

WIRELESS LAN, MOBILE INTERNET CONNECTIVITY, AND PERSONAL AREA NETWORK

Lesson 10

Infrared Data Association (IrDA)

INFRARED (IR) RAYS

- Invisible radiations of wavelength higher than that of red
- An LED or a solid-state laser emits IR rays when given 10–20 mA current from a low power battery or power source
- When the 1s and 0s are transmitted, the IR source current is modulated as per the 1s and 0s

DIRECT LINE-OF-SIGHT IR

- Wavelength— 900 nm
- From an LED detected at the receiver (photo-detector) to get the data
- The detector has 30° ($\pm 15^\circ$) window to detect the incoming radiation
- Used for remote control of TV

IRDA (INFRARED DATA ASSOCIATION)

- A protocol for personal communication area network deploying infrared rays

IRDA APPLICATIONS

- IR-based data transfer between a laptop (computer) and mobile hand-held PocketPC when the two come in vicinity and line-of-sight of the IR receivers and detectors in each of them

IRDA APPLICATIONS

- Synchronization of PIM data (calendar, email, business card, and text messages) between a PC and mobile device or a device at cradle and IR COM port

NETWORK CHARACTERISTICS

- Point to shoot communication from peer to peer

IRDA DEVICE LEVELS OF COMMUNICATION

- Five levels of communication—minimum, access, index, sync, and SyncML (Levels 1-5)
- A level specifies a method of communication from simple to SyncML-based

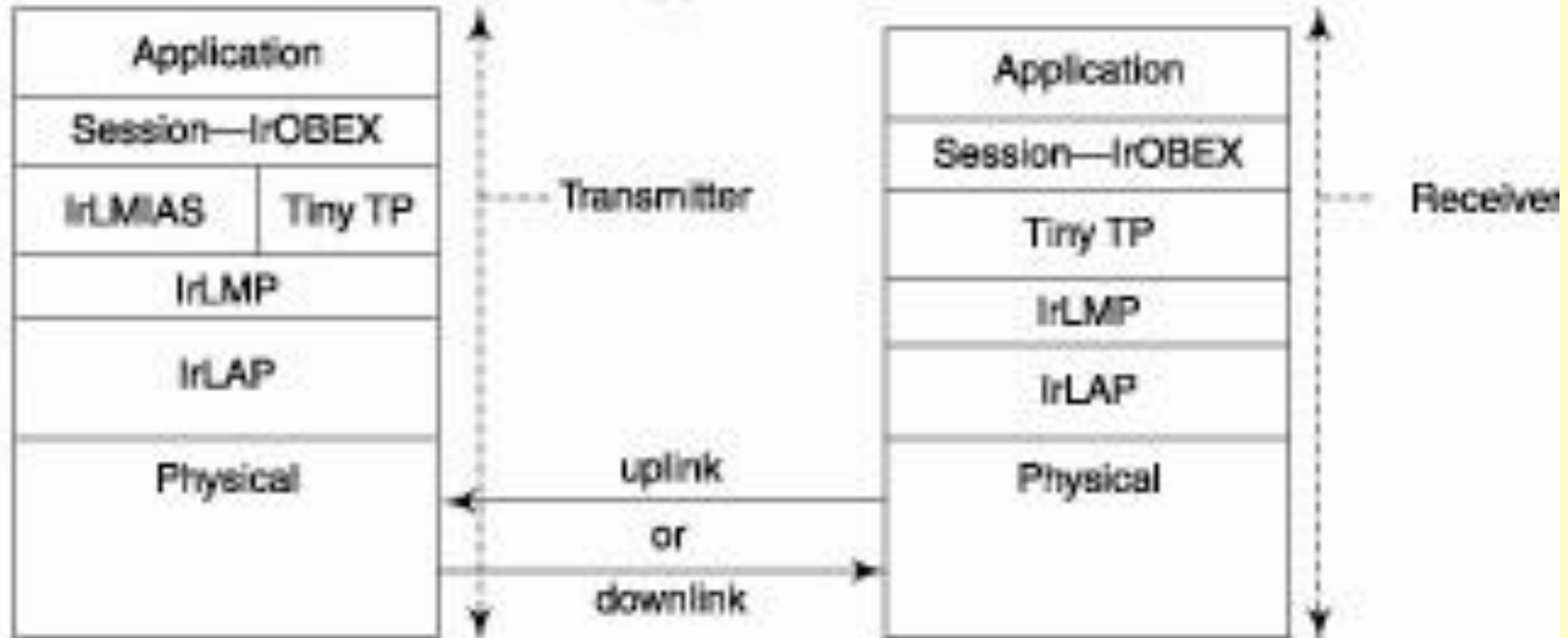
IRDA DATA TRANSFER RATES

- IrDA 1.0 protocol for data rates up to 115 kbps
- Data rates of 1.152 Mbps to 4 Mbps (16 Mbps draft recommended)

IRDA FUNCTIONS OF PROTOCOL LAYERS

Application <ul style="list-style-type: none">- Security- Sync (PIM), Object Push (PIM), or Binary File Transfer	IrLMIAAS <ul style="list-style-type: none">- Service discovery from other device	Physical layer <ul style="list-style-type: none">- Half duplex access or alternating directions duplex access- 1 m or 10 cm (for low power LED)- Mode:<ul style="list-style-type: none">(i) synchronous PPM [Section 12.1.2.(1) (c)],(ii) synchronous serial 1.152 Mbps, or(iii) asynchronous serial 115.2 kbps down to 9.6 kbps
Session <ul style="list-style-type: none">- IrOBEX, IrLAN, IrBus, IrMC, TrTran, IrComm	IrTinyTP <ul style="list-style-type: none">- Segmentation and reassembly- Connection to IrLMP	
IrLMP <ul style="list-style-type: none">- Multiplexes multiple applications data as well as exclusive link access- Ad-hoc connection between peers		

IRDA PROTOCOL LAYERS



IRDA PROTOCOL LAYERS

- (a) Layer 1—physical
- (b) Data link layer— 2a—IrLAP (link access protocol), 2b—IrLMP (link management protocol)
- (c) Layer 3-4—transport layer—tiny TP (transport protocol) or IrLMIAS (link management information access service protocol)

IRDA PROTOCOL LAYERS

- (d) Layer 5—session—IrLAN, IrBus, IrMC, IrTran, IrComm, and IrOBEX (object exchange)
- (e) Layers 6 and 7—security and application software layers as specified by the IrDA Alliance Sync (PIM), object push (PIM), or binary file transfer

SESSION AND TRANSPORT IRDA PROTOCOLS

- IrLAN (for Infrared LAN access)
- IrBus (for access to serial bus by joysticks, keyboard, mice, and game ports)

SESSION AND TRANSPORT IRDA PROTOCOLS

- IrMC (IrDA mobile communication and telephony protocol)
- IrTran (IrDA transport protocol for image or file transfers)
- IrComm [IrDA communication protocol by emulating serial (for example RS232C COM) or parallel port]

OBJECT EXCHANGE IRDA PROTOCOLS

- IrOBEX (for object exchange)

OBEX

- Supports security by encryption and decryption at transmitter and receiver, respectively
- Communicates and exchanges binary data by establishing a client–server network between two IR devices

OBEX CLIENT

- Makes a request and server returns the response
- OBEX client and server either establish connection-oriented connection before data transmission
- Send requests and responses through connectionless connection

DISSIMILARITY WITH BLUETOOTH

- Bluetooth for wireless short range exchanges in mobile environment within 10 m network
- IrDA is for exchanges within a range of one meter in the vicinity of line-of-sight
- IrDA has small form factor in radiation pattern and has $30^\circ (\pm 15^\circ)$ window

COMPARISON OF BLUETOOTH AND IRDA

- Network connection Latency—3 s for Bluetooth and a few ms for IrDA
- Bit rate—1 Mbps for Bluetooth and 1.152 Mbps to 4 Mbps for IrDA

COMPARISON OF BLUETOOTH AND IRDA

- Protocol stack—250K bytes
- Code Size—50% down to 2% as compared to a Bluetooth device
- FHSS for Bluetooth and serial synchronous, asynchronous, or PPM for IrDA

SIMILARITY OF BLUETOOTH AND IRDA

- Efficiency
- Used for low power short range transmission

SUMMARY

- IrDA protocol for personal communication area network deploying line of sight 30° ($\pm 15^\circ$) window infrared rays
- Five levels of communication—minimum, access, index, sync, and SyncML (Levels 1-5)

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...SUMMARY

- Serial synchronous, asynchronous, or PPM for IrDA
- IrOBEX for object exchange using IrDA
- Data rates of 1.152 Mbps to 4 Mbps (16 Mbps draft recommended)

End of Lesson 10
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