THE CITY OF BIG BROADBAND SHOULDERS

Chicago and AT&T Lead the Way to Wireless Expansion With Outdoor DAS and Micro Trenching

ALSO INSIDE:
- LTE: Change Is In The Air
- Choosy Providers Choose...
- Evolution or Revolution?
- The Copper Rush
- When Copper Poses As Fiber
Wireless data traffic on the AT&T network has grown exponentially over the past several years, largely attributed to the increasing popularity of advanced smart phones.

To meet the demand while maintaining the performance of the nation’s fastest mobile broadband network, AT&T is deploying additional wireless spectrum across the country. This network enhancement includes the addition of new layers of frequency to increase capacity at local cell sites. The result is an increased allocation of network resources for AT&T’s network to support the ever-growing demand for mobile services.

Beyond adding spectrum to traditional cell sites, AT&T is also adding newly deployed Distributed Antenna Systems (DAS) in high wireless use areas, such
as densely populated business districts, high use neighborhoods, and festival areas, where traditional cell towers are not feasible. (See Figure 1.)

The DAS network architecture supplements traditional macro-cell wireless infrastructure, such as towers, through a series of antenna locations connected to a common source via fiber optic cable. In outdoor environments, DAS antennas are typically mounted on existing structures, primarily street lights or utility poles. (See Figure 2.) The DAS network increases capacity and coverage through the use of many antenna locations, each with a relatively small and localized coverage area. Utilizing DAS antennas with localized coverage areas allows each DAS antenna to use the same spectrum bands as the traditional cell sites. The ability to provide improved wireless coverage, increase voice and data traffic capacity, and improved spectrum efficiency, makes the DAS network architecture an important element of a carrier’s national wireless infrastructure and its broadband and public safety strategies.

AT&T’s recent DAS deployment in the central business district in the City of Chicago, the company’s first and largest fully AT&T-owned DAS network in the country to date, demonstrates that forward thinking and innovative public policy can open doors to increased private sector investment and enable companies to offer the innovative broadband wireless services that consumers and businesses are demanding.

Why Chicago?

Incorporated as a city in 1837, Chicago was ideally situated to take advantage of the trading possibilities created by the nation’s westward expansion. The completion of the Illinois and Michigan Canal created a water link between the Great Lakes and the Mississippi River, but the canal was soon rendered obsolete by railroads. Today, half of U.S. rail freight continues to pass through Chicago, even as the city has become one of the nation’s busiest aviation centers, thanks to O’Hare and Midway International airports. But the modern day communications link for both commercial and personal transactions is broadband wireless service.

Today, Chicago, like other great cities of the world, relies on private sector broadband wireless infrastructure to support its vibrant commercial and entertainment hubs. Residents, workers, and tourists in the City of Chicago rely on wireless broadband at a tremendous and increasing rate. Professionals in The Loop use smart devices in the office and on the street to conduct business, which results in massive data transmission. Festival traffic, theatre-goers, tourists, and shoppers frequently convene at a given moment, and strain wireless broadband capacity. The City of Chicago recognized that AT&T’s interest in expanding its DAS network to provide better and permanent wireless coverage in downtown Chicago, in Millennium

Figure 1. DAS equipment on traffic light pole near Grant Park.

Figure 2. DAS equipment on traffic light pole near Millennium Park.

Figure 3. DAS equipment on street light pole in densely populated residential area.
and Grant Parks, and in other high use or festival/activity areas, was good for the City.

“The City of Chicago has a rich history of communication infrastructure innovation. We recognize our citizens and commercial enterprises increasingly rely on mobile networks to stay connected and to fuel economic growth,” said Pat Harney, Deputy Chief of Staff for Infrastructure. Harney initially reviewed the proposed use of Micro Trenching and formed a cross department team to evaluate this new proposed construction method.

That review was lead by the Chicago Department of Transportation (CDOT). “CDOT is always exploring new concepts to meet Chicago's needs for infrastructure improvements,” said John Bills, Managing Deputy Commissioner of CDOT.

The deployment of DAS provides certain challenges in metro areas, which are extremely congested with other utility providers and have high vehicular and pedestrian traffic levels. However, 2 significant barriers to DAS deployment that still unnecessarily exist can be solved with good public policy decisions. The first unnecessary barrier is protracted negotiations with utility companies or municipalities over wireless attachments, which stymie infrastructure deployments. Second, the need to connect the numerous DAS antennas via fiber optic cable to a common source can prove prohibitively costly in urban areas if traditional open-cut street trenching is required.

The first barrier, access to City poles, was eliminated by the Chicago City Council in 2005, when they voted 49-0 to amend the Municipal Code, Chapter 10-29, to authorize private parties to request permission to attach DAS equipment to City light and traffic poles “to enhance better wireless service”. If a DAS request is consistent with the Code, no additional City Council approval is necessary. Permits are issued by the CDOT and the Office of Emergency Management and Communications (OEMC), with input from the City’s Chief Information Officer and the Streets and Sanitation Commissioner. At least 20 days prior to the issuance of any permit for the installation of equipment of City poles, notice must be provided to the Alderman in the Ward where the pole is located.

After the Municipal Code was amended, detailed regulations were issued to make the application process well documented and transparent. The pole application process involves two phases. AT&T found this pole application process to be thorough and well planned. The City, in particular CDOT, was responsive and well organized. Working with multiple City Departments, AT&T obtained access to the City poles needed to bring its project to fruition. (See Figure 3 and Figure 4.)

“Step 1. Once a site has been selected for a Micro Trench installation and the engineers have prepared their plans for the job, the construction team begins their work.

Step 2. The Micro Trench route is carefully marked, taking into considerations existing utility locate positions.

Digging into Micro Trenching

Micro Ducts are installed at a depth below typical street resurfacing dimensions and therefore do not require relocation for resurfacing. In addition, the narrow cut and minimal depth results in minimal sub-grade disruption, thus reducing deterioration impacts. The narrow cut reduces compressive impacts caused by typical trench restoration. Metallic wires are installed in the Micro Duct for subsequent installation.

The second barrier, a cost-effective fiber optic connection to the DAS pole, was knocked down by innovative and forward-looking actions by CDOT. For the first time, CDOT approved the pilot use of Micro Trenching, rather than open-cut trenching. CDOT was impressed with the versatility of Micro Trenching, which can be installed in sidewalks or streets.

“This project strengthens mobile networks in downtown Chicago through Micro Trenching between City poles and existing network connections under City streets which allows wireless providers to make important network upgrades with minimal construction and subsurface disturbance to City public right of way while also minimizing traffic and pedestrian impact,” said John Bills. “We believe this pilot project to be a successful public-private partnership to help residents, businesses, and visitors to Chicago.”
Step 3. Since the depth of the Micro Trench is relatively shallow, and to avoid digging a pit, the pathway will generally enter an AT&T manhole through a core drill from the street above.

Step 4. The saw used should be selected to provide the required depth of cut.

Step 5. A clean surface will help bonding between the restoration material and the trench walls, therefore, light sandblasting and vacuuming is used to remove any debris in the trench and clean the surface.

Step 6. Once the trench has been properly prepared, a layer of sand or equivalent is spread into the trench to help insulate and protect it from heat and compression.

Step 7. The Micro Duct is slotted into the trench until it makes contact with the bottom sand layer.

Step 8. After installing an additional layer of sand over the Micro Duct, a foam backer rod is installed to provide insulation and heat dissipation.

Step 9. Upon completion of the backer rod installation, the crew ensures that the trench depth is uniform.

Step 10. A self-bonding hot fill polymer asphalt aggregate is heated and poured into the trench over the backer rod.

Step 11. The cut can be ‘camouflaged’ by spreading quartz topping over the hot asphalt mixture.
Micro Trenching along with the vision and partnership of the City of Chicago provided an innovative approach to a unique urban situation.

“This is truly a story of how smart government policies make a difference in the everyday lives of consumers and employers. First, the State of Illinois adopted a new telecommunications law to encourage private sector investment in the state. Then, the City of Chicago backed an innovative approach to strengthen the mobile network while minimizing the interruption on the public,” said Paul La Schiazza, President, AT&T Illinois. “The result is a stronger mobile network that citizens and businesses can rely on for public health, safety, commerce, and entertainment. In this story, everyone wins.”

Chicago has a long standing tradition of a big city “that works”. At the pace they are going, their moniker may need to be replaced with “the city of big broadband shoulders”.

AT&T would like to acknowledge and thank the following organizations for their assistance in making the Chicago Outdoor DAS Project possible: City of Chicago, ComEd, Geo-Path, and A-D Technologies.

Jim Gerber is Assistant Vice President, Construction & Engineering, AT&T. He has more than 27 years of experience with AT&T in various Network assignments. For more information, email jg2176@att.com.