EC310 ANTENNA AND WAVE PROPAGATION

Microstrip Antenna For UWB Applications.

PREPARED BY
GAUTAMI .A,AP/ECE

UWB ANTENNAS -CASESTUDY

OVERVIEW.

- Antenna
- How Antenna radiates ?
- Microstrip Patch Antenna
- Feeding Techniques
- Advantages
- Proposed Microstrip Antenna
- Ultra Wide Band
- References

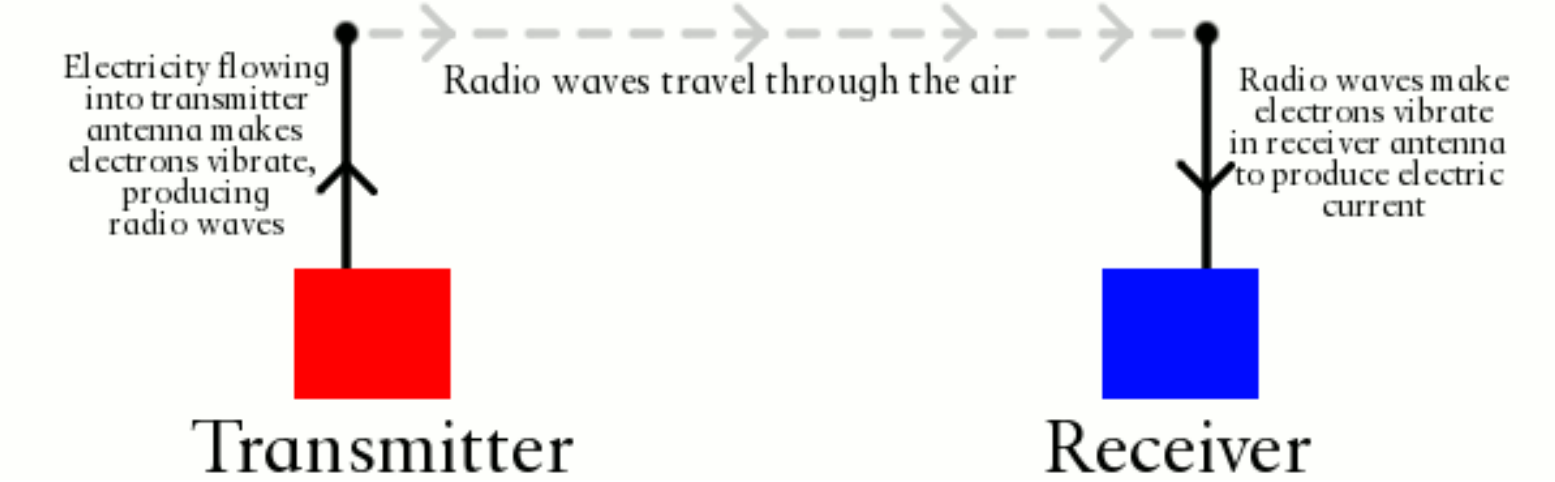
WHAT IS ANTENNA ??

•An electrical device which converts electric power in to radio waves, and vice versa.

•A transitional structure between free space & a guiding device.

•The IEEE definition of an antenna is given by the following phrase:

"That part of a transmitting or receiving system that is designed to radiate or receive electromagnetic waves".



HOW ANTENNA RADIATES ??

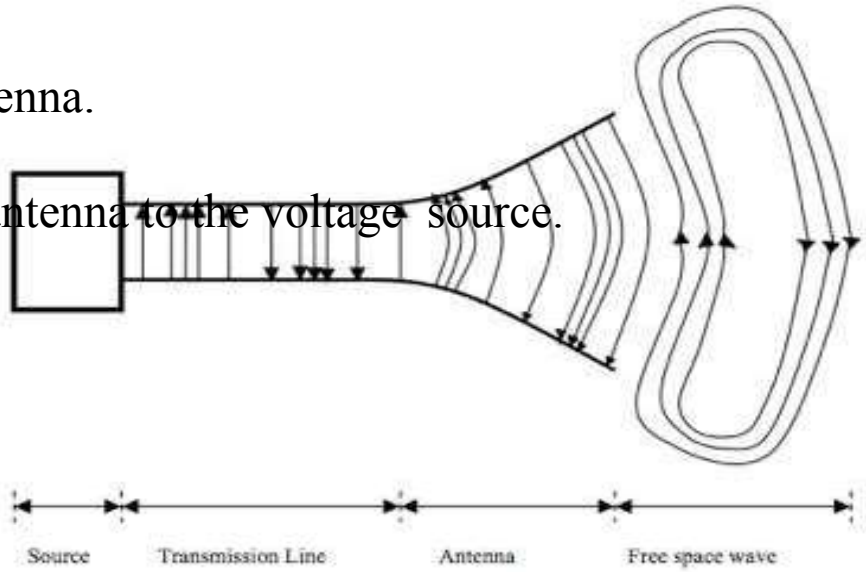
•An antenna radiates by changing the flow of current inside a conduction wire.

•By time-varying the current in a straight wire. If there is no motion of flow or if the flow of current is uniform, the straight wire will not radiate.

•If we bend the wire, even with uniform velocity, the curve along the wire will create an acceleration in the current flow and the wire will therefore radiate.

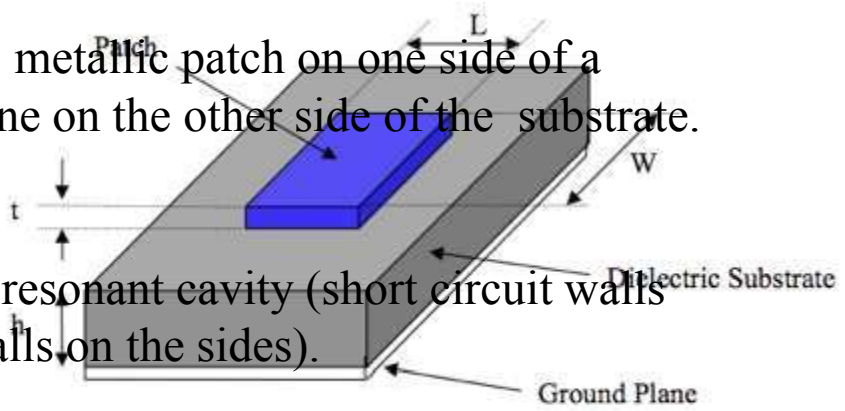
•In figure , we see a radiating antenna.

•Transmission line connects my antenna to the voltage source.



MICROSTRIP ANTENNA

•A microstrip antenna consists of a metallic patch on one side of a dielectric substrate and ground plane on the other side of the substrate.



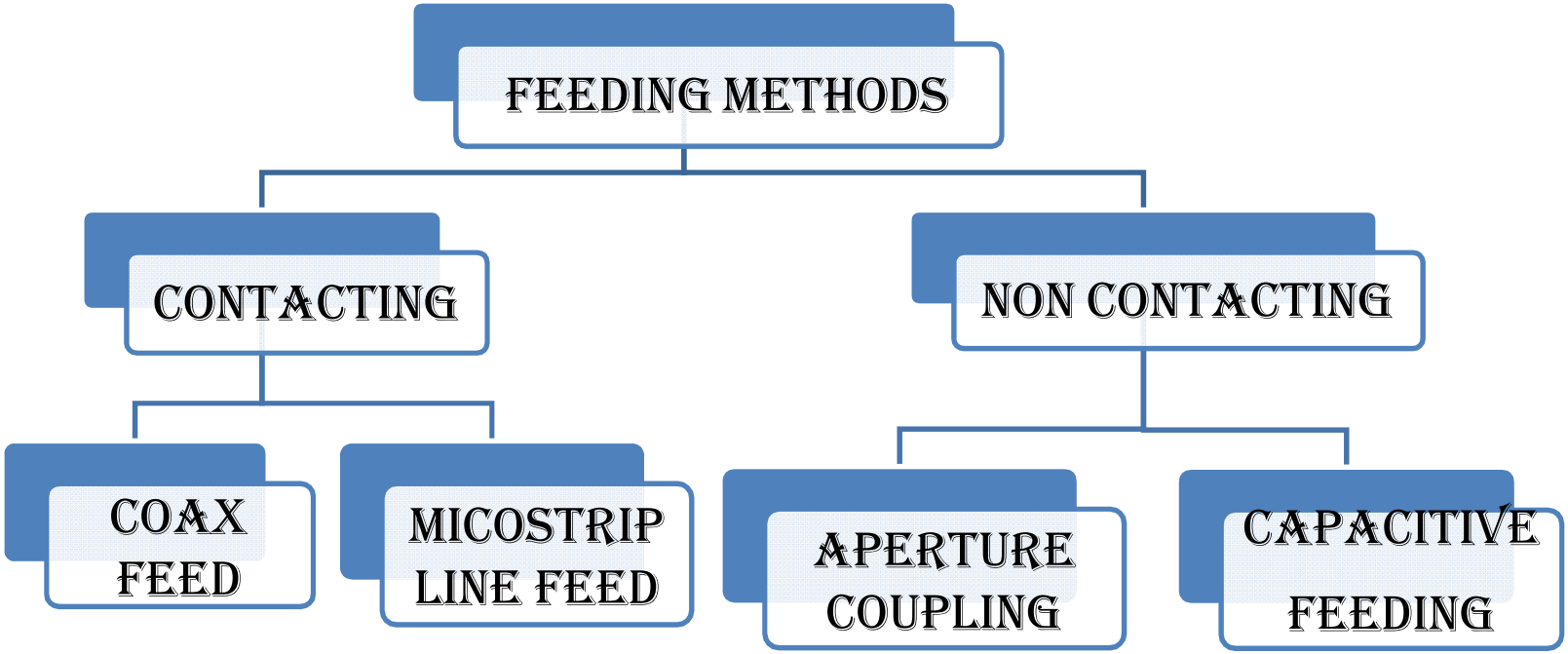
•The patch acts approximately as a resonant cavity (short circuit walls on top and bottom, open-circuit walls on the sides).

•If the antenna is excited at a resonant frequency, a strong field is set up inside the cavity, and a strong current on the surface of the patch. This produces significant radiation.

WHY MICROSTRIP ANTENNAS ?

- Low weight and small volume.
- Low fabrication cost
- Allows linear and circular polarization.
- Mechanically robust to mount.
- Capable of dual and triple frequency operations.

FEEDING TECHNIQUES



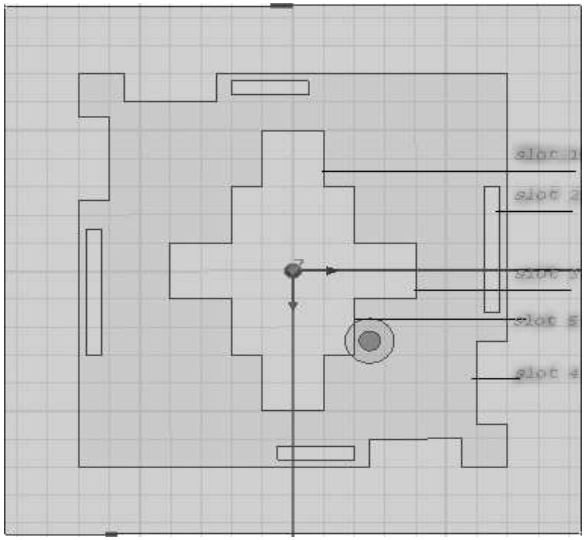
PROPOSED ANTENNA

•The antenna is fabricated on a FR-4 epoxy substrate with relative permittivity 4.4 and thickness of 1.6 mm.

•W/L ratio must be between 1 to 1.5 .

• Patch dimensions :

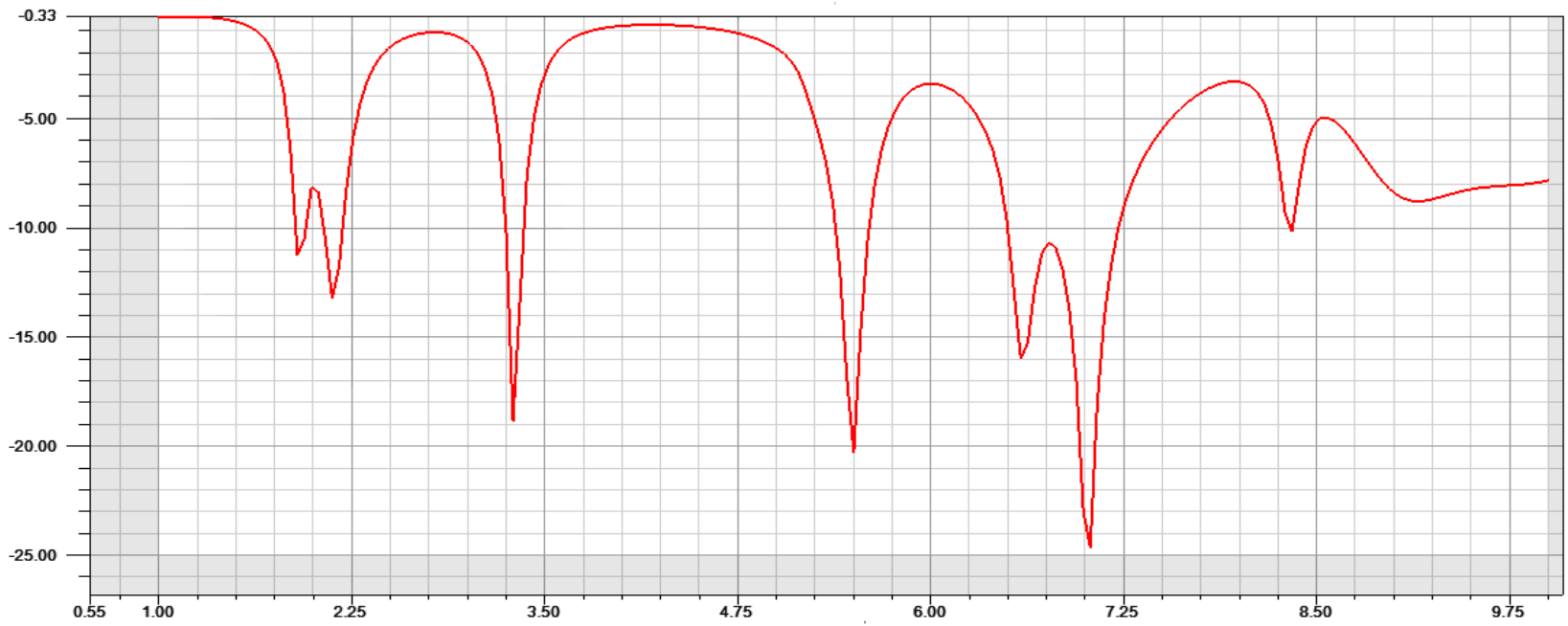
Length	28mm
Width	28 mm
Slot 1	20mm×4mm
Slot 2	9mm×1mm
Slot 3	4mm×16mm
Slot 4	6mm×2mm
Slot 5	12mm×8mm



•The proposed antenna is probe fed and antenna parameters like **Return Loss**,**VSWR** and **Radiation pattern** at corresponding resonance frequencies are simulated on HFSS.

RETURN LOSS

•The simulation of the proposed antenna is done on HFSS software, Simulation gives triple frequencies at 3.29 GHz ,5.5 GHz and 7GHz.

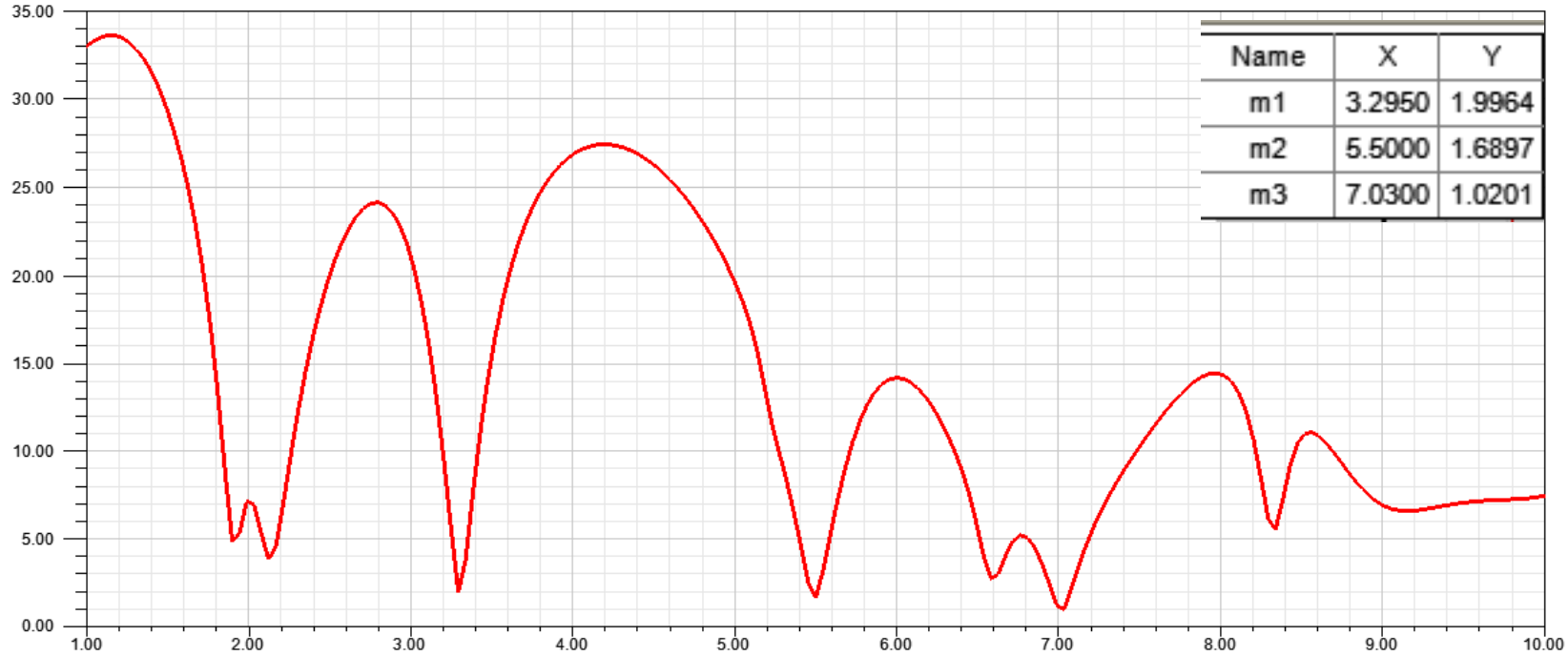


Bands obtained are from

- 3.24GHz-3.36GHz centre frequency 3.29GHz and return loss-18.8dB.
- 5.30GHz-5.60GHz centre frequency 5.50GHz and return loss -20.2dB.
- 6.40GHz-7.20GHz centre frequency 7.00GHz and return loss -24.6dB.

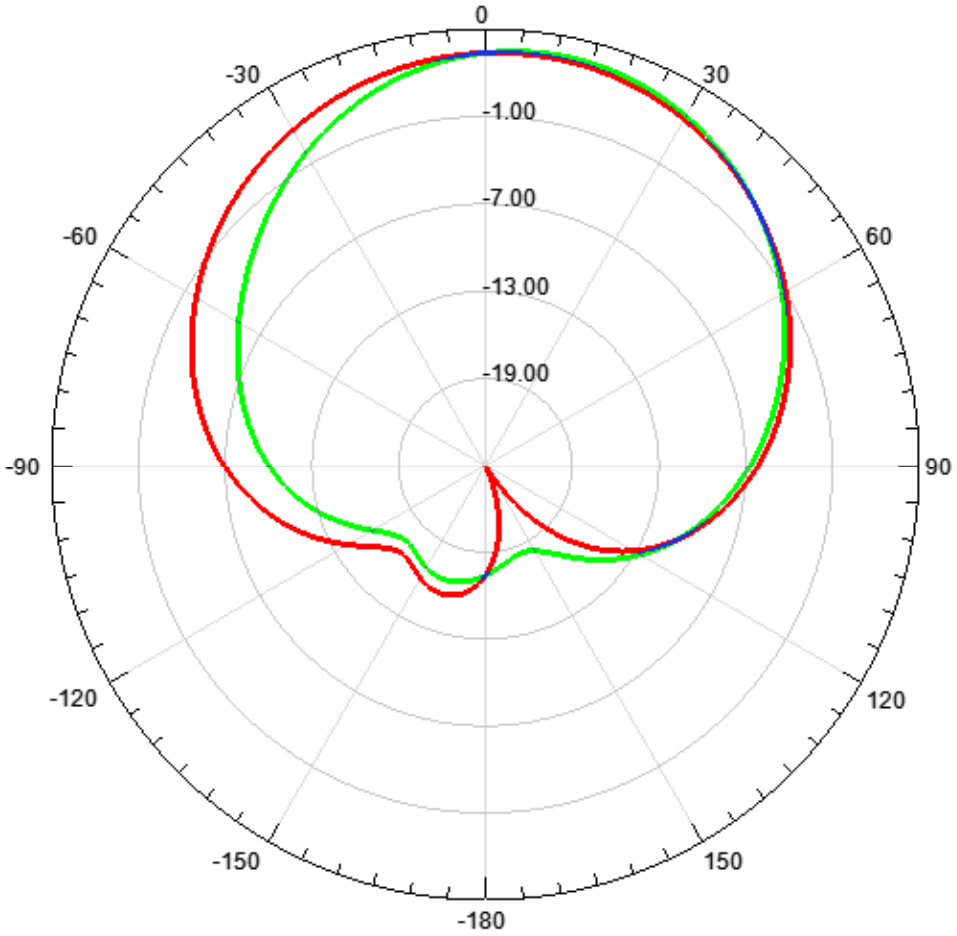
VSWR

•The VSWR(Voltage Standing Wave Ratio) is the ratio of the maximum to the minimum RF voltage along the transmission line.



•From the simulated result , the VSWR value ranges from 1 to 2 throughout the desired frequency range.

RADIATION PATTERN



Name	Theta	Ang	Mag
m1	0.0000	0.0000	3.3577

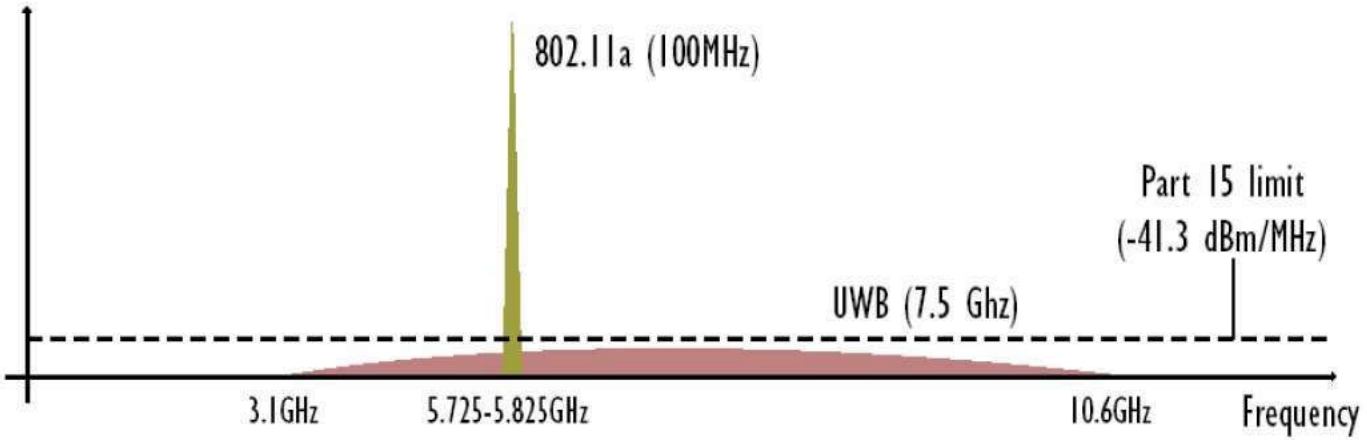
- Figure shows radiation pattern with positive gain 3.35 dB of centre frequency 6 GHz.

ULTRA WIDE BAND.

•UWB: Ultra Wide Band, Also known as(ultra band). A series of very short baseband pulses with time duration in nano -seconds that exist on **ALL frequencies simultaneously.**

•UWB in the frequency range from 3.1 to 10.6GHz.

•Bandwidth greater than 500 MHz.



UWB APPLICATIONS

•Stream DVD content to HDTVs simultaneously.

•Wirelessly synchronize appliance clocks.

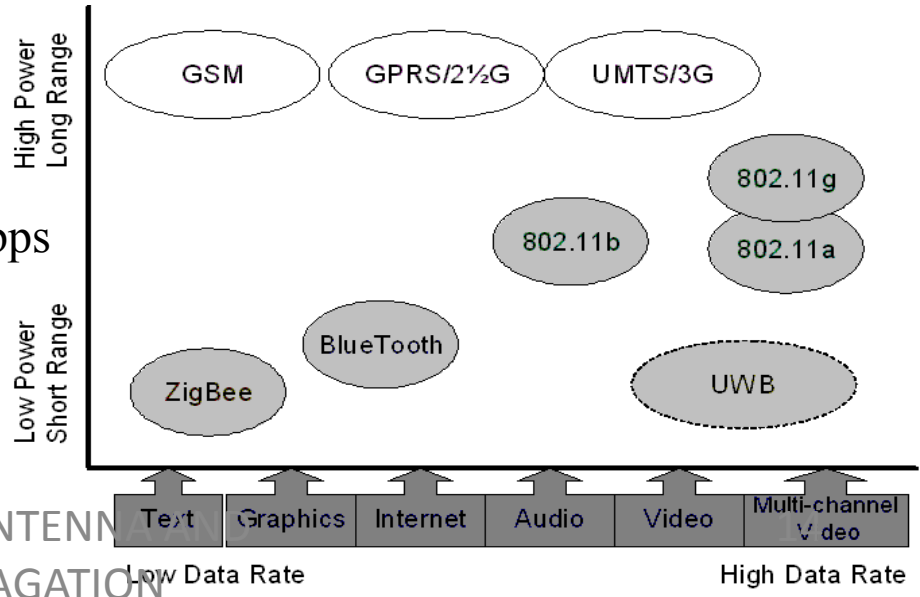
•Connect high-data rate peripherals.

•Move huge files between digital cameras, camcorders, and computers.

•Military applications (radars, penetrate walls, etc.)

WHY UWB ?

- Low power consumption
- Low detection
- High immunity to multipath-fading effects
- Ability to penetrate walls
- Faster than Bluetooth, Wi Fi
- Data rate of 450Mbps instead of 1Mbps



CONCLUSION.

•A small size microstrip-fed slot antenna for UWB operation is proposed and successfully implemented.

•The proposed antenna design is simple, and its performances have fulfilled the requirement set by UWB communications.

•UWB is an excellent solution for high-speed WPANs

-Many times the maximum required data rate

-Power efficiency and no multi-path fading.

REFERENCES.

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THANK YOU