



Kaspersky Industrial CyberSecurity: solution overview 2019

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Attacks on industrial systems are on the increase

Three in four industrial companies say they believe they will experience an ICS cyber attack and reasonably 77% of companies rank cybersecurity as a major priority¹. Business and supply chain interruption has ranked as the number one risk concern globally for the past six years; cyber incident ranked second in 2018². For businesses operating industrial or critical infrastructure systems, the risks have never been greater. 40% of industrial companies say the disruption of operations would be the most critical consequence of a cyberattack³. Industrial security has consequences that reach far beyond business and reputational protection. When it comes to protecting industrial systems from cyberthreats, there are specific and significant ecological, social and macro-economic considerations.

¹ The state of industrial cybersecurity 2018. Kaspersky

² Allianz Risk Barometer 2018

³ PwC: The Global State of Information Security, 2018

Operational technology vs. information technology

As defined by automation standard IEC 62443, an Industrial Control System (ICS) is a collection of personnel, hardware, and software that can affect or influence the safe, secure, and reliable operation of an industrial (technological) process.

Industrial Control Systems include but are not limited to:

- Distributed Control Systems (DCSs), Programmable Logic Controllers (PLCs), Remote Terminal Units (RTUs), Intelligent Electronic Devices (IEDs), Supervisory Control And Data Acquisition (SCADA) and diagnostic systems.
- Associated internal, human, network, or machine interfaces used to provide control, safety, and manufacturing operational functionality to continuous, batch, discrete, and other processes.

In more high-level terms, any industrial systems infrastructure can be broken down into two domains:

- Information Technology (IT) – systems required for managing data in the context of business goals
- Operational Technology (OT) – systems required for managing the physical, industrial processes of industrial automation.

IT security strategies tend to focus on data protection, and to follow the objectives of the "C-I-A" model: Data Confidentiality, Integrity and Availability. However, for most OT systems, cybersecurity is not about "data" but about the continuity of industrial processes. So, in terms of the C-I-A model, "availability" is a main focus of security strategies as applied to OT. This is what distinguishes industrial cybersecurity needs from those of other systems, meaning that the even most effective classical IT cybersecurity solution is inappropriate for use on OT systems, putting the availability (and in some cases the integrity) of processes at risk.

Risks and threats

Despite a growing awareness of the prevalence of cyber-based attacks on industrial control systems, many IT security models continue to adhere to the outdated belief that physically isolating systems (through "airgaps") and "security by obscurity" is enough. It's not – in the era of Industry 4.0, most non-critical industrial networks are accessible via the internet⁴, whether or not by choice. Extensive research by Kaspersky ICS CERT, using data from the Kaspersky Security Network, indicates that industrial PCs are regularly attacked by the same generic malware that afflicts business systems (IT), including (but not limited to) well-known culprits such as trojans, viruses and worms. In the first half of 2018, Kaspersky products across the globe blocked attempted malware attacks on 41.2% of all Kaspersky-protected computers classified as components of industrial infrastructure⁵.

Another rising threat to the ICS is ransomware. The range and diversity of ransomware escalated massively between 2015 and 2017. The emergence of ransomware is highly significant for the industrial sector – such infections cause high-impact, wide-ranging damage to critical systems, making the ICS a particularly attractive potential target – as proven by numerous incidents of ransomware attacks (especially WannaCry and exPetr infections) hitting ICS/SCADA systems during 2017. In the near future ransomware designed to attack industrial systems may have its own specific agenda – instead of encrypting data, the malware may set out to disrupt operations or to block access to a key asset.

As well as generic threats, industrial security must contend with ICS-specific malware and targeted attacks: Stuxnet, Havex, BlackEnergy, Industroyer, and infamous Triton that targets Safety Instrumented System – the list is growing rapidly. As the Stuxnet and BlackEnergy attacks have shown, one infected USB drive or single spear-phishing email is all it takes for well-prepared attackers to bridge the air gap and penetrate an isolated network.

In addition to malware and targeted attacks, industrial organizations face other threats and risks targeting people, processes and technology – and underestimating these risks can have serious consequences. Kaspersky develops solutions and services to help our customers tackle and manage not only malware and targeted attacks but also many other cyber incidents and risk factors, such as:

- Mistakes by SCADA operators or contractors (service providers)
- Fraudulent actions
- Cyber sabotage
- Compliance issues
- Lack of awareness and hard data for forensic investigation

⁴ ICS and their online availability 2016, Kaspersky

⁵ Threat Landscape for Industrial Automation Systems for H1 2018, Kaspersky ICS CERT

The need for specialized industrial cybersecurity

Only cybersecurity vendors who understand the differences between cyber-physical enterprises and data-oriented enterprises can deliver solutions that meet the unique security needs of industrial enterprises. Arc Advisory emphasize that Kaspersky performs the unique combination of threat intelligence, machine learning, and human expertise that supports agile protection against any kind of threat⁶.

Meanwhile, a well chosen solution could help to meet the business needs, provide a high ROI for organization and mitigate the operational risks⁷

Kaspersky: trusted industrial cybersecurity provider

A representative vendor in cybersecurity and industrial protection⁸, Kaspersky is continually researching and developing solutions that do more to address constantly evolving threats to industrial and critical infrastructures. From operations management to the ICS level and beyond, Kaspersky is playing a leading role in helping industry, regulators and government agencies globally to anticipate changes in the threat landscape and to defend against attacks.

A trusted security provider and partner to leading industrial organizations who have relied for many years on our anti-malware protection, Kaspersky collaborates with well-recognized industrial automation vendors and organizations, including Emerson, SAP, Siemens, Schneider Electric, Industrial Internet Consortium and others, to establish compatibility, specialized procedures and co-operation frameworks which protect industrial environments from existing and emerging threats, including highly targeted attacks.

Kaspersky has developed a portfolio of specialized solutions to address specific industrial cybersecurity market needs – Kaspersky Industrial CyberSecurity (KICS). Aimed to provide a holistic approach to industrial cybersecurity, Kaspersky Industrial CyberSecurity brings value on any stage of the customer's OT security process – from cybersecurity assessment and training to advanced technologies and incident response.

In 2018 Kaspersky was mentioned in Gartner report "Competitive Landscape: Operational Technology Security" as a representative vendor in 4 categories:

- OT Endpoint security,
- OT Network Monitoring and Visibility,
- Anomaly Detection, Incident Response and Reporting,
- OT Security Services⁹.

⁶ Arc Advisory: Kaspersky Moves Forward with Improved Cybersecurity Solutions, 2018

⁷ Forrester Research: The Total Economic Impact™ of Kaspersky Industrial CyberSecurity, April 2019. <https://www.kaspersky.com/forrester-tei-for-kics>

⁸ Gartner Market Guide for Operational Technology Security, July 2018

⁹ Gartner: Competitive Landscape: Operational Technology Security, October 2018

Read the full Gartner report:

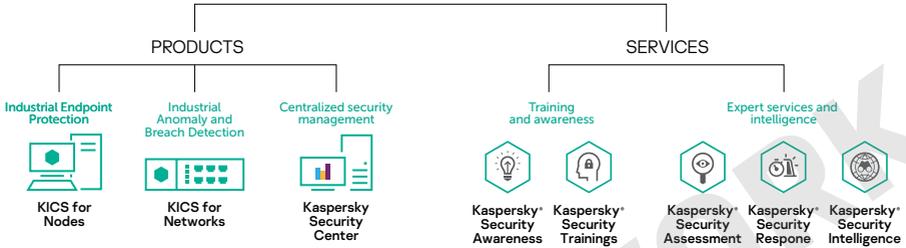
<https://ics.kaspersky.com/KICS-cited-in-Gartner-competitive-landscape-OT-security>



Kaspersky Industrial CyberSecurity components



Kaspersky Industrial CyberSecurity



Kaspersky Industrial CyberSecurity: services

Our suite of services forms an important part of the KICS portfolio – we provide the full cycle of security services, from industrial cybersecurity assessment to incident response.

Training and awareness

- Trainings:** Kaspersky offers training courses designed for cybersecurity experts and OT managers/ICS operators, e.g. during "Advanced Industrial Cybersecurity in Practice" training, participants gain an insight into relevant cyberthreats, their developmental trends and the most effective methods to protect against them. Skill-development courses also enable security professionals to further develop their skills in specific areas, including ICS Penetration Testing and Digital Forensics.
- Awareness Programs:** To increase awareness of relevant industrial cybersecurity issues, as well as fostering the skills needed to address and resolve them, Kaspersky offers training games for security managers and engineers. For example, Kaspersky Industrial Protection Simulation (KIPS) simulates real-world cyber attacks on industrial automation systems, demonstrating the main issues associated with industrial cybersecurity provision.

Expert services

- **Cybersecurity Assessment:** For organizations concerned about the potential operational impact of IT/OT security, Kaspersky provides minimally invasive industrial cybersecurity assessment. A crucial first step in establishing security requirements within the context of operational needs, this can also provide significant insight into cybersecurity levels, even without further deployment of protection technologies.
- **Threat Intelligence:** Up-to-date analytics, collected by Kaspersky experts, help to enhance customers' cyber protection from targeted industrial cyber attacks. Provided as TI feeds or reports, it meets specific customer needs by regional, industry and ICS software parameters.
- **Incident Response:** In the event of a cybersecurity incident, our experts will collect and analyze data, reconstruct the incident timeline, determine possible sources and motivation, and develop a remediation plan. In addition, Kaspersky offers a malware analysis service – within its framework, Kaspersky experts will categorize any malware sample provided, analyze its functions and behavior, and develop recommendations and a plan for its removal from your systems and for rolling back any malicious actions.

Kaspersky Industrial CyberSecurity: centralized security management

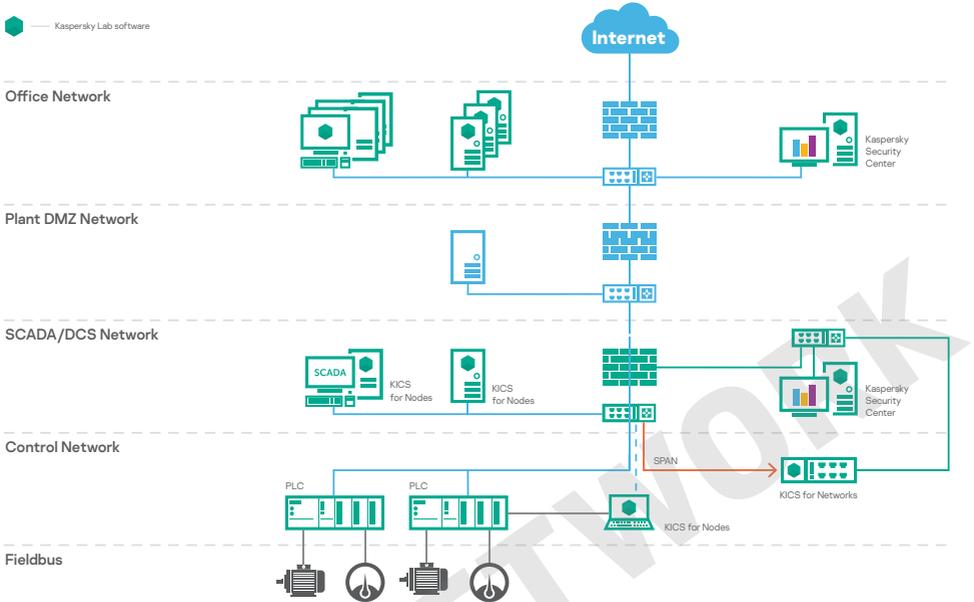
Kaspersky Security Center

To ensure the highest levels of protection from all attack vectors, security on the industrial floor should operate at both node and network levels. To ensure optimal control, ease of management and visibility, KICS – like all Kaspersky protection technologies – is controlled via a single management console, Kaspersky Security Center, enabling:

- Centralized management of security policies - the ability to set different protection settings for different nodes and groups.
- Facilitated testing of updates before roll-out onto the network, ensuring full process integrity.
- Role-based access aligned with security policies and urgent actions.

Kaspersky Security Center ensures ease of control and visibility not only for industrial layers at multiple sites, but across the surrounding business floors, as illustrated below.

Kaspersky Industrial CyberSecurity components deployment



Kaspersky Security Gateway

KICS can also send event-related data to other systems, such as SIEMs, MESs and Business Intelligence solutions. All detected events and anomalies are reported to 3rd party systems – including SIEM, mail, syslog servers and network management systems – through CEF 2.0, LEEF and Syslog protocols. As well as helping detect, counter and investigate cyber attacks, detailed industrial network monitoring supports predictive maintenance.

Integration with Human-Machine Interfaces (HMIs)

The solution can send security notifications directly to HMIs, providing industrial floor workers with specific information for immediate reaction to and escalation of the cyber incident.

Kaspersky Industrial CyberSecurity for Nodes

As an industrial endpoint protection software, KICS for Nodes was designed to specifically address threats at operator level in ICS environments. It secures ICS/SCADA servers, HMIs and engineering workstations from the various types of cyberthreat that can result from human factors, generic malware, targeted attacks or sabotage. KICS for Nodes is compatible with both the software and hardware components of industrial automation systems, such as SCADA, PLC and DCS.

Threats and risks factors	Kaspersky technologies
Unauthorized software execution	Whitelisting; prevention or detection-only (registration rather than blocking) modes
Malware	Advanced anti-malware signature-based detection engines; Cloud based detection engine, which uses Kaspersky public cloud (KSN) or private cloud (KPSN) File Integrity Monitor
Cryptors, including ransomware	Anti-cryptor
Network attacks	Host-based firewall Memory Protection (Exploit Prevention), Log Inspector
Unauthorized device connection	Device control
Unauthorized wireless connections	Wi-Fi network control
PLC programs spoof	PLC integrity check
ICS specifics – airgaps; false positives for ICS software/process, etc.	Trusted updates, which tested with software of leading industrial vendors; certification of product by leading industrial automation vendors.

Application whitelisting

The relatively static nature of ICS endpoint configurations means integrity control measures are significantly more effective than in dynamic, corporate networks. Integrity control technologies featured in KICS for Nodes include:

- Control of application installation and start-up according to whitelisting (best practice for industrial control networks) or blacklisting policies.

- Control of application access to operating system resources: files, folders, system registry etc.
- Control of all types of executable running in Windows environments, including .exe, .dll, .ocx, drivers, ActiveX, scripts, command line interpreters and kernel-mode drivers.
- Updating of application reputation data.
- Pre-defined and customer-defined application categories to manage controlled application lists.
- Fine-tuning of application controls for different users.
- Prevention or detection-only modes: blocking any application that isn't whitelisted or, in "watching" mode, allowing applications which aren't whitelisted to run, but registering this activity in Kaspersky Security Center, where it can be assessed.

Device control

Management of access to removable devices, peripherals and system busses, based on device category, family and specific device ID.

- Support for both whitelisting and blacklisting approaches.
- Granular, per-computer, per-user policy assignment to a single user/computer or group of users/computers.
- Prevention or detection-only mode.

Host-based firewall

Set-up and enforcement of network access policies for protected nodes such as servers, HMI or workstations. Key functionality includes:

- Control of access over restricted ports and networks.
- Detection and blocking of network attacks launched from internal sources, such as contractor laptops, which may introduce malware that attempts to scan and infect the host as soon as it joins the industrial network.

Wi-Fi network control

This enables the monitoring of any attempt to connect to unauthorized Wi-Fi networks. The Wi-Fi Control task is based on Default Deny technology, which implies automatically blocking connections to any Wi-Fi network "not allowed" in the task settings.

PLC integrity check

This enables additional control over PLC configurations via periodical checks against a selected, Kaspersky-secured server. The resulting checksums are compared against saved "Etalon" values, and any deviations are reported.

File Integrity Monitor

This feature is designed to track actions performed within specified files and folders in the monitoring scopes specified in the task settings. You can use it to detect file changes that may indicate a security breach on the protected server – like changes to SCADA projects stored on a SCADA server.

Advanced anti-malware protection

Kaspersky's best-in-class proactive malware detection and prevention technologies are adapted and re-designed to meet heavy resource consumption and system availability requirements. Our advanced anti-malware protection is designed to work effectively even in static or rarely updated environments. Kaspersky's anti-malware covers the full spectrum of technologies, including:

- Signature based malware detection.
- On-access and on-demand detection.
- In-memory (resident) detection.
- Ransomware detection via special Anti-Cryptor technology.
- Kaspersky Security Network (KSN) and Kaspersky Private Security Network (KPSN), enabling the ultimate malware detection service.

Trusted updates

To ensure Kaspersky security updates have no impact on the availability of the protected system, compatibility checks are performed prior to both database/component releases and process control system software/configuration updates. Potential resource consumption issues can be addressed through a number of different scenarios:

- Kaspersky performs database update compatibility tests with industrial automation vendor software on the Kaspersky test bed.
- Your IAV performs compatibility checks.
- Kaspersky checks security database updates for you: SCADA server, workstation and HMI images are integrated into Kaspersky's test bed.
- Kaspersky security updates are tested on your site and automated via Kaspersky Security Center.

Kaspersky Industrial CyberSecurity for Networks

As an industrial anomaly and breach detection software, KICS for Networks operates at the industrial communication protocol (Modbus, IEC stack, ISO, etc) layer, analyzing industrial traffic for anomalies via advanced DPI (Deep Packet inspection) technology. Network integrity control and IDS capabilities are also provided.

KICS for Networks also helps to solve non-security issues by asset discovery and network map visualization.

Threats and risks factors	Kaspersky technologies
Appearance of unauthorized network devices on industrial network	Network Integrity Control detects new / unknown devices Asset discovery, Network map
Appearance of unauthorized communications on industrial network	Network Integrity Control monitors communications between known/unknown devices Asset discovery, Network map
Malicious PLC commands by: <ul style="list-style-type: none"> • Operator or 3rd party (e.g. contractor) in error • Insider (fraud actions) • Attacker / Malware 	Technological DPI analyzes communications to and from PLCs and control of the commands and parameter values of the technological process.
Network attacks	An Advanced Intrusion Detection System identifies all known network attack patterns, including the exploitation of vulnerabilities in industrial software and hardware Events correlations
Lack of data for investigation and forensics	Forensics tools: monitoring and safe logging of suspicious industrial network events and detected attacks

Non-intrusive industrial network traffic inspection

KICS for Networks delivers passive network traffic monitoring of anomalies and network security while remaining invisible to potential attackers. Installation is as simple as enabling/configuring port mirroring; easy integration of the software/virtual or hardware appliance into existing industrial network equipment is achieved via the SPAN port of the existing switch or TAP device. KICS for Networks has a modular architecture – sensors can be deployed separately from a central control unit.

Industrial DPI for anomaly detection

KICS for Networks supplies industrial users with a trusted platform for monitoring process control command flow and telemetry data, enabling, among other things:

- Detection of any command which would reconfigure a PLC or change the PLC state.
- Control parameter changes in technology processes.
- Protection against outside threats while mitigating the risk of "advanced" insider interference from engineers, SCADA operators or other internal staff with direct access to systems.

Machine Learning

Our industrial DPI can not only be configured by a standard rule-based approach – it can also detect anomalies inside industrial processes via a powerful LSTM-based forecasting model. Machine learning capability brings industrial anomaly detection to a new level, making incident discovery possible in the most complex and frequently reconfigured industrial networks.

Network integrity control for security and assets inventory

KICS for Networks enables the identification of all Ethernet connected network assets – including SCADA servers, HMIs, engineering workstations, PLCs, IEDs and RTUs. All new or unknown devices and their communications are detected automatically. This gives security teams the capacity to develop their own reliable, secure network asset inventory, rather than using potentially vulnerable OT/IT asset management tools which are highly targeted by attackers.

Forensic tools

Kaspersky's solution gives industrial users a safe logging system, which provides tools for data analysis and digital forensics. The system also prevents any changes to ICS logs.

Additional services for Kaspersky Industrial CyberSecurity

Kaspersky Security Network

Kaspersky Security Network (KSN) is a cloud-based, complex distributed architecture dedicated to gathering and analyzing security threat intelligence from millions of nodes worldwide. KSN not only detects and blocks the newest threats and zero-day attacks, but also helps locate and blacklist online attack sources, providing reputational data for websites and applications.

All Kaspersky corporate solutions, including industrial solutions, can be connected to KSN if required. Key benefits include:

- Superior detection rates.
- Reduced reaction times – traditional signature-based responses take hours: KSN responds in about 40 seconds.
- Lower false positive rates.
- Reduced resource consumption for on-premise security solutions.

Kaspersky Private Security Network (KPSN)

For organizations that have very specific data privacy concerns, Kaspersky has developed the Kaspersky Private Security Network option. It provides almost all the advantages of KSN, but without sending any information whatsoever outside the network.

KPSN can be deployed within any organization's own data center, where in-house IT specialists retain complete control over it. Local KPSN installations can help meet country-specific compliance requirements or other industry-specific legislation.

Key KPSN functions:

- File and URL reputation services: MD5 hashes for files, regular expressions for URLs and malware behavior patterns are centrally stored, categorized and rapidly deployed to client
- Record Management System (RMS): Sometimes security software makes mistakes and incorrectly categorizes files or URLs as trusted/not trusted. RMS acts as a "false positives" deterrent, rectifying errors as well as continuously analyzing to improve quality
- Cloud-based intelligence and information.



Kaspersky Industrial CyberSecurity

Kaspersky Industrial CyberSecurity is a portfolio of technologies and services designed to secure operational technology layers and elements of your organization - including SCADA servers, HMIs, engineering workstations, PLCs, network connections and even engineers - without impacting on operational continuity and the consistency of industrial process.

Learn more at www.kaspersky.com/ics

All about ICS cybersecurity:
<https://ics-cert.kaspersky.com>

Cyber Threats News:
www.securelist.com

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* World Leading Internet Scientific and Technological Achievement Award at the 3rd World Internet Conference

** China International Industry Fair (CIIF) 2016 special prize