TimePictra® Software Suite

Synchronization Element Manager for High-Accuracy Time Networks

Summary

Our TimePictra® software suite is an excellent choice for telecom, power grid and critical infrastructure networks that rely on high-accuracy time for operation. The TimePictra software suite features a modular architecture that can scale and evolve as operational requirements change.

Accurate time and high-stability frequency have become essential resources for modern critical infrastructure applications. Because many systems depend on precise timing, any disruption—whether accidental or malicious—can create wide-ranging operational impacts.

To help safeguard timing accuracy, networks must be monitored closely. Centralized visibility and control enable operators to detect anomalies, identify timing degradation early and respond before services are affected.

As networks grow to use primary time sources, such as Primary Reference Time Clock Class B (PRTC-B), enhanced PRTC (ePRTC), coherent PRTC (cPRTC) and virtual PRTC (vPRTC) with High-Accuracy Time Transfer (HA-TT), the TimePictra software suite helps monitor the timing network to support security, redundancy and resilience while meeting the tight timing margins required by advanced networks.

Key Features

- Web-based, multi-window workspace
- Comprehensive Fault, Configuration, Accounting,
- Performance and Security (FCAPS) management functions
- Network SLA monitoring and reporting
- Fully integrated with BlueSky® GNSS firewall for a protected and secure network
- Secure and hardened software
- Geographical, topology and domain navigation
- Running on a single server or load-balanced cluster for always-active high availability
- Multiple northbound interfaces
- Representational State Transfer Application Programming Interface (REST-API) for integration and orchestration

Key Benefits

- Access the TimePictra software suite from any standard web browser
- No client software or plugins required
- Adaptable layout—focus on what matters most for each operation

Applications

- Service provider wireline and wireless networks
- Power utility networks
- Enterprise networks
- Government networks

Critical Time and Frequency Networks

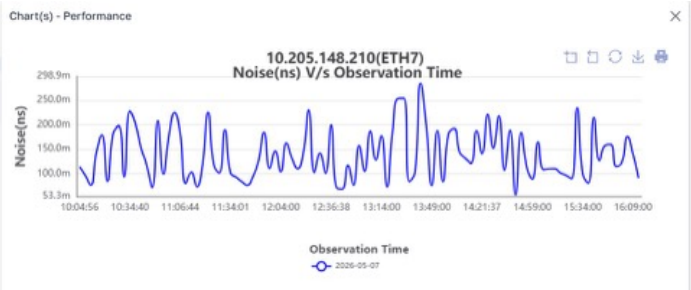
Modern networks are getting bigger and more important. They support 5G, smart grids and financial trading, which all need accurate timing to work well.

As a result, there are more timing devices in networks, and they need to be managed and checked for problems. The TimePictra software suite is a comprehensive system for managing time and frequency in critical networks. It covers fault management, configuration, inventory, performance and security.

The TimePictra software suite includes many features such as a map of your network, easy navigation, dashboards for alarms and inventory, and user and license details. You can add new software features anytime with a license key, with no extra installation or downtime. The TimePictra platform has a flexible design that allows you to expand and improve your system as your network grows.

Network SLA Compliance

The TimePictra platform automatically collects performance data and KPIs from multiple sources across the network, which helps provide an accurate view of the actual performance. By maintaining a long-term historical record, the platform makes it easy to demonstrate past SLA compliance and analyze performance trends over time, helping operators identify long-term changes in network performance.



Dashboard

A user dashboard simplifies the display of network health, including alarm counts with severity, network element inventory, logged-in user and license information. With the Group Pack option, the dashboard can be customized with user preferences.

Network Operation Integration

Many network operators integrate element management with their network manager systems for the overall management of multi-vendor, diverse equipment environments. The TimePictra platform enables integration of its northbound interface using Simple Network Management Protocol (SNMP), American Standard Code for Information Interchange (ASCII), REST-API and Syslog northbound for alarm, performance, asset tracking, security audits, topology integration and orchestration.

High Availability Option

The TimePictra platform's High Availability option operates with either load-balanced or geographically diverse server clusters to replicate the database and synchronization management function, which removes any single point of failure.

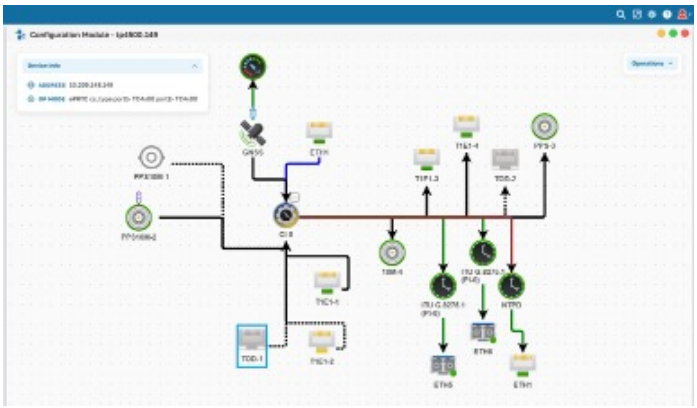
FCAPS Capabilities

Fault Manager

Events and alarms are displayed using a color-coded format compliant with ITU-T standards; notifications are easily intelligible. Network personnel have the ability to readily access the entire suite for any of the synchronization network elements.

Configuration Manager

The Configuration Manager allows authorized users to access, manage and visualize, in real time, the different service interconnections between elements and the flow of time and frequency within each element. The Configuration Manager allows intuitive monitoring and configuration changes to enable the system to operate reliably and efficiently.



Accounting (Inventory) Manager

This manager provides full asset and inventory information on any of the managed elements in the synchronization network. With full details of firmware, hardware versions, licensed options, inserted SFPs and modules, the inventory provides a full asset list for the managed network.

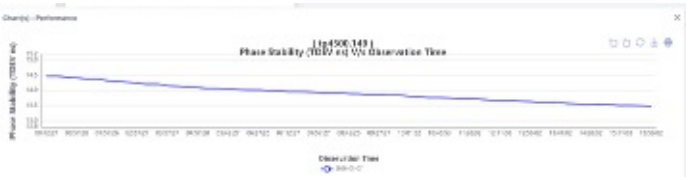
Performance Manager

The performance analysis engine graphically displays a wide range of standard synchronization metrics, including Maximum Time Interval Error (MTIE), Time Deviation (TDEV), Time Error (TE), Constant Time Error (cTE), Maximum

Time Error (MaxTE), Floor, Floor Package Percentage (FPP) and Time Interval Error (TIE). These visualizations help users proactively identify and address issues while gathering evidence to support SLA compliance across the synchronization network.

The TimePictra platform also allows users to compare current measurements against stored, industry standard, mask-defined thresholds. Its performance tools consolidate all relevant timing data into a comprehensive, year-long evidence archive.

Hardening Option



For networks that require stronger encryption, tighter access control and more rigorous user management, this option provides a significant hardening advantage. It reduces the attack surface and strengthens authentication by integrating with enterprise-grade security frameworks.

The TimePictra platform supports:

- Remote Authentication Dial-In User Service (RADIUS) centralizing authentication and enforces consistent access policies across the network
- Lightweight Directory Access Protocol (LDAP) and Lighweight Directory Access Protocol over Secure Sockets Layer (LDAPS) enabling secure directory-based identity management, with LDAP S adding encrypted communication to prevent credential exposure
- Security Assertation Markup Language (SAML) providing federated authentication, which reduces password sprawl and improves identity assurance
- Two-Factor Authentication adds a second verification step to dramatically lower the risk of unauthorized access
- Allowlists restrict access to approved users or systems only, which minimizes potential entry points for attackers

Specifications

Management Capacity

- Up to 6,000 network elements
- Up to 200,000 PTP client elements
- ITU T M.3400 (FCAPS)
- ITU T X.733 and X.734

Communication Protocols

- GUI: HTTP, HTTPs, SSL, TLS
- CLI: SSH
- NBI: SNMP, Syslog, ASCII, RestConf
- SBI: SNMP, TL1, SSH, HTTP, RestConf
- User Authentication: SAML, RADIUS, LDAP

Network Element Support

The TimePictra software suite supports our timing and synchronization architecture and products, including:

- vPRTC, Assisted Partial Timing Support (APTS)
- TimeProvider® 4000 and 5000 series
- SSU2000 synchronization supply units
- TimeCesium® primary frequency reference/5071A cesium primary time and frequency standard (Fault, Status and Tube History)
- SyncServer® S600/S650 time server
- BlueSky® GNSS Firewall with SkyWire™ technology

Server Requirements Recommendation

The TimePictra platform can run on a standalone server or as a virtualized instance on a virtual server farm.

Hardware and Operating System

- VMware® instance
- Minimum four virtual processors
- 64 GB RAM minimum
- Minimum virtual disk size
- 600 GB (dependent on network size)
- 64-bit PC server
- Minimum four core, eight thread, 3 GHz server
- 64 GB RAM (suggested minimum)

Database

- MySQL® 8.0 or MariaDb® 11

Operating System

- Red Hat®, Oracle® Linux® or Alma Linux versions 9.x or 10.x

Web-Based Client

- Firefox Mozilla®
- Google® Chrome®
- Microsoft® Edge®
- Safari

Basic Software

Fault Management

- Alarm processing
  - User acknowledgment tracking system
  - User defined alarm descriptions
  - User defined search filters
- Report printing in PDF format
- Historical capacity of 10 million alarms and events
- Over one year of historical storage and analysis
- Event tool tip description
  - Fault analysis
  - Active alarm and historical event analysis using bar or pie chart
  - Active alarm and historical event details

Topology Visualization

- Network topology in logical and geographical formats
- Seamless integration between network, system and element views

Configuration Management

- Network element
- Detail status and configuration view
- Device front-panel display (physical view with LED display)
- Device logical view and modification
- Real-time alarm display in logical view panel

Accounting (Inventory) Management

- Inventory detail
- Filtering display
- Device type identification
- Firmware and hardware revision tracking
- Serial number tracking

Performance Management

- On-demand and historical data plotting
- Multi-window graphing
- Dynamic zoom functionality
- Graphical and data export
- Support for TE, cTE, MaxTE, Floor, FPP, MTIE, TDEV
- Powerful plotting engine
- Multi-axis
- High resolution plots
- Plot width minute, day, week or month
- Multi-device plots
- Multi-day plots
- Up to 10 lines of plot simultaneously
- Up to 365 days of performance history available online

Security Management

- TimePictra platform user administration
- Default and customized user profiles
- Password-failed login attempt
- Change password on initial login
- Number of concurrent sessions
- Password expiration days
- Network element user administration

Software Options

Performance Pack Option

- Live and historical data plotting
- Automatic data collection on a 24-hour interval
- Up to one year of historical performance plots
- Mask library support

Security Pack Option

- HTTPS secure client and server communication
- Login customization
- Dynamic user authentication using RADIUS, LDAP, Open Authorization (OAuth) and SAML

Group Pack Option

- User preference-based dashboard customization
- Full customization on user and resource groups
- Domain, alarm policy, configuration policy and performance mask library
- Navigation tree drag-and-drop functionality
- Report pack option
- Support for XML, PDF, HTML and CVS file formats
- Print report functionality
- Activity logs
- Current and historical alarms and events
- Inventory and history lists

SNMP Northbound Option

- Active alarms and events forwarding
- SNMP v2c and v3 traps
- Syslog northbound for alarms, security events and performance

TeMIP Northbound Option

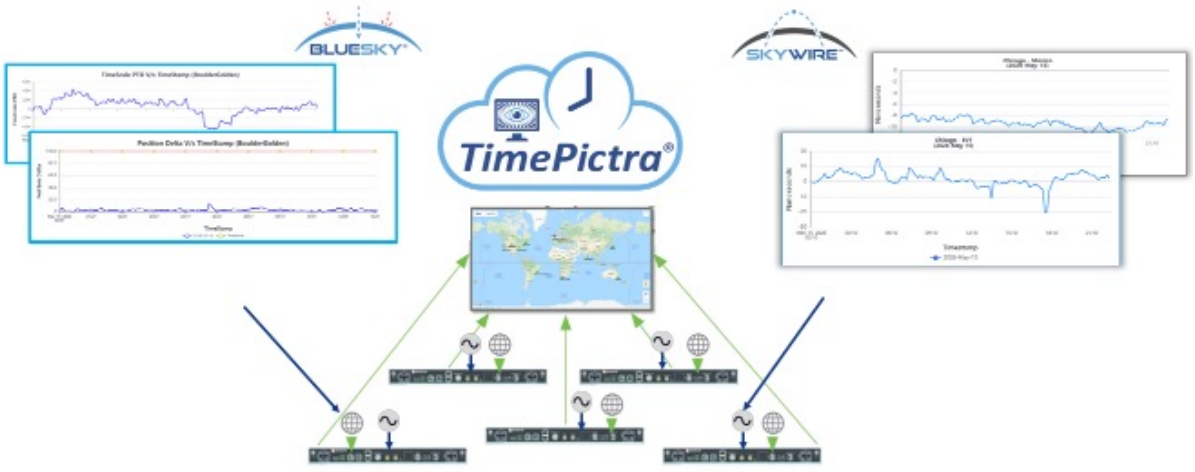
- Active alarms and events forwarding in ASCII format
- Daily topology transmission using ASCII and MD5 checksum files
- Heartbeat messaging to the Operations Support System (OSS) at 1-minute interval
- Support for multiple TeMIP servers
- Reliable alarm delivery

REST–API

- Secure posts and gets for:
- Current and historic alarms
- Assets and Inventory
- Orchestration
- Network element provisioning

Use Case: BlueSky GNSS Firewall With SkyWire Technology

SkyWire technology is implemented within the BlueSky GNSS Firewall to enable secure, high precision timing across a range of deployment scenarios. This capability is centrally managed and visualized using the TimePictra software platform. The integration of SkyWire technology into the BlueSky GNSS Firewall adds precise clock comparison and alignment across geographically dispersed locations, with traceability to Coordinated Universal Time (UTC) as maintained by national timing laboratories. TimePictra software performs the required common view calculations, data aggregation and visualization, while the BlueSky GNSS Firewall simultaneously enforces GNSS signal validation. Together, they deliver an integrated and resilient to defending against GNSS based threats.



Two geographically separated BlueSky GNSS Firewall systems are each connected to an external reference clock. Using integrated SkyWire technology, each firewall performs precise time of arrival measurements of GNSS signals and generates common view measurement data. These measurement files are securely transmitted to TimePictra, where data from both locations is aggregated and processed. TimePictra computes the relative clock offset between Site A and Site B and presents the results through intuitive graphical plots. This enables operators to visualize clock alignment and verify timing performance across distributed sites. Additionally, as seen in the graphic below, BlueSky performance monitoring can be visualized in parallel with clock offset data from SkyWire technology.