Substation Automation Solutions
Robust Products for Power & Energy Applications

- IEC 61850-3 & IEEE 1613 Compliant
- Computing Platforms
- Ethernet Switches
- HMI Devices

www.advantech.com/eA
Overview

Power & energy applications are becoming more and more critical as demands for electricity continue to increase worldwide. Additionally, new challenges are arising due to the limitations of our traditional power resources as we try to minimize the impact our power usage has on the environment. To that end, renewable energies, such as wind and solar power are playing more significant roles in modern electricity grids. Furthermore, the modernization of legacy Transmission & Distribution (T&D) systems and providing reliable T&D information for electric power management are becoming key goals for today’s power and energy applications.
Grid Integration

To optimize the effectiveness of integration from various Distributed Energy Resources (DER) and ensure the interoperability and interconnectivity of control devices with varying proprietary protocols, the IEC 61850 standard for grid integration and substation automation communications has been established within the power and energy sector for all T&D applications.

IEC 61850 & IEEE 1613 Certifications

IEC 61850 is the international standard that defines the hardware and communication requirements for all products within substation automation. IEC 61850 is being applied increasingly within substation automation, T&D automation, and grid integration applications. This standard ensures interoperability for the myriad of devices which comprise power and energy, especially between all of the intelligent electronic devices (IEDs) from different manufacturers.

IEC 61850-3 is the hardware standard of general requirements ensures environmental and EMI immunity of network devices used in substations. Another standard for electronic power substations is IEEE 1613, detailing environmental and higher standard testing requirements for communications networking devices.

Based on the IEC 61850-3 and IEEE 1613 certifications, Advantech’s power and energy products ensure reliable communication and interconnectivity between the intelligent electronic devices (IEDs), the network components and the control platform.

Advantech’s Substation Automation Architecture

The IEC 61850 standard ensures that all devices within power and energy system architectures can communicate with all the electronic devices (IEDs) in the process layer. In this application, the computing platforms, control platform and protocol gateways are the most critical devices to fulfill this interoperability. Redundant Managed Ethernet switches provide this interconnection between the substation and power system which is critical to improve reliability, efficiency, and productivity. The IEC 61850-3 standard for power and energy communication networks and systems guarantees reliable performance in the critical environments these applications are based, guaranteeing certain levels of EMI immunity and interference resistance.

Advantech’s UNO-4672 computing platform is an advanced and flexible device to simplify substation system configuration, due to its ability to integrate gateways, controllers and servers into one station computer. They are expandable, support LAN redundancy and teaming functionality, feature a robust design and meet the IEC 61850-3 and IEEE 1613 requirements for substation-grade equipment. The result is a reduction in hardware which in turn reduces the overall failure rate of the system. Advantech's Managed Ethernet Switch, EKI-4654R, provides a reliable Ethernet backbone to realize redundant ring capabilities. Aside from its wide input power range (AC/DC), EKI-4654R provides dual redundant power modules to fulfill the high reliability and dependability requirements of substation network configuration.
Substation Automation Applications

Advantech brings over 25 years of valuable industrial experience to the substation automation market, and has cooperated with leading system providers in the power industry worldwide, providing products and applications to meet their needs.

Transmission & Distribution Substation in China

One of the top 5 power industry providers in China has been serving power generation and T&D applications for more than 30 years. They employ a variety of Intelligent Electronic Devices (IED) in their substations for monitoring and protecting equipment which are comprised of different proprietary protocols (DNP 3.0 or IEC 60870) and different physical communication connections (Ethernet or serial ports).

To unify and synergize critical field information (such as transformer tap positions or switchgear leakage detection), they required a robust platform with 19” rack mount to integrate substation process level signals and upload system data to the substation level for monitoring and control. They adopted Advantech’s UNO-4678, a fanless computing platform with no internal cabling, which provides a robust and reliable platform for substation automation.

Primary Substation in China

Another of our clients is one of top 3 power industry Engineering, Procurement and Construction (EPC) contractors in China, helping to produce top tier high voltage equipment serving over 30 countries around the world.

In an effort to modernize their high voltage substation, they required IEC 61850-3 & IEEE 1613 compliant hardware devices to serve critical processes without interference (such as transient, surge and EMI). Advantech’s UNO-4672 computing platform was the clear choice for this solution, with its LAN redundancy and teaming function capabilities. Furthermore the EKI-4654R Ethernet switch provides a short recovery time, ensuring a reliable network infrastructure. The excellent cost/performance ratio of these products and their flexible functionality also met the clients’ strict Total Cost of Ownership (TCO) requirement.

Secondary Substation in France

One of the worldwide leading T&D companies offering reliable nuclear power generation and solutions to bring electricity onto power networks. In order to supervise and control 110kV substations (or medium voltage switchgears), engineers require an integrated automation platform to manage plant-wide power systems. In this solution, Advantech’s UNO-3074 provided an excellent platform capable of archiving intelligent switch signals, analog values, or remote electrical signals and providing critical messages through the station bus to the substation system.

UNO-3074 provides a full-featured integrated industrial-grade platform for plant substation automation. With its 4 x PCI slots, this customer adopted RAID interface cards for hard disk backup to prevent critical information loss and increase the system reliability. The robust design realizes reliable performance to save the maintenance costs for our customer as well.

System Diagram

- EKI-4654R
- UNO-4672
- UNO-4678
- UNO-3074
**UNO-4672**
**Intel® Pentium® M/Celeron® M Fanless Box PC with 6 x LAN, 8 x COM, 8 x DI, 8 x DO, PC/104+**
- IEC 61850-3 & IEEE 1613 Compliant
- 19" rack mount/2U form factor with fanless design and no internal cabling
- Onboard Celeron M 1 GHz or Pentium M 1.4 GHz processor
- 2 x RS-232 and 8x RS-232/422/485 isolated serial ports with automatic flow control and 128KB FIFO
- 2 x 10/100/1000 Base-T (supports teaming function) and 4 x 10/100 Base-T
- Supports 2 x internal CF card and 1 x 2.5" SATA HDD
- PC/104+ extension and 4 x USB 2.0 (1 x internal)
- Rear wiring, rich system & I/O LED status indicators
- Windows CE 6.0, Windows XP Embedded SP2, and Linux ready solution

---

**UNO-4678**
**Intel® Celeron® M Fanless Box PC with 3 x LAN, 8 x COM, PC/104**
- 19" rack mount/1U form factor with fanless design and no internal cabling
- Onboard Celeron M 1 GHz processor and 512 MB memory
- 8 x isolated RS-232/422/485 ports with automatic flow control
- 3 x 10/100Base-T RJ-45 ports
- Supports Lm sensor to retrieve CPU and board temperature for monitoring purposes
- Supports 2 x USB slots and 1 x type I/II CF cards
- Windows CE 5.0 and Windows XP Embedded ready solution
- Windows 2000/XP driver ready and Linux drive support
- Windows XP Embedded (SP2) ready platform with write protection (EWF)

---

**FPM-5171G**
**17” SXGA Industrial Monitor with Resistive Touchscreen, Direct-VGA, and DVI Ports**
- 17" SXGA TFT LCD with resolution up to 1280 x 1024
- Direct VGA & DVI-D video input interface
- Lockable OSD keys with 2 user-defined contrast/brightness settings
- Flat-sealed front panel design
- Robust design with anti-rust chassis and aluminum die-cast front panel
- Front access USB connector
- Combo RS-232 & USB interface for touchscreen function (optional)
- Supports industrial 10-30 Vdc power input
- Front panel is NEMA4/IP65 compliant

---

**EKI-1526**
**16-port RS-232/422/485 Serial Device Server**
- 19" rack mount/1 U, rear wiring
- 16-port RS-232/422/485 serial communication
- Provides 2 x 10/100 Mbps Ethernet ports for LAN redundancy
- Supports baud rate up to 921.6 kbps
- Provides COM port redirection (virtual COM), TCP and UPD operation modes
- Provides rich configuration methods: Windows utility, Telnet console, web browser, and serial console
- Built-in 15KV ESD protection for all serial signals
- Built-in buzzer for easy location
- SNMP MIB-II for network management

---
<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
<th>City</th>
<th>Toll Free/Local Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater China</td>
<td>China</td>
<td>Kunshan</td>
<td>86-512-5777-5666</td>
</tr>
<tr>
<td></td>
<td>Taiwan</td>
<td>Taipei</td>
<td>886-2-2792-7818</td>
</tr>
<tr>
<td></td>
<td>Netherlands</td>
<td>Eindhoven</td>
<td>31-40-267-7000</td>
</tr>
<tr>
<td></td>
<td>Poland</td>
<td>Warsaw</td>
<td>48-22-33-23-730</td>
</tr>
<tr>
<td></td>
<td>USA/Canada</td>
<td>Milpitas, CA</td>
<td>1-408-519-3800</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>Japan</td>
<td>Toll Free</td>
<td>0800-500-1077</td>
</tr>
<tr>
<td></td>
<td>Korea</td>
<td>Toll Free</td>
<td>080-365-9494</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
<td>Toll Free</td>
<td>001 800-9898-8998</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>Bangkok</td>
<td>66-2-248-3140</td>
</tr>
<tr>
<td></td>
<td>India</td>
<td>Toll Free</td>
<td>1-800-425-5070</td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td>Sydney</td>
<td>1300-308-531</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melbourne</td>
<td>1300-308-531</td>
</tr>
<tr>
<td>Europe</td>
<td>Germany</td>
<td>Toll Free</td>
<td>00800-2426-8081</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>Grenoble</td>
<td>33-4-7670-4700</td>
</tr>
<tr>
<td></td>
<td>Italy</td>
<td>Milano</td>
<td>39-02-9544-961</td>
</tr>
<tr>
<td></td>
<td>Benelux &amp; Nordics</td>
<td>Toll Free</td>
<td>00800-2426-8081</td>
</tr>
<tr>
<td></td>
<td>UK</td>
<td>Ascot</td>
<td>44-1344-878-400</td>
</tr>
<tr>
<td>North America</td>
<td>North America</td>
<td>Toll Free</td>
<td>1-800-205-7940</td>
</tr>
<tr>
<td></td>
<td>Belgium</td>
<td>Brussels</td>
<td>32-2-511-511</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>Grenoble</td>
<td>33-4-7670-4700</td>
</tr>
<tr>
<td></td>
<td>Italy</td>
<td>Milano</td>
<td>39-02-9544-961</td>
</tr>
<tr>
<td></td>
<td>Benelux &amp; Nordics</td>
<td>Toll Free</td>
<td>00800-2426-8081</td>
</tr>
<tr>
<td></td>
<td>UK</td>
<td>Ascot</td>
<td>44-1344-878-400</td>
</tr>
<tr>
<td>Americas</td>
<td>North America</td>
<td>Toll Free</td>
<td>1-800-205-7940</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
<td>Sao Paulo</td>
<td>55-11-5592-5355</td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td>Sydney</td>
<td>1300-308-531</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melbourne</td>
<td>1300-308-531</td>
</tr>
</tbody>
</table>

Please note specifications before quoting. This guide is intended for reference purposes only.
All product specifications are subject to change without notice.
No part of this publication may be reproduced in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission of the publisher.
All brand names and product names are trademarks or registered trademarks of their respective companies.