

# **IT-Friendly Gateway for Optimizing PROFIBUS/PROFINET Automation Networks**

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## Executive Summary

*As connections between plant floor automation equipment and enterprise-level business systems becomes the norm for the manufacturing industry (AutomationWorld, 2013), combining the expertise of automation engineers with that of IT engineers is the key to achieving an information-driven plant that can respond quickly to production errors, and thus minimize adverse impact on the business (Intel, The Factory of Tomorrow Will Be Smart). In this article, we show how gateways can integrate Fieldbus devices with PROFINET, the most popular Ethernet-based protocol, as well as leverage IT knowledge to optimize the performance of this connectivity.*

## Overview

One of the biggest advances in industrial manufacturing in recent years is the trend of connecting all computers, controllers, and devices to one network. In light of this, operators are always on the lookout for economical ways of connecting legacy devices to a network, and are particularly interested in solutions that leverage existing IT management technologies.

A common strategy in today's industrial environment is to link existing automation networks to an Ethernet backbone. According to IMS Research, PROFINET is the second-most popular Ethernet-based industrial protocol, with a market share of 28%, and is expected to grow faster than other Ethernet-based industrial protocols [3]. In addition, the professional organization that created PROFINET also developed a fieldbus protocol called PROFIBUS, which has gained popularity due to its emphasis on real-time operation and reliability for field devices in industrial automation. Consequently, solutions that support a combination of PROFINET and PROFIBUS are the most suitable for integrating automation and IT systems. Operators can take advantage of industrial proxies to integrate intelligent devices in the field with information layer applications such as SCADA systems and EMS (electronic manufacturing services). The proxy works as an agent that transfers data between the PROFIBUS and PROFINET networks—it acts as a PROFIBUS master on the device network, and as a PROFINET I/O slave on the PROFINET network.

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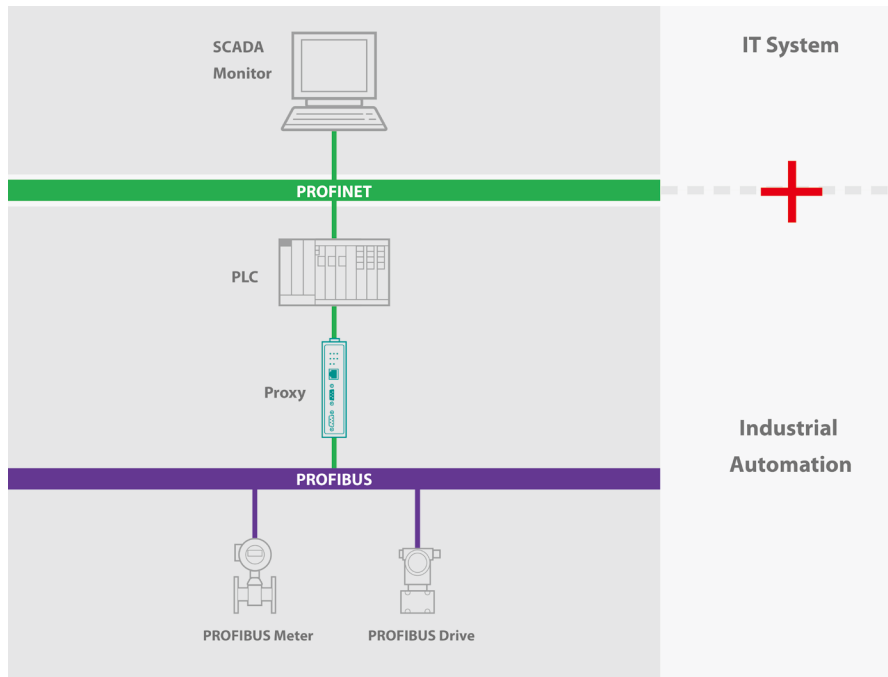
Moxa manufactures one of the world's leading brands of device networking solutions. Products include industrial embedded computers, industrial Ethernet switches, serial device servers, multiport serial boards, embedded device servers, and remote I/O solutions. Our products are key components of many networking applications, including industrial automation, manufacturing, POS, and medical treatment facilities.

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## Using a Proxy to Bring IT Management Tools to Automation Networks

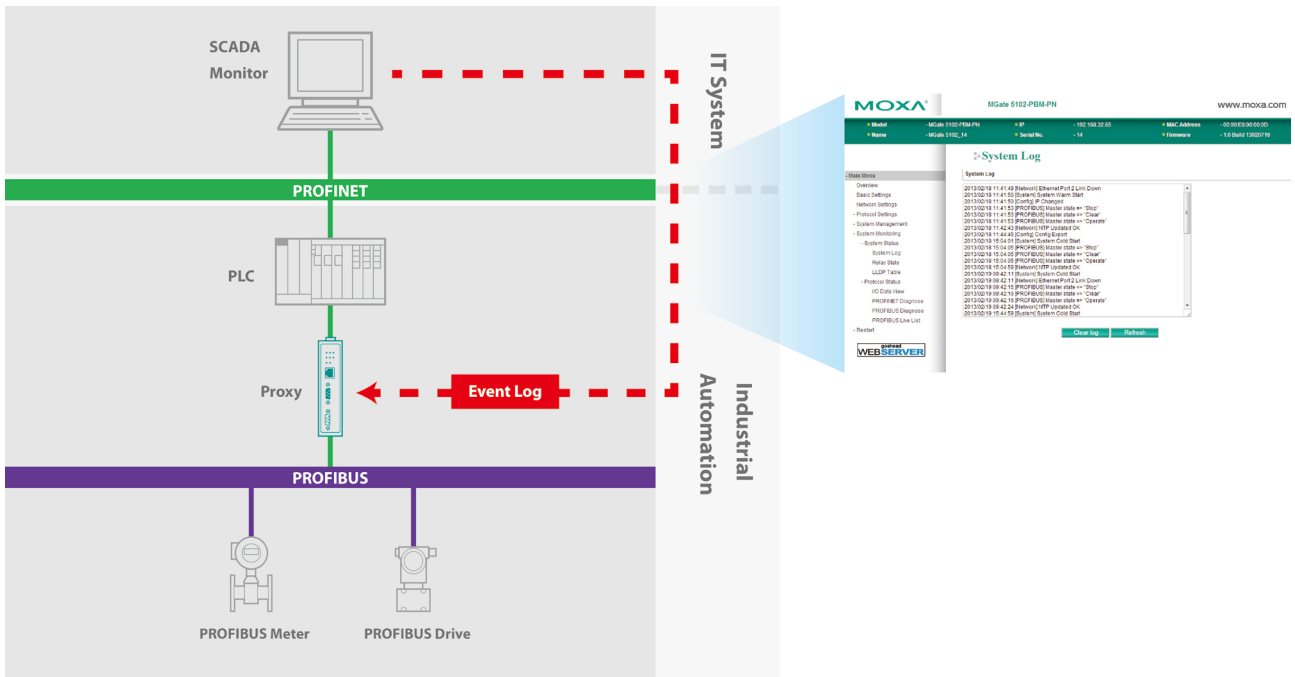


A possible drawback to using proxies, as described above, is that although the proxy can do a good job of integrating field devices with the control level, it may not support common IT-related functions. For IT systems used in an office environment, a number of technologies have already been adopted to optimize management effort, including system logs, email alarm notifications, and web consoles, which are all important tools in an IT engineer's management toolbox. Being able to use similar tools to manage industrial automation networks would make them much easier to manage and maintain. Such a scheme can be achieved by requiring the proxy device to support the following functions:

1. System Log for Conducting Regular Analyses
2. Instant Alarm Notifications
3. Web Interface for Checking the Status of Gateways or Field Devices

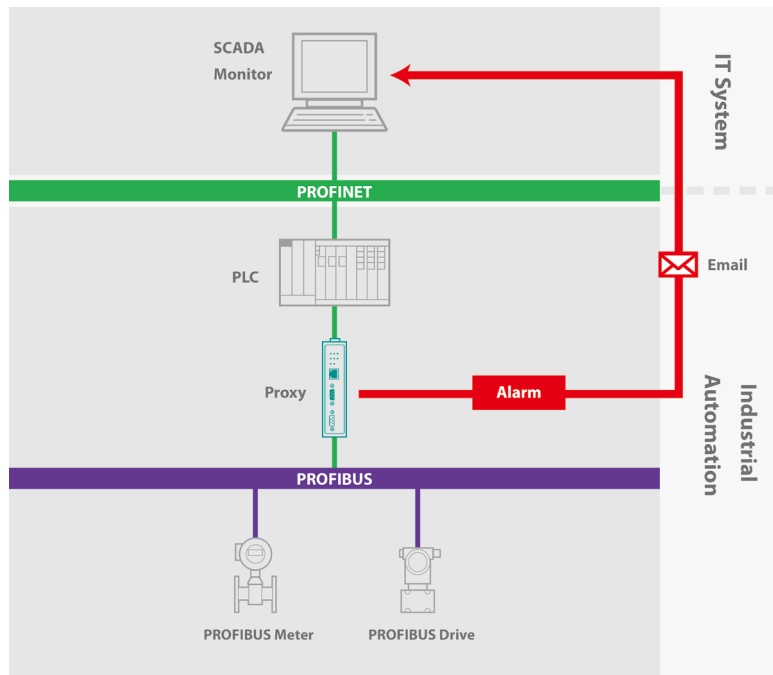
### System Log for Conducting Regular Analyses

One of the most useful ways to maintain system reliability is to regularly review the status of the system. This is because major system crashes are often caused by small, seemingly inconsequential occurrences. IT system managers have learned that keeping a careful watch on certain key indicators, and then taking action when anomalies are spotted, can prevent most system crashes. For this reason, proxies should provide a system log that records all system and communication actions, including login failures, IP conflicts, and PROFIBUS disconnections. Login failures, for example, could indicate that someone is trying to hack their way into your proxy console. In such cases, the administrator can consider changing the password, or require using more complicated passwords to reduce the chance of a successful attack. On the other hand, IP conflicts could indicate that someone installed a new device but used the wrong IP address. Although this someone could be a friend, their mistake could introduce unwanted instability into an otherwise stable network.



**Instant Alarm Notifications**

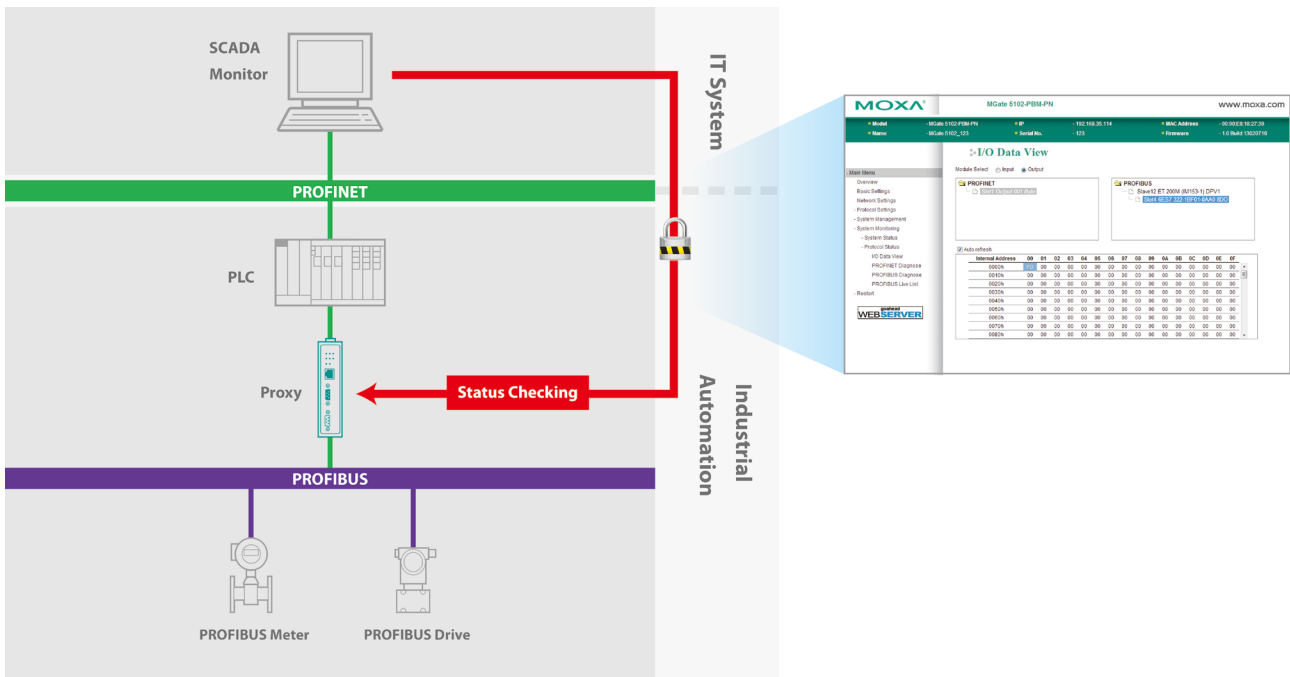
Routine events, such as logging in to the system, are recorded in the system log, but non-routine events, such as power loss and Ethernet disconnection, require special attention. A power loss event indicates that the main power supply has shut down, and the proxy has either stopped working or has switched to a backup power supply. In addition, repeated power losses of short duration could indicate that the main power supply is unstable. Note that since most users will insist on being able to configure a backup power supply, the proxy should support dual power supplies. Since a backup power supply can only be used for a short period of time, the administrator would need to take immediate action to recover the main power supply. Issuing an instant email alarm alerts the administrator that immediate action is required.



**Web Console for Checking the Status of Field Devices**

The most convenient way to check the status of the proxy and connected field devices is with an advanced web console. With a web console, administrators do not need to install anything on their own computer, they just need to open their web browser and connect directly to the proxy’s web console. The web console should provide access to the system log and alarm statuses, as well as the latest data exchange information for troubleshooting purposes. Because the proxy connects the PROFIBUS field device to the PROFINET, the web console should also provide the connection status of each field device.

Since network security is an important issue that cannot be ignored, the proxy should support data encryption via the HTTPS protocol, which uses SSL/TLS encryption to ensure that the web console’s account names and passwords do not fall into the wrong hands.



**Moxa’s MGate Gateway Solution**

Moxa’s proxy/gateway solutions provide the following features to optimize your PROFINET/PROFIBUS network:

**System Log**

System logs, which provide a second-by-second record of what is happening on a computer or network, are widely used in the IT industry. Moxa’s proxies come with a system log function that records all system and communication activities, giving administrators an important tool for preventing unexpected system shutdowns.

**Instant Alarms**

To prevent unexpected events, such as power loss and Ethernet disconnection, Moxa’s proxies leverage existing IT technology for sending emails to administrators, or triggering relay alarms for onsite notifications. In addition, Moxa’s proxies have a built in microSD card slot that allows engineers to back up the installation’s configuration on a microSD card, making it extremely easy to reset the configuration.

## Web Console

Moxa's MGate proxy allows engineers to monitor proxy status via their computer's web browser. With data import/export and log recording capabilities, this monitoring tool streamlines device configuration, maintenance, and troubleshooting, and also supports encryption functions such as HTTPS and SSH to prevent unauthorized access. Visit the following web page for further information on how industrial Ethernet gateways can optimize your industrial network integration:

[http://www.moxa.com/Event/Tech/2012/Industrial\\_Ethernet\\_gateways/index.htm](http://www.moxa.com/Event/Tech/2012/Industrial_Ethernet_gateways/index.htm)

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## Sources

1. <http://www.automationworld.com/book-review-it-and-automated-manufacturing>
2. [Intel—The factory of tomorrow will be smart](#)
3. <http://www.profibus.com/news-press/detail-view/article/ims-research-estimates-top-position-for-profinet/>
4. <http://www.plantengineering.com/industry-news/automation-news/single-article/pi-north-america-meeting-profinet-growth-ford-powertrain-integration/e89b673452e8a2c7a00e789e2a3c9ee4.html>

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