

Digital substations issues and their solutions

SC B5 PS2

Question 2.01: What are the challenges in the development of digital substations and how to address the problems caused by the digitalization?

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Challenges



Cyber security issues inside the substation

Today, everyone is concerned with the issues of protecting the perimeter of the substation from outside intrusion. However, no one is protected from intrusion into communication systems of a digital substation. Building up devices (complex) that can ensure cyber security inside digital substation has not been started yet. The main threat comes from exploitation and adjustment staff with their laptops. It is necessary to use encryption tools and develop new complexes and algorithms to address the cyber security issues inside digital substations.



Process bus diagnostics for loss of GOOSE and SV messages.

It is necessary to develop monitoring tools for GOOSE and SV messages that do not degrade the performance of the process bus.



Issues of electricity metering at the Digital substations.

Today, only automated system for commercial electricity metering (ASCEM) is certified. Having certified Merging units (MUs) as commercial metering devices, would make it possible to create virtual electricity meters. So far, the regulatory framework does not allow doing it. Electricity metering does not fit into the Digital substation technology.

Challenges



Implementation of anti-emergency automation functions using Digital substation protocols.

The GOOSE and SV protocols do not imply information communication outside Digital substations. It is necessary to implement R-GOOSE and R-SV, including corresponding devices, that will allow working on geographically dispersed areas of anti-emergency automation systems.



Information technology issues.

These kinds of issues are related to obtaining the required quality of information, ensuring the delivery of information in the required volume and with the required speed.

Solutions



Further development of the regulatory and technical documentation for relay protection and automation systems in the context of usage of digital and information technologies.



Further development of issues related to equipment certification and technical and design solutions.



Increase value of R&D in the development of digital technologies for power protection and automation systems for power systems of the future.