



6 PROFINET Myths

And The Much Better Realities

Introduction

As more factory automation and process control applications advance from serial fieldbus communications to Ethernet based communications, there is confusion about the truths associated with Industrial Ethernet. Industrial Ethernet is not just one thing; it actually comes in more than one 'flavor', or protocol. Oftentimes, the lack of transparency surrounding one Industrial Ethernet protocol bleeds over into the information regarding another.

A handful of myths surrounding PROFINET have sprouted over the years. As a result, the line between myth and reality blurs, and we take it upon ourselves to highlight some of the more popular myths and their much better realities.

Read this White Paper to find out what is myth and what is reality.

Myth 1: *PROFINET is just PROFIBUS on Ethernet*

Reality: Although it builds on the concepts of PROFIBUS, PROFINET is a new protocol, tailored to Ethernet capabilities. Other Industrial Ethernets have just wrapped up their old messages in a TCP/IP or UDP/IP wrapper and called it an Industrial Ethernet. PROFINET built the protocol from the ground up, to take advantage of the benefits of Ethernet. For example: larger message sizes (1440 bytes compared to 244 bytes for PROFIBUS) are possible. By using all the techniques available with standard Ethernet, PROFINET achieves speed and determinism that cannot be achieved with the office-centric TCP or UDP techniques. TCP/IP still has its place in PROFINET though; see the next myth.



It is worth noting that PROFIBUS has the largest installed base of any of the serial fieldbuses. So even though PROFINET is a different protocol, we couldn't leave the installed base behind. The solution is a proxy. A proxy is like a gateway in that it connects two different networks, but unlike a gateway, the mapping between networks is standardized in the PROFINET specification. The proxy concept worked so well for PROFIBUS, it was extended to Interbus (the second most installed serial fieldbus), when its organization decided to forego their own Industrial Ethernet and use PROFINET. And from there it was extended to many other networks, including AS-i and DeviceNet.

Myth 2: *PROFINET does not use TCP/IP*



Reality: PROFINET DOES use TCP/IP... for configuration and diagnostic communication. But it does not employ TCP/IP for real-time communication. Sending messages through the TC/IP stack adds time and uncertainty to the message. The TCP/IP stack is just software – software that takes time to execute and not the same amount of time each time. While that is adequate for non-time-critical data, it is not adequate for real-time data. PROFINET surmounts this inadequacy by skipping TCP/IP for real-time data using a standard Ethernet field

called EtherType. PROFINET uses EtherType 8892 to direct the PROFINET real-time message directly to the PROFINET application, skipping TCP/IP.

Myth 3: PROFINET requires a proprietary chip

Reality: A standard Ethernet controller chip can be used for PROFINET, even for real-time data. Just add a PROFINET stack (the software that knows how to direct the PROFINET message as well as the TCP/IP traffic). In order to achieve motion control, PROFINET does require that the stack be implemented in silicon; that is, in a chip. Otherwise the required speed cannot be achieved. However, the chip is not proprietary. Proprietary means “owned by a company.” That is not the case here; in fact, PROFINET chips are available from dozens of companies. (And many of these same chip companies have implemented all the major Industrial Ethernets in their chips.) Just because you do not need a chip, does not mean you should avoid using one. You can use a chip even for non-motion applications. Looking back at the success of PROFIBUS, PROFIBUS is almost always implemented in a chip. You could use a separate RS485 chip and implement PROFIBUS in software, but that is rarely done. By having the communications processing in its own chip, the main processor for the device is free to handle its main purpose, whether that is simple IO blocks or complex devices like vision systems.



Myth 4: PROFINET does not use standard Ethernet

Reality: If you examine a PROFINET frame on an Ethernet line using a sniffer like Wireshark, you can see that PROFINET is in an IEEE802.3-standard Ethernet frame. All the Ethernet header and trailer fields are there, and it is carrying the PROFINET data.

Ethernet Frame												
InterFrame Gap 12 Byte	Pre- amble 7 Byte	Sync 1 Byte	MAC 6 Byte	MAC 6 Byte	VLAN 2 Byte	Ether- type 2 Byte	Frame ID 2 Byte	PROFINET Data 40*...1440 Bytes	Cycle Counter 2 Byte	Data- Status 1 Byte	Trans Status 1 Byte	FCS 4 Byte

Myth 5: PROFINET is not an open technology

Reality: Anyone can buy the PROFINET standard from the IEC and implement PROFINET in their device on their own. This is in contrast to EtherNet/IP, which requires that a contract be signed with ODVA, the organization that controls EtherNet/IP. This is also in contrast to EtherCAT where a single company, which

receives a royalty for every node, owns the technology. Of course, although you can develop PROFINET from scratch there is little reason to do so; there are dozens of companies that have already created PROFINET stacks, chips, and modules. Using one of them greatly accelerates the development process.

Myth 6: PROFINET is owned by Siemens

Reality: PROFINET was created and is owned by PI (PROFIBUS and PROFINET International), an international trade organization with over 1400 members. Any member company is welcomed and encouraged to participate in the development of the technology by joining a Working Group. Siemens has adopted PROFINET as their sole Industrial Ethernet backbone, but GE Intelligent Platforms and Phoenix Contact have also adopted PROFINET as their sole Industrial Ethernet backbone. Almost every other controller manufacturer has PROFINET as one of their Industrial Ethernet choices.

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