Florida Fiber: Martin County Saves Big with Gigabit Network

Lisa Gonzalez
lgonzalez@ilsr.org

Christopher Mitchell
christopher@newrules.org

Twitter: @communitynets

Web: MuniNetworks.org

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Executive Summary

Martin County (hereafter "the County"), located on Florida's Atlantic coast, faced a problem shared by local governments across the nation: the rapidly escalating cost of telecommunications access. For ten years, the County had connected schools and other public facilities with leased lines from the local cable company but Comcast was threatening to radically increase its prices after the lease expired in 2010.

Knowing that the County had few choices and little bargaining power under Florida law, County Chief Information Officer Kevin Kryzda had to find an alternative to a Comcast-inspired 800% increase in costs in coming years.

Kryzda embarked on what he termed the "rubber chicken circuit" to encourage local leaders and elected officials to consider building a county-owned network rather than continuing to lease services indefinitely. Analyses suggested the investment would save money for the taxpayers, provide a next-generation fiber optic network that was almost limitless, dramatically increase the reliability of network connections, and eliminate the County's dependence on Comcast.

Despite strong opposition from Comcast, the County moved forward with the plan with support from the school district and local businesses. By exploring a variety of partnerships with other public entities, Kryzda reduced the original estimated cost of $9.8 million to $4.14 million.

The school district paid for $1.3 million of the capital costs out of an existing capital budget and will recoup its investment in five years. Savings after year six will be at least $340,000 per year. The school district pays $6,120 per year to connect 26 sites with gigabit connections. Comparing connections supplied by AT&T to the remaining two school district sites not connected by the County, the County network delivers 14,161 times the capacity provided by AT&T per dollar.

The dark fiber from Comcast had no redundancy and was deployed on poles, leaving it vulnerable to hurricanes. The new County-owned network was built underground with redundancy, a dramatic improvement.

A local hospital is leasing dark fiber from the network, allowing it to explore next-generation services at an affordable rate. Revenue from the hospital put the County "in the black," meaning that the County has not had to increase its telecommunications costs relative to what it had been previously been paying despite now having a far superior network. Over twenty years, the cost savings are estimated at over $30 million compared to leasing connections.

The community has become more self-reliant and has more control over its future budgets, no longer fearing rate hikes from Comcast or other providers. Though a partnership with an existing local Internet Service Provider provider, some in the County have additional choices for broadband. Martin County has no plans to offer services directly to residents or businesses, but the presence of its network has fundamentally altered the market, to the benefit of residents and local businesses.

Introduction

Martin County covers 750 square miles, including 200 square miles of water, from beaches on the east to Lake Okeechobee on the west. Tourism and retirement have played a major role in the County's economy. A mild climate attracts retirees at a high rate relative to the rest of the state. People over the age of 65 comprise about 27 percent of the county's 150,000 residents.

The county operates water and wastewater utilities but does not have its own electric utility. The County Information Technology (IT) Department has long operated its own telecommunications network, largely over lines leased from the cable company.

In the Beginning was Dark Fiber

Like any local government, Martin County has public facilities (schools, police, fire, etc.) scattered across its footprint that need to communicate with each other and the outside world. Since 1999, Martin County operated its own network at minimal cost using dark fiber lines leased from the incumbent cable company as part of its video franchise agreement. The original franchise was negotiated with Adelphia, which Comcast assumed after Adelphia went bankrupt amidst scandal and mismanagement.

Dark fiber is another term for fiber optic cable without any network gear attached. Martin County leased the dark fiber from Comcast and used its own networking gear to provide services to public buildings. At least two fiber strands, sometimes as many as eight, ran from the County Administrative Center to each of the 54 county locations for a total cost of $10,500 per month ($121,500 each year).

Regardless of whether it used 10Mbps, 100Mbps, or 1000Mbps (1 gigabit), Martin County's bill to Comcast remained fixed at $10,500 per month. If it wanted higher capacities, the County simply had to invest in more expensive electronics (lasers, routers, etc.). However, a weakness in the Comcast system was that the connections were aerial and lacking in redundancy.[1]

Florida Consumer Choice Act

In order to offer cable and broadband, cable companies need access to poles and other assets that are located on property throughout the community. This property is commonly called the right-of-way (ROW). Cable companies have historically had to negotiate with each local government for permission to use the right-of-way. They typically paid a recurring franchise fee, made a few television channels available to the public, agreed to minimum quality standards, and sometimes provided some form of broadband network for the local government.

The Florida Consumer Choice Act of 2007 eliminated the need for companies to negotiate with each community for access to poles, conduits and other assets on public property.

The Act was justified as a way to encourage competition in cable television and broadband. However, states that have adopted this state-wide franchise model have the same general set of DSL/cable choices and see the same regular rate increases as states that have not revoked local authority to manage the right-of-way. For more information, see *Statewide Video Franchising Legislation: A Comparative Study of Outcomes in Texas, California, and Michigan* by the Center for Science, Technology, & Public Policy at the University of Minnesota.

The franchise agreement with Comcast was set to expire in 2009 and changes in the regulatory environment had reduced the County's negotiating power relative to Comcast. The Florida Consumer Choice Act of 2007 moved franchise authority to the State and limited what communities could require of telecommunications providers that wanted to use the public's Right-of-Way (see box).

Unlike Adelphia, Comcast tends not to lease dark fiber. Rather than allowing Martin County to continue leasing dedicated strands of fiber, Comcast wanted the County to move to "managed services." The managed services approach would give more control to Comcast, which could then charge more for higher tiers of capacity. And

Dark Fiber v Managed Services

When Martin County was leasing dark fiber, it decided what equipment to use on its network. It is that equipment that sends laser pulses over the fiber, bringing it to life. The County could decide whether to pay x for equipment that will allow 100 megabit connections or pay y to move data at gigabits per second. However, decisions about equipment go far beyond just capacity. Some equipment is more reliable, some allows for Qualify of Service specifications, and so on. Comcast prefers to sell what it calls managed services, where it would tell Martin County it can pay x for 100Mbps, y for 1Gbps, etc. However, Comcast would decide what equipment is used, taking control out of the hands of the County and limiting its options. Generally, the markup on buying capacity from a cable or telephone company is far higher than what it would cost an entity like Martin County to do over dark fiber.

Comcast would likely engage in oversubscription, a common practice where the provider takes a single 100Mbps connection and sells it to multiple customers, promising each "up to 100Mbps." This arrangement means that subscribers could see speeds of 100Mbps but congestion would result in slower speeds most of the time. An analogy would be selling access to a highway with a speed limit of 65mph but rush hour conditions render the top theoretical speed meaningless.

Moving from dark fiber, where Martin County owned and operated its own electronics, to managed services would strand the investments in equipment made by the County and school district.

Comcast was not the only provider in Florida to phase out dark fiber contracts. After AT&T took over BellSouth in Florida, it too ceased leasing dark fiber and pushed managed services contracts.

Comcast Negotiations

Martin County Chief Information Officer (CIO) Kevin Kryzda wrote a letter to Comcast in 2006, stating the County's intention to negotiate a new agreement to continue leasing dark fiber. Comcast did not respond -- and had little reason to -- because the Florida Consumer Choice Act of 2007 would soon pass, eliminating local authority to negotiate a video franchise agreement. Statewide franchising would leave the County in a much worse negotiating position.

Toward the end of 2009, Comcast offered to extend the dark fiber lease through 2010, on a month-to-month basis, for $12,075 per month (a $18,900 increase for the year). At the end of the year, Comcast intended to raise the monthly rate to $18,113, providing fresh motivation to Kryzda to find a long term solution for the County's telecommunications needs.

Kryzda knew the County had few options. The County had little bargaining power with Comcast and no other company had the willingness or capacity to replace the dark fiber network. Both Comcast and AT&T only wanted to sell the more profitable managed services.

Shortly thereafter, Comcast proposed a new 5-year lease agreement that would phase out the dark fiber network. Over the course of the proposed lease, monthly payments would jump from $12,075 in the first year to $98,261 in the fifth year, an increase of 814% over the proposed 5-year contract (see Table 1). After the fifth year, the County would purchase managed services from Comcast.

Kevin Kryzda characterized Comcast's strategy as "take it or leave it."[2]

But behind the scenes, Kryzda had already been exploring a long term solution: a county-owned network. Even before Comcast presented the ultimatum to the community, he had developed an alternative vision that would result in a better network for the County at a lower cost.

The Rubber Chicken Circuit

Kevin Kryzda became the catalyst, pushing Martin County to embrace his alternative vision. Kryzda had joined Martin County in 1983 as an Engineering Technician and worked his way up through the Information Technology Department. He was named CIO in 1999.

In 2006, Kryzda anticipated the shift in balance of power that would come with the Florida Consumer Choice Act of 2007. Even though he had not yet negotiated with Comcast, he knew what to expect. More engineer than public speaker, Kryzda nonetheless began planning to hit what he termed the "rubber chicken circuit" to give a series of presentations to explain why the County should build its own network.[3]

Comcast Proposal for Contract Renewal

Proposed INET extension from Comcast 12/2009	**1999-2009** *(dark fiber lease)*	**FY10**	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**
Comcast Monthly Charge	$10,500	$12,075	$18,113	$45,282	$98,261	$98,261	$98,261
% increase from previous year		15%	50%	150%	117%	0%	0%

Table 1: This table shows Comcast's proposal to the County to continue leasing services after the Fiber Lease extension would expire. After FY15, the County would have to transition to managed services, presumably at still higher cost, rather than continuing to lease dark fiber.

Kryzda also knew the County would have to at least appear ready to go its own way in order to gain a better deal from Comcast:

> "…the moment of realization came for me early on, in 2007 or 2008, that I had to get support for doing something about the eventual departure from Comcast. The best outcome, at the time, might have been for Comcast to finally relent and offer the same network at a reasonable price; even double [what the County was paying at the outset] might have been reasonable."[4]

Kryzda tapped other local governments that had considered building community-owned networks to learn how to explain network technology and economics to local leaders without either frightening them or putting them to sleep. He also started to prepare the Board of Commissioners for Comcast's inevitable backlash. Before long, local officials asked him to attend meetings requested by Comcast.

Kryzda was a man on a mission. He talked with Board members from the local hospital system, members of the Economic Development Commission, and large local employers who would have use for high bandwidth and redundant connections. Though the County had no plans to offer services directly to any businesses or residents, the network could potentially lease dark fiber to businesses or a new service provider that would add competition to the community.

Putting the Pieces Together

In 2008, Kryzda worked with the Martin County Bond Council and a local law firm to estimate the cost of a publicly owned network. Though Comcast's dark fiber comprised the majority of the existing network, the County and school district had supplemented those connections over the years with their own fiber optic investments. The County and school already owned all the gear necessary to operate the network, they just needed to replace the spans owned by Comcast. County IT staff, with help from Technology Assurance Labs in Orlando, estimated the new network would cost $9.8 million.

Looking for opportunities to bring down the cost of the network, Kryzda turned to Don Donaldson, Martin County's Engineering Director. The Florida Department of Transportation (FDOT) had received a grant from the Federal Highway Administration (FHA) designated for transportation and public safety to expand the current "Intelligent Transportation System," originally built in 1999. Intelligent Transportation Systems use communications and computers, along with sensing and detecting technologies, to manage intersections with real-time information. Goals include less traffic congestion, reduced pollution, and improved safety.

Knowing that FDOT designated the grant for installing conduit and fiber in more intersections throughout the County, Kryzda initiated a conversation about merging pieces of their networks to share costs. Donaldson was initially apprehensive because FDOT maintains a strict interpretation of US Code Article 29, requiring FHA grants for transportation to be used exclusively for transportation services.

Kryzda believed they could find a way to collaborate. Rather than sharing fiber, he inquired, might the County network be allowed to share conduit that would be laid for the transportation project? The two systems would not be commingling assets, simply sharing empty space. Donaldson agreed.

Using new routes along the targeted traffic corridors, Kryzda contracted with a design engineer to adjust the network design. The contract cost $33,000 but cut $2.5 million off the network's price tag, reducing it to $7.3 million. Kryzda credits this kind of collaboration and creative thinking for making the network attractive to elected officials and ultimately for its construction.

The Martin County School District, which used the same network as the County, was enthusiastic about the County-owned network proposal. Due to state mandates for online testing and online instruction for every grade, the school district needed access to a high capacity, next-generation network. In a letter of support Steve Weil, Executive Director of Operations at the Martin County School District stated, “The District’s use of the high speed network has changed from luxury to necessity.”[5] A 2012 report from the State Educational Technology Directors Association supports Weil’s conclusion, noting that school district networks should have 1 Gbps connections between facilities by 2014-15 and 10Gbps by 2017-18.[6]

Weil’s enthusiastic letter anticipated benefits such as controlling service levels and speed, prioritizing traffic, and making upgrades easier. The school district accounted for 30 percent of the dark fiber and agreed to contribute 30 percent of the cost of creating the new network even before the decision to build the network was approved by the Board. The school district would be 30 percent owners, with a pro rata share in any future benefits or expenses. Because it had funds available from an existing capital budget before the project began, the schools’ participation also reduced the total borrowing required.

Planning, Financing, and Building

On April 20, 2010, Kryzda presented the Long Term County Network Proposal to the Martin County Commission. Letters of support from the Business Development Board of Martin County, the school district, and the Economic Council of Martin County documented the need for a county-owned network.

The proposed network would not merely duplicate what Comcast previously provided. The new network would be far superior and fault-tolerant. A single accident on Comcast’s network could cut off first-responders from communications. The County’s network would be built underground and use a ring topology that would allow for uninterrupted service even if an accident severed a cable.

A business analysis by consulting firm Rice, Williams Associates concluded that a primary source of anticipated revenue would come from leasing connections to the Martin County Public Schools while a small revenue stream could come from other institutional clients, and several local townships. The firm believed the network a sound investment due to the County’s strong credit rating, the downward price trend in the construction market, the situation with the Comcast lease, and the potential value of the network. Not only would the County save money, it would have far greater capacity and greater reliability than if it continued leasing services from Comcast.

The Commission voted unanimously to issue an RFP for the construction of the network, which would give major carriers an opportunity to bid, even if just to offer dark fiber.

Unsurprisingly, the County’s plan to build its own network led Comcast to quickly change its negotiating tactics. After the Board authorized the RFP in April 2010, Comcast suddenly revised its previous “take it or leave it offer,” cutting prices in half. Rather than stepping into the fifth year at $98,261, the revised offer was $45,000 and would transition to managed services in the sixth year.

Comcast’s changed position shows the importance of local government establishing a viable alternative to depending on a distant corporation. Martin County’s examination of a publicly owned network would have saved the County $2 million over the next five years if it had accepted Comcast’s revised offer as compared to the first.

Martin County Commissioners, however, had already seen the benefits of a carrier independent network and were moving forward.

AT&T submitted a bid to provide services as a vendor, but its approach was similar to Comcast’s original high-priced approach. Comcast did not submit a bid. Kryzda notes that Comcast instead spent significant time during the RFP bid period lobbying the Board of Commissioners to reconsider their “risky” investment.

Martin County Map

A local public/private relationship presented itself during the RFP. Indiantown Telecommunications Service (ITS) is a relatively small, rural local exchange carrier located in the center of the county. Between 2006 and 2010, ITS invested in its own fiber network, installing fiber optic cable in and around the center of the county. ITS approached Martin County and Kryzda, offering a 43-mile fiber swap. ITS would use Martin County fiber to expand its service area and Martin County would use existing ITS fiber to avoid trenching and installation costs. The savings associated with the agreement brought the expected cost of building the network down to $4.14 million.

To pay for its share, the County arranged a 15 year, $3.12 million bank loan with First Southwest Company at 3.25% interest, resulting in annual debt service of $270,000.

Kryzda had adopted an aggressive goal of completing the Community Broadband Network (CBN) before the end of July, 2011, when the Comcast Fiber Lease extension would expire. The County was so convinced it would succeed it did not budget for lease payments beyond July of 2011. It was an ambitious strategy, but the self-imposed deadline worked. The construction for the project commenced on January 3rd, 2011 and the County no longer required Comcast's leased lines after July 31. However, the full network took a little longer to complete. The County first connected each sites with a single connection to make the deadline and then later added the redundant connections to complete a network comprised of seven rings.

School District Savings

	FY12	FY13	FY14	FY15	FY16	FY17	Total
Comcast	$160,779	$348,886	$348,886	$348,886	$348,886	$348,886	$1,905,209
CBN O&M	$6,120	$6,120	$6,120	$6,120	$6,120	$6,120	$36,720
CBN Capital	$260,000	$260,000	$260,000	$260,000	$260,000	$0	$1,300,000
Savings	-$105,341	$82,766	$82,766	$82,766	$82,766	$342,766	**$568,489**

Table 2: The school district saves over $500,000 in the first six years by partnering with the County to build a publicly owned network rather than continuing to lease connections from Comcast. Here, we compare the price of leasing from Comcast against the County Broadband Network approach (CBN), including the $1.3 million capital investment amortized over five years. Cost savings continue to accumulate even faster in later years.

Partnerships and Community Benefits

Even before the build was finished, Martin County saw the advantages in creating more local partnerships. At a February, 2011 meeting, while the network was still being built, Martin County Commissioners voted unanimously to spend $250,000 to expand the network to Port St. Lucie's network. The town of Port St. Lucie, sits about 7 miles past the County line, but the Board wanted to seek out possible economic opportunities. The new connection would link the Martin Memorial Hospital to its Health System in Tradition, a Port St. Lucie community.[7]

The Health System has 19 facilities in Martin and St. Lucie Counties, some administrative and others clinical. In addition to traditional use of Internet applications, the System makes use of tele-health applications. The Martin Health System (MHS) uses EPIC, a state-of-the-art clinical medical record system, for sharing health records making clinical processes more efficient and effective for patient care.[8] EPIC allows the Health System to be compliant with the federal mandate to convert all medical records in the U.S. to electronic format by 2014.

According to Kryzda, that one relationship "put them in the black."[9] In short, the hospital lease covered the gap between what the County had been paying to lease the dark fiber network from Comcast and the higher debt service cost from building its own network. Without the dark fiber lease to MHS, the network would have still been a good investment compared to the cost of leasing from Comcast but the MHS lease actually reduced the County's expenses.[10]

The total annual operating and maintenance costs of the network are estimated at $51,000 each year. The equipment used to operate the network has long been budgeted for separately as part of the County and school district IT budgets.

The school district expects to recoup its $1.3 million capital investment in less than 5 years. If the original Comcast offer had been accepted, the school district would have continued to pay 30 percent of the lease, increasing its costs to $348,886 annually by 2013.[11] Instead, the school is paying a meager 12 percent of the operations and maintenance costs of the network each year.[12] For $6,120 each year, the school connects 26 facilities with 1Gbps connections.

The school has two additional sites served by AT&T Metro-E connections at a much slower 10 Mbps.[13] The cost of that service, which is 1/100 th as fast as the County-owned network, is $5,268 per month.[14] At first glance, this suggests that the County network is not only 100 times faster than AT&T, but also 10 times less expensive. But the true difference is even greater, as illustrated in Table 3. During the five year amortization period for the school district's capital investment, the County network provides 9.77 Mbps for each $100 compared to the .03 Mbps delivered by AT&T. But after the costs are amortized, the

County Network Superior to AT&T Connections

	Yearly Cost	Yearly Cost/Site	Mbps	Mbps / $100
AT&T	$63,216	$31,608	10	0.03
CBN Year 1-5	$266,120	$10,235.38	1000	9.77
CBN Year 5+	$6,120	$235.38	1000	424.84

Table 3: Of the school district's 28 sites, 26 are connected to the County Broadband Network at 1Gbps and 2 are connected using MetroE from AT&T at 10Mbps. Breaking out the cost and capacity on a per site basis, AT&T delivers only .03 Mbps for each $100 spent whereas the County network delivers 9.77 Mbps during the years over which the capital cost is amortized and 424.84 Mbps in later years.

County's network delivers 14,161 times the capacity of AT&T per dollar.

Katie Preston, Director of Educational Technology at the Martin County School District says of the network:

> The CBN provides a scalable fully redundant network with a life expectancy of 25 years. This jointly owned and maintained network replaced the traditional, non-redundant, carrier provided, connectivity that was consuming a large portion of the school district's operating budget. The new network has allowed us to meet the ever increasing needs related to online curriculum and testing and will allow us to meet future requirements through simple and affordable equipment upgrades.[15]

Public safety in Martin County has improved as well. By sharing conduit and routes, twice as many intersections are hooked into the Intelligent Transportation System as would have been absent the collaboration.[16]

New, unanticipated uses for the County network appear on a regular basis. Three public safety towers are now on the network, saving $73,000 in annual connectivity and surveillance costs. When the past public safety network carrier, AT&T, proposed moving the signal to its new MetroE-2 system, the price jumped dramatically. Martin County moved its public safety system on to the new County network instead. Call center operators insist the new connections are far superior than what was offered by AT&T.

The network runs approximately 154 miles throughout the county. In addition to serving the County facilities and the school district, the towns of Jupiter Island, Sewell's Point, the City of Stuart, and Martin Health Systems take full advantage of the CBN's capabilities.

Barriers to Public Ownership

If the County wants to provide telecommunications services to non-governmental entities, it must adhere to Florida Stat. §350.81.[2] Dark fiber is not considered a telecommunications service.

Florida Stat. §350.81 dictates a stringent and burdensome set of rules, regulations, and requirements that discourage publicly owned networks from providing services to residents and businesses. Among the various restrictions on publicly owned networks is one that requires a referendum if the network is funded with revenue bonds that take longer than 15 years to mature. Under the law, publicly owned networks must be self-sustaining within four years, a provision that is not required of the private sector. If four years is not sufficient, the network's owners must make plans to stop providing services, find a private partner, dispose of the system, or obtain approval for some other use of the system. A four-year deadline is particularly difficult to meet when a community network invests in expensive fiber-to-the-home services.

The Future of Martin County's New Network

One of Kryzda's unforeseen responsibilities throughout the process has been managing expectations. At the beginning of the discussion to build a community network, it was obvious that the Commission wanted to capitalize on greater connectivity for the entire County. The Commission stated that it wanted to avoid a "proprietary network," serving only community anchor institutions. Early ideas were to find a way to offer bandwidth to public institutions, government, businesses and residents. Legal restrictions, however, make it difficult for the County to offer telecommunications services to residents and businesses (see Barriers to Public Ownership Box).

Palm Beach County

Nearby Palm Beach County also has its own network connecting public facilities. Greenacres, a town in Palm Beach County, has just announced it will connect to the County network, saving almost $25,000 per year while increasing capacity to its facilities. The city currently pays AT&T $33,360 per year for a 1.5 connection but will now pay the County $8,400 for 10Mbps.

In January 2011, the Board of Commissioners hired Cherrystone Management Consultants Inc. to provide a study on new ways to generate revenue with the network. Some recommendations in the report included selling broadband capacity to wireline and wireless carriers, ISPs, the State of Florida, and commercial entities. Cherrystone also suggested Martin County become a "Global Broadband Gateway Port Community." Another possibility was seeking a partnership with Comcast to offer services on the new network, although that suggestion was not received with much enthusiasm on either side.

Kryzda does not anticipate providing commercial services to residents or businesses directly. Based on a legal analysis done by Baller Herbst Law Group, a pre-eminent telecommunications law resource, such a move could be difficult under existing law (see Barriers to Public Ownership box). Florida has created special regulations for publicly owned networks in addition to all the regulations on private companies that would already apply to the County. Thus far, Martin County is only considering leasing dark fiber on a case-by-case basis and possibly offering Internet access to government entities.

Conclusion

From the start, Kryzda kept his eye on the prize: obtaining the best deal for the County and the taxpayers. He credits collaboration with partners, like the School Board and the County Transportation Department, as keys to success along with creative thinking. Finding existing assets and incorporating them into a network design saves money and firms up relationships across agency lines.

Martin County Network Savings

	Annual Average	Total Savings
Over 20 years	$1.5 Million	$30.3 Million
Over 15 years	$1.3 Million	$19.8 Million
Over 10 years	$1.1 Million	$11.3 Million

Table 4: Projected savings of the Martin County Broadband network compared to leasing services from Comcast.

This network was a success from day one. The County maintains control over its network, including budgeting for future upgrades rather than fearing the next round of negotiations with Comcast. The cost of the network to the County is far less than what it would have had to pay Comcast to deliver a comparatively inferior service. Between the school district's contribution and the hospital's dark fiber lease, the County has virtually unlimited capacity and could actually generate additional revenue by leasing additional strands of fiber. Through the partnership with ITS, residents and businesses in parts of the County have gained an additional Internet Service Provider to choose from.

Local governments across the nation face a classic why-rent-when-you-can-own analysis for telecommunications services. These services will be necessary for as far into the future as anyone can presently imagine. One of the important lessons from Martin County is that smart public investments can result in large savings, and smart partnerships can result in even more savings. Additionally, the cost of the network would have been higher had Martin County not previously built its own spans of fiber optic cable incrementally as opportunities presented themselves.

References

[1] Email from Kevin Kryzda, May 9, 2012.

[2] Telephone conversation with Kryzda, May 9, 2012.

[3] Telephone conversation with Kryzda, April 19, 2012.

[4] Email from Kryzda, May 9, 2012.

[5] Letter from Steve Weil, Ex. Dir. Of Operations of Martin County School Board, to Board of Commissioners, submitted with Long Term County Network Proposal, at Aril 20, 2010 Board of Commissioners meeting.

[6] See The Broadband Imperative, available at http://www.setda.org/web/guest/broadbandimperative

[7] http://www.youtube.com/watch?v=4EAiUGY2upw&feature=relmfu

[8] http://www.epic.com/about-index.php

[9] Telephone conversations with Kryzda, April 19, 2012 and June 1, 2012.

[10] The first $150,000 of debt service is paid with general funds allocated specifically for the County's technical needs. $150,000 is approximately the average of the cost of the network Funds from the Hospital lease pay off the remaining $120,000 of debt service, with the remainder of the lease revenue designated to cover operation and maintenance cost.

[11] Email from Katie Preston, May 17, 2012.

[12] To determine operating and maintenance, the mileage of the network was divided by the number of connected agencies pooling their resources as part of the network. Individual agencies, such as FDOT and the school district, had built their own smaller internal networks that served their own purposes. The new network linked them together, creating a network of 154 miles of fiber, including 54 miles of new construction. Using the total miles of fiber, the county prorated for each agency based on the miles needed to connect facilities to the network.

[13] As neither site is on land owned by the County, they decided not to connect them with the network.

[14] In 2012, 49% of the AT&T connection is reimbursed by E-rate, but that percentage changes from year to year. E-rate is a federal program that subsidizes the cost of connections to schools and libraries.

[15] Email from Katie Preston, May 17, 2012.

[16] Martin County makes trouble-free transition to broadband cable system, By Jim Mayfield, Treasure Coast Palm, July 29, 2011.