

V03 – DCS Closed Node Validation

ENGINEER: _____

DATE: _____

COMMENTS:

MARS
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Date: 03/20/05

V03 – DCS Closed Node Validation

After sealing the node the following BER tests and power tests should be performed before deployment.

This test is comprised of a physical layer and link layer (ISO-0,1) BER test to insure that the combined optical and electrical channels are capable of conducting gigabit Ethernet frames with an error rate of less than 1 error in 10^{12} .

The required equipment for this test is:

- 1) Suitable gigabit Ethernet BER optical test set
- 2) MARS sub sea node assembly completely fibered
- 3) A test fiber, VOA, or actual MARS fiber cable
- 4) MARS shore station or shore station simulator
- 5) Optical Power Meter
- 6) Optical attenuator per following text
- 7) Fiber Optical Cleaning Equipment
- 8) 1 or preferably more LAN FORGE test platforms
- 9) 1 ODI Wet Science Cables with ROV Termination on one side and RJ45/ethernet connection on the other side.

NOTE:

Since this is a closed node test the only available connection to the CISCO router ports is via the science connection unless an additional test port has been developed.

Possible fabrication of a non-wet adapter for coupling to the ODI female is an alternative to actual ODI connections)

Just before node deployment is is still advised to use an actual ODI connector and check EACH science port for connectivity.

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GENERAL PROCEDURE

This test is to be performed after the V01- Optical test. This will insure that all equipment is properly attenuated preventing damage. There are no recorded results for this test. The object is to adjust the system until all channels run cleanly without BER errors.

This test will be divided into 3 parts:

Optical Output Power Test

Testing the optical power emanating from the shore and sub sea systems.

Optical Passthrough Test

Testing the optical path and data carrying capability on the passthrough channel.

Data Throughput Test

Testing that the router, electrical converted and fiber optic channels are running error free from the subsea science ports to the shore science ports

> CAUTION! Be sure that you do not overdrive any of the optical receivers by injecting too much light into them. All attenuators should be properly installed for these tests.

NOTES:

- 1) We will use the phrases East .98 East .75 and East .32 as shorthand for East 1558.98 East 1555.75 and East 1549.32 channels
- 2) We will use the phrases West .98 West .75 and West .32 as shorthand for West 1558.98 West 1555.75 and West 1549.32 channels
- 3) The east side only is shown in the figures that follow. All tests should be mirrored for the West side.
- 4) We assume the use of an ANCOT Netminer BERT tester deployed with SFPs as the BER test unit.
- 5) There is an obvious preference to perform the test with the actual MARS cable and shore station, however should physical circumstances prevent this, the test may be performed with a fiber spool or VOA (variable optical attenuator), and with a mobile test shore station.
- 6) If a VOA is used, set it to 15dB loss to simulate the MARS cable plus termination assemblies.
- 7) If a VOA is used you may use the second port on the BER tester instead of using 2 BER testers since the sub sea node and shore station can be placed in close proximity.
- 6) Proper fiber handling and safety techniques are assumed throughout and not further mentioned.
- 7) Use SM fiber for all loopbacks

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ELECTRICAL POWER CHECK

With all of the DCS system powered up:

- > Read the overall electrical power consumption of the DCS elements from the power supply
- > Using the node power controller management interface read the power consumption of the individual DCS elements
- > Record the values in the results section of this document

TEMPERATURE CHECK

With all of the DCS system powered up:

- > Using the node power controller management interface read the temperature of the individual DCS elements (excepting the EDFAs)
- > Using the EDFA serial interface read the temperature of the EDFAs
- > Record the values in the results section of this document

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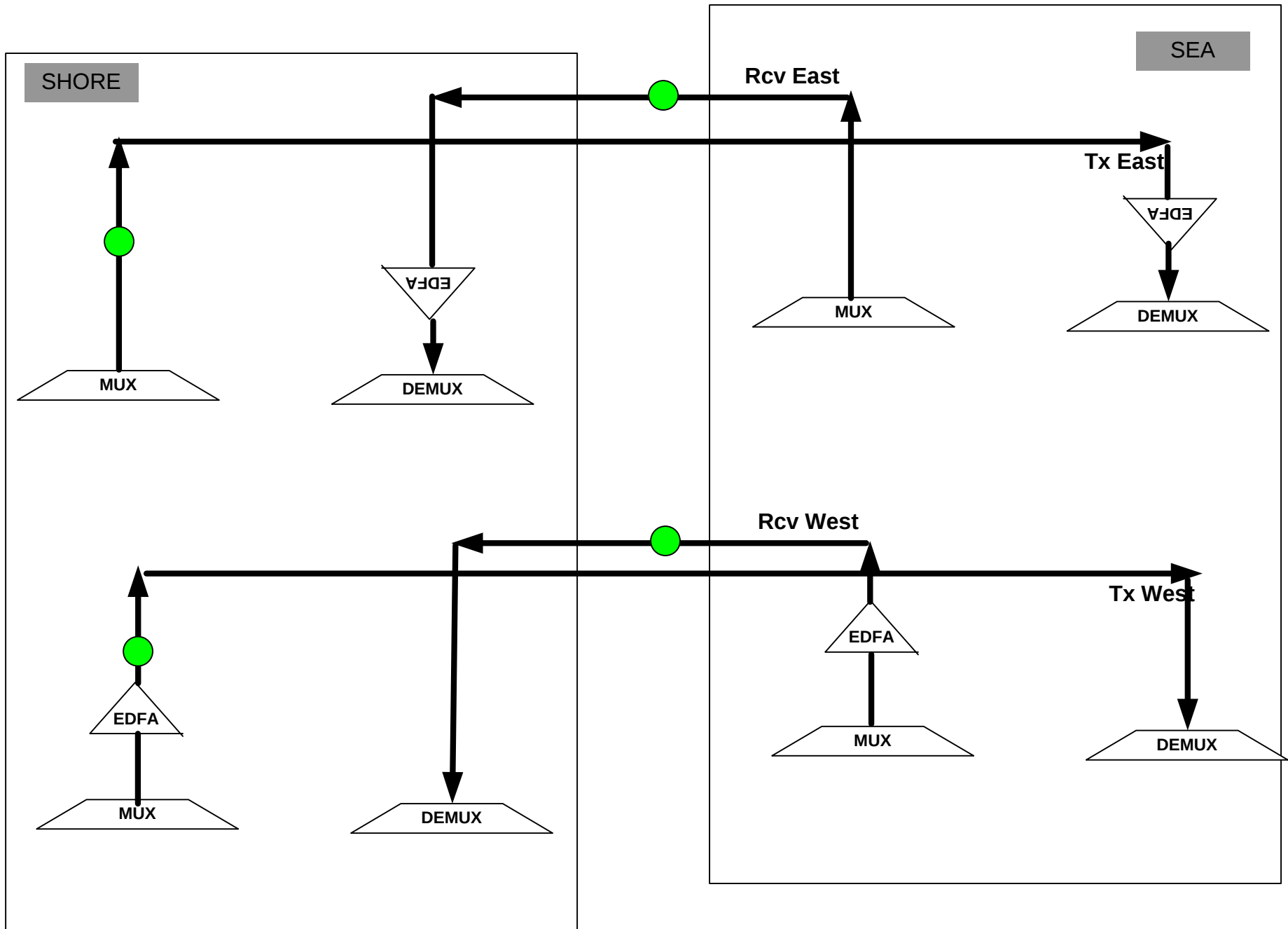
OPTICAL POWER CHECK

This test is done while the sea node closed.

- 1) Set an optical power meter to 1550nm
- 2) Power up the node and shore station, but insure that no data or BER test is flowing
- 3) Measure the output of the sub sea transmit fibers for East and West (see next page)
- 4) Measure the output of the shore transmit fibers for East and West (see next page)
- 5) Record the vales in the RESULTS section of this document
- 6) Log into the Shore Station GYDA controller. List the East and West power values for the 1558.98 and 1555.75 MRTRs
- 7) Log into the Sub Sea GYDA controller. List the East and West power values for the 1558.98 and 1555.75 MRTRs

V03 – DCS Closed Node Validation – optical power test

Optical Power is measured at points shown in green



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SUB SEA NODE OPTICAL BER TEST (Pass Through Channels)

This test is done while the sea node closed. It is, at this point, the only optical test which can still be performed without engaging the CISCO switches.

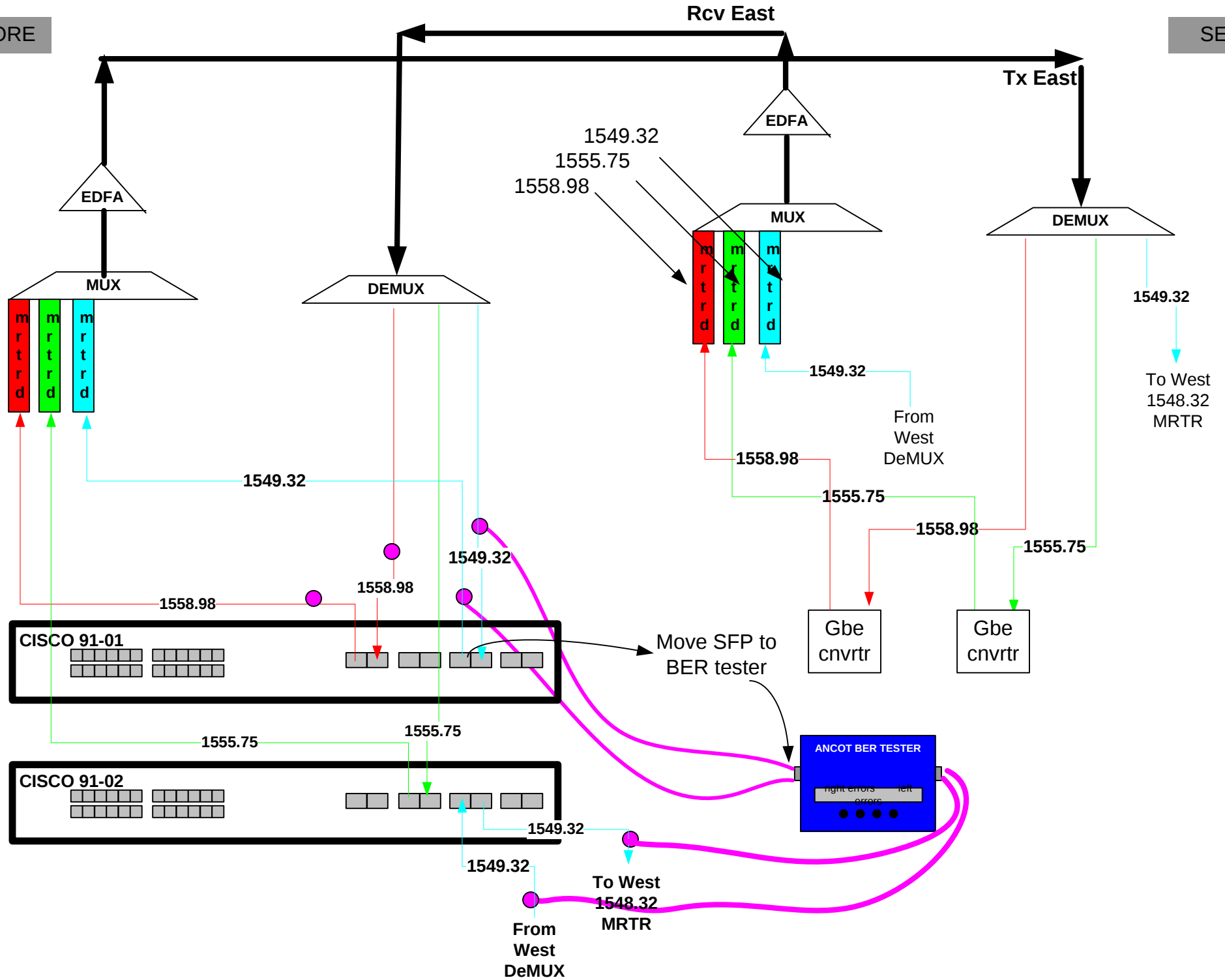
This test is unique as it can be performed completely from the shore side, after the sub sea node is deployed in the water. The setup for this test is shown on the next page. The magenta circles are points where the optical system is tapped into for insertion of the BER tester.

- 1) ON THE SHORE SIDE Remove the East .32 SFP with fibers from the CISCO 91-01 Router (The SFP at port 27) and place it in an SFP socket of the BERT tester.
- 2) ON THE SHORE SIDE Remove the West .32 SFP with fibers from the CISCO 91-02 Router (The SFP at port 27) and place it in an SFP socket of the BERT tester.
- 3) Run a CRT, CJT and CST BERT test for 30 minutes each.
- 4) Record all outcomes in the results section

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SHORE

SEA



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Network Accessibility Checks

This test is simply a set of ping tests to insure that the various LANs in the sub-sea node can be accessed.

- 1) ON THE SHORE SIDE attach a PC to a port in the management VLAN. These may be any port 3 thru 19 of the mra91-01 switch.
- 2) Configure the PC with an address of 10.128.91.100
- 3) Issue pings to the following devices and record the result in the results section:
 - > sub-sea GYDA 10.128.1.14
 - > comms controller 10.128.1.20\
 - > power controller 10.128.1.??
- 4) Using an ocean wet connector, attach a science instrument simulator to science port 1. (A PC may be used)
- 5) Configure the PC or science instrument simulator to 10.11.1.1
- 6) Ping the science device from the shore PC
- 7) walk the science instrument simulator through all ports reconfiguring it's IP address as follows:

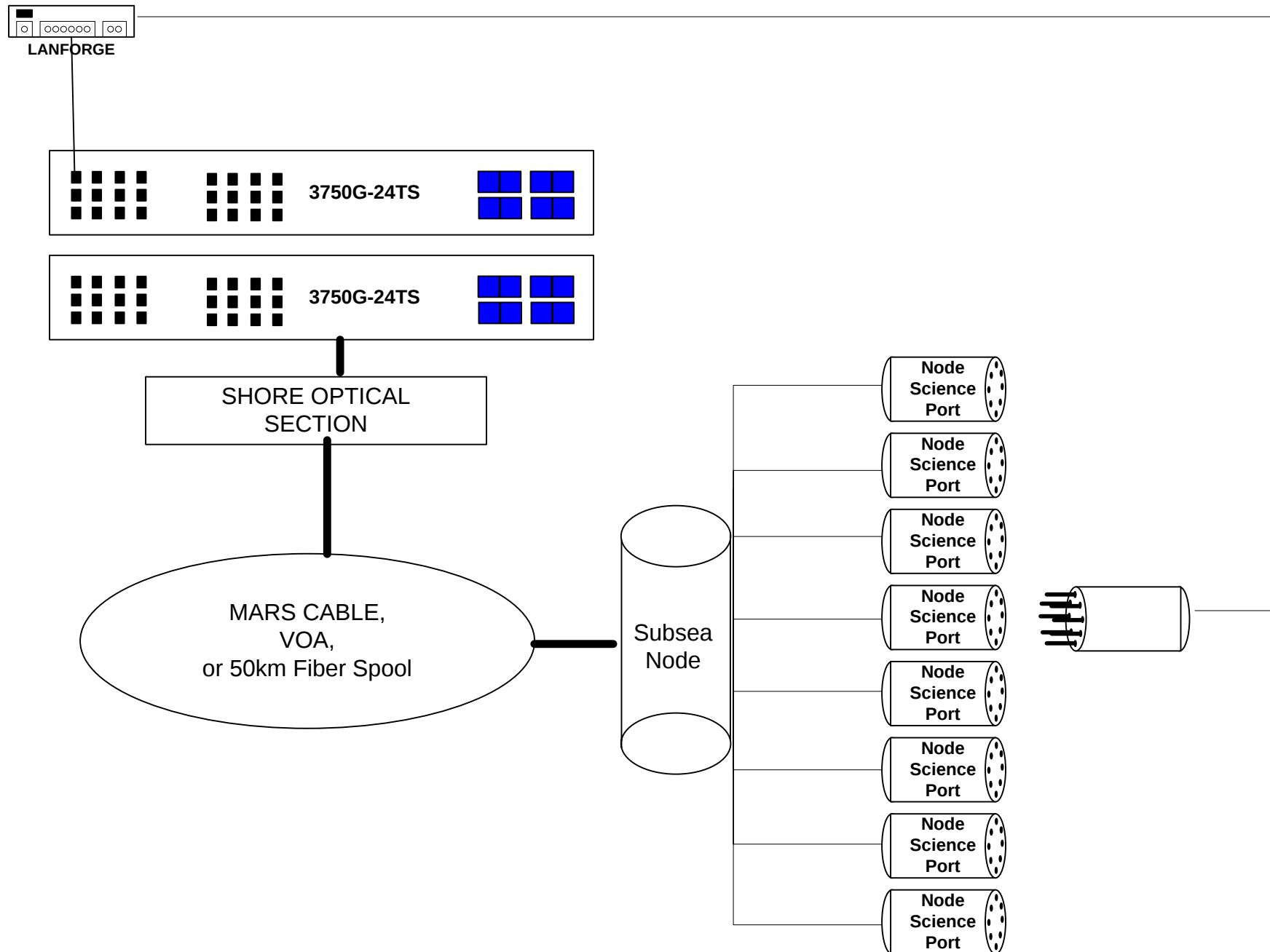
SCIENCE PORT 1	10.11.1.1
SCIENCE PORT 2	10.12.1.1
SCIENCE PORT 3	10.13.1.1
SCIENCE PORT 4	10.14.1.1
SCIENCE PORT 5	10.15.1.1
SCIENCE PORT 6	10.16.1.1
SCIENCE PORT 7	10.17.1.1
SCIENCE PORT 8	10.18.1.1
- 8) Record the results in the results section

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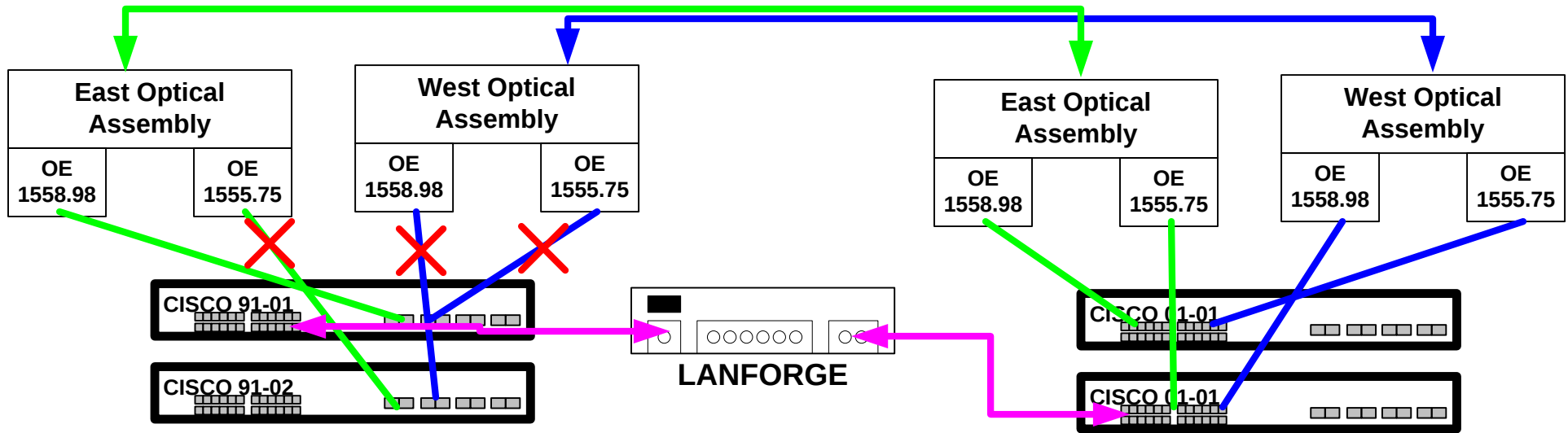
Data is passed from the science wet port to the shore using a Lanforge data generator. The basic physical setup is shown on the next page. The following pages show schematics which demonstrate disconnecting various paths on the Shore station to isolate and test individual data paths in the ether channel.

- 1) ON THE SHORE SIDE Place a Lanforge cable into one of the science VLAN ports of one of the CISCO routers
- 2) ON THE SUB SEA SIDE Using a WET ethernet connector connect a Lanforge port to one of the subsea science ports
- 3) On the SHORE SIDE remove the fibers or SFPs from:
 - CISCO 91-01 port 26.
 - CISCO 91-02 port 25
 - CISCO 91-02 port 26This cuts off the the other paths so that only the East-East .98 channel is being tested. Use Figure set_finalE98 to help understand the setup.
- 4) Run a Lanforge data test for 5 minutes
- 5) Repeat this test for the following channels (see following diagrams)
 - East .75 - remove the fiber from CISCO 91-01 port 25 and CISCO 91-02 port 25, 26. See Figure set_finalE75
 - West .98 - remove the fiber from CISCO 91-02 port 26 and CISCO 91-01 port 25, 26. See Figure set_finalW98
 - West .75 - remove the fiber from CISCO 91-02 port 25 and CISCO 91-01 port 25,26. See Figure set_finalW75
- 6)Record the results in the RESULTS section of this document

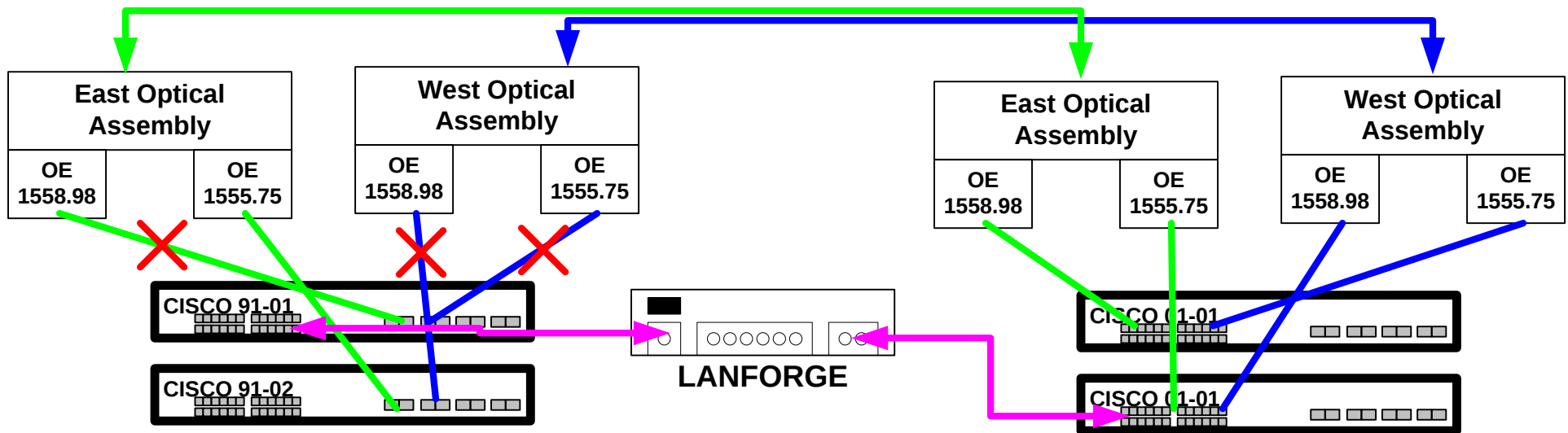
Showing Test Setup Using WET Connector



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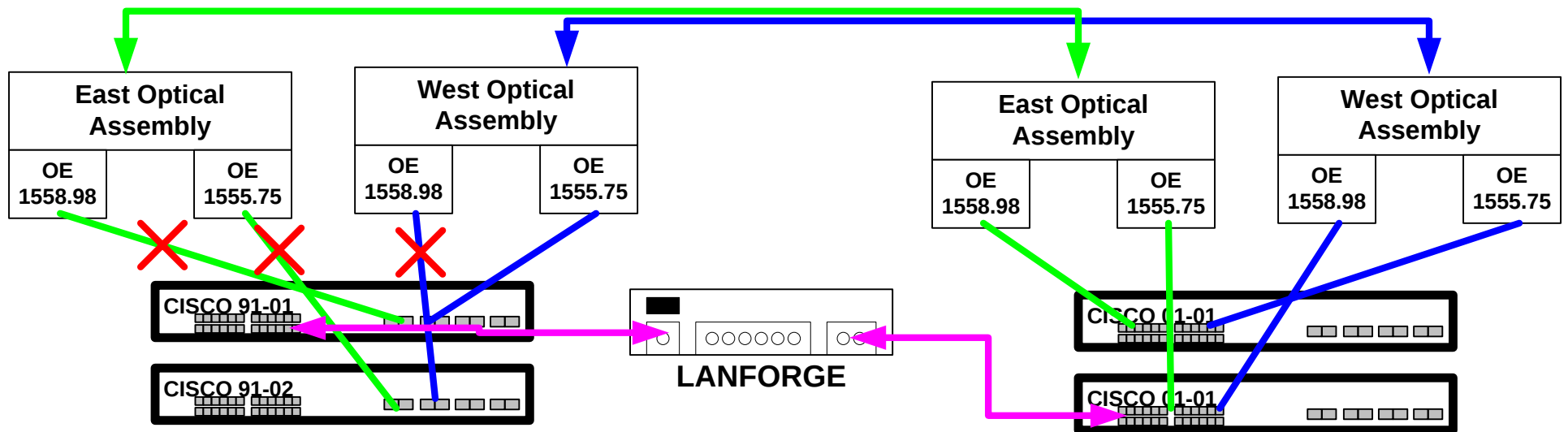
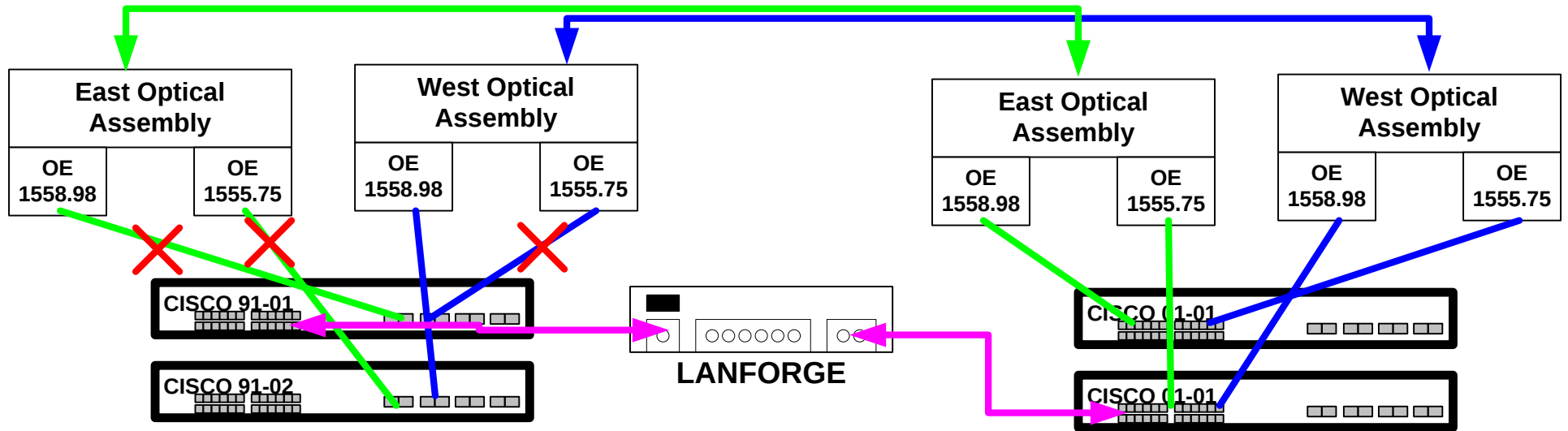


CHECKING EAST 1558.98 CHANNEL



CHECKING EAST 1555.75 CHANNEL

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Science Port Check

This test is a repeat of the prior test with all four data channels running. Each science port is checked briefly to insure that it is passing data

- 1) Reconnect all fibers at the shore station
- 2) Connect the WET Science connector to each science port in succession
- 3) Check the data throughput and packet errors for 5 minutes
- 4) Record the results in the section at the end of this document

Switch Snapshot

Snapshots of the CISCO switch critical parameters are captured here. Cut and paste results in the results section

- 1) Use an ssh agent from the shore station. Log into the sea and shore CISCO switches, Issue the commands shown and collect the output:
- 2) show running
- 3) show ether-channel detail
- 4) show vlan
- 5) show ip route
- 6) show arp

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Electrical Power Test	
East EDFA	
West EDFA	
East OEs	
West OEs	
East NE	
West NE	
CISCO 01	
CISCO 02	
OBC	
TOTAL	

Optical Power Test	
Cable	Power (dBm)
Shore East	
Shore West	
SubSea East	
SubSea	
Shore East .98	
Shore East .75	
Shore West .98	
Shore West .75	
Sea East .98	
SeaEast .75	
SeaWest .98	
SeaWest .75	

Temperature Test	
East EDFA	
West EDFA	
East OE .98	
West OE .98	
East NE .98	
West NE .98	
upper ambient	
lower ambient	
humidity	

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Optical Pass Through Channel Test		
Test	Duration of Run	# Errors
CST		
CJT		
CRT		

NETWORK ACCESSIBILITY TEST - pings	
PORT	Pass/Fail
GYDA: 10.128.1.14	
Comms ctrlr: 10.128.1.20	
power ctrlr: 10.128.1.??	
science 1: 10.11.1.1	
science 2: 10.11.1.2	
science 3: 10.11.1.3	
science 4: 10.11.1.4	
science 5: 10.11.1.5	
science 6: 10.11.1.6	
science 7: 10.11.1.7	
science 8: 10.11.1.8	

Data Throughput Test		
Science Port Used:		
PATH	Duration of Run	# Packet Errors
E 1558.98		
E 1555.75		
W 1558.98		
W 1555.75		

Science Port Test		
PORT	Duration of Run	# Packet Errors
1		
2		
3		
4		
5		
6		
7		
8		

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CUT and PASTE OUTPUT of CISCO Commands HERE