NORTEL
NORTHERN TELECOM

Frame Relay Service Strategies

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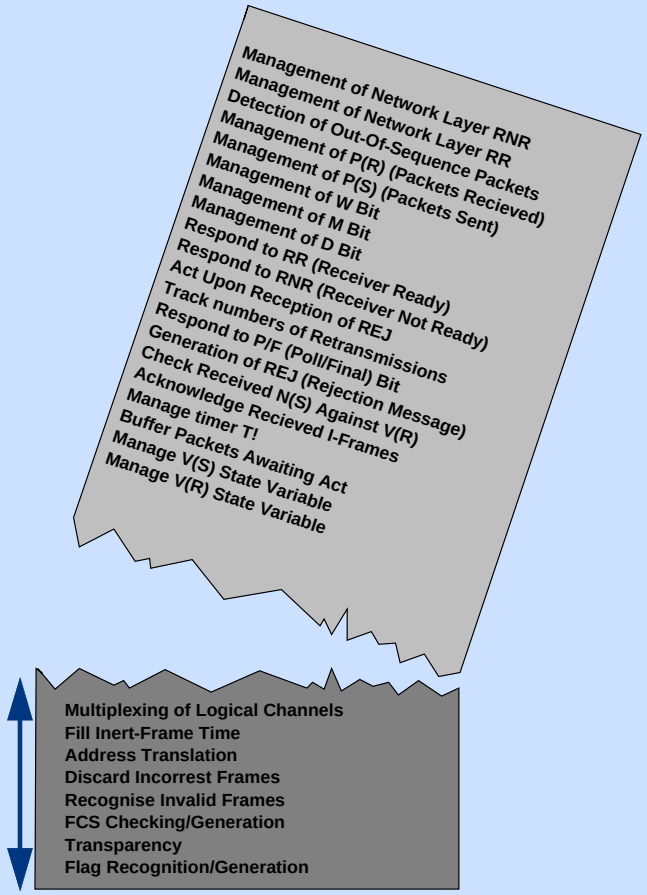
Chair, Market Development and Education Committee of the Frame Relay Forum

Agenda

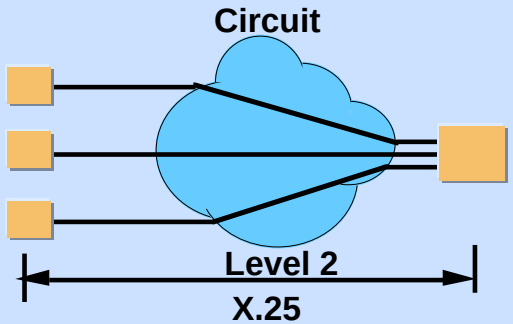
- Technology and market
- Positioning technical differentiators
- Positioning strategic differentiators
- Evolution and conclusions

What is Frame Relay?

- **A version of packet switching that takes advantage of:**
  - **greater DTE intelligence**
    - **(PCs on LANs rather than simple terminals)**
  - **improved line quality**
    - **(digital lines and fiber optics)**
- **Transmit frames at Level 2**
  - **no error correction**
  - **limited congestion control**
    - **end-user systems can perform recovery at higher OSI levels**
  - **reduced overhead processing**
  - **increased throughput**

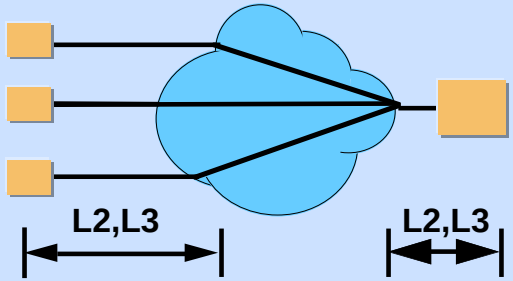


WAN Technology Alternatives



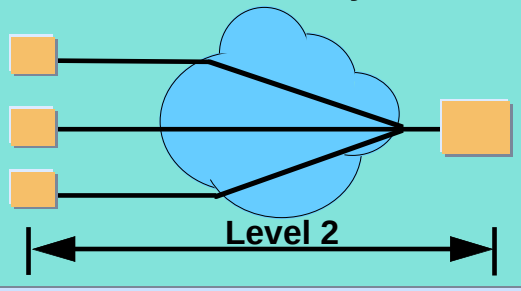
- Protocol transparency = highest throughput
- Point-to-point
- Dedicated bandwidth

} no bandwidth consolidation



- Protocol termination = high data integrity
- Point-to-multipoint
- Bandwidth on demand

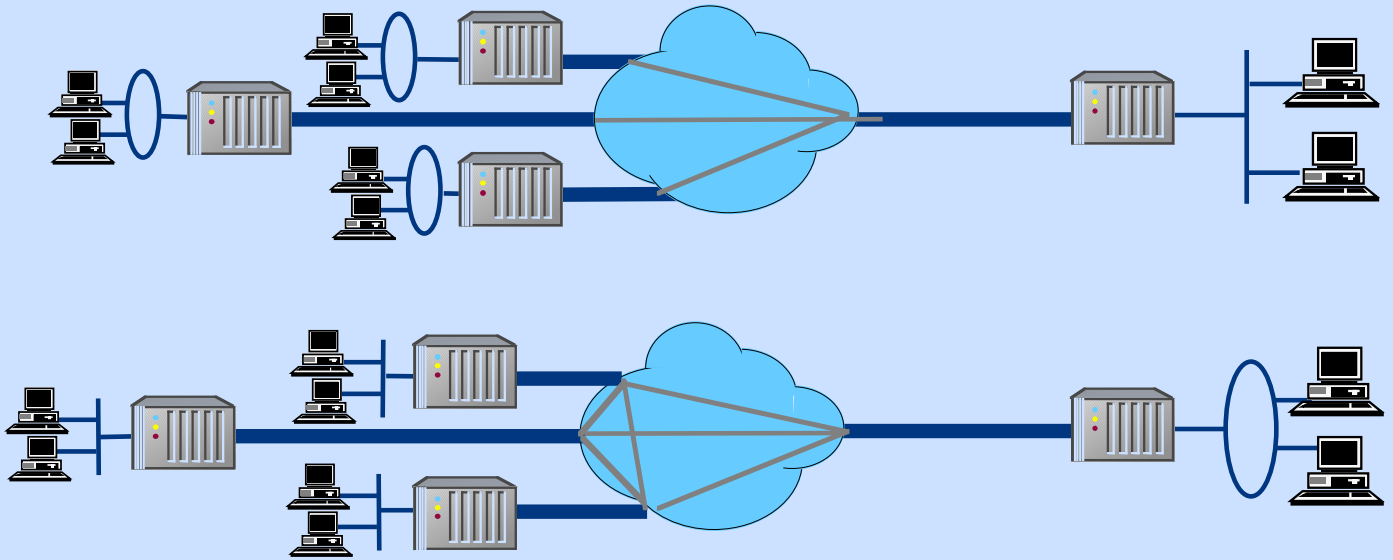
} bandwidth consolidation

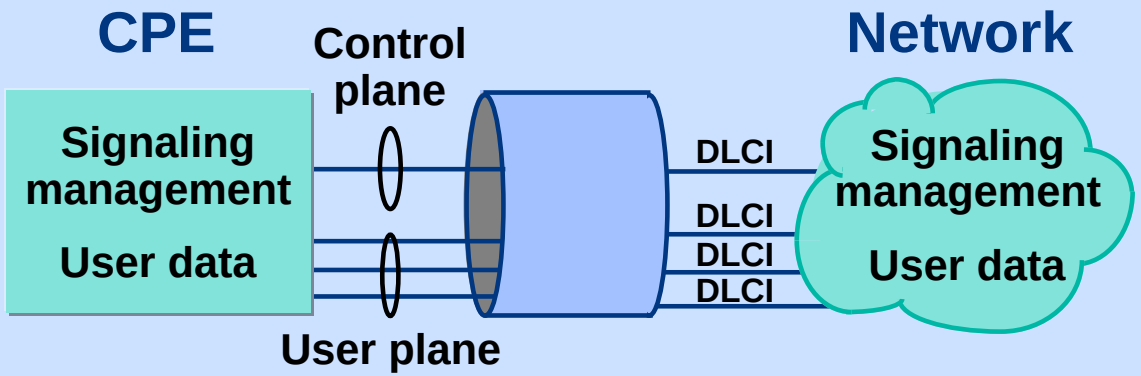


- No protocol termination = high efficiency
- Point-to-multipoint
- Bandwidth on demand
- Relationship to ATM

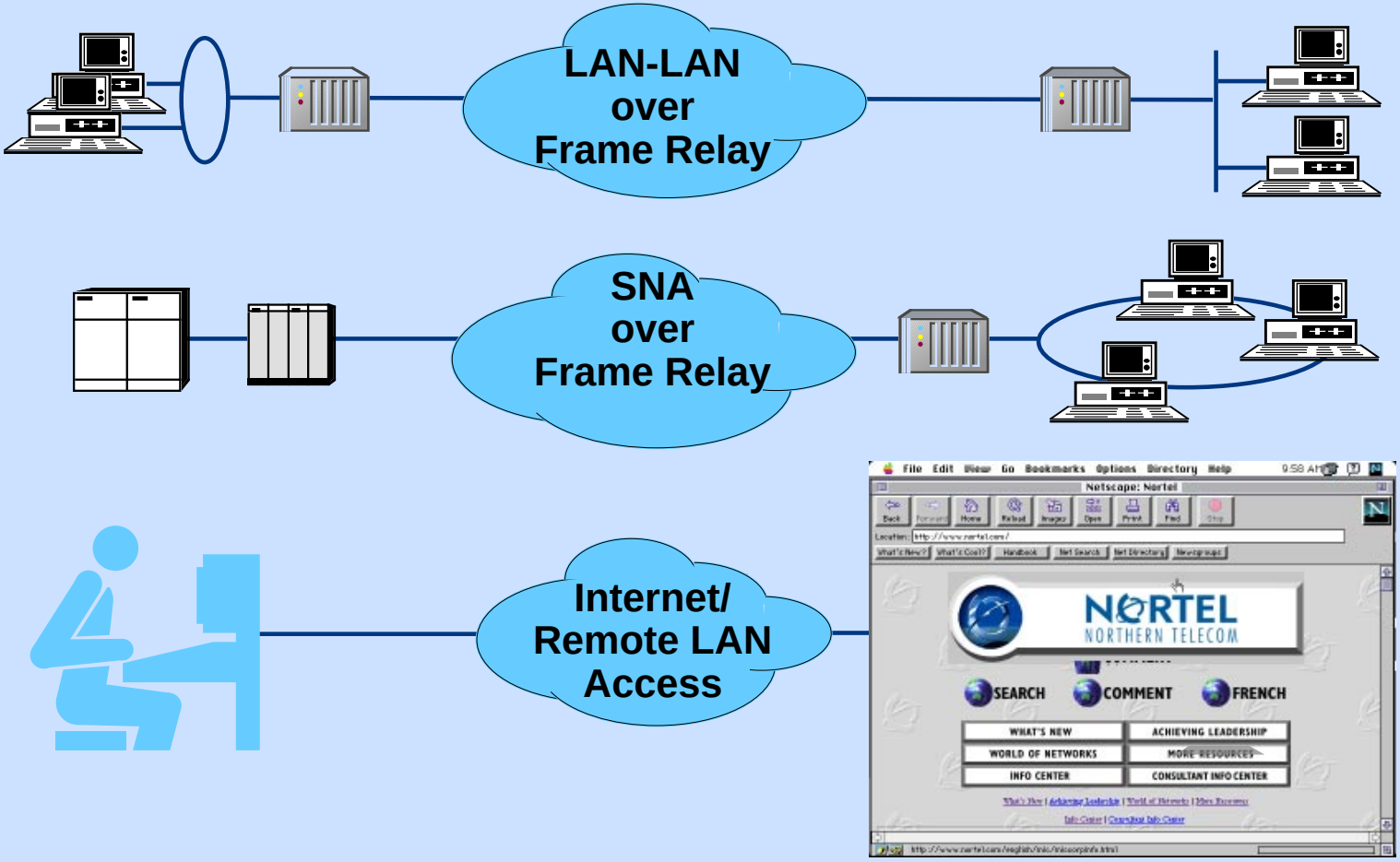
} bandwidth consolidation and evolution

Frame Relay Service Concept





Leading Frame Relay Applications

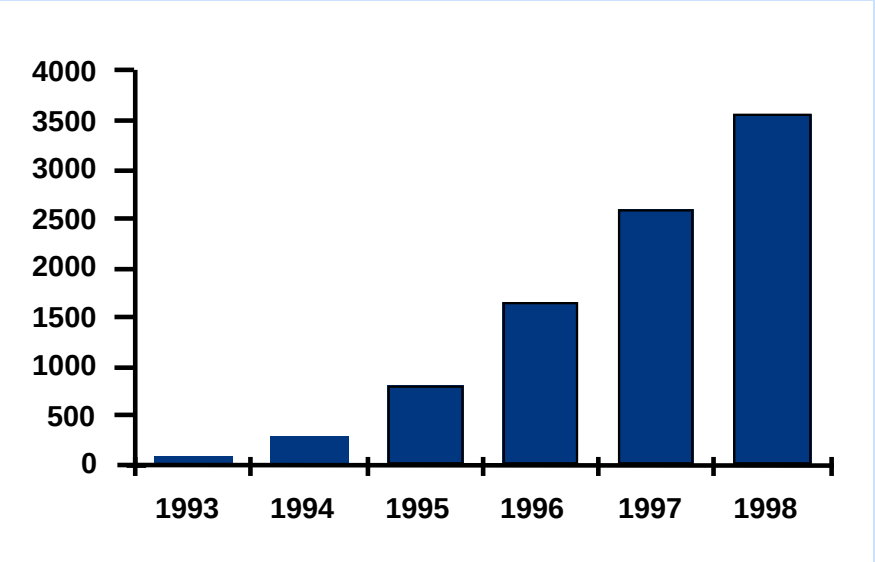


Drivers of Frame Relay

- **Savings over private line networking**
  - **savings on access, CPE and network costs**
    - **one WAN port, one facility**
- **Greater flexibility in network expansion**
  - **simplified architecture**
  - **easier adds, changes and deletions**
- **Higher survivability due to shared resources**
  - **improved application performance and network utilization**
- **Lower cost of ownership**
  - **reduced management and administrative costs**
- **Multiprotocol bandwidth consolidation**
  - **enterprise user maximizes link utilization**

Market Growth

Worldwide frame relay services market



(in US $Ms)	1993	1994	1995	1996	1997	1998
Total	80.2	267	799.2	1634	2584.1	3572.3

Source: 1995 Vertical Systems Group

Examples of Service Definitions

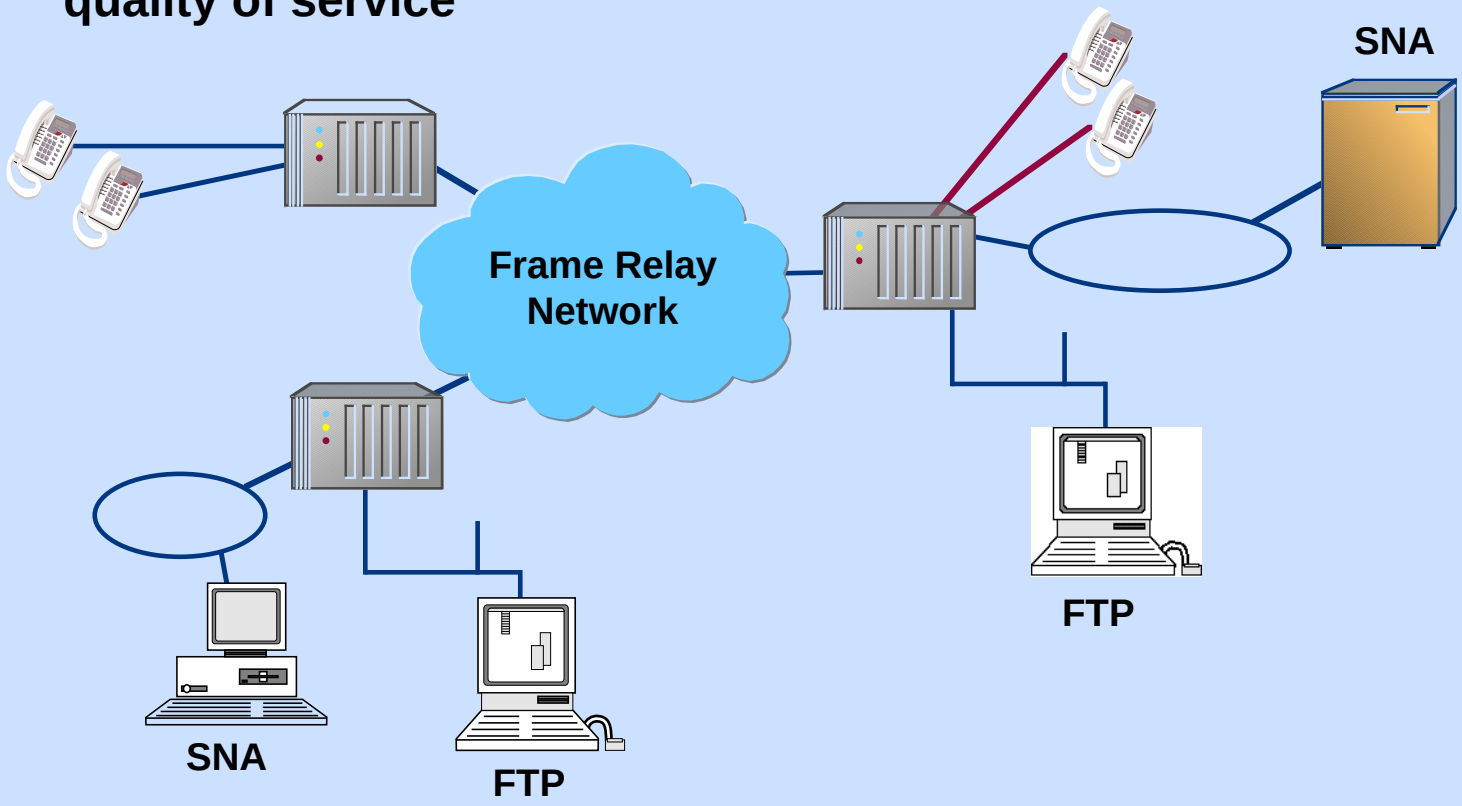
Provider	Port Speeds	CIR	Port over-subscription	Tariff Structure	Analog dial access	ISDN access	SVCs	ATM Inter-operability	Managed Offering	Managed Service
(A)	56/64 kbit/s - T1/E1	4-64kbit/s	200%	flat rate	yes	yes	yes	no	yes	Near real-time SNMP monitoring and reports
(B)	from 56 to 512kbit/s	19.2-768 kbit/s	200%	flat rate	yes	yes	no	no	yes	Monthly reports
(C)	56/64 kbit/s - T1/E1	4-512 kbit/s	200%	flat rate	yes	yes	no	yes	no	
(D)	56/64 kbit/s - T1/E1	0; increments of 8 kbit/s	200%	flat rate	no	yes	no	no	Yes	Configuration management, near real-time SNMP monitoring and reports
(E)	56/64 kbit/s - T1/E1	0; increments of 8 kbit/s	Unlimited	usage and flat rate	yes	yes	yes	no	yes	SNMP monitoring/reports
(F)	from 56 kbit/s to 6 Mbit/s	0,56,128,256 and 512 Mbit/s	Unlimited	flat rate	yes	yes	yes	yes	no	
(G)	56/64 kbit/s - T1/E1	0,19.2,38.4 kbit/s	None	flat rate	yes	yes	no	no	yes	Near real-time SNMP monitoring and reports
(H)	from 56 kbit/s to 1.024Mbit/s	1 kbit/s increments	400%	flat rate	yes	no	no	yes	yes	Near real-time monitoring
(I)	56/64 kbit/s - T1/E1	16,32,48 and 64 kbit/s	None	flat rate	yes	yes	yes	no	yes	Configuration management; real-time SNMP monitoring and reports

Service-specific Differentiators

- **Traffic prioritization**
  - **Legacy/LAN/voice coexistence**
- **Resiliency**
  - **UNI/NNI back-up**
  - **disaster recovery**
- **Switched access/Remote LAN access**
  - **digital: ISDN BRI/PRI; SW56**
  - **analog V.34**
- **High-speed access**
  - **host-link consolidation (up to 50 Mbit/s)**
  - **native LAN mode services (4, 10, 16 Mbit/s)**
- **Switched virtual circuits**
  - **meshed interconnectivity**
  - **reduced costs**
  - **voice/video application support**

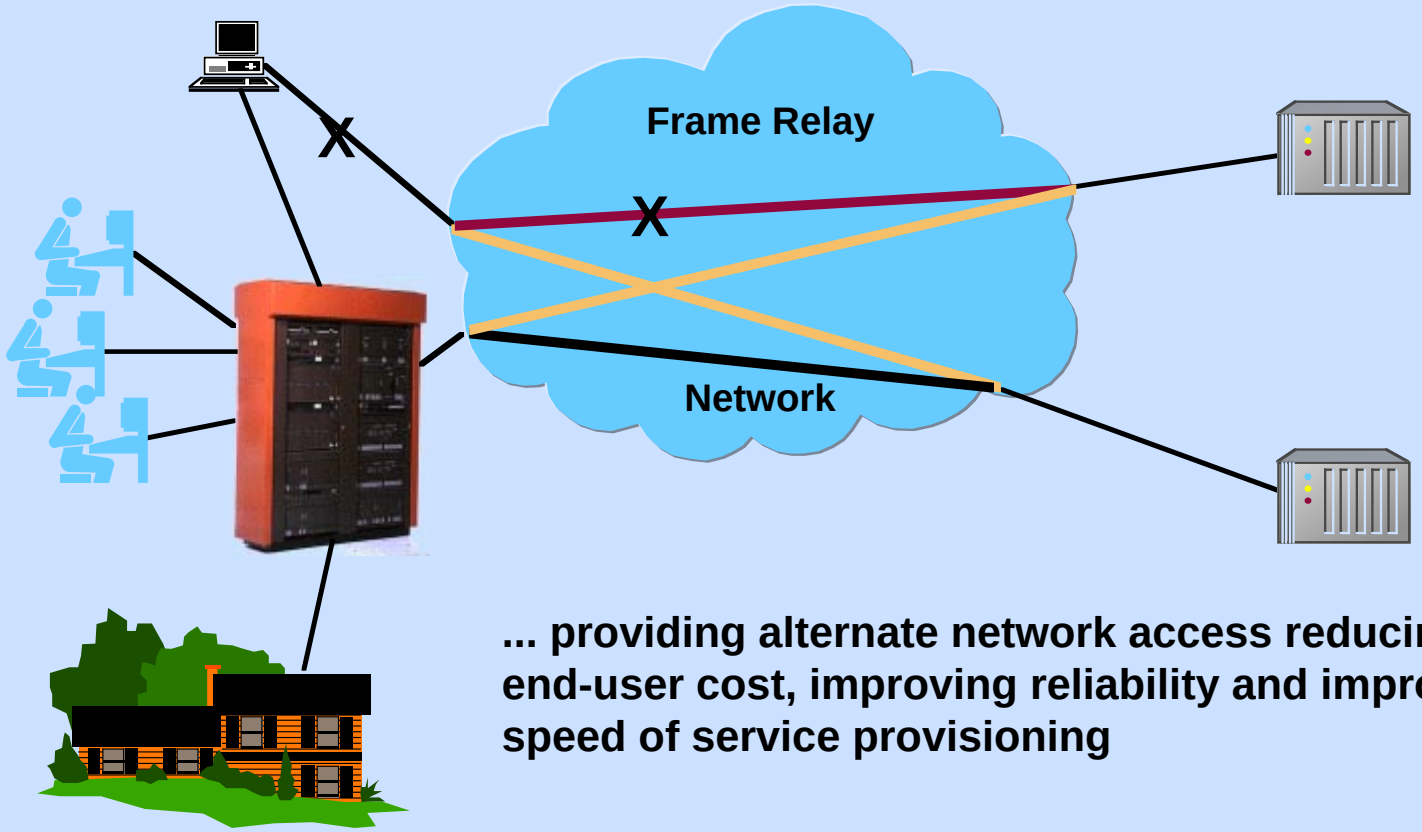
Traffic Prioritization

Networks must leverage or supply the prioritization for each traffic class to maintain an application-specific quality of service



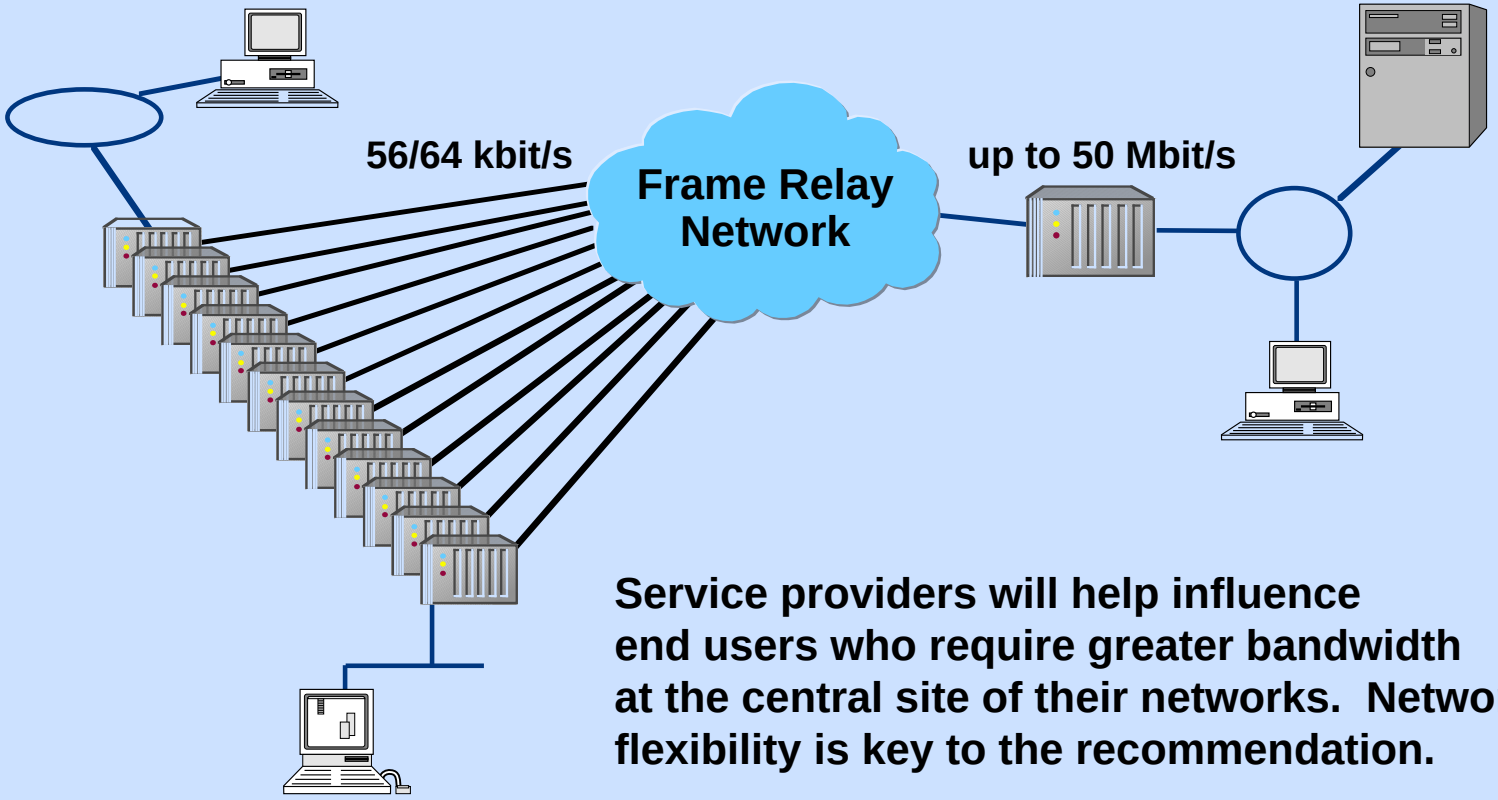
Disaster Recovery/Alternate Access

Service Providers are increasingly challenged with improving network availability and ...



... providing alternate network access reducing end-user cost, improving reliability and improving speed of service provisioning

High-speed Services

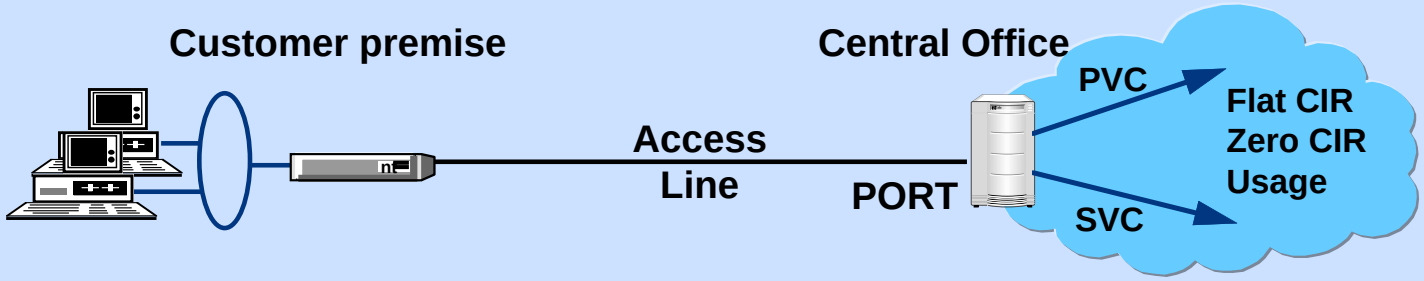


Service providers will help influence end users who require greater bandwidth at the central site of their networks. Network flexibility is key to the recommendation.

Differentiating Tactics - Strategic

- **Innovative tariffs**
  - **using port speed, # of PVCs, CIR, distance**
- **Provide a 'guaranteed' service**
  - **proper engineering of backbone**
    - **over engineer backbone**
  - **provide reports validating usage**
- **Offer component management of CPE equipment**
  - **and/or consulting services**
- **Virtual private networking/customer network management**
  - **private NNIs**
- **Customer service and marketing**
  - **responsive and educated support staff**
  - **lead the introduction of new products, services and technology**

Innovative Pricing

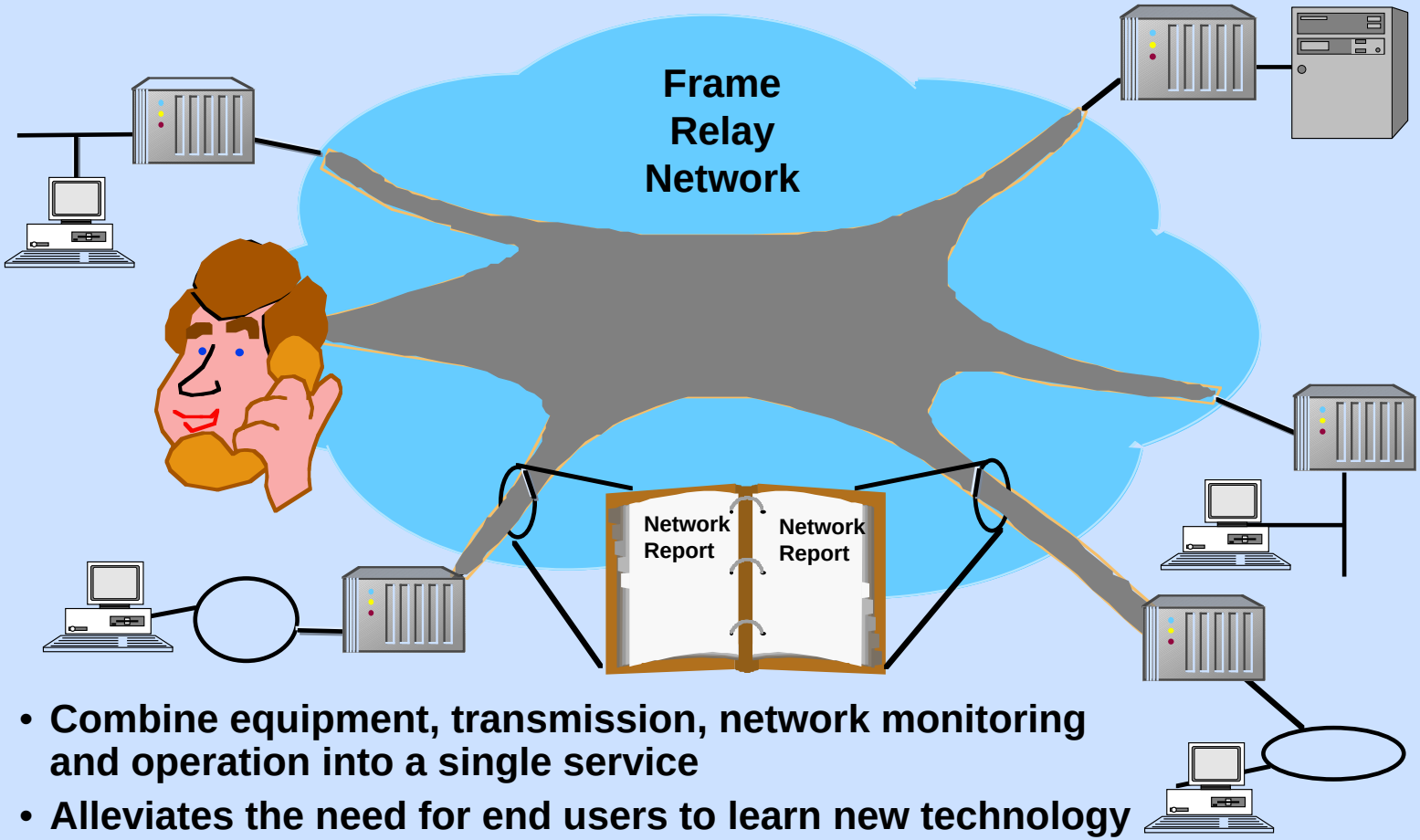


Tariff Example

Speed	Port Mthly	One-time	Access Mthly	One-time
56 kbit/s w/DSO	75.00	375.00	50.00	630.00
128 kbit/s w/DS1	150.00	375.00	175.00	634.00
384 kbit/s w/DS1	400.00	375.00	175.00	634.00
1.536 Mbit/s w/DS1	500.00	375.00	175.00	634.00

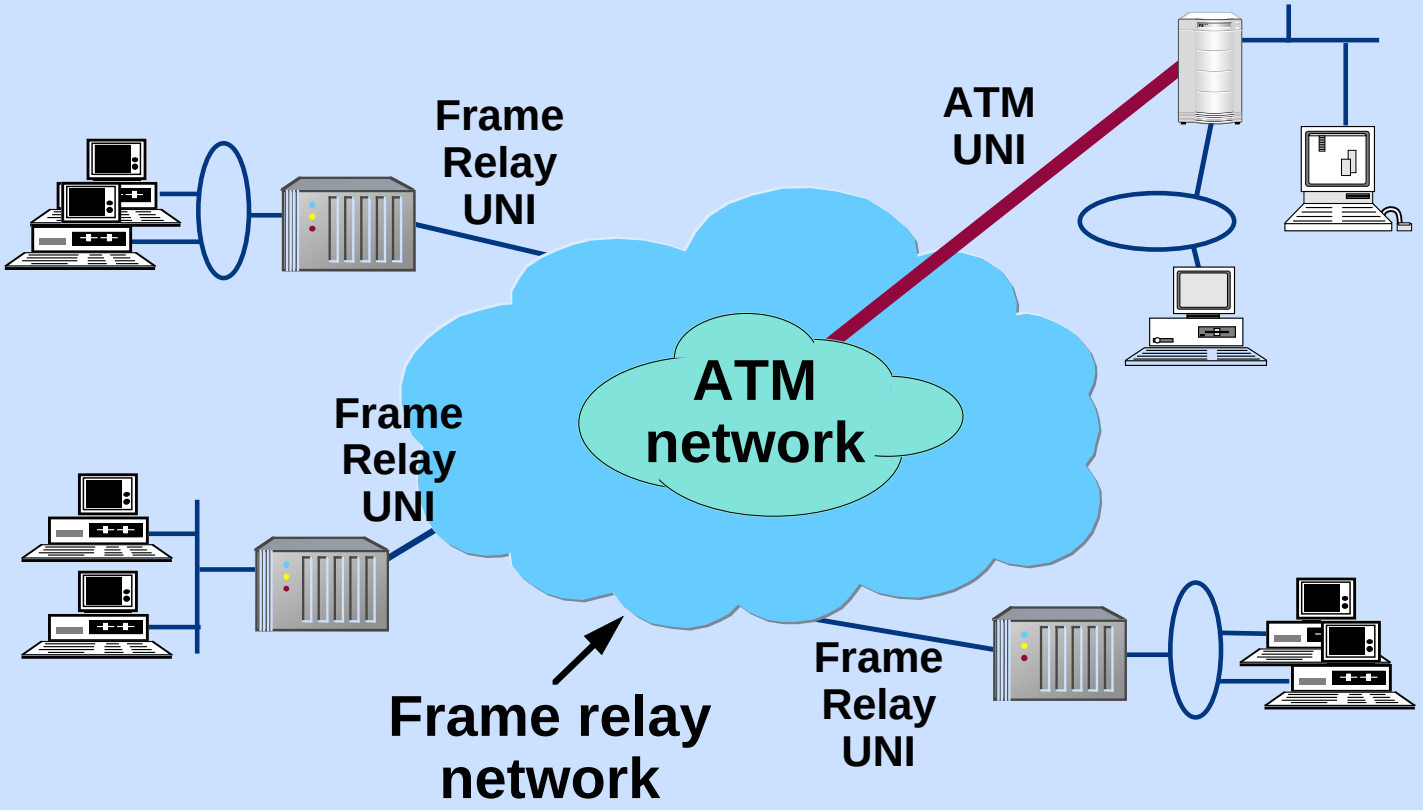
Other Features	Monthly Charge	One-time Charge
First DLCI per port	None	None
Next 2-6 DLCI per port	15.00 each	None
Next 7-11 DLCI per port	10.00 each	None
12th an above DLCI per port	5.00 each	None
Change charge per port	None	30.00
Traffic detail per customer	15.00	50.00

Managed Services



- Combine equipment, transmission, network monitoring and operation into a single service
- Alleviates the need for end users to learn new technology and frees resources to focus on business objectives

Smooth Evolution to New Technology



Conclusions

- **Strong growth through the end of the century with excellent revenue opportunities**
- **Established frame relay service providers will be positioned to offer follow-on services**
- **A platform with many value-added frame relay features is a key differentiator for next generation service offerings**
- **Administrative responsiveness, technical support and flexibility are values of high interest to the end user**