



## Satellite technology serves a complementary role with terrestrial providers in the IoT space.

Satellite services have unique and necessary characteristics required for proper implementation of an IoT ecosystem. With more than 20 billion connected “things” expected to be in use throughout the world by 2020,<sup>2</sup> combined with new technologies that generate low cost-per-bit connectivity, the satellite industry is redefining the solutions it can provide to address the largest communications requirement our world has ever known. What is certain is that no single communications technology is prepared to handle this estimated IoT traffic alone.<sup>3</sup> Satellites do have some features which make them ideal for meeting the needs of a meaningful percentage of IOT traffic:

### Global Footprint

Satellite networks have global broadband coverage allowing for IoT to be provided in remote locations terrestrial cannot reasonably access either because of cost or terrain, including at sea, in the air, or other unconnected locations.

### Resilience

An IoT ecosystem needs ubiquitous, resilient, and seamless connections at all times to run efficiently. Satellites, in conjunction with terrestrial services, have a proven track record of resilience and can provide these connections anywhere in the world in an economical manner.

### Broadband, Narrowband, & Broadcast Capabilities

Satellite communications have broadband, narrowband, and broadcast capabilities. Accordingly, the global network of satellite operations can support the needs of different IoT users with the bandwidth and capabilities that are required.

**Satellite technology already has a proven reliability in the Industrial IoT ecosystem, and as IoT grows it will continue to be a valuable resource to cities, communities, farming and manufacturers as they become more interconnected.**

2. <https://www.gartner.com/newsroom/id/3598917>

3. <https://techcrunch.com/2017/06/08/satellites-are-critical-for-iot-sector-to-reach-its-full-potential/>

## Satellite technology can deliver a variety of frequencies, orbits, and speeds, to provide services tailored to “smart” applications.

L-Band satellite services have been providing Machine to Machine (M2M) connectivity services for many years, and now with the advent of high-throughput Ku-band and Ka-band satellite connections, the capabilities in orbit have created a broadband superhighway in space - easily handling the potential volume of opportunity in the IoT and M2M sectors.

- **Currently, around 2.7 million devices are supported through satellite IoT.<sup>4</sup> These devices include infrastructure, smart grid, oil and gas, disaster monitoring, and environmental monitoring. The broad coverage of satellite services means that these devices can be reliably supported anywhere in the world.**
- **Satellite services already support key vertical markets. For instance, satellite services are utilized in Military support, border patrol, shipping, aviation, and fleet management, and serve a critical redundancy role.**

### Precision Agriculture

The agricultural sector will need to produce 70% more food in 2050 than in 2006 in order to feed the growing population of the earth.<sup>5</sup> As farms become more connected, satellite services will be key in pushing agricultural efficiencies to the next level through IoT and precision farming. Already many farms are collecting and analyzing big data to realize increases in yield, while also reducing their usage of water and fertilizers.

### Smart Mining

Hazardous industries such as mining, oil & gas are uniquely poised for digital disruption through IoT and four in ten mining businesses expect to use the technology to drive improvements to things like the health and safety of staff by 2019.<sup>6</sup> As these industries are located in some of the most remote parts of the world, satellite based solutions are already playing a significant role by remotely monitoring conditions and gathering data to anticipate and react to potential safety threats. Satellite based IoT solutions can play a significant role by remotely monitoring conditions and gathering data to anticipate and react to potential safety threats.

### Smart Transport, Shipping & Logistics

Satellite IoT is also transforming the Transportation and Logistics industries, where small increases in efficiency have a major impact on profitability. A continuous flow of data from transportation assets on land, sea and air is now allowing companies to capture, analyze and share information with key internal and external stakeholders. This wealth of data, in turn, is providing the insight necessary to develop new ways of working, leading to increased operational efficiencies, safety and security.

### Smart Cities

Many parts of the developing world have been left behind in the race to build the smart cities of the future, due to lack of reliable communications. Satellite based Smart City solutions are now enabling these cities become more efficient, solve urban challenges, enable local entrepreneurs, students and businesses to capitalize on the opportunities that are created.<sup>7</sup>

4. <http://www.satmagazine.com/story.php?number=1897443442>

5. [http://www.fao.org/fileadmin/templates/wsfs/docs/expert\\_paper/How\\_to\\_Feed\\_the\\_World\\_in\\_2050.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf)

6. <https://www.inmarsat.com/news/mining-poised-for-rapid-iot-adoption/> 7. <https://internetofbusiness.com/kigali-iot-network-africa/>



## Satellite Networks are a required part of the growing IoT ecosystem and are often times the only option.

Satellite operators today are beginning to utilize electronic antennas and power-friendly modems to make installing and using satellite IoT easier. This requires innovation throughout the satellite ecosystem, to facilitate access while complementing other technologies to enable hybrid solutions:

**Immediately following a disaster, mobile and portable satellite communications are likely the only connectivity option available. As search parties look for people using IoT devices such as drones and robots, satellite serves to provide that stable and constant connection during times when terrestrial systems are down.**

**As mentioned, there are expected to be as many as 20 billion<sup>8</sup> connected “things” by 2020 with an estimated 5.3 million<sup>9</sup> of those connections being through satellite services. No communications service can support the expected IoT/M2M connections alone.**

**Satellite is able to bridge the gap between the urban-rural divide and provide IoT to remote locations in a way that terrestrial providers alone are incapable of doing in an economical way.**

For example, satellite operators today have made investments with meta-material-based antenna-technology providers to provide a range of antenna and terminal products no bigger than a laptop in size. They'll serve application verticals such as in-motion terminals, content delivery and wireless backhaul.

In addition, the industry is now combining the advantages of satellites in geostationary orbit with those offered by constellations of satellites in medium- and low-earth orbits. These hybrid fleets will deliver broadband coverage of the Polar Regions and furthermore be able to layer bandwidth for regions or applications with high-density traffic, as well as for critical applications where redundancy is required.

**IoT, to realize its full potential, must take advantage of the ever-widening scope of satellite technology, so that an ecosystem develops that will fully integrate the devices, applications, and users of the Internet of Things.**

8. <https://www.gartner.com/newsroom/id/3598917>

9. Northern Sky Research, M2M and IoT via Satellite, 6th Edition, Jan. 2016.