

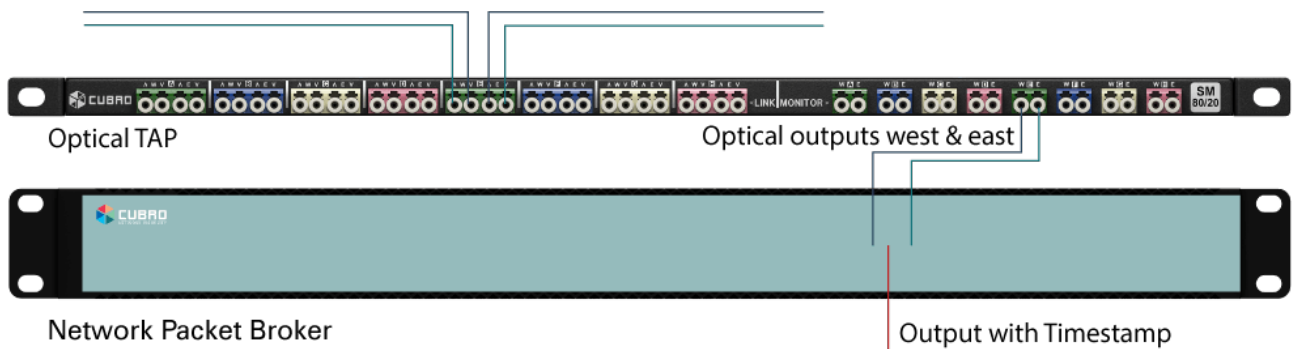
Precision Timestamps for Financial Institutions

Why Nanosecond Timestamping is a Business Imperative - Not Just a Technical Upgrade

FOR: Chief Technology Officers | Chief Compliance Officers | Chief Risk Officers | Head of Network Infrastructure

In financial services, time is not just money; it is **evidence**. Every packet crossing your network carries a story: when a trade was initiated, when an alert was triggered, when a security event occurred. If your infrastructure cannot record that story with precision, you are exposed - operationally, legally, and competitively.

Cubro's advanced network packet brokers deliver chipset-based nanosecond timestamping - the level of precision that modern financial infrastructure demands.



THE BUSINESS RISK YOU MAY NOT SEE

Regulatory Exposure

Without verifiable timestamps, MiFID II and DORA audit requirements cannot be met, creating material compliance risk.

Data Integrity Risk

Millisecond-level timestamps in high-frequency environments result in multiple packets sharing the same timestamp, corrupting telemetry.

Competitive Disadvantage

In algorithmic and high-frequency trading, timing gaps of even microseconds translate directly to execution quality and revenue.



What changes with Nanosecond Timestamping

- Regulatory Certainty.** Your compliance posture strengthens immediately. MiFID II, DORA, and SEC recordkeeping regulations require accurate and verifiable timestamps for all transactions and network events. Cubro’s 8-byte timestamping provides an immutable, hardware-generated audit trail.
- Security and Forensics.** Detect anomalies at the packet level. Determine the exact moment a breach occurred, correlate events across your infrastructure, and build time-aware security models. This level of detail is not achievable with millisecond-resolution tools.
- Trading Integrity.** Guaranteed micro-traceability in every trade environment. In high-frequency and algorithmic trading, every nanosecond is a competitive variable. Cubro ensures your transaction records are synchronised with precision time protocol (PTP), so your timestamps hold up under regulatory scrutiny and internal audit.
- Performance Visibility.** Reduce the mean time to resolution for network incidents. Pinpoint latency, jitter, and packet loss across 100G links with a level of resolution that most monitoring tools simply cannot match. Time-aware telemetry becomes the foundation for network optimisation.
- Accurate Network Analysis.** Timestamps enable precise reconstruction of network events, enabling faster troubleshooting of latency, jitter, and congestion issues. When packets are captured from multiple sources or at different speeds, timestamps ensure they are stored and analyzed in the correct chronological order.

The critical difference: Typically, network devices use NTP with a timestamp at millisecond resolution. In a 100G environment, thousands of packets arrive per millisecond, meaning they all share the same timestamp. That data is effectively meaningless for forensic, compliance, or trading purposes. Cubro solves this at the chipset level. Doing this at the chipset level and not in software has a big impact on performance and latency.

Cubro vs. Standard Network Packet Brokers

Capability	Cubro EXA Series / C32 and C48	Standard NPBs
Timestamp Resolution	1 nanosecond	Milliseconds to microseconds
Time Sync Support	NTP & PTP	NTP only
Timestamp Format	8-byte IEEE-based	6-byte (allows only ms)
Packet-Level Accuracy	Every packet, every port	Inconsistent



Capability	Cubro EXA Series / C32 and C48	Standard NPBs
Regulatory Audit Trail	Yes - immutable, verifiable	Partial or unavailable
High-Speed Support	100G ready	Performance-limited

Extended Capabilities: C32 & C48 Aggregators

Cubro’s timestamping capability extends beyond the high-speed EXA series. The C32 and C48 Aggregators bring the same nanosecond precision to a wider range of deployment scenarios, with four flexible timestamp formats designed to work with the tools your teams already use.

Format 1 - New Time stamp header

Adds a new header to each packet. Allows your forensic and analytics tools a precise reconstruction of network events, enabling faster troubleshooting of latency, jitter, and congestion issues without losing any MAC address information - compatible with Wireshark via Cubro’s lua file.

Format 2 & 3 - Embedded MAC Timestamping

Timestamp is written into or after the MAC address fields of the original packet. No additional bytes are added, so packet size remains unchanged - important in environments where packet size affects forwarding behaviour.

Format 4 - Compact Industry- Compatible Mode

Designed for direct compatibility with leading network analysis platforms. Overwrites source MAC address and 2 bytes of destination MAC address with timestamp data - no packet overhead, no loopback port required. Validated with industry-standard latency analysis tools used across financial services.

Timestamp + VLAN Tag - Simultaneous Identification

Every packet can carry both a precise nanosecond timestamp and a unique VLAN ID identifying its ingress port - in a single pass, without any loopback. This means your analysis tools know not just when a packet arrived, but exactly where it entered the network.

Why four formats matter: Different analysis tools expect timestamps in different positions within the packet. Rather than forcing you to change your tooling, Cubro adapts to your existing environment. Whether your infrastructure uses standard network analysis platforms or custom capture solutions, one of the four formats will integrate without modification.



Proven in the field: A leading Nordic Bank

A leading Nordic bank, operating across multiple markets with stringent regulatory obligations, came to Cubro with a problem that many financial institutions share but few have solved: **their network timestamping was inconsistent.**

1 The Problem

Different monitoring tools across the bank's infrastructure used different timestamping standards and resolutions. The result was a patchwork of time references, some at the millisecond level, some inconsistently synced, creating discrepancies in transaction records, security logs, and performance data. For a bank with compliance obligations across multiple jurisdictions, this was not a minor technical issue. It was an audit risk.

2 The Approach: Proof of Concept First

Rather than asking the bank to commit immediately, Cubro proposed a Proof of Concept. The bank's network team evaluated the capabilities of the Network Packet Broker directly within their own infrastructure, with full technical support from Cubro throughout. This approach allowed the bank to validate performance, integration compatibility, and timestamp accuracy against their own traffic, on their own terms.

3 The Outcome

Cubro delivered centralised, hardware-based nanosecond timestamping across all network traffic - providing a single, uniform time reference for every packet, for every monitoring tool. The bank's security, forensic, performance, and compliance applications all drew from the same consistent source. Timestamping discrepancies were eliminated. The audit trail became dependable.

Key takeaway: The bank did not need to replace existing monitoring tools. Cubro's Network Packet Broker sat centrally in the infrastructure, normalising timestamps before traffic reached any downstream application. One deployment resolved inconsistencies across the entire monitoring stack.



Why Financial Institutions trust Cubro

Cubro has spent over two decades developing network visibility technology to meet the demanding requirements of financial services, telecommunications, and critical infrastructure. Our solutions are built and supported in Europe, giving our customers direct access to engineering expertise and a team that understands the regulatory environment they operate.

We do not believe in one-size-fits-all. Our timestamping solution offers four different time stamp formats to make sure monitoring systems are able to ingest time stamps without modifications.

Ready to talk about your network's timing requirements?

Our technical team is available to assess your infrastructure and discuss how precision timestamping can address your compliance and operational needs.

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