ITFreeTraining

RJ45 and RJ11

For the free video please see
http://itfreetraining.com/ap/1c60

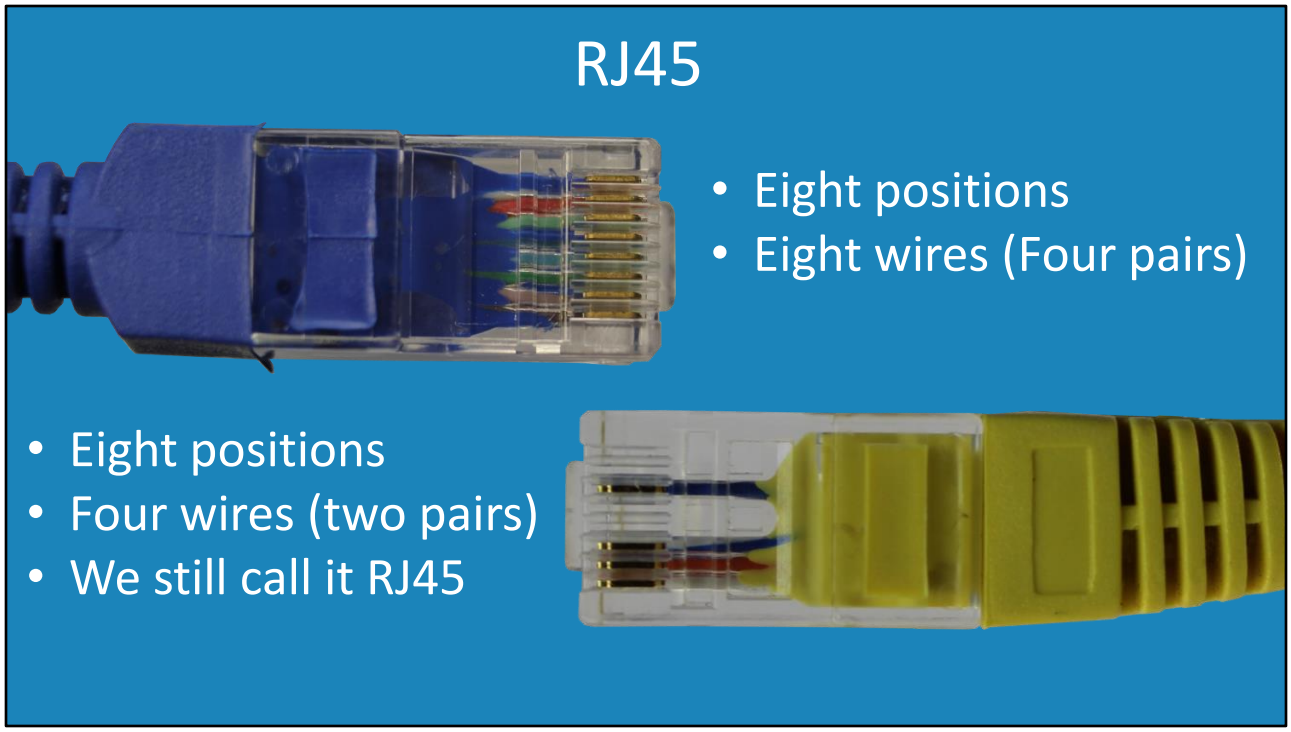
In this video from ITFreeTraining, I will look at the connector types RJ45 and RJ11. These are fundamental connector types that are used in networking and, thus, very important for the IT technician to know about.

Registered Jack (RJ)

- Specification defining jack and connector
- RJ followed by number defines
  - Number of positions
  - Number of conductors/connectors (Pins)
- In IT we use two. RJ45 and RJ11
  - Refers to the connector rather than specification

0:12 To start with, I will look at the Registered Jack otherwise known as RJ. RJ is a specification that defines the jack and the connector – this is essentially the plug and the socket that it goes into.

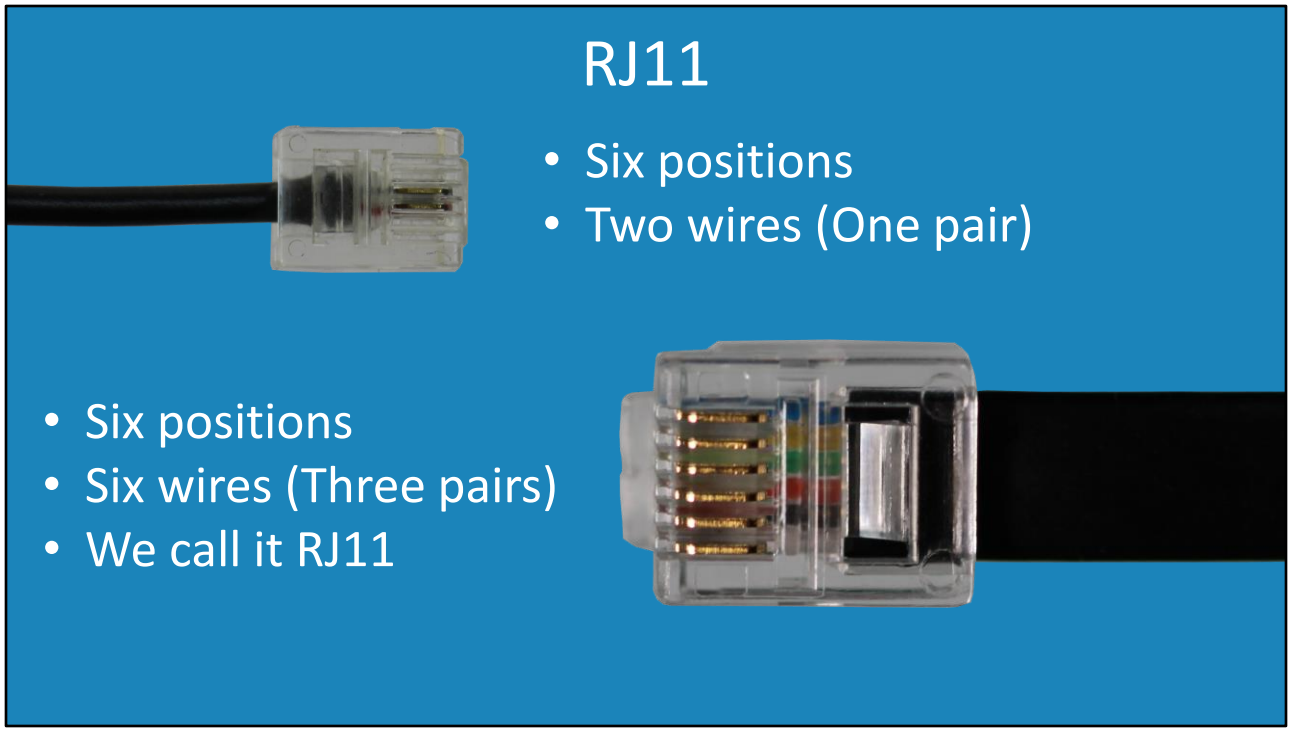
The original RJ standard defines the number, wire position and conductors in the connector. This is something you don't really need to know. Why? Because in IT we only use RJ45 and RJ11 as the terminology to define the plug. In IT we don't worry about how many conductors there are, or how many wires it supports or their position, as we just use the names to refer to the plug rather than the specification. Let's have a look at a RJ45 plug attached to a cable, and this will start to make sense.



1:00 Let's consider a standard network cable, which we would in IT refer to as RJ45. This particular cable, therefore, meets the standard called RJ45. This is because, in order to meet the standard, it needs to have eight positions. A position simply means somewhere a connector can be mounted to. The next requirement it needs in order to meet the standard is that it needs to have eight wires or four pairs of wires. You can see that this connector has this and, thus, meets the standard for RJ45.

Now let's consider this cable. This cable, like before, has eight positions. However, there are only four wires or two pairs of wires being used. This connector does not meet the RJ45 standard and, technically, it should not be called RJ45. This cable does meet another RJ standard which has a different number, not 45 after it; but you will never need to know that in IT. In IT we still call this an RJ45 connector, even though, technically, it meets a different RJ specification.

Essentially, in IT, we adopted the convention of calling the connector an RJ45 connector. If there are eight wires, technically this is correct, but any less than that it is not. Don't worry about it, if you are talking to someone in IT they will all call it an RJ45 cable; someone in telecommunications may call it by its correct name, but not in IT. Let's now have a look at the other connection you may come across.



2:40 The next connection that I will look at is the RJ11 connection. To be technically correct, this connector has six positions and two wires or one pair. This connector is often use to connect telephones.

If, for example, you come across a cable like the following, it has six positions, six wires or three pairs, then technically it is not an RJ11 connector, but in IT we still call it an RJ11 connector.

Before I move on in the video, I will do a quick summary of the main points to make sure everything is clear.

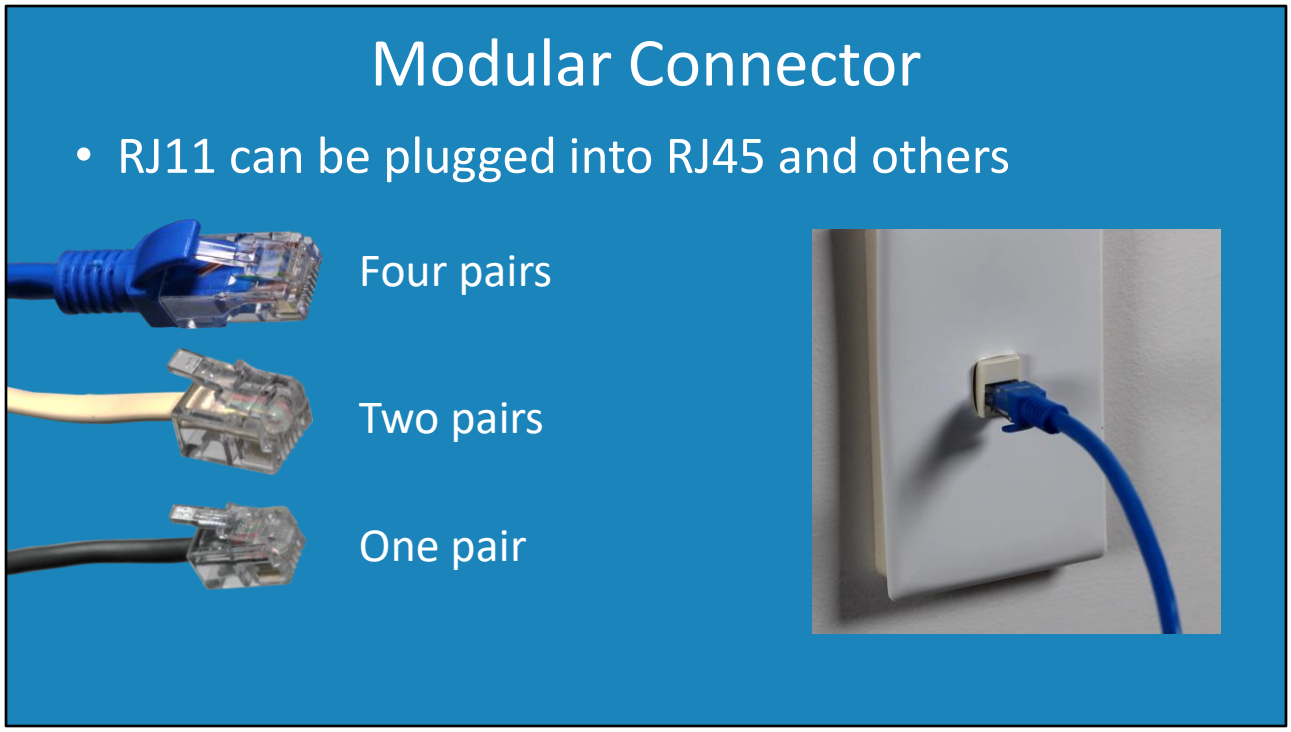
RJ Summary

- Eight connectors for wires (Positions)
- In IT
  - Any number of wires it's RJ45

- Six connectors for wires (Positions)
- In IT
  - Any number of wires it's RJ11

3:16 Shown here is what we refer to, in IT, as an RJ45 connector. These are used primarily in networking, so you will see a lot of them. They have eight connectors for wires which are called positions in telecommunication language. In telecommunications, the number of wires in the connector will determine what number follows RJ. In IT, however, regardless of how many wires are used we call it an RJ45 connector.

The next connector that you are likely to come across is the RJ11 connector. A little bit smaller than the RJ45 connector, the connector itself has six connectors for wires. As before, in IT regardless of how many of these connectors have wires attached, we still call it an RJ11 connector. Although, at times, it may not be technically correct, it is a convention that we have been using in IT for a long time. If you are working in IT, you won't need to worry. If you decide to take up a career in telecommunications, you may need to know.



4:18 The registered jack is also referred to as the modular connector. In fact, it was called a modular connector before it was given the name registered jack. It is given this name because multiple connectors can be put into the same plug. For example, RJ11 and other connectors can be plugged into an RJ45 plug.

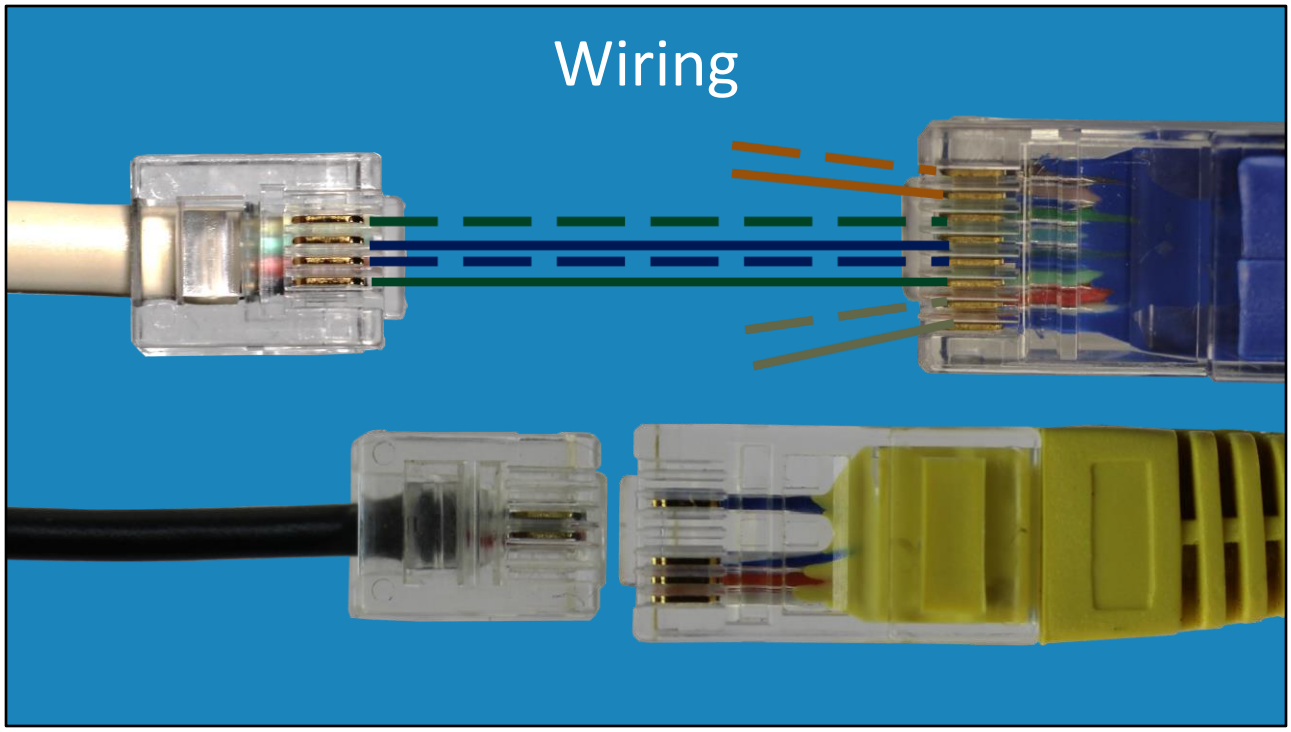
You can see here, the network cable commonly has four pairs of wires, and plugs easily into the RJ45 plug as you expect it to do. Networking requires two pairs of wires, but often network cables will have four pairs leaving two of the pairs unused.

You will also notice that a telephone cable, RJ11 cable, will plug into the same RJ45 plug. Commonly it will have two pairs of wires. Telephones only require one pair of wires to operate; however, often an extra pair is included. This extra pair is usually included in case of a failure in the other pair or for a second line if required.

The last connector, not generally used in IT, is a smaller version of the other two and has a single pair. You will notice, however, that it will also easily plug into the RJ45 plug, just like the others did.

Having a modular connector is great in that it allows different devices to be plugged into the same plug. In the old days, it was common for telephones to use the RJ11 connector. As telephones started to change to IP telephones, the telephones started to change to the RJ45 connector. This allowed the administrator to simply patch the other side to either the network or a phone line. The result was that the same cabling could be used for different devices. All

that needed to be changed was what it was plugged into at either end. However, the cable also needs to be able to support both the RJ11 and RJ45 connectors, so let's see how that was achieved.



6:12 To understand how compatibility is achieved, let's consider the wiring of the cable. Before networking became widespread, the telephone was commonplace. For networking to be compatible with telephones, the plug needed to support one or two pairs of wires. For telephones, the inner wires are the first pair and the outer wires are the second pair.

Now let's consider when networking started getting used. These networks used four pairs of wires. You can see that the inner pair matches the inner pair of both cables. This pair is commonly used for telephones.

The next pair is the next two wires out from the center. This matches the network cables wires. There is, however, room for two more pairs of wires. The first pair is shown at the top. The last pair is at the bottom.

This essentially means that two pairs match up and two pairs do not. To understand this better, consider a cable with just a single pair. One pair in the center is enough for a telephone to operate, but not for networking since two pairs of wires are required.

If I compare this with a cable that was just designed for networking, notice that the center pair is not used, instead the next pair is used and one of the outer pairs. This allows the telephone to be separated from networking. The same wires could have been used, but having them separated like this does make it easier to troubleshoot. That is, the number of wires being used allows you to determine if networking or a telephone is on the other end of the cable.

The pairs of wires are usually color coded. One wire will be fully colored while the other wire will be broken between that color and white. If you have ever looked at a network cable, you may have wondered why the pairs are laid out in such a strange order. Now you know why! The network cables were designed to be compatible with the old telephone system, but additional wires were added for networking. In a later video, I will look at making your own cables. When I do that, you will need to ensure that you put the wires in the correct order.

Just remember, when we talk about RJ45 or RJ11 in IT, we only use these two terms and always call them that regardless of how many wires or pairs are used.

I hope you have enjoyed this video from ITFreeTraining and found it informative. For more videos from us, please see our YouTube channel or web page, and until the next video, I would like to thank you for watching.

References
"The Official CompTIA A+ Core Study Guide (Exam 220-1001)" Chapter 3 Position 11380-11662
"CompTIA A+ Certification exam guide. Tenth edition" Pages 809 – 811
"Registered jack" https://en.wikipedia.org/wiki/Registered_jack

Credits
Trainer: Austin Mason http://ITFreeTraining.com
Voice Talent: HP Lewis http://hplewis.com
Quality Assurance: Brett Batson http://www.pbb-proofreading.uk