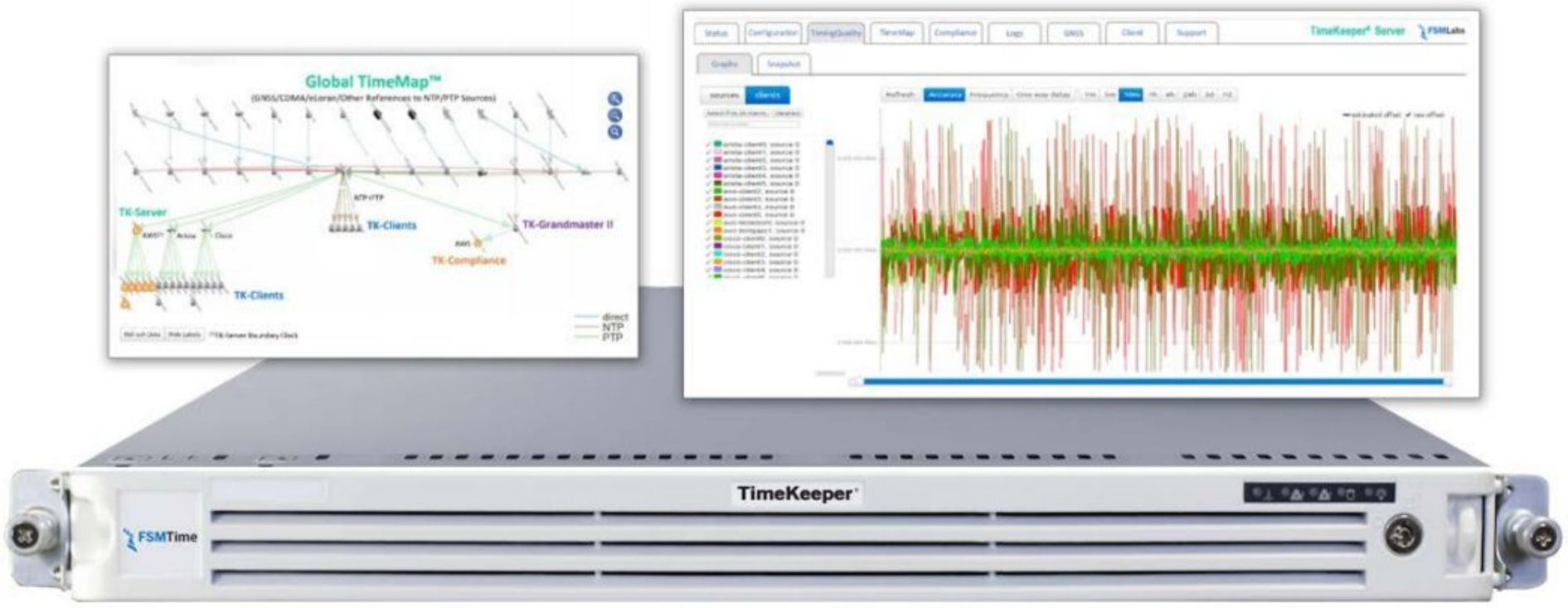
FSMTime
SECURE ENTERPRISE CLOCK SYNC™
by FSMLabs

TIMEKEEPER® GRANDMASTER II

Secure <30Ns, Software-Powered GNSS Time Server with Ultrahigh-Speed 10/25/40/100GbE NTP/PTP Ports



TK-Grandmaster II Time Server Appliance Powered by the Intelligent TimeKeeper Server Software

BENEFITS

- Lowest cost to upgrade legacy low-speed NTP infrastructure with high-precision NTP/PTP clock sync solution
- Hardware-timestamped accuracy within 100's of nanoseconds using NTP/PTP feeds
- *Global TimeMap™* topology visualization for planning and management
- High reliability, resiliency, and quality through state-of-the-art design
- Reduced timing errors and network latency by matching packet speed with network speed

FEATURES

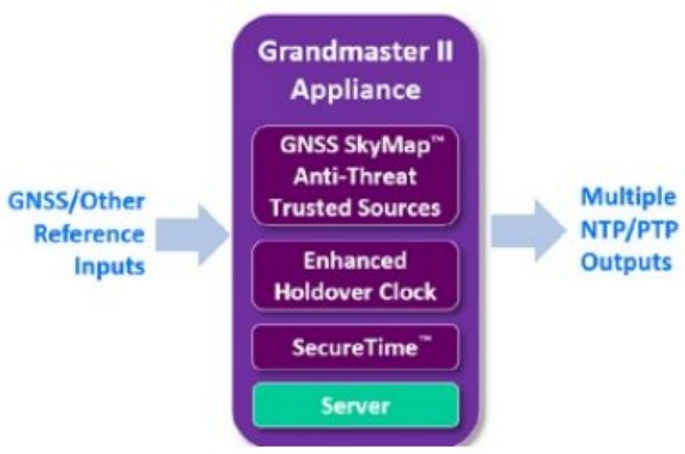
- Outputs ultrahigh-speed 1/10/25/40/100GbE ports
- Uses patented *GNSS SkyMap™ Anti-Threat Trusted Sources* capability
- Provides *Enhanced Holdover Clock* (crystal or atomic rubidium)
- Uses patented *SecureTime™* monitoring and *TrustedTime™* multisource failover capabilities, with each source verified, validated, and cross-checked in real time
- Accommodates hot-swappable power supplies and storage cards
- Includes flexible, intuitive web-based management dashboard or CLI

TIMEKEEPER GRANDMASTER II

TimeKeeper Grandmaster II (**TK-Grandmaster II**) is a secure, second-generation, high-performance software-powered time server appliance for data center IT users, receiving any time source (GNSS, IRIG, CDMA, NTP, PTP, eLoran and other profiles) and serving time over multiple ultrahigh-speed, hardware-timestamped NTP/PTP ports at <30ns precision. Working in conjunction with the intelligent TimeKeeper Server (**TK-Server**) software package, **TK-Grandmaster II** provides powerful client/server management, configuration, monitoring, fault logging, performance analytics, clock sync chain topology visualization, alert notification, and security. **TK-Grandmaster II** is designed with high reliability, resiliency, and quality, with its *Enhanced Holdover Clock*, failover capabilities, IPMI access, high-capacity storage cards, and redundant, hot-swappable power supplies and hard drives. **TK-Grandmaster II** seamlessly upgrades legacy NTP/PTP infrastructure with leading-edge precision at the lowest TCO. **TK-Grandmaster II** performance exceeds many regulatory requirements, such as MiFID II, RTS-25, FINRA, CAT NMS, OATS, PCI DSS, PSD2, and UTC/NIST traceability.

HOW THE TK-GRANDMASTER II WORKS

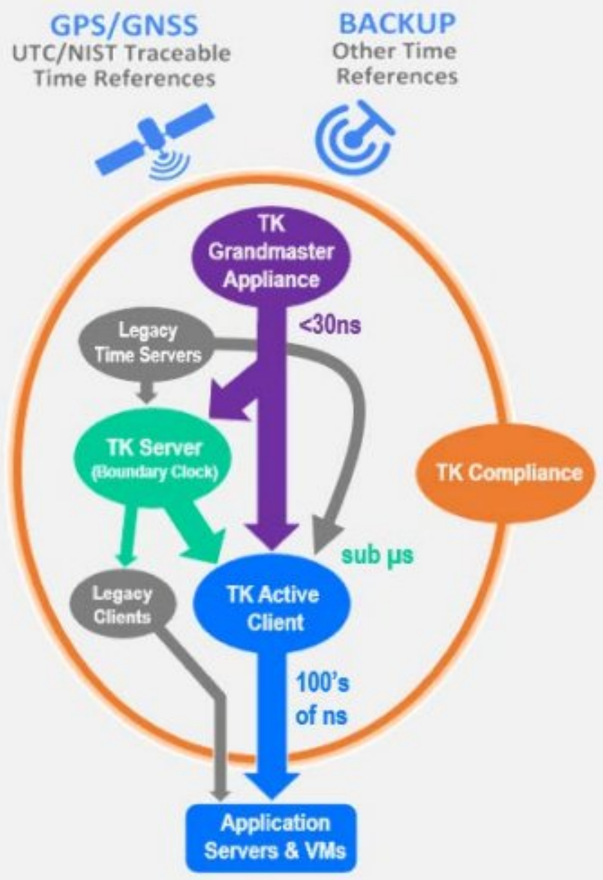
TK-Grandmaster II integrates the intelligent TimeKeeper software and the following innovative, scalable features for resilient, reliable enterprise clock sync:



TIMEKEEPER GRANDMASTER II

TIMEKEEPER CLOCK SYNC CHAIN

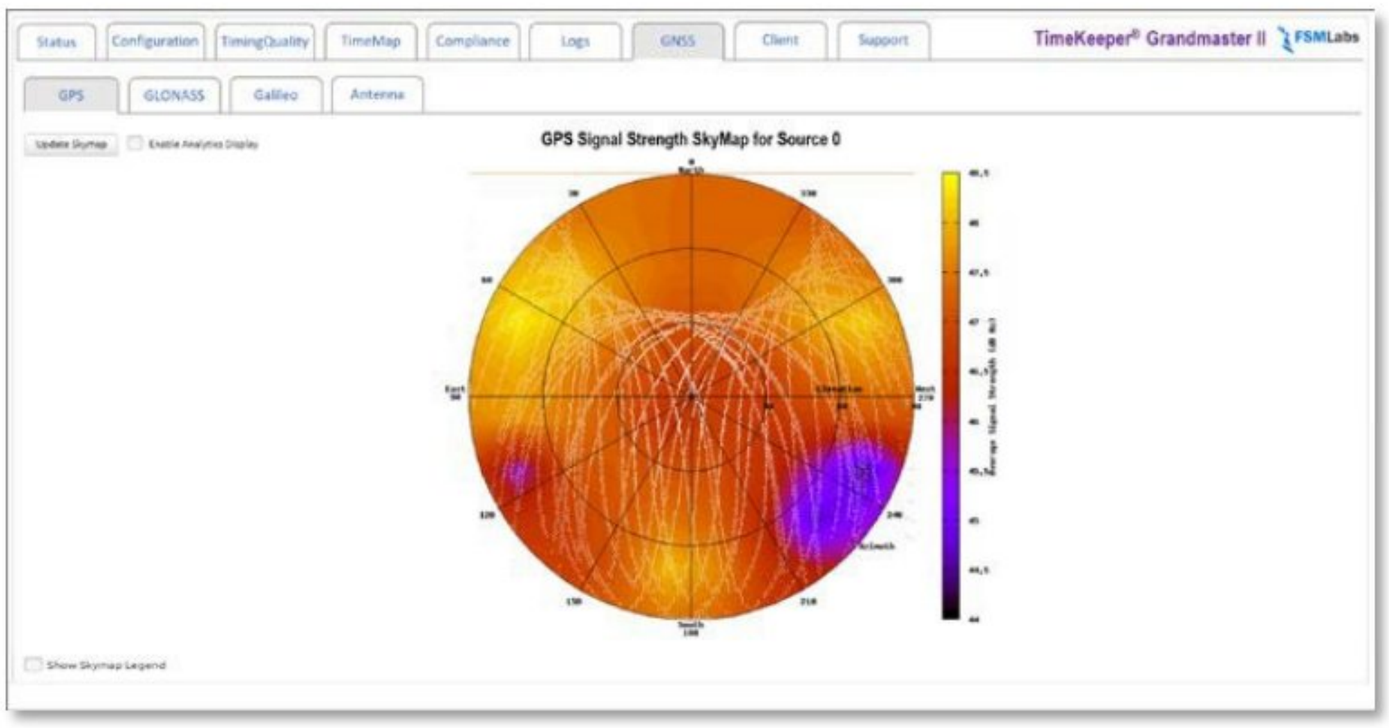
TimeKeeper technology achieves sub-µs enterprise timing performance.



TimeKeeper Platform (**TK-Platform**) is fault- tolerant, making enterprise clock sync resilient end-to-end and providing trusted sub-microsecond accuracy performance to **TK Active Client**'s application servers and VMs. TimeKeeper Compliance (**TK-Compliance**) tool assures that the integrity of the enterprise clock sync chain, with *TimeIQ™* intelligence from all its connected time sync devices, is meets regulatory standards, such as MiFID II, FINRA, CAT NMS, OATS, PSD2, PCI DSS, UTC/NIST traceability.

GNSS SkyMap Anti-Threat Trusted Sources

The *SkyMap* technology is a patented GNSS analytics tool, monitoring real-time performance, threat, and resilience of multi-GNSS time references and accepting only trusted time sources for reliable, quality NTP/PTP time serving of the enterprise clock sync network. Threats such as spoofed and jammed signals are automatically detected and mitigated by *SkyMap*, rejecting inaccurate or compromised sources. Vulnerable or invalid sources are graphically visualized (see the purple areas below), showing the map location and sky view of the affected GNSS antenna, with *SkyMap* providing user alerts and audit logs.



SkyMap visually displays the satellite signal reception of multiple UTC-traceable primary time source references such as GPS and GNSS, while verifying, validating, and cross-checking each reference in real time. *SkyMap*'s visual reception display facilitates optimal line-of-sight GNSS rooftop antenna installation.

Enhanced Holdover Clock

TK-Grandmaster II is equipped with smart GNSS-disciplined clock technology with either a crystal or an atomic rubidium oscillator, which greatly enhances the holdover of timekeeping capability of the enterprise clock sync in case of lost or compromised GNSS time sources.

TrustedTime

TrustedTime tracks multiple time sources to create verified, validated, and cross-checked *SecureTime*, by **TK-Server**'s network *TimeMonitor™* and *TimeMap*, and by TimeKeeper Client's (**TK-Client**) *TrustedTime* multisource failover capability, ensuring client time sources are fault-tolerant for time-critical enterprise applications. *SecureTime* also provides transparent failover for redundant **TK-Grandmaster II** appliances.

Web Management Dashboard

TK-Grandmaster II is designed with an intuitive web management dashboard, providing comprehensive user control features such as installation, configuration, performance monitoring/analytics, UTC-traceability, alert notification, fault logs, CLI, support, administration, and more. **TK-Grandmaster II** settings can be changed without affecting the clock sync operation.

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TIMEKEEPER GRANDMASTER II

SPECIFICATIONS

Satellite Time Source	GNSS	▪ Multi-constellation, 72-channel GNSS receiver ▪ Concurrent GPS/GLONASS/ Galileo/BeiDou/SBAS constellation support (up to 3 at any time) ▪ GNSS antenna (SMA connector)
Holdover Oscillator	DOCXO Atomic Rb	Low Drift: 4µs/day; Accuracy to UTC: <50ns Low Drift: 0.6µs/day; Accuracy to UTC: <30ns
Network	Interface Ports	▪ 5x 1 GbE (RJ45) ▪ 2x 100/40/25/10 GbE (SFP28) ▪ Optional: Up to 6x 100/40/25/10 GbE (SFP28) and 1x 1 GbE (RJ45) ▪ IPMI (RJ45) ▪ InfiniBand ▪ RS-232 (DB9)
	Time Protocols	▪ NTP server/client ▪ 40k+ NTP requests/sec capacity with hardware timestamping ▪ PTP Server/Grandmaster/Boundary Clock (multiple domains, concurrent multicast, hybrid, unicast, V1/V2, per domain sync frequency) ▪ PTP multiple profiles, concurrent multicast, hybrid, unicast, V1/V2, per domain configurable sync frequency ▪ Option*: PTP profiles (telecom G.8275.1/2; broadcast SMPTE 2059-1/2, and others)
	Smart Fault Tolerance	▪ Real-time failover from GNSS to multiple PTP and/or NTP network sources, local oscillator, and other time sources ▪ Real-time *SkyMap* GNSS threat detection/mitigation and failover ▪ Real-time *TrustedTime* of PTP/NTP/GNSS/other, with cross-check and failover ▪ Real-time client monitoring and alerting for PTP and NTP ▪ Real-Time *TimeMap* view of all clients and sources, one-way delays, and other metrics/data
	Source Monitoring/Logs	▪ Per-source monitoring, analytics, alerting, and logs
I/O Interfaces	Input	▪ 1PPS, SMA connector ▪ Option*: SyncE ▪ Option*: IRIG AM/DCLS
	Output	▪ 1PPS, SMA ▪ 10Mhz, SMA ▪ Option*: SyncE ▪ Option*: IRIG AM/DCLS

Network	Security	▪ HTTPS/SSL/SSH (with disable function) ▪ SNMP v2/v3 (with disable function) ▪ IPv4/IPv6* with DHCP and static assignment with sophisticated routing support ▪ Access control ▪ DoS and DDoS protection and defeat mechanism ▪ RADIUS, TACACS+, and X.509 certificates
Intelligent Management		▪ Secure TimeKeeper enterprise-class clock sync platform ▪ Remote TK-Grandmaster II appliance configuration ▪ Monitoring of thousands of TK-Clients ▪ Real-time data aggregation, performance charting, and DL/AI analytics ▪ Full network clock sync visualization Web management dashboard or CLI
Built-In TK-Server	SkyMap	• Powerful TK-Server software • GNSS *SkyMap* with anti-threat trusted sources capability
	MultiSource I/O	• Input: NTP/PTP/1PPS/GNSS signal Output: NTP/PTP
	TimeMap	• Global *TimeMap* visualization of the entire enterprise clock sync chain topology for planning and management
	TimeMonitor	• *TimeMonitor* monitors the performance of the entire enterprise clock sync
Hardware Engine	Dual Power	▪ Hot-swappable power supplies
	Dual Storage	▪ Hot-swappable high capacity storage
	High Performance	▪ High capacity server computing engine for analytics and high-performance capabilities
Physical	Dimensions (inch / mm)	H: 1.7 / 43; W: 17.2 / 437; D: 29.7 / 754
	Weight (lbs./ kg)	▪ 26 / 11.8
	Power (VAC)	▪ 100-240 (50-60Hz); option*: -48VDC
	Consumption (W)	▪ 100 (operating), 120 (start-up)
	Space Rack	▪ 1U mountable
Environmental		Operating / Storage
	Temperature (°C / °F)	10-35 / 50-95; -40 to 70 / -40 to 158
	Relative Humidity (%)	8-90; 5-95, noncondensing
	Certifications	▪ FCC, CE, TUV listed, RoHS
Industry Standards		▪ Euro MiFID II ▪ US FINRA, SEC 613 CAT NMS, OATS ▪ PCI DSS ▪ UTC / NIST traceability

**contact us for availability*

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TIMEKEEPER GRANDMASTER II

WHY USE TIMEKEEPER TO TIME-SYNC YOUR CRITICAL ENTERPRISE APPLICATIONS?

TK-Platform provides secure, resilient, state-of-the-art enterprise clock sync at higher accuracy than competing products, while providing the lowest TCO. Get a TimeAudit and see the difference.

TK-Platform is the gold standard in secure enterprise clock sync, used by hundreds of large organizations including banks, financial institutions, government agencies, and more.

TK-Platform consists of integrated products for secure clock sourcing, distribution, synchronization, monitoring, management, and administration. Products include:

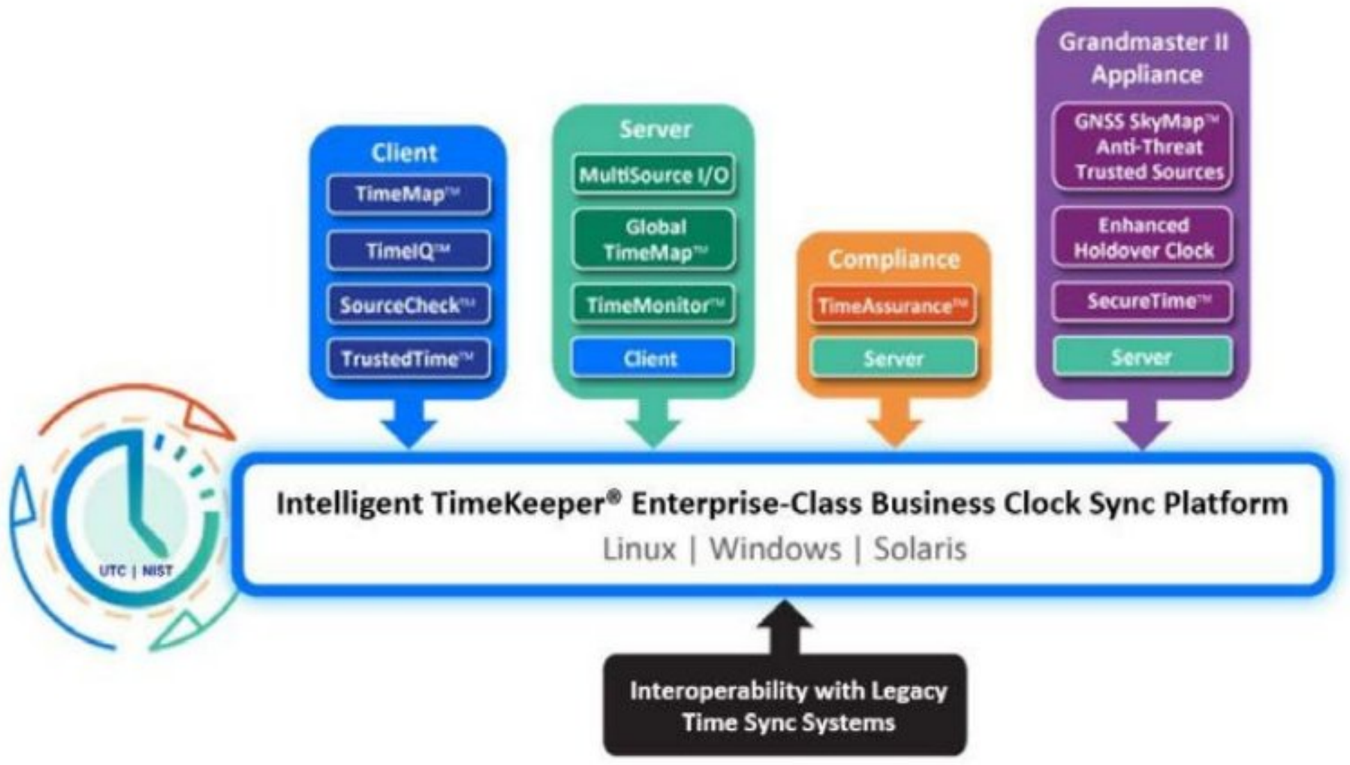
- **TK-Platform** (includes all products)
- **TK Active Client**
- **TK-Server**
- **TK-Compliance**
- **TK-Grandmaster II**

TIMEKEEPER ENTERPRISE-CLASS APPLICATIONS

- Financial
- Data center
- 5G IoT
- Cybersecurity
- Automation
- Cloud Database
- Gaming
- Broadcast

TIMEKEEPER ENTERPRISE-CLASS NETWORK CLOCK SYNC PLATFORM

TK-Grandmaster II is a component of the intelligent, patented TimeKeeper enterprise-class network clock sync platform. TimeKeeper has the flexibility to operate with any legacy NTP/PTP infrastructure and to be configured with failover capability. **TK-Grandmaster II** appliance is vendor-agnostic, connects to multiple time sources through its integrated **TK-Server** grandmaster software, is compatible with a mix of timing vendors, and is fault-tolerant by design.



ENTERPRISE-CLASS TIMECARE℠ SERVICES

Our industry-leading **TimeCare** line of services helps our customers keep their network clocks time-synced 24/7 to run their server applications reliably and in compliance with regulatory requirements.

GET A TIMEAUDIT℠

Get a **TimeAudit** today and check your enterprise clock sync performance and compliance by contacting us at timeaudit@fsmtime.com.

GET A DEMO

Contact us at sales@fsmtime.com to get a live demo today.

HOW TO ORDER

Contact us at sales@fsmtime.com to order these product part numbers directly from us or through our global value-added resellers:

TK-Grandmaster	TK-GM/Rb (Grandmaster GPS/GNSS/XO or with Rb clock)
TK-Server	TK-SV-PN
TK Active Client	TK-CL-S/M (Single or Multiple)
TK-Compliance	TK-CMPL
TK-Platform	TK-SV-PN, TK-CL-S/M, TK-CMPL, and TK-GM/Rb

Intelligent TimeKeeper Platform Products and Services

Secure Enterprise-Class Clock Synchronization for Time-Critical Operations and Business Applications

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