



Testing Audio Video Bridging (AVB)

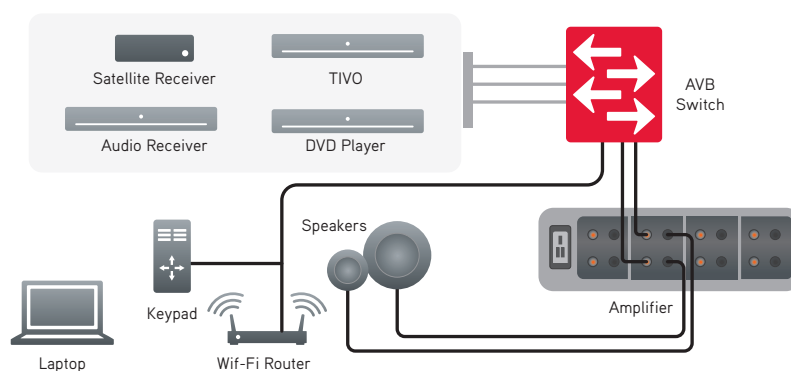
As technology moves forward, the landscape of audio and video (AV) interoperation and connections continues to grow more complex. We expect higher and higher quality in more and more venues: home, mobile, and automotive. AV connections are historically analog one-way, single-purpose, and point-to-point. This model resulted in large confusing masses of cables, especially in professional and high-end consumer applications.

Many of the specialized professional, home, and automotive protocols did not interoperate. Adapting standard networks could use commodity technology, but tight quality of service control was difficult.

One of the more recent attempts to address AV technology issues is Audio Video Bridging (AVB). AVB uses Ethernet cabling and protocols as a means to address the various technical issues and needs inherent in AV equipment. AVB is a standard that builds on the Ethernet protocol standards to assist in synchronizing and simplifying AV connections and interaction.

There are three main venues for AVB:

- Automotive** – Previously, it was sufficient that the automobile merely conveyed passengers safely and comfortably from Point A to Point B—but not any longer. While high quality audio has long been a default expectation, video and data services are increasingly in-demand as manufacturers transform the car into an infotainment center. AVB enables ADAS, infotainment, Internet, and control traffic to be transmitted over same shard media, while meeting delivery and timeliness constraints of different domains.
- Professional Audio/Video** – Ethernet and Wi-Fi have become the most dominant of all networking technologies. Over time, these technologies have continuously pushed the boundaries of speed—with the current state-of-the-art Ethernet moving to 100Gbps. Given the enormous cost savings in cabling and other infrastructure over analog cable, it is natural that networked AV would be widespread in the professional world. AVB is a breakthrough technology for Pro-AV, enabling higher bandwidth (10, 40, 100GbE) for broadcasting media and sports events, enabling multiple channels over single and all pervasive Ethernet media.
- Consumer Ethernet** – Consumers today own more devices than ever and have shifted their consumption from physical to digital content. Home networks have become nearly ubiquitous. The convergence of these trends has created a desire for many consumers to not only use their networks to connect to the Internet and exchange data, but also to distribute digital content among their many devices. With emergence of Internet of Things, AVB enables IP address-enabled devices to connect and interact simply and with high quality over a single network.



Solution Highlights

AVB equipment and network installations must undergo pre-deployment testing to ensure quality performance and end-user satisfaction--before hitting the market. Ixia helps customers to:

- Obtain a comprehensive, single-device test solution for validating all AVB protocols
- Verify the accurate and synchronized delivery of time-sensitive streams through AVB networks
- Confirm that the guarantees for AVB system bandwidth, QoS, priority remapping, and latency are met
- Test for prioritization, preemption, and ranking of time-sensitive streams in AVB networks
- Confirm that both AVB and best-effort traffic are correctly handled in the same network
- Validate AVB network boundaries in time-sensitive networks
- Scale AVB device test setups at Ethernet speeds up to 100GbE

Market Issues

In the past, audio and video systems employed custom networks designed to provide a good end user experience. These networks coexisted with LAN networks and required special skills and maintenance. To make things worse, these custom networks did not use standard technologies, and users had to pay for the costly upgrades when they moved to higher speeds or when more elements were added.

One of the fundamental issue is synchronization of Audio Video traffic. Without the synchronization, the audio and video aspects of traffic are not lip-synced. Synchronizing Ethernet to ensure proper audio and video transmission is an issue. Ethernet is inherently an asynchronous protocol, and operates without timing. Ethernet networks were built for the best-effort delivery traffic, and lacked support to deliver time-sensitive traffic.

AVB provides a way for these custom networks to migrate to Ethernet Networks. The IEEE standard 802.1AS provides a method for Ethernet systems to synchronize with each other. The standards IEEE 802.1Qat and IEEE 802.1Qav provide a mechanism for ensuring Quality of Service and bounded latency for AVB traffic.

This time synchronization on an AVB system must be verified for accuracy before hitting the market. What's more, is that both AVB and non-AVB traffic can coexist on existing Ethernet networks today. So it is imperative that both kind of traffic must be properly forwarded through the network to provide the desired quality of service.

The AVnu Alliance is an industry forum dedicated to the advancement of professional-quality audio video by promoting the adoption of the IEEE 802.1 Audio Video Bridging (AVB), and related standards, over various networking link-layers. The organization creates extensive test procedures and processes that ensure interoperability of networked AV devices, helping to provide the highest quality streaming AV experience.

Although AVnu Alliance provides a test methodology specification for interoperability certification of AVB equipment, there are no AVB test equipment in the market which can be used for proper qualification of interoperability, time-synchronization, low latency streaming capabilities of AVB devices. Until now.

Ixia Solution

Ixia has worked very closely with its customers to develop the right product that is designed to meets industry's test requirements. Ixia's AVB solution in IxNetwork can not only help prepare for AVnu certification, it can be used to prepare AVB implementations for production use.

IxNetwork works with Ixia's test platforms to exchange control-plane and data-plane traffic with the device under test. Ixia's chassis are populated with hot-swappable load modules that implement a wide variety of interface types. Each test port is equipped with an independent processor and substantial memory in addition to specialized traffic stream generation and capture hardware – providing the speed and intelligence needed for large-scale protocol emulation.

Ixia's AVB solution can be used for sizing production network load handling and time synchronization capabilities and for qualifying deploying actual network components:

Functionality

- Test compliance to the AVB standards 802.1AS, 802.1Qat, 802.1Qav and IEEE 1722
- Emulate gPTP Master/Slave and provide peer-to-peer latency measurement using the in-built Stratum-3 Clock
- Extensive MSRP Talker and Listener control plane statistics and learned information to help debug issues down to each MSRP/MVRP state machine, messages and stream reservation
- Scale test setup for number of Talkers and Listeners on the same port using the user-friendly Next Generation Framework
- Measure the traffic latency, throughput, priority remapping and data integrity for each MSRP reserved stream to verify credit-based shaper algorithm forwarding and queuing functionality
- Test AVB 1722 encapsulation, AVB raw, and non-AVB traffic all on the same port with simple wizard
- Support for Ethernet speeds of 100MB, 1/10/40/100GbE

See www.ixiacom.com for more information.

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