BS ISO/IEC 27033-7:2023

BSI Standards Publication

Information technology — Network security

Part 7: Guidelines for network virtualization security

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The UK participation in its preparation was entrusted to Technical Committee IST/33/4, Security Controls and Services.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2023

ISBN 978 0 539 15674 4

ICS 35.030

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2023.

Amendments/corrigenda issued since publication

Date	Text affected

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INTERNATIONAL STANDARD

ISO/IEC 27033-7

First edition
2023-11

Information technology – Network security —

Part 7: Guidelines for network virtualization security

Technologies de l'information — Sécurité des réseaux —

Partie 7: Lignes directrices pour la sécurité de la virtualisation des réseaux

Reference number
ISO/IEC 27033-7:2023(E)

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Published in Switzerland

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 27, *Information security, cybersecurity and privacy protection*.

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Introduction

The purpose of this document is to address the key challenges and risks of network virtualization security. Network virtualization includes virtual network infrastructure, virtual network function, virtual control and resource management. This document aims to:

1) identify security risks of network virtualization;

2) propose a network virtualization security model;

3) propose security guidelines for virtual network infrastructure, virtual network function, virtual control and resource management.

This document intends to help stakeholders in understanding the main characteristics of network virtualization security. For example, this document can help software and hardware suppliers to securely design and develop products that implement network virtualization, and help operators to evaluate the security of these products and deploy them securely for network services. By proposing security guidelines, this document aims to help the industry to improve system security that is built on network virtualization technology.

The target audience can include the network equipment vendors, network operators, internet service providers and software service providers.

With the rapid development of IT technologies such as cloud computing, IT systems and communication systems are increasingly evolving with the adoption of virtualization technology. Virtualization enables systems to have high agility, flexibility and scalability with low cost, but at the same time, introduces many security challenges.

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Information technology – Network security —

Part 7: Guidelines for network virtualization security

1 Scope

This document aims to identify security risks of network virtualization and proposes guidelines for the implementation of network virtualization security.

Overall, this document 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.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
network virtualization
technology that enables the creation of logically isolated network partitions over shared physical network infrastructures so that multiple heterogeneous virtual networks can simultaneously coexist over the shared infrastructures

Note 1 to entry: Network virtualization allows the aggregation of multiple resources and makes the aggregated resources appear as a single resource.

[SOURCE: ISO/IEC TR 29181-1:2012, 3.3]

3.2
network functions virtualization
NFV
technology that enables the creation of logically isolated network partitions over shared physical networks so that heterogeneous collections of multiple virtual networks can simultaneously coexist over the shared networks

Note 1 to entry: This includes the aggregation of multiple resources in a provider and appearing as a single resource.

[SOURCE: ISO/IEC TR 22417:2017, 3.8]

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3.3
software-defined networking
set of techniques that enables to directly program, orchestrate, control and manage network resources, which facilitates the design, delivery and operation of network services in a dynamic and scalable manner

[SOURCE: ITU-T Y.3300:2014, 3.2.1]

3.4
virtual machine
virtual data processing system that appears to be at the disposal of a particular user, but whose functions are accomplished by sharing the resources of a real data processing system

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.4564]

3.5
container
isolated execution environment for running software that uses a virtualized operating system kernel

[SOURCE: ISO/IEC 22123-1:2023, 3.12.4]

3.6
orchestrator
tool that enables DevOps personas or automation working on their behalf to pull images from registries, deploy those images into *containers* (3.5), and manage the running containers

[SOURCE: NIST SP 800-190]

3.7
service function chain
ordered set of abstract functions and ordering constraints that are applied to packets and/or frames and/or flows selected as a result of classification

[SOURCE: IETF RFC 7665, modified — removed "a service function chain defines an" at the beginning of the definition and replaced "must" with "are" in the definition.]

4 Abbreviated terms

The following abbreviated terms apply to this document.

5G	the fifth generation mobile network
AMF	access and mobility management function
API	application programming interface
AUSF	authentication server function
CDN	content delivery network
CIS	centre for internet security
DoS	denial of service
DDoS	distributed denial of service
HMAC	hash-based message authentication code
IDS	intrusion detection system

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