## CONNECTION TYPES

### DIGITAL AUDIO CONNECTIONS

<table>
<thead>
<tr>
<th>Name</th>
<th>Plug</th>
<th>Jack/Port</th>
<th>Description/Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical</td>
<td><img src="image1" alt="Plug" /></td>
<td><img src="image2" alt="Jack" /></td>
<td>A digital, fiber-optic connection used to send digital audio signals from a source component to an audio processor, such as an A/V receiver. Impervious to common household magnetic and RF interference, it offers excellent speed and bandwidth, though cables are usually more costly than coaxial cables that are used for the same purpose. In terms of performance, there is little if any discernable difference in sound between the two.</td>
</tr>
<tr>
<td>Coaxial</td>
<td><img src="image3" alt="Plug" /></td>
<td><img src="image4" alt="Jack" /></td>
<td>A digital interface format invented by Sony and Philips (hence, SPDIF) used to send digital audio signals from a source component to an audio processor such as an A/V receiver. Coaxial refers to the cable design and not the connection technology, which unfortunately results in some confusion with other video and networking cables that use a coaxial design. For digital audio applications, coax cables are more economical than optical and just as capable, but can be affected by electrical interference.</td>
</tr>
<tr>
<td>HDMI</td>
<td><img src="image5" alt="Plug" /></td>
<td><img src="image6" alt="Jack" /></td>
<td>A digital connection that can carry both digital video and audio signals over a single cable. HDMI can support up to eight channels of audio at multiple sampling rates, and cables can extend for as long as 15 meters. HDMI is used primarily as a video connection, but the specification allows for audio, video and control data, and future products will incorporate these functions.</td>
</tr>
</tbody>
</table>
### IEEE-1394

**Name**: IEEE-1394  
**Description/Uses**: IEEE-1394 is capable of high-speed throughput of up to 800mbps and is fast enough for digital audio transfer and compressed video. In an audio context, 1394 sends digital audio signals from a source component to an audio processor, such as SACD and DVD-A signals for example.

### ANALOG AUDIO CONNECTIONS

#### Stereo Audio

**Name**: Stereo Audio  
**Description/Uses**: An analog connection that carries two separate line-level signals, left and right, from a stereo source component to an audio processor. The plug type was introduced by RCA in the 1940s to connect phono equipment to radios; hence the connection is sometimes also called an “RCA” or "phono connection." Individual or grouped cables with RCA-type plugs and jacks are also used for other types of audio connections, such as multi-channel analog hookups, and are also the design model for coaxial digital audio cables.

#### Multi-Channel

**Name**: Multi-Channel  
**Description/Uses**: An analog connection used for connecting high-resolution, multi-channel audio source components, such as SACD and DVD-A players, to audio processors, such as an A/V receiver. There are a few proprietary digital connections used by CE manufacturers to send all 5.1 channels (and sometimes 7.1) of an SACD or DVD-A source via a single cable, but these are still uncommon due to anti-piracy concerns.
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<tr>
<td><strong>Mini Stereo</strong></td>
<td><img src="image1" alt="Mini Stereo Plug" /></td>
<td><img src="image2" alt="Mini Stereo Jack" /></td>
<td>An analog connection used to add portable audio equipment, such as MP3 players, to home audio systems. Headphones also commonly use these connections, which are called &quot;mini&quot; because the plug and jack are 1/8&quot;, smaller than the traditional 1/4&quot; inch plugs and jacks traditionally used for headphone connections. However, the mini stereo plug is used for unamplified line-level signals as well as amplified headphone signals.</td>
</tr>
<tr>
<td><strong>Phono Level</strong></td>
<td><img src="image3" alt="Phono Level Cables" /></td>
<td><img src="image4" alt="Phono Level Jacks" /></td>
<td>Phono level analog connections use plugs and jacks that look similar to stereo audio connectors. However, the actual inputs on the audio processor accept only low-level signals such as those from a phono cartridge. In some cases there will also be a third lead used as a &quot;ground&quot; to eliminate electrical hum.</td>
</tr>
<tr>
<td><strong>Speaker Plugs &amp; Jacks</strong></td>
<td><img src="image5" alt="Speaker Plugs &amp; Jacks" /></td>
<td><img src="image6" alt="Speaker Plugs &amp; Jacks" /></td>
<td>Speaker connections perform only one task -- connect the audio amplifier to the system's loudspeakers. There are numerous plug types used for this job, including the spade (L), banana (C) and pin-type (R) plugs pictured. The jacks are often 5-way binding posts, which can accept five different types of terminations from the speaker wire, or even stripped wire with no plug attached.</td>
</tr>
<tr>
<td><strong>Speaker Wire</strong></td>
<td><img src="image7" alt="Speaker Wire" /></td>
<td><img src="image8" alt="Speaker Wire" /></td>
<td>In some audio systems, usually smaller or entry-level products, the speaker connections use a &quot;spring clip&quot; method to attach wire, as shown at the right. Because these are usually smaller connections than binding posts, there is no room for most speaker plugs, hence a short length of stripped wire is simply inserted into the clip to make the speaker connection.</td>
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</table>
# DIGITAL VIDEO CONNECTIONS

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<tr>
<td>HDMI</td>
<td><img src="image1.png" alt="HDMI plug" /></td>
<td><img src="image2.png" alt="HDMI jack" /></td>
<td>HDMI is emerging as the preferred carrier for digital video connections, due to its small size, excellent throughput and versatility, as it can also carry audio and control signals along the same wire as the video. HDMI cables are also compliant with copy protection technologies. Through the use of a simple adaptor that separates the audio and video signals, HDMI is also backward compatible with DVI video connections.</td>
</tr>
<tr>
<td>DVI</td>
<td><img src="image3.png" alt="DVI plug" /></td>
<td><img src="image4.png" alt="DVI jack" /></td>
<td>DVI is a digital video connection originally developed for computer displays, but was eventually adapted for use in CE products. DVI comes in several &quot;flavors,&quot; with some carrying only digital signals, some carrying analog video signals, and some cables able to carry both. DVI cables are compliant with content copy protection, and with an adapter, can be used with HDMI cables.</td>
</tr>
<tr>
<td>IEEE-1394</td>
<td><img src="image5.png" alt="IEEE-1394 plug" /></td>
<td><img src="image6.png" alt="IEEE-1394 jack" /></td>
<td>IEEE 1394 is more common on camcorders and consumer video editing gear than on home theater components. A few DTV recorders, like D-VHS decks, use 1394 since it is the only interface that allows for recording of DTV or HDTV signals.</td>
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<tr>
<td>Component Video</td>
<td>AKA Y-PR-PB</td>
<td>Y</td>
<td>An analog video connection featured on the vast majority of DVD players and DTVs, using three separate wires color-coded red, blue and green. In a component video connection, the green, or &quot;Y&quot; lead carries the brightness portion of the signal, while the other two leads carry color information. All three cables must be connected to the corresponding jack to receive full picture information. The separation between the colors and brightness information provides greater purity of the overall video signal.</td>
</tr>
<tr>
<td>S-Video</td>
<td>AKA Y/C video</td>
<td>Y/C</td>
<td>A standard-definition analog video connection that divides video signals into two separate paths, one for color information (chroma) and one for brightness information (luminance). The connection yields superior performance to composite cables, which send both signals down the same path, though results are not as good as with component video.</td>
</tr>
<tr>
<td>Composite Video</td>
<td>AKA Standard video</td>
<td>V/O</td>
<td>A standard-definition analog video connection so-named because brightness and color information travel along the same wire as a &quot;composite&quot; signal. Often grouped with a pair of stereo audio leads for simplified hookup, a composite video connection offers lesser quality than either S-Video or component video.</td>
</tr>
<tr>
<td>RF Connection</td>
<td>AKA Coaxial cable</td>
<td>F</td>
<td>RF connections pass a modulated analog signal to a display or receiver with an integrated analog TV tuner. A typical example is a cable set-top box connected to a TV via the STB’s “RF output” and TV’s “Antenna In” jacks. In this case, the TV would typically be tuned to channel 3 or 4 in order to receive the picture. RF connections should only be used when absolutely necessary, as line-level connections provide better performance.</td>
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<tr>
<td>RGB Video</td>
<td><img src="image" alt="RGB Video Plug" /></td>
<td><img src="image" alt="RGB Video Jack" /></td>
<td>An analog video connection originally designed for professional applications, and still seen on some higher-end consumer video equipment. RGB stands for red, green and blue, which are routed separately to a video display through a multi-pin connector. Additional signals are sent along the same wire to ensure horizontal and vertical synchronization, hence RGBHV. Some RGBHV connections are handled through 5 separate cable leads, terminated in phono plugs or locking BNC plugs.</td>
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**HOME NETWORK CONNECTIONS**

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<tr>
<td>Ethernet</td>
<td><img src="image" alt="Ethernet Plug" /></td>
<td><img src="image" alt="Ethernet Jack" /></td>
<td>Ethernet is the most common connection in home networking. Cables are terminated in a plastic modular plug called an RJ-45. This is a slightly larger version of the common telephone plug, the RJ-11. Ethernet plugs are even used in wireless networks, to connect wireless NICs to devices that don't have NIC capabilities built in. Ethernet cables are ranked by &quot;category,&quot; with higher CAT numbers offering greater throughput.</td>
</tr>
<tr>
<td>USB</td>
<td><img src="image" alt="USB Plug" /></td>
<td><img src="image" alt="USB Jack" /></td>
<td>A digital connection designed as a &quot;plug-and-play&quot; standard for PC peripherals and network devices. The original implementation (USB 1.1) offered only 12mbps of throughput, but the current USB 2.0 offers 480mbps. Newer USB 2.0 devices are backward-compatible with USB 1.1 devices, but only at the latter's slower throughput.</td>
</tr>
<tr>
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<tr>
<td><strong>IEEE 1394</strong></td>
<td><img src="image1" alt="IEEE 1394 Plug" /></td>
<td><img src="image2" alt="IEEE 1394 Port" /></td>
<td>In home networks IEEE 1394 is used to connect peripherals requiring fast throughput, such as audio and video devices. The full 6-pin configuration is more common than the 4-pin in a networked context.</td>
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<tr>
<td>AKA</td>
<td>FireWire</td>
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<td>I-Link</td>
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<tr>
<td><strong>RS-232</strong></td>
<td><img src="image3" alt="RS-232 Plug" /></td>
<td><img src="image4" alt="RS-232 Port" /></td>
<td>A recommended standard (hence, &quot;RS&quot;) interface for connecting and controlling serial devices. Prior to the popularization of Ethernet-based control, RS-232 was already an established technology for controlling home electronics and systems, and it is still seen frequently today. Two types of plugs and jacks are used; a 25-pin connector and a 9-pin connector, with the former popular for PC devices and the latter more popular for CE devices.</td>
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<tr>
<td>AKA</td>
<td>Serial control</td>
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