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Bottom line.

While current cyber attacks pose serious risks to critical infrastructure systems, SCADA systems are crucial in protecting these activities by providing automated alarms, secure communication protocols, and real-time monitoring. SCADA applications contribute to the safety, dependability, and resilience of these crucial systems by reducing the risks associated with increasingly digitized and interconnected critical infrastructure through the constant improvement of their security features. (NCAST, 2020; SCADA Systems)

Vulnerabilities in critical systems and SCADA's role in risk mitigation

Power grids, water treatment plants, and transportation networks are examples of critical infrastructure systems that are necessary to preserve both economic stability and public safety. However, cyber attacks are putting these systems at greater danger, raising the possibility of disruptions that could have disastrous effects on society. Through real-time monitoring, data analysis, and automated control capabilities, SCADA systems, which are widely used to monitor, operate, and coordinate the operations of these infrastructures—play a crucial role in lowering these risks (SCADA Systems).

Vulnerabilities in Critical Infrastructure Systems

A number of variables, such as the interconnectedness of current technology, the presence of old hardware, and the historically poor cybersecurity safeguards implemented for these systems, make critical infrastructure systems extremely vulnerable to attacks. When many of these systems were first designed, operational reliability rather than security was the main

priority. For instance, outdated industrial control systems are vulnerable to unwanted access since they frequently lack integrated security protections. Attackers can use a variety of techniques to take advantage of these flaws, including malware injection, phishing schemes directed at operators, and network packet eavesdropping (National Institute of Standards and Technology, 2020).

The growing usage of internet connectivity and common network protocols in SCADA systems creates a serious vulnerability that leaves vital infrastructure open to remote attacks. The drive for integration and remote monitoring has resulted in a dependence on WAN and IP-based protocols, which has increased the risk of hostile access to SCADA systems. Previously, SCADA networks functioned in isolated environments (also known as "air-gapped" systems).

The Role of SCADA Systems in Mitigating Cyber Risks

By offering centralized, real-time monitoring and control over intricate operations, SCADA systems help to ensure the security and stable operation of essential facilities. By collecting and processing data from a variety of sensors and field equipment, these systems enable operators to quickly identify and address problems. Operators can make well-informed decisions based on the most recent information by using SCADA systems, which gather and send data on equipment status, environmental conditions, and system performance through components like Remote Terminal Units and Programmable Logic Controllers (SCADA Systems).

For example, when specific requirements are reached, such unusual pipeline pressure or excessive power generator temperatures, SCADA software can automatically send out notifications. These "notifications enable prompt action to stop" possible safety risks or equipment damage. In order to help operators comprehend and effectively manage complicated processes, SCADA's Human Machine Interface offers graphical illustrations of infrastructure activities (SCADA Systems)

In order to manage access and stop unwanted manipulation, many SCADA systems have recently added improved security features such as firewalls, whitelisting, and VPN's . While VPNs offer encrypted channels to shield data transmission from eavesdropping or manipulation, these security features aid in ensuring that only reliable users may connect with crucial components. Additionally, suppliers of SCADA systems provide security protocols such as DNP3 and IEC , which enhance overall cybersecurity resilience by enabling secure data flow across various devices and networks (NIST, 2020).

conclusion

Although contemporary cyber attacks pose serious risks to critical infrastructure systems, SCADA systems play an essential role in protecting these activities by providing automated alarms, secure communication protocols, and real-time monitoring. SCADA applications contribute to the safety, dependability, and resilience of these crucial systems by continuously improving their security capabilities.

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Resources

https://www.scadasystems.net/

https://www.nist.gov/publications/framework-improving-critical-infrastructure-cybersecurity-version-11