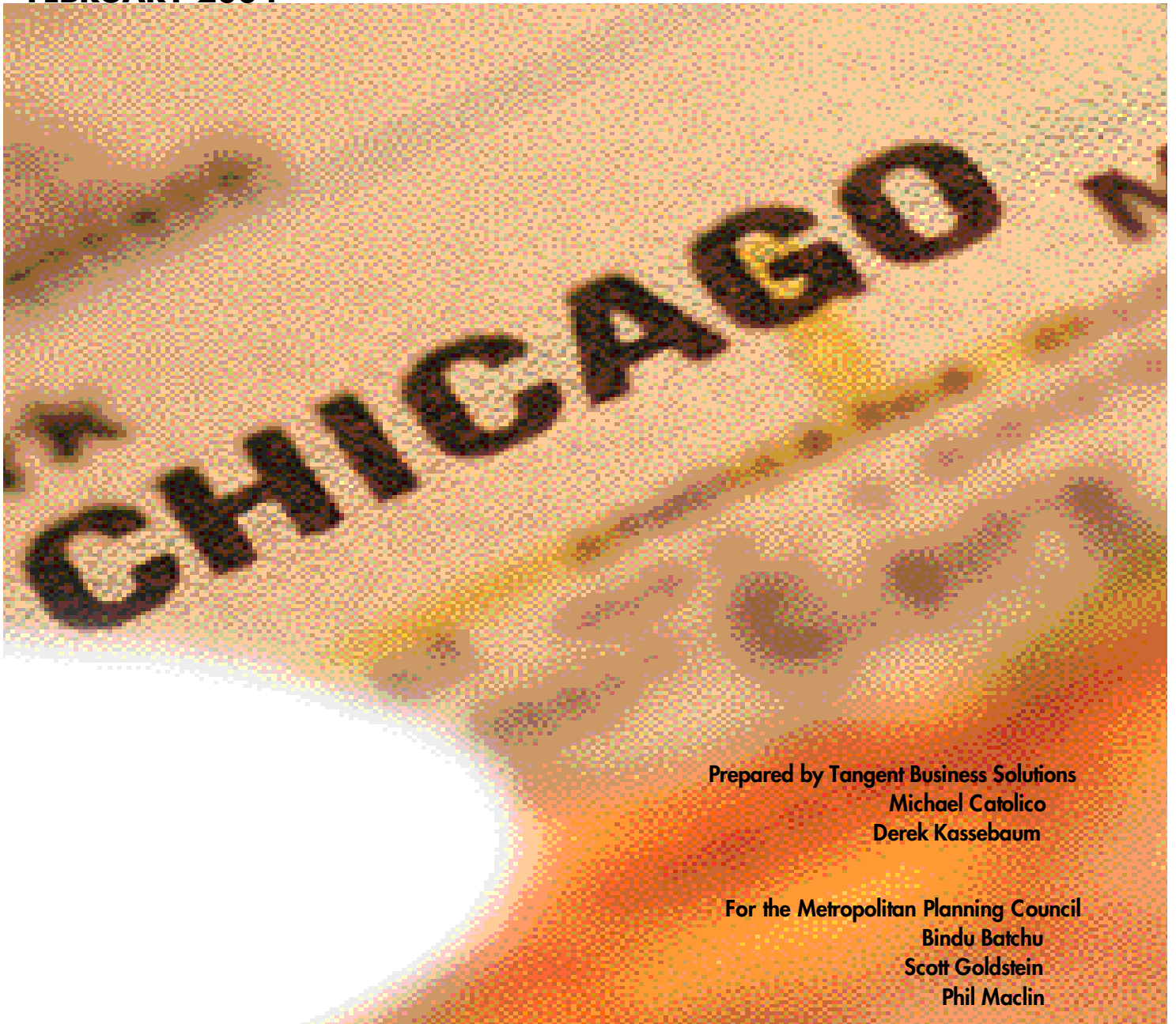




ACCESS TO REDEVELOPMENT

AN ANALYSIS OF SUPPLY AND DEMAND FOR HIGH-SPEED
DATA SERVICES IN CHICAGO'S NEIGHBORHOODS

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Summary

As municipal and business leaders pursue ways to spur economic development, one crucial element is telecommunications and broadband infrastructure. Having access to advanced voice and data services is a priority for many businesses. This study examines the specific level of demand for broadband services among small and medium sized businesses and nonprofit organizations in the City of Chicago. While high-speed access is prevalent downtown and in many neighborhoods, significant areas of the city are currently underserved. The objective of this research is to determine levels of supply and demand, as well as analyze proposed market based solutions to spur infrastructure investment.

The research is part of the Metropolitan Planning Council's ongoing role in advising the City of Chicago in the development of CivicNet — a new public-private network that will connect at least 2,000 public locations to an "open network" for private businesses and nonprofit organizations. CivicNet will be a unique, high-speed network created by aggregating the demand of multiple agencies (with up to \$30 million in annual spending power) for telecom (voice and data) services, further distinguishing Chicago as a primary center for advanced digital communication.

The research presented here identifies several issues related to the demand for broadband.

1. Businesses throughout the city and in diverse neighborhoods are adopting new technologies and applications that demand high-speed connectivity.
2. The current supply of broadband services is unevenly distributed throughout the city, resulting in significant areas of unmet demand.
3. Two levels of unmet demand are identified: "unserved" communities, without access to affordable low bandwidth solutions such as DSL; and "underserved" communities, with emerging high bandwidth needs and insufficient affordable supply that could be addressed by access to a fiber optic network.

This study maps the areas of need and reviews the available alternatives. It also addresses the relative limitations of wireless solutions, such as Wi-Fi, and misplaced assumptions of a "bandwidth glut." The implications for decision makers planning for the city's future include the potential loss of productivity and competitiveness that result from inferior or inadequate telecommunications infrastructure — an exacerbation of the divide between the high-tech "haves" and "have-nots" — and the value of an advanced network for enticing new business development for the city. From a service provider perspective, the research confirms demand levels proposed in the CivicNet project.

Concentrations of private demand can be met through the creation of "neighborhood nodes" that provide connections to CivicNet at high priority locations anchored by the existing demand of government agencies.

Expanding supply and demand

Broadband¹ is impacting the way businesses operate, communities grow, and individuals communicate. Community and business leaders seek broadband services that are technologically advanced, affordable, and widely available. Policy-makers set goals for economic growth for their constituents. Service providers make capital investments based on solid prospects for revenue growth and viable returns. The City of Chicago is currently examining creative ways to provide broadband access to its residents and businesses by inducing private firms to build and maintain the infrastructure through CivicNet.

CivicNet proposes to offer providers incentives for building a fiber optic network that will eventually serve all Chicagoans.² By providing telephone and data communications for Chicago³ and leveraging the city's telecommunications infrastructure and rights-of-way, CivicNet will deliver guaranteed revenue and reduced construction costs to enhance the economics of the network investment and build-out. The contract, valued at up to \$30 million per year for up to 10 years, is one of the largest public telecom deals in the nation, and observers from as far away as Japan and the United Kingdom are closely watching its progress. CivicNet can be built with no additional taxpayers dollars. In fact, moving forward with CivicNet will save the City of Chicago, and sister agencies, millions of dollars per year through bulk purchase.

Negotiating where and when to construct facilities, balancing the priorities of various communities and agencies, and planning the technical and financial logistics of the network are inherent challenges of the CivicNet project. This report will help to clarify some aspects of the decision process by providing quantified analysis of where demand is and the level of need to be addressed. The focus of this analysis has been primarily on the needs of small- and medium-size businesses (SMB) and nonprofit organizations — those with fewer than 250 employees at a single location. This market segment has been overlooked historically by service providers and, as a consequence, has only lately begun to tap into the benefits of broadband.

Purpose and scope of the research

MPC⁴ asked Tangent Business Solutions (Tangent) to address several key objectives:

- Assess demand for broadband services among SMBs, while noting the unique differences of various industry segments;
- Quantify and map current and forecasted demand geographically in the city of Chicago;
- Identify current locations of supply of broadband networks and facilities;
- Assess critical areas of unmet demand; and
- Discuss the implications of these findings for CivicNet, other broadband providers, and businesses.

This analysis takes the perspective of a telecom provider when assessing demand. Typically, a provider is willing to serve a market, specific location, or single customer if that entity delivers a reasonable economic return. Because of the significant costs of building and maintaining a network, providers seek high levels of demand in concentrated geographic locations.

As a consequence, the traditional business case favored by service providers seeks to serve customers that deliver strong revenue potential, and minimize capital investment and ongoing operating expenses. Historically, this has translated into a focus on large enterprise customers in geographically concentrated, high-demand markets.

This formula has resulted in a number of providers serving Chicago's downtown area and select corridors. For SMBs not located in these favored areas, access is either limited to the available infrastructure or provided at high cost. Where broadband dependent applications like telemedicine, e-commerce, and video conferencing are required, these organizations (and, by extension, the communities they belong to) are placed at a competitive disadvantage.

If service providers continue to focus only on the areas currently recognized as having high demand, other communities are at risk of falling further behind in their ability to attract and grow new business in the future.

CivicNet alters traditional business case dynamics by providing a minimum base of revenue to the provider and dramatically reducing the risk of initial investment. CivicNet guarantees providers revenues from all City agencies and provides access to City and sister-agency facilities to reduce the cost of network construction. Since there are approximately 2,000 government locations throughout Chicago, CivicNet guarantees that broadband will be provided in all parts of the city. CivicNet also requires the development of an "open network" for private use — both through direct retail sales to companies and individuals, and wholesale to other telecom providers. To enhance the business case and make it possible to address unmet needs in the private market, MPC sought analysis to pinpoint the locations, types, and depth of demand in the SMB market. The goal is to make a market case for increased investment for the open network in neighborhoods that already have (or will soon have) sufficient demand for broadband technologies — even if they are not currently perceived that way.

How broadband transforms organizations

The benefits of broadband to SMBs are many. While the broadband pipeline by itself does not instantly improve performance, the applications and communication functions made possible by high-speed services are often the catalyst for significant, positive organizational changes. SMBs that use broadband improve operational efficiencies and customer service. Cost savings are realized through reduced warehousing of materials and outsourcing of non-core activities. Revenues are enhanced via improved communications, access to alternative distribution channels, and inexpensive entry to new markets.

The advanced applications that improve business operations are the true drivers of broadband demand. Appendix 5 of this report outlines many ways that organizations are incorporating new technologies via broadband services to enhance performance. To highlight some examples:

- Manufacturers can link their customer order entry information with suppliers to streamline the procurement process.
- E-commerce levels the competitive playing field for many smaller retailers by expanding their market reach without the need for a large and widely dispersed sales force.
- Healthcare providers are developing entirely new services and improving patient outcomes through such practices as remote monitoring of intensive care facilities.
- Smaller firms can better attract and retain quality personnel through the ability to offer telecommuting options to employees.

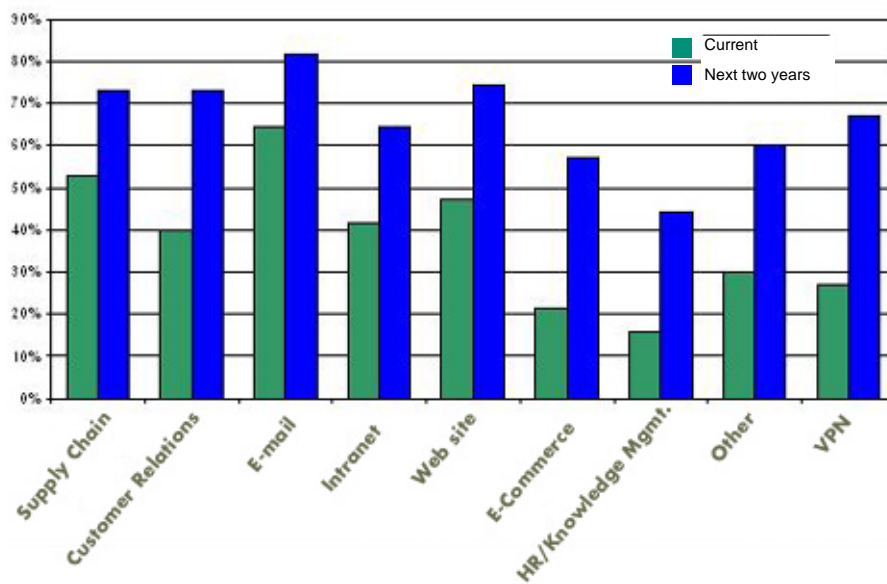
These services and improvements are impossible without an adequate communications infrastructure in place. While large enterprises have the economic power and scale to initiate many of these technical improvements, affordable broadband and the emergence of

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aggregator solutions (such as Applications Service Providers or ASPs) make these improvements accessible to many smaller firms.

SMBs are increasingly going high-tech. Applications such as e-mail (used by 63 percent of SMBs) and corporate Web sites (48 percent) have become commonplace. The near-term forecast (by 2004) calls for greater adoption and use of numerous broadband applications such as supply chain management (72 percent of firms use or plan to use), customer relations management (72 percent) and the use of Virtual Private Networks or VPNs (68 percent) for remote file sharing (Figure 1). As the costs of these applications become more affordable and competition requires their adoption, SMBs increasingly understand the importance of these technologies to their success. As they are compelled to adopt these solutions, demand for improved broadband access and higher bandwidth will follow.

Figure 1: SMB Broadband Applications
Percent of firms using/planning to use



Identifying broadband demand

Methodology

The study uses several elements to develop its broadband demand assessments and forecasts. The key sources include:

1. Line count data of telecom voice and data services provided by individual carriers and the U.S. Federal Communications Commission (FCC);
2. Proprietary databases regarding telecommunications spending characteristics and service take rates for firms based on type of business, number of employees, and annual revenues;
3. Dun and Bradstreet (D&B) business data including address, type of business, number of employees, and size of annual revenues;
4. Other economic data from publicly available and privately purchased sources regarding regional growth and demand for various communications services; and
5. Current and previous survey data of local businesses.⁵

In December 2002, Tangent conducted a random phone survey of businesses specifically for this project on behalf of MPC. The survey included questions focused on the following areas:

- Current and future bandwidth needs;
- Current broadband access technology in use (if any);
- Opinions regarding current and future broadband applications; and
- Monthly expenditures for services.

The survey work has two primary goals:

- Corroborating estimates of demand from other sources; and
- Measuring changes in reported perceptions of forecasted demand over time.

The method for determining the sample began with a D&B database query of all businesses in Chicago. The initial report returned 88,000 businesses, of which approximately 93 percent were deemed to be SMB (fewer than 250 employees at a site). The sample was reduced by eliminating firms with fewer than five employees, and sectors that have demonstrated little interest in purchasing broadband services such as hair salons, dry cleaners, laundromats, and small grocery stores. While there may be exceptions — for instance, a hair salon may use the Internet to advertise and sell hair care products or book appointments — the relative rarity of such occurrences and the focus on providing a highly conservative estimate of demand is the basis for their exclusion from the analysis.

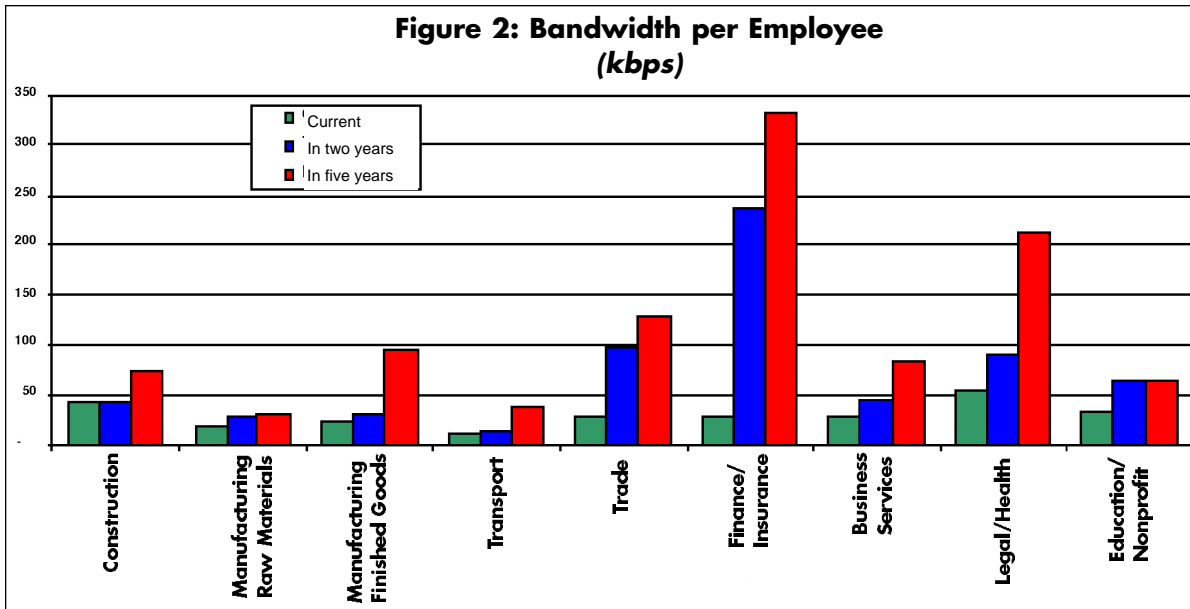
The resulting population consists of approximately 15,700 firms from which a random sample of 130 companies was surveyed. Statistically, this sample size provides a confidence level of 95 percent with a range of plus or minus eight percent. In other words, we can be 95 percent certain that the results of the analysis are within an eight percent range of accuracy. For example, we found that 68 percent of firms currently use e-mail applications. This means that we can be 95 percent sure that between 60 percent and 76 percent of firms in the larger population use e-mail.

Results

From the various data sources, bandwidth per employee was determined to compare firms and project demand. By applying a specific bandwidth per employee figure by type of industry to each SMB in the population, a determination can be made of the magnitude and dispersal of demand in the Chicago market.

Information regarding service adoption, billing details, and line count data for SMBs was combined with the results of the survey to determine bandwidth per employee for each industry sector. Tangent examined historical trends and modeled future growth based on bandwidth per employee.

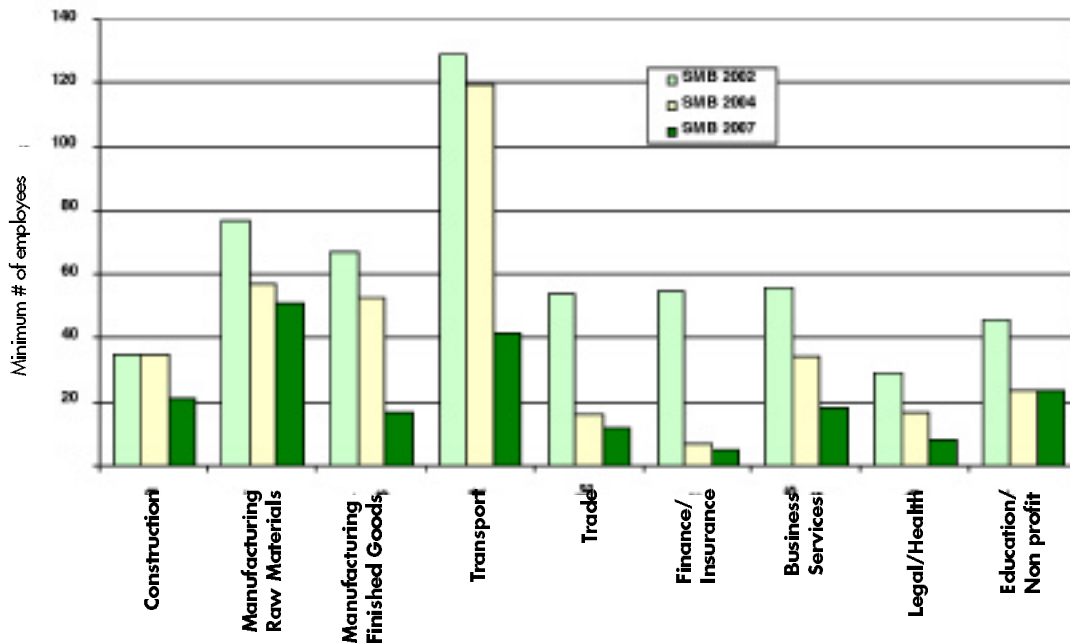
Figure 2 shows bandwidth per employee figures for various industry segments. Current figures for each SMB are compared with two-year and five-year forecasts.



Certain key sectors consume the most bandwidth on a per employee basis. Financial, legal, and professional service firms have the greatest relative data needs. However, the need to enhance productivity and competitive performance is also driving the need for broadband among heavy industry, manufacturing, and construction firms.

Another way to look at the issue is to estimate the size of a firm that would be needed to meet a certain bandwidth threshold. Figure 3 shows the minimum number of employees an SMB would need, on average, to require T1⁶ service based on type of industry.

Figure 3: What Size Firm Needs Broadband?



For the purposes of this project, the data demonstrates key areas of demand among types of SMBs. Typically, this information is used by a service provider to identify prospect lists and plan potential network deployment.⁷ Viewed from this perspective, a service provider can estimate the needs for broadband services by understanding what types and sizes of companies are in a given market. This information can, in turn, be used to measure the viability of market entry by quantifying the potential demand and assessing the critical mass needed to economically justify providing services.

Analysis 1: Tiered usage levels

With the results of this analysis, the estimated demand⁸ for a population of 15,700 businesses can be determined. The level of bandwidth service required can be mapped at each specific business location. The typical result of such an analysis is a targeted prospective lead list for service providers.

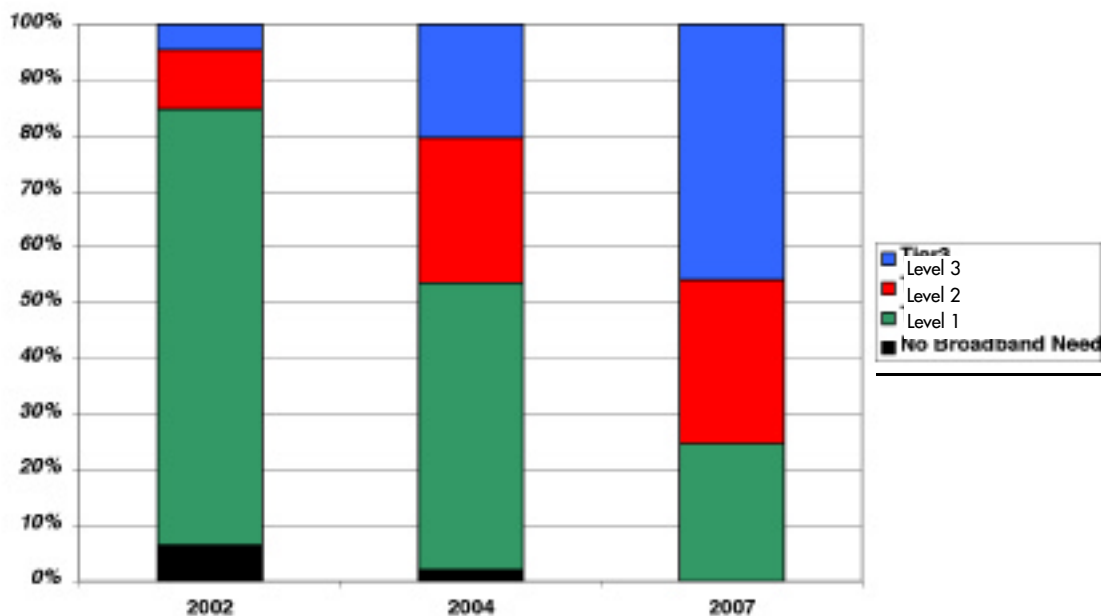
When considering demand from the point of view of an SMB, we can identify, for the purposes of this report, three levels of bandwidth need:

- Level 1: DSL/Cable solution (speeds of 256 kbps to 1.5 mbps)
- Level 2: T1 solution (speeds of approximately 1.5 mbps)
- Level 3: Multiple T1⁹ solution (speeds greater than 3.0 mbps).¹⁰

These distinctions are useful for a number of reasons:

1. Level 1 firms require an affordable solution that meets their needs. Showing where these firms are located, relative to DSL/cable availability, indicates current unmet need or unserved areas. In 2002, 78 percent of SMBs in Chicago demonstrated a need for Level 1 Service. By 2007, only 24 percent of firms will find this sufficient, as most SMBs will be using applications that require greater bandwidth.
2. Level 2 firms have needs that require greater bandwidth than Level 1 firms. Although these services are currently available, they are significantly more expensive than low-need solutions. Approximately 11 percent of SMBs currently require this level of service. This segment is expected to grow to 29 percent by 2007.
3. Plotting Level 3 demand areas show locations that can most benefit economically from the implementation of fiber-based solutions. Though only 4.5 percent of SMBs in 2002 demonstrated demand for this service, demand is expected to grow to 46 percent (approximately 7,222 firms) by 2007. Lack of affordable high-speed solutions will therefore become detrimental to SMBs in the very near future.

Figure 4: Type of Broadband Solution Needed
(All SMBs in Chicago)

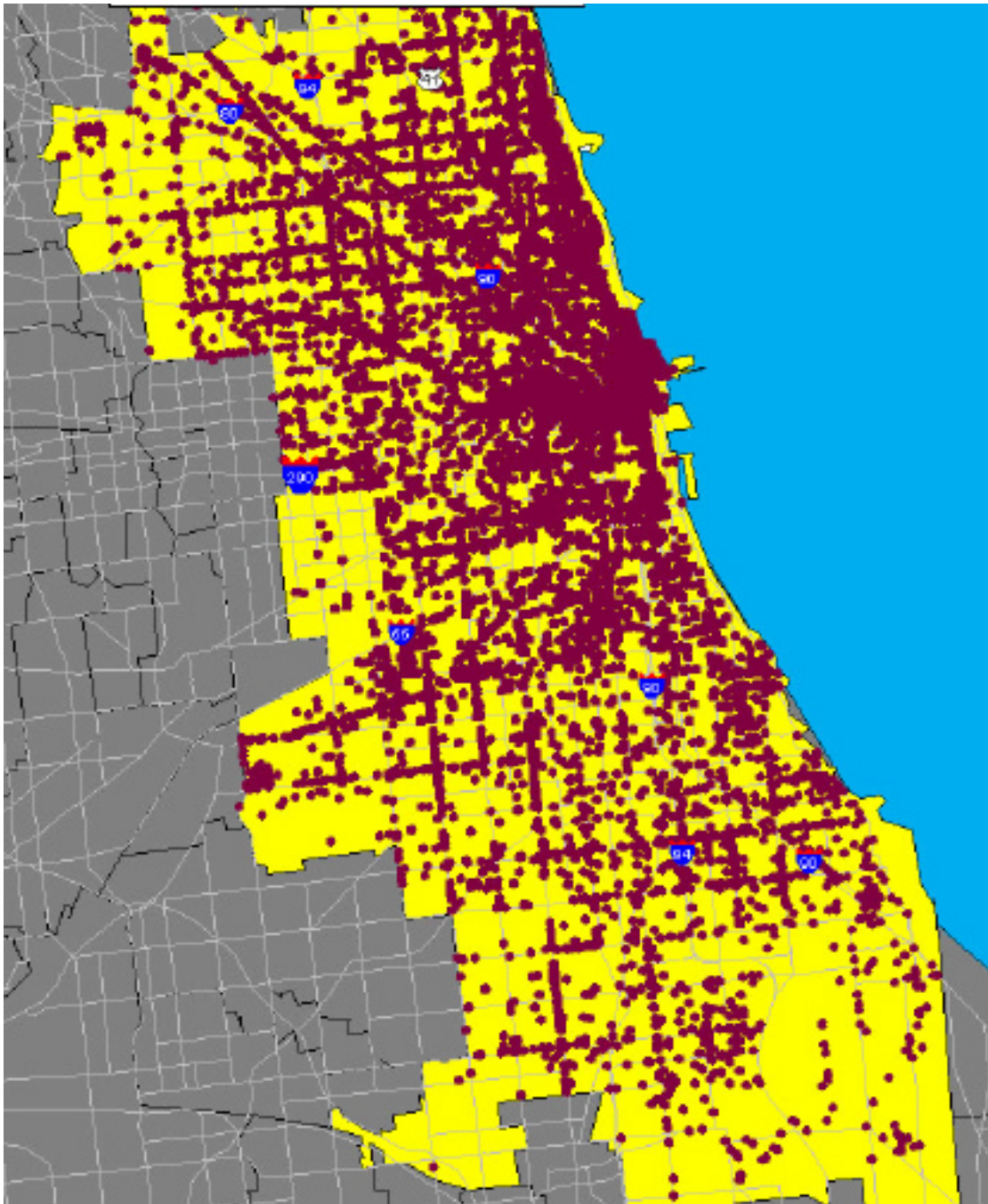


Analysis 2: Mapping demand

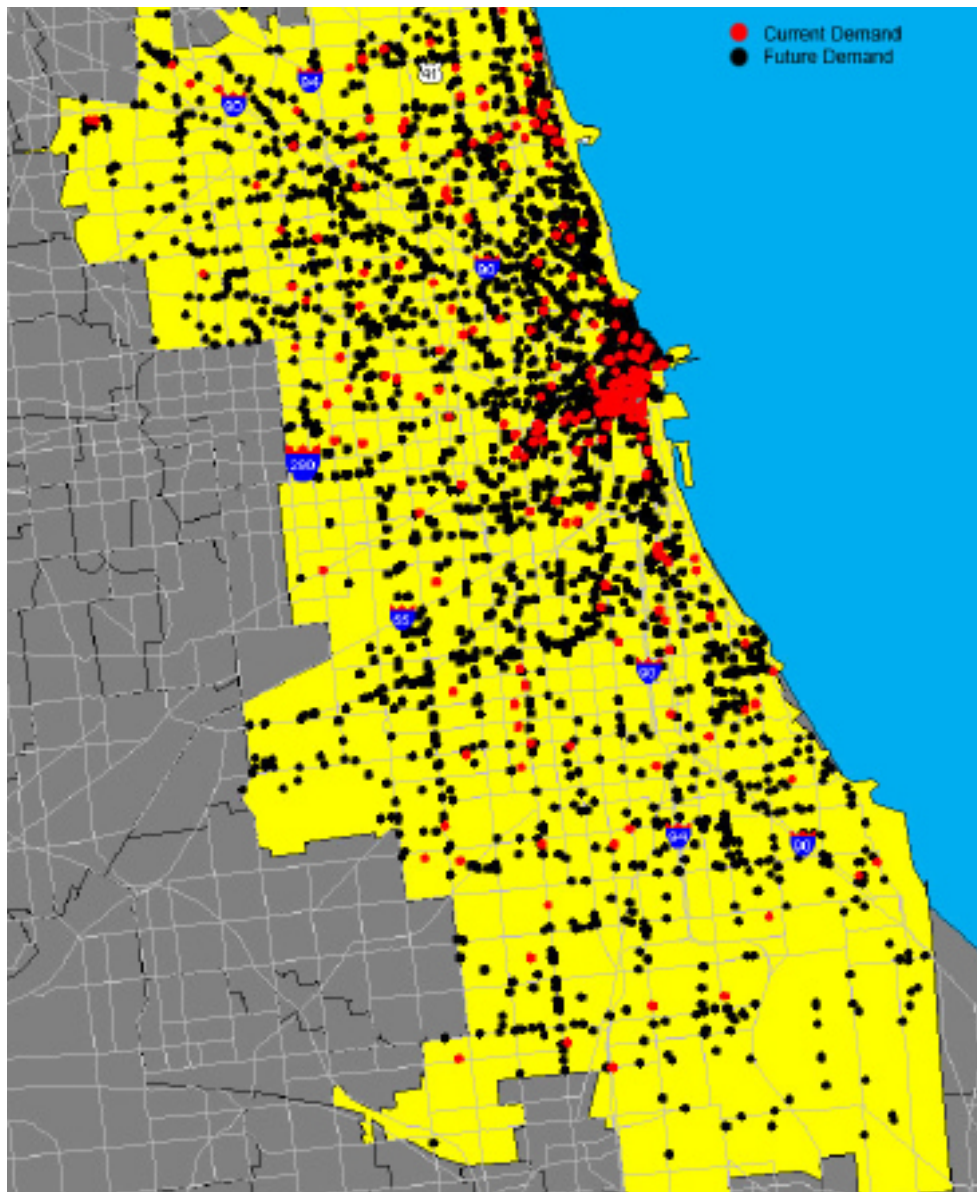
Virtually all SMBs require minimum levels of broadband today, with 93.5 percent of SMBs in 2002 demonstrating a need for Level 1 service or bandwidth at 256 kbps or greater. By 2007, Level 1 service will see its demand decrease by over 50 percent for SMBs citywide.

The demand for broadband correlates closely with the locations of SMBs. Map 1 shows high concentrations of current demand in the Loop, and on the Near North and Near West sides, plus along most of the lakefront. Corridors of demand radiate out along major streets and form a grid-like pattern over much of the city. The sparser densities in the far south region are related to the relatively low concentrations of businesses in these communities.

Map 1: Broadband Demand (>256 kbps)



Map 2: High Bandwidth Demand (>3 mbps)



Map 2 shows that Level 3 demand (i.e., greater than 3 mbps) is also heavily concentrated near downtown. Yet, there are pockets of demand that are scattered throughout the city. Neighborhoods along the lakeshore, plus some concentrations along major transportation routes such as CTA trains and interstate highways are most prominent. When the fiber supply is overlaid on this map in the next section (Maps 4, 5, and 6), it becomes clear that current supply converges with much, but not all, of this demand. Providers have planned and built their networks where customers are and/or where they have moved near the current network access points.

The future forecast presents a picture of significant growth. Almost half (46 percent) of SMBs are expected to need Level 3 or high-speed bandwidth in excess of 3.0 mbps by 2007, as compared to less than five percent in 2002. When we compare this distribution to current supply, the potential number of underserved communities becomes a critical issue, since fiber routes are not currently accessible to those requiring high-speed solutions by 2007.

Analysis 3: Key industrial Corridors

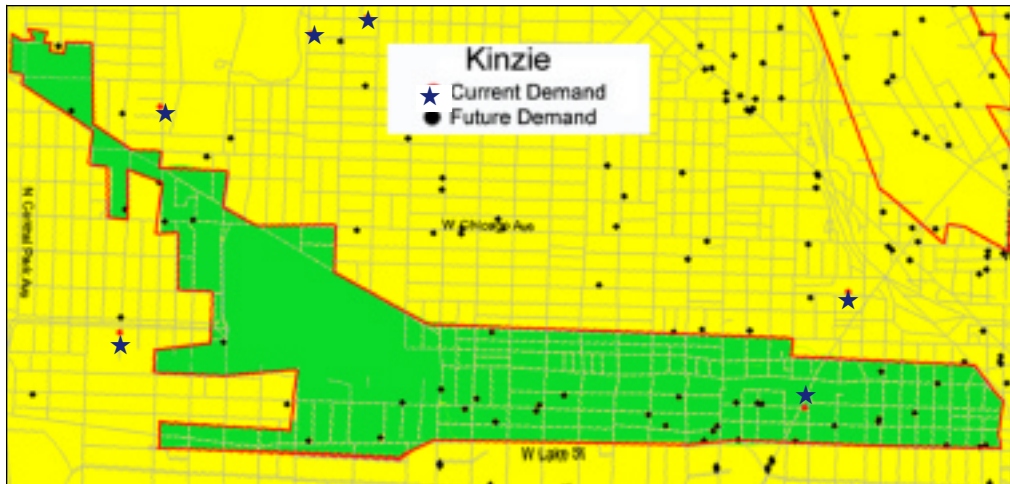
To further clarify demand patterns, Tangent examined a number of city-designated industrial corridors with high concentrations of technology firms. The key corridors include Pilsen, North Branch, Western/Ogden, and Kinzie. A fifth corridor, Stockyards, shows similar characteristics. The following maps show current and future sites of Level 3 demand in each respective corridor. Each of these corridors has in excess of 200 firms, 70 percent of which are expected to need fiber-type connectivity delivering Level 3 service by 2007. While these corridors do not necessarily have large numbers of pure technology firms, they do have a significant concentration of diverse industries that will benefit from technology applications and will therefore demand the appropriate broadband solutions to deliver that technology.

These corridors are vital for a number reasons with respect to any broadband initiative the City pursues:

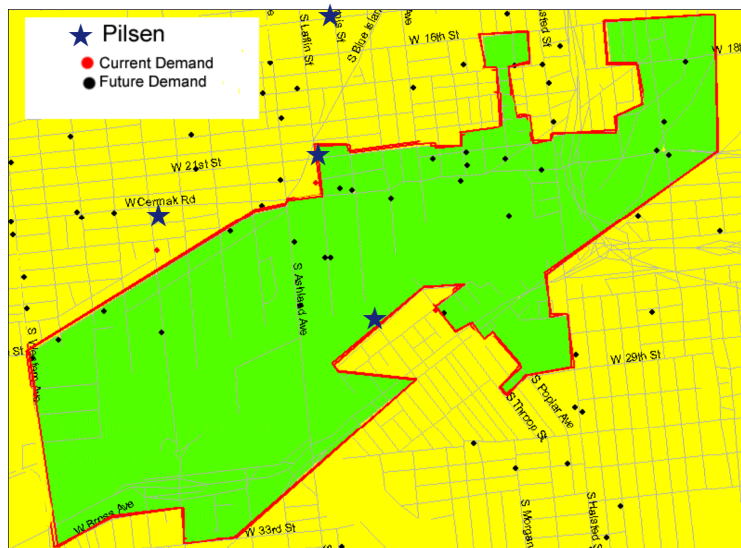
1. Each of these corridors appears to be an emerging center for economic growth.
2. Many of the SMBs located in these corridors demonstrate a growing need for broadband services.
3. The need for broadband in these areas will become acute over the next several years.
4. The most cost-effective solutions to addressing broadband infrastructure needs to be developed in order to make these corridors an attractive source of economic growth.

This last point will be discussed later in this study with regard to the "neighborhood node" strategy.

Map 3A: Kinzie Industrial Corridor



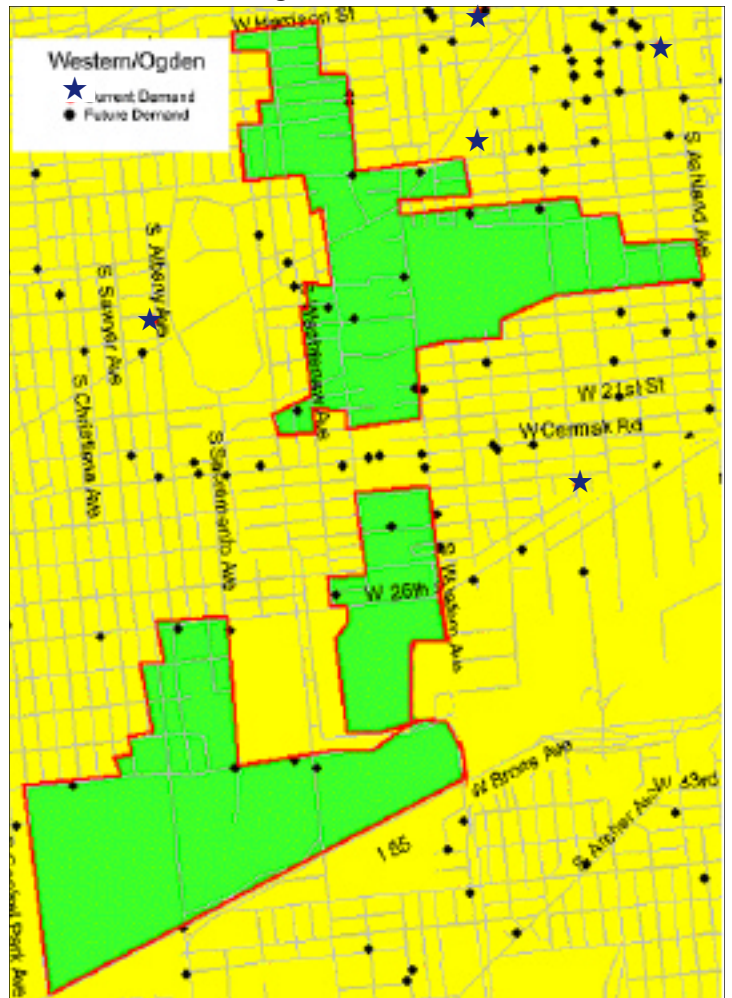
Map 3B: Pilsen Industrial Corridor



**Map 3C:
North Branch Industrial Corridor**



**Map 3D:
Western/Ogden Industrial Corridor**



Map 3E: Stockyards Industrial Corridor

