

IIoT NETWORK DESIGN & WIRELESS SELECTION GUIDE



With widespread use of interconnected technology to enhance industrial processes today, engineers and managers are often asked how to design IIoT networks and select wireless solutions. Whether the task is to integrate a new sensor into an existing system or to automate a completely new process, knowledge of industrial internet networks design and selection considerations helps identify the right solution.

Understanding how to design IIoT networks and select industrial wireless solutions benefits both productivity and the bottom line. The Carotek IIoT Selection Guide makes it easier to contribute to the Industry 4.0 network, wireless and mobile solutions design and selection process.

COMPONENTS OF IIOT SYSTEMS

IIoT generally refers to a network of interconnected sensors, instruments, and other devices controlled by industrial software applications. IIoT connectivity enables efficiency and productivity improvements through the collection, exchange, and analysis of data. Investments in IIoT wireless technologies allow you to collect critical component monitoring data, while saving operator time.

The architecture of an IIoT solution can be thought of in layers – the content layer (UI devices), service layer (software), network (communication and wifi), and devices (hardware like sensors).

SELECTING AN IIOT SOLUTION

Generally, industrial internet networks design and component selection follows a process similar to this:

1. Define objectives.
2. Survey the plant/factory.
3. Select a candidate.

4. Design a solution.
5. Deploy, monitor, and update.

The first step in industrial internet networks design and selection is to choose the protocol, such as a WirelessHART network, which can interoperate with any existing HART devices. The ideal communication environment should be easy to configure, quick to deploy, well suited to the environment, and within budget. Standardizing on a protocol provides a framework for developing powerful monitoring solutions.

Industrial wireless sensor networks using WirelessHART have three main elements:

1. Gateways. Gateways enable communication between WirelessHART devices and host applications connected either to a high-speed backbone or an existing plant communications network.
2. A network manager. A WirelessHART network manager can be integrated into the host application, gateway, or process automation controller. The network manager configures the network, scheduling device communication, monitoring network health, and managing message routes.
3. Field devices. WirelessHART field devices connect to process or plant equipment. An existing installed HART-enabled device becomes part of the mesh when it has a WirelessHART adapter attached to it.

INDUSTRIAL NETWORKS, WIRELESS AND MOBILE SOLUTIONS SELECTION

Once the protocol has been selected, there are a number of devices available for monitoring, sensing, and controlling processes, depending on the project goals. An engineering design of the IIoT solution should include things like device placement, software for controllers and other applications, databases, and interfaces. An RF design process should map the facility to create a model that can be tested to confirm signal performance and access point placement. After technical modeling of the process, the design should be validated iteratively to ensure results can be achieved.

With a scalable solution, increasing the number of end points generally has little effect on network reliability. Because WirelessHART uses an easily scalable mesh network, a single WirelessHART network can contain up to 250 devices, and each device can serve as a router for messages from others. The overall the range of the network is extended because each device can forward messages to the next device rather than communicating to a gateway.

SELECTING AN IIOT SENSOR

Connectivity is a key to IIoT, and sensors are nearly as important. IIoT sensors collect a vast array of data compared to traditional analog sensors, and this additional intelligence allows end users to analyze a much larger set of data. IIoT sensors feature embedded intelligence that enables them to self-identify on a network -one advantage that can take a lot of effort out of identifying which sensor is which. IIoT sensors can also have the embedded intelligence to perform additional tasks like turning off a switch when a pressure limit is reached.

Factors for selecting an IIoT sensor include:

- Cost – up front and long term
- Longevity of technology
- Usefulness of features like self identification and self calibration

Contact Carotek for expert assistance with industrial network, wireless and mobile solutions design and selection. Or browse our selection of [IIoT solutions](#) to research some options for your application.

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