



Taking Control of SS7 Infrastructure Costs

Case Study

By
Performance Technologies

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Introduction

Today's telephone operators continue to face economic pressures that prompt them to seek out new solutions to lower operating costs, improve the quality of the services they offer and allow them to deploy new revenue generating services to customers. Missouri Network Alliance (MNA), a telephone cooperative, approached Performance Technologies looking for a way to reduce its Signaling System 7 (SS7) infrastructure costs and address numerous concerns with its existing SS7 network. While this report offers a profile of this particular telephone operator's success, its results are applicable to many telecom operators, both wireless and wireline.

Missouri Network Alliance

The Missouri Network Alliance, L.L.C. (MNA) was established in 1999, comprised of fourteen member companies. The MNA members are independent telephone companies serving rural Missouri communities for more fifty years.

Member companies include:

Alma Fiber Networks, L.L.C.

Chariton Valley L.D. Corporation

Citizens Telephone Company

First Fiber Corporation (IAMO Tel)

Grand River Communications, Inc.

Green Hills Communications, Inc.

Kingdom Telephone Company

L.E.C., L.L.C. (CassTel)

Mark Twain Long Distance, Inc.

Northeast Missouri Rural Telephone Co.

Oregon Farmers Mutual Telephone Co.

RBJ Corp. (Holway Tel. & KLM Tel.)

Rock Port Telephone Co.

Steelville Telephone Exchange, Inc.

MNA has more than 55,000 subscriber lines. The organization was established to leverage the members' existing fiber optic networks into a broadband transport network to serve the ever-increasing bandwidth needs of rural Missouri. MNA's Phase I network includes broadband network points of presence (POPs) in 48 rural communities across the northern half of the state of Missouri. The network is designed to be fully survivable based on a SONET ring architecture using Optical Network System (ONS) products. The network encompasses 1573 miles of fiber.

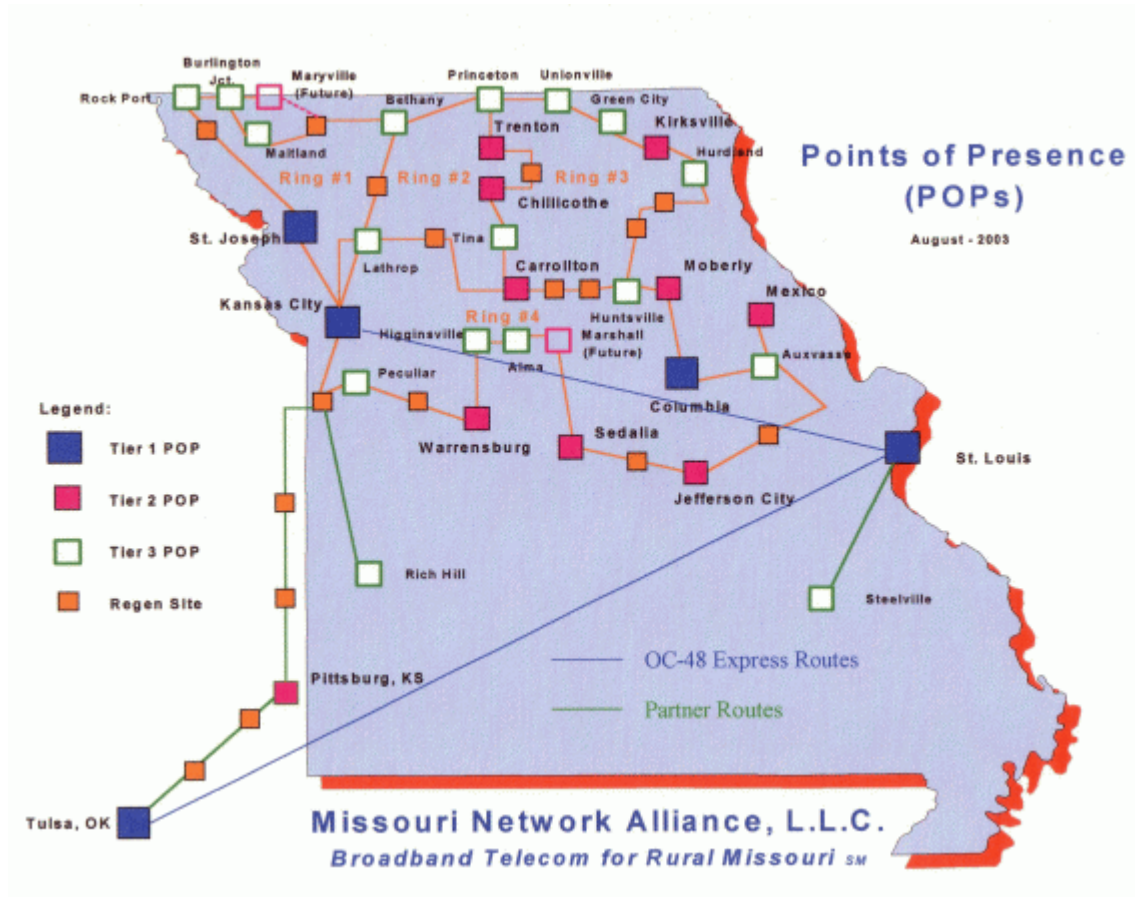


Figure 1. MNA POPs

MNA – The Network Fragmentation Problem

While MNA may have established itself as a cooperative business entity, its SS7 network remained fragmented. Each member company leased SS7 links individually from multiple SS7 wholesalers to each of their rural switches. Collectively, they had fourteen connections into four different external core SS7 network providers all carrying low volumes of signaling traffic. MNA was unable to capitalize on its purchasing power as a larger entity and leverage the value of its extensive fiber facilities.

MNA's SS7 operating expenses were identified as disproportionately high due to the following:

- SS7 link leasing costs as well as ISUP and TCAP service contracts were negotiated individually without leveraging the collective traffic volumes the alliance generated.
- Message routing between member companies was complex and costly as messages had to transit across multiple external STP nodes.

- Information databases (eg Calling Name) owned by some cooperative members were unable to be effectively leveraged by all members due to these costly messaging paths.

The logistics of managing and interfacing into multiple STP providers was extremely difficult and resulted in poor response times, extended service outages and cumbersome issue management. Each alliance member had different contacts and processes for working with the different external STP providers and sometimes even different contacts and processes for working with the same provider. Timely launch and deployment of new services was a significant challenge.

MNA was looking for a cost-effective alternative to its existing SS7 network topology that would address the issues outlined above.

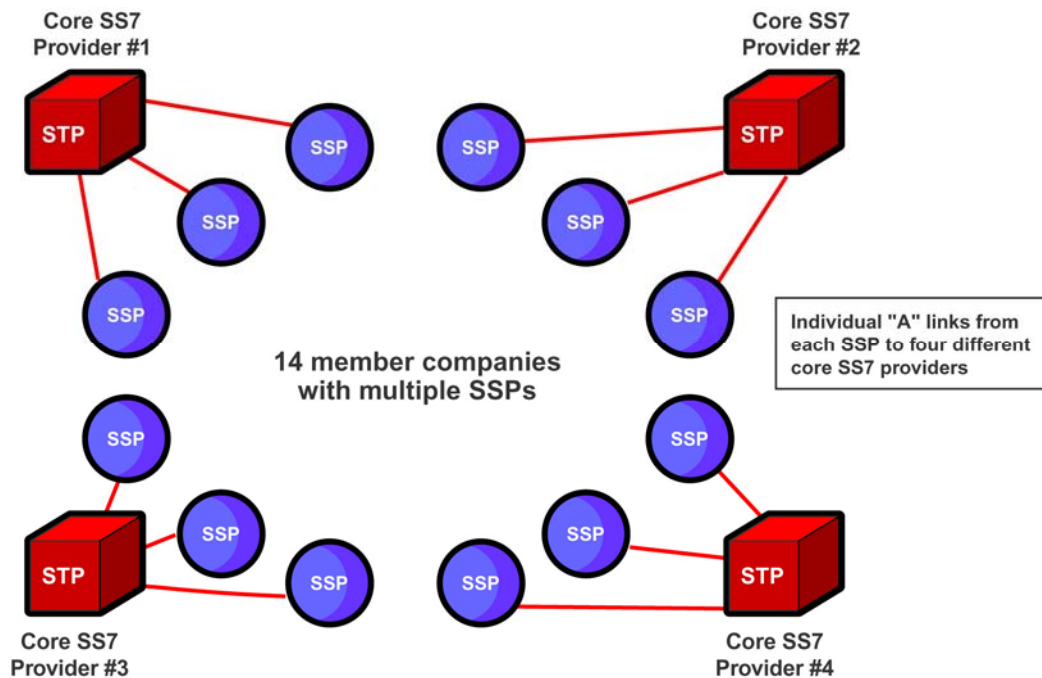


Figure 2: Initial MNA SS7 Network Topology

Alternatives Considered

To decrease the cost of SS7 links and to improve the SS7 service for the member companies, MNA recognized that the ability to route traffic locally and consolidate its remaining SS7 traffic would help reduce SS7 infrastructure costs. Leveraging its existing fiber optic network and leasing fewer but more efficiently used SS7 links from a single external SS7 wholesaler would help MNA realize significant cost savings. MNA investigated several alternatives to achieve this solution.

A. Enhance Existing DMS10 SRP Link Concentrator Capabilities

Several MNA alliance members have DMS10 SRP switches that are capable of routing. The possibility of routing using these existing switches was considered. While this option was technically feasible, it was dismissed for the following reasons:

- The two member companies owning the DMS 10 equipment were uncomfortable with the responsibility involved with owning and managing a signaling network for all member companies
- Lifespan concerns of SRP software
- Limited growth potential and future flexibility
- No economic advantage

B. Deployment of an STP Node within MNA's Network

Alternately, MNA considered the cost and feasibility of owning and deploying local STPs to aggregate SS7 traffic and perform routing within its network. Historically, CapEx and OpEx costs associated with purchasing and managing a pair of STP nodes could only be justified by the largest of carriers, as these switches typically offer large scale SS7 connectivity.

While a pair of STP nodes provided a good technical fit to its problem, MNA's SS7 link requirements and budget were on a much smaller scale than what the many STP vendors could offer. This option would only be feasible if a smaller scale, more cost-effective STP node could be identified.

Chosen Solution

After studying the alternatives, MNA recognized the value in taking ownership of its SS7 infrastructure and deploying a pair of STP nodes in its network.

MNA identified Performance Technologies' SEGway™ Mini-STP as a good fit for its budgetary and technical requirements to create its own private SS7 network. The SEGway Mini-STP offered a high quality, "right-sized" solution. The consolidation of signaling traffic resulted in a reduction of leased ports from fourteen underutilized SS7 A-links down to two higher-traffic-volume SS7 B-links from each SEGway Mini-STP to a single external STP provider. Routing charges between member companies dropped to zero.

MNA chose VeriSign as its provider of external STP links and services. VeriSign certification testing of the SEGway Mini-STP took approximately one month to complete and involved cooperation between MNA, VeriSign and Performance Technologies. Performance Technologies provided SS7 support expertise by reviewing test results and providing test tool configuration, test environment configuration and test execution recommendations.

A. Business Justification

- Cost reductions
 - Solution leverages the existing fiber ring to simultaneously reduce transport costs and increase reliability
 - Savings achieved through implementation offset the capital expenditure of the SEGway Mini-STP nodes
 - Consolidated traffic and reduced leased link costs to SS7 wholesaler
 - Improved bargaining power with single SS7 wholesaler
 - Potential to consolidate CLASS services platforms like voice mail and caller name services
 - Single point for SS7 traffic analysis provides capability to introduce shared costs protocol analysis for 100 percent accuracy of intra vs. inter state billing with IXCs
- Enable new services and new revenues for MNA customers
 - Prepaid services
 - Credit card validations
 - Unified messaging services
- Ability to sell SS7 services to non MNA telcos and customers
 - Offer new services and capabilities
 - Private SS7 network in place to leverage scale on services offerings
- Platform for competitive advantages and services differentiation
 - Retain existing customers
 - Capture new customers
- Strategic evolution to packet-based infrastructure
 - Private signaling network provides a platform to compete with next wave of VoIP technologies
 - SEGway Mini-STPs provide access to additional SS7 over IP “packet” solutions to reduce TDM link costs where fiber optic transport is not available

B. Technical Solution Fit and Support

- Full MTP3 routing and SCCP/GTT capability
 - Mated pair configuration for reliability (Kansas City and Warrensburg locations)
 - Can expand to support up to 24 pairs of A links
- Reduced risk of service interruptions
 - Use of protected SONET fiber transport between member companies reduces risk of service outages
- Performance Technologies provides carrier-grade, 24x7 support

C. Operational Leverage

- Utilization of the available fiber bandwidth for SS7
- Gain “control” of the MNA SS7 network:
 - More operational flexibility
 - Less risk of and faster response to outages
- Leverage focused expertise:
 - Focused SS7 expertise for 14 member companies
 - Centralized management = operational efficiency
- MNA SS7 network enables new operational capabilities:
 - Ease of provisioning (SS7 routing tables and services deployment)
 - Protocol analysis for traffic and call modeling
 - Potential to also provide billing backup information

The table below summarizes the benefits to deploying a pair of STP nodes.

Link Consolidation Summary

Issues with MNA’s Existing Network Topology (Due to multiple external STP providers’ architectures)	STP Solution (Via network consolidation)
High cost of SS7 links	Lower cost of SS7 links
Many (20+) low traffic A-links	Fewer (four) higher efficiency B-links
High external SS7 routing cost between MNA members	Private signaling network = no SS7 routing cost between MNA members
High SS7 service contracts cost	Significantly lower SS7 service contracts cost
Multiple contracts for same external SS7 service	A single contract for each type of external SS7 service
Chaotic network management	Centralized network management
Poor response capabilities to outage of SS7 service	Improved response to outage of SS7 service
Slow and difficult to forecast implementation of new SS7 links	Control of own SS7 network provides speedy implementation of new SS7 links
Difficult to implement new SS7 services	Speedy implementation of new SS7 services
Little ability to differentiate services = vulnerable to new forms of competition	New ability to develop competitive advantages by offering differentiated services customized to new consumer demands
Inability to leverage member company databases	Ability to sell dips to member company databases

The availability of 24x7 Performance Technologies signaling support services for MNA’s systems and the depth of SS7 knowledge at Performance Technologies also strengthened the SEGway Mini-STP business case

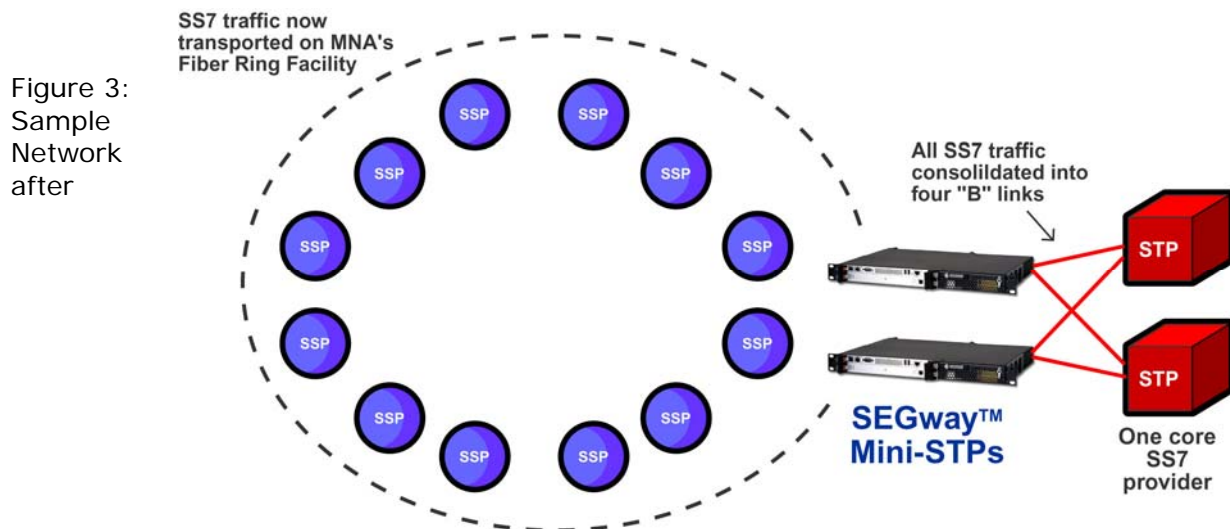
Implementing the New MNA Signaling Network using SEGway Mini-STPs

MNA collected information for each SSP including:

- Operational information (contacts, site NPA/NXX, CLLI, number of access lines, number of ISUP routes, node type, node point code [PC], switch LATA, OCN, ISUP trunk provider, calling name database provider, 800 database provider, TCAP/CLASS provider, STP point code & CLLI, switch software)
- Network description (OPC [originating PC] & CLLI, DPC [destination PC], LATA)
- 800 database (switch PC, CLLI, location, serving NPAs, serving LATAs)
- Calling name delivery service order (switch PC, CLLI, location, NPA, NXX)
- TCAP/CLASS (switch PC, CLLI, location, NPA, NXX)
- LNP (office name, switch type, OPC & CLLI, local routing number, service profile identifier)

Performance Technologies provided initial installation and training services when the two production SEGway Mini-STPs were integrated into the MNA network. MNA established a schedule for cutting over production links for each SSP from the specific current STP provider to the SEGway Mini-STPs, then executed the cut-over. As the cut-overs occurred and as the MNA SS7 network was developed, Performance Technologies provided support services including product upgrades and configuration recommendations.

Adding a pair of mated SEGway Mini-STPs to the MNA fiber ring allowed the MNA members to aggregate all their SS7 signaling from the member company switches and to use just four B-Links to provision their SS7 connection to a single SS7 service provider.



Consolidation

The MNA network now has two higher-traffic-volume SS7 B-links from each SEGway Mini-STP to an external STP belonging to one STP provider. Routing between member companies no longer incurs any STP provider charges. Consolidation of the SS7 links to one external STP provider enabled MNA to take advantage of the buying power and the negotiating power that accompanies a larger subscriber base. The cost of routing calls outside of the MNA network has been reduced, and the cost of STP services has been reduced.

ISUP route charges are now approximately one third less, and ISUP routes are now purchased in groups of 100 and are allotted to different originating point codes among the member companies. Consolidation of the SS7 network also enabled MNA to centralize and increase operational effectiveness. Location of SEGway Mini-STPs on a SONET protected network decreased the potential for SS7 outages. Management of the SEGway Mini-STPs by one group has simplified and expedited processes for correcting problems, turning up new switches and launching new services.

STP Implementation Results

MNA plans to utilize its new SS7 signaling network to enable the growth of new customer services and revenues. The SEGway Mini-STPs also provide a new level of operational efficiency that will enhance service to the member companies and their customers.

A growing list of Intelligent Network (IN) and Advanced Intelligent Network (AIN) services depend on SS7: number portability, 800 numbers, CLASS services, calling name and call event management. As customers demand more services with higher levels of reliability, the SEGway Mini-STPs provide control of the MNA network and deliver the services customers expect while giving MNA a competitive advantage.

There are intelligent peripherals that can be connected to the SEGway Mini-STPs to enable new services such as voice mail. Vacant timeslots on the SEGway Mini-STPs may be used for voice mail, conference calling, announcements and AIN services such as time-of-day, wake-up call, prepay, credit card validation and Internet enhanced service voice mail.

With the mated SEGway Mini-STP pair in MNA's network, the organization owns and controls its SS7 services rather than leasing links and STP ports from other companies. Wireless LNP, mandated for May 24, 2004, will be more easily implemented using the MNA network. The addition of the Global Title Translation (GTT) and calling name database options has resulted in lower charges for database queries while increasing revenue opportunities for participating companies. Volume rates through integrated SS7 connectivity can be negotiated from third-party providers for database queries, ISUP trunk signaling and TCAP/CLASS services. MNA will also be able to leverage member company-owned calling name databases.

ILECs are beginning to use data collected from SS7 links to take advantage of the rich data contained within the SS7 messages. Products are available to harvest data that can be used for the following:

Revenue assurance
Fraud prevention
AMA auditor
Troubleshooting

Intercarrier billing
Quality of service
Traffic capacity analysis

The purchase of one link analyzer to be shared among the 14 member companies so that interstate versus intrastate terminated links can be monitored becomes financially feasible and can be used to adjust payment from the IXC, which pays the member companies to terminate calls.

Benefits of the SEGway Mini-STP Solution

Economic Benefits:

- By consolidating its SS7 network architecture and aggregating signaling traffic, MNA has reduced the number of links to its core SS7 signaling providers, which decreased connectivity, messaging and transport costs.
- Increased traffic volume on links to the external SS7 provider has permitted more cost-effective use of the links and enabled a stronger negotiating position for external SS7 links and services.
- The consolidation of the member companies' signaling traffic allows the cooperative to implement subscriber services and solutions such as voice mail or caller ID, which can then be shared among all, thus reducing costs.

Operational Benefits:

- By using SEGway Mini-STPs to implement its own private signaling network the cooperative and the members gained control of their SS7 traffic.
- Reducing the number of signaling links individually connected to external SS7 service providers has reduced the risk of service outages for the cooperative member companies and their subscribers.
- The SS7 traffic is now carried to the SEGway Mini-STPs on the protected SONET ring of the cooperative. This lowers transport costs for the members and increases the stability of the SS7 signaling service to the signaling end points in the network, which results in improved service reliability for subscribers.
- By creating their own private SS7 signaling network, the member companies have also been able to focus the daily operational responsibility onto personnel who have the expertise to manage and maintain a more robust and reliable signaling network.
- The consolidated signaling traffic allows the cooperative to consider implementing the shared use of new plant and equipment, like an SS7 protocol analyzer, which

would be prohibitively expensive for an individual member company to consider purchasing.

- Signaling services can now be provisioned from one point in the network for all of the member companies, improving the efficiency and effectiveness of signaling management for all.

Potential for New Services and Revenues:

By using its own private SS7 network and sharing costs, the cooperative can now consider implementing subscriber services (voice mail, caller ID, universal messaging), which could not be cost-justified by the individual member companies alone. New services, optimized for subscribers needs, can generate new revenues.

The cooperative now has the ability to consider providing SS7 signaling services to non-MNA companies to generate new revenue opportunities.

Conclusion

MNA now has control of its own SS7 network. The SEGway Mini-STP product offered a cost-effective, scaled solution and satisfied the organization's technical needs, which has allowed MNA to take central control of the signaling services for its member companies. As new telecommunications competition enters the market, smaller and rural service providers like MNA's member companies need "right-sized" solutions to be able to control costs and deploy new services for new revenue potential.

Performance Technologies' SEGway Mini-STP provides the right capabilities, reliable support services and an attractive business case in a compelling best value offering.

Performance Technologies develops platforms, components and software solutions for the world's evolving communications infrastructure. Our SEGway™ SS7 over IP Solutions help carriers and service providers around the globe cost-effectively and reliably transport and route SS7 traffic between IP and PSTN networks. For more information, visit www.pt.com or contact sales@pt.com.

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