List of AVB-capable Ethernet switches

Biamp uses the IEEE 802.1 Audio Video Bridging (AVB) open standard to transmit AV traffic between Tesira devices. AVB is built in to Ethernet and incorporates other 802.1 standards for automatic VLAN configuration, automatic multicast address assignment, stream reservation, traffic shaping, guaranteed delivery and time synchronization. Like all 802.1 standards, AVB support is required on the switch.

All switches described in this article have been informally tested with Biamp Tesira products\(^1\). Due to differences in switch designs (switching capacity, CPU speed, etc.), each model has different abilities for the maximum number of AVB streams and devices it can manage. Contact the switch manufacturer for more detailed information.

Biamp strongly recommends use of Avnu Certified switches when using devices from different manufacturers. The Avnu Alliance is a community creating an interoperable ecosystem of low-latency, time-synchronized, highly reliable networked devices using open standards through certification. Devices that pass independent lab testing receive Avnu certification. Biamp Tesira AVB endpoints are Avnu Certified. See the Avnu Alliance website for a list of certified products.

Biamp

TesiraCONNECT TC-5 is a 5-port expansion device for Biamp conferencing products. The TesiraCONNECT is placed at the center of any Biamp conference room to provide power and media streaming for Biamp components. TesiraCONNECT works out of the box with Biamp products, simplifying conference room deployments and avoiding additional setup steps required in traditional media switches. This small form factor device can be mounted behind a display, under the table, or simply sit in a rack or credenza in the room. TesiraCONNECT also connects multiple AVB enabled DSPs within a system. Supported topologies include the connection of up to 4 TesiraCONNECT devices in a single media network cluster.

TesiraCONNECT TC-5D is also a 5-port expansion device with the same capabilities as the TC-5, enhanced with built in AVB and Dante interfaces. The TC-5D can be deployed in exactly the same ways as the TC-5. For more details specific to TC-5D, refer to this article.

\(^1\) See the Avnu Alliance website for a list of certified products.
TesiraCONNECT devices allow for easy deployment of Tesira devices within conferencing spaces. TesiraCONNECT devices are not intended to be used for TesiraLUX video streaming, mixed protocol networks, campus-wide AVB media networks, and interoperability with other AVB device manufacturers, all of which require an Avnu-certified network switch. See the sections below for a listing of Avnu-certified switches.

See the TesiraCONNECT article for supported topologies and installation information.

Cisco

AVB is supported on select models of the following Catalyst series.

Please always check Cisco AVB for updates on their current models.

Please always reach out to Cisco Support regarding information about their latest software updates.

<table>
<thead>
<tr>
<th>Catalyst 3650 Series</th>
<th>Catalyst 3850 Series</th>
<th>Catalyst 9300 Series</th>
<th>Catalyst 9500 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required license level:</td>
<td>Required license level:</td>
<td>Required license level:</td>
<td>Required license level:</td>
</tr>
<tr>
<td>ipbase or ipsevices</td>
<td>ipbase or ipsevices</td>
<td>Network Advantage</td>
<td>Network Advantage</td>
</tr>
<tr>
<td>Cisco minimum:</td>
<td>Cisco minimum:</td>
<td>Cisco minimum:</td>
<td>Cisco minimum:</td>
</tr>
<tr>
<td>IOS XE Gibraltar 16.12.7</td>
<td>IOS XE Gibraltar 16.12.7</td>
<td>IOS XE Amsterdam-17.3.5</td>
<td>IOS XE Amsterdam-17.3.5</td>
</tr>
</tbody>
</table>

C3650-24PDM C3650-48FQM C3850-12X48U C9500-12Q
C3650-8X24PD C3650-8X24UQ C3850-24XU C9500-16X
C3650-8X24FD C3650-12X48UQ C3850-12XS C9500-24Q
C3650-12X48UR C3650-12X48UD C3850-16XS C9500-40X
C3650-12X48UZ All models.

NOTE: The following Cisco models PTP is not supported on all ports.
- **C9300-48UXM** only ports 1-16, 18-34, 36, 38, 44 support PTP.
- **C9300-48UN** only ports 1-36, 38 support PTP.

Catalyst 3650 and 3850 series switches have been certified by the Avnu Alliance.

Catalyst 9300 and 9500 series switches have been certified by the Avnu Alliance.

The following Cisco license levels are required for AVB support.

- ipbase or ipservices license level for Catalyst 3000 family.
- Network Advantage perpetual license for Catalyst 9000 family.
- DNA Subscription license not required for AVB support.

The following Cisco IOS® XE Software release versions are required for AVB support.

- IOS XE Gibraltar-16.12.7 for Catalyst 3000 family.
- IOS XE Amsterdam-17.3.5 for the Catalyst 9000 family.

Cisco applies the following limitations when AVB is enabled:

- AVB is not supported on StackWise connected switches. Fiber and copper uplinks are supported.
- AVB is not supported on ports that are combined using link aggregation (EtherChannel).
- Cisco specifies up to 200 streams are supported per switch*** Biamp has successfully tested with up to 143 streams per switch.
- Catalyst 9000 family does not support AVB on 100 Mbps connections. (All Biamp AVB devices are 1 Gbps.)

Please read the [Cisco AVB FAQ](http://support.biamp.com/) for a complete list of questions and considerations for designing AVB enabled networks with Catalyst switching.

See [Enabling AVB on Cisco Catalyst Switches](http://support.biamp.com/) for details on configuring the switch. For TesiraLUX support, please see our [Video network design](http://support.biamp.com/) guide.

### Extreme Networks

Extreme Networks Avnu certified AVB-enabled switches include select Summit® series switches, and scale from Gigabit to 10/40GbE, copper/fiber, with or without PoE+. AVB support is available on Extreme Networks switches running ExtremeXOS® version 15.3 or later with the purchase of an AVB feature pack. Please contact [Extreme Networks or Extreme Networks Channel Partners](http://support.biamp.com/) for more details.

Biamp recommends **EXOS 22.7.1.2 (patch 1-8)** for mixed media networks. The latest Extreme firmware recommendations...
Extreme supports AVB on the following Summit series:

<table>
<thead>
<tr>
<th>Summit Series</th>
<th>Stream Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summit X430 (EOL)</td>
<td></td>
</tr>
<tr>
<td><strong>Required License:</strong> X430 AVB Multimedia Feature Pack</td>
<td>100</td>
</tr>
<tr>
<td>Note: The X430 only supports up to 8 connected AVB ports, regardless of switch size. AVB video streams are not recommended with this switch.</td>
<td></td>
</tr>
</tbody>
</table>

**Summit X440, X440-G2**

**Required License:** X440 Multimedia (AVB) Feature Pack (16523)

Note: The X440 first gen is not recommended with over 20 enabled AVB ports, regardless of switch size. If using an AMP-450P or TCM-1/TCM-1A, LLDP must also be enabled.

Note: The X440-G2 24 and 48 port models support AVB on ports 1-24 and the rear SFP+ combo ports 51-52. AVB is not supported on ports 25-48, 49 or 50.

**Summit X450-G2**

**Required License:** X450-G2 Multimedia (AVB) Feature Pack (16169)

**Summit X460, X460-G2**

**Required License:** X460 Multimedia (AVB) Feature Pack (16426)

Note: If using an AMP-450P or TCM-1 family of products the X460, LLDP must also be enabled.

**Summit X620**

**Required License:** X620 Multimedia (AVB) Feature Pack (17433)

**Summit X670, X670-G2**

**Required License:** X670 Multimedia (AVB) Feature Pack (17135)

**Summit X770**

**Required License:** X770 Multimedia (AVB) Feature Pack (17728)

Note: 802.1X on dynamic VLAN (AVB) enabled ports is not supported by Extreme Networks. Control ports are supported.

For an introduction to using Extreme network switches, see Connecting to an Extreme switch. To enable AVB functions on Extreme networks switches, see Enable AVB on Extreme Network Switches. For TesiraLUX support, please see our Video network design guide.
Netgear

M4250 Pro AV Line

The Netgear M4250 AV Line of switches contain a range of configurations that offer support for multiple audio and video Ethernet protocols, including AVB, Dante, and AES67. In addition to a wide variety of industry-standard networking features, this line of switches includes specific features tailored to the AV industry.

- Switches are certified by the Avnu Alliance for AVB support.
- Dedicated AV web-based GUI interface that allows the application of port-based profiles for different AV protocols to simplify switch configuration for different supported AV protocols.
- Rear-facing ports to provide a clean AV installation. Reversed mounting is possible when required and a second pair of rack ears allows switches to be mounted recessed by 2-inches for cabling.
- LEDs are provided both on the front panel and rear connections of the unit for enhanced status visibility.
- Intelligent cooling management control used to minimize acoustic noise. Software-controlled fan adjustments enable the fans to be turned off when ambient temperature and PoE loads are appropriate for a totally fanless operation.
- Dedicated console (serial and USB) and out-of-band network ports for configuration and management.
- Support for web-based GUI or Command Line Interface configuration methods.
- Support for up to 255 AVB streams.
<table>
<thead>
<tr>
<th>Model Name</th>
<th>Model Number</th>
<th># of Ports</th>
<th>Port speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4250-16XF</td>
<td>XSM4216F</td>
<td>16 x SFP+</td>
<td>1G/10G</td>
</tr>
<tr>
<td>M4250-12M2XF</td>
<td>MSM4214X</td>
<td>12 x RJ45</td>
<td>100/1G/2.5G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 x SFP+</td>
<td>1G/10G</td>
</tr>
<tr>
<td>M4250-10G2XF-PoE++</td>
<td>GSM4212UX</td>
<td>10 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 x SFP+</td>
<td>1G/10G</td>
</tr>
<tr>
<td>M4250-10G2F-PoE+</td>
<td>GSM4212P</td>
<td>10 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 x SFP</td>
<td>1G</td>
</tr>
<tr>
<td>M4250-10G2XF-PoE+</td>
<td>GSM4212PX</td>
<td>10 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 x SFP+</td>
<td>1G/10G</td>
</tr>
<tr>
<td>M4250-26G4F-PoE+</td>
<td>GSM4230P</td>
<td>26 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 x SFP</td>
<td>1G</td>
</tr>
<tr>
<td>M4250-26G4XF-PoE+</td>
<td>GSM4230PX</td>
<td>26 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 x SFP+</td>
<td>1G/10G</td>
</tr>
<tr>
<td>M4250-26G4F-PoE++</td>
<td>GSM4230UP</td>
<td>26 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 x SFP</td>
<td>1G</td>
</tr>
<tr>
<td>M4250-40G8F-PoE+</td>
<td>GSM4248P</td>
<td>40 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 x SFP</td>
<td>1G</td>
</tr>
<tr>
<td>M4250-40G8XF-PoE+</td>
<td>GSM4248PX</td>
<td>40 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 x SFP+</td>
<td>1G/10G</td>
</tr>
<tr>
<td>M4250-40G8XF-PoE++</td>
<td>GSM4248UX</td>
<td>40 x RJ45</td>
<td>10/100/1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 x SFP+</td>
<td>1G/10G</td>
</tr>
</tbody>
</table>

**Notes:**

- Biamp recommends firmware version 13.0.2.31 for Netgear Pro AV Line switches.
- There are several different ways to configure this switch for AVB. The following articles provide instructions on these different methods:
  - [Netgear M4250 - Enabling AVB using the AV user interface](#)
  - [Netgear M4250 - Enabling AVB using the main user interface](#)
  - [Netgear M4250 - Enabling AVB using the Command Line Interface (CLI)](#)
- AVB is not supported over LAG.
- AVB license must be purchased separately.
- Netgear offers design support through their Pro AV Design Services group. Biamp recommends contacting them
at ProAVDesign@netgear.com for network design support.

- Netgear also provides comprehensive technical support for business customers. Please click this link for information on contacting Netgear ProSUPPORT for Business for assistance with switch performance or configuration issues.

GS7 Series

Select models of the Netgear GS7-series support AVB functionality. All Netgear switches require an EAV license in order to use the AVB functionality. All GS724Tv4 switches that are purchased from Biamp Systems already have this license installed. Switches purchased from other vendors may require this license to be purchased and installed separately. All AVB-capable Netgear switches are shown in the table below:

<table>
<thead>
<tr>
<th>Model Number</th>
<th># of Ports</th>
<th>Port speed</th>
<th>PoE</th>
<th>Firmware Version</th>
<th>Setup Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS716Tv3</td>
<td>16</td>
<td>1Gbps</td>
<td>No</td>
<td>6.3.1.4</td>
<td></td>
</tr>
<tr>
<td>GS724Tv3</td>
<td>24</td>
<td>1Gbps</td>
<td>No</td>
<td>5.0.3.5</td>
<td></td>
</tr>
<tr>
<td>GS724Tv4</td>
<td>24</td>
<td>1Gbps</td>
<td>No</td>
<td>6.3.1.4</td>
<td></td>
</tr>
<tr>
<td>GS748Tv5</td>
<td>48</td>
<td>1Gbps</td>
<td>No</td>
<td>6.3.1.4</td>
<td></td>
</tr>
</tbody>
</table>

Note that the Netgear AVB switches cannot be used in conjunction with AVB switches from other manufacturers. When using Netgear AVB switches, all switches in the network that are used for AVB traffic must be the same manufacturer and model. Mixing the GS724Tv3 and GS724Tv4 models is unsupported.

The Netgear GS724Tv3 switch is discontinued and due to performance limitations, should no longer be used for current Tesira systems. It does not operate with the following Biamp products:

- Parle microphones: TCM-1, TCM-1A, TCM-X, TCM-XA, TTM-X
- AMP-450P and AMP-450BP
- EX-UBT
- TesiraLUX
- TesiraXEL
- TesiraFORTE X
- TesiraFORTE Rev. B

Netgear switches are not Avnu certified and are suitable for small to mid-sized AVB implementations using legacy Tesira product. The use of a single switch for AVB device counts greater than 16 should be avoided regardless of port density, due to the high CPU demands placed on a switch in managing AVB streams and ports.
AVB video streaming using TesiraLUX is not supported on Netgear switches.

Biamp dealers can purchase the Netgear GS724Tv4 switch from Biamp Systems, in which case the switch will be fully configured for AVB out of the box. Any switch not purchased from Biamp Systems will need to be configured for AVB (see Setup Instructions links in the table above).

**GBIC Fiber Transceiver**

The Netgear GS7xxT switches include two GBIC ports for fiber optic connections. Compatible GBIC modules for these switches include:

- Netgear AGM731F : 1000BASE-SX (Multi mode; up to 550m with 50/125 cable, up to 275m with 62.5/125 cable)
- Netgear AGM732F : 1000BASE-LX (Single mode; up to 10km with 9/125 cable)
- Netgear AGM733 : 1000BASE-ZX (Single mode; up to 70km with 9/125 cable)
- Avago AFBR-5715APZ
- Diablo Cable GE-SFP-SX - Multi mode 2Km Item # 18530
- Diablo Cable GE-SFP-LX/LH Single mode - 10Km Mini GBIC Item # 18531

**Luminex**

The following models of Luminex GigaCore switches are Avnu Certified for AVB interoperability. GigaCore Firmware 2.8.0 is required for AVB support. All GigaCore switches have standard and PoE+ variants. All copper and fiber ports are 1G maximum.

<table>
<thead>
<tr>
<th>Model</th>
<th>Ports</th>
<th>PoE+ Budget</th>
<th>Firmware</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigaCore 10</td>
<td>8x etherCON RJ45, 2x rugged fiber</td>
<td>Optional 130W</td>
<td>2.8.0</td>
</tr>
<tr>
<td>GigaCore 12</td>
<td>12x etherCON RJ45</td>
<td>Optional 160W</td>
<td>2.8.0</td>
</tr>
<tr>
<td>GigaCore 14R</td>
<td>12x etherCON RJ45, 2x SFP</td>
<td>Optional 160W</td>
<td>2.8.0</td>
</tr>
<tr>
<td>GigaCore 16RFO</td>
<td>12x etherCON RJ45, 4x rugged fiber</td>
<td>Optional 160W</td>
<td>2.8.0</td>
</tr>
<tr>
<td>GigaCore 16Xt</td>
<td>12x etherCON RJ45, 4x SFP</td>
<td>Optional 160W</td>
<td>2.8.0</td>
</tr>
<tr>
<td>GigaCore 26i</td>
<td>24x RJ45, 6x SFP</td>
<td>Optional 370W</td>
<td>2.8.0</td>
</tr>
</tbody>
</table>

GigaCore 2.8.0 release applies the following limitations when AVB is enabled:
• PTPv2 is disabled in every group
• MultiLinkX (link aggregation) is disabled
• VID 2 is not permitted for a group
• Only use 100Mbps/1Gbps FDX port links
• AVB can only be active in one group
• Jumbo frames are disabled switch wide
• Copper SFP modules are not supported

See [Enabling AVB on Luminex GigaCore switches](#) for instructions on configuring the switch. For TesiraLUX support, please see our [Video network design](#) guide.

**L-Acoustics**

The [L-Acoustics LS10](#) is a plug-and-play 10-port Avnu certified AVB enabled switch offering support for up to 150 AVB streams. The switch features a 5 second boot time.

The LS10 is a 10-port switch, all ports are 1Gbps. 8 ports are RJ-45 EtherCON jacks (supports standard CAT-5 or EtherCON connectors), the remaining 2 ports are SFP cages supporting either 1Gbps copper or 1Gbps fiber GBICs. The LS10 does not provide PoE or PoE+ on any port.

[L-Acoustics Network Manager](#) software is used to access the switch interface for firmware updates, configuration, and monitoring. The switch allows configuration of RSTP and for customization of propagation delay threshold settings. A GPIO connection allows remote fault monitoring of the switch.

The LS10 features an internal mains power supply (100VAC-240VAC / 50Hz-60Hz) and both accepts and provides 24VDC backup power to/from another LS-10. There is an accessory single rack space (1 RU) shelf which allows 1 or 2 LS10 switches per shelf.

Further details on integrating L-Acoustics AVB devices with Tesira can be found in our article on [L-Acoustics AVB](#).
MOTU

Biamp recommends the Biamp TesiraCONNECT TC-5 for new installations. The TesiraCONNECT TC-5 provides 5 ports capable of AVB streaming and eliminates the need for injectors by providing PoE+ on 4 of the ports without any power budget limitation.

MOTU offers a 5-port AVB switch that has been confirmed to work with AVB-enabled Biamp Tesira devices. The model number of the switch is simply "AVB Switch". See MOTU's website for more information.

Biamp has informally tested the switch and determined that it is capable of handling at least 36 AVB streams, for a total of 144 AVB audio channels. There may be additional channel/stream restrictions on networks that consist of multiple MOTU switches.

The MOTU switch should only be used primarily for small installations with relatively light AVB usage. Biamp does not recommend building larger AVB networks using multiple MOTU switches connected directly to each other, or using the MOTU switch in systems with heavy AVB usage. The MOTU switch cannot be used in conjunction with a Netgear AVB switch or switches from other vendors. Fiber media converters are not supported.

AVB video streaming using TesiraLUX is not supported on MOTU switches.

Control4/Pakedge

Note: Pakedge S3-24P and S3L-24P switches have been discontinued and are no longer available for purchase.

Select models of the Control4/Pakedge S3-series are Avnu certified and AVB-enabled. AVB licensure is included with the switch firmware at purchase or with firmware update. All Avnu certified AVB-enabled Pakedge switches are shown in the table below:

<table>
<thead>
<tr>
<th>Model</th>
<th># of Gigabit Copper Ports</th>
<th>PoE+ Budget</th>
<th># of 10 Gigabit SFP+ Ports</th>
<th>Network Stream Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3-24P (EOL)</td>
<td>24</td>
<td>370W</td>
<td>4</td>
<td>225</td>
</tr>
<tr>
<td>S3L-24P (EOL)</td>
<td>24</td>
<td>370W</td>
<td>4</td>
<td>70</td>
</tr>
</tbody>
</table>

For further details on enabling AVB on Pakedge S3 series switches, please visit the Pakedge AVB configuration and resources page. For TesiraLUX support, please see our Video network design guide.
Media Converters

AVB can be converted to run over fiber optic cables using media converters. However, it is important to use true media converters that do not have integrated Ethernet switches built into them. The following media converters have been informally tested with Tesira products:

- Diablo Cable 18243 - 1310nm / 10KM GBIC 10/100/100Base TX to 1000Base FX
  (Please ensure the unit is used in 'converter' mode rather than 'switch' mode. SW-1 should be set to OFF, SW-2 should be set to ON.)
- Luxcom OM1000E - 1000BASE-T to 1000BASE-X
- TP-Link MC220L

Peer Delay adjustments required when using media converters

The length of the fiber line and media converter will have an impact on propagation delay. If the link propagation delay exceeds the peer delay threshold, AVB clocking will not function correctly and ports will report AS-incapable. Both the switch and Tesira must have their peer delay threshold configured to account for the media conversion. The link propagation delay should be checked in the switch, and a peer delay value greater than the propagation delay should be entered. The peer delay values do not need to match on both ends, as long as both are greater than the propagation delay.

The default peer delay threshold in Tesira is 1200ns. The peer delay threshold in Tesira is configurable up to 2,147,483,647 nanoseconds.

MOTU AVB switches do not have a configurable peer delay and should not be used with fiber media converters.

TesiraLUX 10GB SFP+ modules

TesiraLUX IDH-1 and OH-1 have a 10G AVB SFP+ port, in addition to a 1G AVB copper port.

TesiraLUX should support any 10GBASE- standard SFP+ transceiver module from a reputable manufacturer. It's strongly recommended to use the same module on both ends of the cable (e.g. Extreme SFP+s on both ends, etc.). Check with the switch manufacturer to see if there are any limitations on their end with respect to supported modules.

TesiraLUX supports single mode or multi-mode fiber. Generally SMF (single mode fiber) is overkill for short distances but otherwise works fine. Distance limitations will depend on the laser wavelength and power of the transceiver module installed which, in turn, defines the necessary fiber construction. For many new installations, 10GBASE-SR (short run) with low cost MMF (multi mode fiber) will work fine. Check with the SFP+ module manufacturer for specifications unique to their product prior to installation.
TesiraLUX only supports 10G link speeds on the SFP+ port. Use the 1GB copper port for 1GB connections. TesiraLUX does not allow dynamic switching between the copper and fiber port; it will only use one of the two ports.

If an AV Input block is in a 10G Video Partition, it will always utilize the 10G fiber optic port on the IDH-1, even if the required bandwidth is below 0.75Gbps.

Further Reading

- Tesira network infrastructure
- Video network design
- Explicit AVB streams (IEEE 1722.1)

1. Manufacturer specifications can change without notice. Biamp Systems strives to keep this list up to date, but is not always made aware of changes made by third parties to the Ethernet switches referenced, and therefore Biamp Systems cannot guarantee compatibility with any of the products listed on this page.