



## *Five Criteria for Choosing an Industrial Ethernet*

- Performance
- Scope
- Adoption
- Support
- Certification

## Summary

*This white paper describes five criteria important to the selection of an Industrial Ethernet: performance, scope, adoption, support, and certification. While many protocols strive for satisfaction in a given area, PROFINET surpasses requirements in all areas.*

## Introduction

As the Industrial Ethernet market is split roughly in thirds between PROFINET, Ethernet/IP and ‘other’, there are still factors to be considered when choosing an Industrial Ethernet networking standard. Everyday, more users are questioning the strategies of their vendors in search of ‘best in class’ technology. This white paper serves as a guide to that search.

## Performance

PROFINET takes four steps to achieve increasing levels of determinism. Each step is employed only as the application requires.

### *Step 1 – TCP/IP*

PROFINET uses TCP/IP, but only for non-time-critical data like configuration and diagnostics. ‘Normal’ ethernet traffic can reside on the same cable as PROFINET messages. Most importantly however is the enterprise level connectivity for improved visibility into manufacturing data that this allows. In this domain, PROFINET uses commercial-off-the-shelf switches.

### *Step 2 – Layer 2*

In time-critical settings, PROFINET simply skips the TCP and IP layers to transport data directly from Ethernet to the application. This is the basic approach inherently used by nearly all PROFINET data, and will cover the requirements of 90% of installations.

### *Step 3 – Bandwidth Reservation*

For some high-speed IO applications, PROFINET will reserve some time on the network for these data packets. It is as simple as separating time domains for real-time and non-real-time channels during a cycle.

### *Step 4 – Scheduling*

Motion Control can require an additional step. The PROFINET configuration tool knows the network topology, and when data arrives at a given device. So, with scheduling, data intended for the farthest device is always sent first.

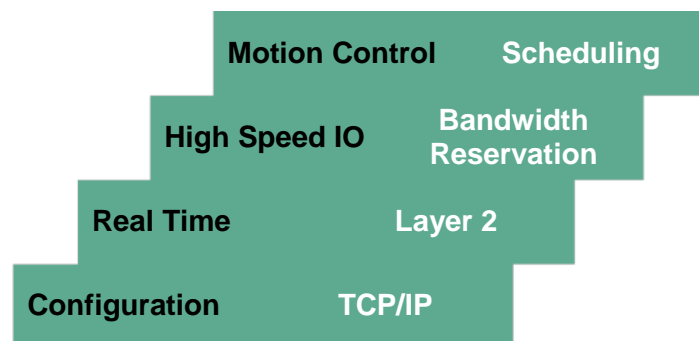


Figure 1 – Four steps to high performance determinism

## Scope

When choosing an Industrial Ethernet protocol, it is desirable to pick just one that will cover all requirements. PROFINET covers IO, motion control, safety, peer-to-peer communication, vertical integration, wireless, and so on. Ergo, there is no need to search for a second or third network to fulfil any newly desired functions. Adding another network is expensive for a whole host of reasons: configuration expenses, new diagnostic tools, and most of all, training.

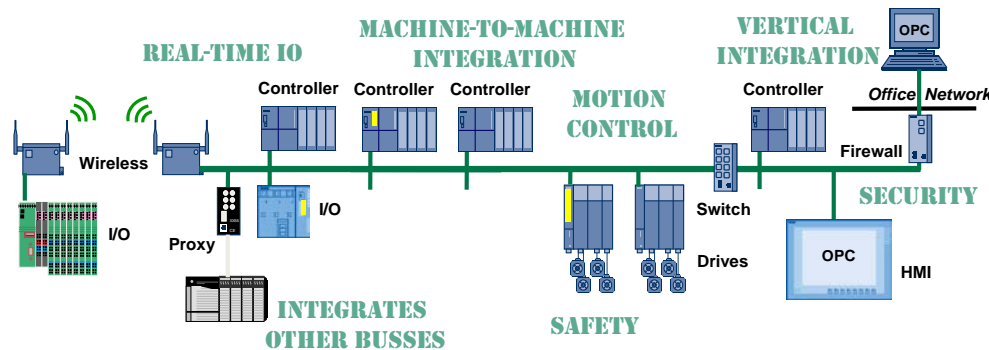


Figure 2 – Address all functions with a single network

## Adoption

As a technology gains popularity, three things happen:

- Its lifespan increases
- More devices become available for it
- The knowledgebase (people using it) widens

PROFINET adoption is growing at an exponential rate. In 2007 every 15<sup>th</sup> PROFI-enabled device sold was PROFINET; in 2010 that number drops to every 5<sup>th</sup> device. Through 2011, approximately 4 million nodes will be installed. Additionally, PROFIBUS is the most widely installed fieldbus in the world with 54% market share. The second most popular fieldbus is Interbus with ~20% installed base. Both of these technologies migrate to PROFINET. There are nearly 500 PROFINET enabled products from many suppliers. This means the user is not beholden to a single vendor if that vendor should decide to embrace a different technology.

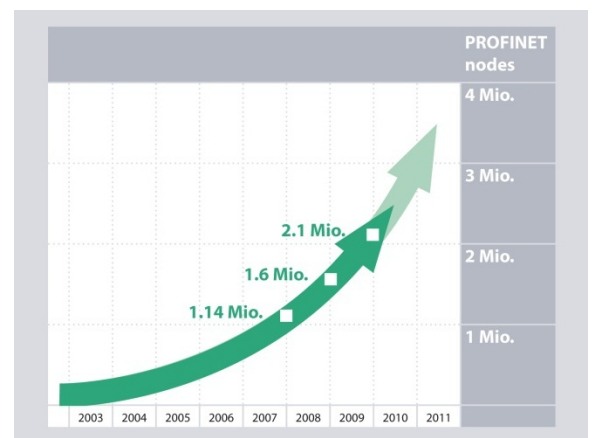


Figure 3 – Growth at an exponential rate

## Support

Today's economy requires business to be done on a global scale. From production to sales, that could mean manufacturing in a remote location, to acquiring customers overseas. In either case, it is necessary that there be support for a given technology that is local, and native. Under the PI International organization, 27 regional associations (“RPA”s) have been formed for such a purpose. Additionally over 40 unique Competence Centers (“PICC”s) exist globally to provide expertise when necessary. They help users understand and apply PROFINET and assist device manufacturers in integration. Help is always available in a given time zone, in the local language.



Figure 4 – Local and native; worldwide support

## Certification

When choosing an Industrial Ethernet, perhaps the most important factor is confidence in the technology and the support provided. Devices employing PROFINET are tested at a PI Test Lab (“PITL”) and certified to work with the protocol. 10 such labs exist globally, along with 18 PI Training Centers (“PITC”s). These Test Labs and Training Centers themselves are certified and then audited to ensure integrity and quality of service throughout the PI organization.



Figure 5 – Devices are tested and certified

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