Network Architectures - Part 2

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Hello and welcome to the Part 2 of our lecture on Network Architectures. In this part I'll talk about architecture of different types of networks.

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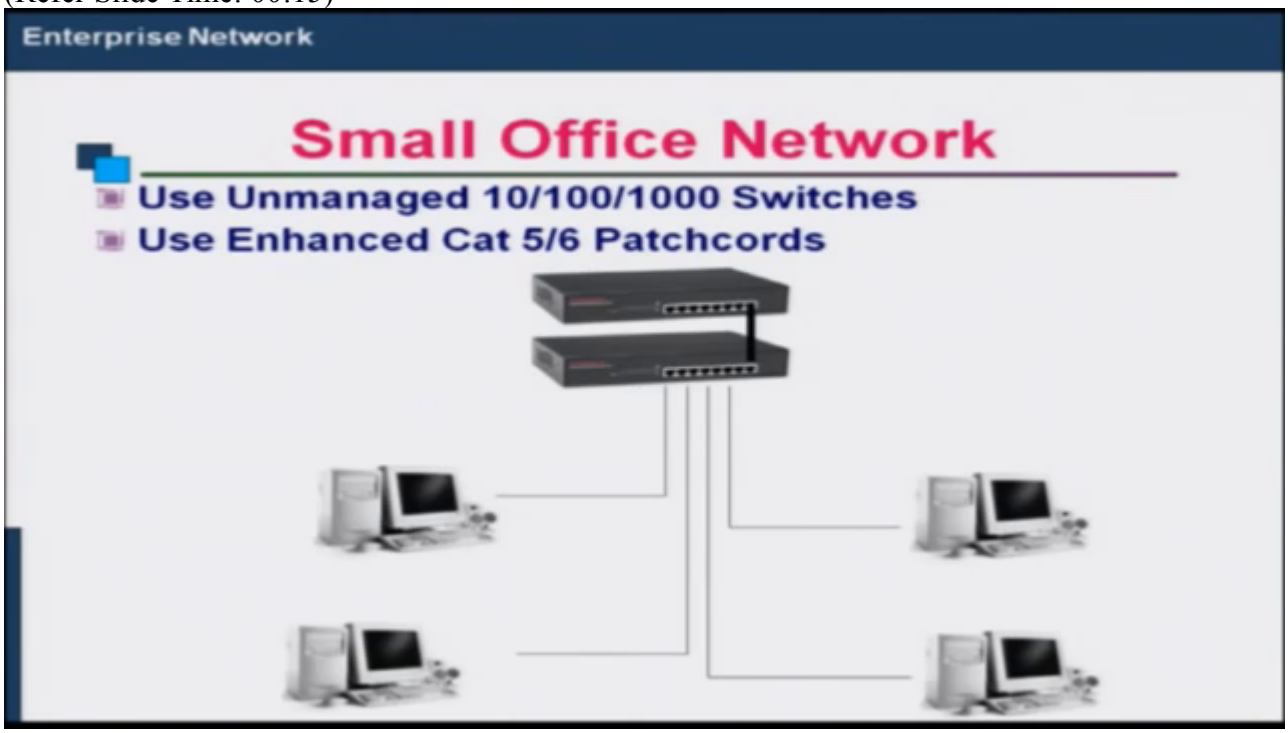

If I want to set up a small computer network in my lab or room connecting few computers, the only thing that I need is a switch and a few UTP patch cords and I can connect my computers using these UTP patch cords and the switch. The switch will provide the interconnection between these computers and I have a small network in my lab. If a switch is a 8 port switch then I can connect 8 computers and in case I want to add more computers I can simply add one more switch and cascade these two switches and add more computers. This is an ad hoc architecture. But if I want to extend this network to my building or my campus or a city or multiple cities then I cannot scale this architecture, because this is an ad hoc architecture.

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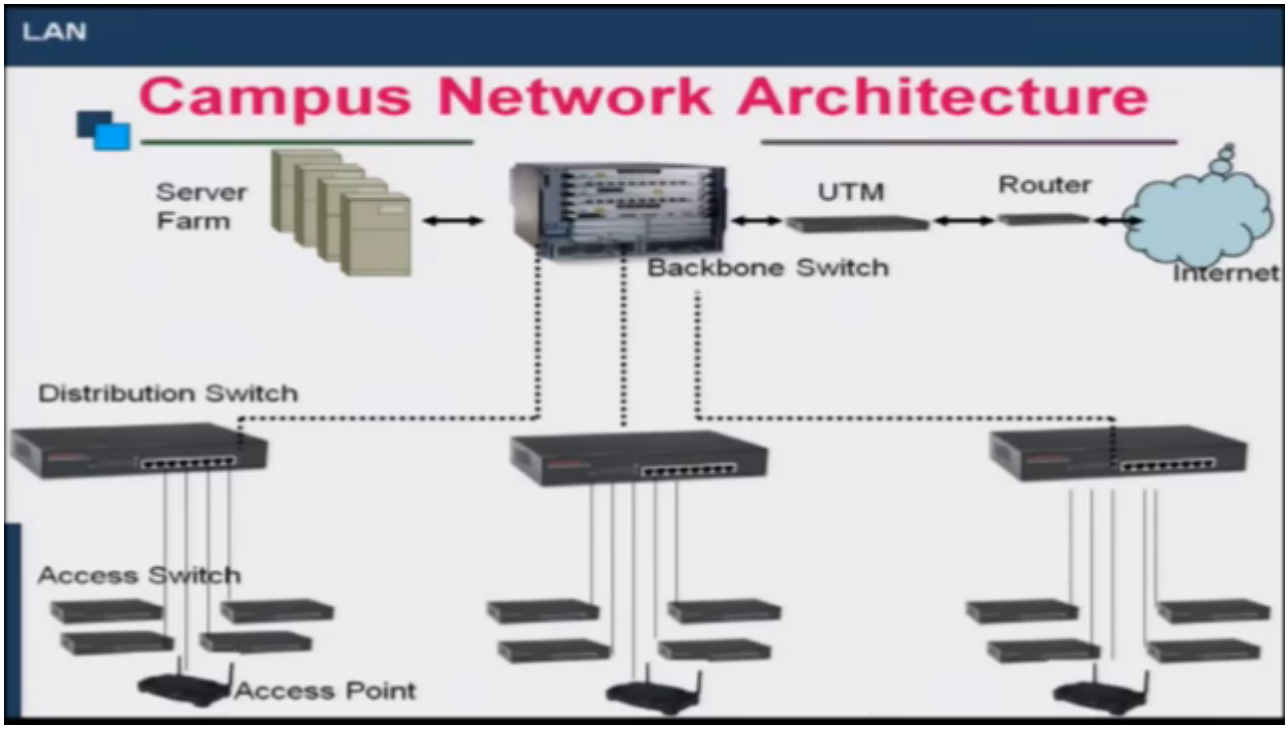

So the architecture that is used in different types of networks I'll briefly talk about. In case of a campus network where I have a few buildings in a campus the architecture that we use is called as a three-tier architecture. In this architecture we have a data center where we have application servers and in this data center we have what is called as a Backbone Switch, so all the servers connect to the Backbone Switch. In each building we have a distribution switch and this distribution switches in different buildings are connected to the Backbone Switch using fiber optic cables because these distances are typically involved, a few kilometers each.

So the Backbone Switch gets connected to the distribution switches using fiber optic cables and within each building we place multiple access switches. The access switches on one hand connect to the end devices, that is the computers or laptops and on the other hand connect to the distributions switch. So we have a inverted tree topology in which the Backbone Switch. The Distribution Switch and the Access Switches get interconnected to each other and provide connectivity to end computers and hence provide connectivity from one computer to other computer.

In case I want to have a wireless network also then I can connect wireless access points to different access switches and provide wireless connectivity in the region in which an access point has been provisioned. This is a very simple architecture which is used to provide connectivity in a campus environment. And finally, the network would also have a firewall or a UTM device to connect it to the Internet.
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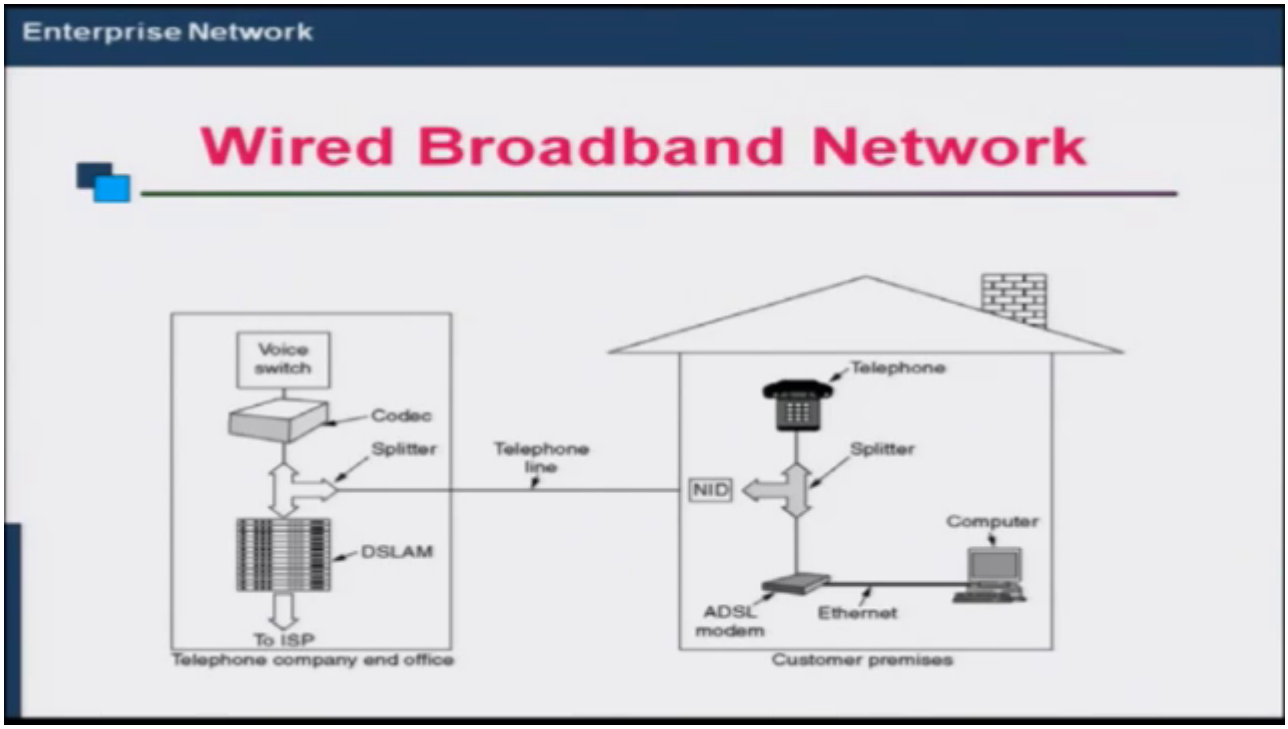

Similarly if I want to provide connectivity in residences, homes then to technology options are used. One is wired broadband and the other is wireless broadband. In wired broadband what we do is that we use the telephone cables to provide the connectivity. This is also called as a DSL broadband connectivity. In this connectivity you have a DSL modem at your residence. The voice signal from your telephone and the data signal from your computer are multiplexed and sent on the telephone wire that comes to your home. At the telephone exchange these two signals are separated, the voice signal is sent to the voice exchange and the data signal is sent on the internet. So using the telephone wire that comes to your home and using a DSL modem you can use the same telephone wire connectivity to provide data or the internet connectivity also.

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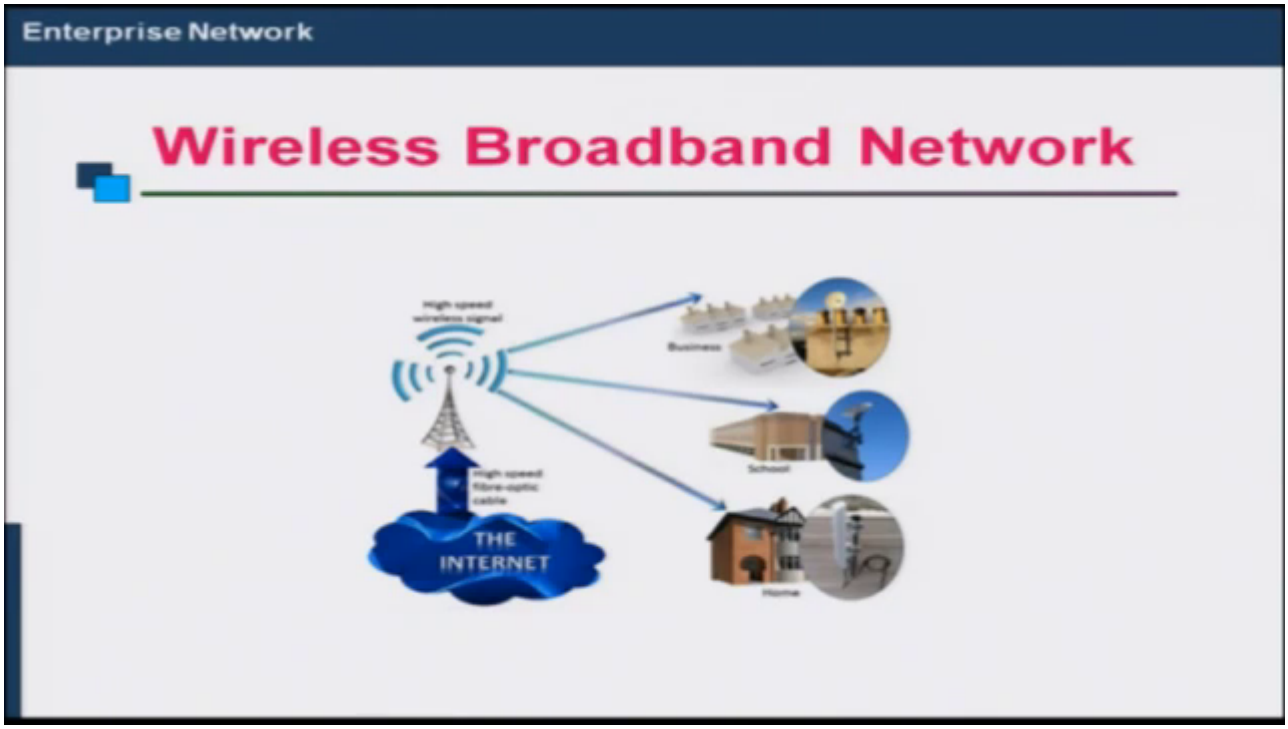

In wireless broadband in which we use the 2G or 3G wireless to provide data connectivity, what we have is that either we will have a 2G or 3G and these days even 4G dongles which I can connect to my laptop or desktop or in case of mobile phones this is inbuilt. So using the data connectivity on 2G or 3G or 4G wireless networks I can access the Internet using that. The advantage of this kind of connectivity is that this can provide seamless data connectivity or internet connectivity on my mobile phones even when I'm travelling.

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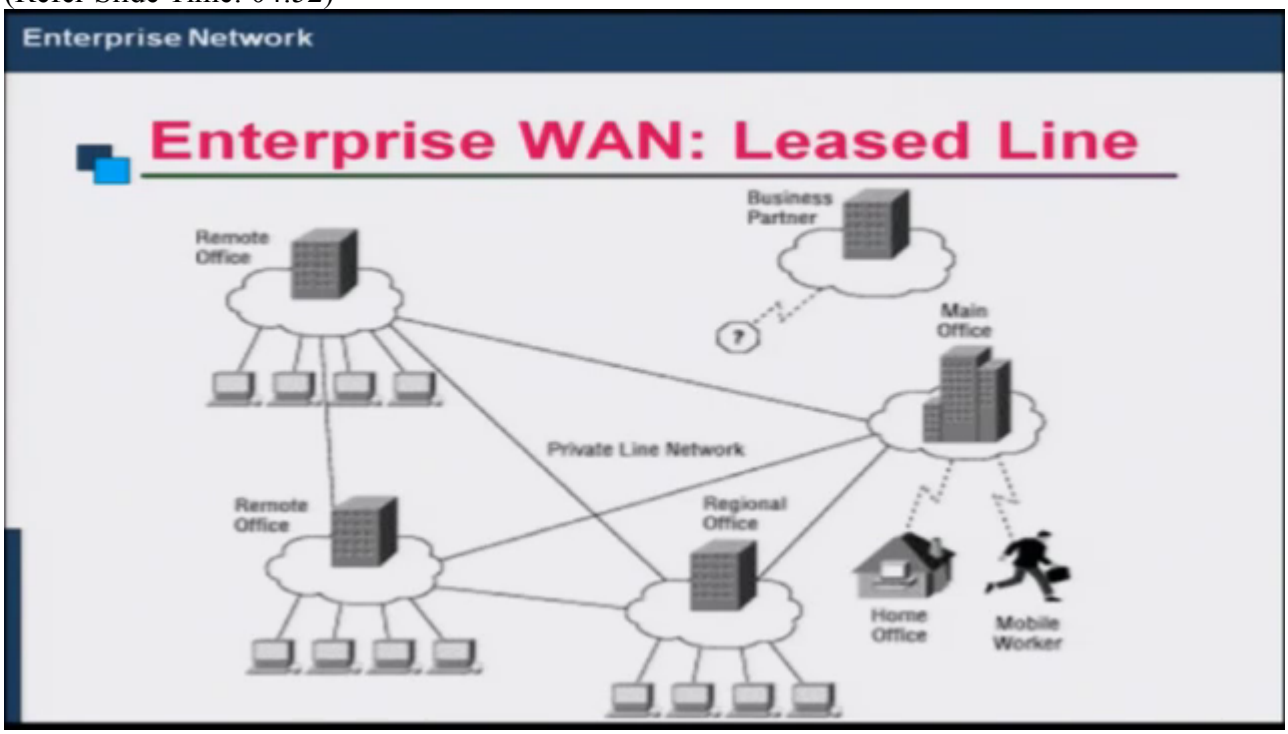

If I have a corporate network which means that I have multiple offices across multiple cities which I want to interconnect like the network of Microsoft, all the Microsoft offices across the globe are interconnected to each other. Similarly examples would be for IBM, for Intel or

any company which may have national or international presence they interconnect their corporate offices, business offices across the globe. And this network is used to provide data exchange between the offices; in most of the cases voice over IP also. So they built a voice over IP network across their multiple offices and they have a written edited data network which can be used to share software and hardware resources across offices.

The architecture that is used in this kind of corporate enterprise networks are multiple. One possibility could be that I can have a point-to-point leased line network between multiple offices. So I have point-to-point connectivity between multiple offices and I can use this point-to-point link to provide the data network connectivity.
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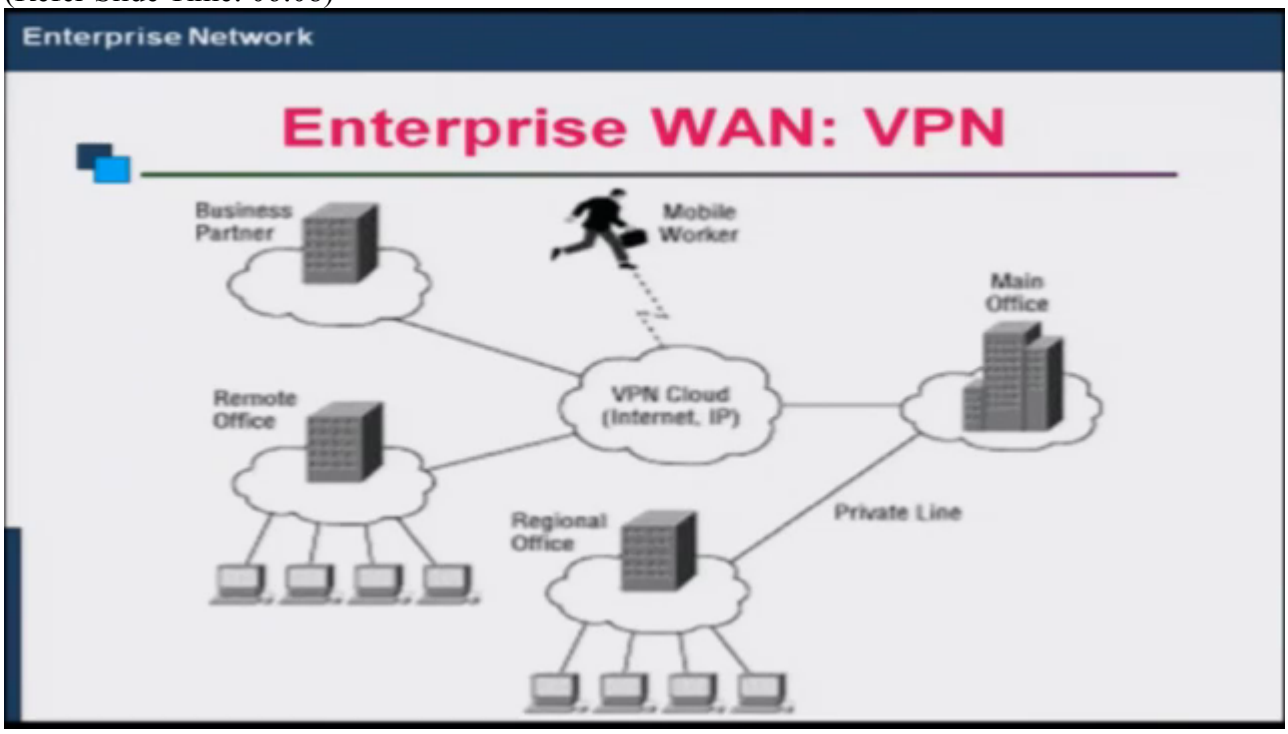

The second architecture or technology that is used to provide such connectivity is that I can use VPN over Internet. Since each corporate office has got its own Internet connectivity I can build VPN or Virtual Private Network over the Internet to provide secure communication across these multiple offices. So instead of having separate dedicated point-to-point links between multiple corporate offices I could use the standard internet connectivity that comes to these offices to provide the data communication between them.

One advantage of this architecture is that every organization would have users who are travelling or you may want to access the corporate data when you are at home. So what you can do is that while you're travelling or while you are at home if you have any sort of Internet connectivity using DSL connection, a cable connection or a wireless broadband connection then you can use VPN client software on your laptop or desktop at home and using that client VPN software you can over the Internet you can have a VPN connectivity to your corporate network and access data. So in this architecture the Open Internet is used to provide secure communication between the offices and also between telecommuters who want to access the corporate data.
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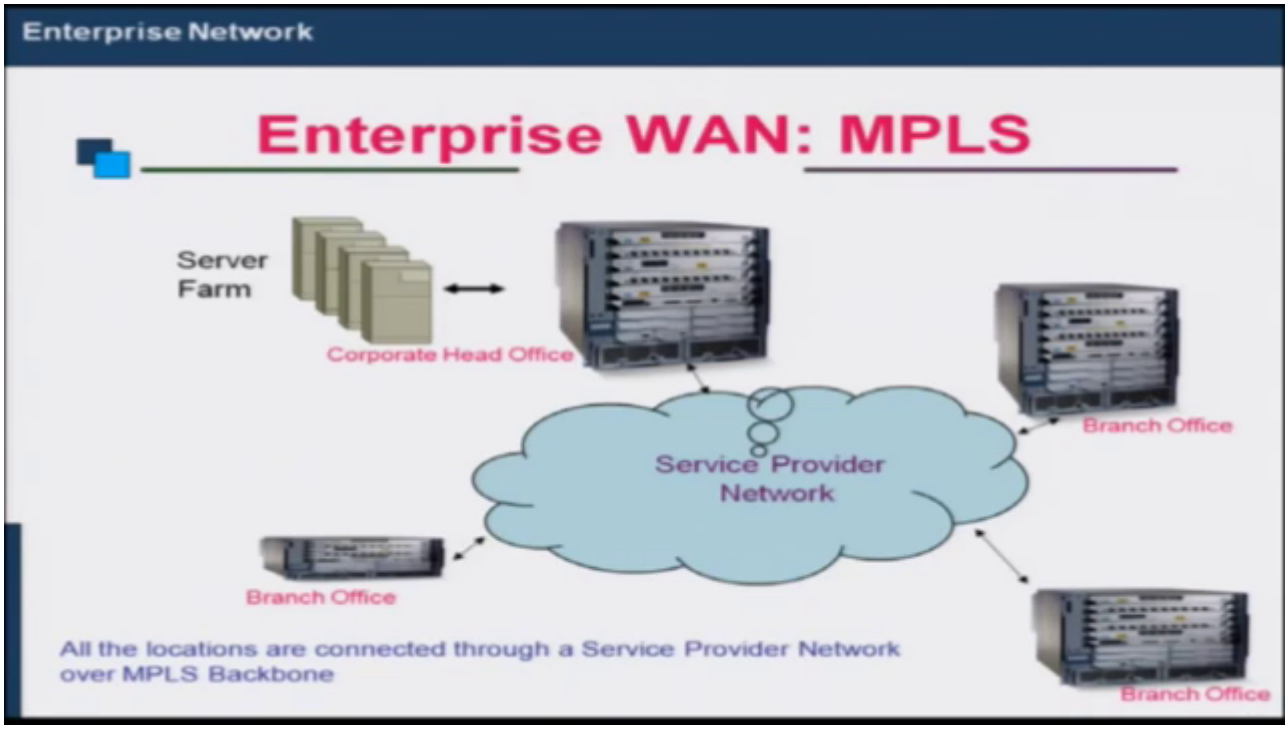

The third architecture that is used to provide corporate connectivity is also called as the MPLS VPN architecture. In this architecture what is done is that multiple offices are connected to a service provider network. So as we go along in part three of my lecture I'll tell you what is the architecture of service provider networks, so what you do is that you would have service providers which would have national presence or international presence and you interconnect all your corporate offices to this service party networks. These service provider networks are used to provide Internet services and voice services.

So using the service provider network you build a what is called as an MPLS VPN network which is a private network interconnecting multiple corporate offices and you can also provide internet VPN connectivity to the telecommuters through the service provider networks. So here the advantage is that you contract out the complete connectivity to one service provider which has national and international presence and they will provide connectivity to all your office locations as well as connectivity to your mobile telecommuters and they will provide you all types of services which would include data communication between the offices, internet access as well as voice over IP applications.

So this in brief was different type of architectures which are used to set up a campus computer network or provide network connectivity in residences or to provide connectivity to corporate enterprise networks. With this we end the Part 2 of this lecture. And in the next part we'll talk about the architecture of Internet and how the web works. Thank you.