

Power Grid Upgrade Through IEC 101/Modbus to IEC 104 Gateway

Overview

Smart grid is an electrical grid that uses digital communication technology to monitor the status of power consumption and power quality in real time. By using this information, engineers can adjust the power generation and the load of power transmission and distribution to reduce power consumption and enhance the power grid's reliability. In order to reap the benefits of smart grids, legacy systems need to be upgraded with minimal cost and efforts. Engineers have to seamlessly integrate legacy systems into new communication networks through protocol gateways that convert between Modbus RTU/ASCII/TCP, IEC 60870-5-101 and IEC 60870-5-104.



Challenges: Computing Platforms vs. Standalone Gateways

Two common solutions for protocol conversion are available: computing platforms and standalone gateways. Each solution has its advantages and disadvantages for different scenarios. The table (on the right) compares the pros and cons of both solutions to help you choose the solution best suited for your system upgrade project.

System Upgrade Options	Computing Platforms	Standalone Gateways
Pros	<ul style="list-style-type: none"> ✓ Flexible development 	<ul style="list-style-type: none"> ✓ Cost-effective ✓ Minimal setup efforts ✓ Less maintenance efforts
Cons	<ul style="list-style-type: none"> ✓ Expensive ✓ Time-consuming deployment ✓ Huge efforts to maintain 	<ul style="list-style-type: none"> ✓ Less flexibility
Scenarios	Suitable for <ul style="list-style-type: none"> ✓ Large-scale system upgrade ✓ Additional programming demands 	Suitable for <ul style="list-style-type: none"> ✓ Small and medium system upgrade ✓ No additional programming required

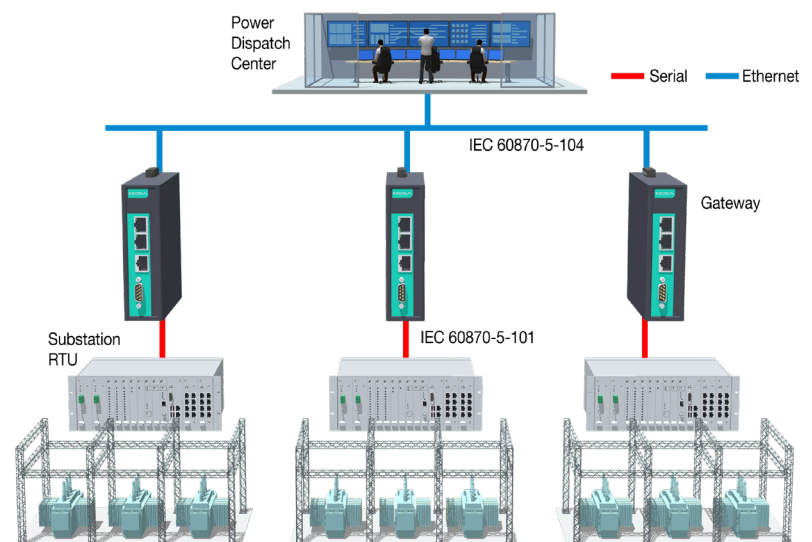
Moxa's Solution

Instead of using a computing platform, Moxa provides the MGate 5114, a standalone gateway that is the perfect solution for medium and small power grid system upgrade. Usually, three scenarios for upgrades occur, and our solutions can make them fast and easy.

Power Substation

Communication Between a Substation and Power Dispatch Center

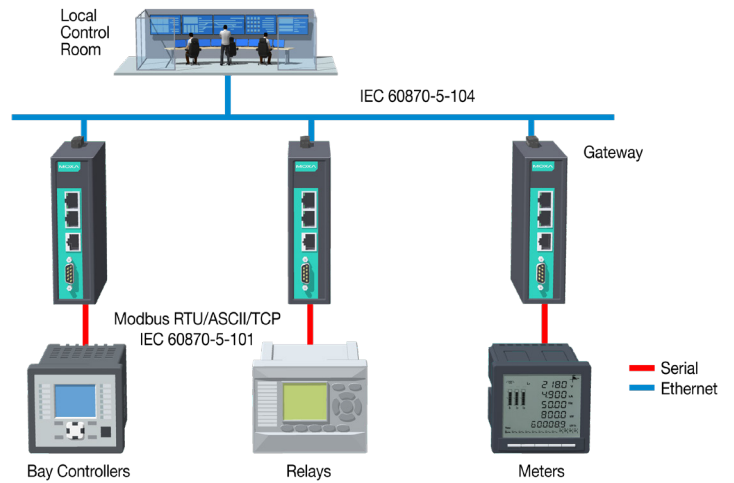
In this scenario, protocol conversion is required because an upgraded power dispatch center, which usually use IEC 60870-5-104 protocol communication, needs to monitor substations that are still using legacy systems, which use IEC 60870-5-101 protocol communication. Our MGate 5114 protocol gateways can convert between IEC 60870-5-101 and IEC 60870-5-104, making it easy for operators to monitor legacy systems in substations for the power dispatch center.



Power Substation

Communication Within a Substation

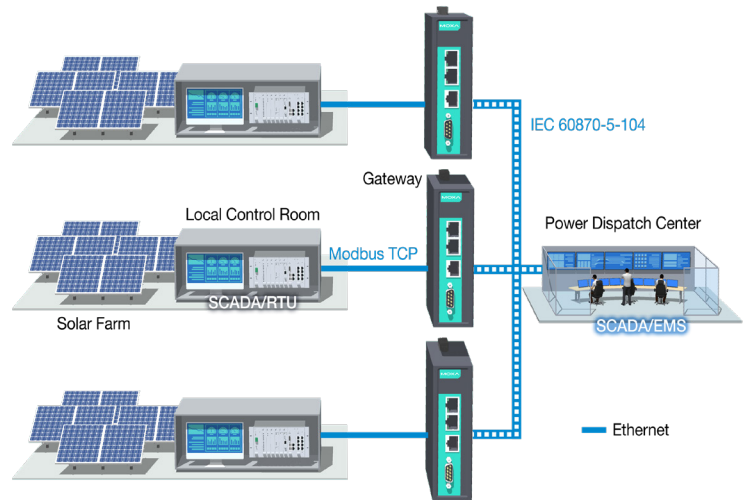
In this scenario, protocol conversion is required because the SCADA system within a substation has been upgraded, and the protocol communication used is IEC 60870-5-104. To monitor the on-site legacy devices, such as bay controllers, relays, and meters, that use IEC 60870-5-101 or Modbus RTU/ASCII/TCP protocols, the MGate 5114 protocol gateways can be used to make legacy devices visible in SCADA systems.



Renewable Energy

Communication Between Renewable Energy Systems and the Power Dispatch Center

For power grid systems, it's essential to ensure the power dispatch center is able to monitor the status of renewable energy systems to ensure power quality. However, renewable energy systems, such as solar power systems, usually use Modbus TCP as protocol communication, while the power dispatch center has already been upgraded with the IEC 60870-5-104 protocol. In this scenario, the MGate 5114 protocol gateways can convert between these two protocols, allowing the power dispatch center to easily communicate with renewable energy.



From the above three scenarios, you can see that the MGate 5114 Series features multiple protocol combinations that support Modbus RTU/ASCII/TCP, IEC 60870-5-101, and IEC 60870-5-104 protocols, without extra protocol license fees. The MGate 5114 Series not only fulfills various power grid scenarios in just one model, but also requires no additional development efforts. Moreover, engineers who are not familiar with protocols always look for ease-of-use gateways. The MGate 5114 Series provides a wizard function, and just five steps are needed to finish the configuration. It also provides powerful troubleshooting tools such as diagnosis, object status monitoring, and traffic monitoring function, which are usually used in the commissioning stages. These tools help users find the root cause easily.

Product Highlights



MGate 5114 Series

1-port Modbus RTU/ASCII/TCP/IEC 101-to-IEC 104 gateways



More cost-effective than using PC-based protocol gateways



Effortless configuration via web-based wizard with five configuration steps



Easy troubleshooting through complete diagnostic information and traffic monitoring