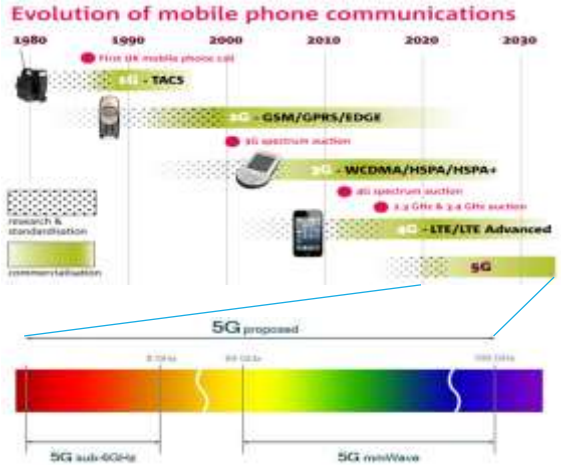
Geodata for Wireless Network Planning

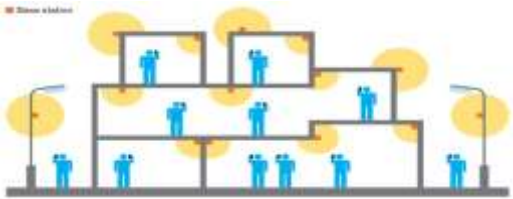
See a better world.™

Overview

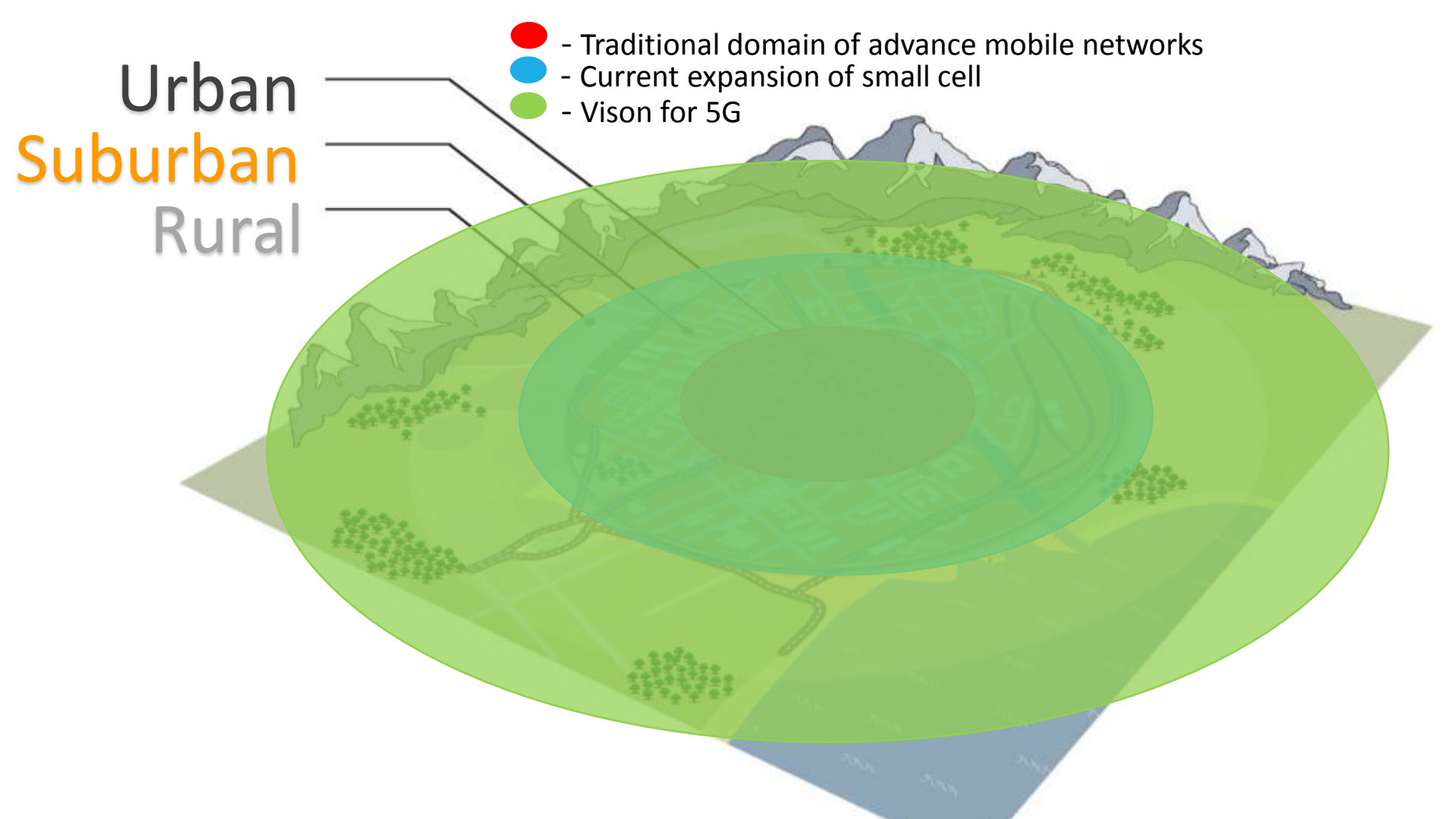

Connectivity is expected

Network needs are changing





- Move towards high frequency spectrum
  - Sub-6GHz to mmWave
  - Means Line of Sight (LOS) becomes critical
- Densification - Micro cell and Pico cell as well as Low Power Wide Area (LPWA); stuffing more and more network equipment into a smaller areas
  - More potential for interference requires smart planning
  - All these micro RANs need to be connected back to the core network, Microwave emerging as optimal transport
- Interoperability - Huge amounts of data sent through multiple frequencies all acquired by a single receiver
  - Increased vulnerability to data surge at high traffic times
  - Requires microwave backhaul path diversity to handle failure scenarios


- Traditional domain of advance mobile networks
- Current expansion of small cell
- Vison for 5G
Urban
Suburban
Rural

Current geodata Practice

$$$$$

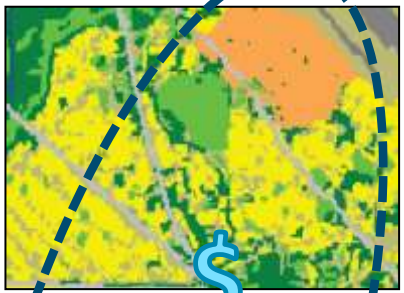
3D polygon

These data are great for planning but are very high cost and limited to the urban core.

$$

2.5D Clutter Height

These data are low cost and scalable but do not provide accurate predictions



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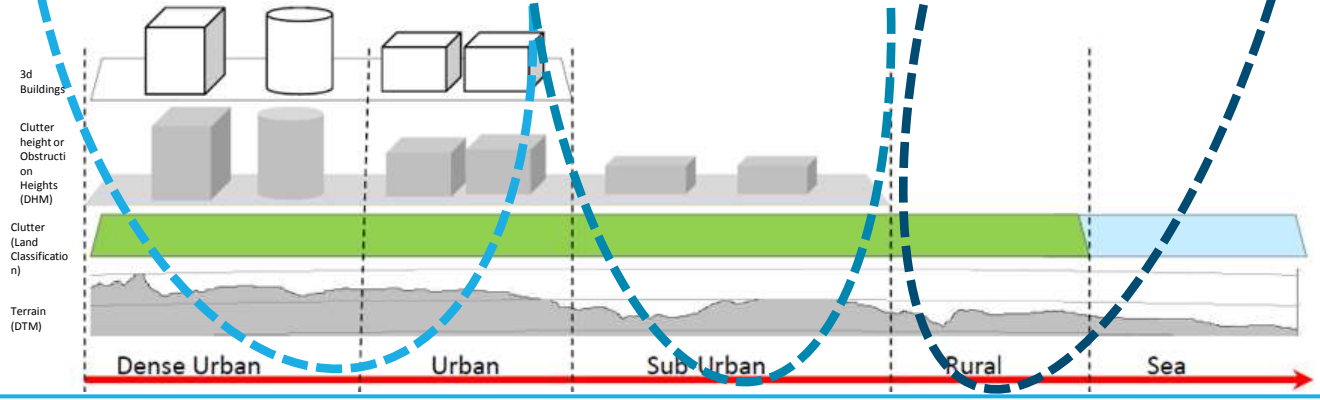
2D Clutter

These data are very low cost, but provide very poor prediction accuracy



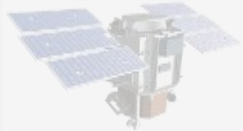
DigitalGlobe – Overview of Technology

Creating the Industry's Best Elevation Data fueled by industry's best constellation and archive

IKONOS®

80cm GSD[1]

9 m CE90[2]



QuickBird®

65cm GSD

23 m CE90

WorldView-1®

50 cm GSD

<4 m CE90

GeoEye-1®

46 cm GSD

<3.5 m CE90

WorldView-2®

46 cm GSD

<3.5 m CE90

WorldView-3®

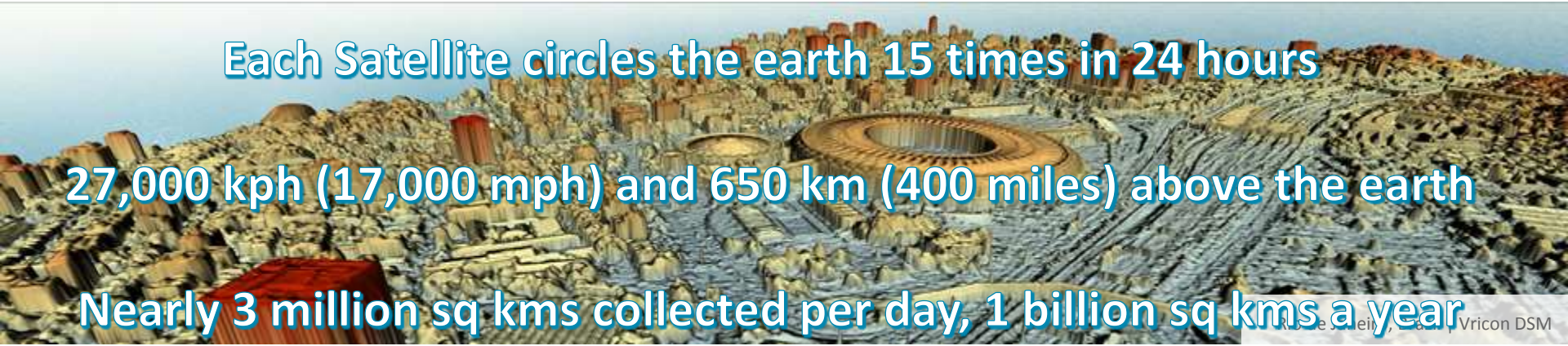
30 cm GSD

<3.0 m CE90

WorldView-4®

30 cm GSD

<3.0 m CE90



1. Ground Separation Distance, a common measure of spatial resolution; 2. Circular Error 90%, a measure in meters of the native spatial accuracy of the satellite

2D footprints

Building footprint extraction
with Machine Learning technology

How is it Done?

THE GLOBE IN 3D

How does it work?

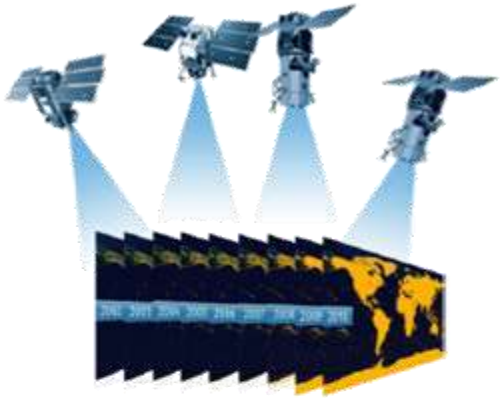
takes advantage of today's massive amounts of geospatial data.

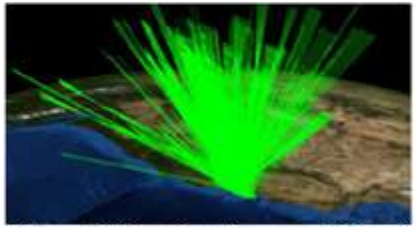
leverages a very unique algorithm and the combination of

- DigitalGlobe's entire database
- DigitalGlobe's refresh capacity through the constellation

The algorithm

- Fully automated and scalable – Big Data processing
- Sensor agnostic – Satellites, UAVs and manned aircraft
- Combining imagery



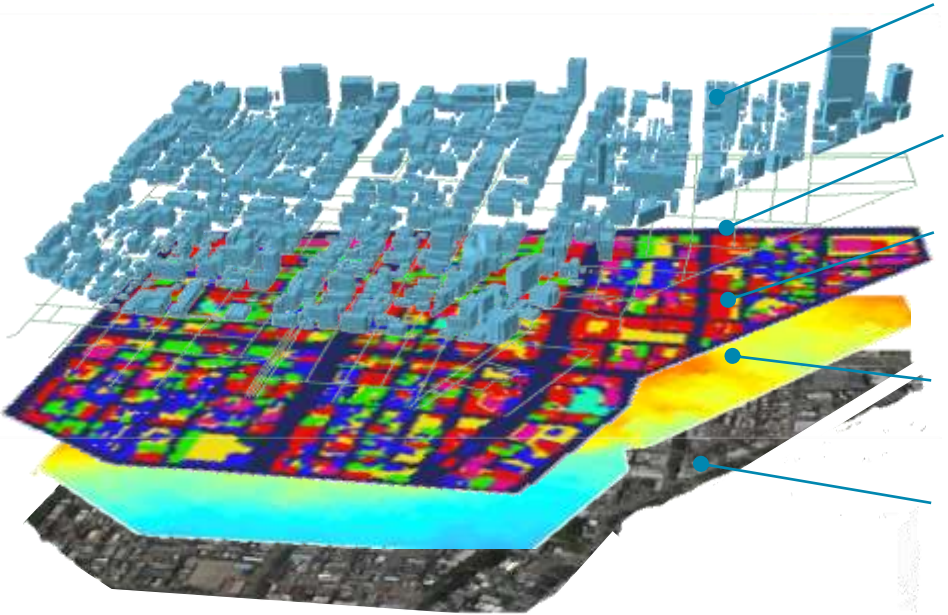


Higher Resolution Images = Better 3D Models

Geodata Products

Data layers

- ***Geo dataset is composed by 3D vector, 2D Liner Vector, Clutter (DLU&DHM), DTM (and ortho imagery optionally).***



3D Vector

These dataset are developed from high accurate building footprint and elevation model. 3D forest and bridge can be provided as optional.

2D Liner Vector (Optional)

These can represent a number of different elements including roads, bridges, rivers, coastlines, etc.

Clutter (DLU & DHM)

Digital Land Use offers a range of statistically categorized classes (e.g., forest, high building, etc.).
Digital Height Models provide height data as Raster.

DTM

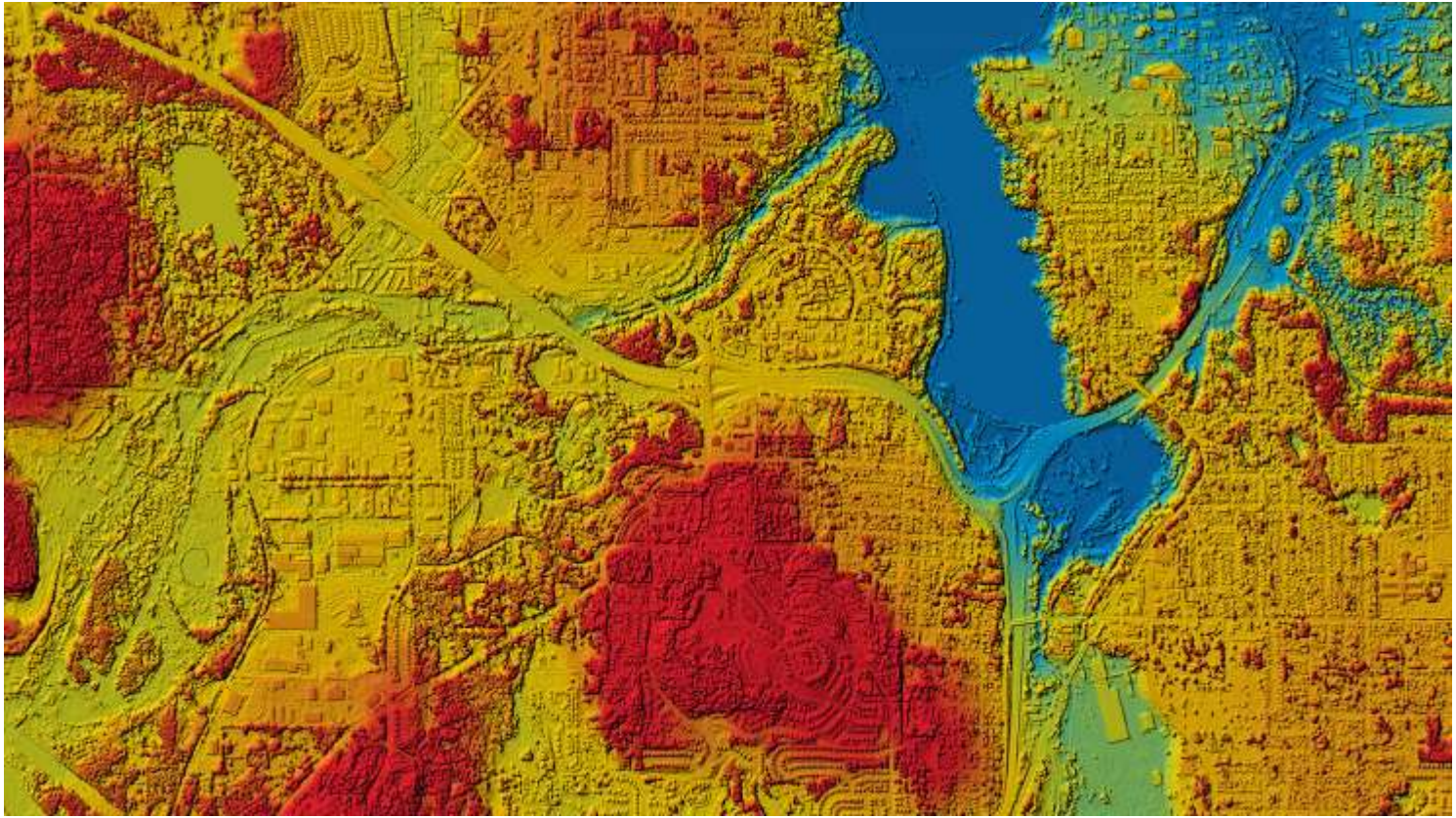
Digital Terrain Models provide a 3D model of the surface of the earth.

Ortho imagery (Optional)

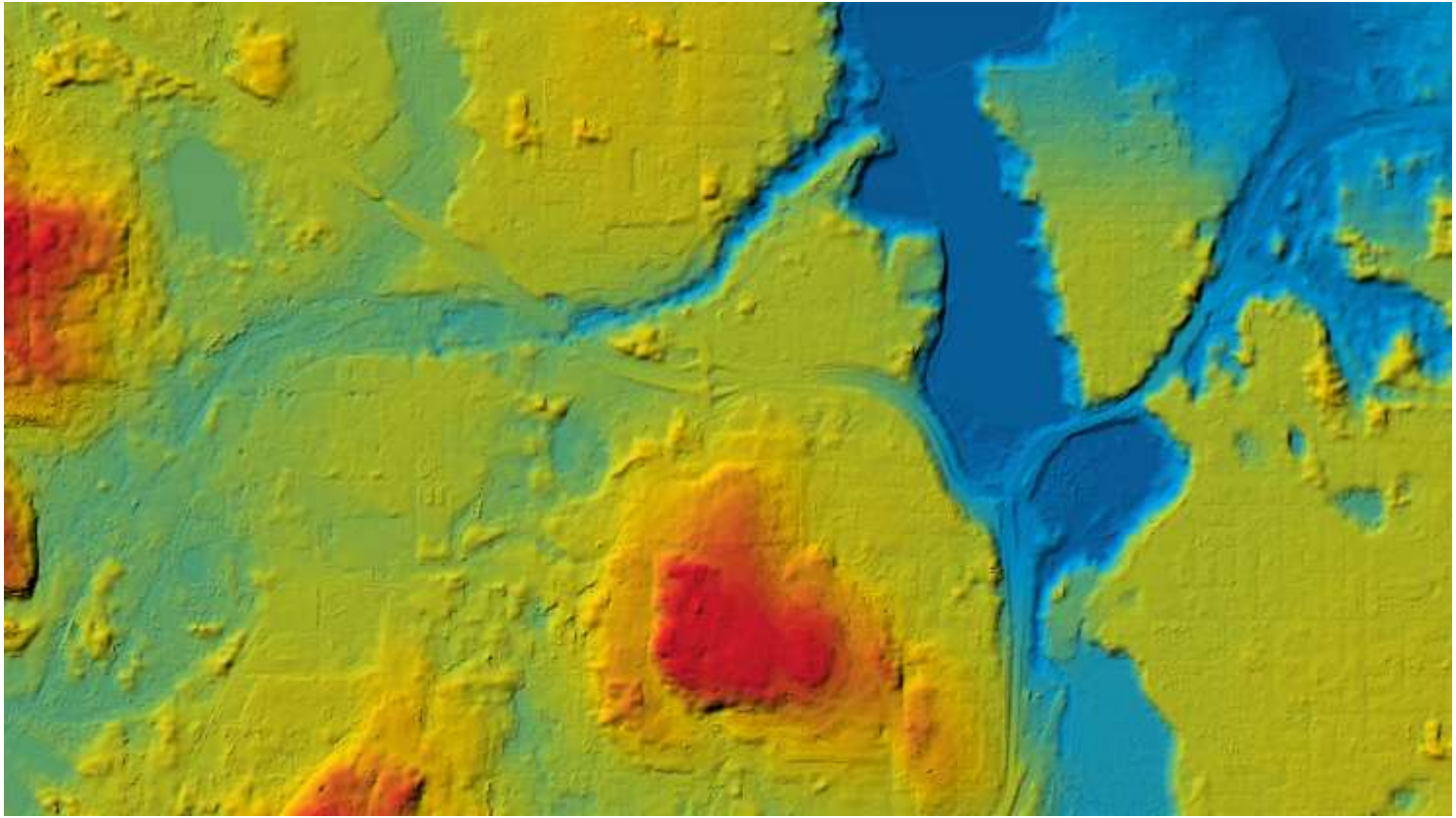
A high-resolution image simplify the 3D telecom dataset compared to the real world.

True Ortho

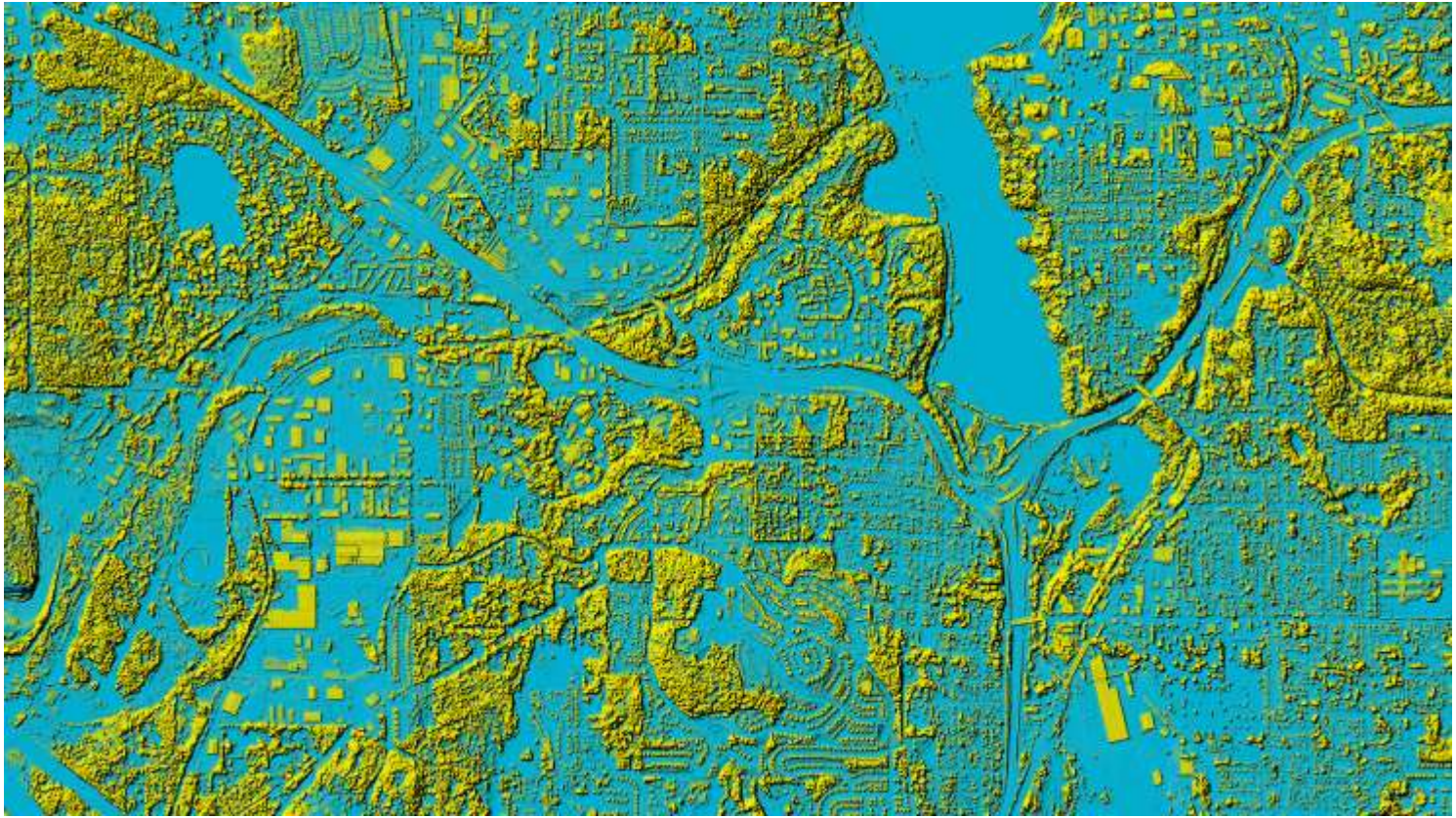
DSM (All Surfaces)



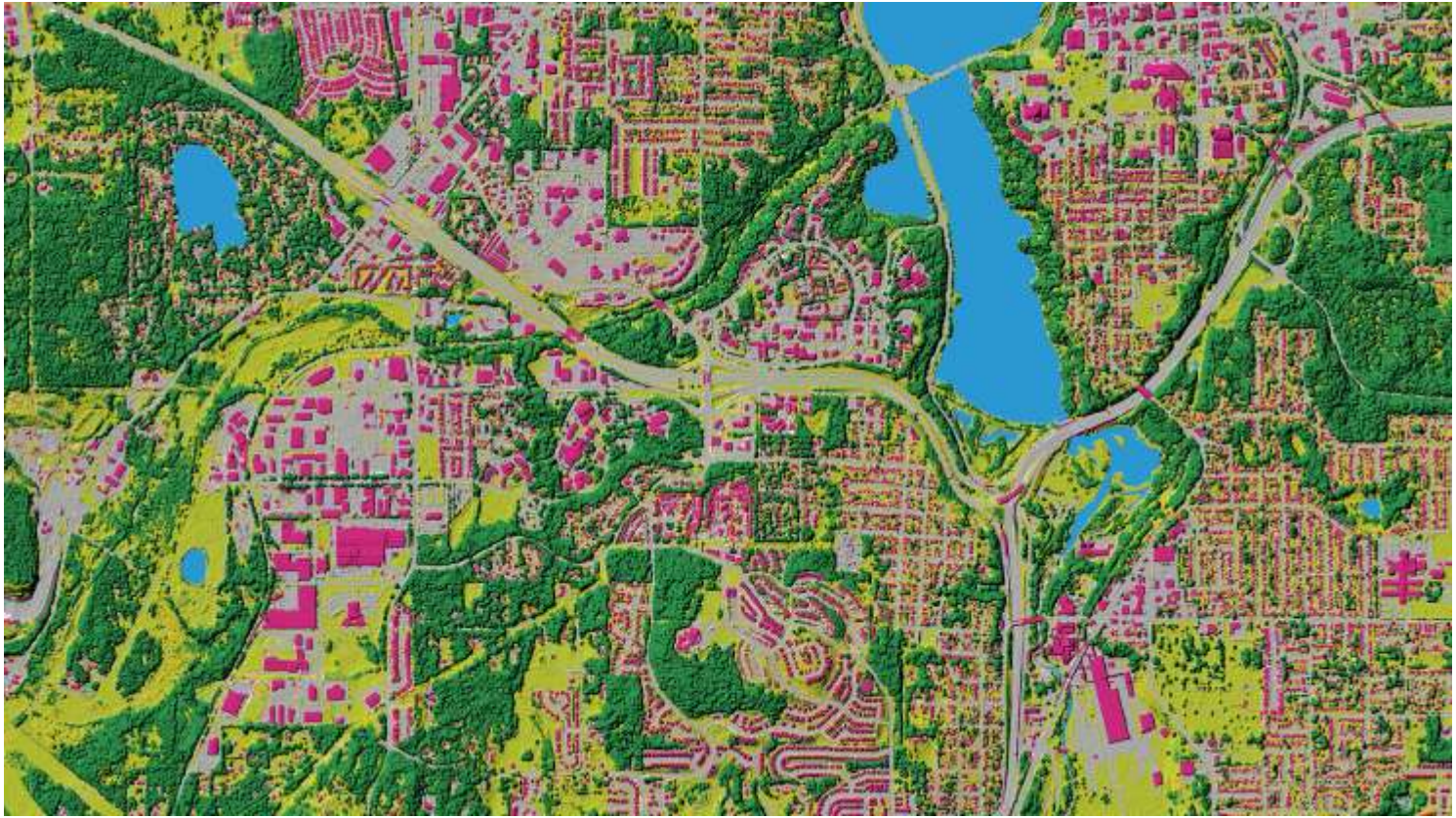
DTM (Terrain)



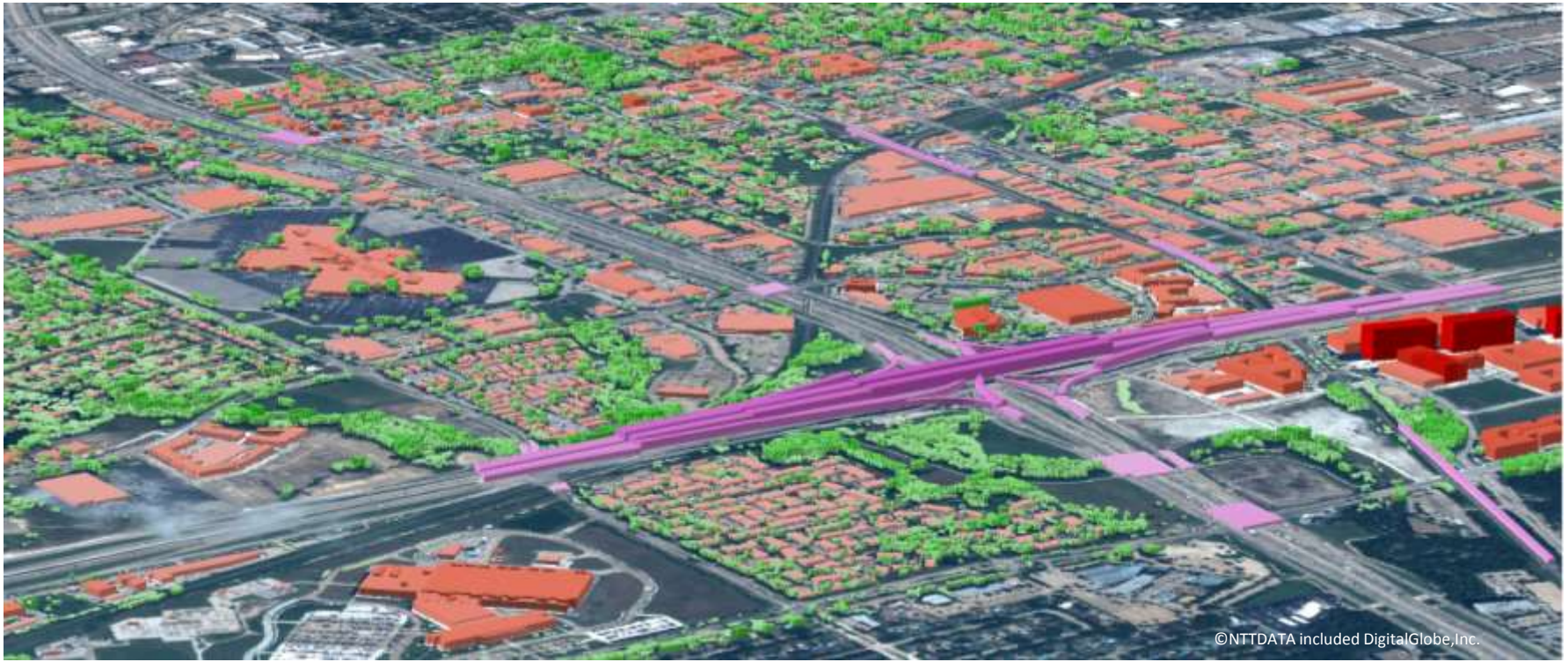
Obstruction Height (DHM or Digital Height Model)



Clutter (Land Use and Land Cover Classification)



3D Vectors



Use Case Descriptions

Finding the ROI

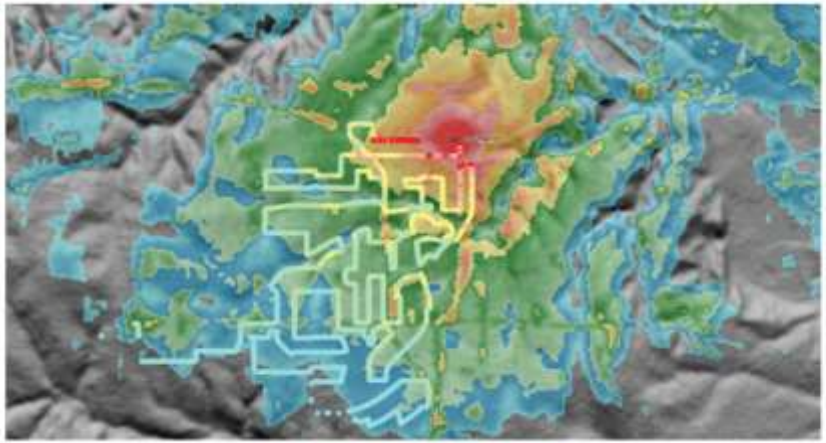
Industries that rely on line of sight communications have very few options to accurately model and predict success/failure rates at scale

- Satellite TV
- Microwave backhaul
- Future wireless networks (5G)
- Fixed Wireless Broadband

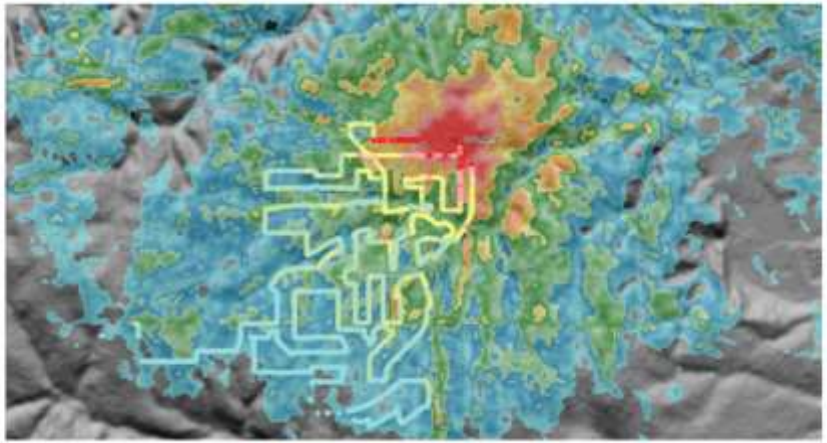
Geodata available through DigitalGlobe could:

- Reduce service calls/truck rolls
- Reduce desktop planning
- Reduce field visits
- Enable earlier real estate planning and procurement, with known alternates.
- Speed up time to market

Use Case – Derive Accurate RF Models without Redundant Drive Testing and Tuning

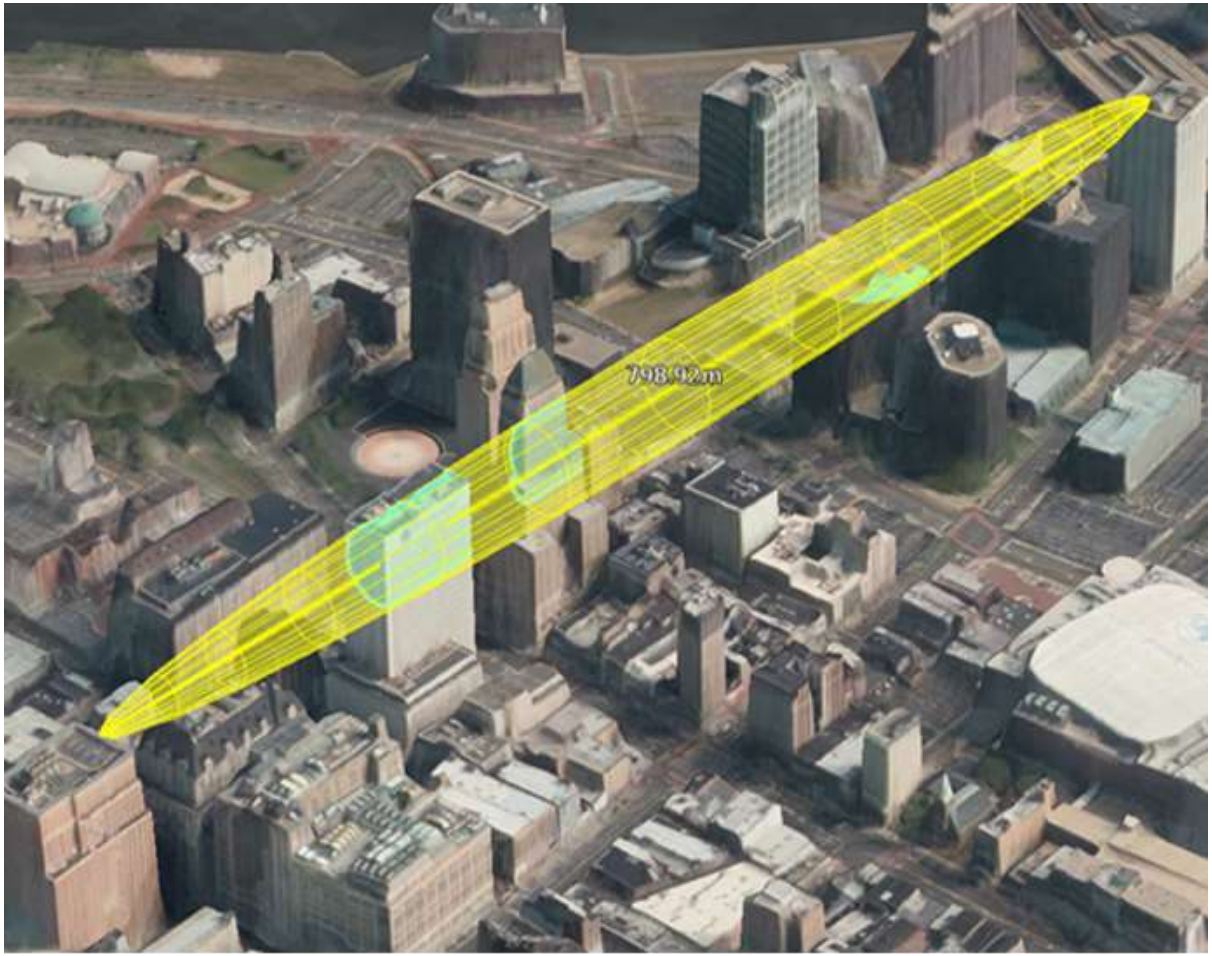


Drive test measurements overlaid with non-tuned 30 meter geodata – low correlation



Drive test measurements overlaid with high res 10 meter geodata – much better correlation w/o tuning

Telco Radio Line of Sight



Finding Solutions for Microwave Backhaul Planners

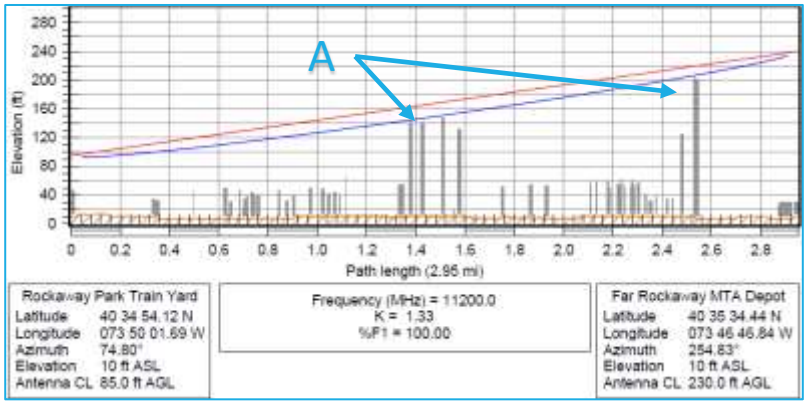
Problem: low accuracy obstruction height Geodata is overestimating clear LoS, creating near 60% failure rate of planed microwave links - Fujitsu Network Communications

- Current remedy:
  - Numerous field visits & re-visits
  - Re-planning of microwave links
  - Longer than required planning & development schedules

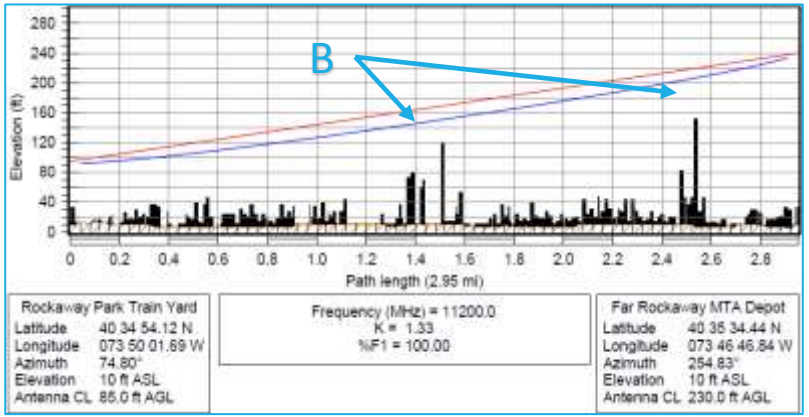
- Elevation data available through DigitalGlobe could:
  - Reduce microwave planning schedule
  - Reduce field visits
  - Reduce costs
  - Enable earlier real estate planning and procurement, with known alternates.

Improved Microwave Backhaul Planning

Microwave Path profile using surveyed obstruction data



Microwave Path profile using Vricon Height Obstruction data



These two microwave profiles are of the exact same area. With traditional field surveying, a series of obstructions (indicated with arrow A) would lead to a disqualification of this path from backhaul planning. The DigitalGlobe Height Obstruction data shows that this area (indicated with arrow B) is clearly below the Fresnel zone and would be an optimal microwave link.

Improved Microwave Backhaul Planning

We used to rely on lower quality clutter data in the New York area. With this data, 60% of all our planned links failed when they were checked by our surveyors. Now, thanks to the accurate and complete representation of buildings and foliage in the Vricon 3D data provided by DigitalGlobe, we are able to confidently reject blocked links and pick the clear links, all within our virtual desk plan. Thanks to this high-quality clutter height data, we have seen a 98% decrease in false positives."

—Wade McKin

Microwave Solutions Architect V, Fujitsu Network Communications

www.digitalglobe.com/geodata