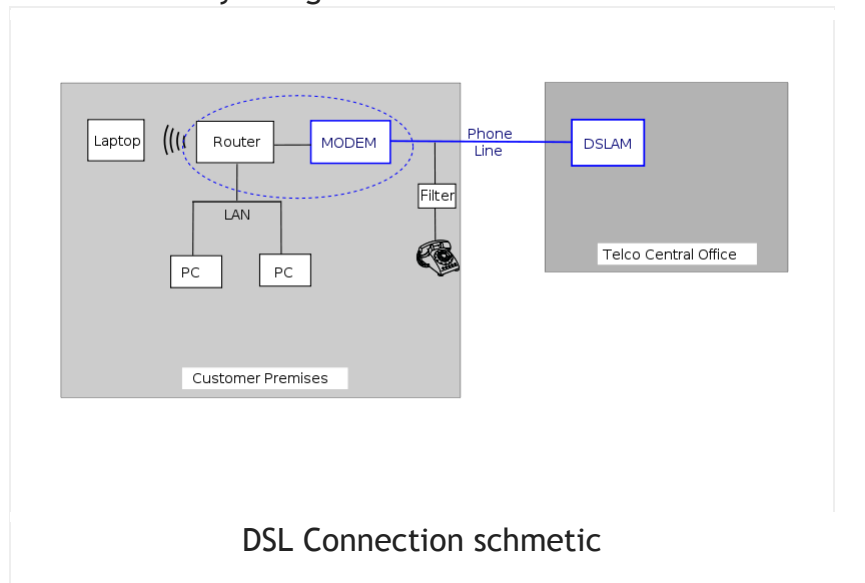


Digital Subscriber Line (DSL)

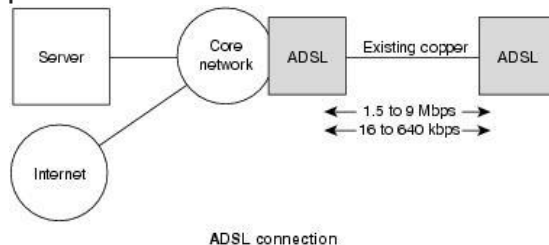
DIGITAL SUBSCRIBER LINE:

Digital Subscriber Line (DSL) technology is a modem technology that uses existing twisted-pair telephone lines to transport high-bandwidth data, such as multimedia and video, to service subscribers. It is always ON technology, hence no dial up procedure is required. As the DSL mainly runs over the ordinary telephone lines, hence separate BW is provided for both voice and data so that phone can be used simultaneously along with internet.



ASYNCHRONOUS DSL:

ADSL is the most publicized of the new modern technology designed for digital data transmission on ordinary line. Asymmetric Digital Subscriber Line (ADSL) technology is asymmetric. It allows more bandwidth downstream—from an NSP's central office to the customer site—than upstream from the subscriber to the central office. ADSL transmits more than 6 Mbps to a subscriber and as much as 640 kbps more in both directions.



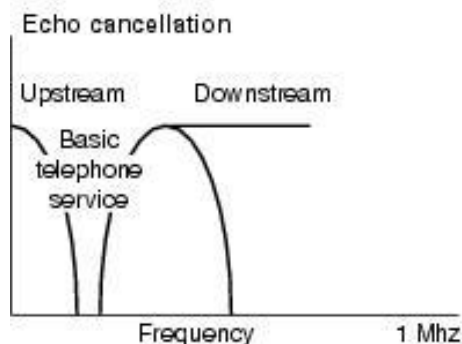
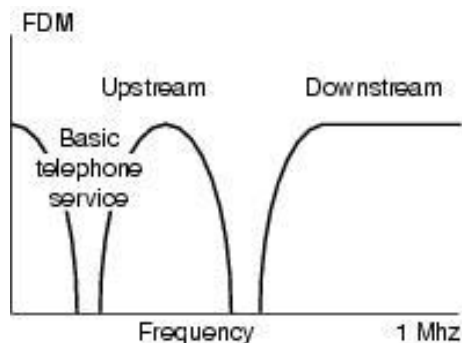
An ADSL circuit connects an ADSL modem on each end of a twisted-pair telephone line, creating three information channels: a high-speed downstream channel, a medium-speed duplex channel, and a basic telephone service channel. ADSL modems

divide the available bandwidth of a telephone line (1 MHz) in one of two ways: frequency-division multiplexing (FDM) or echo cancellation,

An ADSL circuit connects an ADSL modem on each end of a twisted-pair telephone line, creating three information channels: a high-speed downstream channel, a medium-speed duplex channel, and a basic telephone service channel. ADSL modems divide the available bandwidth of a telephone line in one of two ways: frequency-division multiplexing (FDM) or echo cancellation,

- FDM assigns one band for upstream data and another band for downstream data.
- Echo cancellation assigns the upstream band to overlap the downstream, and separates the two by means of local echo cancellation

With either technique, ADSL splits off a 4-kHz region for basic telephone service at the DC end of the band.

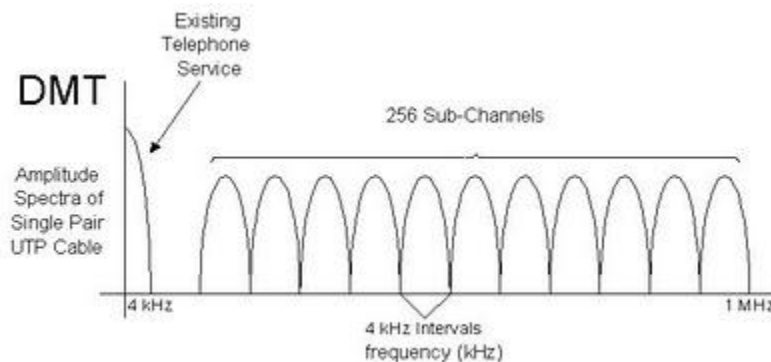


The first band is of basic telephone services, also called POTS (plain old telephone service). The voice band is carried only in the 0-4kHz band. Then the second band is for upstream and third one is for downstream. The spaces between the bands is the additional BW to prevent crosstalk between the voice and data channel.

LINE CODES:

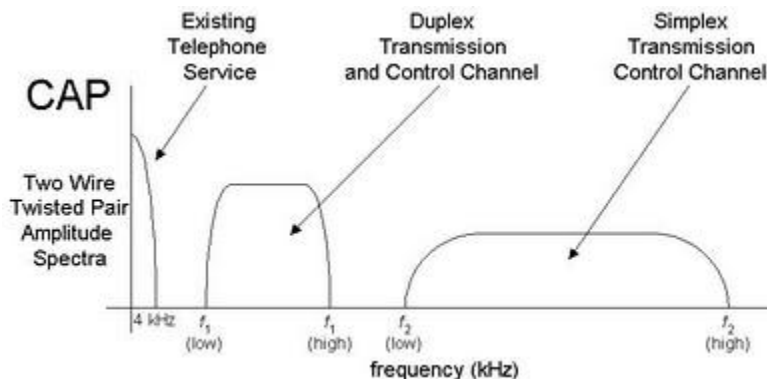
DMT and CAP are line-coding methods for modulating the electrical signals sent over the copper wire in the local loop.

- Discrete multitone uses multiple carriers at single frequency. The available transmission band (upstream and downstream) is divided into a number of 4 kHz subchannels. On initialization, a DMT modem sends a test signal on each channel to determine SNR, then the modem assigns more bits to channels with better signal transmission qualities, and less bits to poor signal transmission quality channels. Each sub-channel carries a data rate of 0-60 kbps. After initialization, the bit stream to be transmitted is divided into a number of streams, one for each sub-channel. The sum of the data rate of each sub-channel is equal to the total data rate. Each sub-stream is then converted into an analog signal using QAM, each QAM signal occupies a distinct frequency band, so these signals can be combined by simple addition to produce a composite signal for transmission.



- Carrierless amplitude phase modulation (CAP) is a non-standard variation of quadrature amplitude modulation (QAM). Instead of modulating the amplitude of two carrier waves, CAP generates a QAM signal by combining two PAM signals filtered through two filters designed so that their impulse responses are orthogonal.

CAP used for ADSL divides the available space into three bands. The range from 0 to 4 kHz is allocated for POTS transmissions. The range of 25 kHz to 160 kHz is allocated for upstream data traffic and the range of 240 kHz to 1.5 MHz is allocated for downstream data traffic.



High Data Rate DSL (HDSL):

- o Mainly was developed in late 1980'.
- o Symmetric mode.

- Data rate 1.5-2Mbps
- 2B1Q coding is used
- T1/E1 service only, but require two twisted pair.
- Range of about 3.7km

Single Line DSL (SDSL):

HDSL is not suitable for home user, because it require two twisted pair cables. So SDSL was developed to provide same type of service but over a single twisted pair line.

- Data rate 1.5-2Mbps
- Symmetric mode
- T1/E1 rates on a single line.

Very High Data Rate DSL (VDSL):

VDSL is same as ADSL but it has much higher data rate. The likely signaling technique is DMT/QAM. VDSL do not use echo cancellation.

- Currently data rate 13-52Mbps
- Asymmetric mode
- Single line over POTS and ISDN

Source:

http://datacombasic.blogspot.in/2011/04/digital-subscriber-line-dsl.html?utm_source=BP_recent