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Mapping **your** world in 3D

Mobile Network Planning

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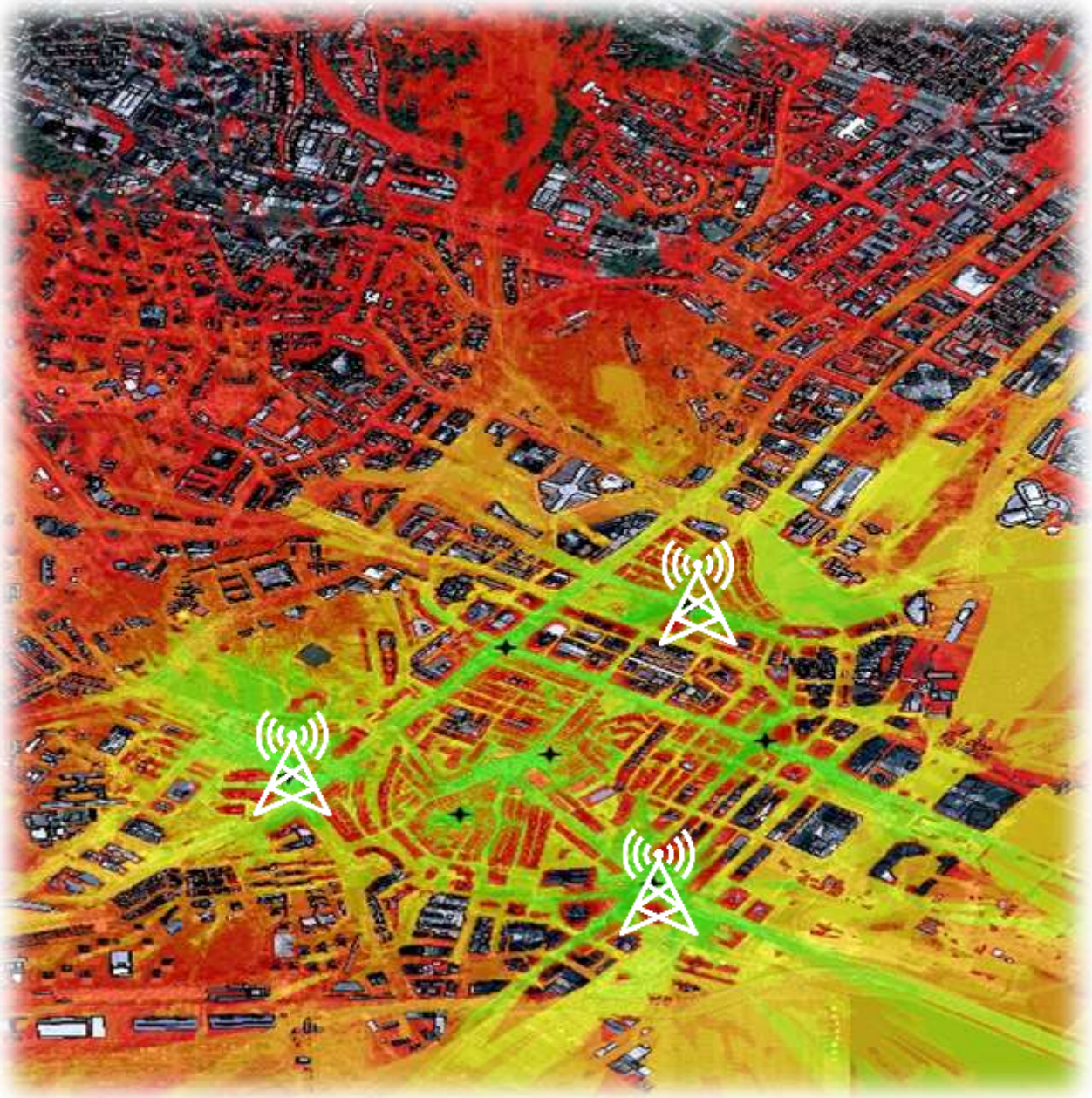

Guarantee Connectivity & Quality

Reduce CAPEX & OPEX

Digital Map Layers

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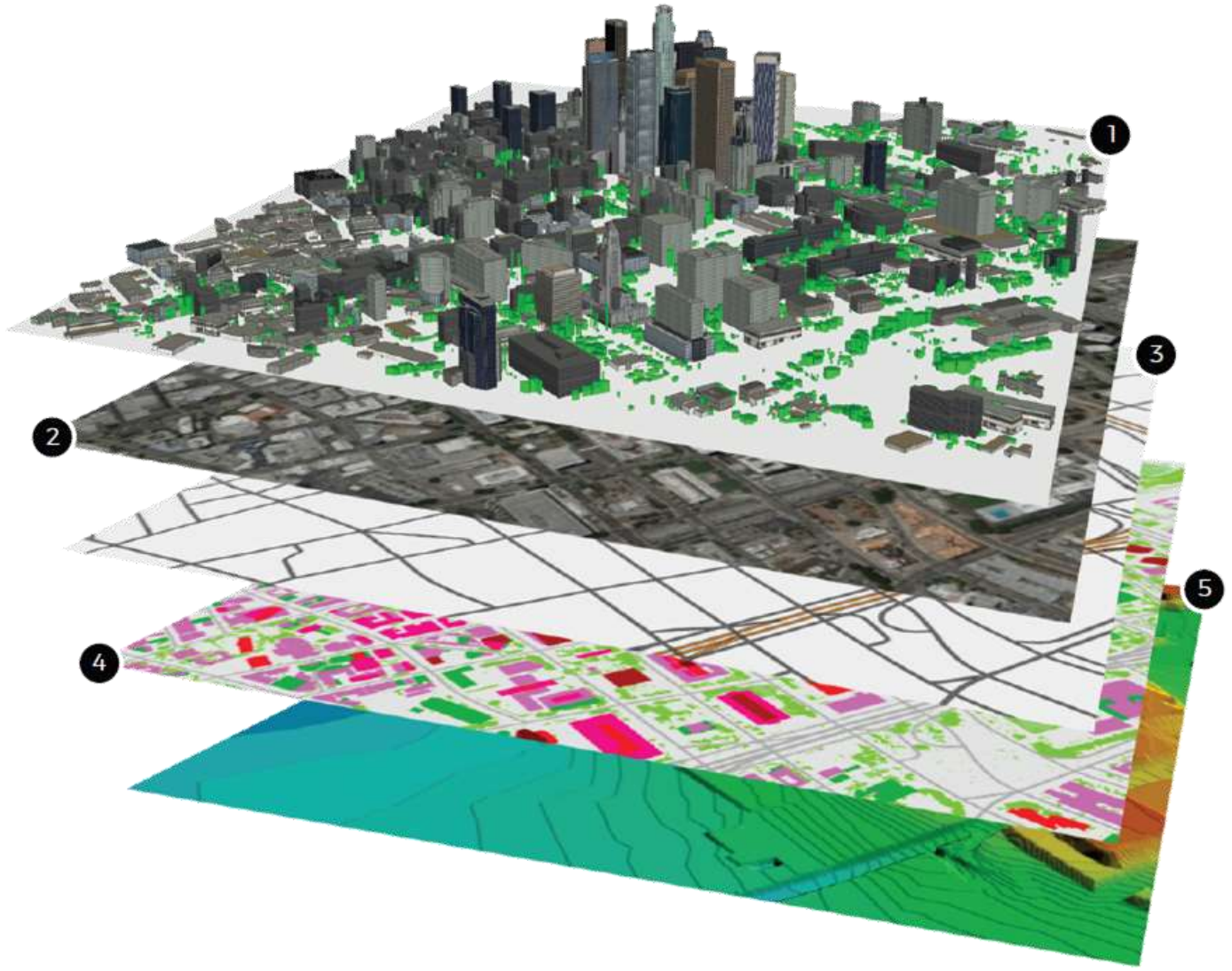
1. **3D Models (buildings, trees, bridges)**
   Contours are extracted using AI techniques and heights are derived from high resolution stereo satellite imagery or LiDAR measurements

2. **Orthoimage**
   A georeferenced image tied to the other layers

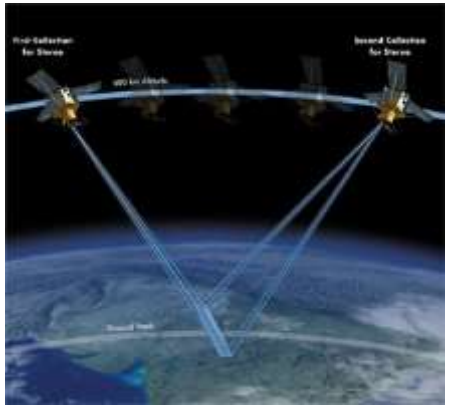
3. **Vectors**
   Represent transportation network and water features

4. **Clutter**
   Land use classification into water, vegetation, urban and open areas

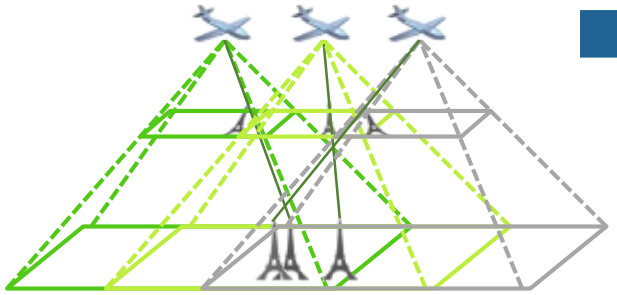
5. **Terrain**
   The Digital Terrain Model represents the elevation of the ground



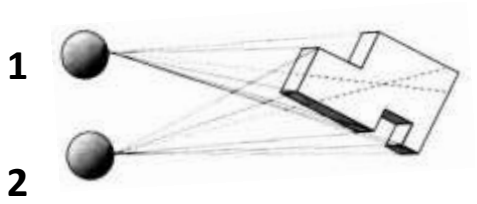
3D Models - Production Process



True stereo satellite acquisition

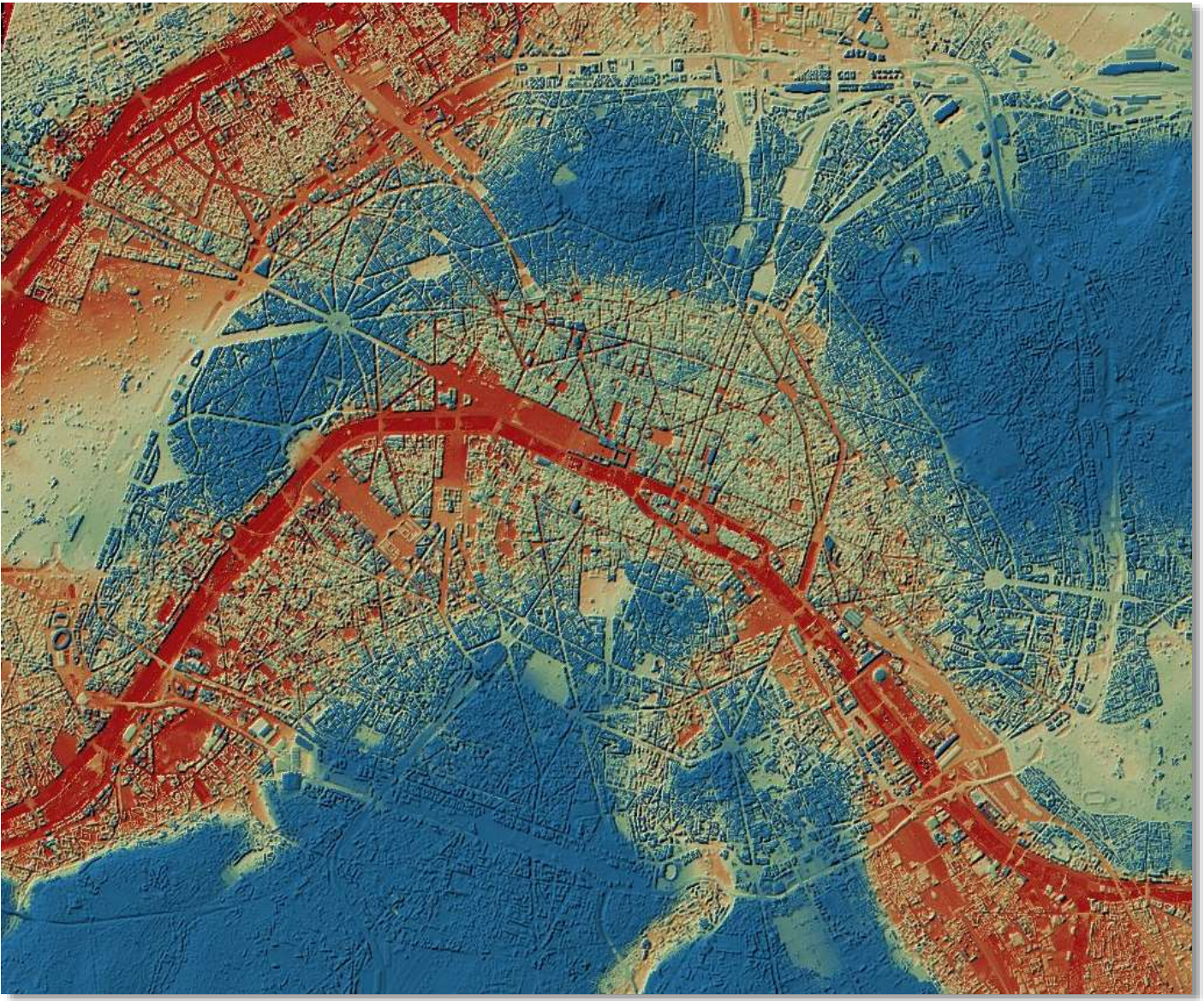


Aerial acquisition
for photogrammetric process



- Same building captured from two different viewing angles
- Photogrammetric process to create the 3D height
- Processed primarily with proprietary software tools

Elevation Model



Features Classification

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Barcelona, Spain

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5G
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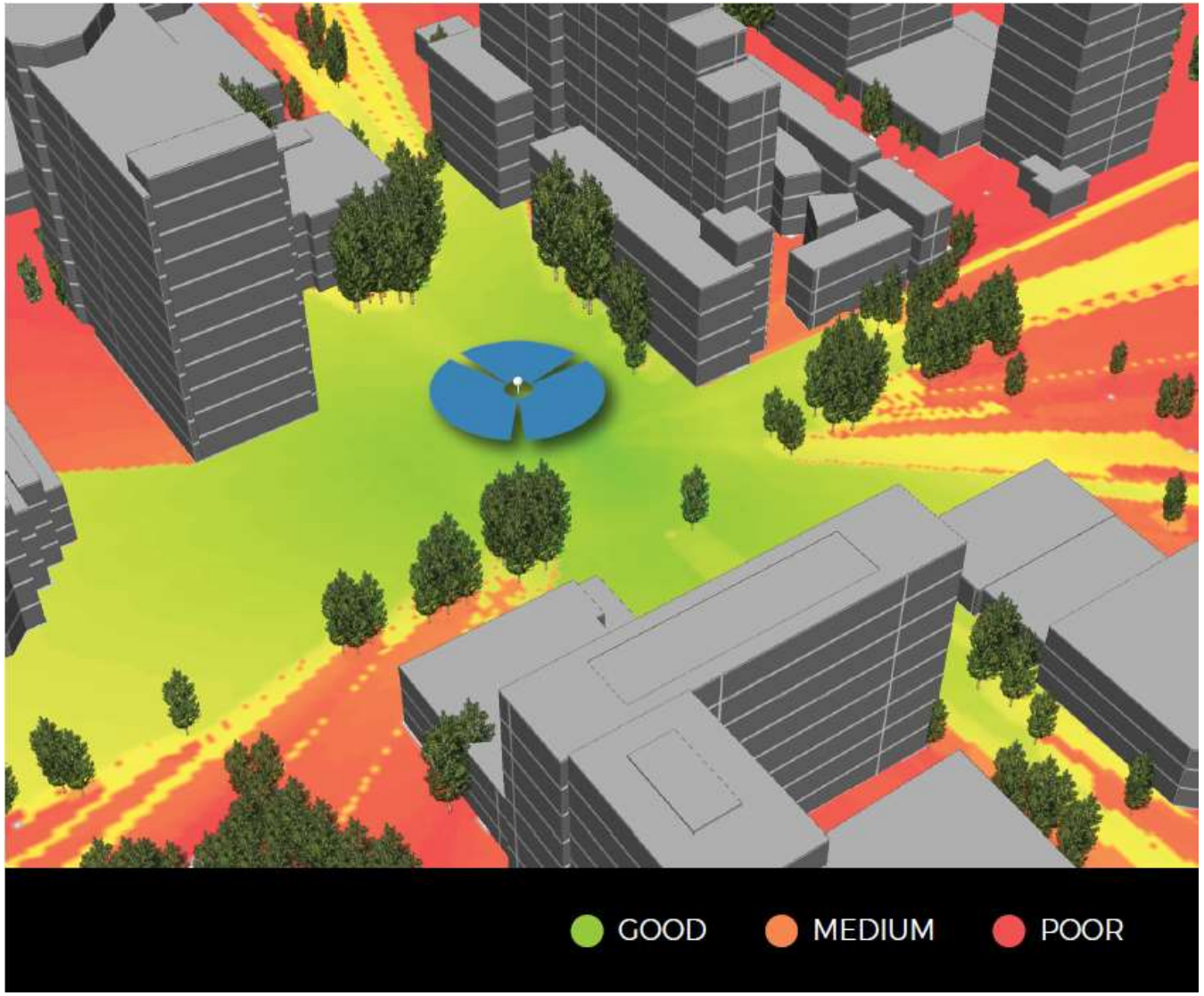
Key Considerations for 5G Planning



Higher frequencies

✓ Signal propagation highly impacted by the environment, including the vegetation

26-28 GHz: 1dB/m attenuation due to the trees
3.4-3.6 GHz: 0.4dB/m attenuation due to the trees

Low Height Antennas

✓ Large number of small cells deployed. When cells are deployed below roofs level, 3D matters

Use Case – 5G mmWaves Planning

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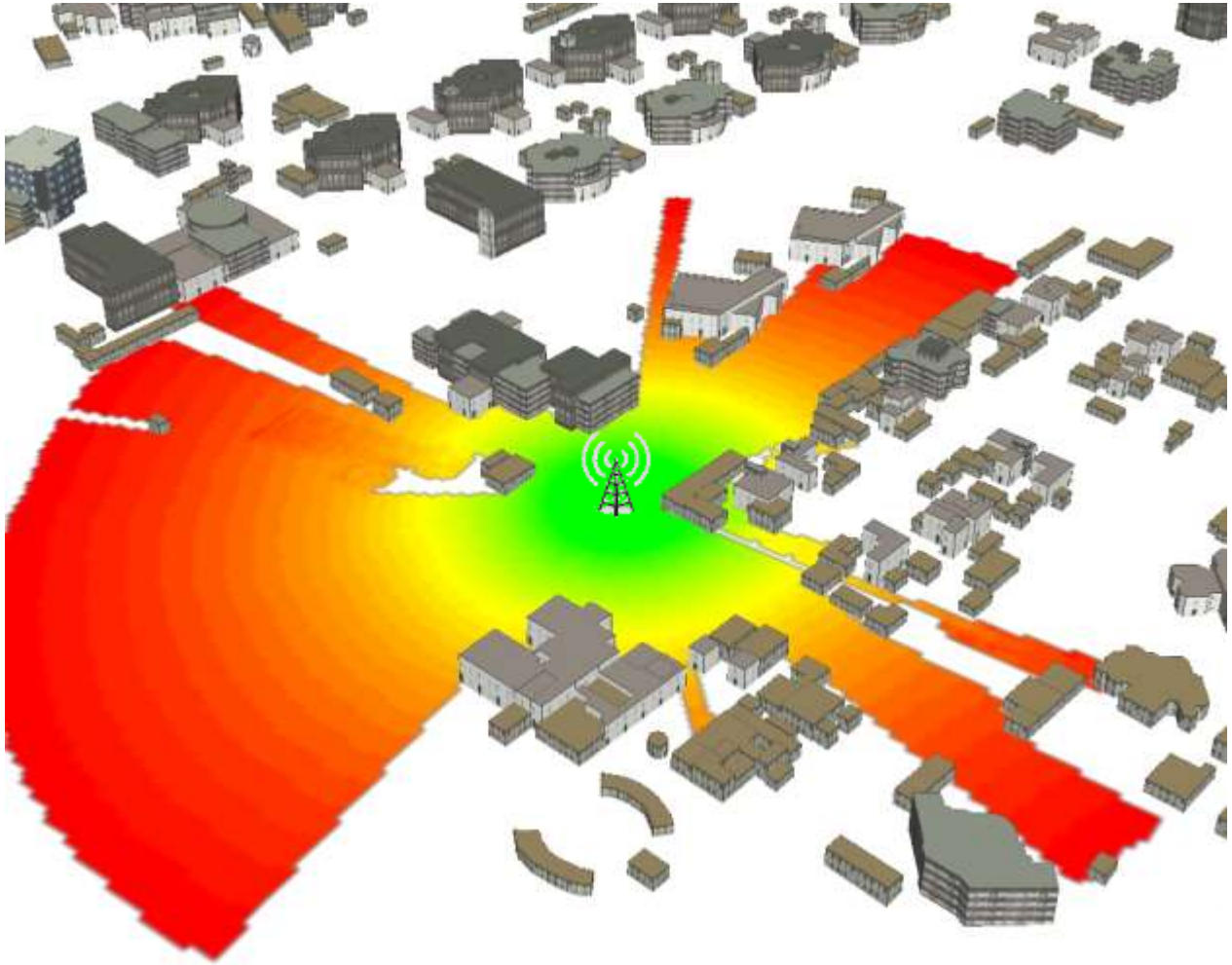
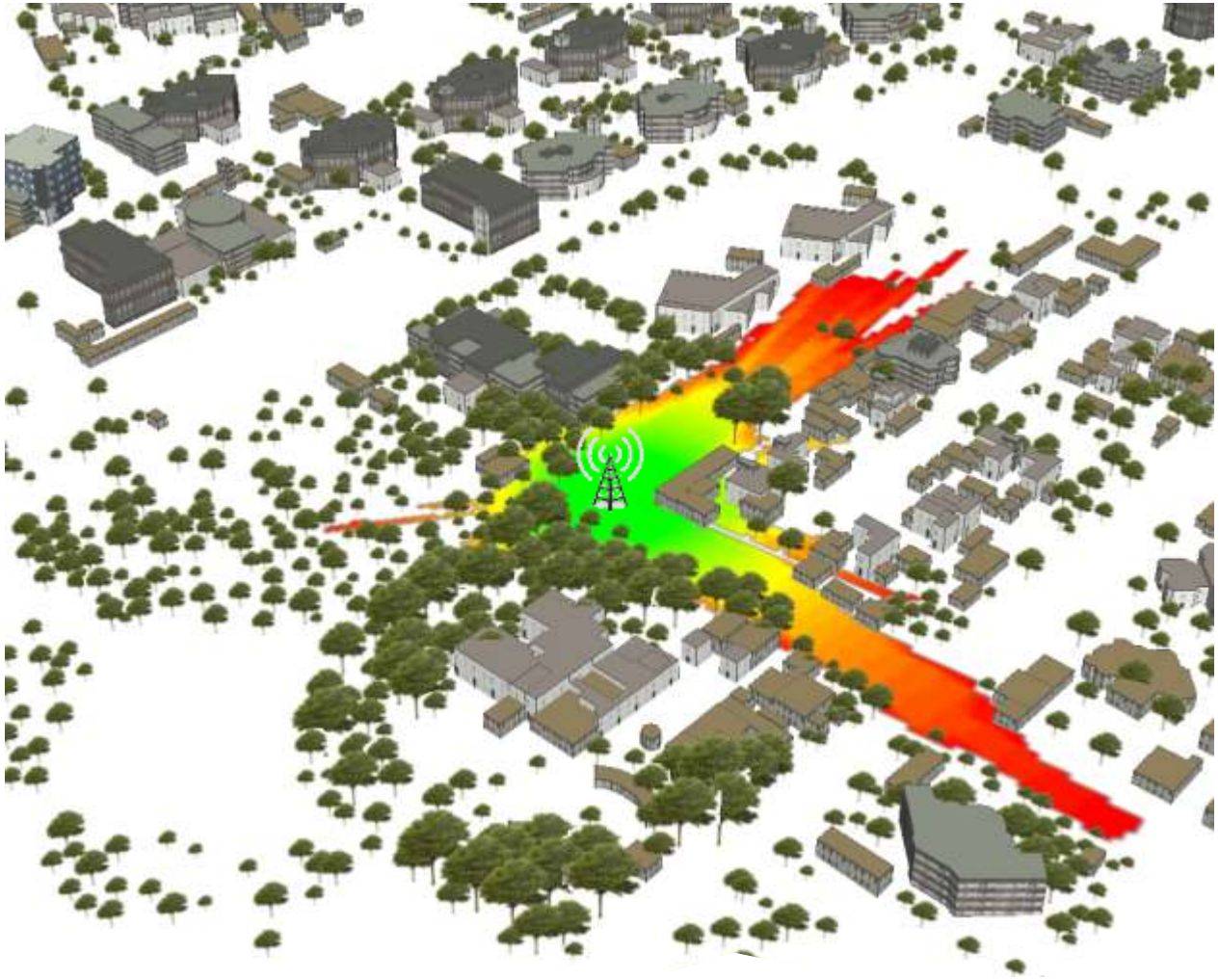
3D buildings only



3D buildings & 3D trees



Good Medium Poor

Frequency 28GHz
Omni antenna h=7m
Attenuation due to trees: 1 dB/m

5G Use Cases & Applications

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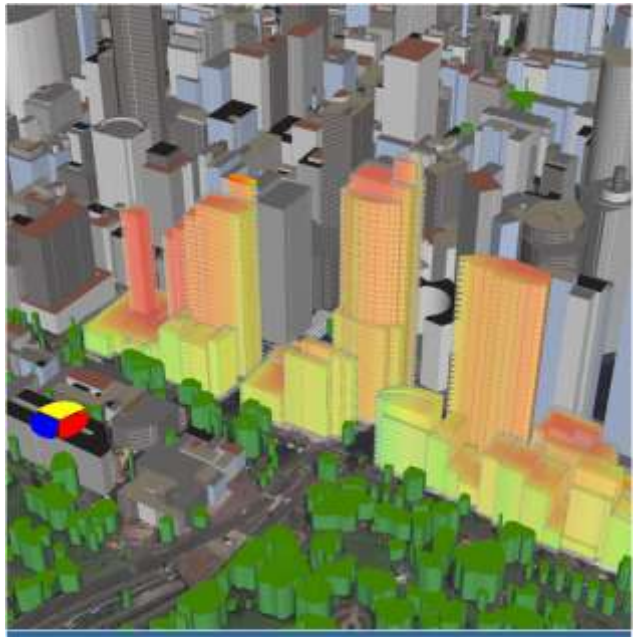
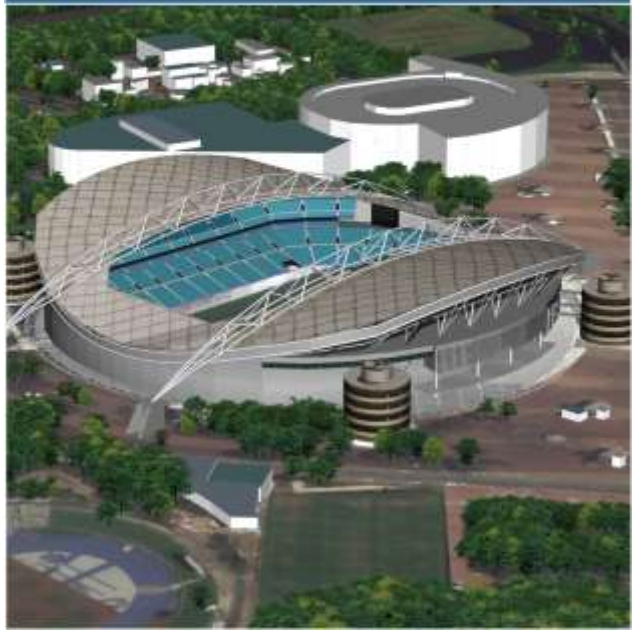
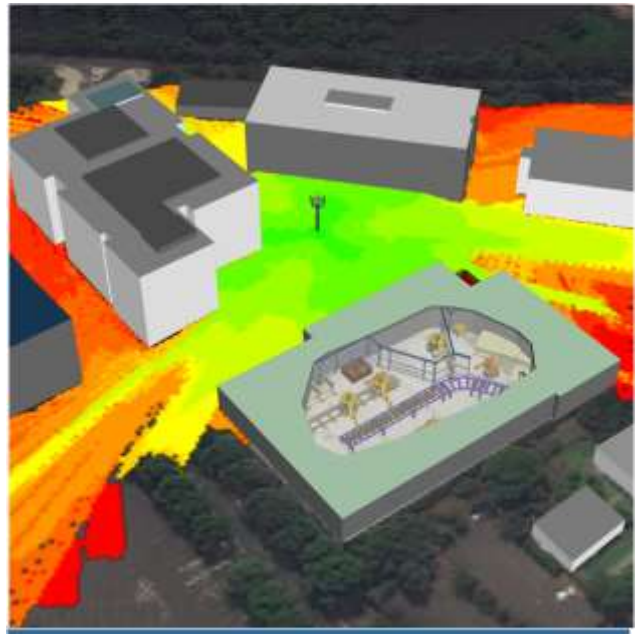
Fixed Wireless Access (FWA)



Enhanced Mobile Broadband (eMBB)

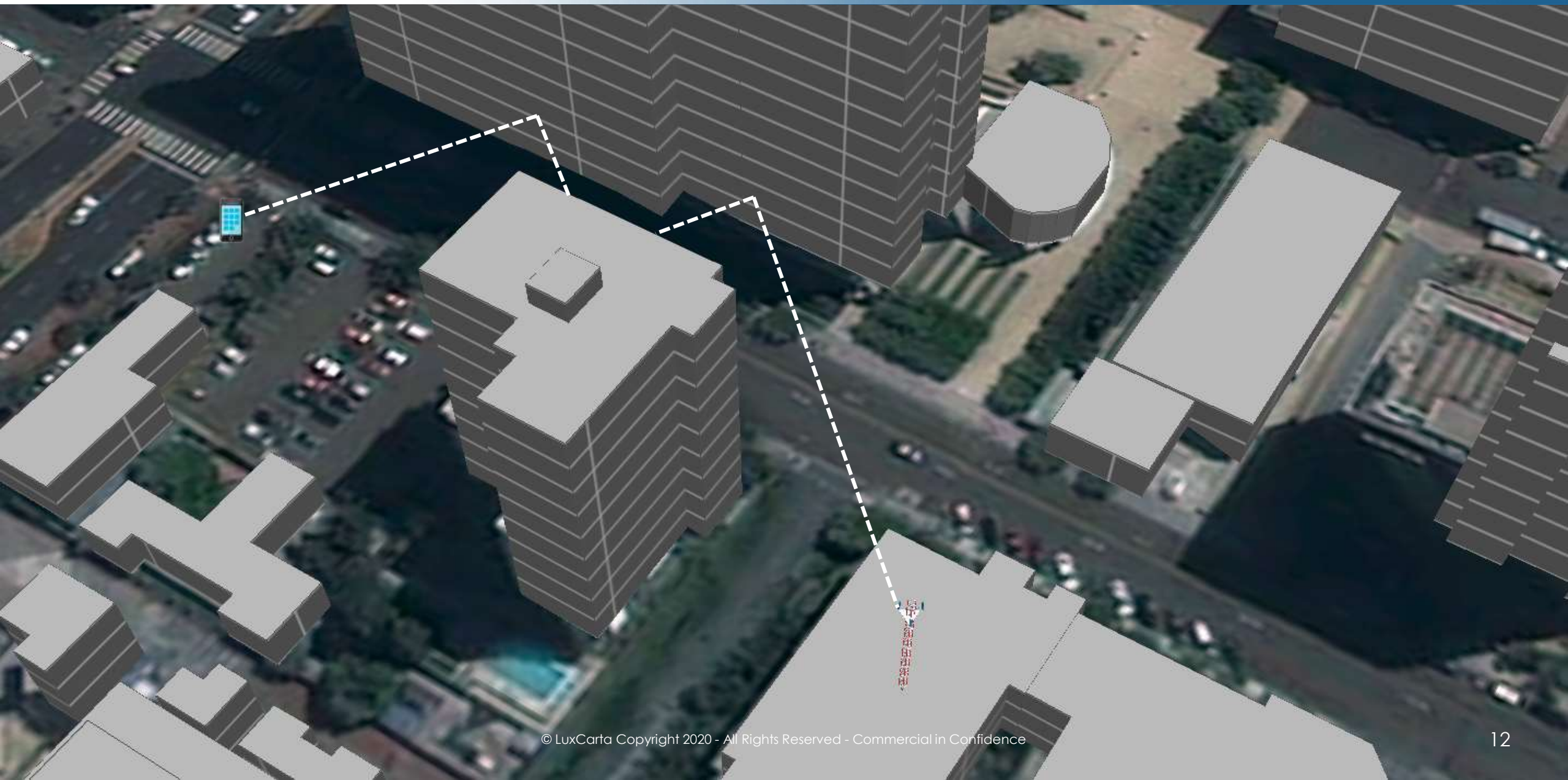
Connected Stadium





Industrial IoT

Urban Complexity – Need for 3D Building Models



5G NR Mobility Planning

Good Medium Poor

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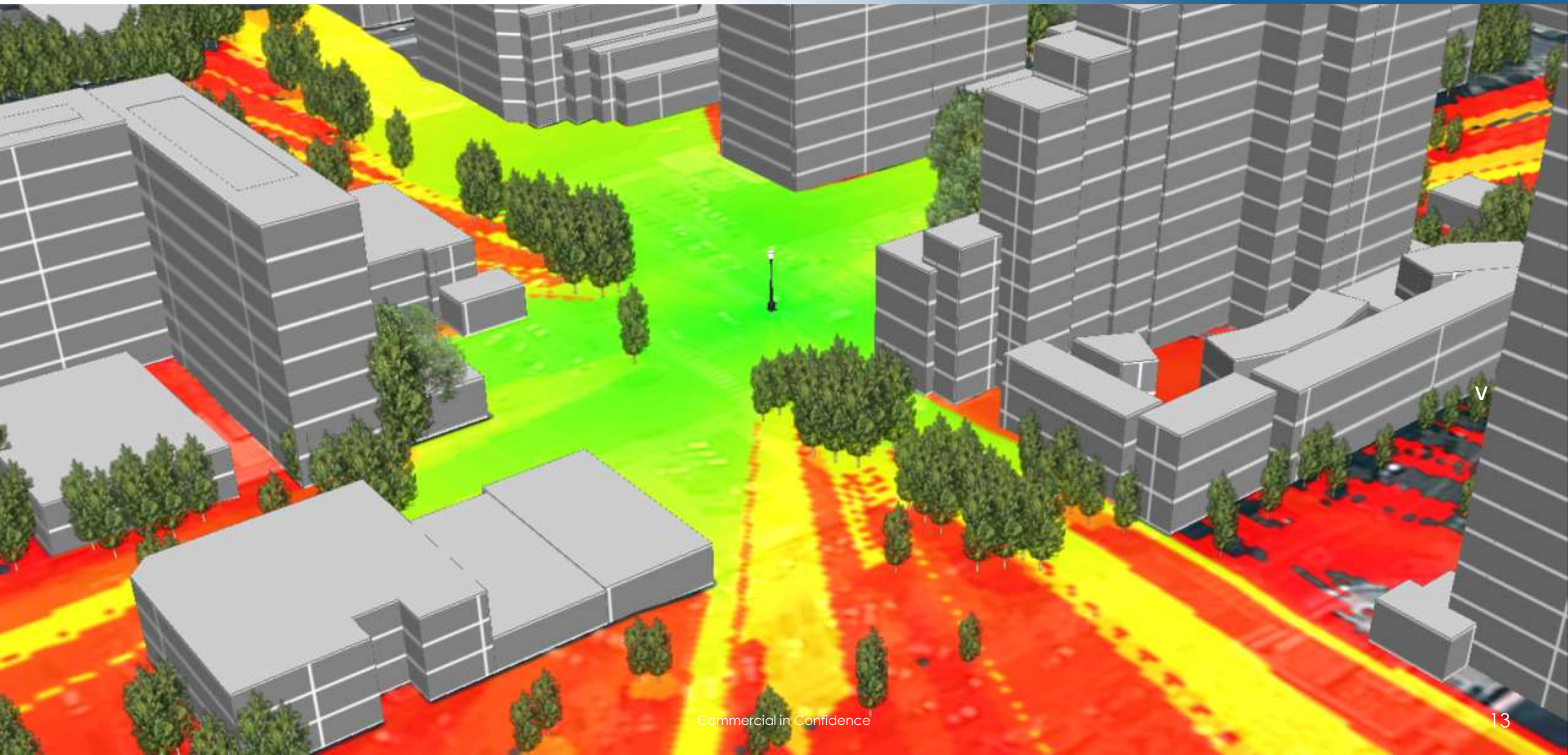

5G Fixed Wireless Access

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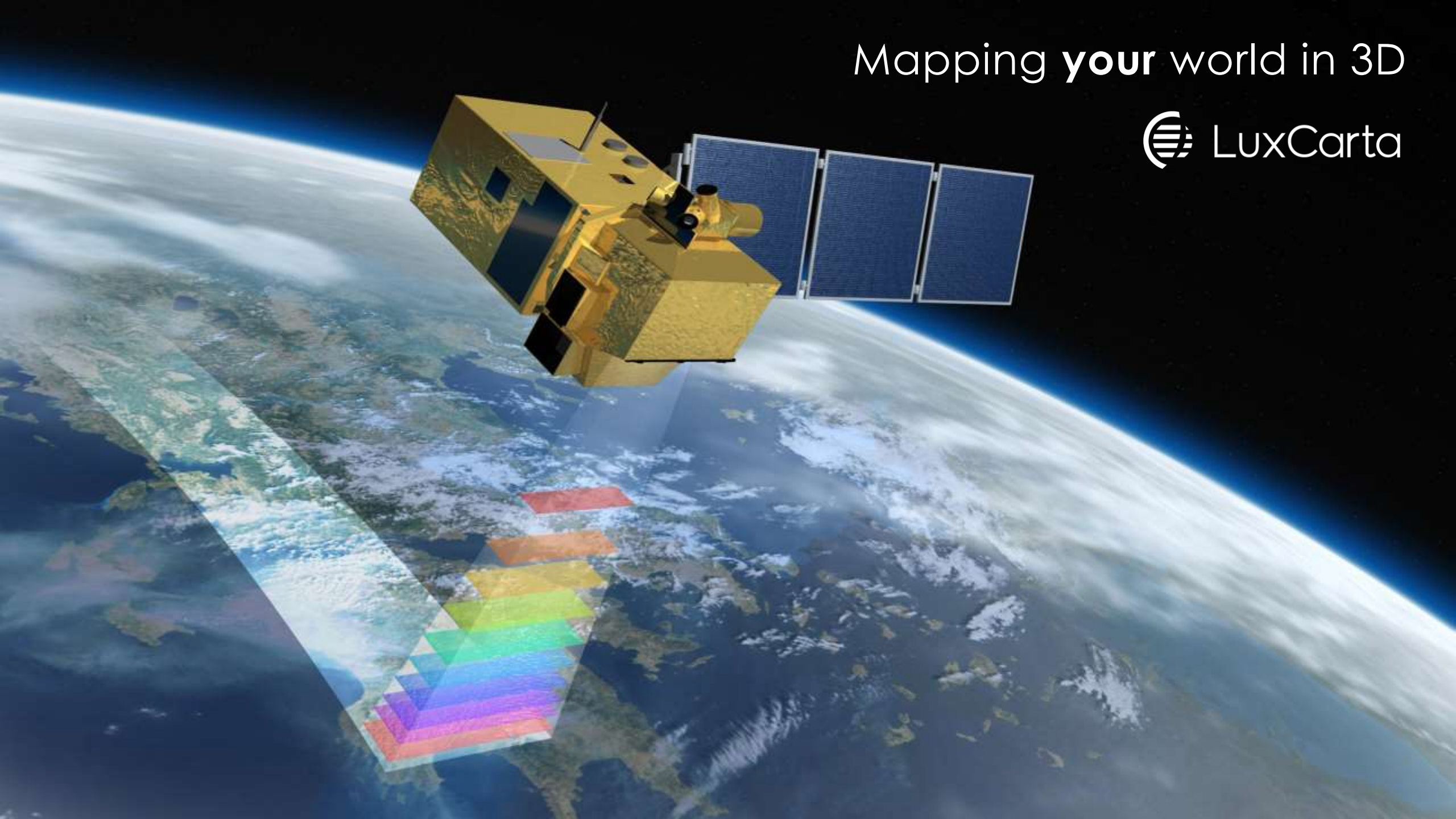
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