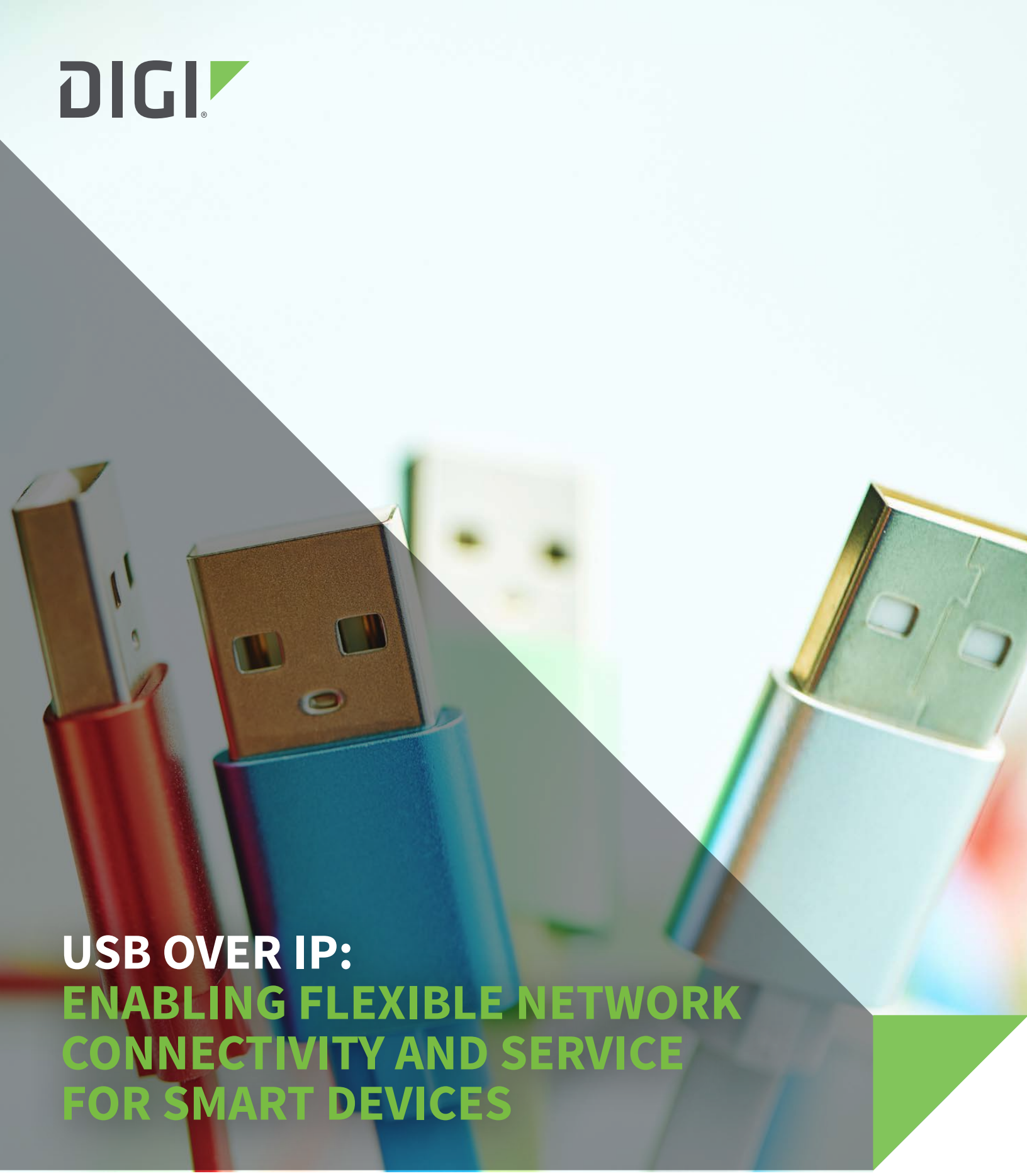

USB OVER IP:
ENABLING FLEXIBLE NETWORK CONNECTIVITY AND SERVICE FOR SMART DEVICES

USB Connectivity Is a Critical Connection Option

The ability to connect to any device anywhere is essential to modern business. Being able to retrieve data from and manage equipment over the network saves time and reduces costs. However, different devices require different connectivity options.

One of the most popular options implemented on smart devices and peripherals is USB — providing a low cost, flexible interface for intelligent communication with complex devices. USB connectivity makes it simple for a device to be directly connected to a computer, to identify the driver and application that it needs to operate, as well as to provide power to the device. With a protocol that is both continually updated and backwards compatible, USB provides a simple and effective method for direct device connectivity.

Demand for USB connectivity has grown accordingly, leading to new problems to solve. In this paper we discuss some of these challenges and how Digi AnywhereUSB® Plus solves them.

> The USB protocol has developed to focus much more heavily on providing rich connectivity for a smaller number of devices.

Challenges with USB

To understand where USB over Ethernet/IP network technology comes into play, it's beneficial to review the challenges that many in the industry face, as they deploy greater numbers of USB-based devices.

Bandwidth and Power Needs

The USB protocol, while originally envisioned with wide applicability and the intent to support very large scale deployment, has developed to focus much more heavily on providing rich connectivity for a smaller number of devices. As devices become more complex, they request access to higher bandwidth. Higher bandwidth can require use of shorter cables and control of more simultaneous USB communications paths (called "endpoints") for separate functions — which limits the number of devices that can be placed in one USB device tree. The chipsets that are available are optimized for these purposes.

Devices require greater access to power to recharge onboard batteries, which requires better power solutions, especially when offering connectivity at any sort of scale.

Traditionally, adding extra ports to connect interface devices like receipt printers, barcode scanners, monitors, pole displays and magnetic stripe readers meant installing additional computers close to the equipment. With USB-based devices, these computers have had to be located within a few meters of the equipment:

- USB 2.0 devices have to be placed within 5 meters/16 feet of the host computer.
- USB 3.0 devices are not recommended to be placed more than 3 meters away.

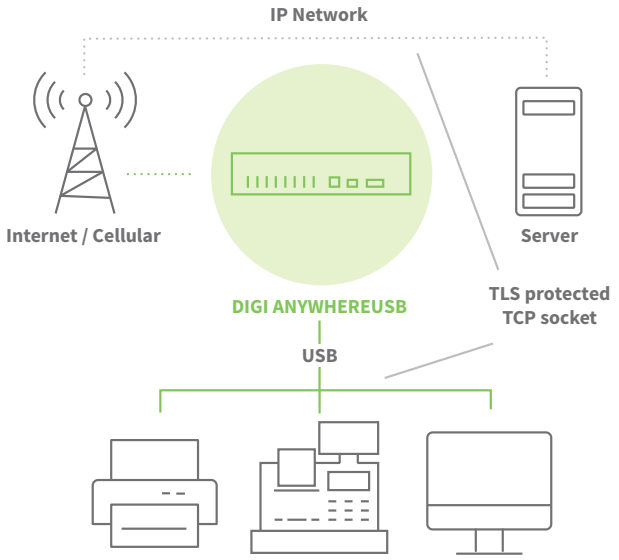

Figure 1: Challenges with USB

Evolving Standards

Standards are changing, and today favor fewer physical connections on most computers.

USB has become an industry standard for connecting equipment; however, size and power constraints mean that computers come with fewer physical interfaces. Data collection and analysis now often happens either in virtualized environments or in a cloud infrastructure. Even when physical computers are co-located at the same facility, the number of available ports, the optimal placement of the computer, and the optimal placement of the USB devices often creates cabling or distance challenges.

Managing an Increasing Number of Devices

USB devices have become more complex. They are often used in different ways at different times. And they may need to be connected to different systems to support different projects, or be treated as shared resources to be used or allocated for temporary projects and then returned to a resource pool.

For example, in many environments, USB-powered devices must be kept charged, so that they can be used by mobile personnel for an extended period and then turned in for recharging and management. Alternately, a device is needed to perform a task by one person on one computer, and then has to be used by a different person for a different task that requires it to communicate with a different computer.

For security and reliability, organizations need to be able to support these use cases – preferably without physically moving the device unnecessarily. Another important need is to avoid connecting and disconnecting the devices too frequently, to reduce wear and tear on the USB connections and cables.

AnywhereUSB Plus: Network-enabled USB Hubs

Digi AnywhereUSB® Plus is a network-enabled hub that is designed to resolve the key pain points for USB administrators by providing access to virtualized systems and cloud-enabled applications. With 2, 8 and 24-port hubs to choose from, administrators can be freed from the constraints of cable length and topology while increasing the number of available devices that can connect to a system, and managing the need for enhanced power for smart device charging.

Because the Digi AnywhereUSB Plus hubs use network-enabled technologies, the physical distance of 5 meters (for USB 2.0) or 3 meters (for USB 3.0) is measured from the AnywhereUSB Plus hub instead of from the host computer. This allows more efficient device placement, decreasing space requirements on the test bench, in production, or in the retail space.

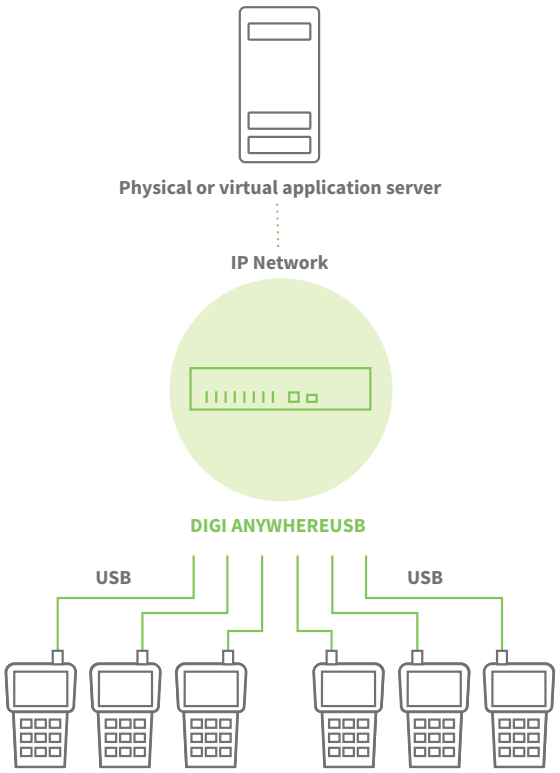

Figure 2: Managing the growing number of USB devices

Administrators can divide the devices into logical groups to selectively connect and disconnect devices from the monitoring computer when not needed so that the number of connected devices can be kept under system endpoint count limits. Each device can receive the power it needs, as the power is provided through the network enabled hub.

Support for Multiple Communication Types

USB provides connectivity models for a wide range of devices, with different transfer types such as interrupt, isochronous, and bulk; and device classes such as audio, HID, mass storage, smart card, serial, communications, printer, video and others. Most modern devices and device classes can communicate transparently using Digi AnywhereUSB Plus with USB over IP connectivity for Ethernet, WAN and other networks.

Managing the Security of Critical Resources

Shared resources need to be effectively controlled. Systems that connect to equipment over a shared network need to be authenticated. Digi AnywhereUSB Plus offers TLS certificate-based security, ensuring that the connecting computer has appropriate authorization to use the specific attached devices and to provide a means to manage this connectivity effectively.

USB over IP Provides Flexibility at the Network Edge to Enable Greater Productivity

With the wide range of dynamic and changing environments that USB devices are required to operate in, USB over IP technology such as the Digi AnywhereUSB Plus family can provide important benefits in terms of scalability and flexibility while improving physical device security through not having to move equipment around unnecessarily, and network security through the use of strong encryption. This technology also increases long-term reliability by limiting physical connects and disconnects and reduces costs by making it much easier to share resources between workstations, servers and virtualized platforms.

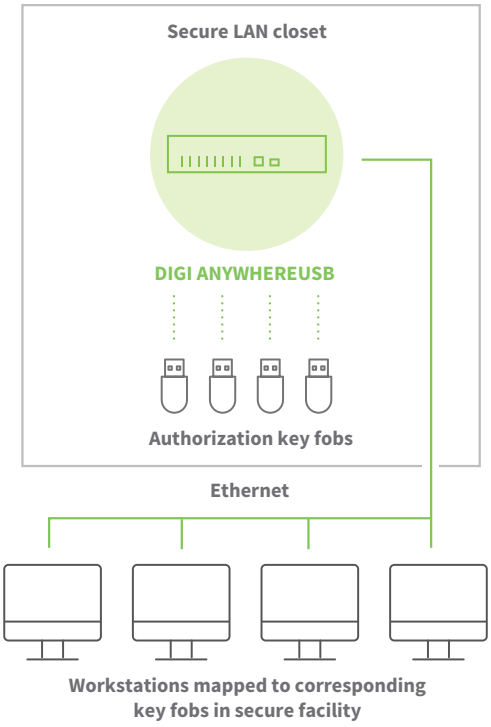

Figure 3: Digi AnywhereUSB Plus

Digi teams consult closely with each entity as they identify the right setup for their needs and prepare to deploy. You can start the conversation from our **Contact Us**. Learn more about Digi AnywhereUSB Plus at: **digi.com/anywhereusb**

Why Digi?

Digi is a complete IoT solutions provider, supporting every aspect of your project, from mission-critical communications equipment to professional services to get your application designed, installed, tested and functioning securely, reliably and at peak performance.

Digi builds its products for high reliability, high performance, and versatility so customers can expect extended service life, quickly adapt to evolving system requirements and adopt future technologies as they emerge. Digi cellular routers, servers, adapters and gateways support the latest applications in traffic, transit, energy and smart cities.

Our solutions enable connectivity to standards-based and proprietary equipment, devices and sensors, and ensure reliable communications over virtually every form of wireless or wired systems. An integrated remote management platform helps accelerate deployment and provide optimal security using highly efficient network operations for mission critical functions such as mass configuration and firmware updates, including system-wide monitoring with dashboards, alarms and performance metrics.

Company Background

- Digi is publicly traded on the NASDAQ stock exchange, symbol DGII
- Founded in 1985, Digi has 30+ years of experience connecting the “things” in the “Internet of Things” — devices, vehicles, equipment and assets
- Headquartered in the Twin Cities of Minnesota, Digi employs over 550 people worldwide
- The business has been profitable for 15 consecutive years
- Digi’s annual revenue is around $250 million
- The company has 285 patents issued and pending (150 issued)
- In our three decades in business, we have connected over 100 million devices

As a communications equipment manufacturer, Digi puts proven technology to work for our customers so they can light up networks and launch new products. Machine connectivity that’s relentlessly reliable, secure, scalable, managed — and always comes through when you need it most. That’s Digi.

Contact a Digi expert and get started today

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