

Customer Network Management Requirements

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Biographical Information - The seminar will be led by Steven Taylor, President of Distributed Networking Associates and Publisher/Editor in Chief of Webtorials.Com, a premier source of on-line telecommunications seminars and market research. An independent consultant, planner, author, and teacher since 1984, Mr. Taylor is frequently quoted in the trade press and is one of the industry's most published authors on high bandwidth networking techniques. Distributed Networking Associates may be contacted at 2707 Lake Forest Drive, Greensboro, NC 27408; (336) 288-3858. E-mail: taylor@distributed-networking.com.

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Customer Network Management Requirements

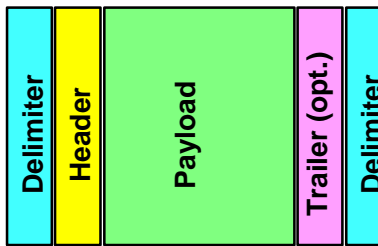
- Typical Customer Networks
- Management Challenges
- Possible Solutions

Today's Networks

- | | |
|-----------------|-------------------------|
| ■ What we hear: | ■ What this means: |
| ■ VPNs | ■ Packet-based |
| ■ Intranet | ■ Provided by a carrier |
| ■ Internet | ■ Fast |
| ■ ATM | ■ Rapidly changing |
| ■ Frame Relay | ■ Out of control? |

Reminder: Generic Packet Format

- Protocol Data Unit (PDU) is basic building block
- Key differences:
 - Fixed vs. variable PDU length
 - Connection vs. connectionless



Where Packet Types Fit...

	Fixed length	Variable length
Connection	ATM	Frame Relay
Connectionless	N/A	IP

Even though there is perceived - and sometimes actual - competition between ATM, Frame Relay, and “Native IP” network services, the similarities are much stronger than the differences. They’re all ***Broadband Packet***.

Move from the “Private” Network

- We built “private networks in the 1980s due to:
 - Economics
 - Failure of the Carriers to Respond to Users' Data Networking Needs
 - Network Flexibility and Competitive Advantages
- Move to tighter “hybrid” integration
 - Broadband packet services will lead to new transport mechanism for “private networks”
 - Requires shift in philosophy by vendors, users, and carriers
 - Still need a feeling of control

Customer Network Management Requirements

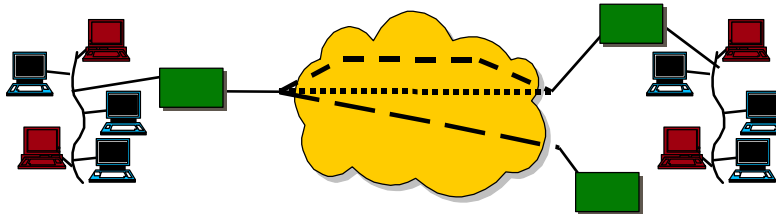
- Typical Customer Networks
- ➔ Management Challenges

Management Challenge Areas

- Configuration Management
 - Moves Adds and Changes
 - Performance management
- Design, Planning, and Modeling
- Fault Management
 - More in the carrier domain than with “private networks”
 - But still important
 - “Faults” are more difficult to quantify
 - No longer a simple “binary” decision

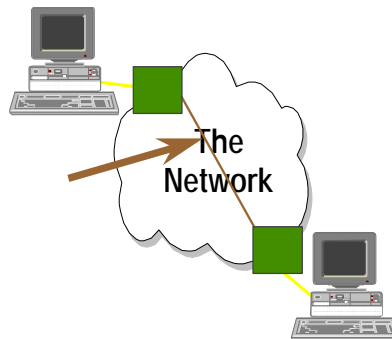
Configuration Management Example: Frame Relay PVCs

- Dominant transport for Frame Relay today
- Similar functions apply for ATM
- Quality of Service is delivered via CIR
 - “Native IP” does not *currently* have similar QoS



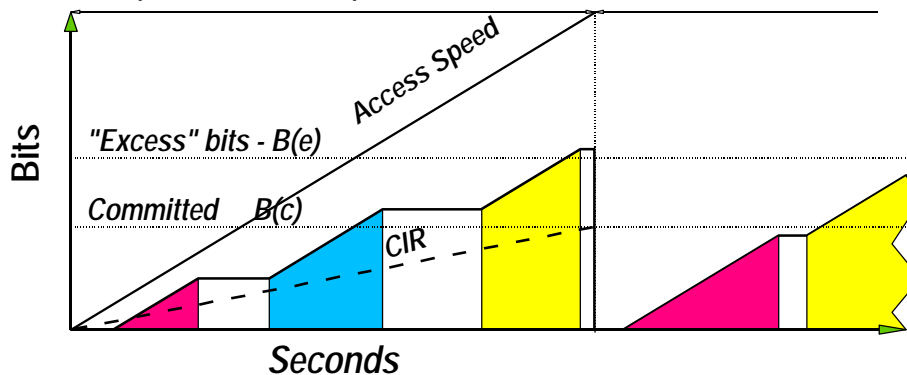
Frame Relay Pricing Elements

- Access local loops from standard tariffs
- Port Charge based on access speed
- ➔ PVC Charge



Committed Information Rate

- CIR is designed to guarantee a certain expectation of performance



Computing an Appropriate CIR

- Key parameter is measurement interval for CIR
 - Usually VERY short due to buffers, etc.
 - Much shorter than periodicity of information
- Report intervals may show much lower utilization than is needed for performance
- Should be order of magnitude needed for DTS

Economics

- Assume start with bidirectional 512 kbps PVCs
- Detailed analysis shows real need for 384 kbps for the "heavy" traffic direction and 128 kbps in the other
- Representative* monthly pricing for PVCs drops from \$1550 to \$800. Lower port speed saves another \$160.
- ***Total savings are \$11,000 per year on this single PVC.*** *Specific savings may vary...

Bottom Line

- The move to more complex carrier services changes the customer's "demarc point" for management of the services
- Both new tools and new skill sets are required
- Packet services further complicate planning and modeling
 - Make a prior static model dynamic
 - Automated tools are needed
 - Must have a good database to work from

Customer Network Management Requirements

- Typical Customer Networks
- Management Challenges
- ➔ Possible Solutions

Possible CNM Solutions

- Exact solutions will depend on technology chosen for infrastructure
- As a rule (subject to *a lot* of opinions)
 - ATM is the most manageable
 - Frame Relay is in the middle
 - IP is the least manageable, but may run over ATM or FR
- Frame Relay used here as an example for CNM specifications and enhanced products

Example 1: FR “Customer Network Management”

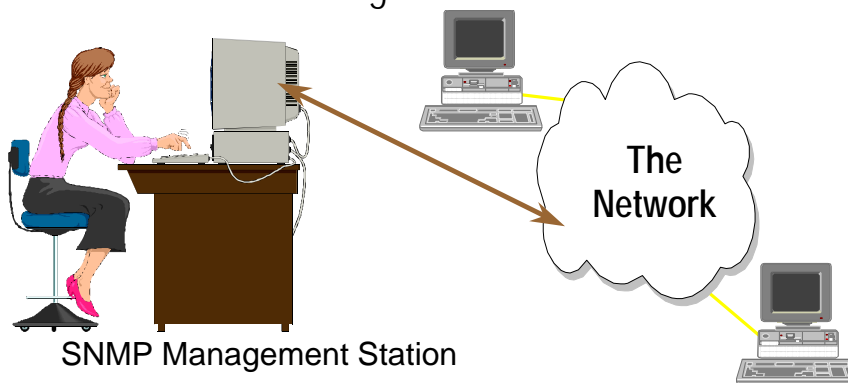
- The Frame Relay Forum doesn’t officially “do standards,” but there *IS* an “implementation agreement” for “Customer Network Management”
 - PVCs only
 - Joint development by Frame Relay Forum and IETF
 - FRF.6 - March 1994
 - Based on RFC 1604
 - Based on SNMP
 - Essentially a MIB

Scope of FRF.6

- Monitor capabilities
 - "Peek" at various parameters for status info
 - MAX-ACCESS read-only
- Reconfiguration Capabilities
 - "Poke" to activate, deactivate, etc.
 - MAX-ACCESS read-create
 - Similar capabilities to SVCs... More later.

Span of FRF.6

- For use within a single carrier network

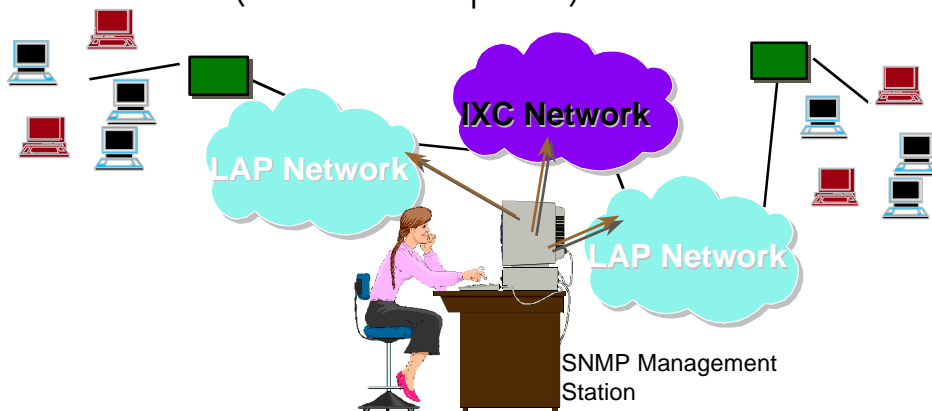


Representative Capabilities

- Read-only
 - Network contact
 - In-Channel Signalling Protocol
 - None, LMI, T1-617D, T1-617B, Q.933
 - Network event counters
 - DLCI
 - Frames Sent/Received
- Read-Write
 - Connection Status
 - B_c and B_e
 - Maximum Frame Length
 - Committed Information Rate (CIR)
- Optional
 - Accounting Information

Multiple Carrier Networks

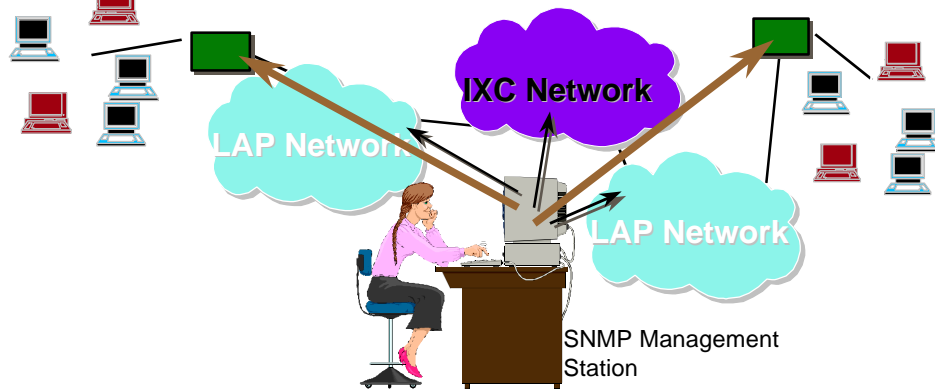
- Separate statistics and management for each network. (DTE is also separate)



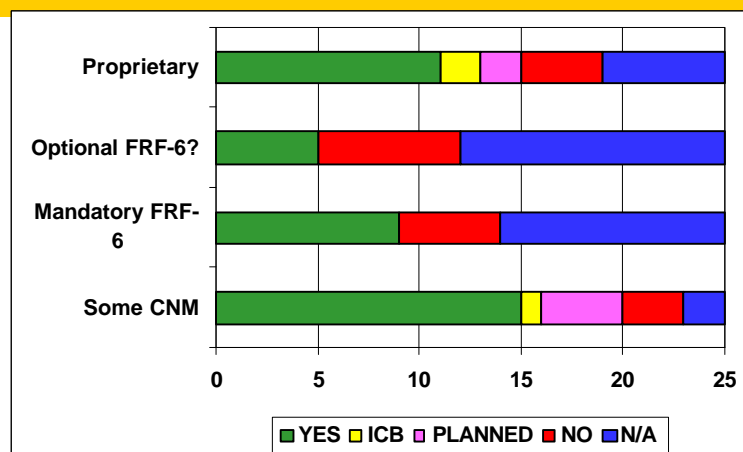
Frame Relay DTE

■ Separate RFC for DTE Management

■ RFC 1315



Carrier Offerings of CNM Capabilities



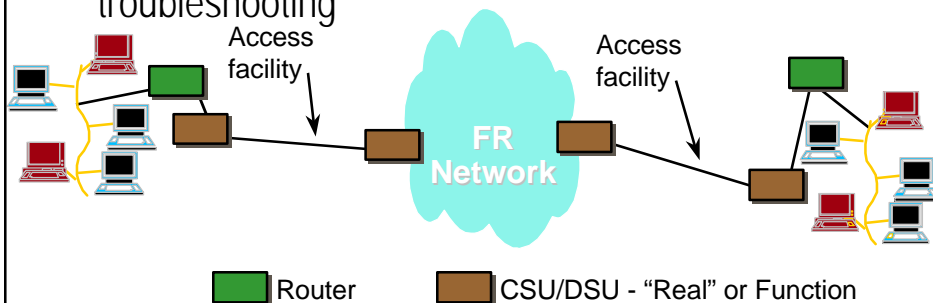
Based on responses from 25 carriers; Source <http://www.webtorials.com>

Frame Relay Service Level Definition IA

- Current Work in the Frame Relay Forum
 - Currently out for "Letter Ballot"
- Intent is to define the parameters used in Service Level Agreements (SLAs)
 - Provide a common vocabulary
- **Should** make it easier to compare service offerings from various carriers...

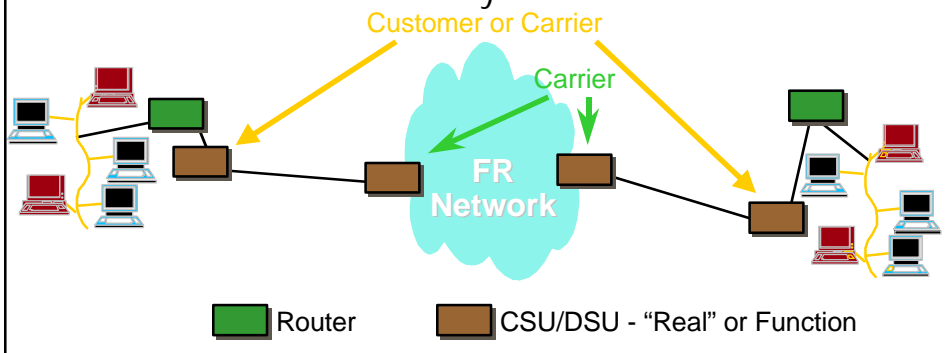
Example 2: FR/ATM CSU/DSU-Based Management Tools

- CSU/DSU is the common element in all Frame Relay UNIs (at least to T1/E1 speeds)
- Excellent "demarcation point" for statistics and troubleshooting



Who owns the CSU/DSU?

- The "Network Side" CSU/DSU is always owned by the carrier
- The "Customer Side" may be CPE or CLE



Status of CSU/DSU Management

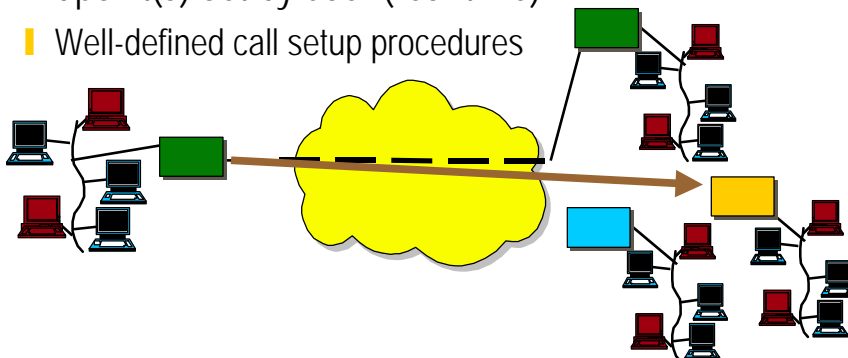
- Several products are on the market
- Proprietary and standardized statistical output
- Software to "fine tune" CIRs, etc.
- Can pay for itself quickly in reduced costs
- Provides "independent" point of view for troubleshooting
- Can be CPE or CLE as part of a "managed service"

CDU/DSU Future

- Adds value to an already valuable service
 - Also “keeps the service provider honest”
 - Helps alleviate historical mistrust of carriers
- Can be deployed equally well as CPE or CLE
- Large installed customer base
- Domestic and international markets
 - Internationally and at higher speeds, a “probe” model may be used

Example 3: FR Switched Virtual Circuits (SVCs)

- May coexist with PVC
 - In fact, this is usually the case at host sites
- Endpoint(s) set by user (real-time)
 - Well-defined call setup procedures



Current SVC Status

- Standards in place for Frame Relay & ATM
- ATM
 - Primarily ATM LAN equipment
 - Some ATM services
- Frame Relay
 - Equipment is available
 - One carrier (MCI) offers FR SVC in early mode now
 - Still promised by many

CNM and SVCs

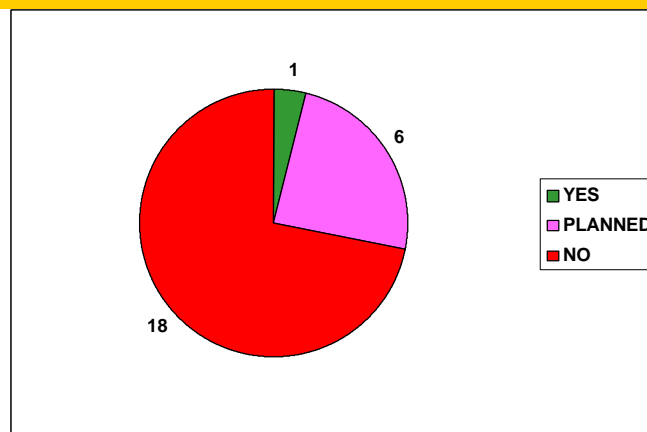
- Both provide many of the same functions
- Management may be ultimate deciding factor for success
- Streamlines the provisioning and "MAC" processes
 - Major problem today

CNM, SVCs, and Pricing

- The ultimate success of SVCs (and CNM, either via SVC or FRF.6) may be price
- Eliminates the need for manual intervention



SVC Availability



Based on responses from 25 carriers; Source: <http://www.webtorials.com>

Summary

- Customer Network Management Requirements
 - Typical Customer Networks
 - Management Challenges
 - Possible Solutions
- For more detailed information, check out <http://www.webtutorials.com>