Next Generation Wireless Requirements for Automotive Manufacturing

Unique Requirements for Discrete Parts Manufacturing

What is USCAR?

The United States Council for Automotive Research (USCAR) is the umbrella organization for collaborative research among Chrysler LLC, Ford Motor Company and General Motors Corporation. Founded in 1992, the goal of USCAR is to further strengthen the technology base of the domestic auto industry through cooperative research and development.

User Group Priorities

User Group / Importance	ISA100.11a	ISA100 Factory Automation Study Group	Automotive Requirements
Optimized for Battery Life	High	Medium	Low
Gateway to Plant Network	High	Medium	Low
Mesh Network	High	Medium	Low
Wireless Bridge Between Networks	High	Medium	Medium
Discrete I/O	Low	High	High
Fast Update Rate	Low	High	High

Why Wireless?

- Wireless I/O is desired for equipment where wiring is either high maintenance, not physically possible or cost prohibitive
- Wireless is not intended to be the replacement for all currently wired networks

Three Classes Of Automotive Wireless:

- High Speed I/O – #1 Priority
- Medium Speed Communications - #2 Priority
- Low Speed Communications - #3 Priority

High Speed I/O

Performance Requirements

- Throughput time (PLC to device or Device to PLC) - 10ms
- Power-up time (Initial connection of DC power to full wireless device functionality) - 1.5 seconds or less*
- 0 to 60 Degree (C) Operating Range
- Deterministic response time
- Very high reliability

* Required for tool changing applications

High Speed I/O

Performance Requirements

- High density - approximately 50 instances of devices with 16 I/O points each within a 10M radius
- High EMF/RFI tolerance - Capable of operation in close proximity to welding and other RF devices
- Must not interfere with existing 802.11 b/g/a/n infrastructure

Medium Speed I/O

Secure Wireless Controls - Ethernet

Applications

- Mobile PLC
- AGV systems
- Track mounted systems
- Rotary test stand applications

Requirements

- Isolated, secure controls networks
- Connection to a secure wireless access point
- Access point must manage security, not the PLC

Low Speed Low Power

- Useful for applications that are cost prohibitive to wire back to a central location
  - Remote temperature sensors and setpoints for energy management applications
  - Machine mounted vibration signature devices
  - Utility meters for power, gas, steam, compressed air, etc.

Requirements

- Very low bandwidth,
  - Communications from devices hourly, daily or on event
- Mesh or similar radio relay network required to extend range
- Must not interfere with existing 802.11 b/g/a/n infrastructure

Questions?

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