NIST College
Banpea
BScCSIT

Computer Network (CSC258)

LAB 1

CAT6 UTP EIA/TIA 568A/B Straight and Cross-over Wiring and Testing

Objectives:

1. To understand the color coding standard of UTP cable.
2. To create straight and crossover cable and test/verify it connectivity.

Material Required:

UTP CAT6 cable (1M), Crimper, LAN Tester.

Theory:

Ethernet Cable

An Ethernet cable is a network cable used for high-speed wired network connections between two devices. They are used to connect devices located on local area networks (LANs), such as routers, PCs and switches. This network cable is made of four-pair cable, which is consists of twisted pair conductors. It is used for data transmission at both ends of the cable, which is called RJ45 connector.

Most Ethernet cables are designed to connect a computer to a router or switch. Ethernet cables come in a range of types that are defined by the *Electronic Industries Association and Telecommunications Industry Association*.

Ethernet cable types include Category 5e and Category 6– commonly abbreviated to ‘Cat5e’ and ‘Cat6’ respectively.

The Ethernet cables are categorized as Cat 5, Cat 5e, Cat 6, and UTP cable. Cat 5 cable can support a 10/100 Mbps Ethernet network while Cat 5e and Cat 6 cable to support Ethernet network running at 10/100/1000 Mbps. It is recommended that Cat5e and Cat6 cables are restricted to a maximum run length of 100 metres.

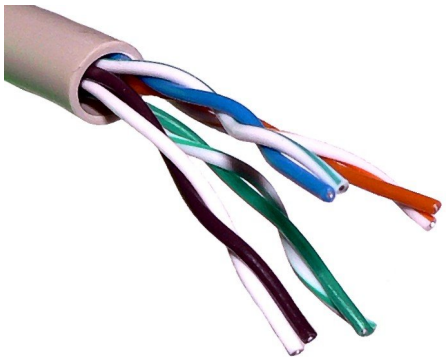

Figure 2: How UTP looks like.

Figure 1: RJ45 connector.

Straight Through Cable

Straight-through cable is a type of CAT5 with RJ-45 connectors at each end, and each has the same pin out. It is in accordance with either the T568A or T568B standards. It uses the same color code throughout the LAN for consistency. This type of twisted-pair cable is used in LAN to connect a computer or a network hub such as a router. It is one of the most common types of network cable. I is also called *patch cords*.

Crossover Cable

A Crossover cable is a type of CAT 5 where one end isT568A configuration and the other end as T568BConfiguration. In this type of cable connection, Pin 1 is crossed with Pin 3, and Pin 2 is crossed with Pin 6.

Crossover cable is used to connect two or more computing devices. The internal wiring of crossover cables reverses the transmission and receive signals. It is widely used to connect two devices of the same type: e.g., two computers or two switches to each other.

Rollover Cable

Rollover wired cables, most commonly called rollover cables, have opposite Pin assignments on each end of the cable or, in other words, it is "rolled over." Pin 1 of connector A would be connected to Pin 8 of connector B. Pin 2 of connector A would be connected to Pin 7 of connector B and so on. Rollover cables, sometimes referred to as *Yost cables* are most commonly used to connect to a device's console port to make programming changes to the device. Unlike crossover and straight-wired cables, rollover cables are not intended to carry data but instead create an interface with the device.

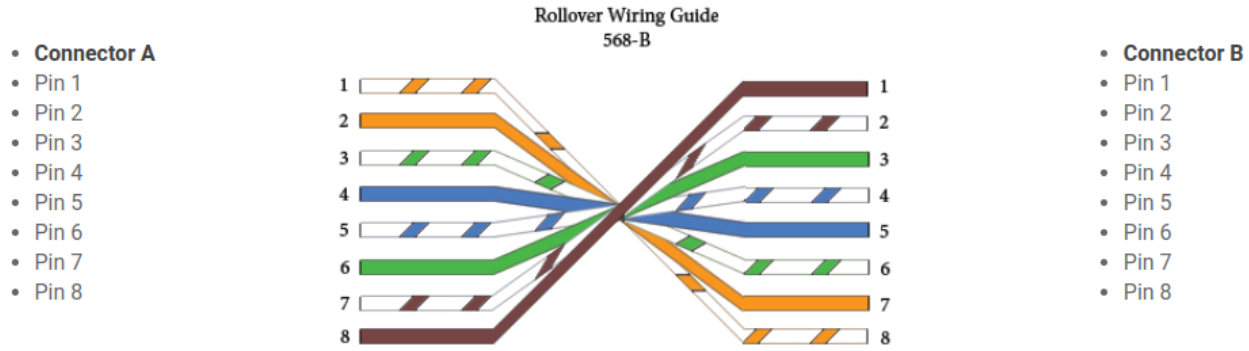

Figure 3: Rollover cable.

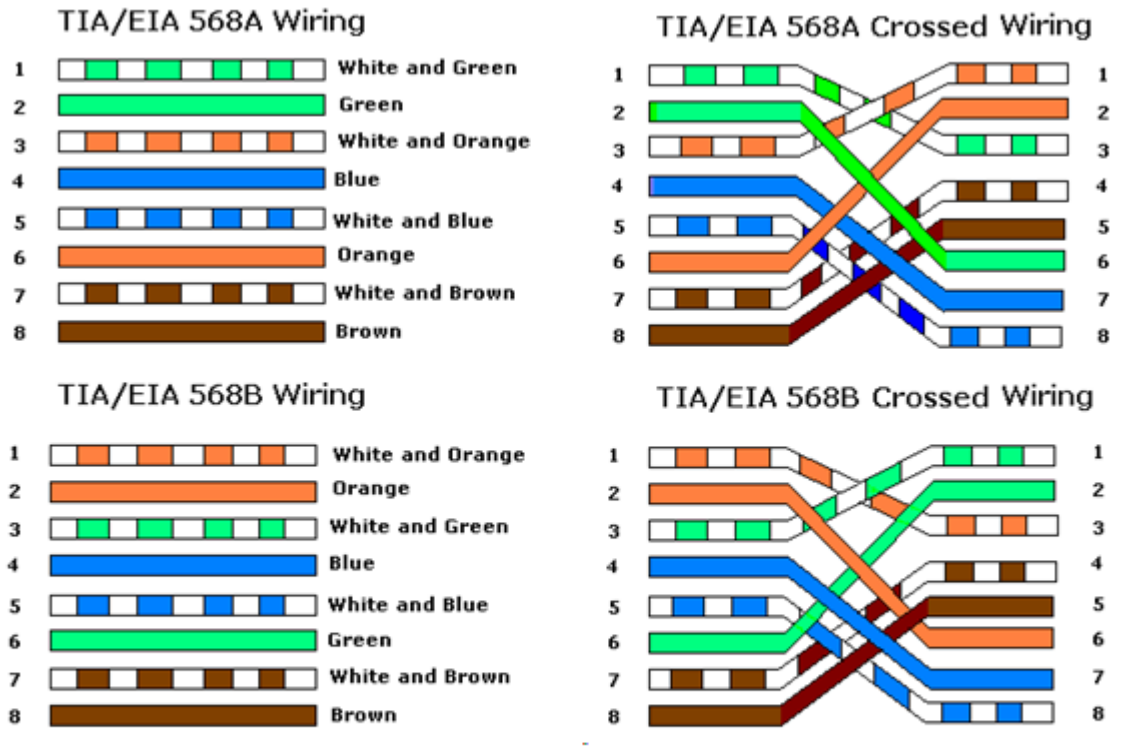

Figure 4: Straight through cabling and crossover cabling configuration in RJ45 connector at sender and receiver sides.

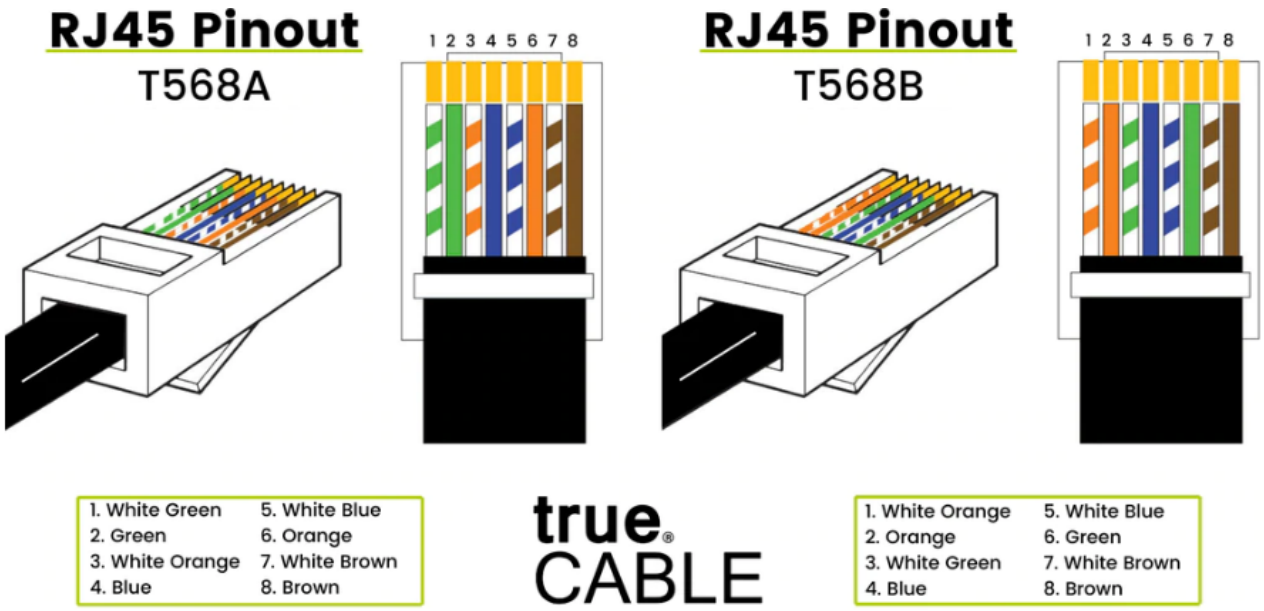

Figure 5: T-568A and T-568A wiring standard.

Remember for normal wiring

- odd number always hold the partial color while even number holds the solid color.
- Only 1-3, 2-6, pair of number required to be adjust for A and B standard. Orange and Green are interchangeable.
- Color code for number 4, 5, 7 & 8 are always fixed.
- Standard A starts with Green and Standard B starts with Orange.

Straight Through vs. Crossover Cable, which one to choose?

	HUB	SWITCH	ROUTER	PC
Hub	Crossover	Crossover	Straight	Straight
Switch	Crossover	Crossover	Straight	Straight
Router	Straight	Straight	Crossover	Crossover
PC	Straight	Straight	Crossover	Crossover

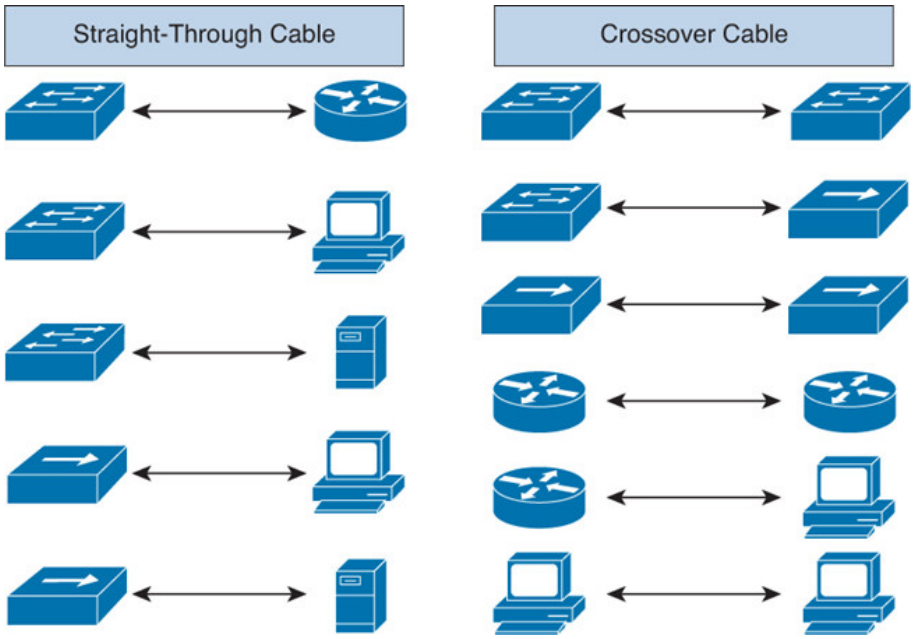

Figure 6: Choosing Straight through vs crossover cable.

Your Task:
Using one meter CAT6 cable develop either cross-over or a straight cable, test and verify it.

Exercise:

1. Discuss the straight and crossover wiring standard.
2. Discuss RJ45 clamping procedure.
3. Where can we use straight, crossover and rollover cable? Explain.
4. Discuss different 802.3 Ethernet cable standards.