

Samsung SNAP Build Fiber Cleaning Guidelines

- **Single mode Fiber Vs Multimode**
- **Samsung Approved SFPs required**
- **Scoping & Cleaning all fibers and SFPs**
- **Fiber Light Test**
- **dB Attenuator application**
- **Labelling**
- **Basic Fiber Troubleshooting**
- **Field Lessons**

September 1st, 2022

SNAP Build Fiber Cleaning & Light Testing dB Attenuator requirements

Fiber/ Transceivers handling rules

1. Every fiber cable fresh out of the box must be cleaned prior to applying to DU/RU system. Don't assume the factory cable may not contain impurity or dirt due to handling and packaging.
2. Every SFP fresh out of the box should be clean prior to applying to DU/RU system
3. Bulk heads on either side of tower mounted and ground mounted OVP as well patch panels must perform cleaning prior to application.
4. Trunk fiber must be clean prior to apply to Samsung jumper and system
5. Scope the fiber / bulk head / SFPs as needed Step 1-4 for making sure no impurity on the fiber core is left and may cause degraded service
6. VFL to identify correct strand of fiber end to end from RU to DU
7. Light level testing on both RU and DU end

Tools



Antistatic Glove



Optical Power meter



Optic Visual Fault locator



Fiber Optic Cleaner
(for Optical Connector)



Fiber Optic Cleaner
(for Optical Module)



SFP Optical
Module



Optical Module
Removal Tool



Digital Multi-meter



Fiber probe



Proper Optical Attenuator
(ex. 5dB Attenuator)

SM/MM Fiber Cables



Yellow is SM Fiber Optic Cable
With Optical Connectors, 2 cores



Yellow is SMM Fiber Optic Cable
With Optical Connectors, 1 core



Aqua or Orange is MM Fiber Optic Cable
With Optical Connectors, 2 cores

SFP Matrix (CDU-30 & FSU10/20)

Samsung 4G/DSS RAN HW Product (Baseband Controller Card)	Samsung RAN HW Module (Port)	Interface	Rate	MODE	Samsung FERT Code On Packaging	SFP OEM	SFP OEM Part # On SFP Module	SFP Description
CDU30 FSU10 FSU20	LMD (GE1) FMA(10GE) FSU20 Bottom Line Card(GE0)	Backhaul	1G	single Mode	SLS-BB1150EAEX	OE Solutions	RSP12SLX-IT3	1.25Gbps, 10km, 1310nm/1310nm Duplex
		Backhaul	1G	single Mode	SLS-BB1150EAEX	Lightron	SFP24-IS3LC-IAY	1.25Gbps, 10km, 1310nm/1310nm Duplex
		Backhaul	1G	single Mode	SLS-BB1150EAEX	Accelink	RTXM191-404	1.25Gbps, 10km, 1310nm/1310nm Duplex
		Backhaul	1G	Multimode	SLS-BB1150EGEX	OE Solutions	RSP12SV5-IT1-1	1.25Gbps, 500m(OM2), 850nm/850nm Duplex
		Backhaul	1G	Multimode	SLS-BB1150EGEX	Accelink	RTXM191-552-C97	1.25Gbps, 500m(OM2), 850nm/850nm Duplex
CDU30	LMD(GE2)*	Backhaul	10G	Multimode	SFG-AFE000DAVZ	Finisar	FTLX8573D3BTL	10Gbps, 300m(OM3), 850nm/850nm Duplex
		Backhaul	10G	Multimode	SFG-AFE000DAVZ	OE Solutions	RSPX0SSR-IT1	10Gbps, 300m(OM3), 850nm/850nm Duplex
		Backhaul	10G	Multimode	SLS-BB1150EKEX	Finisar	FTLX8571D3BNL	10Gbps, 300m(OM3), 850nm/850nm Duplex
		Backhaul	10G	single Mode	SFG-AB203YDFVZ	OE Solutions	RSPX0SLR-IT3	10Gbps, 10km, 1310nm/1310nm Duplex
		Backhaul	10G	single Mode	SFG-AB203YDFVZ	Finisar	FTLX1475D3BTL-SG	10Gbps, 10km, 1310nm/1310nm Duplex
		Backhaul	10G	single Mode	SFG-AB203YDFVZ	Accelink	RTXM228-402	10Gbps, 10km, 1310nm/1310nm Duplex
		Backhaul	10G	single Mode	SLS-BB1150EHX	OE Solutions	RSPX0SLE-IT3	10Gbps, 20km, 1310nm/1310nm Duplex
		Backhaul	10G	single Mode	SLS-BB1150EHX	Accelink	RTXM228-430	10Gbps 20km, 1310nm/1310nm Duplex
		Backhaul	10G	single Mode	SLS-BB1150EHX	(Source Photonics)	SPP-10E-LR-IDFH-SEC	10Gbps 20km, 1310nm/1310nm Duplex

Samsung 4G/DSS RAN HW Product (CDU/FSU Baseband Modem Card)	Samsung RAN HW Module (Port)	Interface	Rate	MODE	Samsung FERT Code On Packaging	SFP OEM	SFP OEM Part # On SFP Module	SFP Description
LCC4(CDU30) FMA1(FSU10) Bottom Line Card(FSU20)	L0~L11 L0~L11 R0~R11	Fronthaul	10G	single Mode	SLS-BB1150EMEX	Lightron	WSPXG-EL3LC-PHA	10Gbps, 20km, 1270nm/1330nm Bi-di
		Fronthaul	10G	single Mode	SLS-BB1150EMEX	Finisar	FTLX2672D327-SG	10Gbps, 20km, 1270nm/1330nm Bi-di
		Fronthaul	10G	single Mode	SLS-BB1150EMEX	OE Solutions	RBTX0SLE-I27-A2	10Gbps, 20km, 1270nm/1330nm Bi-di
		Fronthaul	10G	single Mode	SLS-BB1150EHX	Accelink	RTXM228-430	10Gbps 20km, 1310nm/1310nm Duplex
		Fronthaul	10G	single Mode	SLS-BB1150EHX	Source Photonics	SPP-10E-LR-IDFH-SEC	10Gbps 20km, 1310nm/1310nm Duplex
		Fronthaul	10G	single Mode	SLS-BB1150EHX	OE Solutions	RSPX0SLE-IT3	10Gbps, 20km, 1310nm/1310nm Duplex
LCC4(CDU30) FEA1(FSU10) Top Line Card(FSU20)	L0~L11 L0~L11 L0~L11	Fronthaul (Inter CDU30<->FSU10/20)	10G	Multimode	SFG-AFE000DAVZ	Finisar	FTLX8573D3BTL	10Gbps, 300m(OM3), 850nm/850nm Duplex
		Fronthaul (Inter CDU30<->FSU10/20)	10G	Multimode	SFG-AFE000DAVZ	OE Solutions	RSPX0SSR-IT1	10Gbps, 300m(OM3), 850nm/850nm Duplex
FEA1(FSU10)-HP OR ZT vDU Top Line Card(FSU20)-HP OR ZT	GE0~GE1(MPO-2xDuplex MM) GE1~GE2(MPO-2xDuplex MM)	eCPRI(CDU-vDU) via MPO cable	25G	Multimode	SFG-AFE000DBVZ	Finisar	FTLF8536W4BTV-SG	25Gbps 100m(OM4), 850nm/850nm Duplex

SFP Matrix (4GRRHs & 5G mmW NR-AUs)

Application	Samsung RAN HW Product(4G &DSS RRH)	Samsung RAN HW Module (RRH Ports)	Interface	Rate	MODE	Samsung FERT Code On Packaging	SFP OEM	SFP OEM Part # On SFP Module	SFP Description
RRH Side Only	1)RFV01U-D1A(AWS/PCS) 2)RFV01U-D2A(700/850) 3)RF4402d-D1A(AWS/PCS Med Pwr.) 4)RT4401-48A(CBRS) 5)RT2201-46A(LAA)	1)L0 & L1* 2)L0 only 3)L0 & L1* 4)L0&L1* 5)L0 only	Fronthaul	10G	single Mode	SLS-BB1150ELEX	OE Solutions	RBTX0SLE-I33-A2	10Gbps, 20km, 1330nm/1270nm Bi-di
			Fronthaul	10G	single Mode	SLS-BB1150ELEX	Finisar	FTLX2672D333-SG	10Gbps, 20km 1330nm/1270nm Bi-di
			Fronthaul	10G	single Mode	SLS-BB1150ELEX	Lightron	WSPXG-HL3LC-PEA	10Gpbs, 20km, 1330nm/1270nm, Bi-di
			Fronthaul	10G	single Mode	SLS-BB1150EHEX	OE Solutions	RSPX0SLE-IT3	10Gbps, 20km, 1310nm/1310nm Duplex
			Fronthaul	10G	single Mode	SLS-BB1150EHEX	Accelink	RTXM228-430	10Gbps 20km, 1310nm/1310nm Duplex
			Fronthaul	10G	single Mode	SLS-BB1150EHEX	Source Photonics	SPP-10E-LR-IDFH-SEC	10Gbps 20km, 1310nm/1310nm Duplex

*RRH L1 Port for high Carrier count. Typical 1 CPRI per RRH except CBRS which gets typical 2 CPRI connections. Refer to Site RFDS for guidelines.

Application	Samsung 5G(mmW) NR AU	Ports	Interface	Rate	MODE	Samsung FERT Code On Packaging	SFP OEM	SFP OEM Part # On SFP Module	SFP Description
NR AU Side Only	5G NR AU Gen1 & Gen2 AT1K01-A00/A10 AT1K02-A00/A10 AT1K04-A00/A10 AT1K06-A00/A10	L0(only) L1(Reserved for Daisy chain)	Mid-Haul	10G	single Mode	SLS-BB1150EHEX	RSPX0SLE-IT3	OE Solutions	10Gbps, 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EHEX	SPP-10E-LR-IDFH-SEC	Source Photonics	10Gbps 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EHEX	RTXM228-430	Accelink	10Gbps 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150ELEX	RBTX0SLE-I33-A2	OE Solutions	10Gbps, 20km, BiDi Optics 1330nm/1270nm
			Mid-Haul	10G	single Mode	SLS-BB1150ELEX	FTLX2672D333-SG	Finisar	10Gbps, 20km,BiDi Optics 1330nm/1270nm
			Mid-Haul	10G	single Mode	SLS-BB1150ELEX	WSPXG-HL3LC-PEA	Lightron	10Gpbs, 20km, BiDi Optics 1330nm/1270nm
	5G NR AU Gen2 AT1K04-A00/A10 AT1K06-A00/A10	L0(only) L1(Reserved for Daisy chain)	Mid-Haul	25G	single Mode	SFG-ARM0VTDBVZ	SPL-OR-25E-BX-IDFB-SE	Source Photonics	25Gbps, 15km, BiDi Optics 1330nm/1270nm
			Mid-Haul	25G	single Mode	SFG-ARM0VTDBVZ	RQT2XMLR-I33-1	OE Solutions	25Gbps, 15km, BiDi Optics 1330nm/1270nm
			Mid-Haul	25G	single Mode	SFG-AB203YDEVZ	FTLF1436W4BTV-SG	Finisar	25Gbps 10Km Duplex optic 1310nm
			Mid-Haul	10G	single Mode	SLS-BB1150EHEX	RSPX0SLE-IT3	OE Solutions	10Gbps, 20km, 1310nm/1310nm Duplex
Cell Site router Side Only	5G NR AU Gen1 & Gen2 AT1K01-A00/A10 AT1K02-A00/A10 AT1K04-A00/A10 AT1K06-A00/A10	IXR-s IXR-e NCS540 7705 etc. (Configured Port on Vzw router as applicable)	Mid-Haul	10G	single Mode	SLS-BB1150EHEX	SPP-10E-LR-IDFH-SEC	Source Photonics	10Gbps 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EHEX	RTXM228-430	Accelink	10Gbps 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EMEX	RBTX0SLE-I27-A2	OE Solutions	10Gbps 20Km BiDi Optic Tx1270nm Rx1330nm
			Mid-Haul	10G	single Mode	SLS-BB1150EMEX	FTLX2672D327-SG	Finisar	10Gbps 20Km BiDi Optic Tx1270nm Rx1330nm
			Mid-Haul	10G	single Mode	SLS-BB1150EMEX	WSPXG-EL3LC-PHA	Lightron	10Gbps 20Km BiDi Optic Tx1270nm Rx1330nm
			Mid-Haul	25G	single Mode	SFG-ARM0VTDCVZ	SPL-RO-25E-BX-IDFB-SE	Source Photonics	25Gbps 15Km BiDi optic Tx1270nm Rx 1330nm
			Mid-Haul	25G	single Mode	SFG-ARM0VTDCVZ	RQT2XMLR-I27-1	OE Solutions	25Gbps 15Km BiDi optic Tx1270nm Rx 1330nm
			Mid-Haul	25G	single Mode	SFG-AB203YDEVZ	FTLF1436W4BTV-SG	Finisar	25Gbps 10Km Duplex optic 1310nm
	5G NR AU Gen2 AT1K04-A00/A10 AT1K06-A00/A10		Mid-Haul	10G	single Mode	SLS-BB1150EHEX	RSPX0SLE-IT3	OE Solutions	10Gbps, 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EHEX	SPP-10E-LR-IDFH-SEC	Source Photonics	10Gbps 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EHEX	RTXM228-430	Accelink	10Gbps 20km, 1310nm/1310nm Duplex
			Mid-Haul	10G	single Mode	SLS-BB1150EMEX	RBTX0SLE-I27-A2	OE Solutions	10Gbps 20Km BiDi Optic Tx1270nm Rx1330nm
			Mid-Haul	10G	single Mode	SLS-BB1150EMEX	FTLX2672D327-SG	Finisar	10Gbps 20Km BiDi Optic Tx1270nm Rx1330nm
			Mid-Haul	10G	single Mode	SLS-BB1150EMEX	WSPXG-EL3LC-PHA	Lightron	10Gbps 20Km BiDi Optic Tx1270nm Rx1330nm

SFP Matrix (C-Band MMU/8T8R & vDU)

Application	Product	Samsung RAN HW Module (NR AU Ports)	Interface	Rate	MODE	Samsung FERT Code On Packaging	SFP OEM	SFP OEM Part # On SFP Module	SFP Description
C-band MMU/RU Side Only	MT6407-77A (64T64R LS6 MIMO) RT8808-77A(8T8R LS6 RRH)	MMU Ports ->L0,L1&L2 RU Ports -> L0&L1	Fronthaul	25G	single Mode	SFG-ARM0VTDBVZ	Source Photonics	SPL-OR-25E-BX-IDFB-SE	25Gbps 15Km BiDi optic Tx1330nm Rx 1270nm
			Fronthaul	25G	single Mode	SFG-ARM0VTDBVZ	OE Solution	RQT2XMLR-I33-1	25Gbps 15Km BiDi optic Tx1330nm Rx 1270nm
C-band vDU Side Only	HPE OR ZT Proteus(NIC Card)	Port2,3,4 top right NIC -> A,B&G MMU/RU L0 Link Port2,3,4 bottom right NIC-> A,B&G MMU/RU L1 Link L2 MMU Link reserved for future	Fronthaul	25G	single Mode	SFG-ARM0VTDCVZ	Source Photonics	SPL-RO-25E-BX-IDFB-SE	25Gbps 15Km BiDi optic Tx1270nm Rx 1330nm
			Fronthaul	25G	single Mode	SFG-ARM0VTDCVZ	OE Solution	RQT2XMLR-I27-1	25Gbps 15Km BiDi optic Tx1270nm Rx 1330nm

(Example) How to Identify Appropriate SFP

❑ Packaging label

- ① Samsung FERT Code listed on packaging

❑ SFP module

- ② OEM
- ③ SFP model #
- ④ SFP description



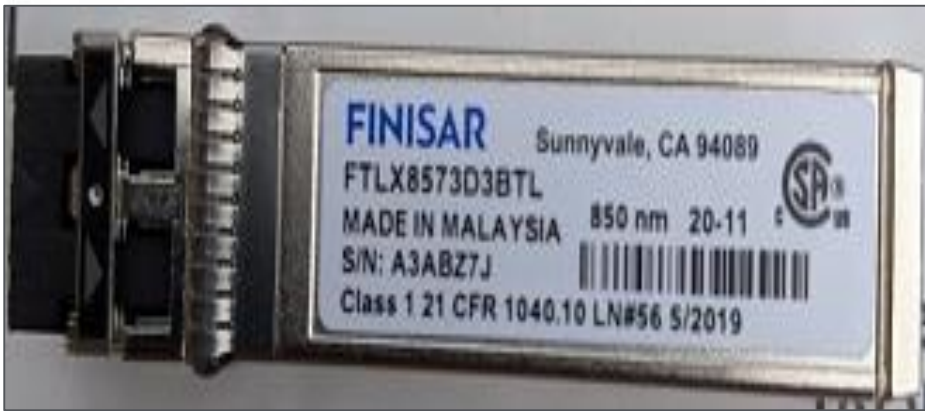
Application	Product	Samsung RAN HW Module (NR AU Ports)	Interface	Rate	MODE	Samsung FERT Code On Packaging	SFP OEM	SFP OEM Part # On SFP Module	SFP Description
C-Band Radio Side Only	MT6407-77A (64T64R LS 6 MIMO) RT8808-77A(8T8R LS6 R RH)	MMU Ports ->L0,L1&L2 RU Ports -> L0&L1	Fronthaul	25G	single Mode	SFG-ARM0VTDBVZ	Source Photonics	SPL-OR-25E-BX-IDFB-SE	25Gbps 15Km BiDi optic Tx1330nm Rx 1270nm

Only judge Samsung SFPs by bail colors when specified.

Small Form-Factor Pluggable (SFP)

- ✓ All CPRI SFPs are rate7, 10Gbps. For the HPE server, the iLOM is a 1Gpb link only and does not run at a lower speed such as 10/100. A 1Gpb electrical SFP is used in the CSR.
- ✓ SFP Cards are inside RRH from the factory. Always double check the RRH to ensure SFP cards are there. If cards are missing reach out to your POC to get replacements ASAP!

Multi-Mode CPRI 10Gbps Optic FSU L0 to L5 upper card and CDU.
FTLX8573D3BTL In the CDU to FSU CPRI links.





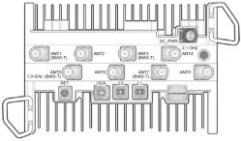
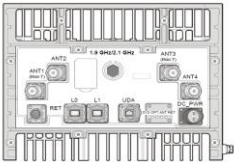
Quantity: 12

Single-Mode CPRI 10Gbps Optic L0 to L5 Ports FSU lower card to RRH.
RSPX0SLE-IT3 in the FSU to RRH CPRI links.



Quantity: Already installed by VZW on the CPRI

RRH SFP Cards







Product	Interface/Port Location	Manufacturer	Cat Part No	Bandwidth	Remarks	Ref Photo
1. 700/850M RRH (320W) [RFV01U-D2A] 	BBU or FSU10/L0 (CPRI To/From CDU 30 or FSU10)	OE Solutions	RSPX0SLE-IT3	10Gb/s	Single Mode, 1310nm, SFP+, 20Km, Duplex	
2. AWS/PCS RRH (320W) [RFV01U-D1A] 						
3. AWS/PCS RRH (160W) [RF4402-D1A] 						



TSB-VzW-0002Q
Optic Modules

25G 15Km BiDi SFP Identification with Bail Color*

C-Band

Vendor	SFG-ARM0VTDVBZ (Tx Wavelength: 1270 nm)	SFG-ARM0VTDVCVZ (Tx Wavelength: 1330 nm)	
OE Solution			
Lightron			
Source Photonics	<p>Bail Color: Black</p> 	<p>Bail color: Blue</p> 	

* 25G 15Km SFP identification by bail color is another check in addition to the SFP checks already specified in the previous slide.

Fiber cable and transceivers handling guide **SAMSUNG**

- ❑ Contamination is the # 1 source of troubleshooting in optical networks. A single particle mated into the core of a fiber can cause significant back reflection , insertion loss and even equipment damage.
- ❑ Both sides of the fiber connection must be free of contamination before connecting.
- ❑ Connector inspection and cleaning are simple steps with immense and crucial benefit and must be employed.

1 Inspect



2 Clean



3 Re-inspect



4 Connect

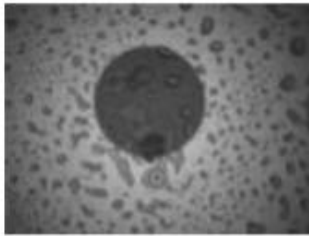
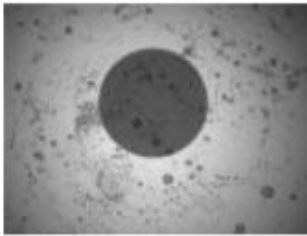
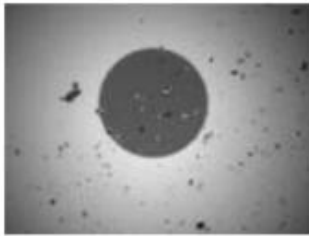
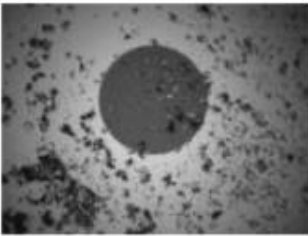


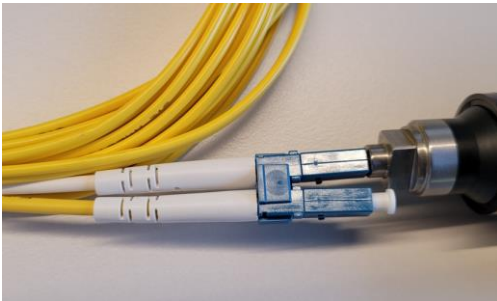
Fiber Inspection

1. Use the inspection probe to verify the cleanness of fiber.

1 Inspect



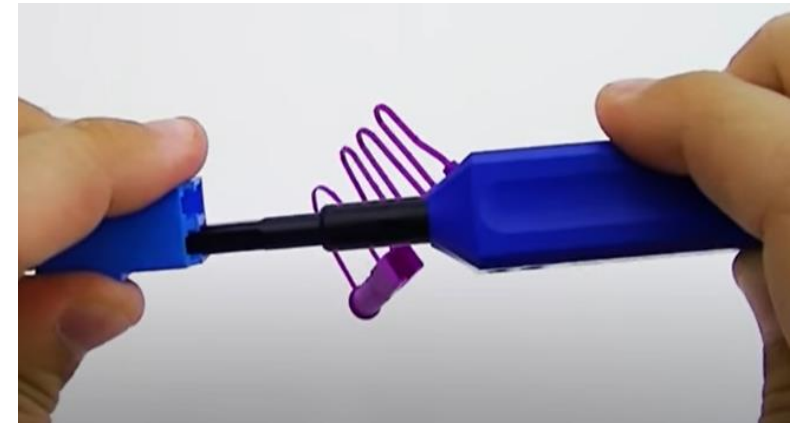
Skin Oil	Hand Lotion	Fiber Residue	Dirt and Dust
			



Fiber Clean

2. Clean Fiber ends using an approved fiber cleaning tool.

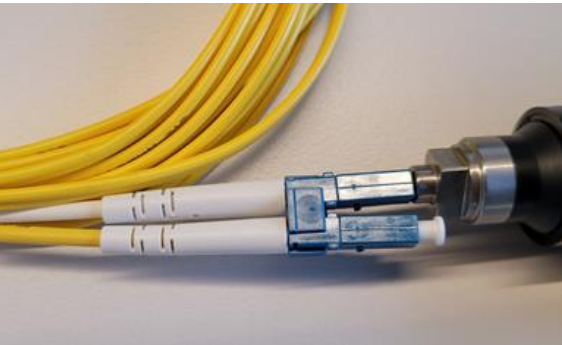
2 Clean



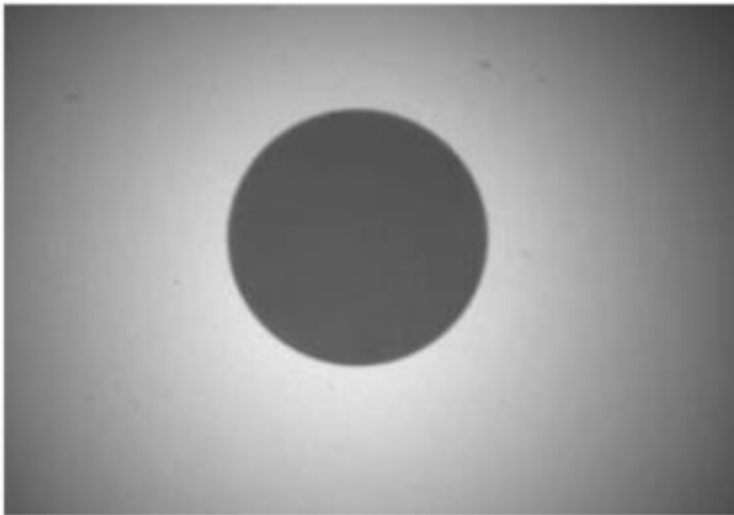
Fiber Re-Inspection

3. Re-Inspect.

3 Re-inspect



Clean Fiber



4. Connect cleaned fiber.

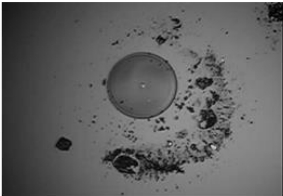
4 Connect



Cleaning Optic module



Dust-Cap
should be left
in place until
installation



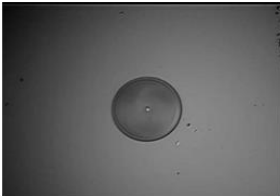
<Before Cleaning>
Cross Section of Ferrule



Remove the Cleaner "Guide Cap",
Insert the Cleaner into TxRx port



Push & pull the cleaner
2 to 3 times to remove the dust



<After Cleaning>
Cross Section of Ferrule

SFP Removal Tool



Features

- Includes a keychain hole for easy access and storage
- Audibly clicks when inserted in the SFP
- Can pull up to 10 lbs.

Specifications

Characteristics	Values
Dimensions -Closed (in)	1 T58x T1516x T78
Dimensions -Open (in)	2T12x T1516x T78
Weight (grams)	6.5
Material	ABS(GF), PP



Ordering Information

Contact Information

Phone Number: 972-685-9149

Email:eric@nwc-us.com

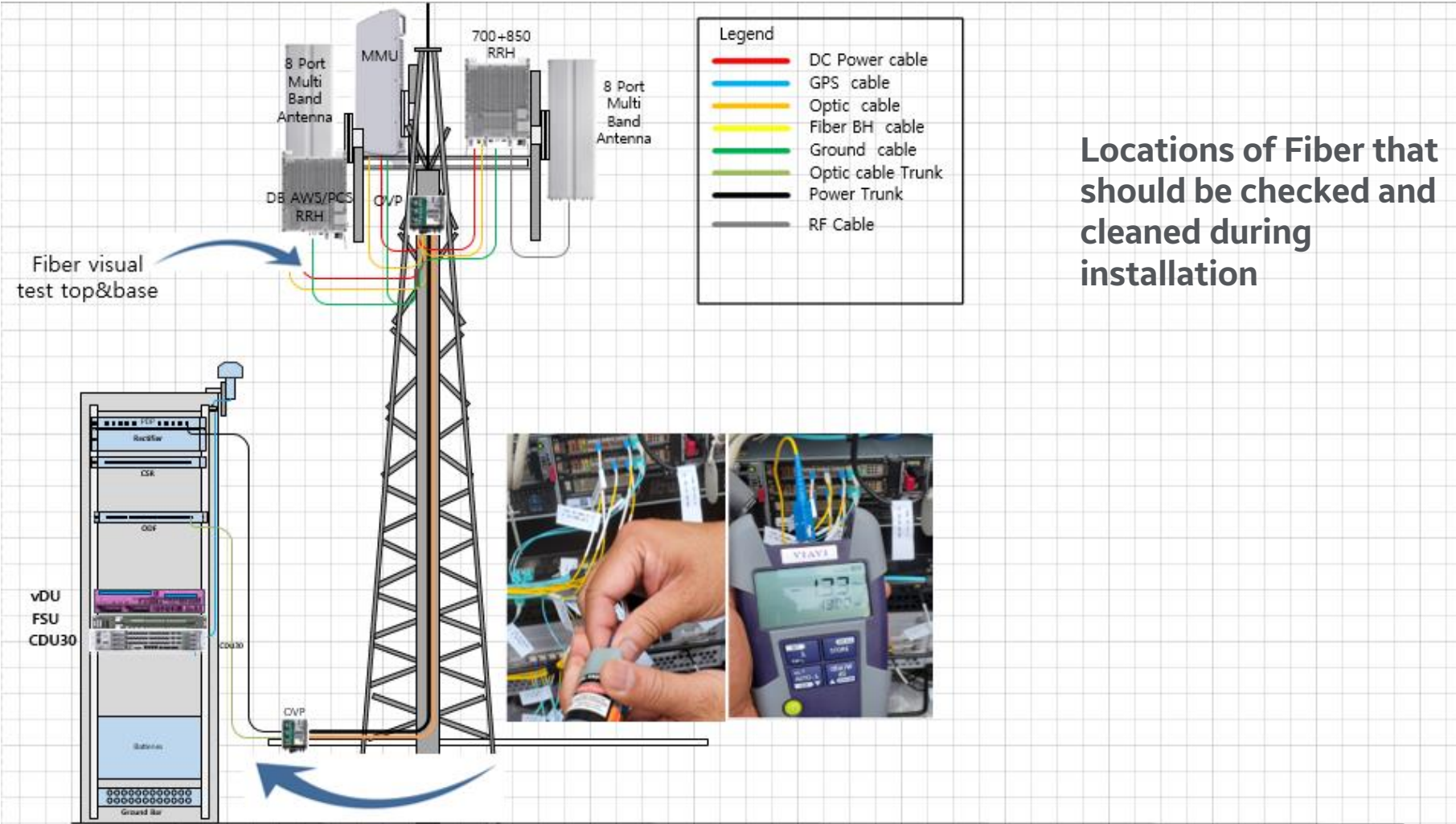
SFP Removal Tool



Fiber Cleaning

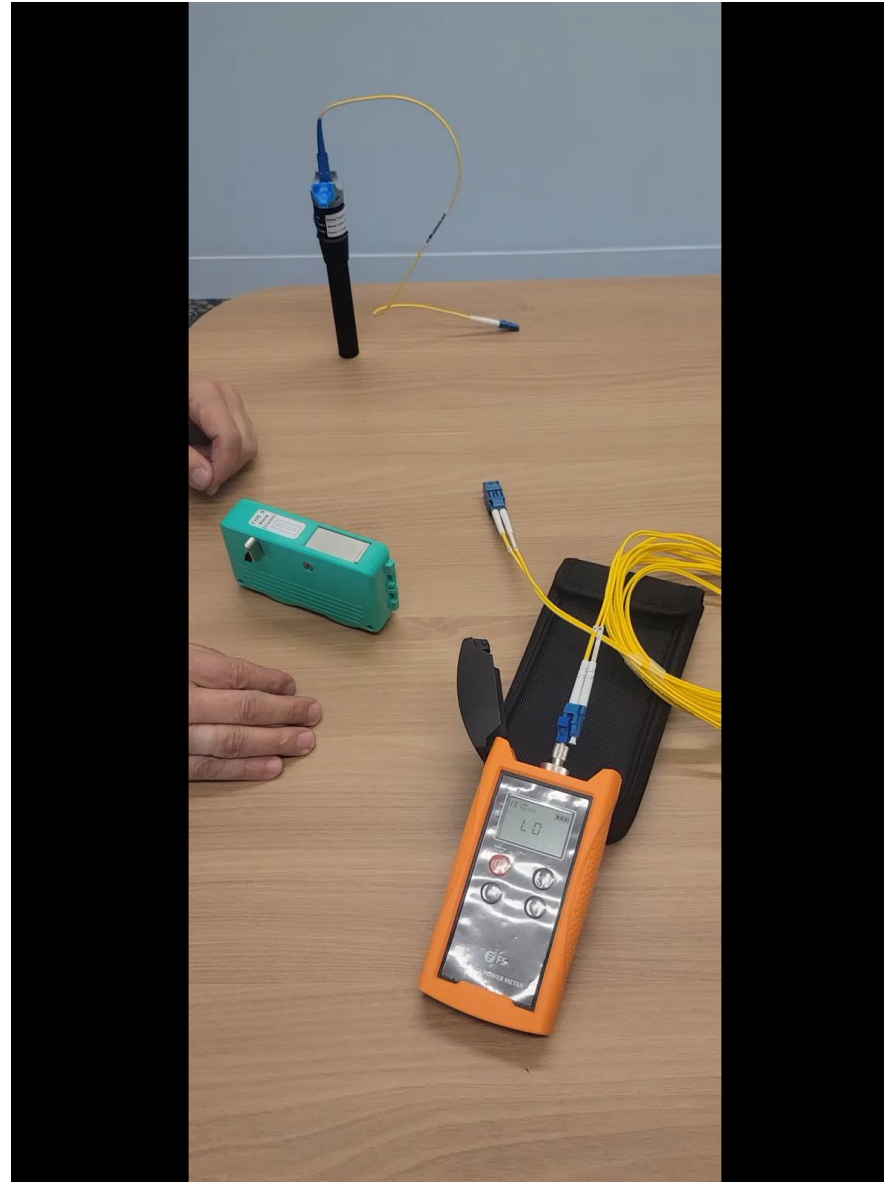
Fiber check visual

Only 1 sector shown.
Fiber check reference
only. Not a plumbing
diagram.



DRAWN BY HW Engineering	TITLE Fiber Sanity test	
REVIEWED BY		
SAMSUNG	Verizon 4G/5G	REV
	SCALE Not to Scale	SHEET 1

Fiber check visual



SNAP Build Attenuator

Important Guidelines

- ❑ Installation guideline of 5dB fixed attenuator refers to only 10G , 20Km BiDi Optic module. Other SFP's does not requires attenuator.
- ❑ 5dB attenuator application ONLY after Rx Power test >1.5dBm. Blind application of attenuator may cause extra padding of signals and unintended degradation.
- ❑ 5dB attenuator applicable only on CDU30 , FSU10/20 or CSR side. Never apply on RRH/AU side.
- ❑ In case of FSU in place , 5dB attenuator to be applied on FSU side only where RRH Fronthaul is landed. In this case CDU30 is not applicable. CDU30 case only would require 5dB attenuator on LCC4 card for respective sector as required.
- ❑ APD (Avalanche Photo diode) applied for high sensitivity of optic module communication failure or receiver damage may occur if optical attenuator is not used if required based on Rx Power check
- ❑ Take extra measures to minimize dust contamination and perform standard fiber & dust cleaning to all fiber line system including attenuators
- ❑ Duplex and BiDi SFP's are incompatible.



Antistatic Glove



Optical Power meter



Fiber Optic Cleaner



Proper Optical Attenuator
1ea As per Link
(ex. 5dB Attenuator)

Attenuator Usage

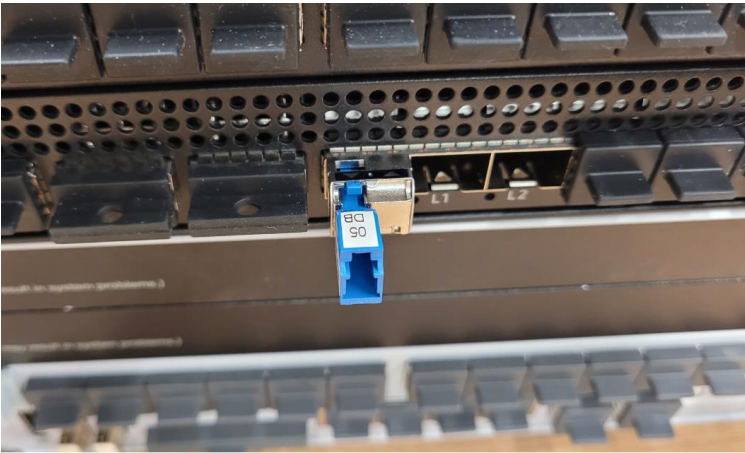
1. Measure with light meter.
2. Level should be between +1.5db and -7.5db – optimal is 0.0db.
3. If hotter than +1.5db use either 3 or 5db attenuator – never stack two or more attenuators together.
4. Only install on the CDU.
5. Re-measure with light meter to verify level is lower than +1.5db.
6. Clean – label cable and plug back in to receiver.

Installation Procedure of Optic Attenuator-1



1. Optic module installation in CDU

Optic Module Type	Avg. Tx Power	Recommended Average Receive Power Level	Max allowable receive power level (Overload)	Optical Attenuator
10G, 20km, Duplex	-2.0 ~ 2.0 dBm	-10.4 dBm	+2.0 dBm	Not required
10G, 20km, Bi-di, AU side	0 ~ +5.0 dBm	-10.4 dBm	+1.5dBm	5dB required on DU (or switch) side*
10G, 20km, Bi-di, CSR side	0 ~ +5.0 dBm	-10.4 dBm	+1.5dBm (As close as possible to 0dBm)	5dB required
25G,15Km , Bi-Di (SW/RU Side)	-7.0~+2.0 dBm	-11.3 dBm	+2dBm	Not Required
25G,10Km Duplex	-7.0~+2.0 dBm	-11.3 dBm	+2dBm	Not Required



2. Optic attenuator must be Installed in CDU optic module before connection of optic cable

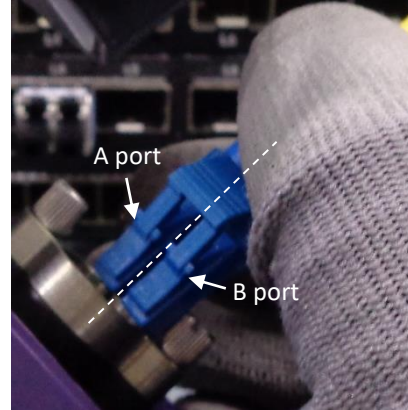
*Samsung baseband shown as example. SW=Switch/Router. In case of FSU , Attenuator to be used on FSU side instead of CDU30.
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5dB Attenuator Use case

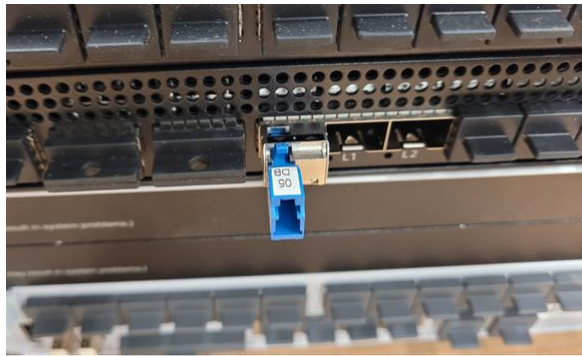


Rx Power >1.5dBm requires 5dB attenuator as per 10G 20Km BiDi Specs

Installation Procedure of Optic Attenuator - 2



3. Measurement of optic power using optic power meter for "A" Port of optic cable in DU side



4. Select proper optic attenuator to make the measured power within normal RX power range

* Samsung baseband shown as example. Refer Switch instead

Installation Procedure of Optic Attenuator - 3

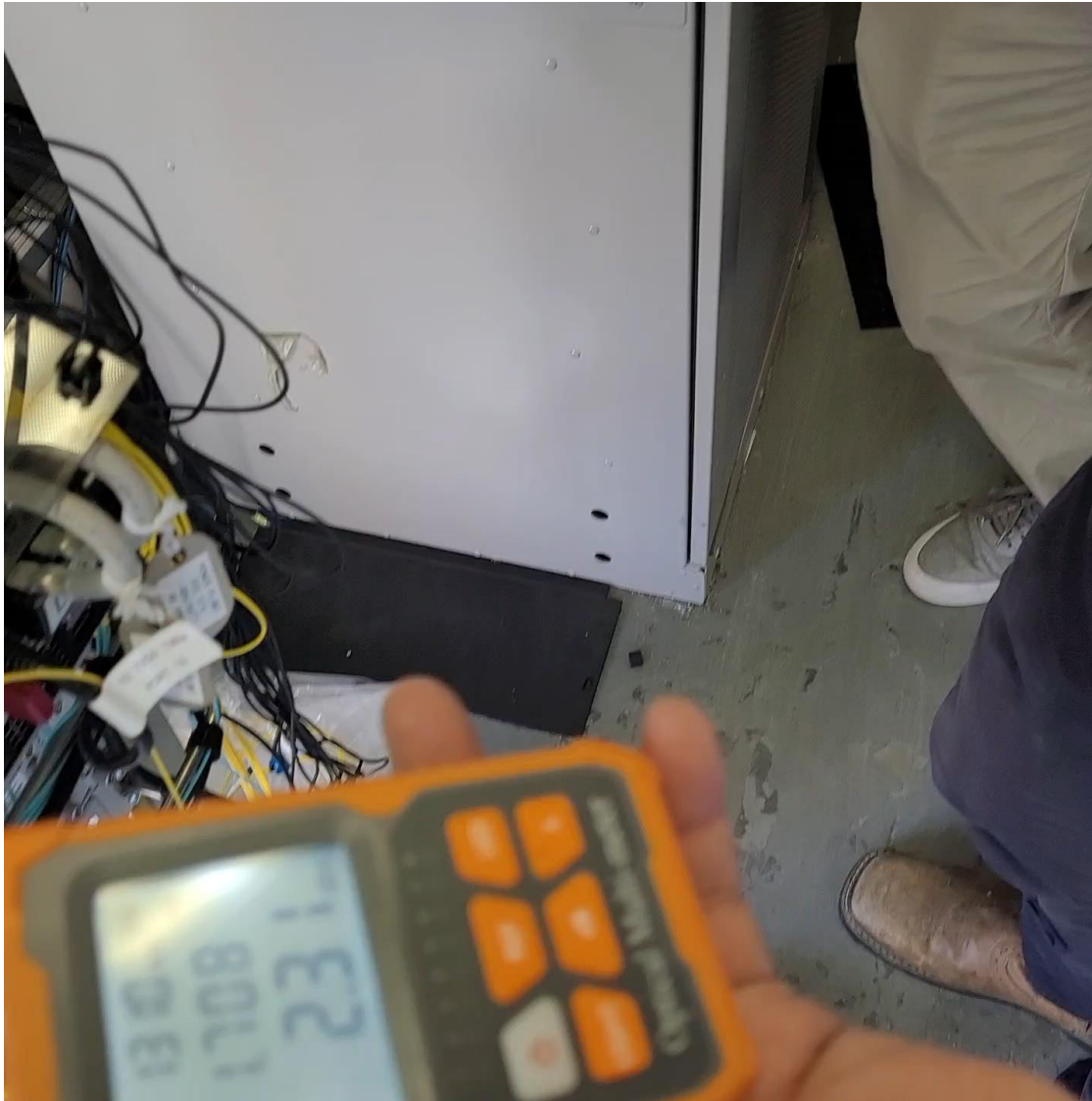


5. Connect optic cable to optic attenuator then check the optic module information such as RX Power and Link Status for DU and RU(MMU) side

6. If optic module or attenuator replacement is required due to link fail or abnormal behavior, please repeat steps 3 through 5.

* Samsung baseband shown as example. Refer Switch instead

5dB Attenuator Use case



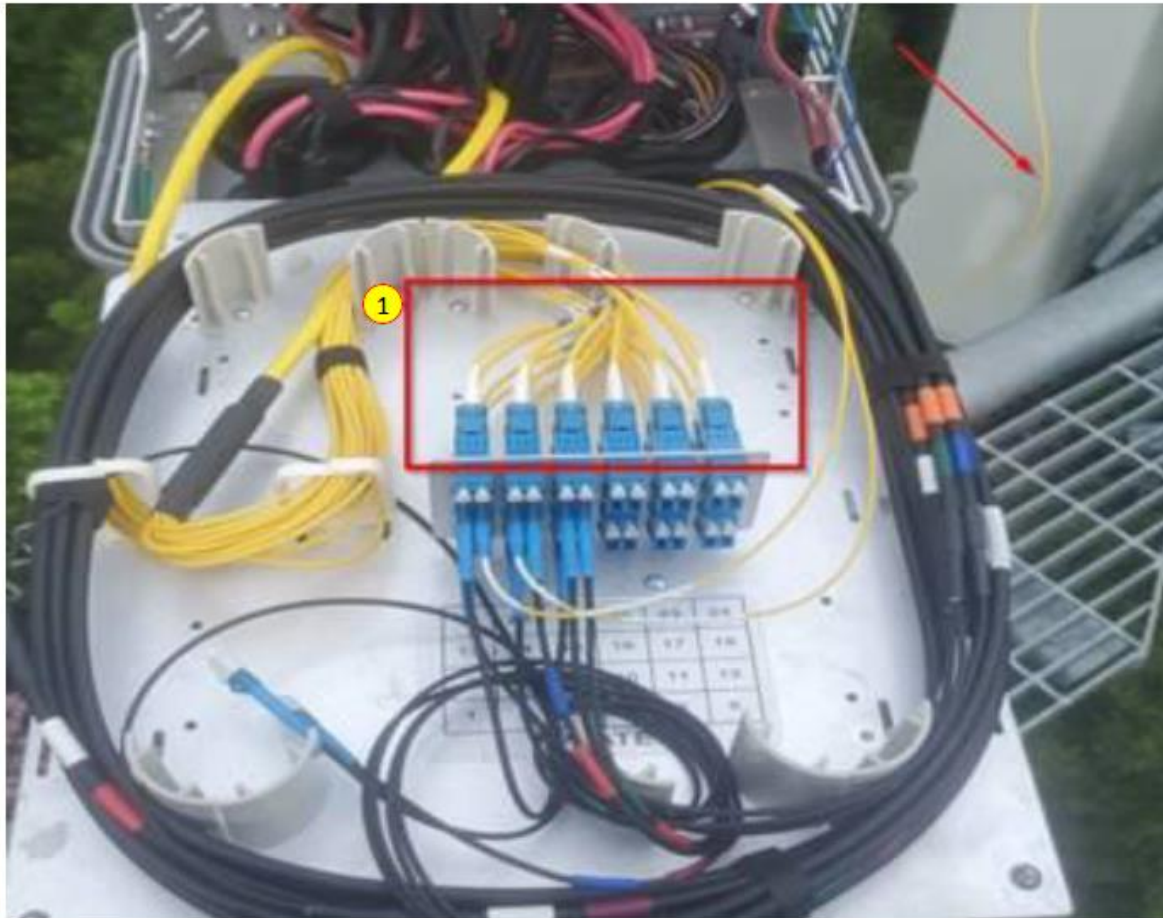
SNAP Build Fiber Labeling

Fiber labelling

SAMSUNG

As-is

1. Did not label fiber.



To-be

1. Fiber labels available.

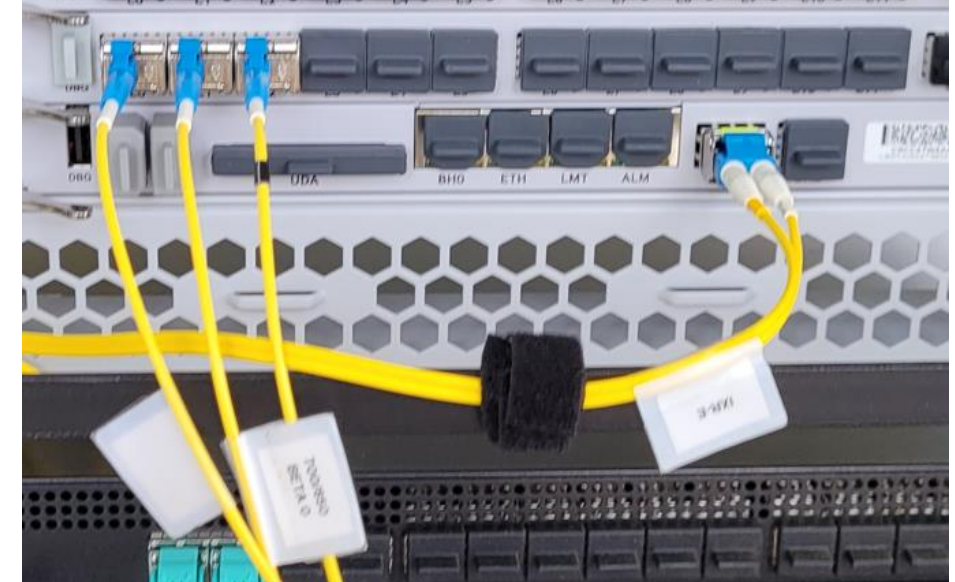
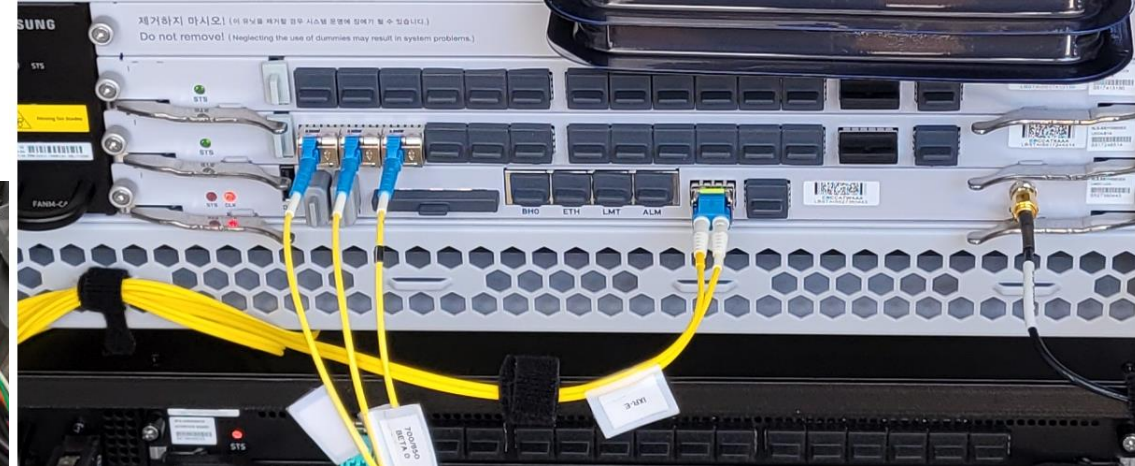
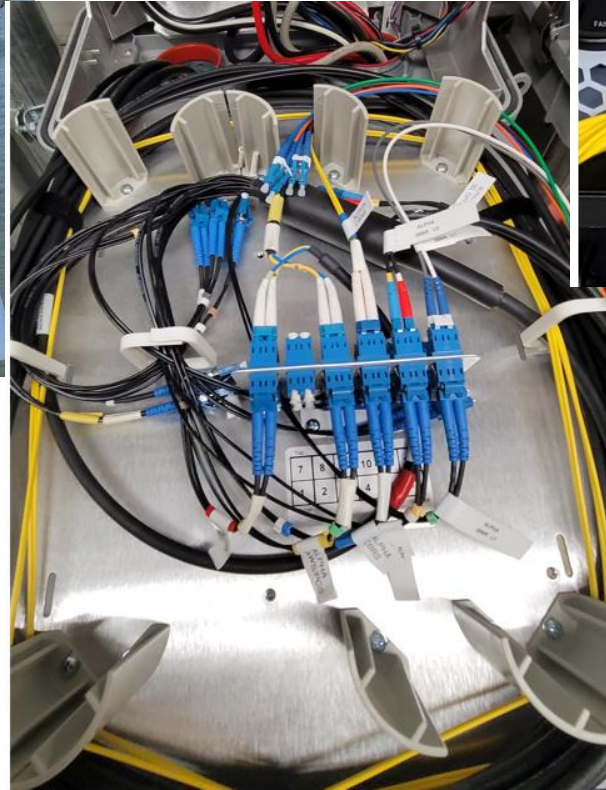
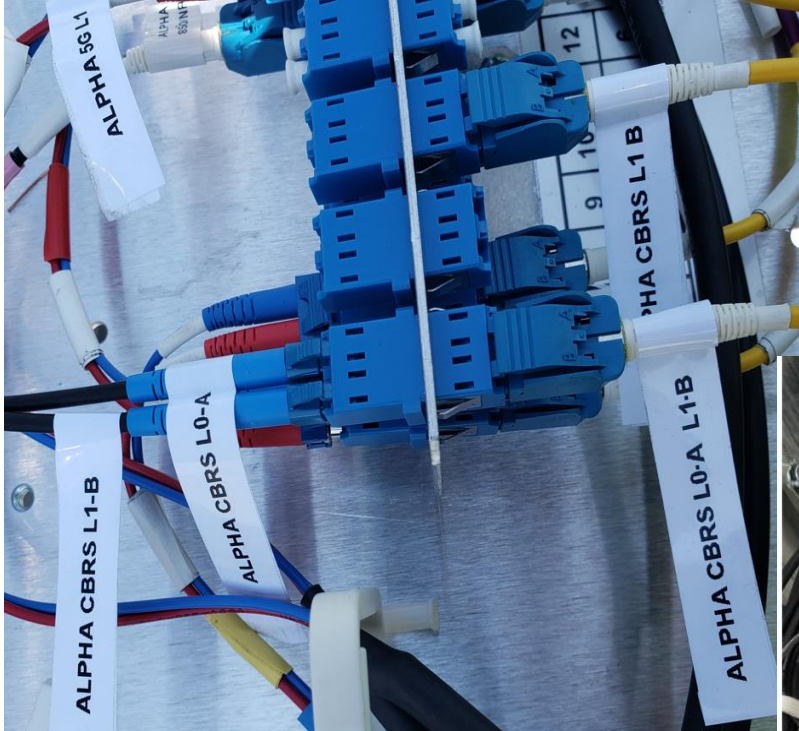


Fiber labelling

Fiber labelling at OVP

Ensure fiber pairs are properly labeled (site name/ID, sector, technology or Frequency (D0 not label Hi-Hi or Lo-Lo) and OPT-1 or OPT-2).

Fiber labelling at CDU30



C-Band MMU/vDU Labelling Example

MMU Power Cable Color Code	MMU Jumper cable @ Top OVP	Trunk Fiber @ Top OVP	Ground OVP Trunk fiber	Fiber Jumper cable @Ground OVP	Fiber Jumper cable @Patch Panel (Cabinet/Shelter)	vDU front haul Port
Blue	LS6_Alpha_MMU_L0	LS6_Alpha-MMU-L0	LS6_Alpha_MMU_L0	LS6_Alpha_MMU_L0	LS6_Alpha_MMU_L0	LS6_Alpha_MMU_L0
Violet	LS6_Alpha_MMU_L1	LS6_Alpha_MMU_L1	LS6_Alpha_MMU_L1	LS6_Alpha_MMU_L1	LS6_Alpha_MMU_L1	LS6_Alpha_MMU_L1
Green	LS6_Alpha_MMU_L2	LS6_Alpha_MMU_L2	LS6_Alpha_MMU_L2	LS6_Alpha_MMU_L2	LS6_Alpha_MMU_L2	
Blue	LS6_Beta_MMU_L0	LS6_Beta_MMU_L0	LS6_Beta_MMU_L0	LS6_Beta_MMU_L0	LS6_Beta_MMU_L0	LS6_Beta_MMU_L0
Violet	LS6_Beta_MMU_L1	LS6_Beta_MMU_L1	LS6_Beta_MMU_L1	LS6_Beta_MMU_L1	LS6_Beta_MMU_L1	LS6_Beta_MMU_L1
Green	LS6_Beta_MMU_L2	LS6_Beta_MMU_L2	LS6_Beta_MMU_L2	LS6_Beta_MMU_L2	LS6_Beta_MMU_L2	
Blue	LS6_Gamma_MMU_L0	LS6_Gamma_MMU_L0	LS6_Gamma_MMU_L0	LS6_Gamma_MMU_L0	LS6_Gamma_MMU_L0	LS6_Gamma_MMU_L0
Violet	LS6_Gamma_MMU_L1	LS6_Gamma_MMU_L1	LS6_Gamma_MMU_L1	LS6_Gamma_MMU_L1	LS6_Gamma_MMU_L1	LS6_Gamma_MMU_L1
Green	LS6_Gamma_MMU_L2	LS6_Gamma_MMU_L2	LS6_Gamma_MMU_L2	LS6_Gamma_MMU_L2	LS6_Gamma_MMU_L2	

SNAP Build Fiber Routing – OVP

Fiber OVP Routing

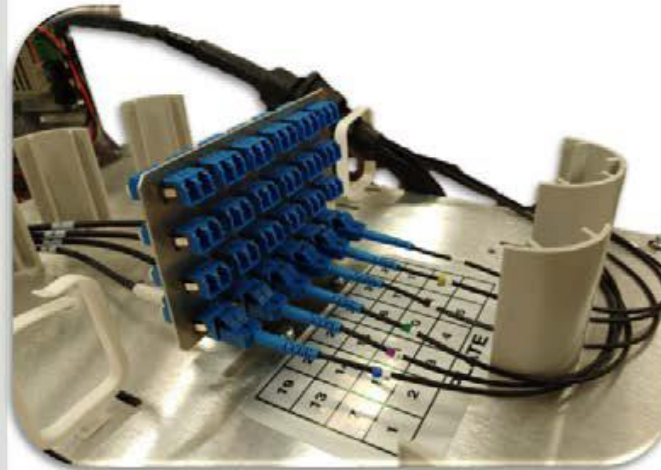
Bi-Di Jumper Integration

SAMSUNG

**Simplex (Bi-Di)
Hybrid Jumper
Integration**

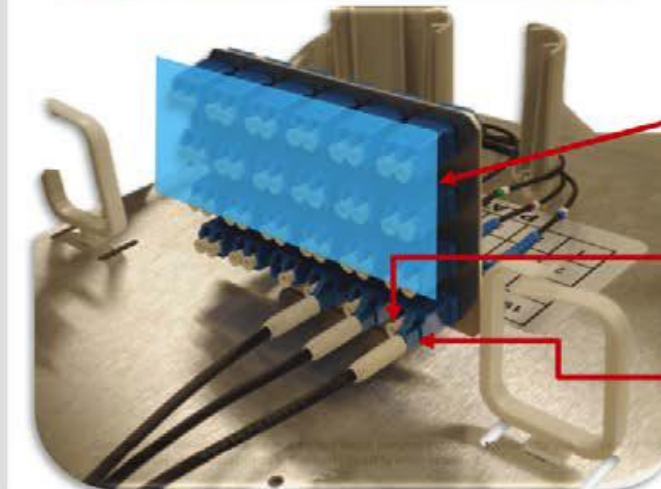
Top OVP

verizon



Hybrid Trunk Cable Side

- No Change
- Follow existing color-code and numbering scheme



Hybrid-Jumper Side

Spare Bulkheads

Left Fiber Port

- Used as spare or for radio with large bandwidth that require a 2nd fiber
- As Spare, please keep dust cap on

Right Fiber Port

- Connect the simplex fiber jumper on the right port to the BiDi SFP on the radio

Ensure fiber pairs are neatly coiled around the cable guides, use Velcro if needed.
Ensure fiber pairs are properly seated in the fiber connection bar.

Information curtesy of Verizon doc - ME-RFS-ST-14-0001 - RRH/RRU/AIR/AA - Hybrid Cable Plumbing Standard Diagrams

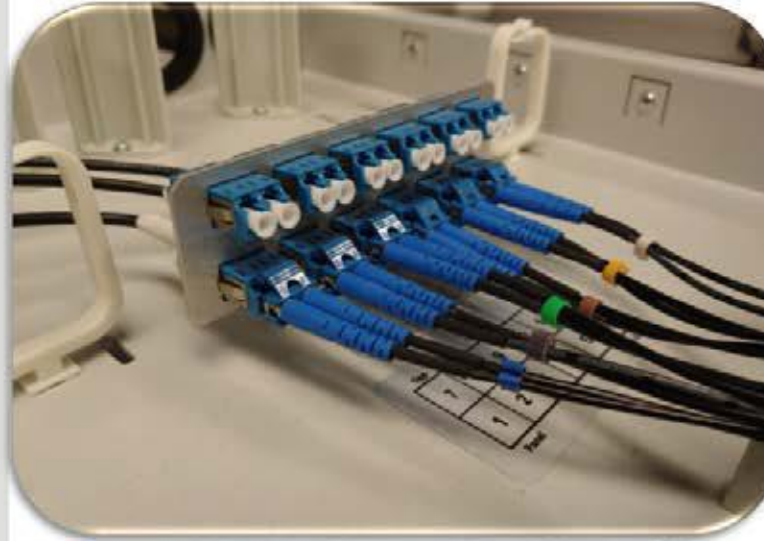
Fiber OVP Routing

Bi-Di Jumper Integration

**Simplex (Bi-Di)
Hybrid Jumper
Integration**

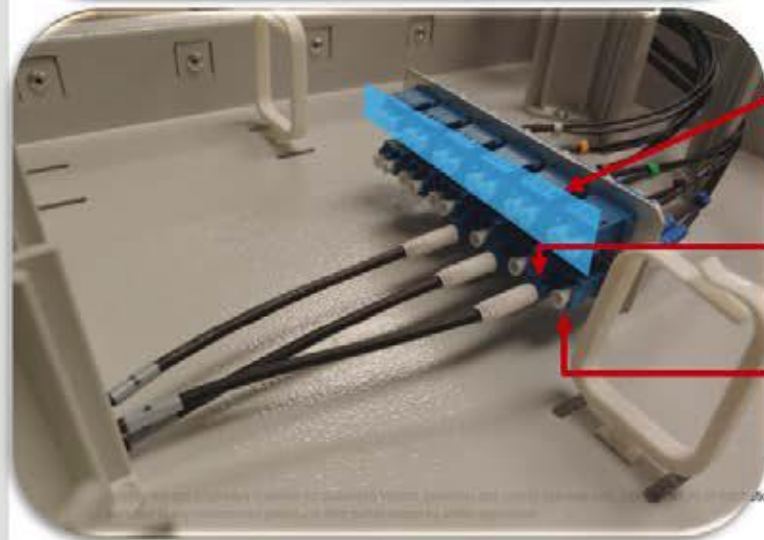
**Bottom OVP
Or
Fiber Tray**

verizon✓



Hybrid Trunk Cable Side

- No Change
- Follow existing color-code and numbering scheme



Hybrid-Jumper Side

Spare Bulkheads

Left Fiber Port

- Connect the simplex fiber jumper on the left port to the BiDi SFP on the BBU

Right Fiber Port

- Used as spare or for radio with large bandwidth that require a 2nd fiber
- As Spare, please keep dust cap on

Fiber Jumpers Routing

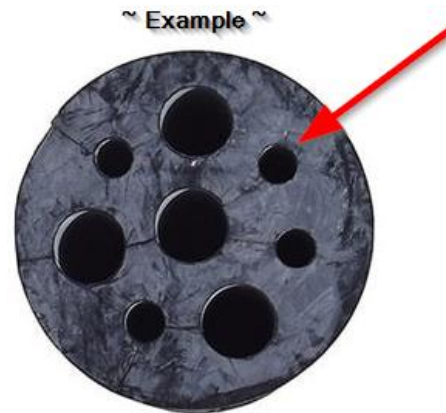
Fiber jumpers need to be supported in their own grommet and snap-in or a grommet that has a standalone hole designed to support a fiber jumper independently.

The first support is required at 18", thereafter support is required every two feet on horizontal runs and three feet on vertical runs.

Color-code should be wrapped around the fiber jumper a minimum of three times and have 3/4" spacing in between bands.

Service coils are permitted for dress-in purposes and to help reduce excessively long fiber jumpers. Service coils need two supports with grommets 180° apart. Do not use zip-ties or skinny tape on service coils.

Fiber jumpers should not exceed maximum bend radius or be routed through grating.



CPRI Fail

CPRI Related Alarms

- Troubleshooting CPRI related alarms such as:

- RRH clock-fail
- RRH cpri-fail
- RRH optic-transceiver-rx-los
- RRH optic-transceiver-tx-fault

1)Rate-Configuration Mismatch can cause errors on optical link path. In each optical link, the SFP Rate and Configured rate should be the same for proper optical communication.

2)Optical inter-operability problems can create errors on optical link path.

- SFPs from different vendors may have different specifications such as Tx/Rx Power, Reflections, wavelengths, etc.

3)Low Rx power (Including Fiber Cable loss, contamination on Rx port of module) can create losses and errors on optical link path.

- SFP modules have 'Rx Sensitivity' and Rx power should be greater than the Rx sensitivity value. Fibers should be cleaned and checked for contamination and Rx power should be checked after installing.
- Defects on SFP module or Fiber can create errors and cause an optical link path failure.

Troubleshooting CPRI Related Alarms

1. Verify optic Rx power is according to SFP specifications at both DU and RRH side. If not, arrange for a site visit.
 2. Clean optic modules and CPRI fibers. (See Section for Handling Fiber Optics.)
 3. Replace optic modules and/or CPRI fibers if required.
 4. Verify wavelengths of optic modules are matched.
 5. Verify that the CPRI running speed in the DU is per guidelines established in VzW RAN Optical Module Technical Service Bulletin. If not, change the CPRI-SPEED setting at the DU side. (See next slide.)
1. Verify RRH and DU SFPs are per recommendations in Optical Module Technical Service Bulletin. If not, arrange for a site visit to change optic modules at DU and/or TLU/PMU.
 2. Investigate RRH.

Step1 (Remote – before visiting site):

- 1) Check to ensure speed (rate) of the port at DU & RU is the same.
- 2) Check to ensure the proper SFP module is being used in each port.
- 3) Check to ensure the optic Tx, Rx Power is within range.

Step2 (Visit the site):

- 1) Check Tx, Rx Power is appropriate at each end of CPRI link. This should be measured by optical power meter.
- 2) Receive power generally should be -8dBm or greater.
- 3) Pull out and re-insert SFP module to reset it.
- 4) Clean optical cable and SFP module to remove contamination.
- 5) If optical power is abnormal, replace SFP module.
- 6) If previous steps do not fix the problem, replace optical cable.

CPRI Rate Guidelines

CPRI Fail alarms occur when Loss of Signal (LOS) or Loss of Frame (LOF) occurs due to rate mismatches.

-In each optical link, the SFP Rate and Configured Rate on each system should be same for proper optical communication.

-The guidelines below should be followed where Samsung DUs are used along with other Non-Samsung RU products according to Open CPRI standards.

Rate 3 Guidance

When the RRH SFP is Rate 3, all SFPs creating the CPRI link (DU, TLU/PMU, and RRH) must be Rate 3 SFP.

CPRI Running Speed at DU must be Rate 3.

Rate 5 Guidance

When the RRH SFP is Rate 5, all SFPs creating the CPRI link (DU, TLU/PMU, and RRH) should be Rate 5 but may be Rate 7.

CPRI Running Speed at DU must be Rate 5.

Rate 7 Guidance

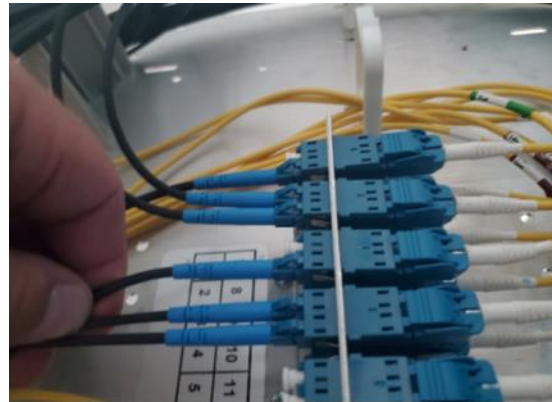
When the RRH SFP is Rate 7, the following must be met:

- If the RRH type has maximum CPRI line rate 7, all SFPs creating the CPRI link (DU, TLU/PMU, and RRH) must be Rate 7, but may be Rate 5.
- CPRI Running Speed at DU must be Rate 7 or 5.
- If the RRH type has maximum CPRI line rate 5, all SFPs creating the CPRI link (DU, TLU/PMU, and RRH) should be Rate 5, but may be Rate 7.
- CPRI Running Speed at DU may be Rate 5.

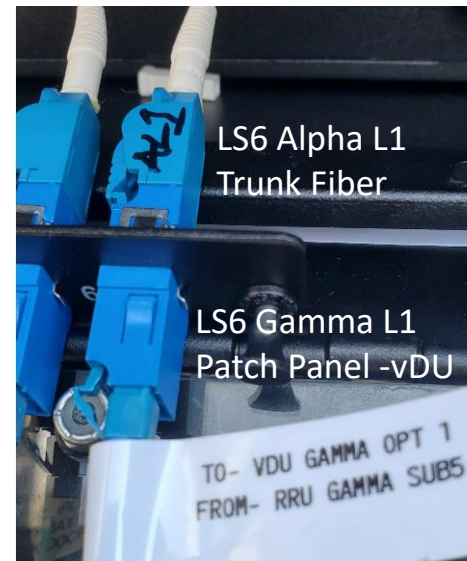
Objective and Field Lessons

High trending issue has been noticed by SEA HW Engineering that GCs are making errors such as:

- 1) Samsung HW is being deployed with BiDi SFPs and Jumper versus Duplex Trunk resulting in confusion, and the right approach is not being employed to validate and correct the rollover fiber strands both on the top OVP and bottom OVP.
- 2) No Sanity check is being employed to make sure Bottom OVP<-> Patch Panel <-> baseband OR OVP<->baseband.
- 3) No labels are found on the top OVP on either Radio Jumper side or Trunk Side.
- 4) Wrong sector labeling or missing labeling
- 5) LS6 MIMO Radio 3rd fiber jumper (reserved for future use) is not installed or, if installed, not labeled at the baseband for future reference.



Tower top OVP
No label on Either side



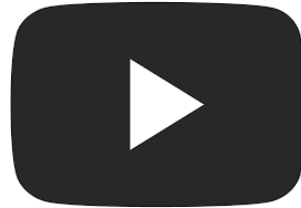
Baseband
Wrong label & Connects

Thank You

Official Website : www.samsungnetworks.com



[linkedin.com/showcase/samsung-networks/](https://www.linkedin.com/showcase/samsung-networks/)



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