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## Hands On: Cutting and Connectorizing UTP

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### Abstract

This paper was created with the aim of increasing our knowledge and to fulfill the assignment of the Information Technology Systems course group. Basically, a computer network can be likened to a wired network, namely the connection of cables to one another in a computer system. Two types of cable that are widely used are twisted pair and coaxial. Twisted pair cable itself consists of 2 types, namely UTP (short for Unshielded Twisted Pair) and STP (short for Shielded Twisted Pair) while coaxial cable also consists of 2 types, namely coaxial thick and coaxial thin. UTP cable is the most common type of cable that is often used in local area networks (LANs) as a medium for connecting computers and

network equipment (hubs or switches), because the price is quite affordable, flexible and the performance shown is relatively good. a computer network using cables, there are two types of cables that are often used, namely straight-through cables and crossover cables. As for making UTP Cross and Straight cables, you must have the following tools: To connect a computer network using cables, there are two types of cables that are often used, namely straight-through cables and crossover cables. As for making UTP Cross and Straight cables, you must have the following tools: Tank Crimping, UTP cable, RJ-45 connector, and Lan Tester. This paper will discuss how to cut and connect the UTP cable.

**Keywords:** Hands On, Cutting and Connectorizing UTP

### 1. Introduction

The development of technology and information that has advanced rapidly in recent years has provided new things in the world of IT. One area that is advancing rapidly at present is the Network field. Along with its development, this field of networking has become a necessity for modern society, where computer networks are currently widely used by agencies, both small and large based on Information Technology.

A computer network is basically a connection between one computer and another computer in a building so that it can communicate with each other. The unavailability of a network between one computer and another in one room or between rooms, so to share data or share software or hardware, another device is still needed, for example: Flasdisk. This is of course a loss for users, both time and energy. Local Area Network (LAN) is the right solution for the situation that occurs in that place. Where computers can communicate with each other, making it easier for users to share software and hardware with each other can also increase work efficiency.

Mardison dan Al Husni (2012) <sup>[6]</sup> UTP cables are often used in a computer network installation. This cable contains four pairs of wires that are twisted and not equipped with a protector. UTP cable is UTP which stands for "unshielded twisted pair", that is, this type of cable is made of copper conducting material, has plastic insulation and is wrapped in an insulating material that can protect against fire and physical damage, UTP cable itself consists of 4 pairs of cable cores convoluted where each pair has a different color code. Nugroho dan Wini (2016) The purpose of winding between a pair of pins of the UTP cable is for minimize interference which is often referred to as cross-talk term. UTP cable easy to install, small size, and price cheaper than other media types. UTP cable is a cable that is currently commonly used, especially to connect several computers in a small scope. There are 2 types of UTP cables, namely Cross, Straight.

In this journal we will discuss about how to cut and connect Straight and Cross cables using UTP cables.

### 2. Literature Review

#### 2.1 Tank Crimping

Tank Crimping is a tool for cutting UTP cables and for clamping the ends of the Rj-45 connector, and usually for stripping the outer UTP cables, and this tool is very important for those of us who want to learn how to crimp cables.

## 2.2 UTP Cable

UTP cable is used as a network connecting medium as well as a data transmission medium and in this UTP cable there are 8 small colorful cables according to predetermined standards. Nugroho dan Wini (2016) <sup>[8]</sup> The eight pins of the UTP cable are arranged in pairs and twisted. So there are four pairs of UTP cables, where each pin of the cable uses a different coloring pattern. When viewed from the designation, the UTP cable is suitable for indoor installations, so each pin is wrapped only by one layer. UTP is one type of network cable that is the most widely used transmission medium to create a local computer network (Local Area Network). The reason is that they are relatively cheap, easy to install, and reliable. As the name implies, this cable consists of a twisted pair cable that is not equipped with protection (unshielded). The function of this winding is to reduce interference and crosstalk in data transmission. Crosstalk is an unwanted connection that occurs on a communication channel.

The function of UTP cable is to act as a transmission medium in a local network or commonly called a Local Area Network (LAN). Apart from UTP, there is also an STP (Shielded Twisted Pair) cable. The difference between these two types of cables is only in the protective layer that STP has.

Talking about UTP cables, there are several types of UTP cable categories that indicate the quality and number of coil densities. Where the higher the category, the tighter the coil will be.

In LAN networks, the data cable that is often used for communication between computers and computers and other network devices is the UTP cable. The reason why it is often used on LAN networks is the relatively cheap price and easy to obtain, and also this UTP cable can be relied on for limited LAN networks.

## 2.3 RJ-45 Connector

Nugroho dan Wini (2016) <sup>[8]</sup> It needs the role of the connector so that the UTP cable can be used to connect between devices (computer). Connector used for connect between devices using UTP / STP cable is named as RJ-45. The Rj 45 connector is a tool that we attach to the end of the UTP cable, so that we can plug the cable into the LAN port on the PC. The RJ-45 connector must be attached to the end of the UTP cable either Straight or Cross.

## 2.4 LAN Tester

LAN Tester is a tool for testing the results of cable crimp, if our crimp is wrong then the light on the LAN Tester will not turn on and if our crimp results are correct then the light on the LAN Tester will turn on automatically according to the sequence of Cross and Straight cables, so this tool very useful for us to know the results of the crimp or cable made.

## 2.5 Straight and Cross UTP Cable Installation Steps

UTP cable has two standards, namely, Straight-Through type and Crossover type. There are two international standards for the UTP cable sequence (T-568A and T-568B). Nugroho dan wini (2016) <sup>[8]</sup> When viewed from the side of the device to be connected, there are two UTP cabling pattern types, namely; straight-through and crossovers. Use of both types of installation The UTP cable depends on the device to be connected. If the UTP cable is used for connecting between the same devices, for example between computer and computer is used type crossover wiring. However, when used

for connecting between different devices, for example a computer with a switch, the wiring type is used straight-through.

1. To peel the protective skin on the UTP cable, a tool called the cable stripper is used, the thing that needs to be considered when peeling the cable protective skin is to make sure the cable goes into the cutter place perfectly then turn it slowly to start peeling off the protective skin of the cable. Because if the cable does not enter the cutter place perfectly, then part of the cable protection skin is not completely peeled off. And if we turn the cutter too hard then part of the cable will also be cut off.



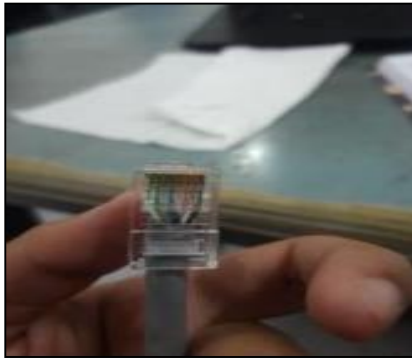
**Fig 1:** Peel the Protective Skin on the UTP Cable (*Situsnesia.com*)

2. Separate the visible small cables and arrange them according to the standard order of color according to the standard used. Once arranged in the order specified, cut evenly and trim the ends of the small cables. At this stage, leveling the ends of the cable is very important, this is done so that all cables can be perfectly pinched to each pin when we crimping the cable. If the end of the cable is not trimmed then when crimping there will be some cables that have not been pinched to the pin. So at this stage a small tool is used which functions to tidy up the ends of the cable.



**Fig 2:** Crimping (*Situsnesia.com*)

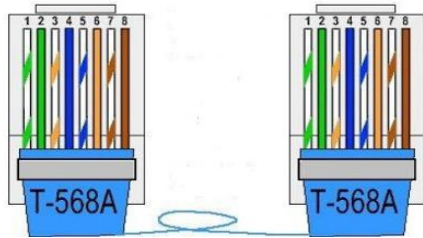
3. Before crimping, make sure that the cables are in order and have been trimmed. Make sure the cable protector is pinched in the RJ45 port because by pinching the LAN cable in the RJ45, the cable will not be easily separated so that the stability of the connection will be maintained. Then use crimping pliers to clamp and push the pin on the RJ45 end, make sure all the RJ45 pins pierce the UTP cable correctly.



**Fig 3:** The Cable is Crimped (Situsnesia.com)

**2.5.1 Standard UTP (Straight-Through)**

Installation of this cable in one cable uses only one standard. If using T-568B, both ends use T-568B, and vice versa. Here's how to install a straight type UTP cable. Prepare equipment and materials such as sufficient UTP cable, 2 RJ45 connectors, crimping tool, scissors and LAN tester. Cut the cable as needed. Peel off the protective jacket on the cable about 2 cm. Separate the strands on the wire according to their color. Sort according to the existing standard (T-56B). Cut evenly when the wires are sorted, leaving about 1.5 cm. Insert the UTP cable into the RJ45 connector. Make sure the cable sequence is correct, jacket the shield goes into the RJ45 and all the cables are perfectly inserted until they touch base RJ45. Crimping the RJ45 connector along with the cable with crimping pliers. Do it on the other end. Use a cable tester to test the connection the cord. UTP (Straight-Through) cable is ready to use.



**Fig 4:** Standard UTP cabling/Straight-Through (Situsnesia.com)

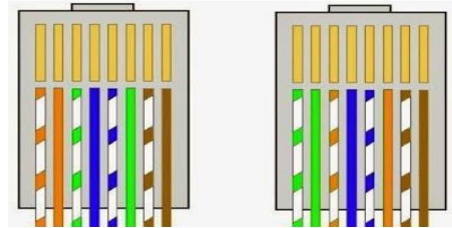
**Table 1:** Standard UTP cabling/Straight-Through (Situsnesia.com)

T568A	
Pin 1	White Green
Pin 2	Green
Pin 3	White Orange
Pin 4	Blue
Pin 5	White Blue
Pin 6	Orange
Pin 7	White Brown
Pin 8	Brown

**2.5.2 Cross UTP (Crossover)**

Installation of this cable in one cable uses two standards T-568A and T-568B at the other end of the cable. Here's how to install a cross type UTP cable. Prepare equipment and materials such as sufficient UTP cable, 2 RJ45 connectors, crimping tool, scissors and LAN tester. Cut the cable as needed. Peel off the protective jacket on the cable about 2 cm. Separate the strands on the wires according to their color. Sort according to existing standards (T-56A and T-56B). Cut evenly when the wires are sorted, leaving about 1.5 cm. Insert the UTP cable into the RJ45 connector. Make sure the cable

sequence is correct, jacket the shield goes into the RJ45 and all the cables are perfectly inserted until they touch base RJ45. Crimping the RJ45 connector along with the cable with crimping pliers. Do it on the other end. Use a cable tester to test the connection the cord. UTP (Crossover) cable is ready to use.



**Fig 5:** UTP Cross Cabling/Crossover (Situsnesia.com)

**Table 2:** UTP Cross Cabling/Crossover (Situsnesia.com)

T568A		T568B	
Pin 1	White Green	Pin 1	White Orange
Pin 2	Green	Pin 2	Orange
Pin 3	White Orange	Pin 3	White Green
Pin 4	Blue	Pin 4	Blue
Pin 5	White Blue	Pin 5	White Blue
Pin 6	Orange	Pin 6	Green
Pin 7	White Brown	Pin 7	White Brown
Pin 8	Brown	Pin 8	Brown

**2.6 Test the Cable Using LAN Tester**

The final step is to test using a LAN tester whether it is correct or not. If all the lights on the LAN tester are lit, it means you have successfully made the network cabling.

Test the cable using LAN Tester when you want to test the cable using a LAN Tester, make sure the UTP cable is properly installed. Be it straight type or cross type cable. If it feels right, continue by testing the two UTP cables (straight and cross).

Straight cable after trying to use a LAN Tester, then the indicator lights will run in the following order, namely: 1-1,2-2,3-3,4-4,5-5,6-6,7-7,8-8. Because the two sides of the cable are arranged in the same order and according to the standard wiring color, namely white, orange, orange, white, green, blue, white blue, green, white, brown, brown.

After trying to use a LAN tester, the cross cable will run in the following order: 1-3,2-6,3-1,4-4,5-5,6-2,7-7,8-8. Because the two sides of the cable are arranged differently but according to the standard color of the cross type wiring, namely white, orange, orange, white, green, blue, white blue, green and white, brown, brown. And the other side, namely white green, green, white orange, blue, white blue, orange, white brown, brown.



**Fig 6:** Check LAN Tester (Situsnesia.com)

### 3. Research Method

The descriptive approach was adopted in this study through the collection of previous literature on cutting and cConnectorizing UTP. The researcher conducted a literature study by collecting references from journals and articles related to Hands On: Cutting and Connectorizing UTP. This paper will discuss how to cut and connect the UTP cable. UTP cables are also commonly used in building LAN networks. In UTP cable installation, there are two types of cable installation that are often used in internet networks, namely Straight through cable and cross over cable.

### 4. Discussion

#### 4.1 Straight Cable

Straight cable is a cable that has the same installation method from one end to the other. Straight cables are used to connect 2 different devices. The standard straight cable sequence is according to the TIA / EIA T568B standard (the most widely used) or sometimes it is used according to the TIA / EIA 368A standard. Examples of using straight cables are as follows:

1. Connecting between the computer and the switch.
2. Connect the computer to the LAN on the cable / DSL modem.
3. Connect the router to the LAN on the cable / DSL modem.
4. Connect the switch to the router.
5. Connect the hub to the router.

Straight cable is used when you want to connect between a computer and a hub or vice versa. In other words, this method is used when we are connecting 2 or more computers, but through an intermediary such as a hub or switch. can be exchanged according to your taste.

#### 4.2 Cross Cable

Cross over cable is a cable that has a different arrangement between end one and end two. The cross over cable is used to connect the same 2 devices. Examples of using cross over cables are as follows:

1. Connect 2 computers directly.
2. Connect 2 switches.
3. Connect 2 hubs.
4. Connect the switch with the hub.
5. Connect the computer with the router.

The cross cable is used when we want to connect a computer to another computer, if we want to connect 2 computers or a hub to a hub, in other words the cross cable is used to connect two of the same network devices. The difference between a cross cable from a straight cable is only from the cable number 1 and 3 and 2 and 6, we just need to swap the two cables.

#### 4.3 How to Make Straight Cable

Making a cross cable has almost the same steps as a straight cable, the only difference lies in the color order of one end of the cable. Unlike the straight cable which has the same color sequence at both ends of the cable.

The final step is to check the cable that was made earlier using the Lan Tester, how to input each end of the cable (RJ-45 connector) into each of the available ports on the Lan Tester, turn it on and make sure all the LED lights are on according to the cable sequence. Made If it is correct, it means that the cable is ready to be installed on the network, however, if there

is an error in the installation of the cable on the connector, then to re-create it must be cut and repeat the method as described in the first point

#### 4.4 Connecting the LAN Cable

The steps for setting up a LAN cable to connect or connect a

#### PC to a PC or connect 2 computers without using a Hub

1. Prepare a LAN cable that is sufficiently long to share pc to pc, Crimping Tang, RJ45.
2. Cut the cord skin until it looks all the colors.
3. Then set the color with the Cross model: (White Orange Orange White Green Blue White Blue Green White Brown Brown) - (White Green Green White Orange Blue White White Orange White Brown Brown).
4. Then flatten all sides after arranging Clamp the cable with the RJ45 head. After the cable is ready, set up the Operating System (I use Pirated Windows Sp2).

#### Steps for setting windows

1. Select Control Panel - Network Connections -; Set up a home or small office network
2. Open windows, then select Next2, you just need to set Work group (Workgroup name must be the same on the PC to be connected). Other settings such as computer name (free), printer will be shared or not. Set the IP of both computers, Select Control Panel -; Network Connections - Local Area Network (which is connected) Right click on the Local Area Network select Status - Properties -; Internet Protocol (TCP / IP) - Properties. You try to use IP in the same class.
3. For example: PC IP 1: 192.168.0.1 Subnet mask: 255.255.255.0 - PC IP 2: 192.168.0.2 Subnet mask: 255.255.255.0
4. In order for Windows XP to make these changes, you must restart Windows XP

#### IP Address Setting (IP Address)

Open your Windows Control Panel menu (Start> Control Panel). Then select the Network Connections icon. After that select Local Area Connection (right-click> Properties). Then select Internet Protocol (TCP / IP), and press the Properties button.

In the IP Address section, enter: 192.168.1.1. Then press TAB, the Subnet Mask will automatically contain 255.255.255.0. As for the partner computer, provide the IP Address 192.168.1.2. IP addresses that are in the range 192.168.0.0 - 192.168.255.255 are commonly used in private networks or Local Area Networks (LANs). So, you can just give the addresses 192.168.2.1 and 192.168.2.10 on the two computers you are connecting to. As long as they are still in one segment, they can still get to know each other. To find out whether the computer is in one segment - it can be seen from the initial 3 numbers between the dots (192.168.2). So you may not provide a different segment address, for example 192.168.1.1 with 192.168.2.2.

In large networks, where there are several network segments, a router is needed to bridge the segments so that they can be connected to each other. File sharing.

For example, a computer with name (hostname) I and IP Address 192.168.1.1 has a folder called DATA which contains a collection of MP3s and Word and Excel documents, which will be shared with computer II (IP Address 192.168.1.2),

**Then the steps are**

1. On computer I, go to My Computer or Windows Explorer.
2. Locate the folder named DATA, then right-click on the folder.
3. Select Sharing and Security.
4. If the Network sharing and security dialog box appears, then click on the words "If you understand the security risks then select" Just enable file sharing "Click" Share this folder on the network.
5. Give a name (share name), for example: DATA.
6. Click the OK button. Done.

**5. Conclusion**

There are 2 types of UTP cable installation, namely straight and cross. On the cable installation must be properly installed in order. The UTP cable has no protection. To test UTP cables using a LAN taster. Zunaidi, Beni, dan Saniman (2014) While UTP (Unshielded Twisted Pair) cable is a type of cable with STP but has no protection so it is more susceptible to damage and interference and tends to be used for interior design and is now more popularly used to build network In straight type UTP cable installation, sort in the order 1-8 must be in accordance with the ends. The extended type cable is used to connect the client to the sub while the cross cable is used to connect the client to the client.

Making UTP cables of the Cross and Staight types requires expertise and patience, because making these cables should not be done carelessly. If we arrange the cables incorrectly, it can result in the cable not being used.

**Problems that may arise**

1. The cable breaks in the middle.
2. The quality of the connector is not good.
3. The installation way is not good, for example, there is an end of the kanel that is not stuck in the connector so that it is not stuck by the connector pins.

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