

DVB-RCS Terminal Population Emulator

Summary

The VeriSat Terminal Population Emulator emulates signalling and traffic from a terminal population. The TPE functionality provides powerful tools for creating logon and capacity request loading scenarios of DVB-RCS Hubs, as well as emulating terminals with different properties. Various statistical models may be applied, depending on the test objectives. The Terminal Population Emulator is offered with an RF burst modulator interface at L-band. The TPE works in conjunction with the VeriSat FLA or FRLA (please refer to separate data sheets).

Target applications

The VeriSat Terminal Population Emulator (TPE) applications include:

- Hub and system performance and capacity testing, signalling and traffic loading
- Operation at L-band for local Hub testing or at RF over the satellite link (TPE ODU optional)
- System operation with large terminal populations
- Generate controlled network scenarios with large terminal populations
- Generate background network loading and then investigate terminal behaviour in the network under various network loads

Terminal Population Emulator Configurations

The TPE block diagram is shown below. The DVB-RCS Hub under test is subject to traffic and signalling loading created by the TPE. The Forward Link Analyser (FLA or FRLA, offered separately) works in conjunction with the TPE and analyses and displays the signalling for the forward or both links.

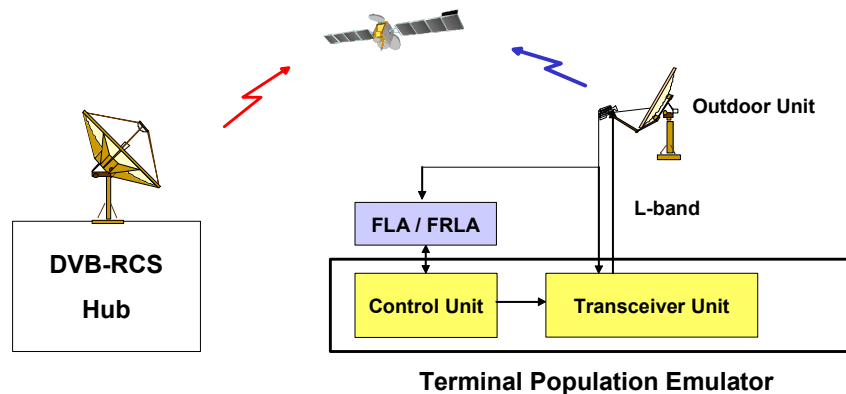


Figure 1. Terminal Population Emulator performing emulation of a terminal population at RF over a satellite link. The forward link signalling information needed by the TPE is received from the VeriSat FLA or FRLA via Ethernet.

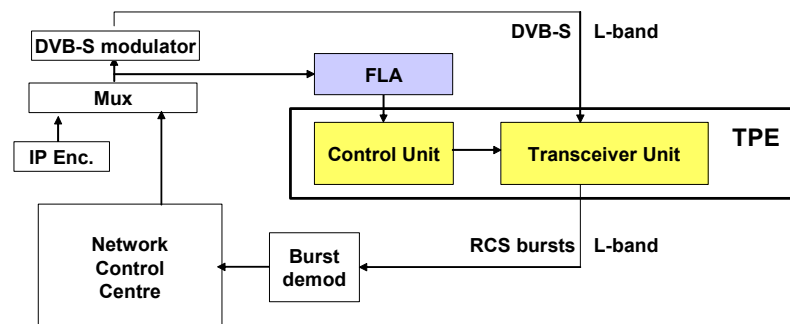


Figure 2. Terminal Population Emulator performing emulation of a terminal population at L-band with RCS air interface bursts.

Terminal Population Emulator Description

Main features

- Emulation of main terminal states for the emulated terminal population
- CSC, ACQ, SYNC, capacity requests (in SAC)
- Simulates up to 100 terminals (larger populations at request):
 - Define pool size of terminals for the emulation/simulation session
 - Decoded forward link signalling and configures the return link timeslots accordingly
 - Logon terminals by CSC transmission and TIM reception, ACQ supported if applicable
 - Generate SYNC bursts for the terminal population
 - Operate in compliance with SCT, FCT and TCT and TBTP for the terminal population
 - Generate capacity requests for the terminals based on selected traffic model for the terminal pool (Normal distribution and Poisson default statistical models)
- Load in terms of CSC slot and SAC fields configured by the user, i.e. no. of CSC slots per superframe
- Emulation of all capacity requests (RBDC, VBDC and AVBDC)
- User-configured loading of SAC message rate (generated SAC messages per time unit or superframe)
- Traffic load generator loading the Hub with dummy IP traffic from the simulated terminals
- Forced logoff from the Hub is detected, stopping terminal transmission and re-starting the logon sequence

User interface

The TPE is configured and controlled via the graphical user interface, including configuration of:

- Population ID (one population ID is supported)
- Population size (number of terminals), emulated terminal MAC address range
- Loading in terms of logons/sec or CSC packets/superframe
- Capacity request size and repetition rate, session duration
- Distribution of signalling load for each emulated terminal according to the selected statistical model
- Capacity request repetition duration can be stopped after a defined time allowing testing of transient conditions

The VeriSat Forward Link Analyser or and the Forward and Return Link Analyser (FLA or FRLA) is used to monitor the forward link signalling - for the FRLA also the reception of emulated return link messages can be monitored).

Operational description

The Terminal Population Emulator initially acquires the configuration from the forward link via the FLA. The session parameters are defined by loading a configuration file that may be changed by the user. When Start is selected, the TPE starts sending CSC request for each terminal defined in the population to be emulated. If a TIM logon conformation is received, the terminal status is updated as logged on, if not the CSC message will be repeated after a defined time. It then starts to send ACQ messages if applicable, and eventually SYNC messages, as defined in the TIM unicast logon message signalled by the Hub. Capacity requests are generated according to the user-defined configuration of: capacity request type, capacity size and the request intensity (requests/time unit or SAC messages/time unit) for each terminal that is confirmed as logged on. This way the hub loading is under full control of the TPE user.

The Hub NCC received the messages and performs the corresponding actions, resulting in updated forward link signalling, configuring SYNC slots and confirming logon with unicast TIM messages to the simulated terminal population.

The session duration is configured by the user. . When the session reaches the session duration limit, the emulator sends a log-off message to the Hub, and the terminal returns to the inactive terminal pool. The TPE also responds to a forced logoff from the Hub

The TPE monitors the Hub response corresponding to the emulated events. The lack of the expected Hub response is registered as an event by the TPE. Other events can be monitored with the FLA/FRLA. At input levels resulting in Hub saturation or malfunction, the number of unacknowledged events will increase to an unacceptable level or result in unacceptable delays, determining the performance threshold of the Hub.

Option: Ethernet interface

The TPE may also create demodulated air interface bursts on Ethernet. The Hub system receives the emulated terminal messages as normal terminal messages. Real messages from an operational burst demodulator may also be received in parallel, allowing the emulator to create background loading levels. The TPE must be adapted to support the protocol between the burst demodulator and the NCC.

DVB-RCS Terminal Population Emulator Technical Specifications

Population Emulation

Terminal population	Emulation of up to 50 terminals with user configurable MAC addresses (emulation of larger populations on request).
Emulation models	Emulation based on statistical models (Poisson, normal distribution)
Logon emulation sequence	Normal terminal logon sequence for each emulated terminal: send CSC burst, receive TIM, send ACQ if applicable, eventually send SYNC and TRF according to signalled time slot allocation
Burst format	CSC, ACQ, SYNC, TRF (ATM or MPEG)
CSC	The number of generated CSC packets per time unit or per superframe is configurable by the user (overriding of TIM-B descriptor contents).
Synchronisation	Time reference stepping mode to automatically increment the propagation delay setting for the CSC bursts until the CSC burst is detected by the Hub and the TIM-Unicast logon message is received by the TPE.
Test mode	CSC, ACQ, SYNC and TRF bursts can be transmitted without receiving hub signalling for special test applications
Coding	Turbo coding.
Capacity requests	Configurable no. of generated requests per time unit or per superframe, configurable capacity size for each request
Capacity request types	RBDC, VBDC, AVBDC
Traffic load generator	PING packet generation for one selected MAC address Dummy IP traffic for the other emulated MAC addresses Load based on configurable statistical models
Configuration management	Storage of configurations, recall of stored session parameters

Return Link interface

RCS air interface (VS710)	DVB-RCS compliant burst modulator with L-band output supporting all RCS compliant Turbo-coded burst formats.
Ethernet interface (VS750)	Ethernet interface (protocol TBD)

Ordering information

VS710-L	TPE Control Unit (desktop PC) and TPE Transceiver Unit (1U 19") with RCS burst output at L-band
VS720-L	TPE Control Unit software for Windows XP and TPE Transceiver Unit (1U 19") with RCS burst output at L-band
VS710-Ku	TPE Control Unit (desktop PC), TPE Transceiver Unit (1U 19") and Ku-band ODU (2 Watt, 1.2m antenna)
VS720-Ku	TPE Control Unit software for Windows XP, TPE Transceiver Unit (1U 19") and Ku-band ODU (2 Watt, 1.2m antenna)
VS750-E	Desktop PC with Ethernet interface emulating the burst demodulator protocol of interest. Please contact VeriSat for supported burst demodulator protocols.

Options

(specify with order number)

IP-FWD	Support for normal IP communication between the TPE and the Hub for one selected user-defined MAC address
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