
BRIEFING MEMO

TO: DEPUTY MAYOR, PAUL WILLIAMS
CITY COUNCIL

FROM: FRANCHISE RENEWAL COMMITTEE
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SUBJECT: INET REPLACEMENT RECOMMENDATION

DATE: July 16, 2012

CC: Erin Dady, Chief of Staff

PURPOSE:

The Institutional Network (I-Net) is a critical piece of infrastructure that enables almost all city operations. The I-Net is provided through the City's cable franchise with Comcast. While the franchise gives the City the right to use the I-Net so long as Comcast continues to operate in the community, eighty-percent of the I-Net is built with outdated technology and is near its end-of-life. The existing agreement with Comcast requires the company to maintain the institutional network, but maintenance is increasingly difficult, and Comcast has made it clear it believes it has no obligation under the existing agreement to replace the existing network with a modern network. While significant parts of the Comcast institutional network will remain important parts of the City's infrastructure for some time, the City cannot rely on the existing infrastructure as the primary pathway for critical City communications. It is essential that the City choose a replacement option in the near future, since any replacement will take approximately two years to put in place.

Since 2008, OTC has been pursuing a replacement for the I-NET. An application for federal ARRA funding to build a fiber optic replacement for the I-Net was submitted in 2010 but did not receive funding.

OTC has been pursuing a number of different upgrade/replacement options including:

- 1) leasing network services from a third party,

- 2) participating in a joint effort with Ramsey County and a private company that would result in construction of a new institutional network (the City would lease dark fiber from Ramsey County under this option)
- 3) negotiating an upgrade to the current I-Net via the Comcast franchise negotiation process.

The three options have been researched and the Franchise Renewal Committee (FRC) recommends that the I-Net replacement no longer be part of the Comcast cable franchise renewal process and that the City enter contract negotiations with Ramsey County for dark fiber.

The FRC is making that recommendation based on the following reasons:

- It takes advantage of what may be a one-time opportunity to obtain control of fiber for decades at a cost considerably lower than the cost of building a standalone network.
- It is the option that provides the longest term commitment and therefore ensures the longest term stability.
- It is the option that offers the City the most flexibility for long-term inter-governmental cooperation and service sharing, including valuable back-haul for expanding public safety wireless networks and inter-agency connectivity for the new 911 CAD system, and it segregates public safety network traffic from commercial infrastructure.
- The network design offers the greatest degree of redundancy and ease of expansion.
- This option brings with it significant community benefits and economic development opportunities by expanding the availability of fiber options throughout City of Saint Paul/Ramsey County.
- The County design is simple and clear, and the City will be able to access the amount of fiber it believes it needs immediately and for the future; the other alternatives limit the fiber available to the City.
- Increases government operational efficiencies and reduces redundancy through shared services with the County.

Note: Any of the options explored will require additional negotiations to reach a final agreement and contract. The recommendation is based on the FRC's current understanding of the options presented.

BACKGROUND:

I-Net

The I-Net is currently connected to over 300 sites, with 115 sites in active use. Most of these are City sites (104); other sites are Ramsey County, School District and State sites. All major City systems, including CAD, Finance, HR, Internet access, and Email are delivered over the I-Net. The system is comprised of 20% fiber optics and 80% Hybrid Fiber Coaxial (HFC).

Currently, the I-Net infrastructure is provided to the City of Saint Paul for government use as part of the City's Cable Franchise for no charge. The cable franchise expires in July of 2013. Comcast provides maintenance services on the infrastructure. The City provides the equipment that sends data over the network and OTC staff provides oversight of the network traffic and performance. The franchise states that Comcast must continue to provide the I-Net to the City as long as Comcast continues to operate in the community, but does not require Comcast to replace the coaxial portion with fiber. Comcast argues that its I-Net obligation ends when the I-Net reaches its end-of-life.

Condition of the I-Net

The 20% of the I-Net that is comprised of fiber optics (Fiber I-Net) is working well and has had relatively few service issues. However, Comcast has determined the 80% of the network comprised of the HFC cable (HFC I-Net) "is unsustainable" and near its end-of-life. Issues associated with the HFC I-Net include:

- Service issues and outages are increasing due to age and the outdated equipment that supports it. Portions of the HFC network were installed over 25 years ago. The last major overhaul of the system was done in 2001.
- The modems the City uses to send data over the system were last manufactured in 2000 and are no longer available nor repairable. The City is reliant on a stock pile of these modems that is depleting. It is estimated the current stockpile will last no longer than two years if failure rate remains the same.
- The amplifiers and battery packs used by Comcast to provide transport over the HFC are also no longer manufactured.

Comcast's compliance to required maintenance levels is an issue. A recent audit by CBG Communications in the fall of 2011 revealed the following:

- The I-Net has not been maintained as required by the franchise. Testing shows issues in head end alignment, use of wrong channel plans, etc.
- Comcast cannot produce the maintenance records required under the franchise agreement.

Wide Area Network (WAN) Needs

The City is dependent on technology to deliver services. The I-Net is a Wide Area Network (WAN). The WAN is critical in connecting end users to needed applications and the Internet. The more technology that is deployed the greater the traffic on the WAN and the greater the need for bandwidth. The increased use of video (e.g., CCTV, Webinars, Video Conferencing, etc.), the continued addition of more systems and cloud services, the growth in email and data volume and the need to migrate to Voice-Over-IP dictates a WAN network that in the near future can deliver 1Gbyte to most locations. The City also continues to expand the usage of remote monitoring (cameras) and control of infrastructure (i.e, traffic lights, pump stations, building controls, etc) and will need to expand the network over time.

As the City becomes increasingly more dependent on technology, the role of the WAN becomes more critical. Therefore, when looking for a replacement the City should be looking for a long-term solution. Since a significant investment will be needed, the City should be planning to leverage that WAN investment for at least the next 20 years. Fiber optics are the best solution for a network that can continue to scale to future bandwidth needs as the fiber has an almost limitless capacity and a long useful life (30-40 years).

INET REPLACEMENT OPTIONS:

The following is an overview of the three options explored.

Lease Managed Network Services

Overview:

The City would engage a private entity to manage the City's network services from and to each City site. The private entity would provide all the infrastructure, equipment and management services needed to meet the specified service levels identified by the City.

Process:

To obtain the costs of a leased managed network solution the City issued an RFP in November 2011. The RFP specified the locations and service levels expected. The City received two viable proposals in January 2012. The one that most closely meets the City's needs was used for comparison purposes.

Advantages:

The advantages of this approach include:

- The ability to have 24/7 WAN network monitoring and network problem resolution.
- Simplifies network management for the City.

Disadvantages:

The disadvantages of this approach include:

- This is the most expensive option and cost is only known for 10 years.
- The City would need to revisit network solutions after 10 years.
- Increased bandwidth needs would increase the monthly service cost.
- Since this is a service, the City would not own any infrastructure after the investment.
- Leasing arrangement contains a high upfront expense for the first five years
- Replicates infrastructure investment by the County.

Partner with Ramsey County

Overview:

The City would lease dark fiber on a county wide fiber system owned by Ramsey County known as the Institutional Fiber Network (IFN). The dual-conduit system will provide network connectivity for government agencies and will enable economic development

opportunities via a second privately owned conduit. The City would provide the electronics to send data over the system. The County would provide limited network monitoring service.

Process:

Since 2008, the City and Ramsey County have been pursuing options to jointly address both organizations' needs for a fiber WAN. The City and County have many locations that are close in proximity and both are interested in ways to reduce cost through inter-governmental cooperation. The City and County have created a plan that connects the majority of City and County buildings.

An RFP was issued in 2009 for a private partner. The private partner chosen was Minnesota Fiber Exchange (MFE). MFE agreed to first pursue ARRA (American Reinvestment and Recovery Act) grant funding, in partnership with City/County. An ARRA grant was not awarded. The RFP allowed the pursuit of other financing models with the private partner in the event the ARRA grant was not received.

Since building the fiber optic network would be a significant investment, options to both reduce costs and try to leverage the investment for additional community benefit were considered. The final plan is for a dual-conduit fiber optic system where the construction cost of the system will be shared between MFE and Ramsey County. One of the conduits will be solely for government use (a/k/a Government Conduit or Institutional Fiber Network). MFE would run a carrier-neutral dark fiber system, meaning it would lease fiber to any organization (a/k/a Commercial Conduit). Dark fiber is typically leased by telecommunications providers and large companies.

The original design included Ramsey County and the City of Saint Paul both owning and bonding for the system. Due to the difficulty of two entities bonding for a single infrastructure with commingled assets, it was recommended that one entity do the full bonding. Ramsey County would be the bond issuer and the City would pay a share of the costs with lease payments to the County. The City would obtain irrevocable rights to use fibers on the system. It is proposed, at the end of the bond debt service, the City would own the laterals (extension of fiber from shared fiber ring to buildings) used exclusively for City facilities while the County retains ownership of any infrastructure used by multiple entities.

Advantages:

The advantages to the City of Saint Paul under this approach include:

- The County is willing to commit to a long-term lease (30-40 years), allowing the City to plan and predict costs over the long-term.
- Increasing the bandwidth capacity can be done through equipment upgrades as part of the normal equipment replacement cycle.
- Equipment can be leased, which allows cost to become part of the operating budget and ensures regular equipment replacement.

- Additional government agencies could share the network which could help reduce the overall costs to the City and County.
- Once the bond's debt service is complete, the City's costs will decrease significantly and the City would have the opportunity to own some of the infrastructure.
- The cost includes basic 24/7 monitoring of the network.
- Supports the City's Comprehensive Plan development guideline to increase availability of broadband.
- All fiber plant would be underground, which is more stable and secure than aerial plant.
- The network design is more developed, and the City has a reliable estimate of build costs.
- The network will interconnect with a number of existing county, municipal and state networks. It would complete a seven county metro-wide government network that would allow for high-speed, secure connectivity enabling shared services among government agencies.

The Commercial Conduit brings significant economic benefits to the Saint Paul community including:

- MFE will build a Network Operations Center in Saint Paul. This is an \$800,000 capital investment and will provide 10-12 new jobs.
- More commercially available dark fiber will be available to non-incumbent telecommunications providers via the Commercial Conduit. More telecommunication providers increase telecommunication choices in Ramsey County/City of Saint Paul. *Note: The City will not determine or participate in providing fiber or telecommunication services to the private sector.*
- MFE is building a large data center in Ramsey County. The Commercial Conduit will provide access to the MFE data center and other data centers for east metro businesses.

Disadvantages:

The disadvantages of this approach include:

- A contract is still to be negotiated with the County.
- This is not the least expensive option over the next 10 years.

Upgrade I-Net via the Cable Franchise

Overview:

Under this scenario, through the relationship created by the cable franchise, Comcast would to upgrade the existing institutional network (I-Net) to a dark fiber/dark wavelength infrastructure. Dark wavelength means that instead of providing a dedicated single fiber to backhaul data, sites would backhaul over shared fiber that splits the light into different wavelengths to maintain traffic segregation. The City would provide most of the electronics to send data over the system.

Process:

In late 2011, the City requested a proposal from Comcast as part of the franchise renewal negotiation process. A proposal was received on February 3, 2012, and was vague in critical respects. The parties exchanged numerous proposals and counterproposals over the next four months. The most recent Comcast proposal is addressed herein.

Advantages:

The advantages of this approach include:

- This is the least expensive option as currently understood.
- Comcast is able to leverage existing infrastructure and therefore provide dark fiber/dark wavelengths at a competitive cost.
- Comcast is willing to pay for one of the initial routers needed to run the network, the capacity of the server is still to be negotiated.
- Since Comcast is already providing some fiber access to the City, implementing this option will be the least disruptive of the three options.
- Increasing the bandwidth capacity can be done through equipment upgrades as part the of the normal equipment replacement cycle.
- Equipment can be leased which allows cost to become part of the operating budget and ensures regular equipment replacement.
- Basic 24/7 network monitoring could be negotiated.

Disadvantages:

The disadvantages of this approach include:

- Comcast has only offered a conceptual network design and will not offer a detailed network design until September 1, 2012 at the earliest. As a practical matter, given the time constraints facing the County, this would mean that the City would have to commit to Comcast before it actually knows the system capabilities. Further, the final network design could change the quoted price.
- Comcast's proposal is for 10 years. After 10 years the pricing model for the next 10 years changes to a cost-per-mile option and would need to be negotiated at that time. The number of miles cannot be determined until the final network design is in place.
- If state and federal cable franchising laws change, the availability of the I-Net, or its price could be affected.
- Comcast restricts the permitted use of the network to only City purposes.
- Fiber plant would be primarily aerial and vulnerable to weather damage.
- Maintains the status quo of fiber optic vendor availability in the City of Saint Paul/Ramsey County.

RECOMMENDATION:

In the opinion of the FRC, the option that best fits the City's need for a long-term, scalable WAN solution is to lease dark fiber from Ramsey County. While this option is not the least expensive of the options presented for 10 years, the FRC feels it is the option that is in the best interests of the City for the following reasons:

- It takes advantage of what may be a one-time opportunity to obtain control of fiber for decades at a cost considerably lower than the cost of building a standalone network.
- It is the option that provides the longest term commitment and therefore ensures the longest term stability.
- It is the option that offers the City the most flexibility for long-term inter-governmental cooperation and service sharing, including valuable back-haul for expanding public safety wireless networks and inter-agency connectivity for the new 911 CAD system, and it segregates public safety network traffic from commercial infrastructure.
- The network design offers the greatest degree of redundancy and ease of expansion.
- This option brings with it significant community benefits and economic development opportunities by expanding the availability of fiber options throughout City of Saint Paul/Ramsey County through Minnesota Fiber Exchange. *Note: The City will not determine or participate in providing fiber or telecommunication services to the private sector.*
- The County design is simple and clear, and the City will be able to access the amount of fiber it believes it needs immediately and for the future; the other alternatives limit the fiber available to the City.
- Increases government operational efficiencies and reduces redundancy through shared services with the County.

A more detailed comparison of the options is provided in Attachment A - Comparison of the Comcast, County and Managed Service Network Options as Pertaining to the City of Saint Paul. A comparison of the estimated yearly costs to operate each option is included as Attachment B - INet Cost Comparison: 3 Options

An approval of this recommendation would allow staff to enter into contract negotiations with Ramsey County for a dark fiber lease. The resolution would also affirm the City's commitment to the project while more detailed contract negotiations are conducted. It is anticipated that an upgrade of the I-Net would no longer be an issue for the franchise renewal.

Ramsey County needs to know soon if the City of Saint Paul is participating in the project since Ramsey County has already approved bonding for its portion of the network and is working on a construction contract at this time.

Funding for this project is moving through the City's 2013 budget process as an above base request, and the funding request is based on the County option, if the County option is not selected; a modification to that request will be needed.