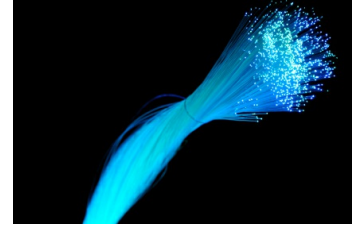


# IoT and the Fiber Imperative

By: Kevin Morgan

The Internet of Things (IoT) and Industrial IoT (IIoT) are changing the way we live, work, and play. They are creating efficiencies in how packages are routed, how manufacturing plants are operated and even how we ensure the milk in the refrigerator is fresh. While legacy broadband networks were built to connect individual users to the Internet, the IoT and IIoT will require hundreds or thousands of connections per site.



Fortunately, these new demands for connections and the bandwidth associated with these connections are best satisfied using all-fiber networks. The key to all of this is reliability. Let's explore.

## Grains of Sand

IoT and IIoT are suffering a bit from the classic cart-before-the-horse analogy. When consumers see ads where someone rushes home and asks Alexa to preheat the oven or check to see if there is milk in the refrigerator, they think "wow, wouldn't my life be better if I had that!" When the next ad comes on, showing a dad away on vacation with his family remotely locking the doors at home because the kids forgot, you feel that purchasing that type of system will make you more secure. It's the classic "peace of mind" advertising play that is intended to drive a purchase decision.

What these creatively crafted advertisements don't portray is the role that the network plays in how these IoT services perform. Each of these services requires bandwidth. Each IoT device sends some small amount of data, which on its own doesn't have much of an impact on the home network. But of course, IoT is only a small part today of what is pushing the need and demand for more bandwidth. Looking at the impact of each of these devices in isolation is a bit like looking at a glass full of sand and focusing on each grain.

[Gartner](#) has estimated that the average family home will contain more than 500 smart devices by 2022, while [Cisco](#) estimates that the number of connected devices on the Internet will exceed 50 billion by 2020. By 2022, one trillion networked sensors will be embedded in the world around us, with up to 45 trillion in 20 years.

## Beaches of Sand

Let's shift to looking at the connected home specifically. Imagine that every device—from thermostats to alarms and even the locks on the door—provides a status update. The multiple streams of data being produced and processed every second of every day dramatically increase, with televisions, computers and traditional connected devices outnumbered as other features of the home come online. While the impacts of the smart home may seem small, the attractiveness of connected devices isn't solely about convenience. For example, alerts from systems such as fire or intruder alarms are time-sensitive and require information to be delivered immediately. IoT-enabled locks that can be opened remotely to let in deliveries or tradesmen will have to work seamlessly, or IoT would open the door (quite literally) to possible security issues. In all scenarios, reliable connectivity must be a priority for the benefits of IoT to be realized.

This necessity, combined with increasing needs for 4K streaming, video conferencing, and cloud-based storage, really drives the need for higher bandwidth capabilities. Of

course, 4K isn't the limit, as we're already seeing 8K and higher monitors enter the market. So, combine all these little grains of sand with more bandwidth-intensive applications like online gaming, video streaming and storage, and you get the feeling that you're not looking at a simple jar, but instead an entire beach of sand that needs to be addressed.

As mentioned earlier, IoT devices are always generating data and traffic. [IDC predicts](#) that by 2025, the global level of data will rise to 163 zettabytes or one trillion GBs, partially due to the replacement of analog devices by IoT devices. [By 2025, people will interact with IoT devices an average of 4,800 times per day.](#) That's a staggering figure, given that most IoT devices are communicating not only with people but also with other devices in the home and across the network.

## Network Demands

Stated simply, the massive amount of data produced by IoT will require more bandwidth. It's an imperative that the industry must address or risk enabling IoT devices to be deployed into homes that have networks that can't support them. Hence the earlier cart-before-the-horse analogy. If network operators don't address this issue now, they risk creating an environment where customers are paying for devices that their networks can't ultimately support. Customers are paying a premium for these IoT-enabled devices and aren't thinking about the capacity of their home networks.

In the new IoT and IIoT world, traditional broadband networks will soon develop bottlenecks that lead to customer frustration, and increase customer support calls, truck rolls and service costs. This is a scenario that can quickly cast the operator in the role of the villain. If the operator wants to be the hero instead, fiber can be a superpower to exceed expectations and even upsell additional high-value services. Fiber to the Home (FTTH) is the watershed event for network operators looking to deliver higher-value services on top of the connectivity they also (or already) deliver. It ensures that the services delivered can scale as needs change and demand for even more bandwidth increases, which it inevitably will. It provides the foundation on which an entirely new service ecosystem can be delivered and monetized.

## Fiber Network Potential in IoT

Fiber becomes even more critical to satisfy the IoT-enabled lifestyle of millennials and Gen Z, who tend to live their lives connected to every device imaginable. But it's not just the residents who benefit. IoT is increasingly becoming the agent of change for how properties, both residential and commercial, are managed. Affordable technology is now available to monitor critical conditions in the property, instantaneously notifying the property manager of environmental changes that can seriously degrade the integrity and operating efficiency of the building. This capability makes buildings more profitable and marketable to new residents. Buildings that are fiber-fed can better leverage IoT to deliver a more comprehensive and richer service set to customers, as well as allow managers to better manage the property for maintenance and safety, with the ability to address issues before they become problems.

According to [Boston Consulting Group](#) (BCG), B2B spending on Internet of Things (IoT) technologies, apps and solutions will reach \$267 billion by 2020, with 50 percent of IoT spending driven by discrete manufacturing, transportation and logistics, and utilities.

Of course, it's not just residential buildings that benefit. According to a recent article in [InBuilding Tech Magazine](#), "IoT and digital devices are changing a fundamental truth about the commercial real estate (CRE) industry. Information, information, information is eclipsing the age-old mantra of location, location, location. While finding a space close to customers, employees, and suppliers is a fundamental requirement for tenants, experts say the emergence of information-based IoT applications and big data are transforming the value proposition of the CRE industry.

Buildings with IoT sensors and devices are not only reaping the rewards derived from reduced energy costs but also have a significant competitive advantage—they can provide clients with valuable consumer data. Using sensors to create heat maps to

determine which products consumers are approaching in retail settings or tracking customers inside a mall to help clients determine product placement are just two examples of how digital technologies are translating data into dollars for building owners.”

The article points out that “one of the primary requirements from office building tenants is higher network capacity and bandwidth to transmit data effectively,” and this means fiber.

## **Fiber Network Potential for IIoT**

While IoT first got its legs in the residential market, it has begun to take off in the business sector as well as it enables companies to use beacons and sensors to gather data from equipment and supply chains.

Now let’s shift to discuss IIoT. This is where it gets really interesting. IIoT relies on machine-to-machine communication, often over long distances. Connected devices may be in the field at a work site, at any point along a supply chain, in a warehouse, or on an assembly line in a factory. These far-flung devices need to transmit information to the main database so information can be processed. These networks will leverage a variety of connection technologies from 5G, Fixed Wireless Access, and mobile—which all require connection to a fiber network for backhaul.

For IIoT, these devices are often communicating in the absence of any human interaction, 24 hours a day, 7 days a week, helping businesses make better decisions, operate more efficiently, and overcome obstacles in real time. A reliable fiber optic network will not only transmit that information quickly but also securely and reliably.

## **Fiber - The Key to Success in IoT and IIoT**

Reliability is the key word here as it relates to the Clearfield value proposition. We focus on providing that critical link so that the fiber network can be cost-effectively designed, deployed, managed and upgraded. For the carrier, this is critical, as companies need to not only build the network but also ensure its integrity and service capabilities so that these IoT and IIoT services can exceed expectations. Networks are complicated and IoT adds a level of complexity that can have a serious impact on a network’s ability to deliver, making fiber the only real path open if you want that cart and horse to stay connected.