

Precision Instrumentation[™]

The Application Tap[®] is a PCI Express (PCIe) card that enables the implementation of precisely timed software instrumentation with minimal performance overhead. By combining a user mode, kernel bypass API, with an on-board FPGA co-processor and high precision clock, the Application Tap delivers hitherto unavailable insights into the performance dynamics of real time applications. This unique software precision instrumentation tool is suitable both as an enabler of production systems monitoring, and also for a range of software performance optimisation tasks such as deterministic profiling.



The Software Instrumentation Challenge

The traditional approach to high precision, non-invasive monitoring of distributed systems, such as market data and trading systems, has been to capture and precisely time stamp network traffic, decode protocols, and analyse data flows, yielding latency and performance metrics. However as architectures evolve from highly distributed systems, and consolidate onto multi-core servers, less inter-process communication is physically available to capture on the network. At the same time, it is becoming increasingly important to be able to monitor software events occurring in the depths of applications, such as order matching engines, and emit data associated with events, precisely timed, with minimal performance overhead.

The Application Tap solves the challenge of minimally invasive software instrumentation by providing a user mode API that enables software events within applications to be instrumented with minimal overhead. The Application Tap API is integrated with custom developed firmware running on a state of the art FPGA co-processor using OS kernel by-pass techniques. Instrumentation

code added to applications is able to pass instrumentation metadata to the Application Tap which time stamps events to 10ns resolution, and forwards the instrumentation metadata to an external monitoring appliance, such as TipOff[®], using an on-board gigabit network interface.

Integration with TipOff for Latency Visibility

The Application Tap is fully integrated with TipOff. This enables correlation of precisely timed software events with network events, providing hop by hop latency visibility, not just at the server level, but right down to the software component level - processes, threads, even code blocks. As legacy distributed systems consolidate down to multi-core servers, and traditional network tap based latency monitoring solutions lose visibility, the Application Tap becomes an essential tool in the precision instrumentation repertoire.

Technical Specifications

Operating Systems	LINUX (32 & 64 bit) Windows Server 2008 R2 (64 bit)	Clock Synchronisation	PTPv2, PPS, GPS
Languages	C, C++, C#, Java	Clock Resolution	10 nanoseconds
Max Message Size	60 bytes non-DMA mode 64k bytes DMA mode	Transmission Port	1GE with SFP transceiver
Max Concurrent Threads	64 (without thread synchronisation)	Clock Sync Port	10/100 RJ-45
		Form Factor	Full height, half length, 4 lane PCIe
		Power	5 Watts