



SNS COLLEGE OF ENGINEERING
(Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



19EC504 – TRANSMISSION LINES AND ANTENNAS

III YEAR/ V SEMESTER

UNIT 4 – SPECIAL ANTENNAS

1



ULTRA WIDE BAND



- Ultra Wide Band (UWB) is a technology for the transmission data by using techniques which cause a spreading of the radio energy over a very wide frequency band with a very low power spectral density.
- The low power spectral density limits the interference potential with conventional radio systems (TV, GSM, UMTS, GPS, etc.) and the high bandwidth can allow very high data throughput for communications devices, or high precision for location and imaging devices.



UWB



- UWB radios can use frequencies from 3.1 GHz to 10.6 GHz in USA and Asia and at least 6.0 to 8.5 GHz in Europe. The Federal Communications Commission in USA (FCC) has defined an UWB device as any device with a -10 dB fractional bandwidth, greater than 20% or occupying at least 500 MHz of the spectrum. Most narrowband systems occupy less than 10% of the center frequency bandwidth, and are transmitted at far greater power levels.
- The FCC introduced severe broadcast power restrictions for UWB in order not to interfere with other narrower band systems nearby, such as 802.11a/g radio.



UWB SIGNALS



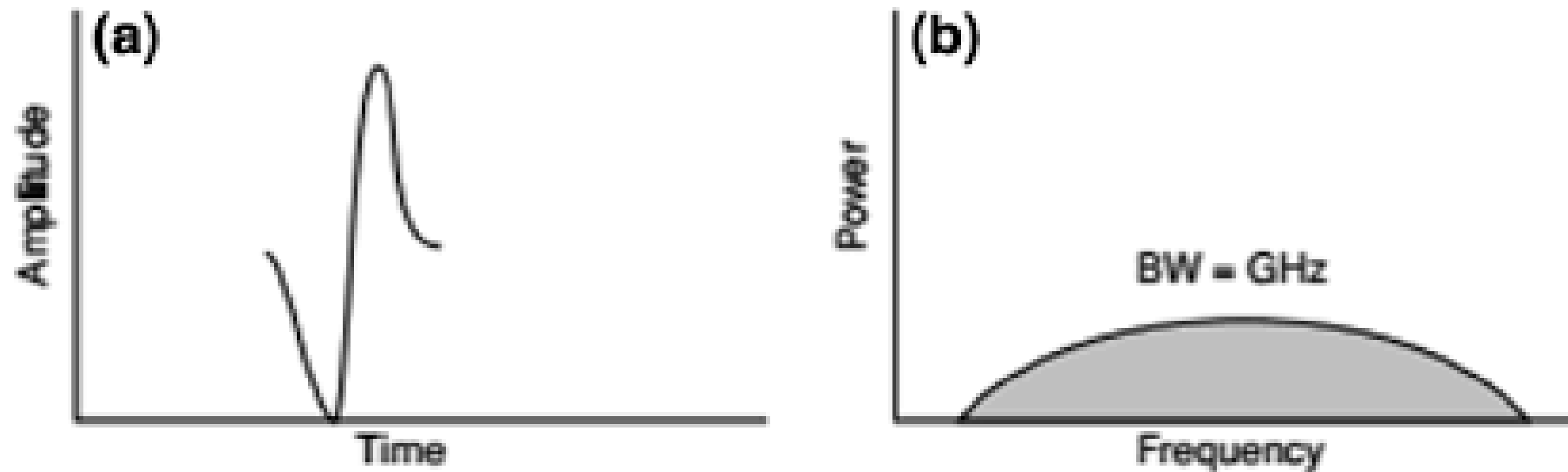
UWB systems use carrier less, short-duration (picosecond to nanosecond) pulses with a very low duty cycle (less than 0.5 percent) for transmission and reception of the information. And duty cycle is the ratio of the time that a pulse is present to the total transmission time.

$$\text{Duty Cycle} = \frac{T_{\text{on}}}{T_{\text{on}} + T_{\text{off}}}$$

Low duty cycle offers a very low average transmission power in UWB communications systems. The average transmission power of a UWB system is on the order of microwatts



UWB SIGNAL REPRESENTATION





UWB ANTENNA SIGNALS



Impulse-radio (IR) UWB first systems were that utilized the concept of wideband communication in power limited system. IR UWB offers short duration pulses with fast rise and fall times, which results in wideband spectra.



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For example, a pulse signal which is centered at 6 GHz and occupies a bandwidth of more than 1,2 GHz (ie. 20% fractional bandwidth). These pulses are having very low energy because very low power level is permitted to UWB transmission, to carry the information of one bit many such pulses are combined.

The IR-UWB transceiver system has advantage of simplicity and low cost. A UWB signal can be any one of a variety of wideband signals, such as Gaussian, chirp, wavelet, or Hermite-based short- duration pulses



THANK YOU