ISO/IEC 27033

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ISO/IEC 27033:2010-2023 — Information technology — Security techniques — **Network security** *(7 parts)*

ISO/IEC 27033 is a multi-part standard replacing the five-part ISO/IEC 18028. Read on for part 1 or jump forward to part 2, part 3, part 4, part 5, part 6 or part 7.

> *"The purpose of ISO/IEC 27033 is to provide detailed guidance on the security aspects of the management, operation and use of information system networks, and their inter-connections ..."*
>
> *[Introduction to ISO/IEC 27033-1:2015].*

ISO/IEC 27033 provides detailed guidance on implementing the network security controls that are introduced in ISO/IEC 27002. It applies to the security of networked devices and the management of their security, network applications/services and users of the network, in addition to security of information being transferred through communications links. It is aimed at network security architects, designers, managers and officers.

ISO/IEC 27033-1:2015 Information technology — Security techniques — Network security — **Part 1: Overview and concepts** *(second edition)*

- **Abstract:** part 1 *"provides an overview of network security and related definitions. It defines and describes the concepts associated with, and provides management guidance on, network security. (Network security applies to the security of devices, security of management activities related to the devices, applications/services, and end-users, in addition to security of the information being transferred across the communication links.) ... Overall it provides an overview of this International Standard and a "road map" to all other parts." [Source: ISO/IEC 27033-1:2015]*
- Revised and replaced ISO/IEC 18028 part 1.
- Provides a **roadmap** and **overview of the concepts and principles** underpinning the remaining parts of ISO/IEC 27033.

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ISO/IEC TS 27560

- **Objective:** *"to define and describe the concepts associated with, and provide management guidance on, network security. This includes the provision of an overview of network security and related definitions, and guidance on how to identify and analyse network security risks and then define network security requirements. It also introduces how to achieve good quality technical security architectures, and the risk, design and control aspects associated with typical network scenarios and network 'technology' areas (which are dealt with in detail in subsequent parts of ISO/IEC 27033). In effect it also provides an overview of the ISO/IEC 27033 series and a 'road map' to all other parts".*
- Provides a glossary of information security terms specific to networking.
- Provides guidance on a structured process to identify and analyse network security risks and hence define network security control requirements, including those mandated by relevant information security policies.
- Provides an overview of the controls *supporting* network technical security architectures and related technical controls, as well as non-technical controls plus other technical controls that are not solely related to network security (thus linking to ISO/IEC 27001, ISO/IEC 27002 and ISO/IEC 27005 plus other ISO27k standards as they are released).
- Explains good practices in respect of network technical security architectures, and the risk, design and control aspects associated with typical network scenarios and network technology areas (expanded in the remaining parts of ISO/IEC 27033 - see below).
- Briefly addresses the issues associated with implementing and operating network security controls, and the ongoing monitoring and reviewing of their implementation.
- Extends the security management guidelines provided in ISO/IEC TR 13335 and ISO/IEC 27002 *etc*. by detailing the specific operations and mechanisms needed to implement network security controls in a wider range of network environments, providing a bridge between general information security management issues and the specifics of implementing largely technical network security controls (*e.g*. firewalls, IDS/IPS, message integrity controls *etc*.).
- Mentions requirements such as non-repudiation and reliability in addition to the classical CIA triad (confidentiality, integrity and availability).
- Somehow manages to provide a reasonably technical overview of network security with barely any reference to the OSI network stack!
- **Status:** the *first* edition of part 1 was published in **2009**. The *second* edition was published in **2015** and confirmed unchanged in 2021.

ISO/IEC 27033-2:2012 Information technology — Security techniques — Network security — **Part 2: Guidelines for the design and implementation of network security** *(first edition)*

- **Abstract:** part 2 *"gives guidelines for organizations to plan, design, implement and document network security." [Source: ISO/IEC 27033-2:2012]*
- Revised and replaced ISO/IEC 18028 part 2.
- Scope: planning, designing, implementing and documenting network security.
- **Objective:** *"to define how organisations should achieve quality network technical security architectures, designs and implementations that will ensure network security appropriate to their business environments, using a consistent approach to the planning, design and implementation of network security, as relevant aided by the use of models/frameworks. (In this context, a model/framework is used to outline a representation or description showing the structure and high level workings of a type of technical security architecture/design)"*.
- Defines a **network security architecture** for providing end-to-end network security. The architecture can be applied to various kinds of networks where end-to-end security is a concern and independently of the network's underlying technology.
- Serves as a foundation for detailed recommendations on end-to-end network security.
- Covers risks, design, techniques and control issues.
- Refers to other parts of ISO/IEC 27033 for more specific guidance.
- **Status:** the *first* edition of **part 2 was published in 2012** and confirmed unchanged in 2018.

ISO/IEC 27033-3:2010 Information technology — Security techniques — Network security — **Part 3: Reference networking scenarios — threats, design techniques and control issues** *(first edition)*

- **Abstract:** part 3 *"describes the threats, design techniques and control issues associated with reference network scenarios. For each scenario, it provides detailed guidance on the security threats and the security*

ISO/IEC 27561
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ISO/IEC TR 27563
ISO/IEC 27564
ISO/IEC 27565
ISO/IEC 27566
ISO/IEC 27568
ISO/IEC 27569
ISO/IEC TS 27570
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ISO/IEC 27706
ISO 27799

design techniques and controls required to mitigate the associated risks. Where relevant, it includes references to ISO/IEC 27033-4 to ISO/IEC 27033-6 to avoid duplicating the content of those documents. The information in ISO/IEC 27033-3:2010 is for use when reviewing technical security architecture/design options and when selecting and documenting the preferred technical security architecture/design and related security controls, in accordance with ISO/IEC 27033-2. The particular information selected (together with information selected from ISO/IEC 27033-4 to ISO/IEC 27033-6) will depend on the characteristics of the network environment under review, i.e. the particular network scenario(s) and 'technology' topic(s) concerned. Overall, ISO/IEC 27033-3:2010 will aid considerably the comprehensive definition and implementation of security for any organization's network environment." [Source: ISO/IEC 27033-3:2010]

- **Objective:** *"to define the specific risks, design techniques and control issues associated with typical network scenarios" [Source: ISO/IEC 27033-1]*.
- Discusses threats, specifically, rather than all the elements of risk.
- Refers to other parts of ISO/IEC 27033 for more specific guidance.
- **Status**: the *first* edition of **part 3 was published in 2010** and confirmed unchanged in 2018.

ISO/IEC 27033-4:2014 Information technology — Security techniques — Network security — **Part 4: Securing communications between networks using security gateways** *(first edition)*

- **Abstract:** part 4 *"gives guidance for securing communications between networks using security gateways (firewall, application firewall, Intrusion Protection System, etc.) in accordance with a documented information security policy of the security gateways, including:*
  1. *identifying and analysing network security threats associated with security gateways;*
  2. *defining network security requirements for security gateways based on threat analysis;*
  3. *using techniques for design and implementation to address the threats and control aspects associated with typical network scenarios; and*
  4. *addressing issues associated with implementing, operating, monitoring and reviewing network security gateway controls." [Source: ISO/IEC 27033-4:2014]*
- Revises ISO/IEC 18028 part 3 and possibly ISO/IEC 18028 part 4.
- Provides an overview of **security gateways** through a description of different architectures.
- Guideline on securing communications between networks through gateways, firewalls, application firewalls, Intrusion Protection System [*sic*] *etc*. in accordance with a policy, including identifying and analysing network security threats, defining security control requirements, and designing, implementing, operating, monitoring and reviewing the controls.
- Outlines how security gateways analyse and control network traffic through:
  - Packet filtering;
  - Stateful packet inspection;
  - Application proxy (application firewalls);
  - **N**etwork **A**ddress **T**ranslation;
  - Content analysis and filtering.
- Guides the selection and configuration of security gateways, choosing the right type of architecture for a security gateway which best meets the security requirements of an organisation.
- Refers to various kinds of **firewall** as examples of security gateways. [Firewall is a commonplace term of art that is curiously absent from ISO/IEC 27000, ISO/IEC 27002 and is not defined explicitly in this standard either.]
- **Status:** the *first* edition of part 4 was published in **2014** and confirmed unchanged in 2019.

ISO/IEC 27033-5:2013 Information technology — Security techniques — Network security — **Part 5: Securing communications across networks using Virtual Private Networks (VPNs)** *(first edition)*

- **Abstract:** part 5 *"gives guidelines for the selection, implementation, and monitoring of the technical controls necessary to provide network security using Virtual Private Network (VPN) connections to interconnect networks and connect remote users to networks." [Souce: ISO/IEC 27033-5:2013]*

- Revised ISO/IEC 18028 part 5.
- **Objective:** see abstract above!
- Extends the IT security management guidelines of ISO/IEC TR 13335 by detailing the specific operations and mechanisms needed to implement network security safeguards and controls in a wider range of network environments, providing a bridge between general IT security management issues and network security technical implementations.
- Provides guidance for securing remote access over public networks.
- Gives a high-level, incomplete assessment of the threats to VPNs (*i.e.* it mentions the threats of intrusion and denial of service but not unauthorized monitoring/interception, traffic analysis, data corruption, insertion of bogus traffic, various attacks on VPN end points, malware, masquerading/identity theft, insider threats *etc*., although these are mentioned or at least hinted-at later under security requirements).
- Introduces different types of remote access including protocols, authentication issues and support when setting up remote access securely.
- Intended to help network administrators and technicians who plan to make use of this kind of connection or who already have it in use and need advice on how to set it up securely and operate it securely.
- **Status:** the *first* edition of part 5 was published in **2013** and confirmed unchanged in 2019.

ISO/IEC 27033-6:2016 Information technology — Security techniques — Network security — **Part 6: Securing wireless IP network access** *(first edition)*

- **Abstract:** part 6 *"describes the threats, security requirements, security control and design techniques associated with wireless networks. It provides guidelines for the selection, implementation and monitoring of the technical controls necessary to provide secure communications using wireless networks. The information in [part 6] is intended to be used when reviewing or selecting technical security architecture/ design options that involve the use of wireless network in accordance with ISO/IEC 27033-2. Overall, ISO/ IEC 27033-6 will aid considerably the comprehensive definition and implementation of security for any organization's wireless network environment. It is aimed at users and implementers who are responsible for the implementation and maintenance of the technical controls necessary to provide secure wireless networks." [Source: ISO/IEC 27033-6:2016]*
- **Objective:** *"to define the specific risks, design techniques and control issues for securing IP wireless networks. [Part 6] is relevant to all personnel who are involved in the detailed planning, design and implementation of security for wireless networks (for example, network architects and designers, network managers, and network security officers)".*
- This is a generic wireless network security standard offering basic advice for WiFi, Bluetooth, 3G and other wireless networks.
- The standard uses the term "wire line network", more commonly known as a wired network.
- The standard repeatedly refers to "access network", a curious term that is not defined (aside from Radio Access Network). It seems to mean "network" but without a definition, we cannot be sure.
- The standard indicates that encryption is an *integrity* control, whereas normally other cryptographic controls and protocols provide the integrity functions, while encryption provides *confidentiality.*
- Similarly to Part 7, this part lists a number of "threats" which are, in fact, attack modes or incident scenarios. The list would, I feel, have been more useful if the standard systematically addressed each of them, explaining how certain controls mitigate them. It doesn't.
- **Status:** the *first* edition of part 6 was published in **2016** and confirmed unchanged in 2021.

ISO/IEC 27033-7:2023 Information technology — Network security — **Part 7: Guidelines for network virtualization security**

- **Abstract:** *"[ISO/IEC 27033-7] aims to identify security risks of network virtualization and proposes guidelines for the implementation of network virtualization security. Overall, [ISO/IEC 27033-7] intends to considerably aid the comprehensive definition and implementation of security for any organization's virtualization environments. It is aimed at users and implementers who are responsible for the implementation and maintenance of the technical controls required to provide secure virtualization environments." [Source: ISO/IEC 27033-7:2023]*
- This standard started out as ISO/IEC 5188 before being absorbed into ISO27k.
- The *first* edition of part 7 was published in **2023**.
- The standard outlines some "security threats" or "security issues" - generic examples of types of incident (such as "Insider attacks: an administrator tampers image or changes security configurations") but does not

explain which information security controls address the identified “security threats/issues”, nor conversely which information risks the suggested information security controls are intended to mitigate: there is no cross-referencing between the two, hence it is unclear how users are meant to identify, select or prioritise whichever controls are most appropriate for their situations. So much for the “implementation guidelines”!

Personal comments

At present, the **ISO/IEC** 27033 standards are largely (entirely?) concerned with digital data networks, but there are other kinds of networks - such as business networks, social networks, professional networks, criminal networks and socio-political/cultural networks - all with differing risks and security concerns. So, should the **ISO/IEC** 27033 set be extended in some way? If so, how?

It is not exactly obvious what kinds of guidance might usefully be offered in these other areas - in fact, formally speaking, it is not even entirely clear what ‘networks’ are. Anyway, that’s something to bear in mind. SC 27, meanwhile, tends to stick to the knitting *i.e.* IT/cyber security, in accordance with its defined scope. Having said that, I feel the information risk and security aspects of industrial shop-floor **O**perational **T**echnology networks are inadequately covered by current ISO/IEC 27033 standards, a significant omission. The networking protocols, risks and controls vary, while the gradual convergence of IT and OT is bound to affect network security in both domains.

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