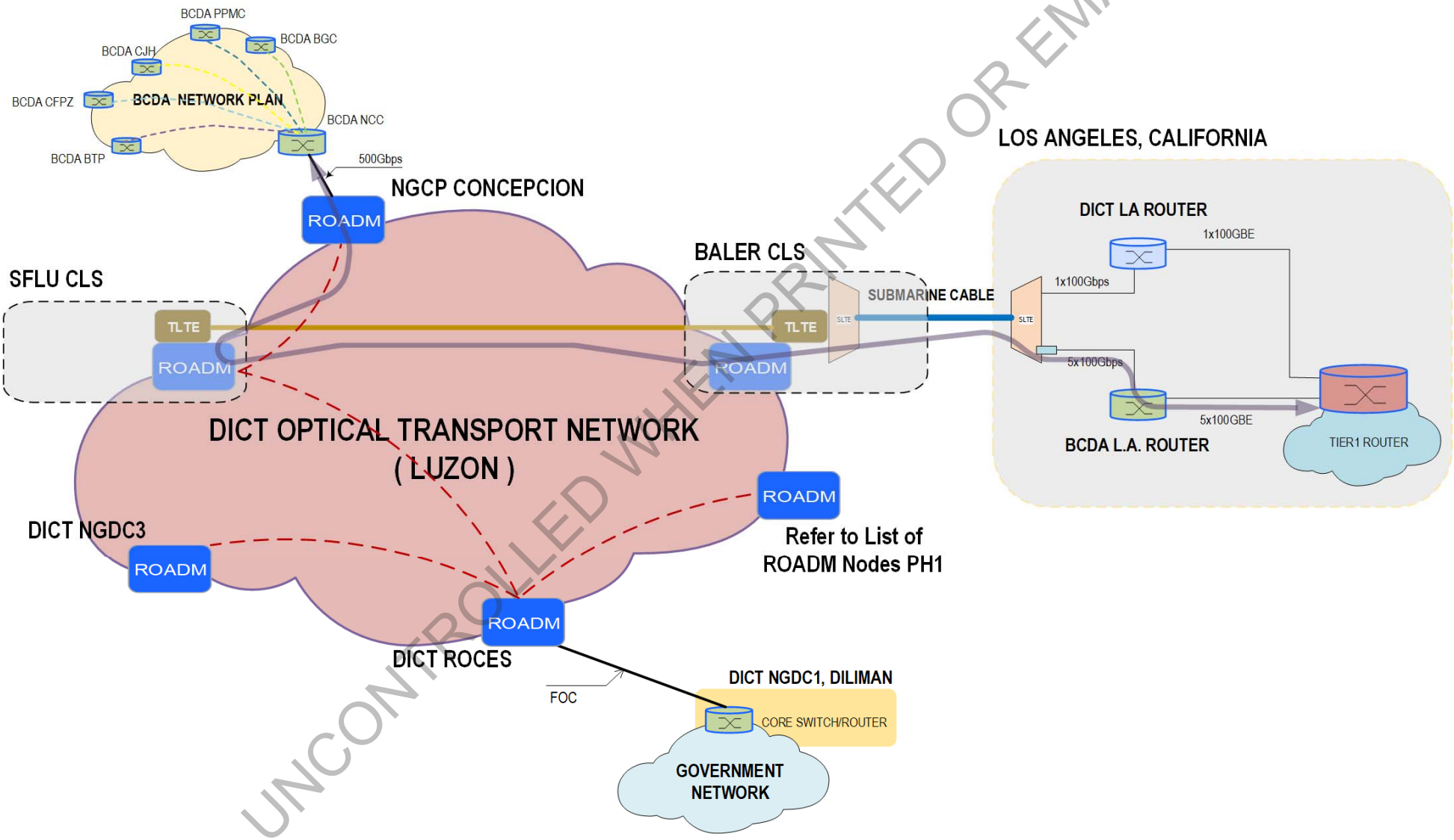
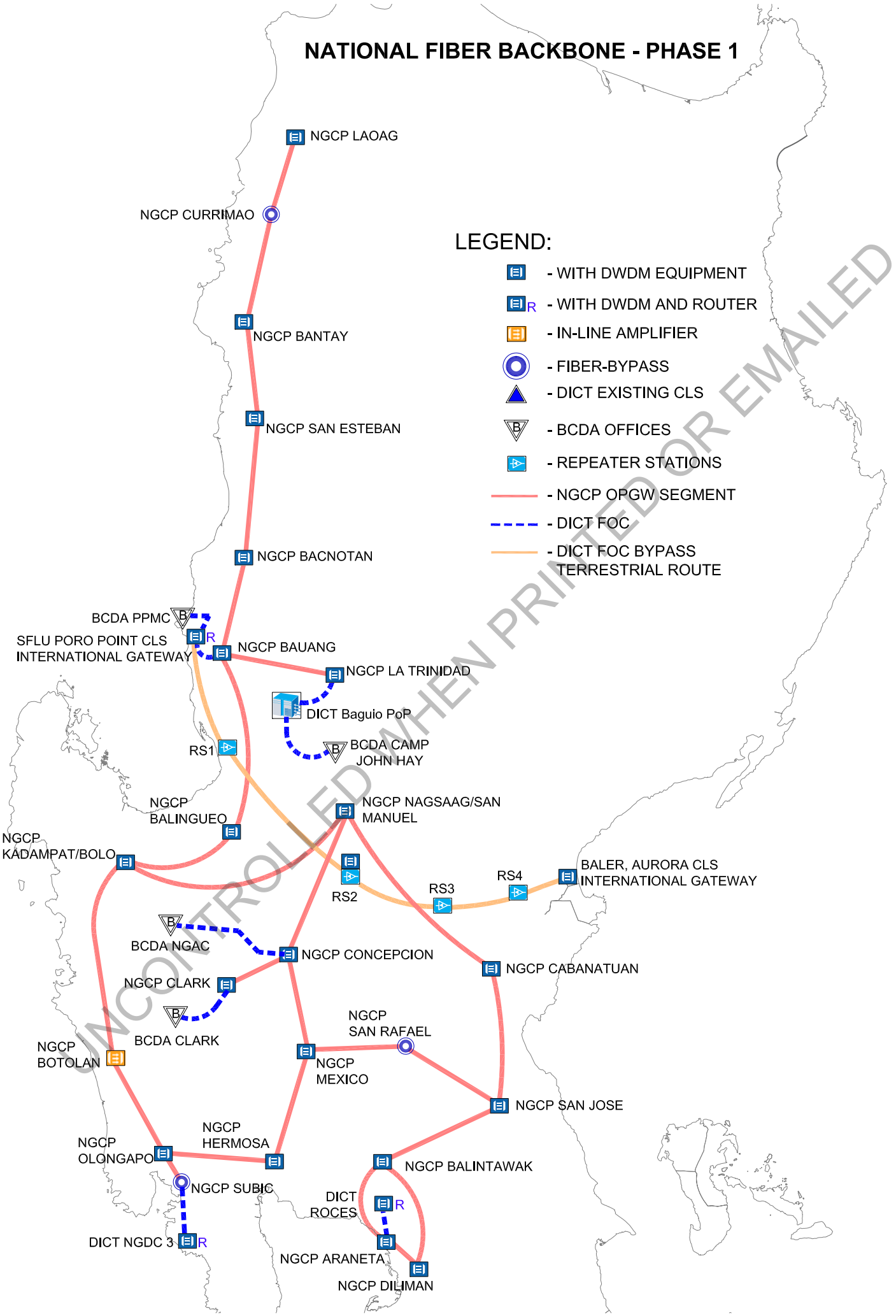
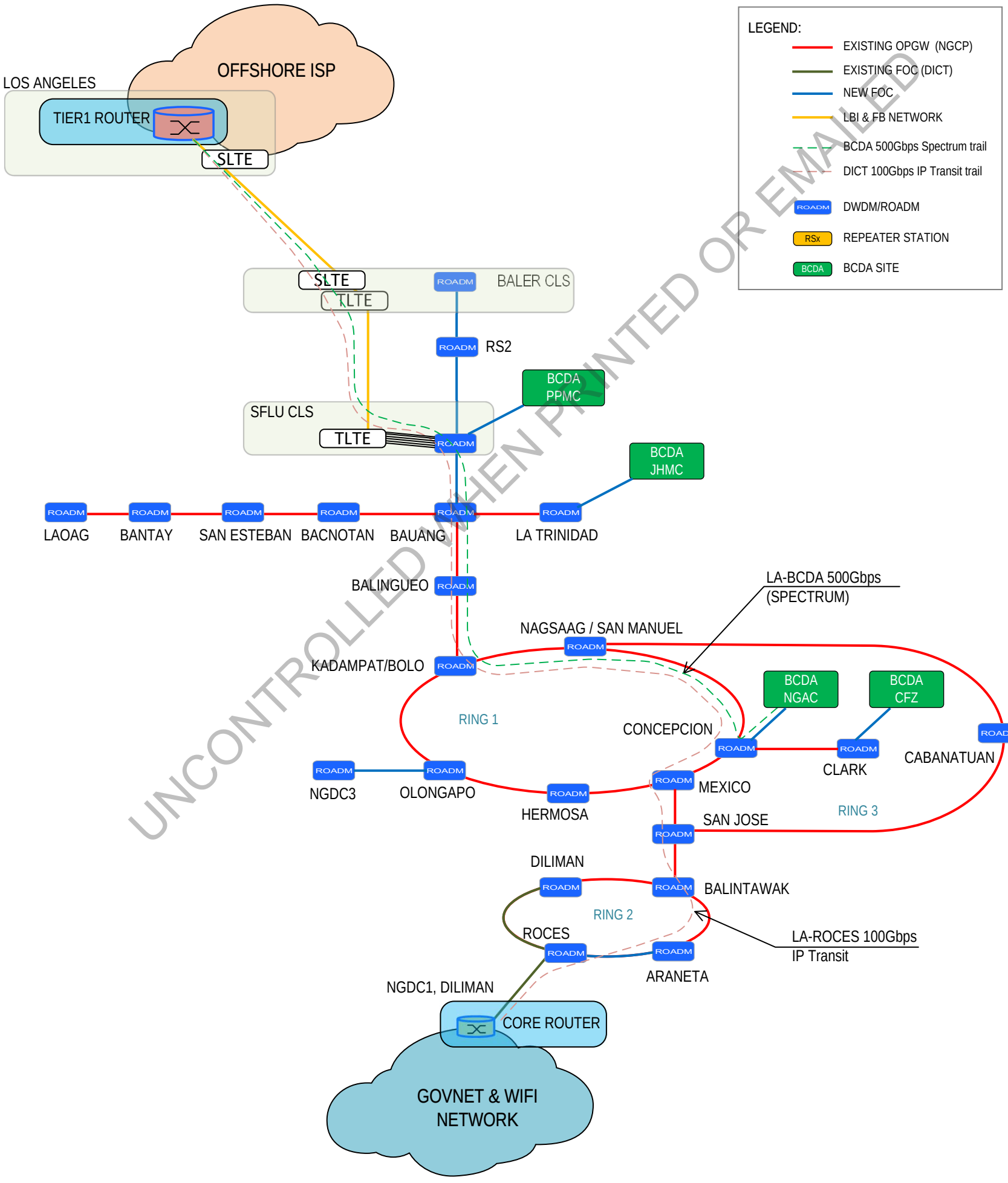
National Broadband Backbone Network – Phase 1



NATIONAL FIBER BACKBONE - PHASE 1



PHILIPPINE BROADBAND NETWORK – BACKBONE PH1 (LUZON) Y2020-21



Node Design Details

	Site A							Site B	
Item No.	Node	Province	Ring Configuration	Router	Type	Degree	Client Interface	DICT PoP Sites	Distance from Access Node (km)
1	NGCP Araneta	Metro Manila	Ring 2		cdf	3	-	-	-
2	DICT Baler_CLS	Aurora			cdf	2	3x10GE	Aurora PoP	0
3	NGCP Balingueo	Pangasinan			cf	2	1x10GE	Dagupan PoP	15.5
4	NGCP Balintawak	Metro Manila	Ring 2		cdf	3	-	-	-
5	NGCP Bauang	La Union			cdf	3	-	-	-
6	NGCP Bolo	Pangasinan	Ring 1		cdf	3	-	-	-
7	NGCP Botolan	Zambales			ila	-	-	-	-
8	NGCP Clark	Pampanga			cf	1	1x10GE	Mabalacat PoP	16
9	NGCP Concepcion	Tarlac	Ring 1/Ring 3		cdf	3	3x10GE	Tarlac PoP	13.5
10	NGCP Diliman	Quezon City	Ring 2		cdf	3	-	-	-
11	NGCP Hermosa	Bataan	Ring 1		cdf	2	1x10GE	Bataan PoP	24.5
12	NGCP La_Trinidad	Benguet			cf	2	3x10GE	Baguio PoP	5
13	NGCP Mexico	Pampanga	Ring 1/Ring 3		cdf	3	1x10GE	Pampanga PoP	10
14	NGCP Nagsaag	Pangasinan	Ring 1/Ring 3		cdf	3	-	-	-
15	DICT NGDC3	Zambales		PE	cdf	1	3x10GE	Subic PoP	0
16	NGCP Olongapo	Zambales	Ring 1		cdf	3	-	-	-
17	DICT Roces	Metro Manila	Ring 2	PE	cdf	2	1x10GE	Roces PoP	0
18	DICT RS2	Pangasinan			cdf	2	-	-	-
19	NGCP San_Jose	Bulacan	Ring 3		cdf	3	1x10GE	Bulacan PoP	32
20	NGCP San_Rafael	Bulacan			bypass	-	-	-	-
21	DICT SFLU_CLS	La Union		PE	cdf	1	1x10GE	La Union PoP	3.5
22	NGCP Subic	Zambales			bypass	-	-	-	-
23	NGCP Cabanatuan	Nueva Ecija	Ring 3		cf	2	1x10GE	Nueva Ecija PoP	27
24	NGCP Bacnotan	La Union			cf	2	-	-	-
25	NGCP San Esteban	Ilocos Sur			cf	2	1x10GE	Bangued PoP	45
26	NGCP Bantay	Ilocus Sur			cf	2	1x10GE	Vigan PoP	2.51
27	NGCP Currimao	Ilocos Norte			bypass	-	-	-	-
28	NGCP Laoag	Ilocos Norte			cf	2	1x10GE	Laoag PoP	3

Notes:

1. PE router will be deployed Q3 YR2021, not included in this bidding
2. FOC length provided in this file is for DWDM/ROADM pluggable module design considerations only
3. Baler and SFLU DWDM will be connected using DWDM/ROADM via RS site, FOC installation on the Luzon Bypass Infra is included in the Fiber Build component of the Phase 1 Project
4. Refer to Annex C on the details of FOC Build component of the Phase 1 Project

TRAFFIC MATRIX

	Site A			Site B				
Circuit ID	PoP A	NBP Node	Client Reach	PoP B	NBP Node	Client Reach	Rate	Protection
1	DICT SFLU CLS	DICT SFLU CLS	0.5km	DICT Roces	DICT Roces	5km	2x100G	Restorable (WSON)
2	DICT Roces	DICT Roces	0.5km	DICT Baguio/LGU	NGCP La Trinidad	5km	3x10G	Restorable (WSON)
3	DICT Roces	DICT Roces	0.5km	DICT Tarlac/LGU	Concepcion	13.5km	3x10G	Restorable (WSON)
4	DICT Roces	DICT Roces	0.5km	DICT Aurora/LGU	Baler CLS	2km	3x10G	Restorable (WSON)
5	DICT Roces	DICT Roces	0.5km	DICT Bataan/LGU	NGCP Hermosa	25km	3x10G	Restorable (WSON)
6	DICT Roces	DICT Roces	0.5km	DICT La Union	DICT SFLU CLS	3.5km	1x10G	Restorable (WSON)
7	DICT Roces	DICT Roces	0.5km	DICT Dagupan	NGCP Balingueo	15.5km	1x10G	Restorable (WSON)
8	DICT Roces	DICT Roces	0.5km	DICT Subic	DICT NGDC 3	0.5km	1x10G	Restorable (WSON)
9	DICT Roces	DICT Roces	0.5km	DICT Pampanga	NGCP Mexico	10km	1x10G	Restorable (WSON)
10	DICT Roces	DICT Roces	0.5km	DICT Mabalacat	NGCP Clark	16km	1x10G	Restorable (WSON)
11	DICT Roces	DICT Roces	0.5km	DICT Bulacan PoP	NGCP San Jose	32km	1x10G	Restorable (WSON)
12	DICT Roces	DICT Roces	0.5km	DICT Bangar PoP	NGCP Bacnotan	23km	1x10G	Restorable (WSON)
13	DICT Roces	DICT Roces	0.5km	DICT Bangued PoP	NGCP San Esteban	45km	1x10G	Restorable (WSON)
14	DICT Roces	DICT Roces	0.5km	DICT Vigan PoP	NGCP Bantay	3km	1x10G	Restorable (WSON)
15	DICT Roces	DICT Roces	0.5km	DICT Laoag PoP	NGCP Laoag	2.5km	1x10G	Restorable (WSON)
16	DICT Roces	DICT Roces	0.5km	DICT Nueva Ecija PoP	NGCP Cabanatuan	26km	1x10G	Restorable (WSON)
17	DICT SFLU CLS	DICT SFLU CLS	0.5km	BCDA NGAC	NGCP Concepcion	15km	5x100G	Restorable (WSON)
18	BCDA NGAC	NGCP Concepcion	15km	BCDA Clark Freeport Zone	NGCP Clark	10km	1x100G	Restorable (WSON)
19	BCDA NGAC	NGCP Concepcion	15km	BDCA PPMC	DICT SFLU CLS	3km	1x50G	Restorable (WSON)
20	BCDA NGAC	NGCP Concepcion	15km	BCDA JHMC	NGCP La Trinidad	11km	1x50G	Restorable (WSON)
21	BCDA NGAC	NGCP Concepcion	15km	BCDA BGC	DICT Roces	15km	1x50G	Restorable (WSON)
22	BCDA NGAC	NGCP Concepcion	15km	BCDA Bataan Techno Park	DICT NGDC 3	22km	1x50G	Restorable (WSON)

Notes:

1. Restore where there's an alternate fiber path
2. Primary Path (Path 1)
   SFLU CLS - NGCP Bauang - NGCP Balengueo - NGCP Bolo - NGCP Nagsaag - NGCP Concepcion - NGCP Mexico - NGCP San Jose - NGCP Balintawak - NGCP Araneta - DICT Roces
3. Path 2 (on Ring 1)
   NGCP Bolo - NGCP Botolan - NGCP Olongapo - NGCP Hermosa - NGCP Mexico - NGCP San Jose
4. Path 3 (on Ring 2) = NGCP Balintawak - NGCP Diliman - DICT Roces
5. Path 4 (on Ring 3) = NGCP Nagsaag - NGCP Cabanatuan - NGCP San Jose
6. Paths 2, 3 and 4 are protection routes between SFLU CLS to DICT Roces
7. Nodes with client drops as defined in the above table should be equipped with necessary pluggable modules
8. Pluggable modules required at DICT POP sites should included in the delivery

NGCP FIBER OPTIC CABLE (OPGW) TEST RESULTS					
ITEM	NGCP SEGMENT (OPGW)	OPGW LENGTH (km)	Total dB LOSS	dB LOSS PER KM	REMARKS
	LUZON				
1	Diliman - Balintawak (old line)	7.0	3.68	0.473	
2	Mexico - Balintawak	69.0	15.75	0.219	
3	Hermosa - Mexico	36.0	10.10	0.248	
4	Concepcion - Mexico	39.0	9.87	0.232	
5	Mexico - San Rafael	25.0	6.22	0.249	
6	Olongapo - Hermosa	27.0	6.95	0.239	
7	Olongapo - Subic (SBMA)	11.0	3.40	0.267	
8	Concepcion - San Manuel	82.0	20.60	0.242	
9	Nagsaag (via San Manuel) - Concepcion	82.2	19.94	0.231	
10	Concepcion - Clark	22.0	6.55	0.274	
11	Botolan - Olongapo	62.0	14.46	0.220	
12	Bolo - Botolan	126.0	28.88	0.221	
13	Bolo - Bauang	114.0	27.53	0.236	
14	Bolo - Nagsaag	67.0	16.47	0.232	
15	Diliman - Araneta (Dona Imelda)	6.4	2.11	0.299	
16	Balintawak - San Jose	21.0	6.05	0.245	
17	La Trinidad - Bauang	37.0	9.33	0.213	
18	Bauang - Balingueo	76.0	17.19	0.216	
19	Balingueo - Bolo	39.0	9.71	0.230	
20	San Rafael (CruzNaDaan) - San Jose	25.0	-	-	Newly installed OPGW, not yet tested. Use 0.25 dB loss coefficient
21	Mexico - CruzNaDaan (San Rafael)	25.0	6.48	0.224	
22	Araneta - Balintawak	6.0	3.42	0.367	
23	Balintawak - Diliman via Araneta (new line)	2.4	-	-	Newly installed OPGW, not yet tested. Use 0.25 dB loss coefficient
24	Nagsaag - Cabanatuan	86.5	24.50	0.239	
25	Cabanatuan - San Jose	102.0	23.03	0.223	
26	Bauang - Bacnotan	28.0	7.87	0.217	
27	Bacnotan - San Esteban	76.0	17.54	0.219	
28	San Esteban - Bantay	38.0	9.54	0.239	
29	Bantay - Currimao	50.0	12.91	0.221	
30	Currimao - Laoag	31.0	10.10	0.252	

ITEM	SEGMENT	FOC LENGTH (km)	OTDR Reading (Average)	dB/km (Average)	REMARKS
	DICT				
1	DICT Roces - DICT NGDC 1 (Diliman Office)	11.5	4.21	0.37	Existing FOC
2	DICT Roces - NGCP Araneta	3.0	-	-	FOC for installation. Use 0.25 dB loss coefficient
3	DICT SFLU CLS - NGCP Bauang	6.13	-	-	FOC for installation. Use 0.25 dB loss coefficient
4	DICT NGDC 3 - NGCP Subic	6.58	-	-	FOC for installation. Use 0.25 dB loss coefficient
5	DICT Baguio POP - NGCP La Trinidad	4.80	-	-	FOC for installation. Use 0.25 dB loss coefficient
6	DICT Baler CLS - RS2	155.3	-	-	FOC for installation. Use 0.25 dB loss coefficient
7	DICT SFLU CLS - RS2	94.9	-	-	FOC for installation. Use 0.25 dB loss coefficient

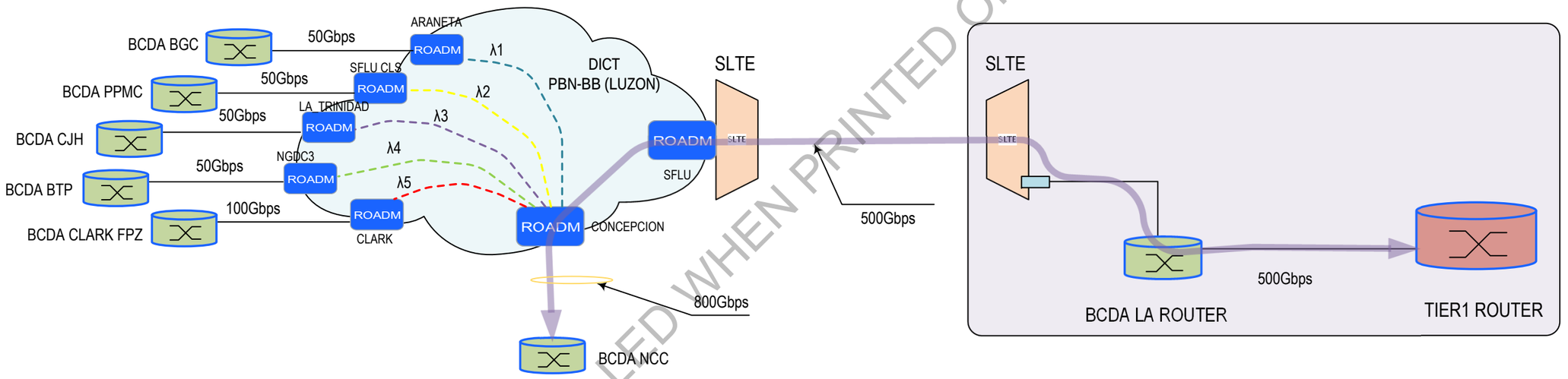
ITEM	SEGMENT	FOC LENGTH (km)	OTDR Reading (Average)	dB/km (Average)	REMARKS
	BCDA				
1	NGCP La Trinidad - BCDA JHMC	5.23	-	-	FOC for installation. Use 0.25 dB loss coefficient
2	DICT SFLU ICLS - BCDA PPMC	2.8	-	-	FOC for installation. Use 0.25 dB loss coefficient
3	NGCP Concepcion - BCDA NGAC	15.1	-	-	FOC for installation. Use 0.25 dB loss coefficient
4	NGCP Clark - BCDA Clark Freeport Zone	9.8	-	-	FOC for installation. Use 0.25 dB loss coefficient

Note: Use 3dB Design margin (0.03db loss/splice - good for 100 splices)

NODE COORDINATES

	NODES	LATITUDE	LONGITUDE
	NGCP		
1	Araneta (old name Doña Imelda)	14.617924	121.015358
2	Bacnotan	16.759245	120.368873
3	Balingueo	15.95913	120.40189
4	Balintawak (old name Quezon)	14.66178	121.01232
5	Bantay	17.594861	120.485958
6	Bauang	16.55786	120.32641
7	Bolo (old name Kadampat)	15.98031	120.16103
8	Botolan	15.300739	120.011565
9	Cabanatuan	15.440592	120.942388
10	Clark	15.228851	120.561645
11	Concepcion	15.378127	120.616943
12	Currimao	18.006151	120.512809
13	Diliman	14.643312	121.041008
14	Hermosa	14.866163	120.4937
15	Laoag	18.215042	120.604208
16	La Trinidad	16.437799	120.629599
17	Mexico	15.055349	120.71634
18	Nagsaag	16.062365	120.650638
19	Olongapo	14.836709	120.271092
20	San Esteban	17.343067	120.446599
21	San Jose 500kV	14.82149	121.046875
22	San Rafael	15.029388	120.936368
23	Subic	14.817878	120.300484
	DICT		
24	Baler ICLS	15.75717	121.53787
25	SFLU ICLS	16.597992	120.30499
26	NGDC 3	14.784353	120.295458
27	Roces	14.630189	121.025137
28	Baguio PoP	14.630189	121.025137
29	RS2	15.981429	120.699414
	BCDA		
30	Poro Point Management Corporation	16.6112	120.2894
31	John Hay Management Corporation	16.402439	120.616058
32	NGAC	15.357836	120.5222
33	Clark Free Port Zone	15.178344	120.517403

BCDA NETWORK DIAGRAM



PROPOSED EQUIPMENT ROOM (DICT ROCES)

R O A D

PROPERTY LINE

ROAD SIDEWALK

PREMISE SIDEWALK

PROPOSED GEN SET

EXISTING GEN SET

MH-2

14632,26

25m PROPOSED OPEN TRENCH

MH-1

10m PROPOSED OPEN TRENCH

2421,37

2600

4500

5400

3100

5550

1830,89

EXISTING CIRCUIT BREAKER

CIRCUIT BREAKER 100AMPS

EXISTING CABLE TRAY

PORT HOLES

PROPOSED BATTERY BANK

700

600

1000

ACU

PROPOSED CABINET

800

4200

LEGEND:

EXISTING CABLE TRAY

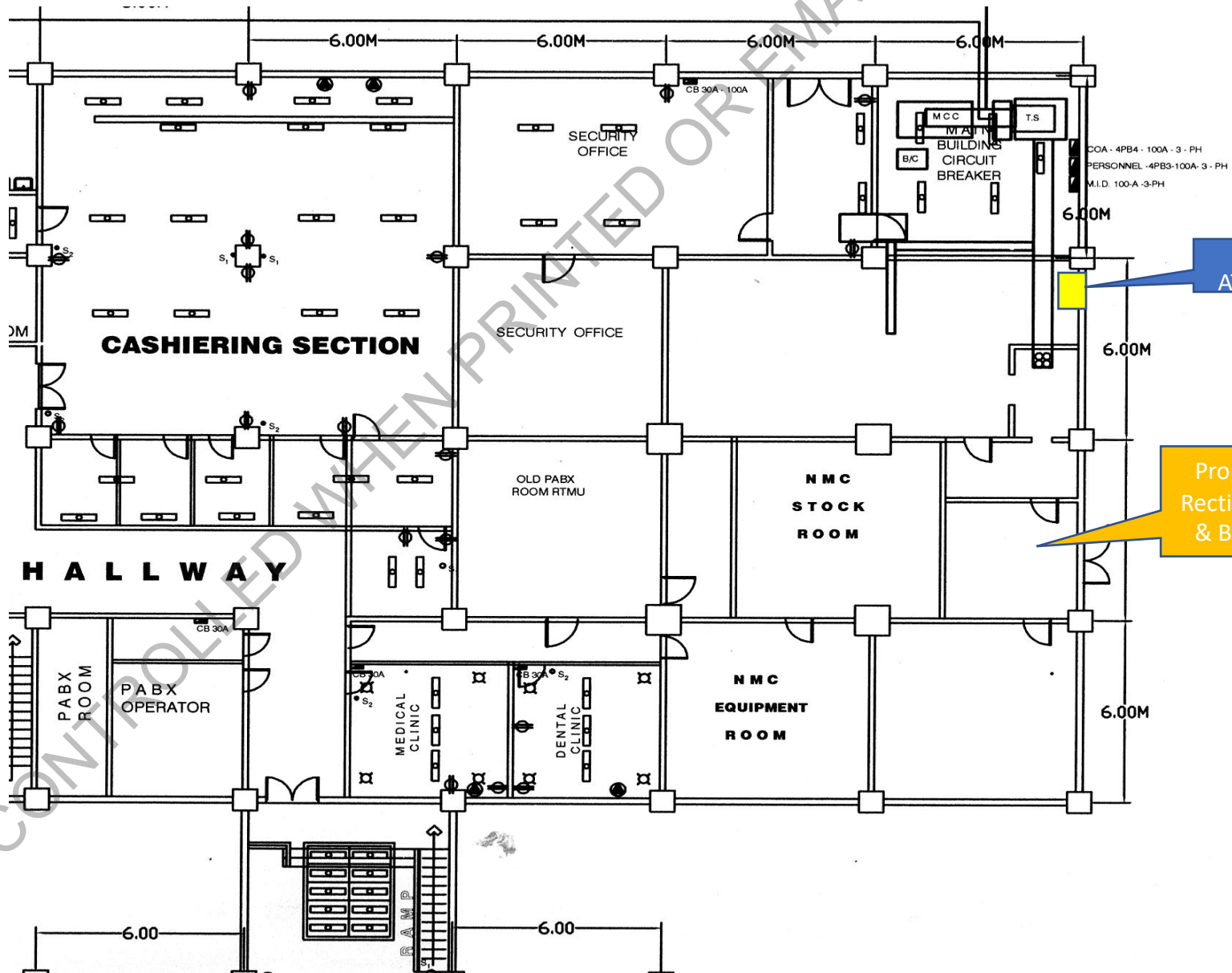
PROPOSED CABINET

PROPOSED BATTERY BANK

NOTE:
1. ALL DIMENSION ARE IN MILIMETERS.

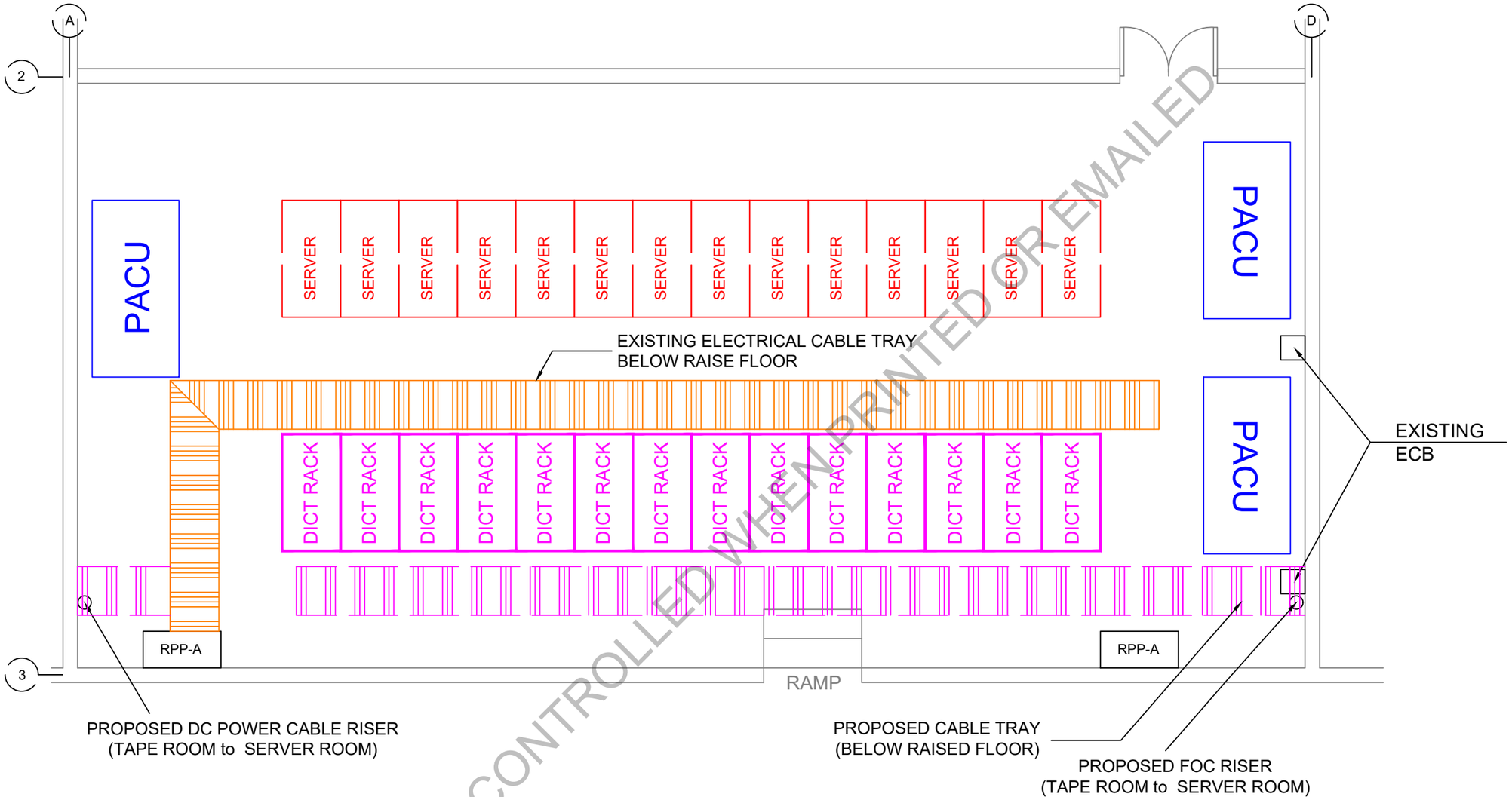
NOTE:
1. ALL DIMENSION ARE IN MILIMETERS.

NOC Genset



NOC ATS/MDP

Proposed Rectifier Rm & Battery



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

PROJECT TITLE:	SHEET CONTENT/S:	SHEET NO.:
PROPOSED LOCATIONS of EQUIPMENT RACK, CABLE TRAYs, and POWER/FOC RISERS AT NGDC-3 (SERVER ROOM)	RACKS, TRAYS, ECB, RISERS	1 / 1
LOCATION: **SUBIC, ZAMBALES**	SCALE: NOT TO SCALE	TERRESTRIAL

OPTICAL TRANSPORT NETWORK

Technical Specifications

1. **DWDM/ROADM Broadband Communication System**

1.1 DWDM/ROADM General Requirements

1.1.1 CDC-F drop side modules can be added as capacity expands;
1.1.2 The ROADM must be ready to support super channels to improve spectral efficiency;
1.1.3 The ROADM must be ready to support super channels to improve spectral efficiency;
1.1.4 The System must support multi-degree reconfigurable optical add/drop multiplexer based on Wavelength Selective Switching (WSS) technology;
1.1.5 CDC-F architecture must support wavelength optical power level tracing when it passes through the network. This function shall provide sufficiently accurate power measurements and minimize transmission penalty from inaccurate power settings;
1.1.6 The proposed coherent solution must have a lightning tolerance of at least 3 Mrad/s which is field proven. The Winning Bidder must declare deployed reference network and this feature must be in operation minimum of 3 years;
1.1.7 The DWDM/ROADM equipment must be able to operate using standard single mode fiber in accordance with ITU-T G.652 and G.654.
1.1.8 The System must support two-fiber in a ring, point-to-point, or mesh type network;

1.1.9 The DWDM/ROADM equipment must support any service from n x 10Gbps by one tributary card;
1.1.10 The proposed equipment must support built in Optical Time Domain Reflectometer (OTDR) function.
1.1.11 The System must have an automatic type of equalization process to allow power adjustment due to fiber or system attenuation.
1.1.12 All common critical cards for Controller, Management, Switch & Power of the equipment must be "hot swappable".
1.1.13 The Winning Bidder must state how many DWDM wavelengths are supported. 80-wavelength systems are preferred.
1.1.14 The line side must support Coherent transceiver with 50Ghz, 100 GHz tunable laser.
1.1.15 The System must support at least 8-degrees ROADM types based on WSS technology with Flex-Grid cross-connect.
1.1.16 All ROADMs must support built in OCM (Optical Channel Monitoring) with power level measure per wavelength.
1.1.17 The System should support Low Latency across the network;
1.1.18 OADM at every node must be remotely reconfigured to select any wavelength for add/drop or pass-through without impacting traffic carried on any other wavelengths;
1.1.19 The ROADM must provide Digital Equalization (equalizing DWDM channels)

function;

1.1.20 The ROADM/DWDM shall support the next generation network technologies of Optical Transport Network (OTN) transponder/muxponder in compliant to ITU-G.709 (Optical Transport Network);

1.1.21 The System must support variety of 100G cards for variety of applications; 100G/200G/400G Transponders, 100G/200G/400G Muxponders;

1.1.22 The System must support Programmable Transponder which support various transmission speed with different modulation, 50G(BPSK) 100G(SP-QPSK) or 200G(8QAM/16QAM), without changing hardware;

1.1.23 The System should support the following traffic types:

1.1.23.1 10 Gigabit Ethernet LAN PHY

1.1.23.2 10 Gigabit Ethernet WAN PHY

1.1.23.3 100 Gigabit Ethernet

1.1.23.4 100G Muxponder (10 x STM64 / 10Gigabit Ethernet at client side)

1.1.23.5 200G Muxponder (2 x 100 Gigabit Ethernet at client side)

1.1.23.6 600G Muxponder (6 x 100 Gigabit Ethernet at client side)

1.1.24 The System shall include pluggable modules/SFPs for the fiber connection between DWDM/ROADM and DICT PoP/sites

1.1.25 The System shall support Software Defined Network (SDN) functionality

1.2 ROADM Control Plane

1.2.1 The System must systematically guarantee that services are restored to original route which operator has set up;

1.2.2 The System must automatically assign the new service into trunk/line in the manner of minimizing the trunk/line fragmentation;

1.2.3 The System must allow to combine protection and restoration for the same service to allow switching within 50ms;

1.2.4 The System must support various service classes for different SLA;

1.3 Optical Operations and Maintenance (OAM) Functions

1.3.1 The System must support automatic power equalization control (Auto Power Balancing) and monitoring;

1.3.1.1 The optical OAM tool shall run continuously in an automatic fashion without any user intervention;

1.3.1.2 The WDM system must support automatic power balancing based on optical OAM tool information to provide constant power level across all operating lambdas (λ) in the network;

1.3.2 The System must support full automated commissioning, and optical channel (OCh) power provisioning;

1.3.3 System Amplifier should support AGC (Automatic Gain Control) to regulate segment loss fluctuation (such as fiber bending or poor fiber splicing) and provide constant optical channel power along the WDM link;

1.3.4 The System must support integrated optical OAM tools for the unique identification of each and every client service in the network to facilitate end-to-end management of services at the WDM layer.

1.3.5 The System shall support NMS GUI interface for users to manage end-to-end performance of each lambda service in the network and debug possible failure

cases including fiber bend, fiber interconnection issue, missed lambda (λ) cross-connection.

1.3.6 The System must support alien wavelength;

1.3.7 The System must support built-in OTDR to characterize fiber losses and to locate fiber cut;

1.3.7.1 OTDR wavelength should be out of band so no impact on WDM amplifier function and no service interrupt;

1.3.7.2 OTDR measurement should provide bi-directional way and do not interrupt any operating service impact;

1.4 Line Amplifier

1.4.1 The amplifiers should have flexibility to be Software-configured as pre-amplifier, post-amplifier.

1.4.2 There must be active control of express traffic to adapt instantly the amplifier-pair to wavelength count never being affected by any degradation arising out from rapid reconfigurations. Sudden addition/removal of channels at intermediate site must not affect the whole transmission of DWDM signals.

1.4.3 The optical amplifiers must respond automatically to changes in the number of channels without the need for manual intervention or realignment. Integrated VOA must allow the amplifier units to automatically compensate for variations in span-attenuation due to ageing and splicing etc.

1.4.4 A range of Erbium-Doped Fiber Amplifier (EDFA, variable gain with mid-access, fixed gain) should be provided that allows the design of cost-effective solutions.

1.4.5 The design and the function of the optical amplifier (OA) should comply with the ITU-T Rec. G.661, G.662, and G.663, Section 7.2.4. As they apply to the OA functions.

1.4.6 The system must track and indicate “fiber span changes” at each pre-Amplifier In-Line-Amplifier input, in order to supervise fiber attenuation changes (dB). The values must be kept in Optical Transport System (OTS) performance monitoring counters.

1.4.7 OTS port in the amplifiers must indicate Minimum and Maximum In/Out power level and be kept in Performance Monitoring Counters.

1.4.8 Optical Amplifiers must indicate the following info via the management system: Number of Channels, Freq. ITU grid per channel, bit rate per channel, accumulated Chromatic Dispersion per channel, Power per channel, OSNR per channel.

1.4.9 There must be the provisioning of monitoring points for external monitoring of OSNR, power and wavelengths at the input/output points of the Booster Amplifier, ILA and Pre-amplifier. These points must be suitable connection of the measurement devices must not affect the transmission of the main path.

1.4.10 The DWDM system must provide EDFA Booster Amplifiers (at Mux end, ROADM egress), Pre-Amplifiers (at Demux end, ROADM ingress) and ILAs en-route stations to compensate fiber-attenuation etc. The Dispersion Compensation Module (based on Fiber) is required to reasonably and accurately compensate the dispersion occurred in the link.

1.4.11 The Winning Bidder should indicate the technical solution for flatting OA’s gain curve and OA’s functional block diagram.

1.4.12 The optical amplifiers must respond automatically to changes in the number of

channels without the need for manual intervention or realignment. Integrated VOA must allow the amplifier units to automatically compensate for variations in span-attenuation due to ageing and splicing etc.

1.4.13 Any increase or decrease from one channel to a fully equipped system or vice versa must cause no bit error. The Winning Bidder should describe in detail and illustrate.

1.4.14 The proposed OAs must reduce the effect of DWDM tilt, up to much higher value for the DWDM optical backbone network.

1.4.15 The Optical Amplifiers must amplify the aggregate DWDM optical signal received at the input using EDFA/Raman technology. There must be active control and instantaneous adaptation of express traffic due to any degradation arising out from rapid reconfigurations. Sudden addition/removal of channels at an intermediate site must not affect the whole transmission of DWDM signals.

1.4.16 The system should support Raman amplifier cards optimized for multi-span applications (backward configuration) with built-in safety mechanisms to ensure less than 1M hazard level operation.

1.4.17 The integration of Optical Amplifier, supporting two OAs/slot, support different gain to match the different scenario.

1.5 The DWDM/ROADM System must conform to the following ITU-T recommendations and international telecommunications and standards:

1.5.1 ITU-T Rec.G.652 - Characteristics of a single-mode optical fiber and cable;

1.5.2 ITU-T Rec.G.654 - Characteristics of a cut-off shifted single-mode optical fiber and cable;

1.5.3 ITU-T Rec.G.655 - Characteristics of a non-zero dispersion-shifted single-mode optical fiber and cable;

1.5.4 ITU-T G.661 - Definition and test methods for the relevant generic parameters of Optical amplifier devices and subsystems;

1.5.5 ITU-T G.662 - Generic characteristics of optical amplifier devices and subsystems;

1.5.6 ITU-T G.672 - Characteristics of multi-degree reconfigurable optical add/drop multiplexers;

1.5.7 ITU-T G.663 - Application related aspects of optical amplifier devices and subsystems;

1.5.8 ITU-T G.664 - Optical safety procedures and requirements for optical transmission systems;

1.5.9 ITU-T G.692 Optical interfaces for multichannel systems with optical amplifiers;

1.5.10 ITU-T Rec. G.709 - Interfaces for the optical transport network (OTN);

1.5.11 ITU-T Rec. G.783 - (Optical Safety procedures and requirements for Optical Transport System;

1.5.12 ITU-T G.798 Characteristics of optical transport network hierarchy equipment functional blocks;

1.5.13 ITU-T G.841 Types and characteristics of SDH network protection architectures;

1.5.14 ITU-T G.975.1 Forward error correction;

1.5.15 ITU-T G.7713 Distributed Call and Connection Management (DCM);

1.5.16 ITU-T G.7713.2 Distributed Call and Connection Management: Signaling mechanism using GMPLS RSVP TE;

1.5.17 ITU-T G.7714 Generalized automatic discovery for transport entities;

1.5.18 ITU-T G.7714.1 Protocol for automatic discovery in SDH and OTN networks;
1.5.19 ITU-T G.7715 Architecture and requirements for routing in the automatically switched optical networks;
1.5.20 ITU-T G.7715.1 ASON routing architecture and requirements for link state protocols;
1.5.21 ITU-T G.8080/Y.1304 Architecture for the Automatically Switched Optical Network (ASON);
1.5.22 ITU-T X.731 Information technology Open Systems Interconnection Systems management: State Management Function;
1.5.23 ITU-T Y.1720 Protection switching for MPLS network;
1.5.24 UL / CSA 60950-1 Information Technology Equipment Safety;
1.5.25 IEC / EN 60950-1 Information Technology Equipment Safety;
1.5.26 IEC / EN 60825-1 Safety of laser products Part 1: Equipment classification and requirements;
1.5.27 IEC / EN 60825-2 Safety of laser products Part 2: Safety of optical fiber communication systems (OFCS);
1.5.28 GR-63 NEBS Physical Protection Zone 4 (Earthquake);
1.5.29 GR-1089 Electromagnetic Compatibility and Electrical Safety Generic Criteria for Network Telecommunications Equipment;
1.5.30 FCC 47 CFR15 Federal Communications Commission: rules and regulations for EMC;
1.5.31 EN 300 019-1-3 Class 3.2 Environmental conditions and environmental tests for telecommunications equipment;
1.5.32 EN 300 386. Telecommunication network

2. **Support Facilities, Materials and Services**

2.1 General Requirements

2.1.1 The Winning Bidder must supply, design, build, install, and commission a modular, and operable power generation system at DICT Roces equipment node to include:
2.1.1.1 Control System: The Control System must be a modular and able to operate gensets in parallel or alternate mode;
2.1.1.2 Winning Bidder shall size the rectifier system to fully charge and administer the 1000AH battery banks and provide DC power to the offered DWDM solution at DICT Roces and DICT NGDC3 sites on protected 5-Tera, 10-Tera, and 15-Tera optical switching capacity of the DWDM.
2.1.2 The Winning Bidder must supply, design, build install, and commission a modular and operable 48VDC power system at DICT NGDC3 equipment node to include:
2.1.2.1 DC Power System: The DC power system must be modular, upgradable system of Battery Banks and Rectifier;
2.1.2.2 Winning Bidder shall size the rectifier system to fully charge and administer the 1000AH battery banks and provide DC power to the offered DWDM solution at DICT Roces and DICT NGDC3 sites on protected 5-Tera, 10-Tera, and 15-Tera optical switching capacity of the DWDM.
2.1.2.3 Ancillaries: AC and DC Breakers, Load Lines, Grounding System, Lightning

Arrester, Surge Arresters, Electrical Wires, and other associated components of a DC Power System;

2.2 Rectifier and Battery (8 Hrs. standby) System

2.2.1 The Battery Banks must consist of 2V-500AH Single Cell batteries, long service life with up to 20 years expected life under normal float charge, wired in series-parallel setup to deliver a total ampere-hour capacity of 1000AH @ 48VDC.

2.2.2 The Battery Banks must come with Rectifier System rated to charge the battery banks and provides continuous 48V DC power to the load line. The rectifier system must not introduce harmonics distortions to the load line.

2.2.3 The Winning Bidder shall size the rectifier system to fully charge and administer the 1000AH battery banks and provide DC power to the offered DWDM solution at DICT Roces and DICT NGDC3 sites. Design must be scalable to support a protected 5-Tera, 10-Tera, and 15-Tera optical switching capacity of the DWDM;

2.2.4 The Battery Banks shall comprise of 48 units of 2V single cell batteries with the following minimum requirements:

2.2.4.1 Nominal Voltage: 2V (Single Cell per Unit)

2.2.4.2 Nominal Capacity: 500 AH

2.2.4.3 Container Material: Flame Retardant ABS (UL 94-V0 specifications)

2.2.4.4 Service Life @ Normal Float Voltage: 20 years

2.3 DC power distribution board (DCPDB) with circuit breakers and 19" rack-based DC distribution panel (DCDP) with DC circuit breakers (DCCB).

2.3.1 The winning Bidder shall design, supply and install eight (8) branch DCPDBs at Roces and NGDC3 battery room. Each DCPDB must be equipped with four (4) units of 75amp DC circuit breakers, bolt-on type or equivalent total ampere requirement of the supplied DWDM/ROADM at full rack (42RU) capacity;

2.3.2 The DCPDB enclosures shall be made from wall mounted, NEMA 1 type powder coated metal enclosures, complete with ground busbar, earth to ground connection and accessories;

2.3.3 DC Busbars and electrical wires must be of adequate size and ampere rating / ampacity to handle the intended current / load capacity of the DWDM/ROADM;

2.3.4 The winning Bidder shall design, supply, and install a dual supply DC distribution panel (DCDP) each on the 42RU equipment ETSI racks of the twenty (20) DWDM/ROADM and ILA with the following specifications:

2.3.4.1 DCDP must be equipped with individual DC circuit breakers, DIN type, DIN rail mounting, etc. to power up each box of the twenty (20) DWDM/ROADM and/or ILA. The Bidder must provide three (3) spares of DC circuit breaker (DCCB) per equipped DCCB ampere rating;

2.3.4.2 DCDP shall have independent input for NMS feed for remote failure monitoring;

2.3.4.3 DCDP must have a current carrying capacity of 100 Amp (minimum, cumulative) per line feed;

2.3.4.4 DC circuit breaker status should be continuously monitorable from outside the DCDP without requiring any operation;

2.3.4.5 Removal of DC circuit breakers should require minimum interruption of operation;

2.3.4.6 Bright LED to indicate supply status of individual supply and/or line feed;

2.3.4.7 DCDP must have electrical wire groomer so as to avoid any contact with loose wires or any loose wires from hanging out;
2.3.4.8 DCDP busbars for circuit breakers and grounding must be of adequate size to handle the intended current capacity;
2.3.4.9 DCDPs must be shielded against any unintentional tampering;
2.3.4.10 DCDP shall be 19"/21" interchangeably mountable.

2.4 Generator Set - 80kVA

2.4.1 The Generator Sets must be four-stroke, water cooled engine, three-phase, environment friendly, full outdoor type, compact structure, configurable to run/operate in parallel or alternate mode, will operate within 30 seconds of commercial power failure, and with the following minimum requirements:
2.4.2 Prime Power Output: 80kVA
2.4.3 Output Voltage: 230-240VAC, 60Hz, three phases
2.4.4 Power Factor: 80%
2.4.5 Typical Load Factor: 60-70%
2.4.6 Starting System: Battery Cranking with 10-sec starting capability
2.4.7 Type: Diesel, Silent Type, Weatherproof
2.4.8 Exhaust Piping Schedule: Schedule 40
2.4.9 Transfer Switch Operation Type: Automatic Transfer Switch (ATS)
2.4.10 Switch Gear: The Switch Gear must be able to operate the gensets in parallel or alternate operations with the following minimum specifications:
2.4.10.1 Auto Start Engine Controls;
2.4.10.2 Engine Protection;
2.4.10.3 Generator (Electrical) Protection;
2.4.10.4 Automatic and Manual Paralleling (Phase and Voltage Matching);
2.4.10.5 Automatic and Manual KW Load Control:
2.4.10.6 Standalone - Isochronous Operation;
2.4.10.7 Paralleling - Isochronous kW Load Sharing;
2.4.10.8 Automatic and Manual Voltage Control:
2.4.10.9 Standalone - Constant Voltage;
2.4.10.10 Paralleling - Isochronous kVAR Load Sharing;
2.4.10.11 Generator Circuit Breaker;
2.4.10.12 Distribution Breaker(s) or Load Connections;
2.4.11 ISO Certification: ISO 9001:2008
2.4.12 Accessories: Complete standard batteries such as industrial batteries, Trickle Battery Charger, Fuel Base Tank, Industrial-Type Exhaust Silencer/Muffler, Auto-Start/Auto-Crank Module, and set of Operations & Parts Manual;
2.4.13 The Gensets must be provided with fuel tanks that can support 24hrs continuous operation.

Note: 1. For locations of gensets, battery banks and rectifier, ACU, equipment, and other ancillaries, please refer to Annex B9;
2. All permits requirements (building permit, mechanical permit, electrical permit, sanitary permit, etc.), installation, and maintenance support of Genset shall be handled by the Winning Bidder
3. Operation of the Generator sets is with DICT.

2.5 Air Conditioning Units

2.5.1 The Winning Bidder must supply, install, and commission a complete and operable air-conditioning system at DICT Roces equipment room with the following minimum specification:

2.5.2 Air Conditioning Unit (ACU): Two (2) units of 5-ton floor standing air conditioning system with controller for simultaneous or alternate operations. The controller must be programmable, with room temperature sensor, and shows the current settings of the ACUs in an easy to read display.

2.6 Other ancillary materials needed for the completion of the project

2.6.1 Equipment rack cabinet 19in. 42RU minimum
2.6.2 Optical Distribution Frame (ODF)
2.6.3 Patch cords from equipment to ODF (Minimum of 10 meters per run).

2.7 Seismic Anchoring

2.7.1 The utility and equipment racks shall be designed and constructed to withstand seismic events when correctly anchored to the building structure.

2.7.2 The utility and equipment rack structure and anchorage shall comply with the relevant section of the National Building Code of the Philippines (PD1096) latest edition.

Note: 1. AC and DC power and backup systems are available in all NGCP sites. AC and/or DC circuit breakers and DC power distribution board (DCPDB) must be provided as needed;

2. The Winning Bidder shall provide DC power and backup system at identified DICT sites only.

3. Network Management System (NMS)

3.1 General Requirements

3.1.1 The NMS must have a rich Graphical User Interface (GUI). It is required that it will be possible to perform any Network Management operation via GUI without the need for the user to perform Command Line Interface (CLI) commands;

3.1.2 The NMS architecture must be based on client-server relationships using standard technologies;

3.1.3 The System must display optical logical layer showing Logical Elements (Optical cards/ports) and logical optical topology;

3.1.4 The System must display a graphical lambda availability chart for Optical Multiplex Section (OMS);

3.1.5 The System must allow the user to see a list of all current alarms for a specific network element (NE) or trail or tunnel or service;

3.1.5.1 The alarm severity must be ranking at least four categories: warning, minor, major, critical.

3.1.5.2 The highest severity alarm state in network element must be displayed by means of different icon colors on the topological map.

3.1.5.3 Topological links that are affected by an alarm must be displayed by means of different link color on the topological map according to the highest severity alarm affecting the link.

3.1.6 The Systems must provide backup, back-up schedule and restore functionality for all collected and generated data, configurations, alarms and log history;

3.1.7 The System must have provision of back-up NMS server;

3.1.8 The System must have NMS/Controller with an open interface to allow integration to DICT's existing Management Network;

3.1.9 The System must have a fully resilient DCN using either in-band or out-of-band communications that will support network management even in the event of fiber break.

3.2 Capacity Management

3.2.1 System shall collect usage data from the Performance Management system;

3.2.2 System shall process usage and capacity information for IP/MPLS and Optical layers;

3.2.3 System shall compare trended usage data to the engineered capacity for network and service layers to identify expected congestion and capacity exhaust conditions within the multi-layer protection design;

3.2.4 System shall report congestion and capacity exhaust conditions to users as tickets;

3.2.5 System shall automatically calculate the recommended reconfiguration of the integrated IP/Optical network to shift traffic load to slow progression to the congestion or capacity exhaust conditions and include this information in the ticket.

3.2.6 System shall automatically apply the recommended reconfiguration utilizing SDN orchestration once given approval by users;

3.2.7 System shall identify reconfiguration types for which users can leave standing approval for automatic implementation;

3.3 Change Management

3.3.1 System shall allow users to create a Change Request (CR) Ticket by supplying the following information (at a minimum):

- Change Owner (user ID);
- Equipment Type
- Equipment ID;
- Change Type: (Pre-Approved, Planned, Accelerated Planned, Unplanned/Emergency)
- Change Priority: (High, Medium, Low);
- Change History: (First Time; infrequent change; repeated change);

- Change Testing Results: (100%/No issues; 100%/workarounds; <100%);
- Change has been peer reviewed: (Yes/No);
- Change Complexity: (High, Medium, Low);
- Change Scope: (List of equipment change is to be applied to);
- Back Out Process Tested: (Yes, scripted; Yes, manual; Yes, difficult; No);
- Number of Winning Bidders involved: (1, 2, 3+);

3.3.2 System shall calculate a Risk Level based on the inputs of the CR fields;

3.3.3 System shall calculate an Impact Level based on the following factors (additional Change Request Ticket fields.):

- Impact on other Network Elements: (None affected, Loss of redundancy/minor reliability conditions violated, Isolation/major reliability conditions violated);
- Impact on Services: (None, 1, Multiple)
- Expected Downtime outside of Maintenance Window: (No down time; down time outside of business hours; down time during business hours/likely SLA violation);
- Service Impact Radius: (Small/Few Affected; Many affected/Regional; Large Radius/Many affected);
- Which users or agencies could be affected: (None; Government Agencies; LGUs; Free Wi-Fi traffic; Cell Tower traffic; all traffic);

3.3.4 System shall calculate an Impact Level based on the inputs of the CR fields;

3.3.5 System shall determine based on the Risk Level and Impact Level what the correct level of review is for the change: Pre-authorize, Change Manager, Change Review Board);

3.3.6 System shall manage the workflow of the CR through review, plan, schedule, implementation, verification, roll-back, and closure states;

3.3.7 System shall provide an interface to display all changes made or planned within a specified time period;

3.3.8 System shall provide an interface to manage the state of the CR through the process;

3.3.9 System shall manage a schedule of changes.

3.3.10 System shall identify when any two or more proposed changes conflict in schedule and impact radius (e.g. flag two changes scheduled for the same maintenance window on two pieces of equipment who share links or paths;

3.3.11 System shall inform the Fault/Event Management system when alarms should be suppressed due to scheduled change activity;

3.4 Configuration Management

3.4.1 System shall store standardized configurations for all Winning Bidders, types, and versions of equipment in the network;

3.4.2 System shall store a record of the current configurations for all configurable items of all equipment in the IP/MPLS-Optical Network;

3.4.3 System shall be able to audit all the equipment in the network, identify to the user when a configurable item does not have the current configuration or when a configuration has been manually altered. System shall retain both configuration versions;
3.4.4 System shall enable users to “push” a selected configuration (e.g. the standard) to one or more configurable pieces of equipment on a scheduled, manual, or scripted basis;
3.4.5 System shall maintain a separate backup server of all current configurations in case one or more pieces of equipment needs to be restored and reconfigured;

3.5 Fault Management

3.5.1 System shall collect events from all remotely managed elements in the network. (full coverage of all equipment and component types from all Winning Bidders);
3.5.2 System shall enable administrators to apply automated modifications to fields of events (e.g. change the Winning Bidder specified severity to a severity level approved by the organization);
3.5.3 System shall correlate events to identify and remove duplicate events;
3.5.4 System shall enhance events with additional information from the Inventory and CMDB databases (e.g. specifics about location, equipment characteristics, Winning Bidder information, etc.);
3.5.5 System shall correlate enhanced events by topology to identify root cause events and suppress child events (but not remove them);
3.5.6 System shall correlate enhanced events by historically defined patterns to identify root cause events and suppress child events (but not remove them);
3.5.7 System shall correlate enhanced events by seeking new patterns to identify root cause events and suppress child events (but not remove them);
3.5.8 System shall forward root cause events and their child events to the Incident Management system in the form of an Incident Ticket creation request. The system shall auto-fill as many fields as possible in the Incident Ticket;

3.6 Incident Management

3.6.1 System shall allow creation, update and closure of Incident Ticket records;
3.6.2 System shall manage the workflow of state change of the Incident Tickets;
3.6.3 System shall identify Incident Severity as one of [Critical, Major, Minor, and Informational];
3.6.4 System shall display all Incident Tickets in graphical tabular interface allowing filtering and sorting by the user through the GUI;
3.6.5 System shall display the multi-layer network topology with color codes for elements and links with associated Incident Tickets. Color code will indicate the highest severity ticket for that element or link;
3.6.6 System shall display the multi-layer network topology with color codes for elements and links with associated Incident Tickets. Color code will

indicate the highest severity ticket for that element or link;

3.6.7 System shall display the optical layer showing logical and physical topologies down to the component (card/port) level;

3.6.8 System shall display the optical channel (OCH) logical layer with topology;

3.6.9 System shall display the IP layer showing logical and physical topologies down to the component (card/device/port) level;

3.6.10 System shall display a multi-layer IP/Optical view of the interconnected logical and physical topologies;

3.6.11 System shall provide links to the Optical Management System for users to examine that's system's information, e.g. graphical lambda availability charts;

3.6.12 System shall display to the user all trails, tunnels, links, services, and CE Nodes impacted by the alarms of an Incident Ticket;

3.6.13 System shall display to the user all Incident Tickets affecting any specified equipment or link;

3.6.14 System shall display to the user all equipment or links affected by an Incident Ticket;

3.6.15 System shall display a geographical map of the network color-coded by Incident severity for any equipment or links;

3.6.16 System shall allow Work Orders to be created from an Incident Ticket and assigned to a Field Services or Technical Services queue;

3.6.17 System shall allow an Incident Ticket to be escalated to a new owner, e.g. Advanced Operations;

3.6.18 System shall allow an Incident Ticket to be escalated to an appropriate Winning Bidder;

3.6.19 System shall enable sending a test request to the Resource and Service Test Management system to gain more information about the condition of the network or services. (aka "Auto-Test");

3.6.20 System shall associate Methods of Procedure information with known root cause event types to enable administrators access that information quickly to restore service and resolve the issue;

3.6.21 System shall enable auto-execution of Methods of Procedure actions which are scripted or available through Open APIs. (aka "Auto-Restore")

3.6.22 System shall journal all user actions and all automated actions associated with an Incident Ticket with their time stamps;

3.7 Inventory Management

3.7.1 System shall retain records of the engineered network assets (type, version, physical components, geographic location, logical location, etc.);

3.7.2 System shall retain records of the physical connectivity of network elements forming a physical topology;

3.7.3 System shall retain records of the logical connectivity of network elements and services forming a logical network and service topology;

3.7.4 System shall be integrated with or interface with the Configuration Management Database to provide the complete picture of the state of the network and services;

3.7.5 System shall retain records of all physical and logical network element

types from all Winning Bidders.

3.7.6 System shall respond to inventory and topology queries from Fault/Event Management to understand how some alarms might be correlated;

3.7.7 System shall respond to inventory and topology queries from Change Management to understand how some changes might affect different network segments, services, or end customers;

3.7.8 System shall retain records of all services supported by its inventory of network elements and links;

3.7.9 System shall retain records of all end customers, what services they are receiving, and how they connect to the network physical and logical topology;

3.8 Order Management

3.8.1 System shall enable staff to enter a Service Request (SR) (new service, service change, service cancellation) based on information received through mail, email, phone call, etc.;

3.8.2 System shall enable clients to enter a Service Request through a portal for new service, service change, or service cancellation;

3.8.3 System shall capture all relevant information about the client in order to successfully implement the Service Request: desired service type, bandwidth, connection specifications, physical location, management contact, billing information, etc.;

3.8.4 System shall enter all Service Requests into work queues. (Staff will work from queues);

3.8.5 System shall support templates to break standard Service Requests into underlying Tasks which can be assigned to specific work queues or dispatched as work orders (field services and technical services);

3.8.6 System shall support tracking of all Service Requests and underlying Tasks for % progress and completion;

3.8.7 System shall support workflows to manage the ordering of Tasks and Complete-to-Start relationships;

3.8.8 System shall support tracking metrics (at organization and individual level) for order fulfillment: Mean/Max/Min Time to Fulfill Service Request by standard SR types, M/M/M Time to Complete Task by standard SR Task types;

3.9 Performance Management

3.9.1 System shall collect Key Performance Indictors regularly from all network elements to identify current values of KPIs such as latency, throughput, and packet loss;

3.9.2 System shall store user-defined thresholds for any KPI type and generate an event if collected data passes that threshold value. That event shall be forwarded to the Fault/Event Management system;

3.9.3 System shall display collected KPIs in a tabular format or in graphical formats showing trending over user-specified time periods;

3.9.4 System shall display collected KPIs in a tabular format or in graphical formats showing trending over user-specified equivalent Time of Day and

Day of Week periods;

3.9.5 System shall enable communication of raw and aggregated KPI values for requested time-periods and requested network elements/network segments/service to the Capacity Management system;

3.10 Problem Management

3.10.1 System shall enable creation, modification, and closure of Problem Tickets to track investigations into chronic incident patterns and other known issues with networks or services;

3.10.2 System shall enable assignment of Problem Tickets to an owner and tracking of the status of the ticket;

3.10.3 System shall enable association of one or more Incident Tickets to a Problem Ticket;

3.10.4 System shall enable creation and assignment of Tasks to other staff and be associated with and tracked with the Problem Ticket;

3.11 Provisioning

3.11.1 System shall enable administrators to manually or automatically update configurations of specified active equipment to enable service activation for end users;

3.11.2 System shall enable administrators to enable access to network or services for specific end users;

3.11.3 System shall enable administrators to manually or automatically apply, replace, or modify policies governing service enablement;

3.11.4 System shall allow SDN orchestration systems to execute provisioning actions through Open APIs or other interfaces;

3.11.5 System shall enable configuration of optical and IP/MPLS layers for service enablement;

3.11.6 System shall enable provisioning of:

- Dedicated Leased Line (DLL)
- International Private Leased Line (IPL)
- Broadband Access (backhaul for Free Wi-Fi, Wireless Broadband)
- Domestic Wavelength Services

3.12 Resource and Service Test Management

3.12.1 System shall allow users to execute on-demand end to end service tests to determine service quality, latency, and other key metrics;

3.12.2 System shall allow scheduling of end to end service tests to determine service quality, latency, and other key metrics;

3.12.3 System shall provide test results to Incident Management system when an Auto-Test request is made;

3.12.4 System shall support execution of built-in or “coded” test functions as well as triggering external test systems or scripts;

3.13 System Log Server

3.13.1 System shall periodically collect and store system logs from all network elements;
3.13.2 System shall archive older logs to long-term storage based on user-defined criteria and to be retained for a user-defined amount of time;
3.13.3 System shall allow users to manually search and review stored logs;
3.13.4 System shall allow queries from the Incident Management system for all log entries within a specified time period, from specified Network elements, and containing specific text strings;

3.14 Ticketing

3.14.1 System shall allow a Client issue to be manually documented in a Client Ticket.
3.14.2 System shall allow a Client issue to be directly documented by the Client in a Client Ticket through a secure, graphical user interface.
3.14.3 System shall enrich the fields of the Client Ticket automatically from the Inventory database once any key data is entered, e.g. IDs of all equipment assigned to the customer, IDs of all services assigned to the customer, and topology local to the Customer Node (CN).
3.14.4 System shall enable assignment of Client Ticket to staff member to be addressed.
3.14.5 System shall enable generation of Tasks under other owners but associated with the Client Ticket to assign and track work related to resolving the issue;
3.14.6 System shall enable association of one or more Incident Tickets and/or Problem Tickets to the Client Ticket;

3.15 Traffic Engineering

3.15.1 System shall enable engineers to optimize the performance of the backbone network;
3.15.2 System shall access the complete topology and configuration of the backbone network;
3.15.3 System shall access collected performance data from the network;
3.15.4 System shall access recorded volumes of traffic by data type (web traffic, VoIP, etc.), QoS class, application (Netflix, Facebook, etc.), and endpoint for analysis;
3.15.5 System shall provide analytical tools to examine, parse, pattern-seek, and classify traffic load patterns.
3.15.6 System shall provide simulation tools to perform “what if” analysis on theoretical changes to the topology or configuration of the backbone network;

3.16 NMS Servers

3.16.1 The System must have carrier-grade NMS servers to support the minimum operational requirement of the Network Management System (NMS).
3.16.2 The NMS must have user workstations at Roces NOC, one remote

terminal at Judge Juan Luna Office and laptops for fieldworks and remote monitoring of the system.

4 100Gbps link between DICT Roces node and DICT NGDC1 Diliman node

4.1 At DICT Roces Node:

4.1.1 Supply, install, configure, commission one (1) unit of transponder/muxponder card of the offered DWDM/ROADM equipment equipped with one (1) unit of QSFP 100GBE/o, LC, gray color, at least 20km reach over SMF, interoperable with major switch vendors; and fully compliant with ethernet, fibre channel and OTN standards;

4.2 At DICT NGDC1 Diliman node:

4.2.1 Supply, install, configure, commission three (3) units of 40GBASE-LR4 CFP hot-swappable optical module, at the unutilized ports of the existing DICT Core Router.

4.2.2 Supply, install, configure, commission one (1) Layer 2 Switch, minimum 8x40/100Gbps ports, 24x10 Gbps ports, at least 800 Gbps system capacity. The L2 Switch must be equipped with the following hot-swappable pluggable optical modules:

- One (1) unit of 100GBASE-LR4 QSFP28 Dual Rate, LC, gray color, at least 20km reach over SMF, and interoperable with other IEEE-compliant 100GBASE interfaces where applicable;
- Four (4) units of 40GBASE-LR4 QSFP+ 1310nm, LC, 0.5km hot-swappable optical module.

4.3 Supply of twelve (12) pcs of 1.8mm diameter fiber optic patch cords with the following specifications:

- LC to LC connector, polish type UPC to UPC
- fiber type: Single-mode, 9/125um, ITU-T G.652D
- fiber count: Duplex
- insertion loss: ≤ 0.5dB
- length: 10.0 Meters