Ethernet over Fieldbus Infrastructure Solves Product Obsolescence Issues and Rapidly Migrates Legacy Networks to IP

Facilities managers are facing End of Life (EoL) hurdles in their industrial control infrastructure due to product and network obsolescence. Faced with product discontinuation, operational and regulatory challenges, they are forced daily to choose between a variety of patchwork solutions to *correct* point problems, or invest large capital budgets to overhaul their network infrastructure.

PCN's IP-485® technology offers a proven, differentiated solution that enables the:

- ***Replacement of obsolete products with new Ethernet products in Fieldbus infrastructure,***
- ***Migration of legacy Fieldbus network segments to Ethernet, or***
- ***Transformation of entire Fieldbus networks to Ethernet***

This is achieved without the addition of new structured cabling or impacting any active Fieldbus operation. By re-purposing the existing Fieldbus wiring, replacement of serial based PLCs, migration from legacy serial devices to their Ethernet counterparts, implementation of IP protocol into legacy infrastructure, and complete infrastructure transformations to Ethernet are all now easily possible without a rip-and-replace strategy.

It was reported in a recent IMS Research Report entitled, *Industrial Ethernet and Fieldbus Technologies – World – 2013,* that while the total number of network nodes to be installed will increase by more than 30% between 2011 and 2016, the mix between Fieldbus and Ethernet products over the years remains relatively unchanged, growing only by 3% (from 23% to 26%). A primary reason for the muted growth in the industrial Ethernet market segment may be that facilities managers lack a cost effective and risk free strategy for the transition of Fieldbus infrastructure to one that is IP, and are only adopting the latter when they have *green field* opportunities. With the cost of structured cable runs at around $50 per meter on the factory floor and an order of magnitude higher in environments such as automotive manufacturing facilities, *IP-485® products* become a key to accelerating the adoption of Ethernet in industrial networks.

There are three main barriers against ease of adoption for industrial Internet connectivity and each represents a distinct challenge for network management:

1. In dealing with ***Obsolescence*** (Figure 1) legacy environments have been operating for decades with serial systems interfaced to their respective fieldbus infrastructure. A number of these systems are facing discontinuation by their suppliers with the only remedy possible is either a replacement with refurbished units on the grey market or a new generation of IP products that will not be compatible with the existing network.

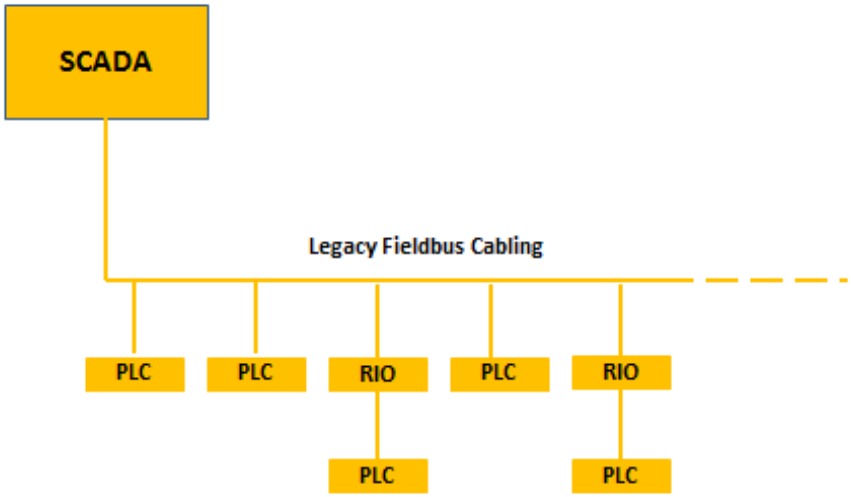

Figure 1. Sample Legacy Fieldbus Network

PCN addresses this challenge by providing a solution to directly integrate new IP products (Figure 1A.) into legacy infrastructure while simultaneously retaining all native serial systems and fieldbus functionality.

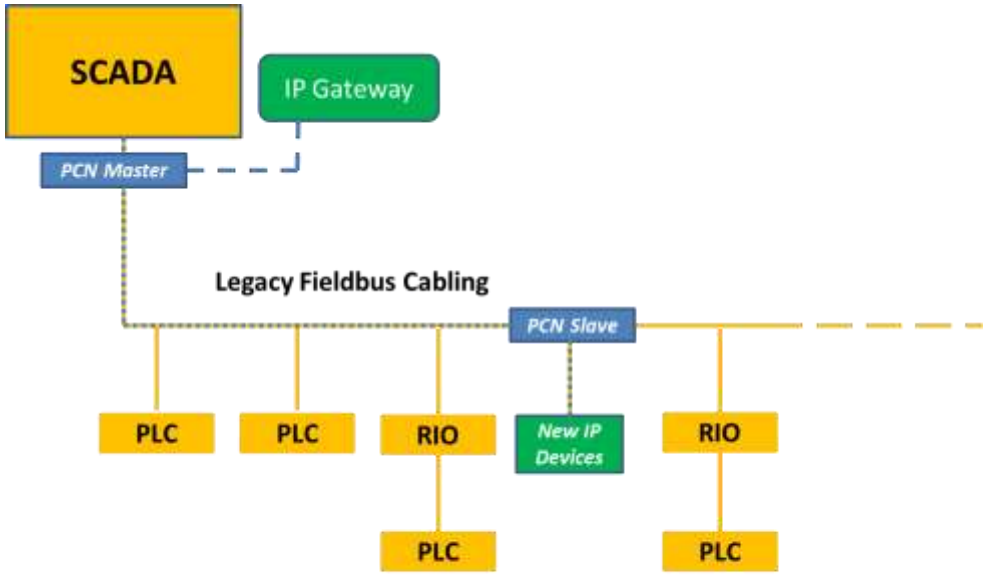

Figure 1A: Legacy Fieldbus Network Facing Obsolescence Issue

With the challenge of product obsolescence addressed through the integration of new IP products into the existing Fieldbus infrastructure, facilities managers can take the next logical step and repeat the strategy to systematically replace other serial devices with IP products at will.

2. This enables the phased transition from a reactive remedy to obsolescence, to a proactive program of ***Migration*** (Figure 2) that allows the network to constantly upgrade over time as budget and functionality requirements dictate. PCN enables this strategy by providing the management and transport of simultaneous serial and IP traffic on the same physical infrastructure.

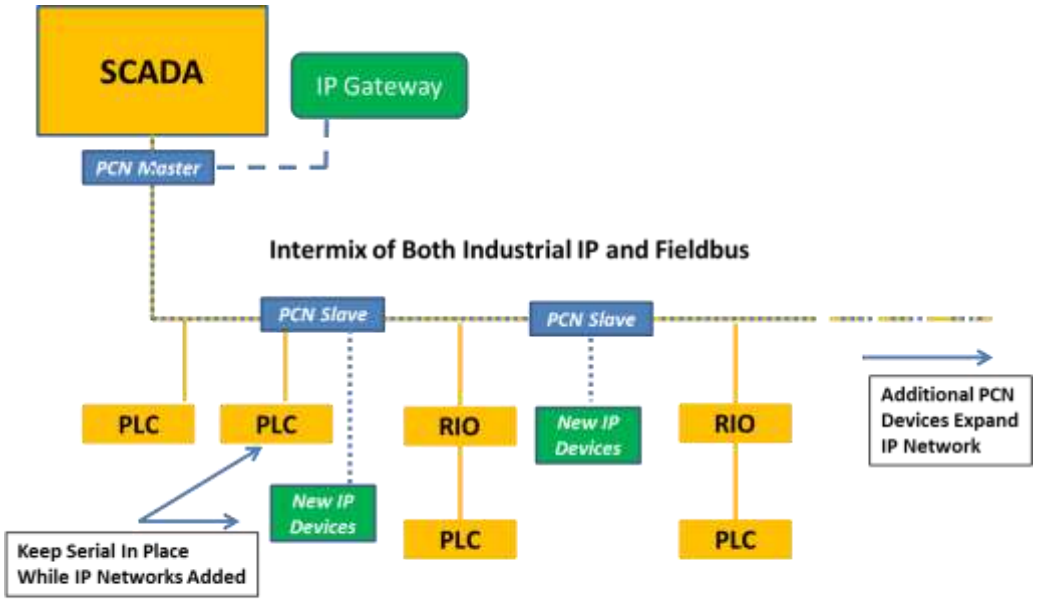

Figure 2: Migration to Ethernet Networks

The end game for facility managers obviously is a complete transformation to IP products interfaced to a modern open standard network infrastructure. Each step taken in network migration brings the infrastructure closer to this reality.

3. The ultimate full transformation is the ***Repurposing*** (Figure 3) of the entire fieldbus network to support a 100% transition to IP functionality and provide all of the benefits one can achieve with the latest generation of IP products as if brand new structured cabling had been installed everywhere. PCN provides this capability without the rip-and-replace of copper infrastructure normally required to upgrade to a 100% IP environment.

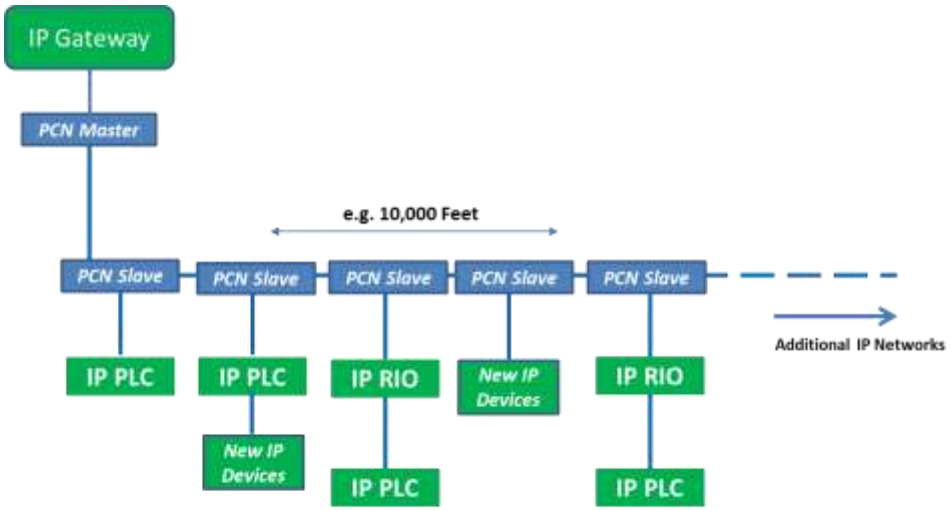

Figure 3: Legacy Fieldbus Network is Now Repurposed to IP

It's important to note that installations can start with solving obsolescence issues with PCN *IP-485®* products and then directly move to a complete repurposing of their network cabling infrastructure; thus eliminating the 2nd step of Migration which involves the intermixing of Serial dat. As shown below in (Figure 4); installation owners can immediately skip to step 3.

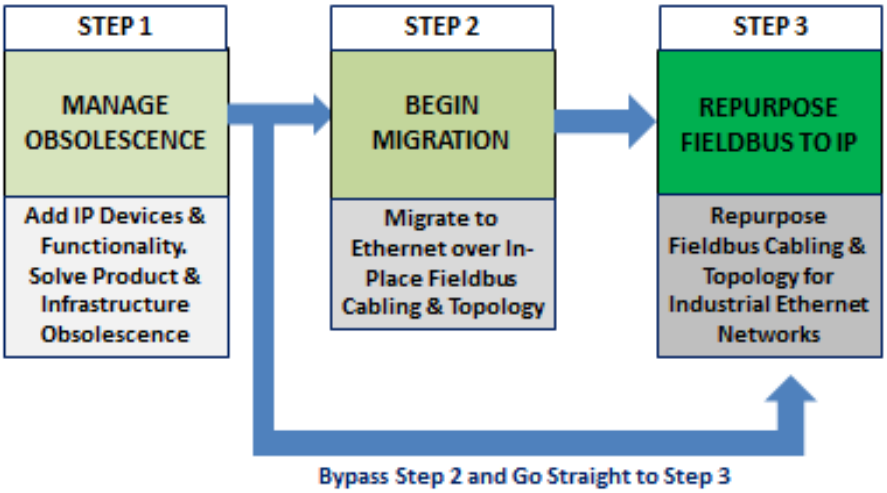

Figure 4: Phases of the Infrastructure Upgrade

How IP-485® Products Work

IP-485® technology is at the heart of PCN's industrial products and enables the simultaneous transport of IP data and Serial data over the same wiring infrastructure (twisted or untwisted wiring) and in place topologies; even in the presence of significant conducted and radiated noise in the medium.

Figure 1 shows how these products may be installed in a typical legacy industrial network to deal with product obsolescence, network migration and full repurposing of network infrastructure.

At the head end, the legacy fieldbus master controller is connected to the serial port of a Single Channel Master. In addition, an Ethernet master or Panel is also connected to one of the RJ-45 ports. This enables simultaneous transport of both Serial network data and Ethernet data on the IP-485® bus established at the output port.

With the IP-485® single channel Master in place, on average up to four Slaves may be connected. Each Slave accepts information from the IP-485® Master over the bus as input and routes the serial communication to its related serial ports and Ethernet communication to its RJ-45 ports.

It should be noted that the PCN products do not generate traffic, they only manage data transport. Legacy PLCs may then be connected to the FIELDBUS port, while IP-PLCs could be added through the RJ-45 ports. In this manner, individual legacy PLC products may be replaced, or entire network segments connected to remote I/Os can be changed over to Ethernet.

PCN's IP-485® technology can be implemented into industrial networks of many types; whereby the architecture described in Figure 1 can be applied to fieldbus protocols, cabling, and topologies currently supporting operations of:

Modbus	***Data Highway***
Profibus	***ControlNet***
DeviceNet	***Seriplex***
CAN	***Hart***
Lonworks	***Sercos & Others***

How do Facilities Managers Deploy PCN IP-485® products into their Networks

PCN Technology, Inc. (PCN) is the designer, developer and manufacturer of IP-485® products and has established Channel Partners who have detailed knowledge of industrial network installations, system integration and strong relationships with global distributors.

Through its exclusive partner network, PCN works with customers in a variety of ways and implements projects within environments where installation owners (end customers) may or may not have direct IT support.

Regardless of whether a project involves replacing obsolete controllers or consists of a phased changeover of entire network segments; IP-485® products offer a simple, straightforward & cost effective approach to modifying the existing network infrastructure. Replacement of individual Programmable Logic Controllers - PLCs require only the integration of a single Master product where the master controller of the network segment is located, and the Slave product at the location of the replaced PLC product. With these two simple steps, product replacements are essentially complete.

For migrating entire network segments, integration of the Master at the head end would be followed by the integration of a Slave at each of the locations where legacy PLCs are replaced with their IP counterparts. From a project perspective, the deployment typically requires a site audit prior to the completion of network design, and basic electrical and PLC/SCADA programming skills for product deployment and test.

Site audits are recommended to obtain and understand basic information about the legacy infrastructure including the make and model of existing master controllers and PLCs, wiring types, termination conditions, bandwidth or data rate requirements, wire lengths and wiring topology. While the basic network design presented in Figure 1 remains unaffected by the information obtained during the audit, it is critical to in-situ network testing and validation of the product deployments.

Understanding the ROI from IP-485® Products

IP-485® technology enables rapid transformation of legacy networks to IP. It is a proven technology with thousands of deployments currently in operation with field reliability at over one million hours MTBF.

The value proposition of IP-485® based products is significant and involves reduced project time, cost and complexity with negligible impact to ongoing operations and revenue collection.

As an example, in the retail petroleum market IP upgrades on the forecourt used to involve construction, permitting, projects costs of a hundred thousand dollars or more, and fueling stations being out of service for weeks, if not longer. With IP-485®, the job is now completed without any construction requirement, for less than ten thousand dollars and under two hours.

In industrial networks, it eliminates the need for tens of thousands of dollars in cabling costs alone. In automotive environments, the overall cost savings could be an order of magnitude larger. In addition to the cost, risk and downtime advantages, there are other intangible benefits as well. Facilities managers can develop a structured manner in which to integrate parts of their industrial network with the corporate IT infrastructure. In the meantime, they can begin to integrate the data across the two networks using gateways. And finally, staff re-training needs are substantially reduced and made manageable with IP-485® across the entire factory.

Summary

IP-485® is a proven, differentiated technology that solves product obsolescence, enables network migration to IP, and repurposes fieldbus cabling and topology at significantly lowered costs and technical risks, and with no negative impact to operations.

Its value proposition is demonstrated in a variety of markets through *IP-485®* product integration including industrial automation, process control and building automation.

To facilitate easy access and integration for automation and control installations, PCN is developing a robust set of Channel Partners with industrial domain expertise and distributor relationships.

As facilities & installation managers rapidly migrate their networks to IP with IP-485® enabled products; the market dynamics between Fieldbus products and Ethernet products installed will reflect an increased adoption in *brownfield* applications.

Evaluate IP-485® Today
Ask for Part #PCN3485-NDK1

**All Referenced Fieldbus Protocol names are Registered Trademarks of their respective companies and/or organizations.*

About PCN

PCN is an award winning products company that designs and manufactures advanced Ethernet networking devices for industrial, process, and building automation and control markets.

Key to PCN's advanced products are its patented technologies which allow the transformation of legacy cabling & topologies into state of the art standards compliant Ethernet networks as if it were structured cabling and without impacting any existing automation functionality already in place.

PCN is based in San Diego, CA. All products are designed, developed and manufactured in the USA. High volume production and distribution operations are based in Oregon with additional engineering, customer service, and network design services located near St. Louis, Missouri.

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