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NETWORK NYC

Building the Broadband City

The Council
of
The City of New
York

Hon. Gifford Miller,
Speaker

A Staff Report To:

The Select Committee
on Technology in
Government

Hon. Gale A. Brewer,
Chair

Thanks and Acknowledgements

On December 10, 2002, the Select Committee on Technology in Government and the Subcommittee on Small Business, Retail, and Emerging Industries held a joint hearing entitled, "Municipal Broadband Policy and its Relationship to Small Business and Community-Based Development." The hearing was truly the culmination of two years of work by Council Staff, technologists, and community advocates who have long been interested in exploiting emerging technologies for a broad range of public policy goals. Several of the major broadband franchise holders in New York City testified, including Verizon Communications (which does not hold a City franchise), ConEd Communications, Metromedia Fiber Networks, Time Warner Telecom, and AT&T Teleport, among others. These companies were joined at the hearing by the President of Canada's educational research network, Bill St. Arnaud, representatives of independent Internet service providers, telecom watchdog groups, and several advocates for community networking initiatives.

The document that follows should be viewed as the direct result of both the December hearing as well as the input of numerous public policy figures, educational institutions, community members, vendors, and elected officials who contributed to the effort below through a series of working group meetings between January and March of 2003.

Special thanks should be given to Anthony Townsend at New York University's Taub Urban Research Center, Franklin Madison at the Industrial Technology Assistance Corporation, the staff and leadership of the New York State Educational Research Network, Bruce Lincoln at the Institute for Learning Technologies, the Public Libraries of New York City, the staff and Commissioner of the Department of Information Technology and Telecommunications, Avi Duvdevani at the New York City Housing Authority, and especially Janet Torres, Senior Advisor to the Chief of Staff at the New York City Council, whose work on the issue of municipal telecommunications policy enabled the vision statement that follows.

Finally, critical research assistance and design support was provided by Jason Mendelson and Jena Min who both deserve unending credit for their ability to extract critical information from governments of all shapes and sizes.

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At over $130 million in annual expenditures, the City of New York is the largest municipal buyer of telecommunications goods and services in the United States. Despite this fact, and despite our increasing reliance on telecommunications networks for the delivery of critical government services, the City has never published a comprehensive, long-range vision statement for our telecommunications infrastructure.[1] And although the City's Department of Information Technology and Telecommunications (DoITT) manages the franchise agreements for 21 separate fiber-optic companies – more companies holding more high-capacity metropolitan fiber than in any other city – and, additionally, holds a portfolio of over 2,200 municipal rooftops potentially ripe for wireless deployments, there has been little public discussion or long-term strategic thinking about how the City could better organize this public and private infrastructure to encourage a truly citywide deployment of affordable, high speed networking capacity.[2]

Lack of Competition in Telecom Procurement Costs New York City $$$

Most immediately, in light of our current *and future* budget crises, the City has apparently not attempted to join the existence of a relatively competitive and robust telecom market in New York City to its massive buying power of such services in a concerted attempt to save money.

Indeed, for several years, the New York City Comptroller's Office has written to DoITT expressing their concern over the $96 million sole source contract annually "awarded" to our City's Incumbent Local Exchange Carrier (ILEC) – Verizon. Without competition, and with Verizon's lock on 75% of the City's telecom bill, the Comptroller's Office repeatedly has asked a basic question: how can New York City be assured that it is getting the best telecom rates and service if it is not soliciting multiple bids in a rigorous, open market process? While DoITT has, on at least two occasions, responded by saying that Verizon's "…performance is being evaluated as we move forward with plans to increase competition in a careful and controlled manner,[3]" that crucial competitive element has simply not been forthcoming to date. As a consequence, the City would appear to be missing out on the substantial cost savings associated with a truly competitive telecom marketplace - savings that other cities, states, countries, and institutions are now benefiting from in these difficult fiscal times.

Fractured Telecom Planning Inhibits Cost Saving Efforts

While some consolidation has been achieved through Verizon citywide billing, albeit through a non-competitive process, the City's non-Verizon telecom expenditures (25% of the total) remain fractured between City agencies – a fact that further hurts the City's ability to save

[1]Credit should be given to David Ross, whose 1998 address at NYU's Taub Urban Research Center entitled, "Telecommunications Regulation: A Need for Coordination," provided an early voice for long-term, strategic telecom planning by New York City.

[2] It is important to note that DoITT is not charged with a wider community technology or telecommunications focus. Unlike the City of Seattle, where community input, representation, and strategizing is a formal part of the telecommunications agency's process, New York City's DoITT does not have such requirements and therefore has not engaged in substantial community network planning – despite the vast potential to do so.

[3] Letter from the Office of the Comptroller to DoITT, July 30, 2002.

money on its telecom bill. Thus, even as DoITT works to secure discounted Verizon telephone rates for the formerly independent Department of Education (DOE), the full power of New York City's presence in the local telecom market – spanning voice, data, and video services – is still yet to be realized. As but one indication of this, several agencies – most notably the Human Resources Administration (HRA), the New York City Housing Authority (NYCHA), and the Department of Transportation (DOT) – have all initiated separate efforts to procure their own dedicated fiber services even though a coordinated effort would undoubtedly prevent duplication, maximize long-term savings, and thus provide a more effective case for any multi-million dollar capital investment.

Interestingly, this disconnect stands in sharp contrast to the centralization of *technology* procurement under DoITT that has occurred, to the City's financial benefit, within the past five years[4]. Without similar centralization and foresight in the realm of telecom, the City not only misses out on the greater economies of scale that come from a unified buying block, it also fails to efficiently allocate pre-existing telecom resources across separate agencies. A prime example of this more immediate lack of coordination is provided by DOT, which dedicates one entire fiber optic strand to each of its approximately 40 traffic cameras that stream arterial imagery from across the City on NYC.GOV.[5] Although each fiber strand could conceivably carry data for multiple agency operations far in excess of what one camera transmits, and although DoITT has made it known that the City's own fiber resources are, unfortunately, stretched to capacity, DOT, operating apart from DoITT's needs and prerogatives, simply does not see a need to buy the necessary electronic equipment that could quickly increase the data capacity of each fiber strand. And of course, without central direction, DOT's decision makes perfect sense: why should an agency take on the added cost of procuring pricey electronic equipment when their own individual agency bandwidth needs are being met (at least for the time being anyway)?

All of which is not to say that DoITT is not aggressively seeking to cut the City's telecom bill and exploit opportunities for synergy. In fact, under the leadership of Commissioner Gino Menchini, DoITT secured a unique rebate for voice services totaling almost $4.5 million in FY2004 from Verizon[6] and is projecting $200,000 in savings in FY2004 by eliminating unused voice and data lines. Annual audits of Verizon's billings have produced additional millions in savings and, as noted above, DoITT has begun the process of linking DOE, whose $30 million in

[4] On October 6, 1998, New York City Mayor Rudy Giuliani signed Executive Order No. 43 entitled, "The Establishment of the City of New York Technology Steering Committee." Among other directives, the Order required that, "the annual technology plans of all mayoral agencies shall be submitted by each agency to the Committee on such date as the Committee shall determine, and in accordance with guidelines prescribed by the Committee." The Order further stipulates that the Technology Steering Committee (created by the same Order) "must approve all annual technology plans of all mayoral agencies, including their plans for the procurement and deployment of major technology initiatives.… Approved agency reports will be published at the beginning of each fiscal year as an annual addendum to the City's Technology Strategy [a document additionally required by the Order and published once in March 1999]." As a specific example of the cost savings that have stemmed from the coordination of technology procurement, DoITT plans to save the City $2.5 million in FY2004 by consolidating several agency data centers at the Department's downtown Brooklyn headquarters.

[5] On July 26, 2002, the Select Committee on Technology in Government toured DOT's Traffic Management facility in Long Island City, Queens.

[6] Verizon offers a rebate for customers who bill annually in excess of $80 million. In 2002, only JP Morgan and New York City received the rebate.

annual telecom expenditures is second only to DoITT's $91 million, to the Verizon Citywide billing program that offers agencies "favorable" rates for a variety of telecom services.

The Old Telecom Model: Pay More for More Bandwidth

Despite various cost-cutting measures, between FY1996 (the year that DoITT was established) and FY2002 the City's partial telecommunications bill – i.e. just for DoITT covered agencies – rose from $60 million in FY1996 to $91 million in FY2002 – a 50% increase. Over that same period of time, DoITT reported year after year in the Mayor's Management Report, that the City's bandwidth needs were increasing exponentially.[7] In FY2002 alone, DoITT reported that its data carrying capacity would soon increase from 100 megabits (100 million bytes) per second to one gigabit (1 billion bytes) per second – a dramatic increase in capacity over a short amount of time, predicated on the ever greater size of City data communications.

These two trends – increasing bandwidth needs on the one hand, matched with increasing expenditures for bandwidth on the other hand – follow, with remarkable proportion, the standard pricing model that one expects in the procurement of telecommunications services from the incumbent telecom company. Indeed, with more than 75% of the City telecom bill currently served by Verizon, it is little wonder that we are overwhelmingly locked into a rate schedule which, at its root, *means that the City will pay more to get more bandwidth*. Thus, when an agency like NYCHA needs to upgrade its bandwidth at a given agency site in order to adequately send data to its remote data center, NYCHA has to pay incrementally more for the bandwidth upgrade – from a full T-1[8] circuit costing approximately $900 per month to a T-3 circuit costing $4,500 per month, for example. (One should note here, as well, that as an added burden, the necessary circuit upgrade may also take weeks or, in some cases, months to properly install.)

Fiber & Wireless Technologies Enable Radically New Public Telecom Approaches

Rudely disrupting the near monopoly power from which ILECs across the country have benefited for decades, recent advances in wireless and fiber optic technologies, combined with regulatory changes precipitated by the landmark Telecommunications Act of 1996 (TCA), have made several alternative infrastructure models not only possible but extremely attractive to large buyers of telecom services like municipalities, states, and private sector companies. At the forefront of this paradigm shift in the telecom marketplace, cities like Chicago, States like Pennsylvania, Provinces such as Quebec, and non-profit educational networks such as the New York State Educational Research Network (NYSERNET) have all extensively examined and are now effecting major structural overhauls in how government and universities can and should

[7] "Bandwidth" is the rate at which information can be transported over a communications system. High bandwidth, or broadband, is intended to mean that the communications medium can support information transfer to, and from, the connected computer in the multi megabit per second range. This is the minimal rate required for good quality visual communications, or to be a content provider on the Internet. While the earliest Internet backbones carried only 56 kilobits per second, a single fiber optic strand can support tens or even hundreds of simultaneous wavelengths each operating at 1 billion bits per second. In short, current optical solutions can provide nearly unlimited data transfer capacity across very long distances over relatively inexpensive optical fibers.

[8] T1 lines allow up to 1.5 megabits per second two-way data transmission and therefore are adequate for many small and some medium sized bandwidth users. DSL and Cable Modem transmission rates typically approach speeds below T-1 lines but are several times faster than dial-up connections.

think holistically about the long-term intersection of telecom, public infrastructure, and public spending.

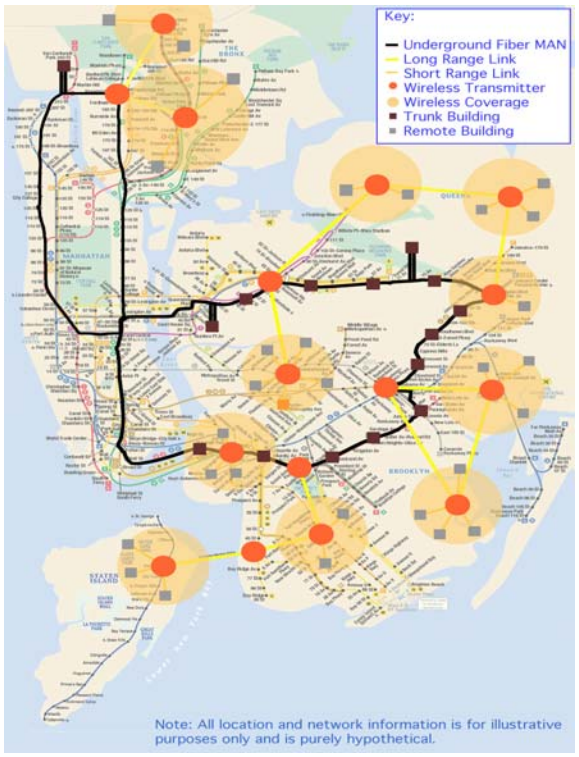
And indeed, with the rapidly unfolding maturation of wireless and fiber optic technologies, in particular, a glut of fiber optics lines leftover from the telecom bubble,[9] and a series of increasingly competitive ownership and leasing arrangements for both fiber and wireless, a wide range of buyers is increasingly obtaining network pricing that can significantly reduce current and future telecom costs – even as their demands for such services mount. Accordingly, these developments have had a significant impact on the traditional telecom arrangements that cities and private enterprises have found themselves locked into for over a century. For example, with high-capacity wireless links, it is now possible to transmit data up to thirty miles, with lines of sight, in bad weather and at speeds that can reach hundreds of megabits per second – all while avoiding the hundreds of thousands of dollars (not to mention recurring rental costs) that it can take to lay telecom lines in the streets or in a city's conduit system.[10] As such, wireless links can serve as a highly efficient "last mile" or last hundred feet solution independent of the telephone company's network (and its charges) and free from the recurring costs that the City's main conduit system, the Verizon-owned Empire City Subway (ECS), charges fiber companies.

As a specific example of the potential cost savings that can result from this approach, in New York City, many neighborhoods have several municipal buildings clustered within a ten to twenty block radius (importantly, the municipal buildings often are also the tallest buildings in a given area). Typically, these firehouses, police precincts, high schools, elementary schools, parks department facilities, library branches, and job centers are all connected separately via the telephone companies network – each having multiple T-1 lines, for example, which incur monthly charges of anywhere between $400 and $1,200 dollars each. With secure, point to multi-point wireless last mile or last hundred feet links, however, the tallest municipal building in a given area can distribute bandwidth wirelessly to all the various municipal sites off of the one building's fiber backbone (the one building therefore becomes a Point of Presence – or POP – located on a fiber Metropolitan Area Network, as described in detail below).

[9] In the boom years leading up to 2002, telecommunications companies laid hundreds of thousands of miles of fiber-optic lines crisscrossing the country - and then many had to declare bankruptcy. One company, Level 3 Communications, which is not one of the bankrupt companies, has 16,000 miles of intercity optical-fiber capacity available for sale. According to a recent industry report, a mile of dark fiber that used to sell for $1,200 has sold, in some cases, for $200 or less since the telecom downturn, a significant savings since intercity networks may comprise several hundred to several thousand miles of fiber. "When these assets go on the market, it's literally pennies on the dollar," said Sterling Perrin, a research analyst with IDC, a technology-consulting company. Florence Olsen, "Lighting Up Dark Fiber," The Chronicle of Higher Education, March 14, 2003.

[10] Long-range wireless antennas that can serve as high-speed links over long distances are currently able to transmit data at speeds of between 1.25 and 2.5 gigabits per second. One industry option, currently in use by several large New York City businesses, offers a transmitter and receiver for approximately $50,000 – a number that does not include installation or maintenance costs.

Potential Fiber/Wireless Metropolitan Area Network



Significantly, with such an arrangement, data connectivity is secured without recurring monthly costs. Indeed, according to one industry estimate provided to the Select Committee, a nine building wireless POP arrangement (illustrated on the left) would only cost the City approximately $45,000 in one time capital expenditures and could be installed in a matter of days or even hours instead of the months which a fiber pull or a telephone company installation could take. As such, the costs of such a buildout would be fully recouped within the first few months of operation. Moreover, with such a network, even greater cost savings would be possible if the City were to consider delivering telephony, as well as data, over the wireless links, since (typically) underutilized *voice* T-1 lines could also then be eliminated.

Cost Savings Through Converged Networking

In industry parlance, such cascading consolidation is know as Converged Networking – a trend that has firmly taken root in the private sector and increasingly in the cash-strapped, newly competitive public sector market. Indeed, as of March 2003, five City agencies, including the Mayor's Office, the Department of Corrections, the Department of Sanitation, the Department of Education and the Economic Development Corporation, had already implemented an Internet Telephony (or Voice over Internet Protocols – VoIP) system for traditional voice services – a move which typifies the Converged Networking approach. By using the data networks that these agencies have procured to deliver Internet services (as one application example), but now using them for telephone service as well, voice, video, data, and Internet communications converge

into one network with multiple, scalable applications not currently available within the confines of the traditional telephone system.[11]

At its root then, Converged Networking avoids the redundant costs of multiple, separate circuits for voice, data, and Internet, and instead leverages the capacity – the bandwidth – of an agency's pre-existing Internet Protocol network that, in critical parts, avoid the so-called "local loop" tariffs charged by the ILEC for voice or data services. In the City of Houston's view, VoIP, as one part of the city's Converged Networking approach, will have the effect of reducing costs through the "streamlining [of multiple] operations… [,] the elimination of the stand alone telephone network, and reduced upgrades and maintenance costs associated with the legacy telephone equipment systems."[12] Although precise cost savings are not yet available for the five agencies currently operating VoIP in New York City, Houston plans to implement VoIP across 100% of City agencies later this year – with a payback on the capital outlay for VoIP equipment expected within this first year of operation and an annual savings of $4.2 million thereafter.[13] Given this information, the Select Committee estimates, in a forthcoming report entitled "Saving

[11] For example, VoIP allows users to construct web-based In-Boxes for email, voice messages, and faxes. Beyond the application potential, however, Converged Networking, and VoIP in particular, offer improved disaster recovery capabilities as well. Indeed, perhaps the most significant technology lesson learned after 9/11 was the greater durability and usefulness of the Internet compared to the traditional telephone network. According to Brian Cohen, a Deputy Commissioner of DoITT at the time, "We'd never thought we'd lose the phones. But when we lost the phones, we still had the Internet. IT became a whole new medium of communication." With cellular customers experiencing significant delays in the metro area on and after 9/11 and with 50,000 phone lines down on the desks of City employees that lasted, in some areas, for almost two months, many City operations, especially emergency services, were forced to turn to the World Wide Web, text-messaging, and the Internet as a whole for fast, reliable solutions to various communications and information management problems.

A significant reason for this, identified by municipal and private sector experts alike, lies in the basic architecture of the Internet. Unlike the copper-based, point-to-point configuration of the telephone network, the Internet breaks information, voice or data, into separate packets that are then carried to an address through multiple pathways. If one packet experiences a delay, it is re-routed through another, more efficient avenue. Once all the packets have arrived, the information is assembled and represented whole, as it was before it was sent. Through packet switching, information therefore becomes more "delay-tolerant," unlike a telephone communication that travels as a single entity from one point to another.

Not surprisingly then, almost immediately after 9/11, DoITT began to run voice communications through underground fiber-optic lines separate from Verizon's damaged system. By using the City's own fiber network (the Institutional Network) as well as fiber from various telecommunications providers (Time Warner Communications was one example), DoITT was able to circumvent Verizon's damaged network and deliver telephone service as well as data service over Internet Protocols. In fact, as DoITT quickly discovered, VoIP delivered multiple benefits over the traditional telephone network since: it allowed specific phone lines to move physical locations without necessitating new number assignments, it did not rely on a single line for communication, and "all-in-one" workstations (with voice and data on the same network) could be set up on one system. City Hall's phone service was thus effectively restored in three days with an Internet Telephony network that allowed staff members to plug in a phone to any Internet jack and maintain a constant number and voicemail no matter where the phone was sited (since the address, the IP number in effect, remained the same). With conventional telephony, such a process would have taken days and incurred significant additional costs. "No Time to Grieve," Darby Patterson, Government Technology, February 2002,; "Disaster Takes Its Toll on Public Network," Information Week, September 17, 2001, p. 96; "Challenges in Information Technology After 9/11," CATT Panel Summary, David Goodman,; "Officials Call for New Phones," Mark Binker, News and Record, March 16, 2002, p. B1; "Statement by Larissa Herda, President and CEO Time Warner Telecom," Federal Document Clearing House Congressional Testimony, March 6, 2002.

[12] See www.cityofhouston.gov.

[13] Select Committee staff interview with Houston's Chief Information Officer Richard Lewis, via telephone, April 8, 2003.

Money and Enhancing Revenue Through Information Technology and Telecommunications," that DoITT could save almost $11 million per year if it moved aggressively forward with VoIP across multiple City agencies.

The Backbone: a Fiber Metropolitan Area Network

Ultimately, cost savings, economies of scale, as well as the overall functionality, redundancy, and security of a truly converged network rests on the construction of a fiber optic backbone that can anchor multiple cost saving applications such as VoIP and wireless last mile links. Most importantly, such a fiber/wireless Metropolitan Area Network (fiber/wireless MAN):

1) avoids, to the greatest extent possible, the local tariffs charged by the ILEC – not only for voice services[14] but also for a wide range of data services currently carried by Verizon's T-1, T-3 and higher telecom lines; and,

2) depending on the ownership model that a city or institution chooses, a fiber/wireless MAN enables bandwidth costs to remain steady as bandwidth needs increase, even exponentially, over time. This result is due to the fact that the customer (can) own the fiber and thus all that is needed to upgrade transmission capacity, in contrast to T-1 lines for example, is electronic equipment or cards that can be quickly attached at the customer's premises to the customer's fiber. In short, with fiber optic technology, new lines need not be laid and new bandwidth charges need not accrues every time there is a need to increase bandwidth because the capacity of fiber-optic lines themselves can be increased infinitely to meet demand. (see footnote seven for discussion).

With a fiber/wireless MAN, however, two critical issues must be confronted by policy makers in order to determine the extent to which the above benefits can be realized: 1) how will the fiber portion of the network be paid for – a challenging question, to say the least, since laying a fiber MAN in a City such as New York would entail significant up front capital expenditures as well as recurring costs such as maintenance and (potentially) conduit fees; and 2) what kind of ownership model is most appropriate? Indeed, the two questions are really mutually reinforcing since the structure of any capital expenditures and/or recurring costs associated with a fiber/wireless MAN are directly related to the manner in which a City owns, or conversely, chooses to lease, either a preexisting fiber network that has excess capacity (known as a dark fiber[15] network) or a fiber/wireless network that must be newly extended. Thus, the type of

[14] Given the architecture of VoIP, the most significant cost savings for City agencies from such a deployment would undoubtedly stem from a fully connected fiber/wireless MAN since the majority of voice calls are between City agencies and therefore could entirely ride the "private" municipal network without incurring Verizon local loop charges.

[15] RISQ (Réseau d'Informations Scientifiques du Québec or the Quebec Scientific Information Network) defines dark fiber as "raw, unconnected optical fibre without any particular assigned function. Not being connected to any equipment, it is not 'lit up.' For specialists, this term evokes the unlimited possibilities of a private fibre optic network providing its owner three key benefits: Flexibility - The owner of an optical network has complete freedom to design its architecture and to choose transport technologies and the equipment installed at each end of the network. So the network owner can keep its own pace with technological change, without being affected by a telecommunications carrier's decisions. No limits can be imposed on usage or bandwidth. The owner has total control over all applications.… Scalability - An optical network can meet growing traffic requirements. The laser

ownership becomes the key to determining the extent of any potential short or long-term cost savings associated with fiber MANs.

Although, in practice, several variations exist, there are essentially two different ownership models available to New York City for building a fiber/wireless MAN. Of course, it should be said at the outset that, despite their different aspects, these two models, or a combination thereof, would undoubtedly save the City money on its future telecom bill – not only because of the intrinsic cost advantages over the current Incumbent model, but also, as stated in the opening, as a direct result of the increased competition for our municipal telecom needs.

Inevitably though, and despite such a pronouncement, the differences between the two approaches will necessarily be evaluated in the context of the current fiscal climate – a climate that makes any long-range infrastructure planning extremely difficult. As one example of this hard reality, NYPL recently pulled out of the New York City-based NYSERNet fiber project, described below, because of substantial cuts to its capital budget. While NYPL determined that Verizon could not affordably meet its future bandwidth needs, and that a further extension of its fiber network beyond its current network[16] would save the Library money over time, the capital funding was simply not there in the face of operational reductions and other immediate service cuts.

Given this predicament, the first model examined below (epitomized by Chicago and Pennsylvania) would seem to be the more attractive of the two models since it entails little or no capital expenditure while realizing immediate cost savings. However, as its caveat, this first approach would also entail incrementally increasing costs over time for increased bandwidth usage. In contrast, the other model (epitomized by NYSERNET, Quebec's RISQ,[17] and hundreds of universities, municipalities, companies and provinces across the world) entails substantial capital expense, relatively stable monthly costs and ultimately, long-term ownership of the data network through Indefeasible Right to Use Contracts (IRUs) – a 20 year agreement that gives a customer effective control over formerly "dark fiber" lines. Although in both models maintenance, network operation, electronic equipment, installation, and the applications that run over the fiber MAN (such as Internet Service) can all be outsourced to private companies, the second model more properly resembles a traditional public infrastructure model – akin to a City building a road and (potentially) operating and/or maintaining mass transit services over that road.

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technology that 'illuminates' optical fiber, and the high quality of today's fibre, make raw transfer speeds measured in Terabits per second feasible. Yet the capabilities of routers and user demands are still a long way from making such capacity necessary. Lifespan – It's estimated that today's optical fibres have a lifespan of 20 years. Even if manufacturing processes and laser technologies improve dramatically over the next few years, it's still the case that cables laid today will still be completely functional in 15 years. This represents a long enough useful life to amortize the investment before switching to a new technology."

[16] NYPL's private fiber network runs underground from the Schomburg library branch in Harlem to 60 Hudson Street in lower Manhattan.

[17] RISQ is the higher education and research network of Quebec that owns and operates a fiber-optics network of more than 4,300 kilometers (2,600 miles). RISQ's members are universities, colleges and educational institutions, as well as research institutes, cultural content providers, broadcasters and government agencies in Quebec. The organization's stated mission is to provide a high-speed, state-of-the-art telecommunications infrastructure, associated services, and access to a wide range of information sources to support the teaching and research objectives of its members.

Leasing Fiber/Deploying Wireless: The Chicago Model

The first model, the Chicago model, is illustrated by that city's ambitious CivicNet project – a three year old effort to completely redesign the municipal, business, and residential telecom network in Chicago by guaranteeing city telecom billing over a period of ten years. Currently in the final round of the procurement process, CivicNet is therefore designed to aggressively leverage the City's current telecom spending (estimated at $30 million annually for over 2,000 sites) and infrastructure (including preferential rights-of-way access, city owned fiber, and rooftops) to entice a private sector company to build out a unified fiber and wireless telecom network. According to Doug Power, the Director of the CivicNet Project, the contractual terms of the CivicNet project stipulate that 1) the City will incur no capital expenses and 2) its overall telecom bill will be reduced both from current and anticipated levels. Once in place, the City envisions that it may own parts of the network, but operations will fall on the private sector. And, as discussed in greater depth below, the City fully expects that the winning company would use the network, and the extra fiber the company would inevitably pull along with the municipal fiber, to competitively resell services to external businesses and residences currently facing few affordable broadband solutions[18].

Significantly, however, while parts of the network may be "owned" by the city, this model more closely follows a traditional lease model – Chicago therefore fully expects that as its bandwidth needs increase, so too will it see its recurring monthly charges increase. However, by packaging the entire city service as a guaranteed contract and entering the competitive marketplace for the first time, City officials are confident both that their current telecom bill of $30 million can be reduced and, more importantly, that future increases accompanying bandwidth upgrades will be significantly less than what the City would have to pay under its current arrangement with the ILEC – SBC Communications. Indeed, as a testament to the effectiveness of this strategy, the Chicago Tribune recently reported that three major telecom consortiums are now in the final bidding stage – including SBC, whose bid will necessarily be lower than the City's current billing[19].

While Chicago hopes to build its network to save money, increase capacity, and promote economic development, the State of Pennsylvania, with an estimated $90 million in annual telecom billing, is already experiencing the benefits of both a fiber network and a competitive switch. With its recently inaugurated Keystone Communications project, the State of Pennsylvania now has 5,000 miles of fiber optic lines delivering voice, video, and data services to state entities through a Competitive Local Exchange Carrier (CLEC) – Adelphia Business Solutions. By switching over 65,000 state telephone lines and thousands of T-1 and other high capacity telecom lines – many of which had been provided for decades by Verizon – the State of Pennsylvania estimates that it will save between $100 and $145 million over the first five years of the project.[20] Like Chicago though, the Keystone network is based on a lease model where

[18] See the CivicNet Proposal at http://www.ci.chi.il.us/CivicNet/civicnetRFI.pdf.
[19] Barbara Rose, "Telecom plan for city faces alterations: CivicNet in final stage of bidding," Chicago Tribune, April 25, 2003.
[20] The State of Pennsylvania anticipates additional cost savings will be realized by moving to VoIP in the coming years. Indeed, a test is to be conducted in the next fiscal year to determine systemwide feasibility. Interviews conducted via email and telephone March-April 2003 with Nicholas Giordano, Director, Bureau of Commonwealth Telecommunications Services (BCTS), Commonwealth of Pennsylvania, Office for Information Technology.

the State will have to pay incremental costs for increasing bandwidth. Nonetheless, as in Chicago, the State estimates that the incremental costs associated with the State's surging bandwidth needs will be significantly lower than under the traditional contract with the ILEC.[21]

Dark Fiber and IRUs: The NYSERNET Model

In contrast to the Chicago model, the City of New York would be wise, as a part and parcel of sound, long-term infrastructure planning, to explore the more ambitious fiber ownership model that is best characterized locally by the efforts of NYSERNet. After decades of serving as the non-profit network manager for major public and private educational institutions in New York City, NYSERNet is moving aggressively forward with an agreement between seven educational and health institutions, including Columbia University, CUNY, and Mount Sinai (among others), to connect approximately 20 sites to a dark fiber network built by a private fiber company. Over the next year, these seven institutions will essentially disconnect their multiple data circuits (VoIP will be introduced at a later date) from carriers such as Verizon, and migrate all data operations to the fiber network operated and maintained by NYSERNet.[22] Significantly, by installing electronic equipment at each site, all seven of the institutions will have complete, immediate and unlimited control over their own data transmission rates. Perhaps most importantly though, the cost of bandwidth at any given site and for any given rate is fixed by the dark fiber/IRU contract that lasts for 20 years. As such, the participating institutions can accurately predict telecom costs over a formerly inconceivable timeframe.

In addition to a predictable cost structure and infinite scalability, NYSERNet's approach realizes several other significant benefits for participating institutions including: 1) improved Network Reliability: "the Optical Network provides improved network reliability in a cost-effective manner with diversely routed fiber loops and collocation facility with backup collocation facilities;" 2) an Integrated Platform for Network Services: "the Optical Network provides economical and high-performance access to a variety of network services, the research network, to Internet service providers and, potentially, to the public switched telephone network for voice services;" and 3) the Ease of Migration to Emerging Technologies: "the Optical Network allows riding of the declining cost curves with emerging optical network equipment and technologies, and supports new applications of end-users."[23]

NYSERNet estimates that the capital costs for the project will reach $6 million dollars – a figure that covers the cost of deploying the fiber optic network as well as the cost of setting up and operating two collocation[24] sites for the first year. With an estimated 20-year cost of $20

[21] Unlike Chicago, the State of Pennsylvania contributed over $24 million to the Keystone project – an up-front expenditure attributable, in part, to the geographic expansiveness of the State project. Pennsylvania estimates further that an additional $35 million in "transition" costs may be necessary to complete the project over the next five years. Nonetheless, because of the overall cost savings of the project, the State estimates that all non-recurring costs will be fully recouped by the second year of operation.

[22] NYSERNet has not contemplated wireless deployments as a part of its fiber network.

[23] "NYSERNet Proposal for Support of an Advanced, High Performance Optical Network for the New York Metropolitan Area," November 20, 2002.

[24] Collocation sites are large office spaces that house multiple telecom providers. The common spaces allow different companies and organizations to easily interconnect networks – both to one another, as well as to the larger Internet and research community.

million – a figure inclusive of the $6 million capital cost – NYSERNet believes that after the first 15 months of the network's operation, the average participating institution will start realizing cost savings.

And indeed, many proponents of the IRU/customer-owned model, espoused by NYSERNet and others, argue (sometimes) unambiguously that such a model produces the greatest long-term savings – in excess of those produced even by the fiber lease models of Chicago and Pennsylvania. According to a January 2003 study by the Telecommunications Infrastructure Fund Board of the State of Texas, given a telecom cost per year of roughly $10 million dollars with an annual increase in service of ten percent – both figures which New York City exceeds – the Fund estimates that the total telecom cost over ten years, under traditional arrangements, would be roughly $830 million. In comparison, the Fund estimates that the projected cost of the dark fiber/IRU model would amount to less than $300 million over ten years.[25] Turning this analysis into action, the Greater Austin Area Telecommunications Network (GAATN) recently announced that it expects to pay approximately $1.2 million over ten years for a municipally owned fiber network, similar to NYSERNet's arrangement, as compared to a fiber lease cost of $1.3 million for just two years. With cost projections such as these, it not surprising that in Canada, as in several countries, virtually all universities and 1/3 of public schools are connected to a customer-owned fiber network.[26]

How Could the Network Be Extended?

Locally, New York City already essentially owns, operates, and manages, an, albeit limited, fiber network known as the Institutional Network or I-Net.[27] In addition, and as a further indication of the lack of coordinated telecom planning in the City, several agencies, including HRA, DOT, and the New York Public Library (NYPL), operate their own separate fiber networks for transmitting large amounts of data and/or as backhaul networks for Internet traffic. While the City has not attempted to estimate precise across-the-board cost savings from such efforts, DoITT, for its part, increased the number of municipal buildings connected to its fiber I-Net by 37% over the last four years, from 46 sites in FY1999 to 62 in FY2002 – saving the City approximately $1.3 million annually.[28] Of course, such immediate cost savings were largely possible for DoITT because the 21 fiber companies who have franchises with the City of New York are required to donate a certain number of fiber strands to the Department. Indeed, were the City to initiate a fiber/wireless MAN as a backbone for all of its coordinated telecom needs, the up-front capital costs would inevitably be significant – whether borne by a private company or by the City.

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[25] "Broadband Access & Network Backbone Scoping Study," Telecommunications Infrastructure Fund Board of the State of Texas, January 27 2003.

[26] Concern has been raised about IRUs because of the potential for bankruptcy. As a result, some intuitional buyers of dark fiber have pursued outright ownership or constructed legal mechanisms to protect themselves against a Telco's collapse.

[27] DOITT defines the City's I-Net as, "a high capacity fiber optic based facility serving across four boroughs. The I-Net consists of multiple OC48 fiber rings, that provide high quality videoconference systems serving the Board of Education Citywide Training Network (CTN), the City's Court Judicial Systems and connections for computer systems operations and CityNet."

[28] According to testimony from the Department during Preliminary Budget hearings in March 2003, 13 City agencies are utilizing the I-Net for Internet access, saving the City $1.3 million annually. Presumably not included in this figure are the larger cost savings that have come from moving agency data operations to the I-Net.

With that oft repeated caveat, it nonetheless seems clear that, somewhere between the Chicago and NYSERNet model, there exists an alternative that could 1) save the City money, 2) better serve the City's current and future telecom objectives, and 3) avoid substantial capital expenditures. However, as Chicago and Pennsylvania have discovered, the government must, at the very least, begin the conversation.

And indeed, that conversation will most likely NOT be carried out in either/or terms, as is suggested by the two fiber MAN models described above. Additionally, given prudent municipal practice, any change in the current system should probably follow a tiered approach. Taken together, this would suggest that, in all likelihood, the City may discover that a gradual, hybrid model may offer the least costly alternative to all of the available telecom strategies – including the current Incumbent model. For example, a limited leasing of fiber to support a carefully planned buildout of cost-saving wireless links may represent a prudent first phase. The City should inevitably also further leverage its pre-existing I-Net fiber, as well as current or future State fiber, as important elements of any expanded network – whether partially leased or owned. This would, of course, necessitate working more closely with the State so that State fiber buildouts could potentially accommodate planned City fiber needs.

An Affordable Fiber Network in the Subways

In order to cost-effectively build a fiber/wireless MAN, the City should, as the diagram on page seven suggests, work closely with the Metropolitan Transportation Authority (MTA) to: 1) allow the City to lease any available MTA-owned dark fiber[29] and, 2) develop the subway system as a fiber conduit. Indeed, the subway system is ideally suited to a fiber MAN because of its extensiveness far beyond Manhattan, its proximity to key government sites, and also its separateness from existing conduits. Unfortunately however, under the MTA's current rental rate structure, private companies have not found it affordable to use the subway system as an alternative to the ECS conduit system – a system which is fast losing available space and which is, in any case, restricted to the Bronx and Manhattan. Unlike private companies, however, the City is uniquely positioned to aggressively encourage the use of MTA rights-of-way at affordable rates - a move which, if realized, would inevitably decrease any recurring costs associated with a fiber MAN while encouraging an extension of affordable fiber services outside of southern Manhattan.

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By bringing to market, among other assets, more than **$2 billion in guaranteed billing** (for a period of, say, 15 years), multiple, reduced rate rights-of-way (through the subway system, as

[29] The MTA has 714 miles of rights-of-way in New York City and 490 miles of fiber – with 78 miles soon to be installed. According to the MTA, the fiber, a mixture of 24-strand and 36-strand, is not currently being fully utilized. Indeed two and a half years ago, the MTA wrote to the City Council that 18 of the 24-strands in the 24-strand bundles were not being used. Although the MTA contemplates, at some unspecified future point, that it will need to use much of its fiber, the City could explore attaching electronic equipment to lit or unlit strands that could increase the capacity of the fiber. While any financial arrangement with the MTA would undoubtedly save the City much of the expense of laying additional strands of fiber, at the very least, the City should coordinate any future fiber buildout in MTA rights-of-ways so as to minimize costs for both the City as well as the State.

well as the extensive high-pressure water main system that sits idle underneath parts of the City[30]), accelerated permitting, and the coordinated use of the City's (and possibly the State's) current and planned fiber resources, the City would essentially be offering a company or a consortium of companies a uniquely stable revenue stream, as well as, perhaps most significantly, an extended network map that could deliver a wide range of telecom services and products to neighborhoods where such deployments are simply too expensive for most private telecom companies to contemplate on their own.

Taken together then, these elements could potentially be attractive enough to shift the very terms of the current telecom marketplace in New York City. As such, it is not inconceivable that such an offering by the City could induce lease-oriented fiber companies to allow outright ownership of fiber at reduced rates – a significant potential offering given that several of the more extensive, pre-existing fiber networks are operated by lease-oriented fiber companies. The "City package" could also significantly reduce or decelerate municipal capital expenditures in a strictly dark fiber model and/or could potentially encourage a company to cover the cost of wireless last-mile equipment, given the service revenue that would flow over such systems. Whatever the precise arrangements, it seems certain that the destabilized telecom market, combined with the relatively significant level of competition and capacity in the New York Metro area, together offer a unique opportunity for the City to reap substantial benefits.

Addressing Economic and Regulatory Goals Through Telecom Expenditures

"Broadband very likely holds the key for the long-term recovery of the telecommunication industry, and indeed our nation's long-term economic growth and its ability to compete on the global stage.[31]"

-- Federal Communications Commission Chairman, Michael Powell

With a strategic focus on our telecommunications buying power, the City not only stands to save money over time; it also could potentially play a more significant role in effectuating several related economic and regulatory goals including: 1) encouraging City-wide economic development, 2) enabling a competitive telecom marketplace, and 3) stimulating the widespread proliferation of *affordable* access to advanced telecom networks. In an important shift from past practices, however, the power to realize these goals no longer primarily emanates from a city's regulatory role – instead, it increasingly stems from a city's buying power. The central reason for this shift rests on a series of Federal Communications Commission and federal court rulings following the 1996 TCA that have had the effect of curtailing traditional municipal authority

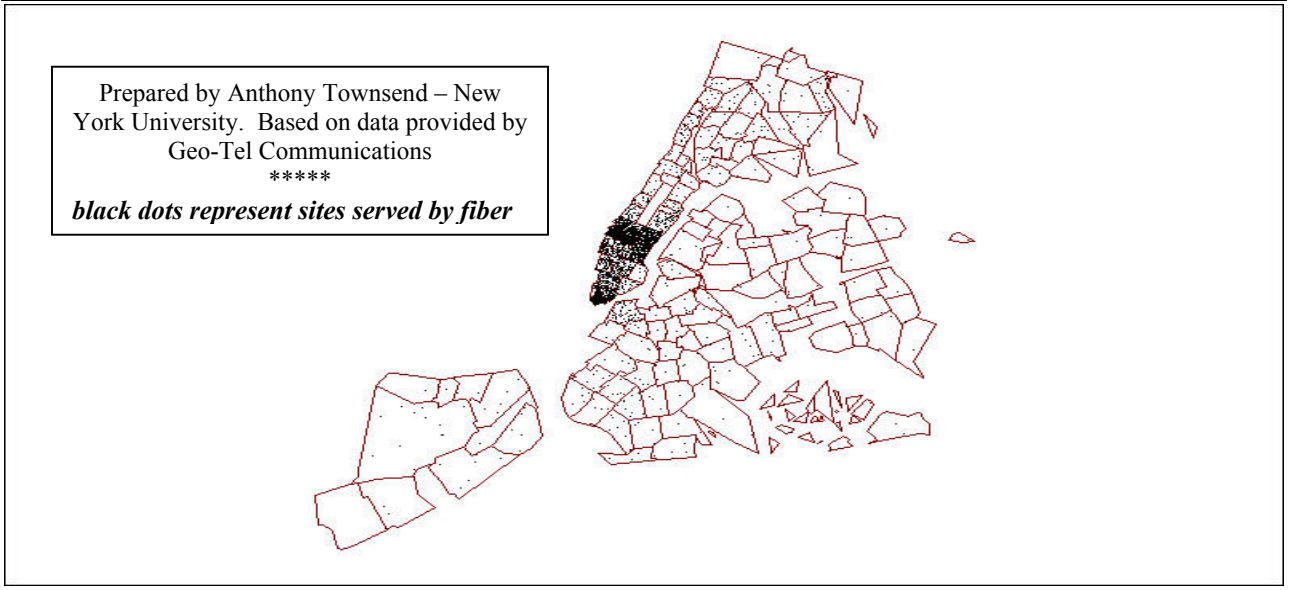
[30] In 2001, the New York City Department of Environmental Protection (DEP) and DoITT jointly issued a Request for Proposals ("RFP") in order to "solicit proposals for the conversion to, and re-use as, conduit for telecommunications fiber optic cable and related facilities of a now-vacant, high-pressure water main system which runs underground in the City of New York, beneath public streets in Manhattan south of 34th Street and in parts of Brooklyn."

[31] John B. Judis, "Michael Powell Vs. the Economy," *The New Republic*, September 2, 2002. For an industry view of the positive economic benefits of broadband see the Telecommunications Industry Association's "The Economic and Social Benefits of Broadband" at http://www.tiaonline.org/policy/broadband/TIA_Contribution_for_ITU-D_20-2_on_Broadband_8-27.pdf. See also a report from Canada's National Broadband Task Force entitled "The Economic Benefits and Challenges of Broadband in the New Networked Economy" at http://broadband.gc.ca/english/resources/econo_jan11_01.pdf. Also helpful is Stephen Pociask's "Putting Broadband on High Speed: New Public Policies to Encourage Rapid Deployment," at http://www.epinet.org/studies/broadband_pociask.pdf.

over telecom issues – the right to be compensated for the use of a city's rights-of-way, the ability to enforce open access rules for the competitive use of network infrastructure[32], and the right to demand so-called public educational and governmental (PEG) access provisions, to name but a few examples. However, just as our city's regulatory powers have declined over time, the new telecom models have also quickly emerged to radically alter what a city can do, and effect, with its telecom dollars.

As an example of this potential, any company building a redesigned municipal telecom network faces little marginal cost for pulling the maximum number of strands of fiber along with an anchor tenant's fiber pull.[33] As a consequence, additional fiber is available to the winning bidder for their own wireless deployments or direct fiber services, for example, in areas where no large anchor tenant, save the City, previously existed to justify such a buildout. In such an arrangement, the telecom provider(s) benefits from an expanded network, the City benefits because the overall cost of the network deployment can be reduced given the new markets that the company(s) can now enter, and, finally, areas currently underserved by *affordable* telecom services, as the graphic below depicts, can potentially be served sooner and at better price points by advanced telecom services.

Fiber Lit Buildings in New York City – September 2002



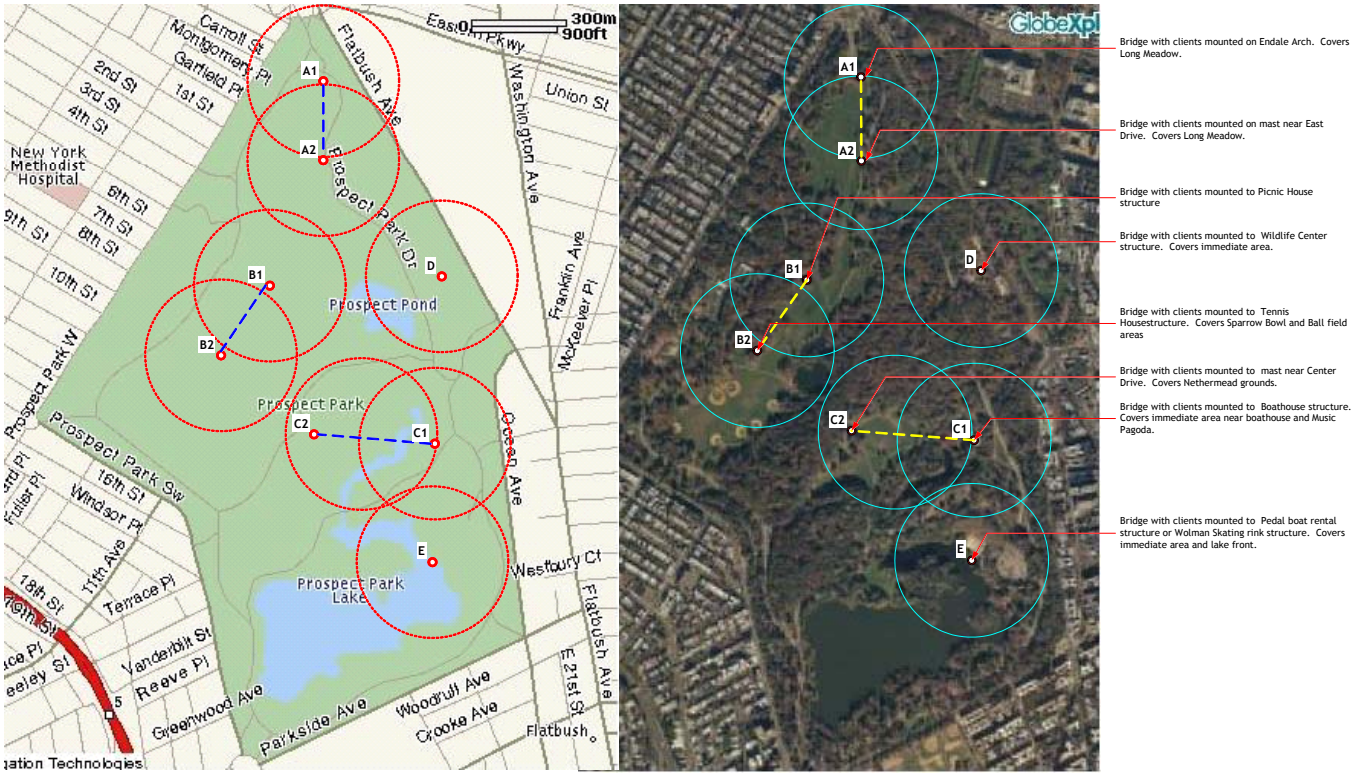
As a further example of a City's potential power to realize larger economic goals, because of the theoretically unlimited bandwidth of fiber optics, a municipal fiber network could not only serve the bandwidth needs of city agencies; it could also serve as an affordable and highly scalable backbone for a public wireless network. Indeed, the City of Winston-Salem recently

[32] See the recent court cases surrounding the City of Portland's attempts to enforce open access provisions on telecom providers, as well as the FCC's 2002 ruling pre-empting municipalities from charging cable modem providers a franchise fee at www.techlawjournal.com/courts/portland/default.htm and www.fcc.gov/Bureaus/Cable/News_Releases/2002/nrcb0201.html, respectively.

[33] In a fiber based network project, the major part of the cost is for labor in installation, rights-of-way charges, maintenance, operation, and electrical/optical interfaces to the end user. Fibers, themselves, are inexpensive, and thus it is very common to see networks that have excess capacity.

joined a growing list of cities, including New York City, Tallahassee, and Long Beach, California (to name just a few), which are deploying free wireless Internet access zones from fiber. With major municipal sites, located across the entire City, connected to a fiber optic metropolitan area network, the old retinue of government policies for narrowing the "digital divide," for example, thus dramatically expands – wireless access zones become plausible in City parks, economic development zones (such as Digital NYC districts), as well as, potentially, low income neighborhoods. Indeed, one recent industry analysis concluded that providing free high speed internet access in Prospect Park through WiFi[34] would incur a one time capital cost of $192,000; the critical caveat lying in the fact that, with backbone bandwidth supplied to wireless nodes throughout the park by the City fiber MAN, no monthly bandwidth charges would accrue. In comparison, under the current pricing model, the City would have to pay hefty monthly charges for getting wireline connectivity to the Park's various wireless deployment nodes.

Potential Prospect Park Public WiFi Network[35]



NOTE:
The circles represent an 802.11b open area coverage zone of approximately 800 feet at 11 Mbps. Actual coverage may be more or less depending on the client card in use. Areas blocked by trees and other obstacles do not have 802.11b coverage eventhough they may be included in the coverage zone. Selected locations for the wireless bridges/access points are based on open areas of the park as can be seen in the satellite photograph on the right. Locations were also selected based on existing infrastructure usable for antenna mounting. ONLY AN ACTUAL RF SITE SURVEY CAN ESTABLISH THE ACTUAL COVERAGE ZONE AND SELECTION OF THE OPTIMUM LOCATION FOR THE WIRELESS BRIDGE/AP.

While the capital costs of any public wireless deployment could conceivably be underwritten by private funds, by building a fiber infrastructure, the City does not have to directly subsidize access itself in order to promote wider access to affordable, high-speed networks; nor does it

[34] WiFi is the popular term for a form of wireless broadband connectivity based on the 802.11x standard defined by the Institute of Electrical and Electronics Engineers, Inc.
[35] Photo Credits: MapQuest.com, Inc. 2003 Navigation Technologies Inc.; GlobeXplorer, Eastman Kodak Company

need to directly intervene in a regulatory manner to promote a competitive telecom marketplace. Indeed, as stated above, fiber buildouts necessarily entail greater access to dark fiber in a wider geographic area. But more than this, multiple arrangements exist that could be embedded *directly* in the fiber/wireless MAN contract itself which could, for example, partially address the high cost of access - both fiber as well as DSL/Cable Modem access – in New York City. As one recommendation, the City could require that competitive telecom providers or non-profit associations be given access to fiber pulled as a consequence of the City's buildout – and at wholesale rates. The City could also implement a preferential rate structure for community networking initiatives wishing to use City rooftops for low-cost community wireless deployments.

A Public Broadband Network?

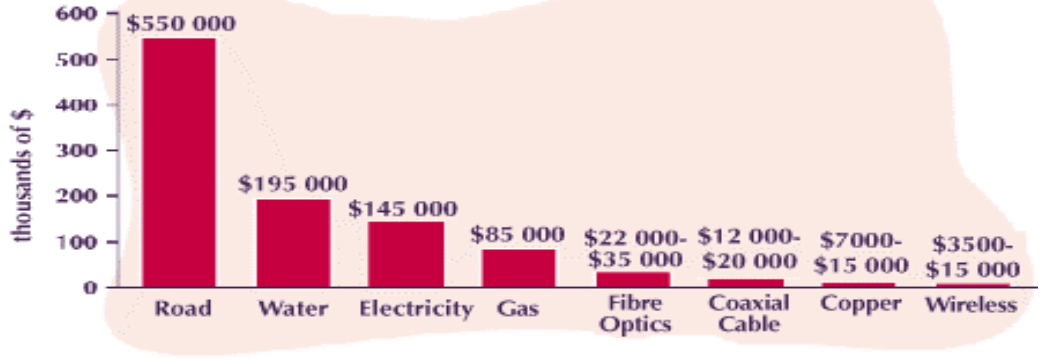
Unfortunately, while getting affordable broadband to "underserved areas" has been a longstanding public policy goal of many United States cities, few sustainable solutions have been offered;[36] likewise, few sustainable solutions have been implemented to bring networking costs down for the larger home and business market. Not surprisingly then, with only two widely available options for broadband, monthly access charges hover around $40-50 per month for New Yorkers.[37] At the same time, small and medium sized businesses in areas that are not below 59th street in Manhattan find it difficult to procure *affordable* fiber solutions – if such a fiber option is available at all.

[36] On October 24, 2002, the Speaker of the City Council, Gifford Miller, unveiled the Council's "Broadband Library Initiative" that was designed to expand affordable broadband access in underserved communities of New York City. By linking the pre-existing, high-speed connectivity of the public library system to a secure, point-to-multi-point wireless distribution mechanism, the pilot project imagined connecting between 25-50 community based organizations and small businesses to five separate library branches' broadband network. The Council estimated that the one time capital cost to the City would be $25,000 ($5,000 per branch for wireless networking equipment) while the one time cost to non-City organizations would range between $1,500-$2,5000 (depending on the organization's pre-existing technical infrastructure). By building an expanded network – known as a wireless wide area network – and by further leveraging the high-speed connectivity that the library system already had in place, the Council estimated that broadband connectivity could therefore be expanded beyond the library walls – with no recurring monthly charge to the participating organizations and with no monthly marginal cost to the library branches. In partnership with the three New York City library systems, several community networking organizations, New York University's Taub Urban Research Center, as well as Cisco Systems, the Council requested, in November 2002, that the Federal Universal Service Administrative Company (USAC) grant permission to the City to commence the Broadband Library Initiative. The request was made because USAC provides substantial funding for library connectivity through the E-Rate program and has strict rules for allocating bandwidth that is supported by E-Rate funds. As such, the Council asked if the library systems in question – the Brooklyn, Queens Borough, and New York Public Libraries – could share E-Rate supported bandwidth with community based organizations and small businesses through a wireless allocation system. In March 2003, USAC gave the Select Committee staff verbal approval to conduct a one-year pilot project and directed us to write a letter requesting local flexibility on certain technical items that are, and remain, unclear. However, several days later - in fact two days before we expected a formal response approving our pilot - the U.S. House of Representatives launched a full blown investigation of the E-Rate program at which time USAC informed the Select Committee that any experiments were to be put on hold. In order to secure approval for the pilot, USAC suggested that the Council go through a formal FCC waiver process - a process that could take up to a year. As of May 2003, the Council was still in discussion with program participants as to whether a waiver process should be undertaken.

[37] Verizon recently introduced a $35 per month DSL package – however, the offer appears only valid through May according to Verizon's website www.verizon.com.

In contrast to this seemingly hopeless situation, Canada and South Korea,[38]as two preeminent examples, have achieved broadband penetration rates two and five times greater, respectively, than that of the United States. However, in order to achieve these usage numbers, and in order to sustain monthly rates on average 50%-60% less expensive than in this country, substantial public investment in fiber networks was necessary. In Canada, for example, policy makers have historically argued, with notable success, that such telecom outlays are substantially less burdensome than other public infrastructure projects and that the socio-economic benefits are immense.

FIGURE 10
Broadband Infrastructure Costs Less Than Other Infrastructure
Cost per kilometre*



The source for the road, water/sewer, gas and electricity infrastructure costs was the City of Kingston and Sunrae Construction, while the costs for telecom infrastructure came from Cisco Systems. Costs will vary depending on specific circumstances.

Source: Upper Canada Net.

While such direct outlays for a public broadband network may not be feasible at this juncture, given the outstanding debt and deficit situation that exists across the country, it is clear that by yoking government's own telecom spending power to the larger goal of broadband expansion – and by thinking strategically about contracting terms, technology choices, etc. – cities such as New York can indeed have a significant impact on development issues that formerly seemed outside of a municipality's purview.

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[38] At around $40-50 a month, broadband costs about two times as much in the United States as in Korea and Canada. Worse, broadband in the United States is typically slower and less suited for interactive entertainment and other two-way uses because it relies on an asymmetric system that receives data much faster than it can send it. Ken Belson , "America's Broadband Dream Is Alive in Korea," New York Times, May 5, 2003.

Preliminary Recommendations:

In order to meet the twin goals of saving the City money on its telecom bill (both now and in the future) and promoting economic development across the five boroughs of New York, DoITT and the City should move aggressively forward on ten specific recommendations and under the direction of four proposed principles:

- DoITT should issue a five year telecom plan every three years as called for by Int. No. 214;
- DoITT should analyze all of the City's telecom needs – including current and planned circuits, building locations, and pre-existing fiber/wireless resources;
- DoITT should establish a blue ribbon panel of non-vendor affiliated academics, technologists, and community members to develop a comprehensive feasibility study for a redesigned municipal network;
- DoITT should examine the possibility of issuing a concurrent Market Survey that would formally ask vendors to provide initial design and cost estimates for a municipal network;
- DoITT should exercise centralized control over all telecom procurement and planning just as it does, to a greater degree, over technology;
- The City should conduct a multi-agency study to analyze the potential security benefits or risks of a fiber/wireless MAN;
- The City should establish a formal coordinating committee with the State so fiber deployments are mutually beneficial and cost-effective;
- The City should negotiate with ECS – whom the City has historical *and* contractual influence over – as well as the MTA in order to obtain favorable rental rates for a municipal fiber MAN;
- The City should explore including free WiFi zones on the list of public amenities (such as public spaces) that allow developers to expand a building on the same size lot;
- The City should aggressively engage public and private institutions in an effort to provide free wireless access in New York City parks.

Financing: The City should also look to federal and State networking, homeland security, and economic development initiatives that might reduce any City contributions to a new municipal telecom network. Indeed, one excellent source of funding is potentially available through the federal government's Economic Development Administration (EDA). EDA recently announced that it has $228.12 million available for grants to support state, regional and community efforts to create wealth and minimize poverty.[39] "Through world-class capacity building, infrastructure, business assistance, research grants and strategic initiatives," the program intends to "promote a favorable business environment to attract private capital investment and high skill, high wage jobs." Moreover, EDA explicitly encourages investment proposals that will "significantly benefit areas experiencing or threatened with substantial economic distress." Generally, all proposals should "seek to enhance regional competitiveness and support long-term development of the regional economy…with priority given to proposals that…[1] Upgrade core business infrastructure such as… communications infrastructure and [2]… Support technology-led economic development."

[39] http://a257.g.akamaitech.net/7/257/2422/14mar20010800/edocket.access.gpo.gov/2003/03-8612.htm.

Proposed Principles for a New Municipal Network:

- The City's procurement of telecom services should be fully open to rigorous competition;
- Given the effect that telecom spending can have on the wider socio-economic fabric of cities, substantial community involvement should guide the municipal telecom procurement process;
- Excess fiber capacity built as a consequence of City funding should be open to third parties at competitive wholesale rates;
- And finally, preferential rates for municipal rooftops and fiber access should be set for community networking initiatives.

A Project of the Infrastructure Division,
Marcel Van Ooyen, Director

Jeffrey Haberman, Deputy Director

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Prepared By: Nick Noe, Legislative Policy Analyst
Assistant Technology Researcher: Jason Mendelson
Research Assistance: Jena Min
Legislative Counsel: Donna DeCostanzo
Finance: Michael P. Schnall
Chief of Staff to Select Committee Chair: Brian P. Kavanagh

For inquires or comment contact: comnoe@council.nyc.ny.us