

O-05 Transponder Sensitivity Range Test

ENGINEER: _____

DATE: _____

COMMENTS:

O-05 Transponder Sensitivity Range Test

The Network Electronics MRTR-Dxxxx transponders have a vendor design range of -20 dBm (minimum sensitivity) through -3 dBm (overload point) for their inputs and 0dBm for their outputs (see attached engineering spces page). The vendor does not document the target operating value for injecting the transponder input. Driving a particular transponder during a laboratory test at -6 dBm for example caused several Bit Errors per second running a BER test at the 1Gb spec.

Consequently this test was added to determine for **each** transponder used in the system, the acceptable input optical power range. The output power of each MRTR-D is checked and recorded as well. The former values will be used to adjust via an attenuator the injection power received from the mux if required. Note however that in the design of this system, there is no MRTR receiving transponder used between the DeMux and the MRTR-D. Since the received power for the long range system should be quite low, due to attenuation of the line it is probable that attenuation at the MRTR-Dxxxx transponders will not be needed.

The required equipment for this test is:

- 1) Suitable gigabit ethernet BER optical test set
- 2) NE FRU assembly with transponder cards
- 3) 5/95 optical splitter
- 4) Calibrated power meter
- 5) Variable Optical Attenuator (VOA)
- 6) Assorted bulkhead attenuators

MARS
Org: WHOI
Engr: Fritz Sonnichsen
Date: 07/06/04

First Procedure: Determination of Transponder Sensitivity

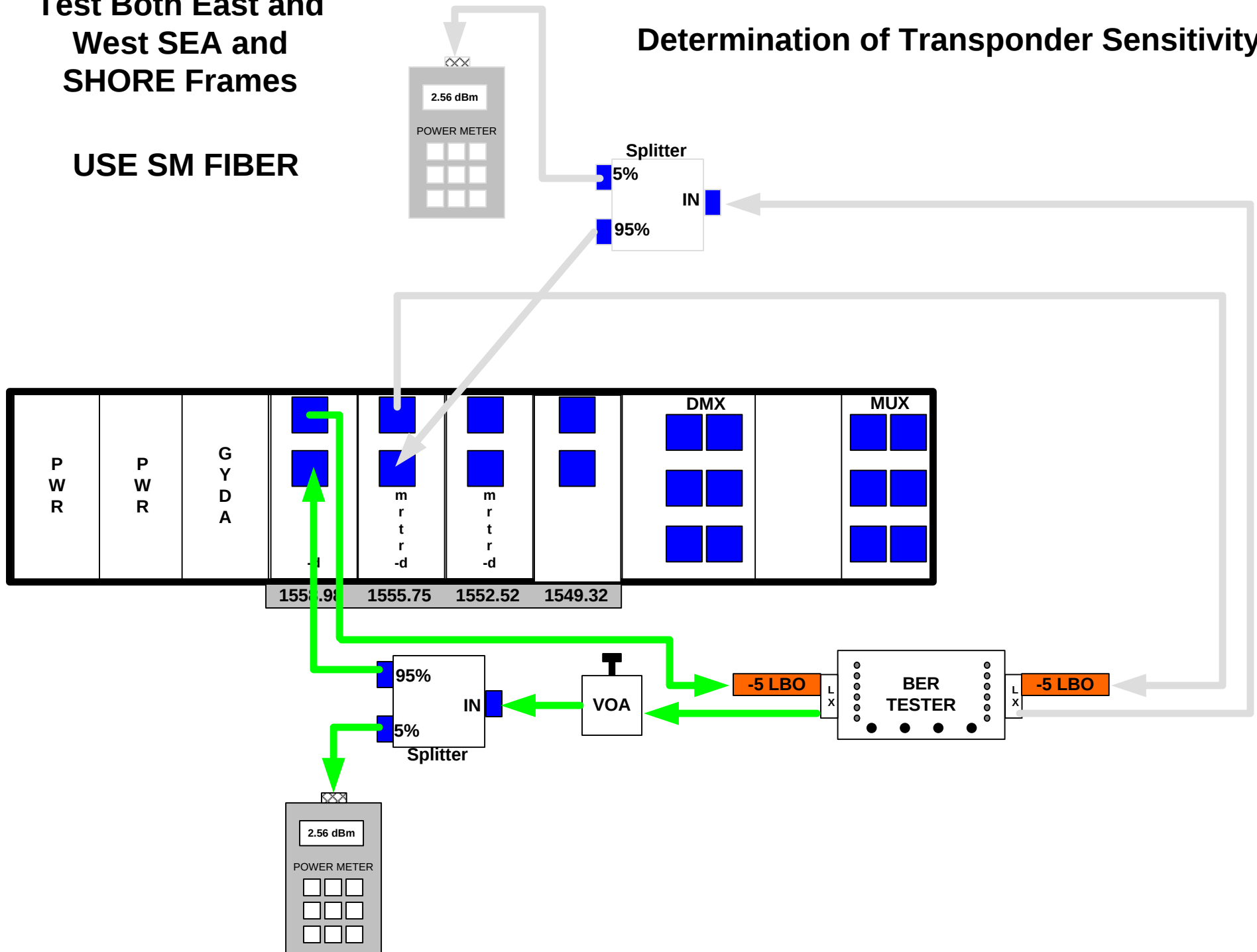
- 0) Make all power measurements at 1310nm. Do all fiber with SM fiber.
- 1) Fiber up the system as shown on the next page. If you have sufficient splitters you may test the second card/path in gray as well, covering 2 transponders at once.
- 2) The LBO at the input of the BER tester is added in order not to overdrive the input receiver which is an SFP. The SFP will not operate over -3 dBm, (see engineering spec sheet in this document) and the transponder transmits 0 dBm, hence a -5dB attenuator should adjust the injection. Check this with the power meter. You may insert the LBO at the output of the transponder instead of at the BER tester.
- 3) Use the "splitter.xls" spreadsheet in this folder to set the VOA in the next step. Look up the desired injection in the "SIGNAL" column and find the required reading at the power meter in the "MONITOR" column.
- 4) Start the BER tester. Adjust the VOA such that it injects -3 dBm into the transponder.
- 5) Clear the BER tester and check for errors. If any errors are detected within 15 minutes, decrease the injection into the transponder via the VOA to -4 dBm. Clear the BER tester again and repeat the 15 minute test.
- 6) Continue step 5 until the system will run consistently (about 5 tries) with no errors.
- 7) Record the value of the injection from step 6 in the results sheet. This is the MAXIMUM INPUT value for the transponder. For this step the injection should be read by placing the power meter directly on the output of the 95% port of the splitter.
- 8) Continue step 5 above increasing attenuation until errors reappear.
- 7) Record the value of the injection from step 8 in the results sheet. This is the MINIMUM INPUT value for the transponder. For this step the injection should be read by placing the power meter directly on the output of the 95% port of the splitter.
- 8) Record the output of the transponder (measured before the attenuator)
- 9) Record the serial number of the transponder.
- 10) Do the above test for all transponders in the system, that is, the 1558.98 1555.75 and 1549.32 transponders of the east and west shore frames and the east and west sea frames. Record all data on the results page.

O-05 Transponder Sensitivity Range Test

Test Both East and
West SEA and
SHORE Frames

USE SM FIBER

Determination of Transponder Sensitivity



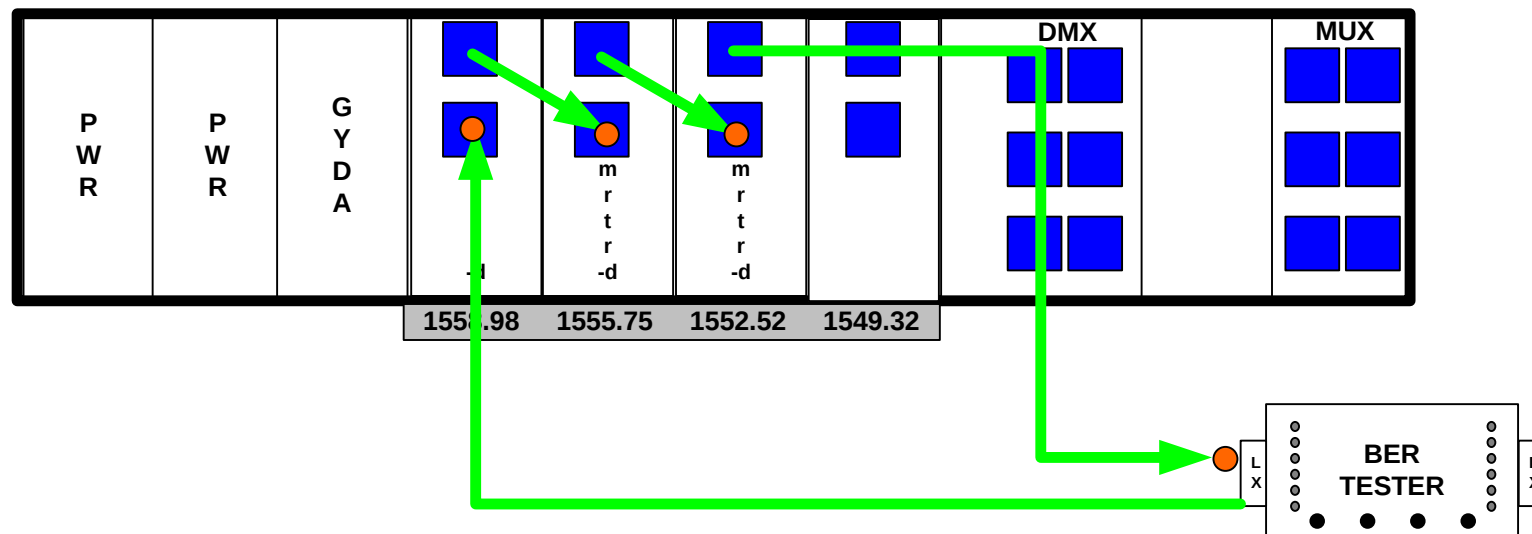
Second Procedure: Optical Frame Self Test

- 0) Make all power measurements at 1310nm. Do all fibering with SM fiber.
- 1) Measure the power at the output of each transponder and at the BER tester output. Using the table from the previous procedure select an attenuator to adjust the input of the adjacent transponder receive port to it's target input. Insert attenuators at the indicated points in the diagram on the next page.
- 2) Fiber up the system as shown in the diagram.
- 3) Commence thhe BER test for 4 hours. No more than 16 errors should be encountered.
- 4) Record the results
- 5) Perform this test for all 4 optical frames.

Optical Frame Self Test

Test Both East and
West SEA and
SHORE Frames

USE SM FIBER



● Attenuator

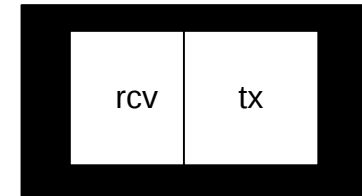
Some Useful Details about Optical Components

com-mon	1555.75
1549.32	1558.98
1552.52	upgrade

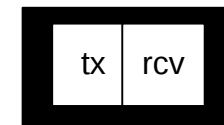
NE Mux and DeMux port layouts



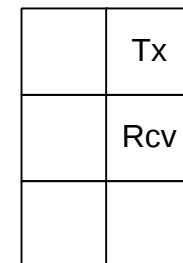
DIP settings for MRTRD
in gB ether mode



CISCO GBIC Paths



CISCO SFP GBIC Paths



NE MR-TR-D15xx
Port Layout

Some Important Optical Specs

Device	Sensitivity dBm	Overload dBm	Damage dBm	Output dBm	Loss /Gain dB
NE MRTRD	-20	-3	-1	-0 (1mW)	
NE MRTR	-25			-7.5	
NE MRTR enhancd	-3 to -19			6 (4mW)	
LX SFP ¹	-3 to -19			-3 to -9.5	
GbE Converter	-3 to -21			-3 to -9.5	
1EC28 EDFA		-6			+23
NE Mux/Demux					-3 per side
MARS Cable					-15

1 - SFP is same spec as a GBIC

NE Channels		
Channel	Wavelength	frequency Ghz
493	1549.32	193500
557	1555.75	192700
589	1558.98	192300

O-05 Transponder Sensitivity Range Test

SENSITIVITY TEST

GENERAL	
Ambient Temp.	24 C

SHORE WEST OPTICAL FRAME					
Frame Serial Number:		131			
Xpondr	Serial #	Maximum Input	Minimum Input	Output	Target Input
1559.98	173-5-5	-8.26	-21.18	-1.50	-14.72
1555.75	161-4-5	-9.14	-24.07	0.77	-16.60
1549.32					

Target Inputs =
Min-input +
(Max Input - Min Input) / 2

SHORE EAST OPTICAL FRAME					
Frame Serial Number:		130			
Xpondr	Serial #	Maximum Input	Minimum Input	Output	Target Input
1559.98	173-5--5	-10.0	-24.16	0.21	-17.07
1555.75	161-4-5	-11.32	-22.82	0.77	-17.07
1549.32					

SEA WEST OPTICAL FRAME					
Frame Serial Number:					
Xpondr	Serial #	Maximum Input	Minimum Input	Output	Target Input
1559.98					
1555.75					
1549.32					

SEA EAST OPTICAL FRAME					
Frame Serial Number:					
Xpondr	Serial #	Maximum Input	Minimum Input	Output	Target Input
1559.98					
1555.75					
1549.32					

O-05 Transponder Sensitivity Range Test**OPTICAL FRAME SELF TEST****GENERAL**

Ambient Temp.

SHORE WEST OPTICAL FRAME		Power at Xpndr Input		
Frame Serial Number:	131	1559.98	1555.75	1549.32
Duration	20h 35m	-15	-15	
Number of Errors	0			

SHORE EAST OPTICAL FRAME		Power at Xpndr Input		
Frame Serial Number:	130	1559.98	1555.75	1549.32
Duration				
Number of Errors				

SEA WEST OPTICAL FRAME		Power at Xpndr Input		
Frame Serial Number:		1559.98	1555.75	1549.32
Duration				
Number of Errors				

SEA EAST OPTICAL FRAME		Power at Xpndr Input		
Frame Serial Number:		1559.98	1555.75	1549.32
Duration				
Number of Errors				