

Accelerate ISA100 Wireless Field Instrument Development with the WCI Rapid Development Kit



Why Develop and Market a Wireless Instrument?

- The process automation market has traditionally been conservative and slow to adopt new technologies
- Today, wireless is pervasive and ubiquitous
- The benefits of offering a wireless connected field instrument are simply too attractive
 - Swift ROI – significantly reduced installation costs compared to wired
 - Touch-free maintenance – remote over-the-air provisioning, instrument configuration and upgrades

Why ISA100 Wireless – User Driven Technology

- The ISA100.11a standard was architected based on end user's requirements and feedback
- ISA100 Wireless Certified devices and systems incorporate the required underlying technology, architecture and features that address end user desired capabilities and features



End User's Wireless Adoption Considerations

- For end users to deploy wireless sensor networks in industrial applications the wireless network must be characterized by
 - Highly reliable data communications
 - Ease of deployment and utilization
 - Extensible in the future
 - Vendor interoperability - standards based
 - Sound security
 - Prolonged battery life
 - IP addressability
 - Solution needs to operate in a single plant network

Technical Primer – Logical Roles



Field Network

I/O Device	Sources or consumes data. Does not route.
Router	Routes messages for other devices operating in the wireless subnet.



Infrastructure

Backbone Router	Routes data over the backbone infrastructure.
System Manager	Provides policy controlled management for all network devices.
Security Manager	Enables, controls and supervises the secure operation of all devices.
Gateway	Provides an application interface between the wireless and the plant network.



Operational

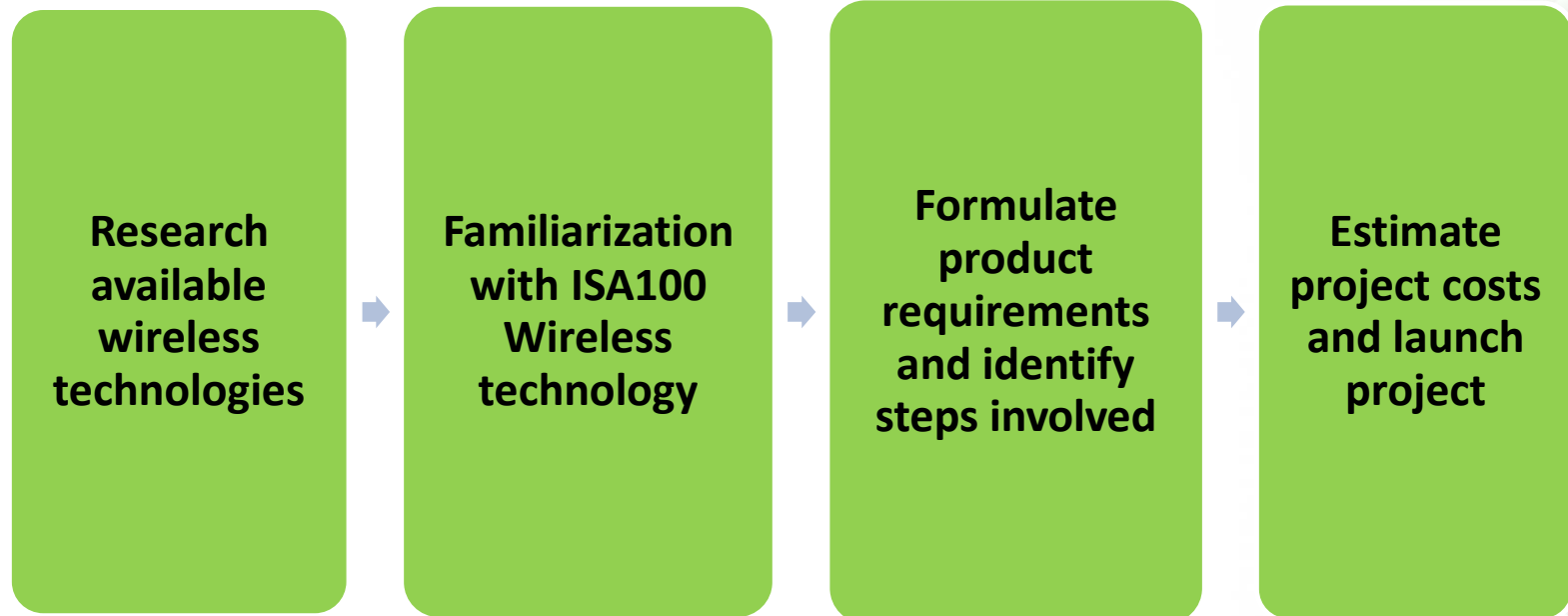
Provisioning	Provisions devices with configurations required for network operation.
System Time Source	Responsible for maintaining the master time source of the network.

Note: Devices typically incorporate multiple logical roles.

Problem Statement

- Developing an ISA100 Wireless compliant and certified field instrument used to be a complex undertaking that requires
 - In-depth knowledge of ISA100 application layer concepts and constructs – steep learning curve
 - Significant effort for developing the instrument specific code that resides on the application processor
- Estimated project duration: 8 – 16 months
- This results in slow market adoption and hinders the growth of ISA100 Wireless compliant/certified ecosystem of field instruments

Current Status Quo – Step 1: Initiation



Duration: 2 – 4 months

Current Status Quo – Step 2: Development and Certification

Firmware and Software Track

Firmware Integration

- Integration of third-party stack via API
- **ISA100 Wireless compliant APP layer implementation**

Software Integration

- Integration with third party vendor's Gateway (DD/CFF)
- Integration plant network (DCS, client apps)

WCI Certification

- Compliance testing for device profiles, extensions etc.

Hardware Track

Hardware Design and Integration

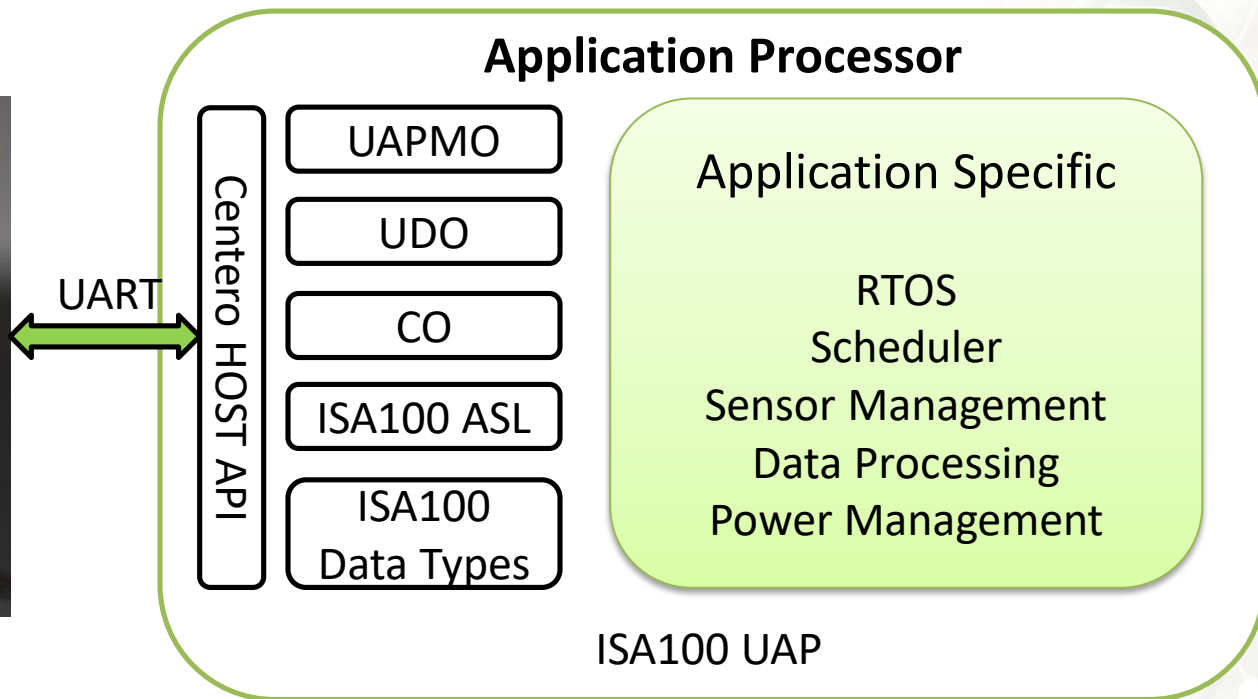
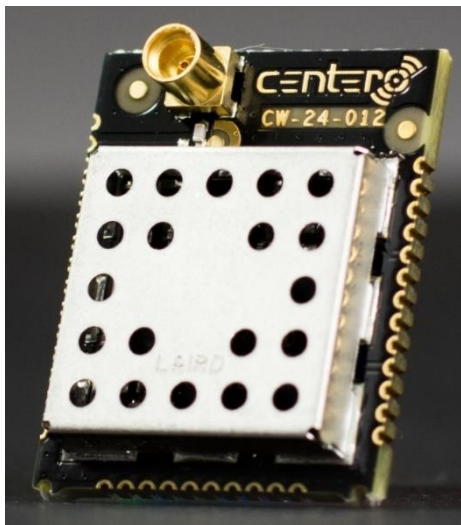
- Integration of third-party wireless module
- Schematics, layout, enclosure, fab files
- Manufacturing, engineering validation

Certification

- Wireless compliance: FCC, IC, ARIB, ETSI etc.
- Safety: UL, ATEX, etc.

Duration: 6 – 12 months

ISA100 Wireless Field Device Architecture



Goals for Development Kit

- Streamline development process and reduce time-to-market
- User friendly – intuitive interfaces and great out-of-box experience
- Reduce learning curve associated with novel ISA100 technology
- KEY: Minimize application processor development effort
- Offer certifiable field instrument implementation that requires minimal tailoring to the customer's specific needs
- Competitively priced with other kits for industrial IoT technologies (WirelessHART, LoRa, Bluetooth Mesh etc)

ISA100 Wireless RDK Highlights

- Develop ISA100 Wireless (IEC 62734) compliant and certifiable field instruments with minimal effort using application layer code provided
- WISA wireless modules included run ISA100 Wireless communication stack
- Gateway boasts feature rich web-based Network Operation and Management System
- User friendly SPiN development board includes OLED display and a large variety of sensors
- Connect external processors, sensors or actuators via Arduino and Freedom form factor connector
- All firmware and software components are remotely upgradeable



ISA100 Wireless Rapid Development Kit



- Comprehensive end-to-end development platform
- Includes everything needed to
 - Swiftly develop ISA100 Wireless compliant field instruments and devices
 - Evaluate performance of ISA100 Wireless technology
- Includes integrated and pre-configured ISA100 hardware, firmware and software
 - Low-cost NIO200IAG Gateway
 - Two (2) SpIN development boards that include a wide gamut of sensors
 - Two WISA wireless module that run the ISA100 Wireless communication stack
 - Field provisioning and configuration software
- Feature-rich Monitoring and Controls System software
 - Configure and visualize process values received from field instruments
 - Network topology and health diagnostics
 - Device management including RF statistics, remote firmware upgrades etc.
 - MODBUS server configuration
 - All components are remotely upgradable

Rapid Development Kit (RDK) Components



ISA100 Wireless Gateway (Quantity: 1)



SPiN Field Development Board (Quantity: 2)



Engineering Utility Software (Quantity: 1)

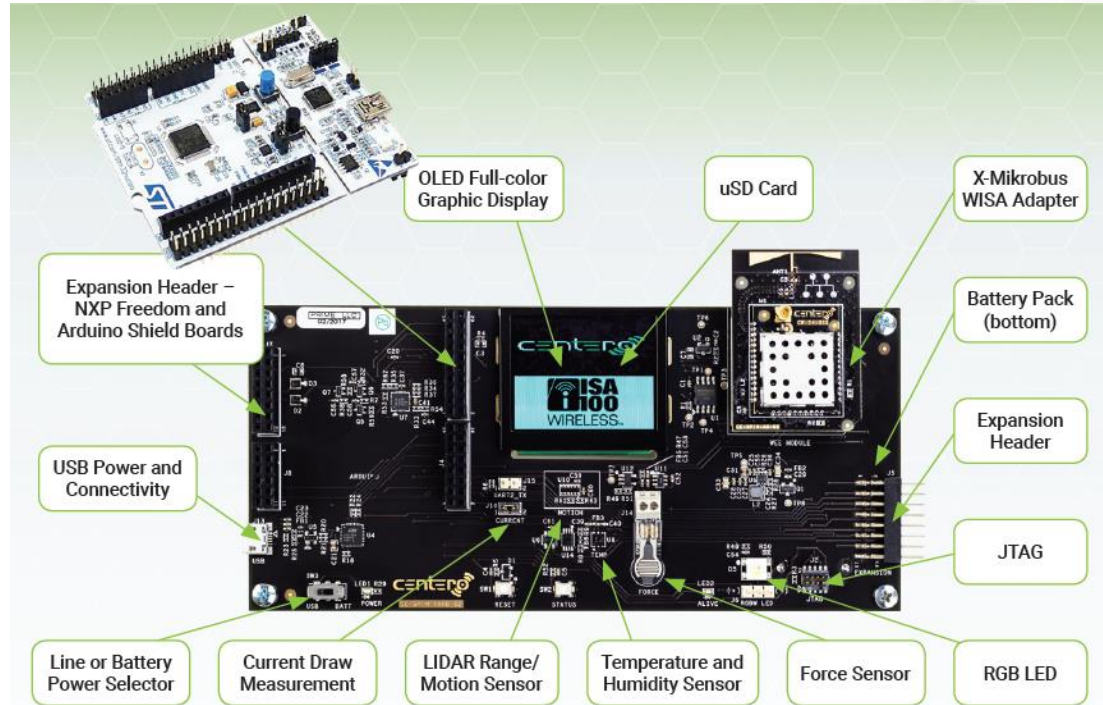


Documentation Package (Quantity: 1)

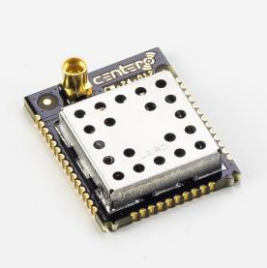
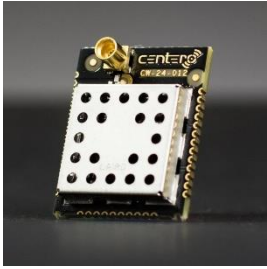


SPiN Field Development Board

- Great out-of-box experience
- Hosts a wide gamut of sensors allowing out-of-box monitoring and control
- OLED sensor displays locally ISA100 parameters (role, join status, EUI-64, sensor data etc)
- Connects to Utility Software via USB – on-board USB bridge
- Expandable – hosts Arduino shield connector – user can stack own sensors or controls



WISA ISA100 Wireless Module



- Runs an ISA100 Wireless compliant communication stack
- Swift integration within products with minimal learning curve for complex IoT technologies
- Tested for interoperability with Honeywell's WDM, Yokogawa's YFGW710 and Centero's NIO200x Gateways
- Designed for integration in intrinsically safe instruments
- Onboard RF Front-end Module with adjustable output power of up to +14 dBm and selectable RX gain modes
- Market leading sensitivity of -108 dBm and link budget of 122 dB
- Suitable for real estate constrained products

ISA100 Wireless Gateway



- Low-cost ISA100 Wireless compliant Network/Security Manager, Gateway and Access Point
- Allows user to swiftly evaluate the performance of ISA100 Wireless field network via rich sensor data set received from SPiN field development boards
- Hosts intuitive web-based interface for
 - Process data monitoring/control
 - Device management and configuration
 - Network topology and health status
 - Over-the-air upgrades of all components
- MODBUS server and intuitive process value mapping

Engineering Utility Software



- Feature rich Engineering Utility Software can be installed on any PC
- Communicates with the SPiN board via USB/serial
- Allows user to provision and configure the ISA100 communication stack
 - Provisioning parameters
 - Country codes and RF profiles
- Full set of ISA100 Wireless commands
- Full configuration of the process values published
- Serial upgrades of the communication stack



Documentation Package – Training Materials

Document or File Title	Description
ISA100 Wireless Nine - Part Training Course	A comprehensive training course provided by the WCI (Wireless Compliance Institute) which covers everything from ISA100 technical basics as well as the process to obtain ISA100 Wireless certification.
The Technology Behind ISA100 Wireless	A presentation that provides the compressed foundation of ISA100 compliant technologies.
White Paper - ISA100 Applications Technology and Systems	White paper that provides a technical foundation as well as industry practices related to ISA100 systems
ISA100 - Spectrum Management and Co-Existence	Presentation that explains ISA100 RF spectrum management features and also provides test results for co-existence with WiFi products.

Documentation Package – Engineering Materials



Document or File Title	Description
RDK User Guide	User guide that describes the functionality of the RDK. It includes initial setup of an ISA100 compliant network as well as the steps needed to create an ISA100 field instrument demo.
Developing ISA100 Compliant Products - Training Course	Training course that provides a step-by-step approach on how to develop ISA100 Wireless compliant field instruments and products.
EASY API Manual	Firmware integration document that details the API and how to tailor the application processor firmware.
Engineering Utility Software - User Guide	Details the functionality and capabilities of the Engineering Utility software.
WISA Radio Module - Hardware Integration Manual	Document contains all the information needed to integrate the WISA wireless module into a product. This includes pinout, pin description, electrical specifications and mechanical drawings.
ISA100 Provisioning and Firmware Upgrade Process	Document describes the process of provisioning and upgrading the WISA ISA100 wireless module via various methods.

WCI RDK Training Course Highlights

- One (1) day hands-on training course
- Introduction ISA100 Wireless architecture, concepts and technology
- Hands-on training course centered on WCI's Rapid Development Kit (RDK)
- RDK included in the cost of the training – trainee keeps the kit
- Goal of the training is for trainee to have a good understanding of:
 - ISA100 Wireless technology
 - Development and certification process
- Build a first functional ISA100 Wireless Field Instrument prototype – sample process values mapped into various objects based

Contact

To purchase a kit please visit

www.centerotech.com/product/wci-isa100-rapid-development-kit

For additional information please visit

www.centerotech.com

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