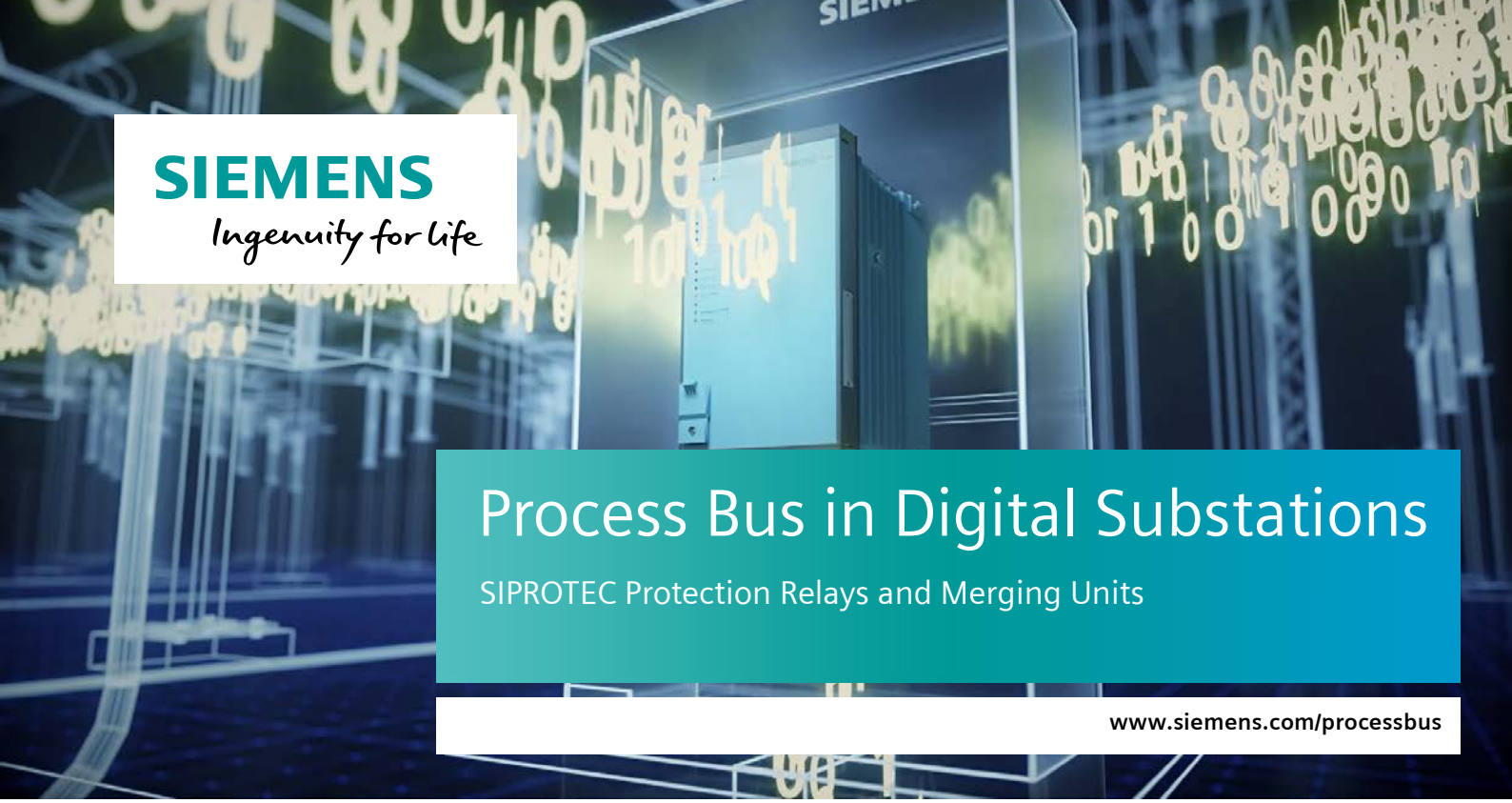

SIEMENS
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Process Bus in Digital Substations

SIPROTEC Protection Relays and Merging Units

www.siemens.com/processbus

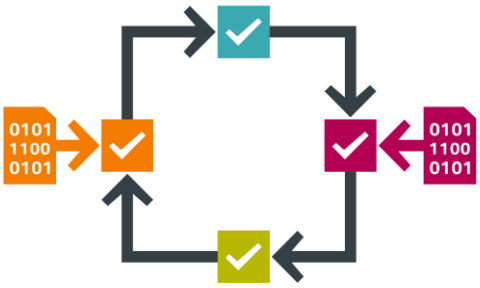
Description
Measurement of voltages and currents is necessary for protection. Currently sensors, delivering analog values, are directly wired to the protection devices. Since the relays in a substation are normally situated in a central building this wiring has to cover a distance. In an EMC critical area like a high voltage substation this demands high power signals resulting in big copper cables. For conventional instrument transformers this is proven technology.

In process bus a new approach is used. Instead of wiring the protection devices to the sensors a Merging Unit is placed near the sensor. The Merging Unit digitalizes the analog values and sends them via a Sampled Measured Value stream to one or more protection devices. The Sampled Measured Value stream is transmitted using fiber optical Ethernet, where EMC is no issue. As an additional advantage this enables new sensors that are not capable of generating high power signals.

The relays no longer have to sample the analog values but directly use the digital values out of the Sampled Value Stream.

Interoperability
Today's conventional instrument transformers provide an analog signal representing the high voltage signal. This is interoperable by definition. Measurement is done directly in the relays.

In process bus the interoperable interface is generated by the Merging Unit. The Merging unit works as a converting device. It converts proprietary sensor outputs to a standardized Ethernet based output. This additionally supports nonconventional instrument transformer.



Process Bus in Digital Substations

To fashion interoperable devices in Energy Automation systems IEC 61850 was created. The standard not only covers message interchange based on IEC 61850-8-1 which is nowadays state of the art technology.

In IEC 61850-9-2 the digital representation of analog values is standardized. This standard is the base for an interoperable process bus. Siemens supports IEC 61850-9-2 interface and focuses on interoperable solutions.

Benefits

- Minimize wiring by measuring directly at the sensors, operating at a central position and use of fiber optical Ethernet
- Enhanced safety by avoiding open wire condition at relays
- Easier extension / maintenance, adding a device only connection to the network necessary.
  No direct connection to the sensors required

Efficient and flexible

- Maximum network reliability, through seamless redundancy protocols
- Interoperability ensured, standardized in IEC 61850-9-2
- Merging Units for conventional CT/VT offer process bus advantages without change in primary equipment

Devices
Siemens offers new Merging Unit SIPROTEC 6MU805 for conventional instrument transformers. This device allows conversion of current substations to process bus substations without change in the primary equipment. The advantages of process bus can be used, but also a mixed configuration of process bus / non-process bus is possible.

SIPROTEC 5 Processs bus solution

The 6MU805 Merging Units are not only certified according IEC 61850-9-2LE for process bus applications but include a lot of additional features. Some, but not all, of the additional features are:

- Extended temperature range (-40 °C – 70 °C)
- Configurable 12 Binary Inputs / 8 Binary Outputs
- Time synchronization via PPS, IRIG-B or GPS
- Full support IEC 61850-8-1 GOOSE

For SIPROTEC 5 relay family Siemens offers extension module PB201. This device extends all SIPROTEC 5 protection devices to process bus substations capable relays.

The extension module PB201 offers:

- Easy expansion of SIPROTEC 5 devices
- 24 channels for Sampled Measured Values
- On board resampling for maximum flexibility

Both SIPROTEC 6MU805 Merging Unit and SIPROTEC PB201 extension module support:

- PRP and HSR (IEC 62439)
- Integrated Web-Server
- Comprehensive engineering with DIGSI
- Full integration of whole substations in process bus technology by keeping well known engineering concepts of SIPROTEC

Siemens process bus solutions not only fulfill the standard but increase customer value beyond.

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