

CONTENTS

[12.0 Wireless Optical Networks](#)

[IrDA](#)

[IEEE 802.11](#)

[Assignment Questions](#)

[For Further Research](#)

12.0 Wireless Optical Networks

OBJECTIVES

This section will:

- Examine the nature of optical transmission links
- Consider how optical paths can be configured to create a network
-
-
-

Line of sight optical signaling has been around for a long time. One of the most useful and ancient forms remains preserved in the modern lighthouse, warning sea-going vessels of dangerous shores.

Arranging point-to-point components into a network requires a clear line of sight between the key components. This can be provided by using an optical repeater in much the same manner as an ALOHA satellite system, or by using an intelligent optical hub.

The IrDA specification governs the nature of the point-to-point link.

12.1 IrDA

[IrDA Standards for High-Speed Infrared Communications](#)

[The Infrared Physical Layer of IEEE 802.11 Standard for Wireless Infrared Local Area Networks](#)

<http://www.irda.org/>

<http://www.extendedsystems.com/products/umc/>

<http://www.microsoft.com/hwdev/infrared/>

Three IrDA specifications govern point-to-point links:

IrPHY - Physical Layer,

IrLAP - Link Access Protocol

IrLMP - Link Management Protocol

The initial specification was for a serial, half-duplex asynchronous channel operating at 2.4 Kbps to 115.2 Kbps. The range was limited to 1 meter and the viewing half angle varied between 15 and 30 degrees. The present specification has been upgraded to support data rates of up to 4 Mbps.

Initial applications were for printer ports on calculators or laptop computers.

12.1.1 IrPHY

IrDA has a bit error of about 10^{-9} at ranges of up to 1m, within a typical office lit with fluorescent fixtures and sunlight. The serial link is half-duplex and originally had a maximum data rate of 115.2 Kbps. Version 2 extends this to 1.15 and 4.0 Mbps. The LED wavelength ranges from 0.85 μm to 0.90 μm .

The IrDA-SIR specification encodes a 0 by a pulse and 1 as no pulse. The pulse duration ranges from a minimum of 1.6 μSec to a maximum of 3/16th of a bit period. Thus, the pulse length is inversely proportional to the data rate.

12.1.2 IrLAP

IrLAP, is derived from the HDLC asynchronous data communications standard and can be point-to-point or point-to-multipoint. There is only one primary station; all others are secondary.

There are three types of IrLAP frames: U [unnumbered], S [supervisory] and I [information]. U frames establish connections and identify station addresses. I frames transfer information between stations.

12.1.3 IrLMP

There are three other aspects of IrDA communication:

- Discovery
- Link Control
- Multiplexing

Discovery occurs when two devices first meet. Each service and device protocol is registered. This allows an application to query device capabilities.

Once an application has determined which service or protocol to use, it makes a request to the link control. This link allows several application or transport protocols to be simultaneously supported on the same link.

Flow Control

In multiplexed mode LM-MUX does not provide flow-control and cannot indefinitely buffer data. An LM-MUX may discard data when a client is unable to accept it. To overcome this, clients must provide either;

- 1 A flow-control method, or
- 2 A retransmission recovery mechanism.

The 1.152 Mb/s mode requires a Communications Controller to monitor data flow control between ISA Bus/FIFO and the UART/FIFO.

The 4.0 Mb mode uses PPM[†] data encoding with four possible chip or time slice positions per data symbol.

12.2 IEEE 802.11

The IEEE 802.11 standard covers various types of wireless LANs. One version of which uses an infrared physical layer operating at 1 or 2 Mbps.

[A brief Tutorial on IEEE Wireless LANs by Intersil](#)

<http://www.ece.wpi.edu/courses/ee535/hwk97/hwk4cd97/husain/ieee.html>

[†] Pulse Position Modulation

Assignment Questions

Quick Quiz

- 1.
- 2.
- 3.
- 4.

Composition Questions

- 1.
- 2.
- 3.
- 4.

For Further Research

Pahalavan, Kaveh and Levesque, Allen H.; Wireless Information Networks, Wiley, 1995

“On the World’s Wavelength,” Telesis, 1987 two

IBM Infrared <http://www.chips.ibm.com/products/infrared/documents/>

JVC Infrared <http://www.jvcinfo.com/jvc400.html>

Spectrix Infrared <http://www.spectrixcorp.com/infrared.html>

Wireless Design Online <http://www.wirelessdesignonline.com/>

Novell Wireless <http://www.novell.com/nwc/aug.96/wire86/stndrd86.html>

FiLAN <http://www.firlan.com/links.html>

IrDa <http://www.irda.org/>

HP <http://www.hp.com/HP-COMP/ir/center/index.html>

http://www.sbrc.com/ir_tutorial.html