Dependability in Wireless Networks

By

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Outline:

- **Introduction**

- **Physical Layer**

- **MAC layer**

- **Conclusion**

Introduction

- **WiFi short for "Wireless Fidelity"**

- **the trade name for a popular wireless technology**

- **Based on IEEE 802.11**

Can We Rely on WI-FI

Contd:

- **Researcher and Hackers easily attack "Wired Equivalent Privacy" WEP.**

- **First security mechanism.**

- **Successful attack block a network and its services.**

- **Wireless network security overall depends on network to application.**

- **PHY and MAC layers.**

Physical Layer

- **Spec.**
  - **Uses a single narrow-band radio channel**
  - **At 2.4 to 5 GHz**
  - **Available power range allows an average radius of 100 m. (depend)**
  - **Node same freq. share same channel**
  - **Two different basic coding techniques**
    - **Direct** Sequence Spread Spectrum DSSS(11b and 11g).
    - Orthogonal Frequency Division Multiplexing OFDM (11a).

Contd:

- **These chars. Allow several attacks !**
- ➢ **Interception**
- ➢ **Injection**
- ➢ **Jamming**
- ➢ **Locating mobile nodes**
- ➢ **Hijacking**

Contd:

- **Interception**
  - **Attacker can intercept a radio communication easily.**
  - **802.11 not prevent traffic analysis.**
  - **Sol:**
    - **Apply mechanisms at MAC layer or above.**
    - **Prevent information leakage.**

Contd:

- **Injection**
  - **Radio transmissions can not restricted in specific area.**
  - **Prevent establishing firewalls and network intrusion system.**
  - **Sol:**
    - **MAC provide data source authentication for transmitted frame.**

Contd:

- **Jamming**
  - **Radio transmission subject to jamming easily (narrow-band).**
  - **Make WLAN unavailable.**

- **Locating Mobile Nodes**
  - **Attacker easily track MAC address ??**
  - **Built database that lists wireless node.**
  - **Track the device owner's location**

Contd:

- **Hijacking**
  - **It's difficult than interception and injection**
  - **Attacker make sure that two victim not talk directly**
  - **Jam the receiver while accessing the transmitted by using directional antenna near the sender.**

MAC layer

- **It is Media Access Control layer.**
- **Sub-layer data link layer**
- **provides addressing and channel access control mechanisms**
- **Has weakness features**
  - **Implement shared channel**
  - **Can have star or mesh topology**

Shared Channel

- **Nodes use same channel.**
- **You need to distinguish nodes.**
- **Use MAC address as identifier.**

Contd:

- ## Jamming
  - Radio transmission subject to jamming easily (narrow-band).
  - Make WLAN unavailable.

- ## Locating Mobile Nodes
  - Attacker easily track MAC address ??
  - Built database that lists wireless node.
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Shared Channel

- Nodes use same channel.
- You need to distinguish nodes.
- Use MAC address as identifier.
- Even if communication encrypted, header must remain.
- Shared channel implies shared bandwidth.
- Several nodes lower transmission speed
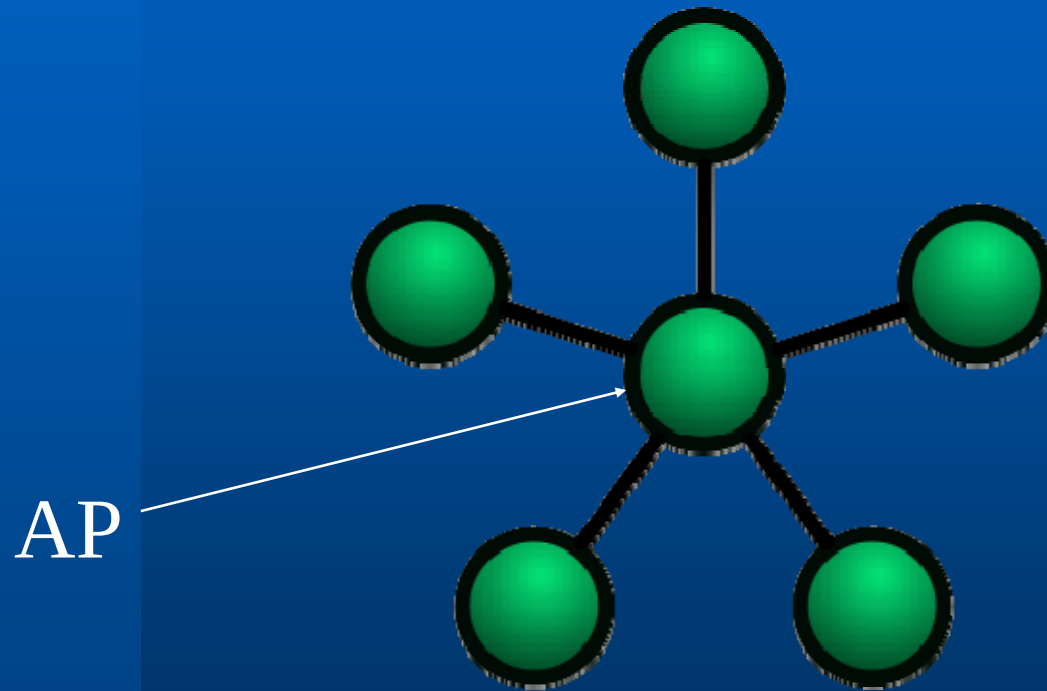
Contd:

- **802.11 uses logical mechanism to detect the channel (free or busy).**
- **Duration field in the header.**
- **Attack change this field.**
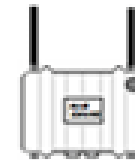
Topology

- **Two different modes of network topology.**

  1. **The infrastructure mode (star)**

  2. **The ad hoc mode (mesh)**

Star topology

AP

Mesh topology

Coclsuion

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Question time

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