



WSTS 2016 What is Time Sensitive Networking (TSN) Why it Matters

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Session Title:	What is Time Sensitive Networking (TSN), Why it Matters
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What is Time Sensit	ive Networking (TSN), Why it Matters
Session :	Evolution of Networks and the Need for Time in a Smart
Connected World	
Abstract:	Standard Ethernet will soon be inherently time-aware. In
this talk we provide	an overview of the multiple standards and amendments in
development in IEE	E 802 TSN that promise to deliver guaranteed, robust
delivery of time-sense	sitive streams over local area networks, as well as the IETF
DetNet effort to expansion	and these capabilities across routed networks. We also
briefly describe the a	approach being taken by Avnu Alliance to facilitate multi-
vendor interoperabil	ity of implementations through certification.



Distributed and Time Coordinated





DRAFT

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Time

ínte

Application Domain for TSN





Automotive

Conferencing



Realtime A/V

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Industrial/ Energy





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Network Latency



Even High Priority Traffic Experiences Packet Delay Variation



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For Some Applications, Latency has Hard Limits



For CPS, Cycle Only Worst Case Delay Matters.

(intel) Time

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With TSN the Latency of Time Sensitive Streams is CONSTANT





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Sources of Packet Delay Variation / Solutions

The Problem	A Solution	The Standard
Bursts of packets with the same or higher priority	Create Global Schedule for Time-Sensitive Flows	IEEE 802.1Qbv
Interfering (especially long) frames (even if lower priority)	Preempt (& then resume) interfering frames	802.1Qbu/802.3br
CRC or Network reconfiguration	Replicate frames on maximally disjoint paths	802.1CB
Babbling Idiot Problem	Police traffic on ingress	802.1Qci
Routers (in addition to	Scale Determinism to Routed	IFTF DetNet

Routers (in addition to switches) also cause delay

Scale Determinism to Routed IETF DetNet Networks



The TSN Standards

[Insert diagrams of each of the previous standards, illustrating the functionality]



Certifying Market-Relevant Interoperability



With TSN, IT and Industrial Application Protocols Can Share the Wire



NOTE: This represent the view of Avnu, not necessarily the plans or views of other organizations, e.g., OPC Foundation, OMG, ODVA, PI, and SAE



Avnu Alliance: Members



Avnu Structure

Provides a forum for companies to come together



Defines market-specific profiles and related Conformance & Interoperability Tests

Avnı	a Alliance Work Groups	
Standardized	Standardized	Lipicope
Avnu Profiles	Avnu APIs	LIAISONS



Software Resources



SW APIs, Best Practices



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	#include (renth b)
	#include (machine)
23	#include (stdio b)
	#include (stdlib b)
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	<pre>#include <arpa inet.h=""></arpa></pre>



http://avnu.org/whitepapers/

What Standards Specify TSN Protocol for Ethernet?



