

- Traditional modems impose an upper limit for the internet access. So to overcome it, DSL technology, SONET (Synchronous optical network), modified cable modem came into the picture.

# **Digital subscriber line (DSL)**

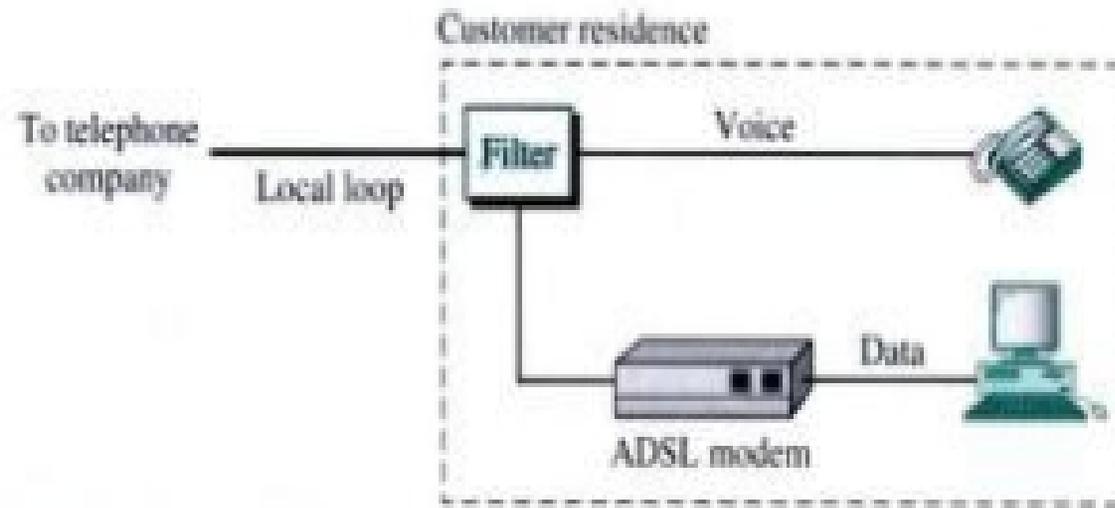
- Higher speed access to the internet.
- It is a set of technologies, ADSL, VDSL, HDSL, SDSL.
- Or referred as xDSL.
- ADSL → asymmetric DSL
- VDSL → very high bit rate DSL
- SDSL → symmetric DSL
- HDSL → high bit rate DSL

# ADSL

- It is similar to 56k bit rate modem, with higher speed in downstream direction (from internet to resident), than in upstream direction (resident to internet).
- Designers of ADSL divided the available BW of the local loop unevenly for the residential customer.
- Not suitable for business customers who need a large BW in both the directions.

- Designers of ADSL tests the condition and BW availability of the line before settling the data rate.
- Data rate of ADSL is not fixed, it depends upon the condition and type of local loop cable.

# ADSL Modem



## *Other DSL technologies*

**SDSL**: symmetric digital subscriber line.

- Downstream rate is much higher than upstream data rate.
- It meets the need of residential customers but again it is not suitable for business that send and receive data in large volumes.
- It divides the available BW equally both in downstream and upstream.

## *HDSL(high bit rate DSL)*

- It is an alternative to the T-1 line(1.544Mbps)
- It uses alternate mark inversion (AMI) encoding, which is susceptible to attenuation at higher frequencies.
- This limits the length of transmission line to 1 km.
- For longer distances, repeater is required, which means increased costs.
- HDSL uses two twisted pair wires to achieve full duplex transmission.

# VDSL

- Similar to ADSL, uses coaxial, twisted pair cable for short distances (500m to 1800m).
- Modulating technique used is DMT, with downstream bit rate 50 to 55Mbps and upstream data rate 1.5 to 2.5 Mbps.

## **PSTN(Public Switched Telephone Network)**

- Highly integrated communication network that connects 70% of the world's population.
- In 2001, 1 billion landline telephone numbers and 600 million cellular telephone numbers.
- Now landline numbers are increasing by 3% and mobile phones are increasing by 50%.
- Length of wire to connect these PSTN numbers in the world, is 15 times the distance between sun and earth.

- In PSTN, each city or a geographical grouping of towns is called a local access and transport area, (LATA). LATA s are connected by a company called a Local Exchange Carrier,(LEC).
- LEC provides intra LATA service. Long distance telephone company collects toll fees to provide between different LATAs over its long distance network.
- These companies are interchanges carriers(IXCs) and have large fiber optic and microwave radio network which are connected to LECs throughout a country.

- Local telephone network or local exchange, consist of a Central Office(CO) which provides PSTN connection to customer, simply landline phone.
- CO can handle million telephone connections.
- CO is connected to a tandem switch which in turn connects the local exchange to the PSTN.