Latency Study
Greater Minneapolis-Saint Paul (GMSP)
Regional Economic Development Partnership
Executive Summary

The Greater MSP area is home to a rich supply of high density metro fiber infrastructure and diverse long-haul fiber routes. As such, the Minneapolis-St. Paul metropolitan area can serve as home to nearly any organization across a wide variety of vertical markets that require data, voice or video services.

Minneapolis-St. Paul Connectivity Highlights

- **The dense metropolitan fiber infrastructure** is comprised of more than a dozen different telecommunications companies providing a variety of high bandwidth services.
- **Long-haul fiber network routes originating from all directions transition through downtown core interconnection facilities.**
- **The area has seen many network upgrades over the last few years that have kept pace with bandwidth demand and advancements in data transport services.**
- **This fiber network growth and investment have helped improved latency figures to geographic markets around the country.**
- **The foundation of any telecommunications network is the long-haul fiber, and the accessibility of diverse infrastructure pathways or routes is one of the key elements in the creation of high-reliability networks. For instance, having two paths ensures that if one route failed the data could take the remaining route. Minneapolis-St. Paul has a diverse long-haul fiber infrastructure and offers the network resiliency desired by most companies considering the region.**

Minneapolis-St. Paul enjoys abundant connectivity throughout the metro and surrounding areas.
In addition to bandwidth availability, latency is a key consideration in data transport. By comparison, the Greater MSP region exhibits network latency characteristics that are...

- Slightly higher than Boston to New York
- Lower than New York City to Washington, D.C.
- Much lower than Miami to Atlanta
- Able to support virtually any latency-sensitive application
Report Background

NEF is a professional services firm that provides research, analysis, consulting and planning for large infrastructure projects such as fiber optic network deployments, municipal conduit systems, data center site selection and more. This study focuses on the network availability and latency of commercially available facilities-based telecommunications services that support the Greater Minneapolis-St. Paul area. The content herein includes background on latency as well as an analysis of long-haul routes and the related metro connectivity available to provide telecommunications network services. The information and analysis contained in this report is based on data obtained from a wide variety of sources including, but not limited to, service providers, in-house resources, historical records, interviews with subject matter experts and facility owners/operators.

For the network portion of the report, NEF focused primarily on facilities-based providers. Facilities-based service providers are those that own and operate their own fiber network. Some service providers routinely lease fiber from other service providers and some lease fiber when they are out of their own operating area. Of the facilities-based service providers, some will lease dark fiber to other service providers or end users, while others only sell telecommunications or "lit" services.

Most service providers have been generous in providing network maps and information; however, many do not allow public dissemination of their routes. The physical layer of networks is always expanding, and the service providers and their services continue to evolve. The service providers will always have the most up-to-date network and service information available. The service providers are presented in no specific order in keeping with NEF's provider-neutral position. The maps used in this analysis show the routes fiber networks take into, and near, the locations of interest.

The NEF team of analysts strives to be accurate and thorough in the research and creation of this report; and while reasonable care has been taken in the preparation of this report, there is the possibility of errors and omissions in facts, figures or material. Information, statistics and data from a wide span of time has been included for the directional and historical value it represents. The intent of this report is to provide data and analysis that would be valuable in an office, relocation or data center site selection process and is not meant to take the place of any due diligence, specific investigatory work or similar fact finding endeavors.
Network Overview

The rich fiber infrastructure in the immediate Greater Minneapolis-St. Paul and surrounding area could support most any operation up to and including a Tier 4 data center. The region’s physical network availability is important because a data center without ample fiber-based network connections is virtually useless, as the viability and success of any network or data center is amplified by its connections to the outside world. Networks that support a data center have many different characteristics that affect their capabilities, reliability and performance. In addition to latency, components such as path diversity (ingress/egress), long-haul networks and metro networks are the key factors in evaluating a location or data center’s network connectivity. The following explanations illuminate each facet of the network in Minneapolis-St. Paul.

Latency

The latency requirements of virtually any application can be met in Minneapolis-St. Paul with the proper network and supporting infrastructure design. The rare latency-sensitive exceptions would include synchronous replication or active/active application where the latency must be less than 6-7 milliseconds. It is always recommended that carriers make improvements to decrease the latency on the long-haul networks by optimizing, modernizing or upgrading the network components. The paths can also be straightened to further decrease the distances and the effective latency along these routes. Normally, when an optimization effort is undertaken, the metro and long-haul fiber is streamlined as part of the process.

A specialized, low latency design could be implemented to further reduce latency to approximately 15% lower than currently latency measurements. Such a specialized route could require a sizable investment to implement but would likely be feasible based on the route analysis. The current latency figures are derived from a mix of available carriers and represents an average available latency.

Path Diversity (Ingress/Egress)

Having one entry point into a data center is a recipe for systematic failure. The network reliability of a data center, whether leased or owned, is directly affected by the diversity of fiber network paths entering and exiting a facility. Consequently, it is vital to understand and ensure that there are multiple ingress/egress paths, diverse service providers and some controlled and documented system for managing this critical aspect of the data center’s connectivity.

The standard rating system for data centers revolves around uptime, which is a percentage that states how reliable a data center operates with a focus on redundancy and diversity. For example, a Tier 4 rating indicates that any two systems operate completely independently of one another. Many Tier 3 & 4 data centers have at least three (3) or four (4) ingress/egress systems in place, managing the fiber that touches their facilities in a diverse, secure and controlled method.
Long-Haul Networks

The long-haul networks are fiber-optic based networks that provide a standardized method of transporting traffic from state-to-state and city-to-city. They can be visualized like the highway system that crisscrosses the United States. In relation to data centers, long-haul networks are the key backbone for transporting data and voice services as they "mesh" with the local and metro networks to ensure that the traffic gets delivered.

Long-haul networks are typically designed to transport data and voice services between major markets. These networks connect to a central "hub" facility (data center) in a given city and then exit the city in another direction. Most of the major metropolitan areas in the United States have robust and diverse connections to long-haul networks.

(See the US Long-Haul Networks Diagram.)
Long-Haul Network Details

The Greater Minneapolis-St. Paul area is supported by many different long-haul networks. The primary northern long-haul route, which transitions through Chicago, traverses straight through the center of the region. This route can connect directly to Chicago allowing access to a wide variety of optimized, low latency and ultra-low latency networks. Chicago is one of the top Internet peering points in the United States. This route also connects directly to Seattle using an optimized route design to support lower latency applications. There is a total of nine (9) other long-haul network service providers that support the Minneapolis-St. Paul region. These long-haul networks, combined with the many available metro networks, ensure that region can support a large variety of corporate business applications as well as commercial/retail data centers.

Data centers act as the beginning and end points for long-haul segments of fiber between two major metropolitan areas. These facilities house the equipment used to light the fiber segments. The type of equipment is based on a variety of factors such as the age of the network, services deployed and cost. Typical configurations for fiber-based long-haul services are SONET and DWDM (wavelengths). Some metro Ethernet is used but typically only on shorter inter-metro configurations like Minneapolis to St. Paul.

Most long-haul networks connect to large, well-established data centers because there the long-haul networks interface with the metro network distribution system. Many metro-area service providers can then increase their service offerings by utilizing the available long-haul networks. In addition to providing long-haul transport, the same networks and network paths provide the backbone for the Internet and the various Layer 2 & Layer 3 networks throughout the world. This is why there are several different long-haul fiber paths and providers going into major metropolitan areas.

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Metro Networks & Map

Metro networks are more like the side streets and roads that support transportation within the town or city. As with the road infrastructure, metro networks typically have some kind of “on-ramp” to the long-haul network. This “on-ramp” connection is oftentimes the same “hub” where the long-haul networks terminate or transition through in a given area. Most metro networks are dynamic and built on customer demand. Many are built in a protected ring fashion, while others are built in a linear fashion to provide services to a single building. Regardless of their design, the metro networks are critical in providing the link to the long-haul and existing data centers in a given area. In the case of Minneapolis, for instance, most networks touch or can touch the “511 Building” at 511 11th Street in the core of the city.
Carrier Hotel & Data Centers

Minneapolis is an emerging market for colocation, and according to CNBC, Minnesota is among America’s Top States for Business. With these distinctions come bandwidth demand and the need for ample fiber optics. Plentiful fiber-based infrastructure, which also has physical path diversity sourced from multiple service providers, is a key requirement for great connectivity, but that fiber must be managed and controlled by equipment. More importantly, these fiber-based networks must be able to connect at meeting points and pass traffic to one another. Without this step, it would be like a supply truck driving down a road only to find a dead end.

Fiber optic networks traverse metro and rural areas, but they must converge at data centers and carrier hotels. A carrier hotel is a type of data center that serves as a central facility for numerous service providers to store and operate equipment. These buildings optimize interconnectivity by providing colocation on a massive scale. More importantly, these facilities need to be where the demand is greatest – in the center of the metropolitan area. Every major city has at least one key hub or carrier hotel location where all of the elements of networks meet. Carrier hotels have emerged as information hubs, and their prime locations ensure efficiency as most data, voice and video traffic transits through them en route to a destination. But carrier hotels are only as useful as the carrier diversity and fiber-based connections they offer.

In addition to being interconnected with other carrier hotels, the best facilities have the following attributes:

- No less than six (6) metro fiber networks with diverse pathways
- A designated “meet-me” room for carriers
- Two (2) power sources
- No less than four (4) entrances that are physically separate
- Multiple direct long-haul fiber system connections
- No less than 10 service providers, which can include long-haul networks, with 20 the preferred benchmark

The more hubs in a given city, the more robust and diverse the network. Minneapolis-St. Paul has over 20 data centers, many of which have exceptional fiber connectivity and resemble a carrier hotel. Key locations have all of the connectivity options, content provider customer base and long-haul route penetration that truly make them preeminent carrier hotels.
Cloud - CDNs

There are hundreds of companies promoting their cloud service offerings and content delivery network (CDN) capabilities. Most of these companies are small and very regionalized in their offerings; and quite often they disappear as quickly as they appeared. However, there are a significant number of options in GMSP for both cloud and CDNs that have long-term staying power and have national or even international offerings.

The monster content companies such as Amazon, Apple, Google and Microsoft all have very advanced networks capable of supporting cloud and content delivery applications. There are others that are equally or potentially more qualified to provide these services such as AT&T, Verizon (Terremark), CenturyLink, HP, Akamai and IBM.

The simplistic definitions of cloud and CDN differ, but only by a few degrees:

Cloud Computing/Service = Computing as a service or software as a service, typically through a web-based network

Content Delivery Network (CDN) = An optimized network with servers that allow for the efficient transportation, storage and presentation of data or media at a local level

The core components of both of these services require flexible, high-capacity, well optimized networks. These networks are comprised of similar components:

1. Metro Ethernet
2. Long-haul network elements
3. Data centers (aggregation points)

Virtually all of the cloud or CDNs utilize the same underlying infrastructure components in the countries and cities in which they operate. The difference, often subtle, is in the software, network designs, connection densities and other similar nuances. The core networks are almost always the same, in particular the all-important long-haul transportation network that provides the path to the broader world.

The adoption of cloud services by small to large businesses alike has driven the need for data centers to locate these services in their facilities. The cloud services in the Minneapolis-St. Paul region have started to feel some of the benefits of the cloud demand. EdgeConneX opened a data center in Eden Prairie, as they partnered with Comcast to bring next generation offering to the region. The lift in cloud demand has been positive for the area because it has brought services much closer. Prior to companies like EdgeConneX moving into the region with their cloud offering, the closest cloud services were available in Milwaukee and Chicago. Today, many of the area data centers now have cloud offerings in Minneapolis at the 511 building and many other locations in the Minneapolis-St. Paul area. Like most of the major metropolitan areas in which these cloud companies operate, there are at least two connection points for the cloud/CDNs. Today many of the local area’s operating data center facilities have edge-connections to many of these platforms.
Internet Exchange Points

There is one Internet Exchange Point in all of Minnesota, The Midwest Internet Cooperative Exchange located in the 511 building in Minneapolis. This IXC was created to improve the Internet connectivity and performance, as well as reduce the cost by keeping the local traffic in the upper Midwest. Companies like Google, Yahoo and Netflix have a presence that take advantage of the peering for better connectivity.
Latency Background

Latency is defined as the time it takes for data to be transmitted from one point to another across a network platform. Normally, this is expressed as Round Trip Delay (RTD) as data is sent and an acknowledgment of that data being received must be returned to the sender to ensure validity is maintained.

In telecom networks, latency is the term used to describe the amount of time it takes for data to travel round-trip from a point to a destination and back. Extrinsic factors businesses face such as competition, compliance or software applications drive the need for latency sensitive networks. For some businesses latency is a critical requirement in their IT infrastructure planning and for others a “nice to have” element of their network. Still others may not have any need for a lower latency network solution. It has become an important enough element of network design that companies should at least be aware of latency and how it affects their IT infrastructure and related applications that drive their business.

Multiple factors affect latency such as physical distance, natural and man-made obstructions, equipment and data processing. Fiber optic technology is based on light as a medium, and the speed of light travels at approximately 186,000 miles per second, which equates to 700 million miles per hour (299,792,458 meters per second). However, current technology has not completely harnessed nature’s capabilities, so even with fiber optics, which is a transmission media capable of bending and controlling light-waves, only 80-85% of the speed of light can be achieved with today’s equipment.

The general rule of thumb for calculating latency is using 8.2 microseconds per mile for a fiber-based solution with newer equipment designs.

The latency of a terrestrial network is based on two main factors:

- Fiber route length (most important factor)
- Architecture (metro Ethernet, optical waves, hybrid)

Because the actual length of the fiber route is the overriding element in calculating latency, long-haul fiber has the greatest impact on the speed of a network. In calculating long-haul latency, the metro network latency must be factored in to the measurement along with the long-haul paths themselves. Because metro networks are typically built over shorter distances, their effect on the overall latency is relatively minimal. However, there are cases where the metro network design and equipment are not optimized to support latency-sensitive services.

Compounding the inefficiencies of human-created media and technology, deployed fiber optic networks rarely follow a straight and direct line. Instead, networks have followed the railways, highways and transportation corridors which are never straight due to geological obstacles and right-of-way disputes. Most of the networks that are currently available are not “as the crow flies” routes. However, many providers have optimized their routes to create shorter connects between two points.

Companies with a business model based on speed of data transmission are constantly seeking a faster network alternative, and in turn, fiber providers have sought to create solutions that address that demand. In some cases, these “ultra” low latency networks use a microwave transmission design because such a design is considered “line of sight” which delivers the shortest possible distance between two points. Deploying this technology has its drawbacks, but for some applications it is the best fit.
The majority of latency sensitive networks are centered on similar locations or hubs and thus, several providers have optimized fibers along a specific path in order to create low latency routes between two points. The optimization focuses on the two key factors of physical path distance and the latest advancements in equipment. These routes are typically owned by larger providers including AT&T, Verizon, Windstream and Level3; however, there are some smaller, niche providers that focus their business entirely around offering the lowest latency services available. Their networks are designed, deployed and optimized solely for the purpose of being faster than the next.

Types of Networks

There are five (5) basic types of network architectures that are prevalent in the industry, as they apply to latency and transport services:

1. Long-haul Legacy Non-Optimized
2. Long-haul Optimized
3. Low Latency Networks
4. Ultra-Low Latency Networks
5. Metro Networks

Long-Haul Legacy – are essentially networks that are older (15 plus years,) both in regard to the equipment powering the networks as well as the fiber that was deployed. As in most things of our world, efficiency and capabilities tend to increase considerably over time. These older networks have equipment that was primarily designed for lower speed networks, with very little emphasis on latency. Technically, these networks were designed and deployed primarily for voice.

Long-Haul Optimized – are essentially networks that have either undergone optical gear upgrades, some redesigns to cut out excess fiber mileage or generally been "optimized" to provide more capabilities and lower latencies between city pairs.

Low Latency Networks – these networks were specifically engineered and designed (and continue to be) to provide exceptional latency characteristics at higher bandwidth (typically 10Gigabit.) Initially, these networks were deployed or optimized for the financial services sector, but as the low latency demand has increased for other business applications more of these low latency networks are being deployed or created. For instance, there are over eight low latency networks between Chicago and New York City today.

Ultra-Low Latency Networks – these networks were purpose-built using the straightest paths possible to ensure that the minimum latencies were achieved between two points. To date, these networks have been deployed exclusively for the financial services sector as their costs are extremely high. Some of these networks are using point-to-point microwave to create the shortest possible path between two points. As in all things telecom, these networks will be open for use by other business applications as the costs come down. Most of these networks are configured between New York, Chicago, New Jersey, Washington DC, Philadelphia and London.

Metro Networks – as previously stated, metro networks typically “hub” from a carrier hotel or large data center. In the case of Boston, for instance, most networks touch or can touch 1 Summer Street in the core of the city. This kind of design ensures that you get many interconnection options to both metro networks as well as the long-haul. Essentially, these hubs act as the backbone of the modern day Internet for each city. Normally, there are multiple hubs in each city.

Because every network has its own characteristic, the latency associated with metro networks is a critical piece of the latency equation. One service provider might use SONET architecture, which will have very good latency characteristics for some applications; while another provider might use older Metro Ethernet equipment that could add 10-15 millisecond of latency, depending upon the design. The long haul transport...
latency can be fixed, especially in an all Layer 1 optical network; where the latency in a metro network can fluctuate based on the number of nodes or “hops.” This can be done by designing metro networks as Layer 1 (pure transport,) but most operate on a Layer 2 or Layer 3 architecture, which has more latency.

Historical Perspective of Latency

Latency has always been an issue in one form or another in communications. From postal mail a few centuries ago to today’s cutting edge global communications networks, transmitting information faster from one point to another has always been the goal. When voice calls had to be manually patched through by an operator, it was annoying enough that an undertaker named Almon Strowger invented a switch to replace the manual operator patch panels. More recently, the wireless telecommunications and Internet revolution created latency issues that had to be addressed by innovation. Many can recall the early days of AOL and other destination web-based services that were wrought with inefficiencies and slow delivery.

There have been many advances in equipment, networks and the respective applications all focused on negating or limiting the effects of latency. However, because latency is a factor in voice, video, storage, transactional and a variety of other applications or services, companies should be mindful when selecting facilities to ensure that required services can be delivered.

The New Latency Dynamic – Financial Networks

Around 2006, financial institutions and hedge funds became a powerful force driving low latency networks. Financial firms began to understand and exploit the variations in latency and created divisions within their companies that focused on trading financial instruments. These groups are known as algorithmic and high frequency traders.

Algorithmic Trading (algo) – is automatic trading methodology based on the use of software applications that enter and manage trade orders using mathematically-based rules with no manual intervention.

High Frequency Trading (HFT) – an off-shoot of algo trading, high frequency trading takes transactions involving world markets to a new level, manufacturing fractional cents based on the timing of the trades and the speed of the transactions. This niche’s entire existence revolves around creating the lowest latency possible.

Speculations of profits associated with algo/HFT are as numerous as the dollars themselves. It has been postulated that firms that employ these trading techniques made profits in excess of $20 billion in 2009. In recent discussions with industry players, NEF has learned that a first place position in trading (lowest possible latency for a single financial instrument) is thought to be worth in excess of $20 million per month. It stands to reason that the amount of money spent by these firms to ensure their networks are streamlined and optimized is substantial.

This demand for reduced latency created new fiber pathways between financial hubs, most notably Chicago to New York, Chicago to Washington DC and New York to Washington, DC. While other low latency paths that have been created, the Chicago-NY-DC routes are the main networks that have been built or optimized to satisfy the push to create “zero” latency. These routes reflect the locations of the two largest financial areas within the United States, NY and Chicago. The Washington, DC destination is used primarily for data associated with the algorithmic trading programs.
Fast or Slow – Content Delivery

Content Delivery Networks, also known as CDNs, are simply large, national or international, well-distributed networks that interconnect at the carrier hotels or data centers along the path. In simplest terms, these networks power much of the Internet. Think of all the applications like Facebook, Twitter, YouTube, even on-line banking, etc. These sites are all using some kind of CDN to create the best delivery of services. When a user clicks on a webpage, quite a bit goes on in the background during the time it takes for the user to see the result of his or her click. The CDNs are responsible for making sure the Internet experience is the best that it can be within the limits of both a network connection and a network’s capabilities. **Figure 1: Visualization of CDN**

Latency in this instance is simply delay. If a user has too much delay in a video, for example, the user would quickly become disenchanted with the video and move on to something else. The value in a well optimized, high performance CDN can be clearly seen in companies like Amazon or Google, where most transactions happen as fast as a user can click, with the only limiting factor being the connection speed to their services. If a business requires content, video, and/or streams of data for its workforce, then the experience is only as good as the company’s connection to the networks that provide such quality content.

Real-Time Data – Storage/Replication, Cloud or Intelligence

From large, multi-national enterprises to small, local companies, today’s businesses run on core applications that either generate revenue or are used to manage operations or both. Consequently, companies require a network design that enables applications to run smoothly and ensures the survival or continuance of their business in the event of a failure or a catastrophe. Such a design includes factoring in some level of system redundancy and diversity; this includes alternative data centers or off-site storage/replication facilities. Latency is one of key components to understand, calculate and manage to ensure the required applications work effectively to support the business.

Physical location is the primary factor in calculating network latency, as it would apply to any application demanding real-time performance. For example, if a company locates a primary or alternative critical network element in a remote location that has poor network connectivity options or is too far from their corporate core network, the application’s response time would ultimately be delayed by the connection. This delay could impact the business as a whole, even hampering revenue generation in some cases. Types of business applications that are latency-sensitive include the following:

- **Storage/Replication**
- **Cloud Computing**
- **Business Intelligence**
Storage/Replication applications or systems are designed for the specialty task of creating fault tolerance by replicating all critical and non-critical data or programs. For example, if there were a failure in the system, even with an operational server that supported one component of a business process, the storage/replication application would allow for the system managers to restore the critical process in a very short timeframe.

Obviously, latency could be a very important factor in such a restoration, as the business process would be stopped until such time as the restoration and reintegration was completed. In the past, this restoration could take hours or even days. In today’s network environment, these applications have reduced this kind of restoration to milliseconds in some cases. Real-time business data must be stored and replicated as quickly as the network can allow.

Cloud Computing applications are remotely hosted services that support an organization. The cloud could be internal data-oriented systems or applications spread across multiple physical locations, or the cloud can refer to an external, managed service provided by companies like Amazon, Apple, Microsoft or Google. Typically, cloud computing is used to reduce costs of the programs themselves or the management of the infrastructure to support hundreds of users.

An example of a cloud-based application can be illustrated with a 500 employee operation which runs document processing using remotely hosted applications like Word, Excel or PowerPoint. The users simply use the programs as if they existed on their desktop computers, when in fact the programs and the documents are being stored or manipulated at the remote hosting facility. Latency in the context of this cloud related example could be seen and measured in the delay to a user in opening an application or a document. This latency or delay has a cost to the individual and the organization and is an expense that companies are constantly attempting to reduce or eliminate to optimize productivity.

Business Intelligence (BI) applications are an umbrella of many different applications and their respective datasets which are used to provide insight and decision-making for the business. BI networks have grown tremendously over the years, and more recently have become real-time components of large businesses and revenue machines in their own right. Any application that operates based on real-time effectively demands an effort to reduce latency. BI network designers have three areas of concern when it comes to latency:

- **Data latency** – how quickly the data is available – mostly external network and equipment functions
- **Analysis latency** – how quickly the data can be digested – mostly internal design functions
- **Action latency** – how quickly results can be disseminated – both internal and external functions

If the network speed is too slow, the real-time intelligence tool quickly loses value and the investment associated with the application becomes wasted. Latency is a key variable.
Disclaimer

While the information contained in this report is based on information obtained from sources which are believed to be reliable, it has not all been independently verified by New England Fiber, Inc. ("NEF"). NEF makes no representations or warranties, express or implied, that the information in this report is accurate, up-to-date, complete or fit for the purpose for which it is required, and NEF disclaims any liability for the use of this information. To the maximum extent permitted by law, neither NEF nor any other affiliate of NEF will be liable to any party in contract, tort (including for negligence) or otherwise for any loss or damage, including, but not limited, to incidental, consequential, indirect or punitive damages arising either directly or indirectly as a result of reliance on, or use of, this report. This report may contain third party information and references to third parties. Such third party information does not necessarily represent the opinion of NEF and links to third-party sites are provided for convenience only. NEF does not express any opinion on the content of such third party information or sites and expressly disclaims any liability for all third-party information and the use of it.

Quality & Integrity of Information

Because the information contained in this report and derived from the database is used to make decisions requiring significant capital investment, the accuracy of the information is critical. As such, NEF includes the following:

- Maps and data from nearly every alternative access carrier and data center provider updated quarterly or at least once per year
- Monthly updates to the lit building database
- Data resolution of the network assets or data center down to street level, including lit building connectivity, interconnect points, and carrier POPs updated by the carriers themselves
- If applicable, budgetary estimates
NEF Background & Expertise

For over a decade, NEF has delivered high capacity telecommunications and data center solutions ranging from concept/design to installation and upgrades – and everything in between. NEF offers a unique solution suite aimed at addressing client needs at any stage of the infrastructure lifecycle. The expert consultants at NEF can provide insights on network and colocation planning while the team of experienced brokers on the NEF team can research, compare and negotiate among hundreds of provider options to optimize clients’ services and budgets.

While our legacy is in dark fiber, those custom private optical networks were just the start. In 2004, NEF began as a primary source for a Boston-area utility company’s dark fiber network and quickly grew into the trusted resource for any high capacity optical fiber network or colocation solution. NEF has designed and deployed telecom networks for organizations ranging from enterprises, educational institutions, healthcare networks, global financial services firms, and even data center operators and carriers.

Deep experience and expertise in bandwidth intensive networks enables NEF to present connectivity and data center solutions that serve initial requirements as well as an organization’s long-term best interests. We seek to understand what the needs and challenges are today and how communications needs might change in the future.

NEF leverages the following:

- **FiberLocator**, the proprietary centralized searchable database of network assets, commercial buildings and data centers
- More than 100 combined years of telecommunications experience yielding an aggregated base of tribal knowledge and relationships that simply cannot be obtained through traditional sources
- Both depth and breadth of knowledge accumulated from managing projects for hundreds of clients of various sizes, in differing industries, with project sizes ranging from small business local data center deployments to international enterprise network infrastructure
- Knowledge of the latest equipment and platforms to fit requirements and budget
Greater MSP Latency Study

Available Consulting Services

As enterprises demand more from their communications networks, NEF works as a trusted adviser to provide information and services to deliver performance and ROI. Whatever the goals of an organization, NEF understands the need for robust, scalable and affordable networks. This report’s information provides insights and recommendations designed to do the following:

- Identify location options
- Address scalability requirements
- Optimize telecom budgets
- Maximize efficiency, including low-latency options

NEF utilizes its proprietary suite of database resources along with tribal knowledge and numerous industry relationships to add measured value to your search for connectivity. Having implemented thousands of network solutions over the past few decades, as well as helping organizations avoid costly builds in the wrong places, NEF leverages deep telecommunications experience to provide no-nonsense assessments and provider-neutral recommendations, including the following:

- Go/no-go recommendations on feasibility or availability
- Reports on available providers
- Pricing for available providers (near-net and on-net)

Online reviews of options/solutions in FiberLocator

By employing its knowledge, reach and carrier-neutrality, NEF has created a report designed specifically to help organizations avoid costly mistakes in buying the wrong network from the wrong provider. NEF works to ensure companies don’t invest in a building without knowing its network capabilities first. NEF’s deep and focused high cap and colo expertise, access to millions of fiber miles, and carrier-neutral mission enables trusted recommendations on the best, most feasible network solutions.