Atacama
Large
Millimeter
Array

APP Optical Fiber Link operation manual

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Contents

1 Introduction

1.1 Purpose

This document summarizes the way of the regular operation of the Optical Fiber Link system in the APP.

1.2 Reference Documents

[RD 1] ALMA Phasing Project Plan

1.3 Abbreviations and Acronyms

APP	ALMA Phasing Project
AOS	Array Operations Site
DWDM	Dense Wavelength Division Multiplexing
FIT	Failures In Time
ITU	International Telecommunication Union
OFL	Optical Fiber Link
OSF	Operations Support Facility
MTBF	Mean Time Between Failure
NAOJ	National Astronomical Observatory of Japan
PIC	Phasing Interface Card
VLBI	Very Long Baseline Interferometry

2 Specification of the OFL system

2.1 General specifications

The purpose of the OFL system is to transmit the antenna sum data from the AOS to the OSF while using minimal fiber resources [RD01]. The eight 10 GbE data streams are wavelength-division-multiplexed onto one fiber at the AOS. This data is transmitted to the OSF where it is demultiplexed and routed to the appropriate recorder sub-system. The optical fiber link system (a pair of a transmitter and a receiver) is fully symmetric and the two devices are inter-changeable as they are totally in the same design. The device has no packet monitoring capability, so it is a passive participant in the VLBI phasing system.

The part of this subsystem that is installed at the AOS is called the Fiber Multiplexer. The part that is installed at the OSF is called the Fiber Demultiplexer. The Multiplexer and Demultiplexer are identical devices. Both can transmit and receive data. In the APP application, the Multiplexer will transmit to the Demultiplexer, but no transmission is planned in the other direction.

3 Start, stop and initialization

Hardware start and stop: Start and stop of the OFLs are manually done with the power switch on the rear panel (they are not necessary for usual operation).

Soft reset: In case that remote reset is needed, this can be done with "reset" command (see below).

Initialization: The OFLs have nine ports for redundancy, and in real operation eight of them are in use. The remaining one without any input signal should be masked for monitoring status, because otherwise the unconnected port continuously produces a "loss of signal" alarm. To set the alarm mask, use "set_alarmmask" command shown below. This initialization should be done only when the ports in use are changed for some reasons.

4 Regular Operation

Status monitoring: Since the OFLs are passive system, the only thing necessary during regular operation is to watch its status via telnet protocol. For details see "show_alarm_str" and "show_alarm_hex" commands below.

5 Connection with telnet protocol

The system is controlled and monitored by accessing to TCP/IP socket (port: 5653) through LAN port. Note that the port number is not 23, which is standard of telnet, but 5653. A command example is shown below:

telnet IP_address 5653

As of December 2014, the IP addresses are set as follows:

OFL module	IP_address	MAC Address
MUX (at AOS)	10.197.49.51	00 20 4A E8 ED 48
DeMUX (at OSF)	10.197.52.56	00 20 4A E8 ED 3D

6 VSI Command List

Following commands are available for operation and maintenance of OFLs. For details of parameters and returns, see next chapter.

Command	Purpose
reset	System reset.
set_alarmmask	Set a mask for an unused port (such as spare port). Error/alarm occurred in a masked port will be ignored and will not be shown.
show_alarm_str	Show alarms in string.
show_alarm_hex	Show alarms in hex.
show_system	Show firmware version and date.
apl_download_start	Update firmware.
Ld	Firmware download.

Table 1: Command list

7 Command Details

7.1 Commands

Keyword	Field #	Description	Type	Allowed values	Power-on value	Default	DTS-specific?	Comments
reset	1	Initiate system reset	char		NA	None	No	Full system reset
set_alarmmask	1	10G port alarm mask	char	000000000 ~ 111111111	000000000	000000000	Yes	Bit=1 for masked port, bit=0 for port in use. For masked port(s), "show_alarm_str/hex" command does not return any alarm. Bit order of the 0/1 string is port 1 to port 9 from the left to the right.
apl_download_start	1	Firmware update mode	char	system	NA	None	No	Change to firmware update mode. Firmware can be updated by “ld” command.
ld	2	Firmware download	char	literal ASCII	NA	None	No	Download the firmware.

Table 2: Command details

7.2 Queries and Responses

Keyword	Returned Field #	Description	Type	DTS-specific?	Comments
set_alarmmask	2	Local port alarm mask	char	Yes	Current value
show_alarm_str	2	Internal temperature	int	Yes	Current value
	[3-n]	Alarms in plain text	literal ASCII	Yes	Note that alarms occurred in the past will be cleared by executing this command ("READ & CLEAR"). Alarm types: (1) Temperature alarm (2) FANx(x=1~3) alarm (3) All XFP modules are stopped. ※In case of temperature alarm, or two or more FAN alarms, all XFP are stopped. (4) AC/DCx(x=1or2) alarm (5) The XFP module of the 10G local portx(x=1～9) is not present (6) The XFP module of the 10G ZR portx(x=1～9) is not present (7) The XFP module of the 10G local portx(x=1～9) detects operational fault. (8) The XFP module of the 10G ZR portx(x=1～9) detects operational fault. (9) The XFP module of the 10G local portx(x=1～9) detects receiver loss of signal. (10).The XFP module of the 10G ZR portx(x=1～9) detects receiver loss of signal.
show_alarm_hex	2	Internal temperature	int	Yes	Current value
	3	Alarm bits in hex 1	hex	Yes	Basically this command is the same with "show_alarm_str", but here every alarm is described in bit and alarms are returned as hex code. Bit assign: 1=alarm 0=normal [31]･･･All XFP modules are stopped [30:6]･･･D.C. [5]･･･AC/DC2 alarm [4]･･･AC/DC1 alarm

					[3]･･･FAN3 alarm [2]･･･FAN2 alarm [1]･･･FAN1 alarm [0]･･･Temperature alarm
	4	Alarm bits in hex 2	hex	Yes	XFP module presence: 1:attached, 0:not attached [31:25]･･･D.C. [24]･･･10G ZR port 9 [23]･･･10G ZR port 8 [22]･･･10G ZR port 7 [21]･･･10G ZR port 6 [20]･･･10G ZR port 5 [19]･･･10G ZR port 4 [18]･･･10G ZR port 3 [17]･･･10G ZR port 2 [16]･･･10G ZR port 1 [15:9]･･･D.C. [8]･･･10G local port 9 [7]･･･10G local port 8 [6]･･･10G local port 7 [5]･･･10G local port 6 [4]･･･10G local port 5 [3]･･･10G local port 4 [2]･･･10G local port 3 [1]･･･10G local port 2 [0]･･･10G local port 1
	5	Alarm bits in hex 3	hex	Yes	XFP module operational fault status: 1:error, 0:normal ※bit order is the same to that for XFP module presence
	6	Alarm bits in hex 4	hex	Yes	XFP module optical signal status: 1=loss of signal, 0=normal ※bit order is the same to that for XFP module presence

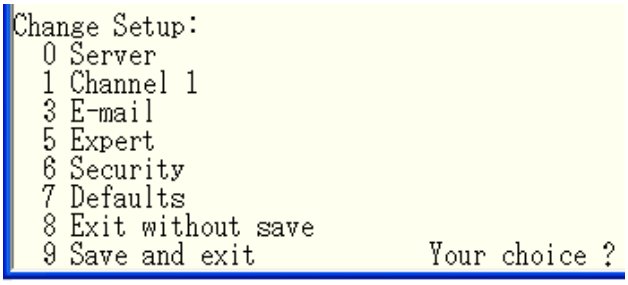
show_system	2	Firmware version	char	Yes	
	3	Firmware date	char	Yes	

Table 3: Queries and responses

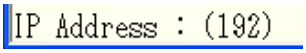
7.3 How to change IP address

To change the IP address of the MUX or DeMUX, connect to the OFL via telnet at port 9999, and then following message will appear.

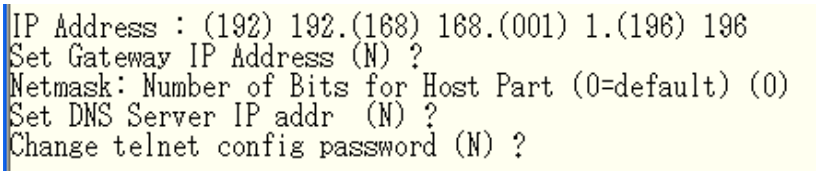
Press “Enter” and you will see the following menu.



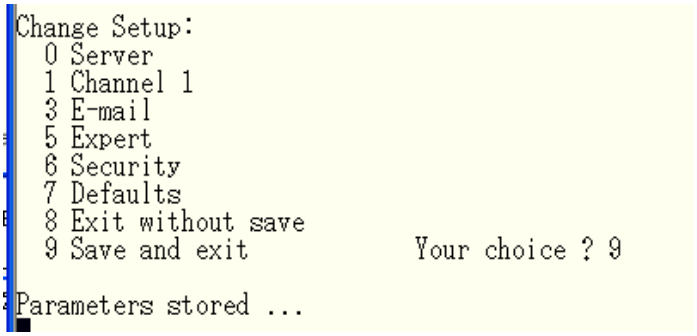
Press “0” and “Enter”, and the prompt shows the four numbers of the current IP address one by one.



Above is the first number, and put the number to which you would like to change. Then, press “Enter” to move the next number and complete all the four numbers of the address. Following is an example, in which IP address is set to 192.168.1.196.



For other queries, just press “Enter” to keep default settings, and you will come back to the following menu.



Press “9” and “Enter”, and then the change will be saved, and telnet will be disconnected.