH
Site: SAN JUAN

FLUKE networks

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HOJA DE ACEPTACIÓN

martel INC
COMMUNICATIONS CONTRACTOR
AVE. JESÚS T. PIÑERO 1584 CAPARRA TERRACE, PR 00921
PO BOX 11421 CAPARRA HEIGHTS STATION SAN JUAN PR 00922-1221
PH. (787) 793-2424 FX. (787) 781-8512 www.martelpr.com

Service Report
No. 2016-119

CUSTOMER	CUSTOMER NO.	TELEPHONE	CONTRACT
DEPARTAMENTO DE EDUCACIÓN	62398		2012
ADDRESS: ESC. MIGUEL SUCH / SAN JUAN	SERVICE REQUESTED BY:		SYSTEM: COMMSCOPE
ZIP	CALL RECEIVED BY:	TIME:	DATE:

ISSUES REPORTED BY CUSTOMER:
INSTALACIÓN CABLEADO ESTRUCTURADO / PROYECTO INTERNAL CONNECTION
SALÓN CREMPE / LAB. MATEMATICAS / LAB. INGLÉS-ESPAÑOL / COMERCIO 1 AL 3
SALÓN 204 / MANEJO DE TECLADO

TRAVEL DATE	START	END	TOTAL	LABOR DATE	START	END	TOTAL

WORK PERFORMED: ☐ MAC ☐ SERVICE ☐ NEW INSTALLATION ☐ BILLABL

LARGE SCHOOL MATERIALS
LARGE SCHOOL LABOR
Se instalaron 7 barras de ground
Se instalaron 7 jumper de ground

ISSUES/OUTSTANDING AND RECOMENDED ACTION:
* Falta entrega de patch cord
Se Entrego 209 Patch cords de 10ft y 226 de 5 Ft y
4 patch fiber

MARTEL REPRESENTATIVE
PRINT NAME: Kerry Fort Diaz
SIGNATURE

MARTEL OFFICE USE ONLY

IMPORTANT
CUSTOMER HEREBY ACKNOWLEDGE RECEIPT OF ITS ORDER FOR EQUIPMENT AND/OR SERVICE WORK AS DESCRIBED ABOVE AND AGREES TO PAY ANY APPLICABLE CHARGE TO MARTEL COMMUNICATION CONTRACTOR UPON INVOICE RECEIPT

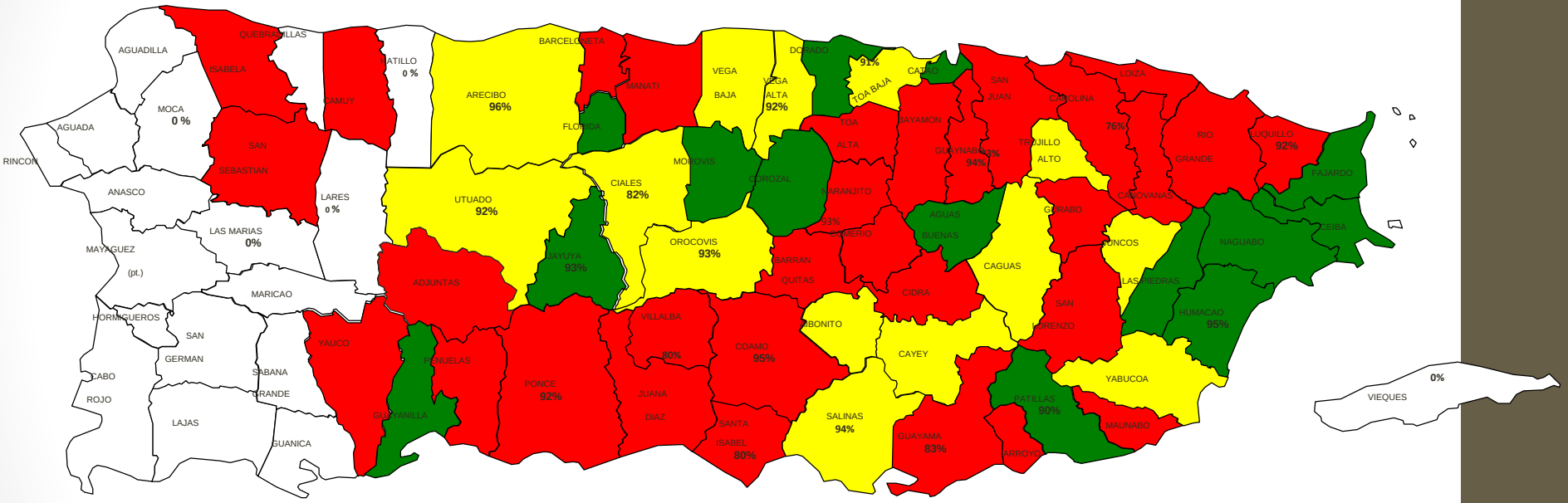
CUSTOMER ACCEPTANCE

PRINT NAME	AUTHORIZED PERSON SIGNATURE	AUTHORIZED PERSON POSITION	DATE MO.	DAY	YEAR
Inrel Sandre			2	5	16

WHITE / OFFICE CANARY / CUSTOMER

APROBADO

PROGRESO



100% completado

99-50% completado

50-1% completado

0% completado

Proyecto

Aumento de Ancho de Banda

OBJETIVOS DEL PROYECTO

Fortalecer el LAN de las escuelas por una distribucción de fibra óptica con mayor capacidad, permitiendo desarrollar la estrategia BYOD

"*Upgrade*" de la capacidad de ancho de banda de 10Mbps, 30Mbps, 50Mbps, 100Mbps y 150Mbps

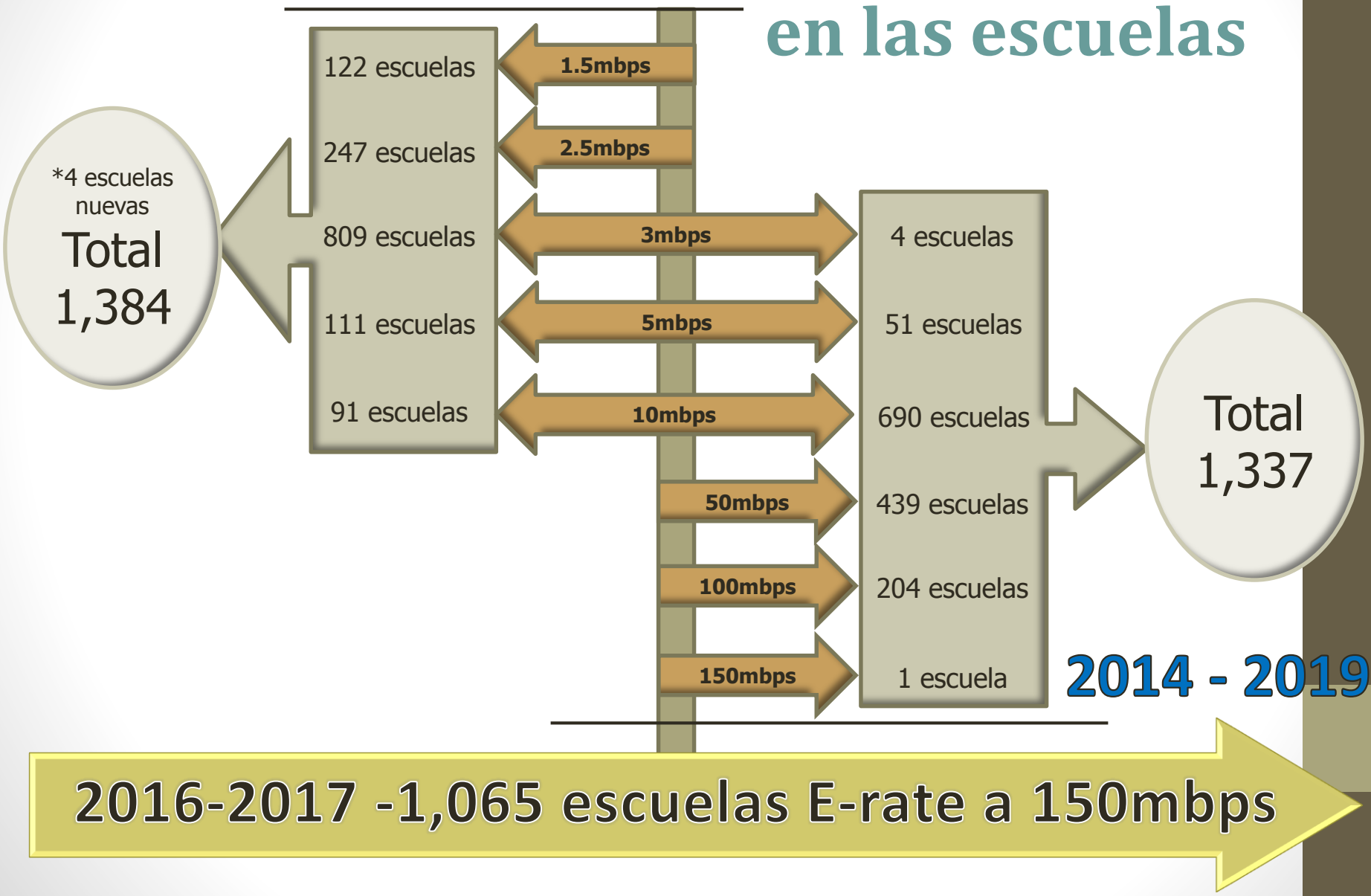
Continuar con el "*upgrade*" del ancho de banda. FCC 2014 Modernization Order

ConectED

En Junio de 2013 el Presidente Obama anunció la implementación de "ConnectED". El programa aspira a que 100% de las escuelas reciban Internet a 1Gbps de velocidad dentro de 5 años.

Con los fondos recibidos por el Programa E-Rate, el DE está fortaleciendo la infraestructura del Internet actual, aumentando la capacidad de 5Mbps a velocidades entre 10Mpbs a 150Mbps de acuerdo al número de estudiantes de las escuelas.

Ancho de banda en las escuelas



INSTALACIÓN

PRUEBA DE CONTINUIDAD

OTDR Report (1310 nm)

Pass

General Information

Filename:	Fiber57.trc		
Test date:	12/11/2014	Customer:	
Test time:	9:01 AM	Company:	
Cable ID:		Fiber ID:	Fiber57
Job ID:			
Comments:			

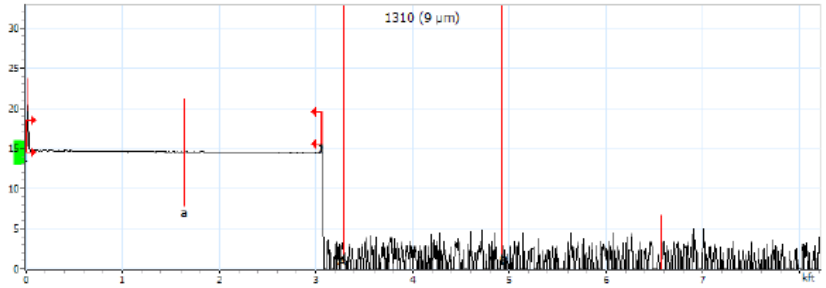
Locations

	Location A	Location B
Location		
Operator		
Model number	MAX-715B-M2-EA	
Serial number	727770	
Calibration date	9/13/2013	

Results

Span length:	3.0578 kft	Average loss:	0.100 dB/kft	Injection level:	14.7 dB
Span loss:	0.305 dB	Average splice loss:	---		
Span ORL:	40.20 dB	Maximum splice loss:	---		

Graph



Markers

Marker	Position (kft)	Value (dB)
a	1.6405	14.534
A	3.2808	5.609
B	4.9214	0.810
b	6.5617	0.000

A-B LSA attenuation:	-0.509 dB/km	A-B average loss:	9.599 dB/km
A-B LSA loss:	0.125 dB	4-point event loss:	14.882 dB
A-B ORL:	0.00 dB	Maximum reflectance:	-68.7 dB

Event Table

Type	No.	Pos./Length (kft)	Loss (dB)	Reflectance (dB)	Attenuation (dB/km)	Cumul. Loss (dB)
Merged Events	1	0.0000	---	-47.5		0.000
Section		3.0578	0.305		0.327	0.305
Reflective	2	3.0578	---	-52.4		0.305

EXFO Signature: _____ Date: 12/11/2014 Page 1 of 4

OTDR Report (1310 nm)

Pass

Macrobend

No macrobend detected.

Pass/Fail Thresholds

	1310 nm
Splice loss (dB)	1.000
Connector loss (dB)	1.000
Reflectance (dB)	-40.0
Fiber section attenuation (dB/km)	0.400
Span loss (dB)	45.000
Span length (kft)	0.0000
Span ORL (dB)	15.00

Test Parameters

	A → B
Wavelength (nm)	1310 (9 µm)
Range (kft)	8.2021
Pulse (ns)	10
Duration (s)	10

Test Settings

	A → B	Macrobend Wavelengths	Macrobend Delta Loss (dB)
IOR	1.467700	1310 nm - 1550 nm	0.500
Backscatter (dB)	-79.45		
Helix factor (%)	0.00		
Splice loss detection threshold (dB)	0.020		
Reflectance detection threshold (dB)	-72.0		
End-of-fiber detection threshold (dB)	5.000		

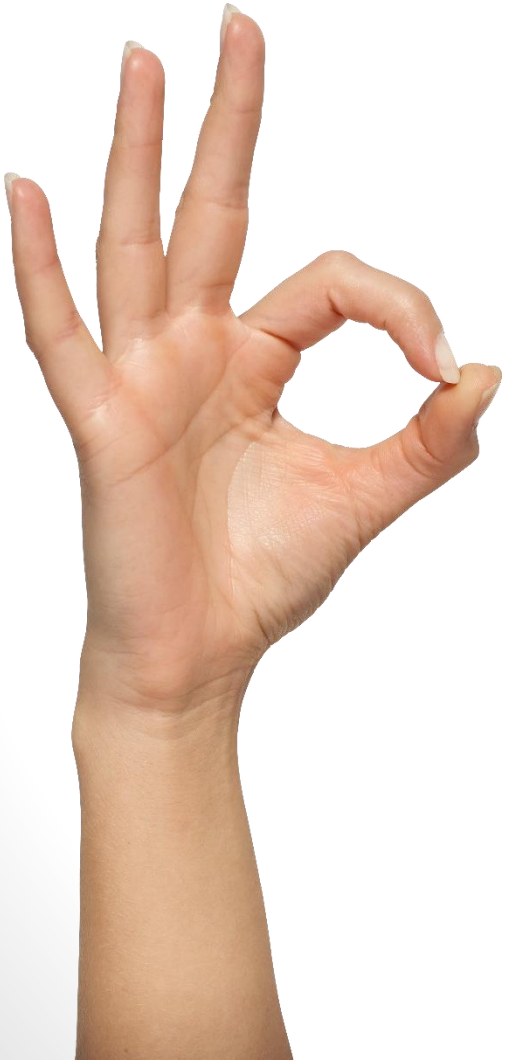
EXFO Signature: _____ Date: 12/11/2014 Page 2 of 4

PRUEBAS ANCHO DE BANDA

```
*******************************************************************************
* RFC-2544 Conformance testsuite.
*******************************************************************************
General settings:
   File name        : SF138-8785.Esc.JorgeWashington
   Technician name  : Hector Villanueva 20456
   Description      : Prueba 30 Mbps Layer 3
   Note             : Prueba de Layer 3 para la escuela Jorge Washington e-rate
42697 en el pueblo de Moca, Puerto Rico.

   Product name     : AMN-1000-GT
   Unit identifier  : G402-9087
   Firmware version : AMT_6.4.1.2_35204
   Operation mode   : Standard
   Serial number    : G402-9087
   Assembly         : 500-038-04:19:22:00

*******************************************************************************
Testsuite settings:
   Name             : 30-MbpsL3
   Description      : 30 MbpsL3
   Throughput test  : Enabled
   Delay test       : Enabled
   Frame loss test  : Enabled
   Back-to-back test: Disabled
   Strict failure   : Disabled
   Verbose report   : Disabled

*******************************************************************************
Peer settings:
   Testing layer    : Layer-3
   Peer IP  address : 10.228.0.2
   NID IP  address  : 10.1.49.100
   DSCP             : 0
   UDP src          : 4443 (0x115B)
   UDP dst          : 4444 (0x115C)


*******************************************************************************
Error codes:
Binary search failure (1), Out Of Order or duplicate failure (2),
Frame loss failure (3), Loss of connection with peer (4),

*******************************************************************************
Throughput settings:
   Trial duration   : 30 secs
   Maximum rate     : 30 Mbps
   Minimum rate     : 1 Mbps
   Step size        : 1 Mbps
   Frame loss       : 0.0%
   Fine stepping    : False
   Binary duration  : 2 secs
   Frame sizes      : 64 128 256 512 1024 1280 1518 Bytes
   Started at       : 2015-09-01 13:54:56+00:00
```

```
*******************************************************************************
Frame   Tx        Tx           Rx        Rx           Frame  Status
Size    rate      rate         rate      rate         loss
(bytes) (Mbps)    (frames/sec) (Mbps)    (frames/sec) (%)
------- --------- ------------ --------- ------------ ------ ------
     64        30       44,642        30       44,642    0.0 Pass
    128        30       25,337        30       25,337    0.0 Pass
    256        30       13,586        30       13,586    0.0 Pass
    512        30        7,048        30        7,048    0.0 Pass
   1024        30        3,591        30        3,591    0.0 Pass
   1280        30        2,884        30        2,884    0.0 Pass
   1518        30        2,438        30        2,438    0.0 Pass

*******************************************************************************
Delay settings:
   Trial duration   : 30 secs
   Maximum rate     : 30 Mbps
   Minimum rate     : 1 Mbps
   Step size        : 1 Mbps
   Fine stepping    : False
   Binary duration  : 2 secs
   Frame loss       : 0.0%
   Frame sizes      : 64 128 256 512 1024 1280 1518 Bytes
   Started at       : 2015-09-01 13:59:32+00:00

*******************************************************************************
Frame   Tx        Minimum Average Maximum Minimum Average Maximum Frame  Status
Size    rate      delay   delay   delay   DV      DV      DV      loss
(bytes) (Mbps)    (usec)  (usec)  (usec)  (usec)  (usec)  (usec)  (%)
------- --------- ------- ------- ------- ------- ------- ------- ------ ------
     64        30    3749    3810    3973       0      13     105    0.0 Pass
    128        30    3762    3816    3949       0      15     103    0.0 Pass
    256        30    3771    3829    3913       0      16     102    0.0 Pass
    512        30    3803    3854    3932       0      15      87    0.0 Pass
   1024        30    3852    3903    4015       0      14     119    0.0 Pass
   1280        30    3881    3927    3980       0      15      76    0.0 Pass
   1518        30    3905    3951    4012       0      15      79    0.0 Pass

*******************************************************************************
Frame loss settings:
   Trial duration   : 30 secs
   Maximum rate     : 30 Mbps
   Step size        : 1 Mbps
   Fine stepping    : False
   Binary duration  : 2 secs
   Frame sizes      : 64 128 256 512 1024 1280 1518 Bytes
   Started at       : 2015-09-01 14:04:09+00:00

*******************************************************************************
Frame   Tx        Tx           Rx        Rx           Frame  Status
Size    rate      rate         rate      rate         loss
(bytes) (Mbps)    (frames/sec) (Mbps)    (frames/sec) (%)
------- --------- ------------ --------- ------------ ------ ------
     64        30       44,642        30       44,642    0.0 Pass
     64        29       43,154        29       43,154    0.0 Pass
```

HOJA DE ACEPTACIÓN



Claro

INSTALLATION CERTIFICATION

Tick# 25596

Installation Date: 11-3-2015

The following equiment was install at the specified location:

School Name: Angel Nislan

School Code: 70466

EQUIPMENT	SERIAL NUMBER
MSR 3012 HP AC Router	CN38FTW002
Order #	1-84351453
Circ.	10593

BANDWIDTH TEST RESULT:
30 Mbps

Luis Maldonado — Technician Name:

Angel Quintanilla — Technician's Supervisor Name

Belkis Arenado Rodríguez — DOE Representative Name:

Technician Signature

(787) 518-9950 — Cellular Number

DOE Representative Signature

Technician Cellular Number

787-787-3726 — School Phone Number

Note:

1. Should you have any problems with the installation within the next 5 calendar days, you should contact the installer or the supervisor.
2. After this period, any problem with the circuit must be reported for service to the Claro Repair Center (PRT), 787-729-3131, at the following times: Monday to Friday from 7:30 AM to 8:00 PM, Saturdays and holidays from 8:00 AM to 5:00 PM.
3. It is necessary, before reporting a circuit, to ensure that the problem is for the circuit and / or equipment installed by CLARO (PRT).
4. You should not make any payment to personnel performing the installation work; all charges will be invoice by letter or telephone bill. If any personnel performing the installation show any type of misconduct or try to receive payment for the installation, kindly report it to the phone 1-888-811-8484.

Stamp Official School Seal

PROGRESO

100%	completado
99-50%	completado
50-1%	completado
0%	completado

Proyecto

OBJETIVOS DEL PROYECTO

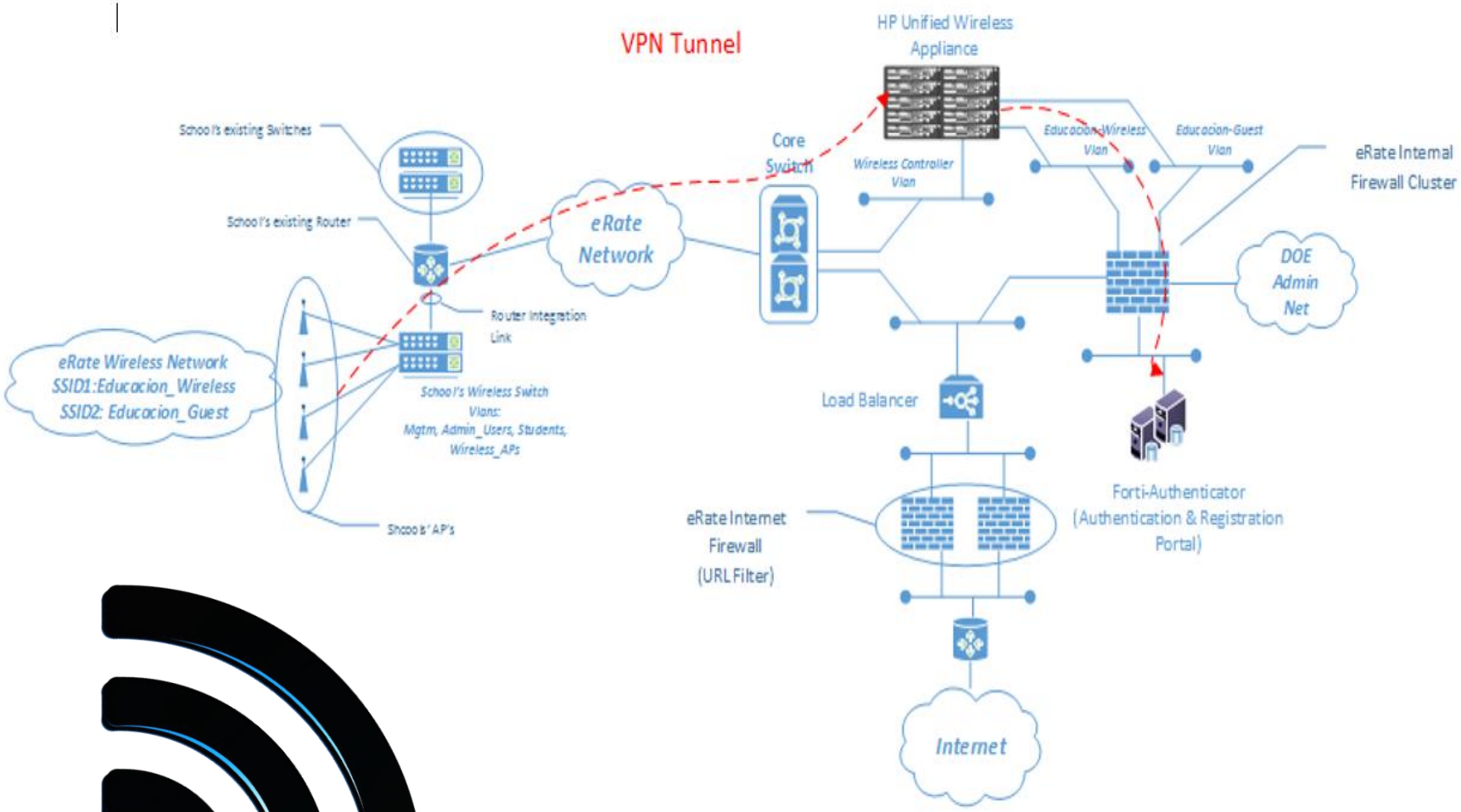
Diseñar una nueva arquitectura de red que apoye el nivel de servicio deseado.

Este diseño debe cubrir todos los puntos de la red, los servicios y los sistemas que funcionan a través de él.

Proporcionar una red inalámbrica robusta y el acceso en todas las áreas académicas.

Fortalecer la capacidad de conexiones inalámbricas (WIFI).

RED WIFI


VPN Tunnel
HP Unified Wireless Appliance
School's existing Switches
School's existing Router
Core Switch
Wireless Controller Vlan
Educacion-Wireless Vlan
Educacion-Guest Vlan
eRate Internal Firewall Cluster
eRate Network
DOE Admin Net
Router Integration Link
eRate Wireless Network
SSID1:Educacion_Wireless
SSID2: Educacion_Guest
School's Wireless Switch Vlans:
Mgtm, Admin_Users, Students, Wireless_APs
Load Balancer
School's AP's
eRate Internet Firewall (URL Filter)
Forti-Authenticator (Authentication & Registration Portal)
Internet

ESPECIFICACIONES DEL PROYECTO

Orden de modernización de la FCC 2014

Puntos de acceso (antenas) para proporcionar una conexión de al menos 30 usuarios simultáneos.

Cobertura inalámbrica para el 100% de las áreas académicas.

Cumplimiento con 802.11ac compatibilidad para 802.11b, g y n.

4 VLAN

1 para las conexiones a dispositivos móviles con 4094 IP.

1 de los ordenadores en las áreas de enseñanza con 510 IP.

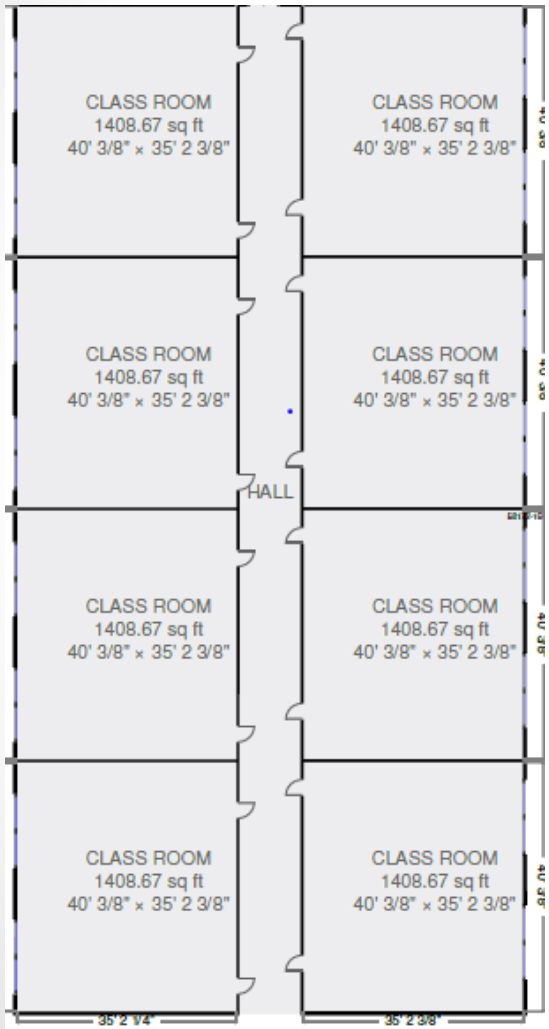
1 para los equipos de la zona administrativa con 254 IP.

1 para la gestión de los dispositivos de la infraestructura de red con 254 IP.

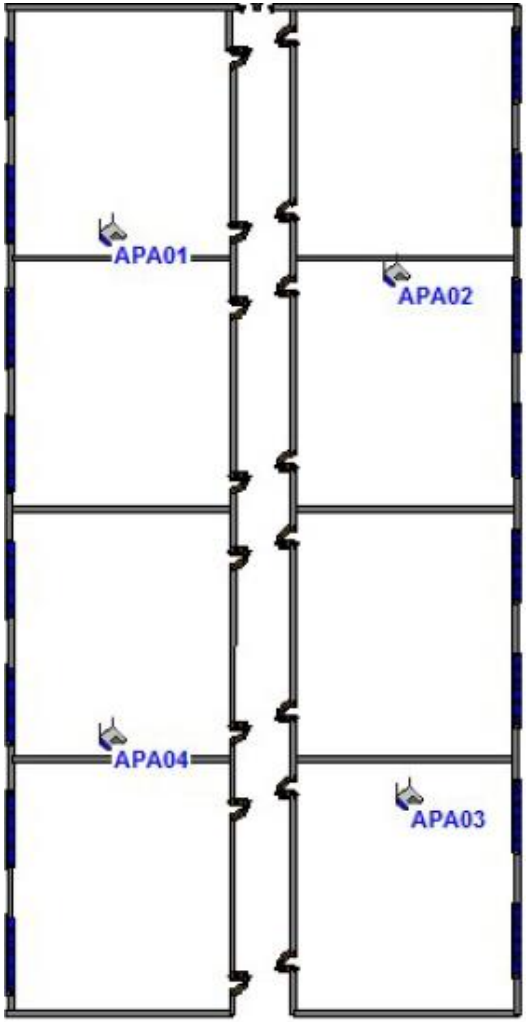
CRITERIOS DE EVALUACIÓN

- Se prepara un estudio (*site survey*) de un plano conceptual de la escuela que ayuda a visualizar de manera eficiente la posible ubicación de los puntos de acceso.
- Se define la cobertura de cada AP incluido en el estudio para lograr un 100% de cobertura.
- El estudio es evaluado por 2 puntos de control (Claro y DE), donde Claro verifica que lo propuesto a instalar no exceda el presupuesto aprobado por el DE.
- Se verifica que el plano de la escuela esté completo y trata de maximizar la señal irradiada con de los AP según la ubicación a los salones de clase y biblioteca.
- Una vez es revisado y aprobado por el DE se procede a la fase de instalación.

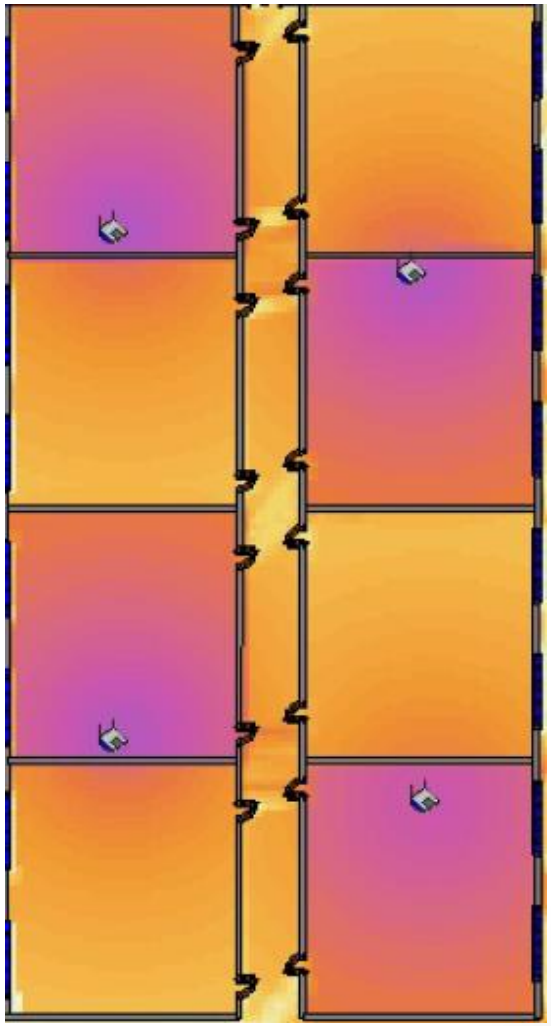
ESTUDIO (*SITE SURVEY*)



Plano de la escuela



Plano de ubicación de APs



Cobertura WIFI

INSTALACIÓN

Una vez aprobado el estudio, se procede con la instalación.

El personal de instalaciones recibe los componentes a instalar por escuela.

El personal de instalaciones utiliza el *TOP VIEW SITE* (ADD *Example*) para instalar los equipos y AP según el SSD previamente aprobados.

Luego de completada la instalación de los equipos, se entrega la hoja de servicio para la firma del director o personal autorizado por el director, esta hoja indica los equipos y/o componentes instalados por escuela.

Una vez instalado, el DE envía a los técnicos para certificar la escuela.

DIAGRAMA DE INSTALACIÓN

EQUIPOS INSTALADOS

PRUEBAS

Luego de instalada la escuela, se monitorea el equipo instalado.

Se realizan diferentes pruebas de PIN a los equipos, los AP *switches* y los UPS.

Se verifica el ancho de banda de la escuela.

Se verifica que los AP propaguen los 2 SSID (*service sent identifier*) Educación Wireless, Educación Guest.

Se accesan en ambos (*Service Sent Identifier*)

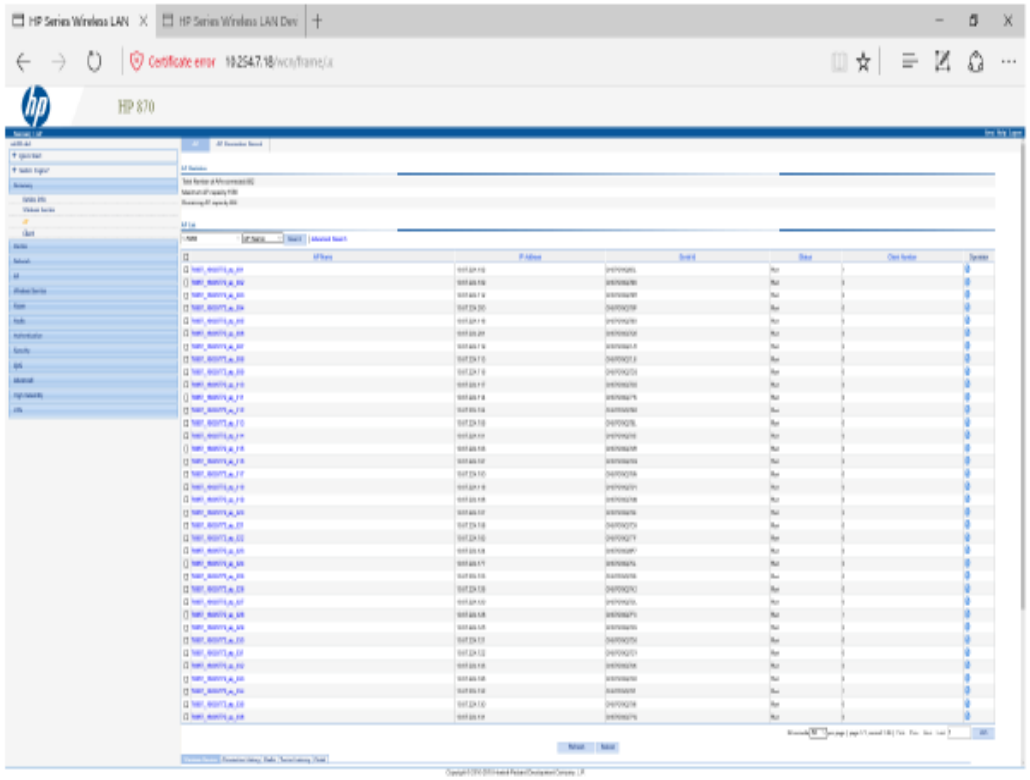
Se navega através del Internet

Verificar que todo contenido no educativo sea bloqueado con el Fortinet, según establece la ley federal CIPA.

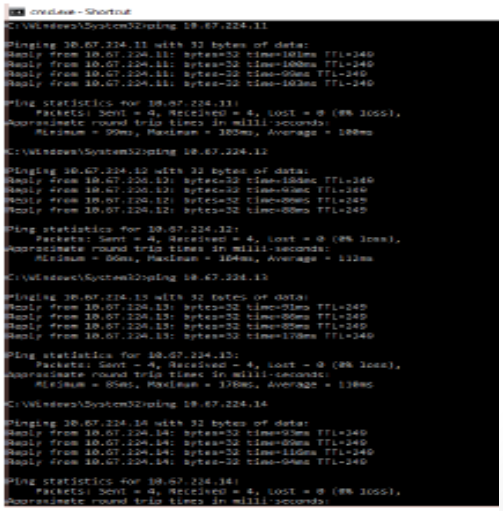
Se toman "*screen shots*" de los resultados y se entrega a la directora o personal autorizado para su firma.

PRUEBAS

A. Access Points



B. Switches



PRUEBAS DE CABLEADO

LINKWARE™ PC
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: GAB01°/05
Date / Time: 05/19/2016 01:43:13 PM
Headroom 9.5 dB (NEXT 45-78)
Test Limit: TIA Cat 6 Channel
Cable Type: Cat 6A U/UTP
Calibration Date: 09/23/2015

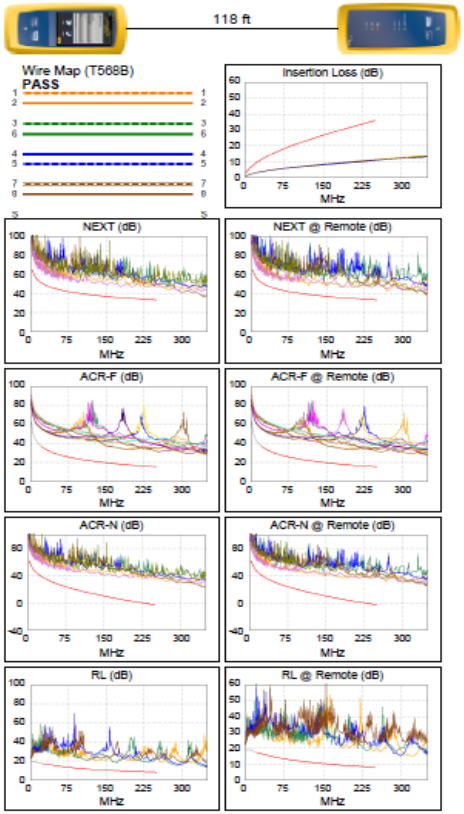
Operator: OECHEVARRIA
Software Version: V4.3 Build 6
Limits Version: V4.3
NVP: 68.2%

Test Summary: PASS
Model: DSX-5000
Main S/N: 3151201
Remote S/N: 3151329
Main Adapter: DSX-CHA004
Remote Adapter: DSX-CHA004

Length (ft), Limit 328	[Pair 12]	118
Prop. Delay (ns), Limit 555	[Pair 36]	182
Delay Skew (ns), Limit 50	[Pair 36]	6
Resistance (ohms)	[Pair 78]	6.2
Insertion Loss Margin (dB)	[Pair 12]	24.8
Frequency (MHz)	[Pair 12]	250.0
Limit (dB)	[Pair 12]	35.9

	Worst Case Margin		Worst Case Value	
PASS	MAIN	SR	MAIN	SR
Worst Pair	45-78	45-78	45-78	12-36
NEXT (dB)	10.6	9.5	12.8	10.1
Freq. (MHz)	40.0	27.6	241.5	187.5
Limit (dB)	46.6	49.3	33.4	35.3
Worst Pair	45	12	36	78
PS NEXT (dB)	12.0	11.9	14.1	13.4
Freq. (MHz)	52.3	52.5	247.0	235.0
Limit (dB)	41.9	41.9	30.2	30.6
PASS	MAIN	SR	MAIN	SR
Worst Pair	36-12	36-12	45-36	36-45
ACR-F (dB)	16.1	16.0	16.4	16.4
Freq. (MHz)	182.0	188.5	249.5	249.5
Limit (dB)	18.1	17.8	15.3	15.3
Worst Pair	36	12	36	36
PS ACR-F (dB)	17.2	17.4	17.2	17.9
Freq. (MHz)	249.5	1.1	249.5	237.0
Limit (dB)	12.3	59.2	12.3	12.8
N/A	MAIN	SR	MAIN	SR
Worst Pair	12-36	12-36	45-78	45-78
ACR-N (dB)	15.8	15.5	37.2	37.0
Freq. (MHz)	2.9	3.0	241.5	241.5
Limit (dB)	61.6	61.5	-1.8	-1.8
Worst Pair	36	36	36	78
PS ACR-N (dB)	17.4	17.7	39.0	37.7
Freq. (MHz)	2.9	2.9	247.0	238.0
Limit (dB)	58.6	58.6	-5.4	-4.4
PASS	MAIN	SR	MAIN	SR
Worst Pair	36	12	36	36
RL (dB)	8.0	8.3	8.0	9.5
Freq. (MHz)	170.0	55.3	170.0	233.0
Limit (dB)	9.7	14.6	9.7	8.3

Compliant Network Standards:
10BASE-T, 100BASE-TX, 100BASE-T4, 1000BASE-T, ATM-25, ATM-51, ATM-155, 100VG-AnyLan, TR-4, TR-16 Active, TR-16 Passive



LinkWare™ PC Version 9.4

Project: ORLANDO ECHEVARRIA 12401 SU JOSE R BARRERAS.flw

FLUKE networks

HOJA DE ACEPTACIÓN

CLARO PRT

Letter of Acceptance
Consulting Services including Equipment

Project name:	E-RATE FY2015 CATEGORY 2	**RFP NO:**	C2/WIFI-OSIATD-2015-001
School Code:	78857	**eRate Code:**	16035772
School Name:	RUBEN RODRIGUEZ FIGUEROA		
Prepared by:	Herister Rivera		

At COROZAL, BAYAMON, Puerto Rico, on_____

Between **Puerto Rico Telephone Company, Inc. dba Claro ("PRT")** and **Department of Education Puerto Rico**

We both certify that **WLAN INFRASTRUCTURE NETWORK INSTALLATION** has been completed for School 78857-16035772- RUBEN RODRIGUEZ FIGUEROA.

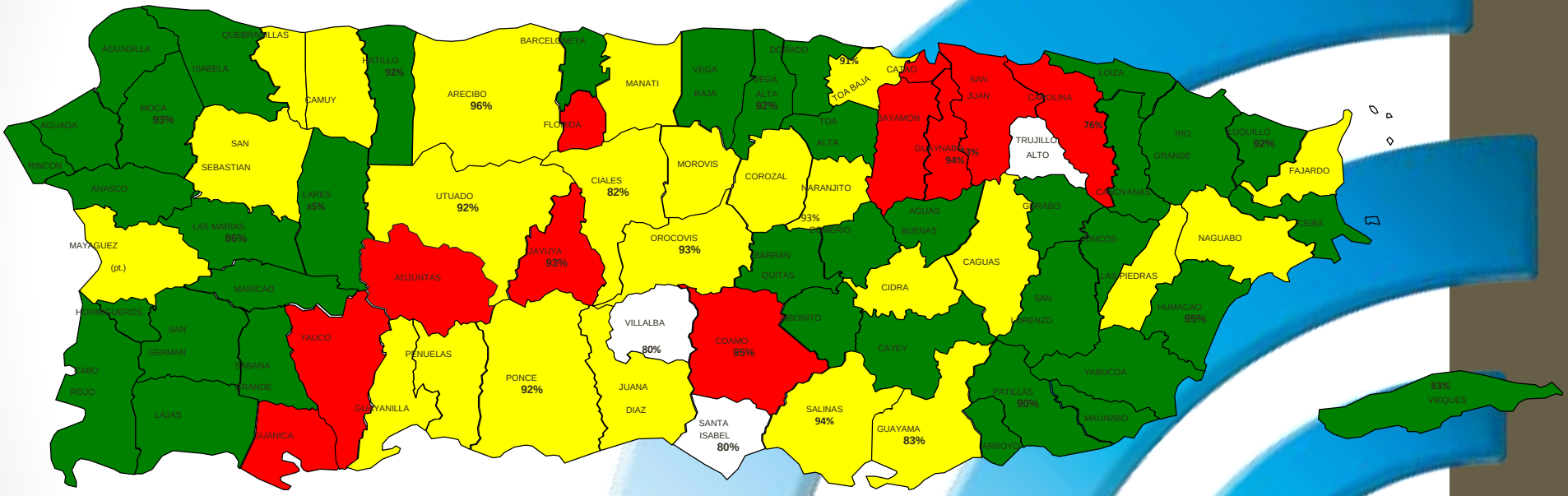
The test plan carried out during the implementation phase, hereby certified by end user, reflects how all equipment's are correctly installed, protected against fraud and operating accordingly to the contract between the parties.

Acceptance

The signatures below represent the Customer acknowledges that the contract between the parties with respect to the correspondent equipment, contains all the terms and conditions agreed between the parties, including but not limited to, the warranty coverage team and exceptions.

Puerto Rico Telephone Company, Inc. dba Claro ("PRT")		Department of Education Representative	
Name:		Name:	Marisol [illegible]
Position:		Position:	Dech Ejecu
Date:		Date:	4-Mayo 2016
Signature:		Signature:	

PROGRESO



100% completado

99-50% completado

50-1% completado

0% completado

http://www.de.gobierno.pr/

Preguntas