Unlock the value of your substation data with Alstom’s multi-function substation server

Enabling the Smart Grid with Alstom’s DAP server

The DAP server is a multi-function substation server designed for managing, securing and delivering substation information to electrical utilities. DAP server empowers substation operators with the information they need to improve power system operability, efficiency and reliability.

DAP server PRODUCT
Alstom’s DAP server has the flexibility to build a reliable, scalable and versatile system to address your substation automation needs.

Key design features:
- DAP server is a ruggedised multi-function substation server
- Designed with cyber security to assist with NERC CIP compliance
- Low risk migration solution for retrofitting legacy RTUs
- Data integration of multi-vendor substation devices
- Standards based protocols such as IEC 61850 and IEEE 1815 – DNP3
- Online condition monitoring for asset management applications

GRID MODERNISATION
One of the major challenges of grid modernisation is the substation automation migration strategy for legacy substations. Common considerations are:
- How to unify and manage the increasing number of devices and data
- How to address cyber security while making information available and accessible
- Forklift replacement or retrofit upgrade approach
- New technology compatibility with existing equipment
- How to utilise, manage and optimise existing assets

The DAP server product range is designed to enrich your existing substation assets and provide a migration path to the next generation of substation automation solutions.
DAPserver supports multiple protocol interfaces to existing substation devices. This means you do not need to replace the existing substation devices when you are upgrading to the DAPserver solution.

Custom hardware and software for legacy RTU upgrades. When there is a need to upgrade your legacy RTU to meet performance or NERC CIP requirements, DAP mini and DAP IO modules are the perfect low-risk and low-cost upgrade solutions.

DAPserver is flexible and scalable to address your substation automation needs, from large transmission to small distribution substations.

DAP IO - Field input/output IED with DNP 3

Substation automation Input/Output modules for your new or retrofit projects.

DAP IO offers 16 digital inputs, 8 control outputs and 16 analogue inputs.

Dual Ethernet ports for redundancy.

Custom designed 3U rack/panel design for replacing legacy RTU modules.

Asset condition monitoring

DAPserver online condition monitoring capability helps reduce the risks of potential asset failures and costs of operations and maintenance.

Substation dashboard of assets allows users to differentiate between critical and non-critical substation alarms. This means a reduction in the number of unnecessary trips.

DAPserver can also collect, manage and deliver the non-operational information to enterprise level data warehouses and asset management applications.

New substation automation systems

DAP server can be integrated into a Substation Distributed Control System (DCS).

Other DCS components from Alstom are:
- Merging units - analogue or numerical
- C-series bay control units
- P40 Agile protection relays
- Measurement and recording IEDs
- Ethernet switches for redundant LAN architectures

Cyber security

DAPserver is designed with cyber security integrated. Secure remote access enables users to establish a secure network tunnel to the substation devices from a central location. With this application, you can securely upload the substation device files such as oscillography and fault data, relay event records, etc.

Authentication, authorisation and audit logs provide tools to assist with NERC CIP compliance.

DAPserver provides the FLEXIBILITY to build a RELIABLE, SCALABLE and VERSATILE system to meet your substation automation needs.

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HOW DAPserver FITS INTO YOUR UTILITY OPERATIONS

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Retrofitting of substation automation systems
- DAPserver supports multiple protocol interfaces to existing substation devices. This means you do not need to replace the existing substation devices when you are upgrading to the DAPserver solution
- Custom hardware and software for legacy RTU upgrades. When there is a need to upgrade your legacy RTU to meet performance or NERC CIP requirements, DAP mini and DAP IO modules are the perfect low-risk and low-cost upgrade solutions
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**HARDWARE**

Various platforms are available depending on your substation automation application. From our smallest footprint server – “DAP mini” to our largest six-node distributed multi-processor system – “DAP-300”, we provide the best solutions adapted to your needs.

**DAP mini features**
- PowerPC processor
- 64 MB Flash, 256 MB SDRAM
- Internal CF storage
- 3x 10/100 BaseT Ethernet
- 5x RS-232 ports, 300-115,200 bps
- 1x RS-232 console port
- IRIG-B input and output
- D20 configuration import wizard

**DAP-100 features**
- PowerPC processor
- 64 MB Flash, 256 MB SDRAM
- 2x Internal CF storage
- 3x 10/100 BaseT Ethernet
- 2x RS-232 ports
- 8x RS232/422/485 ports, 300-115,200 bps
- 1x RS232 console port

**DAP-AT features**
- Based on Advantech UNO-4672 substation hardened computer
- Intel Celeron M, or Pentium M processor
- Supports 2x internal CF card and 1x2.5” SATA HDD
- 6x Ethernet LAN
- 2x 10/100/1000 Base-T
- 4x 10/100 Base-T
- 10x serial communications ports
- 2x RS-232
- 8x RS232/422/485
- 4x USB 2.0 (1x internal)
- 19” rack mount/ 2U form factor
- IEC 61850-3 and IEEE 1613 compliant
- CE marking

**DAP-300 features**
- DAP-300 is a multi-processor system (MPS)
- Distributed processor architecture
- Based on DAP mini server
- Redundant server and communications channel
- Hot standby failover switching
- For large and complex substation systems
- Up to 6x DAP mini server
- Redundant power supply
- Multiple LAN, IP segments
DAPserver COMPLETE SOLUTION

Substation server
DAPserver is a hardened device designed for operations in the harsh environments of electrical substations and industrial facilities. It enables the integration of field devices, unification of substation data, interfaces with enterprise applications and secures delivery of substation information to utility users.

- **Data concentration** - DAPserver has the ability to concentrate data from a wide range of substation devices. The data is collected within the real-time database of DAPserver and is made available to host applications such as multiple SCADA masters or sub-master stations, a local HMI or other substation devices. DAPserver can perform complex calculations and logical operations on the data before it is sent to host applications.

- **Software** – the core of DAPserver is based on the Linux real-time operating system. Modular software applications are available as options depending on the substation application.

System communications
The ability to acquire data from substation devices is essential to utility substation automation applications. The DAPserver platform consists of a Client application to collect data from substation devices and a Server application to publish data to host applications such as substation HMI and SCADA systems.

- **Client application**: the interface to substation IEDs – supports native SCADA IED protocols from major vendors as well as non-operational file retrieval.

- **Server application**: the interface to host applications – supports legacy SCADA protocols as well as IEC 1815 – DNP3/IP, IEC 60870-5-101/104, Modbus and OPC.

- **VPort (virtual port) application**: provides secure tunnel connectivity to your substation devices for remote file retrieval, maintenance and diagnostics. By establishing this virtual connection, the overall effect is the same as extending the traditional serial cable connection between a PC and a substation device across your network in a secure manner.

- **Substation bus**: supports standards-based protocols such as IEC 61850, IEEE 1815 – DNP3/IP, IEC 60870-5-101 and Modbus.

- **Protocol conversion**: DAPserver provides a protocol conversion service which allows for flexibility in the selection and integration of substation IEDs, independent of any protocol restriction.
**NERC CIP requirement**

DAP server utilises the DAPguard cyber security software application for access control and secure communications to substation systems and devices. DAPguard is based on the Linux operating system and tools for authentication, authorisation and audit trail. DAP server can be easily deployed at existing or new substations to address NERC CIP standards requirements.

**Automation applications**

DAP server is equipped with a soft logic programming application. This allows the users to create software applications on an event-driven or periodic basis. An optional software module for the IEC 61131 programming standard is also available.

Combined with the HMI function and IED data integration, the logic application allows the user to create powerful automation solutions. Some examples of automation applications are:

- **Substation automation application** (interlocking, alarm grouping/reduction, data conversion)
- **Distribution automation application** (substation or feeder automation)
- **Online condition monitoring of assets** (alarm generation on status or analogue input limit alarms)
- **Automatic file retrieval from IED** after a disturbance event trigger
- **Protection relay management**

**Redundancy option**

For critical substations, comprehensive redundant architectures are available for added reliability:

- **Redundant server** – failover switching between primary and secondary server
- **Redundant communications** – failover switching between communications channels
- **Redundant power supply** – available on specific hardware platforms

**DAP studio configuration tool**

DAP studio is an intuitive, user-friendly configuration, maintenance and diagnostic tool for the components of the DAP server control system. Aside from being the user interface to access all of the functions and database points of DAP server, DAP studio also provides the following functions:

- **Project configuration management**
- **Uploading and downloading** of the configuration and firmware between DAP studio and DAP server
- **Large device library** preloaded with templates of commonly used IEDs. The templates consist of the communications protocol and point mapping of the IED
- **Import wizards** are available for some commonly used IEDs which reduces the configuration time and data entry errors
- **Protocol analyser feature** allows the user to analyse the protocol data exchange between DAP server and the connected devices
SUBSTATION HMI

DAPserver’s DAPview is an embedded HMI that provides consolidated views for the monitoring, control and maintenance of substation devices either on site or from a remote location. It replaces or complements the traditional mimic control panels.

Some functions of the HMI are:
- Local and secure remote HMI access
- Substation single-line diagram
- Trending for real-time or historical data
- Alarm management for viewing, filtering and acknowledgement
- Custom user screens – easy to use configuration tool

HMI applications
- Substation graphical user interface
- Substation alarm annunciation
- Visualisation of data and information
- Local and remote controls
- Substation and distribution automation
- Protection relay management
- Online condition monitoring
- Remote access to substation IEDs
- Remote maintenance and diagnostics
- Security monitoring and management

HMI benefits
- Improves system availability and reliability
- Improves system security and risk management
- Enables effective decision-making
- Consolidates substation data and information
- Provides role based visualisation for technical and management staff
- Complements SCADA host with detailed information
- Eliminates hardwired annunciator panels
- Reduces dependency on expensive mimic control panels
- Improves staff safety
- Reduces unnecessary travel to sites
- Enables condition-based maintenance and asset management

Digital Control System

Product Solutions

DAPserver

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ENGINEERING SERVICES

The Alstom Substation Automation Solutions team offers a full range of technical services including project management, testing, commissioning and installation support and training.

DAP server allows us to respond to today’s substation automation requirements:

- Meeting the NERC CIP requirements for legacy and new substation automation systems
- Functional testing and integration capabilities - interoperability testing of substation IEDs
- Migration program from legacy RTU based substations to next-generation substation automation systems
- Online condition monitoring to optimise your critical substation assets
- Secure remote access and file retrieval of substation device data
- Centralised substation control room situational awareness
- IEC 61850 training and workshops

As a partner for your substation automation projects, feel free to contact us to discuss how we can help meet your project objectives.

For more information please contact Alstom Grid:

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