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Title

THEOS Satellite to WATER System Interface Control Document

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SUMMARY

This document aims at specifying the interfaces between the New Development of Ground System to the THAICHOTE satellite. It specifies the protocol and the format of the exchanged data.



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DOCUMENT CHANGE LOG

Issue/ Revision	Date	Modification Nb	Modified pages	Observations
				First Issue.

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1 INTRODUCTION

This document aims at specifying the interfaces between the New Development of S-Band Antenna and the THAICHOTE satellite.

1.1 APPLICABLE DOCUMENTS

- AD.01 S-band Station Requirement Specification THEO.SP.00035.T.ASTR issue 3/0
- AD.02 SCC to S-band station Interface Control Document GCS.ICD.00002.DT.T.ASTR issue 2/0
- AD.03 Satellite to GCS Interface Control Document THEO.ICD.00002.T.ASTR issue 1/0

1.2 REFERENCE DOCUMENTS

- RD.01 New S-Band System as built Document
Ref. FD-61M-AS BUILT-REV-A

1.3 GLOSSARY AND ABBREVIATIONS

CGS	Control Ground Segment
EIRP	Effective Isotropic Radiated Power
F/D	Focal Length/Diameter
G/T	Antenna gain-to-noise-temperature
GPS	Global Positioning System
LHCP	Left Hand Circular Polarization
NTP	Network Time Protocol
RF/IF	Radio Frequency/Intermediate Frequency
RHCP	Right Hand Circular Polarization
Rx	Reception
SCC	Satellite Control Center
TM	Telemetry
TT&C	Tracking Telemetry & Telecommand
Tx	Transmission
UTC	Universal Time Coordinated
WAN	Wide Area Network

2 GENERAL OVERVIEW

2.1 S-BAND STATION MISSION

The S-Band TT&C earth station interfaces between Satellite Control Center (SCC) and THEOS Satellite. In charge of the transmission layers for the Telemetry and Telecommand links, including reception and storage of the telemetry data during passes. It will provide the following function:

- Satellite acquisition (ground antenna pointing and tracking)
- Telemetry link reception, demodulation, synchronization and data delivery to the SCC
- Telemetry data recording and off-line delivery to the SCC
- Telecommand transmission using command data delivered by the SCC
- Doppler measurements for satellite localisation
- Generation and delivery of reference synchronisation signals (frequency and time).

2.2 S-BAND STATION PERFORMANCES

The performances of WATER TT&C Station in the following table below.

Parameters	Characteristics
Main antenna Reflector	6.1 meters high efficiency system with S- band capabilities Gain: ≥ 39 dB F/D : 0.35
Antenna configuration	Prime focus feed configuration with simultaneous reception and transmission capabilities
Operating frequency range	Tx: 2025-2120 MHz Rx: 2200-2300 MHz
Polarization	Tx: RHCP or LHCP Selectable Rx: RHCP and LHCP Simultaneous
G/T	> 17.0 dB/K for $> 10^\circ$ elevation @ 2211 MHz
Axial ratio	< 1.5 dB
EIRP	> 50 dBW

3 S-BAND STATION INTERFACES

The external interfaces of S-Band system with THEOS Satellite and SCC are showed in figure 1.

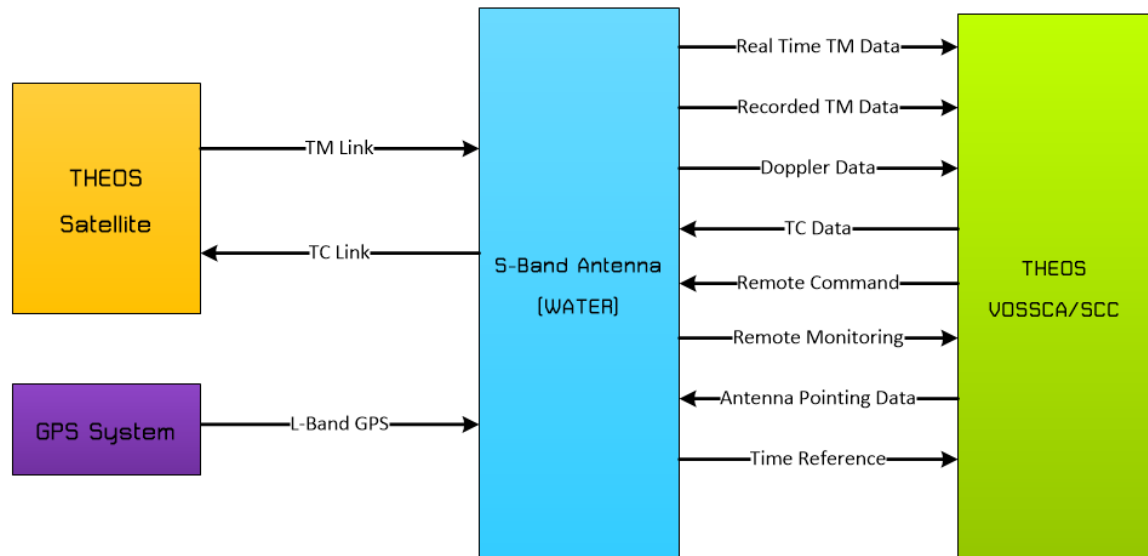


Figure 1. S-Band Station Interfaces

3.1 SATELLITE INTERFACES

Satellite interfaces at S-Band with circular polarization (RHCP/LHCP)

3.1.1 TM RECEPTION

Parameters	Characteristics
Frequency Range	2200-2300 MHz
Signal Type	TM
Polarization	RHCP and LHCP
Signal Modulation	BPSK + Scrambling + Reed-Solomon
Bit rate	10 kbps to 500 kbps

3.1.2 TC TRANSMISSION

Parameters	Characteristics
Frequency Range	2025-2120 MHz
Signal Type	TC
Polarization	RHCP or LHCP Selectable
Signal Modulation	PCM (NRZ-L) / BPSK / PM
EIRP	>50 dBW

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3.2 SCC INTERFACES

All communications between the S-band station and the SCC will be on Ethernet LAN and the TC data is provided by the SCC to the station for immediate transmission.

The real time TM data will be delivered from the S-band station to the SCC and also recorded. The recorded TM data will be delivered to the SCC on request.

The station uses NTP protocol to get the UTC time reference extracted from the GPS signals