

White paper



Location Intelligence

# Location Intelligent 5G

The Location of Things will drive the need for highly accurate location technology.



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## Stepping up to the 5G challenge

Location Intelligence plays a vital role for telecommunication service providers (telcos). From laying cable to placing cell towers, defining service areas to deploying service personnel, it informs network optimization, customer targeting and service provisioning.

With 5G, location-based data will continue to grow at an exponential rate. This next generation of digital cellular networks will fuel great opportunities, but also familiar challenges. The opportunities will require deeper analytics to reveal the impacts of an immature network infrastructure.

The challenge for providers, then, is whether they can deliver on the promise of a more efficient network offering higher bandwidth while dealing with the unprecedented impacts of streaming services and an interconnected world of sensors, vehicles and people. Here, applied location analytics can support and accelerate the development of 5G, its adoption and efficient deployment of new broadband services.



# 21B<sup>+</sup>

Connected devices worldwide  
projected by 2020<sup>i</sup>

### Sizing the 5G opportunity

Orbis Research<sup>ii</sup> estimates that the 5G infrastructure market will grow to as much as \$9.3 Billion by 2023 at an estimated CAGR of 48.2%. Contributing factors include:

- Growing demand for mobile data services
- Increases in software implementation on wireless networks
- Growth of machine-to-machine communication
- Increasing demand for large and high-speed network coverage

For wireless carriers it's an opportunity for technological advantage; it's crucial to get it right.

### New 5G and fixed wireless challenges and regulations

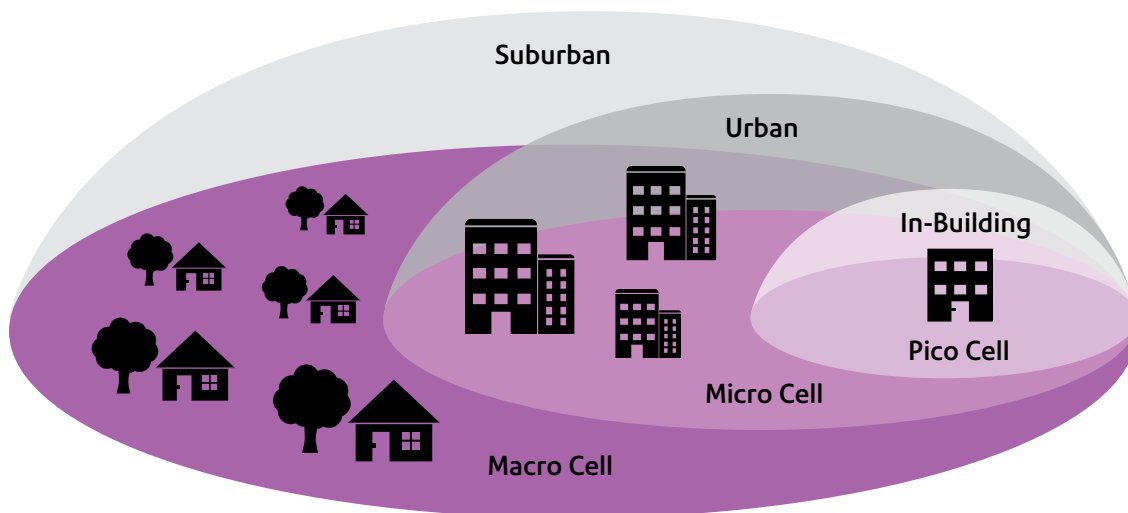
New network specifications present telcos with requirements that go well beyond improvements to coverage standards. Many of these must be addressed with robust locational analytics. These include:

- Locational accuracy
- Subscriber loss
- Flexible deployment architecture
- Network densification
- Government programs for rural area deployment
- Federal Communications Commission (FCC) Form 477 data

### Locational accuracy

"Locational accuracy" reflects an ability to pinpoint potential targets within powdered areas served by both existing and planned network investments. 5G and fixed wireless networks function by delivering signals to highly precise locations. To maximize investments in 5G, these signals must be precisely delivered to the locations that offer optimal opportunity. Without this ability, misallocated network investments will cause ROI to suffer and customers to be underserved.

**Broadband subscriber returns.** Companies the deploy fixed wireless services experience frequent plan cancellations due to inconsistencies of in-building signal performance. These inconsistencies are often the result of misalignment of sites with network assets and failure to understand potential impediments caused by nearby building structures. These location-based data are critical, both at time of deployment and the lifetime of the network infrastructure. Sites and structures change, and providers must adapt their networks for signal consistency.



**Flexible deployment architecture.** 4G deployment speed was limited by the pace at which backhaul network capacity could be provided to each new site. However, 5G deployment will require telcos to decouple certain distributed radio access network (RAN) control functions from cell site back to consolidated baseband datacenters. They will need to place core signaling and intelligence within cloud architectures and use microcell transceivers as their only localized physical elements. This will require detailed location analytics.

**Network densification.** On a 5G network, an increase in smaller microcells mean customers are more likely to move between cells. This can cause frequent hand-offs. In a denser network, new small cells sit under the umbrella of a macrocell. Location analytics can help to determine best micro/macrocell assignments and optimize network traffic.

#### EXAMPLE

**Customer 1** may be sitting outside a coffee shop using a tablet to watch videos. Rather than use a small cell at that location, the network may decide it is more efficient to have the larger macrocell serve this subscriber, or even hand off the traffic to a managed Wi-Fi network.

**Customer 2**, who is moving through the networks, is being served by the same macrocell and is about to enter the coverage of the small cell. Rather than handing this customer off to the small cell, the network may decide that this subscriber's data traffic is better handled by the macrocell and won't hand it off.

Both examples require that the network know the content being served, the device being used, an accurate geolocation, whether the customer is in motion, and the availability of a fixed-wireless network for video and other forms of high-consumption usage.

#### Government programs for remote deployment.

5G deployment is going to be expensive. Telcos will find it hard to justify borrowing or using their own capital resources to build and sustain networks in rural areas where customers are few or terrain and topography complicate operations. Instead, telcos will require financial support from the High-Cost Universal Service Fund (USF) initiatives overseen by the FCC to justify investment and keep rates affordable. The Rural Broadband Association (NTCA) compels significant accountability<sup>iii</sup>: Support recipients must meet specified deployment obligations and geocode every new location to which they deploy broadband. These requirements are expected to extend into fixed wireless, so scalable, high-quality geocoding will be essential.

**FCC Form 477 data.** The Federal Communications Commission (FCC) has proposed a rule updating its Form 477<sup>iv</sup>. The FCC would require carriers to aggregate voice and broadband subscription and deployment data at census-block level, necessitating household-level collection. Telcos currently provide data a street level; shifting to house-hold level collection would demand significant incremental time and resources. (There are more than 130 million housing units in the United States resulting in roughly 750 million records for each filing). Additionally, broadband and fixed-wireless providers would need to identify blocks that they could fully serve, adding another level of complexity.

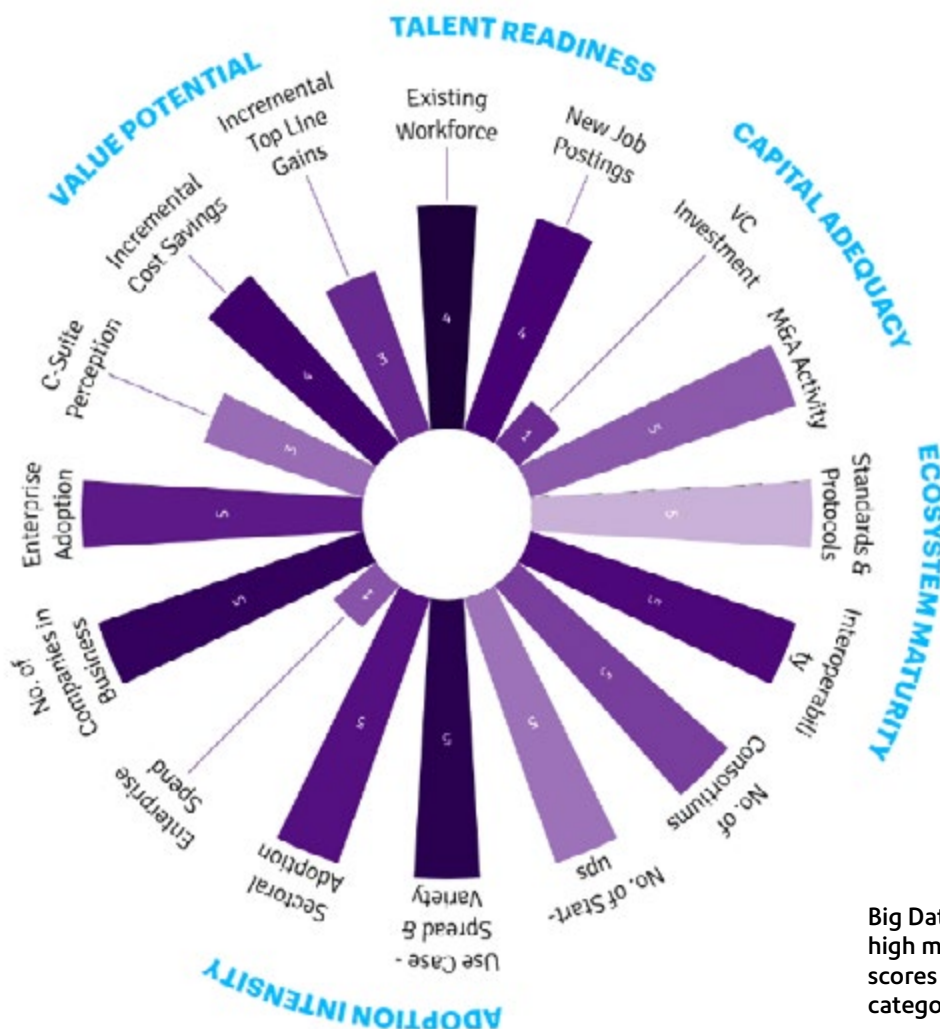
### Mitigate risk.

The deployment of a new network infrastructure like 5G invites high financial risk. By improving location precision, telcos improve their likelihood of achieving their desired ROI. Greater precision helps to remove the guesswork from the 5G planning process. It's essential to building a sustainable roadmap for long-term investment.

**Big data technologies** offer a mature and robust ecosystem. By providing a framework for a “fail fast and fail cheap” approach, they're ideal for complex, iterative analyses.

### Superior location-based data and raster technology.

Telcos need to be able to fragment a potential coverage region into a grid of 'indexable' blocks or sub-blocks. This requires coupling a clean, accurate, digestible set of datasets with a modern data architecture that can support Big Data and AI. Datasets must be legible for machine-learning and network-transformation algorithms. They also need to be consumable at scale to help remove approximations, allow for in-depth analysis, and enable highly accurate, cost-effective predictions. Both Earth observation (EO) imagery and digital elevation models (DEM), both delivered as rasters, provide a foundation to identify topographical impediments in an efficient manner that leverages the power of map visualization.



Big Data exhibits high maturity scores in many categories.<sup>v</sup>

### A location intelligent framework for 5G and fixed wireless deployments

Pitney Bowes provides telcos with the tools to quickly deliver the location-based insights they need. Leveraging years of research and development, our innovative solutions accelerate telcos' ability to verify coverage, optimize networks and inform site selections.

#### 200 million US addresses

A comprehensive database of U.S. addresses, each tagged with a unique, persistent identifier, can instantly connect telcos to any of 8,100 attributes. This enables telcos to access an astonishing amount of actionable Location Intelligence, putting them at a distinct competitive advantage as they build, market and provision 5G and fixed wireless networks.

### Build a better network.

With a clearer, more complete understanding of people, businesses and network assets, telcos can make fact-based network deployment decisions. Here are a few examples of how they can optimize performance and ROI:

<b>Simulate network deployment</b>	Build a digital replica ("twin") utilizing building-footprint and subscriber data linked to a corresponding network asset.
<b>Enrich network-based intelligence</b>	Extract and link network data to the comprehensive database and to relevant attributes.
<b>Understand locations</b>	Develop profiles of activities at desired locations and populations who may live, work or play there.
<b>Identify optimal build sites</b>	Gain required intelligence about population growth, network traffic, and types of data to be consumed.
<b>Consider the big picture</b>	Incorporate sensor data the promise of a connected world when determining where and how much to build.

### Market more effectively.

Pitney Bowes offers the capability to compare predicted KPIs with actual network performance KPIs, side-by-side, for every location in the U.S. With a unique understanding of the number of buildings within a property boundary, the number of units in a building, business locations, daytime and nighttime populations, geodemographics, and the digital and social habits of these populations, carriers can build effective 5G marketing programs in following ways.

<b>Identify and target prime acquisition targets.</b>	Utilize pre-existent network performance to predict buying decisions on new technologies, aligning prime targets with quality network coverage.
<b>Build transparent marketing programs.</b>	Include correctly identified network KPIs and corresponding location attributes to deliver more targeted, confident, effective messaging.
<b>Increase brand loyalty.</b>	Leverage attributes data to deliver personalized messaging tailored to actual names, locations and social habits through preferred channels.

### Enable seamless onboarding.

Pitney Bowes Location Intelligence solutions, and particularly our precision geocoding, help ensure that clients enjoy a seamless onboarding experience for new services. We provide a level of accuracy that enables smart decisions on service qualification based on location, building structure and proximity to assets. This reduces errors and allows for successful network provisioning. Fewer acquisitions are lost, and telcos can better avoid incurring high costs associated with misplaced onboarding.

### Achieve a favorable outcome.

Our solutions help to reduce returns by automating the process of locating customer qualification units. One example: Understanding where services are not available can save telcos millions of dollars. Here are some others:

- Providing phone number portability and NPA-NXX referencing
- Facilitating Public Safety Answering Points (PSAP) and Authorities Holding Jurisdiction (AHJ) for accurate assignment of emergency services
- Assigning state, county, municipality and special taxing jurisdictions for accurate taxation and situsing
- Formatting, standardizing and predicting addresses to:
  - Ensure mailing, postage savings
  - Understanding attributes like vacancy and rural-ness related to a location

### Position your telco for 5G success.

Historically, wireless providers have suffered from a general perception that service delivery doesn't live up to its promises. Early adopters of 4G found that their handsets could handle high speeds; however, network backbones were often not sufficient to support those high rates of LTE throughput.

5G takes existing assets and customers into an adjacent category of new products and markets. Given the massive size of deployment and wide range of potential subscriber profiles, capturing adjacency in 5G will involve significant risk. It will require up-front investments, expansion of core product range and carefully targeted marketing campaigns. Clean and consumable information will reduce the guesswork and help to optimize ROI.

Telcos with a high degree of Location Intelligence will be best positioned to win the race to 5G. They'll be poised to successfully test and incorporate field, asset and population-centric information at scale. This, in turn, will help to lead up to a smooth, steady launch of 5G products and services; and, more importantly, satisfied and loyal customers.

### Contact Pitney Bowes today.

Pitney Bowes offers a robust selection of Location Intelligence solutions. To see how we can help optimize your planning and implementation surrounding 5G, visit:

[www.pitneybowes.com/us/industry/telco-utilities](http://www.pitneybowes.com/us/industry/telco-utilities)

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- i. <https://iot-analytics.com/state-of-the-iot-update-q1-q2-2018-number-of-iot-devices-now-7b/>
  - ii. <https://www.orbisresearch.com/reports/index/2018-2023-global-and-regional-5g-infrastructure-industry-production-sales-and-consumption-status-and-prospects-professional-market-research-report>
  - iii. [https://www.ntca.org/sites/default/files/documents/2018-03/NTCAWrittenTestimony\\_Mar13\\_2018\\_Romano.pdf](https://www.ntca.org/sites/default/files/documents/2018-03/NTCAWrittenTestimony_Mar13_2018_Romano.pdf)
  - iv. <https://www.fcc.gov/document/fcc-proposes-improvements-broadbandvoice-services-data-collection-0>
  - v. [https://www.accenture.com/t20181026T174738Z\\_w\\_/us-en/\\_acnmedia/PDF-88/Accenture-Delivering-Digital-Dividends.pdf](https://www.accenture.com/t20181026T174738Z_w_/us-en/_acnmedia/PDF-88/Accenture-Delivering-Digital-Dividends.pdf)

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