

Wireless Multimedia Systems Fall, 2008 (Lecture 4)

1. Today's topic:

MAC for Multimedia Applications: Current Solutions: Bluetooth, 802.11

Suggested Reading:

◆ Required Reading:

(Haartsen2000) Jaap C. Haartsen, "The Bluetooth Radio System", IEEE Personal Communications, February 2000

(Xiao2002) Y. Xiao, J. Rosdhal, "Throughput and Delay Limits of IEEE 802.11", IEEE Communications Letters, August 2002.

a) MAC Requirements

Fundamental Requirements and pure traffic support (wireless data network, wireless voice network)

Multimedia MAC: to carry mixed traffic over the same wireless medium (Bluetooth (ACL, SCO), 802.11 (DCF, PCF), GPRS (different QoS))

Soft-Resource (CDMA) and Dynamic bit rate

b) Concerns for Multimedia Medium Access

Channel Acquisitions

Collision Free Transmission

Interference Suppression (Spread Spectrum)

c) Mobile Ad hoc Network (MANET)

Evolution of Mobile Ad hoc Network

Commercial Applications of Mobile Ad hoc Network

Challenges of MANET

d) Typical Multimedia Medium Access Examples:

Bluetooth (ISM 2.4 G, Frequency Hopping (FH))

Connection Establishment: Inquiry/Inquiry Scan/Page

Transmissions: SCO, ACL, Polling

Power Saving: Park, Hold, Sniff

Implementations

802.11 (ISM 2.4 G, Direct Sequence (DS))

DCF (Distributed Coordination Function, RTS/CTS/DATA/ACK)

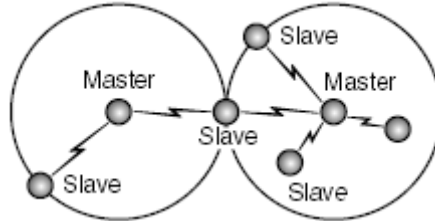
PCF (Point Coordination Function, POLLING)

GPRS (General Packet Service, GSM Band)

Multiple SLOT Access

Bluetooth (802.15 for short range communications, Personal Area Network)

Wireless Connection is established in an Ad-hoc manner. Data delivery relies on a piconet. A piconet consists of a Master and up to 7 slaves. All devices on a piconet follow the frequency hopping sequence and timing of the master. Several piconets could be linked as a Scatternet.



<I> First Step (Service Discovery Protocol, Inquiry/Inquiry Scan), Page/Page Scan

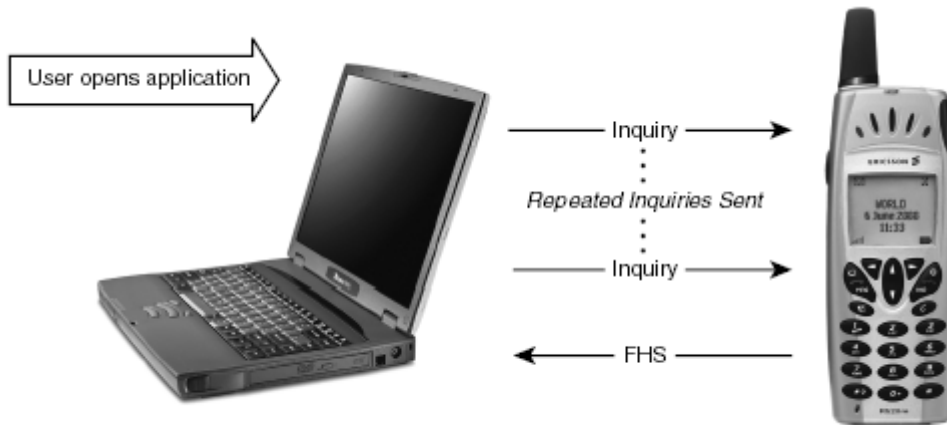
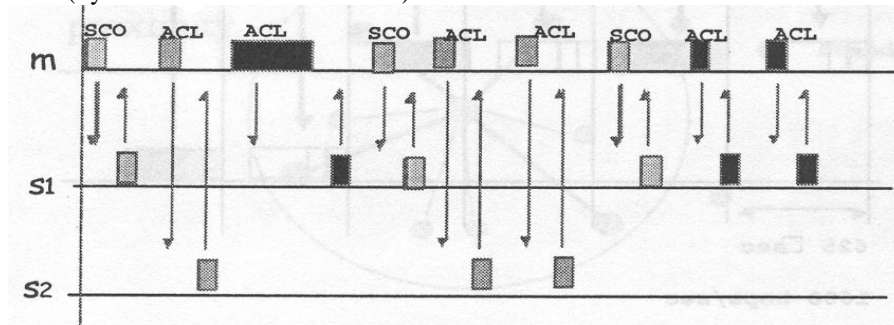


Figure 1-7 Discovering a Bluetooth device.

<II> Connection Established (Time Division Multiplexing within a piconet)

ACL (Asynchronous Connection Link)

SCO (Synchronous Connection Link)



<III> Power Saving/Power Management:

Standby/Idle Mode: the unit only scans a little over 10 ms every (1.28 second to 3.84 seconds)

Hold/Park/Sniff (after the piconet has been established)

Hold: for another inquiry/scan/page functions

Sniff: low power mode, the slave scans at a larger interval

Park: it only listens to the channel at a very low duty cycle

Advanced 802.11 Management:

<I> 802.11 Power Saving

Infrastructure: TIM

Beacon Message:

Timestamp

Beacon Interval

Capability Information

SSID (Service Set Identity, ESS or IBSS)

Supported Rates

CF Parameter Set

IBSS Parameter Set

TIM

Association Request: (Capability Information, Listen Interval, SSID, Supported Rates)

Association Response: (Capability Information, Status Code, Station ID, Supported Rates)

Ad hoc (IBSS): ATIM