

CCS5 & TSC

PROTOCOLS

Packet & Frame Coding & Flow Control:

ECSS-E-ST-50-01C, 03C, 04C; ESA PSS-04-106,107,151; CCSDS 102.0-B-5, 201.0-B-3, 202.0-B-3, 202.1-B-2, 301.0-B-3, 355.0-B-1, 355.1-B-1

Packet Utilization (PUS): ECSS-E-70-41A, C

CubeSat (CSP): versions 1 & 2

Flexible plugin & driver architecture; select protocol at installation.

Main protocols:

Checkout & EGSE: EDEN, C&C, CAN, ZMQ, Serial

Ground Station: Safran Cortex & compatible, ESA NIS, NDIU LITE SLE (RAF & F-CLTU) with UNIS option.

TMTC DATA BASE

SCOS2000 MIB ICD 7.2 extended: (e.g.) unlimited field lengths, drop & load multiple databases, deduced parameters in TM & TC, variable parameters globally accessible & limit-checked, fine control of variable length parameters, big & little-endian parameters, VPD_CHOICE, dynamic HK definition. Online MIB table browser available. All tables accessible from TOPE. Full details in CCS user manual. Not supported: TC sequence tables (use TOPE or command stack files).

AUTOMATION LANGUAGE

TOPE (includes Tcl/Tk 8.6).

Numerous Tcl extension packages included, e.g. Tk, [incr Tcl], database access.

NATIVE OPERATING SYSTEMS

Windows™: works on all recent versions. Automated installer. Tested on Windows 10.

Linux™ works on all recent distributions, installed as RPM. Tested on RHEL7 and OpenSuse LEAP.





CLOUD PLATFORM SUPPORT

Available as Docker image with Kubernetes manifest, verified in MS Azure.

ARCHIVE

Open format: raw binary segmented files, containing header & content, index stored in RDBMS: MySQL & compatible, PostgreSQL. TSC standalone defaults to SQLITE.

TOPE supports retrieval of any archive object, from current or previous sessions, including TM and TC parameters in specific packets.

GRAPHICAL DISPLAYS

Native user interface based on Qt. QML (Qt Modeling Language) allows scripting of fluid touch-enabled displays. Mimic editor provides editor for simple schematic QML displays. Tk toolkit allows classic user-scripted graphical user interfaces to be written using TOPE.

SPECIAL FEATURES

SVF Mode: operation with simulator running in simulated time.

TM simulation: inject raw data or generate TM according to its MIB definition.

TC modelling: model and verify commands sent by another entity.

Secure installation option, automated test & quality metrics.

SOFTWARE PLATFORM

C++ based on commercial Qt5.15. Tcl/Tk libraries included on BSD license terms.

IPR owned by Terma, no GPL.

SUPPORT

Standard license price includes 1-year warranty & email support.

Standard training packages available on request.

Updates from <https://tgss.terma.com>

Export Control restrictions may apply.

WIKI and access to bug-tracking system available to licensed customers.

1 Available in Q2 2025

2 Available in Q2 2025

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