

Broadband Transforms Rural Health Care

Three grantees in the FCC Rural Health Care Pilot Program revealed the challenges and rewards of bringing fiber connectivity to rural health providers.

By Masha Zager ■ *Broadband Communities*

In 2006, the FCC established the Rural Health Care Pilot Program to encourage health care providers that serve rural communities – including some urban hub sites – to develop and use broadband networks. The agency drew funding from the Universal Service Fund (USF); the Universal Service Administrative Company, which administers all USF programs, administers this one as well. Program participants can receive up to 85 percent of the costs of constructing networks, installing advanced services and connecting to the public Internet and to Internet2 or National LambdaRail (two backbone networks that connect research and educational networks nationwide).

The FCC aimed to increase rural Americans' access to health care by allowing rural clinics to tap the expertise of modern urban medical centers. Connecting to urban hub sites would give patients access to care that was unavailable in their own communities – from cardiologists, pediatricians, radiologists, intensive-care specialists and others – without leaving their communities or, in some cases, their homes.

Such networks, the commission reasoned, could deliver services efficiently, reduce patients' costs and travel time, decrease medical errors and enable health care providers to share critical information. In addition, they could help implement electronic health records systems and coordinate responses to public health emergencies.

The following year, the FCC reviewed applications for the program and

G4S Technology, the construction firm involved in all three networks, was instrumental in finding private partners to help fund the projects.

committed \$417 million to 69 entities to build networks. These entities represented more than 6,000 public and non-profit health care providers – hospitals, clinics, universities, research centers, behavioral health sites, correctional facility clinics and community health centers.

Several of these projects later merged, and several others withdrew or failed to meet FCC deadlines. Today, 50 projects are active and in various stages of completion. The FCC is considering how to transition them to the primary rural health care program, a USF-funded program that supports ongoing telecommunications costs for rural health care providers.

Because the 69 original projects were designed to address specific local problems, they diverged widely in terms of size, scope and approach. Some created entirely new networks, and others upgraded existing networks. Some focused on particular populations – seniors, for example – or on particular types of health care providers, such as mental

health clinics; others cast a wider net. The types of applications differed as well. Some projects emphasized data exchange, and others emphasized real-time video consultations with specialists.

State laws and regulations also accounted for some of the differences among projects. In some states, for example, rural health networks were prohibited from having access to rights-of-way along state highways or utility poles to build a network.

A TALE OF THREE NETWORKS

At the **BROADBAND COMMUNITIES** Summit in April, leaders of three of the larger projects – the Rural Nebraska Healthcare Network (RNHN), the Health Information Exchange of Montana (HIEM) and the Illinois Rural HealthNet (IRHN) – told their stories and compared notes about challenges, progress and achievements. (RNHN was profiled in the March-April issue of **BROADBAND COMMUNITIES**.) The session was moderated by Joel Mulder, senior director of business development for G4S

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Technology, the design and construction firm that was involved in all three projects. (This article includes follow-up information from some participants.)

Rural health care providers face a common set of problems, Mulder pointed out. They and their patients have limited resources, and they are often called upon to provide health care that cannot be billed or reimbursed, such as emergency services for seasonal workers.

Because most rural hospitals and clinics are not served by fiber-based infrastructure, the bandwidth available for current and future applications is severely limited. Even when bandwidth is available, it is often cost prohibitive. Mulder said one hospital commented that putting X-ray films in an ambulance with a patient was easier than trying to transmit the images electronically.

Poor, costly or nonexistent broadband access limits hospitals' ability to use technology to reduce costs or enhance quality of care. It also makes attracting medical personnel to rural areas extremely difficult. Doctors looking to move to rural areas are more inclined to establish themselves and practice in localities where advanced technology is available to better serve their patients.

At the same time, these hospitals and clinics play a critical role in keeping rural communities viable. Like school systems in many rural communities, they provide cornerstones for jobs and economic viability. When they close, patients must drive for hours to see doctors – and often don't get the care they need. A hospital's closing can easily begin a downward spiral for a community. Few people want to move to or locate a business in an area where health care is unavailable, and older residents may have to leave the homes they have lived in all their lives if they need regular access to medical care. Conversely, if a hospital or clinic can remain open and even upgrade its technology, residents and potential residents feel reassured that the community will continue to exist.

MATCHING FUNDS

Raising the 15 percent match for project funds may have been the pilot program's

The FCC Rural Health Care Pilot Program is funding 50 advanced networks designed to improve health care in rural regions of the United States. Most are now nearing completion.

most challenging requirement. Though recipients didn't have to identify the sources of their matches before getting awards, they had to arrange financing before USF funds could be released.

Of the three networks discussed in the session, IRHN had the easiest time finding matching funds – at least for the backbone network. Because its project is closely aligned with two stimulus-funded middle-mile networks, one of which is administered by the Illinois Department of Central Management Services, the state of Illinois provided the necessary 15 percent match for the backbone network. Each provider had to supply its own matching funds for its connections to the backbone network. These were raised from a variety of sources.

The Nebraska and Montana networks, which did not receive state funding, had to find matching funds for their entire projects. Initially, they hoped to use in-kind services for the match – RNHN from a telecom partner and HIEM from member organiza-

tions – but the FCC rejected these plans and insisted on cash contributions. Nor could they generate revenues by connecting other customers to their networks, because the pilot program rules require grant recipients to use their networks exclusively for health care. (Some network builders characterize this exclusive approach as inefficient and likely to inhibit rural broadband by siphoning off potential anchor tenants.)

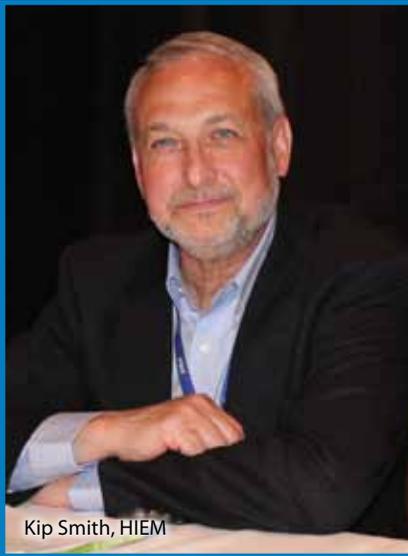
Fortunately, however, the FCC permits grant recipients to generate revenue by leasing dark fiber. Because the Nebraska and Montana projects built new fiber backbones, they could include extra fibers for little additional cost.

G4S Technology helped them bring in private partners that leased these dedicated fibers for commercial networks. "Our company has a long history of working with telecommunications companies in the shared resource market," said Mulder. "We are well known for our ability to match their needs with these types of new builds." In fact, one reason G4S Technology was selected as the construction partner for these projects was its ability to bring additional parties into the process.

The RNHN private partner is middle-mile network operator Zayo Group. G4S Technology, which had previously built and maintained networks for Zayo, approached Zayo with the thought that the partnership would benefit all parties. Zayo could obtain fiber for much less than the cost of building it – which, Mulder said, "would allow [Zayo] to expand its footprint and ... enhance broadband and middle-mile services in all these communities." He added, "They were very receptive." Zayo also secured a contract to maintain RNHN's outside plant – an efficient arrangement because any fiber cut or other damage to the



Joel Mulder,
G4S Technology



Kip Smith, HIEM

outside plant would likely affect both Zayo's and RNHN's cable.

According to Boni Carrell, RNHN's executive director, "It took us 11 months to come up with [a funding source] the FCC would accept. They said we could add privately funded excess capacity as long as it didn't cost us any extra money to install. Zayo's prepayment for the excess capacity (48 fibers, compared with the 36 fibers RNHN uses) was put into an escrow account and counted for our 15 percent share." Any additional payments from Zayo beyond the 15 percent, Carrell said, will go toward network maintenance.

HIEM received a cash contribution from one of its project partners, the Uni-



Boni Carrell, RNHN

The **Health Information Exchange of Montana** was initiated by five independently owned and operated hospitals and two federally funded community health centers in northwestern and north central Montana. To store and exchange basic patient medical information and to expand applications such as remote consultation, disaster readiness, clinical research and distance education services, the group is building a new fiber network to connect nine facilities. The new network, which received a \$13.6 million grant from the FCC, will also serve as a connection point to Internet2 or National LambdaRail.

versity of Montana, but the bulk of its match came from long-term dark fiber leases to several carriers. "We benefited from the Nebraska experience," said Kip Smith, executive director of HIEM.

BUILDING THE NETWORKS

Once the matching funds were secured, all three projects had to meet aggressive timetables set by the FCC.

The projects' approaches to network building were based on the availability of fiber and on the distances between their health care facilities. HIEM and RNHN, which were originally T1-based, had to build new fiber networks. IRHN – which had the greatest access to middle-mile fiber as well as the longest distances between facilities – did not build a fiber backbone but leased a combination of dark fiber, wavelengths and wholesale bandwidth. It entered into 20-year leases so the project would be sustainable after the FCC funding ran out. Fiber laterals or point-to-point wireless connections are being built from the backbone to each health care facility.

Leasing backbone fiber was ultimately much less expensive for IRHN than building it, but getting there wasn't easy. According to Doug Power of the Northern Illinois University Broadband Development Group, one of the leaders

in planning and implementing IRHN, though the organization's RFP specified the amount of money available (about \$24 million altogether), one proposer quoted \$347 million for dark fiber. "It took a couple of rounds for the vendors to understand what was happening," Power said. "You have to convince them you're not kidding."

Between middle-mile fiber, last-mile fiber, wireless equipment, optical equipment, a network operations center and other elements of the network, IRHN contracted with 10 vendors, which the NIU Broadband Development Group oversees. The backbone network is now in place and a number of laterals are completed. Other laterals, however, remain to be built because some health care providers are still seeking matching funds. Funding must be secured soon if these institutions are to take advantage of the pilot program.

HIEM, like IRHN, was obliged by timing constraints to issue multiple RFPs – one for engineering, three for construction, one for temporary leased services and one for electronics. The network is in the engineering phase now, and construction will begin shortly. Smith said local carriers resisted the idea of the network, saying that plenty of fi-

The **Rural Nebraska Healthcare Network** is a consortium of rural hospitals and related clinics that has coordinated a unified health care system for western Nebraska since 1996. With the help of a \$19.3 million FCC grant, the consortium upgraded its patchwork of T1 lines to an advanced fiber network that spans 12 western Nebraska counties, connects nine primary care hospitals and dozens of affiliated health care clinics, and provides access to the National LambdaRail and Internet2 research networks. The new network provides speeds of up to 1 Gbps for a variety of telehealth and telemedicine services in an underserved rural area.

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ber and bandwidth were already available, and they did not respond to the RFPs. “They were all waiting for us to fail,” he said. “But once they determined that we would do it, they got cooperative, and now they have partnered with us for excess capacity. Some of them became good partners.”

The final 140-mile leg of HIEM’s network is being built in collaboration with a BTOP stimulus project. Smith said, “We worked out an arrangement where we built half of the network, they built half, and we lease dark fiber back from each other. It’s not easy; even though the two federal programs have similar intent, they have different rules. But it results in a much improved infrastructure at a fraction of the total cost. Partnership and collaboration are critical.”

RNHN was able to issue a single RFP, and it contracted with G4S Technology to deliver a turnkey system. Construction of the 750-mile fiber optic network began two years ago. The project was fully completed in July 2012, with the governor of Nebraska presiding over a ribbon-cutting ceremony.

APPLICATIONS

The most bandwidth-intensive applications in health care today – those that benefit the most from the availability of high-speed networks – are remote consultations with doctors or other specialists, transmission of medical images and centralization of medical records.



Doug Power, IRHN

The networks are expected to improve rural economies as well as health. A local paper called fiber optics Nebraska’s “new money crop.”

For IRHN, transmitting medical images is the key application. Power said that fiber access allows hospitals to send images to radiologists immediately, instead of waiting for off-peak hours, and reduces the time to send a CT scan from four hours to a few seconds. “We can get diagnoses done by a specialist in an urban area while patients are still in the hospital – we don’t have to bring them back. Strokes can be diagnosed and treated at rural hospitals without patients’ having to be transported.”

In addition to sending medical images, Power said, another important application is patient consultation with medical professionals. “Psychiatry and psychology services don’t exist in some areas,” he explained. “Now we can treat people remotely.”

For HIEM, the key application was electronic health information exchange – making patient medical records available anywhere throughout the region. Though broadband was “an afterthought” for the organization, according to Smith, member hospitals eventually discovered that sharing medical records at low bandwidth was inefficient. Physicians spent too much time entering information into the system. Transitioning from T1 lines to fiber access will give them “a new hour in their day,” Smith said.

Now that broadband will be available at 100 Mbps or higher speeds, HIEM members are beginning to think about medical imaging and telehealth.

“By creating the infrastructure, we’ll remove a big barrier to the ability to offer services in the region,” Smith said, adding that the network will allow “access to quality care without having to travel 80 to 100 miles over mountain passes.”

RNHN’s major initiative to date has been teletrauma. According to Carrell, eight critical access hospitals now have teletrauma systems. When a critically injured patient arrives at one of them, she says, the access hospital and the hub hospital each turns on a camera, and “the consulting physician at the hub hospital can view the patient and guide the critical access hospital, which is staffed mostly by physician assistants and nurse practitioners.”

ECONOMIC DEVELOPMENT

The rural health networks are making a difference to their communities in two ways: both directly in terms of keeping their communities viable and by bringing fiber that can be used for other purposes into communities.

RNHN has already helped Nebraska health care providers recruit young doctors, which keeps its hospitals at the cutting edge and makes communities more attractive. The fiber dedicated to Zayo is helping, too. A local newspaper recently called fiber optic cable Nebraska’s “new money crop.” Two local Internet service providers are already making use of Zayo’s fiber to provide last-mile connectivity. “Stay tuned to see what will happen,” Carrell said. ❖

The **Illinois Rural HealthNet Consortium** is building a statewide fiber optic network to serve approximately 87 health care facilities and connect to Internet2. More than 95 percent of connected locations will have connectivity at speeds ranging from 100 Mbps to 1 Gbps. Consortium members include Northern Illinois University, the state of Illinois and the Illinois Critical Access Hospital Network, among others. The consortium received a \$21.1 million grant from the FCC.