

# New task for e-learning

## HOME CONNECTION TO INTERNET

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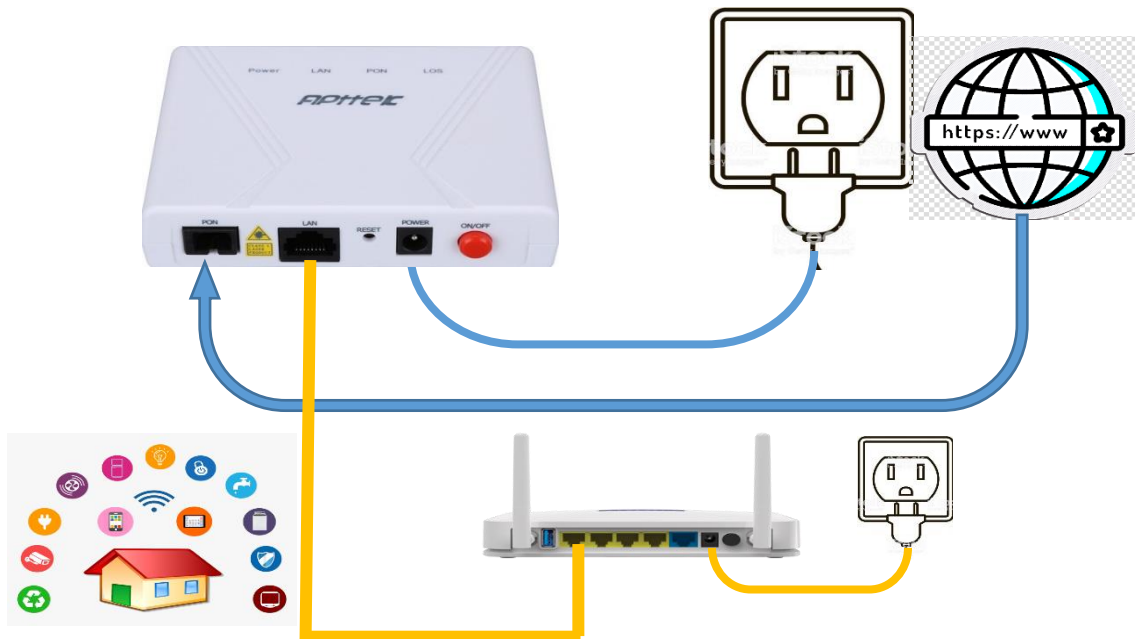
## 1. Describe your internet provider

- In Vietnam, we have 3 major network providers. These are Viettel, VNPT and FPT Telecom. My family chose Viettel because the price is cheap and the speed of network transmission is also fast.
- And when I signed up for Viettel, we received a set of modems and included the internal wifi router and network transmission throughout the house. From there, we can use the internet and install smart home systems.
- The Industry of the Public - Vietnam Industry (Viettel) is an organization.
- The most outstanding product of Viettel is Viettel Mobile mobile network, and Viettel Telecom currently holds the largest market share in Vietnam's telecommunications service market. During 30 years of operation, from the initial main occupation of building and constructing telecommunication works, Viettel has now developed 5 new industries which are telecommunication & IT services; research and manufacture of electronics and telecommunications, defense industry, cybersecurity industry and digital services.
- In Vietnam, people are often use FTTH (Fiber To The Home), they will install cable to your home and give you a modem and router.

## 2. Find a technology which is used for your connection

- I will analyze the Router and Modem that my home is using to connect to the internet. Because I usually use PC for my connection.
- A router is a network device that forwards packets between computer networks. The router performs the functions of directing traffic on the Internet. Data is sent via the internet, such as web pages or email, in the form of data packets. A packet is usually forwarded from one router to another through networks that form an intranet (for example, the Internet) until it reaches its destination node.
- In the router, there are many adapter ports to connect to the internet and broadcast wifi to be able to connect. And in Vietnam, I use the router of Viettel network provider to use.
- Modem is an analog signal modulation device to encode digital data, and demodulation carrier signal to decode digital signals.
- Modems that are used to connect to a fiber optic network are known as optical network units (ONUs). Fiber optic systems can be upgraded by the use of quadrature amplitude modulation. The modulator and demodulator are separate components rather than a single assembly as with most modems.
- Internet users often use faster modems, mainly coaxial cable modems and ADSL modems. In telecommunications, "radio modem" transmits data at a very high speed through a microwave connection. Some types of microwaves modems transmit and receive at more than one hundred million bps. Fiber optic modem transmits data over fiber.

### 3. Draw a simple schema of your home connection to internet



### 4. Describe all parameters of your connection

#### Network Device

To create a network connection we have to ensure that we have a networking device, such as Network Interface Card (NIC), attached to our computer. We may also have a modem as our hardware device to make dial-up connections. Of course, we know that we need to have a driver installed so that our device can work properly. The next thing we need to create is a network connection. In order for a network connections to work we need to use network protocols. For example, well known protocols are TCP, IPv4, POP3 etc. It is possible to have multiple networking devices installed on one machine. Of course, each hardware device needs to be supported by its own individual driver. Now, we can also create separate connections for each one of these particular devices. Every networking device will have some networking components bound to it.

#### Networking Components

Networking components enable us to use various resources on the network. For example, 'Client for Microsoft Networks' component enables us to access resources on a Microsoft network. Networking components, that is **protocols**, **services**, and **clients**, can be installed, enabled or disabled, and bound to a connection. The concept of binding is to associate either a service or a protocol to a connection or to a particular piece of hardware. In Windows we are pretty much unlimited as far as how we want to deal with these bindings. For example, we only need to install a TCP/IP protocol once, and then we can bound it to all networking devices.

We can also associate our connections with particular hardware devices. It's possible to mix and match on these so that we can have multiple connections all talking to one particular hardware device. If we have just one hardware device, we can actually bind multiple

networking components to that particular hardware device, so that we can connect everything that is necessary to our hardware device. Some of the networking components available on Windows systems are:

Protocols:

- Internet Protocol Version 6 (TCP/IPv6) – The latest version of the Internet protocol that provides communication across diverse interconnected networks.
- Internet Protocol (TCP/IP) – routable protocol used on the Internet and the default protocol for Windows XP
- NWLink IPX/SPX/NetBIOS Compatible Transport Protocol – Microsoft's implementation of IPX/SPX for connecting to NetWare servers
- Network Monitor Driver – enables the computer to capture network communication statistics
- Link-Layer Topology Discovery Mapper I/O Driver – used to discover and locate other PCs, devices and network infrastructure components on the network. Also used to determine network bandwidth.
- Link-Layer Topology Discovery Responder – allows your PC to be discovered and located on the network

Clients:

- Client for Microsoft Networks – client software to access resources on Microsoft networks
- Client Service for NetWare – client software to access resources on NetWare networks running IPX/SPX

Services:

- File and Printer Sharing for Microsoft Networks – enables a computer to share its resources with other network clients
- QoS Packet Scheduler – service that prioritizes TCP/IP traffic, enabling a higher priority for time-sensitive communications
- Virtual PC Network Filter Driver – provides networking support for Windows Virtual PC
- Service Advertising Protocol – protocol used with NetWare to locate services on an IPX/SPX network

We have a separate article in which you can see an example on how to manage network components on Windows XP machine.

IP Address and Subnet Mask

After we install a network card, it should be configured by the system to use TCP/IP right away, and to receive configuration information automatically. If that is the case, we simply connect our computer to the network and it automatically configures itself. In some cases we may need to configure network settings manually. For example, if we're connecting to a small network that does not have the services for providing automatic configuration. There are several parameters that we can manually configure and the first is the **IP address**.

The IP address uniquely identifies a host on the network. It is composed of four numbers separated by periods (in decimal notation). Each number group is called an octet (because it has 8 bits in binary format). Each octet can range between zero and 255. For example, a

common IP address might be 192.168.100.100. The computer separates the Subnet address (network address) from the host address using a Subnet mask. Subnet mask is here to divide the address into its two different components. A Subnet mask can look like this: 255.255.255.0. Let's put an IP address and a Subnet mask one below another.

192.168.100.100

255.255.255.0

Any octet of an IP address which has a value of 255 in a Subnet Mask identifies an octet that is part of the subnet address (network address). So in this case we have a subnet address that occupies the left three octets. The subnet address is then 192.168.100.0. Everything past the Subnet Mask is set to zero for the subnet address. The host address is anything to the right of the subnet mask. In this case the host address is 100.

The IP address uniquely identifies each computer on the network and computers use it to communicate with each other.

## **Network Address Considerations**

### **Subnet Address**

When configuring the IP address we have to know how IP addressing works. Let's say that we have an existing network with an existing host on it with an IP address of 172.17.100.100 and 255.255.0.0 for its subnet mask. If we want to connect another host to the that network, the subnet address for the new host must match the subnet address used by all other hosts on the same subnet. In our case, because of the mask value, we know that the subnet used is 172.17.0.0. So when assigning an IP address to the new host, it must begin with 172.17. If we use a different mask value, our new computer would think that it is on a different subnet (network) than all other computers, so they would not be able to communicate.

### **Host Address**

All hosts on the subnet (network) must have a unique host portion of the address. In our example we have a wide range of numbers that we can assign to new hosts without conflicting with the IP address used by other hosts on the network. Remember, we can not use the same host address on the same network for different computers. Another thing we need to know is that we can't use the address of a network (subnet address) for hosts. In our case, we simply can't use the 170.17.0.0 as the host address (it is the network address). The first valid host address is 172.17.0.1. The final rule is that we can not use the last possible address in the range. The last address is found by setting each host octet of an IP address to 255. In our case, we can not assign the address of 172.17.255.255 to the host (this is broadcast address). The last valid IP address for hosts in our case is 172.17.255.254.

## Default Gateway

Configuring the IP address and the Subnet mask allows a computer to communicate with other devices on the same subnet. IP address and Subnet Mask is enough for computers to communicate on the same subnet, but those computers would not be able to communicate with computers on other networks or the Internet. To allow a host to communicate with computers on different subnets we must define the **Default Gateway** address. The Default Gateway address identifies a **router** that is used for sending packets to other networks. A router is a device with two or more network interface cards. Each network interface card is connected to a separate subnet (network). For example, one network interface could be configured with an address of 172.17.1.1, with a mask of 255.255.255.0, while second network interface could be configured with an address of 172.17.2.1 and with the same mask value. When a computer has a message to send, the first thing that it does is it looks at the destination address of the other computer. Let's say that one host with an IP address 172.17.1.50 on the first network has a message addressed to the computer that has the host address ending in .100 (172.17.1.100) on the same subnet. The NIC would check the destination address, realize that the address is on its same subnet and simply send that information to the destination computer. If, on the other hand, the destination address is on a different subnet, for instance, 172.17.2.100, the sending device would check the destination address, realize that it's on a different subnet, and in that case it would have to send the message to the router. The router could then forward that packet to the destination device. The Default Gateway address is an IP address configured on each computer that identifies the router that is used when sending messages to different networks. In our case the router has two separate interfaces connected to two separate networks. Notice that router interfaces are also configured with an IP address that connects to network, for example 172.17.1.1. For all computers on that first subnet we need to configure the default gateway value that points to the router interface on the same subnet as the computers. So, on the first subnet, computers will have to be configured to have 172.17.1.1 as the Default Gateway and we would do that on every computer connected to that subnet. Remember, the Default Gateway needs to be on the same subnet as the computer's address. The same thing is in the second subnet. Computers would need to have a Default Gateway address of the router which would be the IP address on the same subnet. In our case the 172.17.2.1 address.

Of course, the destination network could be a connection to the Internet. Packets for hosts on the Internet would be sent through the default gateway out to the Internet.

## DNS Server

Because computers use IP address to communicate we would have to know IP addresses of every computer on the network or Internet for us to use resources on other computers. For example, if we were browsing the Internet we would have to memorize the IP address of every website we want to visit. Instead of using IP addresses we are using logical names to identify destination computers. Logical names are easier for us to remember, but the computer must translate that names we provide into IP addresses. The computer does this using a system called the **Domain Name System**, or DNS. Special server called a DNS server is configured with the host names and IP addresses of many different computers. For example, if we want to visit [www.google.com](http://www.google.com), our computer will ask the DNS server for the IP address that matches the name that we provided. The DNS server would then reply with the IP

address and our computer would then use the IP address to communicate directly with Google computer that is offering `www.google.com` website. So when we configure a computer with a network connection we need to identify the IP address of a DNS server that the computer can use to resolve logical names into an IP address. Now, DNS address that we specify on a computer does not have to be on the same subnet as a computer. For example, a typical implementation for DNS uses a router to connect our network to an ISP, which is then connected to the Internet. When we need to resolve logical name, our computer communicates with the DNS server at the ISP to get the name. In this case the DNS server is on a completely different subnet from our computer. But, we could configure a DNS server on the same subnet also if we have a DNS server configured on our network. The only important thing is that the computer has an address of a DNS server that it can contact so that when we use names, the computer can find the IP address for the host on the network.

## **Host Name**

One other configuration parameter that we should be aware of is the Host Name. This is a logical name for our computer. We can configure our computer with a name that other users can use to identify and connect to it. Configuring a host name for our computer is not a requirement for connecting to the Internet because devices on the Internet typically do not contact our computers directly. They may respond to requests that we have sent out, but in that case they respond using our IP address and not a Logical Name. Host names are typically used within a business to identify computers on our own Local Area Network. We may also use a Host Name if our computers were connected to the Internet and providing some kind of service. For example if we want to have a Web server on the Internet, we would assign a Host Name to that device so that users could find it and connect to our computer using the name instead of the IP address.

## **Remember**

To connect our computer to the network, we have to have a networking device installed. That network device (usually a NIC) has to have networking components bound to it (protocols, services and clients). Parameters which are required when configuring network connections are: IP address, Subnet Mask, Default Gateway, DNS Server and Host Name. The IP address uniquely identifies each computer on the network and computers use it to communicate with each other. Subnet Mask identifies an octet in the IP address which is part of the subnet address (network address). Using Subnet Mask we know which part of IP address is the network address and which part is the host address. To allow a host to communicate with computers on different subnets we must define the Default Gateway address. We also need to provide the IP address of a DNS server so that we can use logical names on our network. Host Names are logical names for devices on the network.