What is Frequency?

Ans: When number of curves passes a fixed path in a given amount of time is called frequency.

Unit of frequency: Usually frequency is measured in the hertz unit. It is denoted by Hz.

What is Wavelength?

Ans: Wavelength is the distance between points of a corresponding phase of two consecutive cycle of a wave.

The formula is : $C=\lambda. f$ or $\lambda= c/f$

Here ,c is velocity, f is frequency, λ is wavelength.

What is Antenna gain?

Ans: Antenna gain is the measure of directivity. It is defined as the ratio of radiation intensity in a given direction to the radiation intensity that would be obtained if the power accepted by the antenna was radiated equally in all directions (isotropically).

Antenna gain is expressed in dBi.

What is Modulation?

Ans: In electronics and telecommunications, modulation is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal which typically contains information to be transmitted.

Why Modulation Require?

Ans: (1) In wireless communication system modulation is done to modulate a very high frequency signal with the actual signal.

(2) Modulation is needed to send signal through the long path.

(3) For less interference.

(4) Modulation is used to encrypt data, to send signals over large distances with minimum noise.

(5) The main use of modulation is to reduce the length of antennas.

What is Analog Modulation?

Ans: To describe analog modulation we have to know that what Analog signal is:

Analog signal: An analog signal is a continuous signal that contains time-varying quantities. Unlike a digital signal, which has a discrete value at each sampling point, an analog signal has constant fluctuations.

Now for analog modulation we can easily say that:

The altering of a carrier by an analog signal is called analog modulation.

What is Digital Modulation?

Ans: To describe Digital modulation we have to know that what Digital signal is:

Digital signal: A signal in which the original information is converted into a string of bits before being transmitted. A radio signal, for example, will be either on or off.

Now for Digital modulation we can easily say that:

The altering of a carrier by a digital signal is called digital modulation. In digital modulation,(communications) A method of placing digital traffic on a microwave system without use of modems, by transmitting the information in the form of discrete phase or frequency states determined by the digital signal.

What is QAM-16, QAM-64, QPSK, BPSK Modulation?

Ans:16-QAM : A variation on the quadrature amplitude modulation (QAM) signal modulation scheme. 16-QAM yields 16 possible signal combinations, with each symbol representing 4 bits (2 4 = 16). The yield of this complex modulation scheme is that the transmission rate is 4 times the signaling rate.

64-QAM: A variation on the quadrature amplitude modulation (QAM) signal modulation scheme. 64-QAM yields 64 possible signal combinations, with each symbol representing six bits (2 6 = 64). The yield of this complex modulation scheme is that the transmission rate is six times the signaling rate.

Quadrature Phase Shift Keying (QPSK) Modulation:

Quadrature Phase Shift Keying (QPSK) is the digital modulation technique. Quadrature Phase Shift Keying (QPSK) is a form of phase shift keying in which two bits are modulated at once. Quadrature Phase Shift Keying(QPSK) is a widely used method of transferring digital data by changing or modulating the phase of a carrier signal. where the carrier wave's phase is modulated to encode bits of digital information in each phase change.

Binary Phase Shift Keying (BPSK) Modulation:

Binary Phase Shift Keying (BPSK) is a type of phase modulation using 2 distinct carrier phases to signal ones and zeros. BPSK is the simplest form of PSK. It uses two phases which are separated by 180°.

What is wireless propagation?

Ans: Wireless Propagation is the motion of wave through or along a medium. The wave length is related to the propagation velocity "V" and the frequency "f" So wavelength is =V/f . Here ,v is the velocity of the medium And f is the frequency

What is Fresnel zone?

Ans: Fresnel zone is the area of circle around the line of sight. The concept of the Fresnel zones my used to analyze interference obstacle near the path of a radio beam. When we transmit signal from one point there must be create upper Fresnel zone and lower Fresnel zone. The lower Fresnel zone must be 80% clear because maximum data transmit through lower Fresnel zone.

The Fresnel zone is defined as follows:

R = ½√λ*D. where, R : Radius of the Fresnel zone, λ: Wavelength, D: Distance between sites

What is Link budget?

Ans: A link budget is the accounting of all of the gains and losses from the transmitter, through the medium (free space, cable, waveguide, fiber, etc.) to the receiver in a telecommunication system. It takes into account the attenuation of the transmitted signal due to propagation, as well as the loss, or gain, due to the antenna. Random attenuations such as fading are not taken into account in link budget calculations with the assumption that fading will be handled with diversity techniques.
A simple link budget equation looks like this:

Received Power (dBm) = Transmitted Power (dBm) + Gains (dB) -Losses (dB)

For a line of sight radio system, a link budget equation might look like this:

RxP = TxP + TxG -TxL -FSL -ML + RxG -RxL

where: RxP = Received power (dBm), ML = Miscellaneous losses (dB)

TxP = Transmitter output power (dBm), RxG = Receiver antenna gain(dBi)

TxG = Transmitter antenna gain(dBi) , RxL = Receiver losses (coax, connectors...) (dB)

FSL = Free space lossor path loss(dB), TxL = Transmitter losses (coax, connectors...) (dB)

What is Earth Curvature (Earth bulge)?

Ans: Earth bulge is the curvature of the earth over a given distance. For Line of sight radio operations, it must be considered for those radio shots exceeding 11.3 km (7 mile).

Earth curvature calculation:

$$\textbf{Earth curvature} = \frac{(\text{Total link})\ 2}{8^* \text{ effective earth radius}}$$

Where effective earth curvature: 4/3* Earth radius

$$=4/3^* 6378 = 8504$$

Let, Total link = 10 Km

$$\textbf{Earth curvature} = \frac{(10)\ 2}{8^* 8504} = 1.47 \text{ meters}$$

What is EIRP (Effective Isotropic Radiated Power)?

Ans: EIRP is defines the antenna transmitted power. Equal to the transmitted output power minus cable loss plus transmitting antenna gain.

EIRP=Pout-Ct+Gt

Pout= Output power of transmitted in dBm , Ct= Transmitter cable attenuation in dB, Gt= Transmitting antenna gain in dBi

What is transmit power? Describe dBm to Watt Calculation?

Ans: Transmit power is transmitter output power or receiver input power. It is expressed in Watts, it is also expressed in dBm.
We can describe dBm to watt calculation by using this formula:
P(dBm)= 10*log*Pmw
We know, 1 watt=1000 mW
So, P(dBm)=10*log*1000
=30 dBm

What is the difference between dBi and dBm?

Ans: dBi: In general for antennas, a common reference unit is the dBi, which states the gain of an antenna as referenced to an ISOTROPIC source. An Isotropic source is the perfect omnidirectional radiator a true "Point Source", and does not exist in nature.

dBm: Generally dBm is used to measure the power of transmitter output power. dBm is not is reference to anything else but the used as an actual gain .It is not in reference to two power level but directly correlating the gain of a device.

What is Line of sight (LOS), Non Line of sight (NLOS), Near Line of Sight (nLOS)?

Ans: Line of sight (LOS): In general, Line of sight means there is no obstacles between transmitting and receiving antenna.

Non Line of sight (NLOS): In general, Non Line of sight means there are so many large obstacles present between transmitting and receiving antenna.

Near Line of sight (nLOS): In general, Near Line of sight means there is few obstacles present between transmitting and receiving antenna.

What is E1?

Ans: E1 (or E-1) is a European digital transmission format. The E1 signal format carries data at a rate of 2.048 million bits per second and can carry 32 channels of 64 Kbps each.
E1 contains 32 channels where 2 channels are used for synchronization and 30 channels are used for data transfer.
Usually E1 works by Time Division Duplex.

What is STM?

Ans: Synchronous Transmission Module (STM), also known as Synchronous Transfer Mode, is the basic rate of transmission of the fiber optic network transmission standard. It has a bit rate of 155.52 Mbit/s.
There are STM1, STM4, STM16
STM1 can define: STM1=63*E1= 63*2.034= 130.248 Mbit/s. and 2016 Channels.
STM4 can define: STM4=4*63*E1= 4*63*2.034= 512.568 Mbit/s. and 8064 Channels.

What is Time Division Duplex (TDD) and Frequency Division Duplex (FDD)?

Ans: Time Division Duplex (TDD): Time Division Duplex defines as, a single frequency channel is assigned to both the transmitter and the receiver. Both the uplink (UL) and downlink (DL) traffic use the same frequency f0 but at different times.

Frequency Division Duplex (FDD): Frequency Division Duplex defines as, a distinct frequency channel is assigned to both the transmitter and the receiver. At any particular instant in time, uplink (UL) traffic uses a frequency f0 that is different from the frequency f1 used by the downlink (DL).

What is Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM)?

Ans: Time Division Multiplexing (TDM): TDM is used for digital communication and divides the main signal into time-slots, with each time-slot carrying a separate signal.

Frequency Division Multiplexing (FDM): FDM is usually used for analog communication and divides the main frequency of the carrier into separate sub channels, each with its own frequency band within the overall bandwidth.

What is the difference between IEEE 802.11a, 802.11b and 802.11c?

Ans: IEEE 802.11 is a set of standards for implementing wireless local area network (WLAN) computer communication in the 2.4, 3.6 and 5 GHz frequency bands. They are created and maintained by the IEEE LAN/MAN Standards Committee (IEEE 802).

IEEE 802.11a

The 802.11a standard uses the same data link layer protocol and frame format as the original standard, but an OFDM based air interface (physical layer). It operates in the 5 GHz band with a maximum net data rate of 54 Mbit/s, plus error correction code, which yields realistic net achievable throughput in the mid-20 Mbit/s.

IEEE 802.11b

802.11b has a maximum raw data rate of 11 Mbit/s and uses the same media access method defined in the original standard. 802.11b products appeared on the market in early 2000. 802.11b devices suffer interference from other products operating in the 2.4 GHz band. Devices operating in the 2.4 GHz range include microwave ovens, Bluetooth devices, baby monitors, cordless telephones and some amateur radio equipment.

IEEE 802.11c

IEEE 802.11ac is a standard under development which will provide high throughput in the 5 GHz band. This specification will enable multi-station WLAN throughput of at least 1 gigabits per second and a maximum single link throughput of at least 500 megabits per second, by using wider RF bandwidth (80 or 160 MHz), more streams (up to 8), and high-density modulation (up to 256 QAM).