

Ad hoc mobile wireless networks protocols and systems

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Ad Hoc Networks: Fundamentals and Applications**

What is an Ad Hoc Network?

An ad hoc network is a decentralized wireless network where mobile devices communicate directly without relying on a centralized access point or infrastructure. Each device acts as both a sender and receiver, forming a temporary and autonomous network.

Types of Ad Hoc Networks

- **Infrastructure-Less:** No central access point or backbone infrastructure.
- **Mobile Ad Hoc Network (MANET):** Nodes are mobile and communicate while in motion.

Ad Hoc Network Protocol

Ad hoc networks utilize specific protocols for communication, such as:

- **802.11b:** Provides basic connectivity for ad hoc mode.
- **802.11s:** Designed specifically for mesh networks, including ad hoc.
- **AODV (Ad-hoc On-Demand Distance Vector):** A routing protocol for MANETs.

Setting Up an Ad Hoc Wireless Network

1. Enable ad hoc mode on all devices.

2. Configure the devices with the same network name (SSID) and encryption key.
3. Search for and connect to the ad hoc network from each device.

Bluetooth as an Ad Hoc Network

Bluetooth is a short-range wireless technology that can establish ad hoc networks. It allows devices to communicate directly within a limited range.

Ad Hoc Method and System

An ad hoc method refers to any temporary or improvised solution to a problem, while an ad hoc system is a network or application that is designed for a specific purpose and operates independently of any larger infrastructure.

802.11 Ad Hoc

802.11 is a wireless networking standard that includes an ad hoc mode. In ad hoc mode, devices can establish a direct connection without an access point.

Uses of Ad Hoc Networks

Ad hoc networks are useful for:

- Emergency communication
- Sensor networks
- Device-to-device communication
- Gaming and collaboration

Nodes in Ad Hoc Wireless Networks

Each device in an ad hoc network is a node that performs the functions of routing, sending, and receiving data.

Security of Ad Hoc Wireless Networks

Ad hoc networks are inherently more vulnerable to security risks due to their lack of centralized control and encryption.

Disadvantages of Ad Hoc Networks

- Limited range and scalability
- Potential interference and lost connections
- Security concerns

Architecture of Ad Hoc Networks

Ad hoc networks typically have a decentralized architecture with the following elements:

- **Nodes:** Devices that communicate wirelessly.
- **Topology:** The dynamic interconnection pattern between nodes.
- **Routing:** Protocols for transmitting data between nodes.

Basic Principle of Ad Hoc Networks

Ad hoc networks operate on the principle of self-organization and distributed decision-making. Each node actively participates in managing and maintaining the network.

Configuring Ad Hoc Connection

To configure an ad hoc connection, follow these steps:

1. Go to Network Settings on your device.
2. Enable Wi-Fi and select "Ad Hoc."
3. Create a network name and password.
4. Connect other devices to the ad hoc network using the same settings.

Ad Hoc Wireless Mode

Ad hoc wireless mode is a setting on wireless devices that allows them to establish direct connections without an access point.

Ad Hoc vs. Direct Wi-Fi

Both ad hoc networks and Direct Wi-Fi enable direct device-to-device communication. However, Direct Wi-Fi is a proprietary standard used by certain devices, while ad hoc networks are based on standard Wi-Fi protocols.

Applications of Mobile Ad Hoc Networks

- Disaster recovery and emergency response
- Vehicle-to-vehicle communication
- Industrial automation
- Gaming

Example of Ad Hoc

A group of students sharing a project without an internet connection by connecting their laptops through ad hoc mode.

Ad Hoc Tools

Tools for creating and managing ad hoc networks, such as:

- MadWifi
- NoCat
- Serval

Ad Hoc Problems

Challenges associated with ad hoc networks:

- Hidden terminal problem
- Interference
- Routing overhead

Ad Hoc Network Simple Definition

An ad hoc network is a temporary wireless network formed by direct communication between mobile devices without an access point.

Ad Hoc vs. Cellular Networks

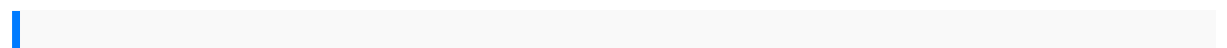
Ad hoc networks differ from cellular networks in that they are self-organized, decentralized, and lack a central infrastructure.

Ad Hoc on Phone Bill

An ad hoc call on a phone bill refers to a call made directly between two mobile phones without using the cellular network infrastructure.

Ad Hoc Network Between Two Laptops

An ad hoc network can be established between two laptops by enabling ad hoc mode and connecting them directly through Wi-Fi.



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