



GÖKTÜRK-1

S-DCUA MODULE – SATELLITE CIPHERING AND DECIPHERING UNIT

Main Functionalities of Satellite Ciphering and Deciphering Unit

Authenticates and decipheres 32 Kbit/s data coming from S-Band, and sends it to Spacecraft Management Unit (SMU).

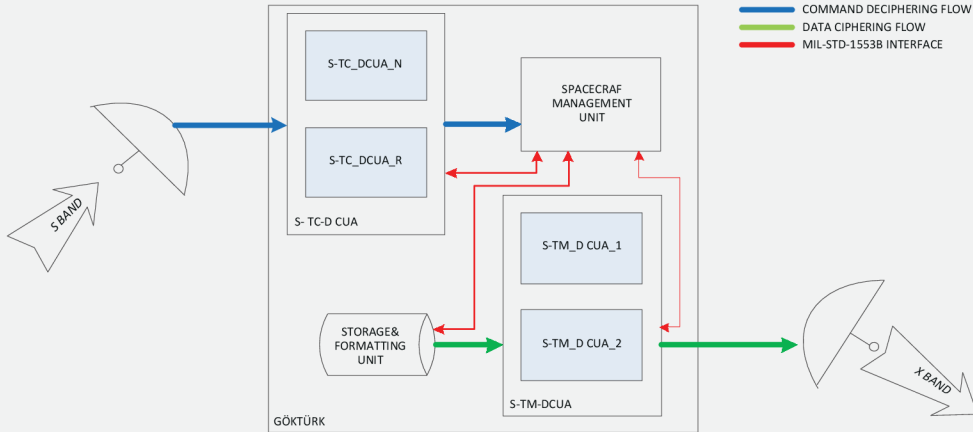
Through four independent 158 Kbit/s X-Band channels, it receives payload data sent by Storage and Formatting Unit (SFU), ciphers the data and then sends it to X-Band Communication Unit.

Generates Telemetry data about its own condition (temperature, current consumption, log records of processed commands, etc). and send them to SMU periodically.



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MAIN FEATURES OF S-DCUA MODULE

- **Hot Redundancy:** S-DCUA consists of two identical submodules (S-TC_DCUA-Nominal and S-TC_DCUA-Redundant). Both modules have the same configuration, are active at the same time, and backup each other. Both modules will be active throughout Satellite's mission life (7.25 years).
- Payload ciphering is performed by two identical submodules (S-TM_DCUA-1 and S-TM_DCUA-2). Each submodule has two ciphering channels working at 158 Mbit/s data rate.
- SMU accesses the SDCUA via MIL-STD-1553B Interface:
 - SDCUA receives commands coming from SMU over MIL-STD-1553B
 - SDCUA sends housekeeping telemetry data to SMU over MIL-STD-1553B
- PCB design of S-DCUA is done to meet space environment needs. All components used are space grade components. ACTEL (Microchip) "Antifuse" FPGAs are used due to their Radiation Hardened design. All cryptographic algorithms and protocols are implemented on these FPGAs.

TECHNICAL FEATURES OF S-DCUA MODULE

General Features	<p>S-DCUA consists of the following units:</p> <ul style="list-style-type: none"> • S-Band Crypto Unit S-TC_DCUA-N (Data processing rate: 32 Kbit/s) S-TC_DCUA-R (Data processing rate: 32 Kbit/s) • X-Band Crypto Unit S-TM_DCUA-1 (Data processing rate: 2x158 Mbit/s) S-TM_DCUA-2 (Data processing rate: 2x158 Mbit/s)
Electrical Features	<p>S-TC_DCUA: Main Input Voltage: 28V Power Consumption: 2x7 Watt (S-TC_DCUA-N + S-TC_DCUA-R)</p> <p>S-TM_DCUA: Main Input Voltage: 28V Power Consumption: 2x14.4 Watt (S-TM_DCUA-1 + S-TM_DCUA-2)</p>
Electrical Features	<p>S-DCUA: Weight: 7.2 kg Dimensions: 185mm x 195mm x 195mm</p>
Interfaces	<p>S-TC_DCUA: <u>RS-422:</u> 1. To receive and send Command Packets in CLTU format, with 32 Kbit/s rate. 2. Key loading interface <u>MIL-STD-1553B:</u> To receive and reply commands from SMU. Sending house-keeping telemetry to SMU.</p> <p>S-TM_DCUA: <u>G-LINK:</u> To receive Data Packets in CADU format, with 158 Mbit/s rate <u>LVDS:</u> To send ciphered Data Packets in CADU format to X-Band Communication Unit, with 158 Mbit/s rate. <u>MIL-STD-1553B:</u> To receive and reply commands from SMU. Sending house-keeping telemetry to SMU. <u>RS422:</u> Key loading interface</p>
Environmental Conditions	Working temperature range: -20 C to +50 C
Radiation	>16.2 Krad

Due to ongoing research and development activities, the mentioned values above may be changed without notice.

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