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 products¹. 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.

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-5 is currently available for order and will be shipping Q3 2019.

<table>
<thead>
<tr>
<th>Model</th>
<th>Ports</th>
<th>802.1at PoE+</th>
<th>Firmware</th>
</tr>
</thead>
<tbody>
<tr>
<td>TesiraCONNECT TC-5</td>
<td>5 AVB-capable</td>
<td>4 ports, 120W budget</td>
<td>Tesira 3.12 or later</td>
</tr>
</tbody>
</table>

TesiraCONNECT allows for easy deployment of Tesira devices within conferencing spaces. TesiraCONNECT is 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

Cisco® Catalyst® 3650 and 3850 series switches are AVB enabled and Avnu certified. See the Cisco AVB page for specific details and FAQs.

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

<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><strong>Required license level:</strong></td>
<td><strong>Required license level:</strong></td>
<td><strong>Required license level:</strong></td>
<td><strong>Required license level:</strong></td>
</tr>
<tr>
<td>ipbase or ipsevices</td>
<td>ipbase or ipsevices</td>
<td>Network Advantage</td>
<td>Network Advantage</td>
</tr>
<tr>
<td><strong>Required IOS release:</strong></td>
<td><strong>Required IOS release:</strong></td>
<td><strong>Required IOS release:</strong></td>
<td><strong>Required IOS release:</strong></td>
</tr>
<tr>
<td>IOS XE Fuji-16.9.2</td>
<td>IOS XE Fuji-16.9.2</td>
<td>IOS XE Fuji-16.9.2</td>
<td>IOS XE Fuji-16.9.2</td>
</tr>
</tbody>
</table>

- C3650-24PDM
- C3650-48FQM
- C3650-8X24PD
- C3650-8X24UQ
- C3650-12X48FD
- C3650-12X48UQ
- C3650-12X48UR
- C3650-12X48UZ

- C3850-12X48U
- C3850-24XU
- C3850-12XS
- C3850-16XS
- C3850-24XS
- C3850-32XS
- C3850-48XS

Note: The Catalyst 9300 series and Catalyst 9500 series are pending Avnu certification.

The following Cisco license levels are required for AVB support.

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

Note: The Catalyst 9300 series and Catalyst 9500 series are pending Avnu certification.
The following Cisco IOS® XE Software release versions are required for AVB support.

- IOS XE Fuji-16.9.2 for Catalyst 3000 family.
- IOS XE Fuji-16.9.2 for 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).
- Up to 200 streams are supported 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 for a complete list of questions and considerations for designing AVB enabled networks with Catalyst switching.

See Enabling AVB on Cisco Catalyst Switches for details on configuring the switch. For TesiraLUX support, please see our Video network design 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 for more details.

Biamp recommends **EXOS 21.1.5.2 (patch 1-5)** for mixed media networks. The latest Extreme firmware recommendations are available at ExtremeXOS Release Recommendations, however Biamp does not recommend the 22.x branch for our products at this time.

Extreme supports AVB on the following Summit series:

### Summit Series

**Summit X430 (EOL)**

**Required License**: X430 AVB Multimedia Feature Pack

Note: The X430 only supports up to 8 connected AVB ports, regardless of switch size. AVB video streams are **not** recommended with this switch.

**Summit X440, X440-G2**

<table>
<thead>
<tr>
<th>Summit Series</th>
<th>Stream Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summit X430 (EOL)</td>
<td>100</td>
</tr>
<tr>
<td>Summit X440, X440-G2</td>
<td>1024</td>
</tr>
</tbody>
</table>

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http://support.biamp.com/
Summit Series

**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.

To enable AVB functions on Extreme networks switches, see [Enable AVB on Extreme Network Switches](http://support.biamp.com/). For TesiraLUX support, please see our [Video network design](http://support.biamp.com/) guide.

**Control4/Pakedge**

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>Firmware Version</th>
<th>Network Stream Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3-24P</td>
<td>24</td>
<td>370W</td>
<td>4</td>
<td>2.0.0*</td>
<td>225</td>
</tr>
<tr>
<td>S3L-24P</td>
<td>24</td>
<td>370W</td>
<td>4</td>
<td>1.0.0*</td>
<td>70</td>
</tr>
</tbody>
</table>

* Contact Pakedge for current firmware, performance expectations and questions regarding simultaneous support of AVB, Dante and AV-over-IP solutions.

For further details on enabling AVB on Pakedge S3 series switches, please visit the [Pakedge AVB configuration and resources page](http://www.pakedge.com/support/AVB). For TesiraLUX support, please see our [Video network design guide](http://www.tesiralux.com/video-network-design).

### 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 Version</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.

## Netgear

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>Link</td>
</tr>
<tr>
<td>GS724Tv3 (discontinued)</td>
<td>24</td>
<td>1Gbps</td>
<td>No</td>
<td>5.0.3.5</td>
<td>Link</td>
</tr>
<tr>
<td>GS724Tv4</td>
<td>24</td>
<td>1Gbps</td>
<td>No</td>
<td>6.3.1.4</td>
<td>Link</td>
</tr>
<tr>
<td>GS748Tv5</td>
<td>48</td>
<td>1Gbps</td>
<td>No</td>
<td>6.3.1.4</td>
<td>Link</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. It does not operate with the following Biamp products:

• TCM-1
• AMP-450P
• EX-UBT
• TesiraLUX
• TesiraXEL

Netgear switches are not Avnu certified and are suitable for small to mid-sized AVB implementations. 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 Transciever

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

MOTU

Biamp recommends the TesiraCONNECT for new installations. The TesiraCONNECT provides 5 ports capable of AVB streaming. It 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.

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:¹

- 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

The length of the fiber line and media converter will have an impact on propagation delay. The peer delay threshold in Tesira is configurable up to 2,147,483,647 nanoseconds. If the link propagation delay exceeds this threshold, AVB clocking will not function correctly. Both the switch and Tesira must have their peer delay threshold configured to account for the media conversion. MOTU AVB switches do not have a configurable peer delay and should not be used with fiber media convertors.

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.