

V01 - MARS Validation - DCS Optical Testing

ENGINEER: Fritz Sonnichsen

DATE: Sep 5,2005

COMMENTS:

At MBARI. Final test before sealing node. Will be repeated by Kevin Sullivan.

REQUIREMENTS COVERED:

3 – Cable Length

**Per the results repeated below the system should surpass the distance requirement better than about
(20 - 1.63dBm - 0.2dB/km*60km) / .2 = 48 km**

Be	1550	Mux Output	1.63
Aw	1550	Output of EDFA	HI
Ce	1550	Mux Output	3.37
Bw	1550	EDFA Output	HI

MARS

Org: WHOI

Engr: Fritz Sonnichsen

Date: 09/04/05

V01 - MARS Validation - DCS Optical Testing

This test will characterize the optical outputs of all devices in both the subsea node and the shore station. These values will:

- Insure that the levels are within the proper ranges for the devices
- Provide data for diagnosis at a later date.

All data should be recorded in the data section of this document and stored for future use.

PROCEDURE

This test is to be performed on both the shore station and the subsea node. The latter should be performed just prior to loading and sealing the node. Review of the optical pages of the "MARS Testing and Diagnosis Guide" is recommended at this time. Using the optical path diagrams on the next pages measure the optical output of the numbered points on the path and record them in the results section. It is assumed that appropriate fiber optic handling techniques will be employed.

- (1) All values are measured with both the sub sea node and shore station powered up but without data flowing through or signals on the system.
- (2) The submarine cable or a comparable fiber pair and attenuator is connected between the sub marine node and shore station. If the latter technique is used, set the attenuators to 15dBm, which approximates the MARS fiber and termination assemblies.
- (3) If there is an attenuator in the optical path measure the optical power *AFTER THE ATTENUATOR* so as to include it's affect
- (4) One at a time, remove the fibers from each of the transmit points shown in the diagrams. (It is better to measure the transmit output at it's fiber rather than at the port in order to include any losses due to the fiber.)
- (5) Set the power meter to either 1310nm or 1550nm as shown in the results tables and record the measurement
- (5) Replace the fiber, cleaning it if it has touched anything during the measurement.
- (6) If any measurement is not within the value range specified in the table
 - Clean and scope the fiber.
 - If problems persist replace the fiber.
 - If problems persist replace the associated hardware device.
 -
- (7) List the values of any attenuators inserted using the table provided
- (8) Log into each EDFA and list the measured power and power setup values as shown in the table provided.
- (9) Log into the GYDA Network Electronics controllers and record the optical levels listed

V01 - MARS Validation - DCS Optical Testing

PROCEDURE (continued)

The following notes should help the EDFA checkout

- (1) Each EDFA must be accessed via it's serial port via an VT100 emulator set for 8N1 9600b without flow control. Using the out of band (OBC) system or a console port server is acceptable.
- (2) Log into the EDFA by typing the following: AD FFFF 1234. A console prompt will appear as: 0001>
- (3) At the console prompt type: AP to display the input and output power
- (4) At the console prompt type: SA 1 to display the power set-up.
- (5) The power setup should have been the following:

EAST SHORE AND SEA EDFAs

Mode: O Req: 0.0 dB

WEST SHORE AND SEA EDFAs

Mode: O Req: 15.0 dB

- (6) If any EDFA's are not setup as in step 5 they may be set up with the following command (the O is the letter O the 0 is the numeral zero):

For the East:

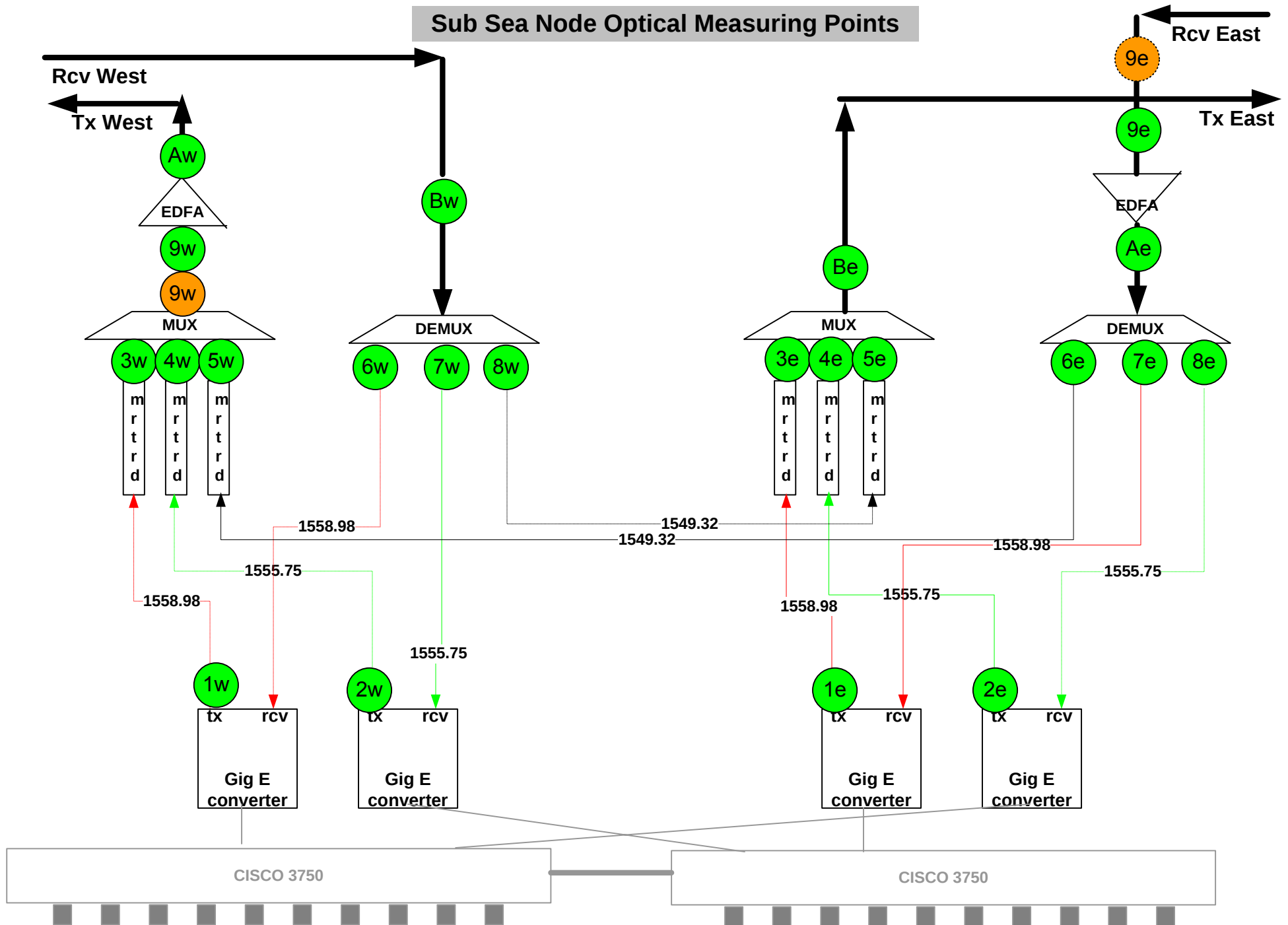
SA 1 O 0

For the West

SA 1 O 15

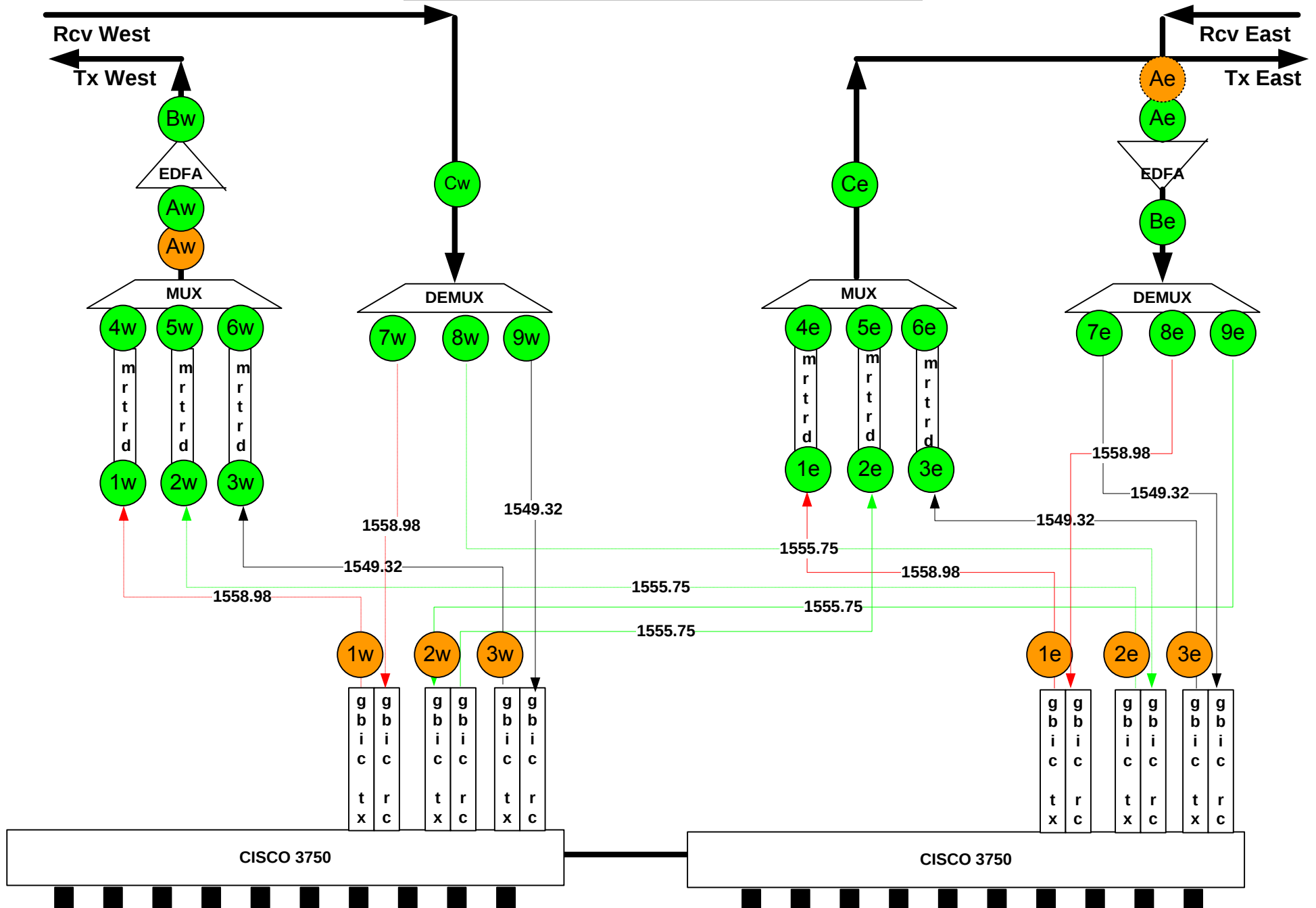
V01 - MARS Validation - DCS Optical Testing

Sub Sea Node Optical Measuring Points



V01 - MARS Validation - DCS Optical Testing

Shore Node Optical Measuring Points



V01 - MARS Validation - DCS Optical Testing

Optical Table for SUB SEA NODE - EAST			
point	λ	desc	measured
1e	1310	OE converter output to 1558.98	-6.03
2e	1310	OE converter output to 1555.75	-7.99
3e	1550	Mux input from MRTR 1558.98	0.23
4e	1550	Mux input from MRTR 1555.75	.0.13
5e	1550	Mux input from MRTR 1549.32	0.70
6e	1550	Demux received input 1558.98	-5.55
7e	1550	Demux received input 1555.75	-6.02
8e	1550	Demux received input 1549.32	-9.01
9e	1550	Input into EDFA	-7.22
Ae	1550	Output of EDFA	-0.78
Be	1550	Mux Output	1.63

Optical Table for SUB SEA NODE - WEST			
point	λ	desc	measured
1w	1310	OE converter output to 1558.98	-6.71
2w	1310	OE converter output to 1555.75	-6.42
3w	1550	Mux input from MRTR 1558.98	-0.12
4w	1550	Mux input from MRTR 1555.75	0.39
5w	1550	Mux input from MRTR 1549.32	0.13
6w	1550	Demux received input 1558.98	-7.26
7w	1550	Demux received input 1555.75	-6.78
8w	1550	Demux received input 1549.32	-6.89
9w	1550	Input into EDFA <i>after</i> attenuator	-6.45
Aw	1550	Output of EDFA	HI
Bw	1550	DeMux Input	-0.54

V01 - MARS Validation - DCS Optical Testing

Optical Table for SHORE STATION EAST			
point	λ	desc	measured
1e	1310	SFP output to 1558.98 <i>AFTER</i> attenuator	-8.12
2e	1310	SFP output to 1555.75 <i>AFTER</i> attenuator	-10.8
3e	1310	SFP output to 1549.32 <i>AFTER</i> attenuator	n/a
4e	1550	Mux input from MRTR 1558.98	-0.35
5e	1550	Mux input from MRTR 1555.75	-0.20
6e	1550	Mux input from MRTR 1549.32	-0.29
7e	1550	Demux received input 1558.98	-6.10
8e	1550	Demux received input 1555.75	-7.81
9e	1550	Demux received input 1549.32	n/a
Ae	1550	EDFA Input	-9.02
Be	1550	EDFA Output	-0.50
Ce	1550	Mux Output	3.37

Optical Table for SHORE STATION WEST			
point	λ	desc	measured
1w	1310	SFP output to 1558.98 <i>AFTER</i> attenuator	-9.95
2w	1310	SFP output to 1555.75 <i>AFTER</i> attenuator	-10.80
3w	1310	SFP output to 1549.32 <i>AFTER</i> attenuator	n/a
4w	1550	Mux input from MRTR 1558.98	-0.26
5w	1550	Mux input from MRTR 1555.75	-1.47
6w	1550	Mux input from MRTR 1549.32	0.24
7w	1550	Demux received input 1558.98	-9.94
8w	1550	Demux received input 1555.75	-9.93
9w	1550	Demux received input 1549.32	n/a
Aw	1550	EDFA Input <i>AFTER</i> attenuator	-6.53
Bw	1550	EDFA Output	HI
Cw	1550	DeMux Input	-2.05

V01 - MARS Validation - DCS Optical Testing

Optical Loss Thru Splices and Wet Connector at 1550nm (dBm)			
port	calibration	Output	Loss
1	-6.1	-6.7	-0.6
2	-6.1	-6.4	-0.3
3	-6.1	-6.7	-0.6
4	-6.1	-6.3	-0.2
5	-5.7	-5.9	-0.2
6	-5.7	-6.2	-0.4
7	-5.7	-6.0	-0.3
8	-5.7	-6.2	-0.5

Attenuators SHORE SIDE		
point	desc	Value
Aw	Into West EDFA from Mux	10
1w	From SFP into MRTR 1558.98 West	5
2w	From SFP into MRTR 1555.75 West	3
3w	From SFP into MRTR 1549.32 West	na
1e	From SFP into MRTR 1555.98 East	5
2e	From SFP into MRTR 1555.75 East	5
3e	From SFP into MRTR 1549.32 East	na

Attenuators SUB SEA NODE		
point	desc	Value
9w	Into West EDFA from Mux	10

V01 - MARS Validation - DCS Optical Testing

GYDA readings for Shore side		
point	λ	Value
East	1555.75	
East	1558.98	
West	1555.75	
West	1558.98	

GYDA readings for Sea side		
point	λ	Value
East	1555.75	
East	1558.98	
West	1555.75	
West	1558.98	

EDFA Power Setup SHORE SIDE			
	AP Command		SA 1 Command
desc	Listed input	Listed Output	Output Setting
West EDFA	-7.9	9.9	10
East EDFA	-9.2	-0.2	0

EDFA Power Setup SEA SIDE			
	AP Command		SA 1 Command
desc	Listed input	Listed Output	Output Setting
West EDFA	-6.3	9.9	10
East EDFA	-7.2	-0.4	0