

## FAQs: Drop-in Networking

**Q: What is a Drop-in Network?**

A: Drop-in Networks provide end-to-end wireless connectivity to electronic devices in locations where wireline infrastructure doesn't exist or satisfy customer needs. More information is available at <http://www.digi.com/technology/drop-in-networking/>.

**Q: Why is Drop-in Networking important?**

A: Drop-in Networking extends network connectivity to millions of new devices economically by enabling breakthrough applications physical locations that were not previously possible. It facilitates product/service differentiation, new levels of customer service and potentially new revenue streams.

**Q: What Digi products are used to create Drop-in Networking solutions?**

A: Digi provides a comprehensive and easy-to-apply set of products for Drop-in Networking. These include ConnectPort™ X gateways, XBee™ adapters and embedded modules as well as XBee wall routers and bridges, Rabbit™ programmable modules and Digi Connect® WAN and ConnectPort™ WAN cellular routers. Digi Connectware® Manager software platform provides complete network management tools.

**Q: What is a ConnectPort X gateway?**

A: A ConnectPort X gateway is used to collect data from a ZigBee® network and transport that data to a central IP network (LAN or WAN) via cellular, Wi-Fi® or Ethernet connectivity.

**Q: What is an XBee adapter?**

A: An XBee adapter is used to provide ZigBee connectivity to existing devices. Each adapter contains a ZigBee module and provides a physical data interface for connectivity. Supported physical interfaces include RS-232, RS-485, 1-Wire, USB, RabbitNet, Digital I/O and Analog I/O.

**Q: What is an XBee module?**

A: It is a ZigBee-certified embedded module that can be designed into devices to provide ZigBee functionality. Each ConnectPort X gateway and XBee adapter is ZigBee-enabled with an embedded XBee module.

**Q: What is an XBee wall router?**

A: The XBee wall router is used to patch holes in a ZigBee network where distance limitations or air interference cause signal erosion or loss between two ZigBee nodes. It is a simple plug-in device that utilizes a standard wall socket for power.

**Q: What value is provided by Rabbit Semiconductor products in Drop-in Networking applications?**

A: Drop-in Networking applications have demonstrated a need for ZigBee devices with programmability and configurable data filtering/control at the end device. The RCM4510W and RCM4400W RabbitCore modules and planned single board computer products based on them deliver that functionality in an easy to use environment based on Dynamic C.

**Q: When would I use an XBee XTender**

A: Some deployments include remote ZigBee network clusters that reside beyond the signal range of an adjacent ZigBee network. Rather than installing another ConnectPort X gateway at that remote cluster, the XBee XTender can bridge between the remote cluster and a gateway on the neighboring ZigBee network using 900 MHz RF.

**Q: How do I manage a Drop-in Network?**

A: Digi Connectware Manager software platform provides remote network management of all connected hardware, including devices on the ZigBee network. It provides a one-to-many interface from which to provision and configure network hardware, track device performance, remotely set filters and alarms, monitor connections, reboot devices and reset defaults, and remotely upgrade firmware. It displays all nodes on the ZigBee network with the ability to query for node profiles, descriptors, connected endpoints, radio configuration settings, radio statistics, bindings and more.

**Q: What types of applications utilize Drop-in Networks?**

There are two general application types for Drop-in Networks: 1) Remote device monitoring or remote site back-up, and 2) Remote monitoring of a large number of devices such as sensors or controllers. The first type of application typically involves 1-2 devices and/or a single site, while the second is aimed at gathering intermittent data from several remote devices such as sensors.

**Q: What are examples of Drop-in Networking applications?**

A: Drop-in Networks are suited to a wide range of applications in building automation, industrial control, energy management, environmental monitoring, supply chain management and other vertical markets. Common applications include:

- Lighting controls
- Automatic Meter Reading
- Air quality monitoring
- Tank level monitoring
- Agricultural automation
- HVAC control
- Remote site monitoring and backup
- Refrigeration monitoring
- Medical sensing and monitoring

**Q: Which wireless technologies are used to enable Drop-in Networking?**

A: Drop-in Networks may use one or more of the following wireless technologies: ZigBee, cellular, Wi-Fi and proprietary radio frequency (RF).

**Q: What is ZigBee?**

A: ZigBee is the only wireless standards-based technology that addresses the unique needs of remote monitoring & control, and sensory network applications. It enables broad-based deployment of wireless networks with low cost, low power solutions and provides the ability to run for years on inexpensive primary batteries for a typical monitoring application.

**Q: For which types of applications does ZigBee make sense?**

A: ZigBee is a reliable, low-cost, low-power and short-range wireless technology. It is ideal for applications aimed at networking clusters of devices such as sensors and controllers in order to gather and monitor data from those devices intermittently. For instance, gathering tank-level readings or air quality readings from sensors once or twice each hour or as little as two to three times per day.

**Q: For which types of applications does cellular makes sense?**

A: Cellular is used in Drop-in Networking applications to provide long-range transport of data collected from devices on ZigBee networks back to a central IP network. The distance limitations of ZigBee prevent it from being a viable alternative for connectivity from remote sites to central IP networks. Digi's ConnectPort X gateway family provides this long-distance backhaul.

Cellular is also used for remote device monitoring or remote site back-up. This typically involves networking 1-2 remote devices and/or a single site and is best accomplished using Digi Connect WAN or ConnectPort WAN.

**Q: When is Wi-Fi technology used for Drop-in Networking?**

A: Wi-Fi is typically used in applications where the customer has already deployed and utilizes a Wi-Fi network. For instance, a fleet manager may use Wi-Fi to collect inventory data from sensors in truck trailers as the vehicles return to the fleet yard after their delivery route has been finished.

**Q: What methods does the ZigBee technology utilize to achieve low power consumption?**

A: Battery powered devices can sleep for hours or days. The duty cycle of battery powered nodes within a ZigBee network is designed to be very low, resulting in very low average power consumption. Once associated with a network, a ZigBee node can wake up and communicate with other ZigBee devices and return to sleep.

**Q: What kind of battery life can a user expect?**

A: While battery life is ultimately a function of battery type, capacity and end-use application, ZigBee was designed from the ground up to support very long life battery applications. Users can expect multi-year battery life when using standard, alkaline batteries in a network supporting a typical application. For very low duty cycle applications of < 1%, such as Automatic Meter Reading, battery life may exceed ten years and be constrained by the shelf life of the battery.

**Q: How does ZigBee address interference and coexistence in the 2.4GHz band?**

A: ZigBee-based products can access up to 16 separate, 5MHz channels in the 2.4GHz band, several of which do not overlap with US and European versions of IEEE 802.11 or Wi-Fi. ZigBee incorporates an IEEE 802.15.4 defined CSMA-CA protocol that reduces the probability of interfering with other users and automatic retransmission of data ensures robustness. The duty cycle of a ZigBee-compliant device is usually extremely low, meaning very few packet data units are transmitted, reducing the likelihood of an unsuccessful transmission.

**Q: How does ZigBee address reliability?**

A: ZigBee was designed for the hostile RF environments that routinely exist in mainstream commercial and industrial applications. Utilizing Direct Sequence Spread Spectrum with features including collision avoidance, receiver energy detection, link quality indication, clear channel assessment, acknowledgement, security, support for guaranteed time slots and packet freshness; ZigBee-compliant networks offer a highly reliable, standards-based solution.

**Q: How many nodes can a ZigBee network support?**

A: ZigBee's addressing scheme is capable of supporting over 64,000 nodes per network and multiple network coordinators can be linked together to support extremely large networks. The logical size of a ZigBee network ultimately depends on which frequency band is selected, how often each device on the network needs to communicate, and how much data loss or retransmissions can be tolerated by the application. Networks have been tested up to 1,000 nodes, but practical usage is dependant upon traffic patterns and duty cycle.

**Q: What is the advantage of the ZigBee solution over proprietary solutions?**

A: The main advantages include product interoperability, vendor independence, and accessibility to broader markets. Customers can expect increased product innovation as a result of the industry standardization of the physical radio and logical networking layers. Instead of having to invest resources to create a new proprietary solution from scratch every time, companies will now be able to leverage these industry standards to instead focus their energies on finding and serving customers

**Q: How can I get more information about Digi's Drop-in Networking solutions?**

A: Please visit <http://www.digi.com/products/wirelessdropinnetworking/> to learn more about Drop-in Networking products, availability dates and applications.

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