

Research and Education Network Business Models

Case Studies Overview

Introduction

In the spring of 2007, The Quilt and MIDnet, Inc, began a collaborative project to document the business models of research and education networks. Goals of the project were to enrich and deepen the content of the original Quilt business model review; reduce the number of surveys and redundant data by collaborating with Quilt-StateNets Financial Focus Group; share the history, knowledge and experience of research and education optical network organizations with the broader research and education community. Specifically, the two organizations were interested in collecting information on organizational structure, governance, management and operations, initial funding sources, cost recovery methodologies, services and service pricing, outreach, lessons learned and future directions.

The information was collected during 75-minute interviews with management personnel within each organization. The information was documented and then sent back to the organization for review. When the document was finalized, approval was given to post the information on a password protected website.

Although interviews are still being conducted, the preliminary findings show that there is not a single business model that all organizations use and there is no single recipe for success. The commonalities of the organizations are that they all support research and education using advanced network and application technologies; outreach and community building are integral to their success and the lessons learned and future directions are similar.

Outreach and Community Building

All of the organizations expressed the importance of outreach and community building. In fact, a number of organizations have said that outreach is THE most important activity. Activities include annual member meetings, educational events and workshops, events to showcase special research or network projects, newsletters, network enabling and capability promotion, and collaborative research projects. One organization has dedicated staff for member outreach and support and another requires their NOC staff to educate and train member engineers during the problem resolution cycle. This latter activity has had a two-fold effect of reducing the number of calls and empowering the members.

Organization & Governance

Even among similarly structured organizations, there were slight variances in the organizational structure and governance. Geographic, historic and political considerations all played a part in the structure and governance.

As shown in Table 1, 47% of the organizations are structured as 501(c)(3) entities. The factors for choosing a non-profit structure varied, e.g., this was the only organizational structure that allowed business to be conducted in the way needed; the organization served multi-state organizations; assets needed to be held in a non-university organization.

Table 1.
Organizational Structures

501(c)(3)	47%
University System Board	24%
Consortium under a non-profit	12%
Consortium under a university	18%

Two organizations were structured as a consortium under a non-profit and one of those is not operating a network at this time. The remaining organizations were structured under a university system Board. The factors for choosing this organizational structure were often convenience and/or an existing organization grew into the R&E optical network. Frequently an advisory committee consisting of member representatives is established to assist and advise the Board.

As seen in Table 2, the majority of organizations had an Executive Officer and either a Board of Directors or Executive Committee that were responsible for strategy, key operational decisions and funding oversight. One organization had an Executive Officer and no governing body and another 18% had committees that were strictly advisory.

Table 2.
Governance

Governing Body	Function	
Executive Officer + Board	Strategy & key operational decisions, funding oversight	47%
Executive Officer + Committee	Strategy & key operational decisions, funding oversight	12%
Board of Regents	Strategy & key operational decisions, funding oversight	6%
Board of Regents	Funding oversight only	12%

Traditional Board of Directors governed all of the non-profits, but not all of the consortiums under non-profits. University-based organizations had a mixture of Boards and Executive Committees. In the majority of organizations, the governing body is representative of the member organizations and each organization has the responsibility for appointing its individual representative.

Startup Funding

Funding for the capital investment in fiber came from a variety of sources. The majority of startup funding came from either founding members or the state's legislature. Other funding sources include: loan from a Regent's organization, the membership, cash from reserve, federal grants, low interest loans and bonds.

Management and Operations

Staffing levels for management and operations ranged from 1 to 110 FTE. The university organizations use some or all of the university's back office systems, policies and procedures as do some of the non-profits. Availability of back office support functions through university channels, network design, network operations support and geography are important factors in determining overall staffing levels. Small geographic areas, member responsibility for commodity internet connections or networks designed with redundancy often led to smaller staffing requirements in operations.

Network operations are conducted in a variety of ways. All organizations monitored the network 24 by 7 and half staffed the network operations center 24 by 7. Thirty one percent of the organizations used a virtual network monitoring system and the remaining organizations used a combination of staffing and virtual monitoring systems. Forty four percent of the organizations outsource their NOC activities. Of those organizations that outsourced, nearly three-fourths used a member as the outsource agent and the remaining outsourced to a third party.

If the network design includes redundancy, remote hands is often done in-house as the urgency to diagnose and repair is often less than a network without redundancy. The majority of organizations rely on members to perform remote hands work either through informal or formal agreements or use a combination of members and third parties for this work. Roughly a third of the organizations interviewed perform remote hands work using internal staff.

Services and Service Pricing Strategies

All of the organizations with operational networks provided transport services and all but one provided Layer 2 services. Layer 3 services were offered by 73% of the organizations. Services beyond transport that are offered include: peering, video service, VoIP, business continuity/disaster recovery, security, email hosting, web-hosting, promotion of research collaboration, collocation, multicast and Ruckus.

Analysis of pricing and cost recovery revealed two main funding sources and seven operational cost categories. The two main funding sources were state government funded networks and member funded networks. The operational cost categories common to both were: program management and administrative costs, operational and network costs, access to national R&E networks, capital investment projects, equipment replacement, opt-in services, and research and development.

Cost recovery strategies for both types of funding sources are similar for all operational categories with the exception of operational and network cost recovery. A number of member-funded organizations allocate a percentage of all costs to each service so that the service is stand-alone service. If a service is discontinued, it does not impact the ability of the organization to continue with its other service offerings. Program and administrative cost recovery methods included: a line item in the total operational budget, a markup on services, an annual membership fee, or a one-time allocation from the state.

There were two operational and network cost recovery models for state funded organizations. Operational and network costs are either recovered as a state appropriation to the member institutions or as an annual budget request to the state. Member funded networks either recovered operational and network costs by sharing the cost equally among the membership or distributing

the cost via a tiered pricing model. If an organization had an affiliate member category, then these affiliates were typically charged a base price plus standard markup.

There were three cost recovery methods for opt-in services. The majority based their fees on the actual cost to provide the service. A small number of organizations used either an algorithm which factors in cost and market rates or a model based on network design, i.e., priced from PoP to PoP.

The two primary cost recovery methods for providing access to the R& E backbone are an annual member allocation that is paid by all members or shared cost recovery among participating members. In the former method, all members have access to the R&E backbones and in the latter, only those members that pay their share of the cost have access to the R&E backbones.

For capital projects, non-profit organizations often used existing reserves to fund the project. State-funded organizations may receive special appropriations or grants. Both types of organizations used an increase in member fees to pay for capital investments.

In the majority of organizations, equipment replacement was a line item in the operational budget. The organizations that included replacement in the annual budget did so because their members expressed a need for a set annual fee for membership and services. Finding funds to replace equipment in the middle of a budget cycle is just too difficult.

Network research and development is not funded by the majority of organizations, but this activity is encouraged. A few organizations stimulate network research by dedicating a 10Gb lambda to each member for network research projects or by funding dedicated staff to support network research and development efforts.

Customer Base

The majority of participants in each of the organizations are from the research and education community. The majority of organizations not currently connecting libraries, museums, and research hospitals plan to do so. For those that haven't already done so, organizations are also planning to add state government agencies, K-12 and healthcare organizations to their list of participants.

Lessons Learned

Each of the organizations was asked to share the lessons they learned while building the network and organization to support it. There were common threads in their responses and the following six themes were most often stated:

1. Community building is important
2. There is great value in bringing people together face-to-face
3. Add value by providing leading-edge services that no one else can, will or does offer
4. Be an enabler for research and education
5. Do what is the best interest of your clients
6. Leverage opportunities

Future Goals/Directions

All of the organizations expect to grow, although data is currently not available to gauge that growth. Most of the organizations will continue to expand their fiber footprint in order to provide full network capability to their connectors; the last mile connection is especially challenging. Many will analyze service offerings and either expand or decrease them. At least one organization plans to focus on activities that support human networking and others plan to go beyond the realm of the physical network. Several organizations are planning for the addition of K-12.