Chapter 14

Wireless LANs

14-1 IEEE 802.11

IEEE has defined the specifications for a wireless LAN, called IEEE 802.11, which covers the physical and data link layers.

Topics discussed in this section:

Architecture MAC Sublayer Physical Layer

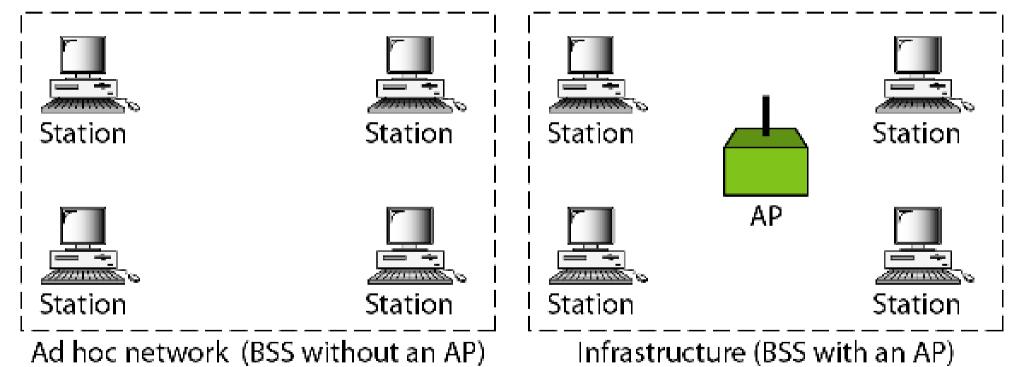
Note

A BSS without an AP is called an ad hoc network; a BSS with an AP is called an infrastructure network.

Figure 14.1 Basic service sets (BSSs)

BSS: Basic service set

AP: Access point



14.4

Figure 14.2 Extended service sets (ESSs)

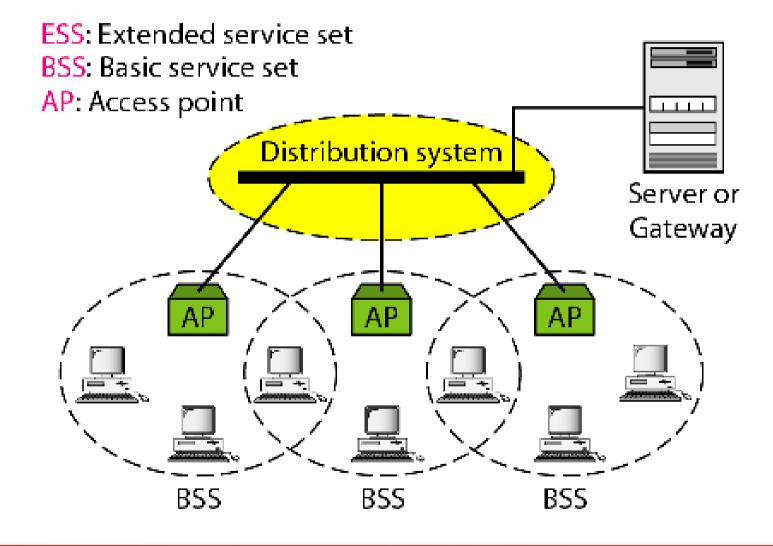


Figure 14.3 MAC layers in IEEE 802.11 standard

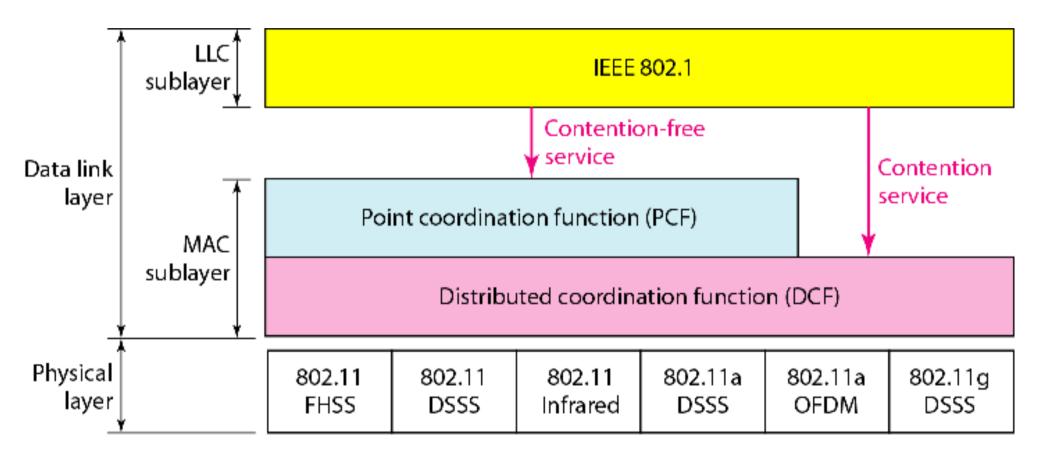


Figure 14.4 CSMA/CA flowchart

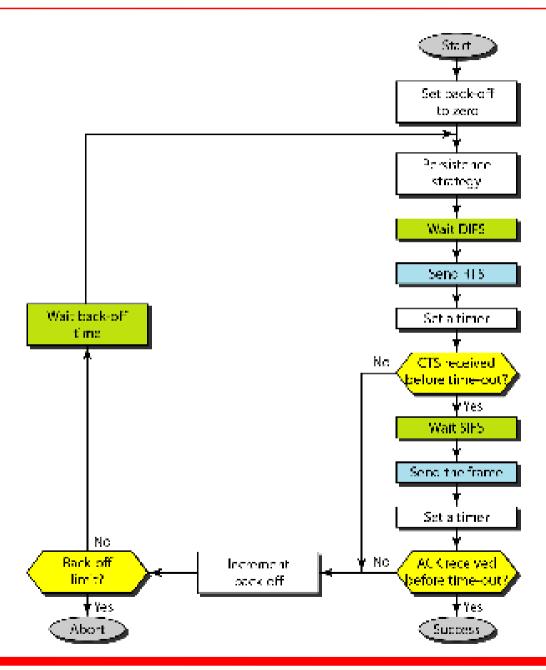


Figure 14.5 CSMA/CA and NAV

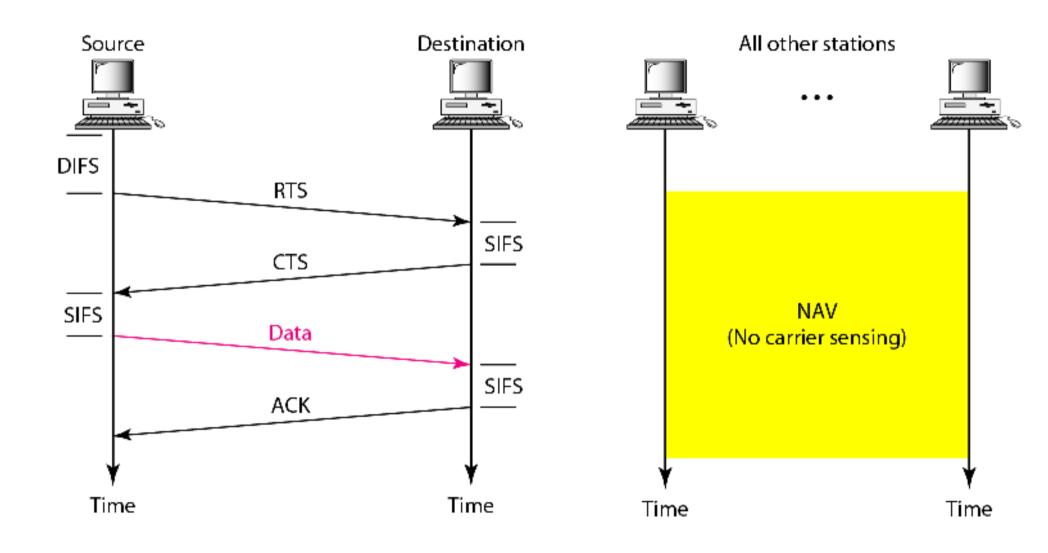


Figure 14.6 Example of repetition interval

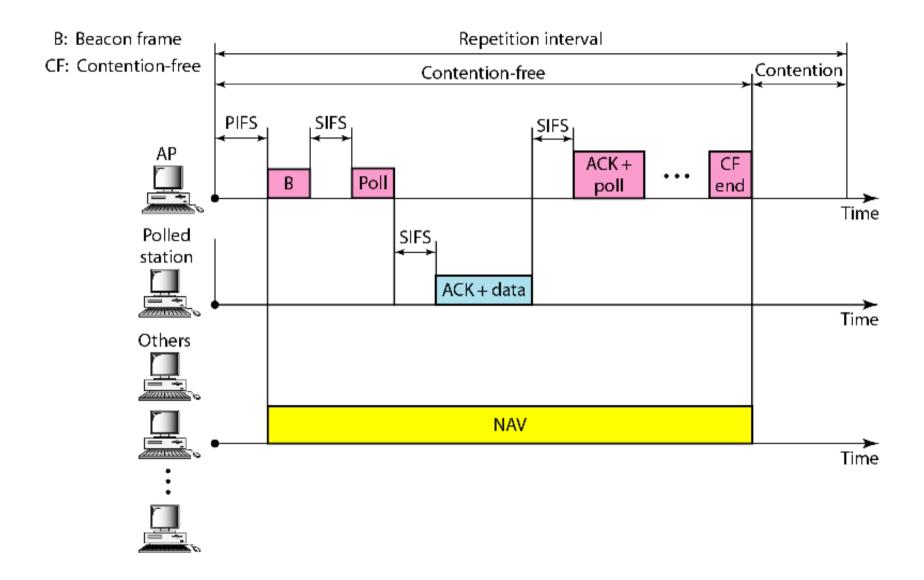


Figure 14.7 Frame format

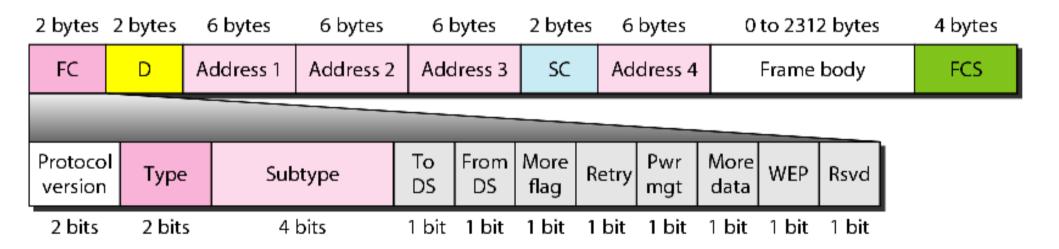


Table 14.1 Subfields in FC field

Field	Explanation		
Version	Current version is 0		
Туре	Type of information: management (00), control (01), or data (10)		
Subtype	Subtype of each type (see Table 14.2)		
To DS	Defined later		
From DS	Defined later		
More flag	When set to 1, means more fragments		
Retry	When set to 1, means retransmitted frame		
Pwr mgt	When set to 1, means station is in power management mode		
More data	When set to 1, means station has more data to send		
WEP	Wired equivalent privacy (encryption implemented)		
Rsvd	Reserved		

Figure 14.8 Control frames

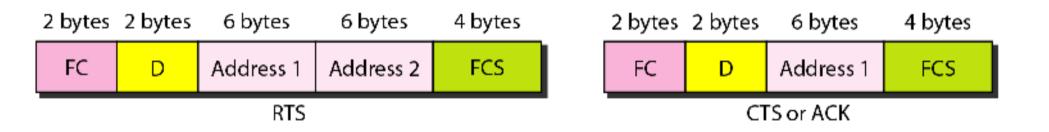


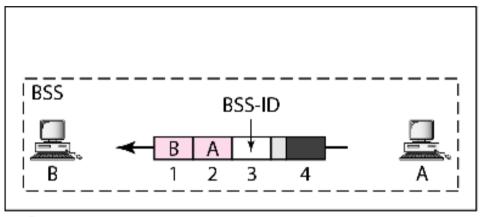
Table 14.2 Values of subfields in control frames

Subtype	Meaning	
1011	Request to send (RTS)	
1100	Clear to send (CTS)	
1101	1 Acknowledgment (ACK)	

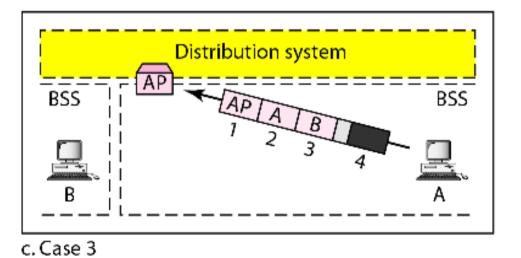
Table 14.3 Addresses

To DS	From DS	Address 1	Address 2	Address 3	Address 4
0	0	Destination	Source	BSS ID	N/A
0	1	Destination	Sending AP	Source	N/A
1	0	Receiving AP	Source	Destination	N/A
1	1	Receiving AP	Sending AP	Destination	Source

Figure 14.9 Addressing mechanisms

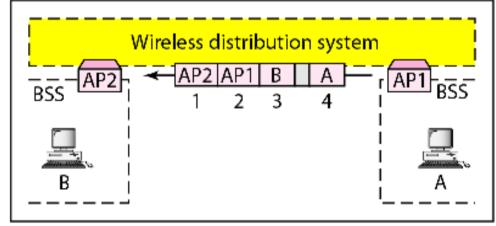


a. Case 1



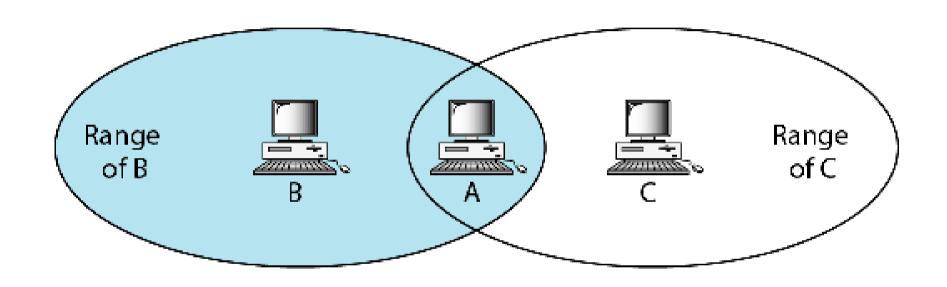
BSS
BAPIA
A
B
A
B
A
B
A
A
A
A
A
A
A

b. Case 2



d. Case 4

Figure 14.10 Hidden station problem



B and C are hidden from each other with respect to A.



The CTS frame in CSMA/CA handshake can prevent collision from a hidden station.

Figure 14.11 Use of handshaking to prevent hidden station problem

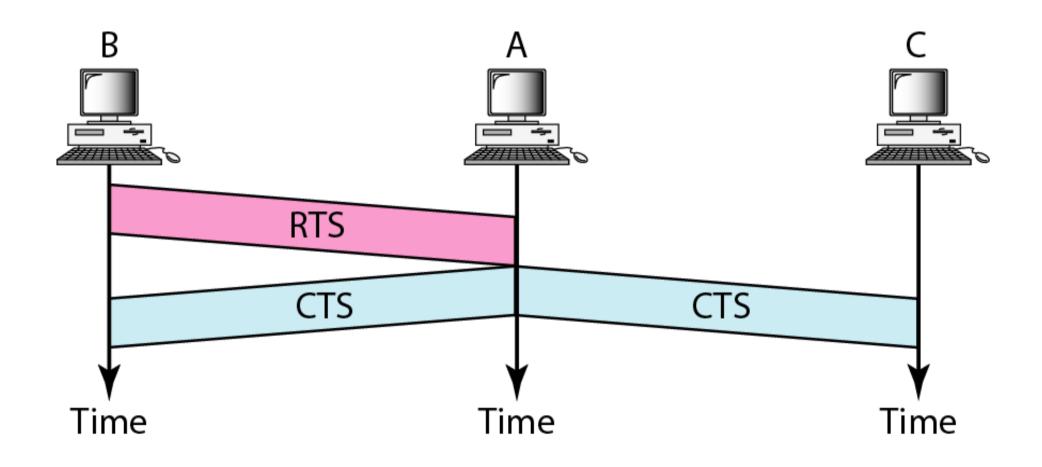


Figure 14.12 Exposed station problem

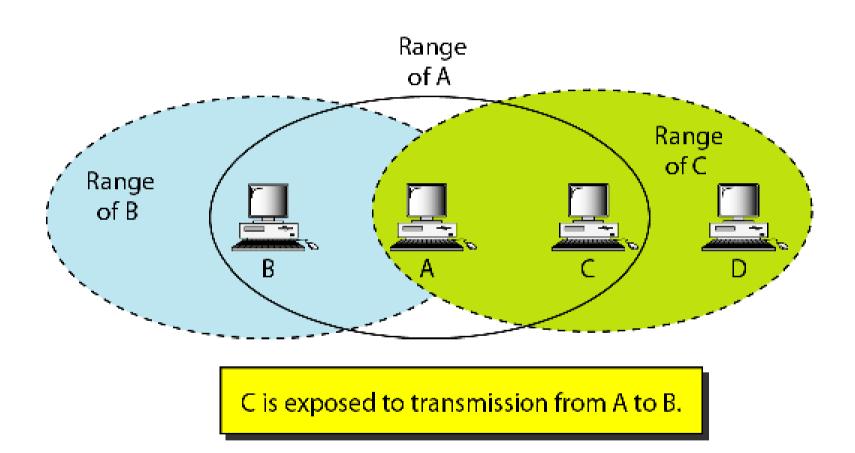
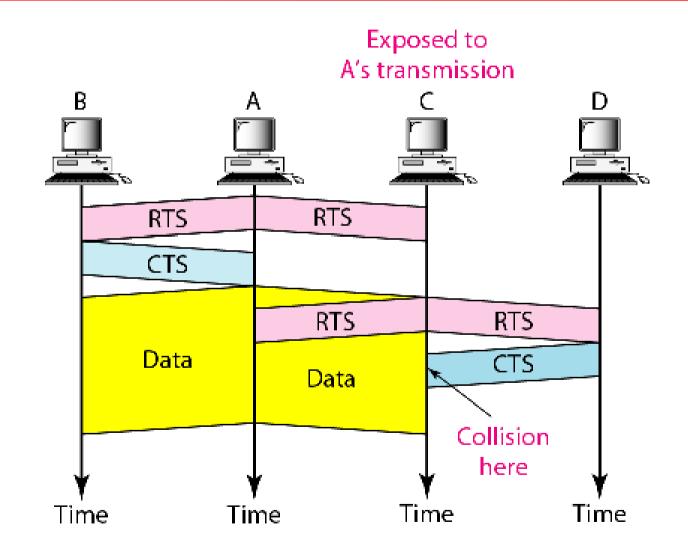


Figure 14.13 Use of handshaking in exposed station problem



14-2 BLUETOOTH

Bluetooth is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks, computers, cameras, printers, coffee makers, and so on. A Bluetooth AN is an ad hoc network, which means that the etwork is formed spontaneously.

Topics discussed in this section:

Architecture
Bluetooth Layers
Baseband Layer
L2CAP

Figure 14.19 Piconet

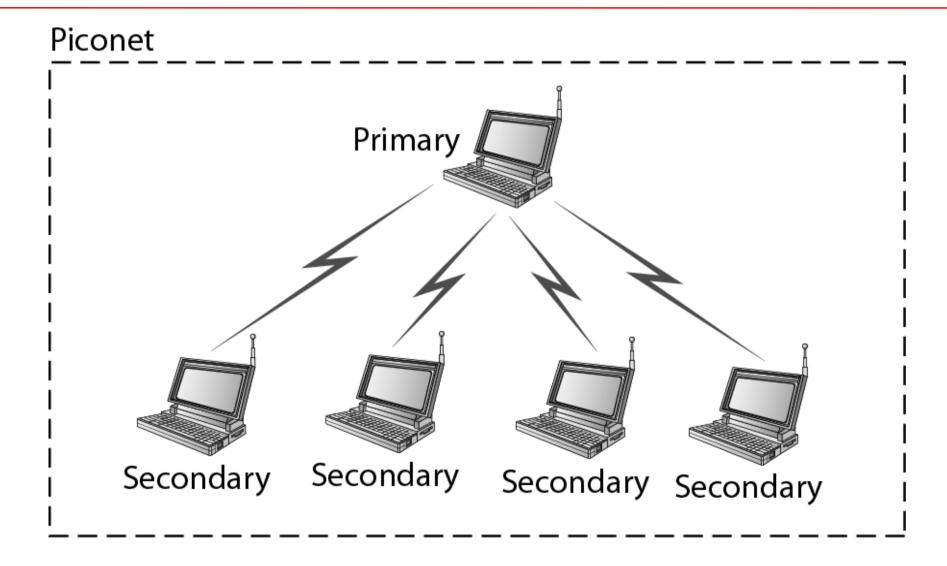


Figure 14.20 Scatternet

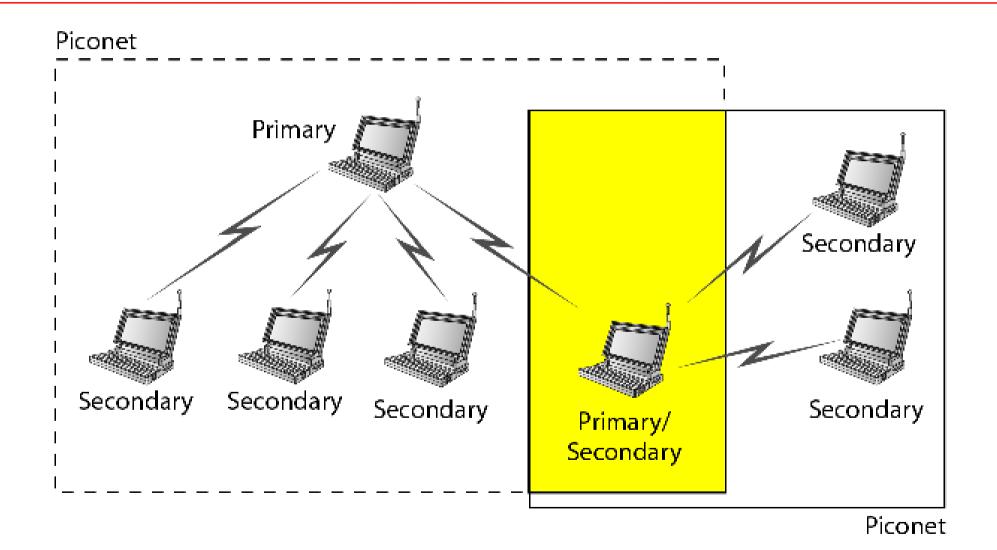


Figure 14.21 Bluetooth layers

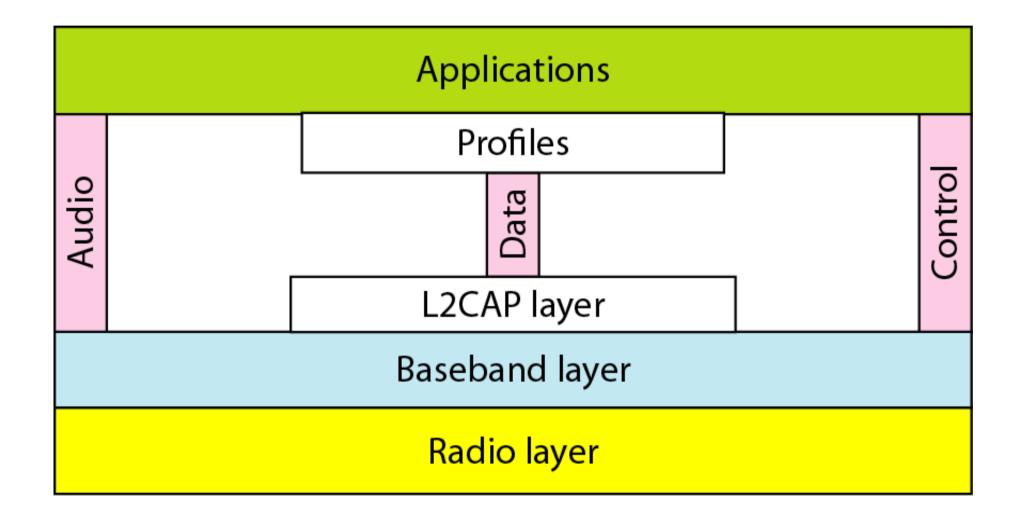


Figure 14.22 Single-secondary communication

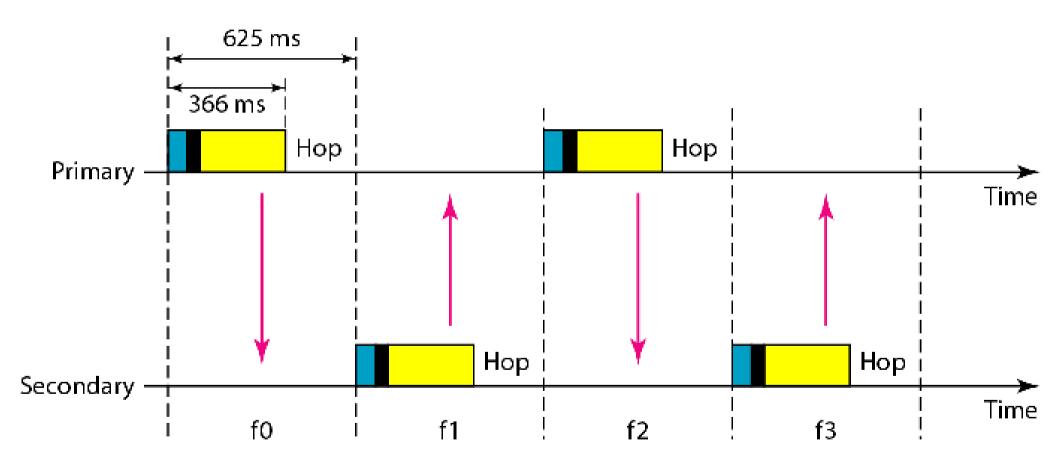


Figure 14.23 Multiple-secondary communication

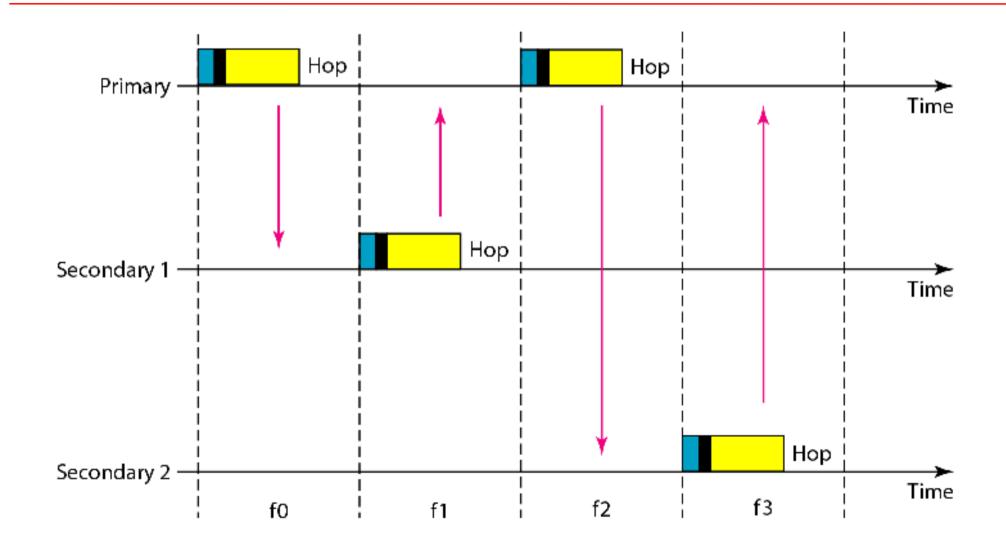


Figure 14.24 Frame format types

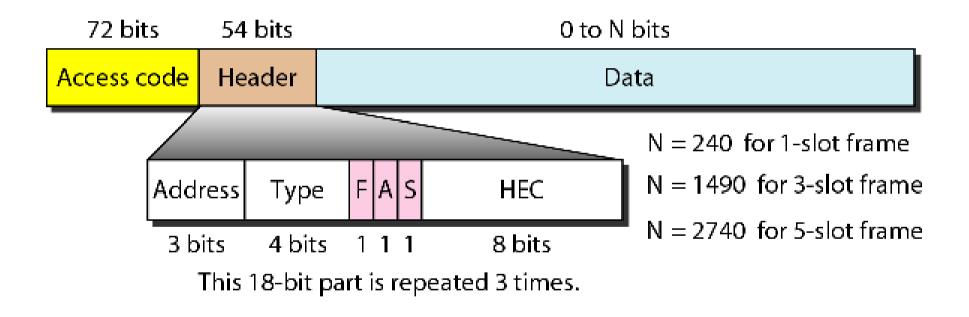


Figure 14.25 L2CAP data packet format

2 bytes	2 bytes	0 to 65,535 bytes
Length	Channel ID	Data and control