PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Cyber Security Guidelines

General recommendations for safeguarding control systems

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Control systems and control networks are exposed to cyber threats. In order to minimize these risks, the protective measures listed below are available in addition to other measures. B&R encourages system integrators and asset owners to implement the measures they consider appropriate for their control system environment.

- Place control systems in a dedicated control network containing control systems only.
- Locate control networks and systems behind firewalls and separate them from any other networks like business networks and the Internet.
- Block any inbound Internet traffic destined for the control networks/systems. Place remote access systems used for remote control system access outside the control network.
- Limit outbound Internet traffic originating from control systems/networks as much as possible. If control systems must connect to the Internet, tailor firewall rules to required resources - allow only source IPs, destination IPs and services/destination ports which control systems definitely need to use for normal control operation.
- If Internet access is required on occasion only, disable relevant firewall rules and enable them during the time window of required Internet access only. If supported by your firewall, define an expiry date and time for such rules – after the expiry date and time, the firewall will disable the rule automatically.
- Limit exposure of control networks/systems to internal systems. Tailor firewall rules allowing traffic from internal systems to control networks/systems to allow only source IPs, destination IPs and services/destination ports which are definitely required for normal control operation.
- Create strict firewall rules to filter malicious network traffic targeting control system vulnerabilities ("exploit traffic"). Exploit traffic may use network communication features like source routing, IP fragmentation and/or IP tunneling. If such features are not required for normal control operation, block them on your firewall.
- Use Intrusion Detection Systems (IDS) or Intrusion Preventions Systems (IPS) to detect/block control system-specific exploit traffic. Consider using IPS rules protecting against control system exploits.
- When remote access is required, use secure methods, such as Virtual Private Networks (VPNs). Please ensure that VPN solutions are updated to the latest version available.
- In case you want to filter internal control network traffic, consider using solutions supporting Intra-LAN traffic control like VLAN access control lists.
- Harden your control systems by enabling only the ports, services and software required for normal control operation. Disable all other ports and disable/uninstall all other services and software.
- If possible, limit the permissions of user accounts, software processes and devices to the permissions required for normal control operation.
- Use trusted, patched software and malware protection solutions. Interact with trusted web sites and trusted email attachments only.
- Protect control systems from physical access by unauthorized personnel e.g. by placing them in locked switch cabinets.

- Protect the engineering workstation[1] by applying measures including, but not limited to, the following:
  - Harden the system (e.g. disable unneeded services)[2]
  - Use protection solutions like endpoint security software
  - Keep the system up to date (e.g. install software updates regularly)
  - Prevent unauthorized access to the engineering workstation
  - Limit activities on the engineering workstation to control system-related work. Do not use the engineering workstation for risky activities like Web browsing and email processing.

- Protect the engineering software and project files from unauthorized access

- Use trusted project files only. Ensure their authenticity and integrity by applying
  - organizational measures
  - technical measures (e.g. use hashes or digital signatures)

[1] An engineering workstation is used to program control systems like PLCs and runs engineering software like B&R Automation Studio.

[2] Consider application of hardening guides like the CIS Benchmarks: https://www.cisecurity.org/cis-benchmarks/