

ISO/IEC 14888-3:2006-11 (E)

Information technology - Security techniques - Digital signatures with appendix - Part 3: Discrete logarithm based mechanisms

Contents		Page
Foreword		vi
Introduction		vii
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Symbols	2
5	General model	4
5.1	Parameter generation process	4
5.1.1	Certificate-based mechanisms	4
5.1.2	Identity-based mechanisms	4
5.1.3	Parameter selection	5
5.1.4	Validity of domain parameters and verification key	5
5.2	Signature process	6
5.2.1	Producing the randomizer	7
5.2.2	Producing the pre-signature	7
5.2.3	Preparing the message for signing	7
5.2.4	Computing the witness (the first part of the signature)	7
5.2.5	Computing the assignment	7
5.2.6	Computing the second part of the signature	8
5.2.7	Constructing the appendix	8
5.2.8	Constructing the signed message	8
5.3	Verification process	9
5.3.1	Retrieving the witness	10
5.3.2	Preparing message for verification	10
5.3.3	Retrieving the assignment	10
5.3.4	Recomputing the pre-signature	10
5.3.5	Recomputing the witness	10
5.3.6	Verifying the witness	10
6	Certificate-based mechanisms	11
6.1	DSA	11
6.1.1	Parameters	12
6.1.2	Generation of signature key and verification key	12
6.1.3	Signature process	12
6.1.4	Verification process	13
6.2	KCDSA	14
6.2.1	Parameters	15
6.2.2	Generation of signature key and verification key	15
6.2.3	Signature process	15
6.2.4	Verification process	16
6.3	Pointcheval/Vaudenay algorithm	17
6.3.1	Parameters	17
6.3.2	Generation of signature key and verification key	18
6.3.3	Signature process	18
6.3.4	Verification process	19

6.4	EC-DSA	19
6.4.1	Parameters	20
6.4.2	Generation of signature key and verification key	20
6.4.3	Signature process	20
6.4.4	Verification process	21
6.5	EC-KCDSA	22
6.5.1	Parameters	22
6.5.2	Generation of signature key and verification key	23
6.5.3	Signature process	23
6.5.4	Verification process	24
6.6	EC-GDSA	24
6.6.1	Parameters	25
6.6.2	Generation of signature key and verification key	25
6.6.3	Signature process	25
6.6.4	Verification process	26
7	Identity-based mechanisms	27
7.1	IBS-1	27
7.1.1	Parameters	28
7.1.2	Generation of master key and signature/verification key	28
7.1.3	Signature process	28
7.1.4	Verification process	29
7.2	IBS-2	30
7.2.1	Parameters	30
7.2.2	Generation of master key and signature/verification key	30
7.2.3	Signature process	30
7.2.4	Verification process	31
Annex A (normative) ASN.1 module		33
Annex B (normative) Conversion functions (I)		36
B.1	Conversion from a field element to an integer (FE2I)	36
B.2	Conversion from an integer to a field element (I2FE)	36
B.3	Conversion from a field element to a bit sequence (FE2BS)	36
B.4	Conversion from a bit sequence to an integer (BS2I)	36
B.5	Conversion from an integer to a bit sequence (I2BS)	37
B.6	Conversion between an integer and an octet string (I2OS & OS2I)	37
Annex C (informative) Conversion functions (II)		38
C.1	Conversion from an integer to a point (I2P)	38
Annex D (normative) Generation of DSA domain parameters		40
D.1	Generation of the prime p and q	40
D.2	Generation of the generator G	41
D.2.1	Unverifiable generation of G	41
D.2.2	Verifiable generation of G	41
Annex E (informative) The Weil and Tate pairings		42
E.1	The functions f, g and d	42
E.2	The Weil pairing	43
E.3	The Tate pairing	43
Annex F (informative) Numerical examples		45
F.1	DSA mechanism	45
F.1.1	Example 1	45
F.1.2	Example 2	46
F.2	KCDSA mechanism	48

F.2.1	Parameters	48
F.2.2	Signature key and verification key	49
F.2.3	Per message data	49
F.2.4	Signature	49
F.2.5	Verification	49
F.3	Pointcheval-Vaudenay mechanism	49
F.3.1	Parameters	49
F.3.2	Signature key and verification key	49
F.3.3	Per message data	50
F.3.4	Signature	50
F.3.5	Verification	50
F.4	EC-DSA mechanism	50
F.4.1	Example 1: Field F_2^m , $m = 191$	50
F.4.2	Example 2: Field F_P , 192-bit Prime P	51
F.5	EC-KCDSA mechanism	52
F.5.1	Example 1: Field F_2^m , $m = 163$	52
F.5.2	Example 2: Field F_P , 192-bit Prime P	53
F.5.3	Example 2: Field F_{P^m} , 32-bit P and $m = 5$	54
F.6	EC-GDSA mechanism	55
F.6.1	Domain and User Parameters	55
F.6.2	Example 1: Field F_P , 192-bit Prime P	55
F.7	IBS-1 mechanism	56
F.7.1	Example 1: Field F_p , 512-bit Prime p	56
F.7.2	Example 2: Field F_p , 512-bit Prime p	58
F.8	IBS-2 mechanism	60
F.8.1	Example 1: Field F_p , 512-bit Prime p	60
Annex G (informative) Comparison of the signature schemes		64
G.1	Symbols and abbreviated terms for comparing the signature schemes	64
G.2	Comparison of the signature schemes	64
Annex H (informative) Claimed features for choosing a mechanism		66
Bibliography		67