



**Broadcast
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Network Cabling Guide

Poor or incorrectly installed network cabling can cause numerous problems with your computer network. Whilst we recommend that you employ a network / cabling specialist to wire and configure your network, we have compiled some important information to help you avoid some of the more common pitfalls.

It is very important to understand that a problem with your network cabling, however small it may appear, can have a catastrophic effect on the operation of your audio network.

WIRING STANDARD

There are two wiring standards for network cabling, T568a and T568b. We will be discussing using the T568b specification.

It is essential that you DO NOT MIX T568a and T568b on the same network.

USE HIGH QUALITY CAT 5e or CAT 6 cabling

Audio files are generally very large data files and need to be moved around the network as quickly as possible. All the computers sold by BSI are capable of network transfer at 1 Gbps (a Gigabit) full-duplex; however your existing network cabling, switches and routers may not be capable of supporting this speed and may only operate at the more common 100 Mbps,

Whilst generally it is possible to utilize good quality Cat 5 cabling for Gigabit networks, we highly recommend that you stick to the 'in spec' Cat 5e standard or highly quality Cat 6 cabling and wire for Gigabit connectivity even if your existing network switches and routers only support 100 Mbps. This will then ensure that the cabling infrastructure is in place when the Gigabit routers and switches are more readily available.

The rest of the points apply equally to 1Gbps and 100 Mbps connections – each can be affected badly by poor cabling / wrong connections.

In high RF environments, it is also essential to use 'shielded twisted pair' (STP) rather than 'unshielded twisted pair' to prevent interference.

HAVE GOOD CABLES RUNS

Cabling between each of the computers should be in a 'star' configuration with each computer having a separate cable run to the central switch and / or router.

Each cable should be no longer than 265 feet and should be a single piece of cable (there should be no joins).

Cabling should NOT be run next to electrical mains cabling (because of the potential for interference); nor should network cabling be suspended on ceiling tiles (this may violate building code and fire regulations).

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As typically network cabling uses solid wire, cabling should not be twisted or bent into a tight radius.

Do not use metal staples to secure cable runs, nor tightly adjusted cable wraps.

We recommend that you ‘flood’ wire any new facility with Cat 5e or higher specification wiring, preferably to professional RJ45 patch bays.



This is because as well as network connections, this wiring can also be used for telephone systems and network cabling makes excellent audio cabling runs (the capacitance of the network cable is such as to allow high-bandwidth, high-speed data to transfer and is perfect for both analog and digital audio).

USE THE RIGHT PLUGS!

Network connections use RJ45 plugs which look similar but are not the same as telephone plugs (which are RJ11). Cables are inserted into the plug and a special tool is used to make the connection between the plug-pins and the cabling – do not try to do this with a screw-driver or pair of pliers!

Typically, cabling will be made up of pairs of ‘solid’ or ‘single-core’ wires rather than the more flexible stranded wire often used in patch cables.

RJ45 plugs are designed for either just stranded or just solid cable but usually not both. It’s virtually impossible to tell the difference by looking at the plugs themselves – you need to be sure that you specify the correct plugs when ordering them.

	<p>RJ45 Plug with 8 pins (Viewed from this angle, pin 8 is on the left and pin 1 is on the right)</p>
	<p>RJ11 Telephone Plug with only four pins.</p>

DO NOT UNTWIST MORE THAN 0.25" OF CABLE

Network cabling comprises of 4 pairs of twisted wires which are color coded (Orange, Green, Blue and Brown).

The cable specification is such that it has been designed for high-speed data-transfer and very little cross-talk (interference between pairs of wires).

It is **very** important that no more than about a quarter of an inch of the cable is untwisted at either end as this can lead to problems such as 'near end cross-talk' which will have a detrimental affect on your network.

KEEP THE PAIRS TOGETHER & WIRE CORRECTLY!

As previously mentioned, network cabling comprises of four pairs of wires, although only two pairs are normally used. Despite this, all the pairs should always be wired to maintain the network specification. The cable pair colors, pair numbers and wire descriptions are shown in the table below.

COLOR	PAIR	DESCRIPTION
White / Blue Blue	1	Unused Unused
White / Orange Orange	2	Transmit Data + Transmit Data -
White / Green Green	3	Receive Data + Receive Data -
White / Brown Brown	4	Unused Unused

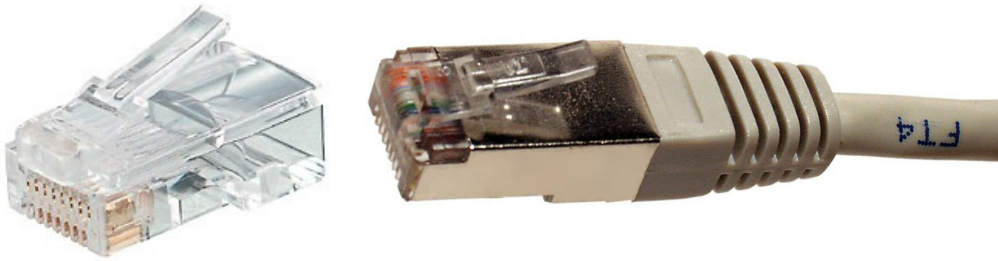
Confusingly, the 'pairs' in the RJ45 plug run across the following pins. It is **essential** that you wire the plug correctly and not just from pins 1 through 8 at both ends (note that in this example, the 'hook' on the plug is facing the front):

RJ45 PIN	PAIR	COLOR
1	2	White / Orange
2	2	Orange
3	3	White / Green
4	1	Blue
5	1	White / Blue
6	3	Green
7	4	White / Brown
8	4	Brown

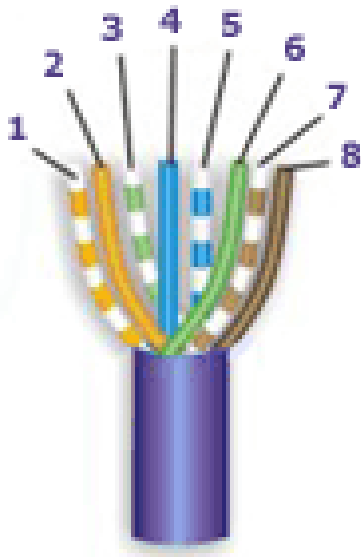
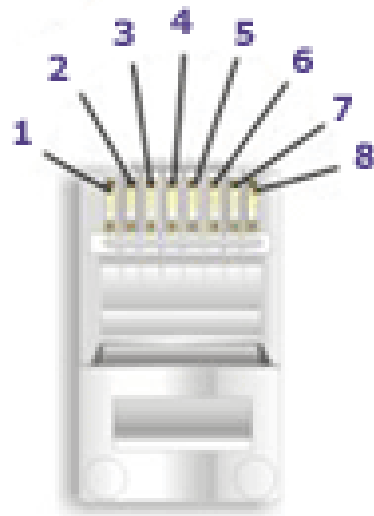


IDENTIFYING PIN NUMBERS

RJ45 plugs have a little ‘hook’ that locks the plug into the socket as can be seen from the enlarged images below. Take time to study the orientation of the plug.



Now flip the plug over so that the ‘pins’ are on top, the ‘hook’ underneath and the cable entry towards you and from left to right will be pins 1 to 8...both cable ends are normally wired the same.



The above wiring conforms to the T568b specification and is used for connections between a computer and hub; computer and switch; computer and router; and computer and cable modem.

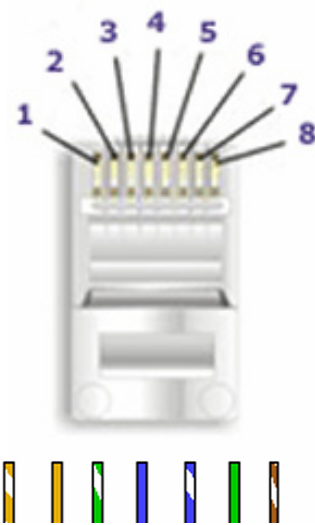
CROSSOVER CABLE

There are instances where you need to connect two devices such as a switch and a hub together, or a router and cable modem together which involves the Transmit pair of cables on one device talking to the Receive pair of the other device.

Typically, these devices will be fitted with an 'uplink' port and you should plug one end of the cable into the uplink port of one device only as the uplink port automatically crosses over the Transmit and Receive pairs in the device itself so that the two devices can 'talk' to each other.

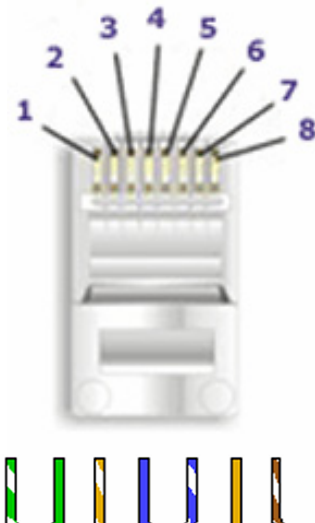
If an uplink port is not available, you will have to wire a cross-over cable at one end of a standard RJ45 cable, the diagram below shows first the standard cable end followed by the crossed over cable end.

STANDARD CABLE END



One cable end should be wired as above, in the standard configuration. The other end should be wired as cross-over. Note that the Orange and Green Pairs are now crossed over.

CROSSOVER CABLE END



USE THE CORRECT TERMINATING TOOL!

As stated before, do not attempt to crimp the RJ45 plug using a screwdriver, metal block or pair of pliers! If you are going to be wiring network cabling, it is worth investing in a high-quality crimping tool.

The better ones will crimp RJ45 and telephone connectors and contain metal blades to cut the network cabling and strip the outer cable cover back and are very easy to use.



CONSIDER USING PATCH PANELS

If you are installing network cabling at a new facility, we strongly suggest that you wire cabling to an RJ45 patch panel. Each room should be ‘flood wired’ with ample RJ45 sockets that can then be patched as either Network (data), Telephone (voice), or Analog or Digital Audio.

