



Leading the World in  
Industrial Networking and  
Communications

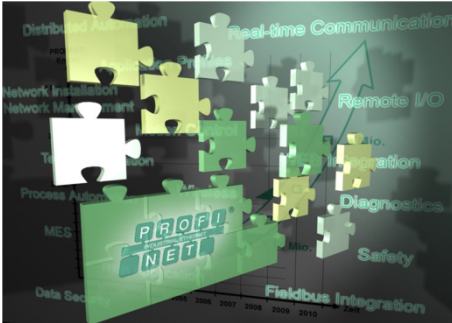
## PROFINET IN CONTEXT

Market penetration increases by 40%.  
Success across a broad front.  
The success influencers.  
Where next?

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## EXECUTIVE SUMMARY



PROFINET, the all-encompassing Industrial Ethernet networking solution for manufacturing and process plants, has passed another milestone with the announcement that 1.6M devices were shipped by the end of 2008.

This represents a 40% increase over 2007.

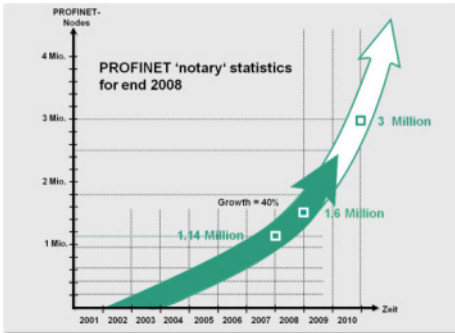
A 'Notary' (an independent third party having special legal status) was again employed to generate the total and ensure complete confidentiality for individual contributors. No other fieldbus organization counts its market statistics in this way.

Initially, PROFINET sales came mostly from West Europe, notably Germany, but now markets are widening, with North America and Asia reacting strongly. The application range has been very wide.

Success is influenced by many factors, for example excellent TCP/IP connectivity, good WLAN partnerships and Profiles such as PROFIdrive and PROFIsafe which permit drives and safety functionality on the same network as control. Good linking to almost all existing fieldbuses - e.g. PROFIBUS and INTERBUS - provides an excellent migration path for end users wishing to move towards an Ethernet-based future.

PROFINET will continue its growth. New Profiles such as PROFInergy - for the Active Energy Management of power-hungry devices like robots - will encourage adoption further.

## THE ALL-ENCOMPASSING INDUSTRIAL ETHERNET



PI member companies are introducing PROFINET-enabled products in ever greater numbers. Because all PROFINET devices have to be certified it's possible to be certain about the number of devices and services available. Today, far more than 200 PROFINET products and services from around 50 companies are on the market.

PROFINET is well in advance of other Industrial Ethernets in that at least five vendor companies have announced PROFINET controllers ('master' devices). Many more are under development worldwide. We also know that by the end of 2007 there were 1.14 million PROFINET devices installed – a figure obtained via a 'Notary' (an independent third party with legal status) who gathered confidential market information from active PROFINET vendors and combined this into a publicly-available total. A figure for 2008 has just been published. Only active PROFINET devices are included in this annual survey; infrastructure components such as switches are excluded. The assistance of a 'Notary' means that no one other than the 'Notary' - not even PI - knows the numbers supplied by individual vendors.

The 2008 survey used the same 'Notary' procedure. It shows that the total number of installed PROFINET nodes has increased to 1.6 million – a growth of 40% during the year (see graph). PI estimates that if growth rates are maintained then the total will pass 3 million by the end of 2010. Comparison with PROFIBUS figures from an equivalent time period indicates that PROFINET is following a similar growth path.

No other 'fieldbus' organization has its market statistics audited by a neutral third party so the PROFINET results are one of the first reliable indicators of market size. The figures prove that PROFINET is genuinely in use, and that devices supporting the technology are achieving beneficial results! The numbers are an important confidence builder for end users and vendors alike and will further stimulate the market.

## GEOGRAPHICAL OVERVIEW



Early PROFINET sales were focused on European markets, principally Germany where the commitment of the AIDA group (Automation Initiative of the German Automotive Industry, the members of which are VW, BMW, Audi, Daimler and Porsche) is providing a major stimulus for vendors - particularly OEMs - to deliver PROFINET-enabled systems.

Relatively short equipment life cycles, the pressure for cost reductions, a new initiative for energy efficiency and a desire for improved links between the factory floor and enterprise management networks have all played a big role in stimulating the automotive market for PROFINET.

PROFINET is extending its reach constantly. North America, another primary automotive market, initially turned towards its own indigenous Industrial Ethernet solutions and PROFINET faced strong competition. Nevertheless, significant penetration by PROFINET in general automation applications is being seen. End user, System Integrators and OEM (Original Equipment Manufacturers) acceptance is also high. Anecdotal evidence from the PTO (the North American Regional PI Association) suggests that interest in PROFINET is growing, with attendance at PROFINET seminars being high in the motor capitals, where numbers are now regularly reaching three figures!

Elsewhere in the world, PROFINET is also 'ramping up' fast. In major market regions – China/Asia, India and Latin America - PROFIBUS remains a popular choice for industrial communications and further penetration by PROFINET will depend on markets and support structures maturing. However, the Chinese standardization authorities have nominated PROFINET for the status of a pre-standard type GB / Z, a big step towards full standardization and the prelude to major market adoption. In other geographical regions where large European companies are active, PROFINET is making significant inroads.

## EXAMPLE APPLICATIONS

PROFINET is successful in many market areas. The following table shows recent examples quoted by vendors:



**Wind Turbines**  
Synchronization of windmills in a wind park



**Oil Platforms**  
Process monitoring and control



**Conveyor Systems**  
Large scale conveying of materials



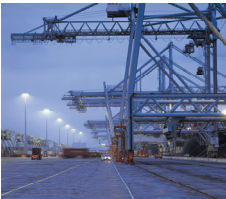
**Water/Waste Water**  
Complete solutions with controls, I/Os, infrastructure and wireless integration. Also, Networking of pump stations



**Building Automation**  
Heating and sprinkler systems, air conditioning, doorway control, lighting



**Food and Beverage**  
Complete tobacco plants, packaging, bottle filling lines, with communication between machines of different OEMs



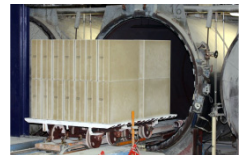
**Cranes**  
Automated handling with wireless connectivity. Also, wireless safety for machines and personnel



**Automotive Manufacture**  
Paint shop, conveyor systems and body shop applications



**Automated Vehicles**  
Wireless connection factory wide



**Building Materials**  
Automation and control of transportation units using wireless

## SUCCESS INFLUENCERS



Why is PROFINET successful? And how does that success fit in with an automation world currently dominated by fieldbuses, notably PROFIBUS and INTERBUS?

One answer is that PROFINET is a truly 'open' Ethernet solution, offering the 'transparency' that modern enterprises need for linking all parts of an organization. One reason this is important is that more and more organizations are looking for remote services, whereby systems and equipment are managed over IT networks, including the internet. PROFINET, with its excellent and open TCP/IP functionality, is ideal for this.

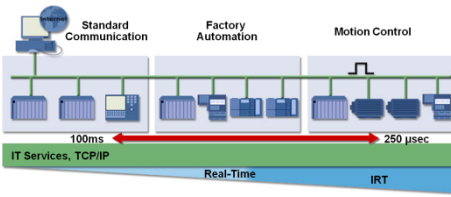
IT departments will see in PROFINET many management functionalities that they recognize, for example the diagnostic capabilities. This makes network construction very simple and enables extensions to be made quickly and easily. Standard diagnostic protocols such as SNMP can be employed.

WLAN connectivity using IEEE 802.11.x products is readily deployed with PROFINET. The PROFINET specification ensures this is done in a single and consistent way, delivering big advantages wherever wireless connections are the ideal solution to plant floor connectivity. Typical examples include transportation systems, unmanned moving vehicles, crane applications and



where production lines have to be operated in remote or difficult environments.

Functional Safety also works well with PROFINET, including with WLAN wireless networks, making remote safety systems (such as on automated cranes) easy to implement. In ship-building, the weight

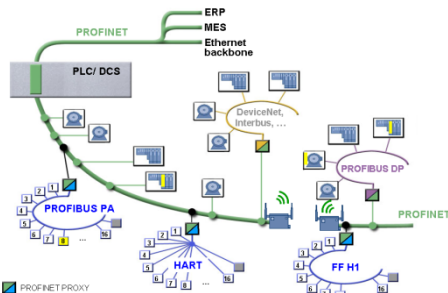


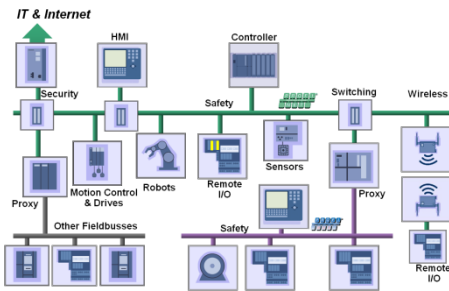
saving offered by PROFINET is a major advantage along with the TCP/IP benefits mentioned earlier. PROFINET's redundancy features also play a role in these markets.

But it's the 'all-encompassing' nature of PROFINET that ultimately delivers the unique value propositions that are so important for end users. These are based on the following:

**REAL TIME OPERATION:** Ethernet as used in offices does not have the determinism (that is, consistent, jitter-free, real time response) needed by modern automation systems. PI therefore built upon basic Ethernet to enable it to deliver the performances required for controlling automation systems. PROFINET offers a full solution that can reach from traditional TCP/IP communications right up to advanced multi-axes motion control (see diagram above). The full range of communications can be employed simultaneously when required.

**PROXY TECHNOLOGY:** PROFINET has easy and simple connectivity for legacy networks and equipment, protecting current investments and delivering greater life cycle returns. The 'proxy' - a linking device for existing equipment - offers the transparency needed to enhance existing technologies with modern, Ethernet-based, structures. Using 'proxies', fieldbuses such as PROFIBUS, DeviceNet, INTERBUS, AS-Interface and Foundation Fieldbus can easily be migrated to an Ethernet future based on PROFINET. The INTERBUS community has already chosen PROFINET as its preferred Industrial Ethernet solution because of the ease with which INTERBUS can be connected to PROFINET using a 'proxy'.





**THE FLEXIBILITY OF ETHERNET:** building on the transparency mentioned above, PROFINET's Ethernet base ensures that network architectures are almost infinitely scalable. Networks can be small - or very large - and can be extended very easily. PROFINET's modularity also means that not all functionality need be used at once. Starting small and growing the network is

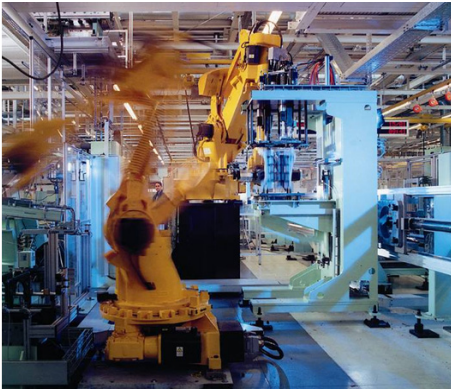
a sound strategy, allowing experience to be gained and the effectiveness of PROFINET to be maximized. Flexibility also means that additional services can be added when necessary - for example 'Fast Start Up' procedures to enable PROFINET devices to be powered up quickly between production cycles. This feature is particularly relevant to production lines employing robots fitted with Automated Tool Change. FSU ensures the shortest possible tool change times, reducing cycle times significantly.

**COMMON PROFILES:** 'Profiles' document consistent ways of using the base communications technology of PROFINET in specific applications. Profiles ensure interoperability, protecting sourcing choices and encouraging competition, all of which benefit end users.

Important Profiles are:

Functional Safety: PROFIsafe is a fully certified, approved and proven safety solution. It's believed to hold a 90% share of the networked safety market. It's a Profile common to both PROFIBUS and PROFINET, so deployment is easy. PROFIsafe can also be used in both process automation and factory automation applications and its proven capability over WLAN makes it ideal for remote safety management functions.

Motion Control: PROFIdrive is an open Profile solution common to PROFIBUS and PROFINET. It simplifies engineering and commissioning and ensures the same skills can be utilized.



Active Energy Management: PROFlenergy is the most recently-announced Profile. Requested by AIDA it's under development now, aimed at managing power-hungry devices such as lasers and robots so they can be made inactive when not in use. The goal is a manufacturer-independent Profile that allows automotive production lines to be operated more efficiently, and with reduced energy consumption. This will help automotive companies cut costs and meet latest

environmental regulations. Clearly it has significant potential elsewhere too.

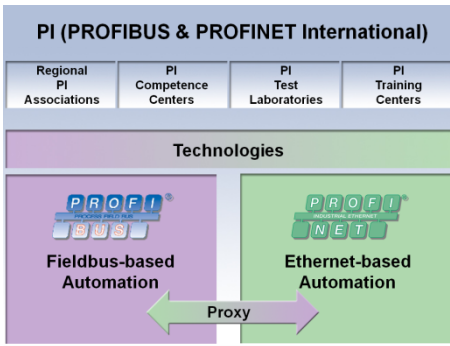
Profiles such as these demonstrate how PROFINET is moving manufacturing lines towards a future where communications over the network support greater operational efficiencies across the enterprise.

**FULL AUTOMATION COVERAGE:** In general, there are two types of manufacturing plant:

Process Automation: process plants can range from water/waste water up to high end oil/gas processing facilities. Needs vary but a common factor is the specialized field instrumentation. At the highest end (oil/petrochemicals) plants are often potentially dangerous and need specialized safety measures. Measurement and control speeds are normally not high. PROFINET's unique



'proxy' ability to link to existing process fieldbuses makes it ideal for linking it to existing process lines without obsolescing existing equipment or skills. And, because many process lines are 'hybrid' – in other words they incorporate discrete-like automation functions such as pumps, valves, drives - PROFINET can offer a solution in these applications as well.



**Factory Automation:** PROFINET delivers the speed and real time performance required by discrete manufacturing, with the flexibility to accommodate virtually any requirement including functional safety, wireless and advanced motion control. It can also integrate popular fieldbus systems using a 'proxy', which means that existing fieldbus systems can continue in use. With PROFINET, any kind of manufacturing plant can be easily and

quickly migrated to an Ethernet-based future. And because migration can be undertaken in easily-managed steps, it is low risk.

**COMMUNITY:** PI has over 1400 member companies globally, represented by 25 Regional PI Associations based in all industrialized regions. Growth in membership continues. The INTERBUS Club has adopted PROFINET as its preferred Industrial Ethernet partner. No other organization can match the resources or expertise available to PI and over 500 engineers work in more than 50 Working Groups to maintain the development of PROFINET in support of end user needs. PI also has a growing involvement with third party automation organizations, particularly in the area of network engineering and device management.

**EXPERIENCE:** By the end of 2008 PROFIBUS had nearly 30 million installed devices worldwide. It is expected that this total will pass 50 million by the end of 2012. Along with the INTERBUS community, PI forms the biggest and most experienced automation community in the world. It's mainly because of 'community' and 'experience' that PI has been able to build the richest, most powerful, all-encompassing Industrial Ethernet in the world.

## WHERE NEXT?



The growth rate for PROFINET will continue. Comparison with a similar stage in the evolution of PROFIBUS suggests that PROFINET is following a similar growth curve.

The difficult economic circumstances of the 'credit crunch' benefits PROFINET because more effective automation solutions are needed to increase efficiencies and enhance competitiveness. 'Green' pressures are becoming an

important driver too, and the new PROFIenergy Profile will stimulate momentum further.

Will PROFINET supersede fieldbuses like PROFIBUS and INTERBUS ... and if so, how soon? The more mature cost structures of fieldbus devices and systems will continue to have an impact on PROFINET for some time. However, the greater potential benefits of PROFINET, its growing value proposition and the maturing Industrial Ethernet market mean that fieldbuses will be overhauled eventually. When this will happen is impossible to predict.

However, this does not mean that fieldbuses like PROFIBUS and INTERBUS will disappear. Their future is equally assured - as sales trends clearly show - and the excellent strategic partnership offered by PROFINET can only help both markets develop indefinitely.

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