

Fiber Antics: Practical Lessons in Building a Municipal Fiber Optic Network

August E. Grant, Ph.D. & Lon Berquist



Dr. August E. Grant is Associate Professor of Communication Technology and Policy in the Department of Radio-Television-Film at the University of Texas at Austin. Having earned an M.A. from the University of Florida and a Ph.D. from the University of Southern California, Dr. Grant is a broadcaster-turned-academic, with an interest in the evolution of mass media and their audiences. His publications and research deal with theoretical approaches to studying communication

technologies and their adoption and impact on individuals and society. Specializing in audience behavior and new communication technologies, he also serves as a consultant to various media organizations.



Mr. Lon Berquist is a doctoral candidate studying Communication Technology and Policy at the University of Texas at Austin. He is a Research Associate for the IC2 Institute and the Texas Telecommunications Policy Institute. He has worked for the City of Austin's Office of Cable and Regulatory Affairs, Stanford University's Networking and Communications Systems, and Viacom Cable. He received his M.A. from Stanford University.

As a variety of telecommunication firms are seeking to re-wire cities with fiber optics and other advanced telecommunications networks, many are finding a new player in telecommunications competition—city government. Many cities have realized the potential of these new networks for economic development, telecommunications competition, and city image.

One such city is Austin, Texas, which spent two years in the process of selecting a company to construct an advanced network passing every home, business, and institution in the city.¹ This article will attempt to draw lessons from that experience that may be useful to companies wishing to work with city government on telecommunications networks.

The City of Austin RFSP

On April 11, 1996, the city council of Austin, Texas voted to negotiate a franchise agreement with CSW Communications for CSW to build a hybrid fiber/coax (HFC) network to interconnect all homes, businesses, and institutions in the city. This vote was the latest step in a two-year process of selecting a company to build a broadband network to provide telephone, cable TV, digital video, and digital data services.

The process began with a "Request for Information" (RFI) issued by the city in June 1994. The RFI was designed to measure the feasibility of such a network and the level of interest on the part of potential contractors, service providers, and citizens of Austin. A total of 34 responses were received from prospective users, incumbent telecommunications providers, competitive access providers, telecommuni-

cations consultants, vendors offering specific products, and prospective network providers.

A committee consisting of private citizens, telecom experts, and city staff from the cable and regulatory services department and the municipal utility department met approximately every two weeks over a three-month period to review and discuss the responses. The responses clearly indicated to the committee that the technology was feasible and that interest in the network was strong enough for the city to move forward to solicit specific proposals for operation of the network.

The committee's final report to the city council, issued October 25, 1994, recommended that the city issue a "Request for Strategic Partners for Telecommunications Infrastructure" (RFSP) for a public/private partnership to implement an advanced telecommunications network. Five specific areas were identified as key factors in the RFSP:

- Extent of the city's contribution to the partnership.
- Timing.
- Costs.
- Financing.
- Management of the proposed network.

In response to the RFI Committee Report and based upon the information it contained, the city council authorized the committee to prepare the RFSP. It was issued March 7, 1995, and listed four policy objectives for the network—an open platform, abundant bandwidth, universal availability, and low environmental impact.

The least ambiguous of these objectives was that the network should be an open platform, with any potential service provider able to secure access to the network. The desire for "abundant bandwidth" was more problematic, as no one had a firm idea of exactly what the bandwidth requirements would be since no such network had ever been constructed. The "universal availability" objective later proved to be one of the most important distinguishing factors among the proposals received.

The least obvious objective, "low environmental impact," was the least apparent to those not familiar with the basic city services. Concern over environmental matters predominates a great deal of city debate, but this item also represented a much more basic idea: City streets should not be disturbed more than once for construction of this type of network. In addition to creating traffic problems, the "street cuts"

normally used to install utility systems, including networks of the type proposed, can cut the life of a stretch of pavement by up to 50%. Hence, if multiple networks were to be constructed with each providing a separate service, the damage to one of the most important city resources, its streets, could be incalculable.

The RFSP also set forth following five goals:

- (1) *Competition*—The city intends to stimulate competition by making capacity available to service and information providers. They may enter the market more easily by not having to bear the costs of building their own transport facility. A single open network allows more providers to offer more services at lower cost.
- (2) *Economic Development*—A first-class telecommunications infrastructure is a necessity in the emerging information economy. An advanced public telecommunications facility will serve existing businesses and promote new ones throughout the Austin area.
- (3) *Asset Management*—By having a common public telecommunications facility, scarce rights-of-way can be used optimally, redundant infrastructure avoided, and disruptions and public costs due to construction minimized.
- (4) *Advanced Telecommunications*—The city seeks a public switched digital broadband network that supports two-way voice, data, video, and multimedia communications.
- (5) *Partnership*—The city prefers to form a strategic partnership with private enterprises. The city brings significant contributions to the enterprise and prefers a role with a greater degree of proprietorship than the traditional franchise arrangement. At the same time, the city prefers to limit additional public debt or risks to the taxpayers.²

One additional goal was stated elsewhere in the proposal. The city-owned utility had been involved in all stages of this process to spur the inclusion of utility applications in the network. In addition to remote meter reading, the utility was interested in using the network to implement "demand side management" (DSM), a system allowing the utility to charge different electric rates at different times. The key objective of DSM is allowing utility customers to shift usage from peak hours to non-peak hours, thereby reducing the generating capacity needed from the city-owned generating plants. (Utilities are typically required to

provide 110% of peak demand, leaving a great deal of capacity idle most of the day.³⁾

Twelve firms responded in whole or in part to the RFSP (see Table 1). Six of the proposals involved only a portion of the network or the equipment needed to construct the network, but the other six contained specific proposals for construction, financing, and operation of a network. The least comprehensive proposal consisted of a comparatively simple fiber backbone costing a few million dollars, and the most comprehensive proposal envisioned a complete fiber network that provided a fiber-optic circuit to every home, business, and institution in the city at a proposed cost of over half a billion dollars.

Table 1
RFSP Respondents

American Interactive	St. Petersburg, FL
CellNet Data Systems	San Carlos, CA
Central & South West Communications	Dallas, TX
Digital Equipment Corporation	Maynard, MA
Fincher, Inc.	Austin, TX
FNT Fibernet International Services Group	Tempe, AZ
Honeywell DMC Services, Inc.	Chelsea, MA
Industrial Construction Services, Inc.	Westminister, CO
InfoStructure	Menlo Park, CA
KCI Long Distance	Syracuse, NY
MCI Metro	Richardson, TX
SpectraNet International	San Diego, CA

Source: Grant & Berquist

In addition to significant differences in network architecture, the proposals also encompassed a range of plans for financing and operating the network. The financing proposals ranged from complete private financing and ownership of the network to complete city financing using tax-free municipal bond packages. There was much less variance in the proposed management schemes, with most of the network providers proposing to manage both construction and operation of the network. (The most optimistic proposals called for the proposing entity to sell equipment to itself at a significant markup, charge a management fee for operating the network, and receive a portion of the revenues from the network as well!)

Following an initial review of all proposals, the committee (now renamed the RFSP Committee) invited

each of the respondents to come in and answer specific questions about their proposals. The committee had been scheduled to complete its review and recommend one or more proposal for further consideration before the end of September, but, by that time, the committee had only managed to narrow the list of proposals to four (because two of the proposers had removed themselves from consideration). Over the next five months, the committee continued to review the proposals and meet with the remaining contenders to determine which proposed system could best meet the city's goals.

Throughout the process, the committee deliberated the merits of different network architectures, business plans, financing arrangements, and timetables. No aspect received as much attention as the degree to which the city would be involved in the day-to-day ownership and management of the network. On the one hand, city ownership or oversight of the network could ensure the goals of openness and universal access, but it would require a city with an already high bond debt to take on a financial obligation almost equal to the city's biggest project to date, a new airport (with a cost estimated at just under half a billion dollars).

The turning point in the debate may have occurred in October 1995, when city voters were asked to approve \$10 million in bonds to fund half of the construction cost of a new baseball stadium for a minor-league baseball team that wanted to relocate to Austin. Technically, the bonds were "certificates of obligation" which could be repaid only with revenues from the stadium, but voters overwhelmingly rejected the bonds in a vote that many termed a referendum on financial responsibility by the city council.

Although many members of the committee seemed to prefer city ownership of the network, that level of involvement was accompanied by the need for financing the network with tax-free municipal bonds. Committee deliberations kept returning to the same point—voters were unlikely to approve bonds for a telecommunications network, and any such proposal would consign the proposed network to failure.

Another important factor was the passage in 1995 of a bill by the state legislature prohibiting municipal "direct or indirect" involvement in the provision of telecommunications services. The bill was shaky on constitutional grounds, and the federal Telecommunications Act of 1996 seemed to preempt the legislation, but committee members knew that a legal battle would be needed in order to have the law declared invalid.

The committee was therefore faced with the question of whether the time and expense of mounting such a legal challenge would delay or derail the network.

Ultimately, the committee met in March to make a final decision on which of the four remaining providers would be recommended for further negotiation with the city. Each provider was rated in three areas: technical aspects, business plan, and viability and experience. No proposal received a perfect score, and CSW Communications received the highest score.

Following the vote, the committee prepared a complete report on its activities, including the recommendation of CSW to build the network. (The complete text of the report is available on the Internet at <http://coa2.ci.austin.tx.us/finance/rfsprptw.htm>.) The recommendation was made public March 26, 1996 at a meeting of the city council's Telecommunications Subcommittee, which voted unanimously to recommend that the full council approve negotiations with CSW at its April 11 meeting.

Lessons from the Austin Experience

The Goals of a City Aren't the Same as for Industry

Notably absent from the four "policy objectives" and nine "goals" mentioned above was any mention of profit or revenue. Instead, the list included environmental impact, open access, and economic development. Perhaps the most important lesson to be drawn from these goals is that the criteria used by a municipality to evaluate a proposed network is quite different from the criteria used in private industry.

We expect that the specific set of goals, however, will vary by city. The presence of a strong environmental movement in Austin mandated the inclusion of environmental concerns, and the political traditions of the city made open access more important than the provision of competition to the incumbent telephone and cable television companies.

City Resources

A municipal government has some unique resources that can either facilitate or impede construction of a city-wide broadband network. These include the city's control over rights-of-way, its power to pass ordinances, and its ability to issue tax-free bonds to finance such a project. In addition, many city governments also operate the local electric utility, giving them an additional reason to pursue construction of a fiber-optic network. For the city of Austin, the city-owned

electric utility played a major role throughout the process.

As Steve Rivkin has discussed, electric utilities are making increased use of demand-side-management, by which the peak load of the utility is reduced by offering customers an incentive to shift usage of electricity from peak to non-peak times.⁴ In order to implement DSM, a utility must have a communications link (wired or wireless) with its customers to literally control appliances such as air conditioners and hot water heaters, turning them down or off as demand for electricity rises. Because peak demand is usually more than twice the average demand for electricity, and electric utilities must build power plants sufficient to serve peak demand (or buy expensive power from other utilities during peak demand), a successful DSM program can lower the peak and eliminate the need to build new generating facilities, thereby saving up to a quarter of a billion dollars—or more.

In Austin's case, a broadband network was seen as a means of providing a two-way link to customers, allowing remote meter reading and DSM.

Any city which owns its own utility will own the utility poles that must be used for wiring a community. Furthermore, the city controls access to streets, under which most networks will need to run conduit or cables. Despite the deregulation touted in the Telecommunications Act of 1996, the bill affirms the authority of local government to charge telecommunications companies fair and reasonable compensation for the use of those rights-of-way.⁵

A city can make it easy or difficult for a firm to construct a network through its power to regulate construction in addition to its control over rights-of-way. Use of this resource to inhibit construction of a network is not likely to be fruitful, but a city can use this resource as an enabling tool, making the process of obtaining permits or getting access to rights-of-way easier for itself or the provider that seeks to help a city achieve municipal goals related to competition, openness, environmental impact, or universal service. However, the Telecommunications Act makes it difficult for a city to make demands so onerous such that they might prohibit a business from providing telecommunications services.

Although potentially risky politically, a public/private partnership offers opportunities for funding construction through tax-free municipal bonds. Given the enormous expense of constructing and financing an advanced telecommunications network, this financ-

ing option should be considered in developing a business plan.

Most important, many cities have existing fiber-optic networks constructed for internal use that can be utilized for a portion of the backbone of a new network, reducing the upfront costs of building the network. Additionally, the municipal government is likely one of the largest customers of telephone service in a city. Commitment of the city's business will ensure a minimal level of business.

Big Questions to Answer

In proposing a broadband municipal network, a company must address a number of fundamental issues that will affect virtually every section of the proposal. The following considerations were most important in the Austin deliberations.

Who Will Own and Operate the Network?

The biggest question which must be addressed by a city seeking construction of a municipal broadband network is the type of business relationship, which can range from complete city ownership and operation to completely private ownership and operation, with a range of possibilities in between. The answer to this question will affect almost every area of the network, from financing and services provided to the construction schedule.

The majority of proposals for the city of Austin assumed that the city would finance and own the network, taking advantage of the city's ability to issue tax-free bonds. Many of these proposals provided detailed analyses of the potential "profits" that would accrue to the city once the network was fully operational. These potential rewards are not without risk, however, and the tone of most proposals seemed oblivious to the fact that the city government was much less concerned with making money for the city than with providing services and minimizing the risk to taxpayers. Ultimately, the deciding factor was baseball (discussed later).

Degree of Openness

Openness has to do not only with having an open platform and abundant bandwidth, but with the ability and willingness to provide access to all potential businesses wanting to serve the community. The reality of business, however, may require some exclusive arrangements with anchor tenants to ensure

some long-term stability among the service providers on the network.

Other Considerations

In addition to those discussed above, the city of Austin experience offers a number of other important lessons for companies eager to build or operate municipal fiber-optic networks. Many of these could be applied to almost any network, but a few of these are unique to dealings with municipal governments.

Public Records Considerations

One of the biggest differences between negotiating with a government entity rather than a private entity is the fact that almost every level of government allows a much greater degree of access to any information which may be deemed of public record. The first consideration is how to protect proprietary information. Any such information should be labeled as "Confidential and Proprietary," and care should be taken to ensure the degree to which the city can keep this information confidential. In Austin, the local daily newspaper unsuccessfully sued the city under the open records act in an attempt to get access to the confidential proposal that was ultimately accepted by the city.

Partnering with Other Telecommunications Businesses

There are obvious advantages for one firm to partner with another firm that might bring additional (or superior) technical, financial, or management resources. A company that complements your strengths makes for a stronger proposal. Additionally, firms locally connected to the community provide the opportunity for local knowledge and the potential for a local office. Depending on the city proposal requirements, partnering with minority and small business contacts can provide a significant advantage.

Partnering of Competing Applicants

One of the most difficult challenges in reviewing competing proposals was the fact that each proposal had at least one advantage over all the others. Some proposals were complementary enough that city staff actually reminded the companies involved that they could combine their proposals into a single effort. Although none of the companies which proposed systems in Austin chose this route, it is an important one to consider as it increases the likelihood of a

company earning at least part of the system, at the cost of giving up a substantial proportion of the potential revenue.

Confusion of Projections with Promises in Revenue and Sales

By far, the most disappointing aspect of the proposals reviewed by the committee was the liberal use of overly optimistic sales and revenue projections. Some of these would have been more believable with supporting information, but others appeared to be “pie-in-the-sky” projections with little or no basis in fact.

The most problematic aspect of these overly-optimistic projections was not the fact that they were included, but that they were sometimes then used to promise substantial revenue to the city over and above the cost of building and operating the network. The lack of credibility of these projections thus had an important effect upon the evaluation of some specific proposals.

Consistency of Replies

One of the more amusing factors for some members of the committee was an overzealous attempt by some proposers to always give a positive response to questions posed by city staff and committee members. Because many committee members had distinctly different perspectives and goals for the network, it was impossible for anyone to please every single committee member. Those who tried to do so sometimes ended up contradicting themselves, leading to long committee discussions about what the proposer really meant when answering the questions, lowering the credibility of the proposal. Our recommendation is that, above all else, information and responses to questions should be consistent, without regard to whether one or more committee members will be disappointed by a negative response. Our perspective is that a proposal can be damaged much more severely if the proposers are seen as telling the committee whatever they want to hear.

Flexibility—and Baseball

The need to remain consistent does not mean that there won't be a time when it would be prudent to revise one or more major aspects of a proposal. The best example of this need for flexibility is an election that took place midway through the RFSP process. Austin, which at the time had no professional sports

teams, was offered a triple-A baseball franchise if the city would help finance construction of a baseball stadium through certificates of obligation. A group of taxpayers who were opposed to any city involvement in the financing of the stadium forced a referendum, and voters overwhelmingly rejected the \$10 million in bonds.

At the same time, some groups were proposing that Austin provide up to \$500 million in public financing of the network to take advantage of the city's capability to issue tax-free bonds to finance construction. A major item of discussion among members of the RFSP review committee was whether the same voters who rejected \$10 million in stadium financing would allow the city to issue up to half a billion dollars in bonds to finance construction of the network. (It should be noted that the city had just commenced construction of a new airport at a projected cost of just under half a billion dollars, but that it took three referendums over five years for voters to approve the project.)

There are two lessons to the baseball story. The first is the need to remain flexible and be able to respond to a changing environment throughout the process. The second is the need to know the city and direction of the political winds—in our opinion, there is no way that residents of the city would have allowed the city to finance construction of the network. Indeed, the failure of the baseball referendum provided a perfect means for the incumbent communications network providers in the city to rouse public outcry against a new network, preempting their potential new competitor.

Understand the Political Process

An important variable to understand when working with any city government is the degree to which decision-making power is split between elected officials and city staff. Austin's city manager form of government severely limited the role of elected officials in the review process, although they had the final say in the selection process. Virtually all review was handled by city staff and the RFSP committee without involvement by the mayor or city council members.

In other cities, elected officials may play a more prominent role than city staff. It is important to fully understand the structure of the municipality and the relative decision-making power of staff, appointed citizens, and elected officials.

A Curious Non-Response

Throughout the process, the committee expected that the strongest opposition to the new network would come from the incumbent network providers, Southwestern Bell and Austin Cablevision, both of which had indicated plans to construct their own broadband networks. Instead of presenting their proposed networks as options, they chose to question or oppose the RFSP process, leaving the city with two fewer options. The degree of acrimony in previous relations with each of the incumbents made it less likely that either would be chosen, but their decision to abstain from the process precluded an opportunity to work with the city or remain involved as the process moved forward.

Know Your Audience

Make sure your proposal is readable by the average citizen, with simple and concise explanations. For every expert who thoroughly understands the technology, services, or business plan, there will likely be two to four more who have only basic knowledge. Overly complex and technical explanations are best left for attachments or appendices, with the main body of the proposal explaining each area in the simplest terms.

Conclusions

The lessons offered by the city of Austin experience clearly indicate that the unique nature of municipal governments and of each individual city be considered when proposing broadband municipal networks. Careful consideration of the factors will not only increase the probability of success of a proposal, but should also result in a proposal that is better for residents of the city.

There is an immense opportunity to construct municipal fiber-optic networks in the United States. In addition to providing new services and competition for existing telecommunications providers, city involvement in construction of these new networks can allow a company access to important city resources that can help expedite or fund a new network. Each one of the hundreds of cities in the United States represents a unique business opportunity, and it is likely that the number of cities interested in constructing broadband municipal networks will increase exponentially over the next five years.

In the process of putting together proposals, it is important to learn from the experiences of other cities.

The first networks to be contracted are just now being built, but, by the end of 1997, there will be more than a dozen stories which can be studied to provide insight similar to that offered in this article.

Our final piece of advice relates to the unique character of each city. It is not enough to simply attempt to apply lessons from other cities; it is just as important to get to know a city before making a proposal. Unique characteristics of each city will suggest ways to customize a proposed network (or the proposal itself) for the mutual benefit of the proposer and the city. **NTQ**

¹ Lon Berquist and August E. Grant, *Exploring the Municipal Information Infrastructure*, paper presented to the annual convention of the Broadcast Education Association, Las Vegas (April 1996).

² City of Austin, *Request for Strategic Partners for Telecommunications Infrastructure* (1995), p. 8.

³ Richard Cville, "Building Community Communications Infrastructure," *New Telecom Quarterly*, Vol. 2, No. 2 (May 1994):20-27; and Steven R. Rivkin, "Positioning the Electric Utility to Build the Information Infrastructure," *New Telecom Quarterly*, Vol. 3, No. 2 (May 1995):30-33.

⁴ See Steven R. Rivkin, "Positioning the Electric Utility to Build the Information Infrastructure"; Steven R. Rivkin, "If Competition Won't Build the NII, Utility Partnerships Will," *New Telecom Quarterly*, Vol. 4, No. 3 (August 1996):19-23; and Steven R. Rivkin, "Electric Utilities Will Build Telecom Infrastructure," *New Telecom Quarterly*, Vol. 2, No. 2 (May 1994):15-19.

⁵ League of Cities, *The Telecommunications Act of 1996: What it Means to Local Government* (1996).