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# RELIABLE SECURE CONNECTIVITY

## XGP5901 Series

Industrial Protocol Gateway

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# XGP5901 Series

## Industrial Protocol Gateway

CE FC RoHS COMPLIANT

## FEATURE HIGHLIGHTS

- Dual 10/100 Mbps Ethernet port, PoE PD
- 1-port RS-232/422/485, baud rate up to 921.6 Kbps
- IP30 Metal housing with Aluminum heat sink
- Strong EMC protection, works in environments from -40 to 85°C
- Same hardware platform for different protocol conversion (Modbus TCP/RTU/ASCII, DNP3.0 TCP or serial, IEC 60870-5-101, IEC 60870-5-103, IEC 60870-5-104, IEC 61850)
- User friendly configuration with a Java-Based Windows utility
- Embedded IPsec, PPTP and OpenVPN for enhanced security
- Redundancy through embedded RSTP Protocol

## PRODUCT DESCRIPTION

The XGP5901 Series is a highly reliable and fault tolerant Industrial Protocol Gateway. Its powerful architecture provides seamless conversion between the different protocols Ethernet or Serial based. The serial devices communicating on different protocols could be integrated into the system and extend its reach over the gateway's redundant Ethernet. This device is designed to work in most demanding industries such as power substations, power generation, oil and gas, farming and manufacturing.

The configuration carried out through a user friendly, Java- Based Windows Utility called eNode Designer. It allows configuring target platforms, set device properties and protocol data point mapping. To do so, a project file representing the system should be created. This will include devices and the protocol applications running on them. The configuration is completely dependent on the "eNode Module" which represents that device or application – but may include things such as changing the communication port settings and defining where data point information enters and leaves the eNode Designer system.

XGP5901 Series embeds an additional layer of security, allowing the devices to be deployed in topologies that request data to flow through the Internet and preventing sensitive control and monitoring data to be readable from malicious activities. IPsec VPN encryption, configurable in both peer-to-peer and peer-to-side modes will make sure the data passing is encrypted through a strong 128, 192 or 256-bit AES encryption.

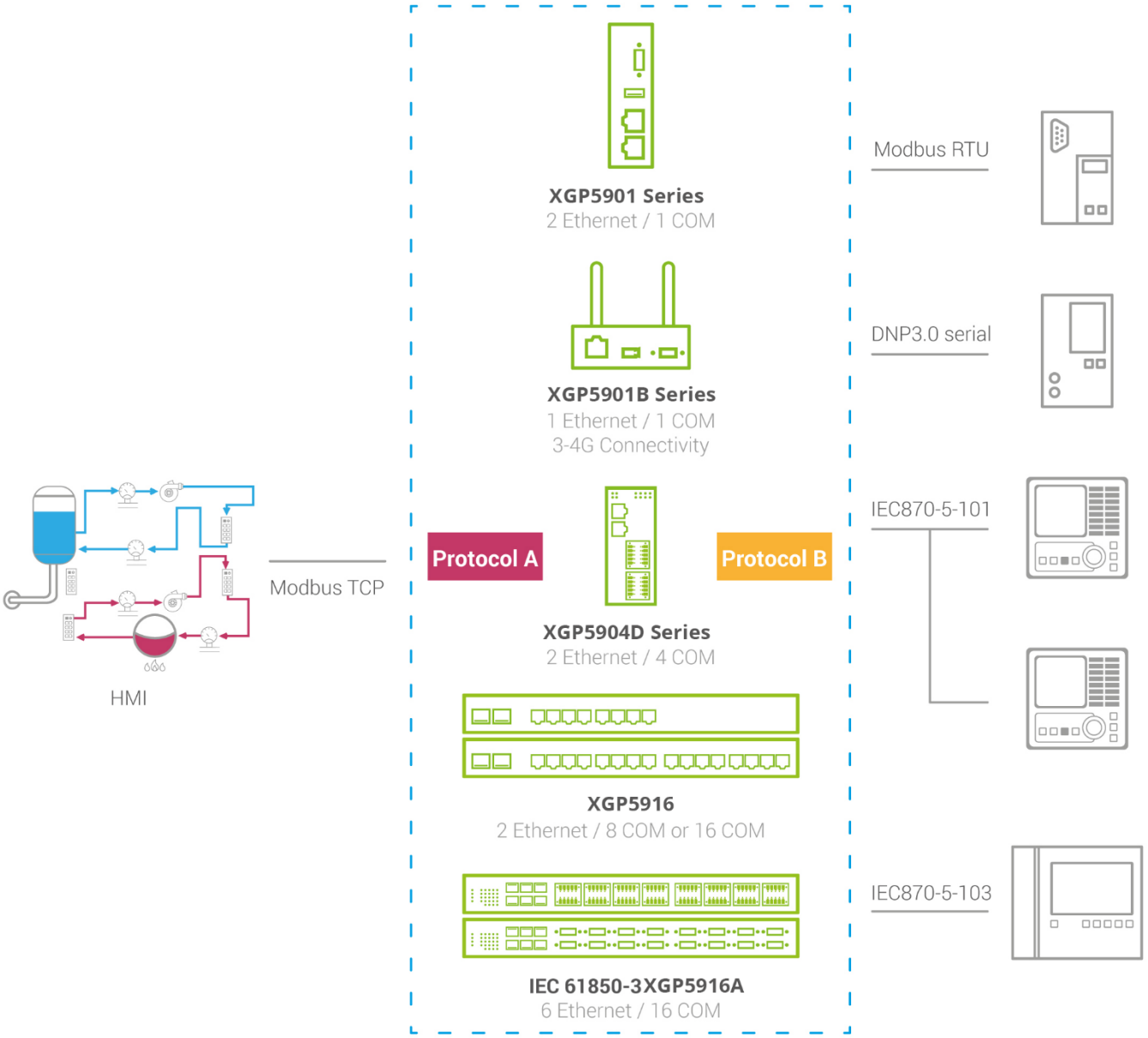
# APPLICATION

## Features

**The protocol gateway's embedded protocol stacks allow**

- Seamless conversion
- Exception/error Management
- Unsolicited event management for the protocols requiring them (such as DNP3)
- High performance
- Cost saving

## General Architecture




*** Protocol A and Protocol B - Please refer to Protocol Availability Matrix and order information**

## Application Example - Modbus Serial Master


The example shows how to Easily connect a Modbus Serial HMI, through Agatel's Protocol Gateway to a DNP3.0 Ethernet Server IED. The host HMI has the role of a Modbus Serial Master while the end-device to be accessed is a DNP3.0 Ethernet Server.

Agatel's protocol Gateway acts towards the HMI seamlessly as a Modbus Serial Slave, answering the poll commands or the write commands required by the Host by its virtual Modbus ID. Meanwhile, it acts as a DNP3.0 Ethernet Client with regard to the end-device whose DNP3.0 address is mapped to the virtual Modbus ID that the HMI is accessing.

**WARNING**
All gateway functions listed in the datasheet refer to the "Gateway" role, and not which "host" or "slave" the gate way is connected to. In this example, the SKU shown is "XSSMB-XECDN" (Modbus Serial Slave to DNP3.0 Ethernet Client)

## PROTOCOL AVAILABILITY

**Protocol Availability Matrix for XGP5901 Series**

| Protocol B | | Protocol A | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Ethernet Server | | | | Serial Slave | | |
| | | IEC 61850 | DNP3 | Modbus TCP | IEC 60870-5-104 | DNP3 | Modbus RTU/ ASCII | IEC 60870-5-101 |
| Ethernet Client | IEC 61850 | n/a | XESDN-XEC50 | XESMB-XEC50 | XES04-XEC50 | XSSDN-XEC50 | XSSMB-XEC50 | XSS01-XEC50 |
| | DNP3 | XES50-XECDN | n/a | XESMB-XECDN | XES04-XECDN | TBC | XSSMB-XECDN | XSS01-XECDN |
| | Modbus TCP | XES50-XECMB | XESDN-XECMB | n/a | XES04-XECMB | XSSDN-XECMB | n/a | XSS01-XECMB |
| | IEC 60870-5-104 | XES50-XEC04 | XESDN-XEC04 | XESMB-XEC04 | n/a | XSSDN-XEC04 | XSSMB-XEC04 | XSS01-XEC04 |
| Serial Master | DNP3 | XES50-XSMDN | TBC | XESMB-XSMDN | XES04-XSMDN | n/a | n/a | n/a |
| | Modbus RTU/ASCII | XES50-XSMMB | XESDN-XSMMB | n/a | XES04-XSMMB | n/a | n/a | n/a |
| | IEC 60870-5-101 | XES50-XSM01 | XESDN-XSM01 | XESMB-XSM01 | XES04-XSM01 | n/a | n/a | n/a |
| | IEC 60870-5-103 | XES50-XSM03 | XESDN-XSM03 | XESMB-XSM03 | XES04-XSM03 | n/a | n/a | n/a |

# PROTOCOL SPECIFICATION

| | |
|---|---|
| **IEC61850 Server/ Client** | |
| **Supported Functions** | • Generic access to the data (Read, Write)<br>• 8 Logical Devices per Port<br>• GOOSE (Generic Object Oriented Substation Event)<br>– a GOOSE message will be generated by the gateway automatically upon event(*)<br>• (*)Being other protocols not Real-Time, there is no guarantee that GOOSE message is generated within 1 ms from the event itself. |
| **Supported Control Type of commands** | • Generic access to the data (Read, Write)<br>• 8 Logical Devices per Port<br>• GOOSE (Generic Object Oriented Substation Event) |
| **Implemented Protocol Subsets** | • IEC 61850-6 (Substation Configuration Language Description: SCL)<br>• IEC 61850-7-1 (Principles and Models)<br>• IEC 61850-7-2 (Abstract Communication Service<br>• Interface: ACSI<br>• IEC 61850-7-3 (Common Data Classes: CDC)<br>• IEC 61850-7-4 (Logical Nodes and data Object Classes)<br>• IEC 61850-8-1 (Mapping to Manufacturing Message Specification: MMS)<br>• Edition 1 & Edition 2 are both Supported |
| **DNP3 Server/ Client/ Master/ Slave** | |
| **General Specifications** | • Serial Mode or Ethernet with TCP or UDP Mode<br>• Server side supports serving up to 5 client in TCP Mode<br>• Client side in a single RS-485 port, supports connecting up to 16 IEDs<br>• Client side supports connecting up to 16 IEDs<br>• Maximum Fragment size 2048 octets<br>• Protocol implementation with configurable parameters conforms to IEEE Std 1815-2012 level 2 |
| **Supported Functions** | • Time Synchronization generic access to the data (Read, Write)<br>• Commands with or without preselection (Select, Operate, Direct Operate)<br>• Transmission of time-tagged events<br>• Self-address |
| **Supported DNP3 Object Library** | • Binary Inputs up to 8000 pts<br>• Binary Outputs up to 2000 pts<br>• Double Inputs up to 4000 pts<br>• Analog Inputs up to 250 pts<br>• Analog Outputs up to 250 pts<br>• Counters up to 250 pts |
| **Modbus Server/ Client/ Master/ Slave** | |
| **General Specifications** | • Support Modbus RTU and ASCII in Serial mode<br>• Support Modbus in TCP mode<br>• For Modbus Client in TCP mode, support connecting up to 64 Modbus servers<br>• For Modbus Server in TCP mode, support serving up to 64 Modbus clients<br>• Support maximum number of data points in read direction: 8000 pts<br>• Support maximum number of commands in write direction: 4000 pts |
| **Supported Function Codes** | 1: Read Coils<br>2: Read Discrete Inputs<br>3: Read Holding Registers<br>4: Read Input Registers<br>5: Write Single Coil<br>6: Write Single Register<br>15: Write Multiple Coils<br>16: Write Multiple Registers<br>43/14: Read Device Identification (server side only) |
| **Supported Exception Codes** | 1: illegal function<br>2: illegal data address<br>3: illegal data value<br>4: server device failure<br>6: server device busy |

| IEC 60870-5-101 Master/ Slave | |
|---|---|
| **General Specifications** | • Protocol implementation with configurable parameters conforms to the IEC 60870-5-101 edition 2 specification<br>• Process Information in Monitor and Control Direction<br>• Balanced and Unbalanced Modes<br>• CP24Time2a or CP56Time2a timestamp for monitor direction report |
| **Supported Functions** | • Station Initialization<br>• Interrogation<br>• Read Procedure<br>• Cyclic Data and Spontaneous Transmission (Slave Side only)<br>• Clock Synchronization<br>• Transmission of Integrated Totals<br>• Direct and SBO command |
| **Supported Data Types** | • **Monitors Points:** Each supports up to 1000 pts: Single Point, Double Point, Step Position, Bit String, Measured with Normalized Value, Measured with Scaled Value, Measured Short Floating Point Value, Integrated Totals<br>• **Control Points:** Each supports up to 500 pts: Single Command, Double Command, Regulating Step Command, Set Point Command with Normalized Value, Set Point Command with Scaled Value, Set Point Command Short Floating Point, Bit string |
| **IEC 60870-5-103 Master/ Slave** | |
| **General Specifications** | • Protocol implementation with configurable parameters conforms to the IEC 60870-5-103:1997<br>• Master supports connecting up to 16 IEDs<br>• Process Information in Monitor and Control Direction<br>• Unbalanced Modes |
| **Supported Functions** | • Station Initialization, Supports reset FCB and CU<br>• General Interrogation<br>• Clock Synchronization<br>• Command Transmission<br>• Test Mode<br>• Blocking of Monitor Direction |
| **Supported Information** | • Monitor direction:<br>– Status indications in monitor direction: from <16> to <30><br>– Supervision indications in monitor direction: <32>, <33>, from <35> to < 39>, <46>, <47><br>– Earth fault indications in monitor direction: from <48> to <52><br>– Fault indications in monitor direction: from <64> to <93><br>– Auto-reclosure indications in monitor direction: from <128> to <130><br>– Measurands in monitor direction: from <144> to <148><br>• Control direction:<br>- General commands in control direction: from <16> to <19>, from <23> to <26> |
| **IEC 60870-5-104 Server/ Client** | |
| **General Specifications** | • Server side supports serving up to 5 client<br>• Client side supports connecting up to 10 IEDs<br>• Protocol implementation with configurable parameters conforms to the IEC 60870-5-104 specification edition 2<br>• Process Information in Monitor and Control Direction<br>• CP56Time2a timestamp for Control Commands |
| **Supported Functions** | • Station Initialization<br>• Interrogation<br>• Read Procedure (Server side only)<br>• Cyclic Data and Spontaneous Transmission (Server side only)<br>• Clock Synchronization<br>• Transmission of Integrated Totals<br>• Direct and SBO command |
| **Supported Data Types** | • **Monitors Points:** Each supports maximum 1000 pts: Single Point, Double Point, Step Position, Bit String, Measured with Normalized Value, Measured with Scaled Value, Measured Short Floating Points Value, Integrated Totals.<br>• **Control Points:** Each supports maximum 500 pts: Single Command, Double Command, Regulating Step Command, Set Point Command with Normalized Value, Set Point Command with Scaled Value, Set Point Command Short Floating Point, Bitstring.<br>• **Event Logging (Server Side only) Universal Event Buffer up to 20,000 Events** |

## SPECIFICATION

| | |
|---|---|
| **Network Interface** | |
| **Ethernet Port** | 2x RJ-45 |
| **LAN Mode** | Dual Subnets or RSTP Redundancy |
| **Compliance** | IEEE 802.3 10BASE-T<br>IEEE 802.3u 100BASE-TX |
| **Serial Interface** | |
| **Connector** | 5-Pin 5.08mm Terminal Block or D-Sub9 connector |
| **Port** | 1 |
| **Mode** | RS-232/422/485, software selectable |
| **Baud Rate** | 1,200~921,600 bps |
| **Parity** | None, Odd, Even |
| **Data Bits** | 7, 8 |
| **Stop Bits** | 1, 2 |
| **USB Interface** | |
| **Speed** | USB 2.0 |
| **Connector** | USB A Type *1 |
| **Power Characteristics** | |
| **Connector** | 3-Pin 5.08mm Lockable Terminal Block |
| **Input Voltage** | 9-48 VDC, 24VAC, 48 VDC (supplied by PoE, PoE models only), |
| **Power Consumption** | 0.65A @ 9VDC |
| **Power Redundancy** | No |
| **Reverse Polarity Protection** | Yes |
| **Mechanicals** | |
| **Housing** | IP30 protection, metal housing |
| **Dimensions (W x H x D)** | 32mm x 122mm x 92mm |
| **Installation** | DIN-Rail or Wall-Mount (optional kit) |
| **Reset Button** | Yes |
| **Weight** | 400g |
| **Environmental Limits** | |
| **Operating Temperature** | -40°C ~ 85°C (-40°F ~ 185°F) |
| **Storage Temperature** | -40°C ~ 85°C (-40°F ~ 185°F) |
| **Ambient Relative Humidity** | 5 ~ 95% RH, (non-condensing) |
| **Software** | |
| **Protocols** | IPv4, ARP, ICMP, TCP, UDP, DHCP Client, DNS Client, Telnet, HTTP, HTTPS, SMTP/TLS, SNMP v1/v2c/v3, Syslog, 802.1D-2004 RSTP, OpenVPN or IPsec VPN (peer-to-peer or peer-to-side), with a maximum VPN throughput of 37.9 Mbps(*), and PPTP |

## REGULATORY APPROVALS

| Regulatory Approvals | | | | |
|---|---|---|---|---|
| **Safety** | EN 60950-1 | | | |
| **EMC** | FCC Part 15, Subpart B, Class A<br>EN 55032, EN 61000-3-2, EN 61000-3-3, EN 55024, EN 61000-6-2, EN 61000-6-4 | | | |
| **Test** | **Item** | | **Value** | **Level** |
| **IEC 61000-4-2** | ESD | Contact Discharge<br>Air Discharge | ±4KV<br>±8KV | 4<br>4 |
| **IEC 61000-4-3** | RD | 80-1000MHz<br>1.4~2.0GHz<br>2.0~2.7GHz | 10 V/m<br>3 V/m<br>1 V/m | 3 |
| **IEC 61000-4-4** | EFT | AC Power Port<br>DC Power Port<br>Signal Port | ±2.0KV<br>±2.0KV<br>±1.0KV | 3<br>4 |
| **IEC 61000-4-5** | Surge | AC Power Port<br>AC Power Port<br>DC Power Port<br>DC Power Port<br>Signal Port | Line-to Line±1.0KV<br>Line-to Earth±2.0KV<br>Line-to Line±0.5KV<br>Line-to Earth±0.5KV<br>Line-to Earth±1.0KV | 3<br>3<br>3 |
| **IEC 61000-4-6** | CS | 0.15-80MHz | 10 Vrms | 3 |
| **IEC 61000-4-8** | PFMF | Enclosure | 30 A/m | 3 |
| **IEC 61000-4-11** | DIP | AC Power Port | 30% Reduction (Voltage Dips), 25/30 Cycle<br>60% Reduction (Voltage Dips): 10/12 Cycle<br>100% Reduction (Voltage Dips) : 1 Cycle<br>>95% Reduction (Voltage Dips), 0.5 period<br>100% Reduction (Voltage Interruption) : 250/300 Cycle | — |
| **Shock** | IEC 60068-2-27 | | | |
| **Drop** | IEC 60068-2-32 | | | |
| **Vibration** | IEC 60068-2-64 | | | |
| **RoHS** | Yes | | | |
| **REACH** | Yes | | | |
| **MTBF** | 21.16 years (MIL-HDBK-217F-based prediction) | | | |
| **Warranty** | 5 years | | | |

## ORDERING INFORMATION

| Hardware | | | |
|---|---|---|---|
| **Model Name** | **LAN ports** | **Serial ports** | **Additional features** |
| **XGP5901-DB** | **2x RJ45** | **1x RS-232/485/422 (D-Sub 9)** | **-** |
| **XGP5901-TB** | **2x RJ45** | **1x RS-232/485/422 (5-pin TB)** | **-** |
| **XGP5901-P-DB** | **2x RJ45** | **1x RS-232/485/422 (D-Sub 9)** | **PoE PD (802.3af)** |
| **XGP5901-P-TB** | **2x RJ45** | **1x RS-232/485/422 (5-pin TB)** | **PoE PD (802.3af)** |

| Optional Accessories | |
|---|---|
| **Model Name** | **Description** |
| **XPA-315-12-Y-LV6-US** | Y-Type (5.08 mm) power adaptor,100-240VAC,1.25A@12VDC out,US plug,LV6 |
| **XPA-315-12-Y-LV6-EU** | Y-Type (5.08 mm) power adaptor,100-240VAC,1.25A@12VDC out,EU plug,LV6 |
| **XCA-DB9-TB5** | Female DB9 to Female 3.81mm TB5 Converter |
| **XWK-315-A-BK** | Black Aluminum Wall Mount Kit |

## PROTOCOLS ORDER CODES

| Protocols | |
|---|---|
| **SKU** | **Description** |
| **XSS01-XEC04** | IEC 60870-5-101 Serial Slave to IEC 60870-5-104 Ethernet Client |
| **XSS01-XEC50** | IEC 60870-5-101 Serial Slave to IEC 61850 Ethernet Client |
| **XSS01-XECDN** | IEC 60870-5-101 Serial Slave to DNP3 Ethernet Client |
| **XSS01-XECMB** | IEC 60870-5-101 Serial Slave to Modbus Ethernet Client |
| **XES04-XSM01** | IEC 60870-5-104 Ethernet Server to IEC 60870-5-101 Serial Master |
| **XES04-XSM03** | IEC 60870-5-104 Ethernet Server to IEC 60870-5-103 Serial Master |
| **XES04-XEC50** | IEC 60870-5-104 Ethernet Server to IEC 61850 Ethernet Client |
| **XES04-XECDN** | IEC 60870-5-104 Ethernet Server to DNP3 Ethernet Client |
| **XES04-XSMDN** | IEC 60870-5-104 Ethernet Server to DNP3 Serial Master |
| **XES04-XECMB** | IEC 60870-5-104 Ethernet Server to Modbus Ethernet Client |
| **XES04-XSMMB** | IEC 60870-5-104 Ethernet Server to Modbus Serial Master |
| **XES50-XSM01** | IEC 61850 Ethernet Server to IEC 60870-5-101 Serial Master |
| **XES50-XSM03** | IEC 61850 Ethernet Server to IEC 60870-5-103 Serial Master |
| **XES50-XEC04** | IEC 61850 Ethernet Server to IEC 60870-5-104 Ethernet Client |
| **XES50-XECDN** | IEC 61850 Ethernet Server to DNP3 Ethernet Client |
| **XES50-XSMDN** | IEC 61850 Ethernet Server to DNP3 Serial Master |
| **XES50-XECMB** | IEC 61850 Ethernet Server to Modbus Ethernet Client |
| **XES50-XSMMB** | IEC 61850 Ethernet Server to Modbus Serial Master |
| **XESDN-XSM01** | DNP3 Ethernet Server to IEC 60870-5-101 Serial Master |
| **XESDN-XSM03** | DNP3 Ethernet Server to IEC 60870-5-103 Serial Master |
| **XESDN-XEC04** | DNP3 Ethernet Server to IEC 60870-5-104 Ethernet Client |
| **XESDN-XEC50** | DNP3 Ethernet Server to IEC 61850 Ethernet Client |
| **XESDN-XSMDN** | DNP3 Ethernet Server to DNP3 Serial Master (Under Development) |
| **XESDN-XECMB** | DNP3 Ethernet Server to Modbus Ethernet Client |
| **XESDN-XSMMB** | DNP3 Ethernet Server to Modbus Serial Master |
| **XSSDN-XEC04** | DNP3 Serial Slave to IEC 60870-5-104 Ethernet Client |
| **XSSDN-XEC50** | DNP3 Serial Slave to IEC 61850 Ethernet Client |
| **XSSDN-XECDN** | DNP3 Serial Slave to DNP3 Ethernet Client (Under Development) |
| **XSSDN-XECMB** | DNP3 Serial Slave to Modbus Ethernet Client |
| **XESMB-XSM01** | Modbus Ethernet Server to IEC 60870-5-101 Serial Master |
| **XESMB-XSM03** | Modbus Ethernet Server to IEC 60870-5-103 Serial Master |
| **XESMB-XEC04** | Modbus Ethernet Server to IEC 60870-5-104 Ethernet Client |
| **XESMB-XEC50** | Modbus Ethernet Server to IEC 61850 Ethernet Client |
| **XESMB-XECDN** | Modbus Ethernet Server to DNP3 Ethernet Client |
| **XESMB-XSMDN** | Modbus Ethernet Server to DNP3 Serial Master |
| **XSSMB-XEC04** | Modbus Serial Slave to IEC 60870-5-104 Ethernet Client |
| **XSSMB-XEC50** | Modbus Serial Slave to IEC 61850 Client |
| **XSSMB-XECDN** | Modbus Serial Slave to DNP3 Ethernet Client |

## WHO WE ARE

Built on 20 years of experience in designing and manufacturing industrial networking products, **Agatel** was established from the UK to serve the infrastructure and industrial sectors in EMEA markets with reliable connectivity for mission-critical systems in demanding environments.

Experienced in hardware and software design and integration, we produce high-quality yet cost-effective industrial networking and communication products with great customization capabilities and robust implementations, equipping our customers for reliable secure industrial networks.

## WHAT WE OFFER

The needs of our customers' industry are different from those of corporate IT environments – industrial operating environments are tough and the impact of failure in the field can lead to business threatening situations, hence our products will have lifetimes in excess of 20 years.

From entry-level to high-performance industry-certified hardware, **Agatel** offers a full solution spectrum to suit our customers' budgets and application requirements, with features such as industrial-grade reliability, integrated security, network redundancy, and advanced performance.

Our product solution profile includes industrial Ethernet switches, network time servers, media converters, industrial wireless devices, and serial device servers, covering a wide array of mission-critical applications such as automation, security, transport, water, oil and gas, and power grids.

## WHY CHOOSE US

We help our customers reduce downtime and operational costs of their industrial applications in harsh environments. Leading system integrators in EMEA rely on our niche technical expertise and product quality to increase their applications' robustness, revenues, and competitive differentiation.

**Agatel** ruggedized high-quality solutions are designed to deliver zero-network-downtime for harsh project demands, allowing for reliable connectivity to keep people and assets safe and secure in harsh and hazardous environments, and allowing customers to focus on growing their business.

**Agatel Ltd**

1st Floor, Apex House
Calthorpe Road, Edgbaston
Birmingham B15 1TR
United Kingdom

Tel: +44 121 809 8855
E-mail: info@agatel.co.uk
Website: www.agatel.co.uk