PCS-9794
Protocol Converter

The PCS-9794 is a protocol converter designed for the highest standards of performance, safety and reliability to meet requirements of a complex Substation Automation System (SAS). As an integral part of the SAS, it works as a communication manager, which maps signals between IEDs and the local SCADA or protection management unit.

The PCS-9794 transmits data to local SCADA or protection management unit and links IEDs through different kinds of communication interfaces.
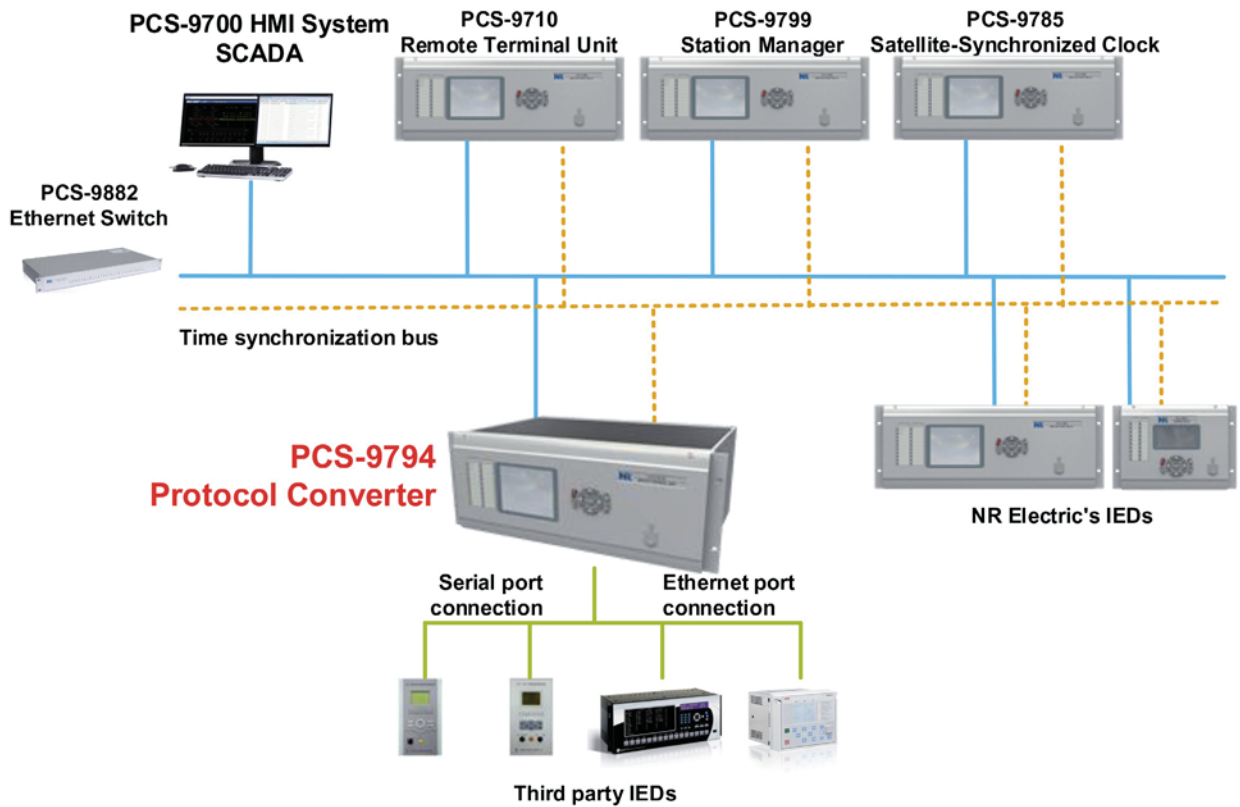

Figure 1 Typical application

Functions

- Protocol conversion
  PCS-9794 can adapt to the signal conversion need of different projects and realize the data exchange between station level and bay level network communications.

- Information acquisition of relay, meter and other IED
  Through its serial ports and Ethernet ports, this device can communicate with relay, meter and other IED to gather their information such as SOE and operation signal.

- Communication
  - This device can communicate with local SCADA and protection management system.
  - This device can communicate with Remote Terminal Unit (RTU) to realize the data transmission to dispatching center or distributed control center.
  - The mapping transmission tables for SCADA or RTU can be customized independently.

- Communication status supervision
  This device can automatically check and update the communication status of the connected IEDs. Once an abnormality is detected, an alarm signal will be sent out.

- Signal synthesis
  The signal synthesis function is supported with the help of the configuration tool PCS-COMM. Logical and mathematic operation of data such as AND, OR, NOT, XOR, +, -, × and ÷ can be proceed for the transmission to remote control center.

- Local binary output
  Several output contacts are equipped with the optional IO module to realize logic output. These outputs are configurable through the auxiliary software.

- Configurable LED indication
  Several LEDs are equipped on the device HMI panel to indicate a binary signal, such as alarm, communication state, switchgear position, etc. Some of them are defined by default while the others are configurable in 3 colors (green, red and yellow) through the auxiliary software.

- Manipulation authority
  All device critical manipulations, such as remote control and setting modification, need a user authority check. The authority password is configurable via local LCD.

- Command record and query
  This device records all the commands and operations, which include control selection, control execution, regulation, setting modification selection, setting modification execution, signal reset, etc. All these records can be viewed and queried with filter.

- History event record
  This device automatically records the events during its service, which include self running state change, alarm from connected IED, communication failure alarm, etc.

- Double device redundancy strategy
  Several device redundancy strategies are supported. The 2 devices are completely electrically independent. Their power supplies, communication ports and programs run independently. The inter-device exchange is realized electrical and network connection.

- Consistency IP for dual network
  For the downlink dual network mode with 2 devices, master and slave communicate with substation IEDs in using the same substation network IP address.

- Time synchronization
  This device supports several time synchronization modes that include PPS, PPM, IRIG-B, timing message, SNTP and IEEE 1588.

- On-line maintenance and monitoring
  This powerful function enables the engineer to monitor the running status of this device through network, including running information print, message display of Ethernet port and serial port, on-field configuration, database view, virtual measurement, file transmission, remote rebooting, etc. With all these advanced functions, the substation upgrade becomes convenient.

- Self-diagnosis
  During device service, it keeps a full supervision on software and hardware. Once an abnormality occurs, the device will be self-blocked to ensure no further mal-operation and send an alarm. For the dual device mode, if the abnormal device is on-duty, it will not only block itself but also activate the backup device to take over all its task to ensure the stability and reliability.

- PRP and HSR
  This device supports the Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR) protocol.

Features

- High performance hardware architecture
  - Dual 800MHz CPUs, 1 or 2GB RAM, optional 4G micro SD or 32G SSD storage memory for historical data
  - Capable for data management and communication of the SAS for whole substation or power plant
  - CPU usage ≤ 25% during normal service; CPU usage ≤ 50% during massive data treatment
  - Support of 6 electrical or (2 optical + 4 electrical) Ethernet ports
  - Support of max.15 electrical or (10 electrical + 4 optical) serial ports.

- Support of 2 electrical or optical ports for PRP/HSR communication

- Air cooling architecture is adopted to avoid wearing part and vibration (the use of fan motor).

- Non-rotating storage is adopted to avoid vibration

- A fully closed chassis with a complete panel

- Completely separated spaces for electronic and electrical systems

- Designed with anti-interference measures to enhance the device EMC.

- Flexible installation size
  - Two different chassis sizes are supported, 4U 19" (large space occupation and more modules for configuration) and 4U 9.5" (small space occupation and less but flexible module configuration), to adapt to different installation requirement.

- Power supply redundancy
  - Dual power supply module is an option. The extra power supply module will be placed at the other side of the device rack and works independently.

- Real-time database
  - The database is compatible with data model IEC 61850 and IEC 60870-5-103
  - Support of multiple models including primary/secondary equipment model, association model, primary schematic diagram model, etc.
  - Unified data acquisition and transmission

- History database
  - Embedded history database
  - Optional capacity: 4GB micro SD or 32GB SSD (Solid State Drive)
  - Multiple data storage types including historical SOE records, operation reports, wave files, etc.

- Real-time data transmission
  - Internal SOE transmission delay <100ms

- Unified substation model transmission
  - The data model transmission between substation and control center is realized by using the SCD file.
  - Support of most international standard protocols including IEC 60870-5-101/104, NR private 103, Modbus, IEC 61850 and CDT.
  - Support of customized protocol development requirement (besides the above standard package) for IEDs, such as DC batteries, earthing line selection device, etc.

- Powerful auxiliary configuration tool
  - Highly integrated configuration functions
  - Full substation configuration support including project implementation, running, maintenance, analysis, diagnostic and debugging.

- System scale
  - Up to 90 IEDs
  - Up to 8 SCADA/RTU