

## Background

In 2016, Ammon Township, Idaho unveiled a municipal broadband network where the city extended fiber-broadband service to every participating home, in exchange for a property tax levy. The 'Ammon Model' for broadband service-delivery has been documented by Harvard researchers,<sup>1</sup> Next Century Cities,<sup>2</sup> Broadband Communities Magazine,<sup>3</sup> New America,<sup>4</sup> Fast Company,<sup>5</sup> and Community Networks.<sup>6</sup> Ammon Township owns and operates a municipal broadband network that uses virtualization software that enables ISPs to offer broadband service over the network without any physical infrastructure or connection. ISPs purchase bandwidth on the City of Ammon Fiber Optics network, which allows the network administrators to ensure that ISPs are actually providing advertised levels of service. Homeowners and ISPs pay a small monthly access fee that finances infrastructure maintenance, and homeowners are assessed a roughly \$3,000 property tax levy that finance the extension of fiber to the premises. Ammon finances the infrastructure through a Local Improvement District, an Idaho state-financing mechanism that allows municipalities to extend infrastructure improvements to properties that opt-into an assessment. The first LID, and neighborhood to receive broadband, had a 70% take-rate, and overall the network has a 60% subscription-rate by residents of Ammon neighborhoods.

Prior to its municipal network, Ammon had not previously operated a power utility. Today, the Fiber Optics program is debt-free, cash-flow positive, and owns and operates 30+ miles of fiber that connects homes, businesses, utilities, schools, public safety, and wireless providers. Ammon's service allows users to instantly switch between providers, receive service from multiple providers simultaneously, and create private sub-networks. The Software Defined Networking virtualization program used by the network replaces specialized hardware used to connect providers into a network. This promotes competition and innovation by providers, who all have equal access to the bandwidth provided by the City of Ammon Fiber Optics and cannot be differentiated by infrastructure alone. As a result, the Township boasts cheap high-speed internet, with 1 Gbps download-speeds available for \$9.99 and many homeowners purchasing separate service plans for their family and business.

Ammon Township began its broadband development efforts in 2006, after a City Council Member approached Bruce Patterson, the one-man IT Department for Ammon Township, with a problem: slow internet speeds were harming his business. Idaho is a major destination for work-from-home professionals, and slow internet speeds encumbered the Council Member's employees with multi-hour downloads of the computer manuals their business printed. Meanwhile, neighboring Idaho Falls had leveraged a backbone network used by the Idaho National Laboratory to construct a middle-mile network that providers accessed to extend fiber to homes and businesses. Ammon is a small, residential community with a population just north of 14,000 – an unattractive business-case for national ISPs. Slow

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<sup>1</sup> <https://dash.harvard.edu/handle/1/33981014>

<sup>2</sup> <https://nextcenturycities.org/becoming-broadband-ready/>

<sup>3</sup> <https://www.bbcmag.com/community-broadband/what-is-the-ammon-model>

<sup>4</sup> <https://www.newamerica.org/oti/reports/cost-connectivity-ammon-idaho/>

<sup>5</sup> <https://www.fastcompany.com/90416863/the-city-with-the-best-fiber-optic-network-in-america-might-surprise-you>

<sup>6</sup> <https://muninetworks.org/tags-304>

internet speeds threatened the ability for Ammon to capture its share of the high-earning professionals and business-owners moving to Idaho to take advantage of teleworking-enabled opportunities.

In 2008, Ammon Township began design of its municipal network, followed by a series of resolutions and ordinances that prioritized broadband as an essential service. In 2012, Ammon officials interviewed operators of municipal and regional ISPs – UTOPIA in Utah, Oregon Telephone, and Wyoming Silverstar Communications – and connected with other regional ISPs at a Municipal Broadband Seminar to learn more about the costs associated with deploying, operating, and maintaining a broadband network. Networking by Bruce resulted in a partnership with a small mobile wireless company that provided construction assistance to Ammon Fiber Optics. This company had experience constructing and leasing dark fiber that the company used to connect with cell towers – a model Ammon applied to its open-competition municipal network.

Equipped with knowledge on the cost, technologies, and profit-opportunities associated with broadband infrastructure, Ammon began to connect a few government buildings to a fiber ring. The municipal network saved money on phone and internet costs, and improved government administration, including enabling the installation of security cameras at previously inaccessible positions. In 2013, Ammon Fiber Optics connected the school district to the fiber ring with financial support from E-Rate, an FCC program to connect schools and libraries to fiber networks. This resulted in increased revenue for Ammon Fiber Optics and savings for the community. After failing to obtain federal grant funding to expand the network to residential areas, In 2015, Ammon Fiber Optics hired a legal firm to approve the city's authority to leverage Local Improvement District funds towards financing broadband infrastructure bonds. After this judicial confirmation, Ammon began to roll out LIDs and broadband to Ammon.

### **Establish Strategic Leadership**

Leadership in Ammon view broadband development as an opportunity to attract workers and entrepreneurs after seeing the benefits of reliable broadband service to neighboring Idaho Falls' growth. As the Township furthered its investment into broadband, attitudes by leadership evolved to view broadband as an essential service that the Township needed to provide to its residents.

Demand for broadband in Ammon culminated from the demands of a City Council member, that had implications for the community. This Council Member printed service manuals for Micron PC, an Idaho-based hardware manufacturer using 3 Mbps DSL internet to download 800 MB CDs. This lag wasted employee time and resources. The Council Member lamented that he did not locate his business in Idaho Falls – which had highspeed internet due to the presence of Idaho National Laboratory. Idaho is a popular destination for educated professionals taking advantage of teleworking and digital opportunities to enjoy the state's natural beauty. The Council Member feared that poor internet service in Ammon would prevent the Township from capturing its share of relocating professionals, a lost opportunity. Poor broadband access not only threatened the Council Member's business, but threatened Ammon's competitive ability to attract and retain high-performing workers.

In 2006, the City Council tasked Ammon's one-man IT department, Bruce Patterson, with examining municipal broadband networks and identifying a model that Ammon could adopt. One network toured by Bruce was in nearby Idaho Falls. In 2000, the City of Idaho Falls started running fiber-optic cable alongside its municipal power lines to connect to sub-stations. Idaho Falls operates a municipal power network, and digital connectivity allows the utility to manage load shifting without having to drive to the

sub-station. Idaho Falls then leveraged this backbone network to connect homes and businesses. Idaho Falls expanded into a dark fiber ring middle mile network that ISPs then leased to install fiber to the premises, resulting in a functioning network by 2005. Improved internet service helped retain talent from the local Idaho National Laboratory, resulting in a cluster of smart energy and transactive energy market research firms that sprang from INL efforts. After his review of Idaho Falls, and other municipal networks in Utah, Oregon, and Wyoming, the IT department informed the Council it was ill equipped to build and operate a municipal broadband network. Instead, the Township needed to first build and operate a smaller network that expanded, with the support of public financing, to provide service to homes and businesses.

In 2008, Ammon Township began design of its municipal network, and in a unanimous resolution declared broadband an essential service. This resolution was followed-up by an ordinance that outlined strategic vision and priorities that the IT Department and newly elected officials often revisit. The ordinance includes step-by-step goals and is a helpful reference for telecommunications providers that are afraid Ammon Fiber Optics is attempting to replace private providers. The commitment by leadership to clearly articulate the need for broadband service across Ammon and goals maintained momentum throughout stages of development, despite any setbacks. Despite early failures to obtain ARRA funding from the NTIA, the Township made investments in a downtown fiber ring that produced public sector cost-savings and service-delivery improvements. It then leveraged federal funds to expand service to schools and libraries. Sustained commitment throughout early setbacks resulted in new opportunities for Ammon to leverage and finance broadband.

Ammon's IT Department formed a partnership with its network virtualization software provider and consultant, Entrypoint, in 2008. Entrypoint was the first privately-owned Idaho ISP – it started as a non-profit, but became so profitable the firm expanded service and became a private company. Entrypoint unbundled the ownership of broadband infrastructure and service delivery to attract ISPs and direct revenue at improving, maintaining, and sustaining the local network.

Ammon Fiber Optics uses community-based leadership to attract residents to the municipal network. After a pilot project with an Entrypoint-powered network, Ammon officials held neighborhood meetings that featured testimony from community-members who participated in the pilot. Ammon Fiber Optics encourages neighborhood members to be advocates for network expansion –homeowners sometimes opt-in once they see construction.

### **Navigate Legislative and Regulatory Barriers**

Ammon's choice of financing required the township to undergo a judicial confirmation of its municipal powers to construct, own, and operate a municipal broadband network. Regulatory barriers can vary according to how a community chooses to finance, and assign-ownership, of a broadband network.

Communities might need to legally confirm their authorities to receive financing. After failing to obtain funding support from various federal government grants for broadband infrastructure, Ammon announced a Local Improvement District (LID) in 2015, an Idaho state-financing mechanism to develop infrastructure to neighborhoods that opt-into a special property assessment.<sup>7</sup> The financial institution

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<sup>7</sup> <https://law.justia.com/codes/idaho/2011/title43/chapter25/>

that provided bond-financing for Ammon's investment in broadband infrastructure required the Township to undergo a judicial confirmation of its right to utilize LID financing.

Ammon's decision to enter this process represented a major investment by the Township itself. Judicial confirmation invites legal challenge by incumbent telecommunications providers, which could have resulted in a lengthy and costly court-battle. The judicial confirmation included a mock trial, where Ammon's legal team argued its authority to construct and operate broadband network to a judge and gave interested parties ninety days to respond with objections. The judge then reviewed the statute ruling and decided that Ammon was within its rights. Any objections would have initiated formal court proceedings.

Ammon's request to utilize LID financing to support broadband infrastructure was approved, because the Township offered any infrastructure extension as an opt-in for homeowners. Once 50% of a neighborhood opts-into Ammon's fiber, the Township forms a new LID and extends infrastructure to properties that opted-into service. Additionally, the Township operates broadband like a traditional utility, where the municipal infrastructure is divorced from service, which is provided by Ammon and several private ISPs. Ammon was able to obtain non-traditional public-financing for its broadband infrastructure by carefully following regulations to ensure their actions were legal, which allowed the Township to confirm its powers more confidently in court.

### **Models to Deploy Broadband Infrastructure**

Ammon Township organized its municipal broadband network as the City of Ammon Fiber Optics, a municipal utility that owns and operates all of the city's broadband infrastructure. In addition to the City's network, four private ISPs offer service through Ammon's network. Both ISPs and residents use an online portal to onboard access to the network and manage any purchased services, which includes details on service-plans and pricing. Ammon Fiber Optics uses the same portal to monitor download and upload speeds for every user, active modems/devices, and lifeline services.

Ammon Fiber Optics is an infrastructure-owner and ISP on the network. Private ISPs that lease bandwidth from Ammon's network include regional networks such as SUMO, which grew out of the Utah UTOPIA municipal network, Quicknet, an Idaho Falls and Ammon-based private ISP, and Fyber.com, an Eastern Idaho wireless private ISP, which has actually sold unused bandwidth to other providers on the Ammon network. Ammon Fiber Optics allows any ISP to offer service with its network and is a regulator for the market, ensuring the promised level of service is delivered. The website allows customers to rate and review service-plans. Ammon Fiber Optics incentivizes ISPs to not offer contract-plans and requires ISPs to meet a slate of technical requirements to continue providing service on the network. Rates to access the Ammon Fiber Optics network are set according to port size, with ISPs, businesses, and homeowners receiving identical rates. The City of Ammon Fiber Optics only provides internet service. The network considered Video Over Internet Protocol (VOIP) service, but it was not considered price competitive relative to internet steaming services and satellite tv.

### **Explore Funding Opportunities**

Local broadband development efforts need to leverage multiple revenue streams to sustain the network, and finance capital and operational expenditures. Ammon Fiber Optics generates operational revenue from its investments in broadband infrastructure by providing service as an ISP, charging a

maintenance fee, and leasing bandwidth to other ISPs that provide service on the network. Ammon financed capital investments in broadband infrastructure in stages. The Township financed initial construction of a town-center fiber ring with municipal funds; leveraged the E-Rate program to extend service to schools and libraries; and secured infrastructure-bonds to extend fiber-to-the-premises that the Township finances with Local Improvement District property assessments.

After a review by the Ammon IT Department of sustainable models for regional networks, the Township began to view broadband as a utility, where the municipality could own and operate the infrastructure, that allows for private service. This financing model was reviewed by Strategic Networks Group.<sup>8</sup> Private ISPs were unwilling to invest in communities like Ammon because the risk outweighed the potential rate of return. A dark fiber community-owned network provides private ISPs with a profitable business model to expand service to rural communities. Community ownership over the infrastructure ensures that usage fees remain directed towards network improvements. Providers with unused bandwidth are willing to offer service in an area if there is no associated capital cost. The virtualization technology used by Ammon means that any capital costs associated with connecting to the network are non-existent and operational costs minimized. Network connection usually requires the physical connection of hardware between separate network- infrastructure. ISPs both offer service on Ammon's network and use the network to connect fiber rings.

In 2015, Ammon received legal authority via judicial confirmation to apply funds collected via a special opt-in property assessment towards broadband infrastructure. Ammon forms a Local Improvement District (LID) in a neighborhood when 70% of the properties opt-into a roughly \$3,000 property assessment that finances the extension of fiber-to-the-premises. The property assessment funds finance a 15-year infrastructure bond authorized by a local financial institution after judicial confirmation of Ammon's authority. The bond provided the capital to construct the initial middle mile and last mile infrastructure. In addition to financing the bond, property assessment funds support network expansion and maintenance. Maintenance costs are stable because of the predictable depreciation of fiber-optic cable and network equipment. A network access-fee for users and providers proves an additional funding source for operations. The network's cash-reserves are limited as it reinvests in expansion.

Ammon was unable to obtain federal awards to finance broadband infrastructure, but the Township learned valuable lessons about constructing a network and gained knowledge-resources that informed future development. In late 2008, Ammon engaged a pro bono consultant to apply for the NTIA Broadband Opportunities Technologies Program, which offered an 80% federal / 20% local match for fiber-to-the-premises broadband projects. The Township set aside \$1 million in funds as a match and hired an engineering firm to do high-level design work for the project. Ammon used this design to develop a business model where a 30% take rate would sustain the network and allow for long-term expansion. Ammon failed to receive funding. As part of a second round of funding in 2010 for fiber-to-community-anchor-institutions, Ammon and an engineering team transformed the designed fiber nodes from the Round One application into connections between government departments, public safety assets, and schools. These failures resulted in questions from the City Council regarding the Township's inability to secure funding and next steps. Although Ammon failed to win any awards, state and federal

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<sup>8</sup> <https://sngroup.com/broadband-economic-case-ammon/>

grant programs provide a competitive source of financing for infrastructure investments and create planning resources that enable future broadband development projects.

Reflecting on Ammon's inability to obtain federal grant-funds, Bruce Patterson thinks their business model was too naïve to make a competitive application. The initial model used in the application assumed a community-wide 30% subscription rate, and Ammon had no practical experience operating a broadband network. Bruce proposed to the City Council that the City invest in a fiber ring to connect Ammon's downtown government buildings – the Township spent roughly \$4,000/month on outsourced telephone and internet costs, and managing the network was a serious drain on Bruce's time. A municipally owned network would slowly pay for itself in savings over 25-30 years and reduce monthly costs for telephone and internet service, as well as free up the IT Department for other projects. This initial investment resulted in Ammon leading a competitive project to connect the Township's schools and libraries to the downtown fiber-ring, with support of the FCC E-Rate program. This multi-staged broadband development process allowed Ammon to build up the capacity to own and operate a sustainable broadband network that provides fiber-to-the-premises of homes and businesses.

### **Best Practices**

**Clearly articulate community goals and priorities.** Ammon Fiber Optics never planned on using Local Improvement Districts to finance the Township's capital investments in broadband infrastructure. Clearly articulated goals and priorities help keep community-leaders and members focused on the stated goals throughout various stages of development and options for service-delivery. The commitment to broadband as an essential service maintained support for the program throughout any initial setbacks. Stated goals also helped private telecommunications providers understand that Ammon was not attempting to replace ISPs with their network, and just provide a platform for broadband. The ordinance lays out the process for community engagement and shows that the Township received comments from residents and businesses. Elected officials and Ammon Fiber Optics officials continue to revisit the statute as turnover occurs across election cycles and as the Township faces new decisions.

**Separate broadband infrastructure from broadband service.** Public organizations can obtain and leverage low-cost capital financing to create broadband infrastructure that attract service providers. Separating service from infrastructure includes private ISPs in broadband development by creating a platform for ISPs to affordably offer service to new areas. Private ISPs lack the access to capital to extend service to rural areas, and by removing up-front capital costs for expansion, ISPs have little reason to enter new areas with only operational costs. The public sector and private ISPs can partner to create a favorable business case for the expansion of service to underserved areas.

**Find partners and networks to model.** Prior to constructing its network and establishing Ammon Fiber Optics, Ammon's IT Department interviewed municipal and small-regional networks across the country to find partners, revenue-opportunities, and models to organize a municipal network. This resulted in partners that helped consult Ammon's broadband development efforts, provide construction assistance, and help Ammon implement virtualization software solutions and obtain revenue from leased dark fiber. Efforts to engage with successful and sustainable models created new opportunities for Ammon that helped realize the community's goal for a sustainable fiber broadband network.