PD ISO/TS 12812-2:2017

BSI Standards Publication

Core banking — Mobile financial services

Part 2: Security and data protection for mobile financial services

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

National foreword

This Published Document is the UK implementation of ISO/TS 12812-2:2017.

The UK participation in its preparation was entrusted to Technical Committee IST/12, Financial services.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017.
Published by BSI Standards Limited 2017

ISBN 978 0 580 82718 1
ICS 03.060

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 April 2017.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

TECHNICAL SPECIFICATION

ISO/TS 12812-2

First edition
2017-03

Core banking — Mobile financial services —

Part 2: Security and data protection for mobile financial services

Opérations bancaires de base — Services financiers mobiles —

Partie 2: Sécurité et protection des données pour les services financiers mobiles

Reference number
ISO/TS 12812-2:2017(E)

Documents
Document Sharing Hub

© ISO 2017

Full document details: PD ISO/TS 12812-2:2017

COPYRIGHT PROTECTED DOCUMENT

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **2**

4 Abbreviated terms **4**

5 Summary of the technical nature of the clauses **5**

6 Security management considerations **7**
6.1 General 7
6.2 Three-layer model to manage security for mobile financial services 8
6.2.1 Process layer 9
6.2.2 Application layer 10
6.2.3 Infrastructure layer 10

7 Security principles and minimum requirements for mobile financial services **11**
7.1 Security architecture aspects to be considered 11
7.2 Mobile financial services hardening techniques overview 13
7.2.1 General 13
7.2.2 Mobile device hardening techniques overview 13
7.2.3 Wireless networks hardening techniques overview 13
7.2.4 Secure remote management of mobile device components using OTA 14
7.2.5 Mobile financial applications hardening techniques 14
7.2.6 Platform security services 15
7.2.7 Application level security services for mobile financial applications 16
7.2.8 Application management security services 17
7.3 Minimum set of security requirements for mobile financial services 17
7.3.1 General 17
7.3.2 Remote MFS access requirements 17
7.3.3 Transaction processing requirements 18
7.3.4 Protection of sensitive data 19
7.3.5 Mobile device requirements 20
7.3.6 Customer education 20
7.4 Minimum set of security requirements for mobile application management 21
7.4.1 Customer enrolment and provisioning requirements 21
7.4.2 Key management 21
7.4.3 Mobile financial service provider and trusted service manager exchanges 22
7.4.4 Application downloading 22
7.4.5 Application deactivation 22
7.5 Summary: Requirements for security services for mobile financial services 22

8 Security requirements for cryptographic components used for MFS **23**
8.1 Mobile device secure environments 23
8.1.1 Mobile Device requirements for MFS 23
8.1.2 Software-based secure environment 24
8.1.3 Trusted execution environment (TEE) 24
8.1.4 Secure element requirements 26
8.1.5 Secure element requirements for digital signature services 28
8.2 Security requirements for cryptographic modules used for MFS 30
8.2.1 General 30
8.2.2 List of requirements for cryptographic hardware modules 30
8.2.3 Requirements for cryptographic software modules 31

9 Security evaluation and certification aspects **31**
9.1 General recommendation 31

Documents
Document Sharing Hub

© ISO 2017 – All rights reserved

Full document details: PD ISO/TS 12812-2:2017

9.2 Cryptographic modules 31
9.3 Software modules 32
9.4 Interoperability of security certifications 32
9.5 Guidance for TEE security evaluation and certification 33

10 Security requirements for mobile proximate payments 33
10.1 General 33
10.2 Common security requirements 34
10.2.1 Integrity of sensitive data and applications at rest 34
10.2.2 Authentication 34
10.2.3 Data protection in transit 34

11 Security requirements for mobile remote payments 34
11.1 General 34
11.2 Security requirements 35
11.2.1 Authentication 35
11.2.2 Proof of consent 35
11.2.3 Payment gateway processing requirements 35

12 Security requirements for mobile banking 35
12.1 General 35
12.2 Authentication considerations 36
12.3 Security requirements 37

13 Electronic money 37
13.1 General 37
13.2 Anonymity requirements 37
13.3 Security requirements 37

14 Data protection requirements 38
14.1 General considerations and legal framework for compliance 38
14.2 Requirements and recommendations for data protection 39
14.2.1 Requirements 39
14.2.2 Recommendations for data protection 39
14.3 Privacy assessment 39

Annex A (informative) **Risk analysis guidelines 40**

Annex B (informative) **Mobile financial system implementation of Know-Your-Customer requirements 45**

Annex C (informative) **Cryptographic mechanisms for mobile financial services 46**

Annex D (informative) **Vulnerabilities and attacks on mobile financial services 51**

Bibliography 55

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 68, *Financial services*, Subcommittee SC 7, *Core banking*.

A list of all the parts in the ISO 12812 series can be found on the ISO website.

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

Introduction

ISO 12812 is made up of ISO 12812-1, an International Standard, and ISO/TS 12812-2 to ISO/TS 12812-4, published as Technical Specifications addressing interoperable and secure systems for the provision, operation and management of Mobile Financial Services (MFS).

This document is intended to assist MFS developers and MFS providers (MFSPs) to evaluate and select security mechanisms for an MFS to be managed according to a pre-established security policy. It is also important for users of MFS to understand how security requirements and considerations come into play in the mobile environment.

Security is a central requirement for any MFS. Institutions increasingly seek to mitigate the risk of fraud in order to protect their customers and hence their own business. Security objectives focus on risk mitigation of identified threats against the integrity and confidentiality of data. Any sustainable MFS business model relies on security and fraud prevention. Consequently, the MFSP needs to define the confidentiality and availability of data prior to implementing any MFS.

Mobile technology has security-specific concerns due to the proliferation and ease of availability of mobile devices and the observed hacking of mobile applications. The experience with traditional card payments is different than that with the mobile device and the wireless channel and requires that risks and controls be reassessed and re-implemented where necessary. Hence, MFSPs require a common understanding of the risks faced by the ecosystem and the suitability of existing security standards (architecture, devices and mechanisms) to address them. This document assumes that when the MFSP is deciding on the security policy to be implemented, the principle of proportionality applies. In other words, security countermeasures should be proportional to the potential risk of financial and reputational damage of a particular MFS.

MFS are initiated from a mobile device which is able to support different wireless communication protocols for different modes of operation. The mobile device can leverage various technologies to deliver MFS, including but not limited to near-field communications in conjunction with the presence of an appropriate secure environment (e.g. SE, TEE, software with supplementary security controls) resident in the mobile device or accessible from a remote/cloud-based back-office. Both types of technology offer different methods for securing financial data, financial applications, and personal data. In order to define security requirements for MFS, this document differentiates between:

— **a proximate mode of operation**, appropriate for various forms of payments where the mobile device directly communicates with another mobile device (i.e. a payee's mobile device) or a payment terminal located at a merchant. Proximate payments are defined as those occurring where the payer and the payee are physically present in the same location (see ISO 12812-1).

— **a mobile remote mode of operation**, where the mobile device uses a mobile communication network which enable MFS to operate where the payer and the payee are not physically located in the same place (see ISO 12812-1). In remote mode, the wireless communication channel is established according to a specific set of standard protocols (e.g. GSM, CDMA, WiFi) which includes authentication procedures to grant access to the network services. A second authentication process of the mobile financial application enables the connection with the corresponding peer application in a remote platform.

This document analyses the various security issues that may arise from the choice of platform and technologies for the operation of MFS. This document also identifies various mobile malware vulnerabilities (e.g. worms, viruses, trojans) specific to mobile devices.

ISO/TS 12812-2 objectives include

a) defining the minimum security requirements, recommendations and guidelines as appropriate,

b) facilitating a generic security framework for the provision and execution of MFS with sufficient flexibility to accommodate different security policies,

c) establishing a generic model for managing security of MFS,

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

d) providing references for implementers to use in evaluating risks of MFS, and

e) identifying security management practices for the operation of MFS, including reference to specific national legal requirements to combat criminal activities (e.g. anti-money laundering) and to enhance data security through the use of proven cryptographic methods.

This document is structured as follows.

Clause 5 categorizes the technical content of the clauses of the document as types of materials: descriptive, recommendations or requirements.

Clause 6 introduces the concept of security management, addressing all different aspects of MFS security including risk management. Insight into risk analysis is found in Annex A.

Clause 7 describes the minimum set of security requirements for MFS, starting with challenges and technologies for a secure mobile application system design.

Clause 8 sets out requirements for those components specifically designed to create a secure environment in the mobile device, as well as cryptographic modules used for MFS transaction processing.

Clause 9 provides insight and sets out requirements for secure evaluation and certification methods.

Clause 10 through Clause 12 discuss more in depth the concepts outlined in Clause 7, by providing further requirements for security services needed to balance the vulnerabilities and threats of different wireless networks both in proximate and remote modes.

Clause 13 is specific to electronic money security requirements.

Clause 14 provides information relevant for selecting countermeasures to mitigate the legal risks of infringement of data protection laws.

Annex A focus on risk analysis including principles to establish a security management program for MFS.

Annex B provides insight into regulatory constraints that are taken into account when designing and/or operating an MFS.

Annex C is a list of ISO recommended cryptographic standards and implementations to design the security services set out in this document.

Annex D elaborates on vulnerabilities and threats for different communication channels used for MFS.

For additional information on the security of mobile payments, please refer to the Bibliography.

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

Documents
Document Sharing Hub

Core banking — Mobile financial services —

Part 2: Security and data protection for mobile financial services

1 Scope

This document describes and specifies a framework for the management of the security of MFS. It includes

— a generic model for the design of the security policy,

— a minimum set of security requirements,

— recommended cryptographic protocols and mechanisms for mobile device authentication, financial message secure exchange and external authentication, including the following:

  a) point-to-point aspects to consider for MFS;

  b) end-to-end aspects to consider;

  c) security certification aspects;

  d) generation of mobile digital signatures;

— interoperability issues for the secure certification of MFS,

— recommendations for the protection of sensitive data,

— guidelines for the implementation of national laws and regulations (e.g. anti-money laundering and combating the funding of terrorism (AML/CFT), and

— security management considerations.

In order to avoid the duplication of standardization work already performed by other organizations, this document will reference other International Standards as required. In this respect, users of this document are directed to materials developed and published by ISO/TC 68/SC 2 and ISO/IEC JTC 1/SC 27.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9564 (all parts), *Financial services — Personal Identification Number (PIN) management and security*

ISO 11568, *Financial services — Key management (retail)*

ISO 12812-1, *Core banking — Mobile financial services — Part 1: General framework*

ISO/TS 12812-3, *Core banking — Mobile financial services — Part 3: Financial application lifecycle management*

ISO 13491 (all parts), *Financial services — Secure cryptographic devices (retail)*

ISO 19092, *Financial services — Biometrics — Security framework*

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

ISO 22307, *Financial services — Privacy impact assessment*

ISO/IEC 15408 (all parts), *Information technology — Security techniques — Evaluation criteria for IT security*

ISO/IEC 19790, *Information technology — Security techniques — Security requirements for cryptographic modules*

ISO/IEC 29192 (all parts), *Information technology — Security techniques — Lightweight cryptography*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12812-1 and the following apply.

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

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

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

3.1
application isolation
security property of the operating system whereby applications are isolated from one another both during execution and in terms of data they store and/or access

3.2
attack pattern
abstracted approach utilized to attack an MFS asset

3.3
attack potential
measurement of the effort to be expended in attacking an MFS asset, expressed in terms of an attacker's expertise, resources and motivation

3.4
attack surface
set of attack points that an attacker can use in order to enter or capture data in an information system

3.5
certificate revocation list
signed data structure containing a time-stamped list of revoked certificates implemented in public key infrastructures

3.6
common criteria
security evaluation methodology for Information Technology components standardized by ISO/IEC 15408

3.7
cryptographic module
set of hardware, software and/or firmware that implements approved security functions

3.8
data breach
loss of control, compromise, unauthorized disclosure, unauthorized acquisition or access where persons other than the legitimate ones have access to personally identifiable information (PII) or any other sensitive information (e.g. authentication data, keys)

3.9
end-to-end security
data encrypted at the source so that only the final recipient has access to the data

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

3.10
external authentication
process by which a mobile payment application authenticates an entity

3.11
information security management system
part of the overall management system, based on a business risk approach, used to establish, implement, operate, monitor, review, maintain and improve information security

3.12
mobile device integrity
absence of unauthorized or unintended changes in the hardware, firmware and software of a mobile device

3.13
personalization
process of storing on the mobile device the user application data required to execute an MFS

3.14
point-to-point encryption
data encrypted between two nodes, where at least one of the two nodes is neither the source nor the final recipient of the data

3.15
protection profile
set of security requirements that are specified with the aim of countering identified threats in a particular environment

3.16
pseudo-anonymity
security traits whereby the true identity of the person (e.g. payer, payee) is masked

3.17
rooting
manipulation by which the user of a mobile device gains access to privileged operating system administration rights

3.18
secure element provider security domain
confined physical and/or logical unit within the secure element where a security policy under the control of the secure element provider is applied

3.19
security controls
management, operational and technical controls (i.e. safeguards or countermeasures) prescribed for an information system to protect the confidentiality, integrity, and availability of the system and its information

3.20
security encapsulation
layered security where one protocol (e.g. PIN encryption) is embedded inside another (e.g. SSL,TLS)

3.21
sensitive data
data which is required to be protected by security controls for a given MFS

EXAMPLE Authentication credentials, payment and banking credentials, cryptographic keys.

3.22
session key
temporary cryptographic key used to protect data for the current session only

Documents
Document Sharing Hub

© ISO 2017 – All rights reserved

Full document details: PD ISO/TS 12812-2:2017

3.23
time stamp
security mechanism providing the digital proof that an electronic document or message was created or signed before a certain time

3.24
trusted mobile device
mobile device that has been certified to conform to certain industry practices that can support a known risk profile (e.g. generation of electronic signatures)

3.25
unlinkability
security property of a protocol that protect it against an unauthorized party being able to link two executions of the protocol to a specific mobile device

4 Abbreviated terms

AES	Advanced Encryption Standard
AML	Anti-Money Laundering
CBC	Cipher Block Chaining
CC	Common Criteria
CSP	Critical Security Parameters
CVV	Card Verification Value
ECC	Elliptic Curve Cryptography
GCM	Gallois Counter Mode
HCE	Host Card Emulation
HMAC	Keyed-Hash Message Authentication Code
HSM	Hardware Security Module
IMSI	International Mobile Subscriber Identity
ISMS	Information Security Management system
KEK	Key Encryption Key
MAC	Message Authentication Code
MFS	Mobile Financial Service
MFSP	Mobile Financial Service Provider
OEM	Original Equipment Manufacturer
OS	Operating System
OSI	Open System Interconnection
OTA	Over the Air
PCD	Proximity Coupling Device

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

PCI-DSS	Payment Cared Industry Data Security Standard
PET	Privacy Enhancing Technology
PEF	Privacy Enhancing Feature
PII	Personally Identifiable Information
PIN	Personal Identification Number
RSA	Rivest Shamir Adleman
RNG	Random Number Generator
SE	Secure Element
SMS	Short Message Service
SMSC	Short Message Service Center
SSL	Secure Sockets Layer
TEE	Trusted Execution Environment
TLS	Transport Layer Security
TSM	Trusted Service Manager
USSD	Unstructured Supplementary Service Data
UVM	User Verification Method

5 Summary of the technical nature of the clauses

Table 1 describes the technical nature of the clauses, classified as requirement, recommendation or descriptive material.

Table 1 — Classification of the technical nature of the clauses

Clause	Title	Descriptive	Requirements	Recommendations
Clause 6 Security management considerations				
6.2 Three-layer model to manage security for mobile financial services				
6.2.1	Process layer		X	
6.2.2	Application layer		X	
6.2.3	Infrastructure layer		X	
Clause 7 Security principles and minimum requirements for mobile financial services				
7.1	Security architecture aspects to be considered			X
7.2 Mobile financial services hardening techniques				
7.2.2	Mobile device hardening techniques overview	X		
7.2.3	Wireless networks hardening techniques overview	X		
7.2.4	Secure remote management of mobile device components using OTA		X	
7.2.5	Mobile financial applications hardening techniques	X		

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub
Full document details: PD ISO/TS 12812-2:2017

Table 1 *(continued)*

Clause	Title	Descriptive	Requirements	Recommendations
7.2.6	Platform security services	X		
7.2.7	Application-level security services for mobile financial applications			X
7.2.8	Application management security services			X
7.3 Minimum set of security requirements for mobile financial services				
7.3.2	Remote mobile financial services access requirements		X	
7.3.3	Transaction processing requirements		X	
7.3.4	Protection of sensitive data		X	
7.3.5	Mobile device requirements		X	
7.3.6	Customer education			X
7.4 Minimum set of security requirements for mobile application management				
7.4.1	Customer enrolment and provisioning requirements		X	
7.4.2	Key management		X	
7.4.3	Mobile financial service provider and trusted service manager exchanges		X	
7.4.4	Application downloading		X	
7.4.5	Application deactivation		X	
7.5	Summary: Requirements for security services for mobile financial applications and data	X		
Clause 8 Security requirements for cryptographic components used for MFS				
8.1 Mobile device secure environments				
8.1.1	Mobile device requirements for MFS		X	
8.1.2	Software based secure environment		X	
8.1.3	Trusted Execution Environment (TEE)		X	
8.1.4	Secure element requirements		X	
8.1.5	Secure element requirements for digital signature service		X	
8.2 Security requirements for cryptographic modules used for MFS				
8.2.1	List of requirements for cryptographic hardware modules		X	
8.2.2	Requirements for cryptographic software modules		X	
Clause 9 Security evaluation and certification aspects				
9.1	General recommendation			X
9.2 Common security evaluation requirements				
9.3	Security evaluation of the TEE		X	
9.4 Security evaluation and certification of secure elements				
9.5 Security evaluation of cryptographic hardware and software modules				
Clause 10 Security requirements for mobile proximate payments				
10.2 Common security requirements				
10.2.1	Integrity of sensitive data and applications at rest		X	
10.2.2	Authentication		X	
10.2.3	Data protection at rest		X	

© ISO 2017 – All rights reserved

Documents Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

Table 1 *(continued)*

Clause	Title	Descriptive	Requirements	Recommendations
Clause 11 Security requirements for mobile remote payments				
11.2 Security requirements				
11.2.1	Authentication		X	
11.2.2	Proof of consent		X	
11.2.3	Payment gateway processing requirements		X	
Clause 12 Security requirements for mobile banking				
12.2	Authentication considerations	X		
12.3	Security requirements		X	
Clause 13 Electronic money security properties				
13.2	Anonymity requirements		X	
13.3	Security requirements		X	
Clause 14 Data protection requirements				
14.1	General considerations and legal framework for compliance			X
14.2	Requirements and recommendations for data protection			
14.2.1	Requirements		X	
14.2.2	Recommendations for data protection			X
14.3	Privacy assessment			X
Annex A Risk analysis guidelines		X		
Annex B Mobile financial system implementation of Know-Your-Customer requirements		X		
Annex C Cryptographic mechanisms for mobile financial services				X
Annex D Vulnerabilities and attacks on mobile financial services		X		

6 Security management considerations

6.1 General

Clause 6 establishes a framework for the management of the security of MFS. MFSPs are very sensitive to the possibility of a loss of reputation and therefore strive to ensure that MFS are secure for their customers. Thus, all MFSPs take care of managing their customer relationships and maintaining the integrity and security of their MFS lest they suffer reputational, monetary, and legal damages that can result from data compromise and fraud.

NOTE Refer to Annex A for further details on risk analysis.

It is thus fundamental to establish a security policy for the MFS program in which

— roles and responsibilities are assigned,

— security issues are governed and incentive exists to implement and maintain security best practices,

— transactions are secured and reliable,

— privacy is ensured, and

— security management systems of the involved parties are comparable and credible.

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub
Full document details: PD ISO/TS 12812-2:2017

One of the objectives of this document is to provide implementers, with both requirements and recommendations to establish a security policy for the MFS related operations. According to ISO 12812-1:2017, Clause 5, the objective of the standard is technical interoperability. This document provides with references to ISO cryptographic standards, whose implementation facilitates the interoperability of protocols and applications for MFS.

6.2 Three-layer model to manage security for mobile financial services

This document establishes a generic model for security management to reduce the potential risk associated with MFS. This model is based on the implementation of security controls on three different functional layers required to provide MFS, namely the (1) process layer, the (2) application layer and (3) the infrastructure layer. MFSPs are responsible to identify and mitigate the specific risks associated with each layer.

— The process layer is made up of the organization and associated policies designed by the MFS program and implemented by the MFSP in order to minimize the risks during the MFS.

— The application layer refers to the distributed software under the direct control of the MFSP or of its partners embedded in the different processing computers and communication links required to initiate and process MFS (e.g. an application stored in the secure environment of the mobile device, a kernel in a point-of-interaction).

— The infrastructure layer is made up of the computing and networking facilities generating, storing, processing or transporting MFS data (e.g. a mobile device, a wireless network, databases, cryptographic modules).

Figure 1 describes the three layers of the generic model and provides examples of security standards that implementers may find useful for the design of the security architecture for MFS.

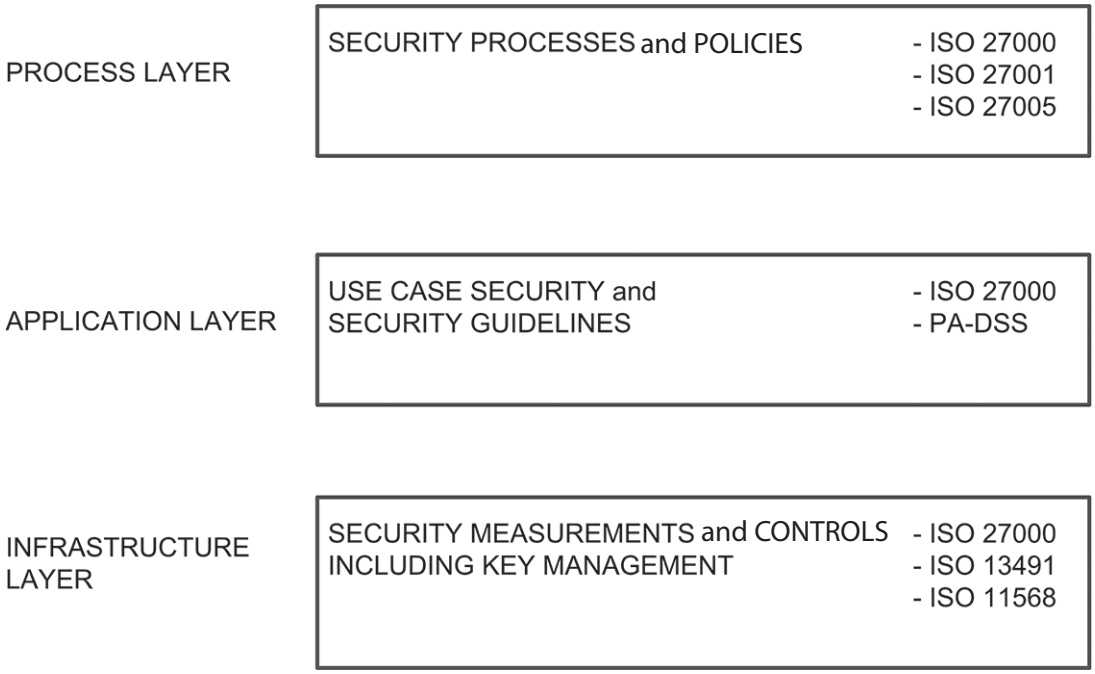

Figure 1 — Three-layer approach

Depending on the results of the risk assessment, further risk-driven measurements should be implemented in addition to the best practices aligned with the security requirements. Similarly, the attack surface can be effectively analysed and the appropriate countermeasures can be put in place, if the specific implementation vectors are known.

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

Implementers may wish to reference available resources in determining how to architect and implement their security measures. Among such resources are the FFIEC IT Examination Handbook, the NIST Guidelines (often used by various payment system participants) and the PCI-DSS

The Open System Interconnection seven-layer model (ISO/IEC 7498-1) may be mapped in to the Application and Infrastructure Layers described in 6.2.3 and 6.2.3.

6.2.1 Process layer

At the process (operational) layer, every party in the MFS program that provides or contributes to the provision of MFS shall have an information security management system (ISMS) in place consisting of a defined set of policies, processes, and systems to manage risks to information assets. In some instances, other than as a consumer, entities that consume MFS information (e.g. cloud providers) also shall have an information security management system in place. The respective party shall provide information on its ISMS upon request to anyone for whom that information is relevant (e.g. auditors, contractual partners), or in appropriate situations, even to customers. Any party who is required to have an ISMS shall periodically review (e.g. annually) and update it so that it is current.

The ISMS shall contain at least methods and procedures to monitor and manage relevant risks identified by the party and shall assign the appropriate resources and responsibilities to mitigate these risks.

Every participating party except a consumer shall define their responsibilities and the valuable assets to protect in their sphere of responsibility.

The minimum set of control objectives that shall be managed and documented by every participating party, except a consumer, are

— a security policy,

— the organization of information security (e.g. a hierarchical IT structure, a tiered secure management structure),

— an asset management plan, including access controls, and

— where appropriate, the party has human resource security and related training in place.

Depending on their supplied services, additional control objectives should be part of the information security management system, including but not limited to the following:

— physical and environmental security;

— communications and operations management;

— access control;

— information systems acquisition, development and maintenance;

— information security incident management;

— business continuity management;

— conformity or compliance mechanism(s).

Although the MFSP has the ultimate responsibility for achieving and maintaining security, if some services are outsourced or delivered through other contractual partners of the MFSP, some or part of any area of responsibility may be delegated to those other entities, even though the ultimate responsibility remains with the MFSP. The MFSP shall monitor its vendors and/or agents with whom it has outsourced any security requirements, to verify the existence of the security service level periodically to ensure the security issues are being handled in conformance with the requirements of this document.

Some implementers may find it useful refer to ISO 27001, which defines ISMS. It should be noted, however, that this document was not developed specifically for use by the financial services industry.

AVA Documents
Document Sharing Hub

© ISO 2017 – All rights reserved

Full document details: PD ISO/TS 12812-2:2017

6.2.2 Application layer

At the application layer, software components shall comply with the information requirements outlined in this document.

The threats and risks related to a particular MFS can be described depending on the devices used, expected customer behaviour, attack patterns and application environments.

The risk assessment can then be conducted and the security measures can be evaluated following the use cases. This applies to the roles and responsibilities of each party in an MFS including the MFSP, customers and third parties. The wireless network, which provides the infrastructure layer (see 6.2.3), is not usually under the direct control of the MFSP. Different wireless protocols can be used to connect the mobile device to a processing infrastructure. This connection is performed through a mobile telecommunication network or an Internet connection, provided by an MNO or a third entity.

As a minimum, MFSPs shall identify, document, assess and mitigate the impact of specific threats for applications associated with the following attack patterns:

— unauthorized access to payment application and data (e.g. key disclosure, code breaking);

— misuse of applicative data generated during the MFS (e.g. relay/replay attacks, skimming, sniffing);

— prevent the access to the application by the legitimate user (e.g. denial of service);

— interception and capture of authentication data (e.g. mobile code);

— installation of rogue applications in the mobile device that may facilitate any of the above.

Specific security control objectives shall be set out to protect the customer and the MFSP from risks resulting from potential successful attacks. Such control objectives apply to

— authentication of applications,

— access control of applications,

— application maintenance, and

— application life cycle control.

6.2.3 Infrastructure layer

At the infrastructure layer, the software, network management, operating systems, firmware and hardware components shall comply with the information security requirements set forth in this document.

The choice of the security controls and performance measurement to be put in place depends primarily on the technical solution and the MFS program environment. In the infrastructure required to secure MFS, cryptographic devices and key management processes constitute central components. ISO 13491 (all parts) and ISO 11568 are largely used by the financial industry for implementation purposes.

Depending on the results of the risk assessment associated with the threats to the infrastructure, further risk driven measures should be implemented in addition to the best practices aligned with the security requirements. Similarly, the risks associated with the attack surface for the overall infrastructure can be analysed if the vectors are known enabling to design proportionate security controls.

A minimum set of control objectives for the infrastructure necessary to deliver the MFS, includes

— physical and environmental security,

— access control to databases,

— capacity management,

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017

— business continuity management, and

— information security incident management.

7 Security principles and minimum requirements for mobile financial services

7.1 Security architecture aspects to be considered

Within the three-layer model described in 6.2, MFS and related applications are deployed over a wireless network, provided that security requirements defined by the MFSP can be fulfilled over that channel. Each of 7.2 to 7.4 are tied to and shall operate within the model; 7.5 summarizes the requirements of the earlier subclauses.

The security architecture is a design of how security controls are positioned and used to counter threats against mobile financial applications and sensitive data and how these relate to the overall mobile financial system architecture. Sensitive data include data used to carry out fraud, data used to initiate a mobile payment, data used for authentication purposes and any other data that if modified would compromise the security and/or privacy of the transaction.

This security architecture is intended to enable the MFS system to achieve a series of security objectives as set forth by the security policy of the system. These objectives depend on the nature of the MFS offered by the system. However, there exist significant objectives shared between different MFS, such as

— achieving a level of protection when executing a mobile application with a mobile device, equivalent to those applicable to other personal devices (e.g. corporate laptops),

— protecting MFS transactions with an appropriate and effective level of security at least equivalent to the one provided by legacy infrastructures,

— preserving user privacy,

— offering a trustworthy user interface for high-risk financial services, including features such as:

  a) what you see is what you sign;

  b) integrity and confidentiality of entered UVM data;

  c) secure service for application activation/selection;

— implementing effective countermeasures against open network threats (e.g. denial of service, phishing, spamming),

— preventing money laundering and other financial crimes, and

— complying with requirements imposed by regulations associated with the MFS related transactions.

Even if cryptography is an important tool to protect mobile financial assets, secure system design encompasses many other aspects, especially the correct implementation of the cryptographic mechanisms, the evaluation of the attack patterns and the secure storage of the cryptographic keys. Thus, the security architecture depends on the level of security of the devices able to establish secure communication links. A platform able to store multiple applications, whose life cycle may be managed in an independent way, raises specific concerns that are addressed in Clause 8.

The MFSP may also take into consideration, the non-technical requirements with special emphasis on the liability allocation decided as a result of the business model(s) supported and the risks identified.

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub

Full document details: PD ISO/TS 12812-2:2017