

Contribuição ao projeto de redes de comunicação de voz e dados utilizando as tecnologias Ethernet e Frame Relay

Universidade de Brasília
Faculdade de Tecnologia
Departamento de Engenharia Elétrica



Defesa de Dissertação de Mestrado

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Divisão do Trabalho



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Cap 4	Redes de longa distância
Cap 5	Padrões de conexão física
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Cap 7	Topologias de redes locais

Divisão do Trabalho

Cap 8

Interconexão de redes locais

Cap 9

Integração de tráfego

Cap 10

Projeto da rede corporativa

Cap 11

Projeto da rede local

Cap 12

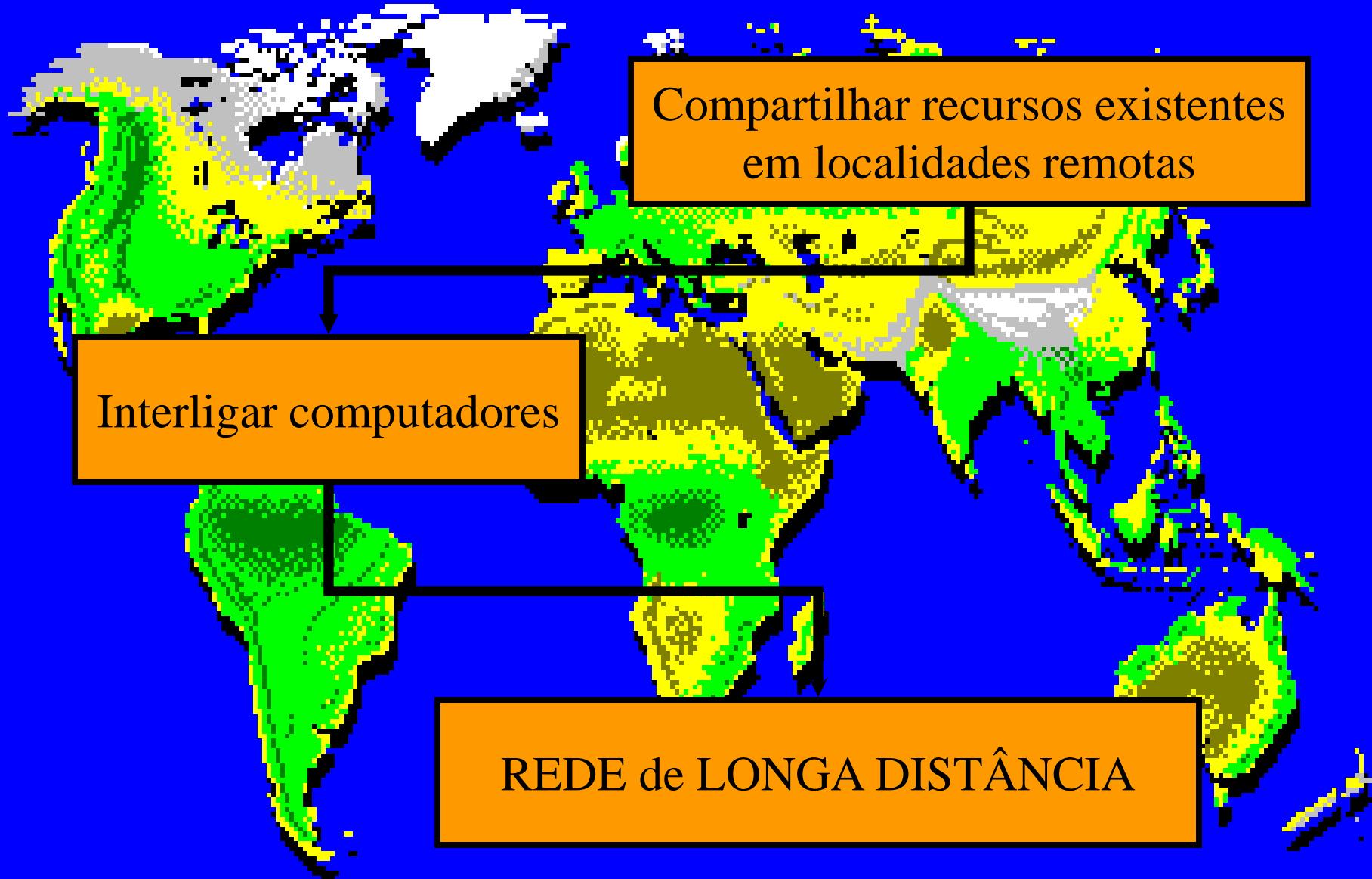
Conclusões



Compartilhar recursos existentes
no mesmo prédio

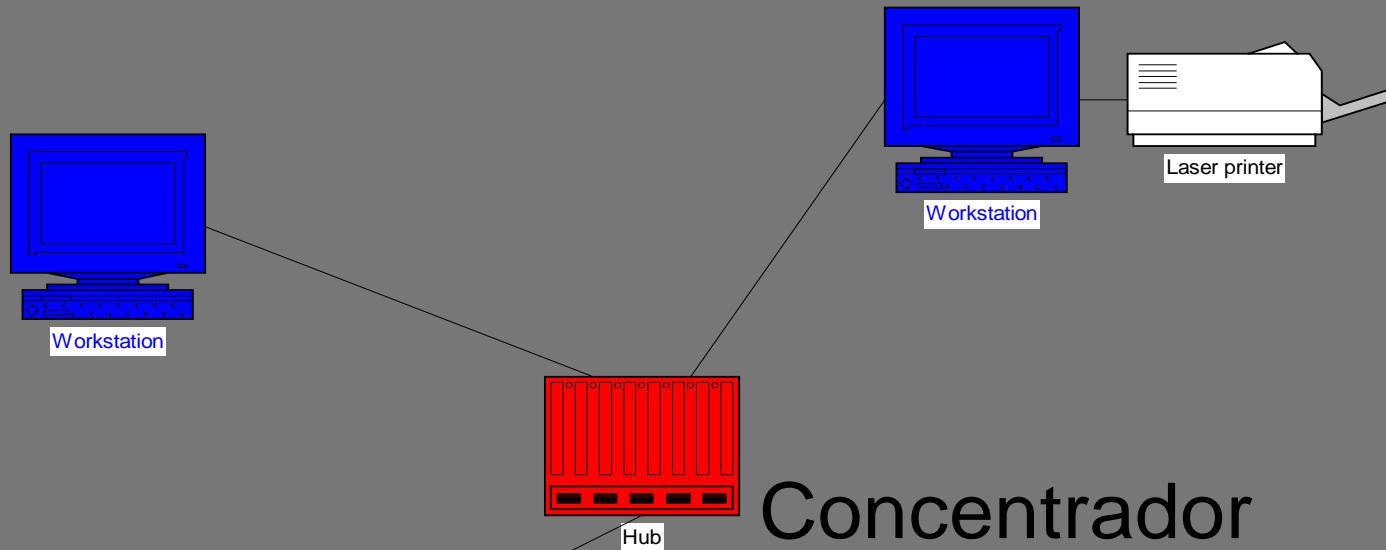
Interligar computadores

REDE LOCAL

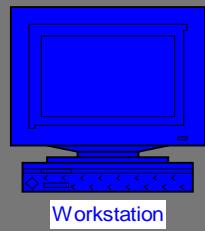


Elementos

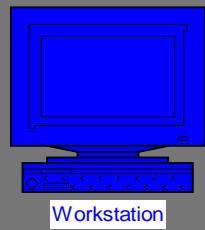
- 
- Meio de comunicação (Transmissão)
 - Equipamento de acesso
 - Equipamento de comutação



Concentrador

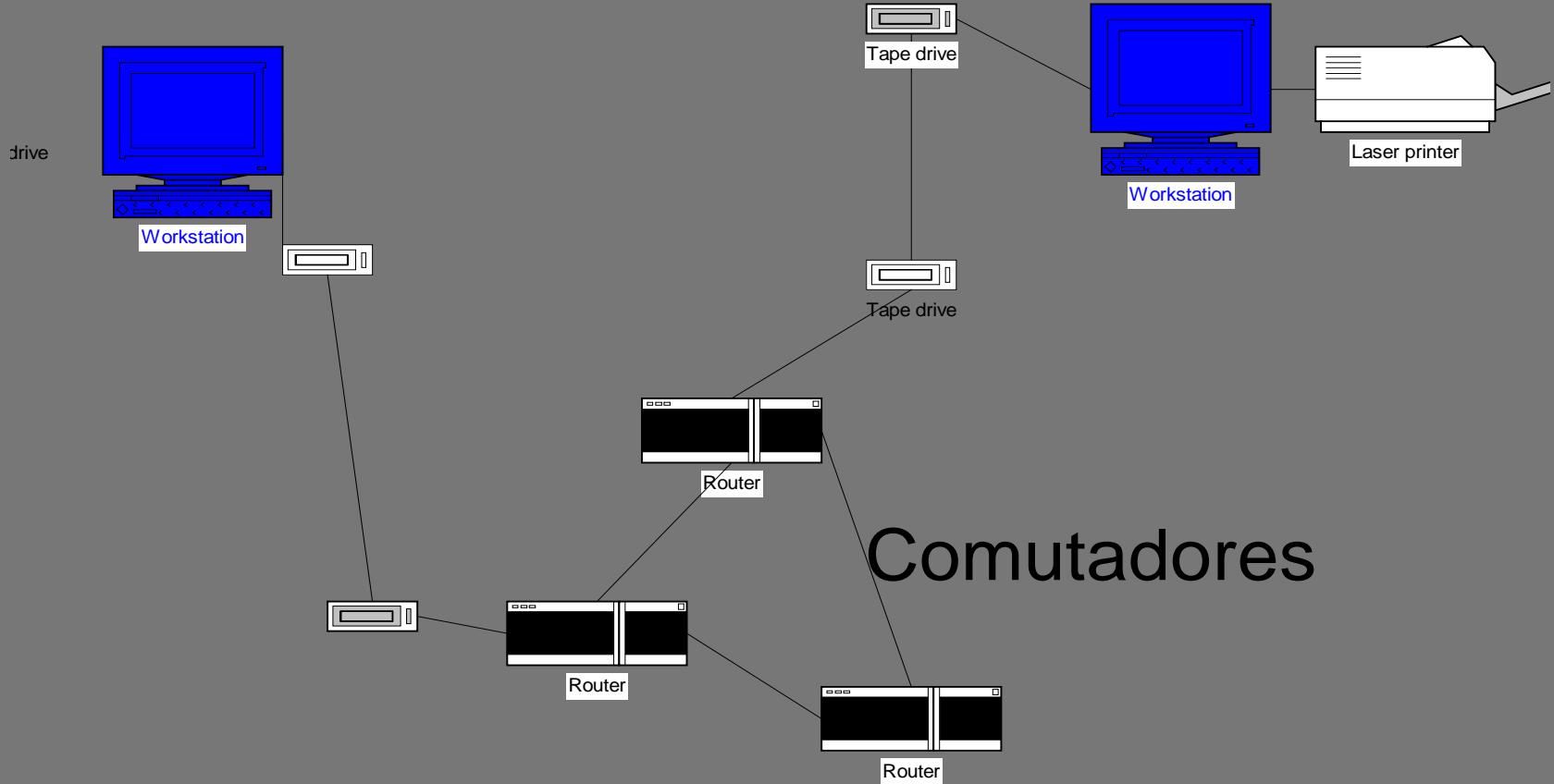


Workstation



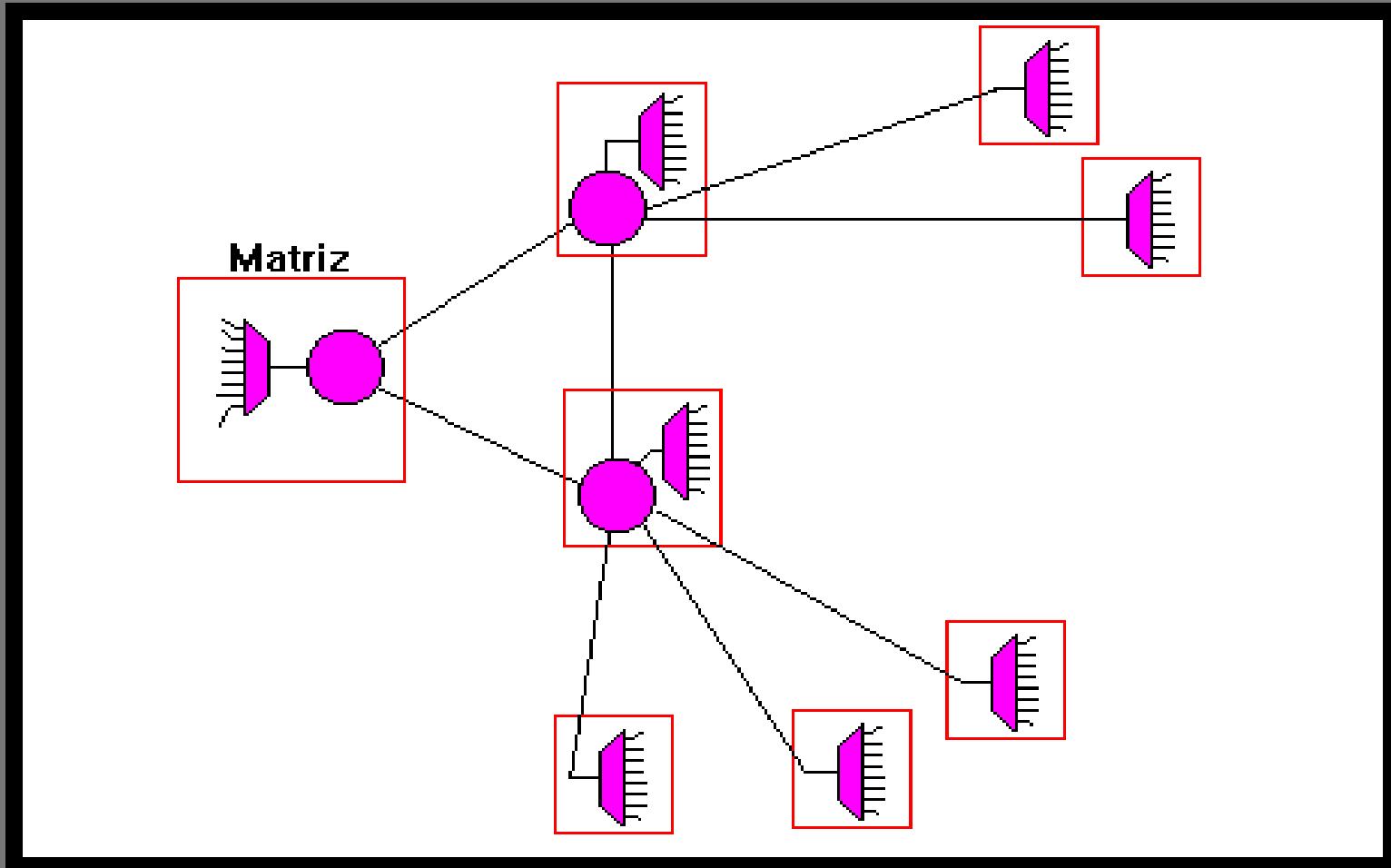
Workstation

Rede Local



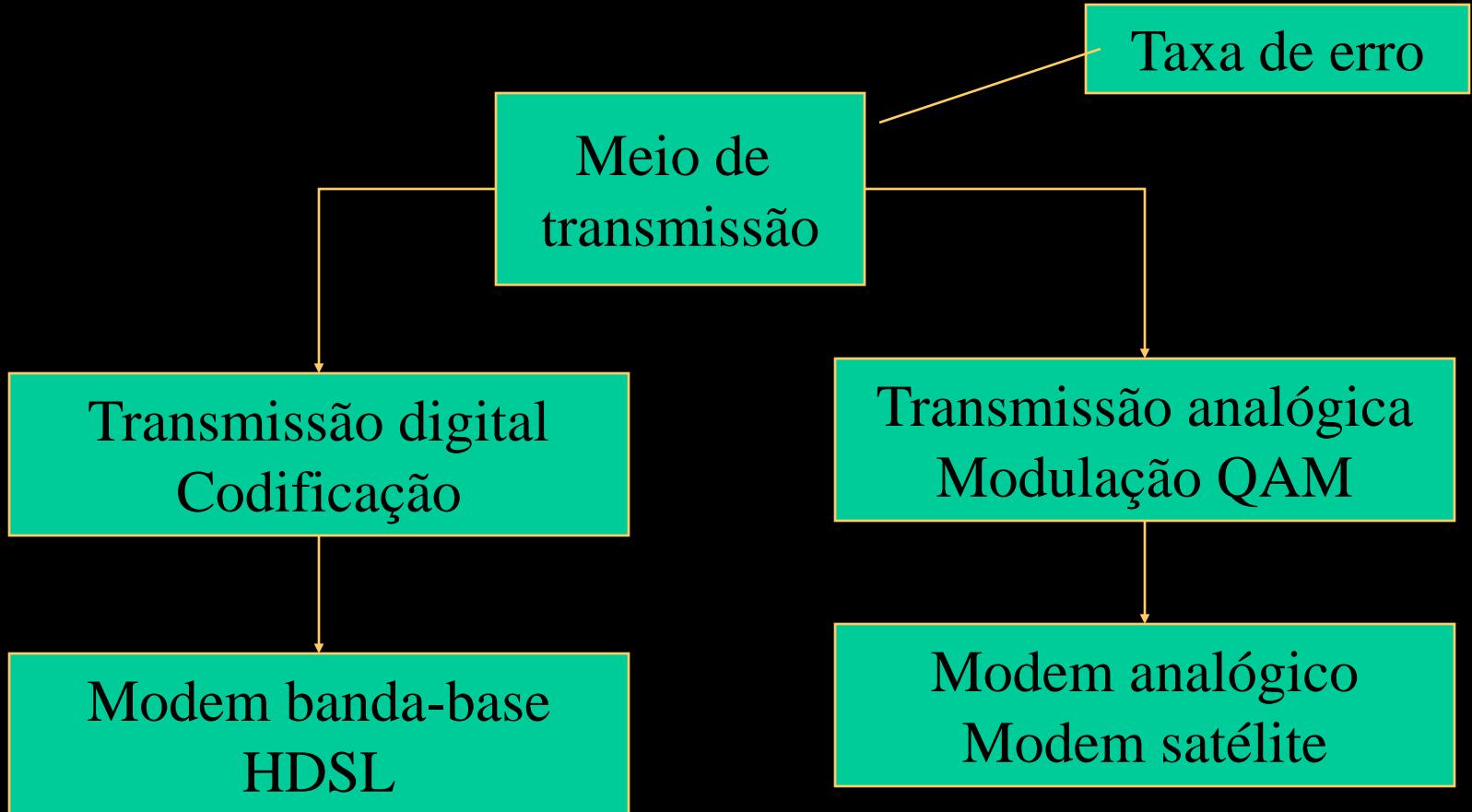
Comutadores

Rede de longa distância

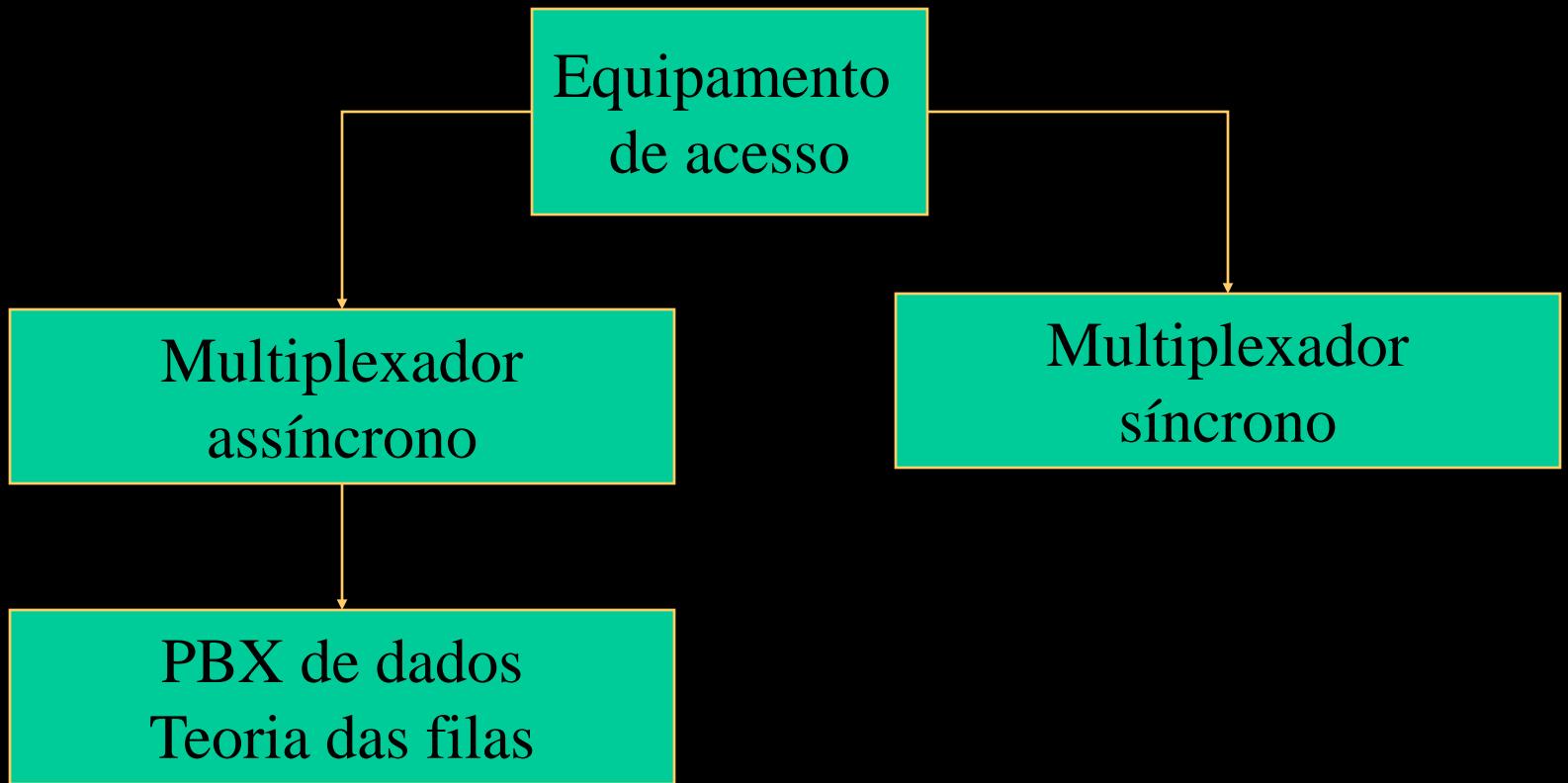


Rede de longa distância

Capítulo 2



Capítulo 2



A evolução do Modem

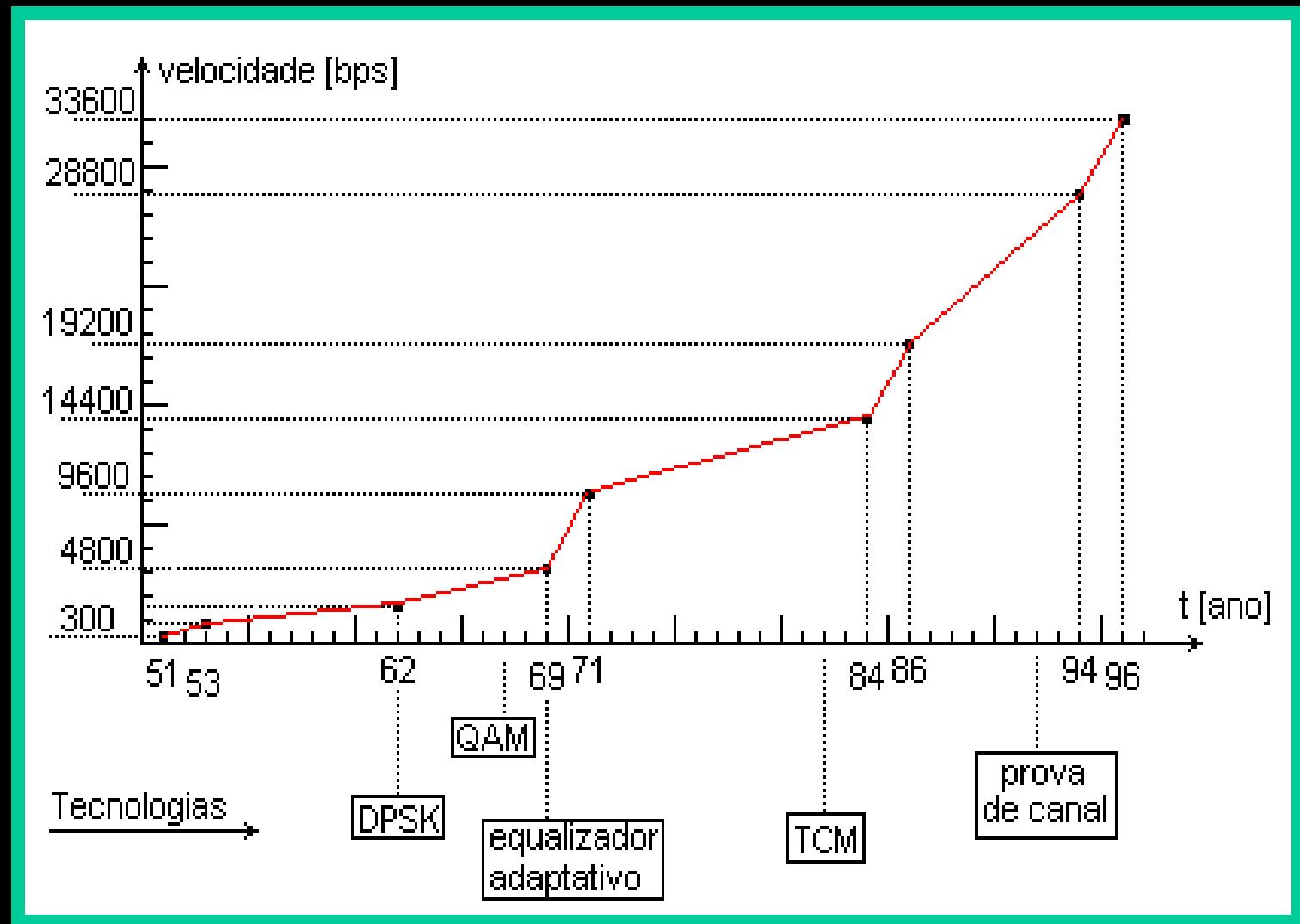
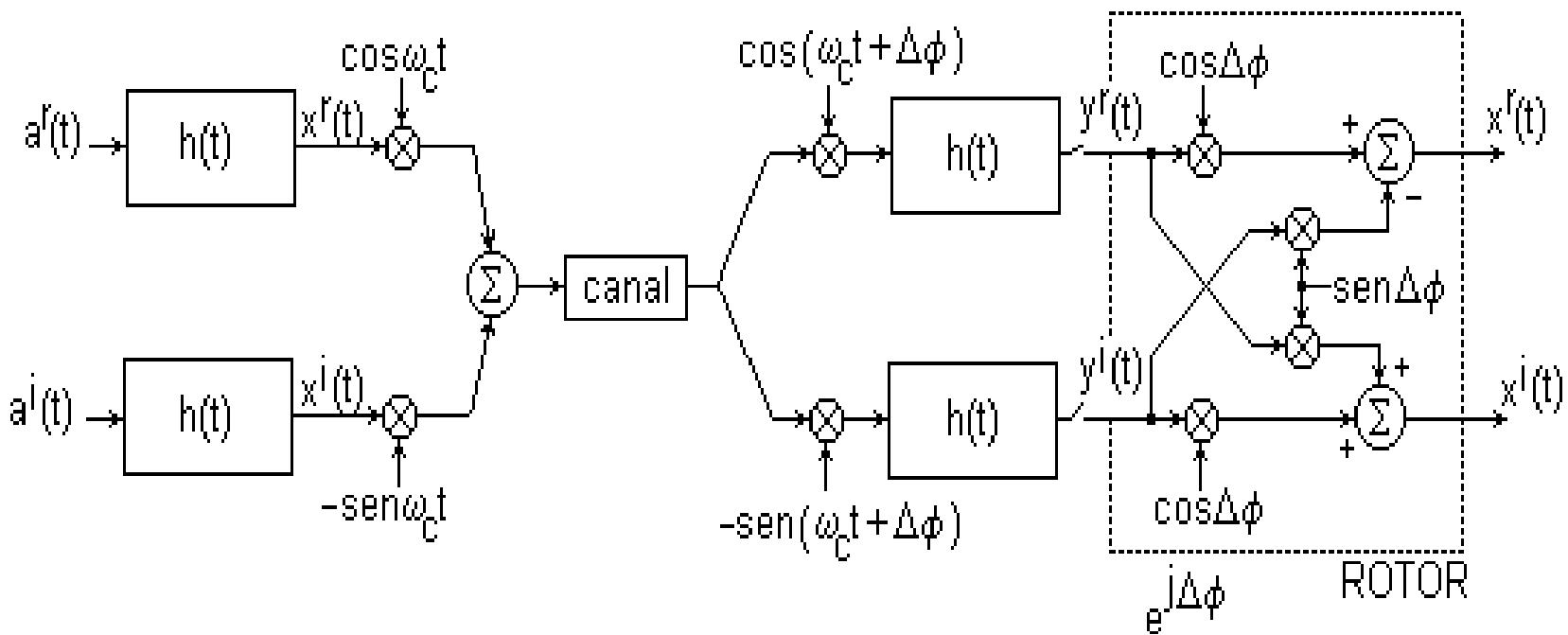
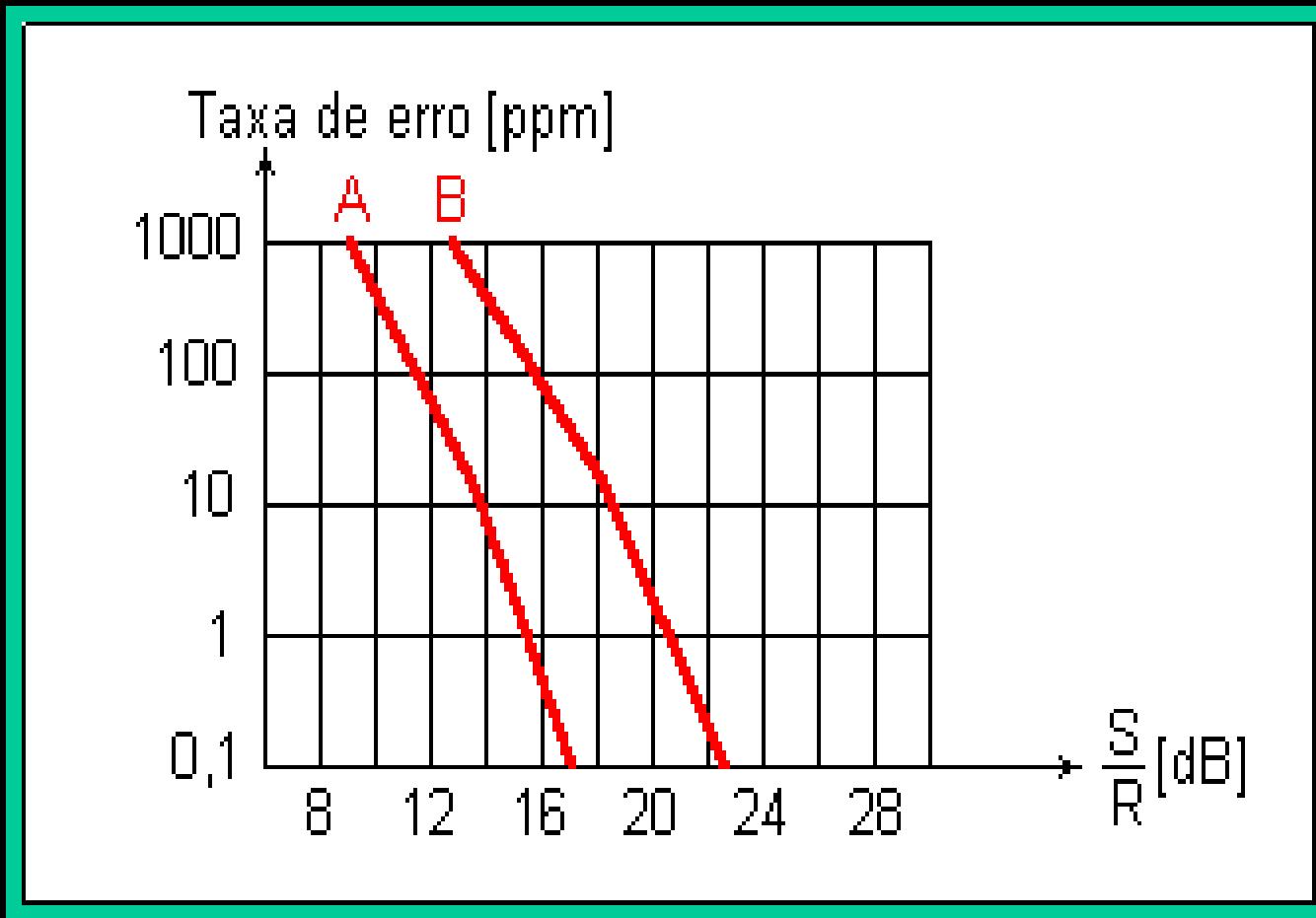


Diagrama do modem QAM

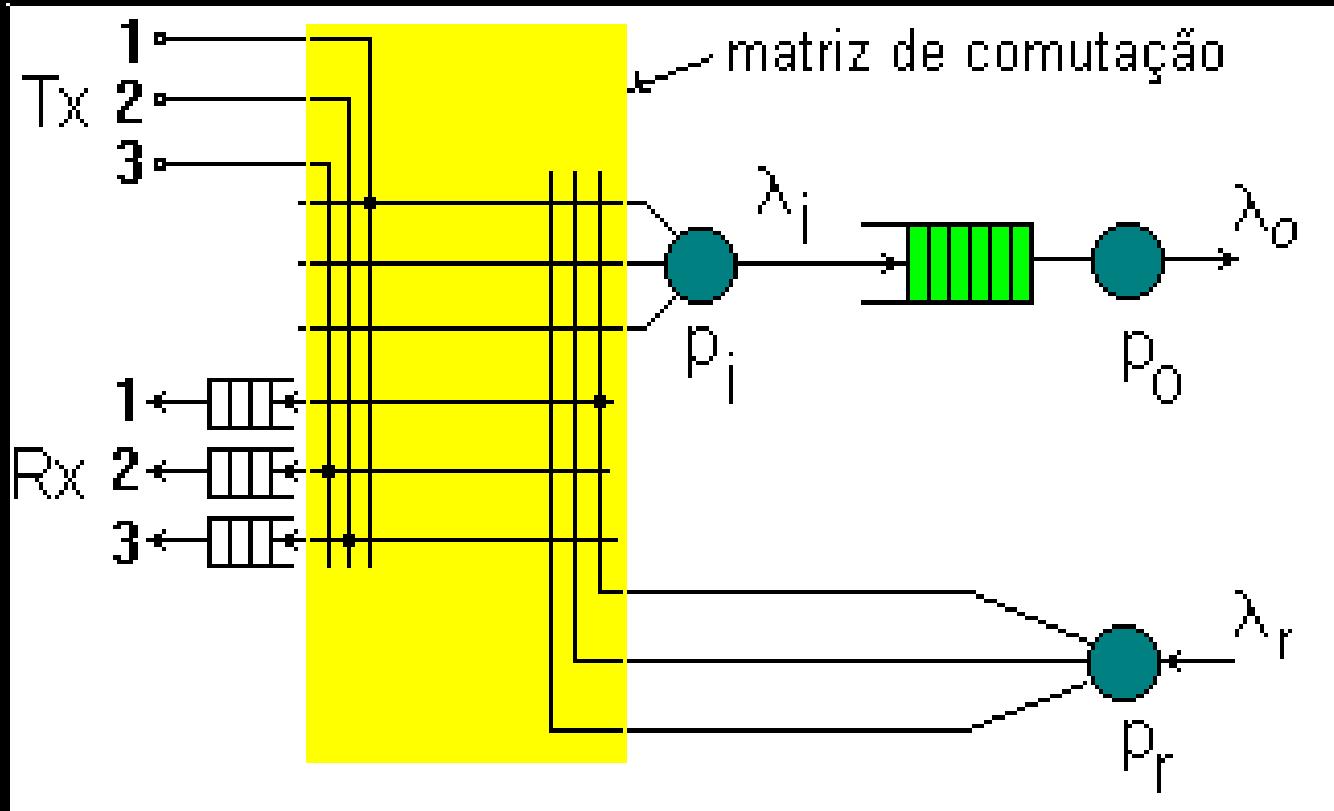


$$S(t) = a^r(t) \cdot \cos(\omega_c t) - a^i \cdot \sin(\omega_c t)$$

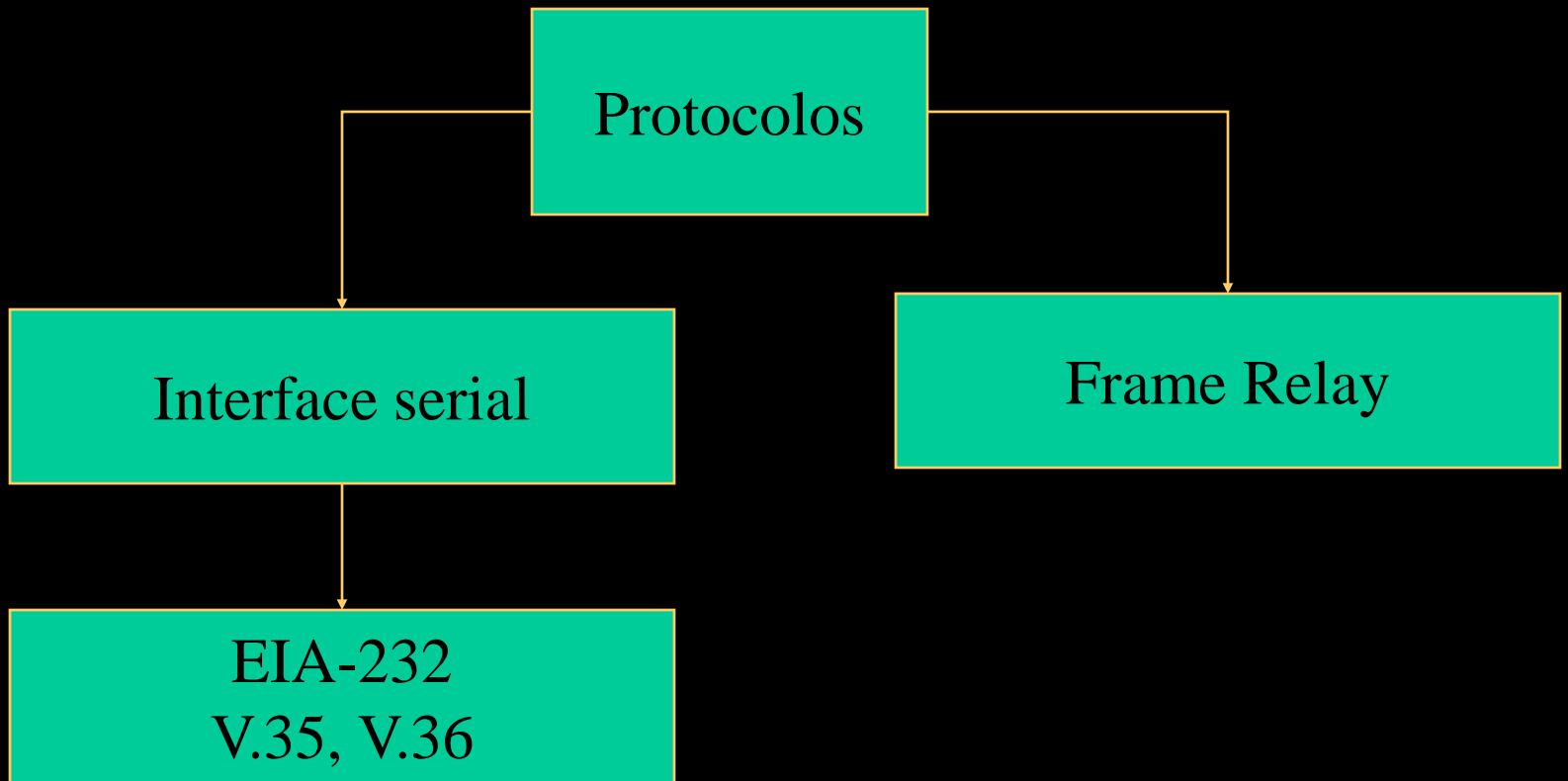
Taxa de erro



Mux-PBX assíncrono



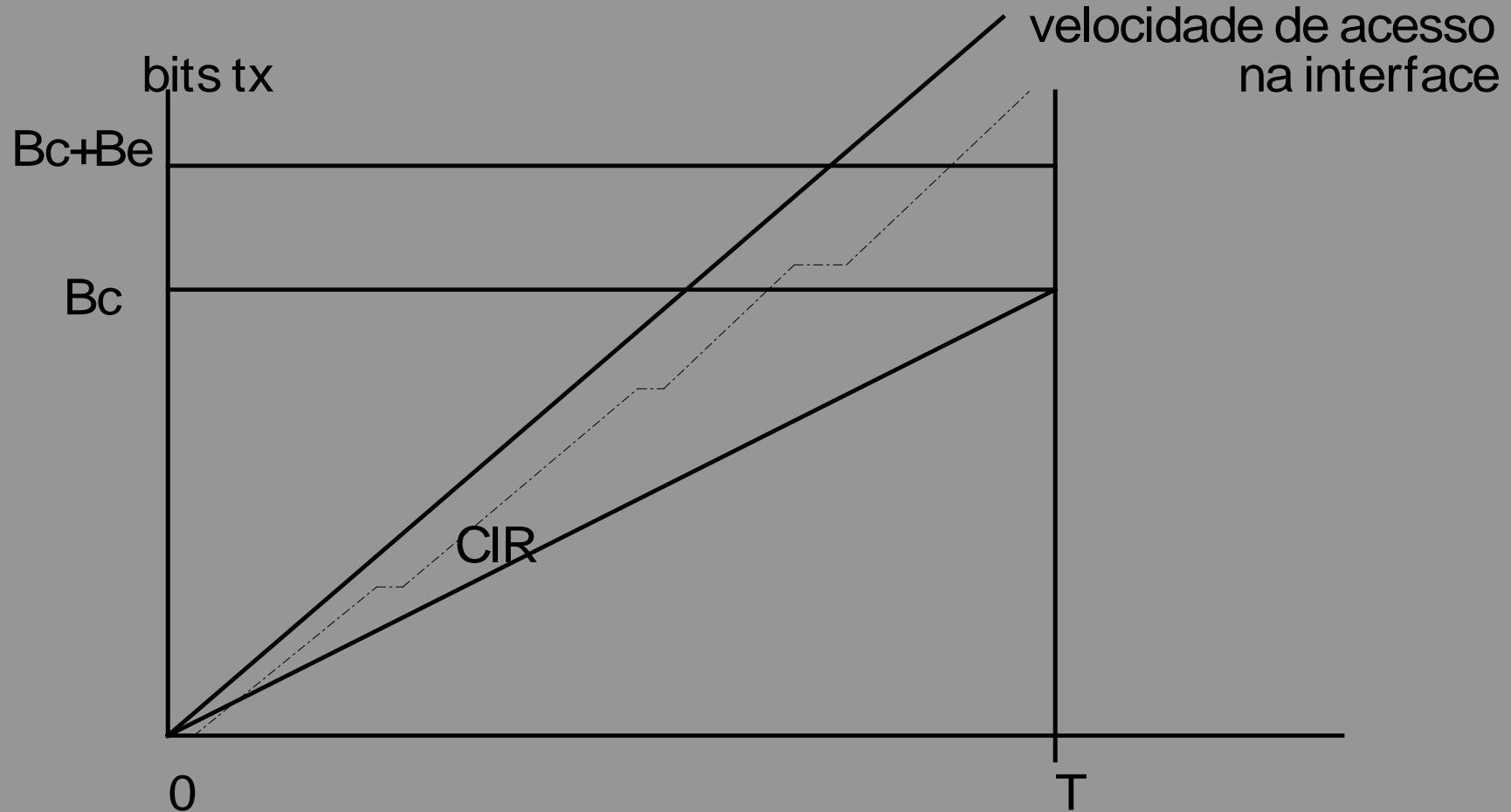
Capítulo 3



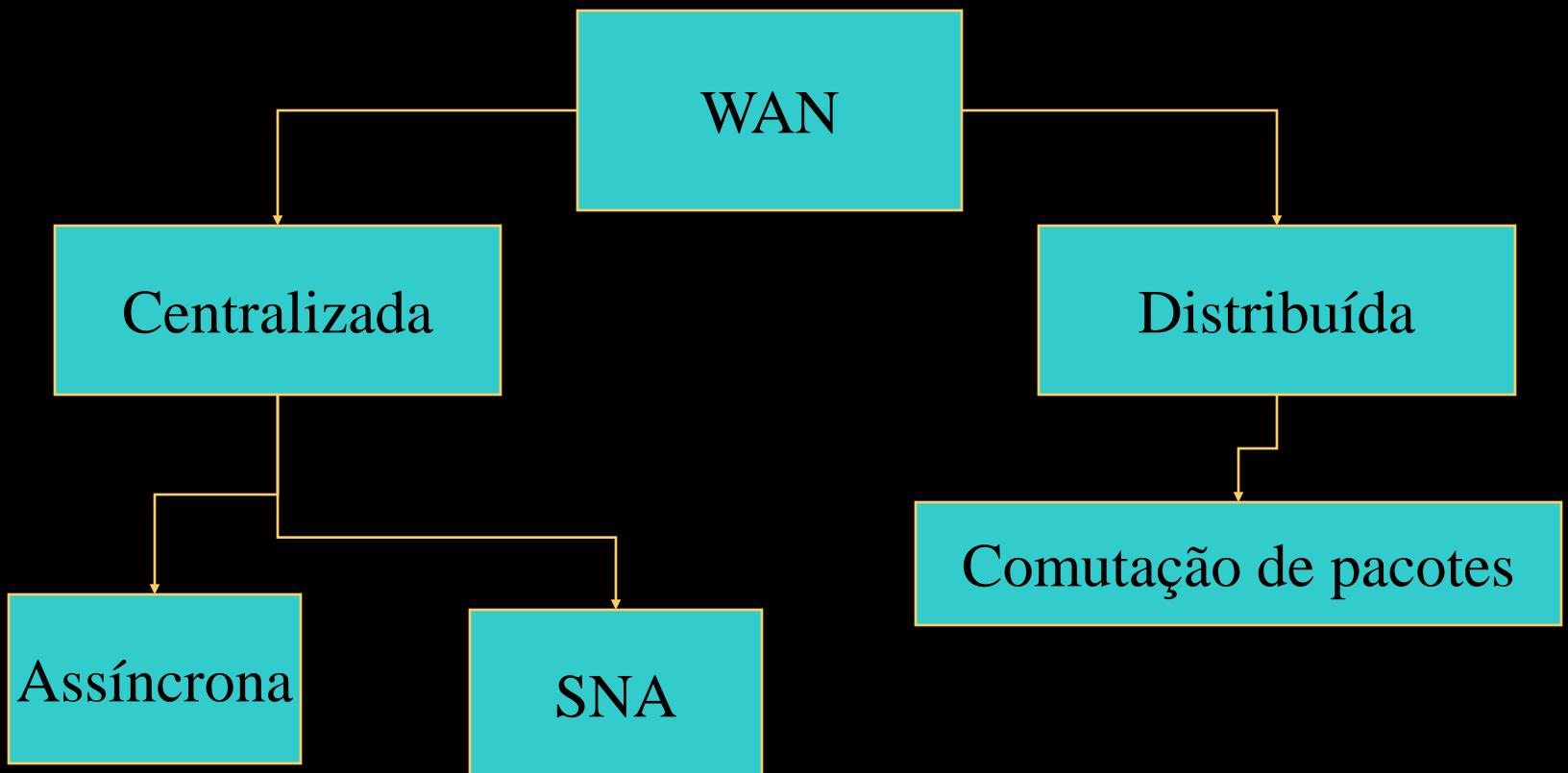
Normas para interface serial

Norma ¹	Elétrica	Mecânica	Lógica	Conector	Velocidade
EIA232	EIA232D	EIA232D	EIA232D	DB25	20 kbps
V.35	V35, V28	ISO2593	ISO2593, V.35	M34	48 kbps
V.36	V10, V11	ISO4902	ISO4902, V.36	DB37	72 kbps
V.10	V10	-	-	-	100 kbps
V.11	V11	-	-	-	10 Mbps
V.24	-	-	V.24	-	-
V.28	V28	ISO2110	-	DB25	20 kbps
X.21	V10, V11	ISO4903	ISO4903, X.24	DB15	-
EIA422	EIA422A	-	-	-	10 Mbps
EIA423	EIA423A	-	-	-	100 kbps
EIA449	EIA422, 423	EIA449	EIA449	DB37	10 Mbps
EIA530	EIA530A	EIA530A	EIA530A	DB25	2 Mbps
EIA562	EIA562	EIA232D	EIA232D	DB25	64 kbps

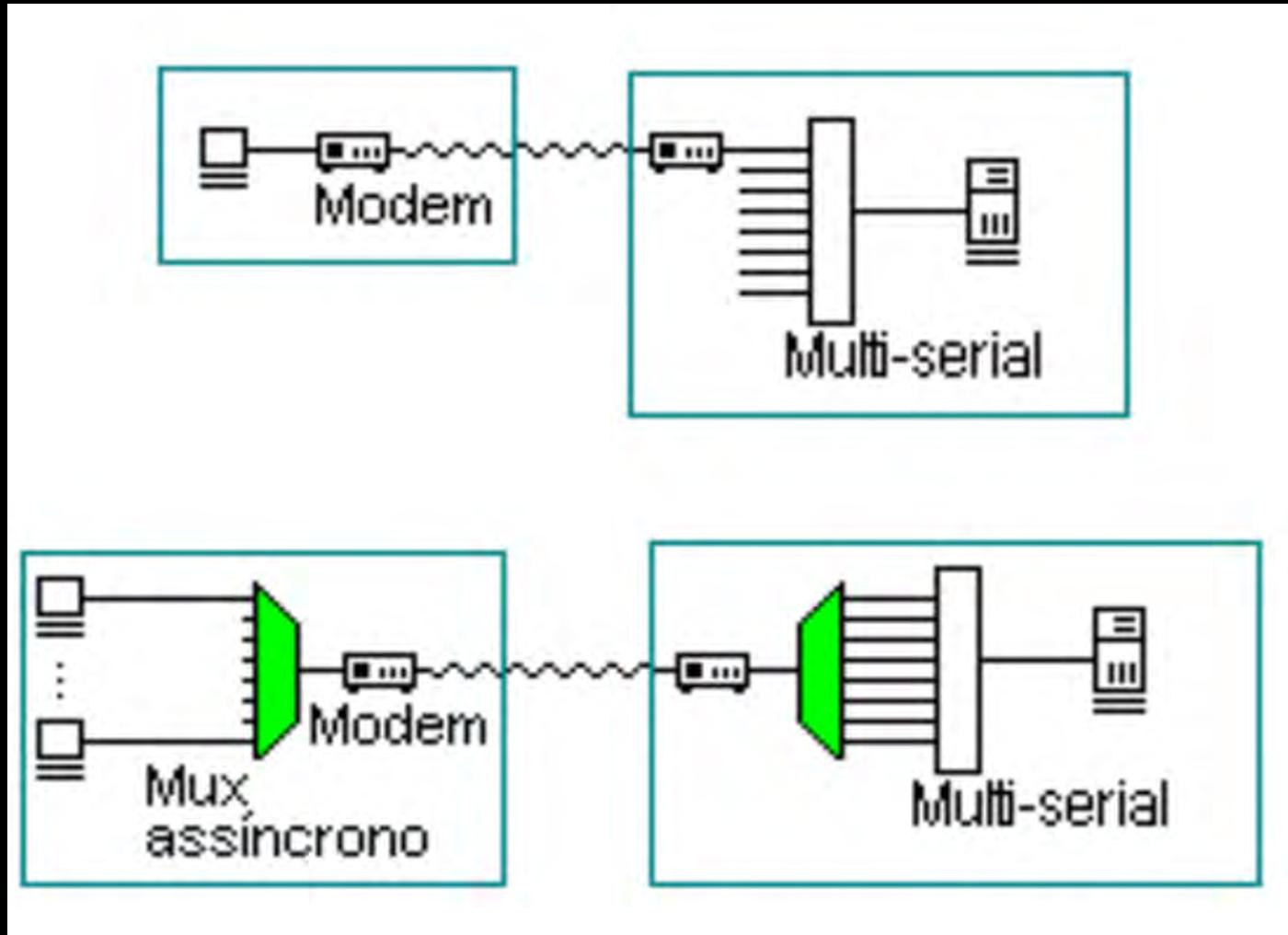
Frame Relay

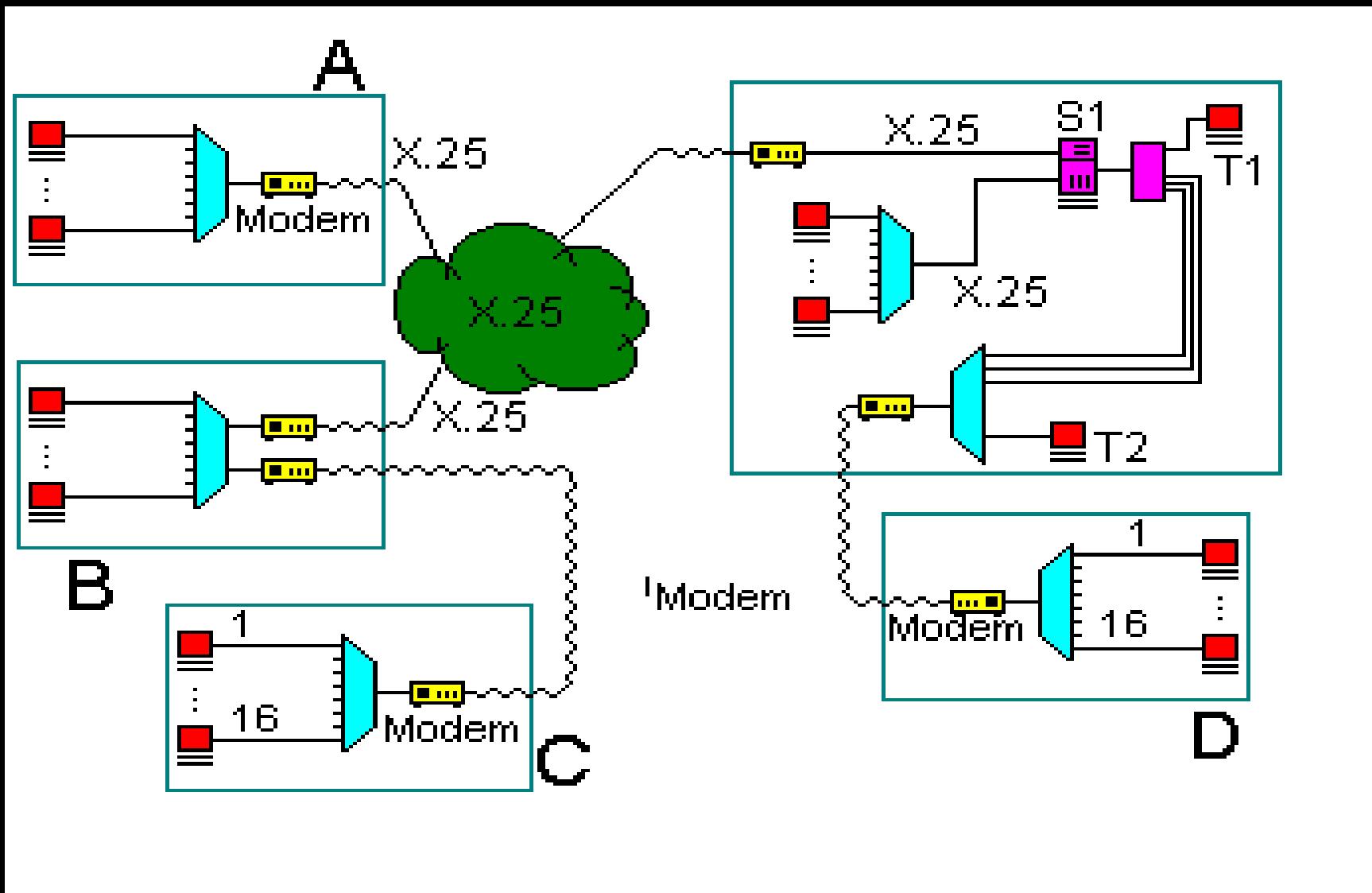


Capítulo 4

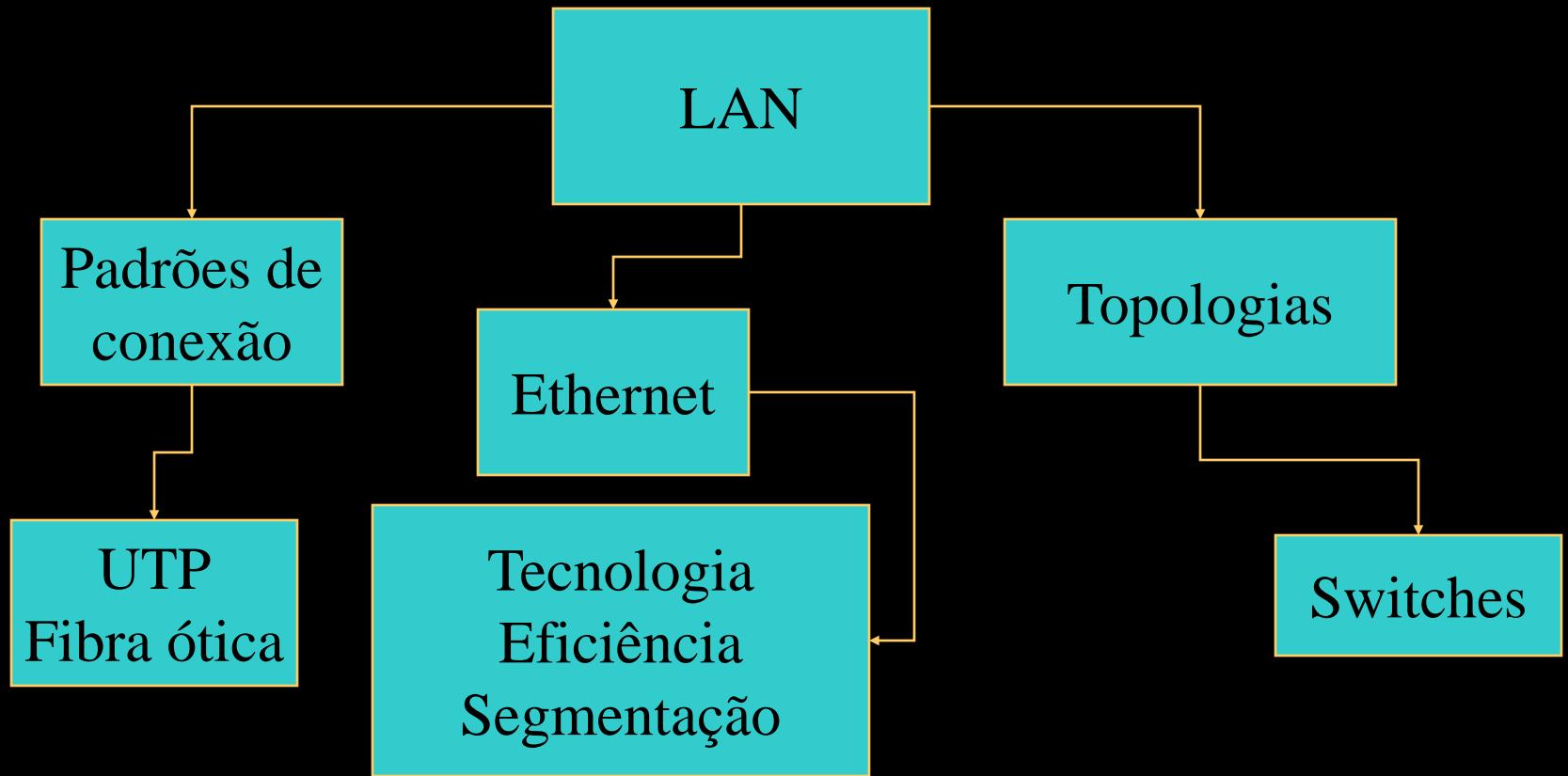


Multiplexador estatístico

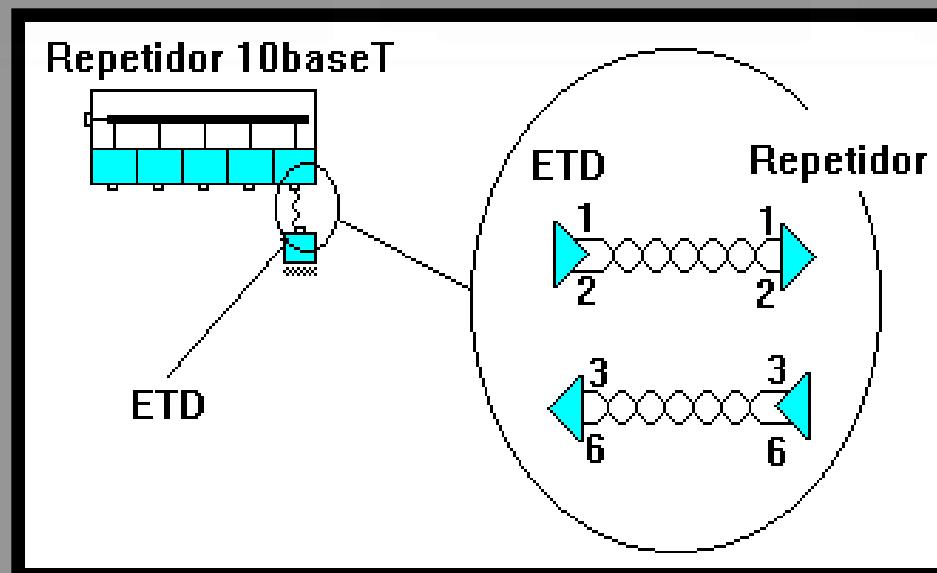
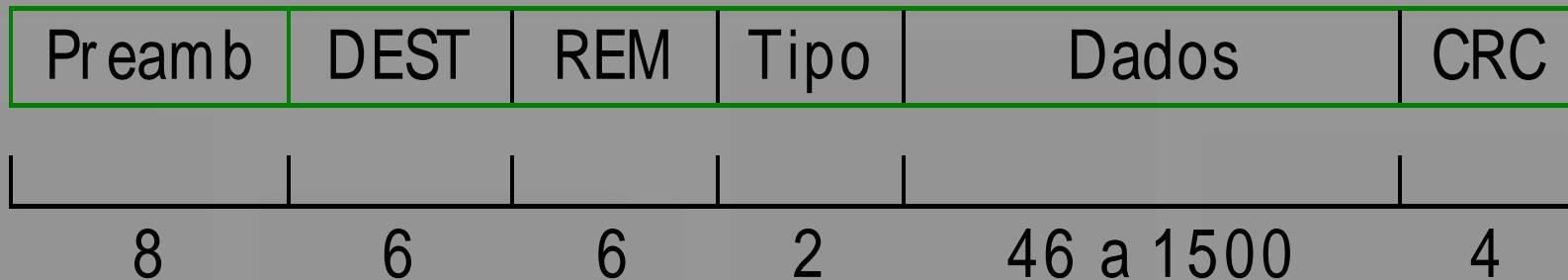




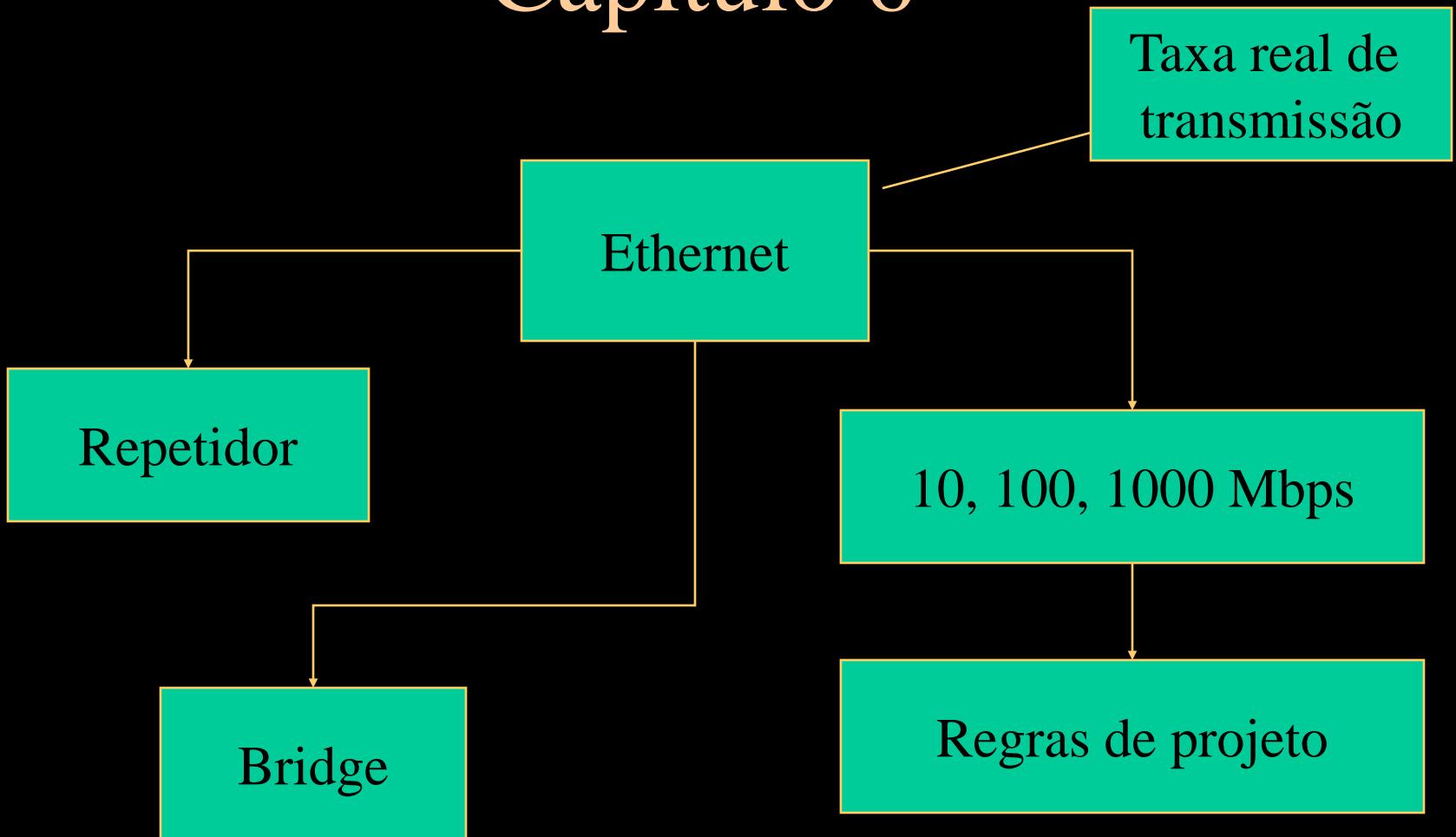
Capítulos 5, 6 e 7

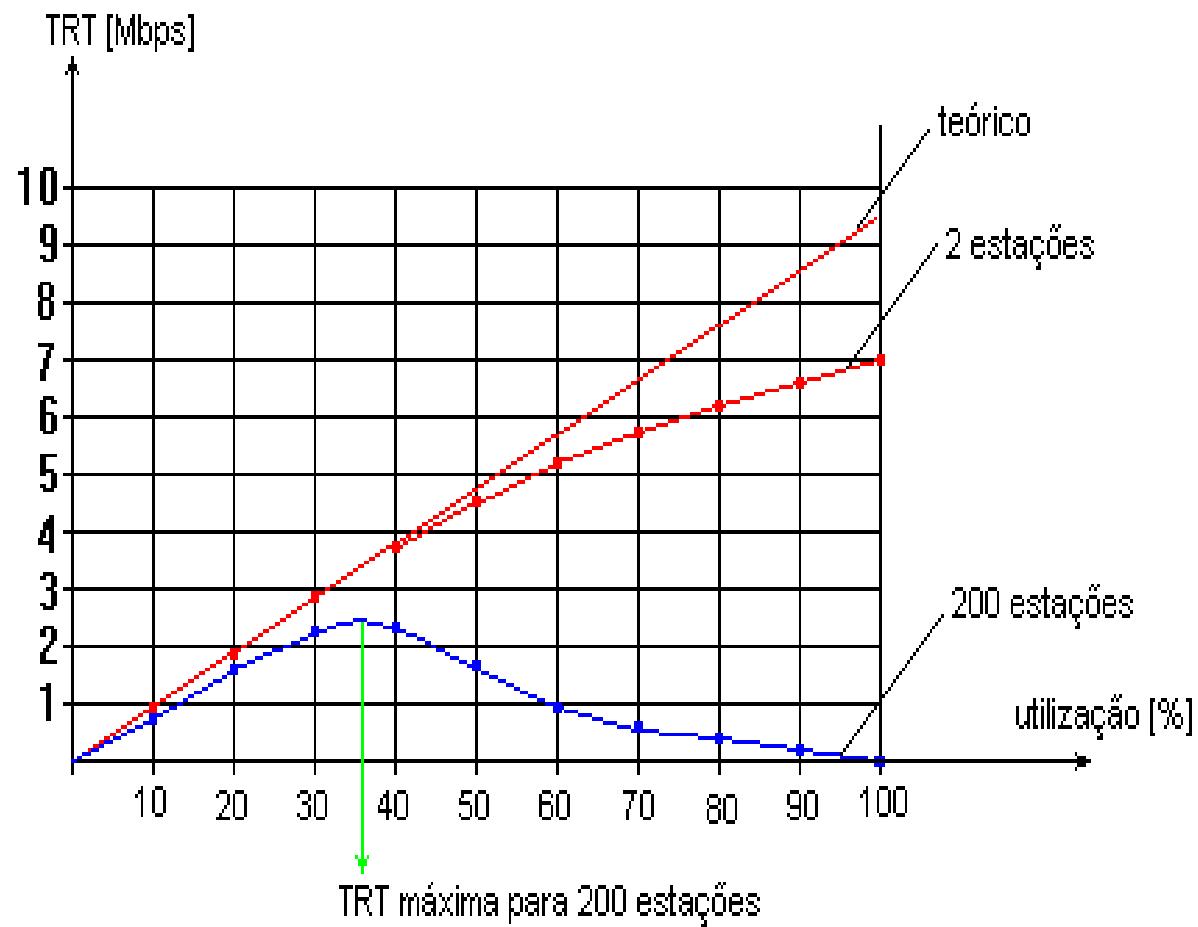


Pacote Ethernet

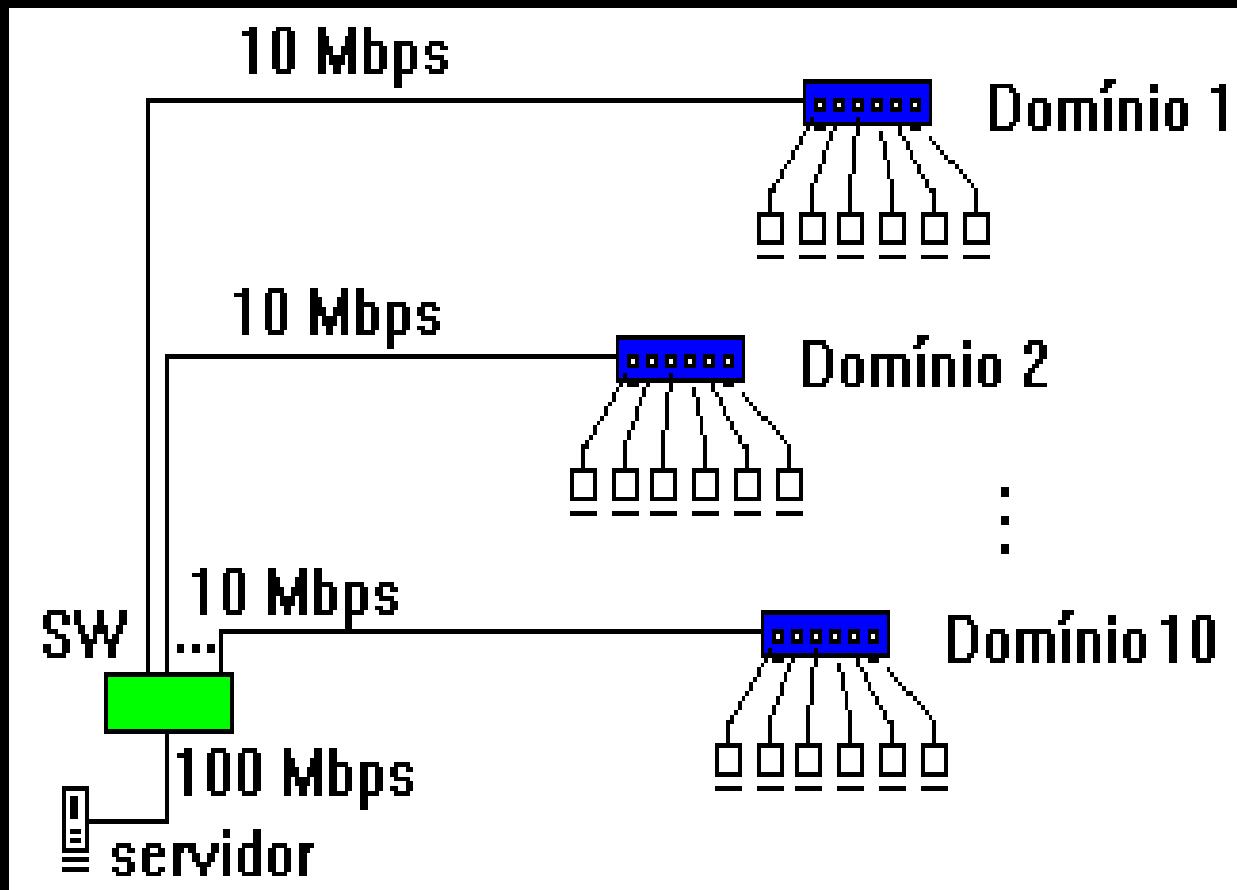


Capítulo 6

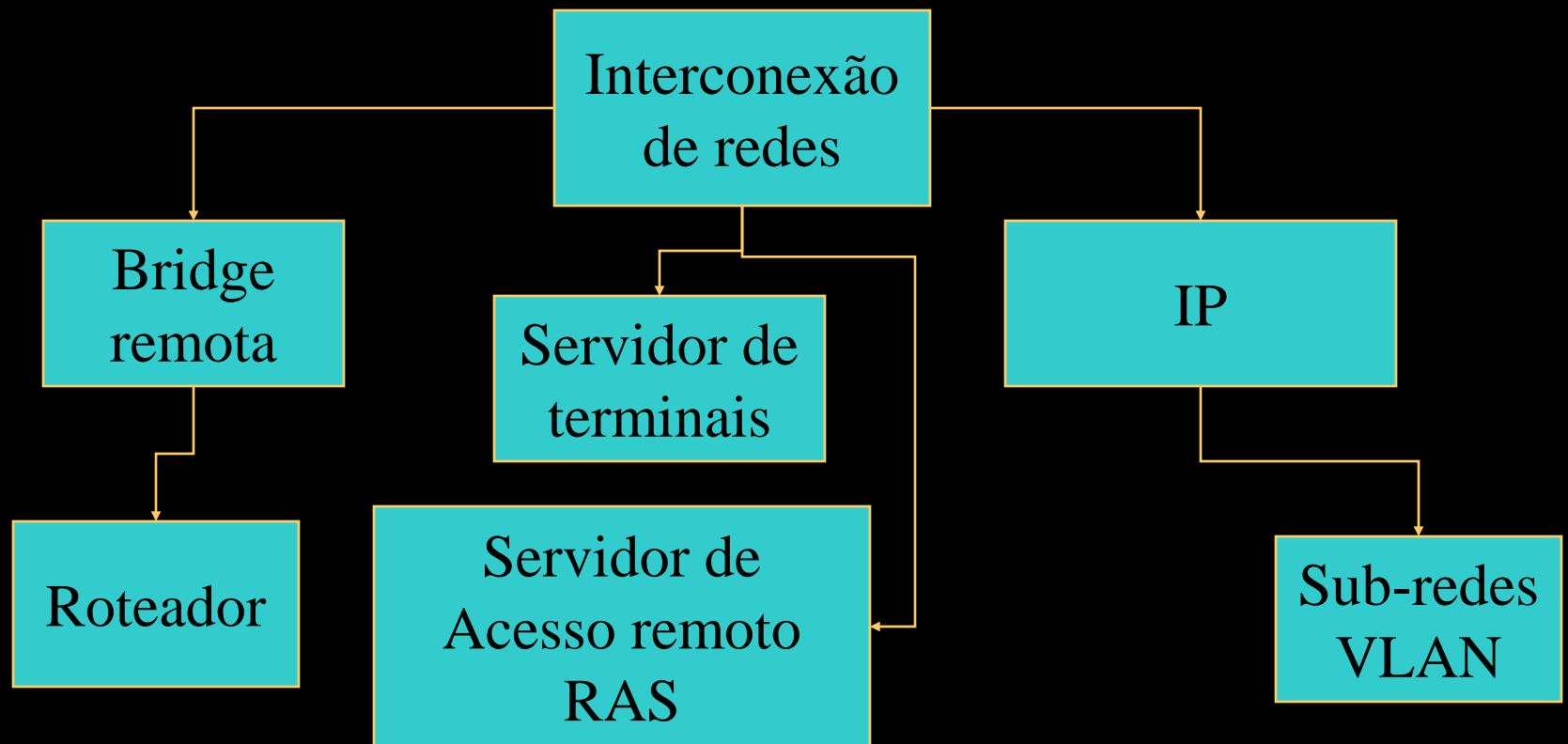




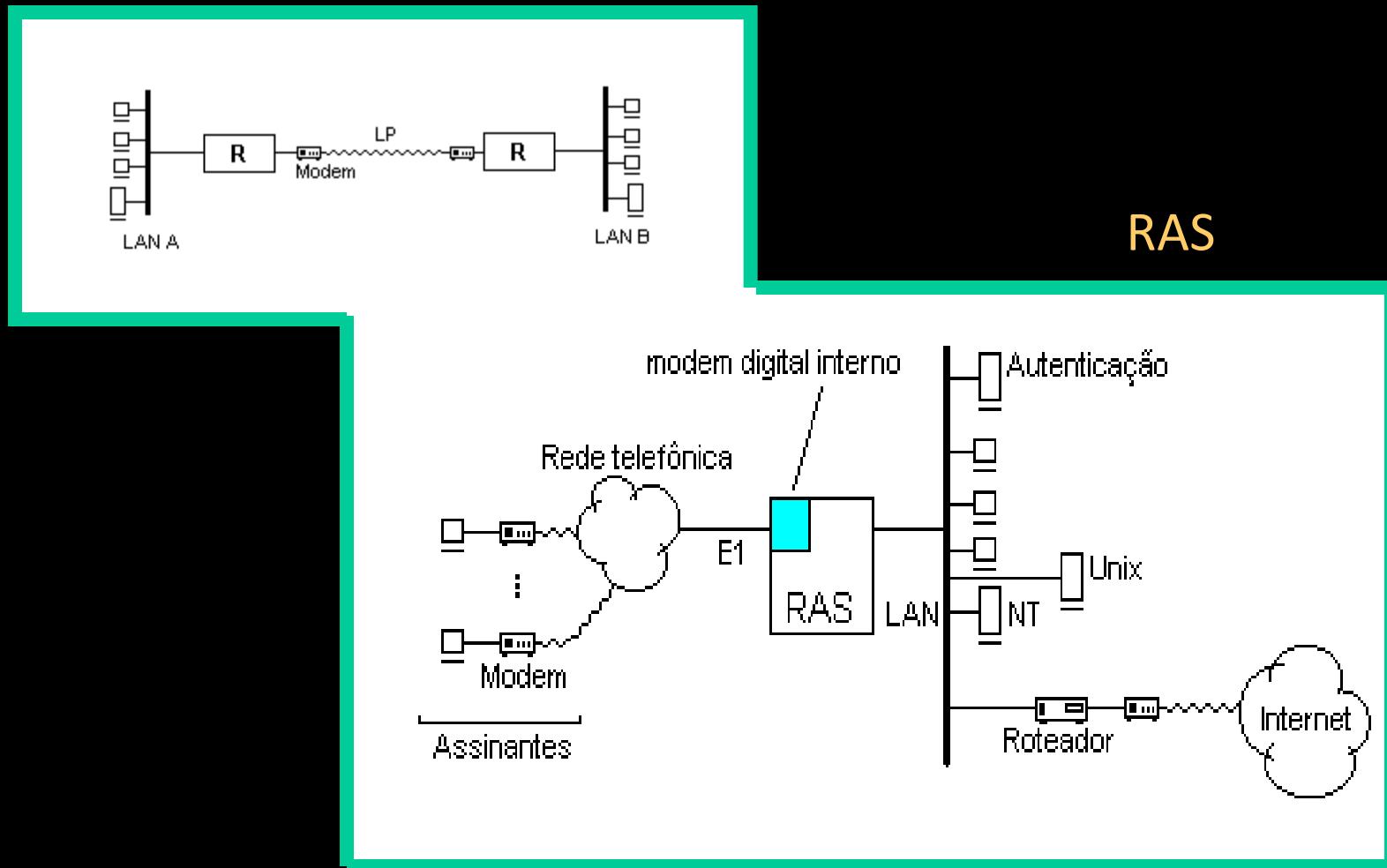
Switches central e de andares



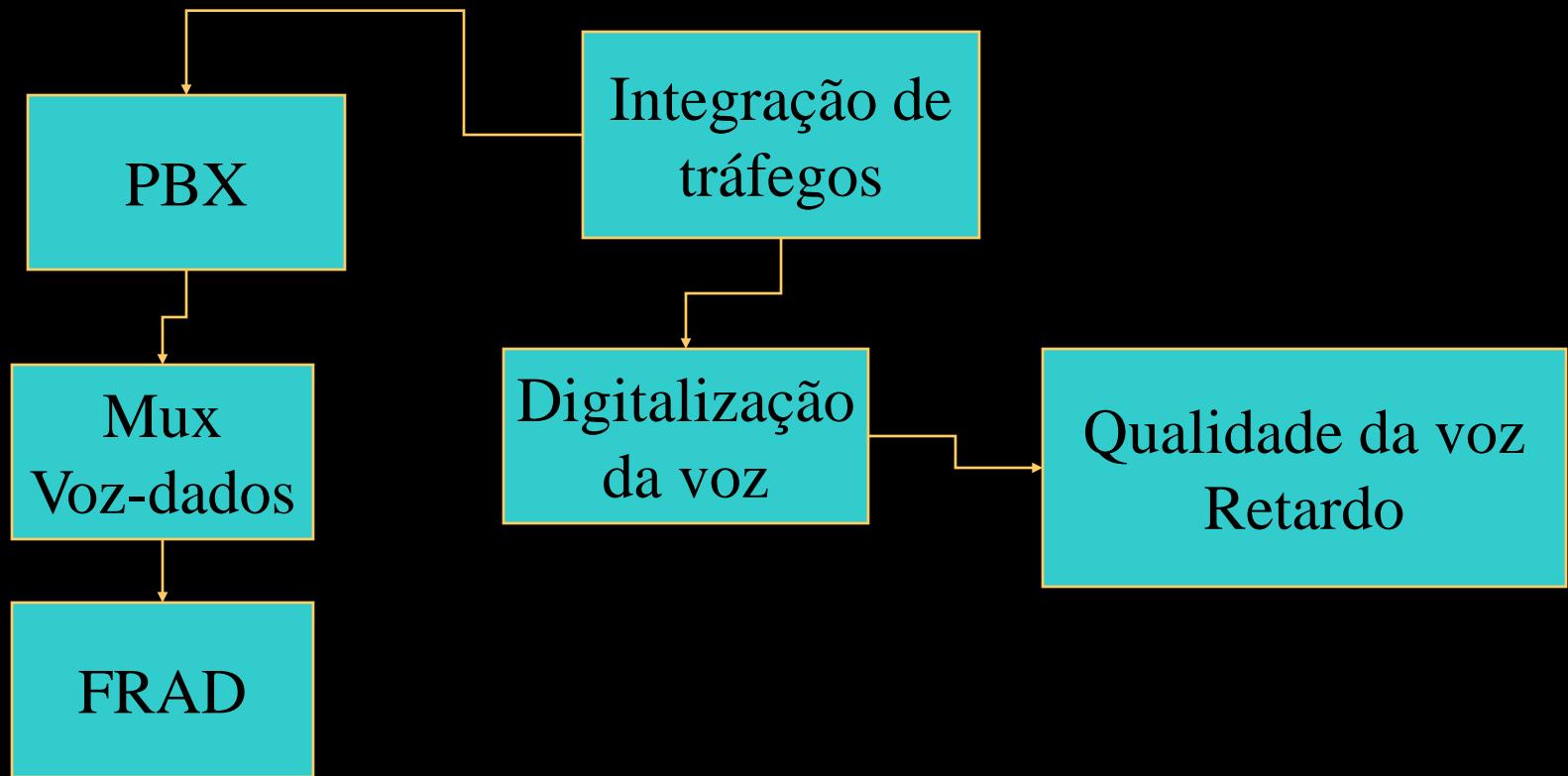
Capítulo 8

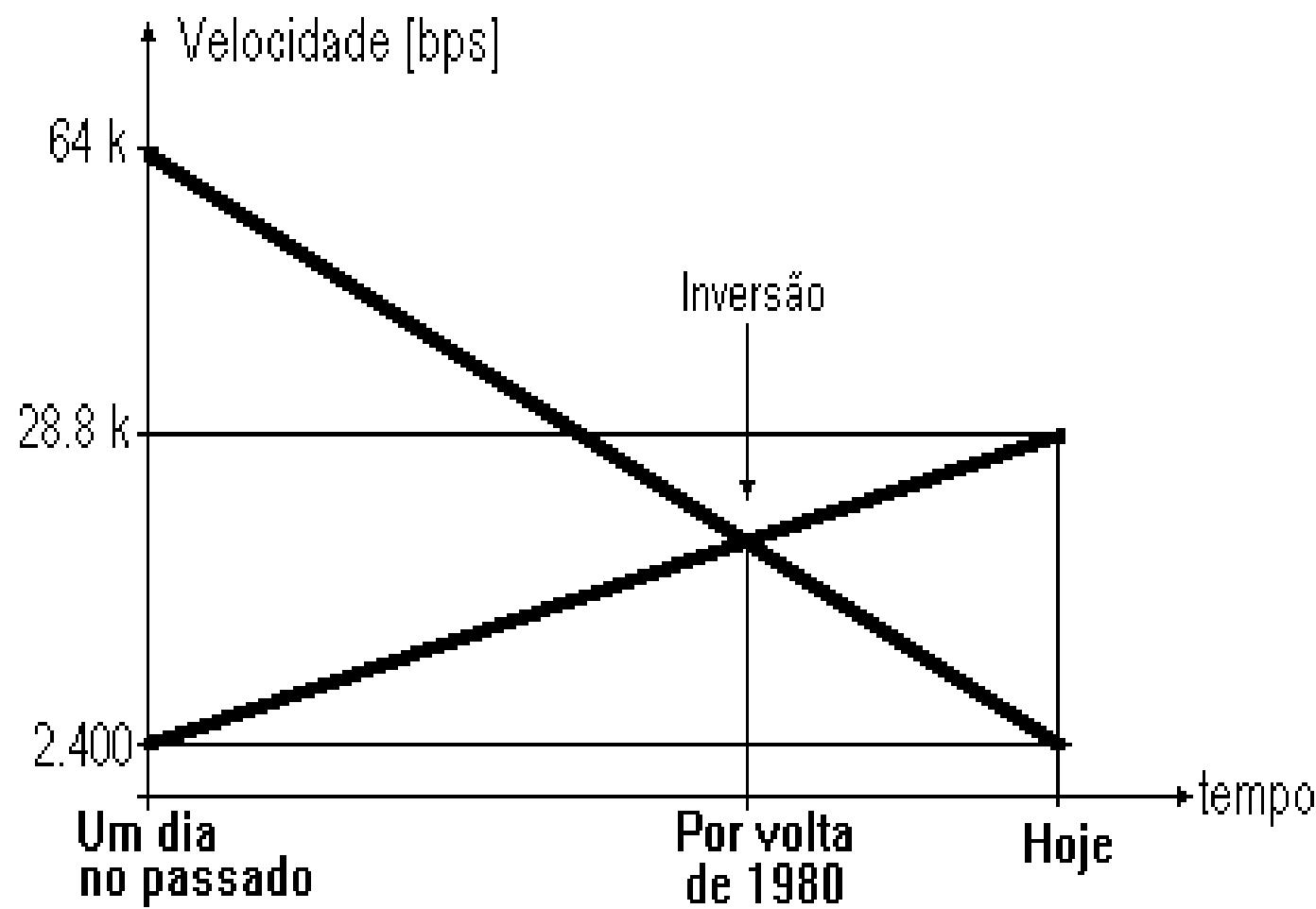


Roteador

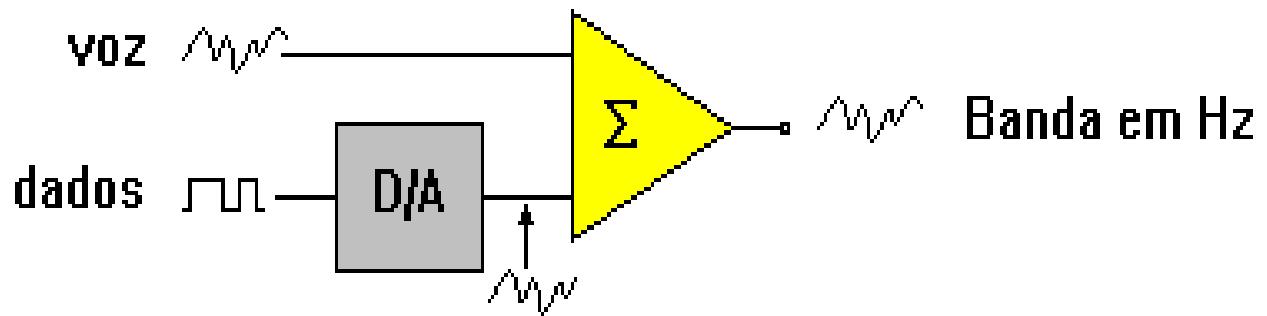


Capítulo 9

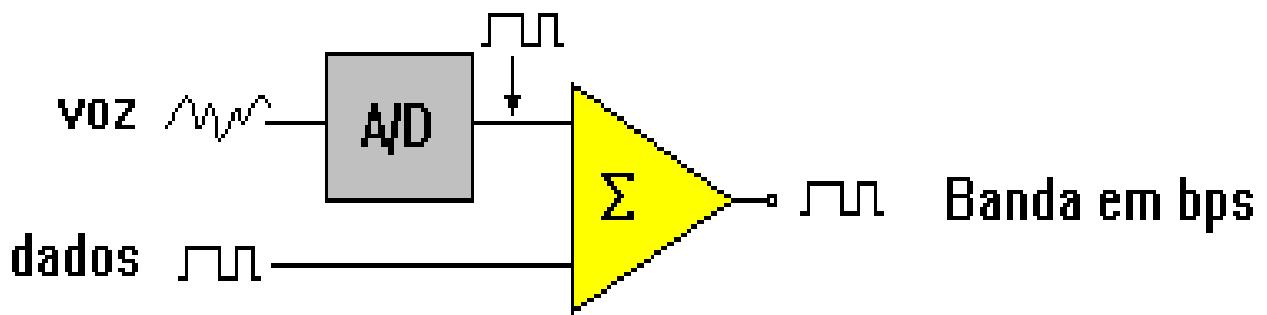


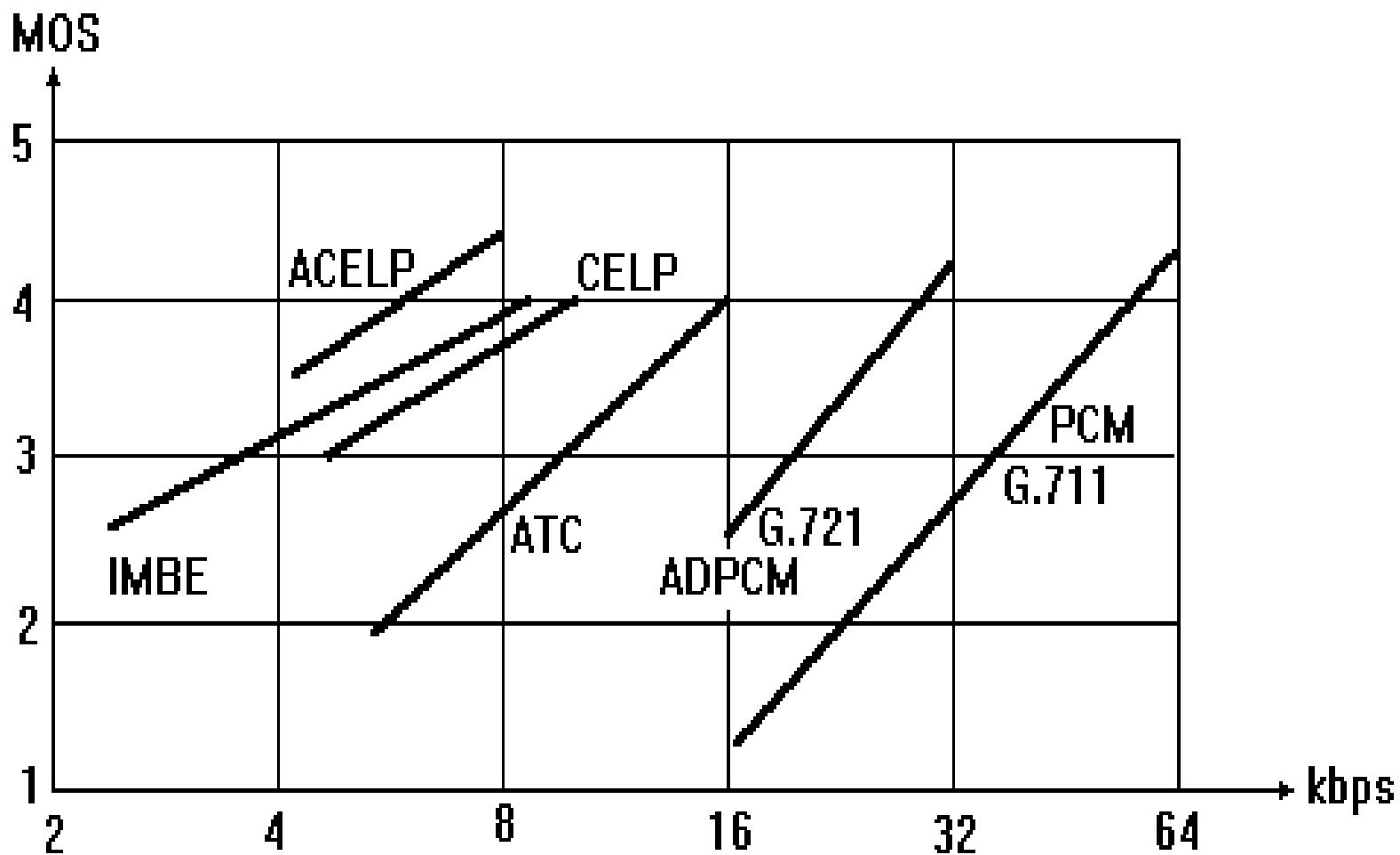


FDM



TDM





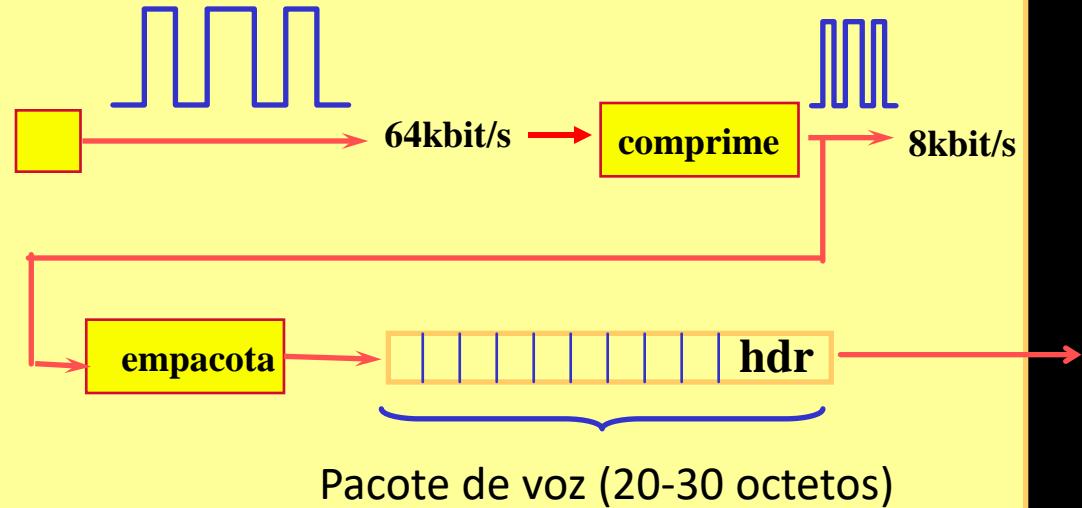


Analógico

Digital Signal
Processor
(DSP)



Digital (PCM)



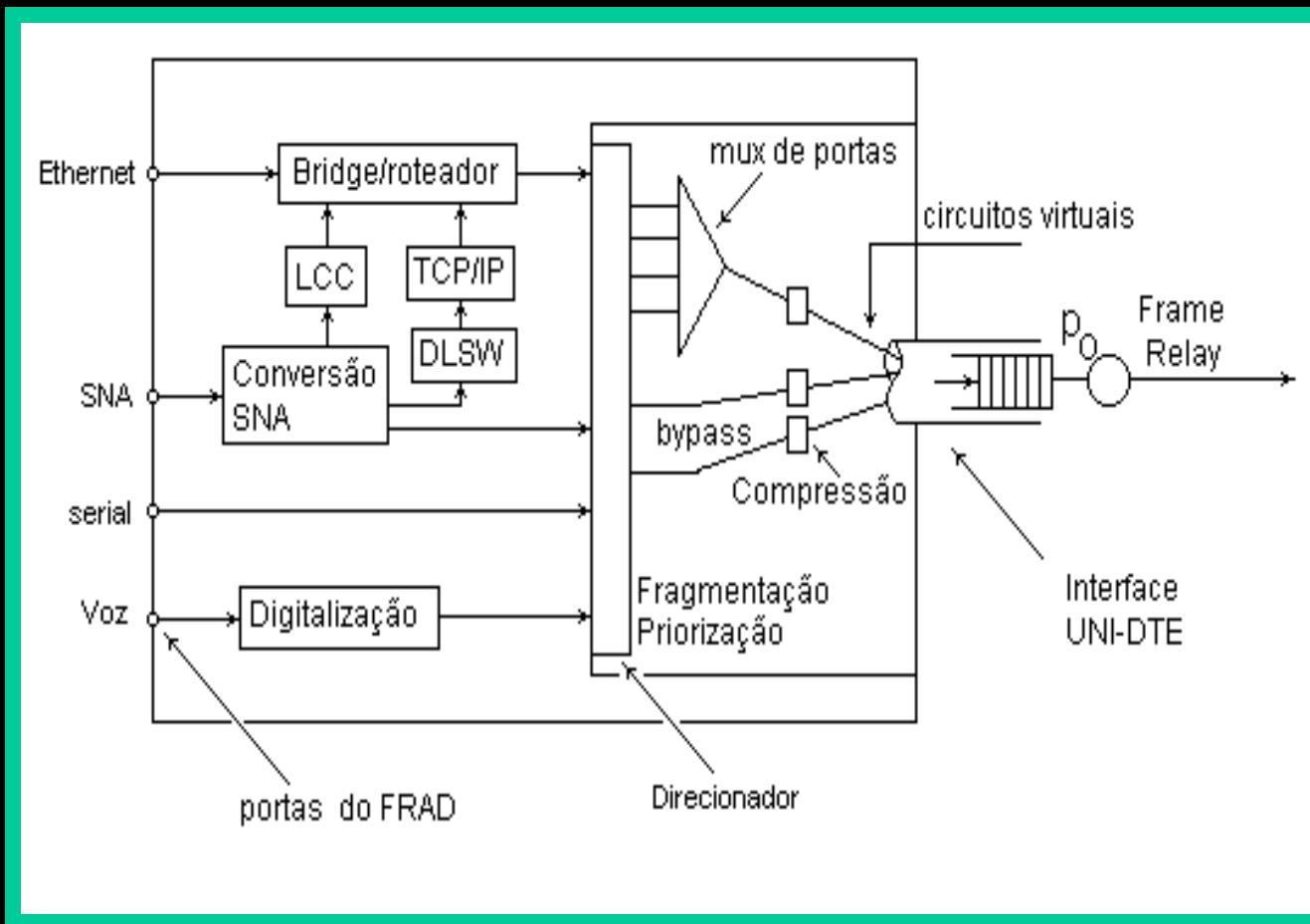
PCM = 64 kbps

G723.1 = 5,3/6,3 kbps

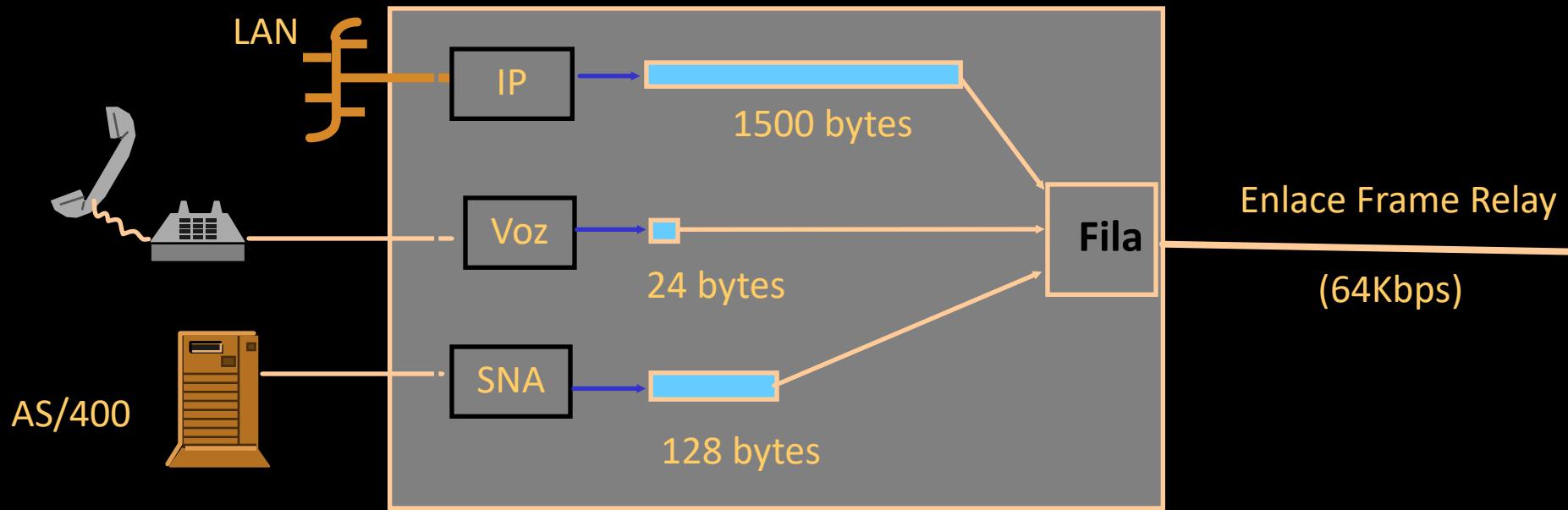
G729a = 8 kbps

CVSELP = 8 e 16 kbps

ACELP = 4,8 kbps

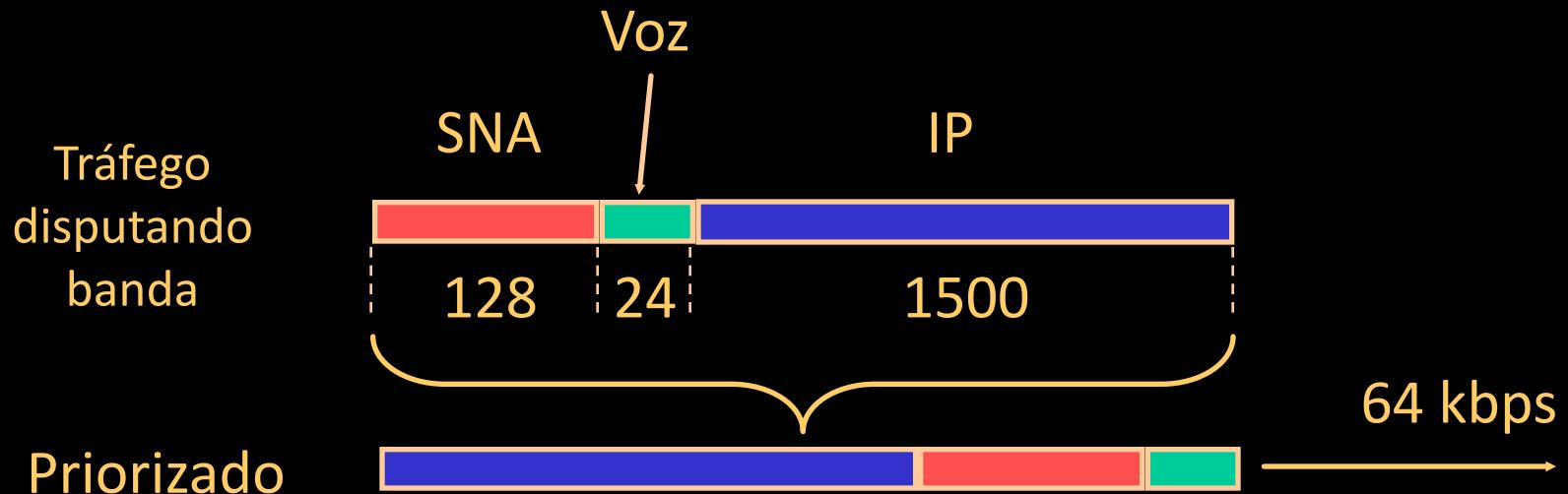


Exemplo



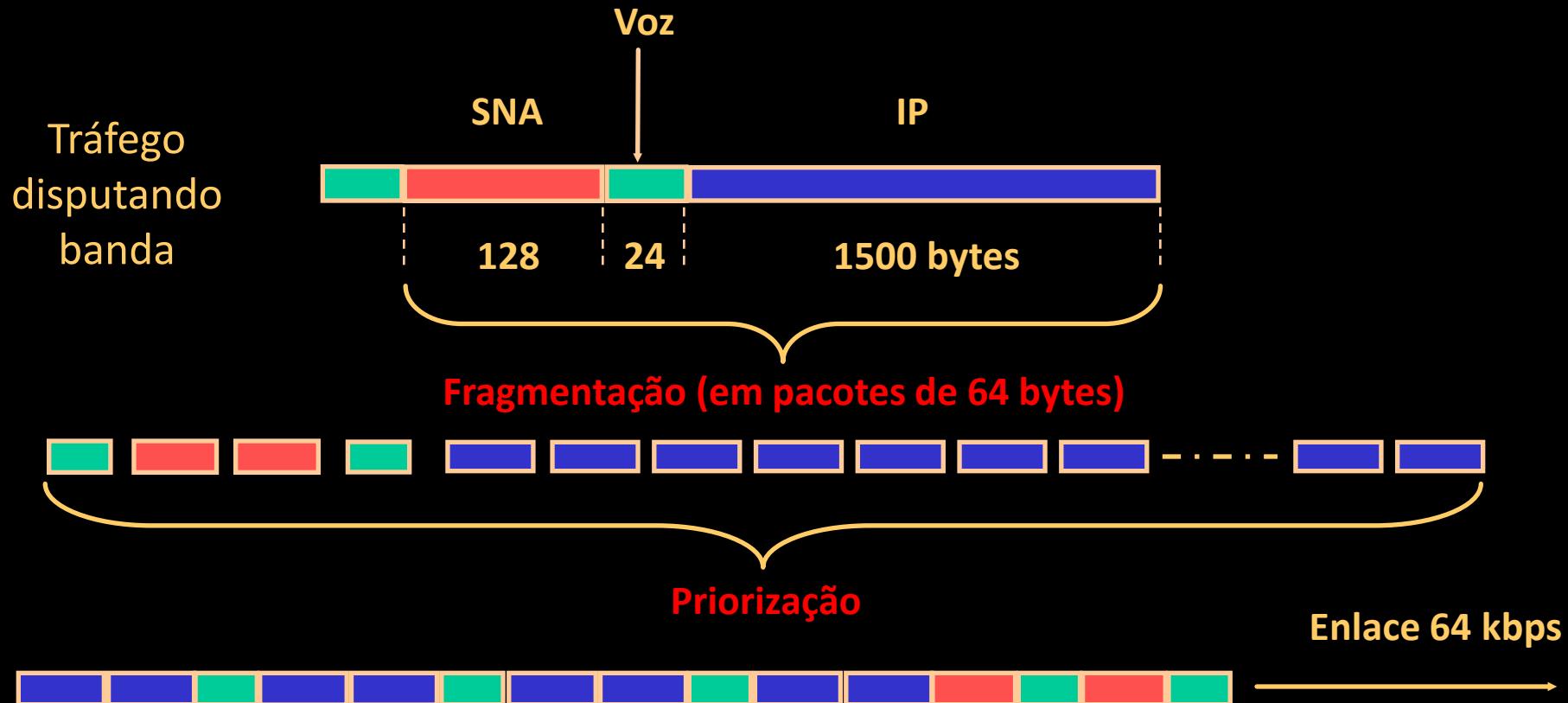
**Se o pacote de voz entra na fila atrás de um pacote IP,
digamos a 64 kbps, será retardado de 188 ms
- isso é inaceitável !**

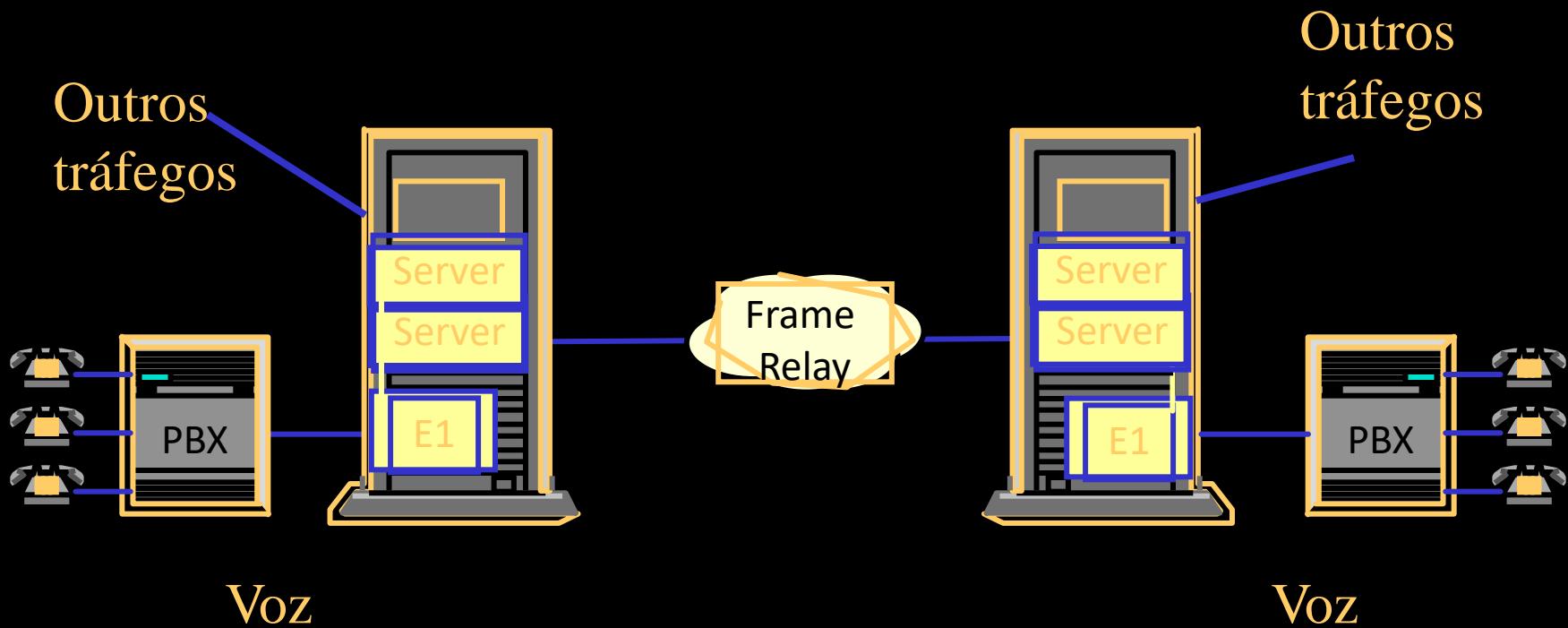
Priorização

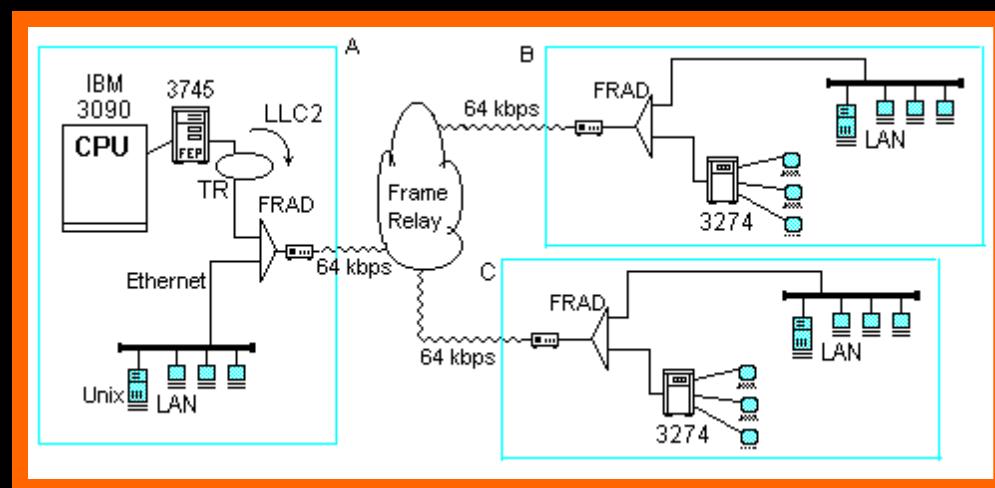
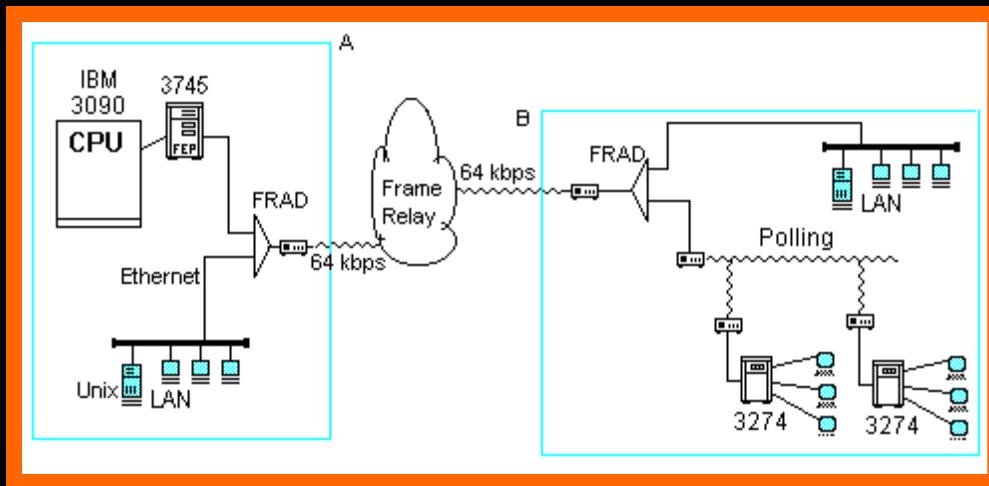


- Pacotes de voz são curtos e tem maior prioridade
- Demais tráfegos podem ser configurados
 - Mas ... - só a priorização não é suficiente !

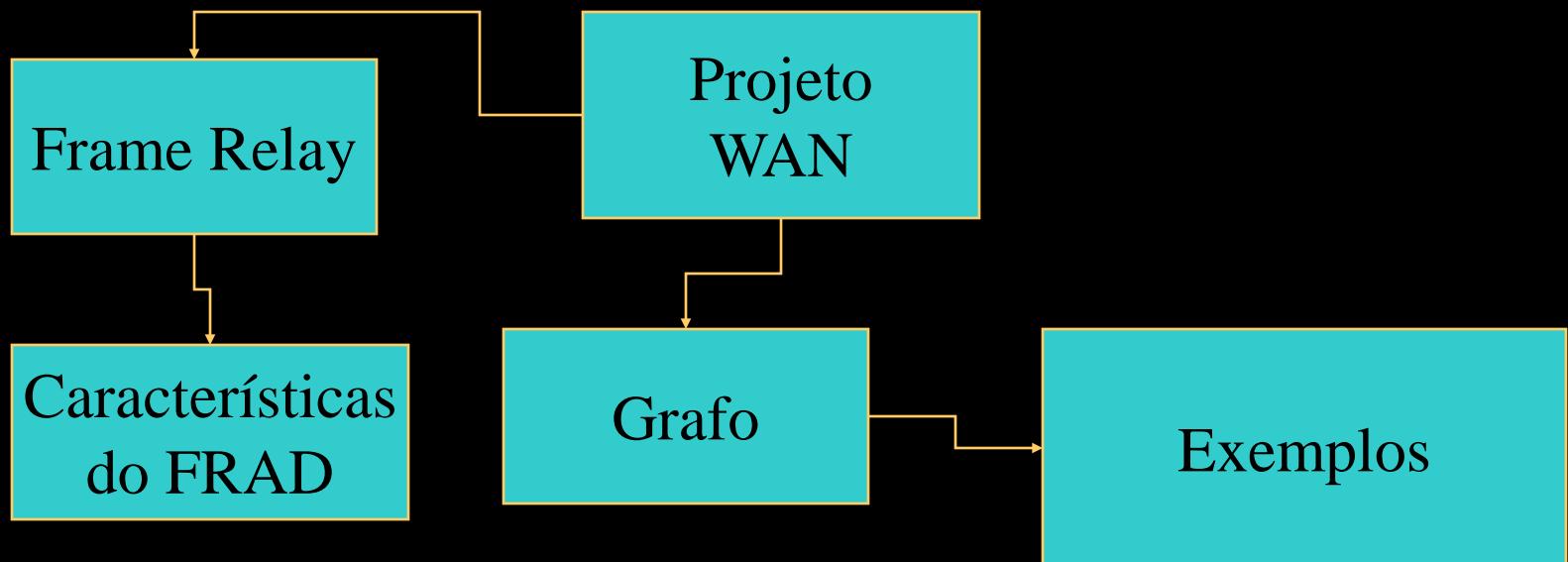
Fragmen^tação



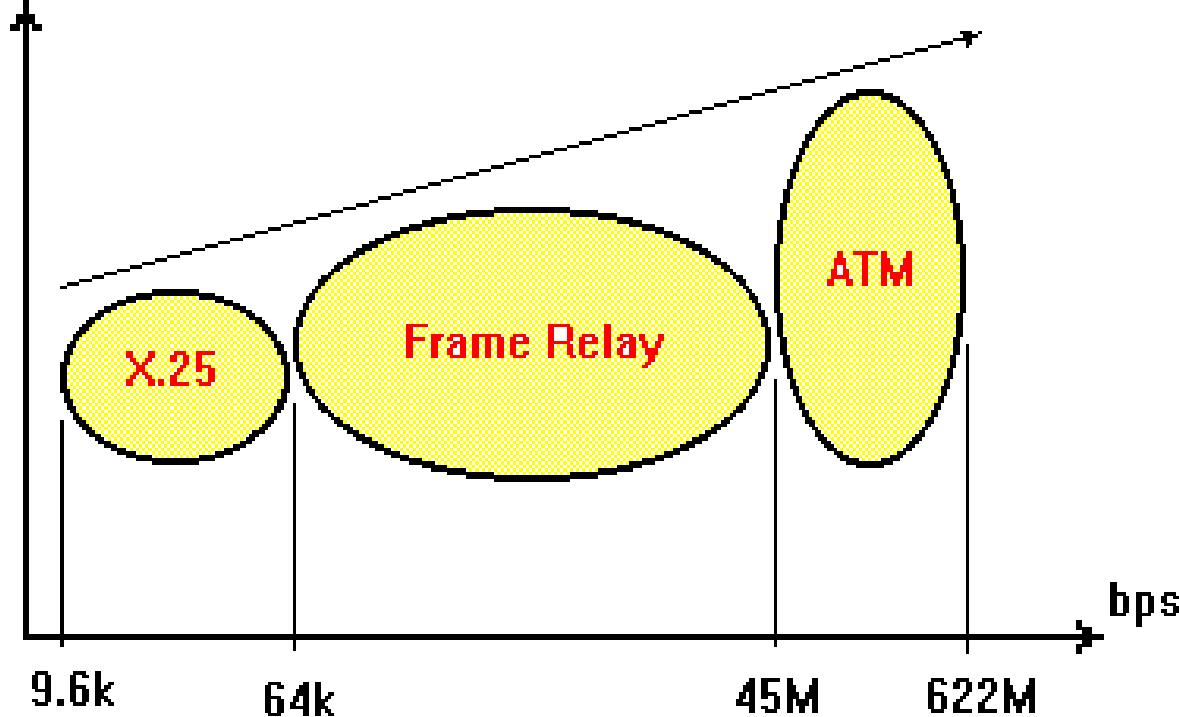


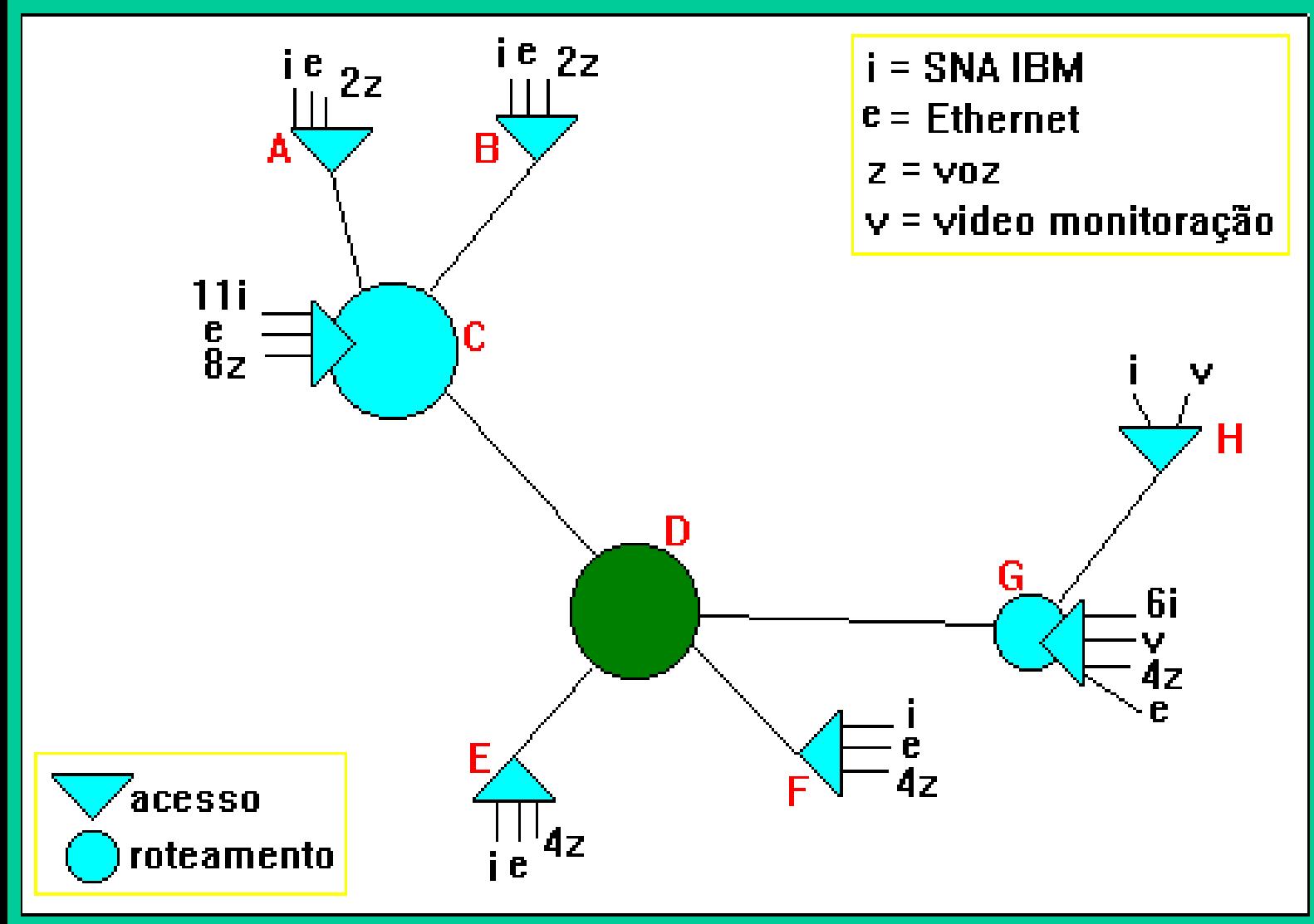


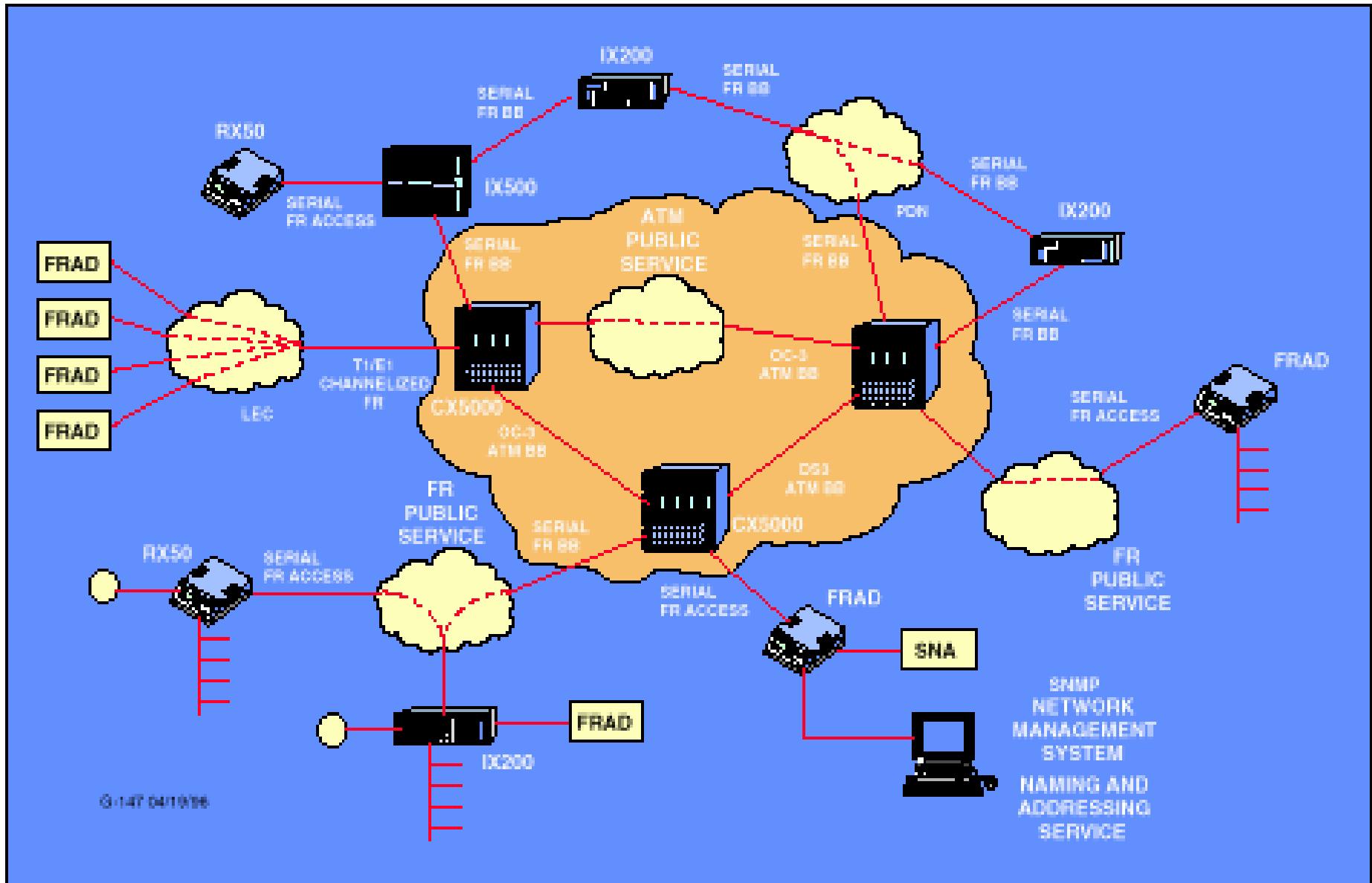
Capítulo 10



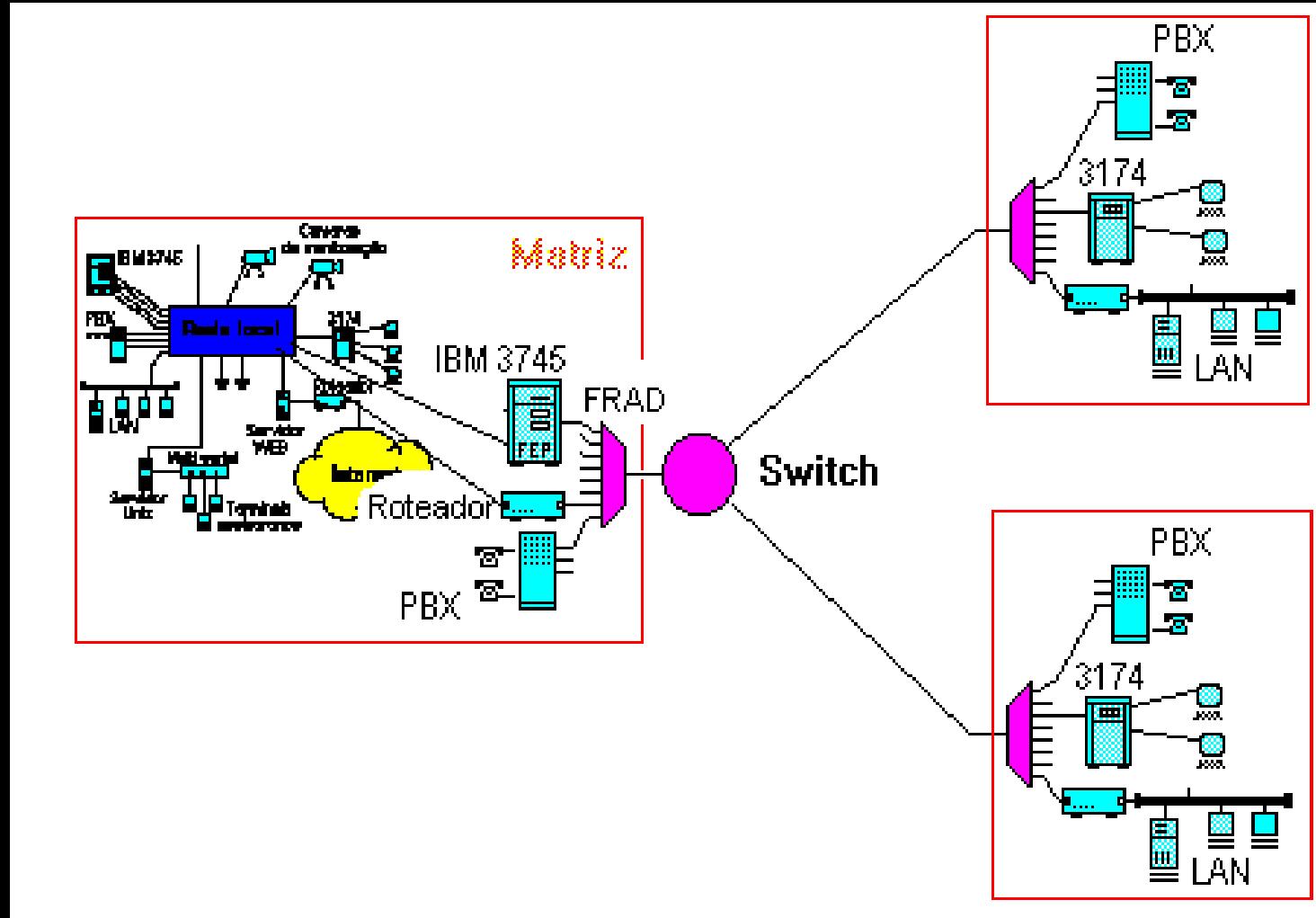
Variância
do tráfego





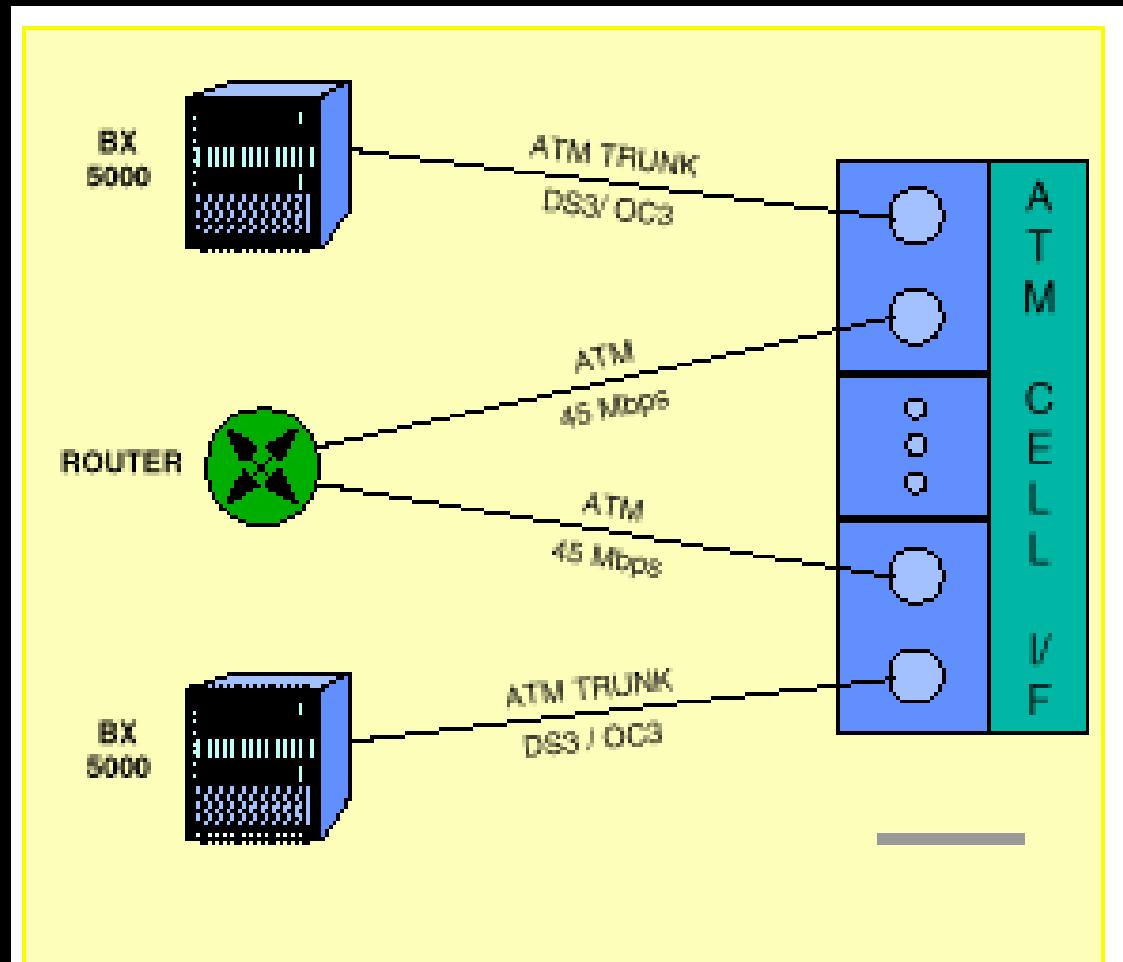


Os dois elementos básicos



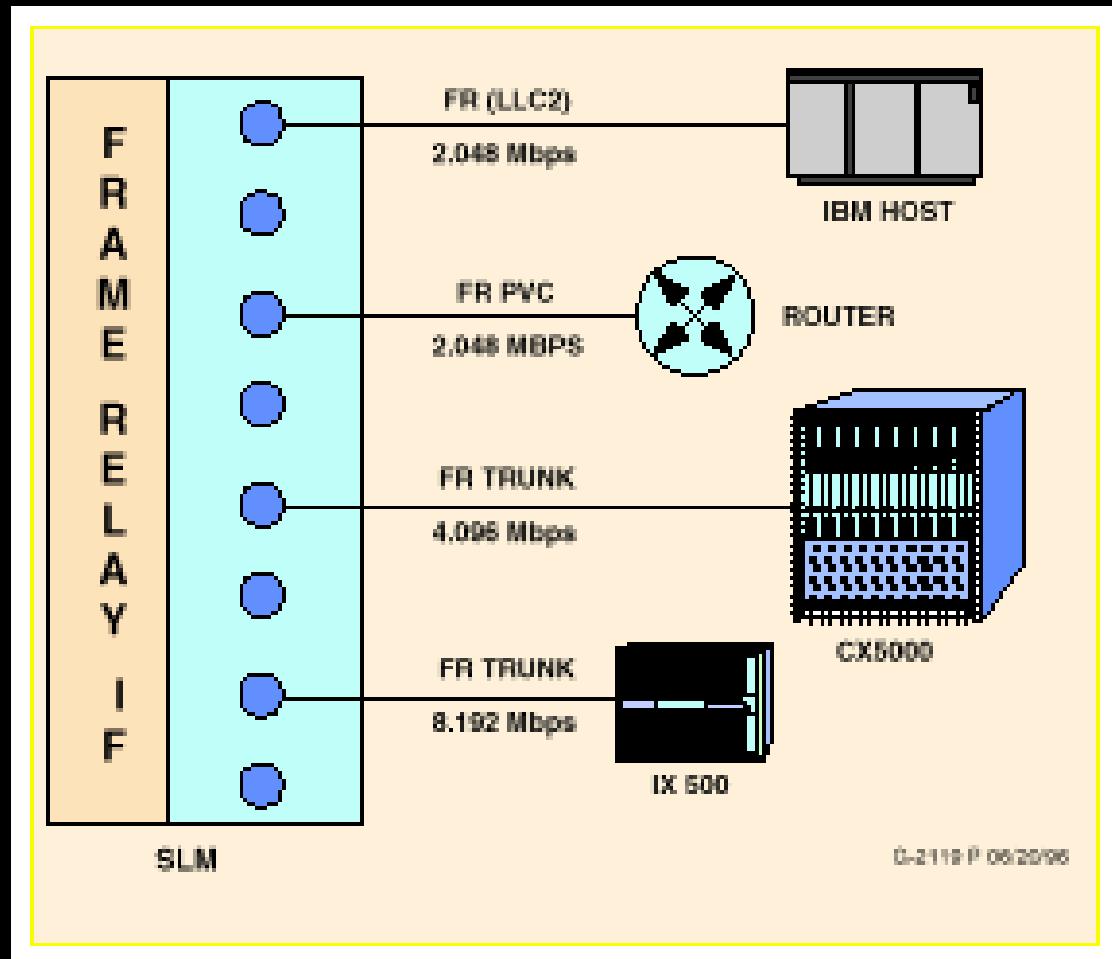
Comutador ATM/Frame Relay

Entradas ATM



Comutador ATM/Frame Relay

Entradas FR

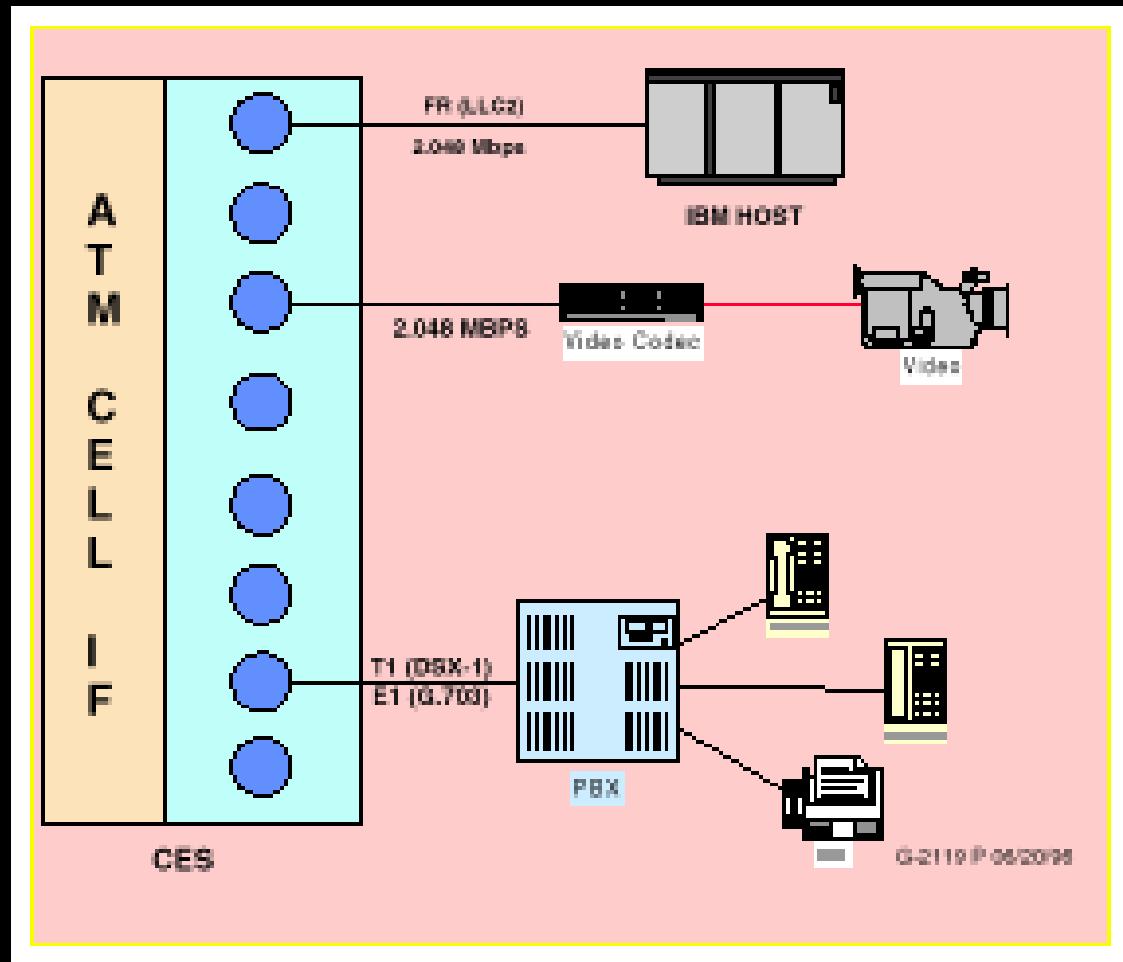


Comutador ATM/Frame Relay

Emulação de Circuitos

Transportar

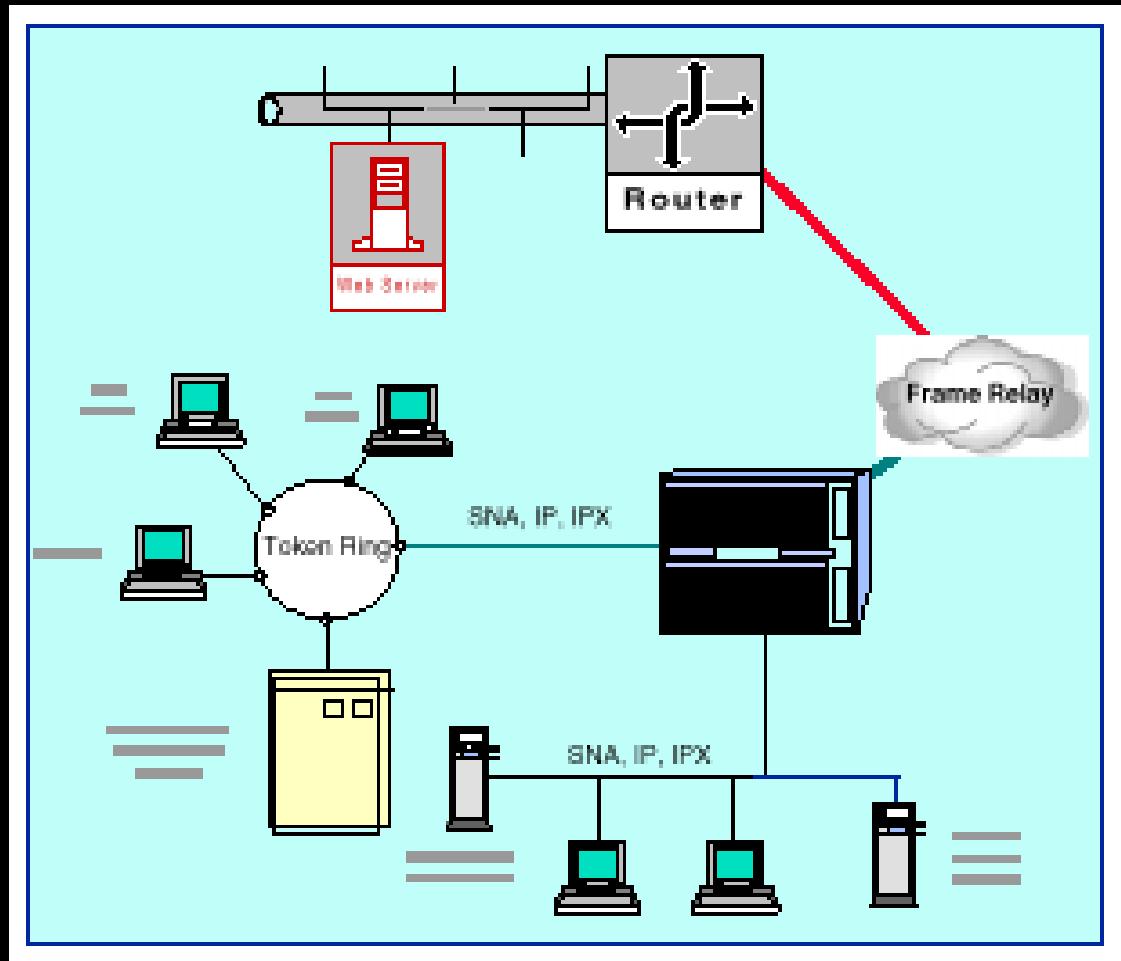
- voz
- vídeo
- outros



Comutador ATM/Frame Relay

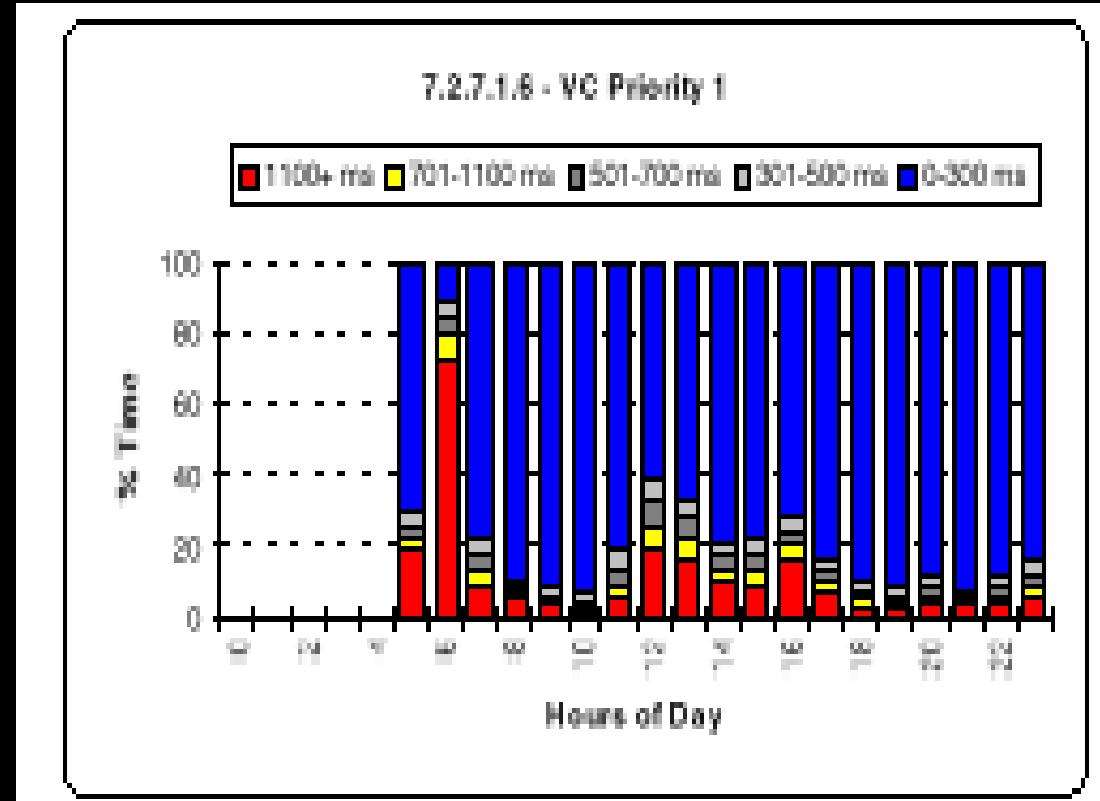
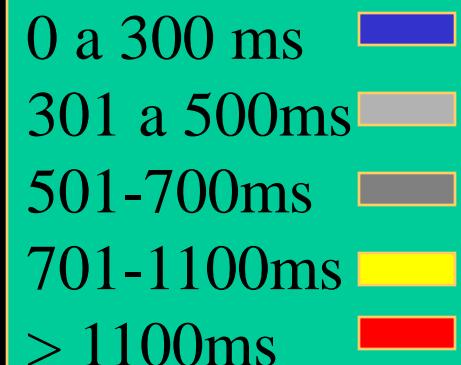
Transporte de
tráfego de LAN
Ethernet/TR

Transportar
- IP
- SNA/LLC2

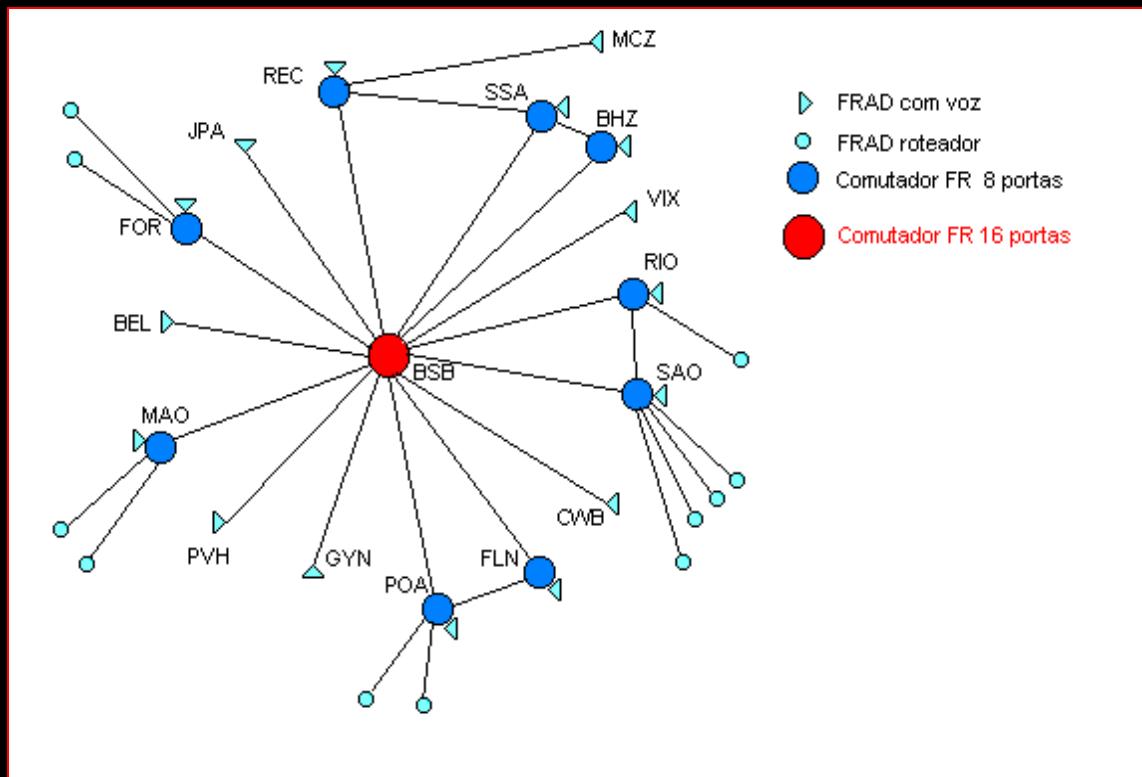


Gerenciamento

Exemplo:
Gráfico de retardo
de pacotes

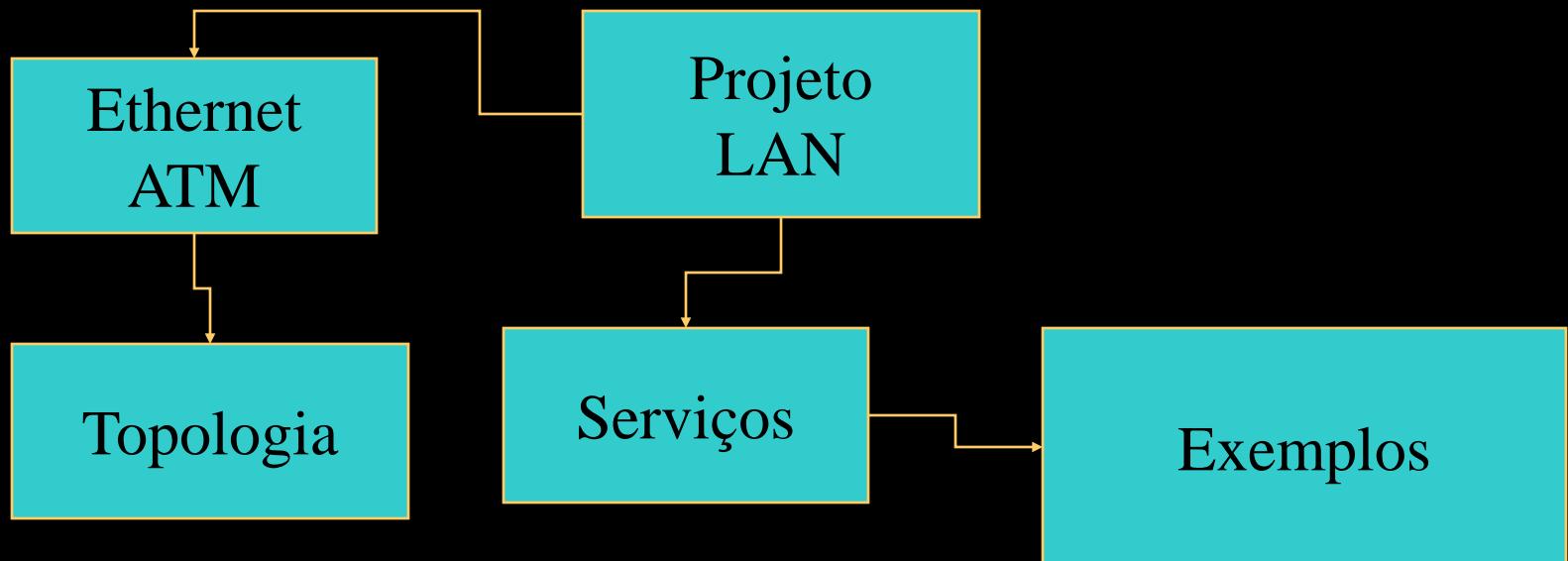


Exemplo de projeto



- 28 cidades
 - 1 concentração principal
 - 9 concentrações com FRAD
 - 7 cidades com FRAD sem concentração
 - 11 cidades com FRAD roteador

Capítulo 11



Tecnologia de rede local

- 1. Velocidades crescem
 - Ethernet: $10 \rightarrow 100 \rightarrow 1000$
 - ATM: $25 \rightarrow 155 \rightarrow 622 \rightarrow 2468$
 - Token Ring: $16 \rightarrow 100 \rightarrow 1000$
- 2. Custo cai
- 3. Converge
 - mais funcionalidade em um produto
- 4. Agrega serviços

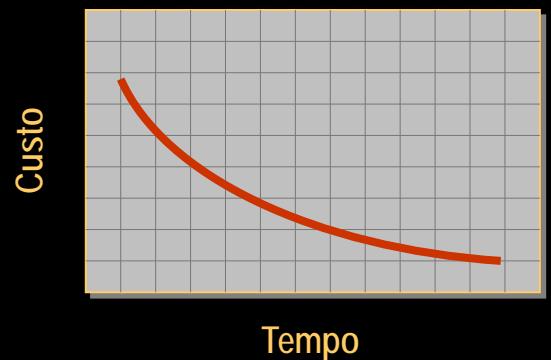
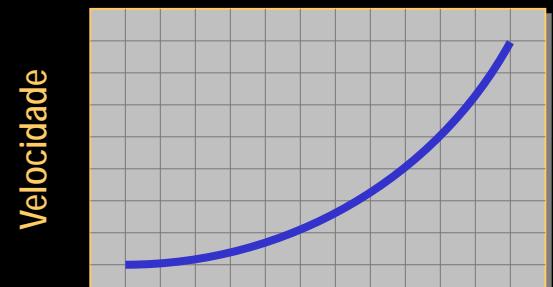
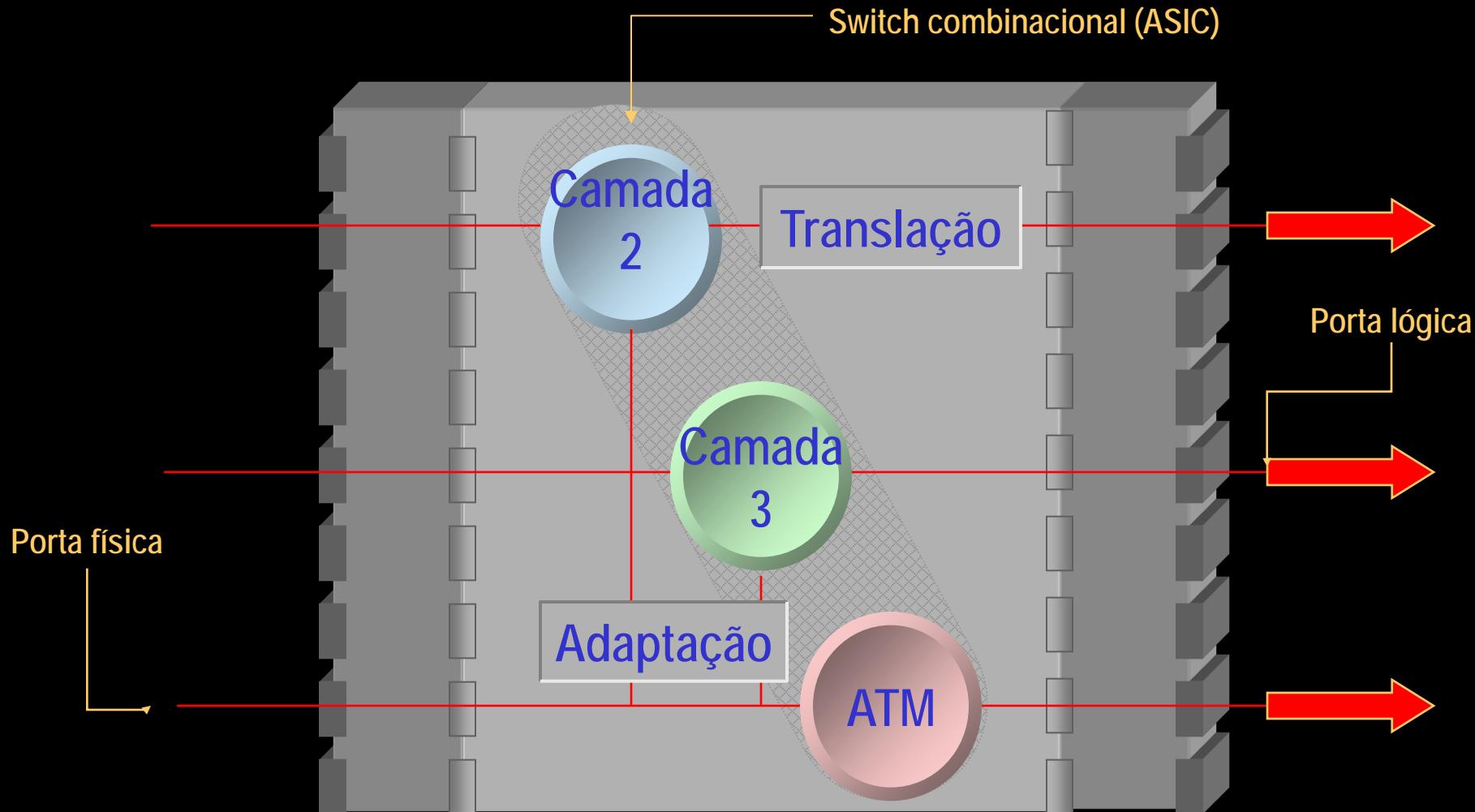
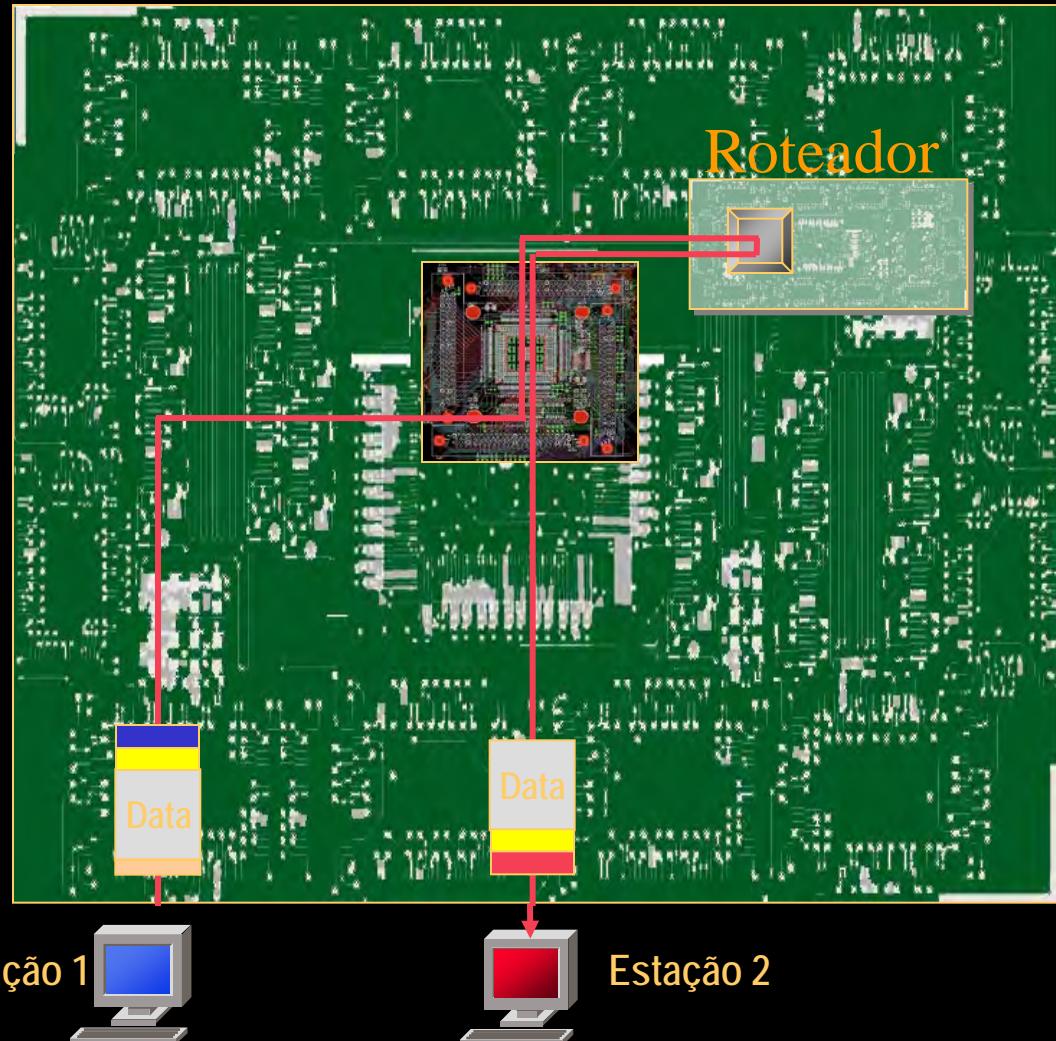


Diagrama em blocos do switch

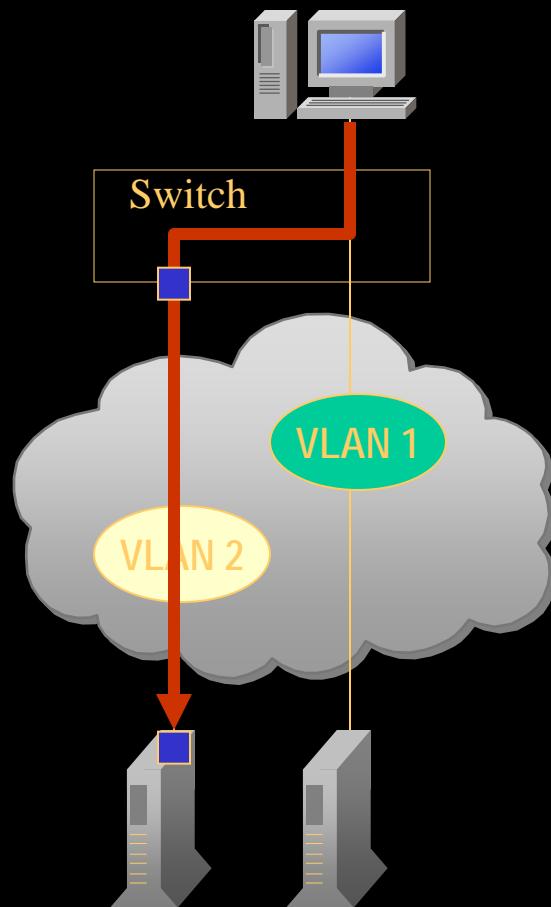


Roteamento Interno ao switch

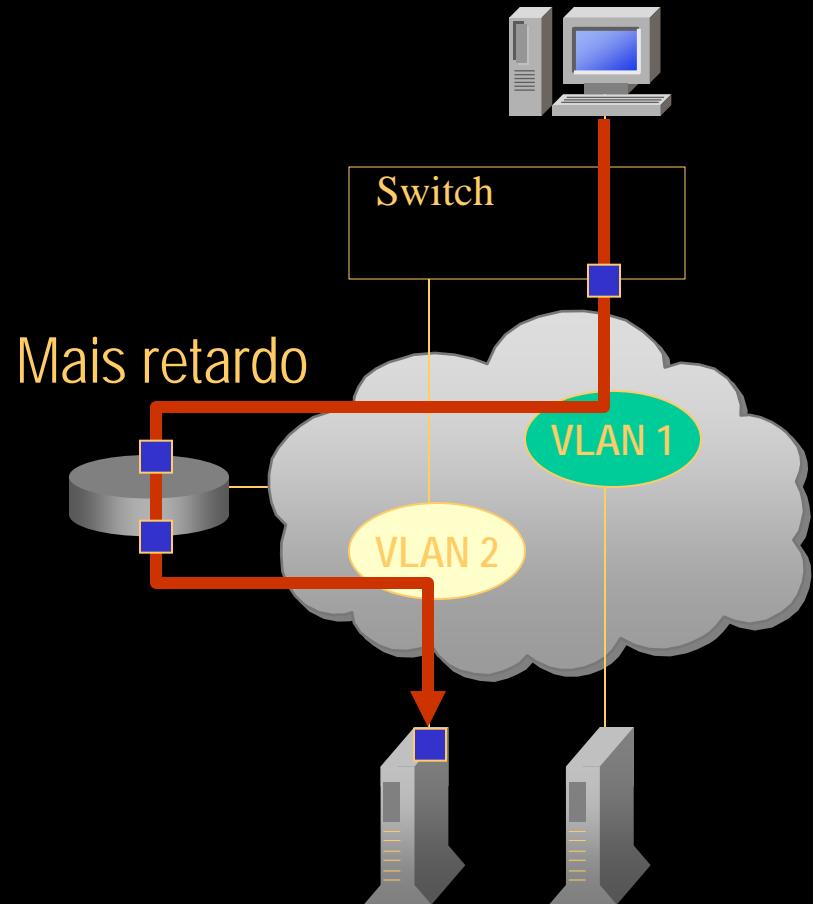


Switching de camada 3

- Com roteamento

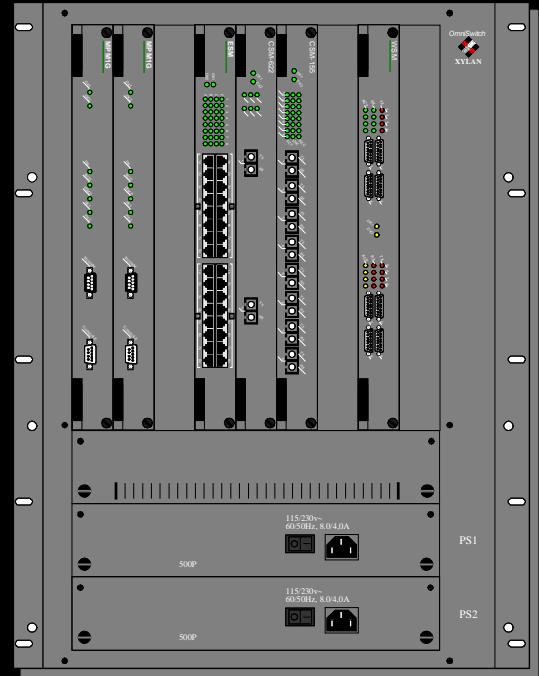


- Sem roteamento



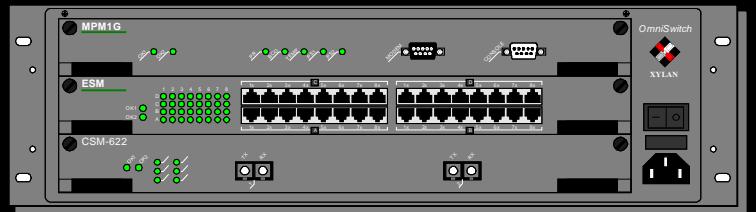
Switch central:

- Chassis modular
- Ethernet, Fast e Giga
- ATM
- Emulação de circuito
- Serviços



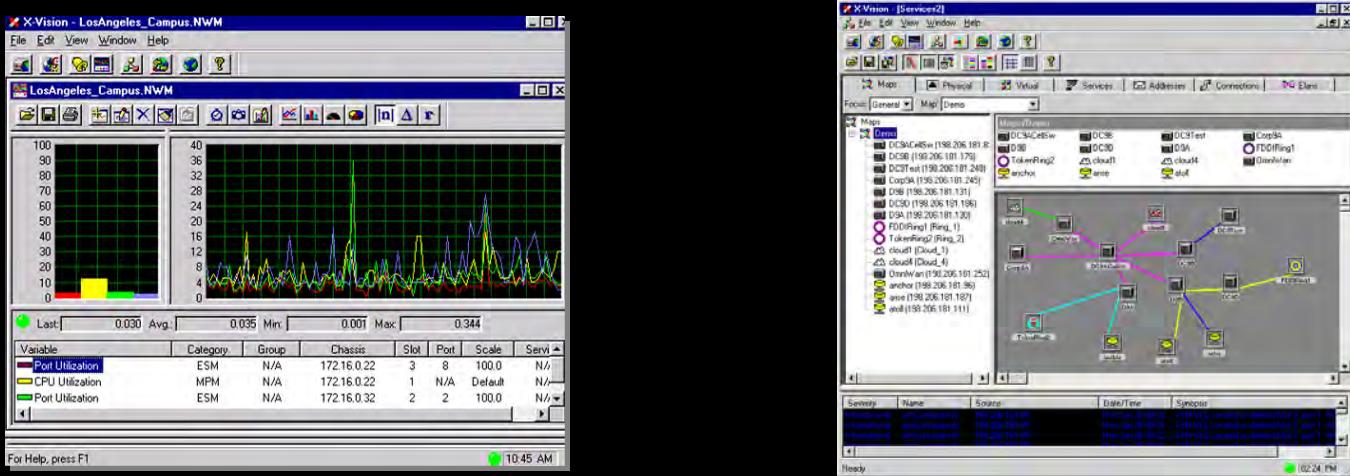
Switch de andar:

- Chassis modular ou monobloco
- Up-link Ethernet, Fast e Giga
- Up-link ATM
- Serviços



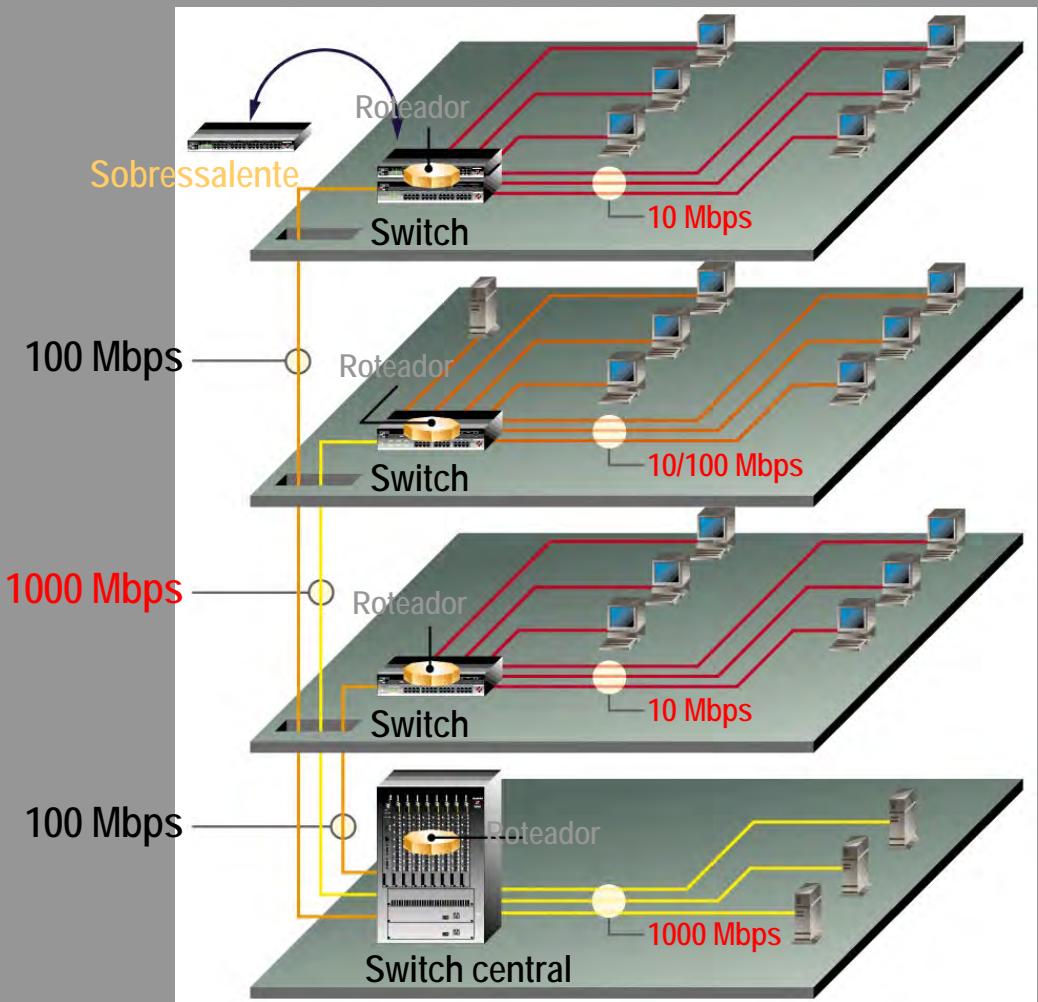
Gerenciamento

- Configuração
- Estatísticas
- Localização de falhas



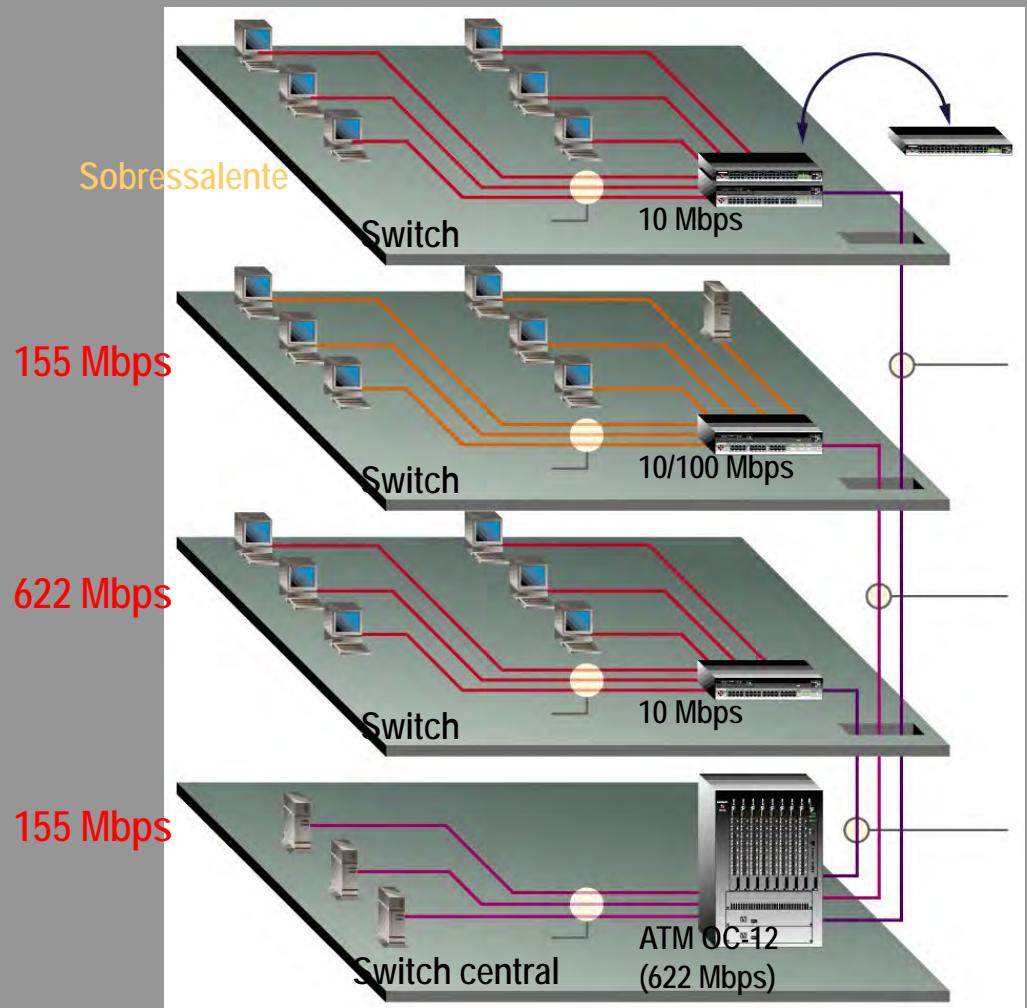
**Backbone:
Fast e Giga Ethernet**

**Servidores:
Giga Ethernet**



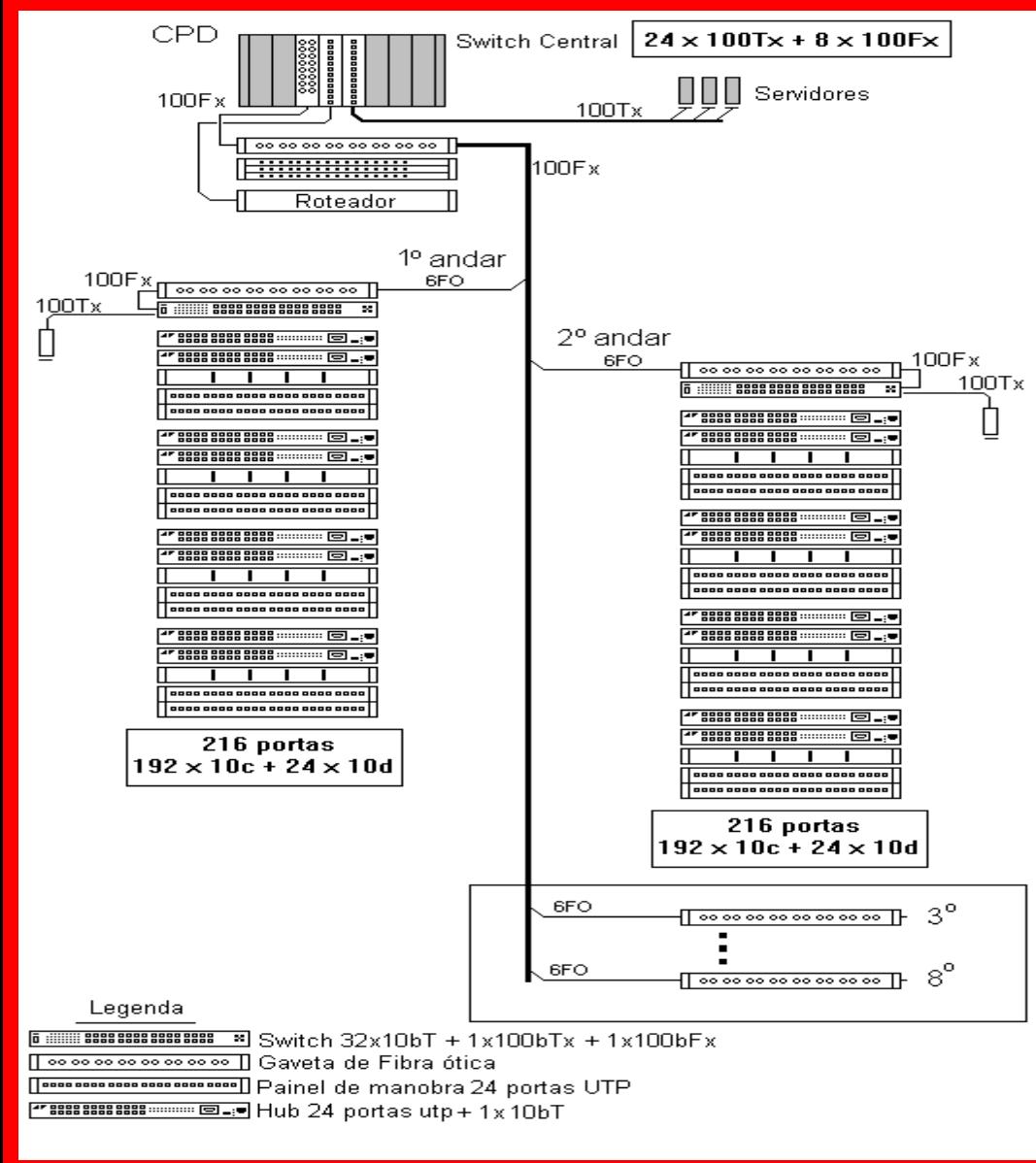
Backbone:
ATM 155 e 622 Mbps

Servidores:
ATM 622 Mbps

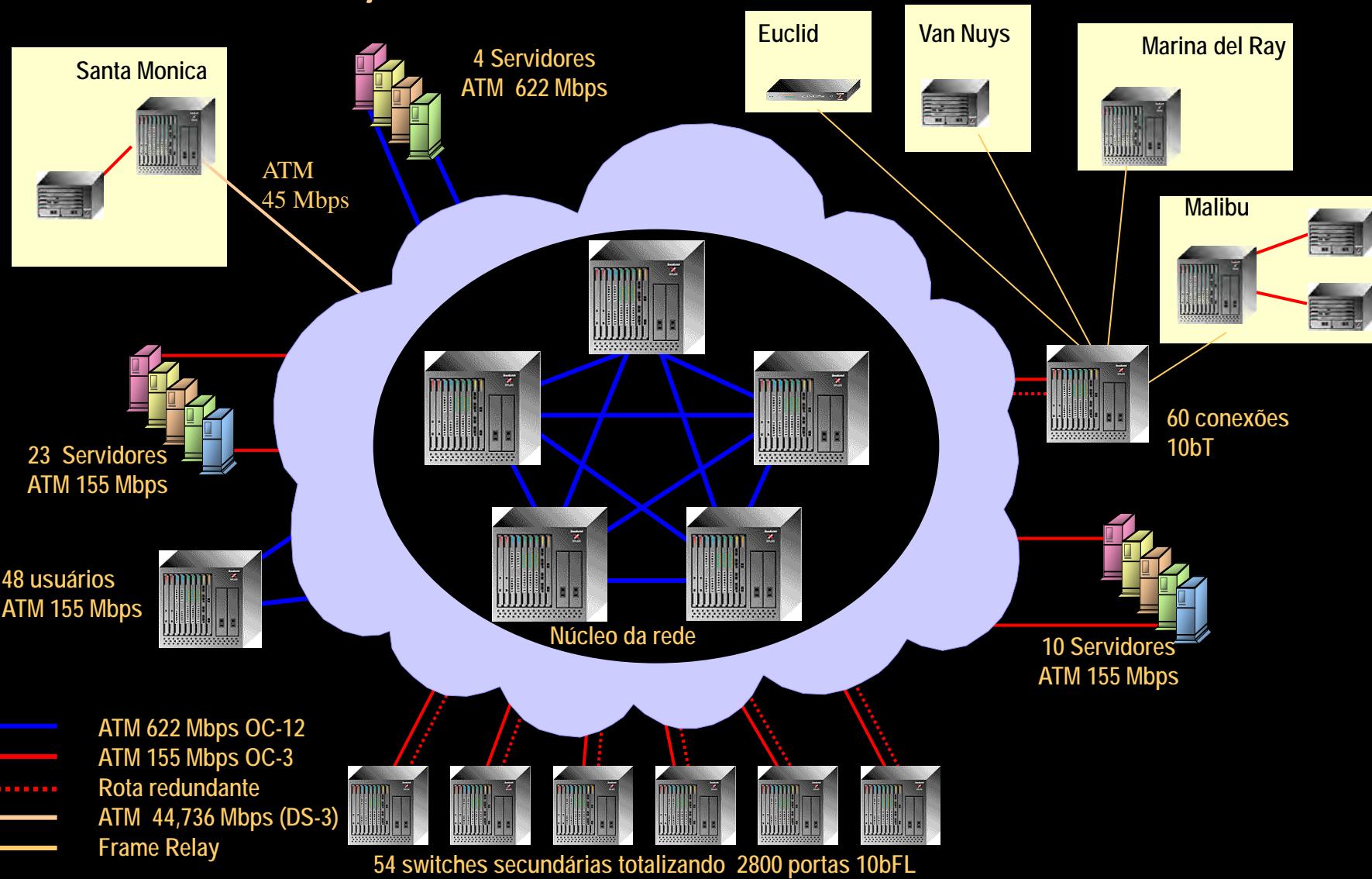


Exemplo de projeto

- Prédio com 8 andares
- 216 portas 10bT para cada andar
24 dedicadas @ 3,1 Mbps cada
192 compart. @ 0,13 Mbps cada
- 20 servidores
- 1728 estações



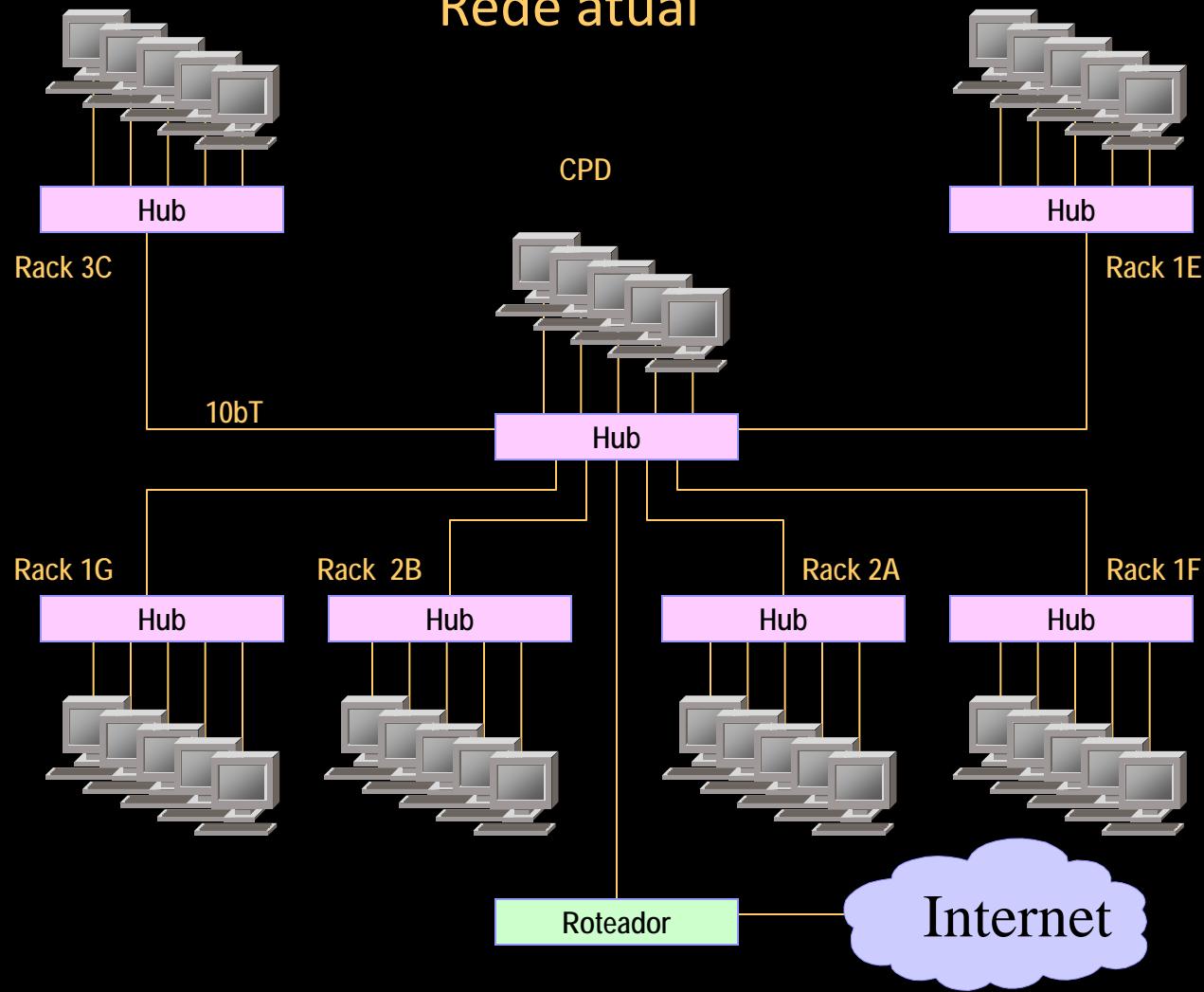
Rede do Getty Center

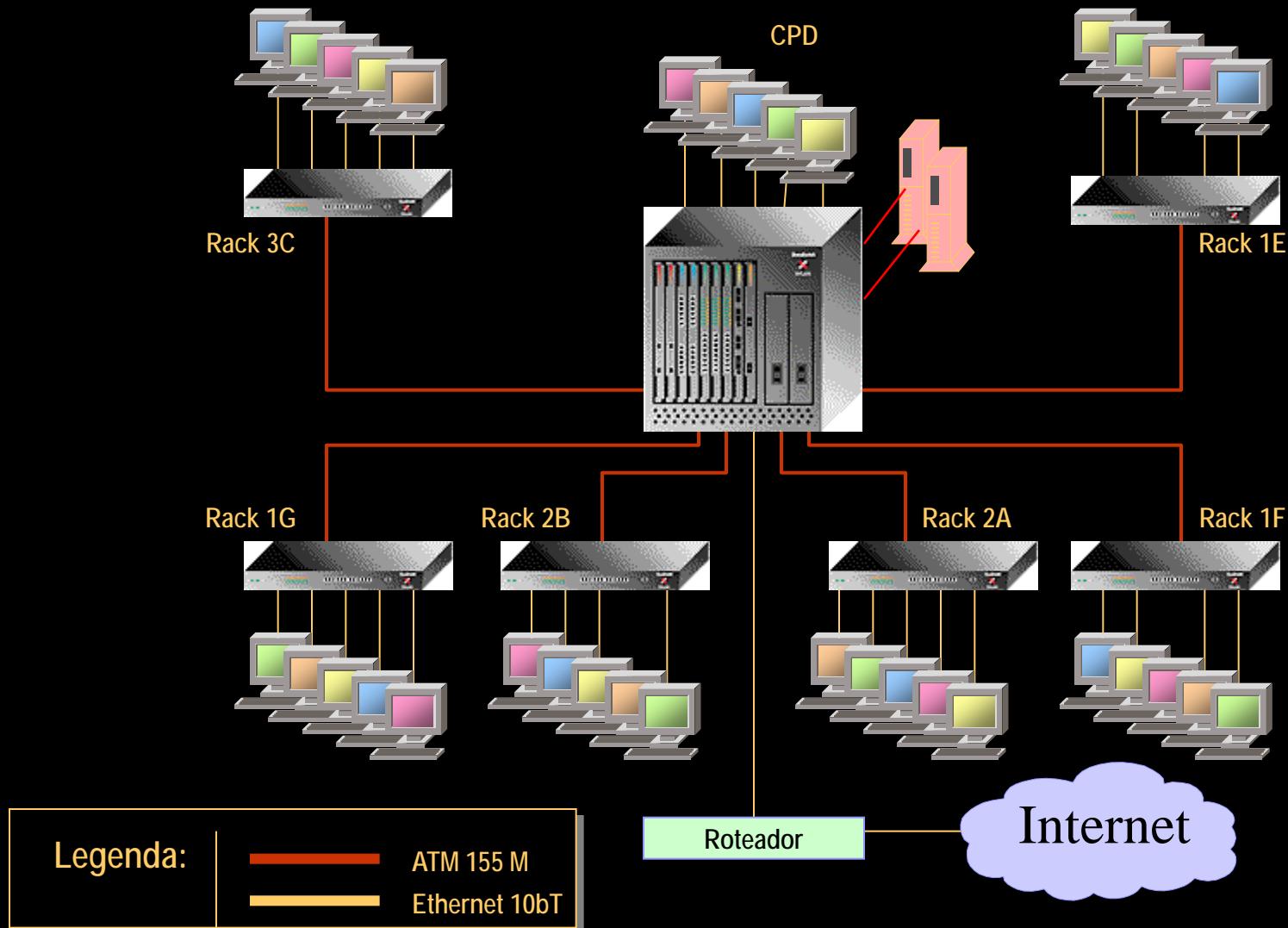


Evolução de rede

- Rede atual tem um único segmento Ethernet
- Novos aplicativos vão exigir mais banda
- Mais estações entrarão em rede
- Deseja-se deixar uma certa folga para ampliação

Rede atual





FIM

