DEVICES AND COMMUNICATION BUSES FOR DEVICES NETWORK–

Lesson-27: WIRELESS AND MOBILE SYSTEM PROTOCOLS– BLUETOOTH

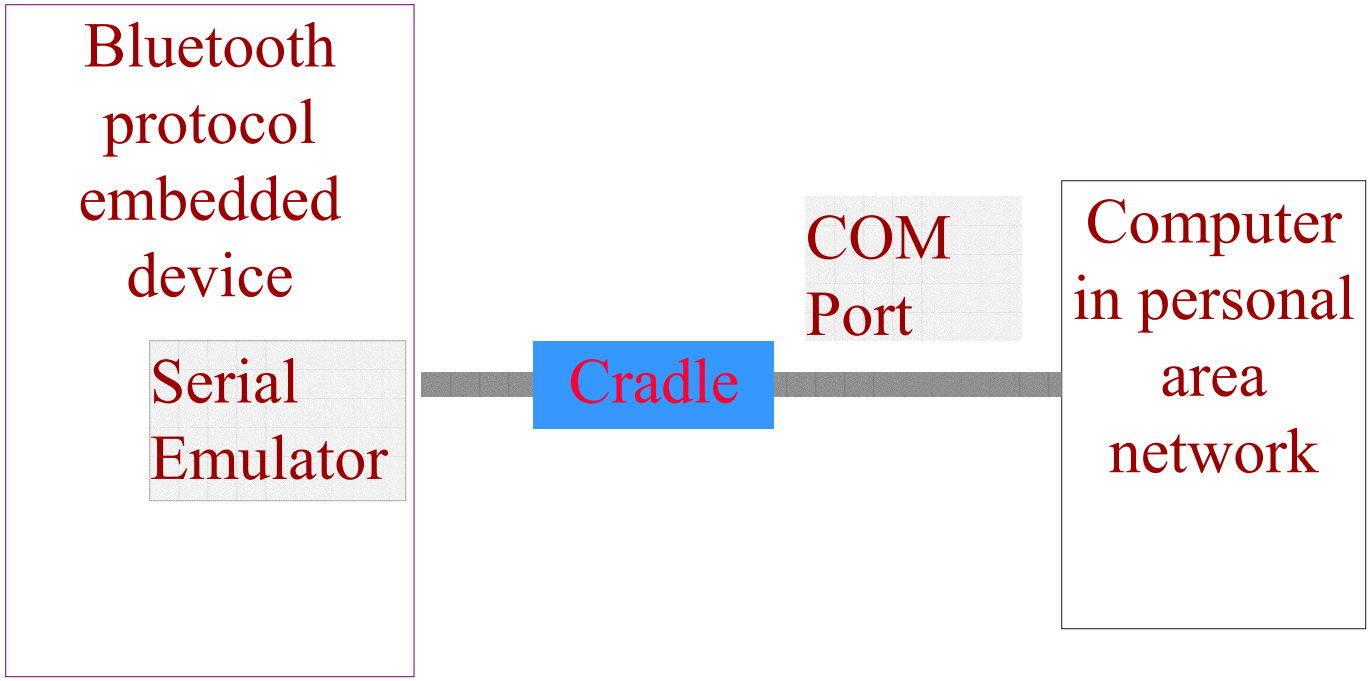
Wireless Personal Area Network (WPAN)

- IrDA (Infrared Data Association)
- Bluetooth 2.4 GHz
- 802.11 WLAN and 802.11b WiFi
- ZigBee 900 MHz

Bluetooth enabled devices

- Synchronizing music, image, PIM (personal information manager) files with Computer using Serial emulator at Bluetooth device
- Large number of CD players
- mobile devices are Bluetooth
- Digital camera
- Bluetooth enabled ear buds— Hands free listening of Bluetooth enabled iPod or CD music player or mobile phone.

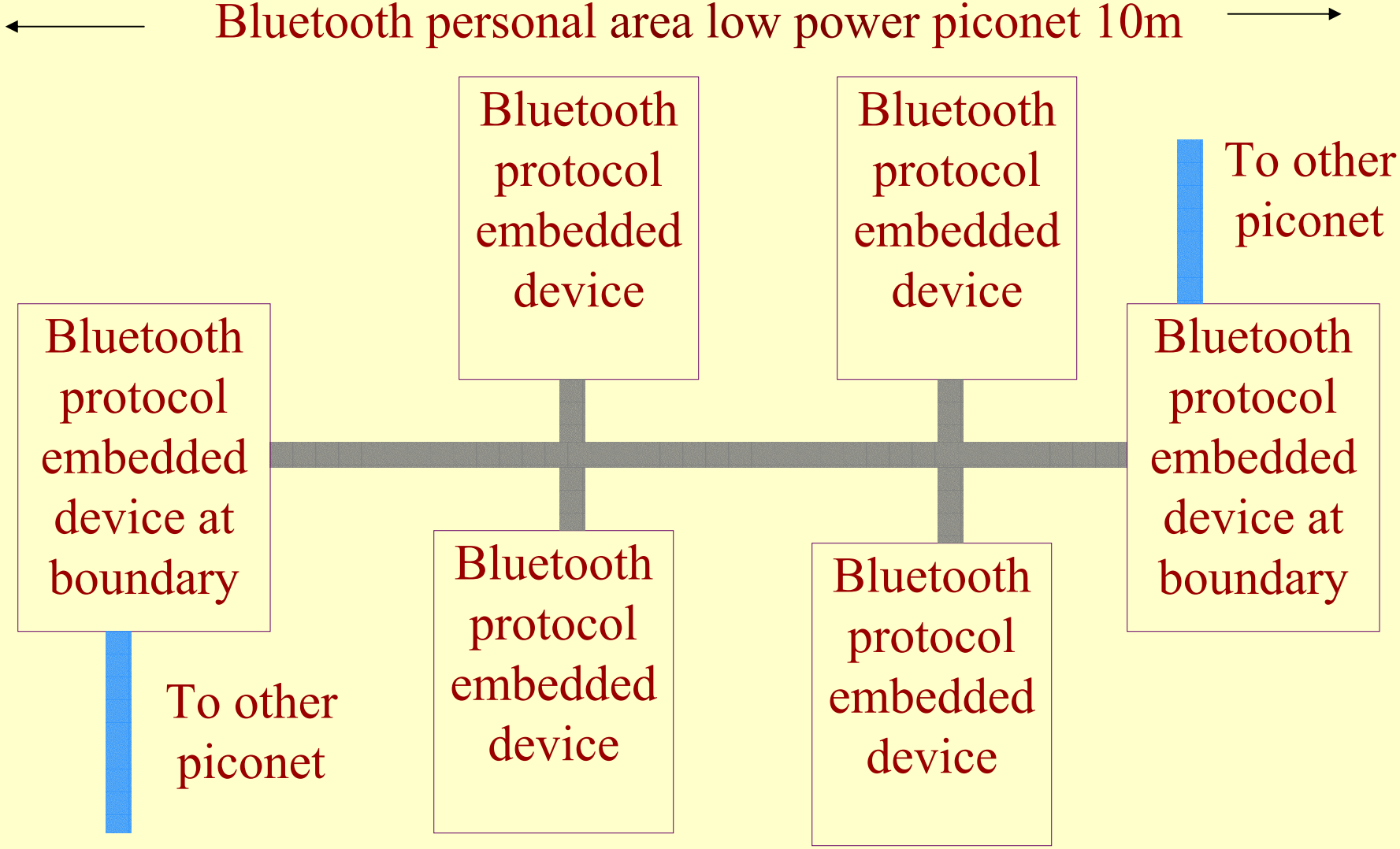
Bluetooth - serial COM port interface



WPAN using Bluetooth wireless protocol

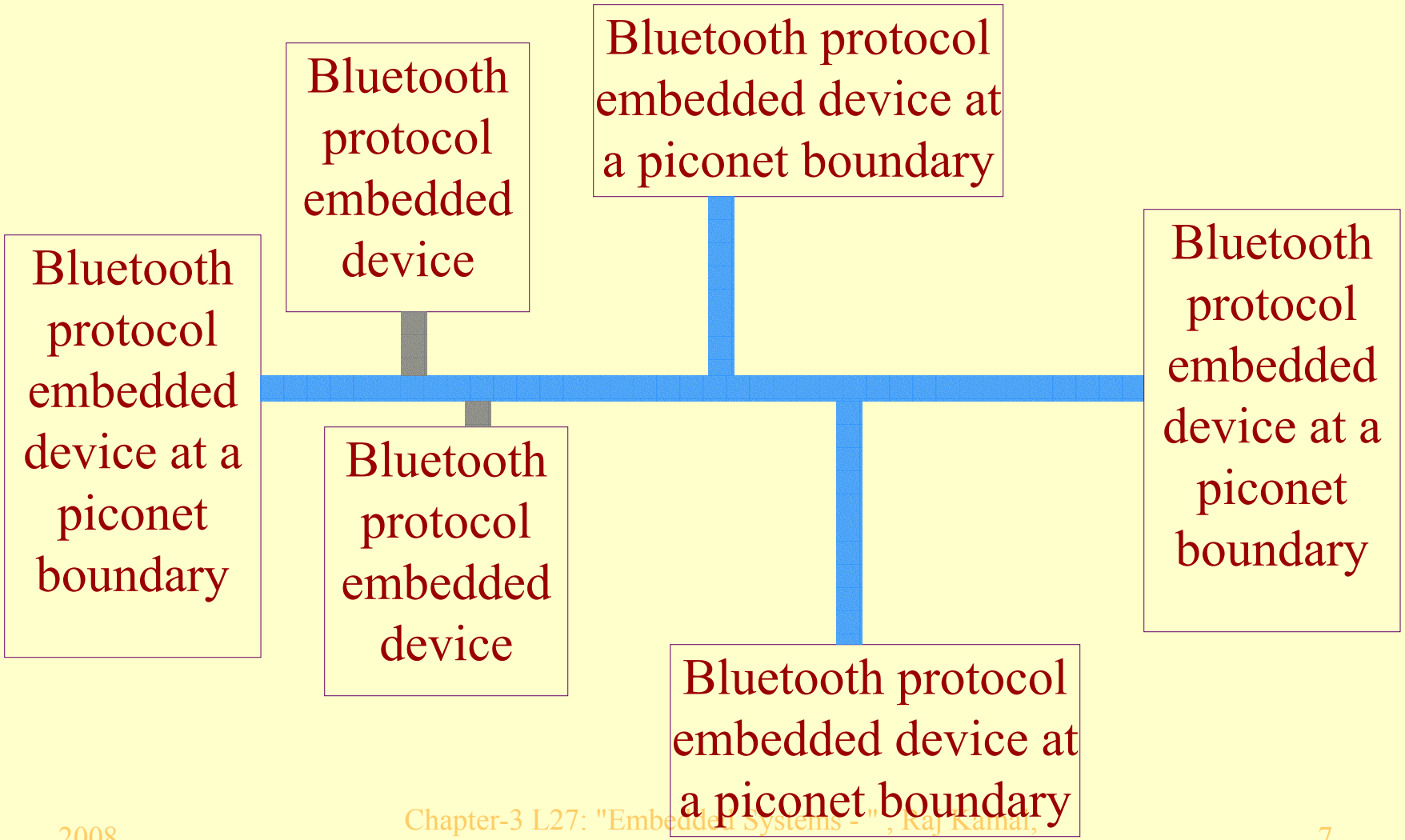
- Hardware Interfaces to embedded system buses
- Software embeds in the system to support WPAN using Bluetooth wireless protocol
- Bluetooth devices— piconet within 10m
- Bluetooth devices— scatternet within 100m
- Data transfer between two devices or between a device and multiple devices

Bluetooth Piconet



Bluetooth Scatternet

Bluetooth personal area high power scatternet 100m



Bluetooth protocol

- IEEE standard 802.15.1 protocol
- Physical layer radio communicates at carrier frequencies in 2.4 GHz band with FHSS (frequency hopping spread spectrum)
- Hopping interval is 625 μs and number of hopped frequencies are 79

Bluetooth protocols

- Bluetooth 1.x data transfer rate supported = 1 Mbps
- Bluetooth 2.0 enhanced maximum data rate of 3.0 Mbps over 100 m

Bluetooth protocol features

- Supports automatic self-discovery
- Supports self-organization of network in number of devices.
- Bluetooth device self discovers nearby devices (< 10m) and they synchronize and form WPAN (wireless personal area network).

Bluetooth protocol Power control features

- Bluetooth protocol supports power control so that the devices communicate at minimum required power level
- This prevents drowning of signals by superimpositions of high power signals with lower level signals

Bluetooth Physical Layer

- Three sub-layers— radio, baseband and link manager or host controller interface
- There are two types of links, best effort traffic links and real-time voice traffic links
- The real-time traffic uses reserved bandwidth. Packet is of about 350 bytes

Link manager sub-layer

- Manages the master and slave link.
- Specifies data encryption and device authentication handling.
- Specifies formation of device pairs for Bluetooth communication.
- Gives specifications for state transmission-mode, supervision, power level monitoring, synchronisation, and exchange of capability, packet flow latency, peak data rate, average data rate, maximum burst size parameters from lower and higher layers.

Bluetooth physical layer

Physical layer– radio, baseband and link manager or host controller interface

Host Controller Interface (HCI) interface

- Hardware abstraction sub-layer
- Used in place of link manager sub-layer
- Provides for emulation of serial port, for example, 3-wire UART emulation.
- Bluetooth device can thus interface to COM port of computer

Bluetooth protocol features

- Communication latency is 3 s.
- Large protocol stack overhead of 250 kB.
- Provision of encrypted secure communication, self-discovery and self-organization and radio based communication between tiny antennae are three main features of Bluetooth

Summary

We learnt

- IEEE standard 802.15.1 protocol
- 2.4 GHz band with FHSS
- Hopping interval is 625 μs and number of hopped frequencies are 79.
- Piconet 10m
- Scatternet 100m

End of Lesson 27 of Chapter 3