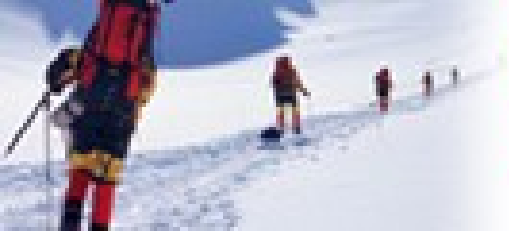

Capítulo 7

Meios de transmissão

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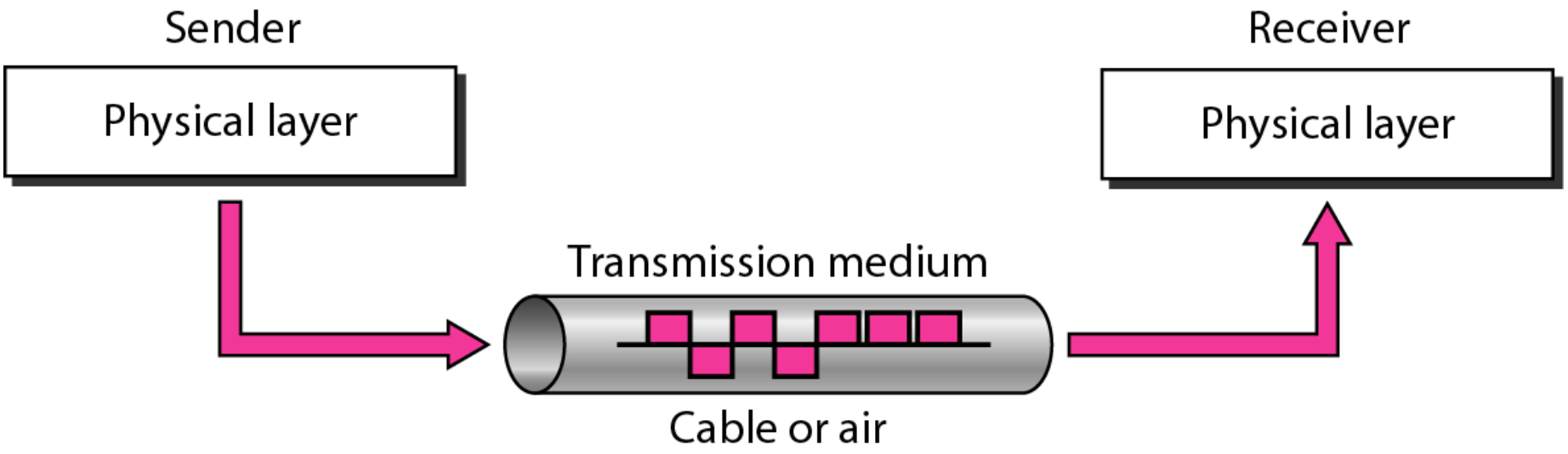
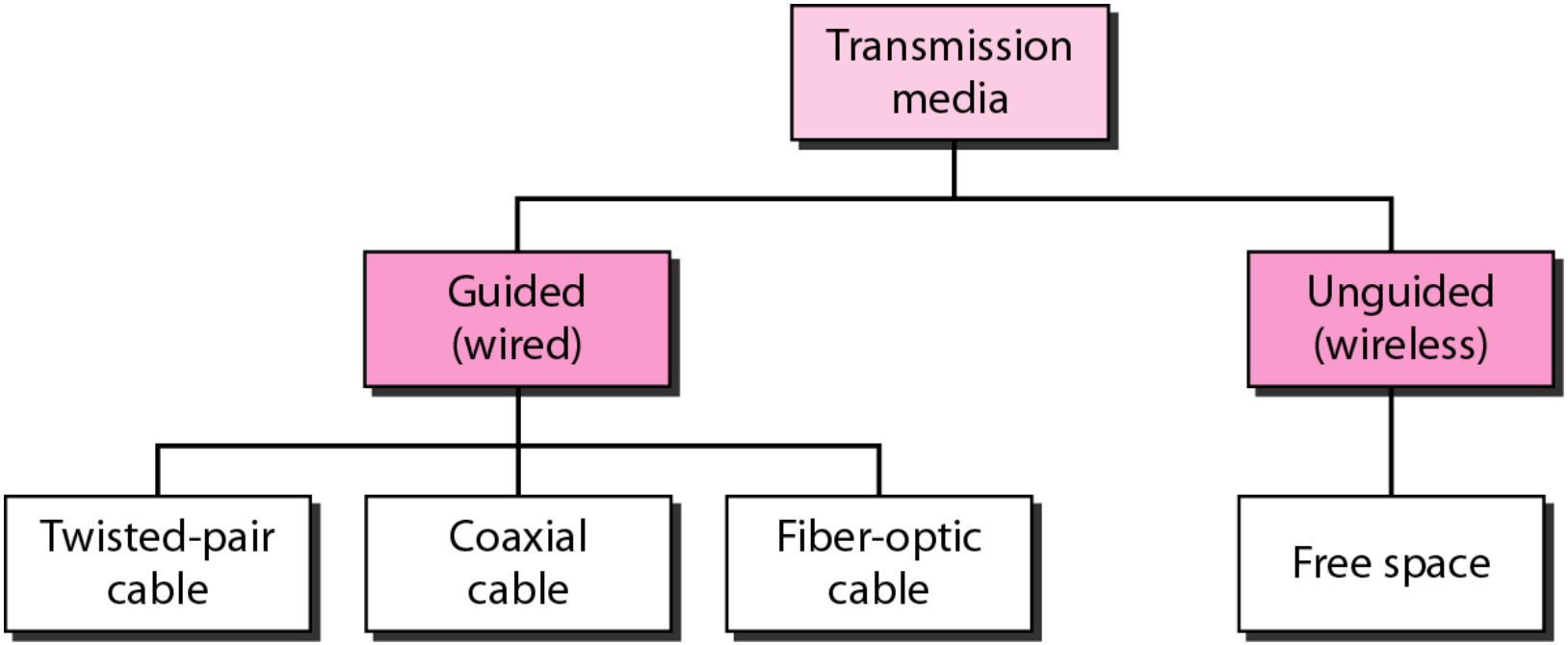
Meio de transmissão e a camada física



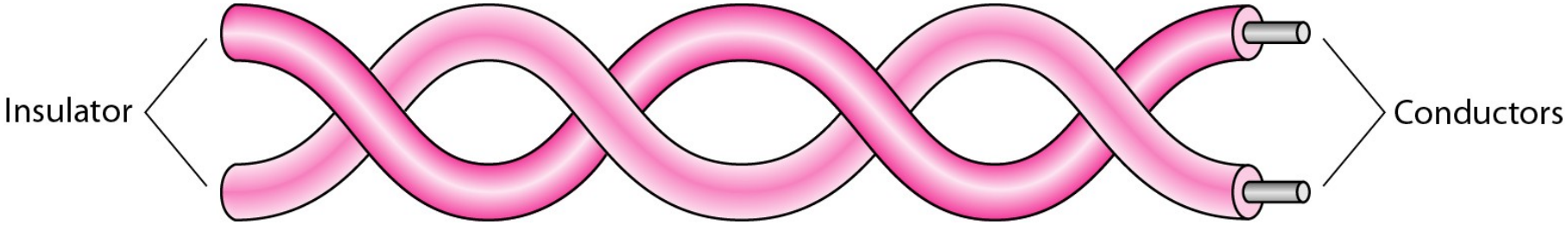
Classes de meios de transmissão



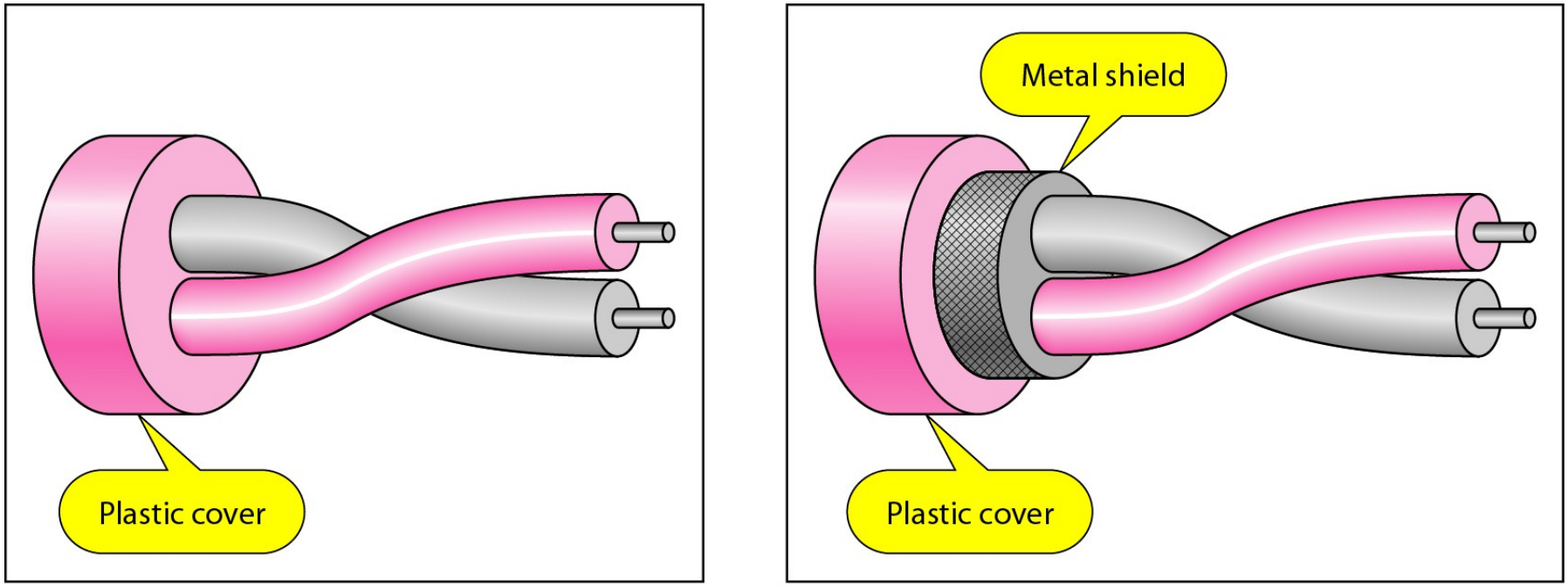
Meios de transmissão guiados

Entre os meios de transmissão guiados, que são aqueles que requerem um condutor físico para interligar um dispositivo a outro temos: cabo de par trançado, cabo coaxial e cabo de fibra.

Cabo de par trançado



Cabos UTP e STP



a. UTP

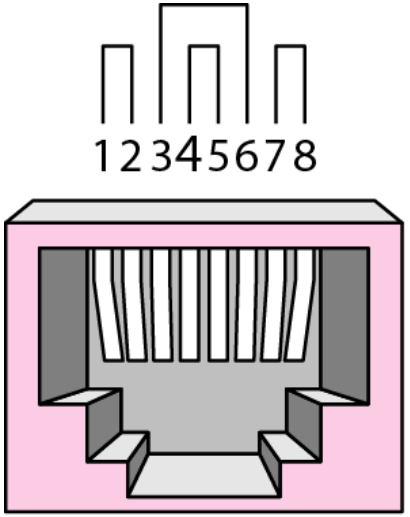
b. STP

UTP (cabo de par trançado não blindado)
STP (cabo de par trançado blindado)

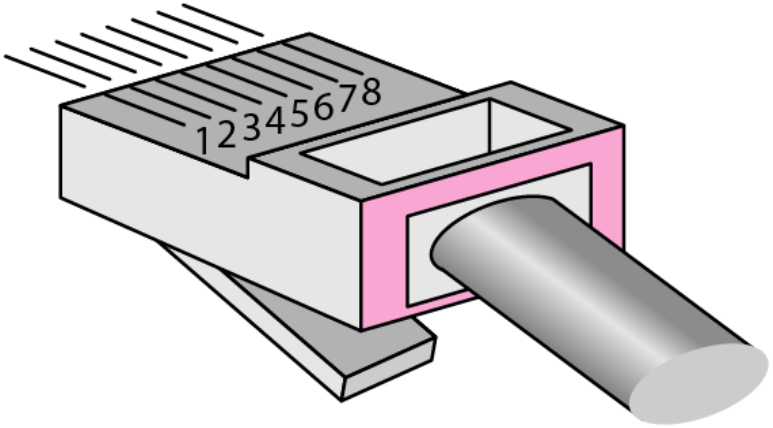
Categorias de cabos de par trançado

Category	*Specification*	*Data Rate (Mbps)*	*Use*
1	Unshielded twisted-pair used in telephone	< 0.1	Telephone
2	Unshielded twisted-pair originally used in T-lines	2	T-1 lines
3	Improved CAT 2 used in LANs	10	LANs
4	Improved CAT 3 used in Token Ring networks	20	LANs
5	Cable wire is normally 24 AWG with a jacket and outside sheath	100	LANs
5E	An extension to category 5 that includes extra features to minimize the crosstalk and electromagnetic interference	125	LANs
6	A new category with matched components coming from the same manufacturer. The cable must be tested at a 200-Mbps data rate.	200	LANs
7	Sometimes called SSTP (shielded screen twisted-pair). Each pair is individually wrapped in a helical metallic foil followed by a metallic foil shield in addition to the outside sheath. The shield decreases the effect of crosstalk and increases the data rate.	600	LANs

Conectores UTP



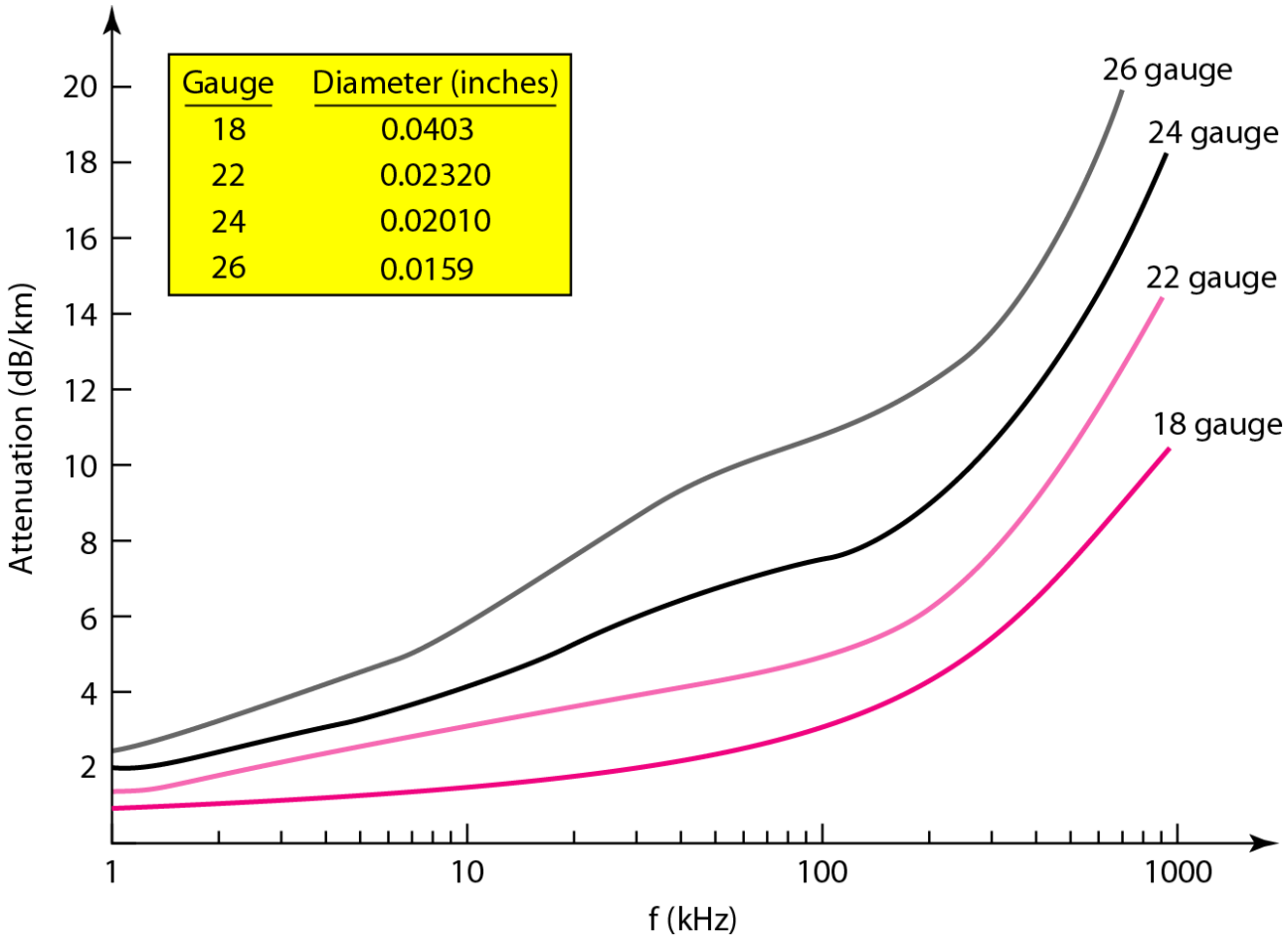
RJ-45 Female



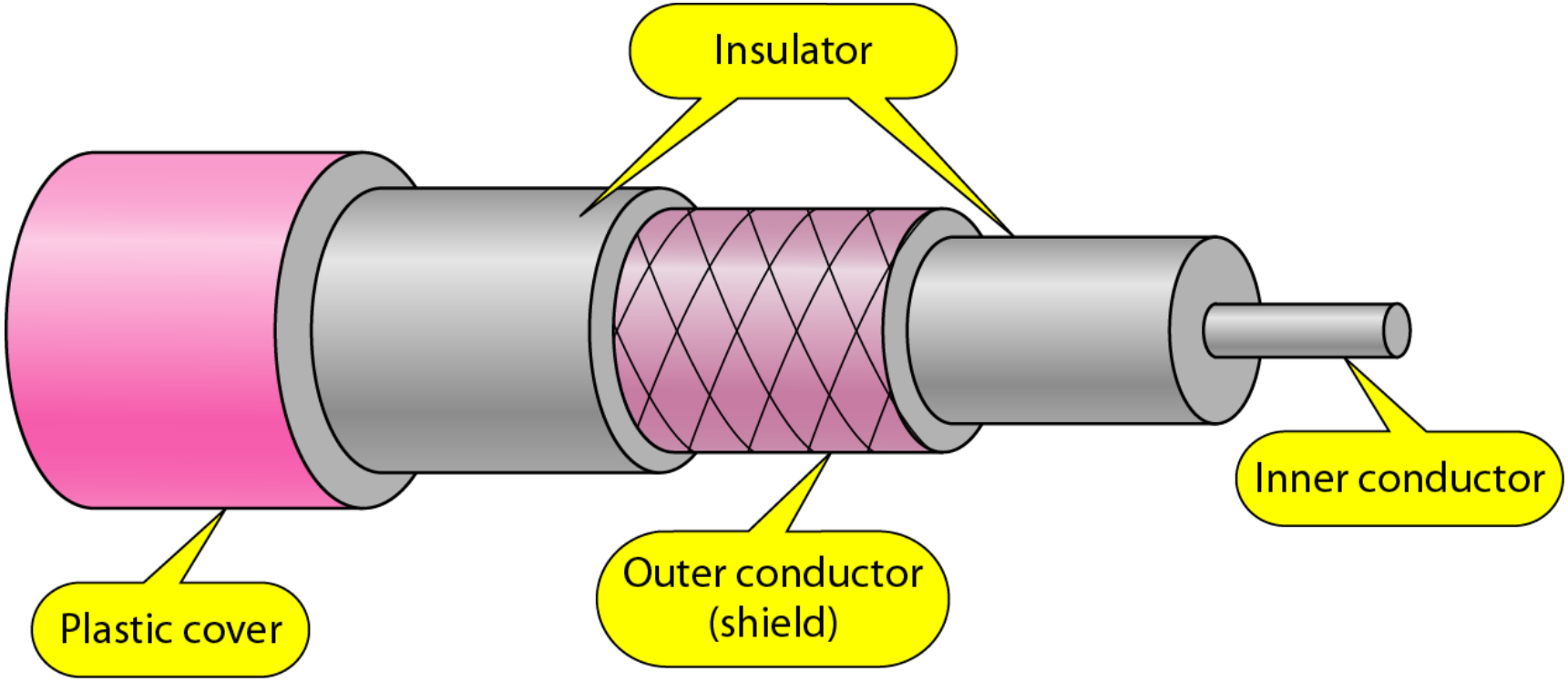
RJ-45 Male

RJ-45 é um conector chavetado, só pode ser inserido de uma única forma.

Desempenho UTP (Atenuação X Frequência)



Cabo Coaxial

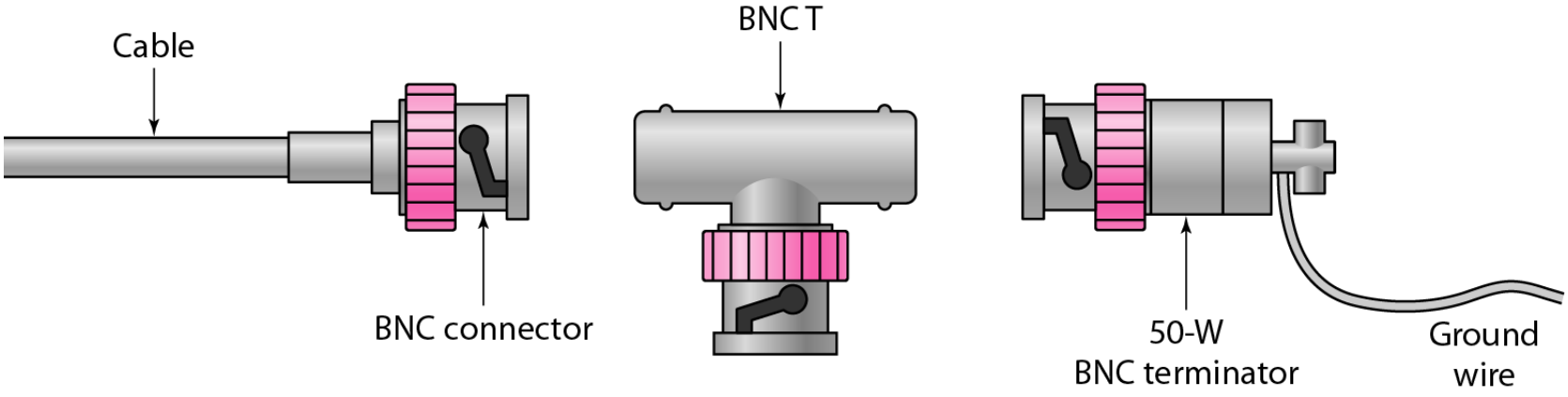


Categorias de cabos coaxiais

Category	*Impedance*	*Use*
RG-59	75 Ω	Cable TV
RG-58	50 Ω	Thin Ethernet
RG-11	50 Ω	Thick Ethernet

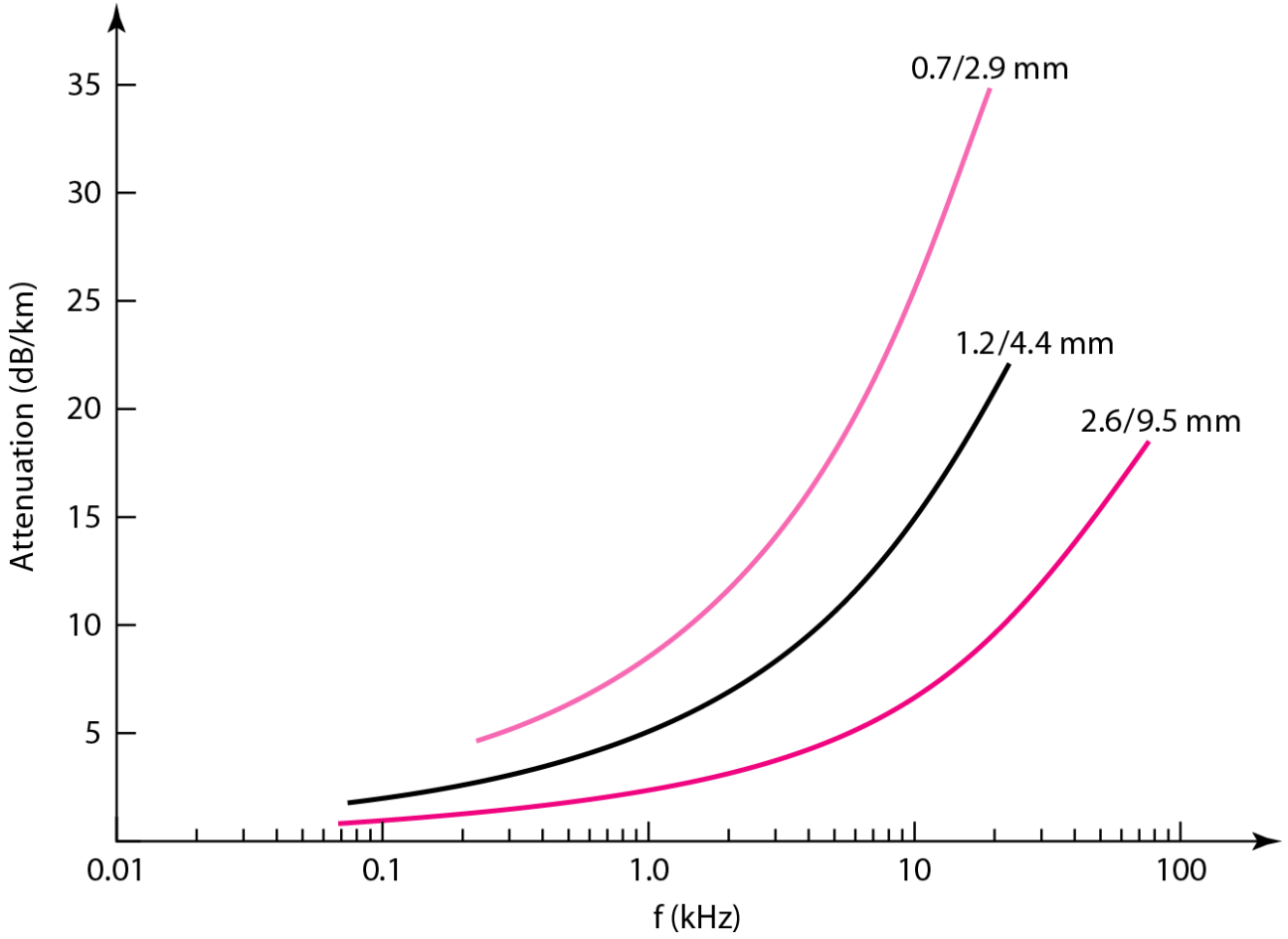
Índices RG (radio government) representa um conjunto de especificações físicas, incluindo a bitola do fio condutor interno, a espessura e o tipo do isolante interno, a construção da blindagem e o tamanho e tipo do revestimento externo.

Conectores BNC



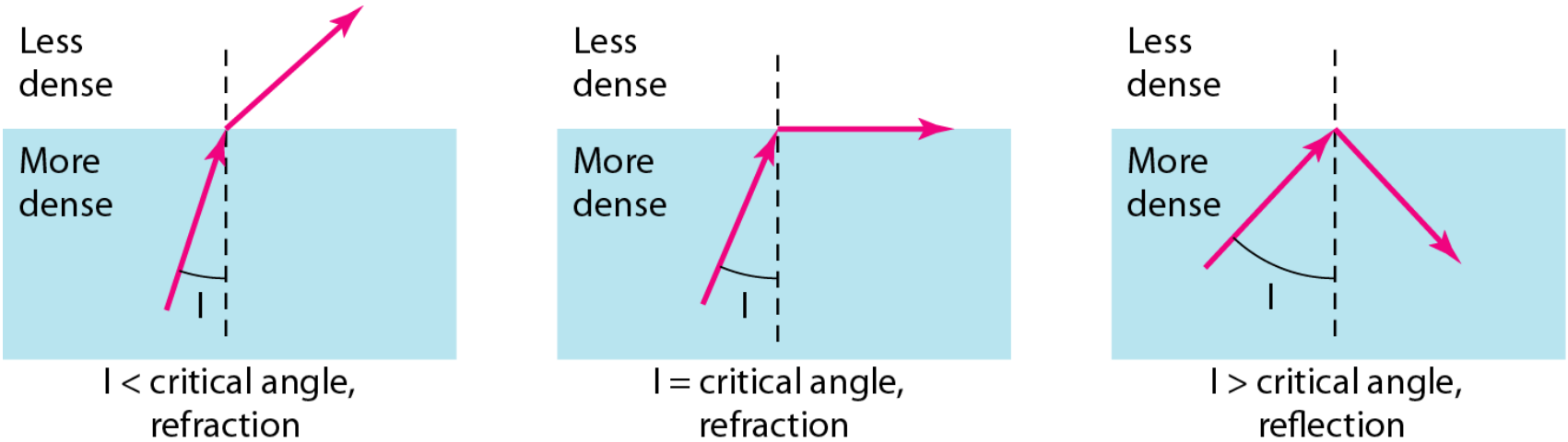
Conectores de cabos coaxiais: o tipo mais comum é o BNC (Bayone-Neil-Concelman)

Desempenho de cabos coaxiais



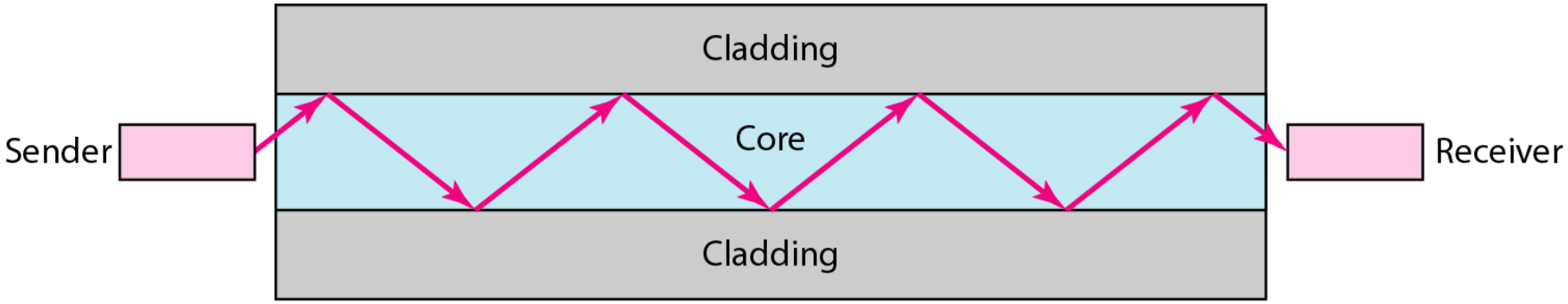
A atenuação é maior em coaxial do que em par trançado

Desvio da luz

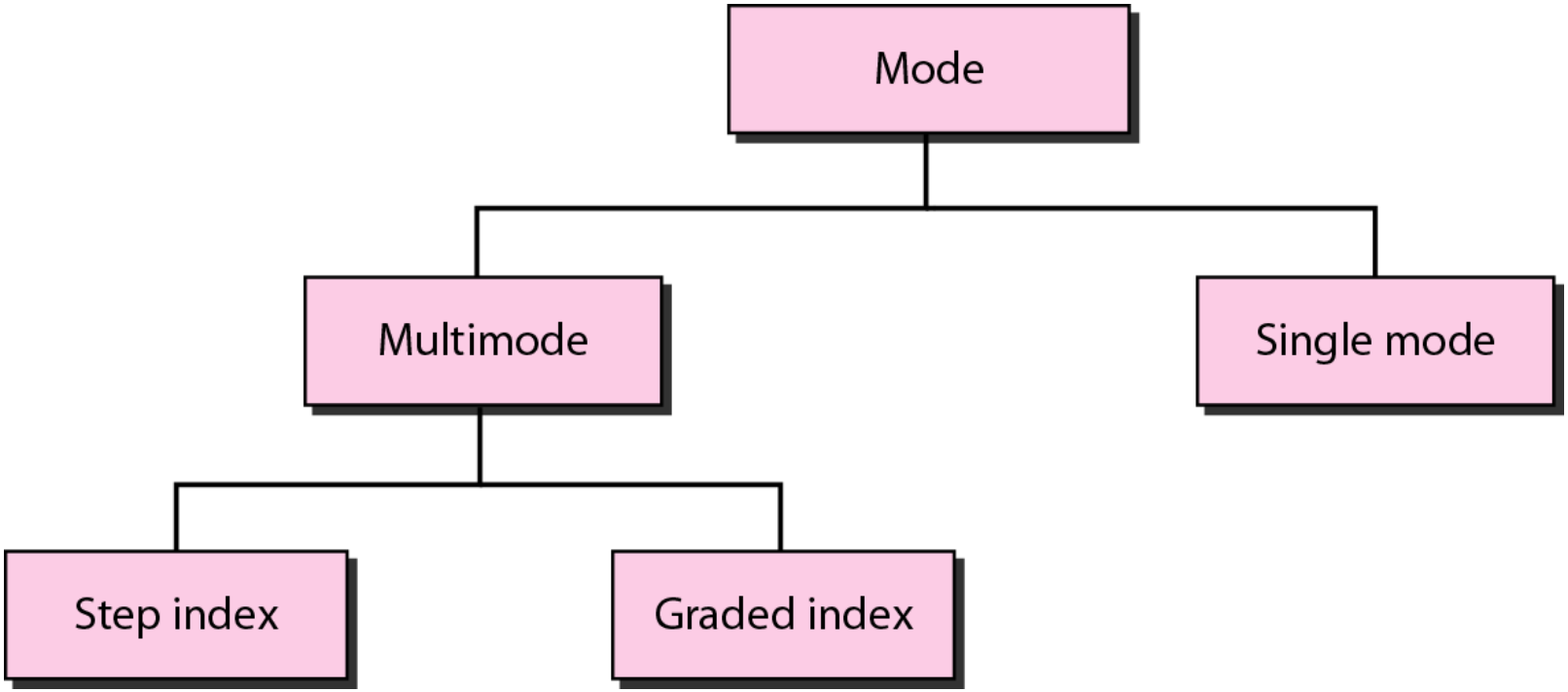


As fibras óticas usam reflexão para guiar a luz por um canal. Um núcleo é revestido por uma casca menos densa. A luz desloca-se no núcleo pela reflexão na casca.

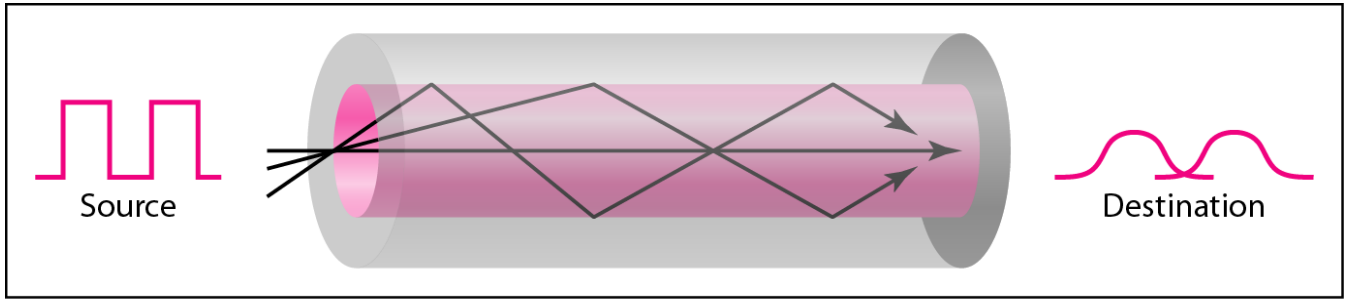
Fiba ótica



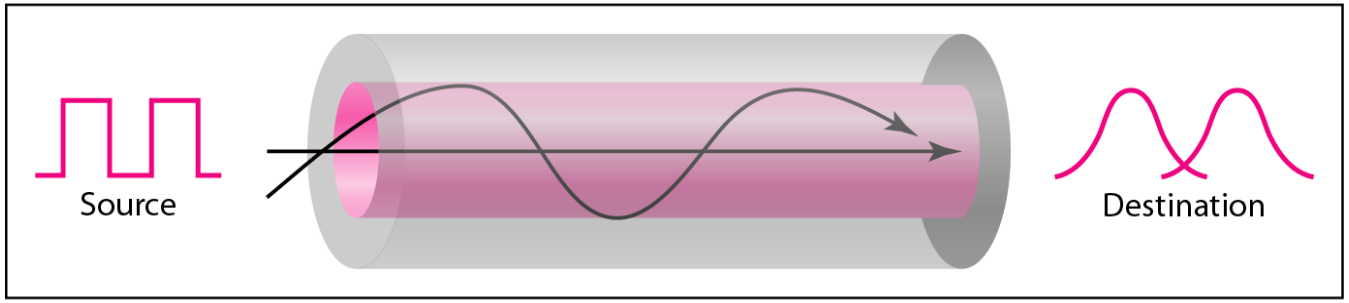
Modos de propagação



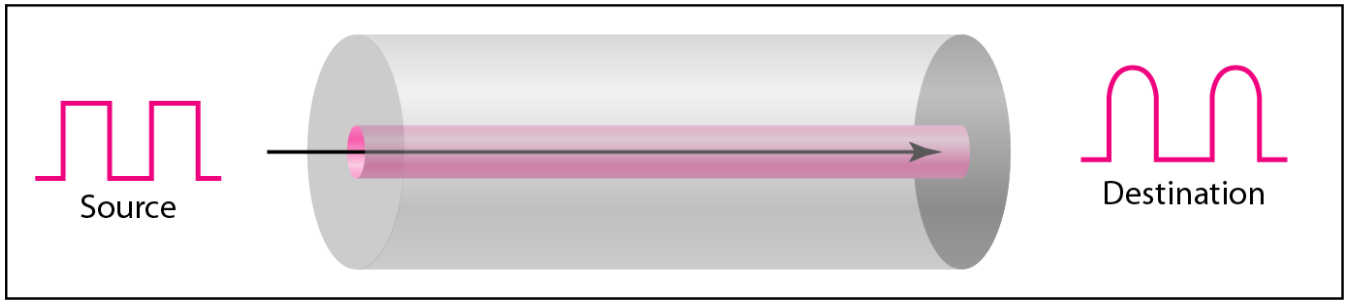
Modos



a. Multimode, step index



b. Multimode, graded index

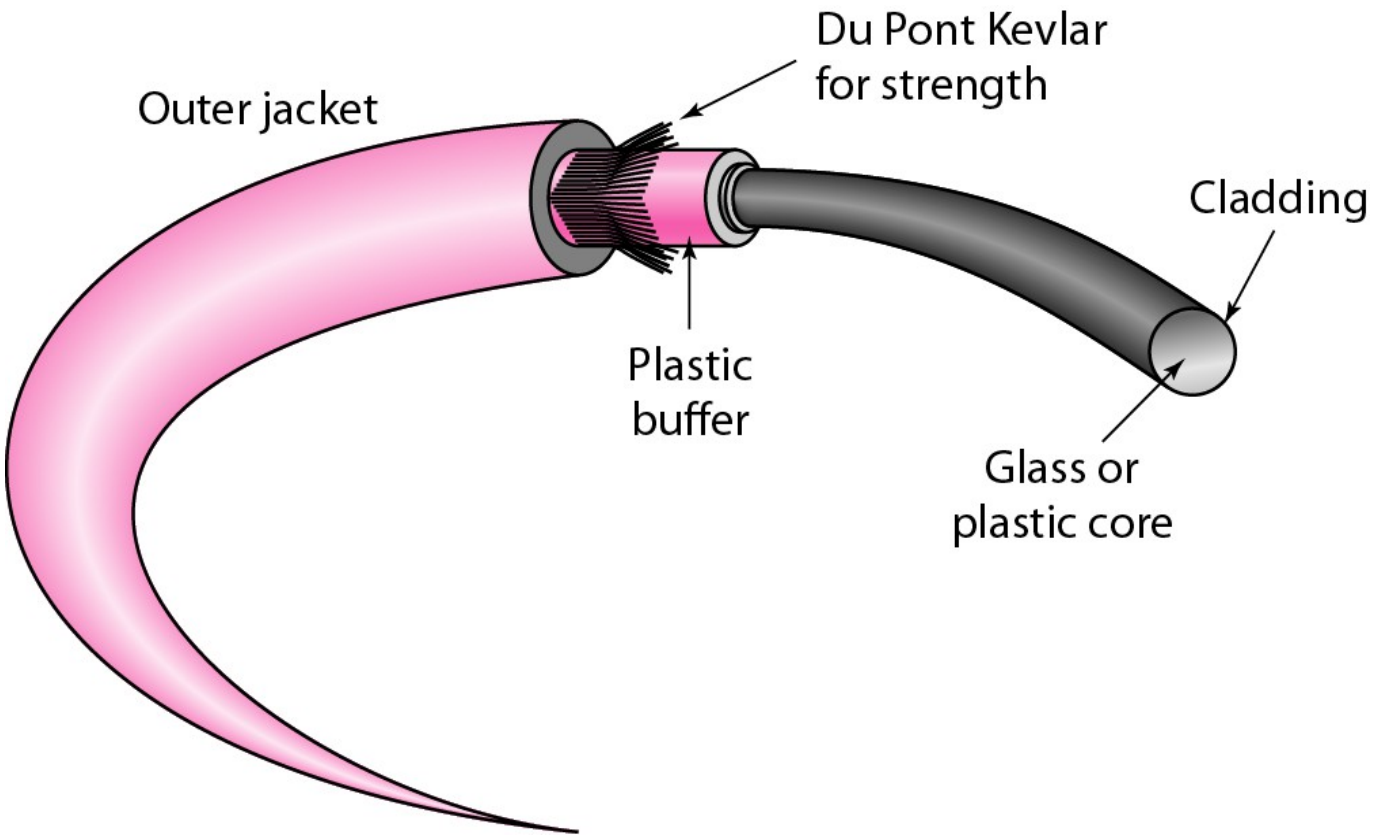


c. Single mode

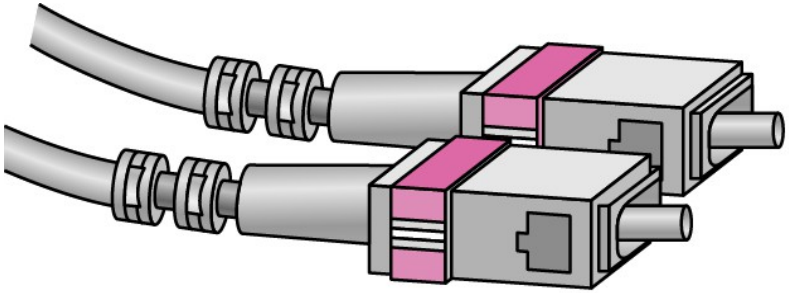
Tipos de fibra

Type	*Core (μm)*	*Cladding (μm)*	*Mode*
50/125	50.0	125	Multimode, graded index
62.5/125	62.5	125	Multimode, graded index
100/125	100.0	125	Multimode, graded index
7/125	7.0	125	Single mode

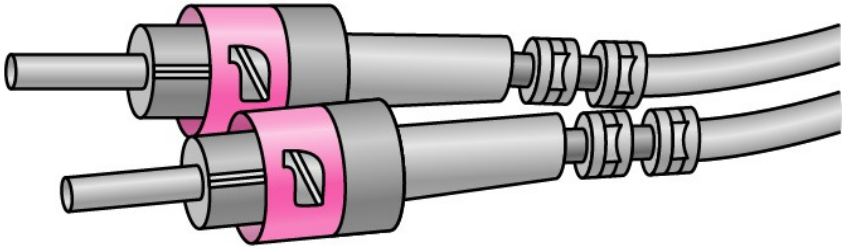
Construção da fibra



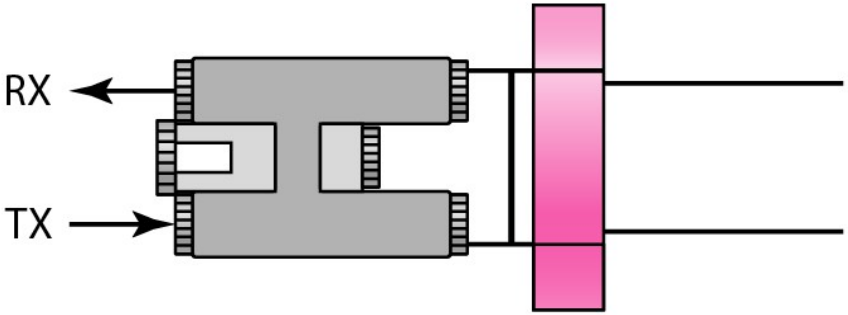
Conectores de fibra ótica



SC connector

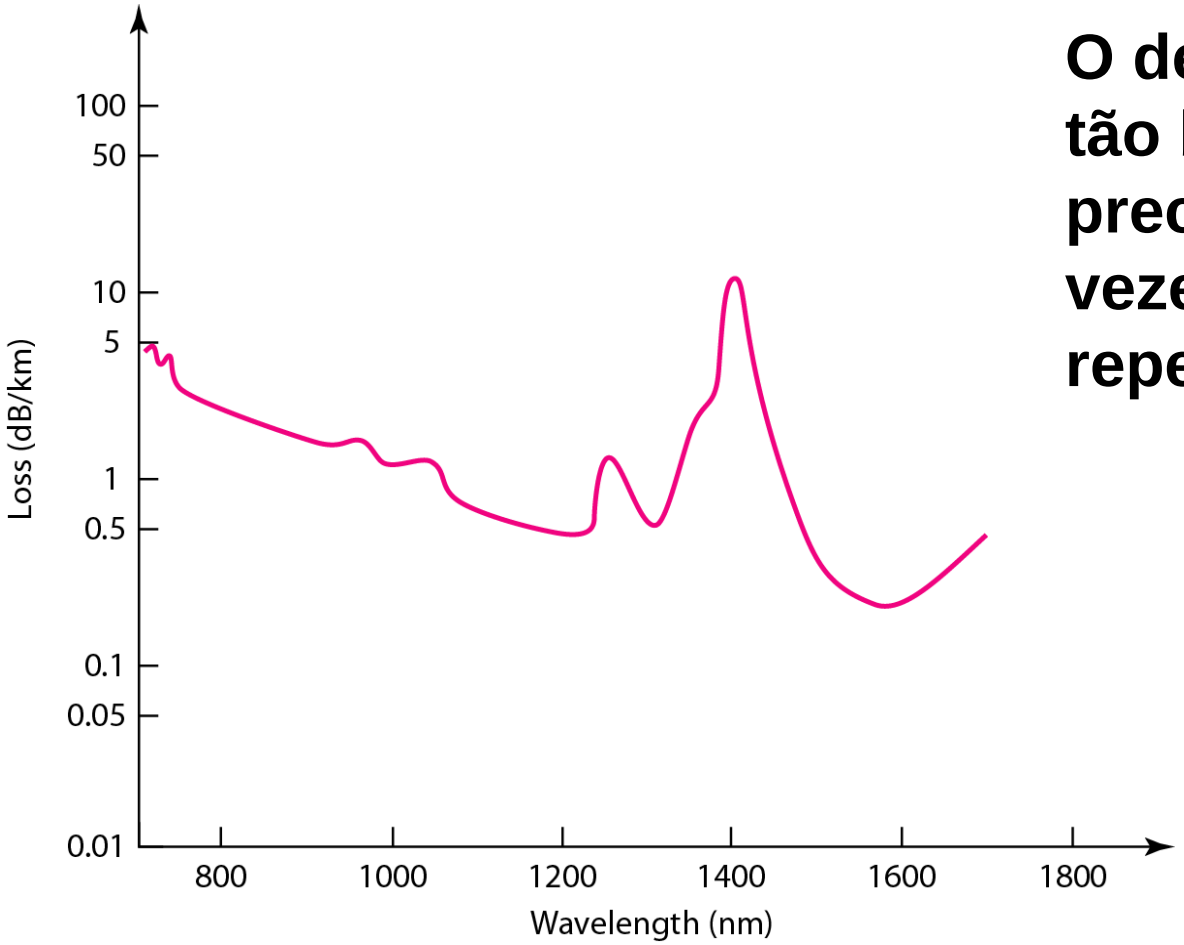


ST connector



MT-RJ connector

Desempenho de fibras óticas

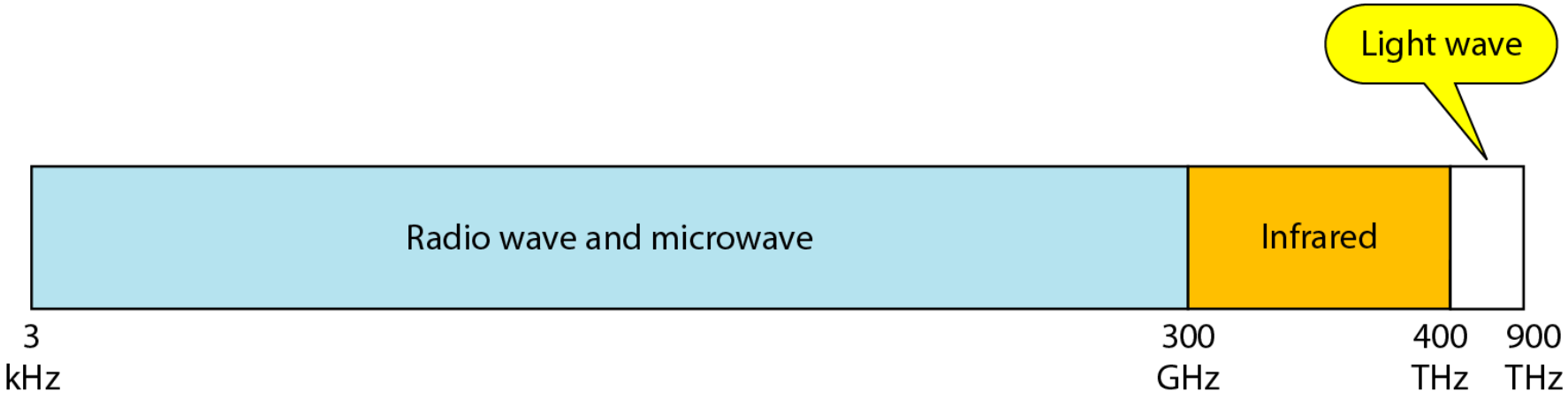


O desempenho é tão bom que precisa de dez vezes menos repetidores.

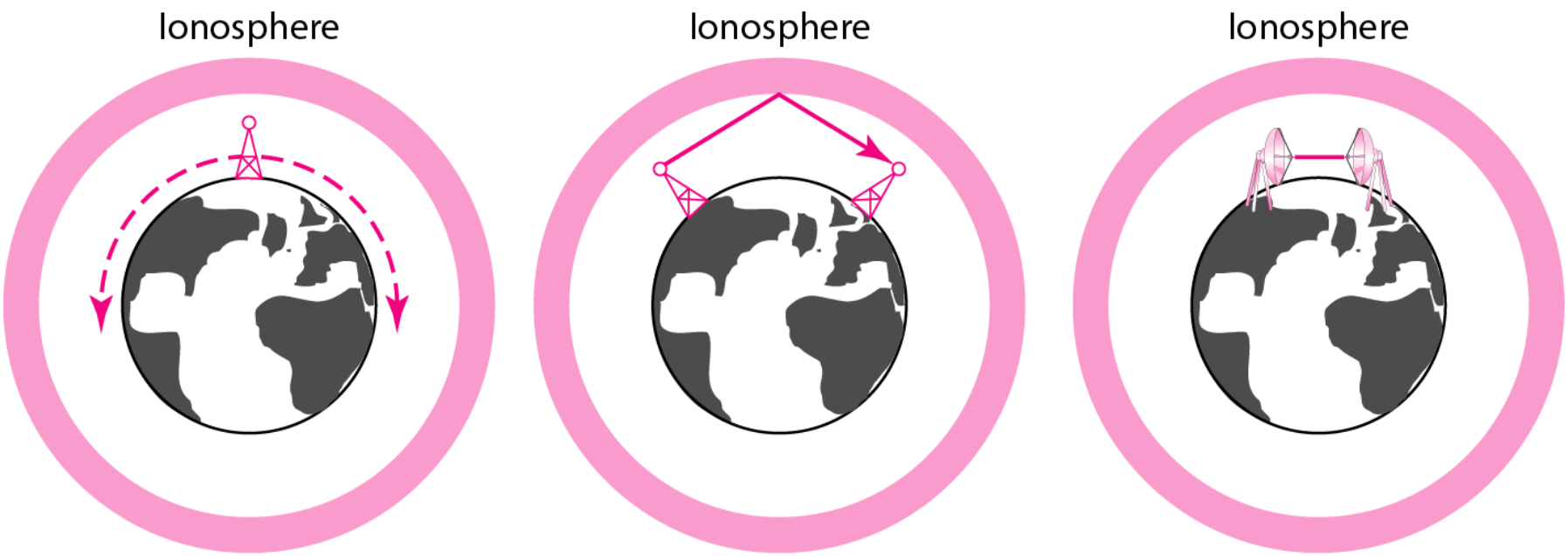
Meios de transmissão não guiados

Os meios de transmissão não guiados transportam ondas eletromagnéticas sem o uso de um condutor físico. Esse tipo de comunicação é, muitas vezes, conhecido como comunicação sem fio.

Espectro eletromagnético para a comunicação sem fio



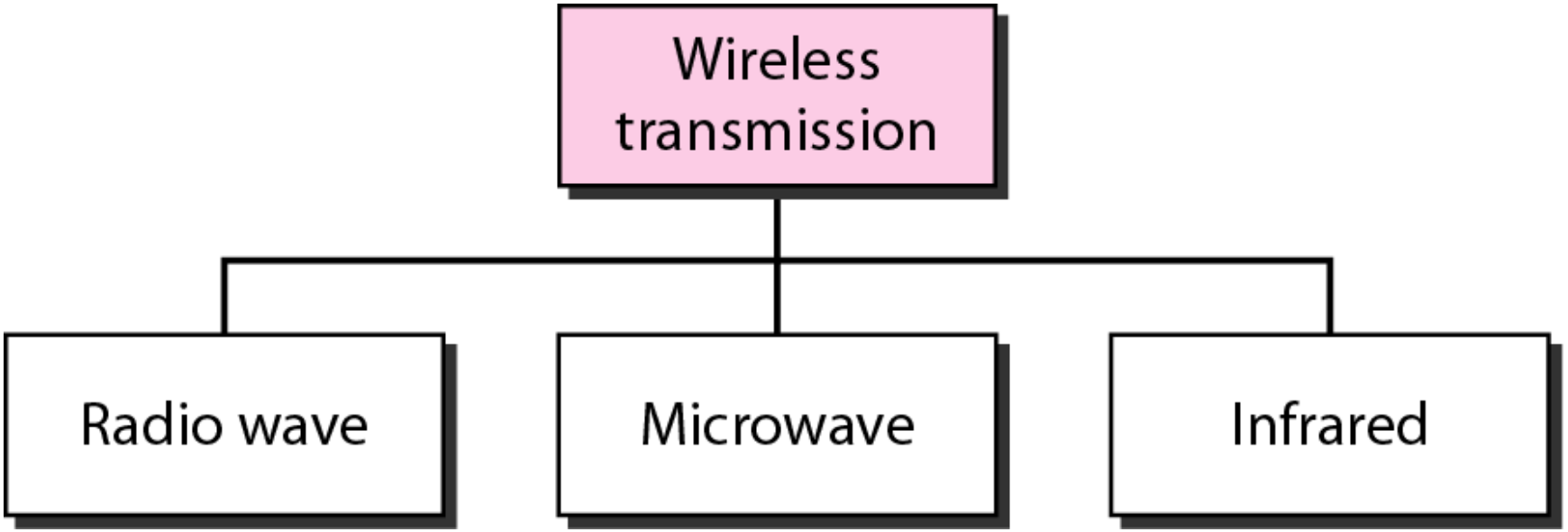
Métodos de propagação



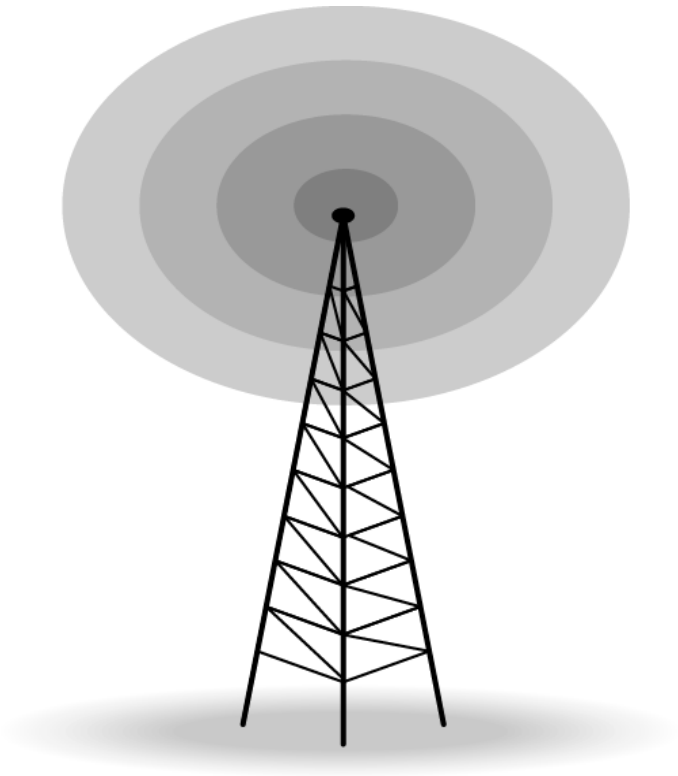
Bandas

Band	*Range*	*Propagation*	*Application*
VLF (very low frequency)	3–30 kHz	Ground	Long-range radio navigation
LF (low frequency)	30–300 kHz	Ground	Radio beacons and navigational locators
MF (middle frequency)	300 kHz–3 MHz	Sky	AM radio
HF (high frequency)	3–30 MHz	Sky	Citizens band (CB), ship/aircraft communication
VHF (very high frequency)	30–300 MHz	Sky and line-of-sight	VHF TV, FM radio
UHF (ultrahigh frequency)	300 MHz–3 GHz	Line-of-sight	UHF TV, cellular phones, paging, satellite
SHF (superhigh frequency)	3–30 GHz	Line-of-sight	Satellite communication
EHF (extremely high frequency)	30–300 GHz	Line-of-sight	Radar, satellite

Ondas para transmissão sem fio

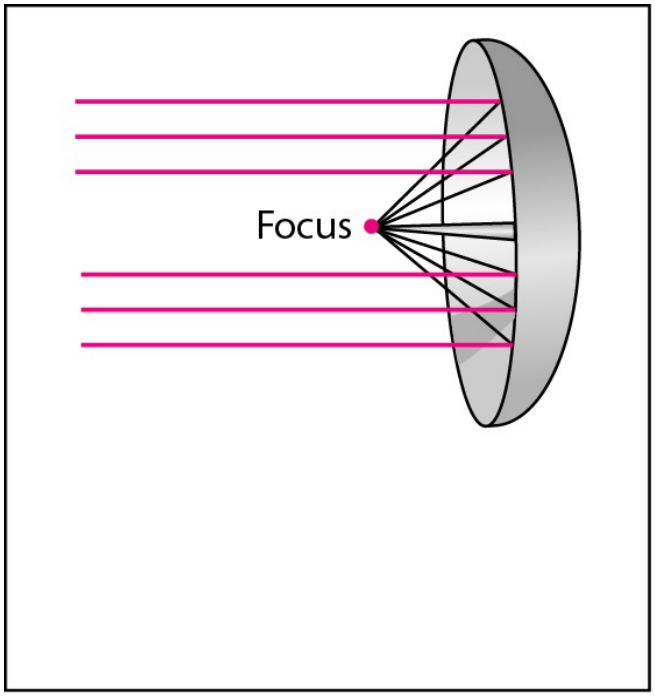


Antena omnidirecional

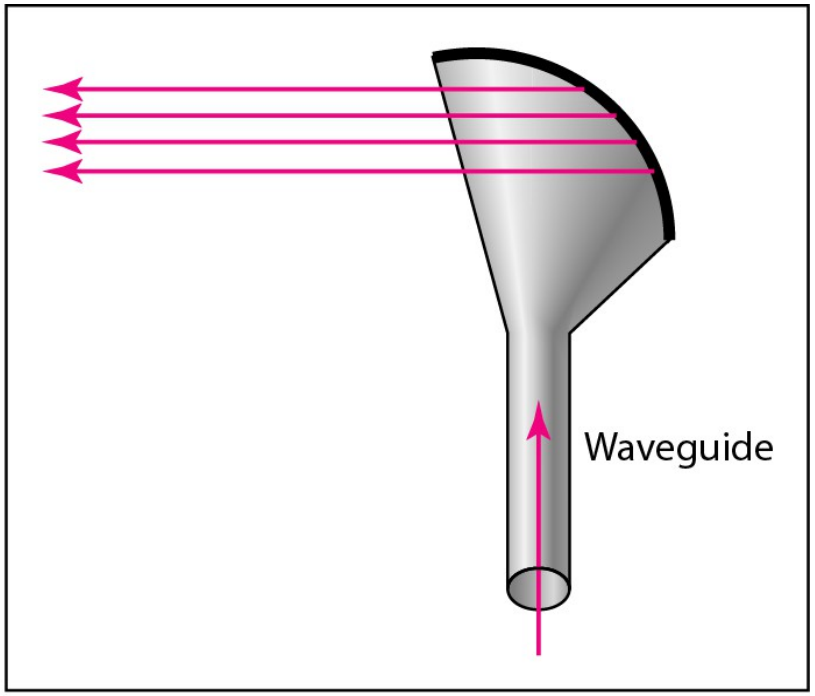


As ondas de rádio são usadas para comunicação em broadcast, como rádio, televisão e sistemas de pager.

Antenas unidirecionais



a. Dish antenna



b. Horn antenna

Nota

Micro ondas são usadas para comunicação unicast, como telefonia celular, redes via satélite e LANs sem fio.

Nota

Sinais infravermelhos podem ser usados para comunicação em curta distância em uma área fechada usando propagação em linha de visada.

Referências

Imagens e textos retirados de:

FOROUZAN, Behrouz A. - **Comunicação de Dados e Redes de Computadores**, 4a ed. - Editora Bookman, 2008.