



Bringing Broadband to the South Fork

With fiber, the future is bright and limitless



July 1, 2015

Highland Telephone Cooperative
7840 Morgan County Highway
Sunbright, TN 37872

Report summary

After more than five years of building a state-of-the-art fiber optic network, Highland Telephone Cooperative created this white paper to illustrate the challenges it faced with its fiber project and highlight the benefits of the network. By investing in fiber, HTC also invested in its community. The cooperative is providing a platform for growth for each and every person in the service area by building the best possible communications network available today.

Index

Pages 3 - 4: Executive Summary

Pages 5 - 6: Section 1: Fiber is improving local education

Case study A: Morgan County (TN) Schools

Case study B: Roane State Community College

Pages 7 - 8: Section 2: Fiber is improving local economic development

Case study C: Local tourism

Case study D: Existing businesses

Pages 9 - 10: Section 3: Fiber is improving local health care

Case study E: Using fiber to provide dependable health care

Case study F: Grace Primary Care

Pages: 11 - 12: Section 4: Fiber is improving local government services

Case study G: McCreary County (KY) Sheriff's Office and Oneida (TN) Police Department

Case study H: Scott County (TN) E-911 and Emergency Management Agency

Page 13: Conclusion: Mark Patterson, General Manager, Highland Telephone Cooperative

Executive Summary

Throughout its 60-year history, Highland Telephone Cooperative has thrived in the rural areas that larger communications companies overlooked.

At Highland's infancy, local citizens went door to door, hoping to find 1,000 like-minded individuals who saw the need for telephone service in the area. They hoped to attract people who knew their hometowns needed the latest communications technology in order for the area to be able to attract new industries, jobs and residents.

In 1955, three years after W.H. Swain became the first person to pledge \$5, local residents opened Highland Telephone Cooperative in a modest office above a hardware store. The member-owned organization eventually brought telephone service to the rural areas of the Upper Cumberland Plateau in Tennessee and southern Kentucky — including Scott, Morgan, McCreary, Anderson and Campbell counties.

The years that followed brought eight-person party lines, rotary phones, touchtone phones and eventually television and Internet service. In the early 2000s, much like their predecessors at Highland, the cooperative board and members found themselves at another crossroads.

The Internet speeds available in rural America were lagging behind what could be found in larger metropolitan areas, and a new state-of-the-art fiber network was needed to maintain the cooperative's commitment to bringing the best possible communications to the rural areas it serves.

In 2009, HTC began pursuing federal funds available through the American Recovery and Reinvestment Act, and in March 2010, the cooperative was awarded \$66.5 million to provide state-of-the-art broadband service delivered over Fiber-to-the-Home in 100 percent of Highland's Proposed Funded Service Area. This made



Highland's first linemen had the difficult, but important job of bringing telephone service to HTC's first members.

broadband a reality to all of Highland's customers instead of only those in certain areas, as is the case with some providers who deploy only partial FTTH builds. By the time work began in September 2010, it was clear upgrading to fiber wouldn't be a routine network upgrade like other advancements in the past. It would mean rebuilding the entire network — something that previously took more than 50 years to build — in just five years.

Simply put, fiber transforms the way people are able to use the Internet in the area. In an area with high unem-

ployment and low college graduation rates, fiber has the ability to improve the quality of life for the entire region. Fiber can help provide greater opportunities for education, offer improved health care, increase efficiency in government services and make the area more attractive for economic development.

Like any state-of-the-art project, building the fiber network was met with challenges. Problems such as an initial shortage of suitable engineering firms and contractors and the difficulty finding fiber after a 2011 tsunami crippled one of the main fiber factories in Japan didn't stop HTC. Crews and contractors pressed on despite the region's rough, rocky terrain and the remote locations of some communities. In the end, HTC ran more than 2,700 miles of fiber, enough to stretch from the HTC office in Sunbright, Tennessee to Vancouver, British Columbia. Through creative problem solving and the support from RUS, HTC overcame the obstacles and has proudly brought the best possible fiber network to its cooperative members.

During the process, Highland created more than 200 new jobs, with about 68 percent of them filled by locals.

Additionally, HTC is delivering even better broadband connections than initially anticipated. The grant application stated expected speeds of 5, 10 and 20 Mbps. To further enhance the customers' broadband experience, HTC management upgraded member connections to 12.5, 25 and 50 Mbps at no cost to the consumer.

Now equipped with fiber, and having finished the project in time to meet the September 2015 federal deadline, Highland and the entire Proposed Funded Service Area is ready for the future. Whatever communications needs may arise, HTC will be able to provide them anywhere in its service area. With fiber, the future is bright and limitless.

The following pages are meant to tell the stories of the fiber network's direct impact on the cooperative's members. The stories illustrate how HTC has leveraged the investment from RUS to fulfill the RUS mission of connecting rural Americans to the rest of the world.



Today's crews laid more than 2,700 miles of fiber lines to bring high-speed broadband to all HTC members.

Section One:

Fiber is improving local education

CASE STUDY A: MORGAN COUNTY (TN) SCHOOLS

Inside area classrooms, a high-speed fiber Internet connection is becoming as vital as a teacher in the room. The connection helps open students' eyes to a life outside their own rural community. With fiber, students can travel the world through online streaming videos, become better prepared for state-mandated tests and experience engaging classroom lessons, all powered by broadband.

"Highland's fiber network made a huge difference for our schools," says Chris Rogers, technology coordinator for Morgan County Schools. "We're discussing the possibility of equipping each student with a tablet, and we're 100 percent sure that the Highland network backbone can support that many devices. Everything is online now, and we're ready."

In years past, the rural nature of many of the schools HTC serves, combined with diminishing school funding, often limited a student's potential to explore the world beyond the area in which they grew up. But now, equipped with fiber, rural students no longer miss out. Students are taking part in online classes, enrichment activities, project research, educational games, website creation and even computer programming over the HTC fiber network.

Broadband is also helping schools prepare for and take state-mandated tests. With current practice exams and test preparation lessons online, fiber gives teachers and students instant feedback, helping teachers know what areas need more reinforcement. Many state tests are now administered online, and without fiber, it would be impossible for local schools to handle the capacity required for hundreds of students to take the tests at the same time.

"There are several counties in Tennessee that cannot do state testing online because their Internet provider can't support the bandwidth required," says Rogers. "Thanks to Highland, that has never been a problem for us."

CASE STUDY B: ROANE STATE COMMUNITY COLLEGE

The counties in the Highland service area have some of the lowest college graduation rates in Tennessee. Over time, by providing a reliable, high-speed fiber connection, Highland hopes to bring new educational opportunities to area students and raise college graduation rates.



Megan Farmer looks over school work during one of her classes at the Morgan County Roane State campus.

"If it wasn't for Roane State's online classes and the new Morgan County campus, I literally would not be in college right now. So it has completely changed my life — and especially my daughter's life because I will be able to provide better for her."

— Megan Farmer
a Roane State student
Lancing, Tennessee

The Morgan County campus of Roane State Community College uses HTC's broadband to offer online classes for students who are unable to travel to another nearby facility.

"Most of our classes are offered via distance learning from another campus," says Michelle Adkisson, Roane State Community College campus director. "Fiber has brought education right to the citizens of Morgan County."

Megan Farmer, a Roane State student who is visually impaired, is proof that fiber technology is changing lives. "I've always loved school, and I've always been good at it," says Farmer. "But because I can't drive due to my vision, and because I'm a single mother, I never thought I would be able to go to college like I had always wanted."

Broadband over fiber has placed education within Farmer's reach. "If it wasn't for Roane State's online classes and the new Morgan County campus, I literally would not be in college right now," she says. "So it has completely changed my life — and especially my daughter's life because I will be able to provide better for her."

Locals like Adkisson believe HTC's fiber project will continue to improve the quality of life in the region, not just for students like Farmer, but for all local students. "Having fiber at their homes will make a big difference in their Web classes, because many of those require students to watch videos and take timed tests," says Adkisson.

Section Two:

Fiber is improving local economic development

CASE STUDY C: LOCAL TOURISM

Across the five-county region that HTC serves, local business owners see an influx of as many as 800,000 people visiting the Big South Fork National River and Recreation Area year round. Studies show the tourism dollars guests spend – around \$10 million annually – benefit many facets of the local economy. While the Big South Fork NRA is the driving tourism engine for the region, equestrian camps, museums, off-road vehicle courses and historic towns like Rugby, Tennessee, also draw guests from all over the region. And the power of fiber is helping to bring in new and returning visitors each day.

Without a high-speed broadband connection from Highland, Rugby's former executive director doesn't believe the town could compete with other tourist attractions in the state. "I don't know that the doors would be open, truly," says Cheryl Cribbet. "For survival, you have to have broadband."

Cribbet is not alone in her belief. The owners of other tourism-related businesses in the region say broadband from HTC helps them stay competitive and bring visitors to the area. "Just about all of our business is through the website," says Richard Koger, director of operations for the Barthell Coal Camp, a local coal museum in Strunk, Kentucky, that gives visitors an insight into the life of a coal miner.

At the Blair Creek Resort, a horse retreat and hotel in Strunk, Mary Ross uses broadband to not only reach thousands of potential visitors at once, but to also reach individuals in unique ways. Using broadband and Wi-Fi, she has been known to give prospective visitors a personal tour using Skype, an Internet-based teleconferencing program. "It's a nice way they can keep in touch in such a remote place," says Ross. "Even though people want the remote location, they want the technology to stay connected."



Cheryl Cribbet says broadband has helped bring tourists to Rugby, Tennessee.

CASE STUDY D: EXISTING BUSINESSES

Much of the region HTC serves is known for its high unemployment rate, especially Scott County, Tennessee, where locals have dealt with an unemployment rate as high as 20.9 percent in January 2011. While Highland and local business leaders believe a fiber network lays a great foundation for future business growth, existing businesses in the area are already seeing success because of HTC's broadband.

Donna Qualls, office administrator at Buckeye Medical Supply in Huntsville, Tennessee, says her company uses the broadband network provided by Highland to keep customers informed about new medical products they offer, as well as to communicate with Buckeye's other four branches. "New technology is always coming out, and broadband is a way to keep people informed about the products we have," says Qualls.

In Oneida, Tennessee, longtime manufacturer Jim Barna Log and Timber Homes is also communicating globally with the help of HTC's fiber. Jim Barna employees shrink the international divide by using Skype for corresponding with international distributors.

In McCreary County, Kentucky, Outdoor Venture Corporation is using technology to secure their business as one of the top three tent suppliers for the U.S. military. Outdoor Venture uses high-speed Internet to do business globally, and the computer design programs that Outdoor Venture uses to communicate wouldn't be possible without HTC's fiber network.

"It's like going from a gravel road to the interstate," says J. C. Egnaw, Outdoor Venture CEO. "The real interstate now is in the high-speed Internet. The addition of fiber in our county is pulling us into the 21st century."



J. C. Egnaw, CEO of Outdoor Venture, uses fiber to help his company compete around the globe from McCreary County, Kentucky.

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— J. C. Egnaw
Outdoor Venture CEO
McCreary County, Kentucky

Section Three:

Fiber is improving local health care

CASE STUDY E: USING FIBER TO PROVIDE DEPENDABLE HEALTH CARE

At medical facilities within the Highland service area, broadband technology is changing the way doctors and nurses work and improving the way they take care of patients.

When Dr. Lindsay McKinley needs to write a prescription for eyedrops or other medicines, she never has to lift a pen. The broadband service offered by HTC allows McKinley, an optometrist at Associates in Eye Care in Oneida, Tennessee, and other local doctors to wirelessly transmit prescriptions to their patients' pharmacies.

"It has made our lives easier," she says. "I just send it, and 'boom' — It's there. (The patients) don't have to drive to the pharmacy and wait. I can't imagine going back to paper."

In Wartburg, Tennessee, when Dr. James Seber needs to consult a medical textbook about a patient's symptoms, he no longer has to flip any pages. Seber, the medical director at the Morgan County Medical Center, says the biggest benefit he gets from a connected clinic is the medical resources available online. "Instead of hunting down a textbook, it helps to have it at your fingertips," says Seber.

Additionally, broadband on HTC's fiber network is helping to make treatment options more convenient for patients. For example, if a patient is treated at South Fork Physical Therapy's Huntsville, Tennessee, location but later decides the Oneida branch is more convenient, broadband makes it a seamless transition.

"Technology is really making it better for everyone involved," says Scott Gilbert, who owns two South Fork Physical Therapy locations. "Treatment is more convenient for the patient, and the staff is better equipped to provide care."



Scott Gilbert stays connected to the Internet wirelessly as he works with a patient at South Fork Physical Therapy.

Gilbert initially used broadband to plan office staffing and to schedule appointments, but they realized the biggest benefit of broadband when they began logging patient information digitally. This allowed Gilbert and his

staff to access patient information and communicate with both branches from just about any location.

CASE STUDY F: GRACE PRIMARY CARE

At the counter just inside the door of Grace Primary Care, patients at the Huntsville office meet staff members who rely on fiber to provide the best possible care each day. The office of Dr. Timothy Smith depends on digital records to organize each patient's medical history, and fast broadband Internet links the office to other hospitals and laboratories.

The fiber allows Grace Primary Care to offer a modern, secure medical experience that supports patients through each step of the care provided by the clinic's 27-member team.

The efficiency of examinations depends on the team's ability to use the latest digital record-keeping technology. Patients entering one of the exam rooms should expect a visit from a staff member equipped with a laptop computer.

Efficiency also limits the time patients must spend waiting, says office manager Tracy Spradlin. "You have to have speed to serve our patients," she says. "You can't wait five minutes for a chart to open."

In a typical year, the office has nearly 15,000 interactions with patients from Scott County, Tennessee, and McCreary County, Kentucky. Insurance records, medical histories, medicines and more must all be tracked as accurately as possible.

Often, the Grace Primary Care team must interact with specialists far outside the region. Fast broadband Internet provided by Highland's new fiber network makes much of the work possible.

"The broadband makes it feasible for us to do this," says Smith. "Without the broadband access, we wouldn't be able to function."

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— Dr. Timothy Smith
Grace Primary Care
Huntsville, Tennessee

Section Four:

Fiber is improving local government services

CASE STUDY G: MCCREARY COUNTY (KY) SHERIFF'S OFFICE AND ONEIDA (TN) POLICE DEPARTMENT

Chris West, an intelligence analyst for the McCreary County (Kentucky) Sheriff's Office understands firsthand how beneficial broadband can be to apprehend a criminal. When West got a message on his computer that four suspected methamphetamine producers had just bought a load of pseudoephedrine at a handful of local stores, he knew it was time for action.

West had been tracking the suspects' pseudoephedrine purchases for months through an Internet-based system. He had noticed a few patterns and decided it was time to move.

Using a fiber connection from Highland, West pulled descriptions and license plate numbers for vehicles associated with the suspects, and then sent out an intelligence bulletin to deputies and nearby state troopers.

When a trooper spotted a car with the matching tag number near Stearns, Kentucky, he attempted to pull over the vehicle. Instead of stopping, the suspect led troopers and deputies on a chase that didn't end until the car wrecked near Whitley City, Kentucky. The four people inside the car were taken to jail on drug, gun, traffic and parole violation charges.

"Knowing who the people were and what they had been doing had a lot to do with the traffic stop and arrests," says West. "It's kind of like that old saying, 'Knowledge is power.' The more you know, the better off you are — especially with some of the people we deal with."

Providing such information is how HTC's broadband network is helping law enforcement and first responders keep the area safe.

At the Oneida (Tennessee) Police Department, officers are also finding that HTC's broadband makes them more efficient. At one time, the department had to mail



Patrolman Josh Kennedy keeps up with crime statistics around the area online at the Oneida Police department.

accident reports to Nashville for state records, but now they are sent digitally along the fiber network. "It speeds things up for us," says Sgt. Brett Bond. "We used to mail in a stack of those monthly."

Tennessee also collects data annually on crimes to compile statewide crime statistics. All of those are now collected digitally. "We're slowly moving to a place where everything is paperless," says Bond.

And while it may sound like just paperwork, faster ways to get the reports filed means more time for patrols and other police work. "The deputies are freed up to do the jobs they were hired to do," says West. "It keeps them out on the street longer."

CASE STUDY H: SCOTT COUNTY (TENNESSEE) E-911 AND EMERGENCY MANAGEMENT AGENCY

Fast response times are critical when responding to an emergency situation, and fiber provided by HTC is essential to helping local emergency responders save lives.

With the high call volume and the high amounts of data used at local 911 centers, fiber is fundamental to help support dispatch, mapping and record-keeping systems.

Wayne Shoemaker, former director of the Scott County (Tennessee) E-911 and Emergency Management Agency, says dispatchers use the broadband network constantly to check locations, license plate numbers and other information for deputies. "It saves time, and so far it's been really reliable," he says.

On the EMA side, he says HTC's network speeds up response times for state agencies. After a flood or other natural disaster, Shoemaker sends in digital damage estimates and other documents rather than calling or faxing the information that would have to be re-typed in Nashville. "They can see your report, and they'll know what we're looking at immediately," says Shoemaker.

Highland has provided the high-speed Internet necessary to help the Scott County E-911 and Emergency Management Agency perform at its best ability, even if area residents are having one of their worst days.

Conclusion:

Mark Patterson, General Manager, Highland Telephone Cooperative

The new fiber network, built by Highland, is truly improving the lives of those in our service area. Each time I read a success story, like the ones mentioned in this report and those that I hear while out in the community, I feel proud to work at the company bringing those benefits to our community.

Building HTC's new network in such a short amount of time was a community effort. I applaud the leadership of the HTC board of directors and the employees of Highland for their hard work. I know their hard work is worth the effort. The ways local people are using fiber is incredible. People are able to work from home and communicate across the world. Access to education has been improved. Local tourism and businesses are able to work better. More people are able to find quality health care locally, and government services are enhanced — all because of fiber.

But this is only the beginning of the story. The most important feature of our broadband network is the potential it holds. Studies have shown that when people put broadband to work in their homes and communities, some exciting things happen:

- Household incomes rise
- Job opportunities increase
- Poverty levels and unemployment drop

The network Highland has built with the support of RUS allows cooperative members to take advantage of today's technology. Where the true power lies is in our network's ability to adapt to new technologies as they become available, freeing members to explore new ways to put broadband to work. Locals have the tools to reinvent how they live, work and play.

And that's the most exciting part — thinking about what the future holds with Highland's new fiber network.



**MARK
PATTERSON**
General Manager