



Capítulo 14

LANs sem Fio (Wireless LANs)

14-1 IEEE 802.11

IEEE definiu as especificações para a implementação de redes LAN sem fio (WLAN), sob a recomendação IEEE 802.11, que abrange as camadas física e de enlace.



Nota

Uma BSS sem um AP é denominada rede ad **hoc;
já uma BSS com AP recebe o nome de rede de **infraestrutura**.**



Nota

Em outras palavras, uma rede ad hoc é um tipo de rede descentralizada sem a necessidade de uso de infraestrutura como roteadores ou AP. Cada nó participa do roteamento pelo repasse de dados para outros nós.

Figura 14.1 *Basic service sets (BSSs)*

BSS: Basic service set

AP: Access point

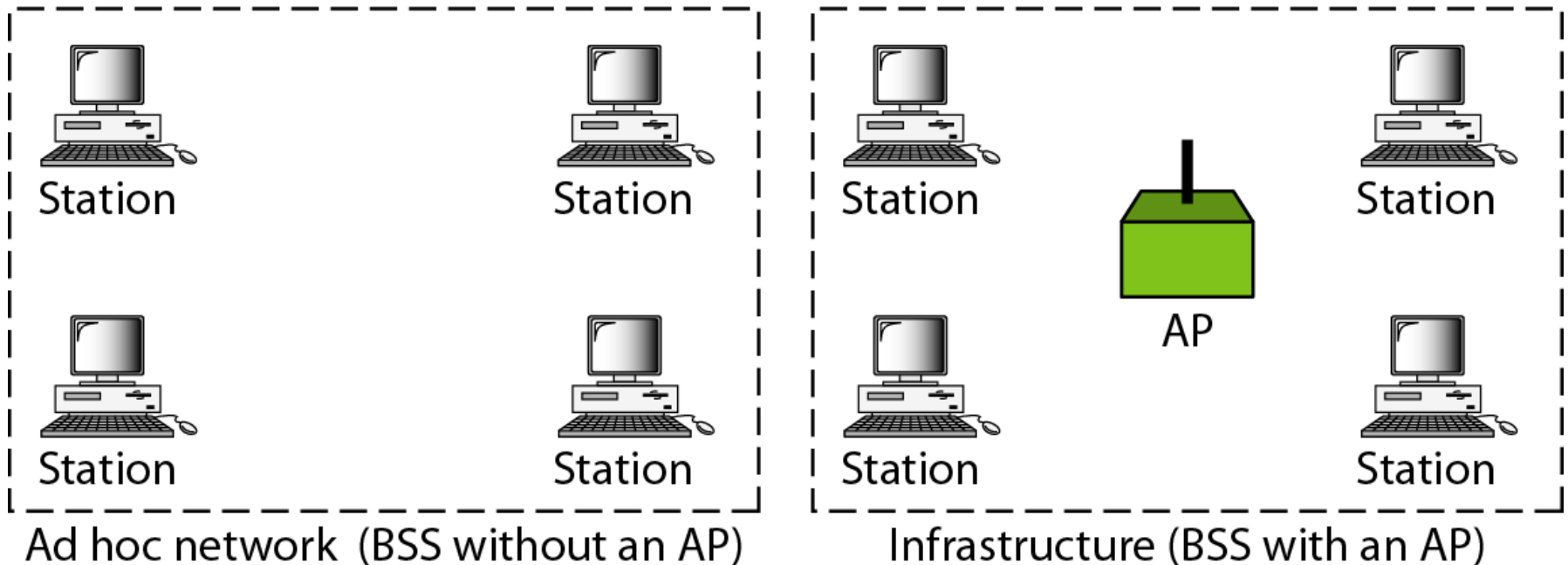


Figura 14.2 *Extended service sets (ESSs)*

ESS: Extended service set

BSS: Basic service set

AP: Access point

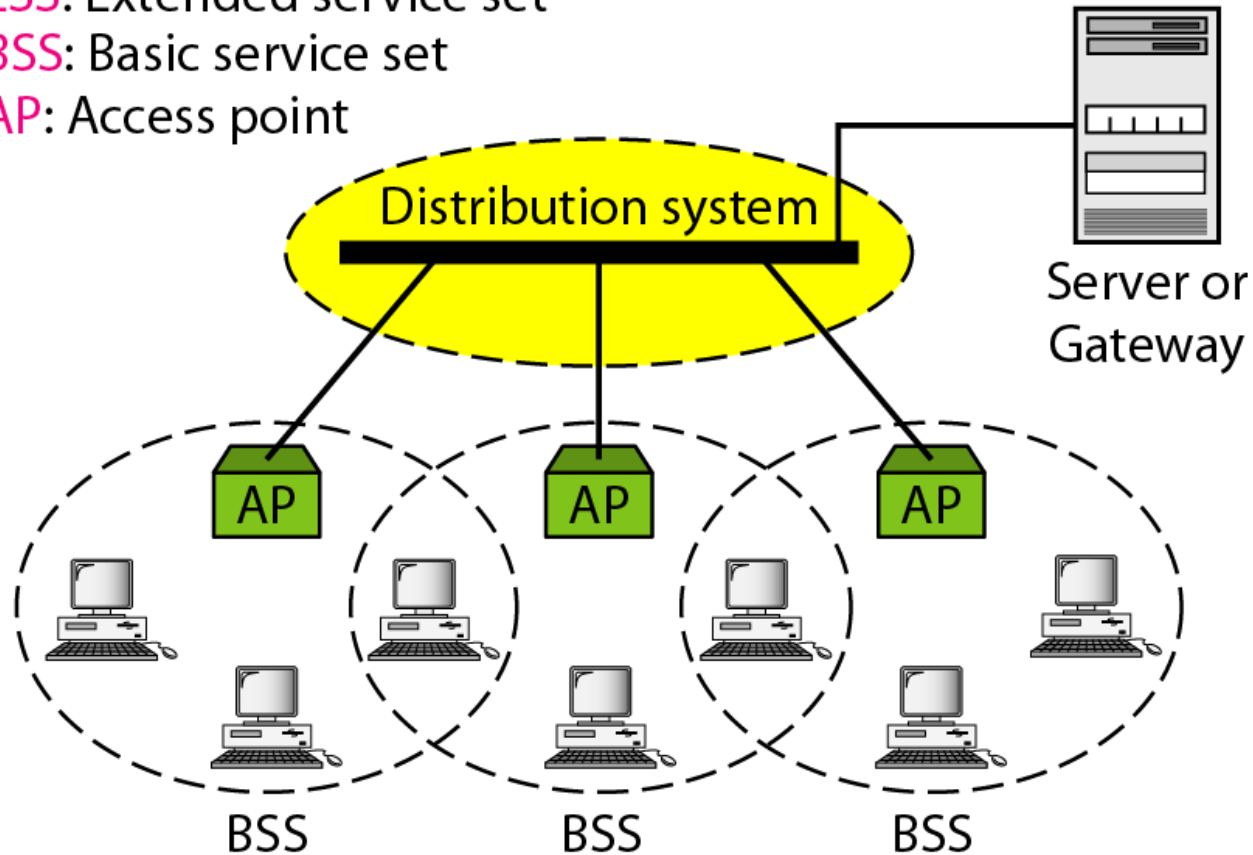


Figura 14.3 *Subcamadas MAC no padrão IEEE 802.11*

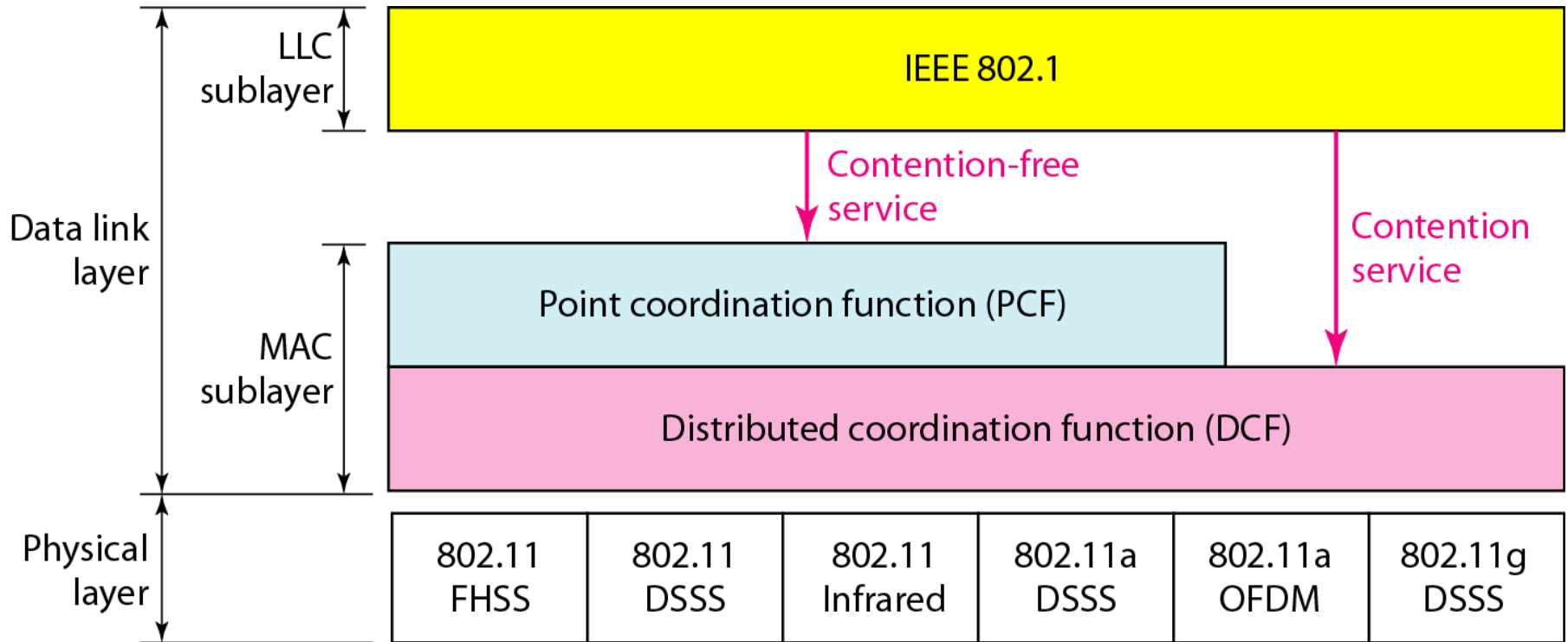


Figura 14.4 Fluxograma para o CSMA/CA

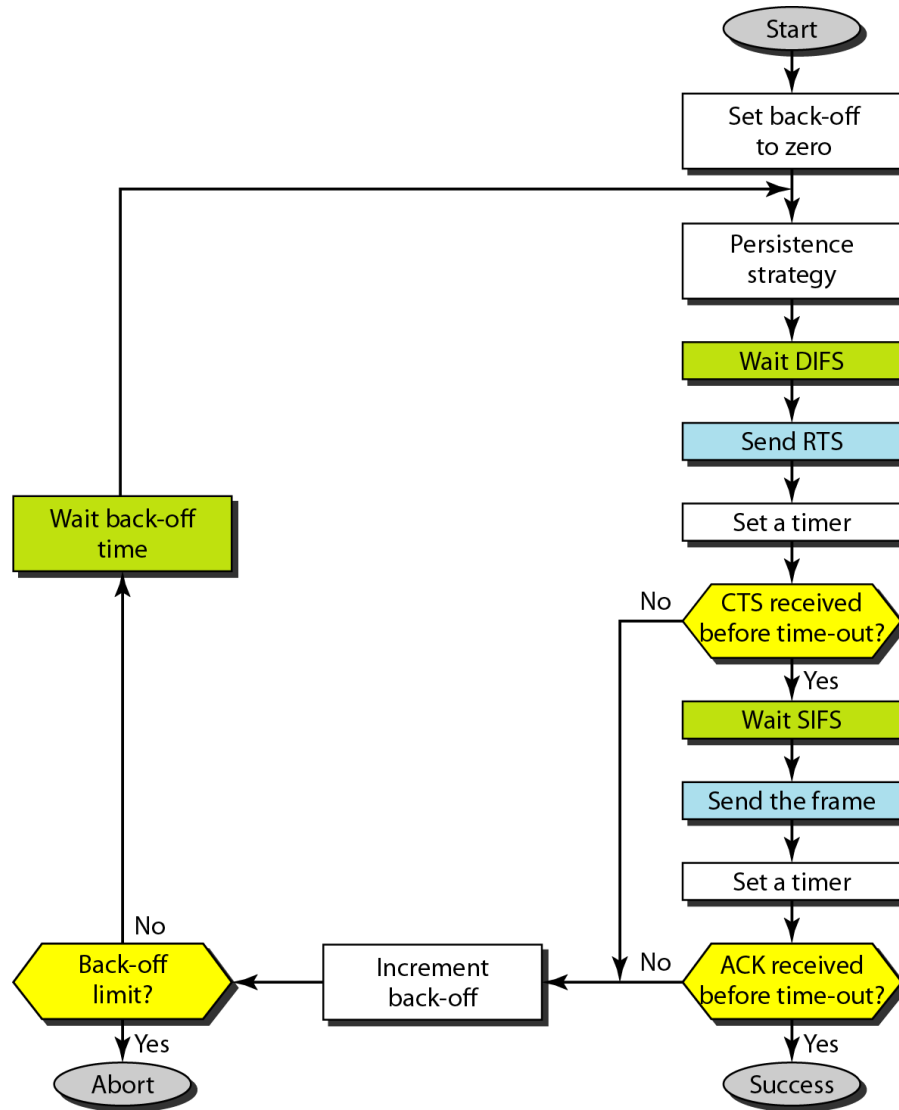


Figura 14.5 *CSMA/CA e NAV*

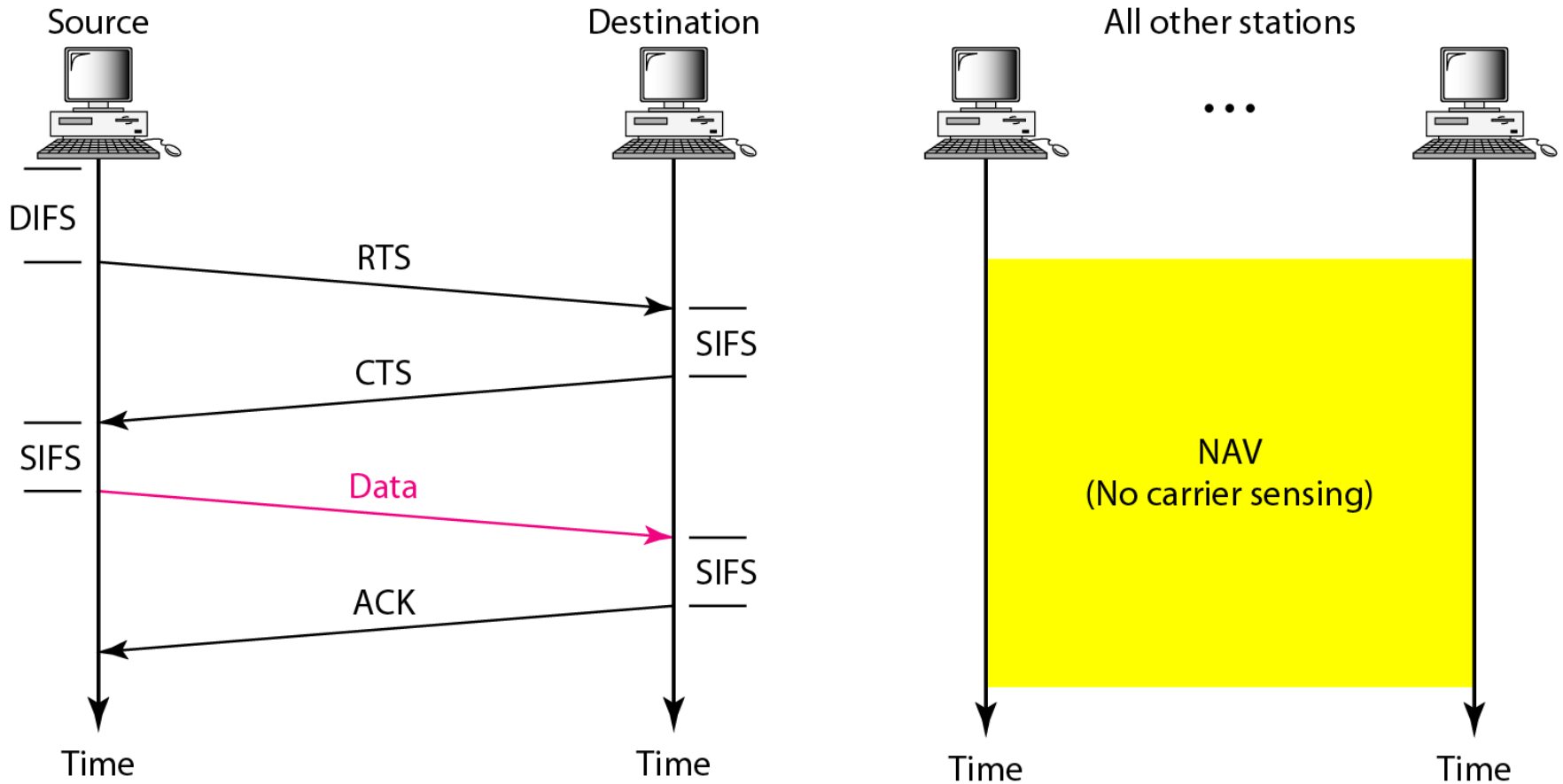


Figura 14.6 *Exemplo de intervalo de repetição*

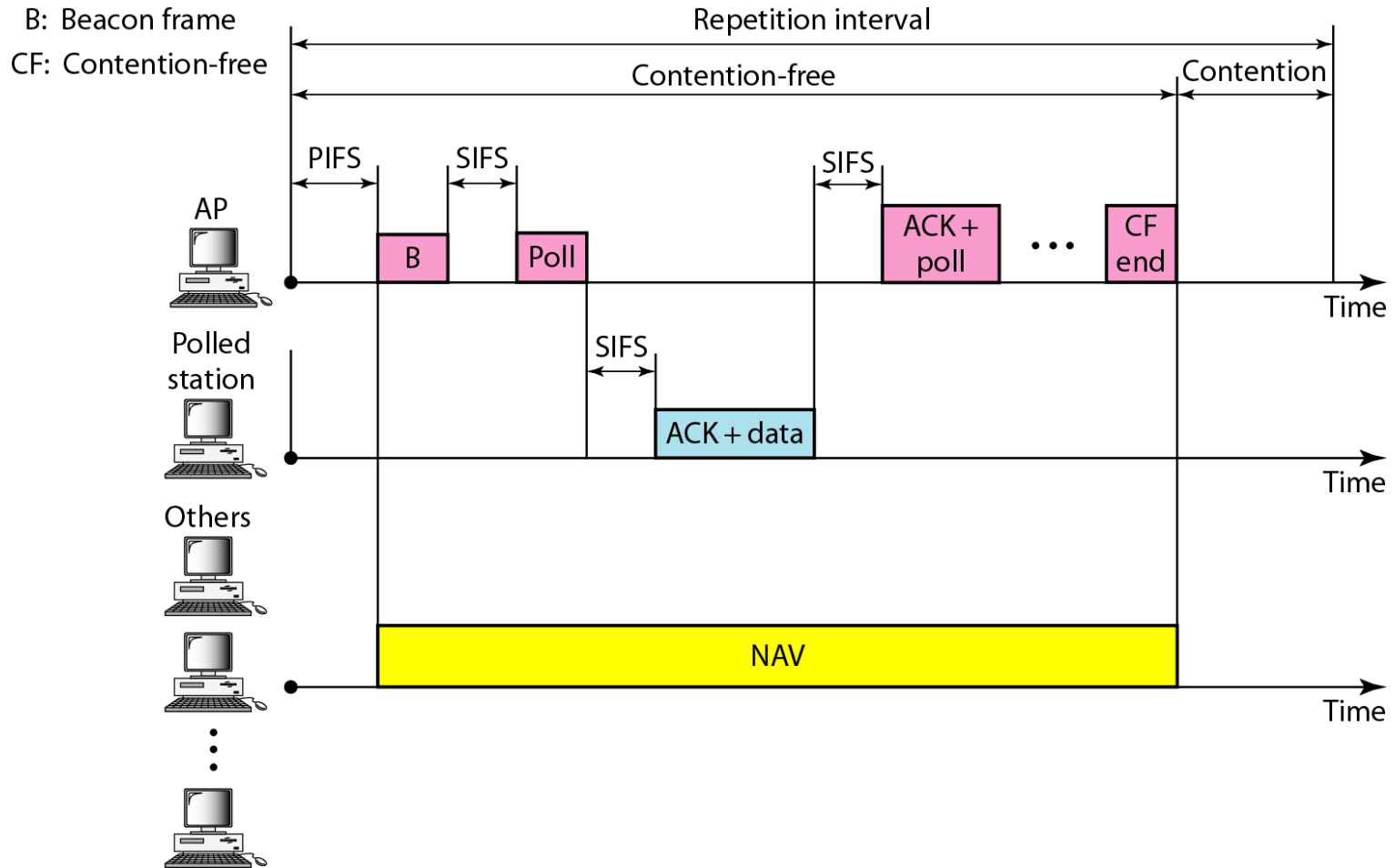


Figura 14.7 *Formato do frame*

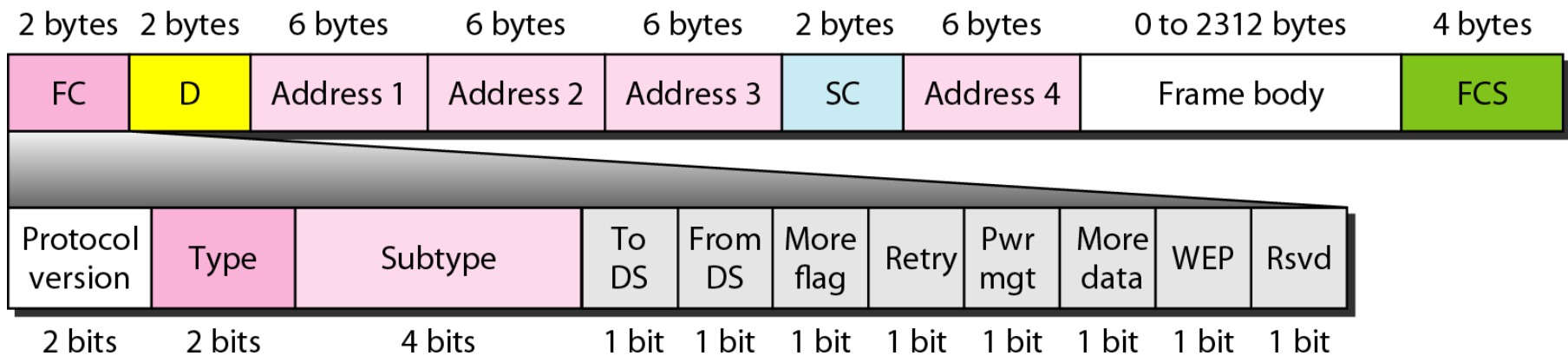


Tabela 14.1 *Subcampos do campo FC*

<i>Field</i>	<i>Explanation</i>
Version	Current version is 0
Type	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

Figura 14.8 *Frames de controle*

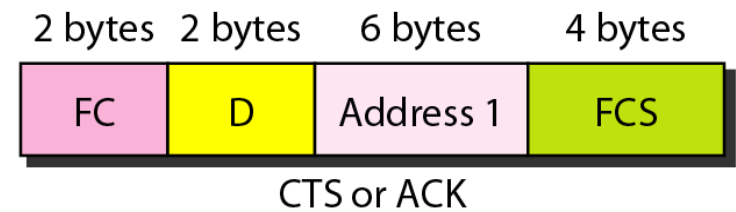
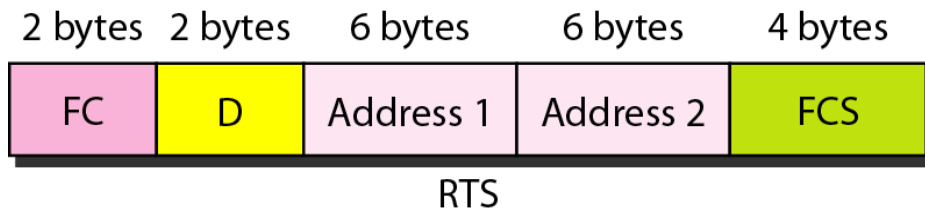


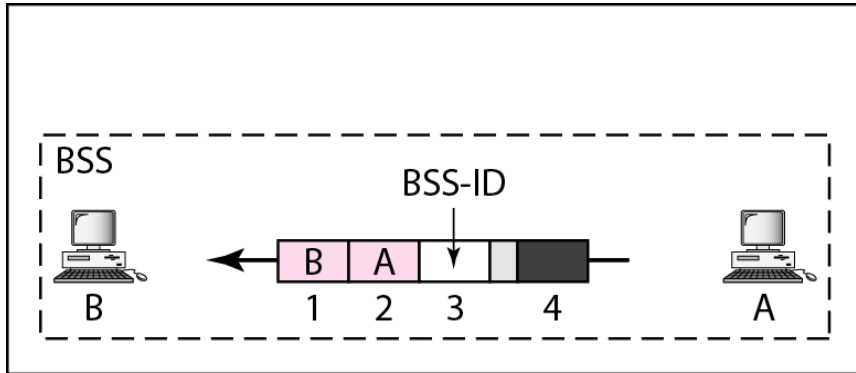
Tabela 14.2 *Valores possíveis para o campo subtype em frames de controle*

<i>Subtype</i>	<i>Meaning</i>
1011	Request to send (RTS)
1100	Clear to send (CTS)
1101	Acknowledgment (ACK)

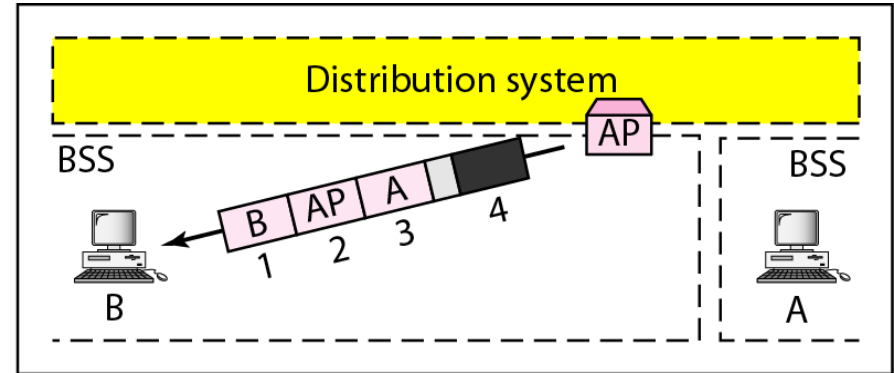
Tabela 14.3 *Endereços*

<i>To DS</i>	<i>From DS</i>	<i>Address 1</i>	<i>Address 2</i>	<i>Address 3</i>	<i>Address 4</i>
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

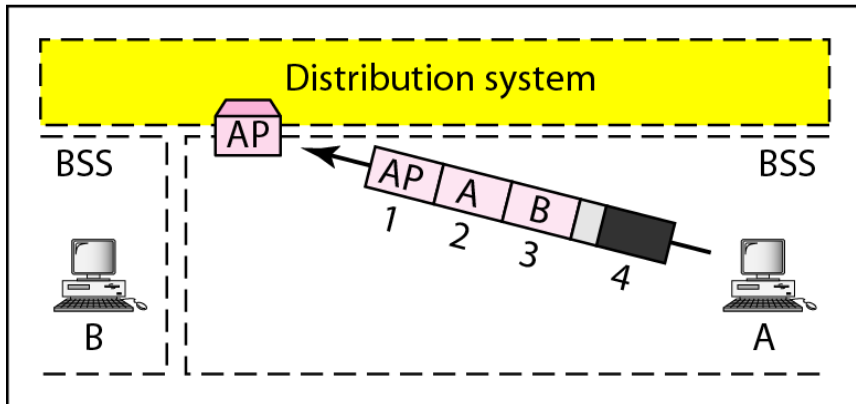
Figura 14.9 Mecanismos de endereçamento



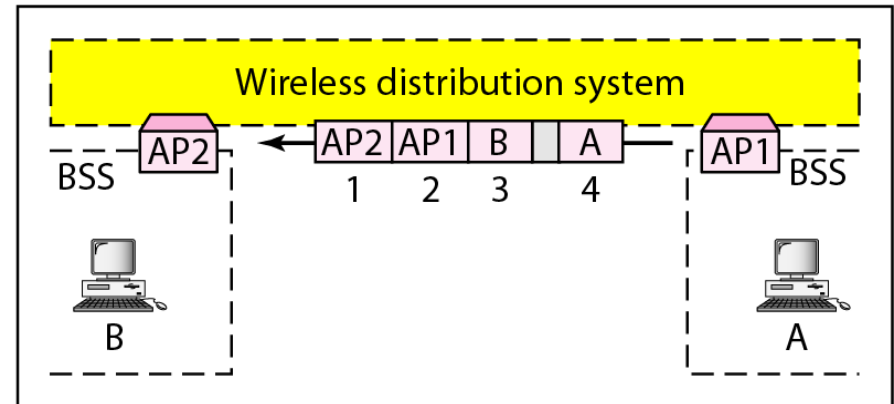
a. Case 1



b. Case 2

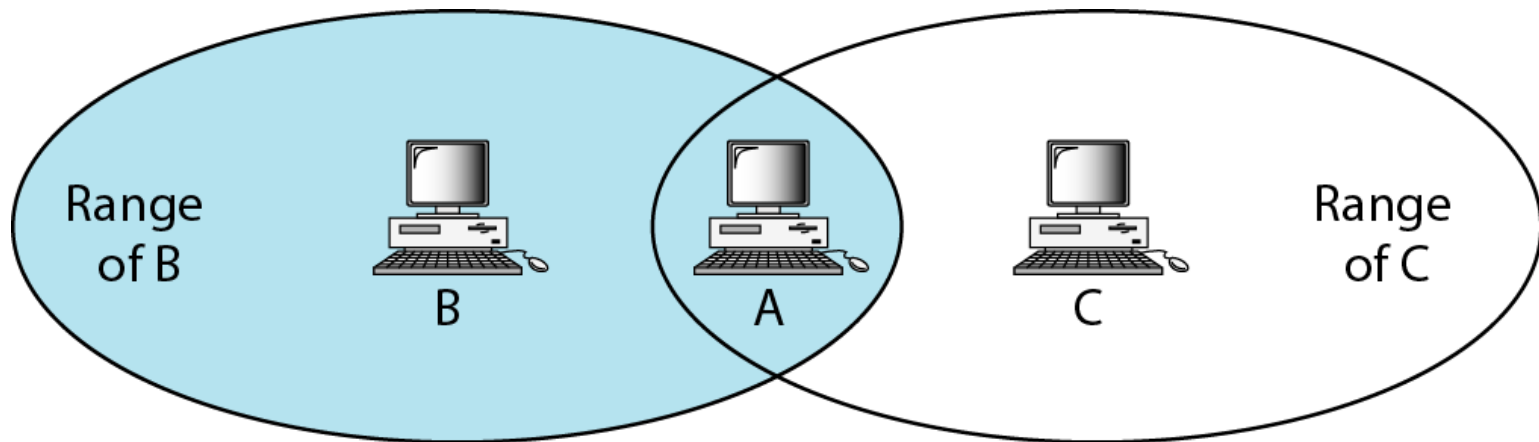


c. Case 3



d. Case 4

Figura 14.10 *O problema da estação oculta*



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



Nota

O frame CTS de handshake no CSMA/CA pode evitar colisões mesmo que exista uma estação oculta.

Figura 14.11 *Handshaking para evitar problemas com estações ocultas*

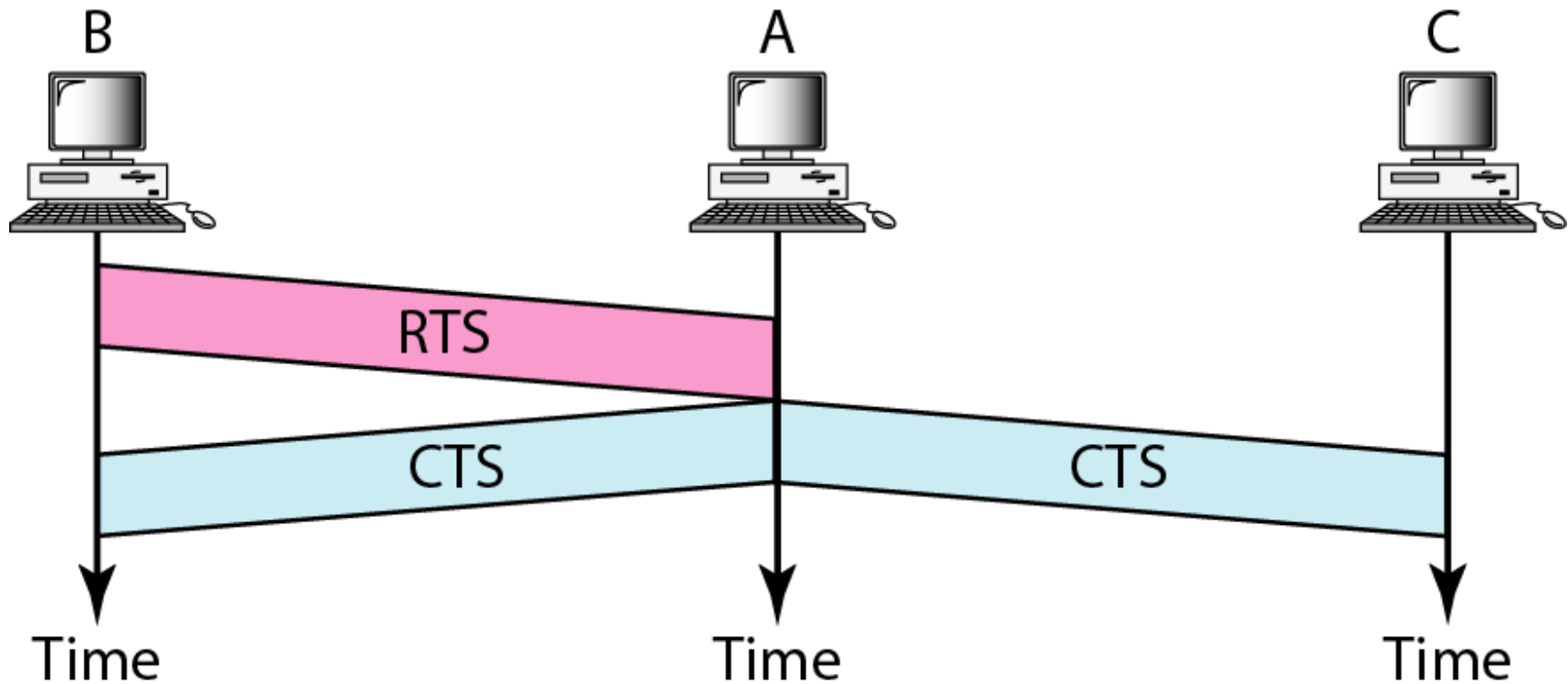
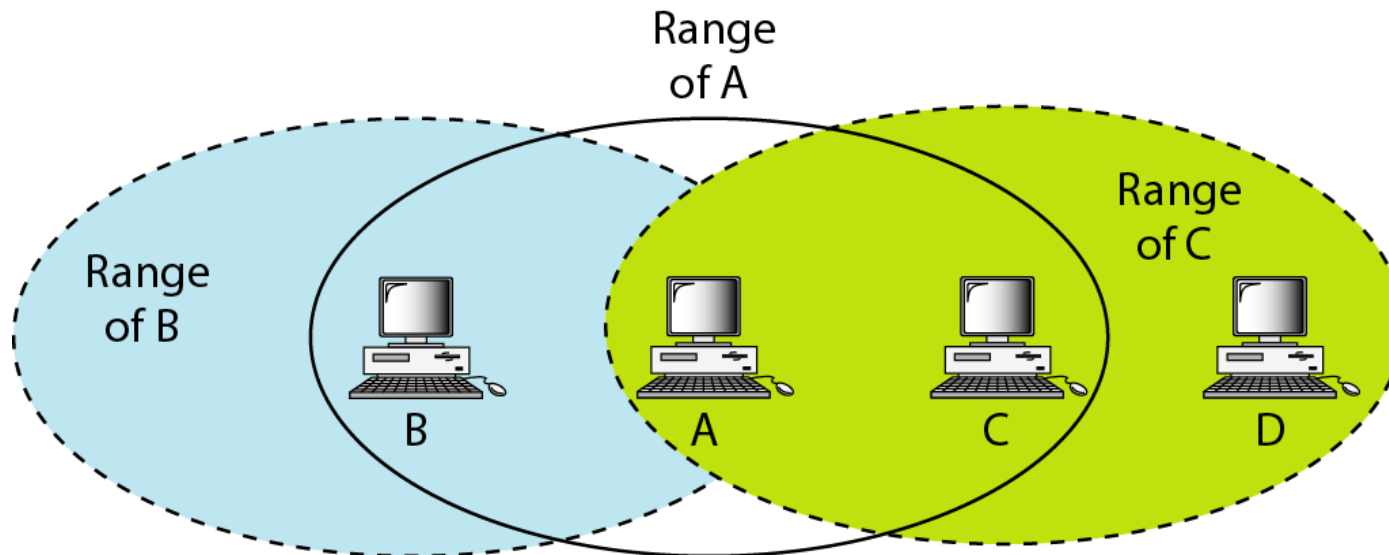


Figura 14.12 *Problema da estação exposta*



C is exposed to transmission from A to B.

Figura 14.13 *Emprego de handshaking no problema da estação exposta*

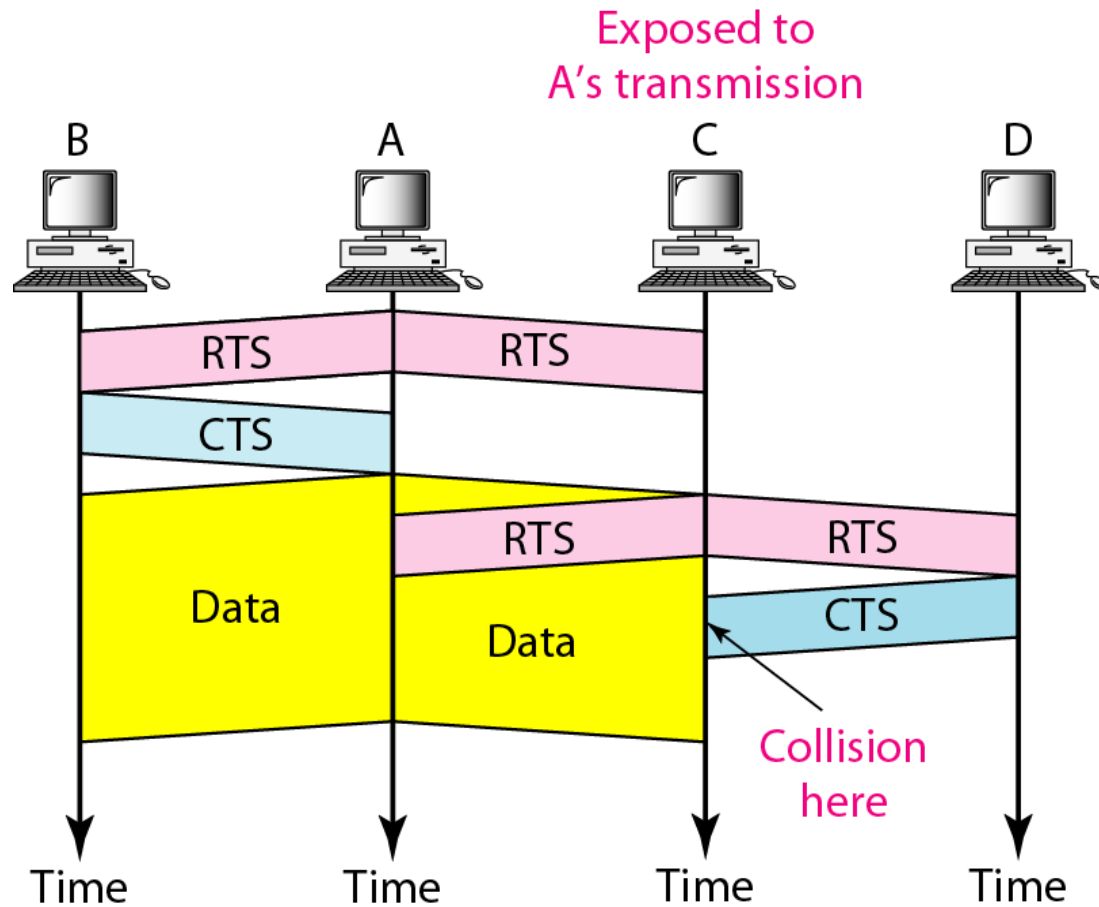


Tabela 14.4 *Camadas Físicas*

<i>IEEE</i>	<i>Technique</i>	<i>Band</i>	<i>Modulation</i>	<i>Rate (Mbps)</i>
802.11	FHSS	2.4 GHz	FSK	1 and 2
	DSSS	2.4 GHz	PSK	1 and 2
		Infrared	PPM	1 and 2
802.11a	OFDM	5.725 GHz	PSK or QAM	6 to 54
802.11b	DSSS	2.4 GHz	PSK	5.5 and 11
802.11g	OFDM	2.4 GHz	Different	22 and 54

Figura 14.14 *Faixa de frequências Industrial, scientific, and medical (ISM)*

