

FRAME RELAY CHALLENGE

Using
Frame Relay
To Merge Your
SNA and LAN
Networks Can
Help Reduce
Your Overall
Networking
Cost

We'll Show You How:
Here Are 11 Comparative,
Real-World Solutions
By Leading Equipment
Vendors and Service
Providers

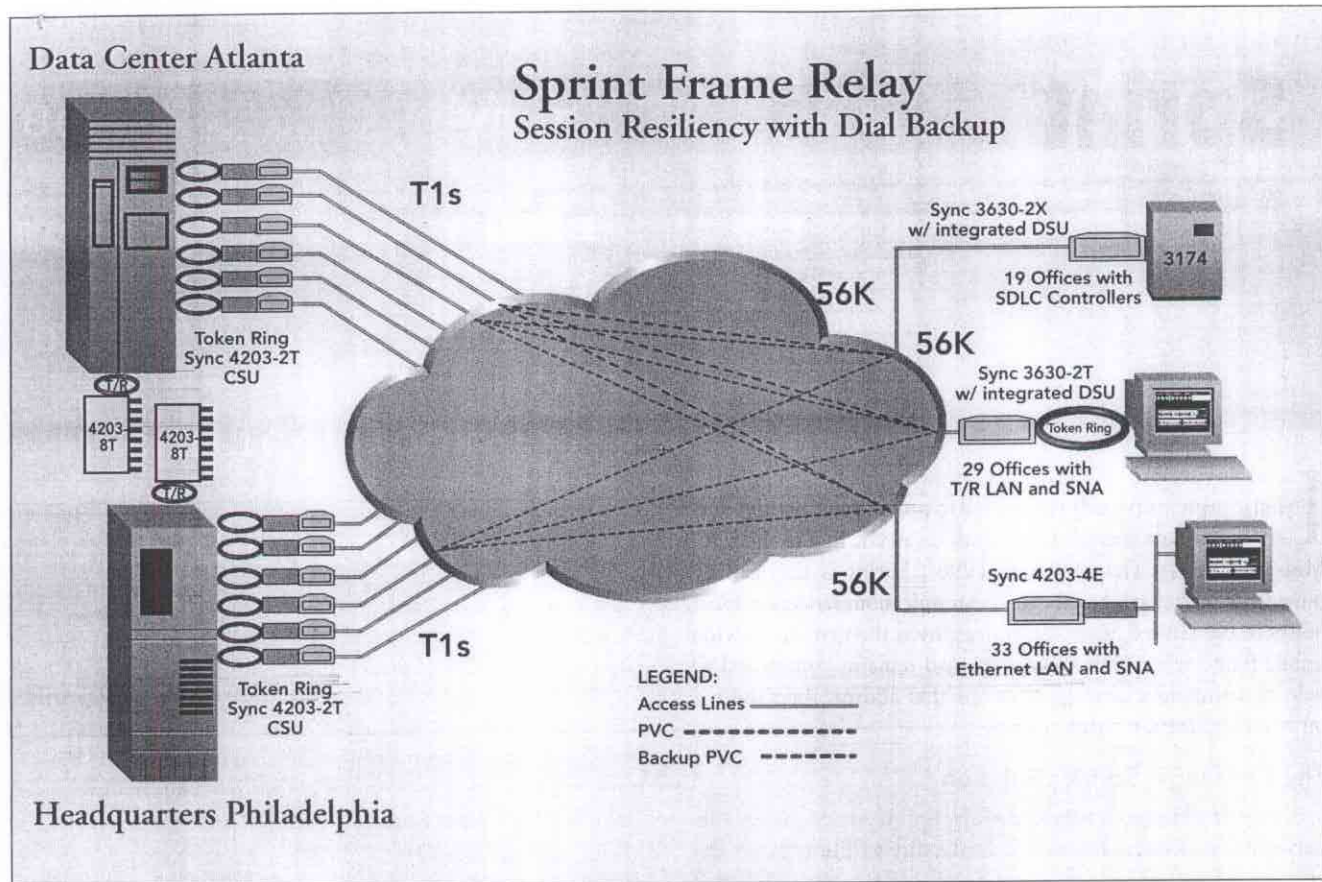
A Layland Consulting Solutions Showcase

Table of Contents

Introduction by Robin Layland, Layland Consulting
The SNA-Frame Relay Challenge Solutions Showcase A3

The System Challenge—by Robin Layland
Solving the SNA and LAN Problem Using Frame Relay A4
Cabletron Systems A6
Motorola A12
3Com A15
Hypercom Network Systems A18
Bay Networks A21
Sync Research A24
FastComm A27

The Service Challenge—by Robin Layland
The Frame Relay WAN Service Provider Challenge A30
AT&T A32
Intermedia Communications A35
MCI A38
Sprint A41



Service and Problem Resolution

Sprint Technical Support Services include performance management, configuration management, problem management, change management, major project support, engineering design and analysis, and network management center services. The unique Sprint In-TouchSM Web-based management gateway lets the network manager initiate trouble tickets and check status at any time, giving the manager control of the resolution process. The Sprint National Service Management Center (NSMC) is responsible for receiving trouble reports, issuing trouble tickets, and providing problem resolution support. Sprint offers two response time options for router hardware maintenance: standard service (next-day maintenance) and premium service (four-hour response time).

Committed Information Rate (CIR)

In Sprint's frame relay network, end-to-end throughput across the network is governed by port speed. Sprint's network provides full performance at access channel speed with no throttling, unlike other carriers' implementation of CIR. Sprint offers CIR in ranges from 0 to 1.024 Mbps, enabling us to design specific applications-based solutions at the most cost-effective price.

Frame relay has become the preferred wide-area network solu-

Sprint's network offers full performance at access channel speed with no throttling.



tion for a broad range of application requirements for everything from LAN-to-LAN to mission-critical SNA. Working with Sprint's network design engineers, the customer is able to enhance the effectiveness of the network by selecting a class of service that has been provisioned for its specific application needs.

These classes of frame relay service provide unique solutions for wide-area business data networking. Each class of service consists of a PVC with a specific configuration. PVC configuration is critical to overall performance and consists of various levels of CIR ingress and egress access channel settings, delay, and overall prioritization. Each service is supported by end-to-end service-level guarantees.

For More Information

Contact: Sprint Business
1-800-588-DATA
www.sprint.com/data1



We help business do more businessSM

Sprint

Frame Relay
Tailored to
The SNA
Environment

In an environment of fast-paced growth and fierce competition, Sprint is uniquely positioned to provide competitive and innovative communications solutions. According to the IDC Mid-Year Report (January-June 1996), Sprint is the leading provider of packet/cell-based data communications services to businesses in the United States. Sprint deployed the first nationwide public frame relay network in 1991 and remains committed to helping companies develop solutions that address their unique business application requirements.

The Challenge: Sprint's Solution

Network Manager's Service Levels. Sprint has engineered its network to ensure high network availability and low transit delay, as indicated in the table below. Sprint offers some of the most comprehensive end-to-end service-level guarantees in the industry, including delay, availability, and data delivery rate.

Parameter	Network Design Value
Network Availability (POP to POP)	99.99%
Frame Relay Network Availability	99.5% (end-to-end guarantee)
Burst Capacity	Up to access channel rate (dynamic)
Minimum Burst Interval	1 second
One-way Delay (including access)	T1, 90 ms; 56 kbps, 150 ms (end-to-end)
Data Delivery Rate	99% (end-to-end guarantee)

Reliability

The frame relay layer is based on Sprint's 100% digital, all fiber optic network, implemented in four fiber, bidirectional, line-switched SONET rings. In the event of a fiber cut, Sprint's SONET deployment provides restoral in milliseconds. In addition, the redundant, diverse, and meshed design of the Sprint frame relay network features automatic rerouting of permanent virtual circuits (PVCs) to prevent network outage.

Along with the inherent restoral capabilities of Sprint's frame relay backbone, Sprint offers multiple disaster recovery options, including frame relay digital dial-backup, host disaster recovery, frame relay switch diversity, and local access diversity. Combining the features of Sprint's network and Sync Research frame relay access devices (FRADs), the solution proposed for the SNA-Frame Relay Challenge maximizes session uptime by dynamically routing to backup PVCs in case of a data center T1 failure (nondisruptive) or initiates a dial-up (ISDN) session around the

frame relay network to the corporation's data center in the event a remote site cannot access the frame relay network (disruptive).

Pricing

To ensure the most cost-effective, reliable frame relay WAN the proposed network design includes 16k-CIR primary and 64k-CIR secondary PVCs, digital dial-backup, and Sync Research FRADs. The design takes advantage of the protocol prioritization and congestion management features of Sync Research FRADs in conjunction with the bursting capabilities of Sprint frame relay network. (Sync FRADs include an integrated CSU/DSU for remote sites.)

Locations	Monthly Recurring Costs (per location)	Equipment (per location)	Equipment/Software Install (per location)
Remote (no LAN)	\$436	\$2,525	\$600
Remote (token ring)	\$461	\$3,625	\$400
Remote (Ethernet)	\$939	\$5,689	\$600
Data Center	\$11,934	\$51,635	\$6,600
Headquarters	\$9,270	\$45,385	\$6,100
TOTAL (all locations)	\$73,844	\$437,857	\$55,500

Network Management and Support

To address the unique migration issues associated with moving from private line to frame relay, Sprint offers complete migration support to assist in equipment configuration, network planning, and implementation. Sprint's Managed Network Services (MNS) are flexible, addressing the customer's need for a reliable managed network solution. All support and management for Sprint-provided services and products are handled internally by Sprint employees. Sprint's total network management package includes 24-hour, in-band network monitoring, fault management, performance management, proactive service reviews, security, and communications and routing equipment. Sprint also provides customer network management tools such as Visual Networks' Visual UpTime™ management tools, historical performance reports, and an SNMP management system. Sprint's new Web-based reporting platform allows the Sprint technical staff real-time access to network statistics. A customer version of this platform is currently under development.

Your Complete Enterprise Network Solution

Most carriers can give you a basic, standalone frame relay network. Only MCI can give you a comprehensive and integrated communications solution you can leverage to meet more of your business needs.

MCI's Enterprise Services combine single-source integrated network products and services. They provide your company with new levels of interoperability and expertise in addressing complex business information and communication requirements. Enterprise Services help you maximize your enterprise investments and leverage technology so you can connect employees, customers, and vendors around the world, or around the corner, with vital business information. Now you can turn to one company to leverage the benefits of integrating the right hardware, software, systems, network, business models, and people.

As part of MCI's Enterprise Services, HyperStream Frame Relay offers interoperability and connectivity with a variety of other MCI products and services, such as:

- **HyperStream ATM.** An advanced broadband service supporting voice, video, and data
- **MCI Remote LAN DialSM** Offering dial-up remote node connectivity for PC/laptops
- **Telnet Connect.** Supporting dial-up connections for remote terminal access
- **Xstream Services.** Providing support for X.25 and IBM 3270 applications
- **MCI's EDI*Net.** A value-added network service enabling business partners to share information
- **MCI Exchange Messaging ServicesSM** A fully managed messaging and groupware environment
- **MCI XChange 400.** A reliable and secure electronic mail interconnection service
- **MCI Enhanced Fax.** A suite of fax-enabled services
- **internetMCISM** Dedicated and dial connectivity, web hosting, intranets, and security services

Managing Your Enterprise

MCI offers a full range of value-added services to manage the growth and performance of your enterprise network. We can supplement your management efforts with implementation assistance, outsourced man-

agement services, and the consulting services needed to support your network and its end-users.

MCI WAN Managed Services provide your company with a solution for the design, implementation, and management of wide area networks (WANs). Through MCI SystemhouseSM MCI's global information technology outsourcing company, clients can take advantage of new technologies and capabilities. Systemhouse offers networkMCI Enterprise Management, an innovative packaged solution that helps mid-sized businesses build, manage, and support distributed computing networks. MCI can build a top-performing standards-based infrastructure, continuously manage your WAN, proactively resolve problems, and support your end-users with a 24x7 help desk. We are strategically positioned to offer businesses end-to-end technology solutions previously unavailable from a single source.

An Inside Look Into Your Network

MCI's HyperScope[®] service provides you with the information you need to track and actively monitor your HyperStream Frame Relay service. HyperScope's Performance Reporting System offers a view into the ongoing performance of your network, enabling you to understand and optimize it. Based on the simple network management protocol (SNMP), HyperScope SNMP service gives you not only performance information but event notification on local access and network port status.

You Choose the Right SNA Solution

MCI's SNA Solution with HyperStream Frame Relay is flexible and tailored to your needs. Choose from a variety of premises equipment and network-based central office solutions. We provide coordinated end-to-end solutions from need analysis and network design through order entry, provisioning, maintenance, and one-stop billing.

The Challenge and MCI's SNA Solution

MCI's solution reflects the use of Priority PVC, high speed access, and usage-based PVCs (permanent virtual circuits) with 16-kbps CIR (committed information rates). Network costs based on usage pricing will range from \$61,048 to \$63,789 per month. Fixed rate pricing would be \$63,789 per month. Fractional T1 access is often not available from local exchange carriers. All sites with fractional T1 network ports reflect the full cost of T1 local access. Actual frame relay costs may be lower

since voice or other services may use the remaining bandwidth. The cost of enhanced managed services and consulting are not included since each solution is specifically tailored to each customer's requirements. MCI also offers equipment leases and can facilitate hardware purchases.

For More Information

Contact your MCI account manager for answers to your SNA and other networking needs.

You may also visit us on the Internet at: <http://www.mci.com>



Local Access

Local Access Type	Avg. Cost Per Site ^(a)	Monthly Recurring
47 @ 56 kbps ^(b)	\$225	\$10,575
39 @ 1.5 Mbps ^(c)	\$625	\$24,375
Less Discount Access Charges		(\$1,748)
		\$33,203

Network Port

Network Port Size	Cost Per Port	Total Cost
47 @ 56 kbps	\$228	\$10,716
21 @ 128 kbps	\$415	\$8,715
12 @ 256 kbps	\$560	\$6,720
2 @ 4.5 Mbps	\$2,989	\$5,978
Less Discount Port Charges		(\$5,462)
		\$26,667

Network Connections

Network PVC/CIR ^(d)	Usage PVC Min/Max Rates ^(e)	Usage PVC Minimum	Usage PVC Max./Fixed Rate PVC
282 @ 16 kbps ^(e)	\$5-\$16	\$1,410	\$4,512
2 @ 128 kbps ^(f)	\$5-\$105	\$10	\$210
Less Discount PVC Charges		(\$241)	(\$803)
		\$1,179	\$3,919

HyperStream Frame Relay Service Element	Monthly Minimum	Monthly Maximum
Local Access Facilities	\$33,203	\$33,203
Network Frame Relay Port	\$26,667	\$26,667
Usage PVC Minimum	\$1,179	-
Usage PVC Maximum/Fixed Rate PVC	-	\$3,919
TOTAL MONTHLY NETWORK COST^(h)	\$61,048	\$63,789

(a) estimated based upon national averages
 (b) existing 19.2 kbps sites given 56 kbps access facilities for future growth requirements
 (c) all sites requiring 56 kbps or greater rates provided with full T1 local access

(d) two simplex PVCs needed for two-way communication
 (e) High Priority PVCs used for SNA connections with headquarters
 (f) PVCs between data center and headquarters
 (g) Usage PVC charges based upon per megabyte of data sent
 (h) network costs based upon discounts for a two year service commitment

MCI

Performance,
Reliability,
And Advanced
Service Features

Communications are the foundation of your business. The challenges you face in today's business environment continue to mount. It is difficult to reduce network costs, increase network flexibility, and preserve existing investments all while improving service to your end-users. You can't afford to take chances with your SNA network. With MCI's HyperStream® Frame Relay, you don't have to compromise performance to get affordable services. MCI's *performance, reliability, and advanced service features* offer the optimal solution for meeting your SNA and other multiprotocol networking needs.

SNA Solutions Tailored to Your Needs

The challenge is to create robust, multipoint networks integrating SNA with today's newer LAN-based applications. MCI's SNA Solutions with HyperStream Frame Relay give you *answers to your networking dilemma along with an SNA road map*. MCI offers innovative support programs and network-based service alternatives for migrating SNA traffic to frame relay.

- **Router Support:** Includes WAN-managed services, equipment leasing, and rental programs. MCI program partners include Cisco, Bay Networks, and 3Com.
- **FRAD Support:** Offers solutions for customers deploying frame relay access devices (FRADs). MCI has partnered with industry-leading vendors such as Sync Research.
- **Network-Based Services:** Provide advanced service capabilities and features such as Priority PVC and central office-based Native Mode SDLC—all designed to facilitate the integration of SNA over frame relay.

MCI's SNA service options offer cost-effective solutions for support of legacy SNA environments. This includes support for local SDLC spoofing and network termination of SDLC with conversion to RFC 1490.

Experience Industry-Leading Performance

MCI builds networks to ensure the very best in response times. The HyperStream network supports *instantaneous and unlimited bursting to your full port speed*. With a network engineered to ensure the capacity is always there to support full bursting, MCI is not forced to limit or regulate your bursting like other carriers. MCI provides you with *very low delay and very high throughput*. This means your time-sensitive SNA information gets through—and it gets through faster.

MCI understands that you are held accountable for delivering a reliable network with the very best in response times. Our customers have come to trust the performance and reliability of HyperStream Frame Relay. This is why we stand behind our *industry-leading frame relay service guarantee*. It specifically addresses your SNA performance needs for data delivery, packet delay, network availability, and trouble resolution time frames.

Be Confident With Industry Leading Reliability

MCI has been custom designing resilient customer networks for years. We offer a full range of dedicated and switched access options to back-

up your primary access facilities—from central office diversity to switched access connections at speeds up to 1.5 Mbps. In addition, all your SNA data has *multiple route choices* between each HyperStream Frame Relay switch in order to minimize any single point of network failure.

Advanced Service Capabilities

MCI is the first carrier to offer a network-based capability that allows you to prioritize applications and traffic on a per PVC (permanent virtual circuit) basis. HyperStream Frame Relay's *Priority PVC* takes frame relay technology a step further by giving you additional traffic management capabilities so mission-critical traffic like SNA can get through.

High speed access to HyperStream Frame Relay offers customer access at speeds ranging from 2.688 Mbps to 12.288 Mbps. Now you can have cost-effective wide-area connectivity at local-area network speeds—or fully enable your high-speed host-to-host connections. High speed access lets businesses such as retailers and banks consolidate and increase the efficiency of access facilities at host and other large sites serving many remote stores or branch offices.

Finally, MCI's flexible *usage-based pricing* options mean you only pay for the data sent. Fixed cost pricing is also available.

Testing and Evaluation

MCI understands the need for a stable and predictable SNA networking solution. We will let you experience the performance and reliability of the HyperStream Frame Relay network at no charge (certain conditions and limitations apply). Or *test our services and quantify application performance* over the live commercial network via the MCI Developers Lab facilities. The MCI Developers Lab offers program management and engineering support for the evaluation of hardware, software, applications, and configuration designs prior to full deployment in your enterprise.

More Ways to Get to SNA Applications

More access options from MCI means *HyperStream Frame Relay can meet more of your networking needs*—whether it's an employee on the go needing a dial-up connection or a branch office communicating with the headquarters mainframe. *Nobody else offers more dedicated and switched access options* ranging from 28.8 kbps through 12 Mbps. Choose from among asynchronous dial-up at 28.8 kbps, cellular access, switched digital 56-kbps access, switched 64-kbps connections via ISDN basic rate interface (BRI), and switched access at speeds up to 1.5 Mbps using dedicated ISDN primary rate interface (PRI) facilities. Dedicated access options range from 56-kbps up to 12-Mbps speeds. Customer-dedicated network-to-network interface (NNI) connections between MCI and local exchange carrier frame relay services are also available. Now you can enhance the bottom line while extending the reach of your company's network.

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47 @ 56	47 @ 56
39 @ 1.5	39 @ 1.5

Network Po

Network	Network
Size	Size
47 @ 56	47 @ 56
21 @ 128	21 @ 128
12 @ 256	12 @ 256
2 @ 4.5	2 @ 4.5

- (a) estimated 1
- (b) existing 19
- for future 9
- (c) all sites rec
- with full T1

which extends visibility and reporting of the frame relay network to the customer premises PVC by PVC. ViewSPAN also forwards all SNMP traps on a real-time basis, keeping the customer posted on all major network events.

The FRAD Management Solution: Intermedia recommends its Extended Level FRAD/router management service, which provides full fault, performance, and configuration management of the customer's FRADs. This lets the customer focus on the evolution of the enterprise network while Intermedia manages, maintains, and configures the FRADs at remote branches. Intermedia maintains responsibility for the upgrading of software via flash download. The network manager can monitor trouble tickets via Intermedia's Web page and can view FRAD performance via a NetView feed into the existing NetView management system.

Intermedia can provide FRAD support services, allowing the network manager to fully out-task the responsibilities of repair and replacement of FRADs at remote and host sites. We recommend our level 2 FRAD support services, which provide four-hour response during business hours Monday through Friday. Customers requiring 24x7 support can purchase level 3 FRAD support services.

The Layer 3 Management Solution: The network manager can monitor the performance of SNA traffic via the NetView feed, enabling visibility into the SNA network at the customer site.

The Service Solution

Network Service Support: Intermedia provides the industry's most comprehensive network service guarantees that encompass all aspects of the wide-area network, including local loops. Under this paradigm, Intermedia views the local exchange carriers as our suppliers and subcontractors, with the resulting responsibility of coordination and management. Intermedia extends its end-to-end transport availability guarantee from LAN port to LAN port of the FRAD via the Extended Level FRAD/router management service.

Summary

For a little over \$100,000 per month Intermedia can provide a turnkey, fully managed multiprotocol WAN solution with guaranteed end-to-end performance. The customer can save more than 40% in circuit costs via the consolidation of parallel networks to a single frame relay backbone and can avoid capital costs via a low monthly lease, which eliminates the potential of technological obsolescence. The network manager can have full visibility of the network, PVC by PVC, reduce FEP costs, and eliminate all the hidden

The Management Solution

Layer	Fault Management	Performance Management	Configuration Management
Layer 3 Management	Integrated NetView/390 (included)	Multiprotocol DSU Probe Management Service (optional)	Customer provided
Layer 2 Management	24x7 Intermedia NOC Support & Congestion Management (included)	ViewSPAN Customer Network Management System (recommended)	Intermedia Network Design and Tuning (included)
FRAD/Router Management	Extended Level FRAD Management (recommended)		

End-to-End Transport Guarantees (including the Local Loop)

Parameter	Guarantee	Credit Back
Network Availability	99.50%	1:1 Pro-rate-affected nodes
CIR Frame Delivery	99.90%	10% of affected nodes
Discard Eligible Frame Delivery	99%	10% of affected nodes
Network Transit Delay	125 milliseconds nationwide	10% of affected nodes
Mean Time to Repair	4 hours	10% of affected nodes

End-to-End FRAD Guarantees (with Extended Level Management Service)

Parameter	Guarantee	Credit Back
FRAD Availability (to LAN Port)	99.50%	All FRAD management fees for the month on affected nodes

Pricing

Product/Service	MoRC	NRC
Frame Relay Transport	\$42,686	\$1,700
FRAD Lease	\$7,739	\$38,500
ViewSPAN	\$1,230	\$3,000
Extended FRAD Management	\$10,500	\$12,300
CPE Support Services	\$40,788	\$49,900
Total	\$102,943	\$104,350

costs of managing routers and FRADs. If a FRAD breaks, Intermedia fixes it. If routing tables change, Intermedia updates them. If software evolves, Intermedia changes it. Now, for an affordable price with no hidden charges, the network manager can refocus efforts on moving the organization forward instead of working to keep it afloat.

For More Information

Contact: Intermedia Communications, Inc.
3625 Queen Palm Drive
Tampa, FL 33619
1-800-940-0011


**INTERMEDIA
COMMUNICATIONS**
No Assembly Required Telecommunications™

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Intermedia Communications

The
End-to-End
Solution

As a pioneer in frame relay and the only provider of fully guaranteed end-to-end wide-area network solutions, Intermedia has distinguished itself as the multiprotocol frame relay service. Intermedia's end-to-end guaranteed solutions have won such accolades as *Data Communications*' "Hot Product of the Year," "Best of Show Finalist" at Interop, and *Network World's* "Short List," and has been classified as a leader/visionary by The Gartner Group.

The Multiprotocol Network Platform Solution

Intermedia has been offering multiprotocol frame relay solutions since 1993 on the industry-leading Cascade B-STDx platform. Intermedia's platform is based on RFC 1490 framing, providing low overhead multiprotocol encapsulation. Its open loop architecture supports a sustained burst rate to the purchased port speed, and CIR is set specifically to the PVC.

The Prioritized PVC Solution

Intermedia offers three levels of PVC prioritization of SNA traffic over IP and IPX across the backbone. SNA PVCs can be set at priority level 1, ensuring that the SNA CIR will receive top priority. IP and IPX PVCs will be given a level 2 prioritization, providing submissive status versus SNA, but dominant status versus level 3 PVCs, which may support Internet or non-latency-sensitive applications.

The Branch Site Solution

Intermedia will lease the Sync Research 3620-2X/2E/2T platform to the customer on a standard agreement for 36 months, with the option to buy. The Sync 3620 platform utilizes RFC 1490 to provide streamlined efficient transport from the customer premises to the Intermedia frame relay network, providing an end-to-end high throughput and low overhead solution. The 3620 offers multiprotocol prioritization, bandwidth allocation, burst management, and nondisruptive SNA session rerouting from the customer premises. These features ensure SNA-critical traffic is prioritized and transmitted efficiently within CIR leaving the customer premises. The 3620 platform is equipped with dial backup via the integral CSU/DSU and DTR-initiated dial connection to the host site CSU/DSU.

The Central Site Solution

Intermedia will use the Sync Research 4200 central site FRAD to convert the SDLC traffic to LLC2. Utilizing the I-FRAD+ management software, the 4200 platform provides all of the benefits of the 3620. The 4200 is equipped to support remote site dial backup via an integral CSU/DSU. The 4200 enables the integration of token ring and Ethernet LANs while leveraging the investment in IBM 3745 and 3172 equipment. In addition, it eliminates the need for costly serial line interface coupler ports on the FEP.

The Management Solution

The Layer 2 Management Solution: Layer 2 fault and circuit configuration management is included with the service. Intermedia's multiple NOCs provide 24x7 network monitoring of layer 2 transport facilities, isolating and repairing faults as they occur. In addition, Intermedia provides real-time congestion management of all trunk routes and network interfaces.

Intermedia recommends its ViewSPAN management system,

The Branch Site Solution

Branch Personality	No. of Sites	Hardware Platform	Software; Management	Protocol Support
SDLC-Only Branches	19	Sync Research 3620-2X with Integral CSU/DSU	I-FRAD+;	Same as host sites
DLC/Ethernet LAN Branches	31	Sync Research 3620-2E with Integral CSU/DSU	NetView/390 Service Point and SNMP agent	
SDLC/Token Ring Branches	30	Sync Research 3620-2T with Integral CSU/DSU		

The Central Site Solution

Branch Personality	No. of Sites	Hardware Platform	Software; Management	Protocol Support
Atlanta Mainframe Data Center & Philadelphia LAN Server Farm	2	Sync Research 4203-2T and Sync Research 4203-2E	I-FRAD+; NetView/390 Service Point and SNMP agent	SNA/SDLC, BSC 3270, BSC RJE, async alarm hosts, bridged or terminated SNA/LLC2, Netbios, and IP and IPX routing

AT&T

The CO FRAD and frame relay transport network are managed by AT&T Operations. AT&T Operations provides a single point of contact and tiered escalation structure that incorporates AT&T Laboratories engineers. AT&T Operations also offers real-time monitoring, fault isolation, and repair on a 7 x 24-hour basis.

AT&T's Customer Network Management Option provides detailed information on network use and performance. Reports provide customer access to port and PVC statistics that supply five-minute peaks and hourly summaries for trending and utilization analysis. SNMP access provides real-time status and alarm notification, network configuration, and near real-time performance data.

Reliability/Availability

The frame relay market has affirmed AT&T's reliability leadership via industry awards in each of the last four years, including *Data Communications' User's Survey*.

Historically, AT&T has exceeded its Frame Relay Service availability target of 99.86%. To ensure that AT&T continues to meet and exceed this objective, AT&T's frame relay network allows for the rerouting of PVCs in the event of a service component failure. In addition, AT&T backs its network with FASTAR®, its patented restoration system.

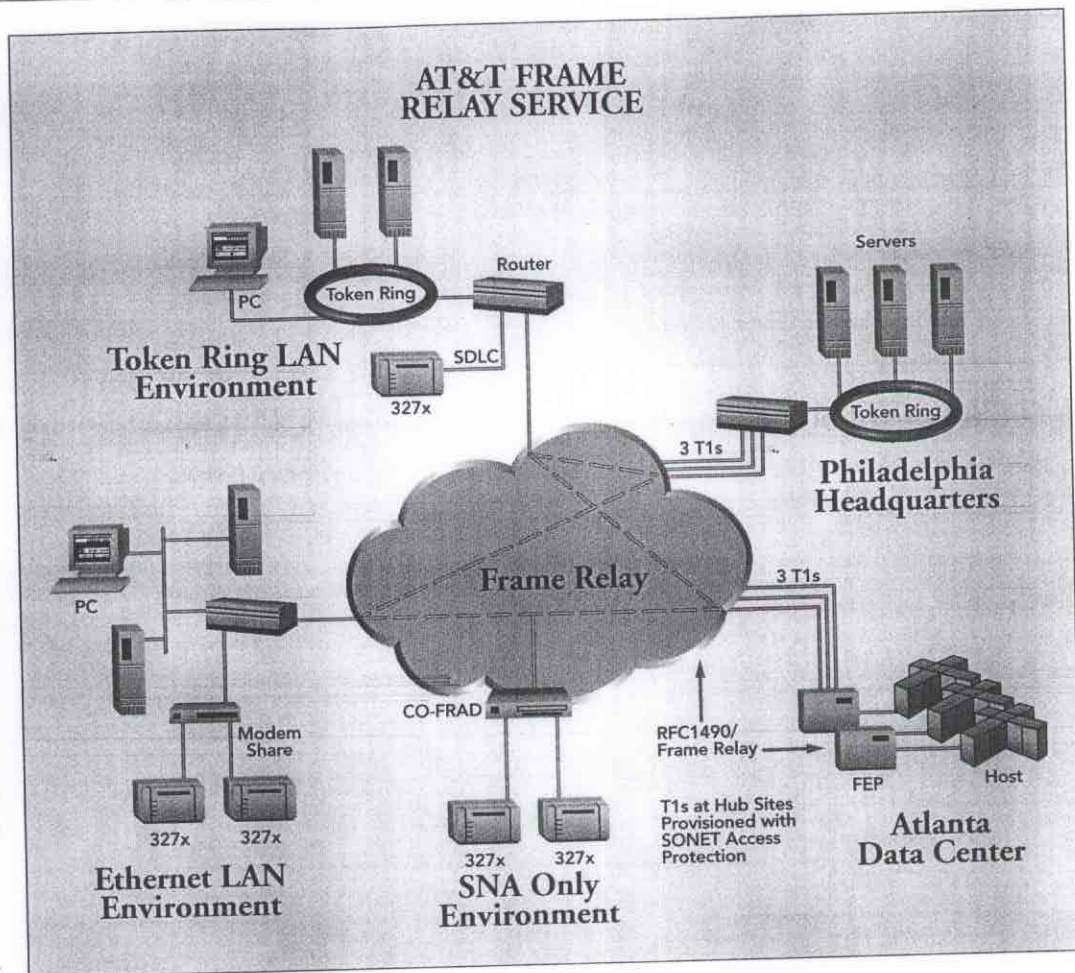
The challenge network solution includes LEC-provided Sonet access protection that improves overall network reliability by providing dual self-healing fiber rings from the hub locations to the local POP.

AT&T recommends that remote sites be equipped with ISDN dial backup to the hub locations. Customers can provide this capability themselves, or AT&T can provide it via the MNS offer.

AT&T also offers Disaster Recovery Options, including an Access Protection Option (APO) and two Site Recovery Options (SROs). The APO protects against circuit and customer premises equipment failures by enabling customers to redirect PVCs to an existing alternate access channel. The SROs, which include backup and growable PVCs, protect against customer site failures by enabling customers to quickly reconfigure their networks.

Pricing

AT&T offers a wide variety of discount plans that can reduce costs when used in conjunction with other AT&T services. Selecting AT&T's CO FRAD eliminates customer premises FRADs from the SNA-only sites and, in more locally dense topologies, provides the ability to multipoint up to 16 sites into a single CO FRAD port.



The pricing below includes the network design from a regional solution center specialist, the CO FRAD, and frame relay transport services. Access costs are calculated using standard tariffs and the closest AT&T POP. Pricing reflects both two- and three-year terms; three-year and longer terms can substantially reduce overall network costs.

Costs	Two-Year Pricing Per Month	Three-Year Pricing Per Month
PVC Costs	\$4,483.98	\$4,123.20
FR Port	\$40,994.40	\$37,696.00
FR Access	\$37,772.34	\$35,650.45
CO FRAD	\$4,959.00	\$4,560.00
Total Network	\$88,209.72	\$82,029.65

* Installation costs (\$207,263.73 for the network cited) are typically waived, based on a 12-month minimum retention requirement.

For More Information

Contact: David Thompson
AT&T Public Relations
(908) 221-4178



AT&T



Ensure
Network
Reliability

Customers managing through the technology revolution need a partner they can trust. From the beginning, AT&T has been the WAN service provider of choice for SNA environments. Now, the expansion of client-server applications and the deployment of Internet technologies, co-evolving with SNA domains, have drawn many SNA customers to AT&T's Frame Relay Service.

AT&T offers several solutions that meet the proposed challenge. We designed and selected an integrated solution that matches service capabilities to customer requirements. SNA-only sites are supported using the CO (central office) FRAD option. The remote sites with multiprotocol requirements are supported with standard AT&T Frame Relay Service.

CO FRAD

This *Data Communications* 1997 Hot Products Award winner allows pure SNA sites to use frame relay without adding CPE or modifying the existing remote environment. CO FRAD Service employs RFC 1490 BNN transport (supported by NCP 7.1), allowing multiple remote sites to be multiplexed on a single T1 facility and directly attached by frame relay to the data center FEP.

All remote SNA sites are engineered with 56-kbps ports and 16-kbps permanent virtual circuits (PVCs) to the data center. Bi-sync requirements can be accommodated by adding a FRAD device at the data center.

Multiprotocol Sites

AT&T Frame Relay Service is ideal for combining SNA and LAN traffic. Our solution provides two PVCs for each multiprotocol site, one for IP and IPX traffic to the headquarters site and another PVC for carrying SNA over RFC 1490 to the data center FEP.

All LAN PVCs are engineered with a 16-kbps CIR that sustains throughput up to port speed based on the statistically available excess bandwidth in the network. The SNA PVCs are engineered with 16-kbps CIRs for sites with 56-kbps ports and 32 kbits for sites with ports greater than 56 kbits.

If NetBIOS/NetBEUI presence is extensive, then AT&T suggests a DLsw solution. Note that NetBIOS is an API, not a protocol. If NetBIOS applications use native TCP/IP or Novell for transport, then no change is required.

SNA Performance

It is important to consider the potential concentration of LAN and SNA traffic at the egress of the frame relay network. Note that the egress port is undersubscribed—the sum of the SNA and LAN PVC CIRs is

less than the port speed. This will minimize the potential for congestion at the egress port due to LAN traffic. When the LAN PVC bursts above its CIR, AT&T's closed loop algorithm controls the bursting at the earliest sign of congestion at the egress.

Other AT&T network attributes that assist in providing consistent SNA performance in a multiprotocol environment include per PVC buffers at network ingress and a T3 ATM-based backbone. These features prevent large intermittent LAN frames from adversely affecting the response time of interactive SNA sessions.

Design and Performance Analysis

To produce optimum designs for each customer network, AT&T uses WAN performance modeling tools developed by AT&T Laboratories. Assuming the given message sizes, 1,800 transactions/hour/controller, and two controllers per line, AT&T estimates a response time of 0.983 second for the locations designated as 19.2 kbps and 0.41 second for those designated as 56 kbps. Both scenarios meet or exceed the stated requirements.

Response times for SNA over routers and frame relay may be longer than for the corresponding multidrop connection for a variety of reasons—the store-and-forward nature of routers and protocol encapsulation, etc., poll spoofing and local acknowledgments notwithstanding. This is a relatively complex topic. AT&T will partner with the customer and, using the performance analysis tools, refine the design to meet response time and throughput requirements, as stated in the challenge.

Network Management

From the beginning, AT&T has worked closely with its customers to thoroughly understand all aspects of frame relay, including applications, protocols, routers, FRADs, performance, and network management. As

a result, AT&T offers a variety of network management options.

AT&T's Managed Network Solutions (MNS) help customers to manage through change by providing companies with flexible, strategic control over their network from complete outsourcing to selective out-tasking. Built on a menu basis, MNS applies professional services of architecture, design, implementation, operations, and life cycle management to offer elements, including managed routers, multiplexers, FRADs, and transport services. Single point of contact support for leading industry vendor equipment includes 7 x 24-hour monitoring, four-hour maintenance, and life cycle management. Customers can elect to use MNS for select sites that require on-premises equipment and select CO FRAD for those that do not.

AT&T helps customers to manage through change by providing flexible, strategic control over their network from complete outsourcing to selective out-tasking.



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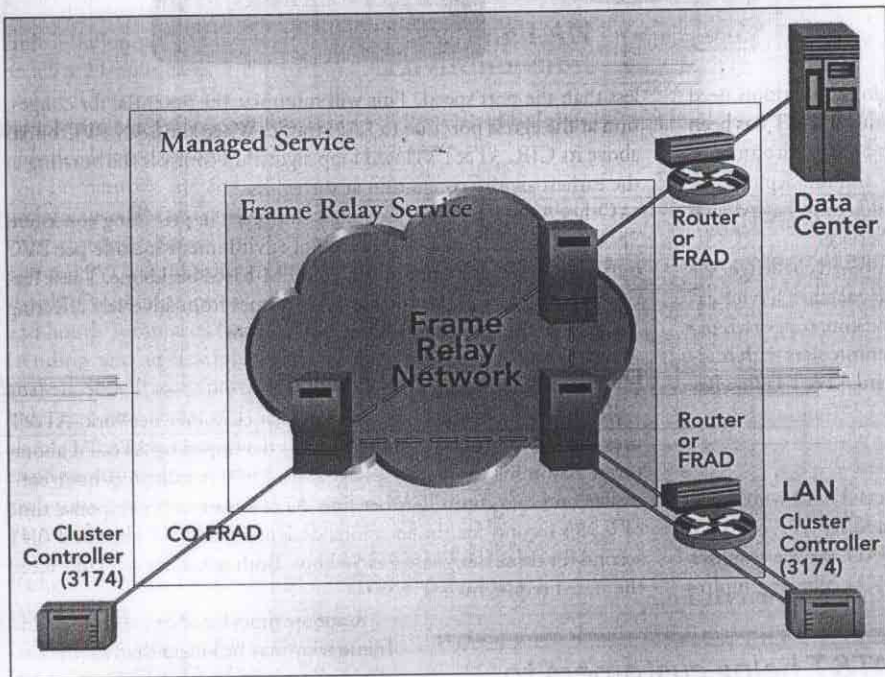
vcase

1. **Network manager's service levels:** With the current leased line network, the manager knows he or she can meet the service-level agreements but is concerned about being able to meet them in a public frame relay network. The service levels to the end-users specify response time and availability. The network manager has minimum throughput requirements for each site. How will the frame relay provider's service offering allow the network manager to meet his or her current service-level agreements?
2. **Reliability:** How does the provider's solution address network reliability?

than the port speed, does it allow traffic to burst above the CIR? If so, for how long? What happens to the traffic above the CIR level?

Additional Services

Frame relay can be just a transmission solution or it can be more. The service providers in this challenge are required to provide a transmission service, but many vendors go beyond this and also offer a managed service. The diagram here shows the differences between the two.



A managed service means the service provider supplies both the frame relay WAN and the equipment that connects to the frame relay network at the customer premises. This means that the customer doesn't have to buy and maintain the routers or FRADs (frame relay access devices) at the site—thus reducing another potential headache.

The diagram also shows the two different remote site solutions. The top frame shows the traditional approach in which a FRAD or router is located at the site. The FRAD or router provides the interface to the frame relay network. The lower frame shows a site that has only an SNA cluster controller. The site does not require a FRAD or router. Many vendors can offer a CO FRAD solution. CO FRAD means that the FRAD is located at the central office. The SDLC line from the cluster controller terminates in a FRAD at the CO instead of going all the way back to the data center and its FEP. The FRAD then converts the SDLC traffic to frame relay and uses frame relay to send the data to the data center.

The challenge outlined here does not address combining voice with data over the

ability? How does the frame relay network provide reliability? What can be done if there is a failure at the access point to the frame relay network, or at the connection from the customer premises to the access point?

frame relay network. This does not imply that it is not a possibility, because it is. Network managers interested in this option should talk to the service providers on how best to fit it into their solutions.

3. **Network management and support:** How does the frame relay service provider propose to manage and monitor the network solution, assuming that there are no network technical support people at the remote sites? The preferred solution is one that allows the network manager to control the network from the headquarters site. Additional concerns are the type of visibility into the frame relay network, the role of the host NetView, and whether the operators understand the relationship between the existing SNA networks and the proposed solution. How can the network manager track network performance? How often does the frame relay service provider issue reports, and can the network manager see these online and in real time?

Pricing Guidelines

Vendors were given detailed information that allowed them to price the challenge. The total cost for the solution includes all WAN charges from the remote sites to the data center and the headquarters. This includes the cost of the local access link to the frame relay network and all charges for the frame relay network. The price assumed a two-year contract that allows for upgrades as needed for capacity reasons. The solution covers the frame relay service, with managed service an option. While cost is an important factor, it should not be the only one to consider in making your choice. Read over how each vendor meets the challenge, since a low-cost solution is not always the best for all network situations.

4. **Service and problem resolution:** How is the new version of software installed? Will the network have to be down in order for problems to be addressed? The proposed solution should be easy to maintain, with a focus on central site maintenance and problem determination. In the proposal, the frame relay service provider should also include an outline of the type of support that will be offered. How fast can the provider resolve problems?

Start the Challenge

Although the solutions given here may not fit your network needs exactly, they do provide you with information to compare the different vendors. If you like a particular solution, contact the vendor and ask the reps to apply the same methodology to your network. For international readers: The vendors here can provide solutions to meet your needs. Contact them for more details about their global offerings.

While cost is important, it's not the only consideration.



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SNA-Frame Relay Challenge Solutions Showcase

The Frame Relay WAN Service Provider Challenge

By Robin Layland

Four of the leading frame relay service providers have taken up the challenge to demonstrate how a corporate network can migrate to a cost-efficient frame relay solution. There are several reasons for migrating to frame relay. Among them are that it reduces network costs and can provide users with better service than traditional leased line networks.

The first way frame relay reduces network costs is by replacing the separate SNA and LAN networks with a unified network. Next, frame relay reduces the amount of money spent on networking equipment because it requires fewer expensive FRAD or router ports. With a leased line network, each location requires a separate port on the headquarters or data center router or FRAD, but with frame relay only one port is needed. The single port provides the interface to the frame relay network, collecting all PVCs from the remote sites.

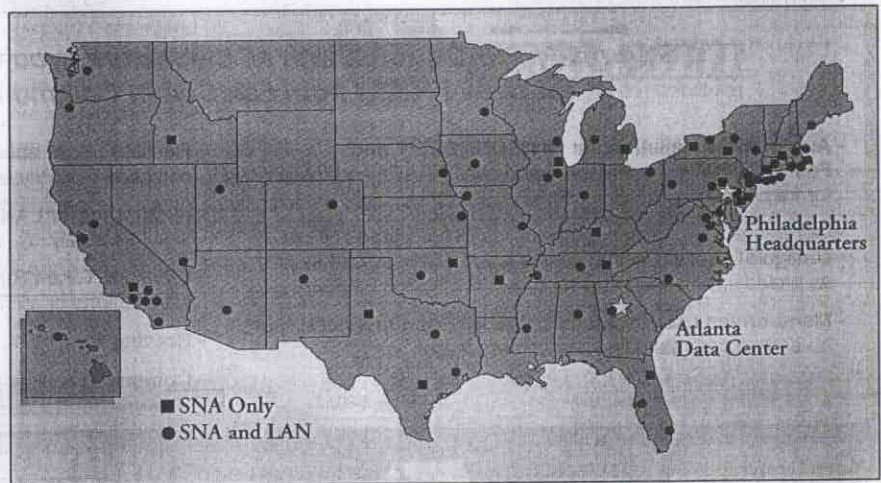
Frame relay also makes the network manager's life easier. In this setup, the service provider engineers and manages the WAN. Traditional leased lines require the network manager to oversee, engineer, and provision the WAN—complicated and time-consuming tasks. Adding to this advantage is the fact that frame relay is priced below leased line networks. Frame relay is a shared network, much as a data network is shared among multiple users. This allows the service provider to combine traffic, which translates into lower costs that can be passed on to you. Finally, frame relay makes more efficient use of bandwidth, unlike leased line networks, which waste unused bandwidth.

Frame relay can also offer better performance. The frame relay WAN, for example, is built using very fast switches and lines, allowing high throughput. Additionally, the access line from the frame relay network to a remote site in many cases is faster than the leased line being replaced. This is especially true when frame relay replaces slow 9.67- or 19.2-kbps lines that are used in many SNA networks with 56-kbps access lines.

The reasons to use frame relay are overwhelming. Presented here are four service providers' solutions to an SNA-LAN networking problem. The network locations are shown on the map below. This is a real net-

work—the actual corporation will remain anonymous. The network consists of 80 remote sites. The majority of the sites (61) have both a LAN and an SNA cluster controller. The LAN supports PCs using TCP/IP, IPX, and SNA emulation. The bandwidth needs of these sites vary. Twenty-eight sites need only a 56-kbps line for all traffic, 21 require a 28-kbps access line, and 12 require a 256-kbps access line. The 19 smaller sites have only SNA cluster controllers. There is no LAN available at any of these sites. Sixteen of these smaller sites currently are supported with a 19.2-kbps link, while three use a 56-kbps link to the corporation's data center.

The data center is located in the Atlanta area. Corporate headquarters is located in Philadelphia. The LAN traffic is destined to reach headquarters, where the corporation has an extensive number of servers supporting a range of LAN applications. The SNA traffic goes to the data



center. Each location requires three T1 (1.544-Mbps) links to the frame relay network. A separate PVC goes from each remote site to the company's headquarters and the data center.

The Challenge

The challenge is to provide a frame relay network that meets the basic connectivity requirements of the company as well as the following criteria:

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proven solution. The cost of adding several voice/fax ports to a remote site would be under \$1,000.

The headquarters site could be implemented for under \$22,000 using FastComm products, or you may take advantage of our compatibility with popular routers. The cost of adding a digital T1 voice/fax solution to this site would be as little as \$7,000.

The data center could be implemented for no additional cost, if direct frame relay connection to the FEPs is implemented and the carrier provides native frame relay backup capability, and/or T1 mirroring. Our PVC redirect and renumbering features allow remote connections to be reestablished over alternate T1s to the data center. If this functionality is not available or is not chosen, a FastComm solution, including token ring connectivity, could be provided for under \$26,000. If external dial backup is provided at the headquarters or data center via an ISDN PRI, it could be implemented for as little as \$4,600 per site, for multiple PRI connections.

All products described in this briefing are available with integral 56/64-kbps or T1/fractional T1 CSU/DSUs. Added cost per site ranges from \$200 to \$400, depending on configuration. By using integral CSU/DSUs and eliminating cables in this network, you can save as much as \$7,000.

Network Management

The keys to a superior network access product are features, price, and manageability. A product that is missing any one of these won't meet your needs. At FastComm, we use these criteria to design and improve our products because we know you depend on your network, day in and day out. All of our network management features are available for the multiprotocol WAN described in this SNA-Frame Relay Challenge.

FastComm Management functionality includes these features:

- Full SNMP read/write capability, with community strings
- Available HP OpenView PC application for graphical management
- Remote downloading of operational software, with security features
- Remote configuration changes for operational and fallback settings
- Telnet access to easy-to-read menus for configuration and control
- Dedicated supervisory port for local or out-of-band management
- Dedicated supervisory port for local or out-of-band management

In the SNA-Frame Relay Challenge network, we would recommend use of the SNMP environment, since this platform can take advantage of several applications that can be used to configure, monitor, and control FastComm FRADs. Third-party monitoring and management ap-

plications typically range from \$500 to \$2,000 per package, depending on the vendor and license terms.

In addition, our FRADs are manageable both in-band and out-of-band, for maximum flexibility. A local supervisory port can be used to access the management function of the FRADs and supports a modem for dial-in management. Once an engineer is communicating via the supervisory port, Telnet capability is available to access other FRADs or devices on the network. The supervisory capability is supported by easy-to-understand menus, making familiarization with the product a snap.

Service and Maintenance

FastComm can provide national or international installation, on-site service, and maintenance, remote management, and monitoring plans through a choice of industry-leading providers that include carriers, service organizations, and major systems integrators. This can make the implementation and ongoing maintenance of your network solution fast, simple, and far less expensive.

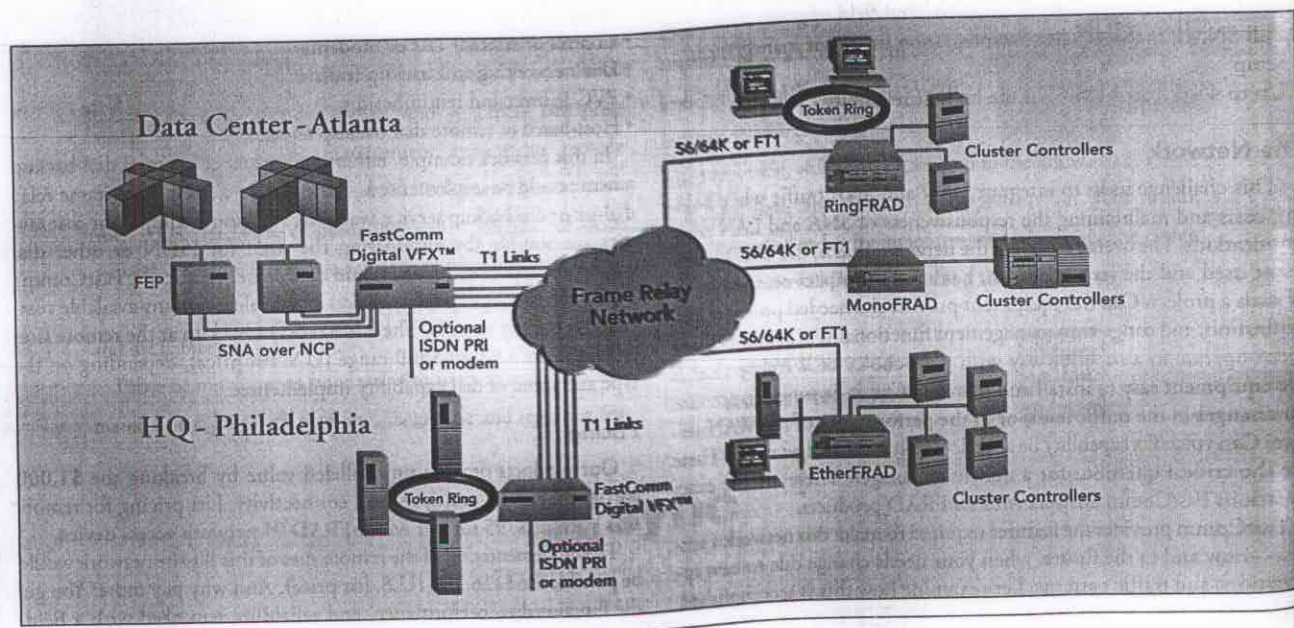
In this network, onsite maintenance costs might run as little as \$25 per month per site, depending on the equipment at the site. Remote management and monitoring fees would be additional. Software maintenance and upgrades would be as low as \$8 per month. Installation costs can be as low as \$200 per site, depending on the equipment, due to the ease of deploying self-configuring FastComm FRADs.

For More Information

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Sterling, VA 20166
(703) 318-7750
(703) 787-4625-Fax
info@fastcomm.com
<http://www.fastcomm.com>



FastComm™
Communications



FastComm

Proven Reliability,
Easy Installation and
Maintenance, and
Field Upgrades

Today's network manager is faced with many challenges: controlling costs, doing more work with fewer resources, integrating legacy traffic with newer Internet/intranet access, and much, much, more.

You need a partner to work with you to solve these problems. FastComm has been providing frame relay access devices (FRADs) from the beginning. We make each network opportunity a success and a partnership. Our products are certified on virtually all frame relay services and are deployed in the largest customer frame relay networks in the world. Why? Simple; our field-proven solution includes:

- **LAN+Legacy™** suite of protocols, which gets all your applications over the WAN: SNA/SDLC/QLLC/LLC2 (RFC 1490), Bisync, Burroughs, Uniscope, async, ALC, HDLC, X.25, Annex G (X.25 over FR), IP, IPX, voice, fax, and more.
- **MaximumPRIORITY™** multiprotocol prioritization and **FastRATE™** CIR control and congestion management for the highest throughput
- **FastCONNECT™** automatic frame relay configuration for hands-off, self-installation of remote sites
- **FastCONFIG™** for one-step configuration of IP addresses on remote LANs
- Integral 56/64 kbps or T1/E1 CSU/DSU for cost savings and ease of management
- A full range of field-upgradable **Fastick™** interfaces for LAN and legacy applications: RS-232, V.35, X.21/V.11, RS-449/422/423, plus 10Base-T, AUI, STP, DDS, BRI, T1, fractional T1, E1, Nx64, and 2W/4W voice/fax ports
- Choice of scalable, upgradable models: **MonoFRAD™**, **EtherFRAD™**, **RingFRAD™** and **VoiceFRAD™**
- Flash memory in each unit holds multiple copies of operating software for ease of network download and field upgrade
- Full SNMP manageability for integration into your management setup
- Up to 41.9 years MTBF for the highest reliability

The Network

This challenge seeks to integrate LAN and SNA traffic while holding costs and maintaining the responsiveness of SNA and LAN communications. The overall design of the network, that is, the WAN equipment used and the service chosen, has a major impact on the success of such a project. Can the equipment provide the needed protocol, prioritization, and congestion management functionality? Does the equipment operate in a superior way with your choice of WAN service? Is the equipment easy to install and manage? Can it be tuned to account for changes in the traffic levels or in the performance of the WAN service? Can voice/fax capability be added? Will it meet budget needs? These are the critical questions for a network manager. These are the exact questions FastComm answers with its FRAD products.

FastComm provides the features required to make this network a success—now and in the future, when your needs change due to new applications and traffic patterns. Let's examine how this is accomplished.

Service Levels

A key consideration for integrating multiple traffic streams is the ability to consistently provide multiple service levels within your corporate Intranet. We implemented our **MaximumPRIORITY™** and **FastRATE™** features to provide you with a four-level, tunable, multiprotocol prioritization mechanism—coupled with the industry's first active CIR management and congestion control in a network access device. Priority levels are defined as immediate, high, medium, and low. Traffic levels sent by each level, relative to the others is fully tunable for optimum throughput and response. Coupled with a WAN service that offers performance guarantees, this setup lets you implement end-to-end prioritizations today.

In this challenge, we would use one or more priority levels for interactive and batch SNA traffic, and another for IP traffic. Note that our prioritization mechanism provides the ability to implement based on:

- Port: For example, port 2 has priority over ports 3 and 4.
- Protocol: For example, voice has priority over SNA, which has priority over IP.
- Protocol type: For example, in IP, HTTP has priority over FTP.
- Address: For example, controller A has priority over controller B; IP destination X has priority over destination Y.

Reliability

The FastComm solution has reliability built in. Our products are based on a motherboard plus daughterboard approach and have no moving parts, switches, fans, or other components subject to failure over time.

- Network reliability is guaranteed through:
- Integral ISDN TA or modem (V.34 or 56k)
 - Control of external TAs or modems
 - Dial networking and backup features
 - PVC redirect and renumbering
 - Host-based or remote dial backup choices

In this network example, either an internal or external dial backup scheme could be implemented. If the carrier chosen has a frame relay dial-up or dial backup service available, additional equipment cost savings are possible (by eliminating the need for ISDN or other dial equipment at the headquarters and data center locations). FastComm's PVC renumbering capability makes it possible to use any available cost-effective backup scheme. The added cost of backup at the remote sites will be in the \$200 to \$500 range (U.S. list price), depending on the type and speed of dial capability implemented.

Pricing

Our products provide unparalleled value by breaking the \$1,000 barrier for remote multiprotocol connectivity. List pricing for remote sites starts at \$795 for our **MonoFRAD™** network access device.

The implementation of the remote sites of this 80-site network would be possible for \$116,200 (U.S. list price). And why pay more? You get the functionality, performance, and reliability you need with a field-

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Sync/Manager is frame relay circuit and SNA-session aware, reporting status and statistics proactively through a FrameNode agent, delivering robustness and performance that network managers can depend on. Designed from a centralized location, the product configures, monitors, and troubleshoots the network. Based on an easy-to-read GUI interface, Sync/Manager is truly friendly with point-and-click actions to

- Configure devices
- Look at network hot spots
- Check unit detail reports for hot spots
- Troubleshoot operations, including protocol traces and EIA lead monitoring to operate

Lower Cost of Ownership

The total cost of a network is not limited to equipment. Recent studies from firms like Strategic Networks Consulting, indicate that much is driven by WAN information and administrative support. The FrameNode, using RFC 1490 multiprotocol encapsulation, reduces WAN costs by transmitting multiple protocols over a single PVC, reducing bandwidth and CIR requirements.

The FrameNode's unified NetView 390 and SNMP management leverages current investment in SNA network automation, tools, and training, to reduce the impact of migrating to an enterprise management.

The Service and Support Your Network Demands

Behind every business-critical network are the intangibles: network design, project management, installation, training, service, and support. At Sync, we are dedicated to providing service and support to make life easier.

We are committed to meeting your needs 24 hours a day, 7 days a week, as your network grows in size and complexity. Our portfolio of remote and on-site service offerings can provide the support you need when and where you need it.

And since the FrameNode is managed in real time by a centralized network management application like Sync/Manager, network administrators can have their cake and eat it too:

- Network software upgrades are downline loadable. New software can be scheduled to be installed.
- Network troubleshooting is performed over a live network. Problem resolution does not require taking either the network or a unit out of service.

Network Scenario Pricing

There are two types of branch sites, with each LAN version split 50/50 between Ethernet and token ring for the following equipment:

- SDLC only
- SDLC and LAN

List prices include hardware and software.

Software for the SDLC-only branch is the Sync FRAD (S-FRAD) for multiple serial protocols (SNA/SDLC, BSC 3270, BSC RJE, Async Alarm Hosts) and terminated SNA/LLC 2 LAN protocols. Other sites include the Internetworking FRAD Plus (I-FRAD+), bridged or terminated SNA/LLC 2 and NetBIOS, and concurrent IP and IPX routing. All software includes NetView/390 Service Point and SNMP agent management.

This assumes no collocation of the Atlanta and Philadelphia branches with the data center and LAN Server Farm equipment.

In addition, there is an enhanced reliability scenario, the ability to provide dial backup from branch locations to the central sites. In a branch FrameNode, dial backup may include an external CSU/DSU or a switched DDS line using a dial modem on a separate port. We have opted to

Branch Scenario	# Sites	Device	Unit Price	Total
SDLC-only	19	3620-2X	\$1,395	\$26,505
SDLC Ethernet LAN	31	3620-2E	\$1,995	\$61,845
SDLC Token Ring	30	3620-2T	\$2,495	\$74,850
Central Site	# Units	Device	Unit Price	Total
Atlanta Data Center	2	4203-2T	\$4,395	\$8,790
Philadelphia HQ	2	4203-2E	\$4,395	\$8,790
Network Equipment Total				\$180,780
Sync/Manager™ for Windows				\$995
Grand Total				\$181,775

Branch Scenario	# Sites	Device	Unit Price	Total
SDLC-only	19	3620-2X (w/2-port serial card)	\$2,295	\$43,605
SDLC Ethernet LAN	31	3620-2E (w/2-port serial card)	\$2,395	\$74,245
SDLC Token Ring	30	3620-2T (w/2-port serial card)	\$2,895	\$86,850
Central Site	# Units	Device	Unit Price	Total
Atlanta Mainframe Data Center	2	4203-4T	\$4,895	\$9,790
Philadelphia LAN Server Farm	2	4203-4E	\$4,895	\$9,790
Network Equipment Total				\$224,280
Sync/Manager™ for Windows				\$995
Grand Total				\$225,275

provide backup for the CIR from each site, using another port.

Again, list prices include hardware and software. We have also equipped the 3600 Series FrameNodes with two-port serial cards and added two ports to the 4200 Series FrameNodes used at the Atlanta data center and the Philadelphia LAN server farm to accommodate dial backup. The 3620-2X at the SDLC-only site has been upgraded with the Internetworking FRAD Plus (I-FRAD+), which will support dial backup.

For More Information

Sync Research (NASDAQ: SYNX) develops and markets the award-winning FrameNode™ family of frame relay access devices (FRADs), geared for enterprises converging mission-critical SNA and client-server WANs on frame relay networks and the TyLink family of multiservice digital transmission products.

Contact Sync Research at (800) Ask-Sync, Fax (714) 460-4484, or visit Sync's Web page at www.sync.com. Sync Research can be reached by mail at 40 Parker, Irvine, CA 92618.



Sync Research

Forward-Thinking
Solutions
For Business-
Critical Branch
Internetworking

When networks are the lifeblood of a company, there's no such thing as one size fits all—especially for branch internetworking. At Sync, we understand connectivity from every angle. The way information flows to and from branches determines the service that can be offered, which has a direct link to profitability. That's why we call them business-critical applications.

We specialize in taking everything you like most about legacy SNA networks—reliable response times and sophisticated management—and combining these traits with the inherent strengths of frame relay. No company is more qualified to deliver on the promise of frame relay than Sync. Our ability to prioritize protocols with SNA-like dexterity enables you to safely migrate to frame relay and capitalize fully on the improved availability, performance, and cost reduction characteristics that make frame relay the standard for branch networks.

There are many options for moving data from point A to point B, but only one real resource for *managing* the combination of SNA and LAN networks over frame relay—Sync Research. Sync's solution is based on the award-winning FrameNode™, designed to support SNA and LAN convergence in business-critical branch networks.

Solid Roots in Multiprotocol Branch Networks

SNA, bisync, IP, IPX: Branch connectivity has its own special characteristics and requirements. Sync has the unique ability to match networking solutions to needs through the FrameNode product family, ideal for high-traffic, business-critical industries. The Sync difference is that we leverage our strengths in SNA to build branch solutions from the ground up. Our roots in SNA are the perfect training ground for SNA, LAN, and WAN access solutions using frame relay.

Hierarchical branch networking aims to give geographically dispersed users instant access to common information and resources. Frame relay using Sync's FrameNode 4200 and 3600 is the most efficient and effective way to accomplish this goal. Combining LAN and legacy SNA traffic, Sync FrameNodes deliver:

- Proven efficiency for hierarchical topologies
- Built-in integration of SNA, legacy, and LAN platforms
- Award-winning quality of service (QoS)
- Streamlined access to network-level bandwidth, resources, and applications

Business-Critical Application Support

Even the slickest network connectivity scheme is of little use if you can't get data to the other side consistently. That's why the FrameNode is loaded with features to ensure business-critical applications to frame relay networks and access and deliver data via your network every time.

Operating like a traffic meter, the FrameNode features Adaptive Congestion Control™ (ACC), a function that compensates for traffic fluctuations and maintains more uniform, predictable command over how information flows across the network.

Proven in independent testing, the FrameNode accurately prioritizes

and proportions multiple protocols over a single PVC. FrameNode's Priority Dependent Queuing™ (PDQ) allows you to set four priority levels to assign transmission priorities based on protocol, SNA PU, or user. Priority Dependent Transmission™ (PDT) provides a flexible bandwidth allocation scheme that guarantees bandwidth for PDQ, then allocates bandwidth on a percentage basis with fixed and dynamic modes. (See *Data Comm's* Tester's Choice award, Feb. 1997.)

Adaptive congestion control and Governed Burst Rate™ further customizes access, making network resources consistently available when needed.

Optimized for Frame Relay

The best route between two points is the FrameNode's virtual switching, a method of arbitrating which path is best for specific data packets to travel. The FrameNode products complement the intelligence of frame relay and deliver the ability to find the best route.

Sync's FrameNode gives you full SNA connectivity for primary routes, backup routes, and alternate routes, providing SNA sessions with deterministic PVC selection on a DSPU basis. Configuring these PVCs allows the FrameNode to provide session resiliency on PVC failure, with deterministic route selection and automatic switching to a hot-standby site while maintaining the host session.

The FrameNode gives you full IP connectivity—critical to branch networking. Sync's Virtual Route Switching (VRSw) yields increased reliability, faster network processing and more efficient bandwidth utilization. Based on standard router conventions and event-driven switching logic, Sync's Virtual Route Switching provides faster route switching and reconvergence, dramatically reduces the bandwidth required for branch office connectivity, is 100% compatible with leading routers, and combines low WAN overhead with dynamic route switching. Virtual Route Switching implementation is simpler to configure and switches to new routes faster than traditional routing.

The Technology for Frame Relay, The Resources to Manage It

Network growth, change, and the complicated merger of legacy systems with client-server computing place a burden on management—the ability to track and monitor data and network resources. With Sync diagnostic tools such as Sync/Manager™ and advanced circuit management technology, you get a minute-by-minute snapshot of the effectiveness and health of your network—an in-depth look that enables you to maximize reliability and availability, as well as to cost effectively manage network change.

- Networks are accessed through SNMP, PUs, and NMVTs.
- Complete SNMP management supports both Windows and Unix systems, LAN device controls, and remote configurations.
- Remote diagnostic capabilities improve troubleshooting and configuration accuracy and enable out-of-band connection to the remote branch office.

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- **Reduced Complexity:** DLSw is also significantly easier to configure (no mapping of devices to PVCs), supports standardized dial services (for backup or primary access), and scales better than the currently available alternatives.

Since the SDLC-only sites don't require routing (one destination) and scaling (maximum of 56 kbps), we use BNN instead. This protocol is best used when there are few SNA devices and only a single PVC. For more information on the technical differences between BNN, BAN, and DLSw, check out the *SNA Over Frame Relay White Paper* at <http://www.baynetworks.com/Products>.

Manageable, Flexible Solutions

Network management is key to any mission-critical network. Bay Networks provides Optivity™, a complete network management system that delivers operation, policy, and design services for end-to-end management of hubs, routers, and switches. Configurations can be stored on a router or loaded across the network, and backups can be stored on removable flash media.

Our solution transparently passes NetView alerts and commands so SNA devices continue to be managed by NetView/390. Bay Networks Optivity™ facilitates the management of complex internetworks and supplies the tools for optimizing performance.

Dial backup is supported, either into or around the frame relay cloud. BayRS also supports BSC 3270, async, and polled async traffic. If frame relay is unavailable at a site, a tail-circuit connection (via PPP, SMDS, or X.25) to the nearest router can be used. APPN is available as a software upgrade.

On the hardware side, there are several options to be considered. These include an integrated Ethernet hub, hardware-based RMON support, and a second LAN segment. An integrated CSU/DSU is available, as well as an optional V.34 modem and ISDN for the backup connection.

Bay Networks' nonproprietary solution, which extends from desktop to mainframe LAN hubs, and global services act as a road map to simplify your network evolution, allowing you to continue to deliver dependable and innovative business applications and to assert your competitive business position in the global marketplace.

Pricing

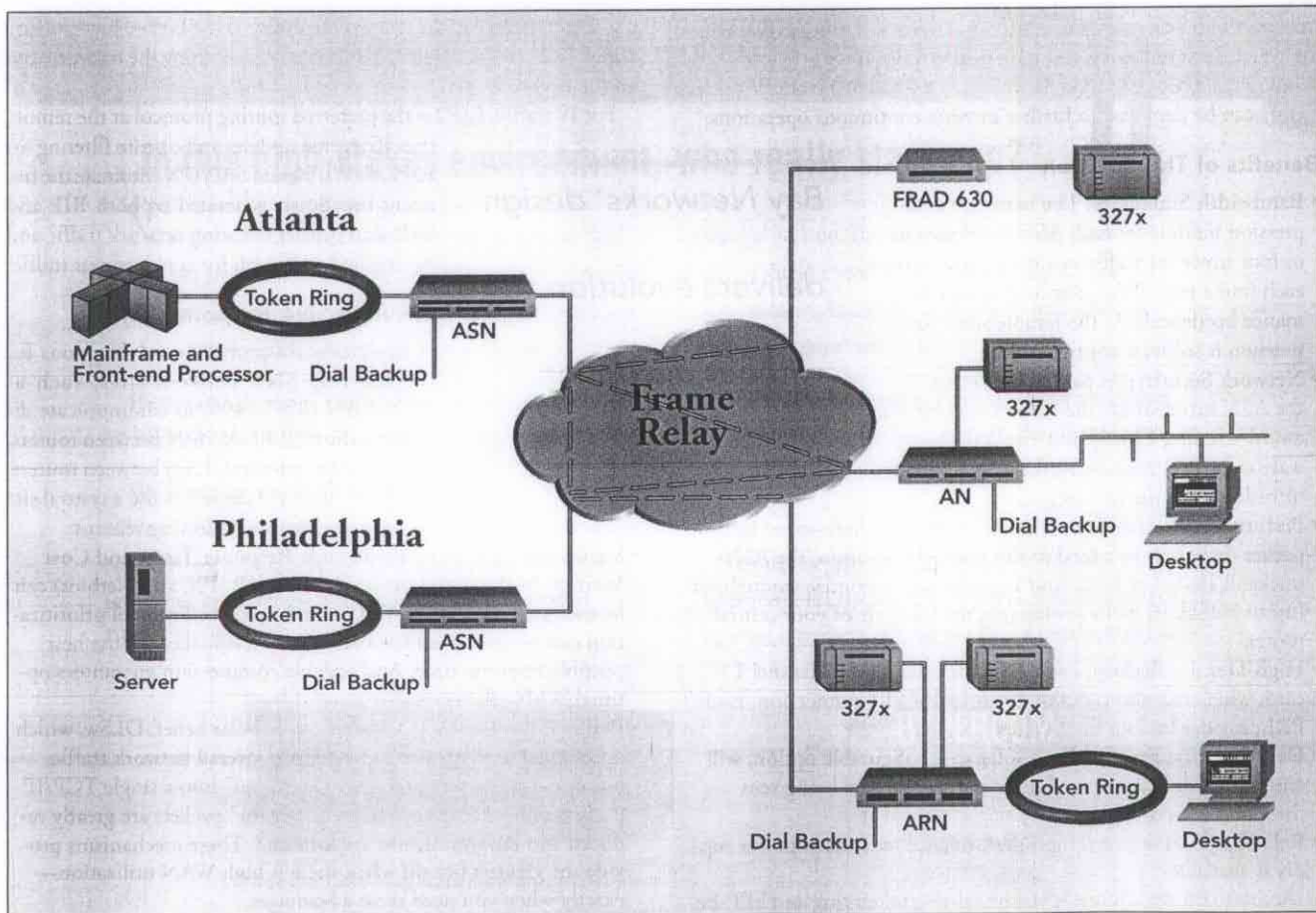
The solution described above has a list price of \$359,895. This includes ISDN backup, compression, and Optivity™ management. There are many variations depending upon your specific requirements. Removing the ISDN dial backup reduces the total by \$24,400; or encryption can be added for \$20 (DES 40) or \$500 (DES 56) per site. Using a single SDLC port (and reusing the existing multidrop equipment) at each location reduces the price to \$218,100 without backup.

For More Information

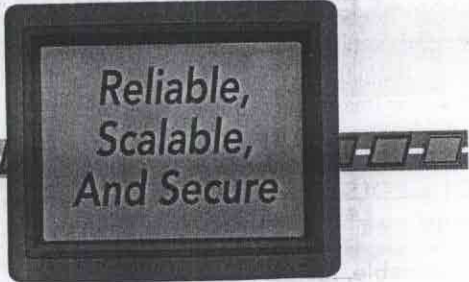
Contact: Marc Bernstein
Senior Product Manager
mbernste@baynetworks.com
(508) 916-8004 or
<http://www.baynetworks.com>



Bay Networks



Bay Networks



Reliable,
Scalable,
And Secure

Bay Networks delivers a comprehensive end-to-end mission-critical networking solution for the enterprise customer who demands peace-of-mind business solutions. With Adaptive Networking™, Bay Networks protects your existing application investment through BayRS, which enables continuous operation, preserves predictable response time, provides bandwidth scalability, and delivers operational productivity.

For this challenge, Bay Networks opted for a cost-effective and resilient design that delivers evolution without disruption.

The Central Site Challenge

Bay Networks recommends integrating your branch offices using our Access Stack Node (ASN) router at the data center and at headquarters. The scalability and performance of the ASN enables a single device to easily handle the required traffic at each location.

The ASN supports BayRS™, Bay Networks' comprehensive routing software. BayRS handles network services such as efficient SNA transport with local acknowledgment, multiprotocol routing, dial backup for network resiliency, and traffic prioritization for predictable response time. Through a modular chassis, the Backbone Node™ router family can be deployed to further increase continuous operations.

Benefits of This Solution

- **Bandwidth Scalability:** The hardware compression module for each ASN condenses up to four times the traffic normally possible over each frame relay PVC, eliminating a performance bottleneck. At the remote sites, compression is software configurable.
- **Network Security:** As part of BaySecure™, the ASN incorporates the market-leading and award-winning CheckPoint FireWall-1 software to protect your network against potential intruders from the Internet.
- **Performance Scalability:** As traffic increases, a high-speed fast packet cache can be added to the ASNs. In addition, the ASNs' stackable design of up to four modules will maximize throughput (up to 200 kbps) while prolonging the life cycle of your central router.
- **High-Density Backup:** Each ASN includes a multichannel T1 card, which can also function as an ISDN PRI connection. Each PRI provides backup for 24 sites.
- **Data Security: Encryption,** a software-configurable option, will ensure that only authorized users can see the data being sent through the network.
- **Reliability:** An optional high-performance redundant power supply is available.

Access to the mainframe is via the existing token ring and FEP. Be-

cause there are fewer SDLC connections, you immediately reduce software and maintenance charges. For this case study, a CNT 6600 (\$45,900 with Escon and token ring) can be used to replace the FEP.

Cost-Effective Branch Office Networking

At branches with a LAN, a BayStack™ Access Node (AN(r)) or Access Remote Node (ARN) router is provided. These cost-effective branch routers provide one LAN (Ethernet or token ring) and up to five WAN ports. Each WAN can be a standard RS-232, RS-449/442, V.35, or X.21 connection at speeds up to T1/E1. Each router runs BayRS™ software, which is fully compatible to ASN's software. Dial backup via ISDN is included with each router.

For branches without a LAN, the Bay Networks FRAD 630 is suggested. The FRAD 630 offers a lower-cost SDLC-to-frame relay conversion, while providing local acknowledgment, WAN services, including traffic prioritization, and a LAN port for future use.

All Bay Networks routers feature advanced frame relay capability. Each router can set the discard eligibility (DE) bit for low-priority traffic. It also responds to BECN requests by limiting the traffic placed on the network.

For IP traffic, RIP2 is the preferred routing protocol at the remote sites. Triggered updates and custom filtering for RIP2, RIP/IPX, and SAP/IPX eliminate the frequent broadcasts generated by both RIP and SAP, thus further reducing network traffic and freeing up bandwidth for core business traffic.

Ensuring SNA Response Time

Bay Networks provides several options for transporting SNA between sites, such as BNN/BAN (RFC 1490) to communicate directly to the FEP, BNN/BAN between routers, Data Link Switching (DLSw) between routers, or APPN. We have chosen to use a central site

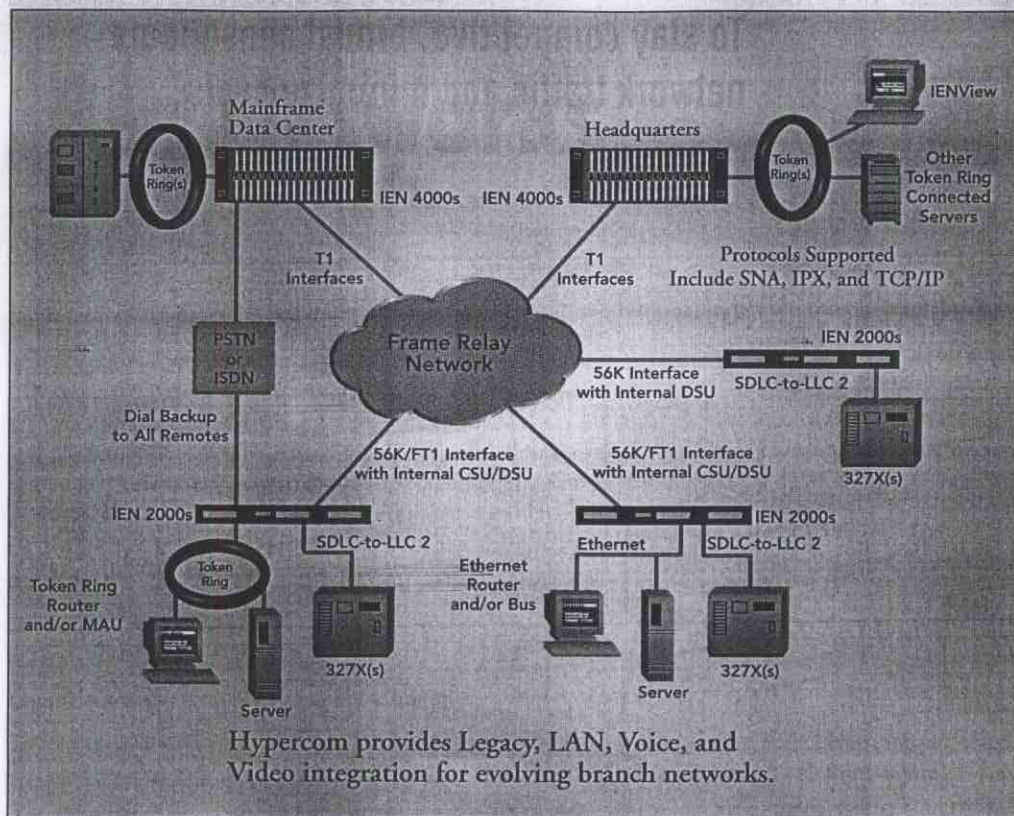
router with DLSw between routers for the following reasons:

- **Significant Flexibility, Predictable Response Time, and Cost Savings:** Multiple protocols (including IP, IPX, and Netbios) can be merged onto a single PVC to reduce costs. Protocol prioritization can be used to ensure that critical traffic receives the best possible response time. And scalable compression guarantees optimal WAN efficiency.
- **Bandwidth Efficiency:** Contrary to popular belief, DLSw, which is designed for large networks, reduces overall network traffic. Since multiple data packets are "packaged" into a single TCP/IP packet, nonproductive "acknowledgment" packets are greatly reduced and retransmissions are localized. These mechanisms provide the greatest benefit when there is high WAN utilization—exactly when you need these advantages.

Bay Networks' design

delivers evolution

without disruption.



IENView receives and logs alert and alarm messages if user-defined operational parameters are not upheld. Problems can be diagnosed quickly and easily, with detailed information provided based on the specific function a module is performing. For example, an SDLC processor will show poll addresses, frames in and out, retransmits, erred frames, and physical-level signals so users can tell whether the port is operating properly. IENView can perform loopbacks and protocol traces to assist in diagnosis.

The IENView application operates with the most popular platforms, including HP OpenView and NetView for AIX. IEN provides an interface to mainframe-based NetView as well.

Hypercom also offers a full range of services to help install, troubleshoot, and support national and multinational networks. Value-added customer

Building on a Legacy of Legacy

Data Communications recently rated IEN one of the most comprehensive voice/data solutions available. Although Hypercom was one of the first to offer both packetized and TDM voice—and video—what makes IEN so comprehensive and all-accommodating is its extensive legacy orientation.

Unlike router solutions, the IEN does not try to force fit legacy protocols into LAN/TCP/IP-based environments via encapsulating or tunneling techniques. Expertise extends to creating customized innovative gateways (i.e., BSC to TCP/IP) that work with both legacy and LAN protocols users are running.

With legacy/LAN consolidation in place, IEN switch/routers led the charge in adding voice, fax, and video to the mix. For top voice quality using frame relay, IEN uses congestion management, variable jitter buffers, dynamic segmentation, variable compression rates, prioritization, and silence suppression to ensure quality and reliability. PCM-based voice or video can be added with a single card, enabling data to be streamlined into T1 links using the channels not filled by voice traffic.

As technology moves faster and faster, Hypercom users know that they're free to evolve technologically, assured that existing equipment will be seamlessly integrated with ATM or the next killer app or service.

Network Management and Customer Support

IEN is managed by Hypercom's IENView SNMP management platform. IENView provides all of the tools required to allow single point control and monitoring of legacy, LAN, WAN, voice, and video network elements from a single management platform. The network manager can gather information about the availability and performance of the network either in- or out-of-band. As software updates become available, users can download them to all remote nodes.

support services include technical training, Technical Assistance Center, BBS/Internet connections, documentation, project management, and installation services.

Pricing

The list price, including hardware, software, and network management, is:

Philadelphia Headquarters	\$19,445
Atlanta Data Center	\$25,605
SDLC-Only Remote Site	\$3,790
Token Ring/SDLC Remote Site	\$6,715
Ethernet/SDLC Remote Site	\$5,610

Note: Any site may have an internal CSU/DSU installed in the IEN chassis at an additional cost of \$2,000 for FT1/T1 and \$600 for 56/64K. PSTN/ISDN backup is included at all remote sites.

For More Information

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 Internet: info@hypercom.com
 Or visit Hypercom's Web site at <http://www.hypercom.com/netsys>

HYPERCOM
 Network Systems®

Hypercom Network Systems



Turn Frame
Relay Into a
Low-Cost ATM

Even with service costs falling, most companies are looking to optimize spending by consolidating IT traffic onto one smooth, easy-to-manage network. ATM promises the flexibility, but it isn't always price competitive. Hypercom Network Systems' branch networking solution uses a combined switch/routing architecture to support legacy (SNA, BSC, etc.), LAN, voice, and video traffic using frame relay. The flexibility of the switch/router platform accommodates packet, circuit, and cell technologies, so today's infrastructure investment will continue paying off tomorrow.

Change is part of progress, but it's not always the easy part. Hypercom believes that if you're investing in a major network revamping—such as combining LAN and legacy traffic—you might as well make a change that lets it be easier and cheaper to keep on making changes. So along with the obvious considerations—speed, reliability, management, cost—we build in “pay as you grow” flexibility. By combining a wide range of functions and interfaces in a single device (i.e., router, CSU/DSU, voice compression, protocol conversion, dial backup modem, and data compression and encryption), Hypercom's Integrated Enterprise Network™ (IEN) eliminates the need to purchase, install, and maintain multiple hardware devices. This cuts costs and makes life easier—for the long haul.

For the sweetest cost savings, don't use cookie-cutter hardware. IEN features stackable, modular components that can be combined to meet individual network needs, supporting a wide variety of protocols and WAN topologies. Tailored software gateway and backup functions address the challenges of hybrid legacy/LAN networks. The more the new hardware infrastructure works with what users have in place, the less time and money will have to be invested in equipment replacement, systems integration, and training efforts.

An Integrated Solution

At the Philadelphia headquarters, two IEN 4000s are installed to support the required connectivity. The IEN 4000 is an eight-slot chassis that can be configured in a variety of ways to accommodate a broad traffic and port mix. This solution includes multiple T1 WAN frame relay links and a 16-Mbit token ring bridge/router connection supporting IP, IPX, and SNA. Optionally, a second 16-Mbit token ring bridge/router connection can be added for redundancy. If required, voice, video, or banking connections can be supported within the IEN architecture.

In the Atlanta data center, two IEN 4000s are installed to support the required connectivity. This site includes multiple T1 WAN frame relay links, a 16-Mbit token ring bridge/router connection to support IP, IPX, and SNA, and ISDN dial backup capability for system reliability.

In order to support the SDLC-only remote sites, the solution includes a two-slot IEN 2000 chassis. A key feature of the IEN is its flexible “plug and play” architecture. As networks evolve, this capability

plays a pivotal and strategic role and provides for hot swap modules to be interchangeable across the entire IEN product line. The IEN solution includes a WAN frame relay link, PSTN dial backup, and SDLC-to-LLC 2 conversion for the 327X IBM controllers.

The token ring/SDLC remote sites employ two stacked IEN 2000s. IEN's stackable architecture permits multiple units to be cascaded to form larger logical nodes. These sites are equipped with a WAN frame relay link, a 16-Mbit token ring bridge/router connection to support IP, IPX, and SNA; SDLC-to-LLC 2 conversion to support the 327X IBM controllers; and an ISDN dial backup to the data center.

The Ethernet/SDLC remote sites employ two IEN 2000s. These sites are equipped with a WAN frame relay link, a 10-Mbit Ethernet bridge/router connection to support IP, IPX, and SNA; SDLC-to-LLC 2 conversion to support the 327X IBM controllers; and an ISDN dial backup to the data center.

Speed and Reliability: Success Means Never Having to Say “Please Resend”

Speed is determined by a user's committed information and burst rates, and the overall health of the network. Reliability consists of two primary components: (a) backup if things go wrong and (b) techniques for making sure they don't, such as

- Optimal network design
- Reliability down to the port level
- Efficient bandwidth utilization
- Intelligent traffic prioritization and monitoring across the WAN
- Backup for access devices and WAN links

Flexibility and granularity are key. IEN features parallel processing, which assigns dedicated processors to individual ports. Additional ports and protocols can be added without affecting others. For the best usage of bandwidth, Hypercom complies with the RFC 1490 standard for sending legacy protocols over frame relay. This uses far less overhead than the Data Link Switching (DLSw) method initially favored by many router vendors.

Prioritization is also key, especially as voice and video are added to the network. IEN creates classes of traffic to eliminate session timeouts or deterioration in performance. Hypercom's Optimal Access™ prioritization technology combines three priority allocation and traffic management schemes.

Once traffic is on the WAN, IEN assures quality of service (QoS) by reacting to congestion alerts sent by the frame relay switch. As these BECN and FECN notifications are received, IEN throttles back. Should the network discard packets, end-to-end data management mechanism within IEN retransmits discarded frames. If communications become totally unreliable, the remote node performs automatic dial backup. Finally, IEN features sophisticated dial backup, via either PSTN or ISDN, for mission-critical applications.

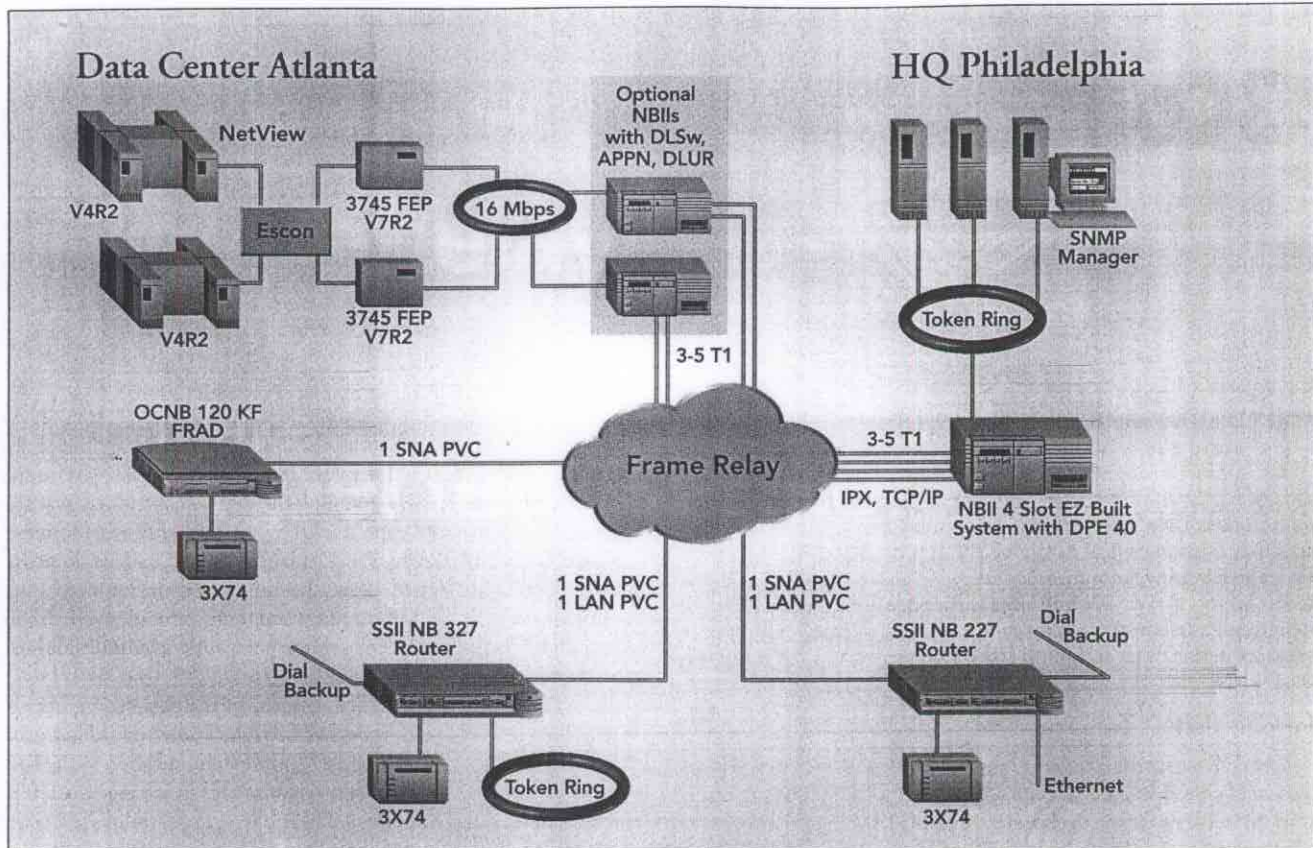
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costs associated with memory or forklift upgrades. The OCNB 120 KF has an integrated CSU/DSU, which results in additional savings per site. For greater serial port density, use the SuperStack II NET-Builder 320 (FRAD), which has three serial ports.

Implementing DLSw throughout the entire network provides significant performance and scalability enhancements.



- **SNA and Ethernet LAN:** The SuperStack II NETBuilder 227 has one Ethernet LAN port and three serial ports. The serial ports support the SNA controllers, frame relay access, and dynamic dial backup for reliability. Alternatively, ISDN dial backup is available with the SuperStack II NETBuilder 427.

- **SNA and TR LAN:** The SuperStack II NETBuilder 327 has one token ring LAN port and three serial ports. The serial ports support the SNA controllers, frame relay access, and dynamic dial backup for reliability. Alternatively, ISDN dial backup is available with the SuperStack II NETBuilder 527.

Network Management

For managing this multiprotocol, legacy network, 3Com recommends using Transcend Enterprise Manager version 4.1 for Unix. Transcend management software offers integrated, enterprise-wide management. 3Com's SmartAgent intelligent device agents proactively gather the in-

formation you need from every network environment and organize it in a way that is actionable, scalable, and modular. Consequently, Transcend improves performance and decreases operating costs.

Pricing

	U.S. List Prices
Data Center-Solution 1	\$49,750
Data Center-Solution 2	\$0
HQ	\$24,875
Remote Sites:	
SNA Only	\$995
SNA & Ethernet LAN	\$3,695
SNA & TR LAN	\$3,995
Network Management	\$9,495

Summary

The above design scenarios provide further proof of 3Com's robust network solutions. Customers have the option of implementing a standards-based network that is fully scalable through product upgrades and software features that enhance performance while converging SNA and non-SNA traffic.

For More Information

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1.800.NET.3COM ext. 2
(408) 764-5000
(408) 764-5001 (fax)



3Com



Providing
Multiple,
Scalable
Solutions

Extension of Legacy Networks

The SNA-Frame Relay Challenge represents a prevalent trend in networking—converging SNA and non-SNA traffic into a single frame relay network. Despite the potential for attractive cost savings associated with migrating from leased lines to frame relay, legacy customers have been reluctant to combine traffic due to the time-sensitive, mission-critical nature of SNA traffic. 3Com has become a leader in delivering innovative, cost-effective, standards-based solutions to the legacy market. With 3Com's experience in large-scale network design and implementation, no company is better suited to provide "a system solution" that integrates IBM/SNA networks with multiprotocol LANs.

Introduction

The RFP has established basic functionality requirements, and it has also implicitly described the customer's need for a redundant, fault-tolerant network. In the data center, multiple IBM mainframes channel attached to dual FEPs using an Escon channel connection indicate a significant investment in network redundancy. 3Com is able to provide multiple, scalable solutions for the RFP. We will describe two of these solutions. Solution 1 supports the current level of redundancy at the data center, provides flexibility of WAN services and multiprotocol support, and establishes a balance between potential savings "insurance" versus initial cost. Solution 2 provides customers with a cost-effective means to migrate the network to frame relay while leveraging their investment in the existing equipment. The two solutions are not mutually exclusive. Rather, Solution 2 is a subset of the first and requires the same products at the remote sites and HQ.

Network Design

3Com's NETBuilder software provides multiprotocol support, including IP, IPX, NetBIOS, Async, BSC, DLSw (RFC 1795), DLSw V2 (RFC pending), APPN, SDLC, OSPE, MOSPE, BAN, BNN, and RFC 1490, to name a few. Multiple PVCs are available from each remote site; SNA traffic is handled on one PVC and LAN traffic on another. Consequently, customers can prioritize traffic by PVC or with Protocol Reservation for reliable, predictable delivery of SNA and non-SNA traffic. Additional NETBuilder software features, such as compression or bandwidth on demand, reduce the amount of WAN traffic, thus enhancing network performance. The introduction of NetView Service Point, SNMP Traps to Alerts, and NetView Alerts to Traps provides greater flexibility for the management of SNA and non-SNA traffic.

Solution 1 provides a scalable, predictable, fault-resistant, redundant network through the utilization of DLSw V2 and dual NETBuilder II routers at the data center. Dual

routers provide dynamic recovery in the event of failure as an extension of the existing data center redundancy. Implementing DLSw throughout the entire network provides significant performance and scalability enhancements. DLSw V2 requires only one TCP/IP tunnel per connection, effectively doubling the number of tunnels available and increasing network capacity. DLSw performance enhancements include Circuit Balancing, On Demand Circuits, and Explorer Reduction. Circuit Balancing allows the routers to cache multiple routes to the same destination MAC address and route traffic on the path with less traffic, which alleviates congestion in networks with multiple hosts and dual FEPs.

In Solution 2 routers are not required in the data center, because the SNA traffic will be transported from the frame relay cloud using the BAN protocol, which supports direct communication to the IBM 3745 FEP running NCP 7.2. Thus customers can leverage the investment in the existing equipment while realizing cost savings associated with migration to a frame relay network.

Product Recommendations

Data Center:

In Solution 1, two complete NETBuilder systems will be installed to provide a flexible, reliable, redundant solution. Each system will consist of one NETBuilder II 4 Slot EZ Built System with DPE 40, a TR+ Module, and HSS 3Port Modules.

Solution 2 does not require any investment in 3Com products at the data center. However, additional costs may be incurred to add more T1 interfaces and LIC3 Type 1 Scanners on the FEP to support the increased T1 density.

HQ:

Headquarters requires a multiprotocol router for the current IPX and TCP/IP traffic. The NETBuilder II 4 Slot EZ Built System with DPE 40, TR+ Module, and HSS 3Port Modules provides the multiprotocol support and port density (to five T1s) to meet the network design requirements.

REMOTE SITES

- **SNA Only:** Remote sites with SNA controllers do not require the full functionality of a router. Therefore, 3Com's FRAD solution is recommended: Office-Connect NETBuilder 120 KE. Our FRAD solutions are based on NETBuilder software with the LAN port software disabled. The FRAD provides a full suite of supported legacy protocols, including Async, BSC, BAN, BNN, RFC 1490, DLSw, SDLC, and HDLC. In addition, the FRAD can scale to a full, multiprotocol router with a simple software upgrade—no hidden

*You can leverage your
existing equipment
investment while realizing
the cost savings of migration
to a frame relay network.*

and MPRouter/MP-PRO products for configuration and control. Remote Data-Scope is available for the Vanguard and MPRouter/MP-PROs for monitoring network connections.

Branch Site #1-Little Rock, AR

Branch Site #1 utilizes the Vanguard 100 product. This has three serial ports: one is RS-232; the second is RS-232 or V.36; the third may be an integral DSU, ISDN TA, or simply RS-232. Multiple SDLC controllers may be multidropped on the RS-232 ports. This challenge calls for one 327X SDLC controller at Branch Site #1.

The Vanguard 100 and Vanguard 100pc products also support PPP, SLIP, and Telnet. They are capable of multiplexing the IP (associated with the PPP, SLIP, and SNMP) with the SNA on a single DLCI. These products can prioritize the SNA traffic over the IP.

Branch Site #2-Birmingham, AL

Branch Site #2 uses a Vanguard 320. This product provides an Ethernet (10Base-T) port and is capable of an integral DSU for connection to the frame relay network. It also has RS-232 ports for SDLC support. Branch Site #2 shows an IP client and a Netbios client attached to the Ethernet. The Vanguard 320 has complete routing support for TCP/IP routing, including RIP II, OSPF, and Telnet, and has transparent bridging support for the Netbios client. The Motorola Netbios Name Filter feature in the Vanguard 320 will eliminate excess Netbios traffic across the network. By configuring the SNA traffic to pass through the network at an Expedite priority, the network manager ensures consistently fast response times in bursty LAN environments. The frame relay PVCs within the Vanguard 320 (as well as all other frame relay products) may be configured to stay within the committed information rate (CIR), go above the CIR, or adaptively react to backward explicit congestion notifications from the network by backing down to CIR in incremental steps. These options give the network manager the flexibility to tune these frame relay PVCs to allocate the minimum guaranteed for the data center and headquarters.

The Vanguard 320 device also supports voice over frame relay (Voice Relay™). Branch Site #2 shows an example of phone connection capability to the headquarters using the Voice Relay™ functionality.

Branch Site #80-Brookfield, WI

Motorola recommends a Vanguard 305 product for Branch Site #80, where token ring connectivity, as well as SDLC connectivity, is required. The Vanguard 305 device provides the same routing support as the Vanguard 320 product, as well as source route bridging. It has three serial ports. One port is used for the SDLC connection and one port for connection to frame relay. The third port may be used for integral ISDN TA capability. For example, Branch Site #80 is shown utilizing ISDN for the automatic backup of its SNA traffic to the data center. Using DCP, the SNA sessions from this remote site to the data center will be kept active while the ISDN call is being made to the data center during a frame relay network outage.

Headquarters-Philadelphia

The 6560 MPRouter™ PRO supports token ring and Ethernet mixed-LAN environments. This example connects over token ring to the IP, IPX, and Netbios servers. The router and bridging software comes standard with the MP-PRO. The IP-standard software includes RIP version 1 and 2, OSPF, and Telnet. The 6560 at the headquarters has

All Motorola frame relay products preserve SNA end-user response by using a simple but very effective prioritization scheme.



five T1 connections, two of which are backup. The headquarters is shown with the 6560 Voice Relay™ capability to support voice connections to the branches.

Data Center-Atlanta

The 6560 at the data center is connected to the 3745 via token ring. It also supports connection to the 3745 via SDLC, Ethernet, QLLC, and frame relay (BAN and BNN). Up to 250 PUs per token ring port may be defined. These PUs appear to the FEP as being attached to the local token ring. MAC address multiplexing and SAP address multiplexing are both supported for all LAN-defined PUs within the 6560. The 6560, in this example, has ISDN support. This will work in conjunction with the DCP feature to backup and maintain sessions across the ISDN in case of a frame relay outage.

Other Features

- D-channel packet capability over ISDN
- SMDS
- Frame relay switching
- BSC (2780/3780/3270 and NCR)
- Airline Control Protocol (ALC)
- Translational bridging
- Async
- X.25
- Burroughs Poll Select
- IBM 2260
- Flash memory in all units
- Remote Monitoring Video

Pricing Model

SDLC Branch Little Rock, AR	Ethernet Branch Birmingham, AL	Token Ring Branch Brookfield, WI	Headquarters Philadelphia	Data Center Atlanta
\$799	\$1,599	\$2,099	\$8,120	\$8,120
x 19 sites	x 31 sites	x 30 sites	x 1	x 1
Total \$15,181	\$49,469	\$62,970	\$8,120	\$8,120

Total Network Suggested List Price: \$143,860

Additional Prices for Management, Voice, and ISDN Support:

9000UX SNMP Manager suggested list price	\$2,500
6560 Voice suggested list price	\$1,500
6560 ISDN suggested list price	\$ 750
Vanguard Voice suggested list price	\$ 200
Vanguard ISDN suggested list price	\$ 200

For More Information

Motorola networking products can be ordered through a Motorola Information Systems Group (ISG) sales representative or an authorized distributor. For locations nearest you, visit our Web site at motorola.com/networking.

MPRouter is a trademark and Vanguard is a registered trademark of Motorola, Inc. Corporate and brand names are the properties of their respective companies.



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Motorola

Frame
Relay for
The Future

Motorola recommends the Motorola 6560 MPRouter™ PRO, the 6520 Multimedia MPRouter™, and Vanguard® products for integrating LAN and SNA traffic over frame relay. These products have the added benefit of combining voice traffic (Voice Relay™) over frame relay.

Preserving SNA/BSC Response Times

All Motorola frame relay products are recognized for their ability to preserve SNA end-user response time by using a simple but very effective prioritization scheme. There are four levels: expedite, high, medium, and low. Expedite is used for traffic that must be sent instantly. For this network, the SDLC SNA and LAN SNA traffic will be prioritized as Expedite. The high/medium/low settings can be configured to share the bandwidth for other protocols using a weighted round-robin function: for example, two highs, one medium, and one low (repeat). For this application, the routed LAN traffic will be set to low. This will also include the management traffic.

In addition to this effective virtual circuit-level prioritization feature, Motorola has added application-level prioritization capabilities with its Protocol Priorities feature. This feature gives the user the added flexibility to prioritize applications within a protocol.

Disaster Recovery

The Motorola Vanguard and MPRouter products support data connection protection (DCP) to keep remote SNA sessions alive during network outages. DCP is used in conjunction with dial backup, via either ISDN, switched 56, or analog. Vanguard and MPRouter products support integral ISDN and 56-kbps DSU for primary or backup links.

Standards

The Motorola Vanguard and MPRouter products are fully compliant with RFC 1490 and support RFC 1490 encapsulation of IP, IPX, 802.5 (BAN), 802.2 (BNN), and 802.3. They interoperate with IBM 3745/46 NCP 7.3, IBM Route Expander/2, and other vendors' products using RFC 1490.

SNA Features

For this challenge, Motorola will attach to the IBM 3745 FEPs at the data center via token ring. Motorola will bring SNA traffic across the frame relay network from the remote SDLC-attached controllers to the FEPs via the

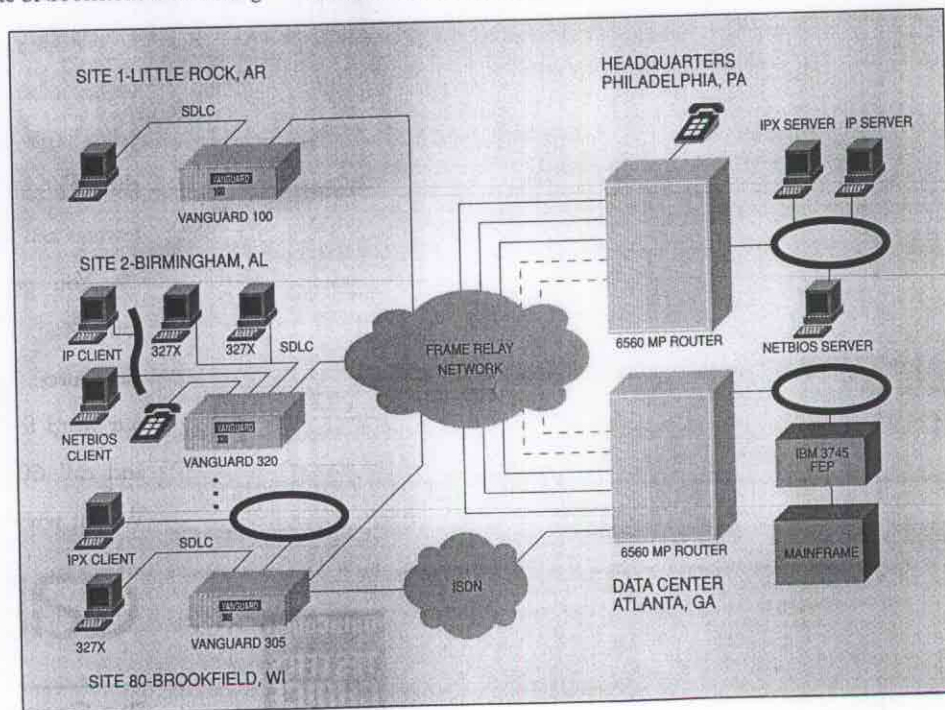
SDLC-to-LLC Conversion feature. This feature does spoofing at the end-points of the network to prevent timeouts within the network and sends only the data through the network for minimal network overhead. Motorola's Conversion feature supports all combinations of SDLC, Ethernet-LLC, token ring-LLC, and RFC 1490-LLC (BNN and BAN) conversion, so that remote LAN-attached SNA devices can take advantage of the spoofing capability. Physical Unit types 4, 2, and 2.1 are supported by the Conversion feature.

Routing and Bridging

The Vanguard and MPRouter devices will route the IP traffic using their comprehensive IP routing. For Netbios traffic capability, the Vanguard and MPRouter products will use their full bridging capability. This includes Netbios name filtering, transparent bridging, source route bridging, and translational bridging. The Motorola solution can multiplex the SNA and LAN data on a single PVC, as well as allocate separate PVCs for LAN and SNA data. Motorola will use separate PVCs for LAN and SNA data as called for by this challenge.

Management

Management of this network may be accomplished by an SNMP manager in combination with the Motorola value-added applications known as the 9000-UX. The 9000-UX can be loaded onto either the NetView for AIX product or the HP OpenView product. Telnet and Remote CTP (Control Terminal Port) are also supported by Vanguard



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Element Management

From an element management perspective, the Netlink FRX4000 and FRX6000 both feature built-in management tools to offer full operational, maintenance, and management control over the net-

SPECTRUM Enterprise Manager is the only management platform with built-in intelligence targeted at leading-edge fault resolution.

work. Both the FRX4000 and FRX6000 are fully manageable by an SNMP manager, such as Cabletron's SPECTRUM enterprise-wide management system. The FRX4000 and FRX6000 also support an integrated NetView Service Point, which enables concurrent support from a mainframe-based NetView console. In addition, all Cabletron Netlink family frame relay products are fully software defined, so software upgrades can be downloaded and remotely installed.

Enterprise Manageability—The SPECTRUM Solution

Cabletron's SPECTRUM Enterprise Manager provides robust multivendor network, systems, and application management to control the integration of SNA and LAN traffic through frame relay as a part of a broad enterprise solution. At the same time, SPECTRUM's new Frame Relay Manager brings to the customer the industry's most complete management of frame relay circuits by exploiting SPECTRUM's advanced technologies.

SPECTRUM Enterprise Manager is the only major platform to grow dramatically in market share three years in a row, according to recently published IDC numbers. Its success has been driven chiefly through its intelligence and scalability, as well as by a growing list of Cabletron-developed and partner applications to address a wide variety of business and management needs.

The Cabletron product is the only true client-server management architecture in the marketplace today, with scalability that has enabled as many as 4,000 SpectroSERVERs to function cohesively in a single account. For SNA/LAN customers with global environments, this scalability means choice in where and how management is done, enabling, for instance, policy-driven, follow-the-sun management. SPECTRUM's intelligence and scalability combine to enable all management to be done centrally, if desired, or dispersed across a number of data centers globally for very large environments.

This is also the only management platform with built-in, out-of-the-box intelligence targeted at leading-edge fault resolution. This intelligence can interpret errors in network and systems devices, applications, and databases according to relationships and even organizational designations, pinpointing problems and recommending

solutions. SPECTRUM's intelligence can also be leveraged to provide powerful advantages in planning, accounting, and business process management.

For integrated management of the SNA environment, Cabletron's BlueVision offers powerful, single-console options in conjunction with SPECTRUM. With BlueVision, network administrators can manage a LAN and an SNA network without performing additional operations or moving to another management system.

SPECTRUM's Frame Relay Manager allows the enterprise customers, as well as ISPs, to do precise monitoring of frame relay circuit bandwidth usage and costs. This is partly enabled by detailed circuit-level reports on bandwidth utilization, line congestion, and performance monitoring. Users also have the flexibility to customize reports to show real-time information at specified time intervals.

The Frame Relay Manager fully leverages SPECTRUM's intelligence and scalability and can work with any FRAD that supports the standard IETF frame relay MIB (RFC

1315) for SNMP data collection. Use of this standard MIB eliminates the need for expensive vendor-specific intelligent CSU/DSUs or RMON probes.

SPECTRUM Frame Relay Manager users are notified immediately when PVCs are experiencing congestion or failure, or exceeding a user-defined throughput. Alarms are generated when load and congestion thresholds are exceeded, as well as in response to a change of state of a data link connection management interface (DLCMI). Users are also immediately notified of changes on frame relay equipment.

Performance View graphs real-time throughput and congestion statistics for a PVC, while an enhanced topology view shows all devices connected to a frame relay interface. Finally, an enhanced autodiscovery feature allows users to save time while modeling the frame relay network and resolves connections on the DLCMI-to-DLCMI level.

Pricing

The total frame relay equipment cost for the 80 branch locations, the data center, and headquarters is \$315,555 (U.S. list).

A single SpectroSERVER lists for \$10,000 and a single SpectroGRAPH for \$5,000. SPECTRUM Frame Relay Manager lists for \$7,500 per copy.

Cabletron, SPECTRUM, SPECTRUM Enterprise Manager, SecureFast, Netlink, and FRX are trademarks or registered trademarks of Cabletron Systems.

For More Information

Contact Cabletron Systems at
(603) 332-9400

Corporate Address:
35 Industrial Way
Rochester, NH 03867

CABLETRON
SYSTEMS
The Complete Networking Solution™

Scalability

The Cabletron Netlink FRX6000s at headquarters and the data center are highly scalable, supporting from eight to 64 ports, including up to eight T1 or six E1 connections at full utilization. Up to 512 DLCIs can be configured on each frame relay link, with a maximum of 4,000 PVCs per node. In addition, the user can configure up to two LAN interfaces (token ring or Ethernet).

The Migration to Switching and Direct Host Connectivity

As the customer environment migrates to switching, Cabletron's SecureFast SmartSwitching products will provide the tools to build next-generation connection-oriented services for both SNA and routed traffic. SecureFast SmartSwitching (SFS) provides a set of traditional routing and new, connection-oriented technologies with a set of policy-based automated network management services. Features like multiple active paths, elimination of broadcast flooding, and policy-based access control give SFS-based networks greater reliability and security than router-based networks, and at a much higher performance level. These are all features critical to SNA users.

Combining Cabletron's frame relay capabilities with a Secure-

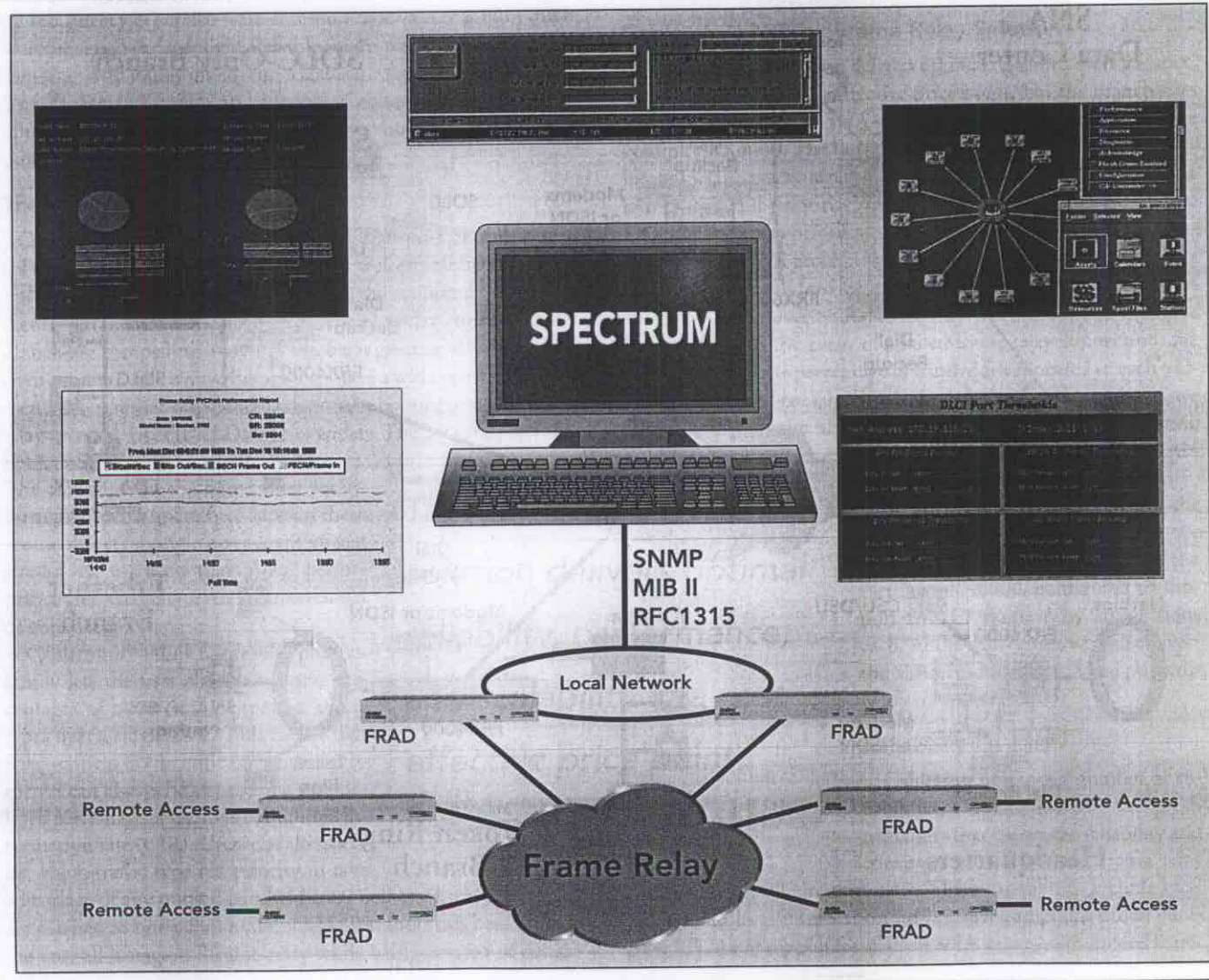
Fast switch fabric and Cabletron's integrated Channel Interface Module (CIM) provides the best solution for transporting SNA traffic fast and reliably between the enterprise server and the end-user. The CIM connects the enterprise server directly to the SecureFast switch

SecureFast SmartSwitching (SFS) provides the tools to build next-generation services for SNA and routed traffic.



fabric via a high-speed Escon channel connection. At the same time, the CIM can house host integration software platforms such as Microsoft's NT SNA server and NetWare for SAA, which then can be directly channel attached.

With a SecureFast-based solution, customers can reap the benefits of new technology while meeting the needs of their current mission-critical SNA applications.



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width allocation, which guarantees bandwidth for each type of SDLC PU (and other) traffic; and an adaptive burst rate feature, which can initially eliminate SNA frame discards due to network congestion.

Performance

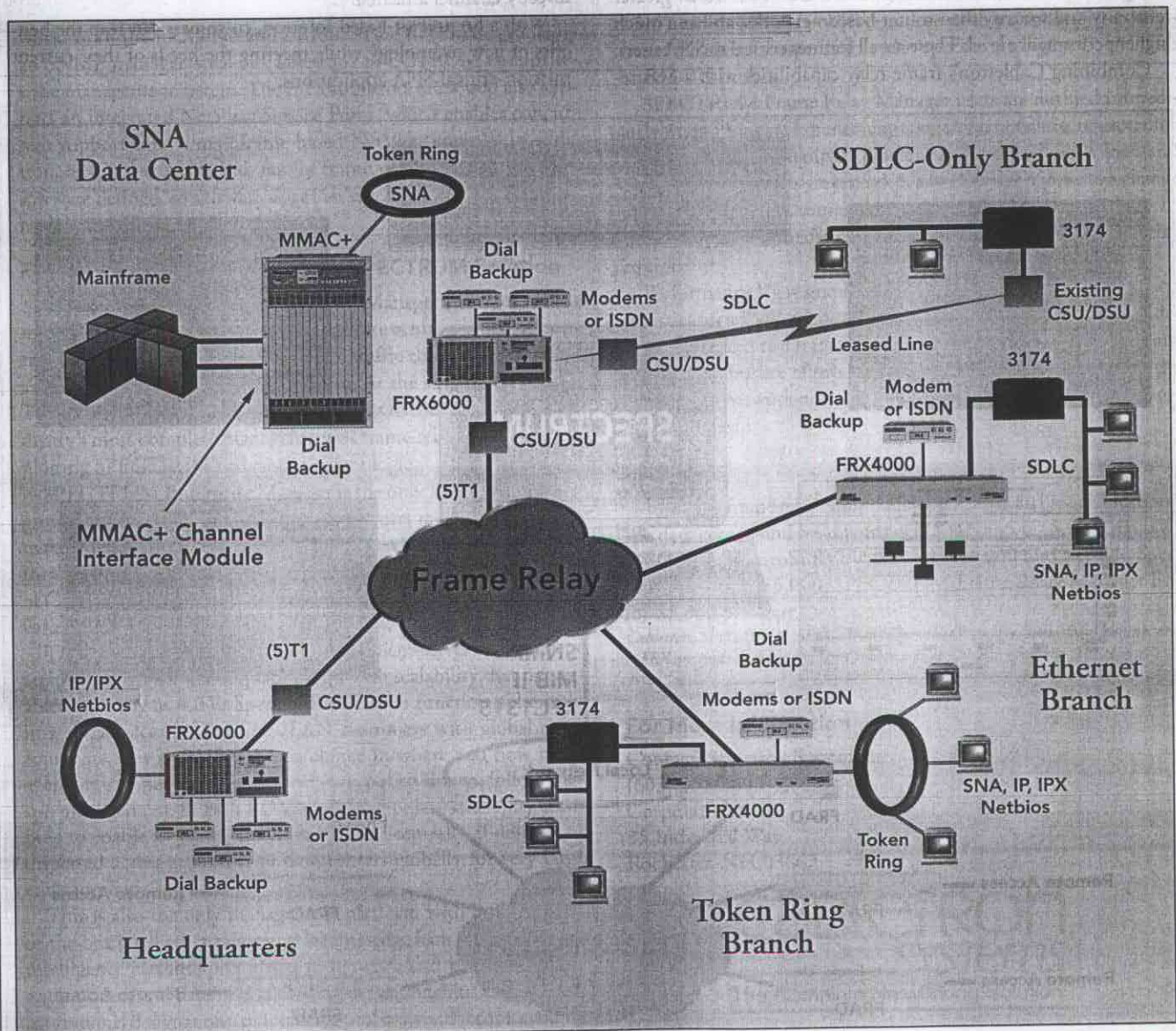
The FRX4000s recommended for the branch sites provide up to four times the performance of a typical FRAD or access router. Offering full utilization of frame relay links up through T1/E1 speeds (2 Mbps), the FRX4000 utilizes an i960 RISC processor, which optimizes response times and eliminates multiprotocol bottlenecks. The FRX6000s proposed at the headquarters and data center utilize the same award-winning architecture, but in a scalable multi-processor platform.

In fact, for the second consecutive year, the Netlink FRX4000 has won *Data Communications'* prestigious Tester's Choice Award for its outstanding performance in multivendor testing of FRADs. The tests were designed to simulate a typical branch environment, measuring performance under congested and uncongested traffic conditions for a mix of SNA, IP, and IPX applications. The Netlink

FRX4000 was the clear leader in tests measuring performance under congested network conditions and delivered near-perfect results in its handling of multiprotocol traffic. This award comes on the heels of the multivendor FRAD testing done recently by The Tolly Group in which the FRX4000 was the undisputed leader in multiprotocol frame relay performance (see www.tolly.com).

In addition to the raw horsepower of the Netlink FRX4000 and FRX6000, our use of RFC 1490 to transport SNA over frame relay greatly increases the throughput of SNA through the network. RFC 1490 encapsulation (BNN) avoids the bottlenecks that arise because of the excessive transmission and processing overhead of data link switching (DLSw). Cabletron also supports BAN and Annex G.

Should a particular site need to ensure optimal performance for a specific type of LAN traffic, Cabletron's Multi-Level Bandwidth Allocation feature can dedicate a specific percentage of CIR to a specific LAN protocol. This feature is totally under the control of the network manager and can be used with any combination of FRX4000/FRX6000-supported protocols.



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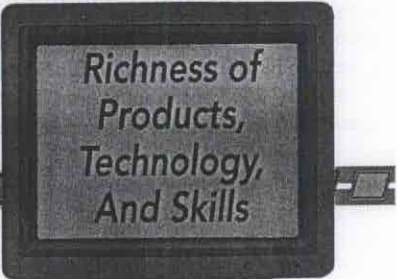
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Richness of
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Cabletron's solution for integrating SNA and LAN networks to help reduce overall costs targets high-performance SNA transmission via frame relay. It also features industry-leading multivendor management and migration options for the evolution to switching. In other words, the proposed solution addresses the SNA and LAN environments in their broadest sense rather than as a set of isolated pieces or fragmented niche solutions.

Within these broad objectives—reliability, scalability, flexibility, and quality of service—are common criteria across both infrastructure and management. Reliable, high-performance hardware combines with highly intelligent, scalable management software and a single point of service and support. Cabletron believes that no other vendor can offer this richness of products, technology, and skills.

The Challenge for Frame Relay

The superiority of frame relay for the transport of multiprotocol traffic over wide-area networks is now well established. For multiple branch environments in particular, the economics of consolidating parallel networks into a single frame relay connection per branch are compelling—savings can be as great as 40% in certain environments. Since most branch sites have a wide variety of equipment, the number of protocols that must be supported by frame relay access devices (FRADs) varies widely. The list often includes SNA, BSC, IP, IPX, LLC2, and async. The challenge for the frame relay equipment provider is not only to support these protocols over a single permanent virtual circuit, but to ensure that critical performance and reliability levels are maintained or enhanced.

Cabletron's Netlink frame relay product family lets the user allocate specific percentages of bandwidth to specific traffic types over a single PVC. This means that delay-critical SNA traffic (and other protocols) can always be assured of a user-defined percentage of the total committed information rate (CIR). Users can also specify which traffic type has priority to take advantage of any unused bandwidth, as well as which traffic types are allowed to burst above CIR. Cabletron users can benefit from the cost advantages of frame relay while being assured of consis-

tently low response times, session availability, and application throughput that will meet or exceed the performance of the current leased line network. The FRX4000/FRX6000 backup capability provides for automatic fail-over to an alternate PVC, dial-up, or ISDN line in the event that there are problems with the network. The Netlink FRX4000/FRX6000 bandwidth allocation capabilities apply to the backup connection as well as the primary PVC.

Cabletron's Netlink Frame Relay Solution

The Cabletron solution delivers optimal reliability, performance, and scalability at a cost-effective price point. For the branch sites with a combination of SNA and LAN traffic, we recommend the Netlink FRX4000. The flexibility of the FRX4000 lets the user allocate specific percentages of CIR to various SNA PU types at the branch site and prioritize one LAN protocol over another. The FRX4000 can also prioritize one PVC over another, so that within the FRAD, SNA processing will always take precedence over specific LAN protocols (or vice versa). The user also can combine SNA and LAN traffic over a single PVC, should this become desirable in the future. In the event of a failed frame relay connection, the user can specify the percentage of bandwidth allocated to each traffic type using the backup circuit. In order to keep costs down, we recommend that the SNA-only branch sites retain their existing equipment until the need to add a LAN causes them to move to frame relay.

At the data center (where all of the SNA traffic is terminated) and at the headquarters, we are proposing the Netlink FRX6000, configured to support five T1 frame relay connections each. At the data center, we will convert the SDLC traffic to LLC2 and put it directly on the LAN.

Reliability for SNA

Cabletron provides a number of capabilities in its Netlink frame relay product family that ensure the reliability and consistency of SNA over frame relay under virtually all circumstances. These capabilities include local polling and local termination for improved response times; complete RFC 1490 support for efficient SNA transport; multilevel band-

*The Cabletron Netlink
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he SNA traffic needs a guarantee of either 16 or 32 kbps from each remote site, depending on the number of attached stations at the site. In frame relay terms, this means that the committed information rate (CIR)—the amount of bandwidth guaranteed—needs to be either 16 or 32 kbps. The LAN traffic needs a CIR of either 16 or 32 kbps, again depending on the size of the LAN. Whatever the guarantee, the equipment needs to be able to support traffic bursts up to the maximum of the access line—256 kbps in some cases. The reason for these guaranteed bandwidth requirements is to ensure that service levels are maintained in the combined network.

The data center has multiple IBM mainframes that are channel-attached to the two 3745s using an Escon channel connection. The FEP is running NCP 7.2, and VTAM is at 4.2. The mainframe applications are CICS-based, with devices accessing the mainframe using the 3270 protocol (PU2 and LU2). The FEP has a token ring connection (TIC) to a 16-Mbit backbone token ring LAN, with plans to add T1 ports for the frame relay connections if necessary.

Network management for the SNA network is provided by IBM's Host NetView running on the mainframe. The LAN hubs are managed using one of the more popular SNMP managers, such as Hewlett-Packard's, IBM's, Cabletron's, or Sun's SNMP management platform.

Network Manager's Concerns

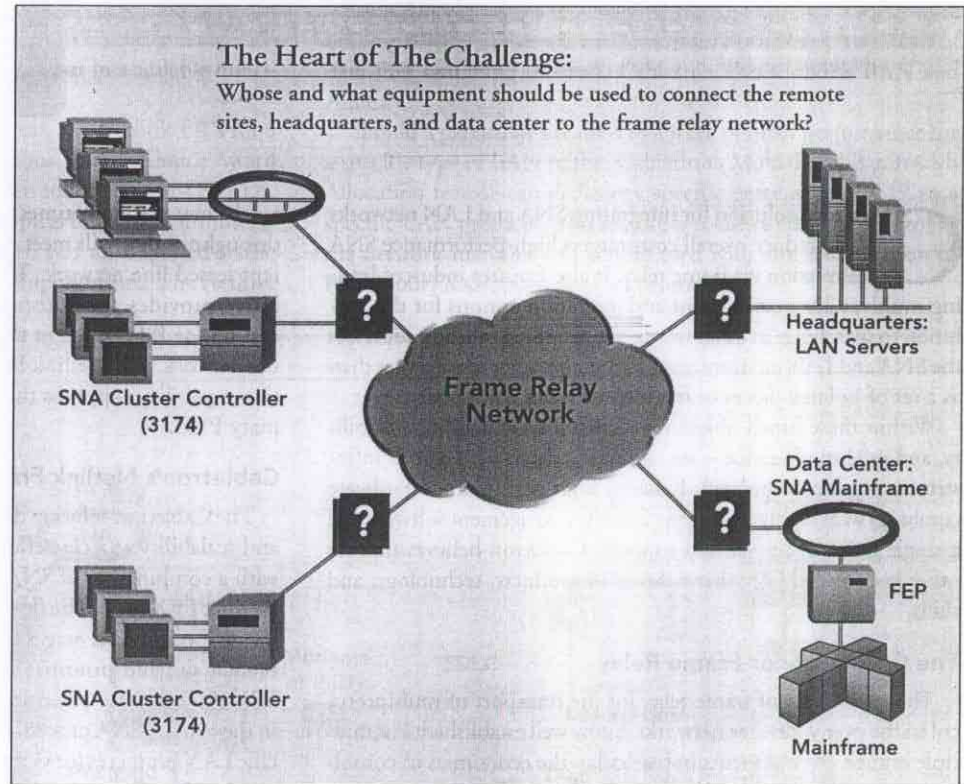
There are always concerns when integrating two different types of networks. Each solution given here should address the following:

- **Response time:** The solution should help the network manager meet the service-level commitment to the end-users. SNA end-users especially expect good and consistent response times. The solution should protect the SNA traffic from potentially bursty LAN traffic.
- **Reliability:** One of the chief concerns is network reliability. How does the solution address this?
- **Cost:** The solution should be cost effective, not only in terms of equipment but also in relation to staff needs and network management requirements. While cost is a primary concern, this doesn't always mean that the lowest initial cost is always the best. The solution should strike a balance between providing the lowest cost with the most benefits while meeting the needs of the business.
- **Network management and support:** The solution should say how the vendor proposes to manage and monitor the network. It is safe to assume that there is no network technical support people at the remote sites. Thus the preferred solution is one that allows the manager to control the network from the headquarters. Additional concerns involve the type of visibility into the frame relay network, the role of Host NetView, and the need for the operators to understand the relationship between the existing SNA networking and the vendor's solution.
- **Service and problem resolution:** The solution should outline how the new software is installed and note whether the network needs to be taken down for any potential problem fixes. It should be easy to

maintain and should accommodate central-site maintenance and problem determination. Also, the vendor should specify the type of support that will be provided.

Other Features

The real world is more complicated than the challenge presented here. Vendors' solutions can also solve more than just the basic problem outlined above. Examples of additional services or features include support for BSC devices in a banking environment or support for voice



calls between the branch office and headquarters of a corporation. Vendors are free to explain how their solutions provide additional features that solve SNA-LAN networking problems.

Pricing Guidelines

The following rules applied to all prices. The cost for the solution must cover the equipment and any software required, including any special network management software. The cost of network management software, however, does not include the SNMP manager or NetView, as it is assumed that the network already has these managers in place. If this is not the case with your particular setup, remember to add this cost into your network plans when you migrate to frame relay. The cost for any equipment or software must be based on the U.S. list price. The cost of the WAN service is not part of the equipment challenge but can be found in the next section on frame relay services. This section begins on page A30.

Start the Challenge

Vendors are responding to the same networking problem, making it easy to compare their solutions. Read each of the answers and imagine how the solution would apply to your network. If a particular solution sounds like the best answer to your networking headaches, call the vendor's reps and ask them to take your own personalized networking challenge, referring them to the base challenge presented here.

SNA-Frame Relay Challenge Solutions Showcase

Solving the SNA and LAN Problem Using Frame Relay

By Robin Layland

SNA networks are stable and reliable, and the business world depends on them. LANs are growing but require high maintenance. At first glance, combining the two into one integrated network seems like mixing oil and water, but this is exactly what network managers are under pressure to do. The reason is simple: Maintaining, installing, and managing two networks is an expensive headache. With budgets being stretched to provide ever-increasing support and bandwidth, network managers need a simple solution to the integration problem: frame relay.

Frame relay provides the look and feel of a leased line network by employing virtual circuits while delivering the performance, manageability, and cost savings of a single network. Unfortunately, you still have to select the correct frame relay solution for your network, something that can be difficult and time consuming. This challenge simplifies the selection process by presenting eight leading equipment vendors who show you how they integrate frame relay. This lets you compare their different solutions and techniques as they all respond to a common networking problem.

The Challenge

The network given here is based on a real corporation's national network. Two physically separate networks have grown up over time. The older SNA network serves SNA cluster controllers that are primarily 3174s but could just as well be older 3274s or AS/400s. This is a star network of leased lines connecting to FEPs at the company's data center in Atlanta. The line speeds are 19.2 and 56 kbps, supporting single 3174s or multidrop 3174s, depending on the size of the locations.

The second network is comprised of PCs and LAN servers. This newer network supports a range of applications from database inquiries to groupware and even SNA accessing using emulation software running on the PCs. Besides servers located at many of the remote sites, there is a large server farm at the headquarters location in Philadelphia.

The challenge as presented to vendors is to combine these two networks into one using frame relay. The first part of this challenge focuses on the equipment needed at the remote

sites, headquarters, and data center to support combined SNA and LAN networking over frame relay. The second part addresses the frame relay service portion of the problem.

The heart of the challenge is shown in the diagram on the next page: Whose and what equipment should be used to connect the remote sites, headquarters, and data center to the frame relay network? CSU/DSUs are not necessarily part of the challenge, but vendors can include them if they desire.

Network Details

The network in the SNA-Frame Relay Challenge consists of 80 remote sites scattered across the United States, with the bulk on the East Coast. The map on page A30 shows their locations.

These 80 remote sites fall into two types. Sixty-one of the sites have both LAN and SNA cluster controllers (3174s). Twenty-eight of these sites need 56-kbps bandwidth to the frame relay network; 21 sites have a greater bandwidth need requiring a 128-kbps access line, and 12 require a 256-kbps access line. The LANs are a mixture of token ring and Ethernet, split approximately 50:50. This is the result of a corporate merger in the past in which the two companies had different LAN standards. There are 19 sites that have only SNA cluster controllers. Sixteen of these smaller sites are currently supported with a 19.2-kbps link, while three use a 56-kbps link to the data center.

The traffic from the remote sites goes to two locations. The SNA traffic is destined for the mainframe data center located in a suburb of Atlanta. Each site in the network needs a PVC from the site to the data center. A second PVC is needed from the sites that have a LAN. The LAN servers are located at the company's headquarters in Philadelphia.

The second PVC, or LAN PVC, is from the sites to the headquarters. The network manager has estimated that the company needs three T1s from the frame relay network to both the data center and the headquarters. Three lines were selected because the company wants to be sure that this is enough bandwidth. In addition, the equipment at the headquarters and data center must have ports installed for five T1s so that it can be quickly upgraded if needed. The company is willing to pay extra for this future growth insurance.

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Network managers need a simple solution to the integration problem: frame relay.

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Introduction by Robin Layland

The SNA- Frame Relay Challenge Solutions Showcase

The average network manager today is under increasing pressure to reduce the cost of the network. This is tough enough without having to go out and gather together all the information that is needed to understand the solutions available. It's no secret that one of the best ways to reduce network expenses is to integrate SNA and LAN traffic into a single corporate network using frame relay.

Usually it is left up to the network manager to call in a range of vendors and ask them to give an overview of how they would solve the problem of integration. With frame relay, this research process can require twice the time since the manager needs to talk to both equipment vendors and service providers. While this provides the network manager with the necessary information, I know from experience that meeting with a number of vendors can easily consume a large amount of time, time that could be better spent addressing the needs of the business. This leaves the network manager in a dilemma: to take the time to understand what is available or not do the work and just hope the one vendor eventually selected is the best.

The goal of the SNA-Frame Relay Challenge is to fill that information gap. Yet this supplement is unlike most of the information you read on solving the SNA-LAN integration problem in that it focuses on solutions rather than technology. Industry discussions tend to focus on individual technologies, offering a wealth of information on technical subjects, the nuts-and-bolts, how-it-works stuff. I un-

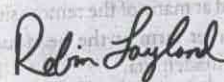
derstand that what a network manager needs most are solutions, because solutions solve business problems. This showcase highlights real solutions to real problems.

I've asked leading equipment vendors and service providers to lay out cases for integrating LAN and SNA traffic using frame relay. What is presented here can be thought of as an executive summary of each vendor's response to an RFP. This gives you an overview of the vendors' solutions without having to spend time having them come to your office, present their strategies, and leave behind a ton of documentation for you to read.

Obviously, every network has a unique set of problems, and a generic RFP—even one based on a real network, such as this one—can't address every possible quirk and nuance. But the goal of this showcase is to save you time and effort by giving a broad view of each vendor's approach.

The next step for you is to contact the vendors for more details. Information on how to reach the participating vendors is listed at the end of each vendor's presentation. I encourage you to contact them if you have any questions.

What a Network
Manager Needs Most
Are Solutions, Because
Solutions Solve
Business Problems.



Robin Layland
Layland Consulting