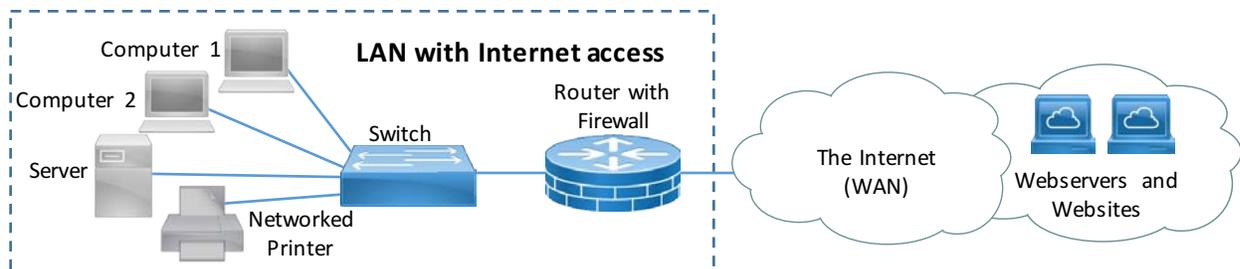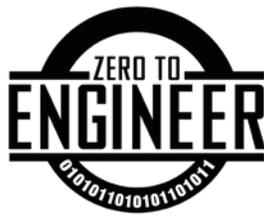# Tech Lesson: What is a Network?

A network is a collection of two or more computers that are able to send data back and forth. There are many different types of networks as we will discuss, however the largest and most well known network is the Internet. The reason it's called the Internet is because it's a large scale internetwork that connects many smaller networks of varying types and sizes. The computer systems in your home are actually considered to be on their own network which in turn are connected to the world-wide Internet. As you ponder on this concept you may begin to imagine networks of varying scales and sizes such as a city, business, school, or military installation. So, how do we categorize these different scales of networks? Let's begin with the LAN and the WAN.

Local Area Network (LAN): This type of network connects computers in small geographic locations such as within a single building or a small group of buildings. In fact, your home network is considered a LAN. Although most LANs connect to larger networks they are able to operate autonomously and don't need to connect to other networks in order for the hosts on the LAN to share data. The only network equipment needed for a small LAN to function is a switch or a hub. For performance reasons larger LANs should not use hubs, and will instead make use of many switches to connect their devices. Here is an example diagram of a very small autonomous LAN.
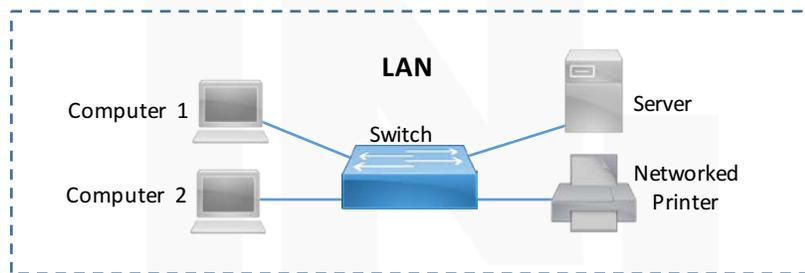
Wide Area Network (WAN): This type of network connects computers and other networks over large geographic distances. The Internet is actually the best example of a WAN and also the largest in the world. Consider being at your home and calling a friend with your favorite video chat program. When you do this you are making a network connection from your home computer to the Internet (WAN) which in turn connects you to your friends computer. When we make this type of connection or access anything at all over the Internet we are traversing the largest WAN in the world. Since we are already discussing the internet let's start with that as our first WAN diagram example. With any WAN connection there will need a be a router to route traffic from the LAN onto the WAN. As we can see below we have added a firewalled router that also protects our network from potential hackers coming from the the public Internet.
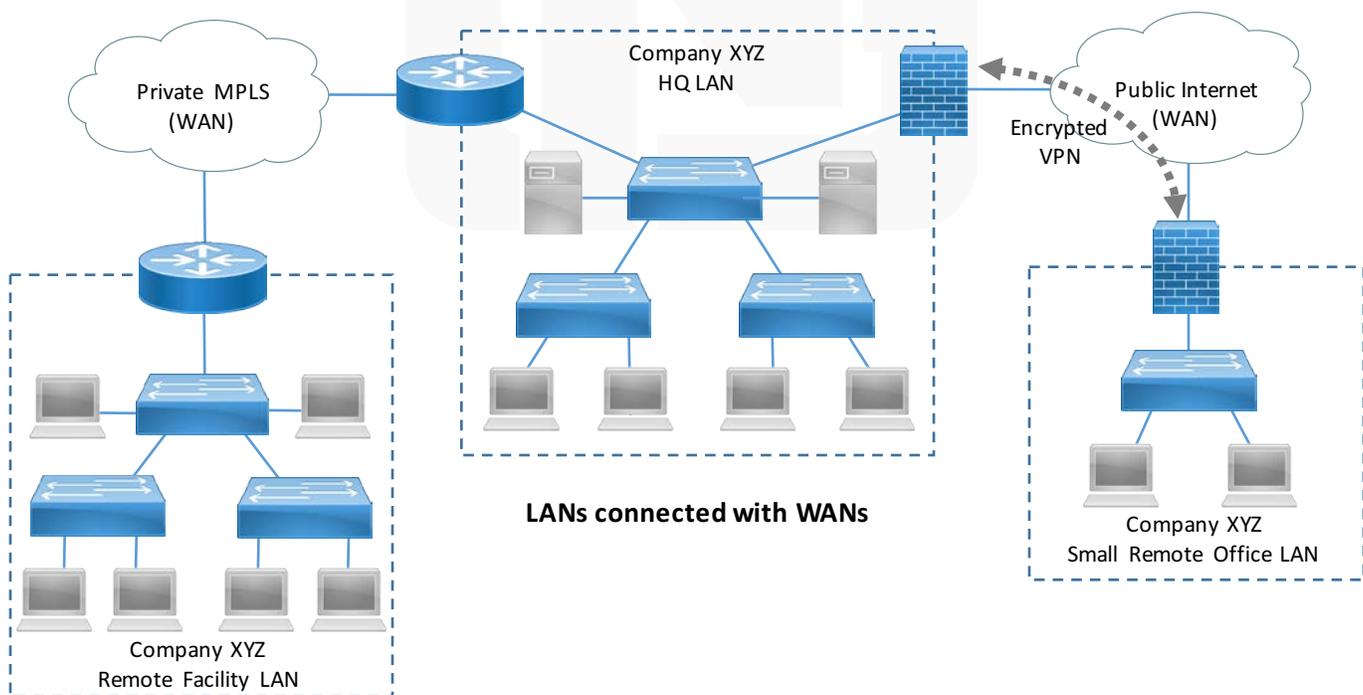
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WANs also connect LANs together as well as other types of networks. For example, a business may have a headquarters building where their main LAN is located. In addition, the business may have a large remote facility and small remote offices each having their own LAN. If the computers at the large remote facility and remote offices need to access network resources from HQ then the LANs need to be connected together. We can accomplish this by using WANs of various types. For example, to connect the large remote facility LAN to the HQ LAN we may lease a private WAN circuit from a service provider that guarantees a high level of performance and bandwidth. Then, to connect the small remote office LAN back to the HQ LAN we may instead just use the Internet as our WAN. However, we will need to create a virtual private network across it to make the LAN to LAN connection.

Below is an example of a business with geographically distributed LANs connected together over WANs. The remote facility LAN on the left is connected back to the HQ LAN over a dedicated private WAN. Private WAN connections are available from service providers and require routers to route the traffic between the LANs. The small office LAN on the right is connected back to the HQ LAN by establishing an encrypted virtual private network (VPN) over the Internet. Since the Internet is a public WAN we need to protect the VPN with encryption to secure Company XYZs data. Firewalls are used to protect the HQ and small office LANs from the wild west of the public internet while also providing the VPN connection capabilities required to connect the two sites.


LANs connected with WANs

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So far we have discussed the two primary forms of computer networks: the LAN and the WAN. Most of the time these two network types will be a good reference point for network related conversations. However, there are still other types of networks that define more specific scenarios and reference points. In addition to the LAN and WAN we will also discuss the WLAN, WWAN, MAN, CAN, and SAN.

Wireless LAN (WLAN) and Wireless WAN (WWAN): The WLAN and WWAN describes LANs and WANs that use wireless radio (aka wi-fi) as the connectivity medium instead of physical cables. These days most LANs will also incorporate WLANs and many home routers come with built in wireless to extend the network. On the other hand an example of a WWAN is a cellular provider network. Cellular providers utilize radio technology to connect vast quantities of mobile devices. Cellular network WWANs can also act as a wireless connectivity medium to connect remote LANs to the Internet and to each other just as regular WANs do.
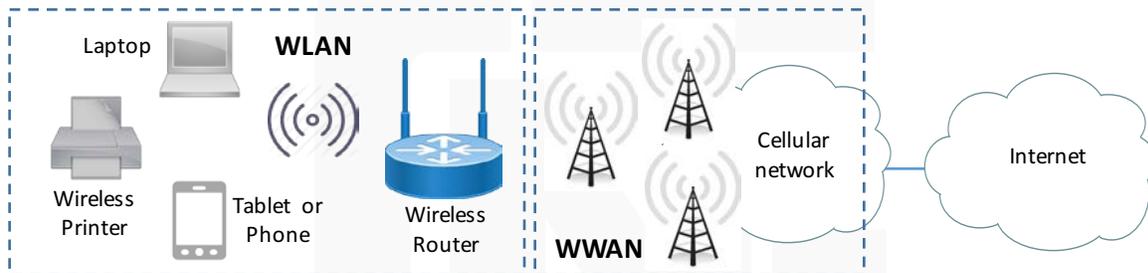

Metropolitan Area Network (MAN): The term Metropolitan Area Network is used to describe a network that is geographically larger than a LAN, smaller scale itself than a WAN, but incorporates both LANs and WANs in its infrastructure. An example of a MAN would be the network of a city, large company, or other entity which spans multiple blocks or city-wide territories. We can consider the previous Company XYZ diagram to be a MAN. Since it was used to describe how LANs are connected by WANs it includes both WANs and LANs within its infrastructure. However, the below may provid
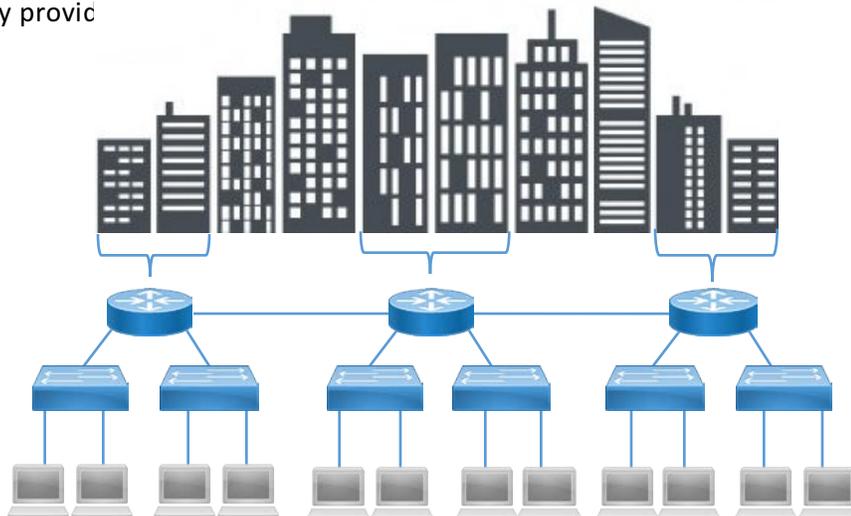
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Campus Area Network (CAN): A CAN is typically used to describe the network of a college campus, industrial complex, or even a military base. A CAN consists of two or more LANs within a limited geographical area and connects multiple buildings together. This type of network makes use of high speed LAN technologies such as multiple Gigabit or even Ten Gigabit Ethernet connections at the core and normally make use of fiber optics to maintain high speeds to distant building switches.

Generalized Campus Area Network Design Example
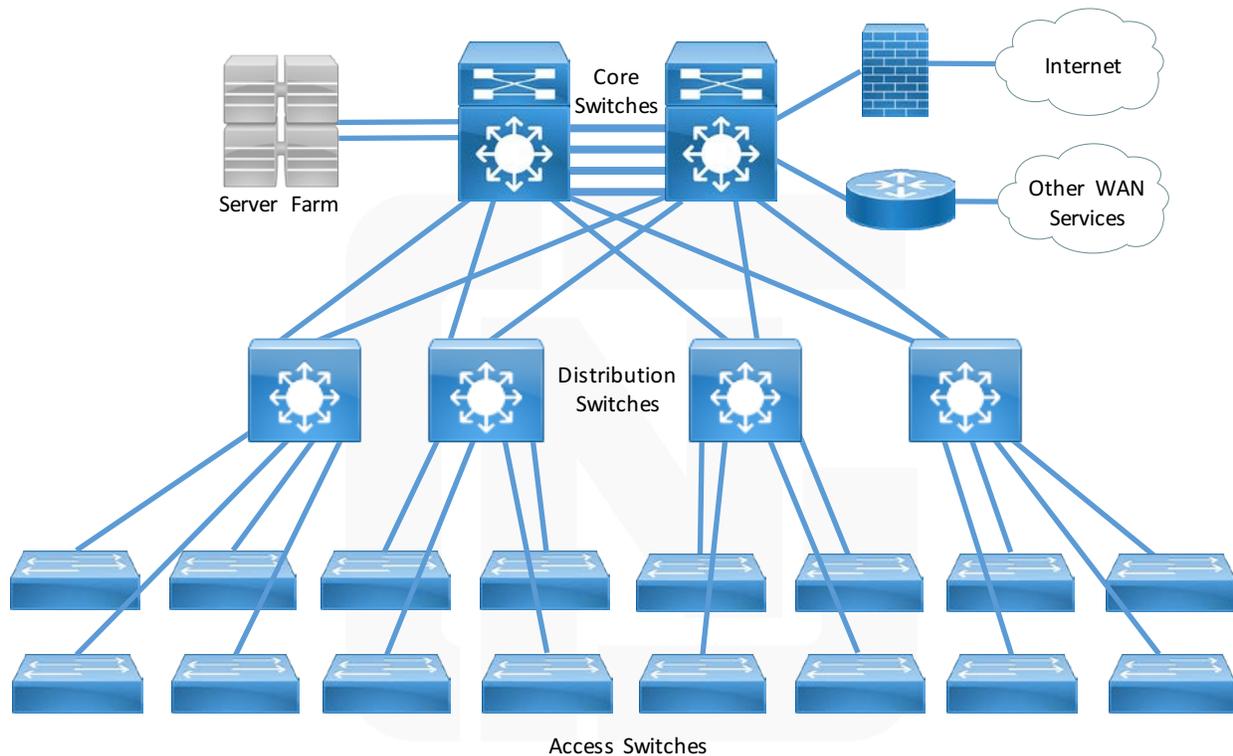
Storage Area Network (SAN): Storage Area Networks are designed to provide high speed connections between multiple servers and shared pools of storage without relying on the LAN or WAN. A SAN typically has it's own network of dedicated storage devices that are usually not accessible directly through the LAN.