GE Aerospace

Chronos
Time-Sensitive Networking Toolset

A comprehensive tool for planning, design, analysis, and configuration of time-sensitive networks for deterministic and safety-critical applications

Self-Service Network Configuration

- Field-configure any TSN-compliant device to rapidly deploy a coherent network configuration to all devices
- Auto-provision mix of best-effort, rate-constrained, and scheduled traffic
- Analyze link utilization, schedule, latency, jitter, and delivery bounds
- Check design feasibility and identify bottlenecks

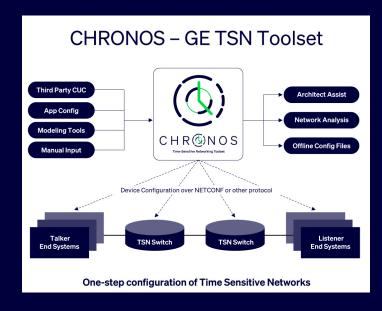### Support for Open IEEE TSN Standards

- Shaping for both time-aware and rate-constrained traffic
- Stream isolation and seamless network redundancy
- Support for legacy Ethernet traffic
- Integrated CUC and CNC for static engineered networks
- YANG-based device configuration over NETCONF

Purpose built for Aerospace System Integrators

- Supports multi-vendor equipment and device specific hardware/software constraints
- Fast and robust for configuring large vehicle networks
- Compatible with vendor-specific XML to binary conversion for data loading
- Verifier module per DO-178C/DO-330 and compatible with other safety-related such as ISO-26262 and IEC-61508[1]

Flexible Integration

- GUI or command-line interface to process several input and output file formats
- Easily integrate into your MBSE toolchain or leverage GE's MBD Integration avionics integration toolset
- Kickstarter guides and user manuals to aid integrat

CHRONOS – GE TSN Toolset

Third Party CUC · App Config · Modeling Tools · Manual Input → CHRONOS Time-Sensitive Networking Toolset → Architect Assist · Network Analysis · Offline Config Files

Device Configuration over NETCONF or other protocol

Talker End Systems — TSN Switch — TSN Switch — Listener End Systems

One-step configuration of Time Sensitive Networks

Features

Operating Systems

- Microsoft Windows® 10 64-bit
- Microsoft Windows® 11
- Ubuntu Linux 64-bit (available in FY2023)[1]

Outputs

Configuration Data Models

- IEEE YANG models and their variants
- Custom and vendor specific models

Data Loading

- Direct device programming with NETCONF and SCP
- Offline configuration files in XML, JSON, and ASCII formats
- Generates XML to be used by external ARINC 665 tools for ARINC 615A data loading

Inputs

Standard Parsers

- IEEE 802.1Qcc XML, IETF Topology XML

Custom Parsers

- Table-based input with Excel template, DDS (Data Distribution Service), ARINC 664 Network Configuration file (NCF). Contact GE for additional formats not listed.

Aerospace Specific

- Expected compliance with IEEE P802.1DP and SAE AS6675
- Verifier module qualified per DO-330[1]

Features

Topology & Streams

- Interactive GUI representation of the network scenario
- Redundant data path selection for FRER streams
- Visualize per-stream schedule, VLAN, queue assignment, and network utilization overlayed on topology

Scheduling & Analysis

- High performance scheduling engine to robustly handle large networks
- Network utilization analysis - heat map, available bandwidth per link, and link utilization distribution
- Network latency analysis - end-to-end network latency, transmit and arrival times, packet delay variation (jitter)

Support Standards (selective list)

- IEEE Std 802.1D multi-port MAC Ethernet bridging
- IEEE Std 802.1Q Virtual Local Area Network (VLAN) support
- IEEE Std 802.1Q Time Aware Scheduling
- IEEE Std 802.1Q Per-Stream Filtering & Policing[1]
- IEEE Std 802.1Q Credit-Based Shaper[1]
- IEEE Std 802.1Q Static MAC forwarding
- IEEE Std 802.1AS Time Synchronization
- IEEE Std 802.1CB Frame Replication & Elimination
- IEEE Std 802.1Qcw YANG data models for configuration

Note 1: Under development. Check availability with sales contact.

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