

## D-Computers, Computer Networks & Broadband, Application Packages & Web Based Services.

### Broadband and Data Services

XDSL, DSLAM & ADSL Modems, BRAS, Tier 1 & Tier2 switch, DMT Modulation technique, PPPoE, WiFi & WiMAX, VoIP, IPTV

### Software Application & Web Technologies

Familiarization with various Company applications like CSMS, FMS, HRIS etc. Creation of Static Web page which includes designing and developing of Static Web Pages using HTML coding and FrontPage. Image processing tools such as Adobe Photoshop, Web site Designing containing Dynamic Web pages, Active Server Pages (ASP), VB Script, Java Script, connectivity of the front end web application (ASP & Java script) with the back end database application, Hosting of Websites.

- 1- Broadband and Data Services
- 2- Software Application & Web Technologies

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## ADSL Overview

ADSL (Asymmetric Digital Subscriber Lines) is latest advanced digital coding, modulation and demodulation technology which used to deliver high-rate digital data over existing ordinary phone-lines by new modulation technology called DMT (Discrete Multi tone) which allows the transmission of high speed data.



DMT provides maximum 1 Mbps uplink data rate and 8 Mbps downlink data rate and maximum distance between subscriber premises and DSLAM may not be more than 5 kilometer. Twisted line pair should be noise free. Line parameter should be checked before installation of ADSL.

By dividing the approximately 1MHz bandwidth afforded by the copper twisted pair into a large number of sub-channels, ADSL modem is designed to offer cost-effective high-speed services for home or office users and offers auto-negotiation capability for different flavors (G.dmt, G.lite, CAP or T1.413 Issue 2) according to central office DSLAM's settings (Digital Subscriber Line Access Multiplexes). Also the feature-rich routing functions are seamlessly integrated to ADSL service for existing corporate or home users. Now users can enjoy various bandwidth-consuming applications via ADSL modem. This gives "always-on" Internet access and does not tie up the phone line. No more busy signals, no more dropped connections, no more waiting for someone in the household to get off the phone, depending on how the connection is configured.

### DMT Bandwidth Utilization

The Discrete Multi-Tone (DMT) line coding technique is the key part of the ANSI T1.413 standard which gives greater acceptance of the standard.

DMT occupies the bandwidth between 26 kHz and 1.1 MHz, but as we have already discovered, the bandwidth of most existing telephony installations does not exceed 800 kHz so the performance of sub-channels in this higher frequency range will diminish.

Purely on the basis of performance, the upcoming DMT chipsets are clearly superior to their CAP (Carrier less Amplitude Phase Modulation) counterparts and the future roadmap of increasing performance and flexibility of implementation makes DMT an appealing option if you need ADSL to coexist with ISDN.

### How the bandwidth is allocated

The bandwidth available to DMT line coding is 26 kHz to 1.1MHz.

This is divided into discrete 4 kHz sub-channels, each hertz of which is allocated 8 bits and Quadrature Amplitude Modulated (QAM) before transmission. This gives each sub-channel a maximum load of 32kbps

Now, because the bandwidth has to be divided between upstream and downstream data transmission, we arrive at the following data rates:

**Upstream** =  $20 \times 8 \times 4 \text{ kHz} = 640 \text{ kbps}$

**Downstream** =  $256 \times 8 \times 4 \text{ kHz} = 8.1 \text{ Mbps}$

#### Note-

These figures are only achievable in theory, as the length of the copper loop, line quality; noise etc will reduce these figures. Loop impairments (bridge taps, loading coils) disqualify line from using ADSL.



**Load coils:** in-line inductances that improve voice-frequency transmission characteristics of a telephone circuit. Essentially, a "load" steals energy from high frequencies and gives it to lower frequencies. Typically only used in very long (>9,000 ft) phone lines.

By "**bridges**" I assume you mean "bridged taps". In older neighborhoods, the phone wiring will have been used by more than one customer. Perhaps these customers lived at different (though near-by) addresses. The unconnected "spur" of wiring is a "bridged tap" on the currently connected circuit.

**Digital loop carriers:** there's a bunch of systems for carrying more than one voice transmission on a single pair of wires. You can shift the frequencies up or down, or you can digitize the voice transmissions and divide the telephone circuit by time or code or something. The more general term is "pair gain".

## ADSL Speed

DSI Type	Max. Send Speed	Max. Receive Speed	Max. Distance
<b>ADSL</b>	800 Kbps	8 Mbps	18,000 ft (5,500 m)
<b>ADSL2</b>	3,5 £4bps	12 Mbps	23000 ft (7,000 m)
<b>ADSL2+</b>	1.4 Mbps	24 Mbps	
<b>HDSL</b>	<b>1.54 Mbps</b>	1.54 Mbps	<b>12,000 ft</b> (3,650 m)
<b>IDSL</b>	<b>144 Kbps</b>	144 Kbps	<b>35,000 ft</b> (10,700 m)
<b>MSDSL</b>	2 Mbps	2 Mbps	29,000 ft (8,800 m)

## DSL Benefits

- Always-On Service
- Phone/Internet Simultaneously
- Up to 25x Times Faster Than Dial-up Modem
- Cost Effective
- No More Busy Signals
- No More Dropped Connections
- Faster Downloads
- Faster Games
- Multiple Computers on Single DSL Line
- Dedicated Connection & Speed

## Different DSL Type

1. Asymmetric DSL (ADSL) Used in MTNL plan
2. High Bit Rate DSL (HDSL)
3. ISDN DSL (IDSL)
4. Universal DSL



5. MSDSL
6. Rate Adaptive DSL (RADSL)
7. Very High Rate DSL (VDSL)-
8. Symmetric DSL (SDSL)
9. DSL Lite
10. Consumer DSL
11. Unidirectional HDSL (UDSL)
12. Assessment of DSL Technology

- **ADSL** - It is called “**asymmetric**” because the download speed is greater than the upload speed. ADSL works this way because most Internet users look at, or download, much more information than they send, or upload. ADSL2 and ADSL2+ are enhancements of ADSL.
- **HDSL** - Providing transfer rates comparable to a T1 line (about 1.5 Mbps), HDSL receives and sends data at the same speed, but it requires two lines that are separate from your normal phone line.
- **ISDN** - Geared primarily toward existing users of Integrated Services Digital Network (ISDN),
- **ISDN** is **slower** than most other forms of DSL, operating at fixed rate of 144 Kbps in both directions. The advantage for ISDN customers is that they can use their existing equipment, but the actual speed gain is typically only 16 Kbps (ISDN runs at 128 Kbps)
- **(DSL)** is a family of technologies that provides digital data transmission over the wires of a local telephone network. DSL originally stood for *digital subscriber loop*. In telecommunications marketing, the term DSL is widely understood to mean Asymmetric Digital Subscriber Line (ADSL), the most commonly installed DSL technology. DSL service is delivered simultaneously with wired telephone service on the same telephone line. This is possible because DSL uses higher frequency bands for data separated by filtering. On the customer premises, a DSL filter on each outlet removes the high frequency interference, to enable simultaneous use of the telephone and data.
- **Multirate Symmetric DSL (MSDSL)** - This is Symmetric DSL that is capable of more than one transfer rate. The transfer rate **is** set by the service provider, typically based on the service (price) level.
- **Rate Adaptive DSL (RADSL)** - This is a popular variation of ADSL that allows the modem to adjust the s **Symmetric DSL**. (SDSL) - Like HDSL, this version receives and sends data at the same speed. While SDSL also requires a separate line from your phone, it uses only a single line instead of the two used by HDSL.
- **Very high bit-rate DSL. (VDSL)** - An extremely fast connection, VDSL is asymmetric, but only works over a short distance using standard copper phone wiring
- **Voice-over DSL (VoDSL)** - A type of IP telephony, VoDSL allows multiple phone lines to be combined into a single phone line that also includes data-transmission capabilities.

### ADSL IS MADE UP OF SEVERAL PARTS

- ADSL Modem and Network Interface Card (NIC)
- Splitter
- DSLAM
- RADIUS
- ISP

### ADSL MODEM AND NIC



The Customer Premises Equipment (CPE) for ADSL consists of the ADSL Modem and NIC card. The ADSL Modem is located at home or office provides an IP connection.

## Type of Modem

### PCI ADSL Modem

The cheapest way to get online requires knowledge of how to install into computer, and is frequently referred to as an "internal" device. PCI modems deliver the best response times (gamers take note!) but also consume CPU cycles to operate.

### USB ADSL Modem

The easiest ways to get online just pop in the CD, install the drivers and plug in the modem. The majority of home users chose USB modems to get online.

### Ethernet ADSL Modem

A standalone device which maintains the connection to the Internet. MTNL uses this type of modem.

## SPLITTER

The filtering arrangement, known as a POTS splitter will need to be installed in the commercial roll-out of ADSL. The digital and analog signals need to be separated. Thus, a filter needs to be placed in the signal path. Device is located on the "side of the house" where the Telecom line is connected. The splitter splits the DSL signal from Telecom lines into a separated data channel and a voice channel. The voice channel is a normal analog phone line (2 wire), and the data channel is sent to the ADSL Modem. The splitter is a passive, non-powered device, which will allow the voice channel to operate even if the power fails at the home location. The Telecom signal is sent to the splitter using an existing 2 wire line to the home.

## DSLAM

The DSLAM is the equipment at the Central Office Telecom that that splits the signal and connects the user to the Voice Switch and ISP.

## ISP CONNECTION

An ISP connects to the DSLAM via a high-speed data connection, usually ATM over a T3 (45Mbps) or OC-3 (155Mbps). Telecom Identify the line on which service will be installed, and the locations of your splitter and ADSL modem jacks.

Mumbai: Mahanagar Telephone Nigam Ltd (MTNL) is set to usher the broadband era in Mumbai. The incumbent operator in these two metros Mumbai & New Delhi is chalking out an ambitious plan that will see consumers and corporate enjoy unfettered 24-hour access to the Internet, which will also enable subscribers to access broadband services such as video-on-demand, video conferencing and telemedicine.

- To have a Broadband service the user must have an MTNL landline connection.



- An ADSL modem is required along with a splitter and depending on the user's Operating System; the connection software may or may not be required.
- The ADSL modem, splitter and the software are provided by MTNL and the user need not purchase any of them externally.
- At the user's premises, the user must have a PC with a LAN-Card (an Ethernet Port) and a Windows 98 or Windows 2000 or a Windows XP Operating System.

### ADSL Ethernet package includes the following items:

- ADSL Ethernet Modem.
- Micro filter
- Standard RJ-11 telephone cable
- RJ-45 Ethernet Cable
- Installation CD-ROM with
- Power Adapter
- Utility Software CD

### Front View of ADSL Modem

The ADSL Router is equipped with 4 LEDs on the front panel to indicate the status of the unit. When power is being applied to the ADSL modem, all the LEDs illuminate solid. After the boot up process has been complete, the LEDs are displayed as below.

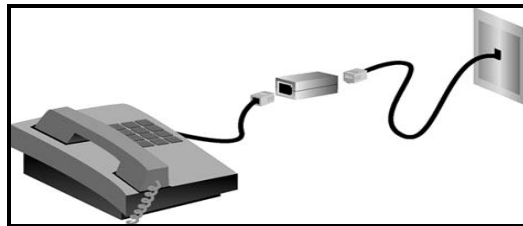


LED	Function	Color	Description
PWR	Power	Green	Off – No power is supplied to the unit. Solid – Power is connected to the unit.
DIAG	Diagnosis	Green	1. Off – Power off or initial self-test of ADSL Router is OK. 2. Blinking – blinking for software downloading of ADSL router in progress or update operation parameters located in FLASH memory in progress 3. Solid – Indicates initial self-test failure or Flash memory programming failure.
LAN	Link status	Green	1. Off – Power is off or no Ethernet carrier is present. 2. Blinking – Ethernet carrier is present and data is going

			through Ethernet port. 3.Solid – Ethernet carrier present.
DSL	Link Status	Green	1. Off – Power off. 2. Slow blinking – ADSL handshaking is in progress. 3. Quick blinking – ADSL connection training is in progress. 4.Solid – ADSL connection is OK.

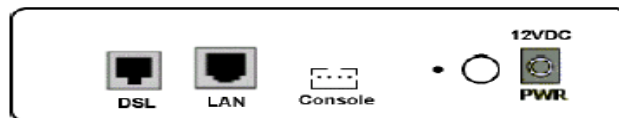
### CONNECT MICRO FILTERS TO TELEPHONE DEVICES

To install the micro filter, plug the phone into the micro filter, and then plug the micro filter into the telephone wall jack. Do not install a micro filter on the cable that connects your modem to the telephone jack. Unless you were provided a micro filter which has a jack for the modem and a jack for the DSL connection.



### CONNECT THE ETHERNET CABLE

Insert one end of the Ethernet cable to the “ENET” port on the back of the ADSL Ethernet Modem. Connect the other end of the Ethernet cable to the Ethernet port on computer’s 10/100 network interface card.

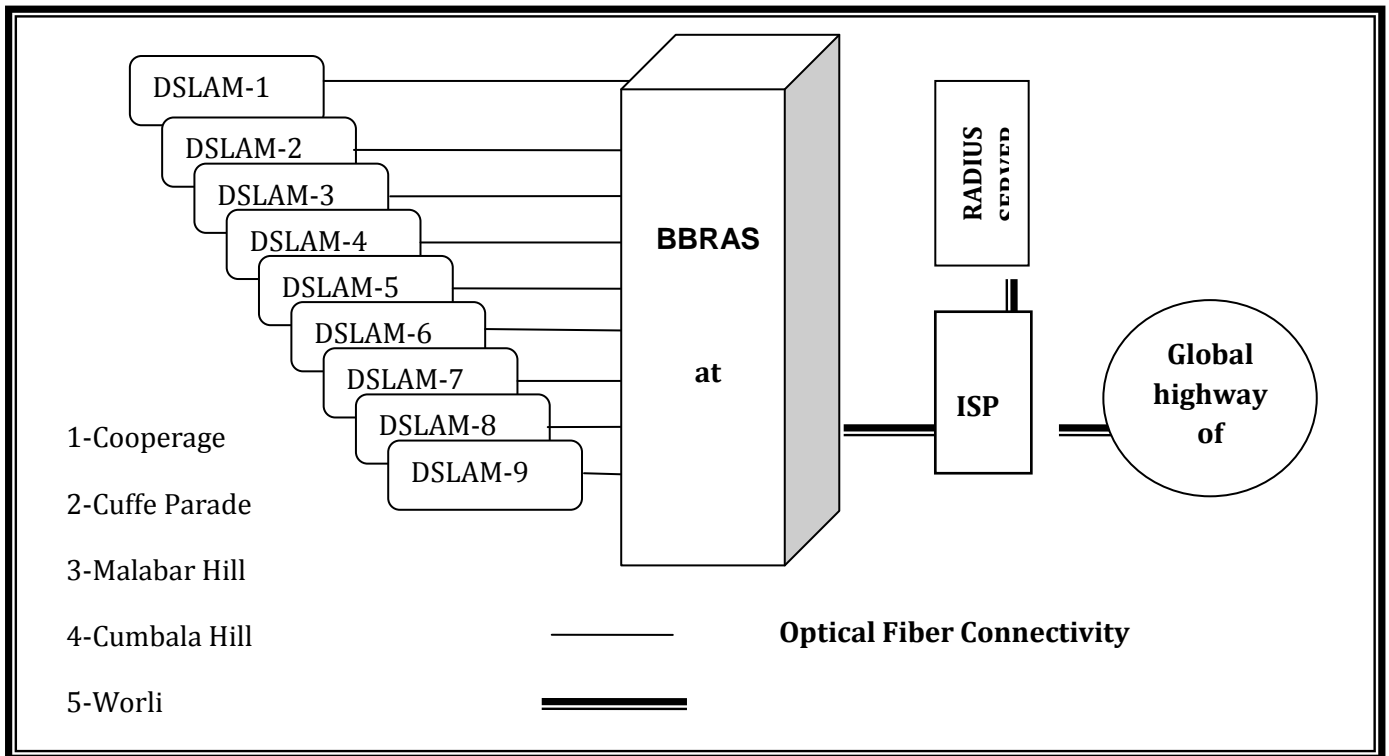


To connect the ADSL Ethernet Modem directly to a computer or to the uplink port of a hub or router, use the Ethernet cable that was provided with modem. The uplink port is used to attach any additional hubs to the broadband router in order to expand the Local Area Network (LAN). The Ethernet cable that came with ADSL Ethernet Modem is a straight-through UTP copper cable.

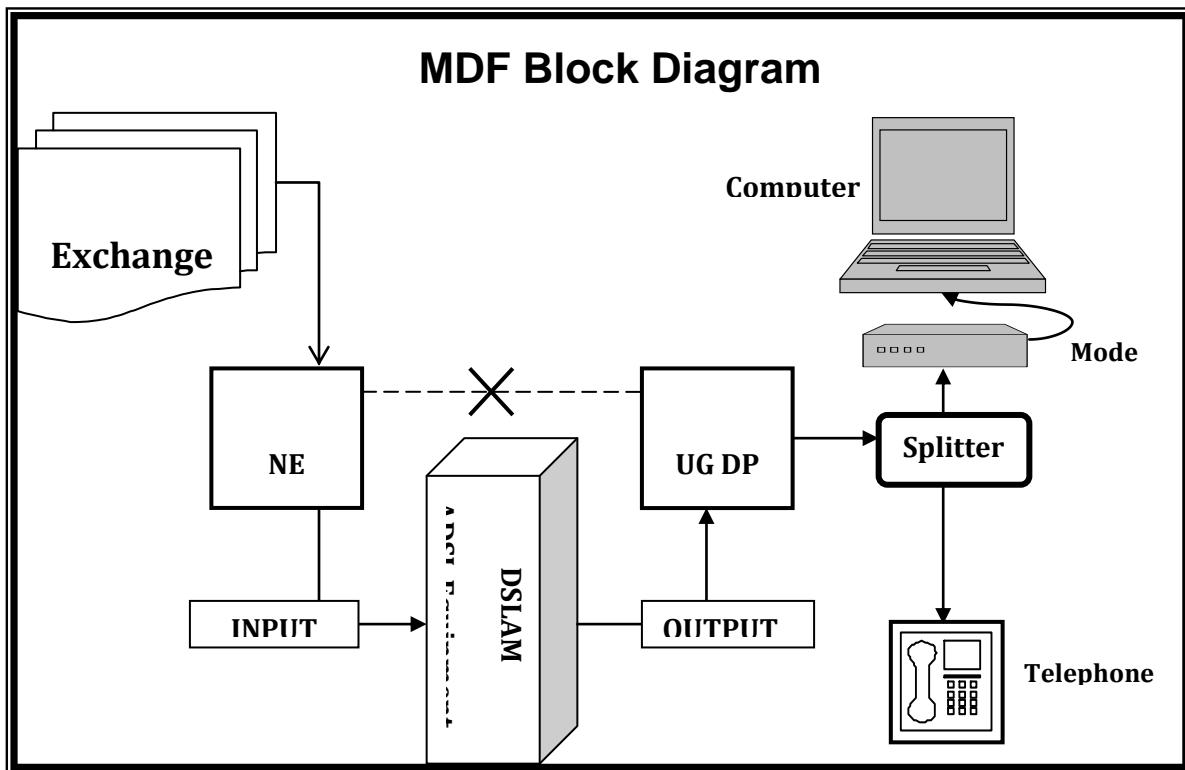


### ADSL NETWORK REQUIREMENTS

ADSL service from local telephone company or local ISP or access to an ADSL DSLAM (Digital Subscriber Line Access Multiplexer).

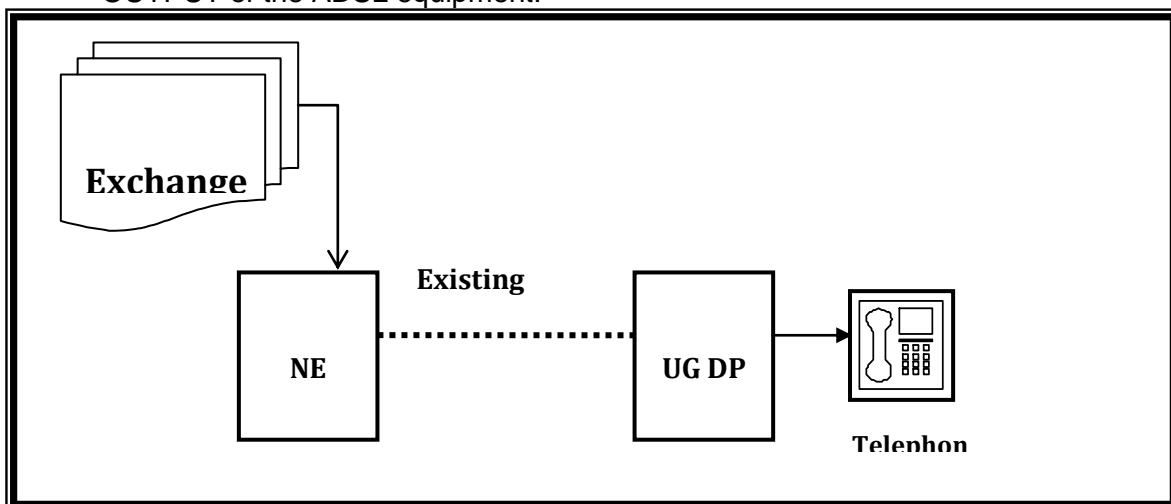






### MDF Connectivity

- Normally subscriber's line is connected in MDF, NE to DP.
- For ADSL two separate tag block are fixed in MDF namely INPUT or Voice & OUTPUT or Data. In this case NE is to be connected to INPUT & DP connected to OUTPUT of the ADSL equipment.



### Configuration of Ethernet Modem

Before installing ADSL modem to any computer, it should be configured by any internet browser like Internet Explorer or Netscape communicator.

To configure the ADSL modem following steps are used in Internet Explorer.

After connecting the modem to any LAN card installed in computer if available, neither ask subscriber to put LAN card in his computer. Disable any default Dial up connection.

#### Step-1

On Computer desktop double click on Internet Explorer and input 192.168.1.1 in the address row and press enter key. If it is successful then a dialog box will appear on desktop followed by a pop up menu, which ask User name = root and password = root.

#### Step-2

Click on Home on main page then Quick Configuration.

Configure the modem as follows-

ATM INTERFACE	-0
OPERATION MODE	-ENABLE
ENCAPSULATION	-1483 BRIDGE LLC
VPI	-0
VC1	-35
BRIDGE	-ENABLE
IGMP	-DISABLE
DEFAULT ROOT	-DISABLE
USER NAME	-BLANK
PASSWORD	-BLANK
USE DNS	-ENABLE

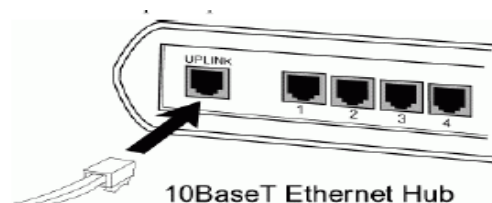
**Now click to Submit**

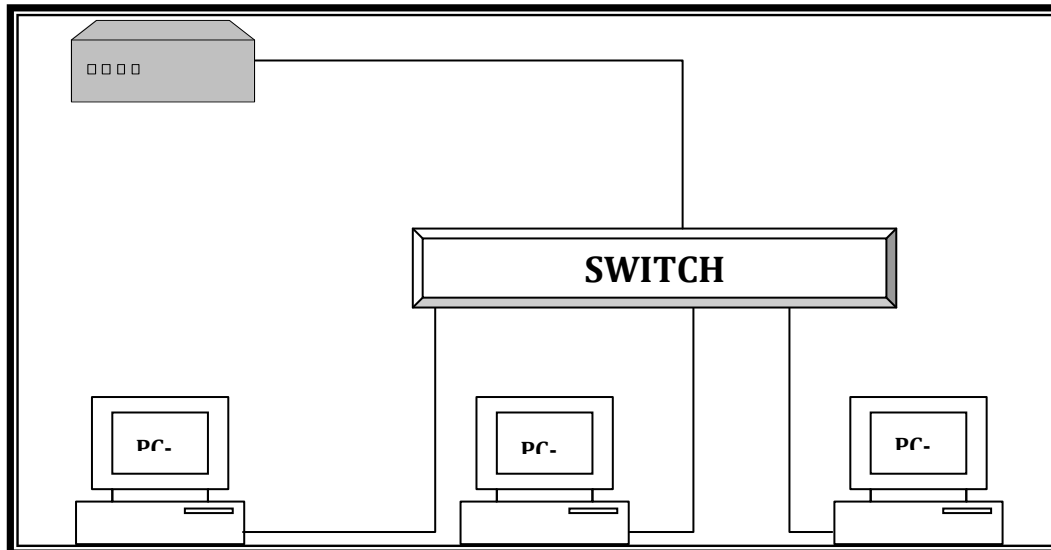
Again in the main page of modem click ADMIN and go to COMMIT & REBOOT select REBOOT FROM LAST CONFIGURATION & finally click to COMMIT. Now modem is ready to install at subscribers premises.

Configuration of ADSL at Subs premises-

At subs premises installation of ADSL modem is depends on the computer system's configuration.

## Modem connected to the switch





The modem can have either of two configurations.

1. Always on type
2. Auto dial-up type

#### Always on type

- Select the PVC on the BBRAS which corresponds to a port of the ATUC card.
- Encapsulate that particular PVC with bridge 1483 and bind it to the interface UNI.
- Assign a static IP to that PVC using the "IP host" command e.g.: 203.94.209.222
- Set the IP address of the PC in the range of the modem 's default IP address which is -192.168.1.1

#### Step-1

On Computer desktop double click on Internet Explorer and input 192.168.1.1 in the address row and press enter key. If it is successful then a dialog box will appear on desktop followed by a pop up menu, which ask User name = root and password = root.

#### Step-2

Click on Home on main page then Quick Configuration.

#### Configure the modem as follows-

ATM INTERFACE	-0
OPERATION MODE	-ENABLE
ENCAPSULATION	-1483 BRIDGE LLC
VPI	-0
VCI	-35
BRIDGE	-ENABLE
IGMP	-DISABLE
IP ADDRESS	-203.94.209.224
SUBNET MASK	-255.255.255.0
DEFAULT ROOT	-ENABLED
GATEWAY IP ADDRESS	-203.94.209.1 (IP address of UNI interface)
USER NAME	-BLANK

PASSWORD	-BLANK
USE DNS	-ENABLE
PRIMARY DNS SERVER	-203.94.227.70 (IP address of DNS server used by the ISP.
SECONDARY DNS SERVER	-

**Now click to Submit**

Again in the main page of modem click ADMIN and go to COMMIT & REBOOT select REBOOT FROM LAST CONFIGURATION & finally click to COMMIT. Now modem is ready to install at subscribers premises.

In the above configuration the modem has been configured to be in the "Always ON" state. A static IP address 203.94.209.222 has been assigned to the modem. The default gateway for the modem in such a configuration is the IP address of the UNI interface, which in this case is 203.94.209.1. The PC connected to this modem can access the Internet without any IP setting that is the LAN CARD of the PC can be configured to "Obtain IP address automatically". Secondly the LAN CARD can also be assigned an IP address in the range of the IP address of the modem with the modem's IP address set as the default gateway for the LAN CARD and the DNS server IP entries as the IP address of the DNS server used by the ISP.

### Auto dial-up type

- Select the PVC on the BBRAS which corresponds to a port of the ATUC card.
- Encapsulate that particular PVC with PPPOE and bind it to the authentication mode-pap
- Assign a static IP to that PVC using the "IP host" command e.g.: 203.94.209.222
- Set the IP address of the PC in the range of the modem's default IP address which is -192.168.1.1

### Step-1

On Computer desktop double click on Internet Explorer and input 192.168.1.1 in the address row and press enter key. If it is successful then a dialog box will appear on desktop followed by a pop up menu, which ask User name = root and password = root.

### Step-2

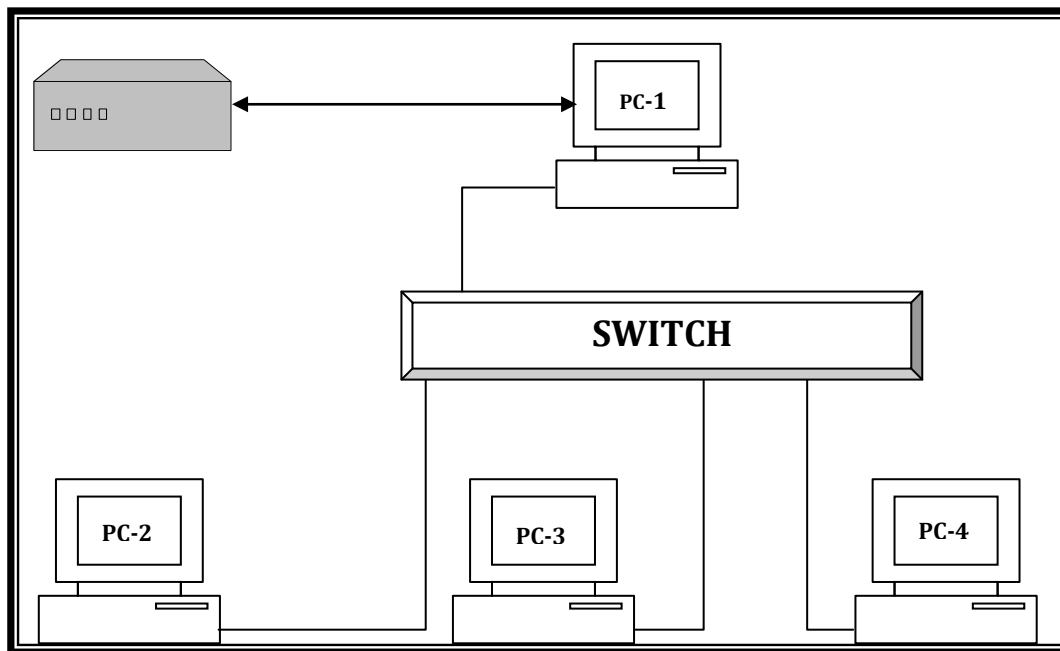
Click on Home on main page then Quick Configuration.

Configure the modem as follows-

ATM INTERFACE	-0
OPERATION MODE	-ENABLE
ENCAPSULATION	-PPPOE LLC
VPI	-0
VCI	-35
BRIDGE	- DISABLE
IGMP	-DISABLE
IP ADDRESS	-BLANK
SUBNET MASK	-BLANK
DEFAULT ROOT	-ENABLED
GATEWAY IP ADDRESS	-BLANK
USER NAME	-Username which exists on BBRAS







In this case the entire configuration remains same except that in LAN SETTINGS we will have to select the option Manual proxy instead of Automatically Detect settings and we will need to specify the IP address of the proxy server. Here PC-1 is working as Proxy server and it will need two LAN CARD.

### PPPOE connection by letting Modem authenticate Username and Password with fixed IP address

- Select the PVC on the BBRAS which corresponds to a port of the ATUC card.
- Encapsulate that particular PVC with PPPOE and bind it to the authentication Mode: pap
- On creating the subscriber name on the BBRAS, assign a fixed IP address to that subscriber name by using the command "IP address (A.B.C.D)"

#### Step-1

On Computer desktop double click on Internet Explorer and input 192.168.1.1 in the address row and press enter key. If it is successful then a dialog box will appear on desktop followed by a pop up menu, which ask User name = root and password = root.

#### Step-2

Click on Home on main page then Quick Configuration.

Configure the modem as follows-

ATM INTERFACE	-0
OPERATION MODE	-ENABLE
ENCAPSULATION	-PPPOE LLC
VPI	-0

VCI	-35
BRIDGE	- DISABLE
IGMP	-DISABLE
IP ADDRESS	-BLANK
SUBNET MASK	-BLANK
DEFAULT ROOT	-ENABLED
GATEWAY IP ADDRESS	-BLANK
USER NAME	-Username which exists on BBRAS
PASSWORD	_*****
USE DNS	- DISABLE
PRIMARY DNS SERVER	-203.94.227.70 (IP address of DNS server used by the ISP.
SECONDARY DNS SERVER	-

**Now click to Submit**

Again in the main page of modem click ADMIN and go to COMMIT & REBOOT select REBOOT FROM LAST CONFIGURATION & finally click to COMMIT. Now modem is ready to install at subscribers premises.

In the above configuration the modem dials up by itself and authenticates a username and password whenever it is switched ON. The modem will be assigned with an IP address dynamically from the existing pool. The PC connected to this modem can access the Internet without any IP setting that is the LAN CARD of the PC can be configured to "Obtain IP address automatically". Secondly the LAN CARD can also be assigned an IP address in the range of the IP address of the modem with the modem's IP address set as the default gateway for the LAN CARD and the DNS server IP entries as the IP address of the DNS server used by the ISP.

## PPPOE connection using Dialer software

Select the PVC on the BBRAS which corresponds to a port of the ATUC card. Encapsulate that particular PVC with PPPOE and bind it to the authentication mode-pap

### Step-1

On Computer desktop double click on Internet Explorer and input 192.168.1.1 in the address row and press enter key. If it is successful then a dialog box will appear on desktop followed by a pop up menu, which ask User name = root and password = root.

### Step-2

Click on Home on main page then Quick Configuration.

Configure the modem as follows-

ATM INTERFACE	-0
OPERATION MODE	-ENABLE
ENCAPSULATION	-1483 Bridge IP LLC
VPI	-0
VCI	-35
BRIDGE	- ENABLE
IGMP	-DISABLE
IP ADDRESS	-BLANK



SUBNET MASK	-BLANK
DEFAULT ROOT	- DISABLE
GATEWAY IP ADDRESS	-BLANK
USER NAME	-Blank
PASSWORD	-Blank
USE DNS	- DISABLE
PRIMARY DNS SERVER	-BLANK.
SECONDARY DNS SERVER	- BLANK

### Now click to Submit

- Again in the main page of modem click ADMIN and go to COMMIT & REBOOT select REBOOT FROM LAST CONFIGURATION & finally click to COMMIT.
- Now modem is ready to install at subscribers premises.
- In the above configuration the subscriber establishes a PPPOE connection by using the dialer software installed on his PC and by authenticating his username and password. The modem will be assigned with an IP address dynamically from the existing pool.

### Installing Enternet 300 or Enternet 500 software

Windows 98 and Windows 2000 require some supporting software to be installed in system for working of ADSL Internet. Enternet-300 or Enternet-500 can be loaded.

To install the ADSL Ethernet Modem setup and utility, insert the Installation CD-ROM into the CD-ROM drive of your computer. If the installation does not start automatically, go to your desktop and double-click My Computer, double-click the drive letter associated with your CD-ROM drive, and then double-click Setup.

The ADSL Modem Installer Welcome window will display; click Next to continue installing the ADSL Ethernet Modem.

After completion of process PC will restart and one icon Enternet 300 will appear on desktop double click on to this to create a new profile enter the system name as MTNL BROADBAND in capital letter , then enter subscriber's Telephone No. as user name & password MTNL small twice, then **finish**.

<b>My Computers</b>	<b>-Double click</b>
D:	-Double click
Enternet 300	-Double click
Setup	-Double click
Next	-Click
Finish	-Click
Restart	-Click
Enternet 300 icon	-Double click
Create new profile	-Double click
System name	-MTNL BROADBAND
Username-	-Subs Tel. No.s
Password	-mtnl
Confirm pass.	-mtnl
<b>Finish</b>	





## GLOSSARY

ADSL	: Asymmetric Digital Subscriber Line
ATM	: Asynchronous Transfer Mode - provides high-speed packet switching from 155 Mbps to (currently) 2Gbps. Used to provide backbone switching for the Internet.
ATMF-25Mbps	: ATM Forum Interface - 25Mbps speed, provided by a PCI NIC card.. One of the interfaces used between the ANT and PC.
CAP	:Carrier less Amplitude Phase Modulation The scheme implemented by AT&T, is called Carrierless Amplitude Phase Modulation (CAP) and is an extension of the QAM technique used for ordinary dial up modems.
Central Office	: Usually refers to one of two meanings -1) The Telecom Building that houses Telephone equipment
CPE	: Customer Premises Equipment - The Telecom term for customer equipment (i.e. the stuff you are responsible for fixing). Examples are CSU/DSU, modems, ANTs, and your phone.
DHCP	: Dynamic Host Configuration Protocol - The IP protocol used to set up dynamically assigned IP addresses.
DS0	: The basic digital circuit for Telecom - offered at 56 kbps or 64kbps. Can support one analog voice channel.
DSLAM	: Digital Subscriber Line Access Multiplexer - The Telecom equipment that concentrates and multiplexes the DSL lines.
xDSL	:Digital Subscriber Line - A term describing a family of DSL services, including ADSL, SDSL, VDSL, etc.
ISDN	: Integrated Services Digital Network, a digital phone service that uses a single copper pair to run 2B (64k) + 1D(16k) channels that can be used for switched voice or data.
ISP	: Internet Service Provider
NID	: Network Interface Device - The housing used to protect the ADSL splitter from the elements.
NIC	: Network Interface Card - A PC card (PCI/ISA) that supports the required network interface. Usually an Ethernet 10baseT or an ATMF-25Mbps Card.
POTS	: Plain Old Telephone Service - The service that provides a single analog voice line. (i.e. your phone line)
Splitter	: The passive device (low-bandpass filter) at the SNI that splits the ADSL signal into separate voice and data channels.
Splitterless	: An ADSL installation that does not require the Splitter. For higher speeds, a RJ11 filter is placed on every extension phone jack where an analog phone is used, thus providing the filtering at the jack, rather than at the NID. For lower speeds, no filter is required.
SOHO	: Small Office HOMe
T1	: DS1-A digital dedicated line at 1.544 Mbps, used for both Voice (24 DS0s) or Data.
T3	: DS3 - A digital dedicated line at 44.736 Mbps, provides for both Voice (672 DS0s or 28 DS1s) or Data



## DSLAM

What a DSLAM is a network device that is usually located at a telephone provider's local exchange and receives signals from lots of DSL lines and then sends the signals on a high-speed ATM line

### DSLAM - (DIGITAL SUBSCRIBER LINE ACCESS MULTIPLEXER)

Faster connections to the Internet from phone lines are possible through a Digital Subscriber Line Access Multiplexer (DSLAM). The role of this network device is located in the telephone exchanges of providers for the services. The service works by taking advantage of the multiplexing techniques used to connect several Digital Subscriber Lines to a high speed connection which they share. These can be placed along remote areas to provide DSL services to once out of reach locations. These additions may be costly to the telephone companies, but it allows them to receive more subscribers to their services, as they would be able to take advantage of DSL services now available in their area.



The DSLAM equipment at the local telephone company will collect data from several modem ports and multiplexes the synchronized composite signal of both voice information and connection data. The DSLAM moves the connections over to DSL lines which are processed through an Asynchronous Transfer Mode, a Frame Relay or the Internet Protocol Network. This traffic is routed through the backbone switch through an Access Network which connects through the Internet Backbone.

The DSLAM is designed to simply network the connections as appropriate and provides an access point between the customer and the ISP. The DSLAM may have enhanced capabilities which may allow for the monitoring of bandwidth consumption by each customer as well as providing compensation for bandwidth leeching through setting bandwidth speed caps for certain connections. Not all DSLAM locations are capable of this function.

DSLAMs are not only used for Internet connections; several hotels, lodges and residential areas as well as businesses utilize them to have their own private telephone exchange or specialized network. They may or may not be used with a digital loop carrier to service multiple data and voice customers with a serving area interface.

### DSLAM Hardware Details

By using an ADSL modem or a DSL router, a customer can make a connection to the DSLAM within their proximity. The connection is made with unshielded twisted pair telephone lines through a Public Switched Telephone Network. DSLAM hardware includes multiple aggregation cards which are used to connect customers through the several ports on the card. A typical DSLAM aggregation card will have 24 ports, but different manufacturers produce different options with more or less ports. The telephone company grade chassis material must be used with modern DSLAMs and use a 48 volt DC power supply. A modern DSLAM will contain the following:

**Chassis** – the chassis must be able to withstand trauma as well as be properly insulated to prevent unnecessary arcs which may cause damage to the DSLAM and any components.

**Aggregation Cards** – the devices which actively move incoming connections to open ports on the system

**Cabling** – the DSLAM requires a large amount of cables to be routed within its chassis to make all of the connections possible.

**Upstream Links** – the upstream links use gigabit Ethernet or multi-gigabit fiber optic links to process the data out of the DSLAM from the customers. ADSL connections usually have slower uplinks while SDSL connections are much faster.

## How Data Can Travel to a DSLAM

The process of making this connection possible requires a few exchanges of data. The data must travel between these points and is routed to the appropriate destination to make the Internet connection valid. The following is the process through which the data must travel to make the connection:

**Customer Location** – A DSL modem must be in use and ready to accept the connection. The modem will attempt to train by dialing the appropriate access number to the DSL service provider through the local loop.

**The Local loop** – The local loop is the group of telephone wires which are used to send the data between the customer and the telephone company. The central office or a servicing area interface must accept the dialing in of the data from the modem which it then processes through a DSLAM.

**The DSLAM** – The device or DSL service which will be accepting the connection from the modem and rerouting it to a main distribution frame. The DSLAM makes it possible to send both data and voice data on the same line through the downstream for the DSL line. The separation of the data and voice streams is done through a special filter on the customer's side which is placed before the modem telephone cable. The data which is being transmitted from the customer's side, is then sent through the DSL service provider along with the phone voice signals, to the voice switch on the telephone company's side.

**The Main Distribution Frame** – The Main Distribution frame is a special connecting rack which is designed to connect the subscriber lines with internal lines. This allows access from outside lines to gain access to internal networks on the system. In most setups for a Main Distribution frame at the telephone company, the design requires both the cable vault



and the telephone switch to be within proximity to each other, to properly reduce interference and keep strong signals. The Main Distribution hands over the data connection to the Handover Distribution Frame.

**The Handover Distribution Frame** – The Handover Distribution Frame is the last location in which the data must travel to allow for the local loop to reach the service provider's DSLAM. This connection is usually very stable for customers which are very close to the local loop.

## Properties of a DSLAM

DSLAMs are very complex pieces of equipment and are basically designed to make connections as fast as possible between different locations. The speed of the connections is really up to several factors but the three most important functions of the DSLAM are:

**Use as a Multiplexer** – The multiplexing abilities of the DSLAM are very complicated and perform the necessary encoding of both voice and data signals through the phone company and through to the ISP. Some DSLAMs can do this for several hundreds to thousands of connections at one time. This requires a large amount of resources to pull off and keep going smoothly.

**Use as a Data Switch** – The data switching capabilities of the DSLAM are important to providing a connection to the internet. The data switching allows connections between services and is required for use by several different customers at once. Once a switch on the board is free, it becomes available for another connection to be made through.

**Collection of Modems** – The DSLAM is also a large collection of modems which are designed to patch the customers through to their appropriate services. The modems within the DSLAM are capable of adjusting the line to remove echoes and other disturbances from the line to compensate and increase the bandwidth for the maximum connection rate possible.

## The Speed of DSLAM Connections Compared to Distance

The DSLAM requires a specific proximity between itself and the customer to have acceptable connection qualities. The longer the distance of the phone lines which will be carrying the signal between the customer and the DSLAM, the lower the quality and speed of the connection will be possible. The data rates are specially designed to go a certain speed with these distances in mind and many consumers will never get the full advertised data rate for their Internet connections due to their distance from the DSLAM. Slow speeds are usually due to varying data rates with distances greater than 2 kilometers and the amount of traffic on the lines. A list of speeds and the distance required to achieve these speeds follows:

25 Mbps – 1,000 feet  
24 Mbps – 2,000 feet  
23 Mbps – 3,000 feet  
22 Mbps – 4,000 feet  
21 Mbps – 5,000 feet  
19 Mbps – 6,000 feet  
16 Mbps – 7,000 feet  
1.5 Mbps – 15,000 feet  
800 kbps – 17,000 feet



It is entirely possible that longer distances can receive faster connections than estimated, but this is due to several factors as well. One of the most common reasons why slower connections are experienced is due to the amount of traffic on the line at one time. If there is a single customer connecting through the line, a faster connection may be expected even with the limits from the distance between the customer and the telephone company.

## A DSL modem

A DSL modem, or digital subscriber line, sends digital signals over telephone lines in order for users to access the Internet. Find out how DSL modems convert Internet signals and provide cable ports for a router or Ethernet cable with information from a certified computer technician in this free video on computers.

Traditional **modems** used in dial-up networking convert data between the analog form used on telephone lines and the digital form used on computers. Standard dial-up network modems transmit data at a maximum rate of 56,000 bits per second (56 Kbps). However, inherent limitations of the public telephone network limit modem speeds to 33.6 Kbps or lower in practice.

Broadband **modems** that are part of cable and DSL Internet service use more advanced signaling techniques to achieve dramatically higher network speeds than traditional modems. Broadband modems are sometimes called "digital modems" and those used for traditional dial-up networking, "analog modems." Cellular modems that establish Internet connectivity through a digital cell phone also exist.

A **digital subscriber line (DSL) modem** is a device used to connect a computer or router to a telephone circuit that has digital subscriber line service configured. Like other modems, it is a type of transceiver. It is also called a **DSL transceiver** or **ATU-R** (for ADSL transceiver unit-remote). The acronym **NTBBA**, which stands for *network termination broad band adapter*, is also common in some countries.

Some DSL modems also manage the connection and sharing of the DSL service in a network, in this case, the unit is termed a **DSL router** or residential gateway. DSL routers have a component that performs framing, while other components perform Asynchronous Transfer Mode Segmentation and Reassembly, IEEE 802.1D bridging and/or IP routing (including network address translation). Typical user interfaces are Ethernet and Universal Serial Bus (USB). Although a DSL modem working as a bridge does not need an IP address, it may have one assigned for management purposes.

## Compared to voice-band modem

A DSL modem modulates high-frequency tones for transmission to a digital subscriber line access multiplexer (DSLAM), and receives and demodulates them from the DSLAM. It serves fundamentally the same purpose as the voice-band modem that was a mainstay in the late 20th century, but differs from it in important ways.

DSL modems transfer data at a rate which is typically 10 to 20 times that of a voice-band modem.



A single telephone line can be used for simultaneous voice and data with a DSL modem whereas a voice-band modem precludes simultaneous voice traffic.

Most DSL modems are external to the computer and wired to the computer's Ethernet port, or occasionally its USB port. Internal DSL modems with PCI interface are rare but available.

Microsoft Windows and other operating systems do not recognize external DSL modems connected by Ethernet, and hence have no Property Sheet or other internal method to configure them. This is because the transceiver and computer are considered separate nodes in the LAN, rather than the transceiver being a device controlled by the computer (such as webcams, mice, keyboards etc.). Most DSL modems and DSL modem-routers can be configured manually, using a Web page provided by the modem via the Ethernet that the router connects to. The confs generally to open a browser, type the DSL modem's LAN IP address in the browser's address bar, and then press "Enter". However, DSL modems rarely need to be configured, because they are part of the physical layer of computer networks, simply forwarding data from one medium (CAT5) to another one (telephone line).

For external DSL modems connected by USB, Microsoft Windows and other operating systems generally recognize these as a Network interface controller.

For internal DSL modems, Microsoft Windows and other operating systems provide interfaces similar to those provided for voice-band modems. This is based on the assumption that in the future, as CPU speeds increase, internal DSL modems may become more mainstream.

DSL modems use frequencies from 25 kHz to above 1 MHz (see Asymmetric Digital Subscriber Line), in order not to interfere with voice service which is primarily 0–4 kHz. Voice-band modems use the same frequency spectrum as ordinary telephones, and will interfere with voice service - it is usually impossible to make a telephone call on a line which is being used by a voice-band modem.

DSL modems vary in data speed from hundreds of kilobits per second to many megabits, while voice-band modems are nominally 56K modems and actually limited to approximately 50 kbit/s.

DSL modems exchange data with only the DSLAM to which they are wired, which in turn connects them to the Internet, while most voice-band modems can dial directly anywhere in the world.

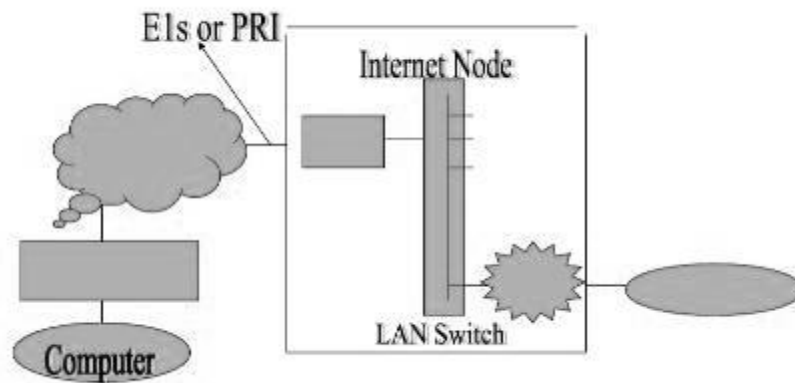
DSL modems are intended for particular protocols and sometimes won't work on another line even from the same company, while most voice-band modems use international standards and can "fall back" to find a standard that will work.

## BRAS

A **broadband remote access server (BRAS, B-RAS or BBRAS)** routes traffic to and from broadband remote access devices such as digital subscriber line access multiplexers (DSLAM) on an Internet service provider's (ISP) network.







The BRAS sits at the core of an ISP's network, and aggregates user sessions from the access network. It is at the BRAS that an ISP can inject policy management and IP Quality of Service (QoS).

#### The specific tasks include:

- Aggregates the circuits from one or more link access devices such as DSLAMs
- Provides layer 2 connectivity through either transparent bridging or PPP sessions over Ethernet or ATM sessions
- Enforces quality of service (QoS) policies
- Provides layer 3 connectivity and routes IP traffic through an Internet service provider's backbone network to the Internet

A DSLAM collects data traffic from multiple subscribers into a centralized point so that it can be transported to a switch or router over a Frame Relay, ATM, or Ethernet connection.

The router provides the logical network termination. Common link access methods include PPP over Ethernet (PPPoE), PPP over ATM (PPPoA) encapsulated sessions, bridged Ethernet over ATM or Frame Relay (RFC 1483/RFC 1490), or just plain Ethernet. In the case of ATM or Frame Relay based access, individual subscribers are identified by Virtual Circuit IDs. Subscribers connected over Ethernet-based remote access devices are usually identified by VLAN IDs or MPLS tags. By acting as the network termination point, the BRAS is responsible for assigning network parameters such as IP addresses to the clients. The BRAS is also the first IP hop from the client to the Internet.

The BRAS is also the interface to authentication, authorization and accounting systems

## RADIUS

**Remote Authentication Dial In User Service (RADIUS)** is a networking protocol that provides centralized Authentication, Authorization, and Accounting (AAA) management for computers to connect and use a network service. RADIUS was developed by Livingston

Enterprises, Inc., in 1991 as an access server authentication and accounting protocol and later brought into the Internet Engineering Task Force (IETF) standards.

Because of the broad support and the ubiquitous nature of the RADIUS protocol, it is often used by ISPs and enterprises to manage access to the Internet or internal networks, wireless networks, and integrated e-mail services. These networks may incorporate modems, DSL, access points, VPNs, network ports, web servers, etc.

RADIUS is a client/server protocol that runs in the application layer, using UDP as transport. The Remote Access Server, the Virtual Private Network server, the Network switch with port-based authentication, and the Network Access Server (NAS), are all gateways that control access to the network, and all have a RADIUS client component that communicates with the RADIUS server. The RADIUS server is usually a background process running on a UNIX or Microsoft Windows server. RADIUS serves three functions:

1. To authenticate users or devices before granting them access to a network,
2. To authorize those users or devices for certain network services.
3. To account for usage of those services.

## T1 & T2 Switches

**T (X) lines are dedicated lines** set up by a telecom company between a remote site and the network backbone. **T1, T2, T3, T4** is different bandwidth specifications that are used to name the different internet speeds. The basic linkup from slowest to fastest is dialup (56kbps) **DSL** (500-100kbps) cable (1000-2000kbps) and T1, T2, T3, T4 (2000-about unlimited kbps). The T's are used for large company networks that require enormous amounts of bandwidth.

1. T1 operates at 1.544 Mbps
2. T2 at 6.312 Mbps
3. T3 at 44.376 Mbps

All you have to know about T1/2/3 is that these lines are typically used by larger businesses and are far more expensive than the traditional broadband connection as they are dedicated and always reliable.

- T1 - Actually, this is a transmission protocol but it is also commonly used to refer to the line based on its bandwidth. It stands for "Trunk Level 1" and has a speed of 1.544Mbps. Differing numbers after the T specify different bandwidths (e.g., T2 = 6.312 Mbps). T lines are typically used by businesses, typically because they can be split into different circuits (e.g., you could use some of the bandwidth for voice-grade circuits and some for Internet access). If you see references to E1s, etc., they're just the European terms for T1's, etc. I think Japan uses Y1, etc. You'll also see them hyphenated as T-1, E-1, etc.
- A T-1 line is the name for a phone-company supplied data connection that moves data at about 1.5 mb per second. That used to be considered fast, but is not anymore - many cable modems go faster than a T-1 line.
- T1 is a high speed digital network (1.544 mbps) developed by AT&T in 1957 and implemented in the early 1960's to support long-haul pulse-code modulation (PCM) voice transmission. The primary innovation of T1 was to introduce "digitized" voice





and to create a network fully capable of digitally representing what was up until then, a fully analog telephone system.

- T1 is a "two-point", dedicated, high capacity, digital service provided on terrestrial digital facilities capable of transmitting 1.544 Mb/s. The interface to the customer can be either a T1 carrier or a higher order multiplexed facility such as those used to provide access from fiber optic and radio systems.
- So T1 is a network that has a speed of 1.544 Mbps and was designed for voice circuits. In addition, there is T1-C which operates at 3.152 Mbps.

### T2, T3, T4 Super group

These are known as "super groups" and their operating speeds are generally referred to as 45 Mbps and 274 Mbps respectively. T1 pricing starts around \$360/month and T2 through T4 are not an option for a home or small business operation (unless your pockets are unusually deep).

### Different transmission protocol speed

**DS0** - 64 kilobits per second

ISDN - Two DS0 lines plus signaling (16 kilobytes per second), or 128 kilobits per second

**T1** - 1.544 megabits per second (24 DS0 lines)

**T3** - 43.232 megabits per second (28 T1s)

**OC3** - 155 megabits per second (84 T1s)

**OC12** - 622 megabits per second (4 OC3s)

**OC48** - 2.5 gigabits per seconds (4 OC12s)

**OC192** - 9.6 gigabits per second (4 OC48s)

## What is DMT

Two main modulation schemes are currently being used to implement ADSL:

- Carrier less amplitude/phase (**CAP**), a single carrier modulation scheme based on quadrature amplitude modulation (**QAM**);
- Discrete multi-tone (**DMT**), a multichannel modulation scheme.

The choice between them naturally depends on how well they perform in the presence of impairments on the existing copper twisted-pair access cabling (see side bar), because these can limit the transmission capacity.

In addition, high-bit rate services carried by ADSL must not interfere with other services, particularly plain old telephone service (POTS) that are being transported simultaneously over the same lines.

A highly adaptive transmission system is needed to cope with all these sources of signal degradation. Having carefully studied the performance and flexibility of both modulation techniques,

Alcatel Telecom decided to implement DMT in its ADSL system. DMT has the added advantage of having been standardized by the American National Standards Institute (ANSI). It is also being adopted by the European Telecommunications Standardization Institute (ETSI).



## Multicarrier Modulation

In essence, multicarrier modulation superimposes a number of carrier-modulated waveforms to represent the input bit stream. The transmitted signal is the sum of these sub channels (or tones), which have the same bandwidth and equally spaced center frequencies. The number of tones must be large enough to ensure good performance. In practice, a value of 256 provides near optimum performance, while ensuring manageable implementation complexity.

Early problems with maintaining an equal spacing between tones have been resolved with the introduction of digital signal processors, which can accurately synthesize the sum of modulated waveforms, and the FFT (fast fourier transform), which can efficiently compute this sum.

## Discrete Multi-tone Modulation

DMT is a form of multicarrier modulation in which each tone is QAM modulated on a separate carrier. The lowest carriers are not modulated, thereby avoiding interference with POTS.

DMT modulation is optimal for band-limited communication channels (such as twisted pair telephone cables), which exhibit large differences in gain and phase with frequency. When the modem is initialized, the number of bits assigned to a tone can be set to compensate for differences in these transmission characteristics. Subsequently, if conditions on the line alter slowly, this bit assignment can be changed "on the fly."

Over long distances, a DMT-based ADSL transmission system approaches the fundamental capacity limit of 13.6 Mbps. However, over the distances typically found in the access network (a few kilometers), the maximum capacity drops to about 6 Mbps.

In principle, tones are independent of one another. However, in practice some inter symbol interference (ISI) occurs because the tail of one symbol corrupts the start of the following symbol.

Fortunately, this can be virtually eliminated by adding a small number of samples (the cyclic prefix) to each DMT symbol. Any ISI is then limited to the prefix that is removed after demodulation by the FFT.

## Benefits of DMT

Both DMT and CAP are similarly complex during implementation in real applications.

**However, DMT has a number of important advantages:**

- DMT achieves near optimum use of the line capacity because it can adaptively allocate information and transmit power across the available bandwidth.
- Bits rates can be adjusted in small increments of a few tens of kilobits per second, enabling DMT hardware to be programmed to support a wide range of data rates in both directions with the possibility of changing these rates "on the fly."
- Power spectral density can be adjusted very flexibly. Forbidden bands (e.g. amateur radio band) can thus be avoided simply by imposing a suitable frequency mask.
- DMT is good at coping with interference from multiple radio frequency sources.
- DMT offers greater immunity to transient noise bursts than CAP; this performance can be enhanced by using interleaving and forward error correction.
- Only minimal equalization is required; in contrast to CAP, DMT does not require a feedback equalizer, so there is no error propagation.
- DMT is the more cost-effective option on complex lines with numerous bridged taps.



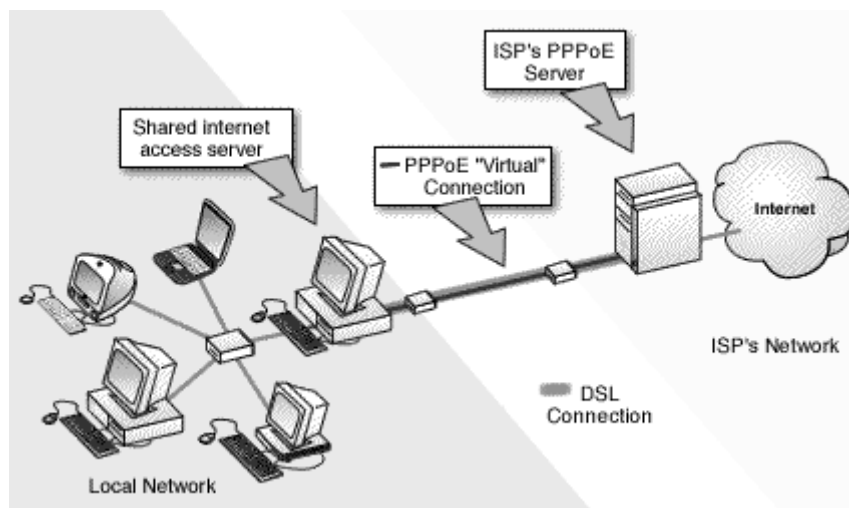
**However, DMT has a few disadvantages.**

- FFT processing introduces some delay, and a high peak to average ratio in the DMT transmit signal can lead to clipping noise.
- Also, complex initialization procedures result in a relatively long activation time. However, correct dimensioning can minimize the first two problems and ensure that any delay is negligible, even for telephony. The complex initialization procedure also can be considered as an advantage as it increases the flexibility of an ADSL system based on DMT.

**Point To Point Protocol over Ethernet (PPPoE)**

The working standard for the PPPoE protocol was published by the IETF in 1999. The IETF specification for PPPoE is RFC 2516. PPPoE expands the original capability of PPP by allowing a virtual point to point connection over multipoint Ethernet network architecture. PPPoE is a protocol that is widely used by ISPs to provision digital subscriber line (DSL) high speed Internet services, of which the most popular service is ADSL. The similarity between PPPoE and PPP has led to the widespread adoption of PPPoE as the preferred protocol for implementing high speed Internet access. Service providers can use the same authentication server for both PPP and PPPoE sessions, resulting in a cost savings. PPPoE uses standard methods of encryption, authentication, and compression specified by PPP.

PPPoE is a specification for connecting multiple computer users on an Ethernet local area network to a remote site through common customer premises equipment, which is the telephone company's term for a modem and similar devices. PPPoE can be used to have an office or building-full of users share a common Digital Subscriber Line (DSL), cable modem, or wireless connection to the Internet. PPPoE combines the Point-to-Point Protocol (PPP), commonly used in dialup connections, with the Ethernet protocol, which supports multiple users in a local area network. The PPP protocol information is encapsulated within an Ethernet frame.



PPPoE is configured as a point to point connection between two Ethernet ports. As a tunneling protocol, PPPoE is used as an effective foundation for the transport of IP packets at the network layer. IP is overlaid over a PPP connection and uses PPP as a virtual dial up connection between points on the network. From the user's perspective, a PPPoE session is

initiated by using connection software on the client machine or router. PPPoE session initiation involves the identification of the Media Access Control (MAC) address of the remote device. This process, also known as PPPoE discovery, involves the following steps:

**Initiation** - The client software sends a PPPoE Active Discovery Initiation (PADI) packet to the server to initiate the session.

**Offer** - The server responds with a PPPoE Active Discovery Offer (PADO) packet.

**Request** - Upon receipt of the PADO packet, the client responds by sending a PPPoE Active Discovery Request (PADR) packet to the server.

**Confirmation** - Upon receipt of the PADR packet, the server responds by generating a unique ID for the PPP session and sends it in a PPPoE Active Discovery Session (PADS) confirmation packet to the client.

When a PPPoE session is initiated, the destination IP address is only used when the session is active. The IP address is released after the session is closed, allowing for efficient re-use of IP addresses.

PPPoE has the advantage that neither the telephone company nor the Internet service provider (ISP) needs to provide any special support. Unlike dialup connections, DSL and cable modem connections are "always on." Since a number of different users are sharing the same physical connection to the remote service provider, a way is needed to keep track of which user traffic should go to and which user should be billed. PPPoE provides for each user-remote site session to learn each other's network addresses (during an initial exchange called "discovery"). Once a session is established between an individual user and the remote site (for example, an Internet service provider), the session can be monitored for billing purposes. Many apartment houses, hotels, and corporations are now providing shared Internet access over DSL lines using Ethernet and PPPoE.

## What is Wi-Fi?

"Wi-Fi" is a type of wireless networking protocol that allows devices to communicate without cords or cables. Wi-Fi is technically an industry term that represents a type of wireless local area network (LAN) protocol based on the [802.11](#) IEEE network standard. It's the most popular means of communicating data wirelessly, within a fixed location, today.

"Wi-Fi" is a trademark of the Wi-Fi Alliance, an international association of companies involved with wireless LAN technologies and products.

In a Wi-Fi network, computers with WiFi network cards connect wirelessly to a wireless router. The router is connected to the Internet by means of a modem, typically a cable or DSL modem. Any user within 200 feet or so (about 61 meters) of the access point can then connect to the Internet, though for good transfer rates, distances of 100 feet (30.5 meters) or less are more common. Retailers also sell wireless signal boosters that extend the range of a wireless network.

Being able to connect to a wireless network or wi-fi hotspot is fundamental for mobile work and play. The step by step directions in the wi-fi tutorial below will help you set up your



laptop so you can connect to a network wirelessly for Internet access or to share files with other computers on the network. Examples are given for Windows XP, Vista/7, and Mac.

## Setting up Wi-Fi

Find the wireless network icon on your computer (on Windows, you'll find an icon that looks like 2 computers in your taskbar on the bottom right; Macs will have a wireless symbol in the top right).

- View available wi-fi networks by either right-clicking the icon and selecting "View Available Wireless Networks" (Windows XP) or left-clicking the icon and selecting to "Connect or disconnect..." (Windows Vista). On Mac OS X and Windows 7, all you have to do is click on the wi-fi icon to see the list of available networks.
- Choose the network to connect to by clicking the "Connect" button (or just selecting it on Win7/Mac).
- Enter the security key -- if the wireless network is encrypted (with WEP, WPA or WPA2), you'll be prompted to enter the network password or passphrase. This will be stored for you for next time,

Connecting to a wireless network or a wi-fi hotspot is pretty straightforward, though there are differences between different operating systems. This tutorial will help you set up your laptop on Windows XP, Vista/7, or a Mac so you can connect to a wireless network for Internet access or to share files over the network. (The screenshots are from a laptop running Vista, but the instructions have info for the other OSes as well.)

### Before you get started, you'll need:

- A wireless network adapter for your laptop (or built-in wireless on a different portable device). If you don't have one built in, you can purchase a USB wireless adapter or a PC card that you just plug in to install.
- You should also make sure you have a firewall installed and the latest antivirus updates and operating system patches, especially if the network you're connecting to is a public one. (Open wireless networks or ones that just use WEP are really not safe).
- If the network is secured with a password or the administrators have hidden the network name (SSID) from being broadcast, you'll need to find out that information as well to get connected.

## Protocols

Wi-Fi is a very common wireless technology that was developed in the 1990s. It is used to connect machines in a LAN. So, Wi-Fi is like a wireless version of Ethernet.

Wi-Fi is technically referred to as the 802.11 protocol. Over time, Wi-Fi has improved, giving rise to different variations of the protocol:

### 802.11a



This version operates at 54 Mbps. It is considered as the favorite wireless LAN protocol for IP telephony. The problem with it is distance; beyond 100 feet, you are out of the network.

### 802.11b

This version operates at 11 Mbps, but the distance of transmission is 300 feet, which is a considerable improvement over its predecessor. This version is used for public hotspots and small campus environments.

### 802.11g

This version is relatively new and is considered as a high-speed replacement for 802.11b. It works at 54 Mbps.

## Using VoIP in a Wi-Fi Network

With the Wi-Fi 802.11 networks, you can engage in Internet Telephony by simply using your laptop or any type of computer equipped with a wireless interface card. You can use headphones and microphones or any other special phone provided by your VoIP **service provider**.

## Advantage & Disadvantage

The basic advantage to using a Wi-Fi® phone is Internet access without data charge expenses. This enables the owner to call anyone while being able to see and access any website. At the same time, the owner is able to upload or download files for business or personal use, allowing the user to multitask in any environment where a Wi-Fi® signal is available.

One disadvantage of a Wi-Fi® phone is that a wireless hotspot is required for the Internet to work. In this way, the data access package that phone providers offer may seem tempting. The foil to this is that hotspots are increasingly common in businesses and public places, so finding a hotspot is rarely difficult.

Another hidden benefit to Wi-Fi® phones is that long-distance calls do not exist. With Wi-Fi® technology, the phone does not recognize that a call made to a phone nearby and one made to another state or country are any different. All the calls appear the same and, because of this, long-distance charges do not apply, so users who call other countries or regions will likely save money on their phone bills.

## WiMAX

- WiMAX is an IP based, wireless broadband access technology that provides performance similar to 802.11/Wi-Fi networks with the coverage and QOS (quality of service) of cellular networks.
- WiMAX is also an acronym meaning "Worldwide Interoperability for Microwave Access (WiMAX).

WiMAX is a wireless digital communications system, also known as IEEE 802.16, that is intended for wireless "metropolitan area networks". WiMAX can provide broadband wireless access (BWA) up to 30 miles (50 km) for fixed stations, and 3 - 10 miles (5 - 15 km) for mobile stations.





- In contrast, the WiFi/802.11 wireless local area network standard is limited in most cases to only 100 - 300 feet (30 - 100m).

With WiMAX, WiFi-like data rates are easily supported, but the issue of interference is lessened.

- WiMAX operates on both licensed and non-licensed frequencies, providing a regulated environment and viable economic model for wireless carriers.

At its heart, however, WiMAX is a standards initiative. Its purpose is to ensure that the broadband wireless radios manufactured for customer use interoperate from vendor to vendor.

- The primary advantages of the WiMAX standard are to enable the adoption of advanced radio features in a uniform fashion and reduce costs for all of the radios made by companies, who are part of the WiMAX Forum™ - a standards body formed to ensure interoperability via testing.
- The more recent Long Term Evolution (LTE) standard is a similar term describing a parallel technology to WiMAX that is being developed by vendors and carriers as a counterpoint to WiMAX.

## WHAT IS VOIP AND HOW IT WORKS

VoIP (Voice over Internet Protocol) is simply the transmission of voice traffic over IP-based networks.

The Internet Protocol (IP) was originally designed for data networking. The success of IP in becoming a world standard for data networking has led to its adaptation to voice networking.

### Some background history:

Although VoIP has been creating quite a stir in the press recently, it's actually not a new idea at all. VoIP has been around in one form or another since 1973 when it began as an experiment by the US Department of Defense.

### Why VoIP is better?

The number one reason to switch to VoIP technology for telephone service is cost reduction. VoIP has become popular largely because of the cost advantages to consumers over traditional telephone networks. VoIP slashes your monthly phone bill by a whopping fifty percent. Let's put some light over these claims.

It offers cheaper international long distance rates which are generally one-tenth of what is charged by traditional phone companies. Its portability makes it a very good option and one could avoid expensive hotel phone charges and cell phone roaming charges. What one requires is just a high speed connection where one could plug the adapter into and people could reach you at your local number irrespective of your location.

Most Internet connections are charged using a flat monthly fee structure. Using the Internet connection for both data traffic and voice calls can allow consumers to get rid of one monthly payment. In addition, VoIP plans do not charge a per-minute fee for long distance.

By making VoIP calls using internet enabled cell phones one could avoid wireless roaming fees and long distance rates which generally touch north. Most of the times in-network calls to other VoIP service subscribers are free even if the calling parties are located in different



parts of the world.

## How does it work?

Just to confuse people, there are many kinds of VoIP. Using voice chat in MSN , G Talk or Yahoo messenger could be regarded as VoIP, so could the highly publicized Skype; but these are all proprietary systems. To talk to someone using MSN, the person at the other end also needs MSN. The same applies to Yahoo and, to a great extent, to Skype. They use their own special system that isn't open and won't connect to other systems easily.

True VoIP should really be based on the SIP system which is the recognized standard. Any SIP compatible device can talk to any other; you don't even use a PC. Any SIP telephone can call another right over the internet, you don't need any additional equipment or even a phone provider. Just plug your SIP phone into the internet connection, configure it and then dial the other person right over the internet.

In all VoIP systems, your voice is converted into packets of data, like little files, and then transmitted to the recipient over the internet and decoded back into your voice at the other end. To make it quicker, these packets are compressed before transmission, a bit like zipping a file.

## Actual Cost of VoIP:

The promise of free international calls whenever you want them probably sounds a little too good to be true – there must be a catch, right? Well, yes and no. Provided you only wish to use VoIP to communicate with other VoIP users, everything is very straightforward. If however you want to be able to use VoIP to make and receive calls to and from people who don't have VoIP, you'll need to subscribe to a gateway service that provides a bridge between VoIP and the conventional phone networks.

## Getting Started with VoIP :

Getting started with VoIP could hardly be simpler. Assuming you already have the two most important ingredients (a Windows or Mac computer and a broadband Internet connection), all you need to get started is the following:

- Some free phone or messaging software.
- A microphone.
- Headphones or speakers (headphones are best because they won't cause as much feedback).

An alternative to a microphone and headphones is an integrated headset, as this will leave your hands free.

When it comes to choosing which software to use, it's worth considering whom you plan to call, since most VoIP software is proprietary. Check with any friends or relatives who already use VoIP and see what they're using. If you plan to use VoIP to call people who use different software, you may need to install more than one program!

Examples of VoIP software you might choose to use are MSN Messenger, Yahoo Messenger, SkyPe and ICQ, all of which are available as free downloads. All of these are designed to be beginner-friendly, so follow the installation instructions and you'll be ready to go in a matter of minutes.





## So what's the catch?

Obviously nothing is ever as simple as it sounds. New technologies aren't perfect and pricing often reflects this, if it wasn't cheaper nobody would switch.

The main problem with VoIP applications is bandwidth contention. This complicated term isn't as difficult as it sounds. You might have anything from a 512Kb broadband connection to 8Mb and beyond, dial-up isn't suitable for VoIP. It doesn't matter how big this connection is, it can still get busy.

VoIP phone call requires at least 100Kb or dedicated bandwidth and without this, you may find your phone calls less than satisfactory. To resolve this problem, there are now ranges of internet routers to use with your existing cable or DSL connection. These are VoIP aware and will dedicate the bandwidth to your phone call when you need it but free up all the bandwidth for other use when you're not on the phone. Some VoIP service providers will supply a compatible router with your connection package, it's essential.

## IPTV

IPTV (Internet Protocol television) is the delivery of programming by video stream encoded as a series of IP packets. IPTV is distributed by a service provider and can be free or fee-based and can deliver either live TV or stored video. It can be bundled with other Internet Protocol services, including VoIP and high-speed Internet access.

In traditional television delivery, all programming is broadcast simultaneously. The available program signals flow downstream and the viewer selects which program he wants to watch by changing the channel.

IPTV, by contrast, sends only one program at a time. Content remains on the service provider's network and only the program the customer selects is sent to the home. When a viewer changes the channel, a new stream is transmitted from the provider's server directly to the viewer. Like cable TV, IPTV requires a set-top box.

IPTV primarily uses multicasting with Internet Group Management Protocol (IGMP) version 2 for live television broadcasts and Real Time Streaming Protocol for on-demand programs. Compatible video compression standards include H.264, Windows Media Video 9 and VC1, DivX, XviD, Ogg Theora and the MPEG-2 and -4.

## Architecture of IPTV

### Elements

- TV Head-end: where live TV channels are encoded, encrypted and delivered in the form of IP multicast streams.
- VOD platform: where on-demand video assets are stored and served when a user makes a request in the form of IP unicast stream.
- Interactive portal: allows the user to navigate within the different IPTV services, such as the VOD catalog.
- delivery network: the packet switched network that carries IP packets (unicast and multicast).



- home gateway: the piece of equipment at the user's home that terminates the access link from the delivery network.
- User's set-top box: the piece of equipment at the user's home that decodes and decrypt TV and VOD content and displays it on the TV screen.

## Protocols

IPTV covers both live TV (multicasting) as well as stored video (Video-on-Demand, or VoD). The playback of IPTV requires either a personal computer or a set-top-box connected to a TV. Video content is typically compressed using either a MPEG-2 or a MPEG-4 codec and then sent in an MPEG transport stream delivered via IP Multicast in case of live TV or via IP Unicast in case of video on demand. IP multicast is a method in which information can be sent to multiple computers at the same time. H.264 (MPEG-4) codec is increasingly used to replace the older MPEG-2 codec.

In standards-based IPTV systems, the primary underlying protocols used are:

- Live IPTV uses IGMP for connecting to a multicast stream (TV channel) and for changing from one multicast stream to another (TV channel change). IP multicast operates within LANs or VLANs so other protocols, such as Protocol Independent Multicast (PIM), are used to route IPTV multicast streams from one LAN segment to another.
- VOD uses UDP or RTP protocols for channel streams and control is done using the Real Time Streaming Protocol (RTSP)
- A network personal video recorder, like VOD, uses UDP or RTP for IPTV streams and RTSP for end-user control communications.

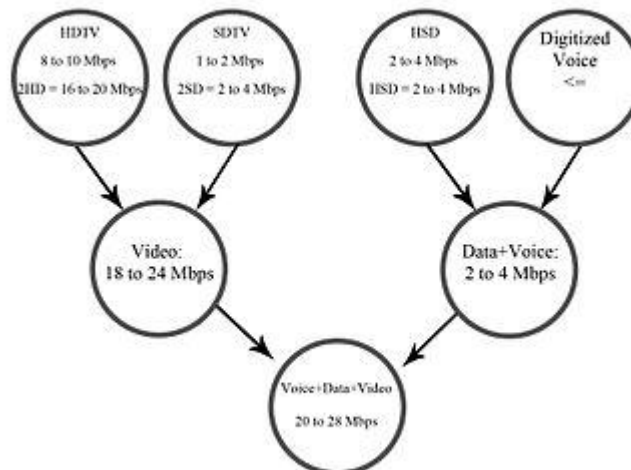
A telecommunications company IPTV service is usually delivered over an investment-heavy walled garden network.

Local IPTV, as used by businesses for audio visual AV distribution on their company networks is typically based on a mixture of:

1. Conventional TV reception equipment and IPTV encoders
2. IPTV Gateways that take broadcast MPEG channels and IP wrap them to create multicast streams.

## IPTV Bandwidth Requirements





Bandwidth capacity for simultaneously 2 HDTV stream, 2 SD stream, additional to HSD and Voice

- Digital video is a combination of sequence of digital images, and they are made up of pixels or picture elements. Each pixel has two values, which is luminance and chrominance. Luminance is representing intensity of the pixel; on the other hand chrominance is representing the colour of the pixel. 3 bytes would be used to represent the colour of the high quality image for a true colour technique. A sequence of images is creating the digital video, in that case, images is called as frames.
- Movies are using 24 frames per second; however, the rate of the frames can change according to territories electrical system. So that there are different kinds of frame rates, for instance, North America is using approximately 30 frames per second where the Europe television frame rate is 25 frames per second. Each digital video has dimensions; width and height, when referred to analogue television, the dimension for SDTV is 650x480 pixels, on the other hand, numerous HDTV requires 1920x1080 pixels. Moreover, whilst for SDTV, 2 bytes (16 bits) is enough to create the colour depth, HDTV requires 3 (24 bits) bytes to create the colour depth.
- Thereby, with a rate of 30 FPS, the uncompressed data rate for SDTV becomes  $30 \times 640 \times 480 \times 16$ , in other words, 147,456,000 bit per second. Moreover, for HDTV, at the same frame rate, uncompressed data rate becomes  $30 \times 1920 \times 1080 \times 24$  or 1,492,992,000 bits per second. With that simple calculation, it is obvious that without using a lossy compression methods service provider's service delivery to the subscribers is limited.
- There is no absolute answer for the bandwidth requirement for the IPTV service because the bandwidth requirement is increasing due to the devices inside the household. Thus, currently compressed HDTV content can be delivered at a data rate between 8 to 10 Mbps, but if the home of the consumer equipped with several HDTV outputs, this rate will be multiplied respectively.
- The high speed data transfer will increase the needed bandwidth for the viewer, at least 2 Mbps needed to use web based applications on the computer. Additional to that, 64 kbps required to use landline telephone for the property. In minimal usage, to receive an IPTV triple play service requires 13 Mbps to process in a household.

## Advantage

- One of the advantages of IPTV is the ability for digital video recorders (DVRs) to record multiple broadcasts at once. According to Alcatel, one leading provider, it will also be easier to find favorite programs by using "custom view guides." IPTV even allows for picture-in-picture viewing without the need for multiple tuners. You can watch one show, while using picture-in-picture to channel surf!
- IPTV viewers will have full control over functionality such as rewind, fast-forward, pause, and so on. Using a cell phone or PDA, a subscriber might even utilize remote programming for IPTV. For example, if a dinner function runs longer than expected, you don't have to miss your favorite program. Just call home and remotely set the IPTV box to record it.
- The IP (Internet Protocol)-based platform offers significant advantages, including the ability to integrate television with other IP-based services like high speed Internet access and VoIP.
- A switched IP network also allows for the delivery of significantly more content and functionality. In a typical TV or satellite network, using broadcast video technology, all the content constantly flows downstream to each customer, and the customer switches the content at the set-top box. The customer can select from as many choices as the telecoms, cable or Satellite Company can stuff into the "pipe" flowing into the home. A switched IP network works differently. Content remains in the network, and only the content the customer selects is sent into the customer's home. That frees up bandwidth, and the customer's choice is less restricted by the size of the "pipe" into the home. This also implies that the customer's privacy could be compromised to a greater extent than is possible with traditional TV or satellite networks. It may also provide a means to hack into, or at least disrupt. Private network.

## The economics of IPTV

The cable industry's expenditures of approximately \$1 Billion per year are based on network updates to accommodate higher data speeds. Most operators use 2-3 channels to support maximum data speeds of 50 Mb/s to 100 Mb/s. However, because video streams require a high bit rate for much longer periods of time, the expenditures to support high amounts of video traffic will be much greater. This phenomenon is called persistency. Data persistency is routinely 5% while video persistency can easily reach 50%. As video traffic continues to grow, this means that significantly more CMTS downstream channels will be required to carry this video content. Based on today's market, it is likely that industry expenditures for CMTS expansion could exceed \$2 Billion a year, virtually all of this expenditure being driven by video traffic. Adoption of IPTV for carrying the majority of this traffic could save the industry approximately 75% of this capital expenditure.

## Interactivity

An IP-based platform also allows significant opportunities to make the TV viewing experience more interactive and personalized. The supplier may, for example, include an interactive program guide that allows viewers to search for content by title or actor's name, or a picture-in-picture functionality that allows them to "channel surf" without leaving the program they're watching. Viewers may be able to look up a player's stats while watching a sports game, or control the camera angle. They also may be able to access photos or music from their PC on their television, use a wireless phone to schedule a recording of their



favorite show, or even adjust parental controls so their child can watch a documentary for a school report, while they're away from home.

Note that this is all possible, to some degree, with existing digital terrestrial, satellite and cable networks in tandem with modern set top boxes. In order that there can take place an interaction between the receiver and the transmitter a feedback channel is needed. Due to this, terrestrial, satellite, and cable networks for television do not allow interactivity. However, interactivity with those networks can be possible by combining TV networks with data networks such as the Internet or a mobile communication network.

## Video-on-demand

IPTV technology is bringing Video-on-demand (VoD) to television which permits a customer to browse an online program or film catalog, to watch trailers and to then select a selected recording. The payout of the selected item starts nearly instantaneously on the customer's TV or PC.

Technically, when the customer selects the movie, a point-to-point unicast connection is set up between the customer's decoder (Set Top Box or PC) and the delivering streaming server. The signalling for the trick play functionality (pause, slow-motion, wind/rewind etc.) is assured by RTSP (Real Time Streaming Protocol).

The most common codecs used for VoD are MPEG-2, MPEG-4 and VC-1.

In an attempt to avoid content piracy, the VoD content is usually encrypted. Whilst encryption of satellite and cable TV broadcasts is an old practice, with IPTV technology it can effectively be thought of as a form of Digital Rights Management. A film that is chosen, for example, may be playable for 24 hours following payment, after which time it becomes unavailable.

## IPTV-based converged services

Another advantage of an IP-based network is the opportunity for integration and convergence. This opportunity is amplified when using IMS-based solutions. Converged services implies interaction of existing services in a seamless manner to create new value added services. One good example is On-Screen Caller ID, getting Caller ID on your TV and the ability to handle it (send it to voice mail, etc.). IP-based services will help to enable efforts to provide consumers anytime-anywhere access to content over their televisions, PCs and cell phones, and to integrate services and content to tie them together. Within businesses and institutions, IPTV eliminates the need to run a parallel infrastructure to deliver live and stored video services.

## Limitations

IPTV is sensitive to packet loss and delays if the streamed data is unreliable. IPTV has strict minimum speed requirements in order to facilitate the right number of frames per second to deliver moving pictures. This means that the limited connection speed/bandwidth available for a large IPTV customer base can reduce the service quality delivered.

Although a few countries have very high speed broadband-enabled populations, such as South Korea with 6 million homes benefiting from a minimum connection speed of 100Mbit/s, in other countries (such as the UK) legacy networks struggle to provide 3-5 Mbit/s and so simultaneous provision to the home of TV channels, VOIP and Internet access may not be viable. The last mile delivery for IPTV usually has a bandwidth restriction that only allows a



small number of simultaneous TV channel streams – typically from one to three – to be delivered.

Streaming IPTV across wireless links within the home has proved troublesome; not due to bandwidth limitations as many assume, but due to issues with multipath and reflections of the RF signal carrying the IP data packets. An IPTV stream is sensitive to packets arriving at the right time and in the right order. Improvements in wireless technology are now starting to provide equipment to solve the problem.

Due to the limitations of wireless, most IPTV service providers today use wired home networking technologies instead of wireless technologies like 802.11.

## CSMS

### Customer Service Management System (CSMS)

A fully computerized single window facility for all telephone related work, covering from Registration of new phones to Billing Services and fault repair services. It is a service for Landline & Broadband customers of MTNL.

It provides services as follows:

CSMS provides a lot of online enquiry thru MSIN connection to Personal Computer or By Terminals.

Its different modules like –

- Pre connection,
- Post-connection.
- Accounts Management.
- Billing.

**Pre connection:** All the services that are required prior to provide a landline or Broadband connection are provided in this module. e.g. New Line Registration, Demand Note generation, Edit and Approve Application, Issue of Work Order, Completion of Work Order etc.

**Post-connection:** All the services that are provided to customer after a landline or Broadband connection is provided to the customer. e.g. Providing the Phone Plus facilities, Transfer of connection, change of address, change of telephone, 3<sup>rd</sup> Party transfer etc.

**Billing-** In Billing Module billing related activity like generation of bills are done.

**Accounts Management:** In this module all the financial accounting audit reports are generated.

**Broadband Services:** In this Module All the Broadband services related activities are done like Broadband Plan change etc.



## CSMS Architecture

CSMS Database server system configuration is as follows.

Data base Server Model	: HP RX8620
Processor	: 12 x CPUs
Memory	: 64 GB RAM

## CSMS Application server system configuration is as follows.

CSMS Application server system configuration is as follows.

Application Server Model (A)	: HP L Class
Processor	: 4 x CPUs
Memory	: 2 GB RAM
Application Server Model (B)	: Sun V 480
Processor	: 4 x CPUs
Memory	: 8 GB RAM

CSMS system volume is divided into 9 suitable databases for 9 areas of MTNL Mumbai. These databases are distributed into 3 high end Database Servers. The end users access the data using application running in CSMS Application Servers. All the servers are connected to each other using MICN network.

## Software

Above Database and Application server is running on Network OS & database platform as follows.

- Oracle 10g Release 2 Database to store the data.
- Oracle Forms 6i for CSMS Application.
- Applications developed in Oracle Forms 6i Software.

## WFMS (Web Based Financial Management System)

It is a powerful Web Based Financial Management System which has replaced the older generation of (CUI) Character User Interface by advance Graphical User Interface (GUI) system. Old system FMS system is now obsolete. WFMS system requires some certain configuration for smooth running of application.





- WFMS end users requires Internet Explorer 6 or above to access the WFMS system.
- Another Ethernet card if Computer is configured for other network.
- A Dial up modem and landline number for MICN connection.
- Only through direct MICN connection or dial up connectivity to MICN RAS.

### Available services by WFMS

WFMS service has following different Modules for different services:

- **Pay bill:** This module is used to Creation of Master, Processing salary, Processing leaves and overtime, Processing Pension, Generation of various reports etc.
- **Works:** This Module is used for Processing of Contractors/Suppliers bills, Processing Imprest and Temporary Advance, Processing Site Rent, Generating Contractor/Supplier related reports etc.
- **FA:** This module is used for Payments and Receipts processing, generation of JV (Journal Voucher), Sub ledger, General ledger, generation of Trial Balance, Payment and Receipt Processing, Generation of Profit and Loss A/c generation of Balance Sheet, Importing JV from CSMS, Importing Refunds data from CSMS etc.
- **Work Flow:** This Module is used for Approval of Employee loans and advances, Approval of Contractor/Supplier bills, Approval of sanctioning of Contractor/Supplier bills, Approval of JVs etc.
- **Common:** This Module is used for Creation of request for bill tracking, Generation of Query based Reports, Change of User password etc.

### WFMS Hardware Architecture

Advance Hardware and Software are used in MTNL's WFMS system, which is located in Data Center.

Both Database and Application Server configuration is given below.

**Database Server: Model** : HP rp3440, 4 CPU, 16GB RAM

**Application Server: Model** : HP rp4440, 4 CPU, 24 GB RAM

Like CSMS operation end user of WFMS can use Windows PC or Thin Clients to access WFMS system. To browse the system Browser should be higher version.

### Software

- Oracle 10g Release 2 Database to store the data.
- Oracle Application Server 9i Release 2 for WFMS Application.

**Minimum System requirements for accessing WFMS system by end users are given below:**





OS: Windows 98/XP  
Browser: Internet Explorer version 6.0  
PDF Reader  
Memory (RAM): 256 MB

**To access WFMS system following things is required.**

**Network connectivity:**

WFMS system can be accessed from computers using Dial-up networking (modem) OR MICN (MTNL Internal Computer Network).

**To access WFMS system using dialup networking following things are required**

- Modem should be installed and working in End-users PC/Thin-Client  
An account for dialup access is required to be created.

**To access WFMS system using MICN network following things are required**

- Ethernet (LAN) Card is required in End-user's PC/Thin-Client.
- Proper IP Address should be configured for LAN Card.
- (Contact IT-NW Curry Road Section to get IP Address if previously not configured)

**The URL for WFMS is**

[http://10.22.28.93:7779/wfmslive/WFMS\\_Login.jsp](http://10.22.28.93:7779/wfmslive/WFMS_Login.jsp)

## HRIS (Human Resource Information System)

The Human Resource Information System (HRIS) is a software or online solution for the data entry, data tracking, and data information needs of the Human Resources, payroll, management, and accounting functions within a business. Normally packaged as a data base, hundreds of companies sell some form of HRIS and every HRIS has different capabilities. It processes the HR information the employees of MTNL. Database of HRIS system is stored in My SQL Database and the application of HRIS is developed in PHP.

Typically, the better The Human Resource Information Systems (HRIS) provide overall:

- Management of all employee information.
- Reporting and analysis of employee information.
- Company-related documents such as employee handbooks, emergency evacuation procedures, and safety guidelines.
- Benefits administration including enrollment, status changes, and personal information updating.
- Complete integration with payroll and other company financial software and accounting systems.



An effective HRIS provides information on just about anything the company needs to track and analyze about employees, former employees, and applicants. Your company will need to select a Human Resources Information System and customize it to meet your needs.

With an appropriate HRIS, Human Resources staff enables employees to do their own benefits updates and address changes, thus freeing HR staff for more strategic functions. Additionally, data necessary for employee management, knowledge development, career growth and development, and equal treatment is facilitated. Finally, managers can access the information they need to legally, ethically, and effectively support the success of their reporting employees.

### **SOME OF THE MOST POPULAR MODULES OF HRIS ARE:**

- **Organization charts** (Create professional looking, dynamic organization charts)
- **Employee self service** (Employees can update personal information and view benefits elections, absence transactions, time-off balances and payroll information)
- **Benefits Administration** (Save paper and postage, take weeks off the benefits open enrollment period, reduce administration time, and improve data accuracy)
- **Track training for employees**

## **What is Web Page**

Web pages are what make up the World Wide Web. These documents are written in HTML (hypertext markup language) and are translated by your Web browser. Web pages can either be static or dynamic. Static pages show the same content each time they are viewed. Dynamic pages have content that can change each time they are accessed. These pages are typically written in scripting languages such as PHP, Perl, ASP, or JSP. The scripts in the pages run functions on the server that return things like the date and time, and database information. All the information is returned as HTML code, so when the page gets to your browser, all the browser has to do is translate the HTML

**Web design** is the process of planning and creating a website. Text, images, digital media and interactive elements are used by web designers to produce the page seen on the web browser. Web designers utilize markup language, most notably HTML for structure and CSS for presentation as well as JavaScript to add interactivity to develop pages that can be read by web browsers.

As a whole, the process of web design can include conceptualization, planning, producing, post-production, research, advertising. The site itself can be divided up into pages. The site is navigated by using hyperlinks, which are commonly blue and underlined but can be made to look like anything the designer wishes. Images can also be hyperlinks.

Web designing is all about writing code that is valid HTML and CSS which make it easier to correct problems, and edit pages. HTML and CSS are the fundamental technologies for building web pages: HTML (html and xhtml) for structure, CSS for style and layout, including WebFonts. By separating the presentation style of documents from the content of documents, CSS simplifies Web authoring and site maintenance. For example, having a separate CSS file allows for making aesthetic changes to the entire website than just to a single web page. If CSS rules are included within a single HTML page, changes would have to be made to each and every page that used the element in question. The reasoning is that HTML should only be used for raw content and CSS be used to manipulate the content for aesthetic style.



HTML and XHTML are mark up languages.

**Web development** is a broad term for the work involved in developing a web site for the Internet (World Wide Web) or an intranet (a private network). This can include web design, web content development, client liaison, client-side/server-side scripting, web server and network security configuration, and e-commerce development.

## Typical Areas

Web Development can be split into many areas and a typical and basic web development hierarchy might consist of:

### Client Side Coding

- Ajax Asynchronous JavaScript provides new methods of using JavaScript, and other languages to improve the user experience.
- Flash Adobe Flash Player is an ubiquitous browser plugin ready for RIAs. Flex 2 is also deployed to the Flash Player (version 9+).
- JavaScript Formally called ECMAScript, JavaScript is a ubiquitous client side platform for creating and delivering rich Web applications that can also run across a wide variety of devices.
- JQuery Cross-browser JavaScript library designed to simplify and speed up the client-side scripting of HTML.
- Microsoft Silverlight Microsoft's browser plugin that enables animation, vector graphics and high-definition video playback, programmed using XAML and .NET programming languages.
- HTML5 and CSS3 Latest HTML proposed standard combined with the latest proposed standard for CSS natively supports much of the client-side functionality provided by other frameworks such as Flash and Silverlight

Looking at these items from an "umbrella approach", client side coding such as XHTML is executed and stored on a local client (in a web browser) whereas server side code is not available to a client and is executed on a web server which generates the appropriate XHTML which is then sent to the client. The nature of client side coding allows you to alter the HTML on a local client and refresh the pages with updated content (locally), web designers must bear in mind the importance and relevance to security with their server side scripts. If a server side script accepts content from a locally modified client side script, the web development of that page is poorly sanitized with relation to security.

### Server Side Coding

- ASP (Microsoft proprietary)
- CSP, Server-Side ANSI C
- ColdFusion (Adobe proprietary, formerly Macromedia, formerly Allaire)
- CGI
- Groovy (programming language) Grails (framework)
- Java, e.g. Java EE or WebObjects
- Lotus Domino
- Perl, e.g. Catalyst, Dancer (all open source)
- PHP (open source)
- Python, e.g. Django (web framework) (open source)
- Real Studio Web Edition



- Ruby, e.g. Ruby on Rails (open source)
- Smalltalk e.g. Seaside, AIDA/Web
- SSJS Server-Side JavaScript, e.g. Aptana Jaxer, Mozilla Rhino
- Websphere (IBM proprietary)
- .NET and .NET MVC Frameworks (Microsoft proprietary)

## What is Static Website

The static website is simple website design which is cost effective and beneficial for the small enterprises or individual to expand their business through web. Through static website individuals or small business houses can place simple information regarding their company and products in simple manner and at low cost. This type of website is very useful for expanding market of company with its information and appearance on Internet.

A static website is just you write your material in any word processor and upload it as an .html or .htm web page. Static websites are simple in character and can be link easily together. There are many websites that provide free static templates for creating static website. According to your company's need you can choose among templates and place your content accordingly. The static website is the best and most simplest way of establishing your global corporate identity on World Wide Web. With the help of static templates you can make your sites online quickly. The only consideration you have to take is to have basic knowledge of hypertext markup language (HTML). The static templates use either tables or CSS (cascading style sheet) for positioning contents. The CSS style remains the preferred choice. CSS allow users to develop cleaner format with less code in the actual page itself.

A static website is perfect for individuals, businesses or companies that have a message that change slowly. In static website users can quickly and easily put contents and images without having much experience. The static website is ideal for demonstrating how your website will look on Internet. Cache friendly copy of website can be shown to many people.

Through Static websites you can showcase products, services and information in an effective way. It is most cost effective in online product advertising. A static website is quite suitable where updating the products or services is not required. Static web designs are ideal for downloading images, brochures etc. Static websites are browser friendly and easy to navigate.

### Advantage of Static Website:

There are a number of advantages of the static websites:

- Simple to create and host
- Cheaper in the comparison of dynamic website design
- Easy navigation for search engines
- Quick to download images, brochures even on lower bandwidths
- Each and every page of the website is editable but the certain knowledge is required
- Can see the preview before adding on live
- Can change the layout of web page when desired
- Direct control over content

### Disadvantage of Static Website:



- Could cost you more in the long run depending on the frequency of the updates
- Long change process as you have to wait for a website designer to have the time to make your changes
- Difficult to maintain when a site gets large.
- Difficult to keep consistent and up to date.

## Static web page

A static website is one that has web pages stored on the server in the format that is sent to a client web browser. It is primarily coded in Hypertext Markup Language, HTML.

Simple forms or marketing examples of websites, such as *classic website*, a *five-page website* or a *brochure website* are often static websites, because they present pre-defined, static information to the user. This may include information about a company and its products and services via text, photos, animations, audio/video and interactive menus and navigation.

This type of website usually displays the same information to all visitors. Similar to handing out a printed brochure to customers or clients, a static website will generally provide consistent, standard information for an extended period of time. Although the website owner may make updates periodically, it is a manual process to edit the text, photos and other content and may require basic website design skills and software.

In summary, visitors are not able to control what information they receive via a static website, and must instead settle for whatever content the website owner has decided to offer at that time.

### They are edited using four broad categories of software:

- **Text editors**, such as Notepad or TextEdit, where content and HTML markup are manipulated directly within the editor program
- **WYSIWYG offline editors**, such as Microsoft FrontPage and Adobe Dreamweaver (previously Macromedia Dreamweaver), with which the site is edited using a GUI interface and the final HTML markup is generated automatically by the editor software
- **WYSIWYG online editors** which create media rich online presentation like web pages, widgets, intro, blogs, and other documents.
- **Template-based editors**, such as RapidWeaver and iWeb, which allow users to quickly create and upload web pages to a web server without detailed HTML knowledge, as they pick a suitable template from a palette and add pictures and text to it in a desktop publishing fashion without direct manipulation of HTML code.

## FrontPage

Web pages are the basic documents of the World Wide Web. They can either be part of a Web site, or they can stand alone. Many of the features in Microsoft FrontPage are used when working with a Web site. There are also features in FrontPage that will help you to both design and create your Web page.

To help you create professional-looking and well-designed Web pages, FrontPage provides several page templates that you can use to quickly create pages with a variety of layouts and functions. For example, you can use a FrontPage template to create a user registration page, guest book, feedback form, a page with a search form, and more.



You can use themes to create pages with a consistent design. A theme contains unified design elements with a colour scheme, including fonts, graphics, backgrounds, navigation bars, horizontal lines, and other page elements.

If you prefer to design and lay out pages yourself, you can start with a blank page, and then do one or more of the following:

- Use frames, tables, layouts, or absolute positioning to precisely position text and graphics on a page.
- Add page elements, such as text, graphics, page banners, tables, forms, hyperlinks, and so on.
- Add dynamic elements such as Flash content, video, sound, or animated GIFs.
- Add content or functionality that can change, such as marquees, hit counters, time stamps, page transitions, interactive buttons, and behaviors that use Dynamic HTML (DHTML).
- Format text by applying styles or using style sheets.
- Set the background of your Web page with either color or pictures.
- Create your own page templates by using dynamic Web templates, which can include pages that contain page settings, formatting, and page elements.

## Editing in FrontPage

You do not need to know how to code in HTML to use FrontPage. While you edit pages as you would in a word processor — typing and formatting text, and adding graphics, tables, and other page elements — FrontPage adds the HTML tags in the background. You simply edit your pages in **Design** view.

However, if you want to familiarize yourself with HTML or edit HTML code directly, you can also use **Code** view, which displays the HTML code of a Web page, or **Split** view, which displays both **Code** view and **Design** view simultaneously.

If you are familiar with HTML, you can display the HTML tags in **Code** view and you can write and edit the HTML tags yourself. With the create and maintain optimized code options available in FrontPage, you can create clean HTML, and easily remove any code that you do not want.

In FrontPage, you can use Extensible Markup Language (XML) to complement, rather than replace, your HTML. You can view or edit files, apply standard formatting to the structure of code in XML files, view the XML tree, and create custom displays of XML data on Web pages. For example, you can create a Web page that displays data from an XML file, format that data, and apply filtering, sorting, and conditional formatting to display the data the way you want.

## Add a file to a FrontPage Web site

To add a file (such as a PDF file, text file, multimedia file, or program) to your Microsoft Office FrontPage 2003 Web site, you must first import the file into your FrontPage **Folder List**, link to it from your Web page, and then publish your Web site. When users click the hyperlink, the file will run from the server or open on their desktop.

- If the **Folder List** is not visible, on the **View** menu, click **Folder List**.
- Open the Web page from which you want to link to the file.
- Select the text or picture that you want to use as the hyperlink.





**NOTE** If you do not select text or a picture, the destination URL is displayed as the hyperlink text.

- On the **Standard** toolbar, click **Insert Hyperlink** .
- Under **Link to**, click **Existing File or Web Page**.

Select the file that you imported into your FrontPage Web site, and then click **OK**.


## Change the title of a Web page

The title of a page is the name that appears in the title bar of most Web browsers, page banners, and link bars.

The title can be different from the file name. For example, the title of your home page could be "My home page" even though the file name is "Default.htm."

- In On the **Folder List**, right-click the Web page file, click **Properties**, and then click the **General** tab.
- In the **Title** box, type the title that you want.
- Any view except **Tasks** or **Reports**, open the **Folder List**.

## Save a Web page

- Click **Save** .
- Locate and double-click the folder where you want to save the page.
- In the **File name** box, type the file name of the page, and then click **Save**.

## Dynamic web page

- A dynamic website is one that changes or customizes itself frequently and automatically, based on certain criteria.
- Dynamic websites can have two types of dynamic activity: Code and Content. Dynamic code is invisible or behind the scenes and dynamic content is visible or fully displayed.

### Dynamic code

- The first type is a web page with dynamic code. The code is constructed dynamically on the fly using active programming language instead of plain, static HTML.
- A website with dynamic code refers to its construction or how it is built, and more specifically refers to the code used to create a single web page. A dynamic web page is generated on the fly by piecing together certain blocks of code, procedures or routines. A dynamically-generated web page would recall various bits of information from a database and put them together in a pre-defined format to present the reader with a coherent page. It interacts with users in a variety of ways including by reading cookies recognizing users' previous history, session variables, server side variables etc., or by using direct interaction (form elements, mouse overs, etc.). A site can display the current state of a dialogue between users, monitor a changing situation,

or provide information in some way personalized to the requirements of the individual user.

## Dynamic content

- The second type is a website with dynamic content displayed in plain view. Variable content is displayed dynamically on the fly based on certain criteria, usually by retrieving content stored in a database.
- A website with dynamic content refers to how its messages, text, images and other information are displayed on the web page, and more specifically how its content changes at any given moment. The web page content varies based on certain criteria, either pre-defined rules or variable user input. For example, a website with a database of news articles can use a pre-defined rule which tells it to display all news articles for today's date. This type of dynamic website will automatically show the most current news articles on any given date. Another example of dynamic content is when a retail website with a database of media products allows a user to input a search request for the keyword Beatles. In response, the content of the web page will spontaneously change the way it looked before, and will then display a list of Beatles products like CDs, DVDs and books.

## Purpose of dynamic websites

- The main purpose of a dynamic website is automation. A dynamic website can operate more effectively, be built more efficiently and is easier to maintain, update and expand. It is much simpler to build a template and a database than to build hundreds or thousands of individual, static HTML web pages.

## Software systems

- There is a wide range of software systems, such as ANSI C servlets, JavaServer Pages (JSP), the PHP, Perl, Python, and Ruby programming languages, ASP.NET, Active Server Pages (ASP), YUMA and ColdFusion (CFML) that are available to generate dynamic web systems and dynamic sites. Sites may also include content that is retrieved from one or more databases or by using XML-based technologies such as RSS.
- Static content may also be dynamically generated either periodically, or if certain conditions for regeneration occur (cached) in order to avoid the performance loss of initiating the dynamic engine on a per-user or per-connection basis.
- Plug ins are available to expand the features and abilities of web browsers to show *active content* or even create rich internet applications. Examples of such plug-ins are Microsoft Silverlight, Adobe Flash, Adobe Shockwave or applets written in Java. Dynamic HTML also provides for user interactivity and realtime element updating within web pages (i.e., pages don't have to be loaded or reloaded to effect any changes), mainly using the Document Object Model (DOM) and JavaScript, support which is built-in to most modern web browsers.
- Turning a website into an income source is a common practice for web developers and website owners. There are several methods for creating a website business which fall into two broad categories, as defined below.

## Content-based sites

- Some websites derive revenue by selling advertising space on their site either through direct sales or through an advertising network.





## Product- or service-based sites

- Some websites derive revenue by offering products or services for sale. In the case of e-commerce websites, the products or services may be purchased at the website itself, by entering credit card or other payment information into a payment form on the site. While most business websites serve as a shop window for existing brick and mortar businesses, it is increasingly the case that some websites are businesses in their own right; that is, the products they offer are only available for purchase on the web.
- Websites occasionally derive income from a combination of these two practices. For example, a website such as an online auctions website may charge the users of its auction service to list an auction, but also display third-party advertisements on the site, from which it derives further income.

## BASIC WEB PAGE ELEMENTS

A basic web page has four main elements: hypertext markup language, text, graphics, and links. You can view a description of each of these elements by a click on its title.

- Hypertext Markup Language
- Text
- Graphics
- Links

### HYPERTEXT MARKUP LANGUAGE

- Hypertext Markup Language is the code that browsers like Netscape Navigator and Microsoft Internet Explorer use to "read" a web page. A web page is a Hypertext Markup Language document.
- Netscape Composer translates your text, graphics and links into Hypertext Markup Language for you.
- Hypertext Markup Language documents are saved with the file extensions .html or .htm.
- When you save your web page in Composer, the .html extension will be automatically added.

### TEXT

- Text consists of headings, descriptions, directions, and information that you wish to include in your web page.
- Text can be added to a web page by typing directly onto the open Composer page.
- Text can also be added by copying and pasting a word processed document onto the Composer page.
- As much as possible, keep text short and to the point.

### GRAPHICS

- Web page graphics are image files (photographs, icons, pictures, cartoons, animations) that you can insert into your web page.
- Graphic files are used as backgrounds, bullets, page dividers, signposts, illustrations, and sometimes, just for fun.
- Web graphic files typically carry the file extension .gif or .jpg.
- There are many "ready made" free graphics collections on the web. You can save these graphics and insert them in your web page as needed.



- Some graphics are copyrighted and cannot be used without permission. Permission is usually easy to obtain with a short e-mail request to the designer. An "image source" link should be placed under or next to a copyrighted image.
- It is a good idea to create a section of links to the graphics collections that you use-- even if they are free.
- Warning! Graphics can take a long time to load and should be used sparingly.

## LINKS

- Links (also called hypertext) are connectors.
- Both text and graphics can be linked.
- Links are usually used in three ways:
  - Links can connect your web page to someone else's web page.
  - Links can connect different pages of the same web site.
  - A web site is simply a collection of web pages linked together.

## PREPARING A WEB PAGE

A well designed web page is a structured document that supports a specific purpose or goal.

- The structure of a web page works like an outline, moving from general subject headings to specific topics.
- A good outline is easy to follow; a good web page is easy to navigate.
- Before you actually learn how to use the Composer program, you will need to organize the content of your page.
- To save time, you will use a prepared outline for a classroom home page that you can adapt to your own teaching situation. A selection of school-related graphics and a diskette for storing your web page files are also provided.

### RULES OF WEB PAGE ORGANIZATION

- Start and maintain a paper (notebook) copy of your web page work.
- Outline the textual contents of your page.
- Write down both the title and **URL** of any web page for which you will create a link.
- Save all of your web page (.gif, .jpg, .html) files in one folder on your C drive (home base computer) or A drive (diskette). This is **MOST IMPORTANT** for publishing your page.
- When you save an image file, write down its source (Graphics Collection title and **URL**), the file name, and a short description of the image.
- The web page title and the web page .html file name are different. The title describes the page's content. The .html file name will be part of the page's **URL** and should be kept short.
- Always make a back up copy of your web page files and keep it updated.

### Outline

- Your first web page will be a classroom home page that is easy to adapt and edit.
- The outline below will be used as the basis for Step 4: Creating Your Page. Step 4 includes a printable form of the outline.
- You will set up the page so that specific information can be filled in later.
- All you need to do for now is use this outline to organize some ideas particular to your teaching situation.
- Feel free to adapt the topics to suit your needs.



## Adobe Photoshop

Adobe Photoshop is hands down, the most popular program for creating and modifying images for the web.

Photoshop is a powerful program with numerous features. For serious individuals who need this level of robustness in a program, there are enough books, online tutorials and tips, learning videos, and classes to aid advanced beginning and intermediate level computer users. But it certainly is the perfect tool for professionals who need advanced features. If you are a Beginner, you might want to start with Photoshop LE (Photoshop Limited Edition) which provides the features hobbyists and small businesses need, but lacks the high level production elements graphics professionals use.

This is true not only because Photoshop is available on a wide array of platforms ranging from Mac to Windows to UNIX, but because after four generations of development, Adobe Photoshop has the most intuitive user interface, the most complete set of tools, and the largest number of reference books around.

Photo shop is also an image creation software as well as an editor. Photo shop can create any effect or style needed in a drawing or painting or layout. There are graphic software that can do specialized work faster and more efficient than Photo shop (such as painter for realistic paint effects), but Photo shop can do it all in one program.

The basics of Photo shop are easy to learn, even the CS versions. They are very intuitive, and there are several ways to do almost everything to work with an individual's style of drawing and skill level yet you can spend years learning all the pro level features.

Photo shop works by altering individual pixels in an image as opposed to a vector drawing program that draws with points, lines and objects mathematically. Photo shop is best with images that have complex textures, blends and photo realism, but Photo shop is also very good at vector drawing as long as the image doesn't need to be scaled and you don't need specialized CAD drawing tools

### The new and enhanced features in this version are:

- **File Browser**--The new File Browser lets you search for images visually rather than just by file name.
- **Healing Brush & Patch Tool**--The Healing Brush and Patch Tool lets you remove artifacts such as dust, scratches, blemishes, and wrinkles.
- **Web Transparency**--The new Save for Web option enables you to remap colors to transparency or to other colors and to dither a transparency for better partially transparent effects in your Web graphics.
- **Enhanced Web Output**--Keep vector art and text looking crisp by letting Photoshop or ImageReady automatically assign a higher priority to those areas when you optimize an image for the Web.
- **WBMP Support**--Preview and save for Web in WBMP format, commonly used for displaying images on PDAs and wireless devices.
- **Rollovers Palette**--Use one convenient palette to create, view, and set rollover states.
- **Workspaces**--Customize your Photoshop working environment by creating a palette layout and then saving the layout as a workspace.



- **Tool Presets**--Customize any tool and save your settings as a new, unique tool.
- **Auto Color Command**--With the new Auto Color command, color correction is easier.
- **Data-Driven Graphics**--Use the new data-driven graphics feature in ImageReady to combine visual sophistication with automated production.
- **Paint Engine**--Create and save custom brushes with a powerful new paint engine that lets you adjust dozens of different brush settings.
- **Art Studio Brushes**--In addition to the brushes you create yourself, you can use the preset brushes included on the Photoshop CD.
- **Pattern Maker**--With the new Pattern Maker plug-in, you can create patterns simply by selecting a section of an image.
- **Liquify Enhancements**--The Liquify command offers more flexibility and allows you to save custom meshes.
- **PDF Security**--Offers complete support for Acrobat 5.0 security settings.
- **Picture Package Enhancements**--Now you can print to different page sizes.
- **Web Photos Gallery Enhancements**--Provides new templates to give you more flexibility.
- **XMP Support**--Add metadata in XMP so your files can be indexed by Internet search engines.
- **Text Support**--Use the new spell checker and find and replace features to eliminate typos.
- **Tighter Integration**--Work more effectively with Photoshop and other Adobe products such as Illustrator, InDesign, GoLive, LiveMotion, Acrobat, and AlterCast.

## ASP

Microsoft® Active Server Pages (ASP) is a server-side scripting technology that can be used to create dynamic and interactive Web applications. An ASP page is an HTML page that contains server-side scripts that are processed by the Web server before being sent to the user's browser. You can combine ASP with Extensible Markup Language (XML), Component Object Model (COM), and Hypertext Markup Language (HTML) to create powerful interactive Web sites.

Server-side scripts run when a browser requests an .asp file from the Web server. ASP is called by the Web server, which processes the requested file from top to bottom and executes any script commands. It then formats a standard Web page and sends it to the browser.

It is possible to extend your ASP scripts using COM components and XML. COM extends your scripting capabilities by providing a compact, reusable, and secure means of gaining access to information. You can call components from any script or programming language that supports Automation. XML is a meta-markup language that provides a format to describe structured data by using a set of tags.

As you work through the lessons in each module, save your work in the C:\inetpub\wwwroot\Tutorial directory to view the content on your Web site. If you did not customize your installation of IIS, C:\inetpub\wwwroot was created as the default home directory. To load and run the tutorial samples, you must have administrator privileges on the computer running IIS. The default IIS security settings should allow you to run the tutorial, but you may need to change your security settings on the directory if you encounter access violations. See the product documentation for more information about IIS security settings.

### Module One



This module explains how to create ASP pages (.asp files) that use the fundamental features of HTML, ASP, and VBScript. This module includes the following lessons:

- Write and Run an ASP Page. Describes how to use Visual Basic® Scripting Edition (VBScript) and HTML tags.
- Send Information by Using Forms. Shows how to display forms on an HTML page.
- Create a Guest Book. Uses forms to gather information from visitors, store the information in a database, and display the database contents in a Web page.
- Display an Excel Spreadsheet in ASP. Explains how to display an Excel spreadsheet in a Web page.

## Write and Run an ASP Page

The best way to learn about ASP pages is to write your own. This lesson covers VBScript syntax and coding samples. To create an ASP page, use a text editor to insert script commands into an HTML page. Saving the page with an .asp file name extension tells the Web server how to process the script commands. To view the results of a script, request the page using a Web browser. VBScript is the default scripting language for ASP, and most of the examples in the tutorial are scripted in VBScript.

## Module Two

This module explains how to develop an ASP page that delivers services useful in e-commerce. This module includes the following lessons:

Rotate Ad Information. Randomly rotate ads on your Web page.

Redirect Users from Ad Links. Redirect browsers to advertisers' sites when users click on an ad image.

Count Page Hits. Track the number of times users request a page.

### Rotate Ad Information

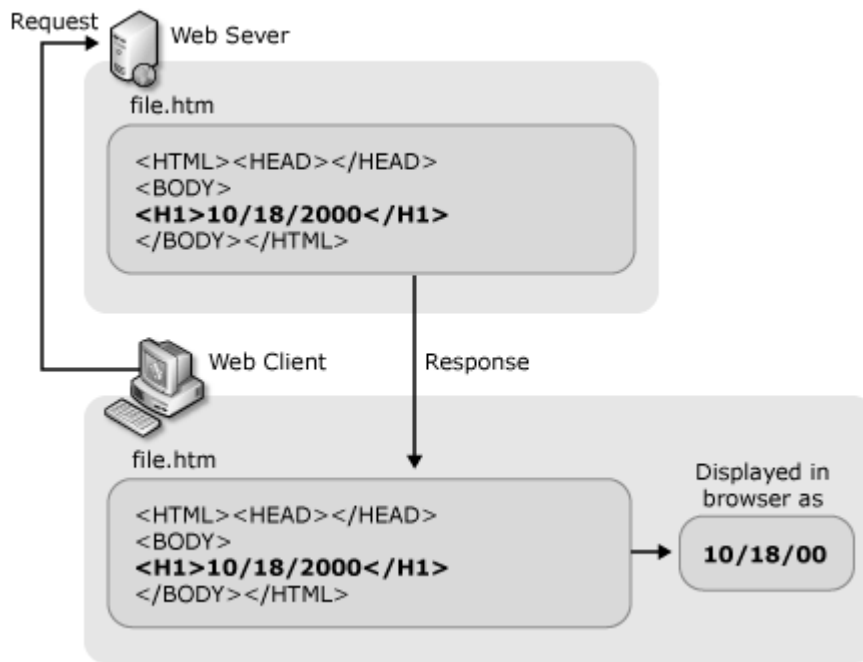
Advertising is big business on the Web. This lesson explains how to take advantage of the Ad Rotator component installed with ASP by describing how to use this component to rotate advertisements on your Web pages. The Ad Rotator component selects an advertisement for your Web page each time the user refreshes or loads the Web page. Two files are required to set up the Ad Rotator component: an Ad Rotator Include file and an ad images data file. By setting up these two files, this component can be called by any ASP page on your site. Changes to the ad parameters are not done on all the sites containing the ad, but to the ad images data file. This saves lots of time if the ad appears on numerous pages within your Web site.

## HTML Compared to ASP

HTML is the simplest language for writing Web pages, but it allows you to create only static Web pages. When a Web client requests a static HTML file from a Web server, the Web server sends the HTML file directly to the client without any computation being done. The client's browser then processes the HTML code in the file and displays the content.

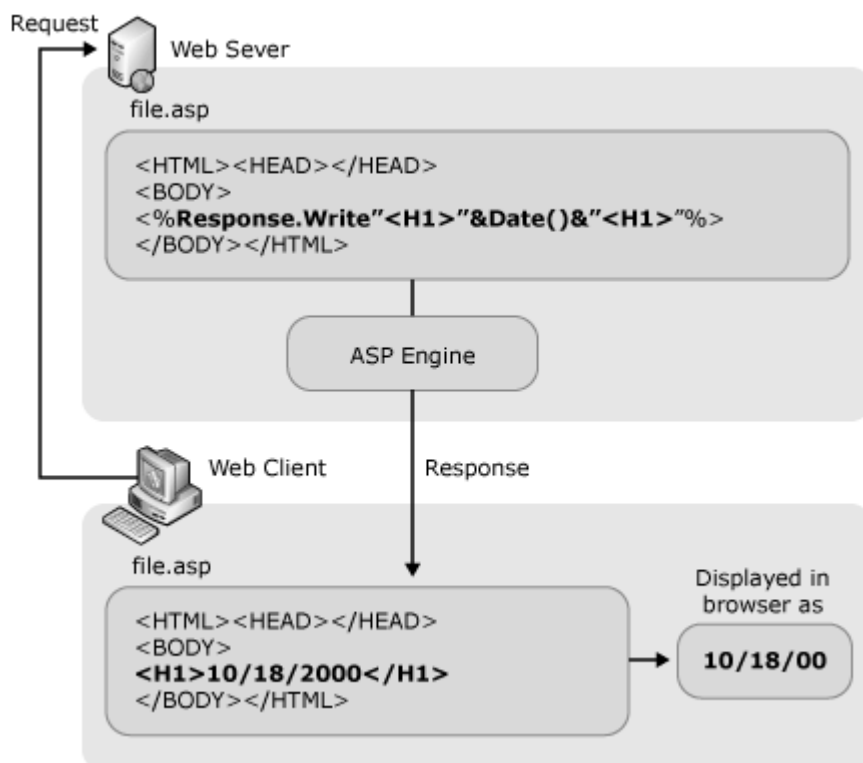
The following illustration shows the transmission of a static file where the displayed date will never change.





VBScript is the simplest language for writing ASP pages. All the code samples in the Creating ASP Pages section are written in VBScript except for samples that are duplicated in JScript for comparison. When a Web client requests an ASP file from a Web server, the Web server sends the ASP file through its ASP engine, where all the server-side script code is executed or converted into HTML code. The converted code is then sent to the Web client.

The following illustration shows the transmission of dynamically generated content where the displayed date reflects the date at the time of the request.





If you are an HTML author, you will find that server-side scripts written in ASP are an easy way to begin creating more complex, real-world Web applications. If you have ever wanted to store HTML form information in a database, personalize Web sites according to visitor preferences, or use different HTML features based on the browser, you will find that ASP provides a compelling solution. For example, previously, to process user input on the Web server you would have had to learn a language such as Perl or C to build a conventional Common Gateway Interface (CGI) application. With ASP, however, you can collect HTML form information and pass it to a database using simple server-side scripts embedded directly in your HTML documents. If you are already familiar with scripting languages such as VBScript or JScript (JScript is the Microsoft implementation of the ECMA 262 language specification), you will have little trouble learning ASP.

## What is VBScript?

- VBScript is a scripting language used to provide dynamic and interactive content on webpages.
- VBScript is short for Visual Basic Scripting Edition. VBScript is a lighter version of the Visual Basic programming language, and like Visual Basic, VBScript was developed by Microsoft.

## VBScript and Internet Explorer

- The most important thing to know about VBScript is that it is a proprietary language.
- VBScript was designed by Microsoft to work in Internet Explorer and browsers based on Internet Explorer's engine such as Flashpeak's [SlimBrowser](#).
- VBScript code will NOT work in web browsers such as Firefox, Opera, Safari, and Chrome.
- Due to the proprietary nature of VBScript, it is not a very popular scripting language on the world wide web. Instead, many people prefer using languages that are not proprietary and run on a variety of web browsers.
- What's the purpose of learning VBScript if it is a proprietary language and there are non-proprietary alternatives out there?

**Here are some reasons:**

**Internet Explorer is the most popular web browser** - knowing how to write code specifically for it is a plus

**Browser specific code** - There may come a time when you want to provide separate content on a webpage for users of a particular web browser

**Knowing another language** - It's always good to know more. Even if you will use VBScript a lot less than other languages, you still have knowledge of another web language

## What can be done with VBScript?

**Interact with the user** - For example, you can ask the user for their name and print a custom message with it on a webpage such as "Hello Roger!"





**Form validation** - Validate data entered by the user. For example, you can check to make sure that certain fields in a form were actually filled out, or that a piece of data contains the required amount of characters

**Perform calculations** - You can use VBScript to perform a range of mathematical calculations ranging from simple arithmetic to complex formulas

**Act upon events** - Specify code to run when certain events occur. For example, when the user clicks a button you can instruct VBScript to display a message in an alert box

## Easy to Use and Learn

If you already know Visual Basic or Visual Basic for Applications, VBScript will be very familiar. Even if you don't know Visual Basic, once you learn VBScript, you're on your way to programming with the whole family of Visual Basic languages. Although you can learn about VBScript in just these few Web pages, they don't teach you how to program. To get started programming, take a look at Step by Step books available from Microsoft Press.

## ActiveX Scripting

VBScript talks to host applications using ActiveX™ Scripting. With ActiveX Scripting, browsers and other host applications don't require special integration code for each scripting component. ActiveX Scripting enables a host to compile scripts, obtain and call entry points, and manage the namespace available to the developer. With ActiveX Scripting, language vendors can create standard language run times for scripting. Microsoft will provide run-time support for VBScript. Microsoft is working with various Internet groups to define the ActiveX Scripting standard so that scripting engines can be interchangeable. ActiveX Scripting is used in Microsoft® Internet Explorer and in Microsoft® Internet Information Server.

## VBScript in Other Applications and Browsers

As a developer, you can license VBScript source implementation at no charge for use in your products. Microsoft provides binary implementations of VBScript for the 32-bit Windows® API, the 16-bit Windows API, and the Macintosh®. VBScript is integrated with World Wide Web browsers. VBScript and ActiveX Scripting can also be used as a general scripting language in other applications.

## What is JavaScript?

- JavaScript was designed to add interactivity to HTML pages
- JavaScript is a scripting language
- A scripting language is a lightweight programming language
- JavaScript is usually embedded directly into HTML pages
- JavaScript is an interpreted language (means that scripts execute without preliminary compilation)
- Everyone can use JavaScript without purchasing a license

## Are Java and JavaScript the same?

NO! Java and JavaScript are two completely different languages in both concept and design!



Java (developed by Sun Microsystems) is a powerful and much more complex programming language - in the same category as C and C++.

## What Can JavaScript do?

- **JavaScript gives HTML designers a programming tool** - HTML authors are normally not programmers, but JavaScript is a scripting language with a very simple syntax! Almost anyone can put small "snippets" of code into their HTML pages
- **JavaScript can react to events** - A JavaScript can be set to execute when something happens, like when a page has finished loading or when a user clicks on an HTML element
- **JavaScript can read and write HTML elements** - A JavaScript can read and change the content of an HTML element
- **JavaScript can be used to validate data** - A JavaScript can be used to validate form data before it is submitted to a server. This saves the server from extra processing
- **JavaScript can be used to detect the visitor's browser** - A JavaScript can be used to detect the visitor's browser, and - depending on the browser - load another page specifically designed for that browser
- **JavaScript can be used to create cookies** - A JavaScript can be used to store and retrieve information on the visitor's computer

## Common uses of JavaScript include:

- Alert messages
- Popup windows
- Dynamic dropdown menus
- Form validation
- Displaying date/time

## What do I need to create JavaScript?

You can create JavaScript using the same equipment you use when creating HTML. That is:

- Computer
- Text editor. For example, Notepad (for Windows), Pico (for Linux), or Simple text (Mac). You could use a HTML editor if you like but it's not needed.
- Web Browser. For example, Internet Explorer or Firefox. You will need to ensure JavaScript is enabled within your browser's settings (this is normally enabled by default).

## Functions

- In JavaScript, you will use functions a lot. A function (also known as a *method*) is a self-contained piece of code that performs a particular "function". You can recognise a function by its format - it's a piece of descriptive text, followed by open and close brackets.
- Sometimes there will be text in between the brackets. This text is known as an argument. An argument is passed to the function to provide it with further info that it needs to process. This info could be different depending on the context in which the function is being called.



- Arguments can be extremely handy, such as allowing your users to provide information (say via a form) that is passed to a function to process. For example, your users could enter their name into a form, and the function would take that name, do some processing, then present them with a personalised message that includes their name.
- A function doesn't actually do anything until it is called. Once it is called, it takes any arguments, then performs it's function (whatever that may be).

## Writing to The HTML Document

The example below writes a <p> element with current date information to the HTML document:

```
< html>
< body>

< h1>My First Web Page</h1>

<script type="text/javascript">
document.write("<p>" + Date() + "</p>");
< /script>

< /body>
< /html>
```

## Changing HTML Elements

The example below writes the current date into an existing <p> element:

```
< html>
< body>

< h1>My First Web Page</h1>

< p id="demo"></p>

<script type="text/javascript">
document.getElementById("demo").innerHTML=Date();
< /script>
< /body>
< /html>
```

## Front End side Web server

Front-end development creates the visual presentation to the end user. For web development this includes the **HTML** and **JavaScript** that creates what the user sees and what can run in the users **web browser**. All of the front end presentation is generated by the middle-tier and back-end components.

## Back End side Web server



Back-end development includes all of the processing required to create the front-end for the user. For web development this includes the middle tier development (perhaps using **PHP** or **java**) on the web or application server, and back-end components such as the database and search engine. Back-end development handles security through user authentication - login, and authorization - customizations based upon what a user is authorized to see. Any action requested by a user goes through a security check, and information is typically looked up in the database, and then a web page is generated and sent to the user using a web server.

**Front-end tier** -> User Interface layer usually consisting of a mix of **HTML**, **Javascript**, **CSS**, **Flash**, and various server-side code like **ASP.Net**, **classic ASP**, **PHP**, etc. Think of this as being closest to the user in terms of code.

**Middleware, middle-tier** -> One tier back, generally referred to as the "plumbing" part of a system. Java and C# are common languages for writing this part that could be viewed as the glue between the **UI** and the data and can be web services or **WCF** components or other **SOA** components possibly.

**Back-end tier** -> Databases and other data stores are generally at this level. **Oracle**, **MS-SQL**, **MySQL**, **SAP**, and various off-the-shelf pieces of software come to mind for this piece of software that is the final processing of the data.

Overlap can exist between any of these as you could have everything poured into one layer like an ASP.Net website that uses the built-in **AJAX** functionality that generates **Javascript** while the code behind may contain database commands making the code behind contain both middle and back-end tiers. Alternatively, one could use VBScript to act as all the layers using **ADO** objects and merging all three tiers into one.

Similarly, taking middleware and either front or back-end can be combined in some cases.

**Bottlenecks generally have a few different levels to them:**

- 1) **Database or back-end processing** -> This can vary from payroll or sales or other tasks where the throughput to the database is bogging things down.
- 2) **Middleware bottlenecks** -> This would be where some web service may be hitting capacity but the front and back ends have bandwidth to handle more traffic. Alternatively, there may be some server that is part of a system that isn't quite the UI part or the raw data that can be a bottleneck using something like Biztalk or MSMQ.
- 3) **Front-end bottlenecks** -> This could client or server-side issues. For example, if you took a low-end PC and had it load a web page that consisted of a lot of data being downloaded, the client could be where the bottleneck is. Similarly, the server could be queuing up requests if it is getting hammered with requests like what Amazon.com or other high-traffic websites may get at times.



## FRONT-END AND BACK-END INTEGRATION

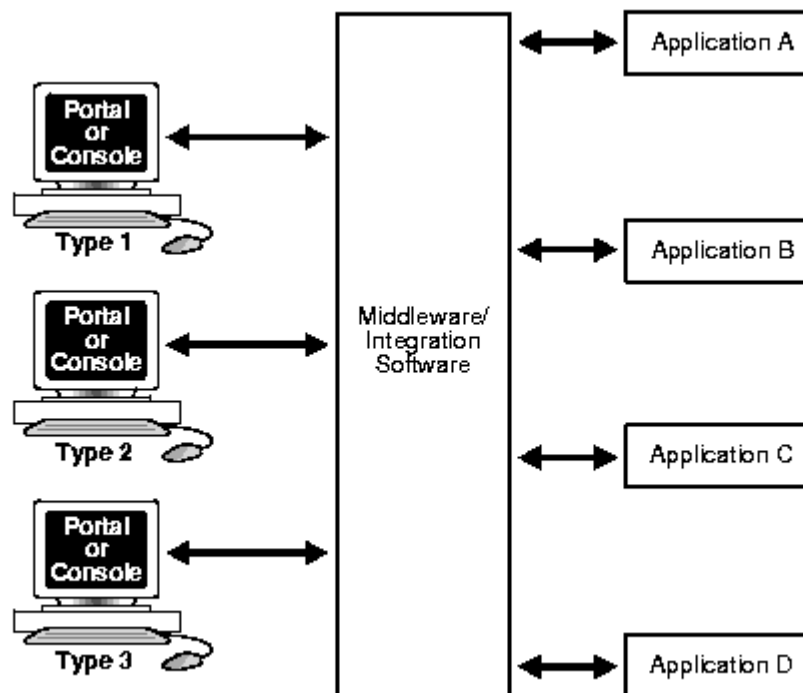
The requirements for front-office and back-office integration are fundamentally different and, as a result, they require fundamentally different integration approaches. This appendix contains:

- Front-End Integration
- Back-End Integration

### FRONT-END INTEGRATION

In this implementation, middleware or a similar integration solution intercepts interactions between applications. The middleware acts as a middle tier application server: transparently marshaling, managing, and directing inter application requests and responses. Typically, the requesting application waits while the middleware requests services of another application.

Front-End Integration



Front-end integration solutions generally display some, or all, of these characteristics:

- Interaction between the integration layer and the applications is:
  - Synchronous, or simulates synchronous processing
  - Two-way communication based on a service request model
- Transactions processed are of short duration.
- The application (user) is not aware of using the services of multiple disparate applications.
- Middleware behaves like a mid tier application server: marshaling, managing, and directing requests and responses and managing transactional and recovery issues.

**Front-end integration has both advantages and disadvantages.**

### **Advantages**

- You can develop a number of presentation layers for different user, customer, and supply channels.
- All presentation layers share the same services, thus ensuring consistent interactions regardless of channel.
- Each presentation layer requires only one signon to access all required functionality.

### **Drawbacks**

Applications must meet these criteria to participate in the interactions:

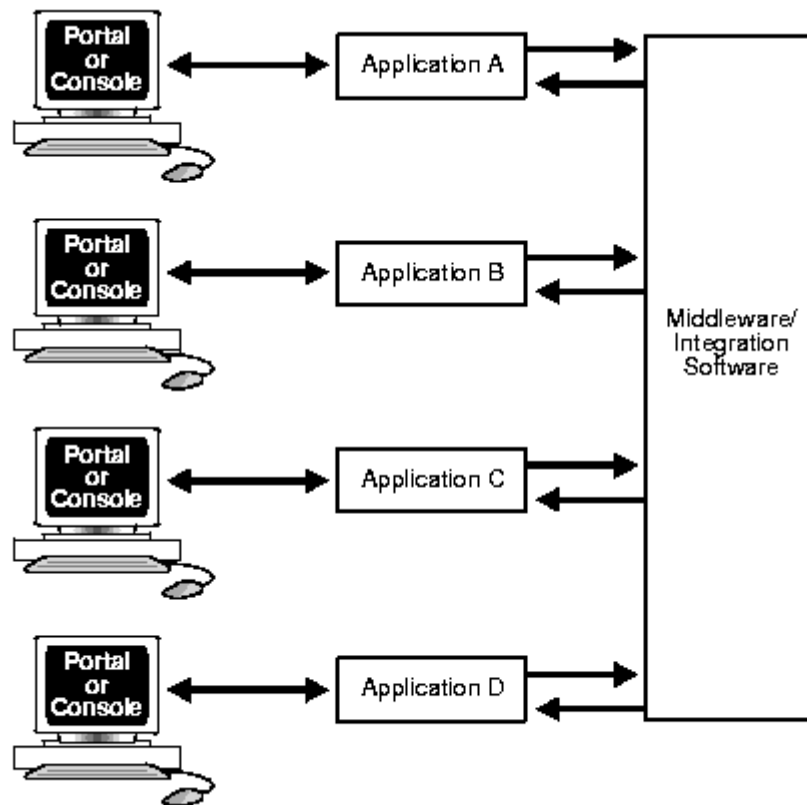
- All functionality must be offered through a service-based API.
- All business and data logic must be separate from the presentation layer.
- The transaction/commit model must act as a resource manager in the chosen multiphase commit processing.
- Few legacy and currently available ERP/CRM packages meet these criteria, so you probably must develop a custom application.
- The presentation layer of packaged applications is unlikely to be usable. This may lead to difficulties in providing support, lengthy implementation time, and so on.
- It is difficult to manage a development and testing environment because of the need for a complex architecture, the lack of suitable strong tools, and the dependence on program-oriented delivery.

## **BACK-END INTEGRATION**

In this implementation, users interact with only one application at a time in a manner determined by their user roles. The application notifies other applications as necessary of the significant aspects of the user interaction. Application-to-application interactions can be based on further sequential notifications.

### **Back-end integration**





Back-end integration solutions display some or all of these characteristics:

- Interaction between the integration layer and the applications is:
  - Predominantly asynchronous
  - One-way communication
- Service-request and event-notification models are both used.
- Business process definitions closely mirror the business, and consequently transactions take a long time.
- The user interacts with a single application or with a small number of applications.
- The integration solution acts transparently as a sophisticated distribution and synchronizing agent.

### Advantages

- The presentation layer interface to the applications need not employ the same architecture as the applications.
- You can use the prebuilt presentation layer delivered with packaged applications.
- The business and data logic in an application need not be separate from the delivered presentation layer.
- It is easy to manage the development and testing environments because asynchronous breakpoints provide natural testing points.
- Graphical tools are provided to ease development.

### Drawbacks



- Each application has a different look and feel and a different signon, which makes applications appear to be only loosely integrated.
- The user interface is narrowly constrained, thus restricting users who act in multiple and diverse roles.

## Database connectivity with web application

Every web programmer thinks about the database connectivity before starting about application. Good database connectivity can increase the performance of the web application. We are explaining about different types of java database connectivity to choose among the best. We have number of reason to choose different way of doing connectivity with database.

1. Simple JSP database connectivity
2. Java Bean database connectivity
3. web.xml and Servlet database connectivity
4. Properties file database connectivity
5. XML file database connectivity
6. Connection pooling java database connectivity

## What is Web Hosting ?

Web hosting is a service that allows organizations and individuals to post a website or web page on to the Internet. A web host, or web hosting service provider, is a business that provides the technologies and services needed for the website or webpage to be viewed in the Internet. Websites are hosted, or stored, on special computers called servers.

When Internet users want to view your website, all they need to do is type your website address into their browser. Their computer will then connect to your server and your WebPages will be delivered to them through the browser.

Most web hosting companies require that you own your domain name in order to host with them. If you do not have a domain name, the web hosting companies will help you purchase one.

### **Some of the basic components of a web hosting service should include:**

- At least 10MB of allocated space
- Good bandwidth
- Free Technical Support
- POP3 E-Mail Accounts
- Email Forwarding
- Email Auto-responders
- Email Aliases
- FTP Access
- FrontPage Support
- Own CGI-Bin Access
- Perl, CGI
- Server Side Includes (SSI)
- Password Protection



## Things to be consider before Web Hosting

Here are some basic things to consider when choosing a web hosting Company:

### **Speed and reliability of the servers and hardware:**

Make sure they have a high-speed server. They provide you good bandwidth.

### **Compatibility with existing Software and Skills:**

Is your web hosting company server, software and support services compatible with the skills and software you are using? For example if you are using FrontPage to create your site, make sure your website hosting company have FrontPage extensions installed on their server.

### **The basic features of a web hosting plan include:**

#### **Disk Space**

All web hosting accounts offer a certain amount of disk space that you can use to store your web files. It is recommended that you have some sort of estimates on what you need for various tasks - the amount of space you need for your emails, web files, databases, etc. By breaking down your usage, you can better estimate how much space you should go for.

#### **Bandwidth or Data Transfer**

- Very often web hosts talk about bandwidth and data transfer as the same entity. However, they are in fact, different.
- Bandwidth is the amount of data that can be transferred at one time.
- Data transfer is the actual amount of data transferred.
- Think of it this way. If bandwidth were a tunnel, the bigger the tunnel the more cars can pass through it. Data transfer would then be the number of cars allowed to go through the tunnel in a given time period, say a month.
- The less bandwidth you have, the slower it takes your website to load, regardless of your visitor's connection type. Visitors will have to wait their turn. The less data transfer you have, the more often you will find your website unavailable because you have reached the maximum amount of data allowed to be transferred.
- To determine what is sufficient, you need to take into consideration the size of your website and the number of visitors you have in a month's time.

#### **Email Accounts**

- Email accounts are a common feature of web hosting, especially if you are hosting a domain. There are three main types of email accounts: POP3, forwarding, and aliases.
- POP3 accounts are the traditional inboxes. You have space on the server to store your emails, and at the same time, you can use an email program to download your mail. Each login and password combination usually equates to one account.
- Forwarding mail accounts are useful if you are employing the service of another company to filter your emails for you. Rather than storing your emails on your mail server, emails are redirected to another email address.
- Aliases accounts are similar to forwarding mail accounts. Some hosts allow you to setup a catch-all alias, which is often used to collect emails sent to addresses not recognized by your mail server.

#### **FTP Access**



- After you have created your web pages on your computer, you need to transfer those files to your web server. The files are transferred to the server by use of FTP.
- FTP is also the protocol of downloading your web files from the server to your computer, ie. backing up your website files.

## What Type of Hosting Do You Need?

There are many web hosting options available nowadays: free web hosting, shared hosting, dedicated server, and the list goes on. All these options serve the same purpose, which is hosting your content so that it can be accessed and viewed by people on the Internet. The major difference is how each is structured as well as the benefits they offer. Let's have a closer look at each of them.

### Free Web Hosting

What can be better than a free web hosting plan? This is a great option for someone who wants to create a homepage or small website to share with friends and family. While free web hosting has received criticism for its lack of features, security and customer support, there are a few reliable free web hosting providers that you can trust. However, keep in mind that free web hosting is more geared for giving you a taste of having and maintaining a small, personal website. If you want to establish a powerful web presence with an online business, you will need to consider a paid hosting service that offers more control, security and reliability.

### Shared Hosting

As the name implies, shared hosting is an environment where you are sharing space on a web server with other users. As clients are sharing the cost of the server, this is the most affordable and popular solution for personal users and small businesses as companies to set up blog, e-commerce and other advanced applications. However, when hosting on a shared server, you are exposed to all the activities of your neighbors. If someone makes a huge scripting error, the entire server can suffer. If someone experiences a sudden burst in traffic, your site might run slower. If the server goes down, so does your website and ultimately, your business.

### Dedicated Hosting

When your business takes off and requires more than the typical sharing server resources, it's time to move up to the dedicated server. Now you're in the big leagues with an entire server dedicated to your hosting needs. However, without any experience, succeeding with this hosting option is nearly impossible - those who require a dedicated server but don't know a thing about server administration can get by with managed hosting. In this scenario, the hosting service provider handles all the management tasks which frees you up to focus on other areas of the business. Keep in mind that a managed service requires is generally more costly.

## Digital Subscriber Line (xDSL)

- High speed connection to the Internet
  - Greater than 128Kbps
  - Always on!
  - Simultaneous up-Link and down-link communication
  - Overcomes Internet frustrations
  - Made possible by digital modems
- Leading broadband access technologies



- xDSL, cable, satellite, ISDN digital modems

### xDSL Introduction

- xDSL is the term for the Broadband Access technologies based on Digital Subscriber Line (DSL) technology - "x" signifies that there are various flavours of DSL.
- Provides always-on, high-speed data services over existing copper wires to residences & businesses - POTS service and DSL coexist on same copper line.
- Lower rate xDSL (up to 1.5 Mbps) is gaining popularity in the residential market; will get faster and cheaper
- High performance xDSL (up to 52 Mbps) targets business and high-end users

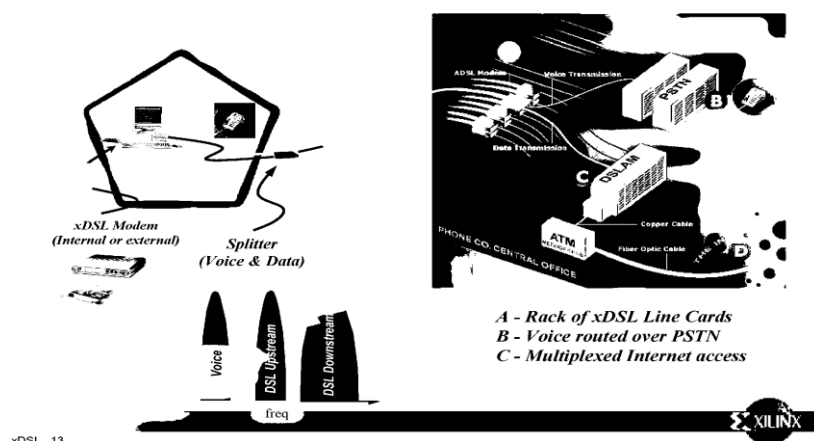
### Benefits & Applications

- High-speed data service
- DSL typically >10x faster than 56-kbps analog modem
- Always on connection
- No need to "dial-up"
- Uses existing copper wires
- Co-exists w/ POTS service
- Reasonably priced today and getting cheaper
- Applications
- High speed Internet access
- SOHO
- Multimedia, Long distance learning, gaming
- Video on Demand
- VPN
- VoDSL

### Equipment market is divided into two subgroups

- Central Office Equipment - DSLAMs
- Customer Premises Equipment - DSL Modems, Gateways

### xDSL Technology & Equipment



### Asymmetric xDSL

**Asymmetric** faster downstream rate vs. upstream. Suitable for applications such as web-browsing, MP3 downloading, Video on demand (VoD)

## Types of asymmetric DSL

- Asymmetric DSL (ADSL)
- Universal ADSL (UDSL),. G.Lite or DSL Lite
- Rate-Adaptive DSL (RADSL) - Detects highest possible line rate & adjusts accordingly
- Very High Bit-rate DSL (VDSL) - Used to get high speed over short local loops

## Symmetric xDSL

**Symmetric** - downstream & upstream rates are equal and it is Suitable for office type apps like Video conferencing

### Types of symmetric xDSL

**Symmetric DSL (SDSL)** - Based on HDSL but single pair. Spectral compatibility an issue (crosstalk & interference)

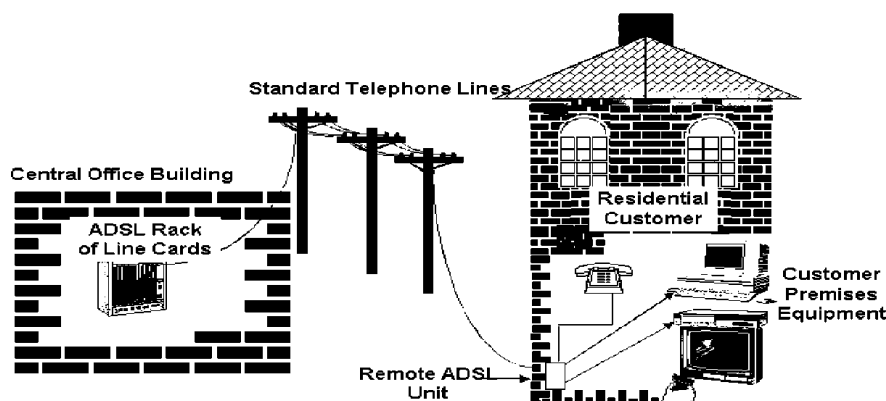
**High bit-rate DSL (HDSL)** - The first of the symmetric DSL technologies. Uses multiple wire pairs (2 or 3) to achieve high bit rates.

## Symmetric xDSL

### - HDSL 2

- Single-pair version of HDSL
- More standards driven to improve interoperability and spectrally compatible with other loop services (ISDN, T1, HDSL)
- also takes into consideration diminishing amount of copper pairs
- Single-pair HDSL (SHDSL)
- Similar to HDSL 2, but more generalized
- Business class DSL for transporting T1/E1, ISDN, ATM, and IP
- ISDN DSL (ISDL)
- DSL over ISDN; okay to pass through repeaters & DLCs
- Always-on, flat rate billing, and transmit data over data network

## ADSL Equipment

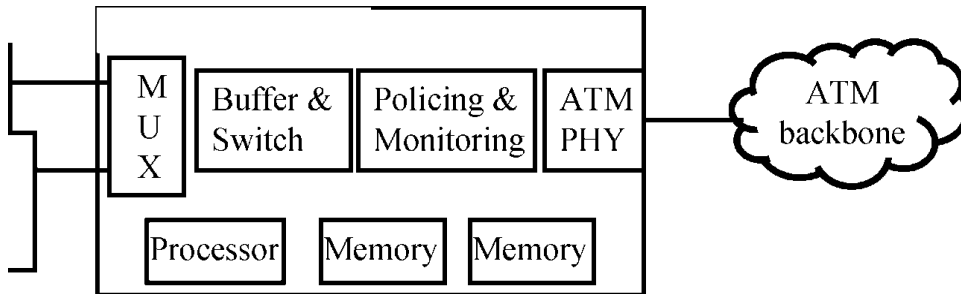


## Two groups of equipment

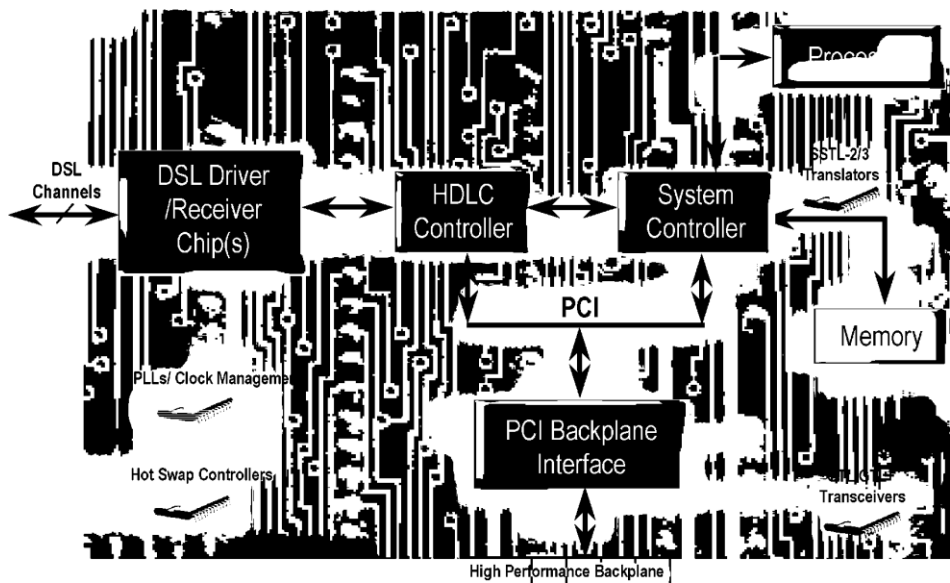
- Central Office - DSL Access Multiplexer (DSLAM), Repeaters
- Customer Premise - DSL Modems, Gateways, Network Interface Card (NIC), splitters and filters

## DSLAM

- DSLAM is usually found in a Central Office
- xDSL line cards are installed in a DSLAM to terminate incoming xDSL signals
- The DSLAM then combines multiple xDSL access lines into one high speed line
- The muxed traffic is converted into ATM cells which gets sent over an ATM backbone



## Generic DSL Line Card for DSLAM Applications



xDSL 22



## DSL Modem/Gateway

- A xDSL modem is the device found at the customer's premise which is used to transmit & receive xDSL signals
- Could be an external "box" or a network interface card placed inside a computer
- An xDSL Gateway combines the functionality of a modem and router

## IP Solution for HDLC

- High Performance module for the HDLC protocol.



- Support for up to 32 full duplex channels, total data rate >40Mb/s
- Low cost, fixed function netlist cores
- Single-Channel Core: HDLC1
- 32-Channel HDLC Core: HDLC32
- Optimized for Virtex, Virtex-E, Virtex-II, Spartan-II, Spartan-IIE

### HDLC Core Features

- Fully Compliant with ITU Q.921, X.25, ISO/IEC 3309, ISDN Channels B & D
- 8 or 16-bit address insertion and detection - selectable
- Programmable 16 & 32-bit CRC (FCS)
- Both cores suited for multiple HDLC scaling
- Full duplex operation, with 32 channel multiplex capability
- T1/E1 stream support using External mux/de-mux
- Generic 8 bit host interface for control and status registers
- Fully synchronized with bit-rate

### HDLC Block Diagram

