



Enterprise-Class AVB Switching for Pro AV

Why Choose AVB?

AVB introduces four major improvements to standard 802 architectures, including precise synchronization, traffic shaping for media streams, admission control, and identification of non-participating devices. AVB delivers cost savings through simplified integration, ease of use, and added functionality and control. Benefits include larger channel capacities, automated tuning via the network, smoother migrations to new applications, and lower implementation and ongoing costs.

Unifying Data, Audio, and Video on Scalable and Reliable Standards-Based Ethernet

Driven by ever-escalating demands for high speed network services, Ethernet has provided organizations with fast, reliable, scalable, and cost-effective networking for over thirty years.

Alternative protocols have appeared and disappeared, network domains have expanded from local to wide areas, data traffic has converged with audio and video – and through each stage, Ethernet has provided the common framework of innovation upon which individuals, organizations, and systems around the world connect, share, and exchange.

This Solution Brief explores the role of Ethernet in one such emerging market, the professional AV industry, in which the ‘AVB’ (Audio Video Bridging) set of IEEE 802.1 standards is simplifying and lowering the cost of implementations that traditionally have been characterized by complexity, expense, and lack of interoperability.

Much as IP changed the telephony landscape from circuit-switched analog to Unified Communications seemingly overnight, so too does AVB provide AV professionals a bridge to the unassailable benefits of Ethernet.

Streamlining AV Deployments

Professional Audio/Video environments have traditionally functioned without a widely-adopted set of networking standards. The extensive and unwieldy cabling systems required for even moderate productions are symptomatic of the connectivity issues, and illustrate the challenge of coordinating audio, video, and data across separate networks.

Additionally, the protocols used in these environments were originally designed for large-scale specialized installations, such as stadiums, amusement parks and live sound applications, and relied on proprietary approaches to prioritizing traffic streams. While suitable for quality, timing, and distance, these protocols generally serve closed communities, lacked scale, and required gateways, adapters and extensive tuning.

Extreme Networks and the AVnu Alliance

The AVnu Alliance is an industry forum dedicated to the advancement of professional quality audio and video converged over Ethernet at various link layers.

Extreme Networks® is a proud member of the AVnu Alliance and dedicated to ensuring our switches are interoperable with the products of other AVnu Alliance members to expand the use of AVB-powered solutions across markets.

To enable an complete ecosystem of compatible silicon and systems, the AVnu Alliance focuses on:

- Developing compliance and interoperability certifications for AVB standards
- Hosting plug-fests for member companies
- Providing certification for reference by other organization, as necessary, to provide end-to-end system interoperability
- Promoting awareness of the AVB technologies

More information and a listing of member organizations can be found at <http://www.avnu.org>.

Installed audio environments frequently require high levels of on-site expertise to manage changes, integrate disparate systems, and support differing customer requirements. Collectively, these intangibles only served to increase costs and compromise efficiency in an industry otherwise known for its innovation.

Clearly the need has existed for a universally-accepted standard that enables manufacturers, installers, and customers alike to benefit from economies of scale, lower barriers to entry, and predictable roadmaps for evolving AV without compromising existing investments.

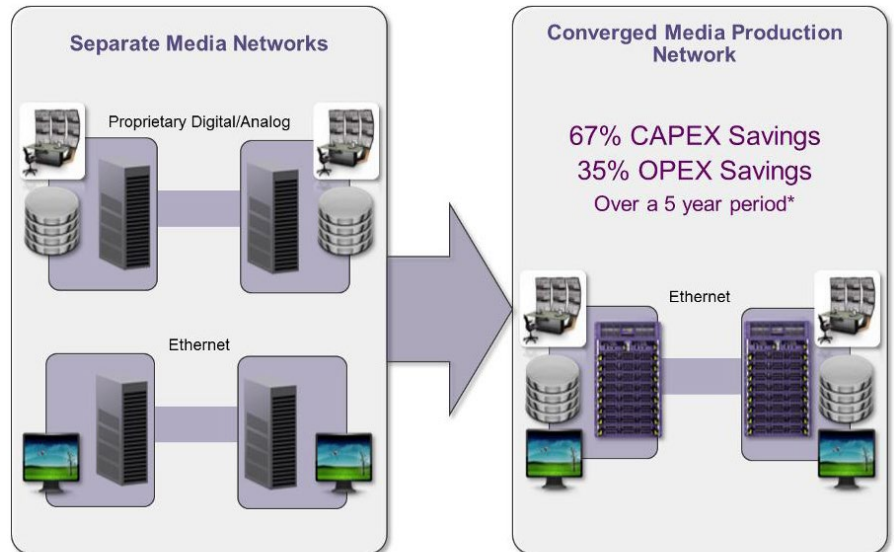
With the availability of the AVB set of standards, proprietary installations requiring multifaceted tuning of network elements can be replaced by end-to-end networks that are easier to manage, simpler to deploy, interoperable with extended networks, and more cost effective.

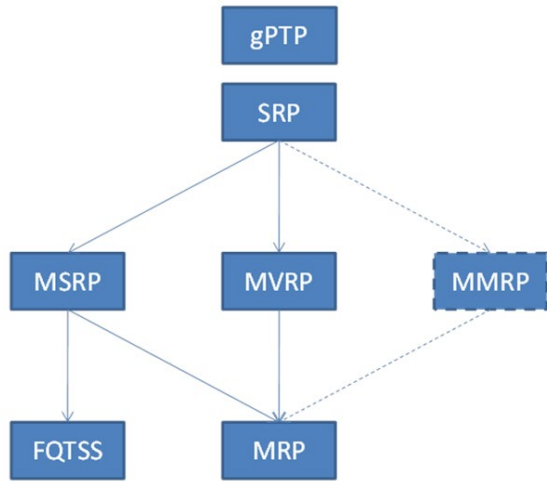
Fundamental Improvements

The primary advantage for AV integrators is simplicity. From the endpoint to the network core, AVB makes networks easier to manage, modify, and provision, and eliminates challenges presented by distance.

Additionally, while traditional AV installations use a single wire path for each media flow and require complex and expensive matrix switches to route each flow to a new destination, (resulting in a jungle of cables), with AVB, the network intelligently switches multiple media flows across a single cable while ensuring QoS, resource reservation, and precise synchronization of all network elements.

Legacy and AVB-enabled Production Network Comparison





802.1 AVB Standards Elements

The following are the IEEE 802.1 Audio/Video Bridging (AVB) standards:

- IEEE 802.1BA – Audio Video Bridging (AVB) Systems
- IEEE 802.1AS – Timing and Synchronization for Time-Sensitive Applications
- IEEE 802.1Q – Multiple Registration Protocol (MRP) and Multiple VLAN Registration Protocol (MVRP)
- IEEE 802.1Q (was 802.1Qav) – Forwarding and Queuing for Time-Sensitive Streams (FQTSS)
- IEEE 802.1Q (was 802.1Qat) – Stream Reservation Protocol (SRP) / Multiple Stream Reservation Protocol (MSRP). This technology ensures audio and video can leverage a predefined amount of the bandwidth for AVB audio. This amount is 75% of the maximum data rate; the other 25% of bandwidth can be used for other data. (Note: These percentage allocations can be adjusted as required across all Extreme Networks AVB-enabled switches.)

These additional standards rely on IEEE 802.1 AVB to provide professional quality Audio/Video.

- IEEE 1722 – Layer 2 Transport Protocol for Time-Sensitive Streams, which allows easier porting of applications currently IEEE 1394 (FireWire™) to AVB.
- IEEE 1733 – Extends RTCP for RTP streaming over AVB-supported networks.

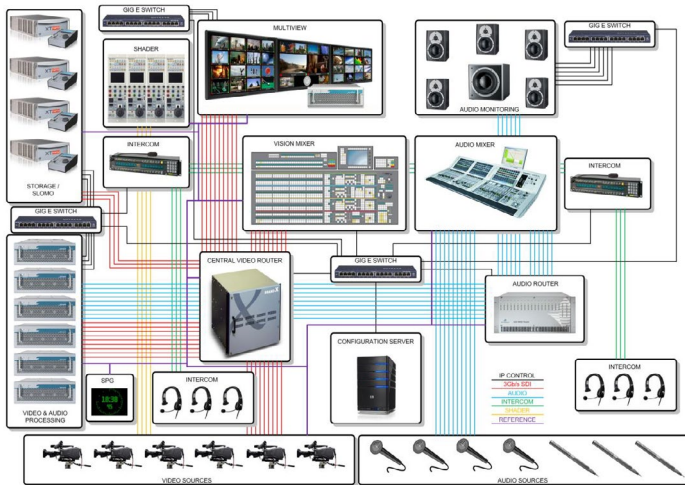
Extreme Networks Solutions for AVB

Extreme Networks AVB-enabled Ethernet switches unify data, audio, and video traffic on a single standards-based network for professional audio-video applications.

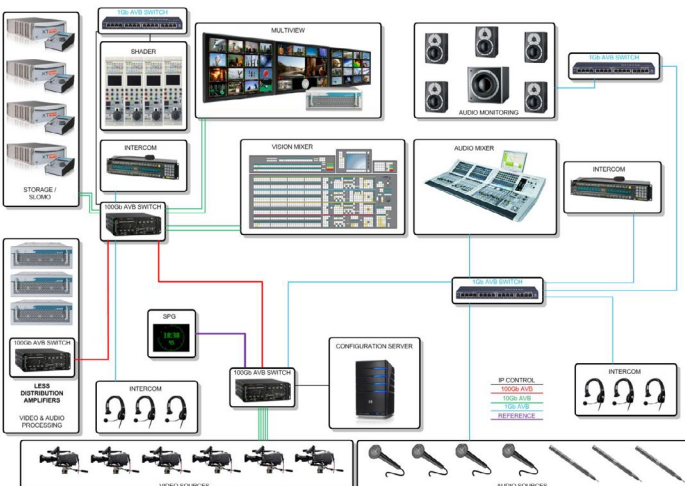
IT managers and AV integrators alike benefit from Extreme Networks powerful management capabilities, simplified deployments, network convergence for all media, and standards-based designs for simplified integration.

With Extreme Networks switches, professional AV installations that previously required extensive time and resources to connect proprietary or non-interoperable network elements now benefit from simplified infrastructures, reduced implementation costs, unified management, and the ability to provide delivery of next generation video and audio applications.

Delivering enterprise-class capacity, scale, and reliability, Extreme Networks switches simplify complexity and connectivity across a variety of environments, including auditoriums, digital classrooms, public spaces, eSport venues, stadiums, studios, telepresence rooms and more.



Before AVB, SDI resulted in complex wiring schemes



With AVB, wiring is greatly simplified. Source: Axon

Simplify Deployments and Networks with Extreme Networks AVB-enabled Switches

Extreme Networks switches are deployed across many of the most demanding technical environments in the world, including high-performance computing, energy, research and development and data centers.

Our advanced designs provide superior scale, density, redundancy, and energy efficiency with reduced form factors, enabling organizations to leverage their investments over extended time periods without compromising execution.

As AVB extends high quality audio into the consumer and mass markets, the Extreme Networks portfolio provides highly scalable, reliable and flexible solutions for emerging AVB applications. AVB is supported across a wide range of ExtremeSwitching platforms, from edge to aggregation to core. Built on the foundation of ExtremeXOS, these switches provide continuous uptime, manageability and operational efficiency.

Extreme AVB-enabled switches include Gigabit and multi-Gigabit edge switches, 10Gb and 25Gb aggregation switches, as well as 100Gb core switches. This enables you to flexibly build an AVB-based network that starts at your edge, but which can grow to span your entire enterprise network.

AVB-enabled Edge Switches

ExtremeSwitching X435, X440-G2, X450-G2, X460-G2, X465 and 5000 Series edge switches can extend high-performance AVB to the edge, with fine grained Quality of Services (QoS), stacking, high availability and identity aware security in a range of compact, cost effective switches. These switches offer 1, 2.5 and 5Gb access ports along with 30W/60W/90W Power over Ethernet, enabling connection of next-gen Ethernet devices, such as audio endpoints, video cameras, physical security, digital signage or smart lighting devices.

AVB-enabled Aggregation and Core Switches

ExtremeSwitching X620, X670-G2, X465, X590, X690, X695, and X870 Series switches provide support for 10, 25 Gigabit and even 100 Gigabit data rates in support

of higher-bandwidth Ethernet applications within an enterprise campus or core network environment. These switches can optimize and extend AVB applications with high-speed uplinks for seamless migration from existing 10 Gigabit Ethernet-based servers to higher-speed server environments as organizations transition their virtualized networks.

ExtremeCloud™ IQ and Extreme Management Center

Extreme AVB-enabled switches can be managed by ExtremeCloud IQ and/or Extreme Management Center to provide comprehensive unified management with a consolidated view of users, devices and applications. This includes configuration, troubleshooting and status monitoring of AVB switches within the network. Providing a fully integrated, extensible platform, these management systems can simplify the design, deployment and security of the network, while simultaneously unlocking valuable IT and business insights.

Extreme-Enabled AVB Switches	Required License
X435	EXOS-AVB-FP-X435
X440-G2	X440-G2 Multimedia (AVB) Feature Pack (16523)
X450-G2	X450-G2 Multimedia (AVB) Feature Pack (16169)
X460-G2	X460-G2 Multimedia (AVB) Feature Pack (16426)
X465	EXOS-AVB-FP-X465
5000 Series (5320, 5420, 5520)	Included in 5000 Series Base License
X590	Included in X590 Base License
X620	X620 Multimedia (AVB) Feature Pack (17433)
X670-G2	X670-G2 AVB Feature Pack (17135)
X690	Included in X690 Base License
X695	Included in X695 Base License
X870	Included in X870 Base License



<http://www.extremenetworks.com/contact>

©2022 Extreme Networks, Inc. All rights reserved. Extreme Networks and the Extreme Networks logo are trademarks or registered trademarks of Extreme Networks, Inc. in the United States and/or other countries. All other names are the property of their respective owners. For additional information on Extreme Networks Trademarks please see <http://www.extremenetworks.com/company/legal/trademarks>. Specifications and product availability are subject to change without notice. 1894-0222-16