

# Build an Ethernet Cable Lab

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BAT-111: Building Automation Systems



*This material is based upon work supported by the National Science Foundation Advanced Technical Education grant program, A New Technician Training Program for Advanced Building Technologies, DUE-2000190.*

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BAT-111: Building Automation Systems

## SYNOPSIS

We are going to build a straight-through Cat 5e or 6 Ethernet cable that you can use in class.

## OBJECTIVES

Upon completion of this activity the student will be able to:

1. Build an Ethernet cable
2. Test the wiring of an Ethernet cable

## PARTS AND EQUIPMENT

- Bulk ethernet cable – unshielded Cat5e or 6
- RJ-45 crimping tool
- RJ-45 Cat5e or 6 connectors
- RJ-45 boots
- Side cutters
- Ethernet cable tester

## REFERENCES

- *Making Ethernet Cables – Tricks of the Trade* by Ground Control
- [INTERFACE - Tips, Tricks & How - Creating Ethernet Cables](https://www.youtube.com/watch?v=HZIASgsSVw4)  
[https://www.youtube.com/watch?v=HZIASgsSVw4]
- [How to Wire Up Ethernet Plugs the EASY WAY! \(Cat5e / Cat6 RJ45 Pass Through Connectors\)](https://www.youtube.com/watch?v=NWhoJp8UQpo) [https://www.youtube.com/watch?v=NWhoJp8UQpo]

## BACKGROUND

Ethernet cables are used to connect many of our wired devices (computer, switch, router, etc.) together to allow them to communicate with each other.

Ethernet cables are made up of four pairs of twisted pair wires. Each pair is twisted to decrease electrical noise from the surrounding environment as well as reduce crosstalk from the other wires.

They are colored:

- Brown & brown/white
- Green & green/white
- Blue & blue/white
- Orange & orange/white

Cat 5 was the original form of ethernet cable and was limited in speed. There are new variations which change the speed of data as well as the physical requirements of the cable.

- Cat 5 – 100 Mbps
- Cat 5e – 1 Gbps
- Cat 6 – 1 Gbps
- Cat 6a – 10 Gbps

Cable length – Cat 5, 5e, and 6 have a maximum length of 100 meters (328 feet).

Shielded or Unshielded – Ethernet cables can be shielded or unshielded. UTP (unshielded twisted pair) is cheaper than STP (shielded twisted pair) but it does not protect from electrical interference as well as STP which has foil wrapping for the shielding. Typically, when connecting computers to switches in most office environments you will see UTP. STP is more common where there is concern for interference due to the environment.

The Registered Jack (RJ), the RJ45, is a standard 8-position, 8-contact connector. RJ45 connectors are used on both ends of an Ethernet cable. A boot is used as strain relief to protect your

T568A or T568B – The order of the wires inside the RJ45 connector is determined by one of two standards (T568A or T568B). A straight-through (or patch) cable will use the same wiring methods on both ends. In the US, most straight-through cables use T568B. If you are building a crossover cable, you would use T568A on one end and T568B on the other end. Make sure you know if your location has a standard wiring method that they use.

For this lab, we are building a straight-through cable (or patch) cable and will be using T568B on both ends of our cable.

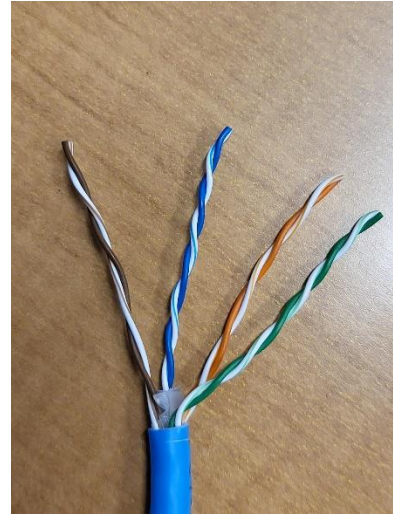


Figure 1: Cat 6 cable



Figure 2: RJ45 connectors

## PROCEDURES

### **Part 1: Gather supplies**

Cut 6 feet of ethernet cable.

### **Part 2: Create Ethernet cable**

What Cat of ethernet cable are you creating? Cat 5, 5e, 6, or 6a? \_\_\_\_\_

Are you creating a straight-through or crossover cable? \_\_\_\_\_

Looking at the jacket of the cable, what Category is your cable? \_\_\_\_\_

Looking at the jacket of the cable, is your cable STP or UTP? \_\_\_\_\_

What is missing in UTP that exists in a STP? \_\_\_\_\_  
\_\_\_\_\_

Looking at the jacket of the cable, what is the gauge of the conductors? \_\_\_\_\_

Which wiring standard are you doing on the first end? \_\_\_\_\_

Which wiring standard are you using on the second end? \_\_\_\_\_

Follow the instructions in the other document to create a straight through cable.

- Make sure the jacket is properly inserted into the connector.
- Make sure you install the RJ-45 boots before you.

### **Part 3: Test Ethernet cable**

Use the Ethernet cable tester, to test your ethernet cable. Verify that all pins are connected correctly. You need to carefully watch the cable tester to make sure that the lights light up in the same order on both halves of the tester.

If there is an issue, try to re-crimp the connector to make sure you have a good connection. If there is still an issue, examine the connectors to determine which end has the wrong configuration. Cut off the end of the wrong configuration and try again.

### **Part 4: Verification**

Demonstrate using the Ethernet cable tester that your ethernet cable with the tester to your instructor.

Instructor Signature that cable was completed successfully: \_\_\_\_\_