


 Marmara University, 2021

Wireless and Mobile Networks


Subject 2
Basics of Radio Communication

Mujdat Soyuturk, Ph.D.
Associate Professor

 Contents

- Introduction
- Radio Communication
- Basic Devices Used In Radio Communications

2 - 2 Mujdat Soyuturk, Wireless and Mobile Networks, Spring 2021, Marmara University


 INTRODUCTION

2 - 3 Mujdat Soyuturk, Wireless and Mobile Networks, Spring 2021, Marmara University


 Introduction

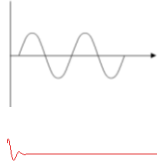


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 RADIO COMMUNICATION

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 Radio Waves



made up of

- Electric,
- Magnetic components

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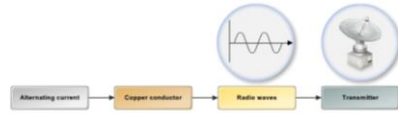
Radio Waves



2 - 7

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Radio Waves



2 - 8

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Radio Waves

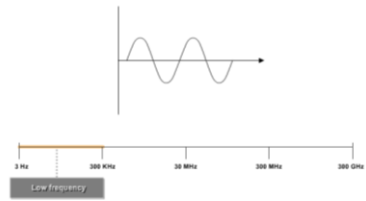


*Radio waves are also generated
in space by cosmic movements*

2 - 9

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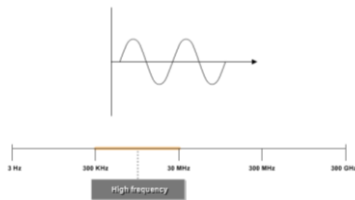
Radio Waves



2 - 10

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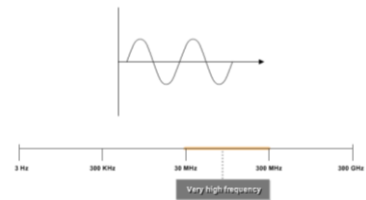
Radio Waves



2 - 11

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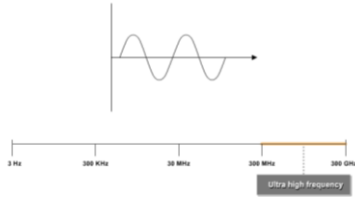
Radio Waves



2 - 12

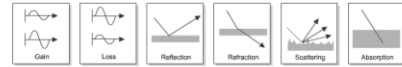
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Radio Waves



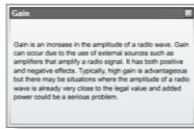
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Radio Wave Behaviors



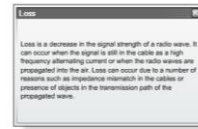
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Radio Wave Behaviors



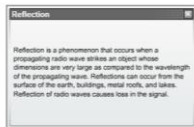
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Radio Wave Behaviors



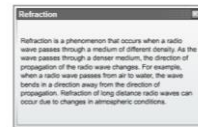
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Radio Wave Behaviors



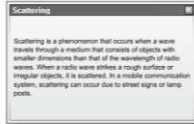
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Radio Wave Behaviors



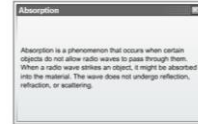
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Radio Wave Behaviors



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Radio Wave Behaviors



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Radio Propagation



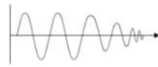
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Radio Propagation



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Radio Propagation



Radio waves travel at
approximately 186000
miles per second

~ 300000 kilometers
per second

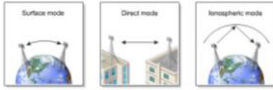
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Radio Propagation



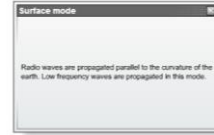
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Radio Propagation



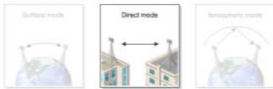
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Radio Propagation



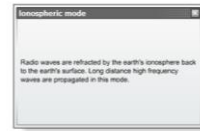
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Radio Propagation



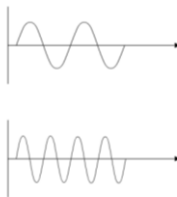
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Radio Propagation



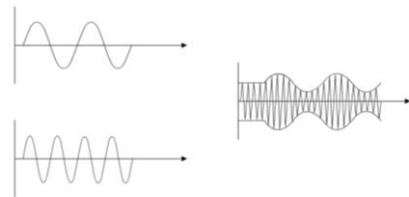
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Radio Transmission Methods



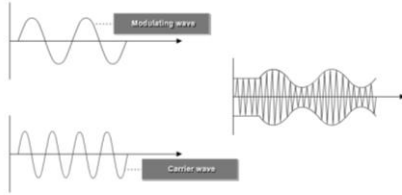
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Radio Transmission Methods

*modulation*

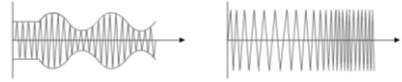
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Radio Transmission Methods



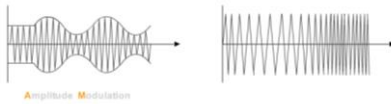
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Radio Transmission Methods



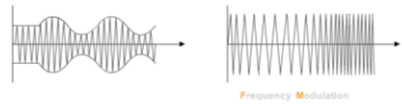
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Radio Transmission Methods



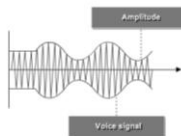
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Radio Transmission Methods



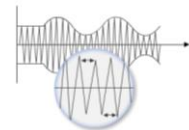
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Radio Transmission Methods



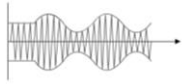
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Radio Transmission Methods



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Radio Transmission Methods

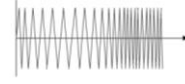


AM waves are not used to transmit signals with very high frequencies

2 - 37

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Radio Transmission Methods

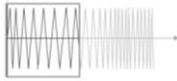


Frequency Modulation

2 - 38

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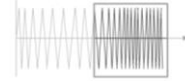
Radio Transmission Methods



2 - 39

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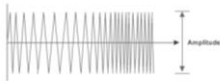
Radio Transmission Methods



2 - 40

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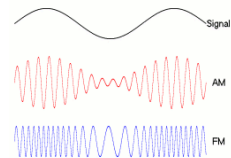
Radio Transmission Methods



2 - 41

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Radio Transmission Methods



2 - 42

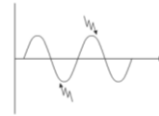
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Radio Frequency Interference



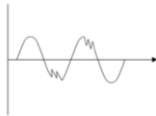
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Radio Frequency Interference



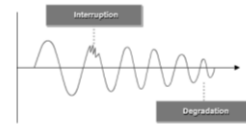
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Radio Frequency Interference



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Radio Frequency Interference



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Signal Attenuation



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Signal Attenuation



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Signal Attenuation



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Signal Attenuation



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Signal Attenuation



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BASIC DEVICES USED IN RADIO COMMUNICATIONS

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Transceivers



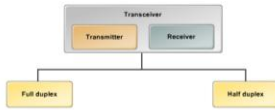
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Transceivers



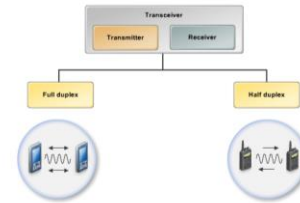
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Transceivers



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Transceivers



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Repeaters



*Regenerates a signal to
improve transmission distance*

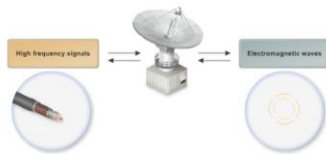
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Repeaters



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Antenna



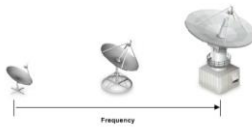
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Antenna



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Antenna



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Antenna



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Antenna



Gain
Signal strength
Shape
Radiation pattern

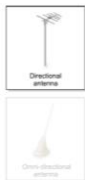
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Antenna



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Antenna



Directional antenna
A type of antenna that concentrates the signal beam in a single direction. They have a relatively narrow, focused transmission beam and a relatively high gain. Since they transmit primarily in a single direction, sending and receiving stations must be precisely aligned. The high gain provides good signal quality and the narrow beam means that only a narrow transmission area needs to be clear of interference.
Directional antennas are used in a point-to-point network to connect one station to another. Directional antennas include the parabolic dish antenna, backfire antenna, yagi antenna, and panel antenna.



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Antenna



Omnidirectional antenna
A type of antenna that radiates the signal beam out in all directions and has lower gain but a wider coverage area. The transmission radiates from the antenna in all directions, generally in a single horizontal or vertical plane, so that the sending and receiving stations do not need to be precisely aligned. However, a wider coverage cone means there are more potential sources of interference, and there is lower gain because the signal power is not as focused.
Omnidirectional antennas are used in multipoint and distributed networks. Omnidirectional antennas include the sailing plane or "bottle" antenna, loop antenna, and various rod-shaped antennas.



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