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Communication network is becoming increasingly important as a worldwide adoption of IEC 61850 standard in Substation Automation Solution (SAS). For decades network engineers have used Network Management Systems (NMS) to monitor and manage communication equipment in substation. However, NMS was never addressing the unique needs of the industry. We need a solution that enables NMS to monitor critical substation protocols such as Generic Object-oriented Substation Event (GOOSE), Sampled Values (SV), Precision Time Protocol (PTP), Parallel Redundancy Protocol (PRP), and High-availability Seamless Redundancy (HSR). The GOOSE/SV transmissions between source and destination IEDs can be easily extracted from an SCD file. This approach enables the precise depiction of the GOOSE/SV communication in a substation and offers substation engineers an efficient way to manage and maintain a SAS.

Most IEDs do not support the traditional way of device management via SNMP. Therefore, it is necessary for NMS to utilize SAS protocols to detect and monitor critical substation assets. One such protocol is Manufacturing Messaging Specification (MMS), which is used to interact with substation equipment and collect required information for asset management purposes. NMS can get information about all IEDs in the system and their communication patterns from an SCD file, populate a cybersecurity baseline and set restricting access policies for the networking equipment that are applied automatically. Substation-focused NMS achieve better visibility and cybersecurity in SAS communication networks.

The substation protocols GOOSE, SV, and PTP can benefit from being monitored by NMS. Traffic patterns can be associated with the topology to identify links and nodes where propagation fails and thus speeding up troubleshooting. Apart from the additional functionality provided by NMS a tight integration with communication equipment can improve protocol visibility even further through the extra information retrieved from data flows. To sum up, our proposed new approach includes implementing substation-focused NMS that integrates with SAS to achieve better visibility and cybersecurity in SAS communication networks.