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SCADA Systems & Vulnerabilities

SCADA (Supervisory Control and Data Acquisition) Systems are crucial in controlling, monitoring, and protecting critical infrastructure. SCADA Systems protect various infrastructure like water treatment, power generation, airports, manufacturing, and much more. Critical Infrastructure is extremely important to protect from threats and SCADA Systems help to mitigate these risks.

What are SCADA Systems?

SCADA (Supervisory Control and Data Acquisition) Systems are important systems that help control, monitor, and protect various critical infrastructures. SCADA International explains, “The system consists of both software and hardware components and enables remote and on-site gathering of data from the industrial equipment” (SCADA International, p. 1, 2024). For example, an offshore oil rig may use the SCADA system in order to remotely control and monitor their oil rig and analyze its data. SCADA systems utilize HMIs or Human Machine Interfaces in order to present data to the human operator. The Human Machine Interface helps to provide various details such as diagnostic, logistical, management, machine, and maintenance information. SCADA systems today utilize networks and WAN protocols in order to communicate information.

Vulnerabilities of Critical Infrastructure Systems and SCADA

Critical Infrastructure Systems are high-priority targets for cybercriminals, terrorists, and other countries. Countries can be crippled if critical systems like water treatment and power generation are compromised. Threats to these kinds of infrastructure are continuously evolving and in order to help prevent devastating attacks, their vulnerabilities must be identified. These systems are more interconnected more than ever through use of networking and the internet which further increases risk. SCADA itself has vulnerabilities that need to be addressed. The article from SCADA Systems explains that for one, it is “...wrongly believed that SCADA networks are safe enough because they are disconnected from the Internet” (SCADA Systems, p. 1, 2024). While some SCADA systems may not be connected to the internet, they are still at risk due to human and physical security factors. SCADA systems also are at risk of unauthorized access and packet control.

How do SCADA applications help mitigate these risks?

SCADA applications help mitigate these risks through various means. For one, these applications help to automate certain processes. SCADA applications also provide data in real-time and help report anomalies and data irregularities. Like many other softwares, SCADA systems record actions through event logging. SCADA vendors are also addressing the system's own vulnerabilities through the development of, "...specialized industrial VPN and firewall solutions..." (SCADA Systems, p.1, 2024). Additionally, whitelisting has been used in order to block unauthorized users from creating application changes.

Conclusion

SCADA systems are extremely important when it comes to monitoring, protecting, and controlling critical infrastructure systems. Critical infrastructure helps nations function every day and thus needs important systems such as SCADA in order to mitigate threats. Though SCADA systems help protect critical infrastructure from bad actors, it also has its own vulnerabilities. SCADA vendors are innovating new ways to protect the application and the systems it protects. In conclusion, SCADA is majorly important in protecting critical infrastructure from various threats and evolves along with them in order to provide better mitigation.

References

Learn all about SCADA systems: What is SCADA?: Scadapedia. SCADA International. (2024, October 23). https://scada-international.com/what-is-scada/

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