# 5G NETWORK PLANNING WITH GEOSPATIAL INTELLIGENCE

## Four Use Cases for Telecommunications

24 March 2019
New York City, NY

## INTRODUCTION

The reality of 5G networks being implemented across the globe is fast approaching. Businesses and consumers alike demand faster network speed with more capacity, requiring an increase in data service from megabits (Mbps) to gigabits (Gbps). Rolling out this new network comes with specific deployment challenges to efficiently plan, design, and maintain the new networks. How can telecom companies more effectively plan for the next wave of wireless technology? Geospatial intelligence offers an innovative solution, allowing for an appropriate level of oversight with high-resolution source data.

## HIGH FIDELITY MEANS LOW RISK: LEVERAGING ACCURATE LOCATION DATA IN 5G ROLLOUTS

### MICROWAVE QUALIFICATION

A major wireless provider in the United States approached Nearmap with a microwave qualification issue they were facing. The company's backhaul team needed a resilient microwave network connecting multiple buildings in a ring pattern. Identifying sites where Line of Sight (LOS) was feasible without any obstructions was a real challenge. Nearmap offered a solution: high-resolution digital surface models (DSM) and true ortho imagery to calculate Fresnel zones between sites.

As a demonstration in Atlanta, Nearmap picked three street level lamppost locations and four locations on top of high-rise buildings. Using high-resolution DSM and true ortho imagery, obstructions in the Fresnel zone were computed for each side (Figure 1). The link 0 | 2 (Fig 1) appears to be clear but the results indicate an issue. Upon zooming in on the image (Figure 2), an obstruction of 40-60cm—due to a tree branch—becomes visible. The deployment team could now plan around the obstruction by moving Site 0 in a southeast direction. The plot of qualified links (Figure 3) now provided a starting point for the deployment team to design their network with confidence.

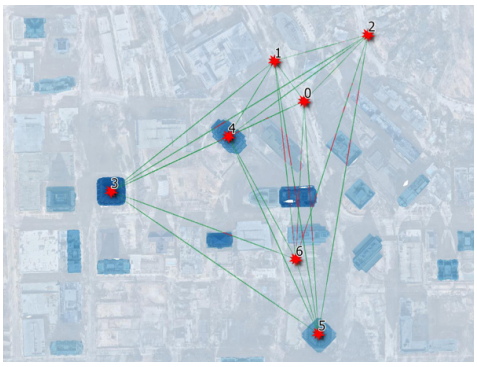


Figure 1

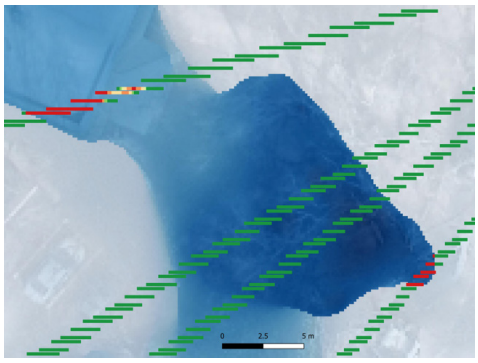


Figure 2

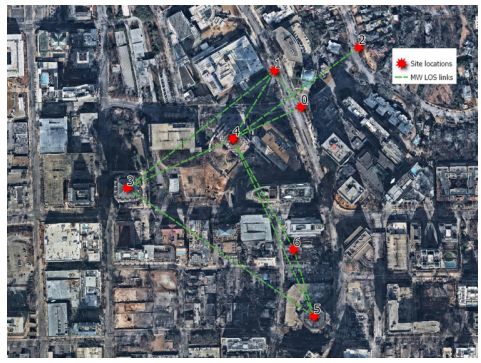



Figure 3

A clear advantage of using Nearmap's high-resolution DSM and true ortho imagery? All of the plotting work could be done remotely, without the need for repeated site visits, improving accuracy and lowering planning costs.

## 5G MMWAVE PROPOGATION MODELING

The greatest challenge telecommunications operators will face with 5G is deploying millimeter wave (mmWave) bands. While mmWave comes with the promise of offering a rate of Gbps of data per user, no telco operator has any experience in deploying bands greater than 6GHz.

Current telco sites were built to support frequencies of sub 6GHz which are not greatly affected by building and foliage obstructions. In contrast, mmWave bands require a clear line of sight with zero obstruction. End users won't have service if obstructions exist between sites and users. The level of data needed for planning and deployment of 5G sites is critical; even the smallest shed or tree can adversely impact coverage.

Similarly, data accuracy is extremely important when it comes to site placement, such as ensuring a building corner or bus stop doesn't block line of sight. The high-resolution DSM in Figure 4 shows coverage in dense, urban Atlanta with 6" ground sample distance (GSD). Figure 5 demonstrates how important high-resolution DSM is on impacting the quality of propagation results. Roof line slope shadow and a tree can easily be detected, but this would not have been possible with lower resolution or outdated DSM.

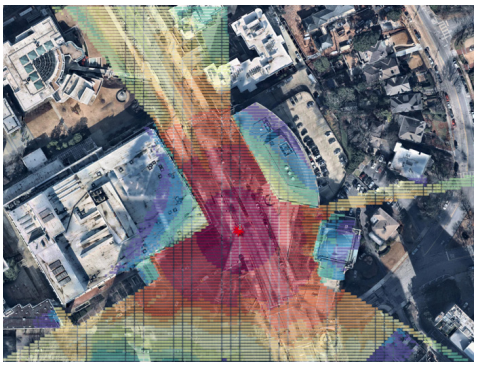


Figure 4

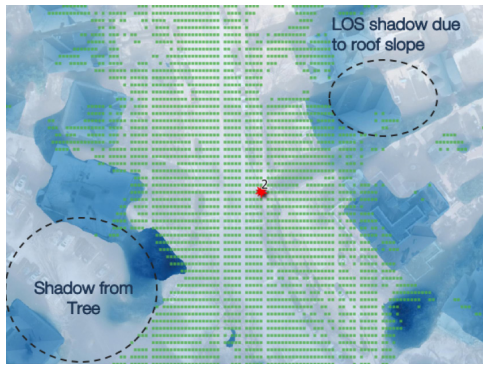



Figure 5

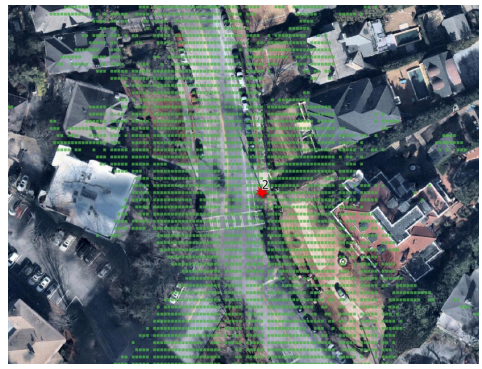


Figure 6

With 5G demands, telco operators would need to install close to ten times the number of sites traditionally deployed with sub 6GHz frequency bands. Understanding changes in foliage and new building structures through computational modeling is key. Access to current, high-resolution DSM gives telco operators the opportunity to be proactive instead of reactive to customer concerns or complaints ahead of planned structural changes to their sites.

18 March 2019
Allegheny, PA



nearmap

## 5G MMWAVE FIXED WIRELESS ACCESS MODELING

One of the earliest use cases 5G mmWave enables is for Fixed Wireless Access (FWA) applications. Wireless internet service providers (ISP) will have access to 5G mmWave technologies in inexpensive or lightly licensed bands, making them more competitive against cable companies. This will enable wireless ISP's to offer Gbps service to their customers -- and cable companies will struggle to compete.

While FWA saves on fiber trenching for ISPs, there are other deployment challenges, such as identifying where Consumer Premises Equipment (CPE) will be located. Nearmap's high-resolution DSM offers a solution in making those decisions. Figure 7 shows the LOS possibilities for CPE locations one meter below the roofline. This plot used DSM for all calculations and true ortho to accurately place the sites. The different colors displayed represent coverage from different sites.

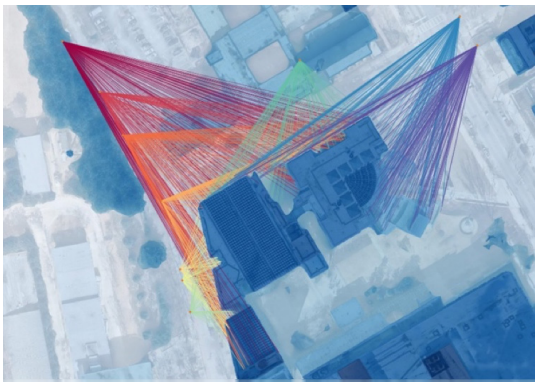


Figure 7

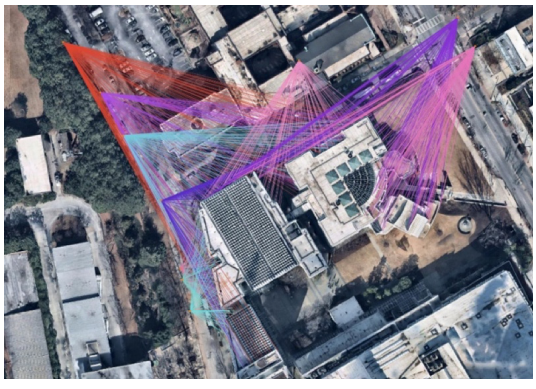


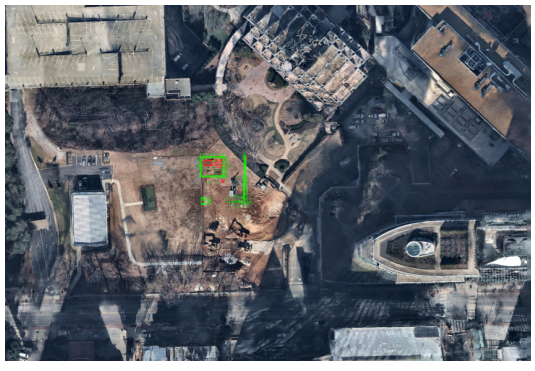
Figure 8

By using Nearmap DSM and true ortho imagery, telecom companies can precisely identify locations for CPE placement and optimize load sharing between their sites. This type of planning and deployment would be impractical without this level of detail from Nearmap data provides.

## CLUTTER CLASSIFICATION & SITE CONSTRUCTION

The ability to discern objects on the ground when doing radio frequency propagation modeling is enhanced with clutter classification. Users can classify building structures, vegetation, poles, equipment, and other types of objects. When layered on top of terrain data in a design tool, clutter classification enables precise modeling of propagation losses.

In telco, location is everything and when it comes to site construction, being able to visualize ahead of time which areas are prime for installation is a must. High resolution imagery allows planners to determine potential site viability across hundreds—if not thousands—of locations without ever having to set foot on the ground.. This saves wireless providers time and money in preselecting deployment sites remotely, reducing the physical manpower needed to visit areas one by one.



## BENEFITS OF USING NEARMAP'S TECHNOLOGY

With the vast application and use of aerial imagery, integrated with GIS platforms, telecommunication companies can efficiently and effectively plan for the next wave of wireless communication. Being able to discern between structures, trees, foliage, and other LOS barriers with detailed models helps optimize network expansion -- a big advantage in strategic business decision and project planning.

It's clear that Nearmap high-resolution DSM and true ortho imagery provides a whole new level of detail to support 5G network planning and rollout requirements. The challenges are real, but the solution is instantly accessible. Nearmap provides a clear advantage to telcos by providing reliable data for planning and design, saving providers time and money across massive implementation projects.

## ABOUT NEARMAP

We capture, manage, and deliver the most frequently updated location content in the world, allowing businesses and governments to explore their environment easily. With Nearmap, organizations unlock opportunities that consistently inform decision making and transform the way they work. Delivered within days of capture, our imagery is much higher resolution than satellite imagery and shows changes over time. Nearmap helps users save time and money, reduce site visits, and make better informed decisions with current, clear imagery.

Nearmap is delivered through our web-based MapBrowser or accessed via third party applications.

www.nearmap.com

7 June 2019
San Francisco, CA



nearmap