Bluetooth Protocol Stack

ISQA 8310

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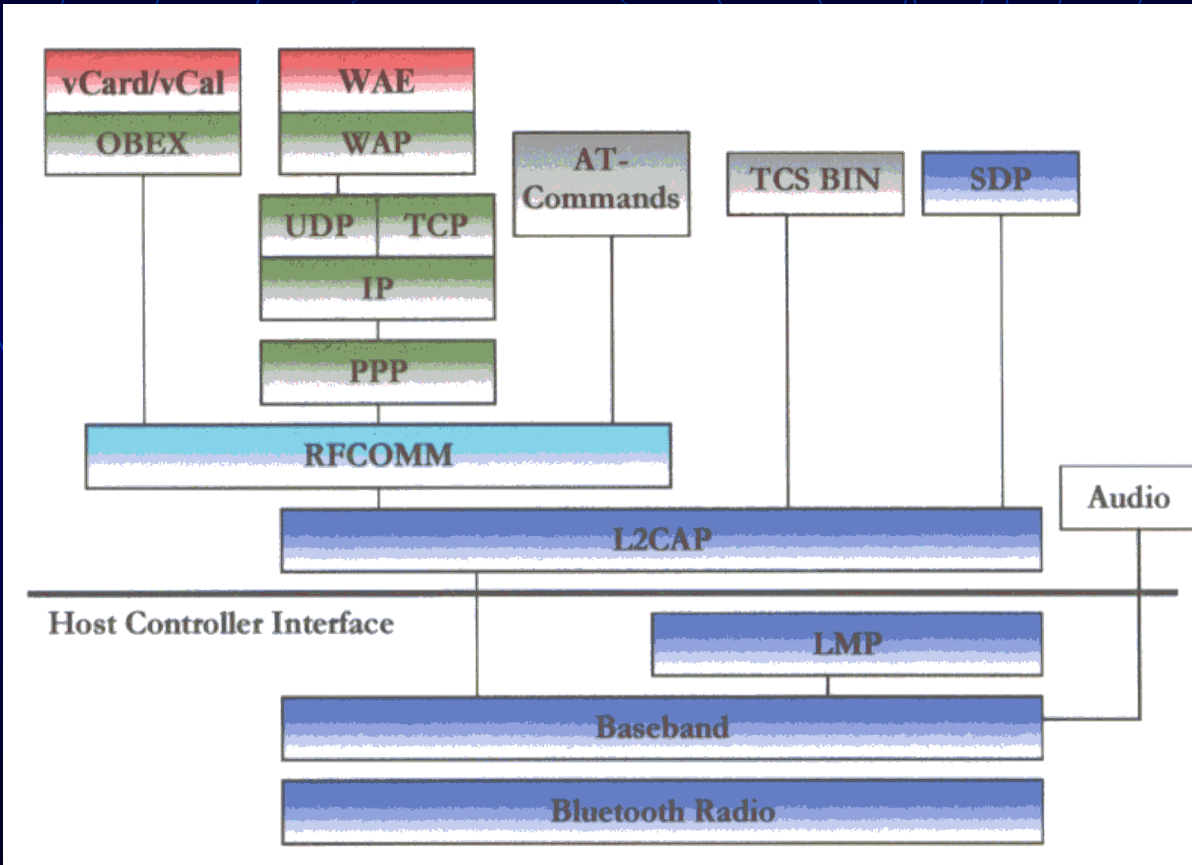
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Introduction

- Short range radio frequency technology
- Bluetooth is used to create a wireless piconet
- Primary function is cable replacement
- Can be used to transmit either audio or data

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Like any network, Bluetooth has protocol layers that define the network and allow it to function.

Baseband Protocols

- These protocols function very much like the physical and data link layer protocols in TCP/IP protocol stack.

- Baseband and Link Control layer controls the physical RF link.
  - Two types of links
    - Synchronous Connection Oriented (SCO) Circuit-switched
      - Audio
    - Asynchronous Connection-Less (ACL) Packet-switched
      - Data

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Link Manager Protocol

- Responsible for link set-up.

- Control and negotiation of packet sizes.

- Manages power modes etc.

- Monitors the state of the piconet.

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Logical Link Control and Adaptation Protocol (L2CAP)

- Multiplexing
- Segmentation reassembly
- Quality of Service
- Group abstraction

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Service Discovery Protocol

- Defines how a client application can act to discover a Bluetooth server

- Defines how a client can search for a service

- Allows for discovery of new services

- Allows for discovery of services no longer available

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Cable Replacement Protocol

- RFCOMM and its functions:
    - Provide emulation
    - Provide transport capabilities
    - Provide reliable data streams

- RFCOMM devices:
    - PCs or Printers
    - Modems

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RFCOMM Frame Types

- UA (Unnumbered Acknowledgement)
- SABM (Start Asynchronous Balanced Mode)
- DM (Disconnected Mode)
- DISC (Disconnect)
- UIH (Unnumbered Information with header check)

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RFCOMM Frame Structure
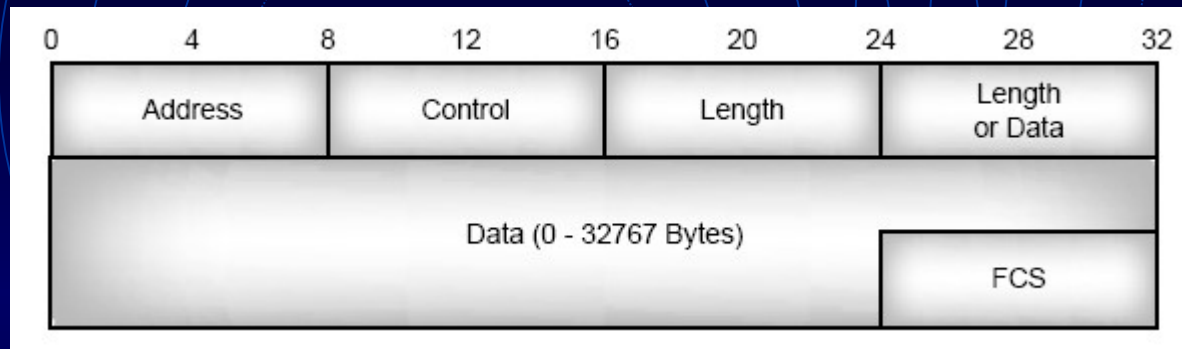
- Address Field
- Control Field
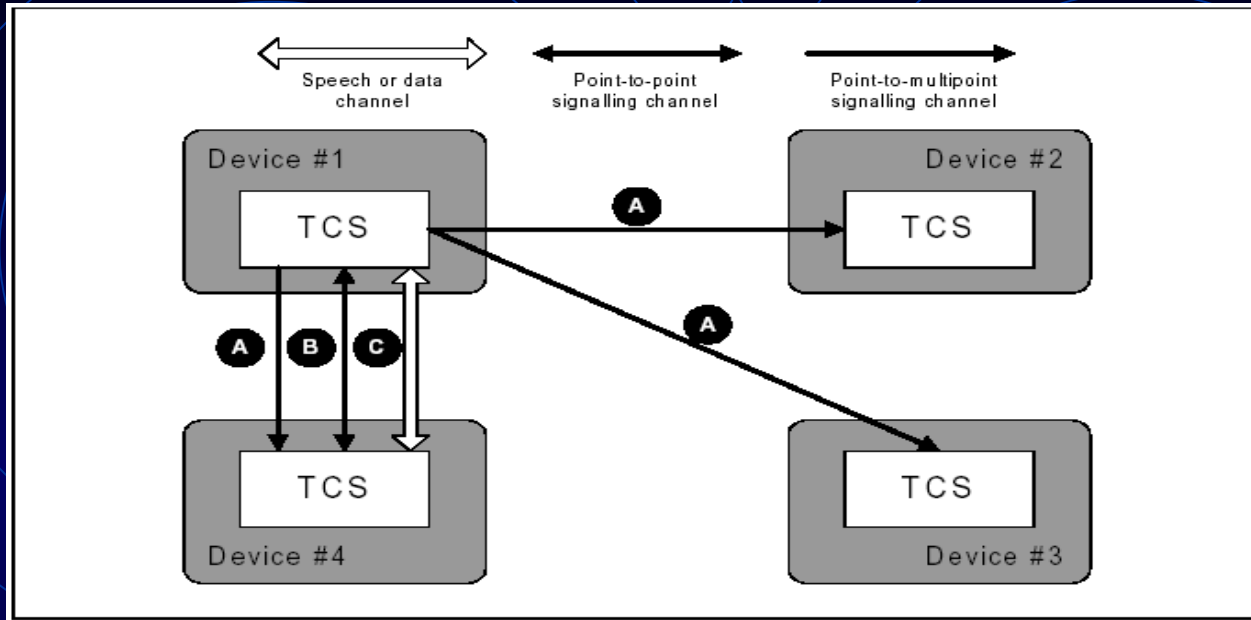- Length Field
- Data

Telephony Control Protocol

- Telephony Control Specification
  - Telephony Control Specification – Binary
    - Call Control
    - Group Management
    - Connectionless TCS
- Operations of TCS can be categorized into two:
  - Operations between devices
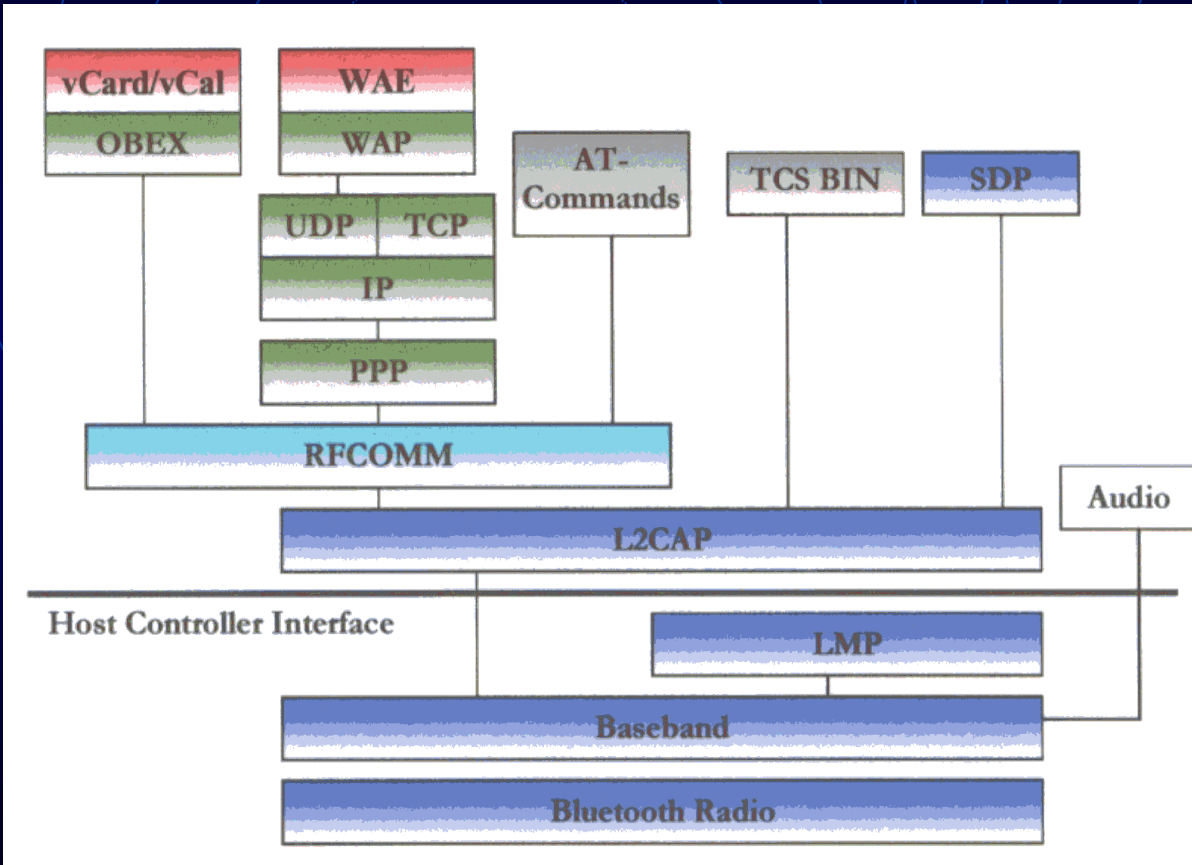   - Single-point configuration

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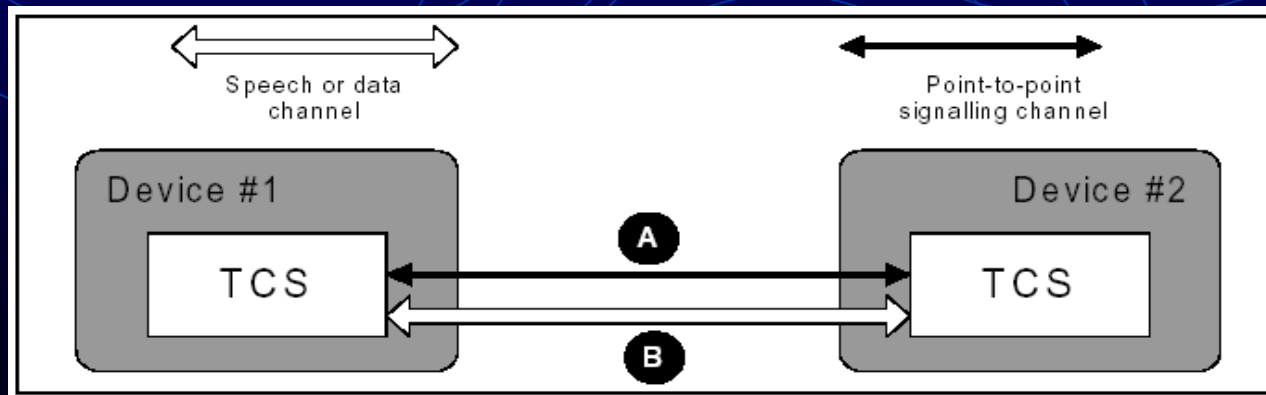
Telephony Control Protocol (cont.)

- Multi-Point Configuration

- Operations between layers
- Telephony Control Specification
  - Telephony Control – AT Commands

Adopted Protocols

- PPP
- TCP / UDP / IP
- WAP
- OBEX

Adopted Protocols (cont.)

- Point-to-Point Protocol (PPP)
  - Runs over RFCOMM
  - Transport multi-protocol datagrams to P-P links
- TCP/UDP/IP
  - Communicate with other Bluetooth enabled devices
  - TCP is used for OBEX
  - UDP is used for WAP
- Wireless Application Protocol (WAP)
  - Bring internet to cellular phones
  - Reuse upper applications developed for WAP application environment.
- Object Exchange Protocol (OBEX)
  - Session layer protocol
  - Each object has header ID and value.
  - Header example: Count, Name, Type, Length, etc.
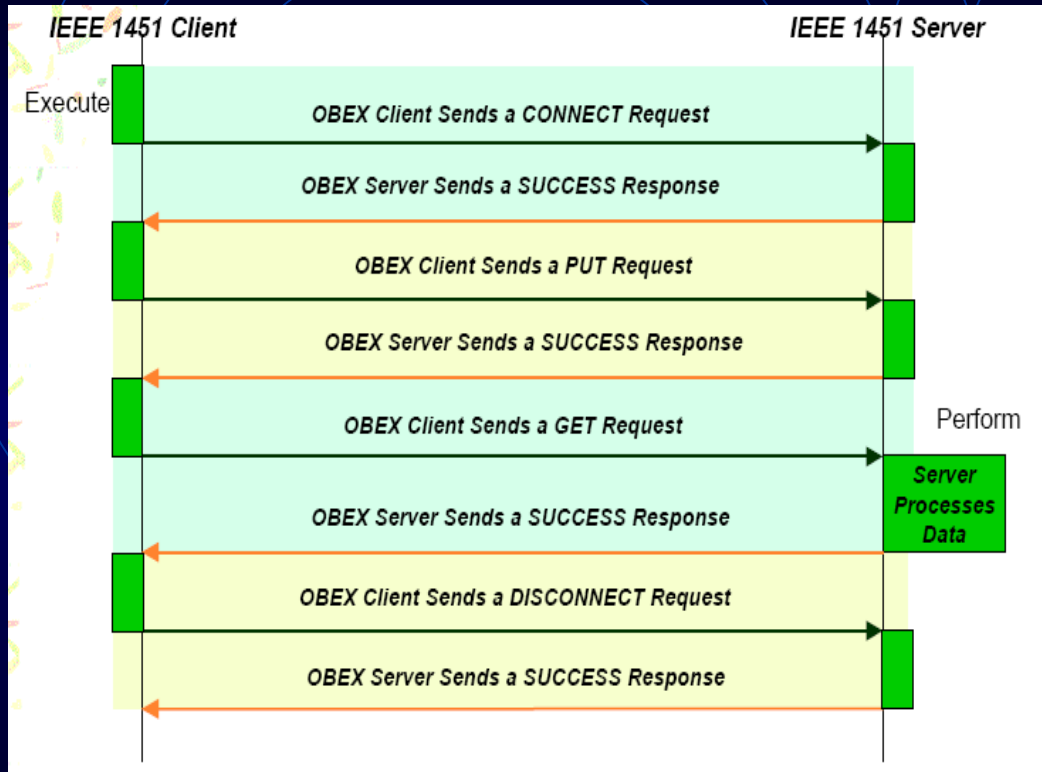
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OBEX

- OBEX Session Protocol
  - Request-response pair
  - Clients issue requests
  - Servers issue responses
  - Each request packet:
    - 1 byte opcode
    - 2 bytes length
    - Data

Questions

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Bluetooth Protocol Stack

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