

ISO/IEC 24767-2:2009-01 (E)

Information technology – Home network security – Part 2: Internal security services – Secure communication protocol for middleware (SCPM)

CONTENTS

- FOREWORD..... 5
- 1 Scope..... 6
- 2 Normative references 6
- 3 Terms, definitions and abbreviations 7
 - 3.1 Terms and definitions 7
 - 3.2 Abbreviations 8
- 4 Conformance 8
- 5 Design considerations of internal security services for home networks 9
 - 5.1 General 9
 - 5.2 Issues addressed by security measures 10
 - 5.2.1 General 10
 - 5.2.2 Unsafe transmission 10
 - 5.2.3 Intentional misuse 10
 - 5.3 Design principles of security measures..... 11
 - 5.3.1 General 11
 - 5.3.2 Minimization of resources for cost-saving 11
 - 5.3.3 Independence of communication media 11
 - 5.3.4 Independence of cryptographic algorithms..... 11
 - 5.3.5 Extensibility of variant usages 11
- 6 Secure communication protocol for middleware (SCPM)..... 11
 - 6.1 General 11
 - 6.2 What is SCPM 12
 - 6.3 How does SCPM work 12
 - 6.4 Where is SCPM going to be implemented 14
 - 6.5 Usage levels of SCPM..... 14
 - 6.6 Usage keys of SCPM..... 15
- 7 Secure message frame format..... 15
 - 7.1 General communication frame 15
 - 7.1.1 General 15
 - 7.1.2 Header (HD) 16
 - 7.1.3 Source address (SA) and destination address (DA) 16
 - 7.1.4 Byte counter (BC)..... 16
 - 7.1.5 Application Data (ADATA) 16
 - 7.2 Secure frame structure 16
 - 7.2.1 General 16
 - 7.2.2 Secure header (SHD) 17
 - 7.2.3 Sequence number field (SNF)..... 18
 - 7.2.4 Plain text data part byte counter (PBC)..... 18
 - 7.2.5 Plain text application data (PADATA)..... 18
 - 7.2.6 Block check code (BCC) 18
 - 7.2.7 Padding (PDG) 18
 - 7.2.8 Message data authentication signature (MDAS)..... 19
- 8 SCPM processing 19
 - 8.1 Algorithms and processing 19

8.1.1	General	19
8.1.2	Encryption algorithms and encryption calculation.....	19
8.1.3	Data authentication algorithms and data authentication calculation.....	19
8.1.4	Cipher block chaining (CBC) mode	20
8.1.5	SNF initialisation and verification.....	20
8.1.6	Initialisation vector (IV) value	21
8.2	Secure message frame processing.....	22
8.2.1	General	22
8.2.2	Message frame processing of data authentication only	22
8.2.3	Message frame processing of confidentiality only	23
8.2.4	Message frame processing of data authentication and confidentiality	25
9	Key management.....	27
9.1	General	27
9.2	Key initialisation	27
9.2.1	Initialisation of a user key	27
9.2.2	Initialisation of service provider keys	30
9.2.3	Initialisation of maker key	32
9.3	Master key update.....	32
9.3.1	Master key update between KSN and a device	32
9.3.2	Key synchronization	36
9.3.3	Master key update request from a device	38
Annex A (informative)	To authorize a key setting node.....	41
Bibliography.....		42
Figure 1	– Use of combined technologies against security risks	10
Figure 2	– General message frame versus secure message frame.....	13
Figure 3	– Round trip communications of SCPM	13
Figure 4	– Position of SCPM.....	14
Figure 6	– Secure message frame	17
Figure 7	– Data format of a secure header (SHD)	17
Figure 8	– Encryption employing AES-CBC with 128-bit key	19
Figure 9	– Data authentication calculation	20
Figure 10	– Sequences of SNF initialisation.....	21
Figure 11	– Calculation of IV value	21
Figure 13	– Secure message frames employing encryption service.....	25
Figure 14	– Secure message frames employing encryption and data authentication services.....	27
Figure 15	– Sequences of user key initialisation	29
Figure 16	– Secure message frames of “user key” initialisation.....	30
Figure 17	– Sequences of service provider key initialisation.....	31
Figure 19	– Sequences of master key updates controlled by KSN using the DH algorithm	34
Figure 21	– Secure message frames of master key update – Key exchange using DH shared secret key	36
Figure 22	– Sequences of master key update for synchronization	37
Figure 23	– A state transition diagram of a device during master key update controlled by KSN	38

Figure 24 – Sequences of master key update requested from a device	39
Figure 25 – A state transition diagram of a device when master key update is requested from the device.....	40
Figure A.1 – An example to authenticate the KSN.....	41