



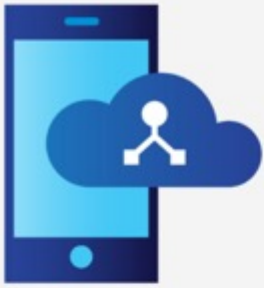
ATLANTA, GA
OCTOBER 11-14

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**2021 Fall
Technical Forum**
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Converged Networks and Mobility

On The Road to 10G - Converged Access Platform for HFC & Ultra Long (+60km) NGPON2

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COX Communications



**VIRTUAL EXPERIENCE
OCTOBER 11-14**

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COX: Sung Kim, Igor Tavrovsky, Ted Boone, Brian Yarbrough

Converged Access Platform ROCML & Drivers

Data Projections

ROCML Overview

COX PON Architecture

Future 25G PON With ROCML

DOCSIS 4.0 & FTTH Network

What is the ROCML

ROCML – Raman Optical Comm. Module
Single platform for HFC, PON & 5G
Passive OSP, active components in CO
Raman, SOA and EDFA amplification
Fiber protection
Dispersion management

Drivers

Extended range +60km 10G PON2
- Scalable to 25G PON & beyond
25Gbps DWDM optical link for ESD 1.8GHz
Primary & backup fiber links
High system OSNR platform
Coherent Capability 100G-400G

Downstream

YoY traffic CAGR 25-30%

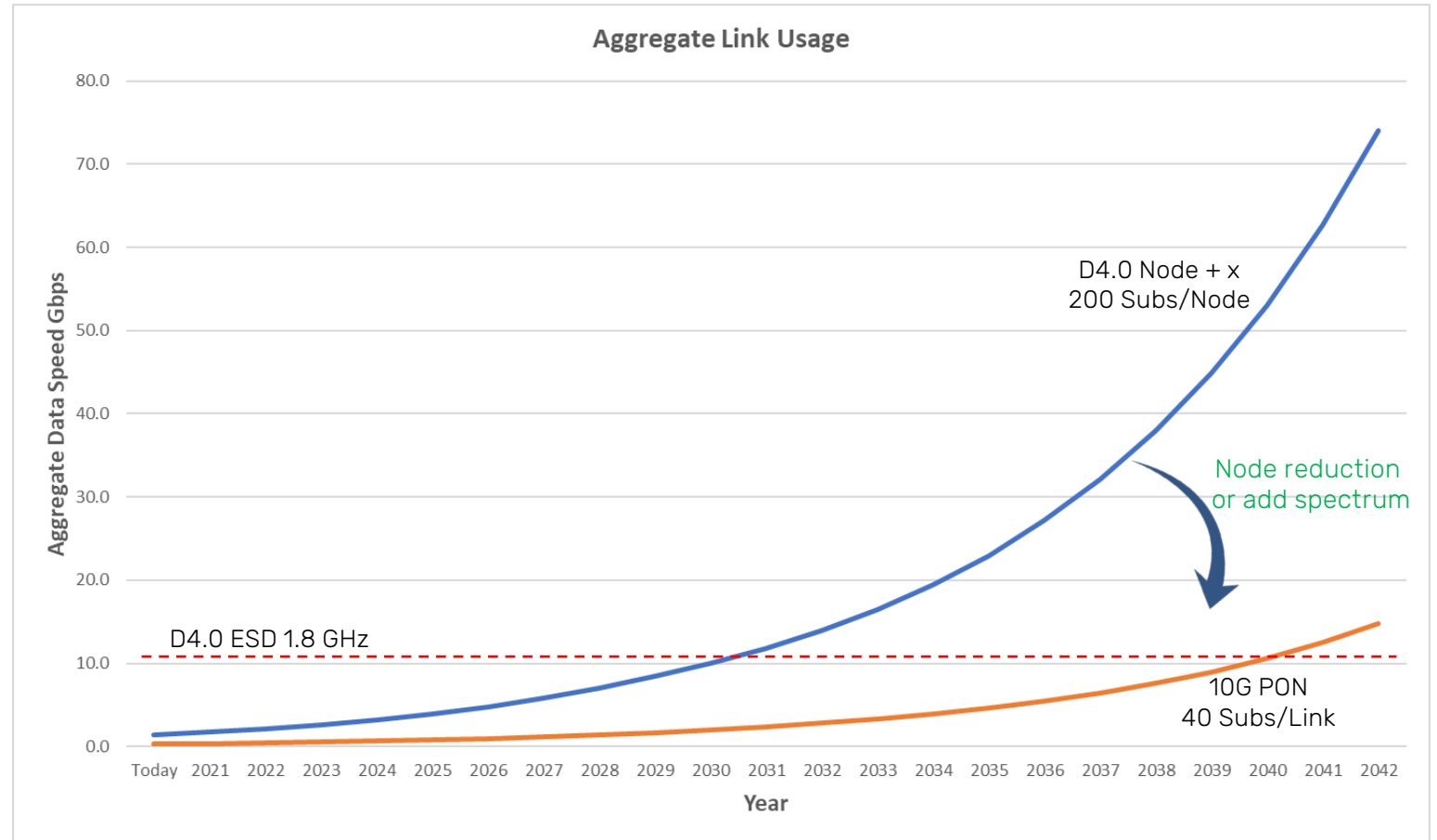
Max speed: Half node/link capacity

HFC D4.0 (ESD 1.8 GHz)

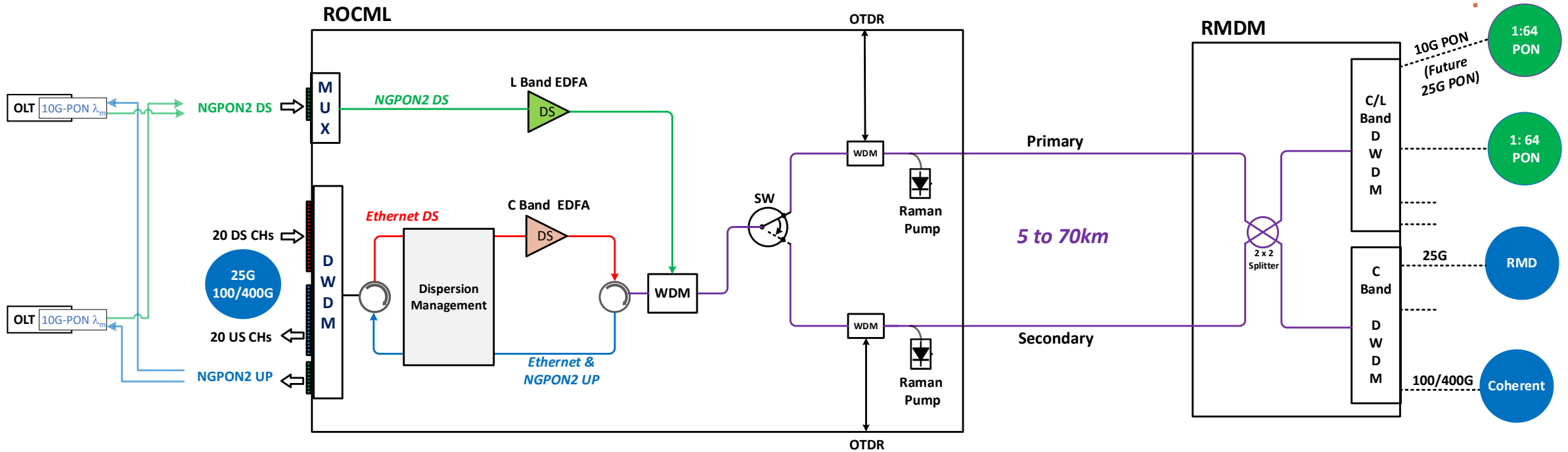
- Up to 12 Gbps DS/6 Gbps UP
- 350 HP/node
- 200 subs/node

PON

- 10Gbps symmetrical
- 64 HP/link
- 40 subs/link



Raman Optical Communications Module (ROCML)



Loss Budgets: PON 50dB, Ethernet 35dB

Ethernet & PON Transport

8 NGPON2 PtP Wavelengths

- L band DS
- C Band UP

20 Bi-Di Ethernet Wavelengths

- C band DS/UP

	ETHERNET					NGPON2				
	Pair	Downstream		Upstream		Pair	Downstream		Upstream	
		ITU	Wavelength	ITU	Wavelength		ITU	Wavelength	ITU	Wavelength
NG-PON2 US	1	14	1566.31	38	1546.92					
C-Band US	2	15	1565.5	39	1546.12					
C-Band DS	3	16	1564.68	40	1545.32					
NG-PON2 DS	4	17	1563.86	41	1544.53					
	5	18	1563.05	42	1543.73					
	6	19	1562.23	43	1542.94					
	7	20	1561.42	44	1542.14					
	8	21	1560.61	45	1541.35					
	9	22	1559.79	46	1540.56					
	10	23	1558.98	47	1539.77					
	11	24	1558.17	48	1538.98					
	12	25	1557.36	49	1538.19					
	13	26	1556.56	50	1537.4					
	14	27	1555.75	51	1536.61					
	15	28	1554.94	52	1535.82					
	16	29	1554.13	53	1535.04					
	17	30	1553.33	34	1550.12		NGPON2 L Band DS		NGPON2 C Band UP	
	18	31	1552.52	35	1549.32	1	71	1602.31	55	1533.47
	19	32	1551.72	36	1548.52	2	72	1601.46	56	1532.68
	20	33	1550.92	37	1547.72	3	73	1600.6	57	1531.9
						4	74	1599.75	58	1531.12
						5	75	1598.89	59	1530.33
						6	76	1598.04	60	1529.55
						7	77	1597.19	61	1528.77
						8	78	1596.34	62	1527.99

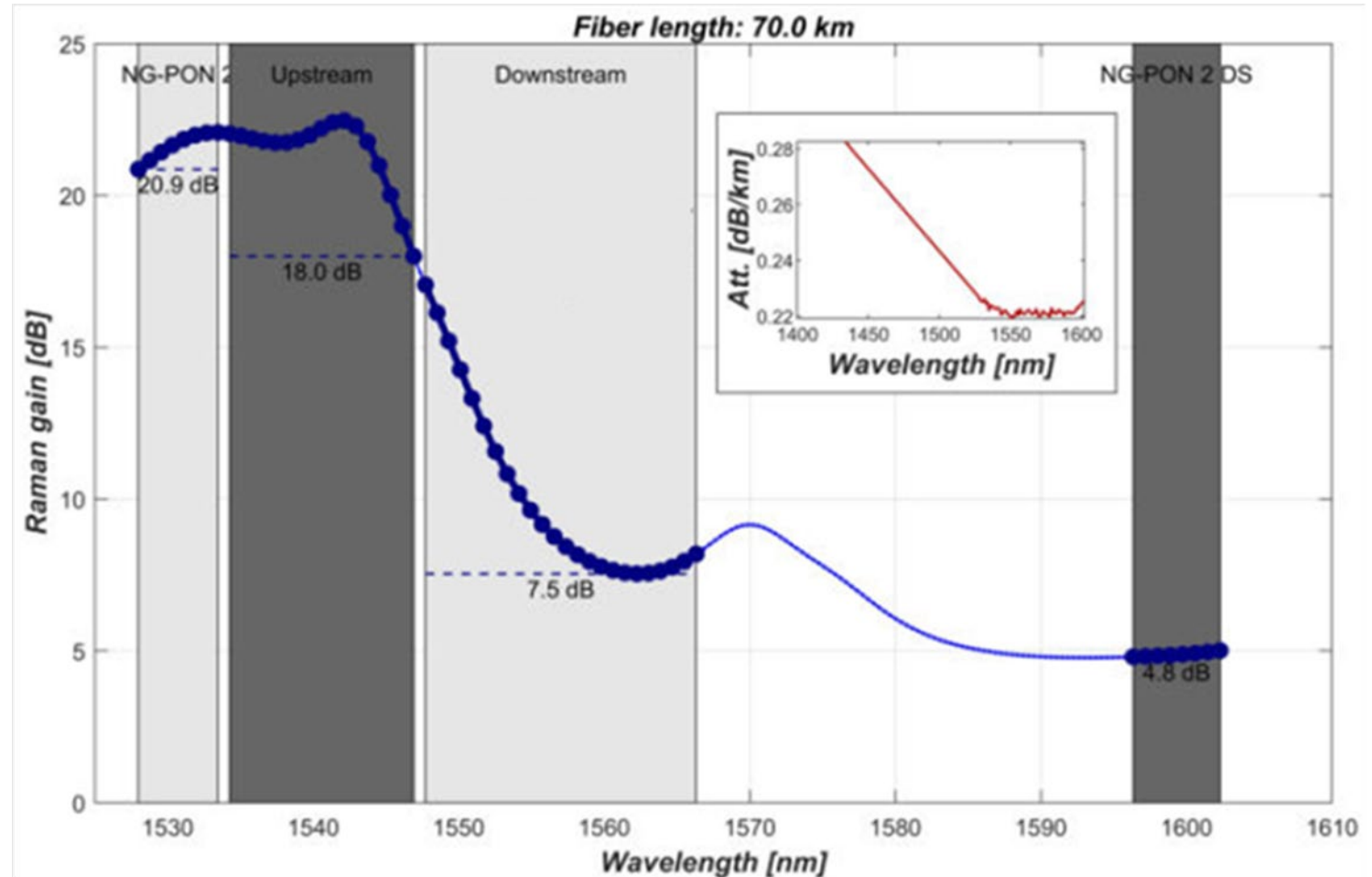
ADVA 70km Simulations

C band UP Gain

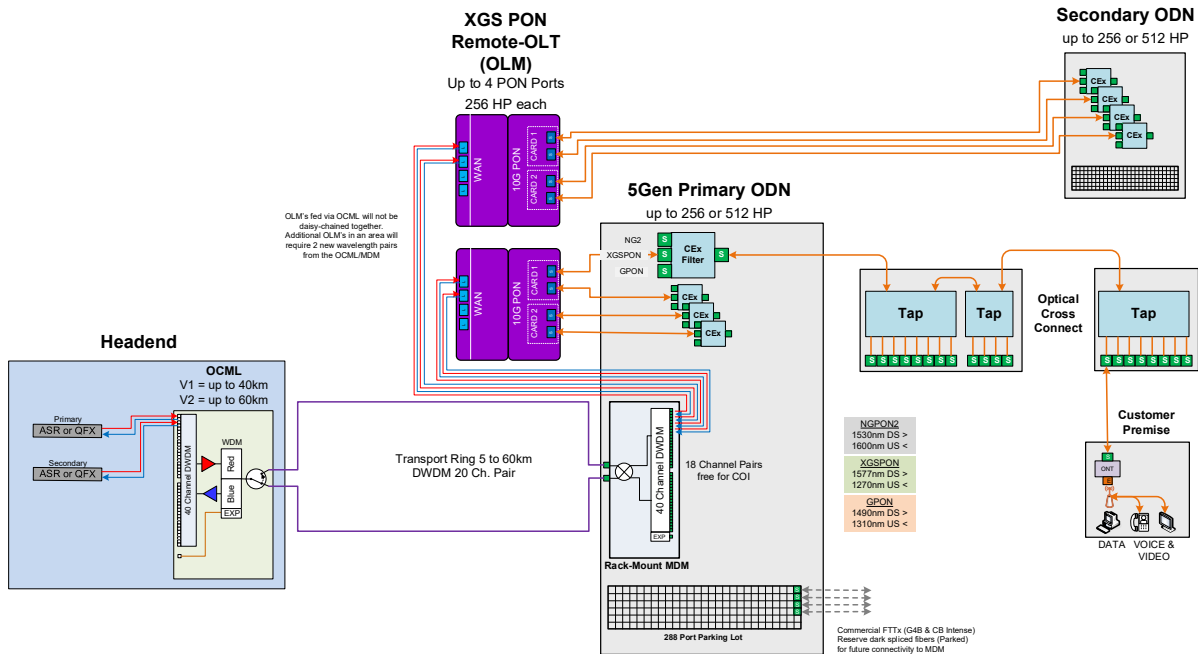
- NGPON2 21dB
- Ethernet 18dB

DS Gain

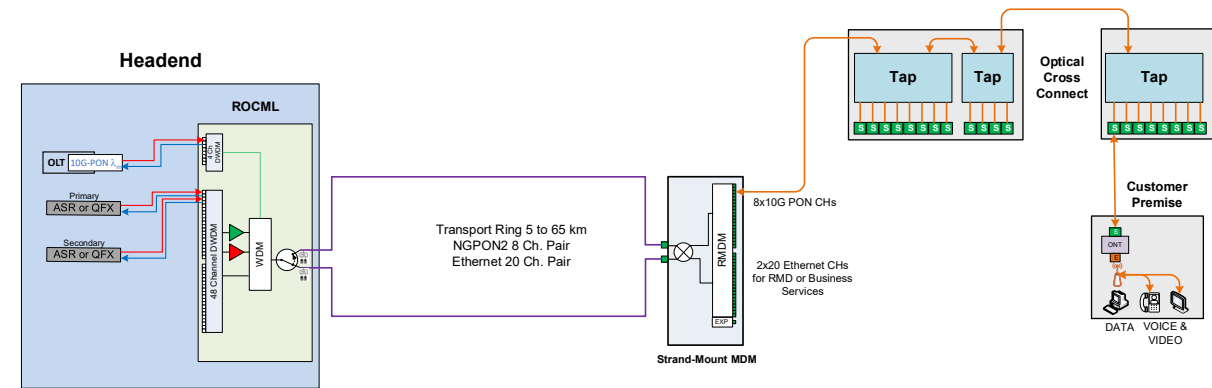
- NGPON2 L Band 5 dB
- Ethernet C Band 7.5dB



Current COX 10G PON



ROCML 10G PON

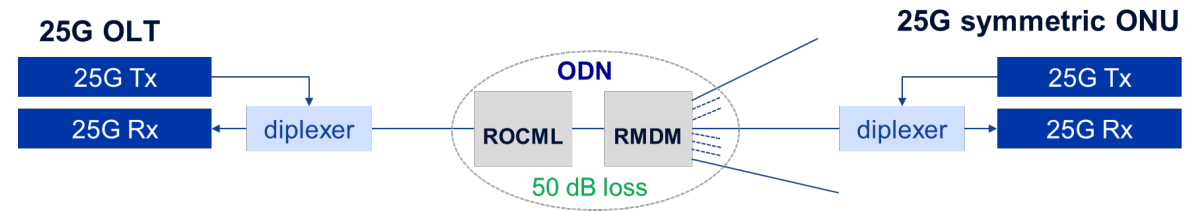


Same Fiber Distribution Network

25GS-PON



25G PON over ROCML



29dB Loss budget

20km

O-band single wavelength

NRZ transmission

Low cost DML lasers in ONUs

No dispersion compensation

No optical amplification

50dB Loss budget

+60km

L/C Band multiwavelength, 8 X 25G

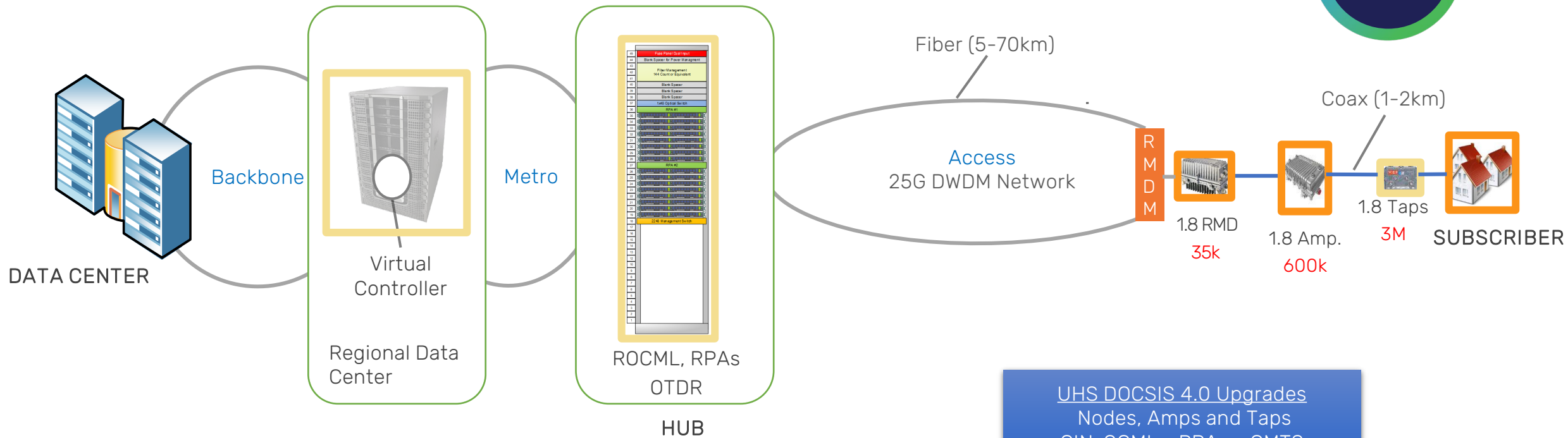
NRZ transmission

Low cost DML lasers in ONUs

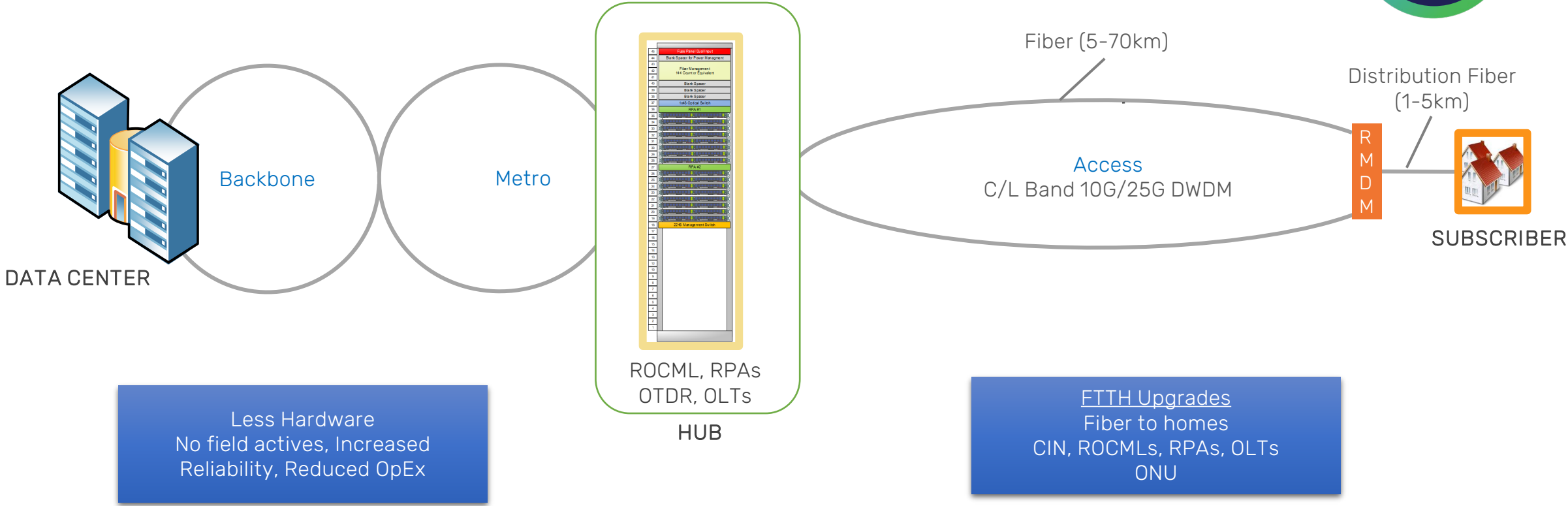
Dispersion compensation

Optical amplification

DOCSIS 4.0 ESD (1.8GHz)



UHS DOCSIS 4.0 Upgrades
Nodes, Amps and Taps
CIN, OCMLs, RPAs, vCMTS
D4.0 CPE



ROCML Provides Access platform for 20 Years

Single DOCIS, PON, 5G & enterprise platform

Protected fibers

25G DWDM ethernet links for RMD

Long range +60km 10G PON, scalable to 25G PON

Coherent 400G capability

ROCML enables transition to all PON network



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Thank You!

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