

## Interface Control Document for the Telescope Communication Hardware



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**ASTRI Mini-Array**  
**Astrofisica con Specchi a Tecnologia Replicante Italiana**



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**DOCUMENT HISTORY**

Issue/Revision	Date	Modification
1.0	16/06/2020	First release
1.1	19/10/2020	Changed to comply with the general document scheme for the ASTRI Mini-Array project
1.2	13/9/2021	Revised section 1 and 3 to take into account different hardware choices and updated architecture Inserted new ORing Switch

## 1 Introduction

The ASTRI Mini-Array is an INAF project aimed to construct, deploy and operate a set of 9 Cherenkov telescopes of the 4 meters class at the Observatorio del Teide in Tenerife (IAC, Spain). The ASTRI Mini-Array will observe astronomical sources emitting at very high-energy in the TeV spectral band.

### 1.1 Purpose

This document is the Interface Control Document regulating the hardware interface between the ASTRI Mini-Array telescope and its communication system. This hardware will be delivered to the ASTRI telescope contractor by INAF.

### 1.2 Scope

This document describes the interfaces (mechanical, electrical and communication) of the communication hardware to the ASTRI telescope.

### 1.3 Content

Section 3 describes the mechanical, the electrical and the software interface between the communication hardware and the telescope.

### 1.4 Definitions and Conventions

#### 1.4.1 Abbreviations and acronyms

AMCU	Active Mirror Control Unit
ASTRI	Astrofisica con Specchi a Tecnologia Replicante Italiana
IAC	Instituto de Astrofisica de Canarias
IIM	Intensity Interferometry Module
INAF	Istituto Nazionale di Astrofisica
LAN	Local Area Network
PMC	Pointing Monitoring Camera
PSU	Power Supply Unit
SFP	Small Form-factor Pluggable
SQM	Sky Quality Monitor
TCU	Telescope Control Unit
THCU	Telescope Health Control Unit
UPS	Uninterruptible Power Supply



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## 2 Related Documents

### APPLICABLE DOCUMENTS

[AD1]

### REFERENCE DOCUMENTS

[RD1]

### 3 Communication Hardware Interface Control Document

Figure 1 shows the scheme of the communication (network) hardware of the ASTRI telescope. Connection to the outside world will be through a number of optical fibres. Those fibers will go to an optical drawer (Telescope Patch Panel) situated in the Telescope. The Fibers from Telescope Patch Panel going to the service cabinet patch panel inside the ASTRI Mini-Array service cabinet dedicated to a single telescope.

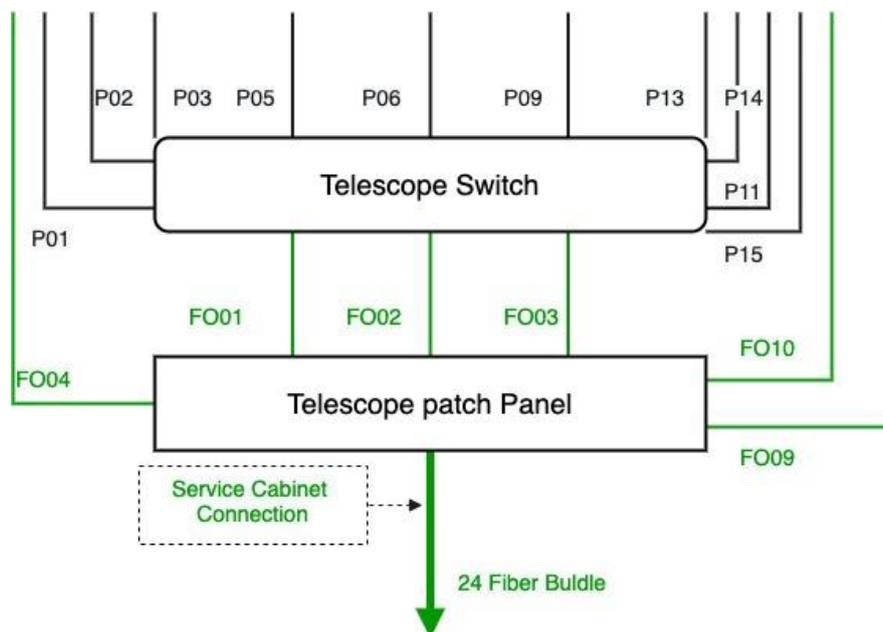


Figure 1. Scheme of the communication (network) hardware of the ASTRI telescope.

The optical fibers coming from the telescope patch panel will go:

- 1) Three FIBERS to the LAN Switch -> two FO01-FO02 devoted to the telescope Control and monitoring and FO03 for the Cherenkov data
- 2) Two will be connected to the WR board of the Cherenkov and the IIM Instruments FO04 and FO10
- 3) One to the BEE of the IIM Instrument for the data transfer FO09 (10Gbit/s)

The components of the communication (network) hardware of the ASTRI telescope will then be (Figure 1):

1. Telescope Switch
2. Telescope Patch Panel

#### 3.1 Mechanical Interface

The selected telescope LAN switch is an industrial switch by ORing (see Figure 2, <https://oringnet.com/en-global/products/download/1349>). The switch is 19-inch rack mountable with a total weight of 6,6 kg. The dimensions of the switch are 440 (W) x 325 (D) x 44 (H) mm. Suitable for mounting in a 19 inch rack in a 1U space.



Figure 2. Telescope switch ORing RGS-PR9000

The Telescope Patch Panel is a 1U rack 19 inch compliant. It does not require any electrical connection. The mechanical standard for the fiber is LC 24 port. Patch panel Sample un the link below.

<https://it.rs-online.com/web/p/patch-panel-per-fibre-ottiche/1213966/>

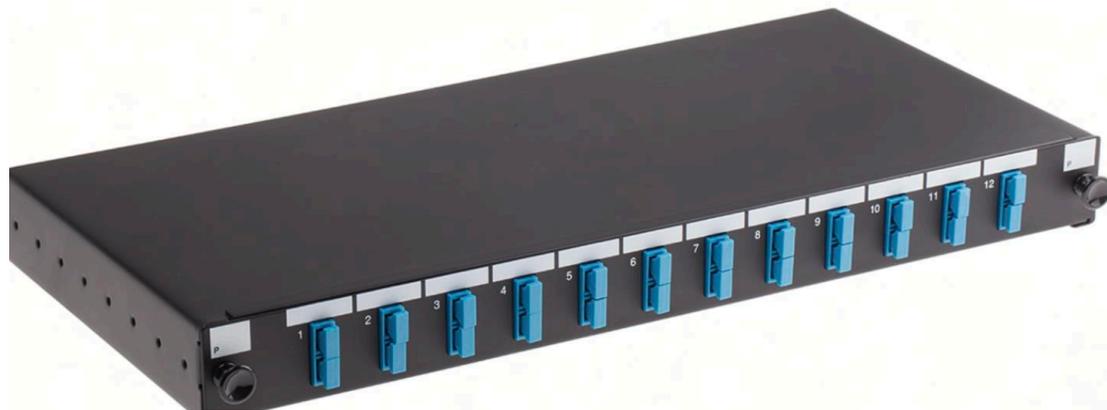


Figure 3 Telescope Patch Panel

### 3.2 Electrical Interface

The telescope switch is powered by a 100-240 Volt AC and has a total power consumption of 43.5 Watts max. See Figure 4. For major details se the Switch User Manual ([https://www.dropbox.com/s/5gppw8rj2uyqgv/User%20manual\\_RGS-PR9000%20Series.pdf?dl=0](https://www.dropbox.com/s/5gppw8rj2uyqgv/User%20manual_RGS-PR9000%20Series.pdf?dl=0) )

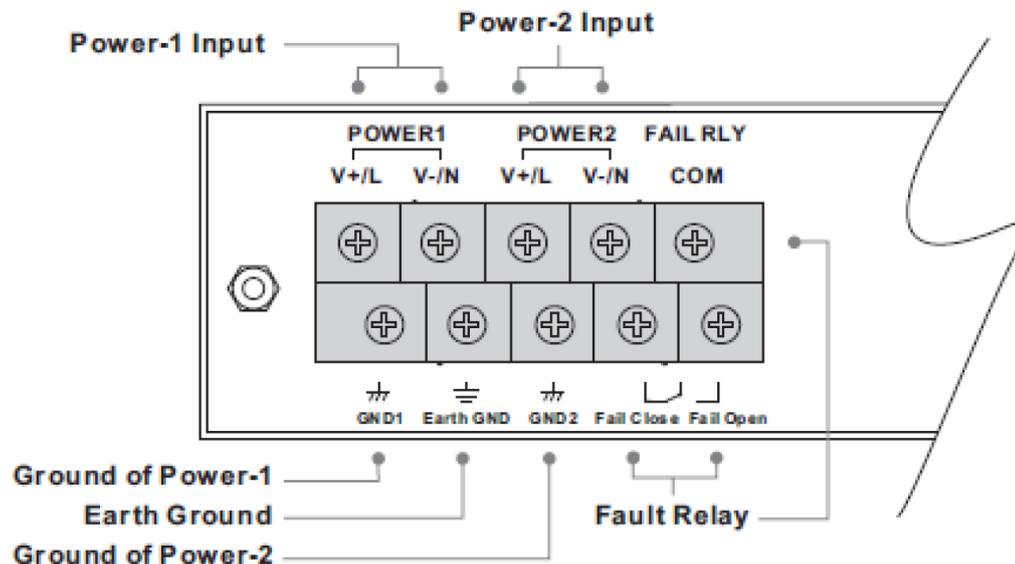


Figure 4. LAN Switch power-input terminal

### 3.3 Data Interface

At the 10/100/1000Base - T(X) gigabits Ethernet ports of the Telescope Switch will be connected the following devices:

- P01 - THCU
- P02 - Camera Control
- P03 - IMM Control
- P04 - Spare
- P05 - PMC
- P06 - SQM
- P07 - Spare
- P08 - Spare
- P09 - UVSIPM
- P10 - Spare
- P11 - Telescope Safety PLC
- P12 - Spare
- P13 - TCU
- P14 - AMCU (TBC)
- P15 - Cherenkov Camera Data
- P16 - Local Diag.

The Fiber Optic FO01-FO03 (from the Telescope Patch Panel) shall be connected to the transceivers placed in the SFP port of the switch.

NB: the transceivers will be compliant with the ASTRI MA fiber Cable.

The connection to the Telescope Patch Panel are explained below:

- FO01 - Cherenkov Camera Data
- FO02 - Monitoring and CTRL 1



- *FO03 - Monitoring and CTRL 2*
- FO04 - Cherenkov Camera White Rabbit
- FO05 - SPARE
- FO06 - SPARE
- FO07 - SPARE
- FO08 - SPARE
- FO09 - Interferometry Data 10Gbit/s
- FO10 - Interferometry White Rabbit
- FO11 - SPARE
- FO12 – SPARE

The Patch Cable are SC-LC monomodal 9/125 like this: <https://www.startech.com/it-it/cavi/smfiblcsc1>

The Telescope interfaces with the Service Cabinet via:

- 24 optical fibers that connect the Telescope Patch Panel with the Service Cabinet Patch Panel

### 3.4 Software Interface

The switch is an INAF deliverable therefore will be configured by INAF personnel.