
Lokální síť (04)

Jan Janeček

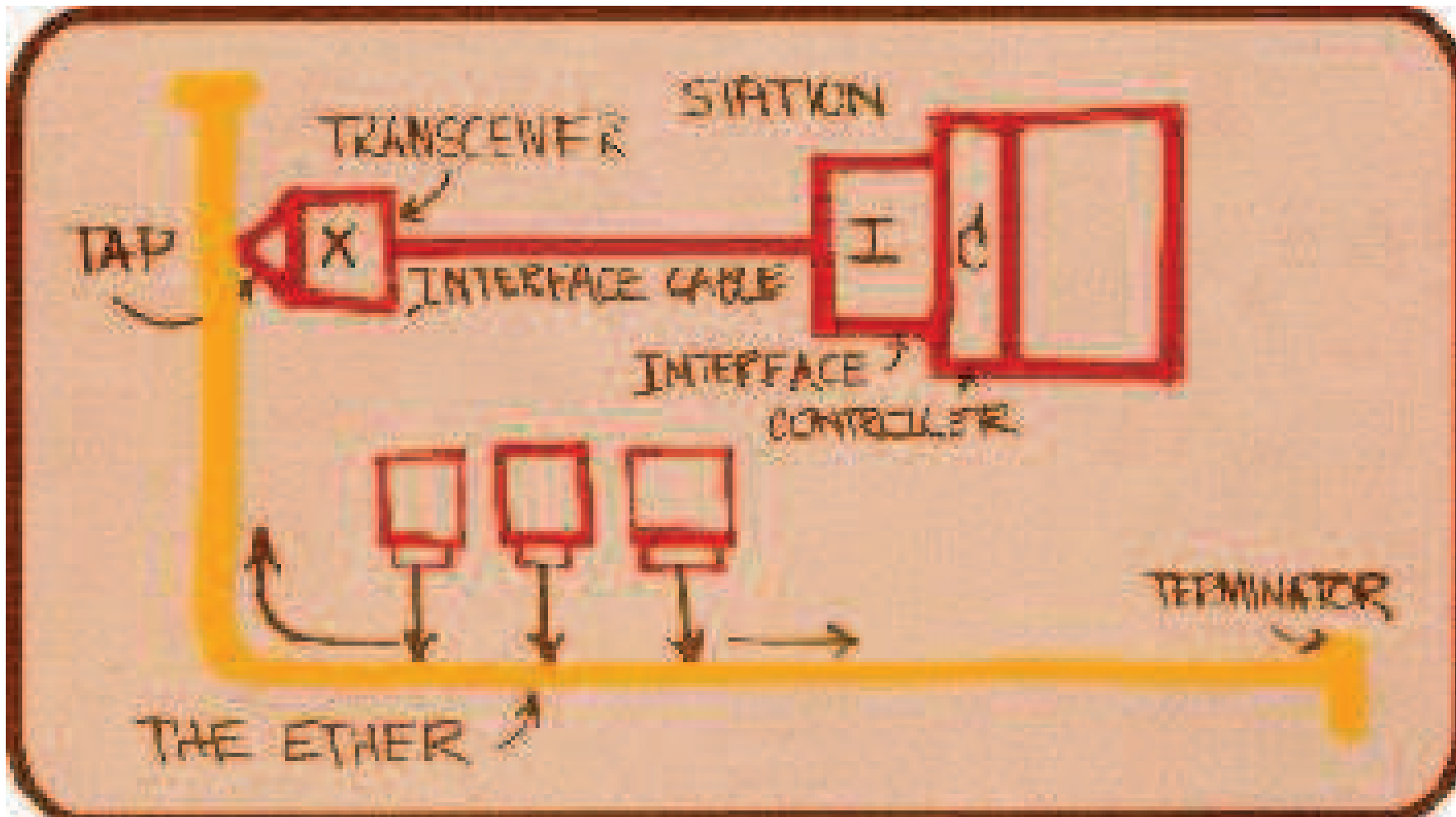
katedra počítačů

České vysoké učení technické v Praze

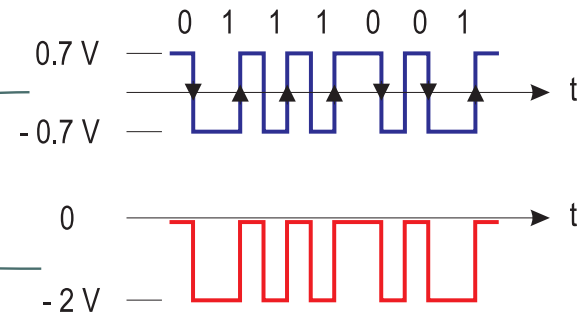
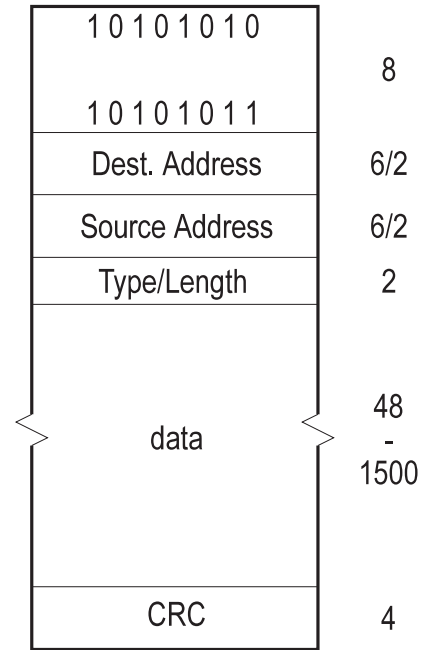
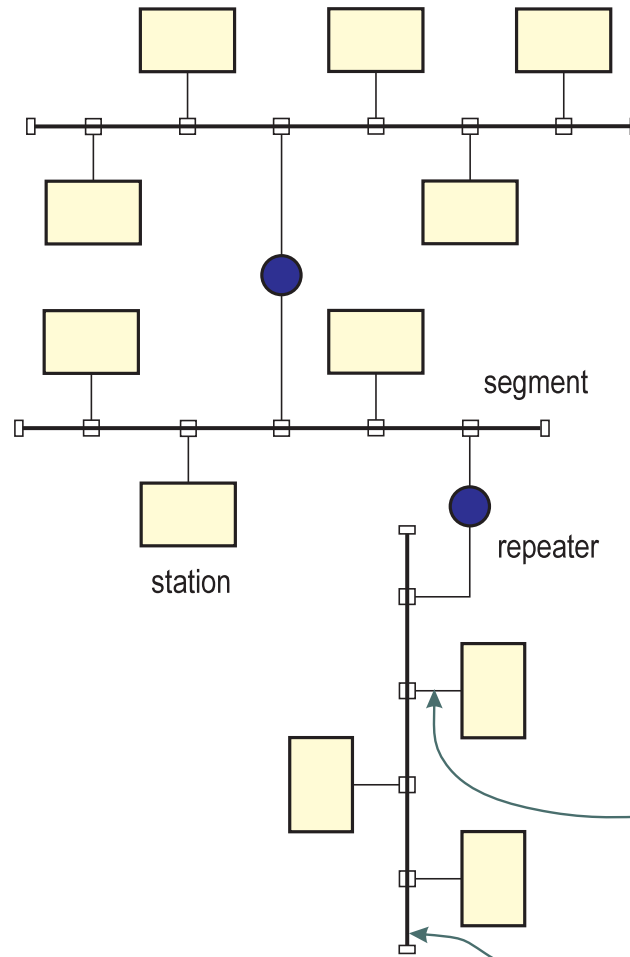
Ethernet technologies

- Standard (10BASE-x) technologies
 - 10BASE-5, 10BASE-2
 - 10BASE-T, 10BASE-FL, 10BASE-FB, 10BASE-FP
- Fast (100BASE-x) technologies
 - 100BASE-Tx/Fx
 - 100BASE-T4, 100BASE-T2
- Gigabit (1000BASE-x) technologies
 - 1000BASE-SX, 1000BASE-LX
 - 1000BASE-CX, 1000BASE-TX
- 10 Gigabit (10GBASE-x) technologies
 - 10GBASE-SR/EW, 10GBASE-LR/EW
 - 10GBASE-LX4, 10GBASE-ER/EW
 - 10GBASE-CX4

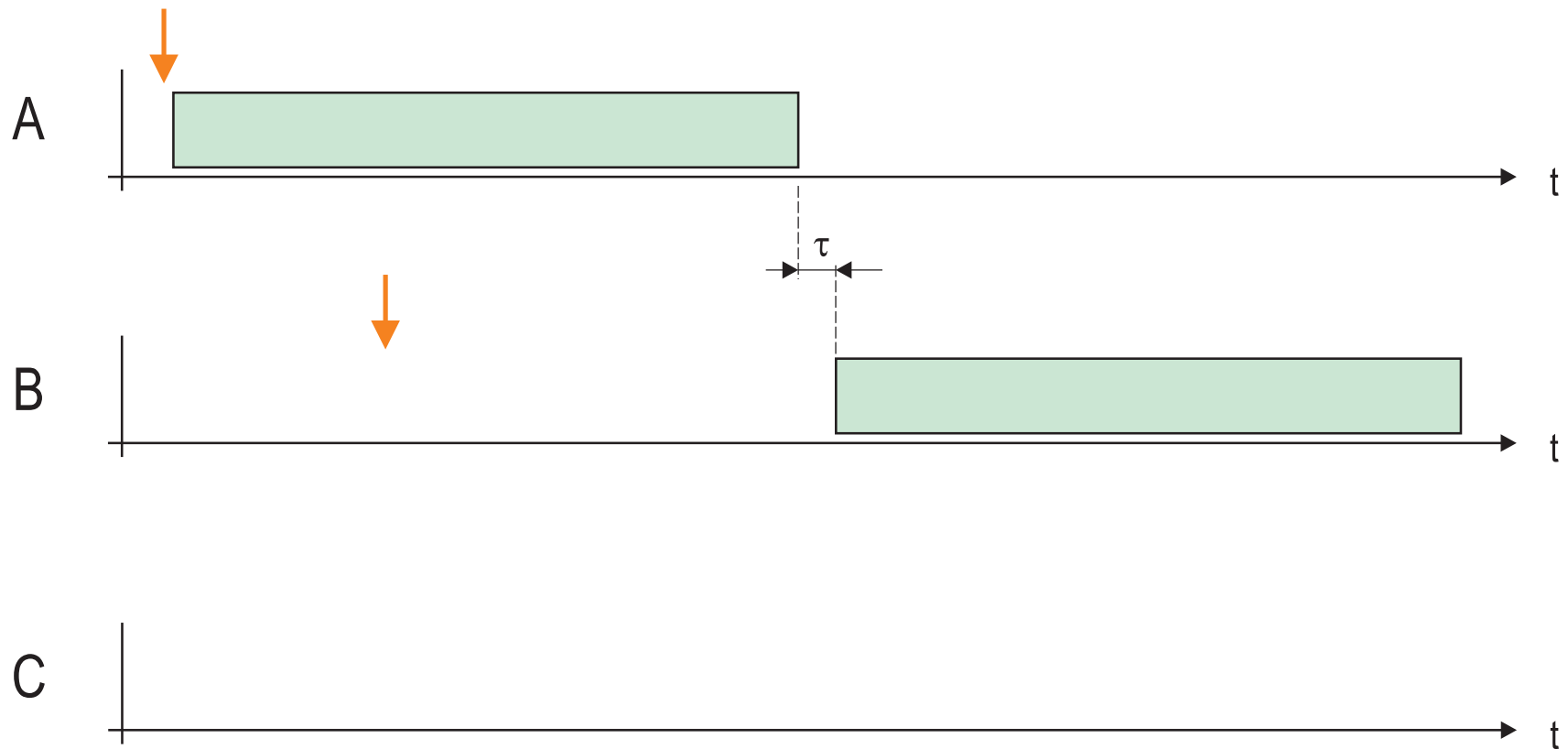
Ethernet I



Ethernet II

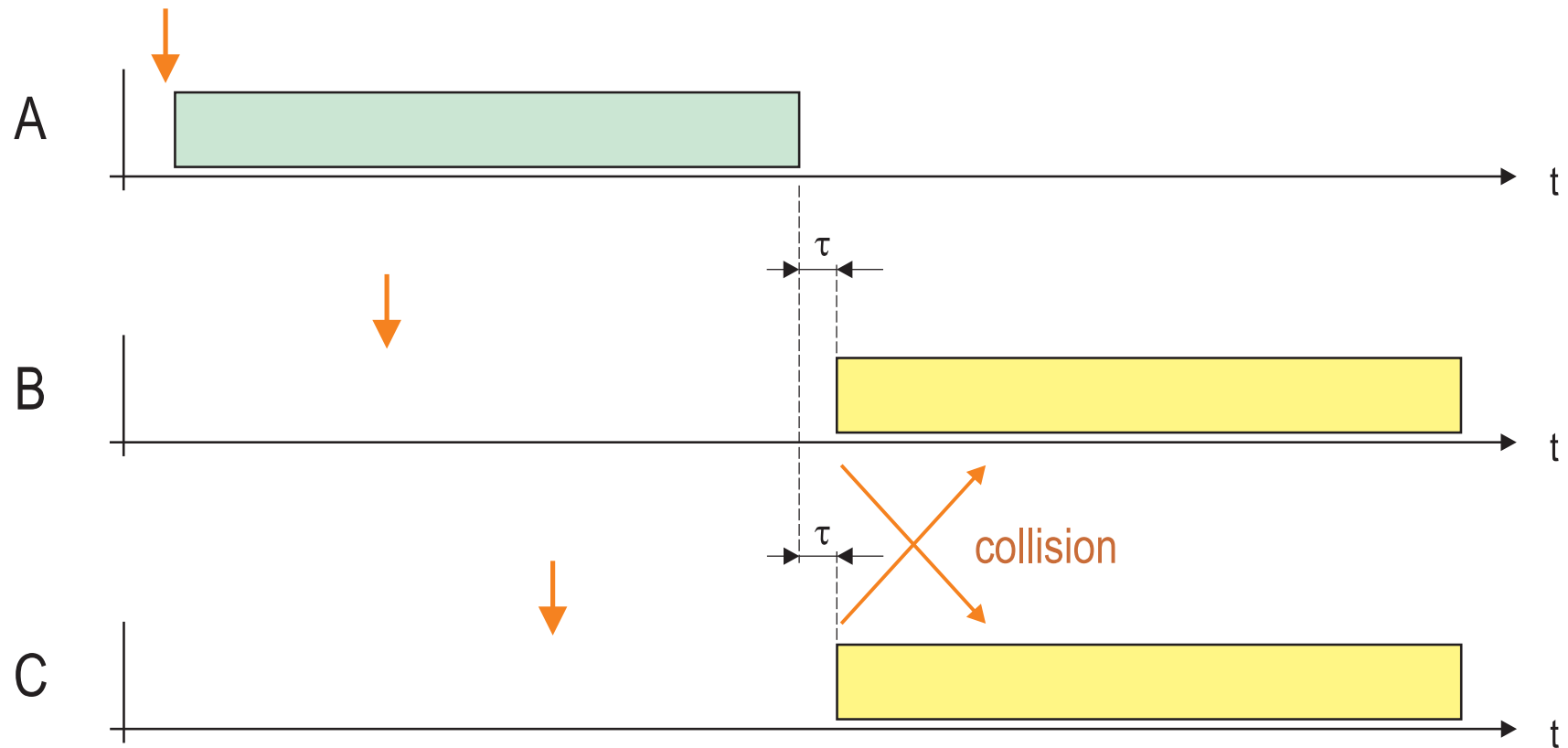


CSMA (1-persistent)



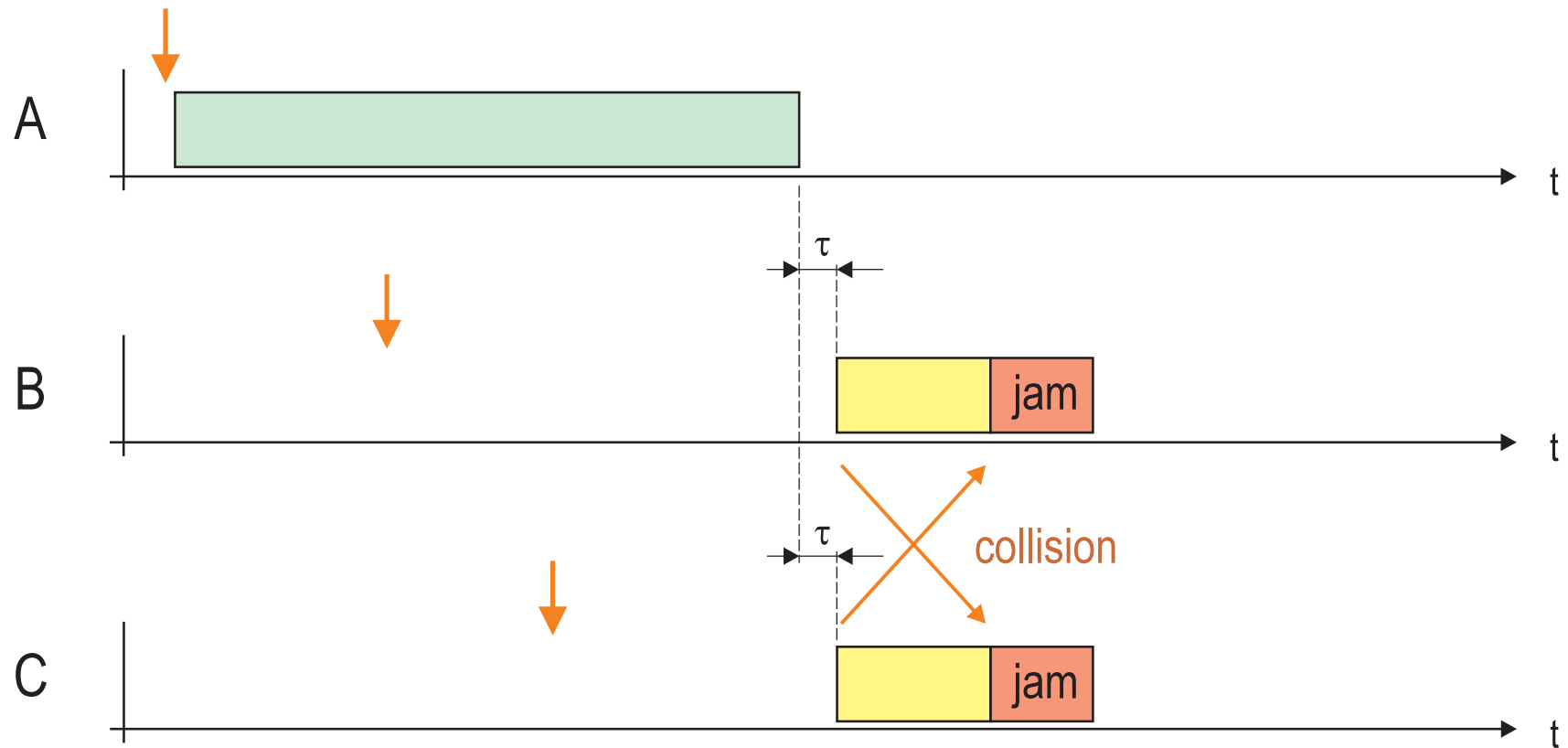
1-persistent CSMA

CSMA (1-persistent)



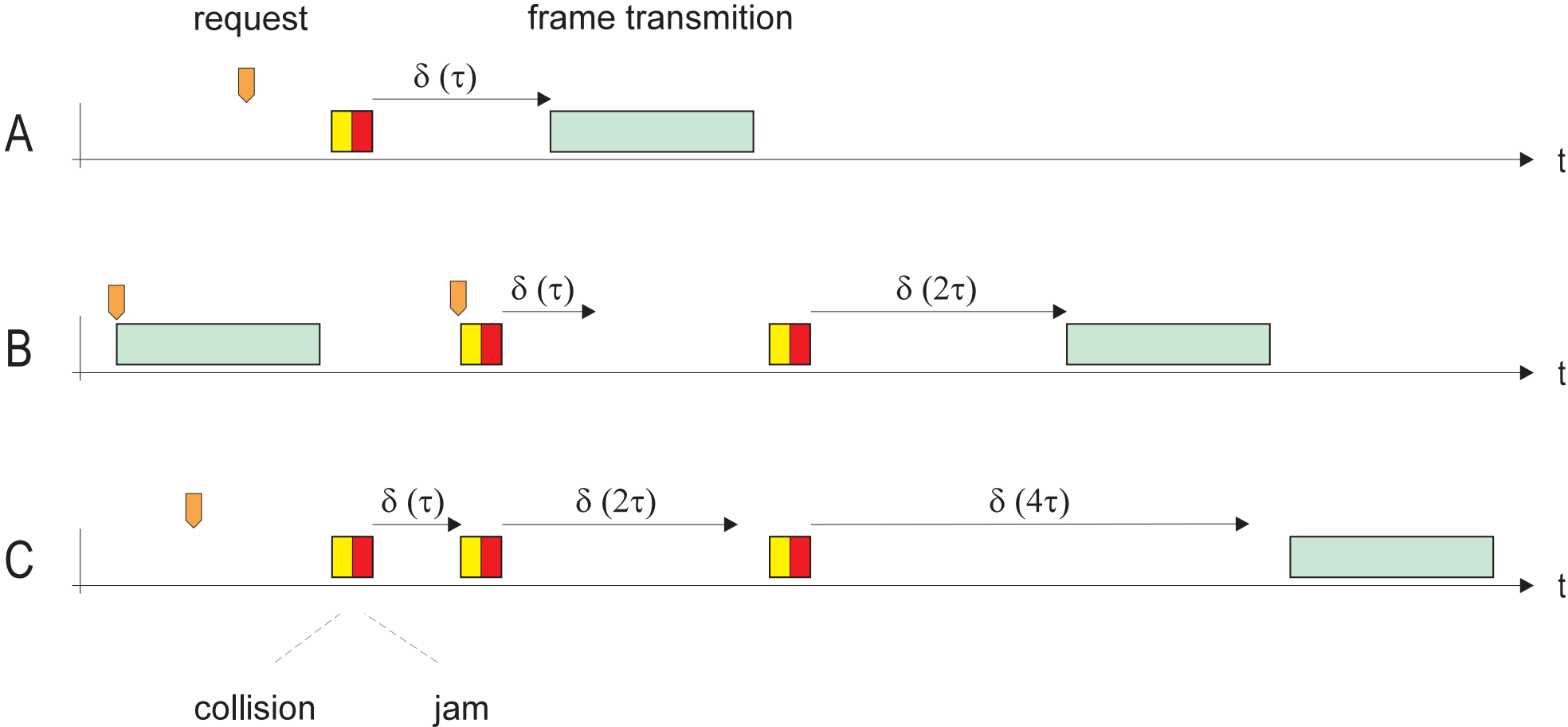
1-persistent CSMA

CSMA/CD - collision detection

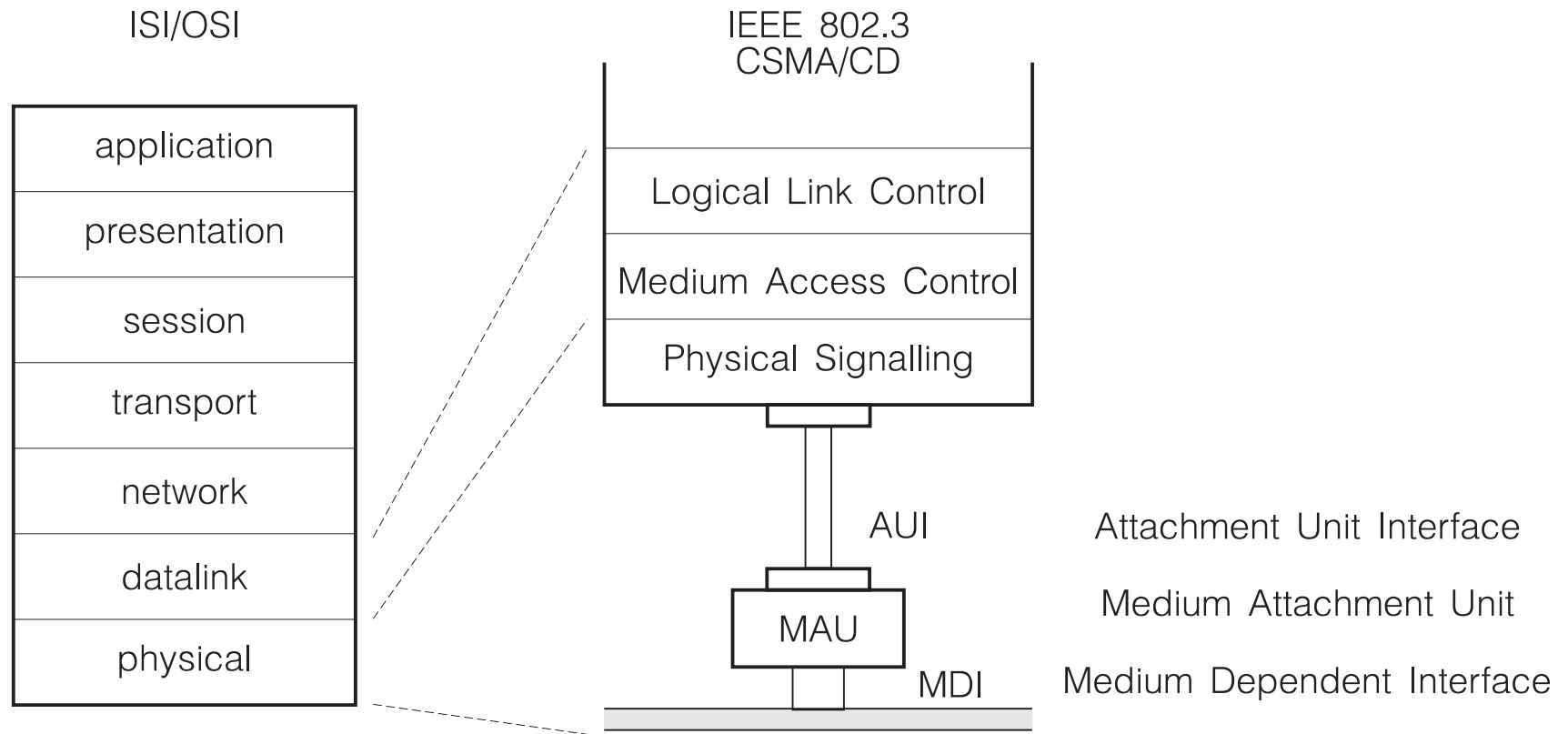


1-persistent CSMA/CD

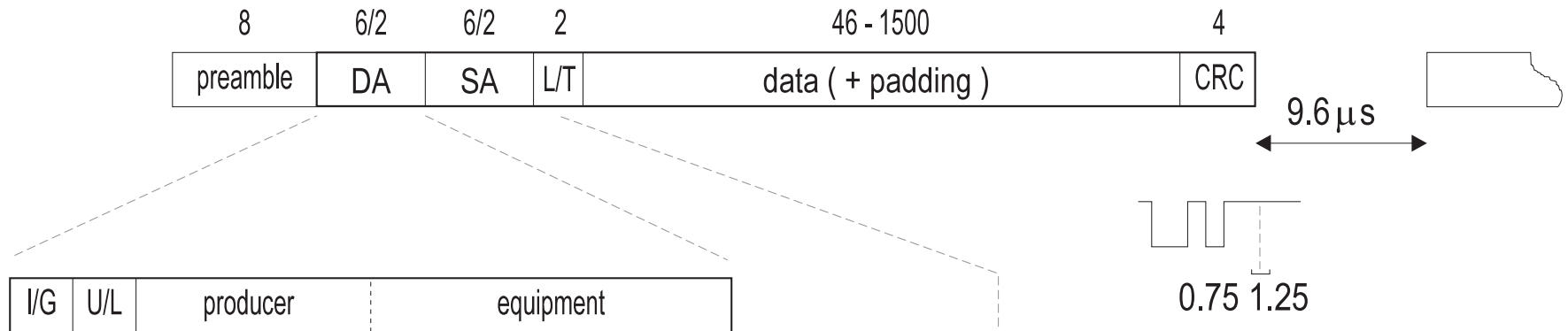
CSMA/CD - exponential back-off



IEEE 802.3 Architecture



Ethernet formats



Universal/Local address
Individual/Group address

802.3	-	0 - 5DC	(length)
DIX (Ethernet II)	-	600	XNS
		800	IP
		806	ARP

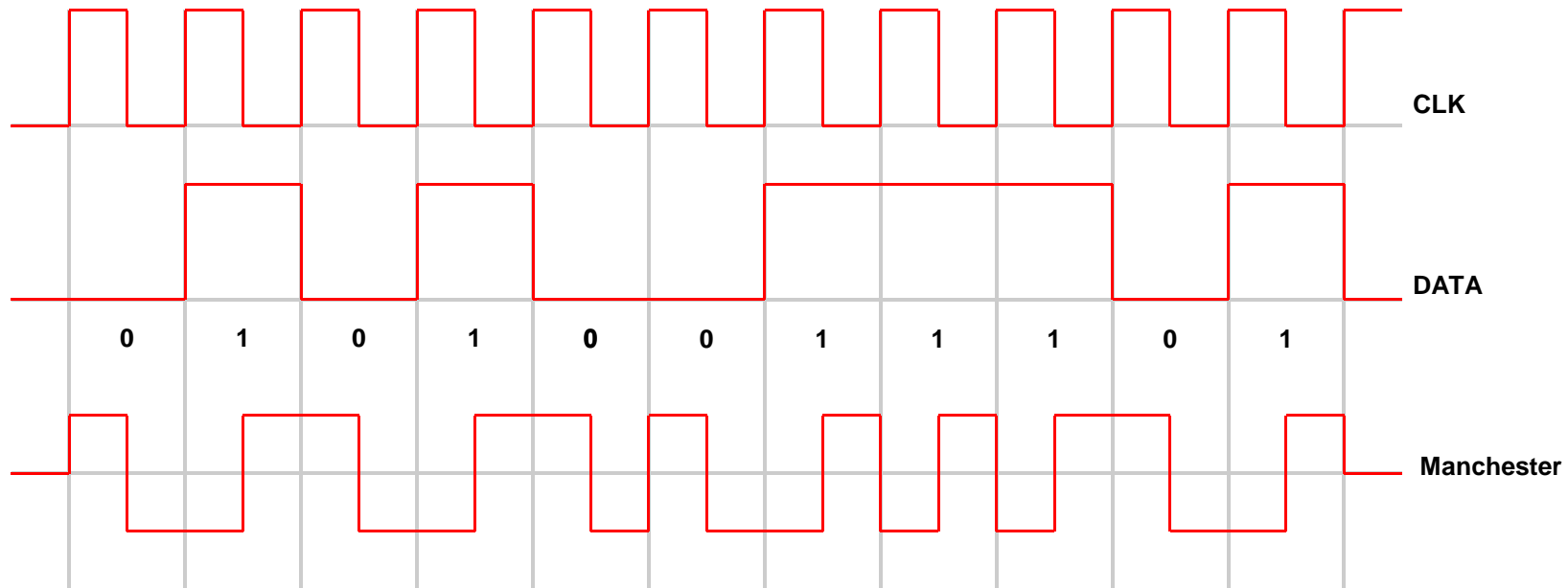


IEEE 802.3 10BASE-5

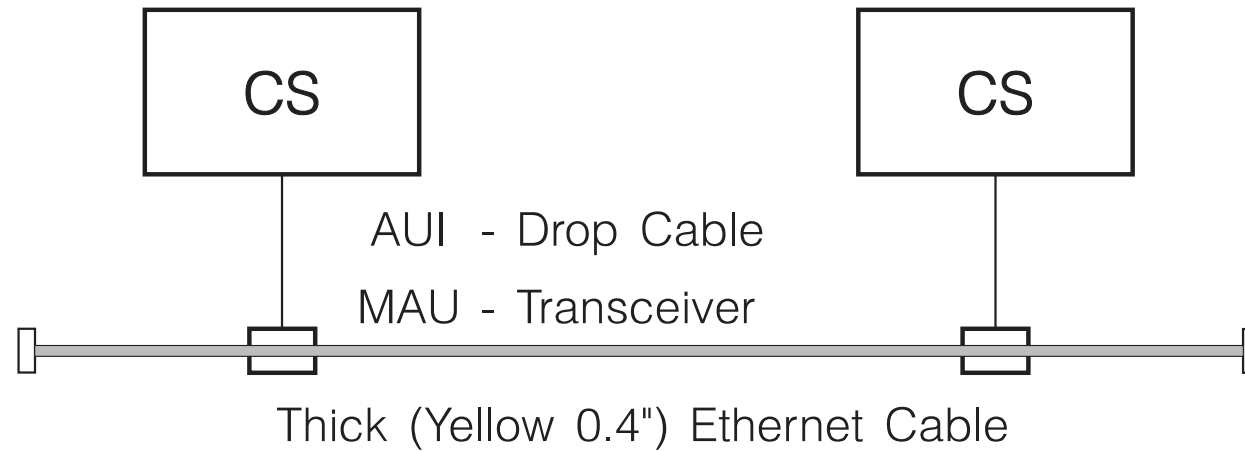
- médium: 50Ω 0,375“ koaxiální kabel
- délky:
 - segment max 500m, max 4 opakovače (2 prázdné seg.)
 - stanice: min 2,5m; max 500m; 100st/seg
- kódování: Manchester



10BASE-? – Manchester



IEEE 802.3 10BASE-5





IEEE 802.3 10BASE-5

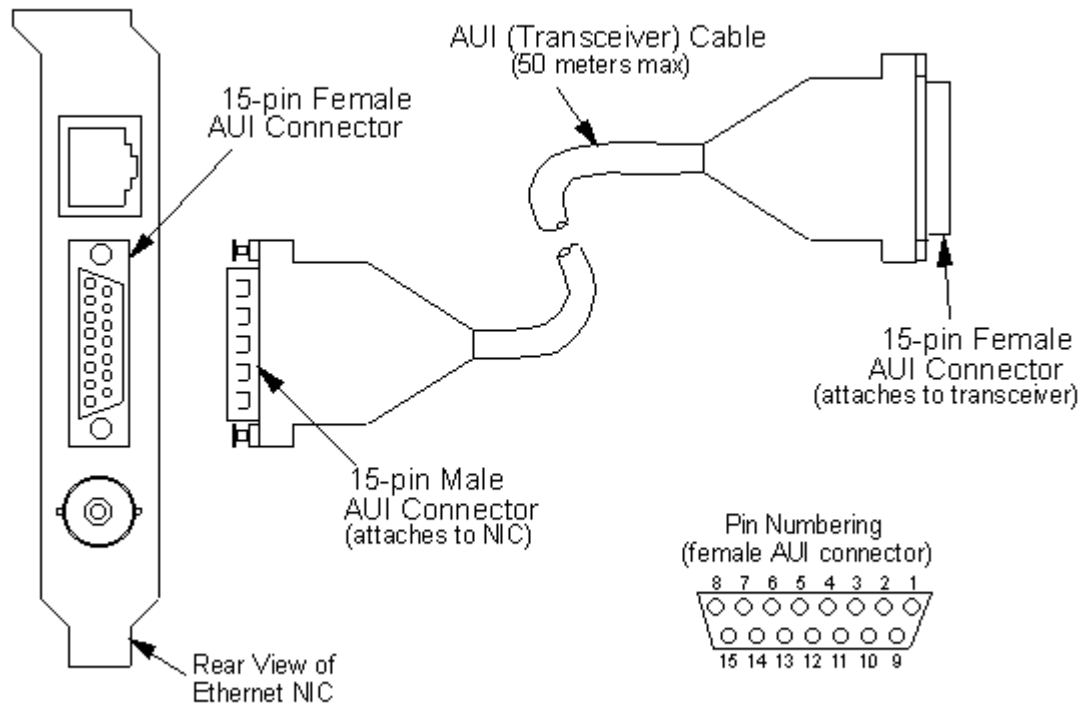
MAU - transceiver





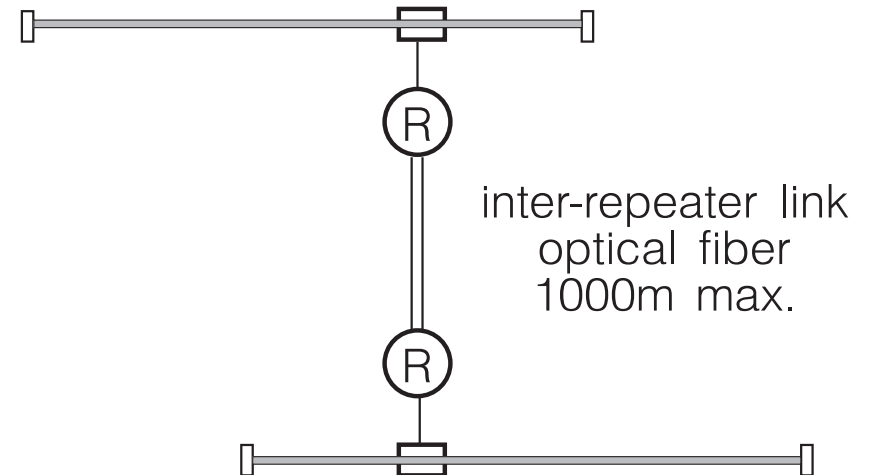
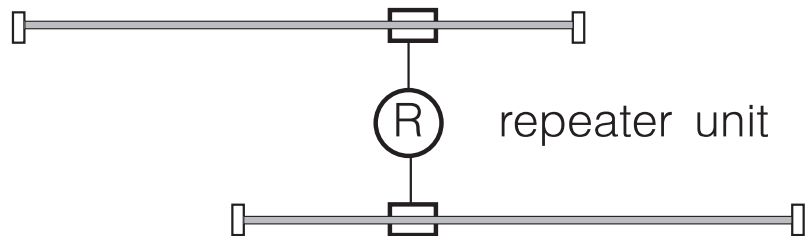
IEEE 802.3 10BASE-5

AUI Cable and Connectors



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IEEE 802.3 10BASE-5 FOIRL

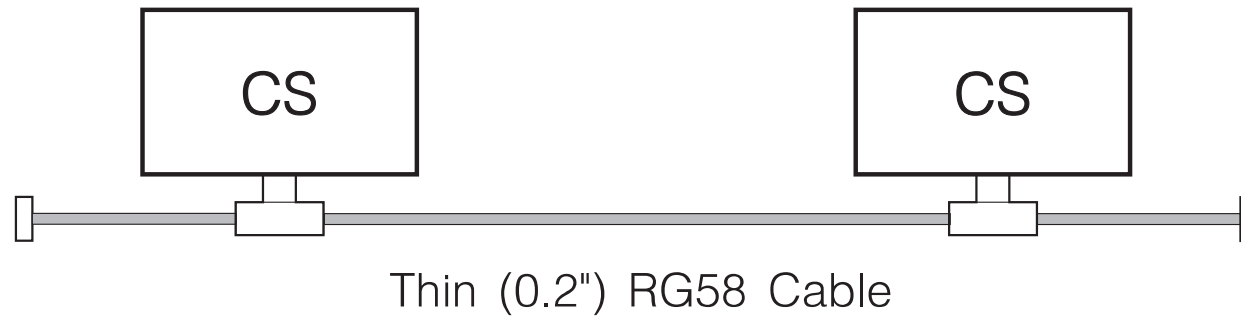




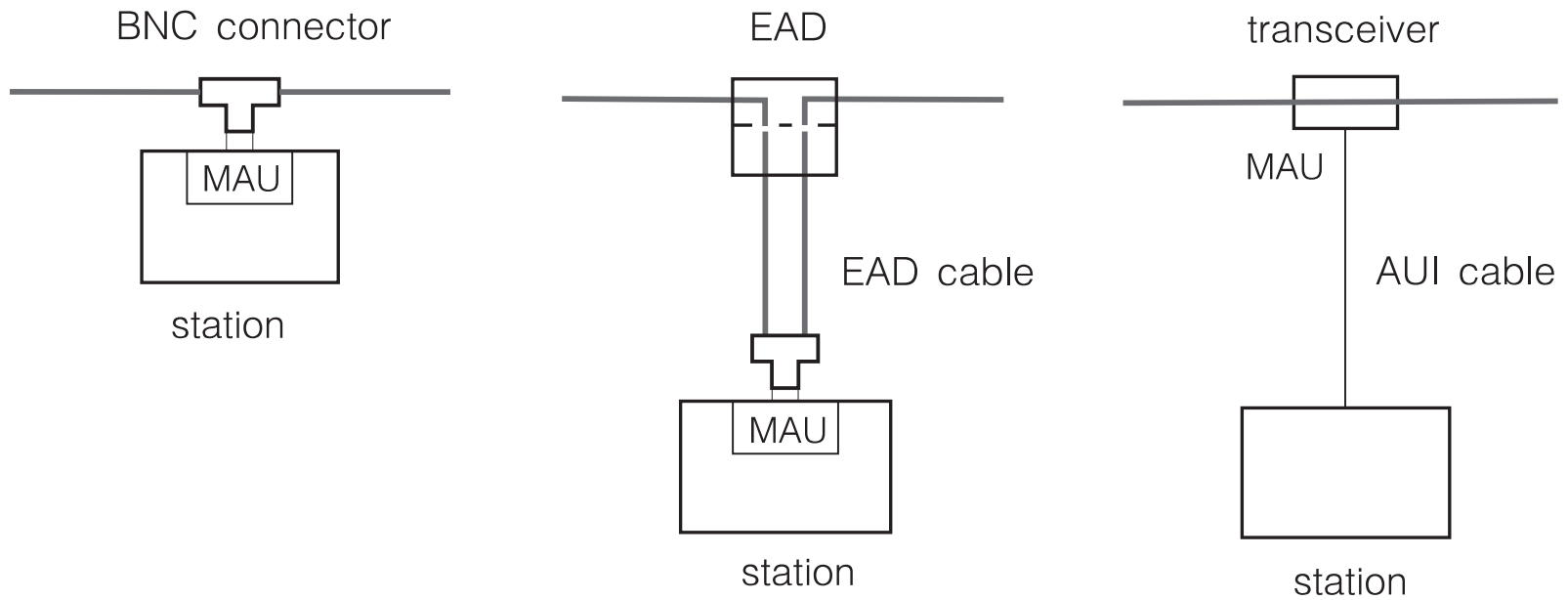
IEEE 802.3 10BASE-2

- médium: 50Ω 0,2“ koaxiální kabel (RG-58)
- délky:
 - segment max 185m, max 4 opakovače (2 prázdné seg.)
 - stanice: min 0,5m; max 185m; 30st/seg
- kódování: Manchester

IEEE 802.3 10BASE-2



IEEE 802.3 10BASE-2 Cabling



IEEE 802.3 10BASE-2

T konektor



EAD zásuvka

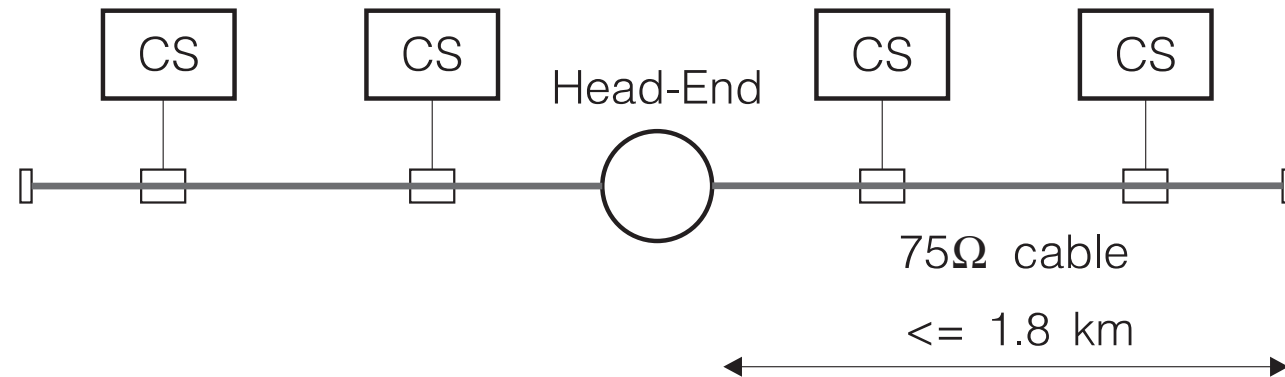




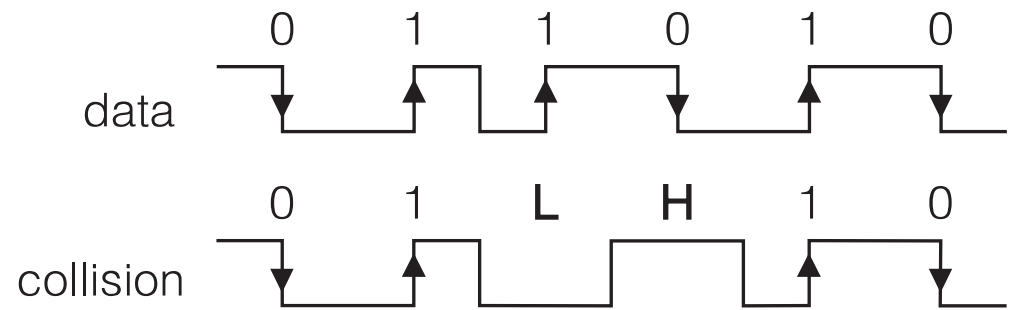
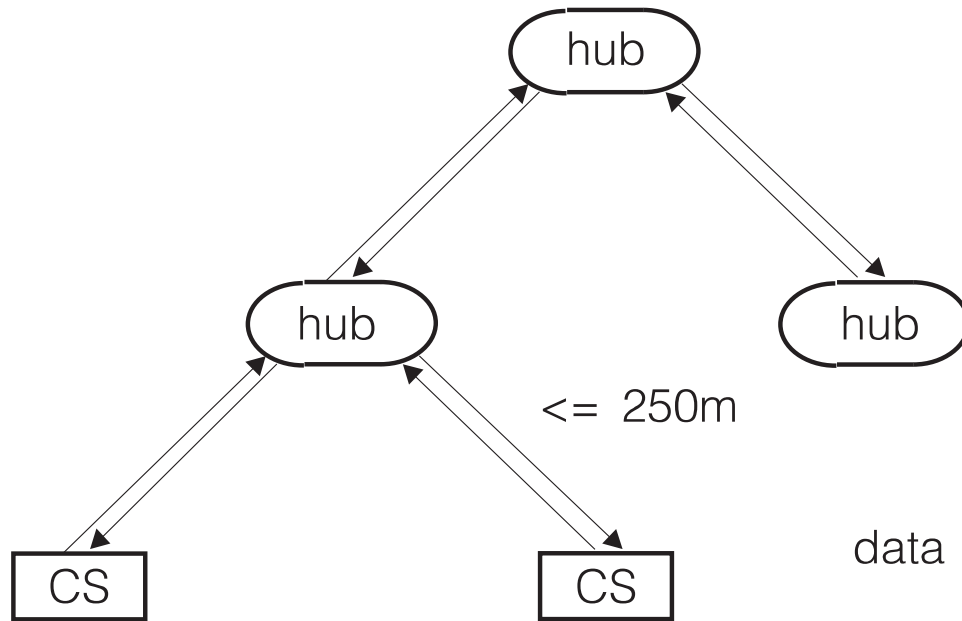
IEEE 802.3 10BROAD-36

- médium: 75Ω koaxiální kabel (CATV)
- délky:
 - segment max 1800m, celkem 3600m
- kódování: NRZ s PSK, 14MHz + 4MHz
- dual vs single cable systém
- headend

IEEE 802.3 10BROAD-36



IEEE 802.3 1BASE-5

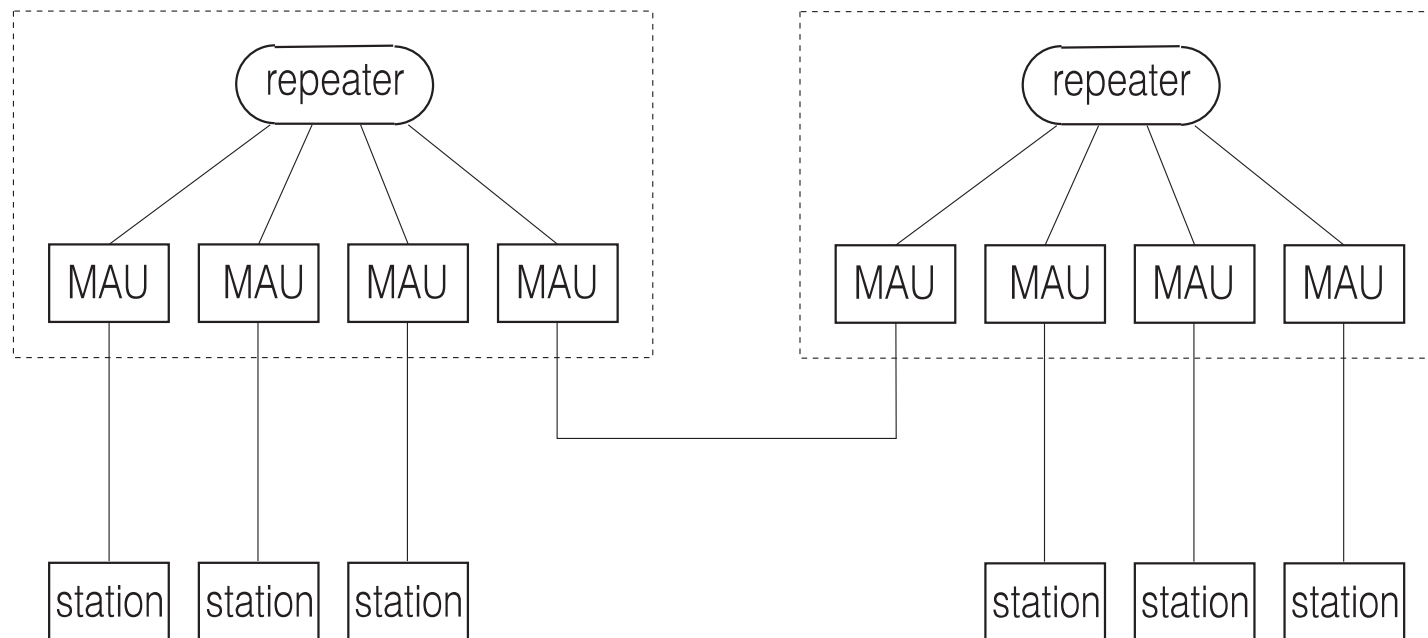




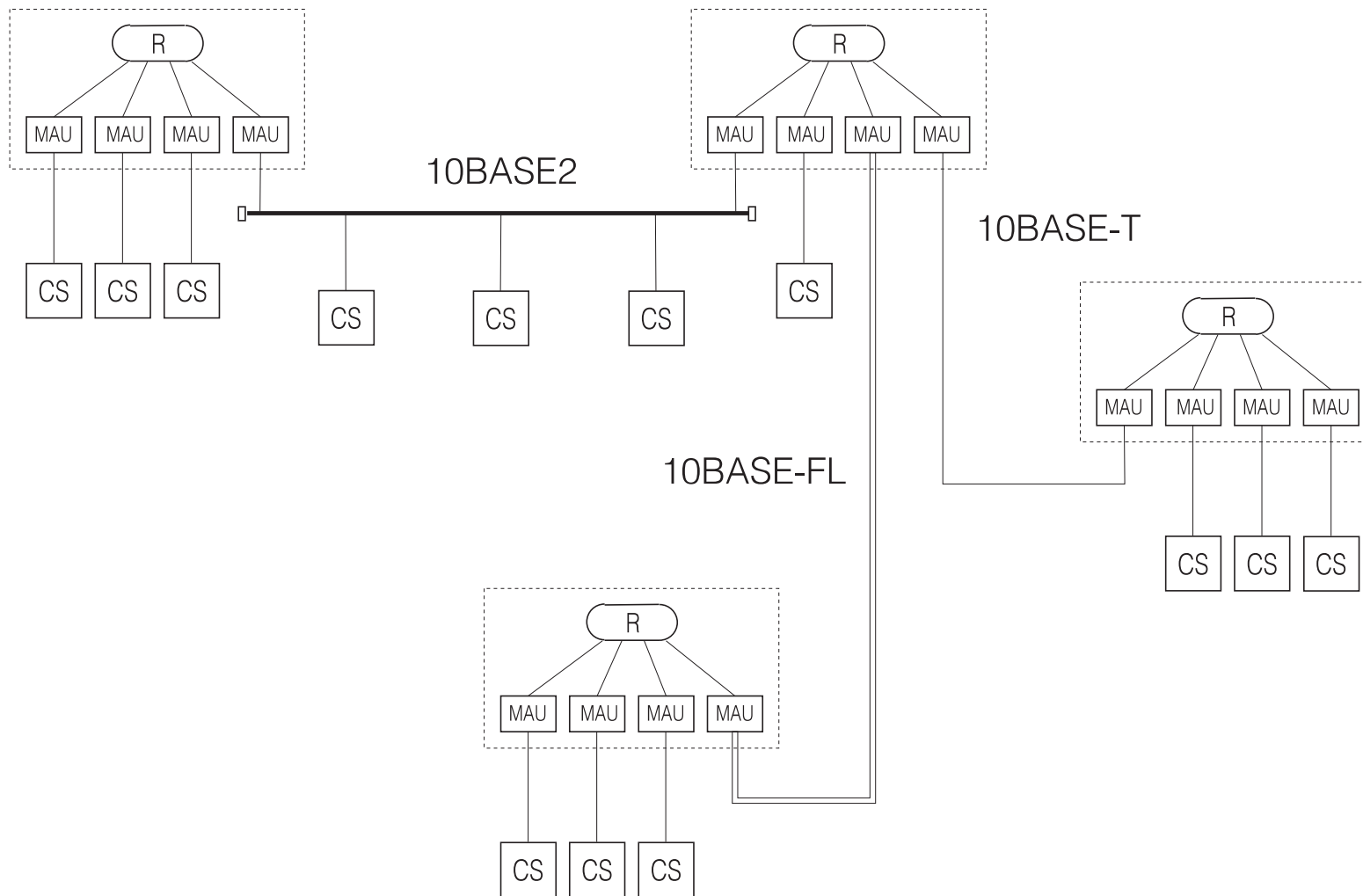
IEEE 802.3 10BASE-T

- médium: UTP (min cat. 3), použity 2 páry ze 4
- délky:
 - 100m (5+90+5)
- kódování: Manchester
- detekce kolize na opakovačích

IEEE 802.3 10BASE-T



IEEE 802.3 Ethernet

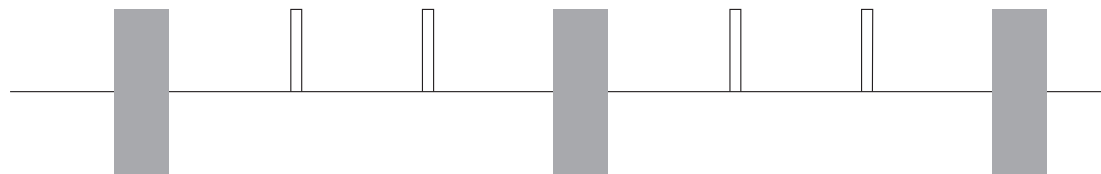


Synchronous Ethernet

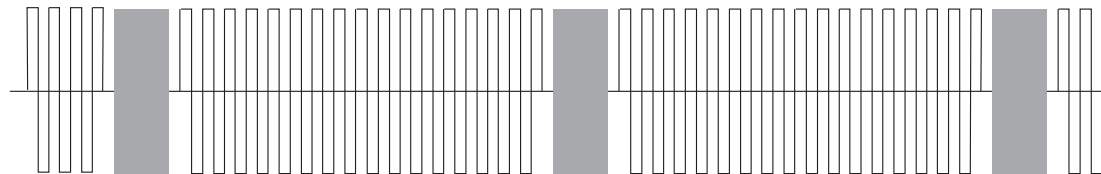
frame



Asynchronous
Ethernet
(coax)

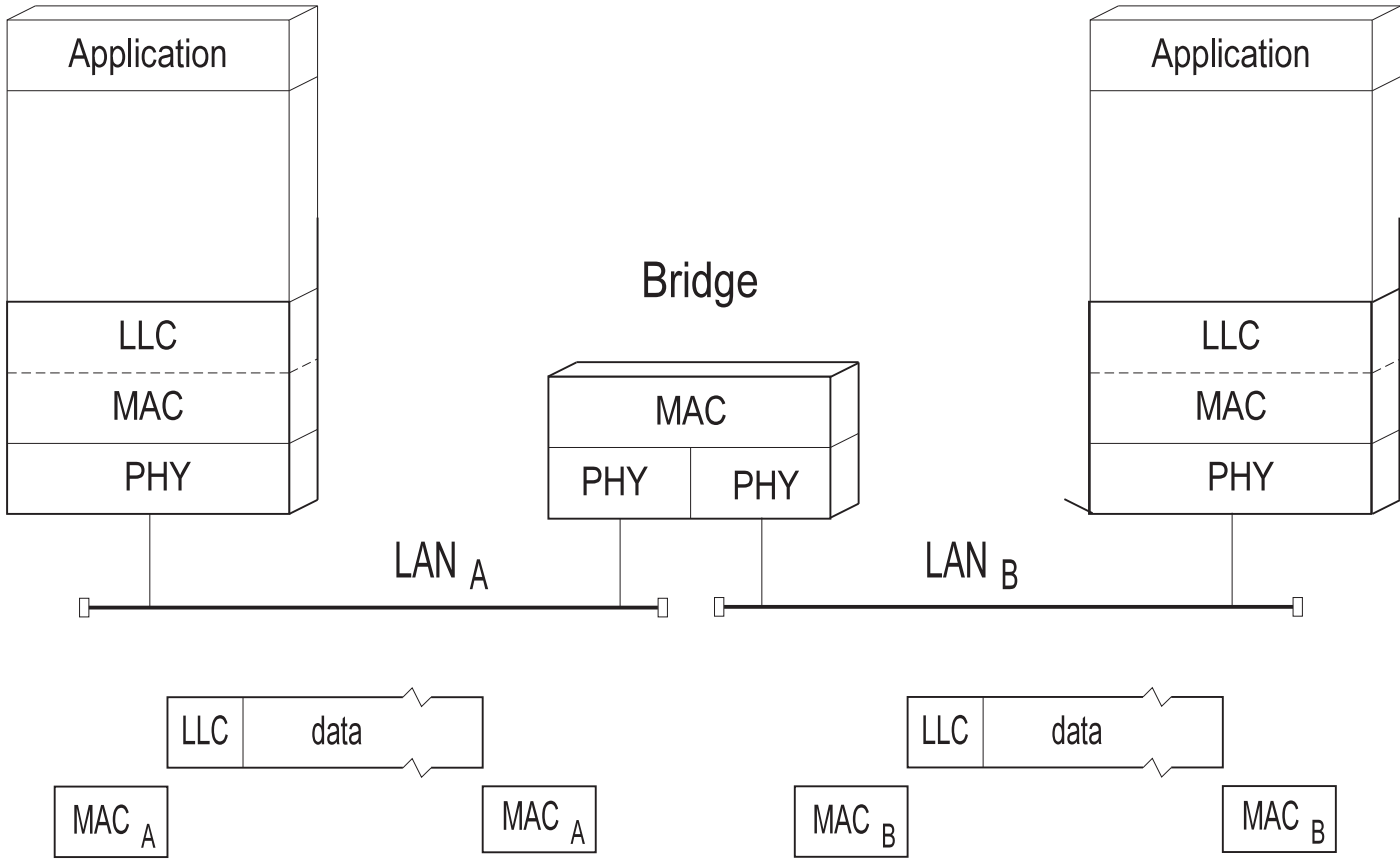


Asynchronous
Ethernet
(TP/FO)

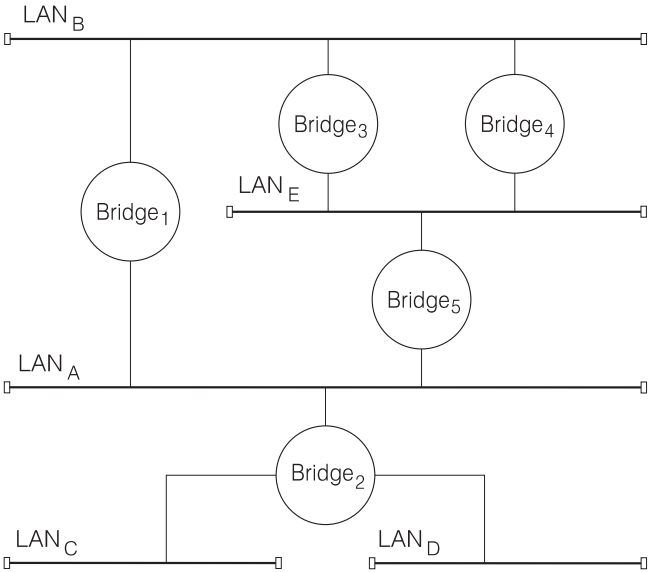


Synchronous
Ethernet
(TP/FO)

Ethernet bridging



Ethernet bridging

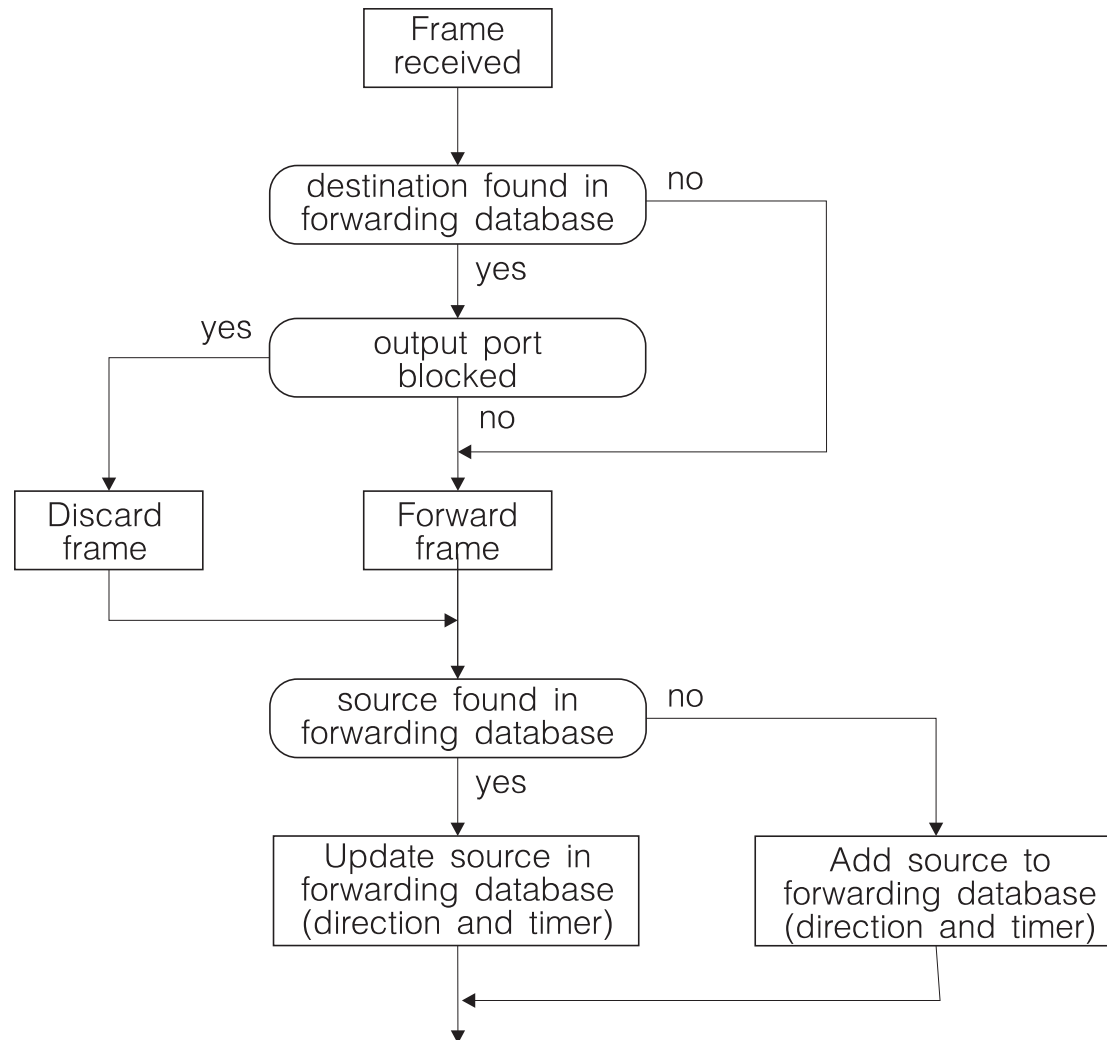


Bridge ₁		Bridge ₂			Bridge ₃		
	A	B	A	C	D	B	E
A	-	A	-	A	A	-	-
B	-	A	-	A	A	-	-
C	-	A	-	D	-	-	-
D	-	A	-	D	A	-	-
E	-	A	-	A	A	-	-

Bridge ₄		Bridge ₅		
	B	E	A	E
A	-	E	-	A
B	-	E	-	A
C	E	B	-	A
D	E	-	-	A
E	E	-	E	-

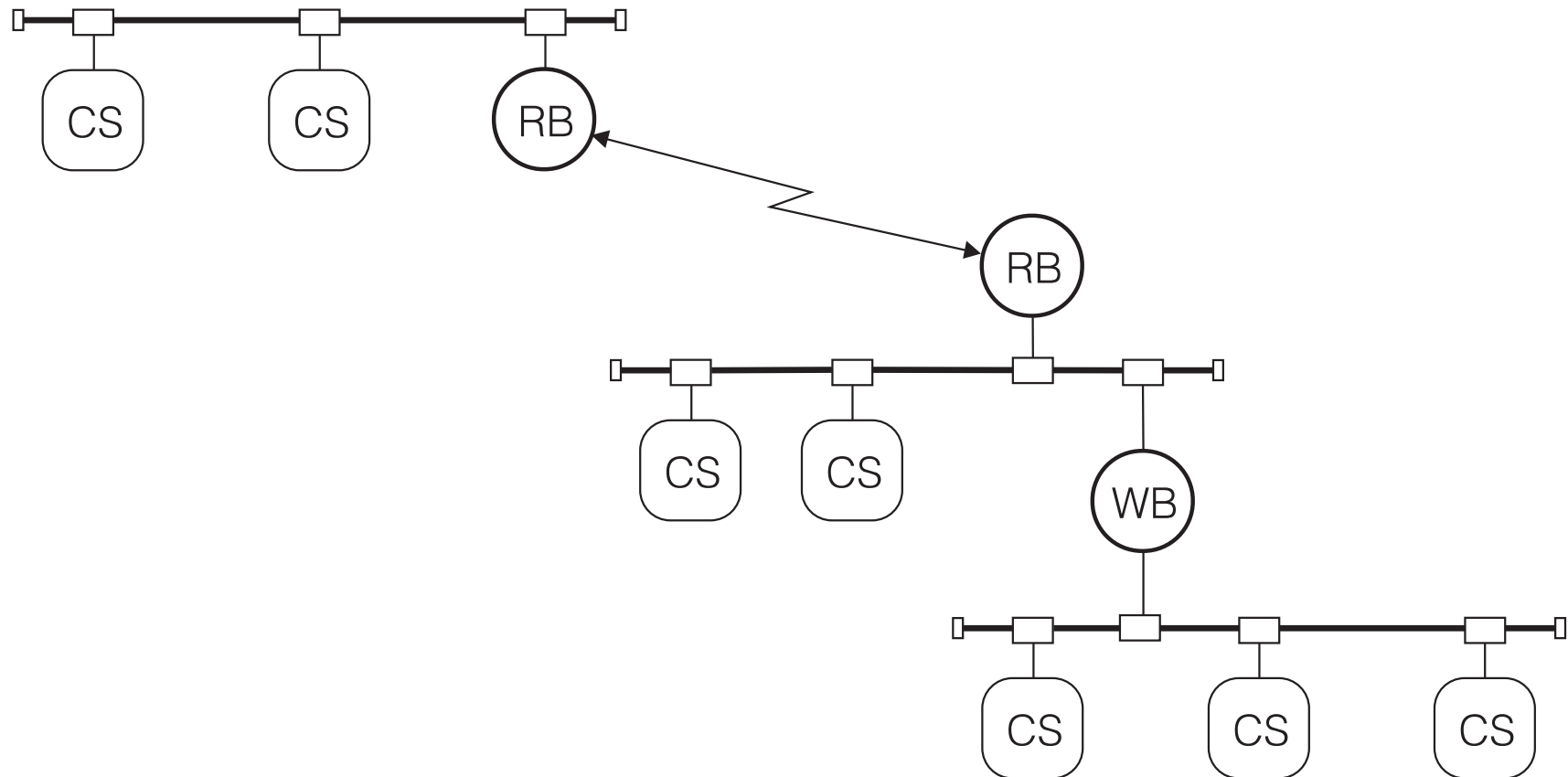
Learning and forwarding

Forwarding

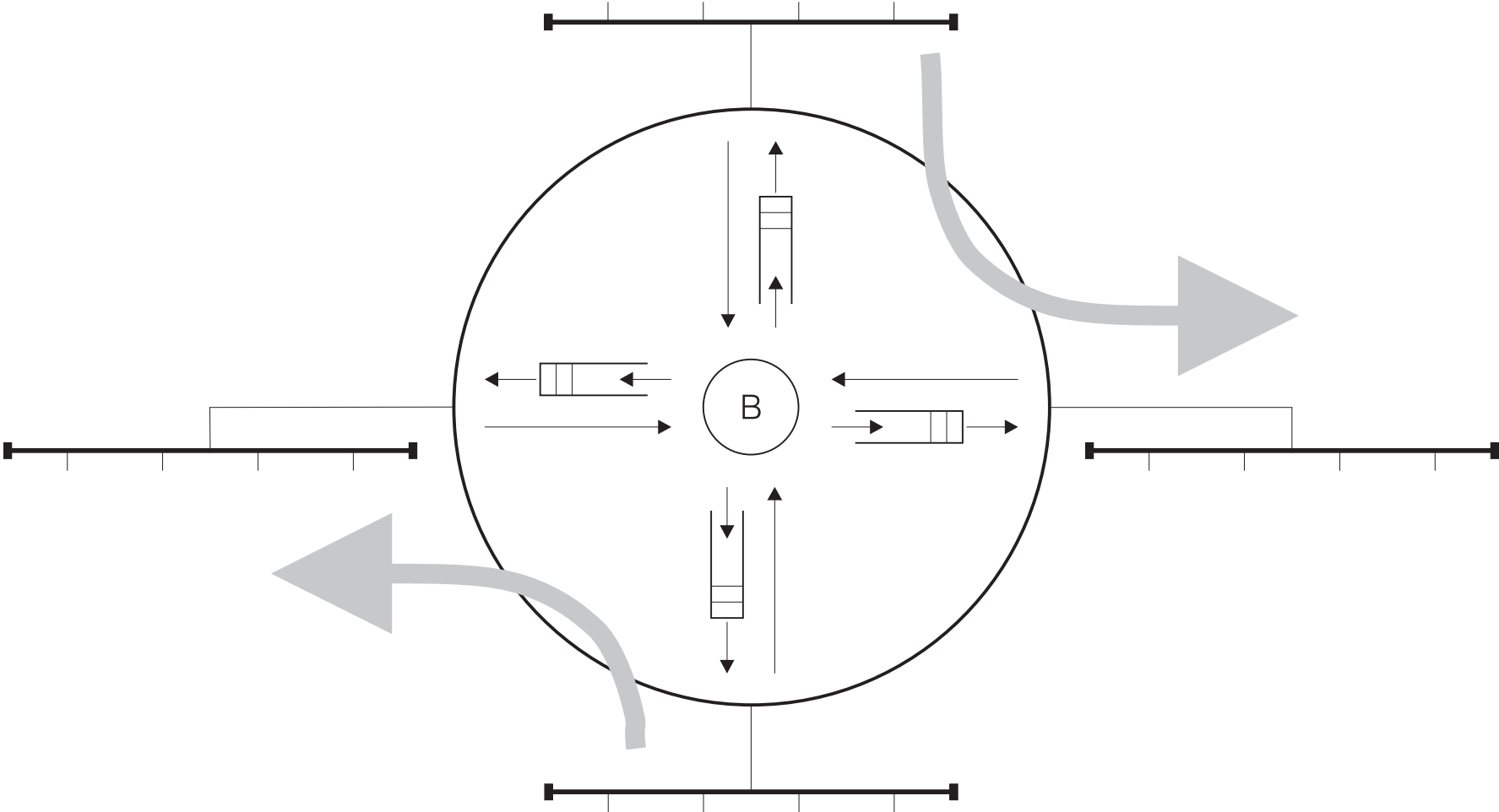


Learning

Remote & workgroup switches



Ethernet switch



Switching modes

