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STUDY GROUP 7 – CONTRIBUTION xxx

SOURCE: ISO RAPPORTEUR ON DIRECTORY and EDITOR OF THE DEFECT IMPLEMENTOR'S GUIDE (Q.??)

TITLE: DIRECTORY IMPLEMENTOR'S GUIDE - VERSION 15 - August 2001

Note: This version applies to the 3rd (1997|1998) and 4th (2000/2001) editions of the ITU-T. X.500 series of Recommendations and the ISO/IEC 9594 International Standards. It includes all approved and some draft corrigenda to these two editions. Readers still using the 1st edition (1988|1990) are advised to keep version 9 of the Directory Implementor's Guide as that is the last version that contains corrections to the 1st edition text. Readers still using the 2nd edition (1993|1995) are advised to keep version 14 of the Directory Implementor's Guide as that is the last version that contains corrections to the 2nd edition text.

Agreed at the xx meeting of ITU-T Study Group 7.

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Contents

1 Introduction

1.1 Background

This Guide is a compilation of reported defects and their resolutions to the 3rd (1997) and 4th (2000/2001) editions of the ITU X.500 Recommendations and ISO/IEC 9594 Standards. It includes all approved corrigenda, and may include draft corrigenda, to the editions of the Directory specification. It is intended to be an additional authoritative source of information for implementers to be read in conjunction with the Recommendations / Standards themselves.

This Guide itself is not an ITU-T Recommendation or ISO/IEC Standard. However, the appendixes of the Guide reproduce approved Technical Corrigenda, which are formal corrections to the Directory specifications. They may also include draft Technical Corrigenda which have no formal standing and which may be overturned or altered during the ballot process.

1.2 Scope of the Guide

The Guide records the resolution of defects in the following categories:

- editorial errors
- technical errors such as omissions or inconsistencies
- ambiguities

Note: This Guide does not address proposed additions, deletions, or modifications to the Recommendations or Standard that are not strictly related to implementation difficulties in the above categories. Proposals for new features should be made in the normal way through contributions by national delegates to Question ?? within Study Group 17 of the ITU-T or JTC 1/SC 6/WG 7 Directory group of the ISO/IEC.

1.3 Contacts and Distribution of the Guide

This Guide is distributed through ITU-T Meeting Reports and White Paper contributions, and ISO/IEC JTC1/ SC6 N-series documents. It is also available on-line from the ITU (http://www.itu.int) and from a server maintained by the ISO Rapporteur for Directory (ftp://ftp.bull.com/pub/OSIdirectory/) .

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2 Defect Report and Resolution Procedures

2.1 Submission of Defects

Any implementor of the 1997|1998 or 2000/2001 editions of the X.500 Recommendations or the ISO/IEC International Standard 9594 is invited to submit a Directory defect report using the form found in Appendix D of the guide. The defect report should be submitted to the appropriate National Defect Report Editor, listed in Appendix E. Each form should cover a single defect. It is important that the form is completed accurately, especially the sections that relate to the base material against which the defect report is being raised.

2.2 Resolution of Defects

A collaborative Directory Defect Resolution Committee has been established to resolve reported defects. In the case of most countries, a single representative has been nominated to the committee from the ITU Administration and the ISO/IEC JTC 1 National Body.

Following agreement on a resolution, within the collaborative Defect Resolution Committee, the proposed resolution may require approval via ballot of ISO/IEC and the ITU.

Please note that no individual responses can be given to those submitting reports, and that the procedure is not intended as a consulting service.

3. Guide to Appendixes

The five appendixes of this Guide are organized as follows:

Appendix A is a collection of the approved technical corrigenda (TC) and draft technical corrigenda (DTC) to the 3rd edition of the Directory specifications. The Directory specifications are arranged in the ISO/IEC order (Parts 1 to 10).

After the ballot comments on a DTC are resolved it is either published as a TC or incorporated into an edition of the directory standard. The number of the TC may be different from the DTC; the mapping is documented in summary at the beginning of the annex.

Appendix B is a collection of the approved technical corrigenda and draft technical corrigenda to the 4th edition of the Directory specifications. The Directory specifications are arranged in the ISO/IEC order (Parts 1 to 10).

After the ballot comments on a DTC are resolved it is either published as a TC or incorporated into an edition of the directory standard. The number of the TC may be different from the DTC; the mapping is documented in summary at the beginning of the annex.

Appendix C is a summary of the Defect Reports to the 3rd and 4th editions. Defect reports up to and including 074 apply to the 1st edition only and are not documented in this version of the Implementor's Guide — see Version 9 for a description of those defects. Defects 075–156. 158, 160, 161, 165, 168, 171, 172, 174, and 175 apply to the 2nd edition only and are not documented in this version of the Implementor's Guide — see Version 14 for a description of those defects.

Appendix D is a pro forma defect reporting form. This form, or one like it, should be used for reporting defects. The defect should be submitted as an electronic copy to ease the editor's task.

Appendix E is a list of Defect Editors with their contact information.

Appendix F is a register of OIDs for the module names of ASN.1 modules that are specified outside of the directory specifications.

Appendix A

Technical Corrigenda to Rec. X.500 (1997) | ISO/IEC 9594 : 1998 3rd Edition

Summary of 3rd Edition Technical Corrigenda

DTC #	Defect Reports resolved	Ballot Close	Published As	History
ITU-T Rec. X.500 (1997) | ISO/IEC 9594-1:1998				
1-DTC1	228	10 Jan 2001	withdrawn	Erik after Orlando 2000
ITU-T Rec. X.501 (1997) | ISO/IEC 9594-2:1998				
2-DTC1	173, 179, 189, 205		2-TC1	Patrick after Orlando 99
2-DTC2	211		2-TC1	Hoyt after Orlando 99
2-DTC3	229, 230		2-TC2	
2-DTC4	228, 242, 255, 260, 261, 267, 269	10 Jan 2001	2-TC2	Erik after Orlando 2000
ITU-T Rec. X.511 (1997) | ISO/IEC 9594-3:1998				
3-DTC1	166, 179, 188, 202, 206, 217		3-TC1	Patrick after Orlando 99
3-DTC2	211		3-TC1	Hoyt after Orlando 99
3-DTC3	231, 232		3-TC2	

DTC #	Defect Reports resolved	Ballot Close	Published As	History
3-DTC4	247		3-TC2	
3-DTC5	224, 228, 242, 263	10 Jan 2001	3-TC2	Erik after Orlando 2000
ITU-T Rec. X.518 (1997) | ISO/IEC 9594-4:1998				
4-DTC1	157,159,162,180, 190, 198, 206, 209		4-TC1	Patrick after Orlando 99
4-DTC2	211		4-TC1	Hoyt after Orlando 99
4-DTC3	233, 235		4-TC2	
4-DTC4	234, 248		4-TC2	
4-DTC5	228, 242, 265	10 Jan 2001	4-TC2	Erik after Orlando 2001
ITU-T Rec. X.519 (1997) | ISO/IEC 9594-5:1998				
5-DTC1	221		5-TC1	Ella after Orlando 99
5-DTC2	236		5-TC2	
5-DTC3	228, 242, 266	10 Jan 2001	5-TC2	Erik after Orlando 2000
ITU-T Rec. X.520 (1997) | ISO/IEC 9594-6:1998				
6-DTC1	211		6-TC1	Hoyt after Orlando 99
6-DTC2	237, 238, 241		6-TC2	
6-DTC3	270	10 Jan 2001	6-TC2	Erik after Orlando 2001
ITU-T Rec. X.521 (1997) | ISO/IEC 9594-7:1998				
7-DTC1	239		7-TC1	

DTC #	Defect Reports resolved	Ballot Close	Published As	History
ITU-T Rec. X.509 (1997) I ISO/IEC 9594-8:1998				
8-DTC1	183, 194		3rd edition	Incorporated into published edition
8-DTC3	200, 201, 212, 213, 218, 220		8-TC1	Sharon after Orlando 99
8-DTC4	185		8-TC1	Sharon after Orlando 99
8-DTC5	204		8-TC1	Sharon after Orlando 99
8-DTC7	222		8-TC1	Sharon after Orlando 99
8-DTC8	226, 227, 240		8-TC? *in preparation*	
8-DTC9	244, 256, 257, 258		8-TC? *in preparation*	Sharon after Orlando 2000, comments resolved at Geneva 2001
ITU-T Rec. X.525 (1997) I ISO/IEC 9594-9:1998				
9-DTC1	182, 186		9-TC1	Processed at Helsinki 97 and produced by Hoyt after Orlando 99
9-DTC2	187, 208, 243		9-TC2	
9-DTC3	245		9-TC2	
9-DTC4	228, 242	10 Jan 2001	9-TC2	Erik after Orlando 2001
ITU-T Rec. X.530 (1997) I ISO/IEC 9594-10:1998				
10-DTC1	252	10 Jan 2001	10-TC1	Erik after Orlando 2001

Recommendation X.501 (1997) | ISO/IEC 9594-2:1998

Information processing systems - Open Systems Interconnection - The Directory - Models

TECHNICAL CORRIGENDUM 1

NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 1 and 2.

Defect reports resolved by Draft Technical Corrigendum 1
(defect reports 173, 179, 189,)

This corrects the defects reported in defect report 9594/173.

Clause 20.5 First Level DSAs

Change the text of bullet c) the following way:

c) It holds subordinate references (of category master and/or shadow) and non-specific subordinate references (of category master and/or shadow) which account for all the naming contexts immediately subordinate to the root of the DIT which it does not itself hold.

This corrects the defects reported in defect report 9594/179.

Annex J, Table J-1

In the second column called "Entry protected Item Permissions Required", add the following texts for the Read and the Search operations:

For the Read operation:

"*ReturnDN* for distinguished name"

For the Search Operation:

"*ReturnDN* for each returned distinguished name"

This corrects the defects reported in defect report 9594/189.

Clause 26.3 Modify Operational Binding
and **Annex F**

Add OPTIONAL to the ASN.1 of **newAgreement** *:*

```
newAgreement    [7]     OPERATIONAL-BINDING.&Agreement
                        ({OpBindingSet}{@bindingType}) OPTIONAL,
```

This corrects the defects reported in defect report 9594/205.

Clause 20.3.2. Knowledge Reference Types

Change the first bullet point after "A DSA may hold the following types of knowledge reference:" *to read:*

- superior references;

Clause 20.3.2.1. Superior Reference

Change the title and second sentence to read:

20.3.2.1 Superior References

A superior reference consists of

– the Access Point of a DSA.

Each non-first level DSA (see 20.5) shall maintain at least one superior reference.

Clause 20.4.1. Superior Knowledge

Change the first sentence to read:

Each DSA that is not a first level DSA shall maintain at least one superior reference.

And add the following second sentence:

Additional superior references may be held for operational reasons as alternative paths to the root of the DIT.

Clause 20.5. First Level DSAs

Change the second sentence to read:

“A DSA referenced by other DSAs may itself maintain one or more superior references.”

Change the last sentence to read:

“They therefore may serve as a superior reference for non-first level DSAs.”

Clause21.4.2. DSE Types h)

Change it to read:

h) **supr**: A DSE that holds a specific knowledge attribute to represent the DSAs superior references.

Clause 22.2.1.2. Superior Knowledge

Change the first sentence to plural and the ATTRIBUTE SYNTAX to SET OF, to read:

The **superiorKnowledge** operational attribute type is used by a non-first level DSA to represent its superior references.

```
superiorKnowledge    ATTRIBUTE    ::=    {WITH SYNTAX    SET OF
                     AccessPoint
                     .....
```

Clause 22.2.2.2. Superior Reference

Insert a new second sentence:

Since a **superiorKnowledge** attribute value may contain the access points of several DSAs, it may therefore represent several superior references.

Defect reports resolved by Draft Technical Corrigendum 2

(defect report 211)

This corrects the defects reported in defect report 9594/211.

Clause 26.2

*Change the two occurrences of **UTCTime** to **Time**:*

*Insert the following after the ASN.1 definition of **Validity***

```
Time ::= CHOICE {
             utcTime          UTCTime,
             generalizedTime  GeneralizedTime  }
```

Before a value of **Time** is used in any comparison operation and if the syntax of **Time** has been chosen as the **UTCTime** type, the value of the two-digit year field shall be rationalized into a four-digit year value as follows:

— If the 2-digit value is 00 through 49 inclusive, the value shall have 2000 added to it.

■ If the 2-digit value is 50 through 99 inclusive, the value shall have 1900 added to it.

Note — The use of **GeneralizedTime** may prevent interworking with implementations unaware of the possibility of choosing either **UTCTime** or **GeneralizedTime**. It is the responsibility of those specifying the domains in which this Directory Specification

will be used, e.g. profiling groups, as to when the **GeneralizedTime** may be used. In no case shall **UTCTime** be used for representing dates beyond 2049.

Clause 26.4

*Change **UTCTime** to **Time**:*

Clause 26.5

*Change **UTCTime** to **Time**:*

Also make theASN.1 changes to Annex F.

Recommendation X.501 (1997) | ISO/IEC 9594-2:1998 Technical Corrigendum 2

NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 3, and 4.

Defect reports covered by Draft Technical Corrigendum 3

(Covering resolutions to defect reports 229 and 230)

This corrects the defects reported in defect reports 9594/229-230.

In 2.1:

Replace:

– ITU-T Recommendation X.525 (1997) | ISO/IEC 9594-8:1999, *Information technology – Open Systems Interconnection – The Directory: Replication*.

with:

– ITU-T Recommendation X.525 (1997) | ISO/IEC 9594-9:1998, *Information technology – Open Systems Interconnection – The Directory: Replication*.

In 17.4.3:

In the **attributeValueSecurityLabelContext** specification replace **SYNTAX** with **WITH SYNTAX**

Delete the **KeyIdentifier** type.

The same changes shall be done in Annex P

In 18.1.2:

Change the 4th paragraph to:

Digital signatures applied to the whole entry do not include operational, ~~or~~ collective attributes or the **attributeIntegrityInfo** itself. Any attribute value contexts are included.

Delete the 5th paragraph (Additional control information …).

*Change the **attributeIntegrityInfo** attribute definition and its supporting definitions to:*

```
attributeIntegrityInfo ATTRIBUTE  ::=  {
        WITH SYNTAX                          AttributeIntegrityInfo
        ID                                   id-at-attributeIntegrityInfo}

AttributeIntegrityInfo  ::=  SIGNED { SEQUENCE  {
        scope          Scope,                -- Identifies the attributes protected
        signer         Signer  OPTIONAL,                    -- Authority or data originators
name
        attribsHash    AttribsHash } }       -- Hash value of protected attributes

Signer  ::=  CHOICE {
        thisEntry      [0]     EXPLICIT ThisEntry,
        thirdParty     [1]     SpecificallyIdentified }

ThisEntry  ::=  CHOICE  {
        onlyOne  NULL,
        specific IssuerAndSerialNumber }

IssuerAndSerialNumber  ::=  SEQUENCE {
        issuer Name,
        serial CertificateSerialNumber }

SpecificallyIdentified  ::=  SEQUENCE  {
        name           GeneralName,
        issuer GeneralName  OPTIONAL,
        serial         CertificateSerialNumber  OPTIONAL }
        ( WITH COMPONENTS { ..., issuer PRESENT, serial PRESENT } |
        ( WITH COMPONENTS { ..., issuer ABSENT, serial ABSENT } ) )

Scope  ::=  CHOICE  {
        wholeEntry   [0]     NULL,          -- Signature protects all attribute values in this entry
        selectedTypes        [1]     SelectedTypes
```

```
                                    -- Signature protects all attribute values of the selected attribute types
        }

SelectedTypes  ::=  SEQUENCE SIZE (1..MAX) OF AttributeType

AttribsHash  ::=  HASH { SEQUENCE SIZE (1..MAX) OF Attribute }
                    -- Attribute type and values with associated context values for the selected Scope
```

Add the following text after the above ASN.1:

An **AttributeIntegrityInfo** value can be created in three different ways:

a) An administrative authority can create and sign the value, and the public key to verify the signature is known by off-line means.

b) The owner of the entry, i.e. the object represented by the entry, can create and sign the value. If the owner has several certificates, or expected to have that in the future, the certificate has to be identified by the CA issuing the certificate together with the certificate serial number.

c) A third party may create and sign the value. The name of the signer, the name of the CA issuing the certificate and the certificate serial number is required.

If the scope is **wholeEntry**, all the applicable attributes shall be ordered as specified for a set-of type in 6.1 of ITU-T Rec. X.509 | ISO/IEC 9594-8. If scope is **selectedTypes**, the ordering shall be the same as the one given in the **SelectedTypes**.

NOTE – If a user does not retrieve all the complete attributes that are defined within the **Scope** data type, it will not be possible for the user to verify the integrity of the attributes.

Delete 18.1.2.1.

The changes to ASN.1 shall also be done in Annex P.

Replace 18.1.3 with:

18.1.3 Context for Protection of a Single Attribute Value

The following defines a context to hold a digital signature, along with associated control information, which provides integrity for a single attribute value. Any attribute value contexts are included in the integrity check, excluding the context used to hold signatures.

```
attributeValueIntegrityInfoContext  CONTEXT  ::=  {
        WITH SYNTAX       AttributeValueIntegrityInfo
        ID                id-avc-attributeValueIntegrityInfoContext }

AttributeValueIntegrityInfo  ::=  SIGNED { SEQUENCE {
        signer        Signer OPTIONAL,          -- Authority or data originators name
        aVIHash               AVIHash } }                    -- Hash value of protected
attribute

AVIHash  ::=  HASH { AttributeTypeValueContexts }
                    -- Attribute type and value with associated context values

AttributeTypeValueContexts ::= SEQUENCE {
        type          ATTRIBUTE.&id ({SupportedAttributes}),
        value         ATTRIBUTE.&Type ({SupportedAttributes}{@type}),
        contextList   SET SIZE (1..MAX) OF Context OPTIONAL }
```

The **contextList** shall be ordered as specified for a set-of type in 6.1 of ITU-T Rec. X.509 | ISO/IEC 9594-8.

*Change the ASN.1 ASN.1 in Annex P as per above and delete **AVIAssertion** data type.*

In annex B:

Delete **OPTIONALLY-SIGNED** import from **DirectoryAbstractService**

In annex C:

In the **application** component of **AttributeTypeInformation** replace **userApplication** with **userApplications**

In Annex D:

Add **directoryAbstractService** to the import from **UsefulDefinitions**

Add **SupportedAttributes** to the import from **InformationFramework**
Add:

Filter
FROM DirectoryAbstractService directoryAbstractService

In annex F:

Add **enhancedSecurity** to the import from **UsefulDefinitions**
Delete **OPTIONALLY-PROTECTED** and **DIRQOP** from the import from **EnhancedSecurity**. Add instead **OPTIONALLY-PROTECTED-SEQ**.

In annex P:

All the changes to annex P has been subsumed by the resolution of defect report 228

Defect reports covered by Draft Technical Corrigendum 4

(Covering resolutions to defect reports 228, 242, 255, 260, 261, 267 and 269)

This corrects the defects reported in defect report 9594/228.

Add at the beginning of 15.3 just before 15.3.1:

Warning – Subclause 15.3.1 and 15.3.2 are known to contain invalid specifications. These subclauses are therefore deprecated. A future edition will either remove the deprecated specifications or provide updated text.

The following specifications are provided to preserve the optionally signed capability provided by edition 2 of these Directory Specifications and to allow that capability to be extended to all operations and to errors:

OPTIONALLY-PROTECTED is a parameterized data type where the parameter is a data type whose values may, at the option of the generator, be accompanied by their digital signature. This capability is specified by means of the following type:

```
OPTIONALLY-PROTECTED { Type }  ::=  CHOICE {
        unsigned              Type,
        signed        SIGNED {Type} }
```

The **OPTIONALLY-PROTECTED-SEQ** is used instead of **OPTIONALLY-PROTECTED** when the protected data type is a sequence data type that is not tagged.

```
OPTIONALLY-PROTECTED-SEQ { Type } ::= CHOICE {
        unsigned              Type,
        signed  [0]   SIGNED { Type } }
```

The **SIGNED** parameterized data type, which describes the form of the signed form of the information, is specified in ITU-T Rec. X.509 | ISO/IEC 9594-8.

Add at the beginning of 18.2 just before 18.2.1:

Warning – This subclause is known to contain invalid specifications. This subclause is therefore deprecated. A future edition will either remove the deprecated specifications or provide updated text.

In Annex A, add ASN.1 comment item as shown:

```
-- securityExchange                 ID    ::=   {ds 32}
-- directorySecurityExchanges       ID    ::=   {module directorySecurityExchanges (29) 1}
-- id-se                            ID    ::=   securityExchange
```

In clause 26, delete any occurrence of

DIRQOP.&…-QOP{@dirqop}

,

and change all occurrences of:

OPTIONALLY-PROTECTED

to:

OPTIONALLY-PROTECTED-SEQ

The same changes shall be made to Annex F.

Replace Annex P with:

Annex P

Enhanced security

(This annex forms an integral part of this Recommendation | International Standard)

This module is known to contain invalid specifications. Part of this module is therefore deprecated. The deprecated part is indicated by ASN.1 comment items. A future edition will either remove the deprecated specifications or provide updated specifications.

```
EnhancedSecurity { joint-iso-itu-t ds(5) modules(1) enhancedSecurity(28) 1 }
DEFINITIONS IMPLICIT TAGS  ::=
BEGIN

-- EXPORTS All --

IMPORTS

-- from ITU-T Rec. X.501 | ISO/IEC 9594-2

        authenticationFramework, basicAccessControl, certificateExtensions, id-at, id-avc, id-mr,
        informationFramework, upperBounds
                FROM UsefulDefinitions { joint-iso-itu-t ds(5) module(1) usefulDefinitions(0) 3 }

        Attribute, ATTRIBUTE, AttributeType, Context, CONTEXT, MATCHING-RULE, Name,
        objectIdentifierMatch, SupportedAttributes
                FROM InformationFramework informationFramework

        AttributeTypeAndValue
                  FROM BasicAccessControl basicAccessControl

-- from ITU-T Rec. X.509 | ISO/IEC 9594-8

        AlgorithmIdentifier, CertificateSerialNumber, ENCRYPTED{}, HASH{}, SIGNED{}
                  FROM AuthenticationFramework authenticationFramework

        GeneralName, KeyIdentifier
                  FROM CertificateExtensions certificateExtensions

        ub-privacy-mark-length
                FROM UpperBounds upperBounds  ;
-- from GULS
-- SECURITY-TRANSFORMATION, PROTECTION-MAPPING, PROTECTED
--          FROM Notation { joint-iso-ccitt genericULS (20) modules (1) notation (1) }

--dirSignedTransformation, KEY-INFORMATION
--          FROM GulsSecurityTransformations { joint-iso-ccitt genericULS (20) modules (1)
--               gulsSecurityTransformations (3) }

-- signed
--          FROM GulsSecurityTransformations { joint-iso-ccitt genericULS (20) modules (1)
--               dirProtectionMappings (4) };

-- The "signed" Protection Mapping and associated "dirSignedTransformations" imported
-- from the Generic Upper Layers Security specification (ITU-T Rec. X.830 | ISO/IEC 11586-1)
-- results in identical encoding as the same data type used with the SIGNED as defined in
-- ITU-T REC. X.509 | ISO/IEC 9594-8

-- The three statements below are provided temporarily to allow signed operations to be supported as in
edition 3.
```

```
OPTIONALLY-PROTECTED { Type } ::= CHOICE {
        unsigned            Type,
        signed      SIGNED {Type} }

OPTIONALLY-PROTECTED-SEQ { Type } ::= CHOICE {
        unsigned            Type,
        signed [0]  SIGNED { Type } }

-- The following out-commented ASN.1 specification are know to be erroneous and are therefore
deprecated.

-- genEncryptedTransform {KEY-INFORMATION: SupportedKIClasses } SECURITY-
TRANSFORMATION ::=
--      {
--      IDENTIFIER                      { enhancedSecurity gen-encrypted(2) }
--      INITIAL-ENCODING-RULES          { joint-iso-itu-t asn1(1) ber(1) }
                                        -- This default for initial encoding rules may be overridden
                                        -- using a static protected parameter (initEncRules).
--          XFORMED-DATA-TYPE           SEQUENCE {
--                  initEncRules  OBJECT IDENTIFIER DEFAULT { joint-iso-itu-t asn1(1) ber(1) },
--                  encAlgorithm  AlgorithmIdentifier OPTIONAL, --  -- Identifies the encryption
algorithm,
--                  keyInformation          SEQUENCE {
--                      kiClass   KEY-INFORMATION.&kiClass ({SupportedKIClasses}),
--                      keyInfo   KEY-INFORMATION.&KiType ({SupportedKIClasses} {@kiClass})
--                                } OPTIONAL,
                        -- Key information may assume various formats, governed by supported
members
                        -- of the KEY-INFORMATION information object class (defined in ITU-T
                        -- Rec. X.830 | ISO/IEC 11586-1)
--                  encData         BIT STRING ( CONSTRAINED BY {
                    -- the encData value must be generated following
                    -- the procedure specified in 17.3.1-- -- })
--                  }
--          }

-- encrypted PROTECTION-MAPPING ::= {
--          SECURITY-TRANSFORMATION { genEncryptedTransform } }

-- signedAndEncrypt PROTECTION-MAPPING ::= {
--          SECURITY-TRANSFORMATION { signedAndEncryptedTransform } }

-- signedAndEncryptedTransform {KEY-INFORMATION: SupportedKIClasses}
--      SECURITY-TRANSFORMATION ::= {
--          IDENTIFIER                  { enhancedSecurity dir-encrypt-sign (1) }
--          INITIAL-ENCODING-RULES { joint-iso-itu-t asn1 (1) ber-derived (2) distinguished-
encoding (1) }
--          XFORMED-DATA-TYPE
--            PROTECTED
--            {
--                PROTECTED
--                {
--                ABSTRACT-SYNTAX.&Type,
--                signed
--                },
--            encrypted
--            }
--      }

-- OPTIONALLY-PROTECTED {ToBeProtected, PROTECTION-MAPPING:generalProtection} ::=
--          CHOICE {
--              toBeProtected       ToBeProtected,
                                        --no DIRQOP specified for operation
--              signed      PROTECTED {ToBeProtected, signed},
                                        --DIRQOP is Signed
--              protected               [APPLICATION 0]
--                                      PROTECTED { ToBeProtected, generalProtection } }
                                        --DIRQOP is other than Signed

-- defaultDirQop ATTRIBUTE ::= {
--      WITH SYNTAX                             OBJECT IDENTIFIER
```

```
--      EQUALITY MATCHING RULE      objectIdentifierMatch
--      USAGE                       directoryOperation
--      ID                          id-at-defaultDirQop }

-- DIRQOP ::= CLASS
-- This information object class is used to define the quality of protection
-- required throughout directory operation.
-- The Quality Of Protection can be signed, encrypted, signedAndEncrypt
-- {
--      &dirqop-Id                                  OBJECT IDENTIFIER UNIQUE,
--      &dirBindError-QOP                           PROTECTION-
MAPPING:protectionReqd,
--      &dirErrors-QOP                              PROTECTION-
MAPPING:protectionReqd,
--      &dapReadArg-QOP                             PROTECTION-
MAPPING:protectionReqd,
--      &dapReadRes-QOP                             PROTECTION-
MAPPING:protectionReqd,
--      &dapCompareArg-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dapCompareRes-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dapListArg-QOP                         PROTECTION-
MAPPING:protectionReqd,
--      &dapListRes-QOP                         PROTECTION-
MAPPING:protectionReqd,
--      &dapSearchArg-QOP                           PROTECTION-
MAPPING:protectionReqd,
--      &dapSearchRes-QOP                           PROTECTION-
MAPPING:protectionReqd,
--      &dapAbandonArg-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dapAbandonRes-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dapAddEntryArg-QOP                     PROTECTION-
MAPPING:protectionReqd,
--      &dapAddEntryRes-QOP                     PROTECTION-
MAPPING:protectionReqd,
--      &dapRemoveEntryArg-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dapRemoveEntryRes-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dapModifyEntryArg-QOP                  PROTECTION-
MAPPING:protectionReqd,
--      &dapModifyEntryRes-QOP                  PROTECTION-
MAPPING:protectionReqd,
--      &dapModifyDNArg-QOP                     PROTECTION-
MAPPING:protectionReqd,
--      &dapModifyDNRes-QOP                     PROTECTION-
MAPPING:protectionReqd,
--      &dspChainedOp-QOP                           PROTECTION-
MAPPING:protectionReqd,
--      &dispShadowAgreeInfo-QOP                PROTECTION-
MAPPING:protectionReqd,
--      &dispCoorShadowArg-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dispCoorShadowRes-QOP                      PROTECTION-
MAPPING:protectionReqd,
--      &dispUpdateShadowArg-QOP                PROTECTION-
MAPPING:protectionReqd,
--      &dispUpdateShadowRes-QOP                PROTECTION-
MAPPING:protectionReqd,
--      &dispRequestShadowUpdateArg-QOP         PROTECTION-
MAPPING:protectionReqd,
--      &dispRequestShadowUpdateRes-QOP         PROTECTION-
MAPPING:protectionReqd,
--      &dopEstablishOpBindArg-QOP              PROTECTION-
MAPPING:protectionReqd,
--      &dopEstablishOpBindRes-QOP              PROTECTION-
MAPPING:protectionReqd,
```

```
--      &dopModifyOpBindArg-QOP                         PROTECTION-
MAPPING:protectionReqd,
--      &dopModifyOpBindRes-QOP                         PROTECTION-
MAPPING:protectionReqd,
--      &dopTermOpBindArg-QOP                           PROTECTION-
MAPPING:protectionReqd,
--      &dopTermOpBindRes-QOP                                PROTECTION-
MAPPING:protectionReqd
-- }
-- WITH SYNTAX
-- {
--      DIRQOP-ID                                            &dirqop-Id
--      DIRECTORYBINDERROR-QOP                          &dirBindError-QOP
--      DIRERRORS-QOP                                   &dirErrors-QOP
--      DAPREADARG-QOP                                       &dapReadArg-QOP
--      DAPREADRES-QOP                                       &dapReadRes-QOP
--      DAPCOMPAREARG-QOP                               &dapCompareArg-QOP
--      DAPCOMPARERES-QOP                               &dapCompareRes-QOP
--      DAPLISTARG-QOP                                  &dapListArg-QOP
--      DAPLISTRES-QOP                                  &dapListRes-QOP
--      DAPSEARCHARG-QOP                                &dapSearchArg-QOP
--      DAPSEARCHRES-QOP                                &dapSearchRes-QOP
--      DAPABANDONARG-QOP                               &dapAbandonArg-QOP
--      DAPABANDONRES-QOP                               &dapAbandonRes-QOP
--      DAPADDENTRYARG-QOP                              &dapAddEntryArg-QOP
--      DAPADDENTRYRES-QOP                              &dapAddEntryRes-QOP
--      DAPREMOVEENTRYARG-QOP                           &dapRemoveEntryArg-QOP
--      DAPREMOVEENTRYRES-QOP                           &dapRemoveEntryRes-QOP
--      DAPMODIFYENTRYARG-QOP                           &dapModifyEntryArg-QOP
--      DAPMODIFYENTRYRES-QOP                           &dapModifyEntryRes-QOP
--      DAPMODIFYDNARG-QOP                              &dapModifyDNArg-QOP
--      DAPMODIFYDNRES-QOP                              &dapModifyDNRes-QOP
--      DSPCHAINEDOP-QOP                                     &dspChainedOp-QOP
--      DISPSHADOWAGREEINFO-QOP                         &dispShadowAgreeInfo-QOP
--      DISPCOORSHADOWARG-QOP                           &dispCoorShadowArg-QOP
--      DISPCOORSHADOWRES-QOP                           &dispCoorShadowRes-QOP
--      DISPUPDATESHADOWARG-QOP                         &dispUpdateShadowArg-QOP
--      DISPUPDATESHADOWRES-QOP                         &dispUpdateShadowRes-QOP
--      DISPREQUESTSHADOWUPDATEARG-QOP                  &dispRequestShadowUpdateArg-QOP
--      DISPREQUESTSHADOWUPDATERES-QOP                  &dispRequestShadowUpdateRes-
QOP
--      DOPESTABLISHOPBINDARG-QOP                       &dopEstablishOpBindArg-QOP
--      DOPESTABLISHOPBINDRES-QOP                       &dopEstablishOpBindRes-QOP
--      DOPMODIFYOPBINDARG-QOP                          &dopModifyOpBindArg-QOP
--      DOPMODIFYOPBINDRES-QOP                          &dopModifyOpBindRes-QOP
--      DOPTERMINATEOPBINDARG-QOP                       &dopTermOpBindArg-QOP
--      DOPTERMINATEOPBINDRES-QOP                       &dopTermOpBindRes-QOP
-- }

attributeValueSecurityLabelContext CONTEXT ::= {
        WITH SYNTAX     SignedSecurityLabel   -- At most one security label context can be assigned
to an
                                              -- attribute value
        ID              id-avc-attributeValueSecurityLabelContext }

SignedSecurityLabel  ::=  SIGNED {SEQUENCE  {
        attHash     HASH {AttributeTypeAndValue},
        issuer      Name                OPTIONAL,  -- name of labelling authority
        keyIdentifierKeyIdentifier  OPTIONAL,
        securityLabel     SecurityLabel } }

SecurityLabel  ::=  SET {
        security-policy-identifier   SecurityPolicyIdentifier     OPTIONAL,
        security-classification          SecurityClassification          OPTIONAL,
        privacy-mark                     PrivacyMark                     OPTIONAL,
        security-categories              SecurityCategories         OPTIONAL }
                (ALL EXCEPT ( {--none, at least one component shall be presen-- } ) )

SecurityPolicyIdentifier  ::=  OBJECT IDENTIFIER
```

```
SecurityClassification ::= INTEGER {
        unmarked            (0),
        unclassified(1),
        restricted          (2),
        confidential        (3),
        secret      (4),
        top-secret          (5) }

PrivacyMark  ::=  PrintableString (SIZE (1..ub-privacy-mark-length))

SecurityCategories ::= SET SIZE (1..MAX) OF SecurityCategory

clearance  ATTRIBUTE  ::=  {
        WITH SYNTAX      Clearance
        ID               id-at-clearance }

Clearance  ::=  SEQUENCE  {
        policyId              OBJECT IDENTIFIER,
        classList                   ClassList                                DEFAULT {unclassified},
        securityCategories          SET SIZE (1..MAX) OF SecurityCategory    OPTIONAL }

ClassList  ::=  BIT STRING {
        unmarked            (0),
        unclassified(1),
        restricted          (2),
        confidential        (3),
        secret      (4),
        topSecret           (5) }

SecurityCategory  ::=  SEQUENCE {
        type     [0]  SECURITY-CATEGORY.&id ({SecurityCategoriesTable}),
        value    [1]  EXPLICIT SECURITY-CATEGORY.&Type ({SecurityCategoriesTable} {@type}) }

SECURITY-CATEGORY  ::=  TYPE-IDENTIFIER

SecurityCategoriesTable SECURITY-CATEGORY ::= { ... }

attributeIntegrityInfo ATTRIBUTE  ::=  {
        WITH SYNTAX                              AttributeIntegrityInfo
        ID                                  id-at-attributeIntegrityInfo }

AttributeIntegrityInfo  ::=  SIGNED { SEQUENCE  {
        scope         Scope,                                    -- Identifies the attributes protected
        signer        SignerOPTIONAL,    -- Authority or data originators name
        attribsHash         AttribsHash } }                     -- Hash value of protected
attributes

Signer  ::=  CHOICE {
        thisEntry     [0]     EXPLICIT ThisEntry,
        thirdParty    [1]     SpecificallyIdentified }

ThisEntry  ::=  CHOICE  {
        onlyOne     NULL,
        specificIssuerAndSerialNumber }

IssuerAndSerialNumber  ::=  SEQUENCE {
        issuer   Name,
        serial   CertificateSerialNumber }

SpecificallyIdentified  ::=  SEQUENCE  {
        name    GeneralName,
        issuer  GeneralName                         OPTIONAL,
        serial  CertificateSerialNumber   OPTIONAL }
        ( WITH COMPONENTS { ..., issuer PRESENT, serial PRESENT } |
        ( WITH COMPONENTS { ..., issuer ABSENT, serial ABSENT } ) )

Scope  ::=  CHOICE  {
        wholeEntry  [0]     NULL,          -- Signature protects all attribute values in this entry
        selectedTypes       [1]       SelectedTypes
                            -- Signature protects all attribute values of the selected attribute types
        }

SelectedTypes  ::=  SEQUENCE SIZE (1..MAX) OF AttributeType
```

```
AttribsHash ::= HASH { SEQUENCE SIZE (1..MAX) OF Attribute }
            -- Attribute type and values with associated context values for the selected Scope

attributeValueIntegrityInfoContext CONTEXT ::= {
      WITH SYNTAX      AttributeValueIntegrityInfo
      ID               id-avc-attributeValueIntegrityInfoContext }

AttributeValueIntegrityInfo ::= SIGNED { SEQUENCE {
      signer      SignerOPTIONAL,          -- Authority or data originators name
      aVIHash           AVIHash } }                    -- Hash value of protected attribute

AVIHash ::= HASH { AttributeTypeValueContexts }
            -- Attribute type and value with associated context values

AttributeTypeValueContexts ::= SEQUENCE {
      type          ATTRIBUTE.&id ({SupportedAttributes}),
      value         ATTRIBUTE.&Type ({SupportedAttributes}{@type}),
      contextList SET SIZE (1..MAX) OF Context OPTIONAL }

-- The following out-commented ASN.1 specification are know to be erroneous and are therefore
deprecated.

-- EncryptedAttributeSyntax {AttributeSyntax} ::= SEQUENCE {
--      keyInfo SEQUENCE OF KeyIdOrProtectedKey,
--      encAlg AlgorithmIdentifier,
--      encValue    ENCRYPTED { AttributeSyntax } }

-- KeyIdOrProtectedKey ::= SEQUENCE {
--      keyIdentifier[0]     KeyIdentifier  OPTIONAL,
--      protectedKeys     [1]       ProtectedKey  OPTIONAL }
            -- At least one key identifier or protected key must be present

-- ProtectedKey ::= SEQUENCE {
--      authReaders         AuthReaders,--          -- if absent, use attribute in authorized reader entry
--      keyEncAlg   AlgorithmIdentifier  OPTIONAL, --          --  algorithm to encrypt encAttrKey
--      encAttKey           EncAttKey  }
                              -- confidentiality key protected with authorized user's
                              -- protection mechanism

-- AuthReaders ::= SEQUENCE OF Name

-- EncAttKey ::= PROTECTED {SymmetricKey, keyProtection}

-- SymmetricKey ::= BIT STRING

-- keyProtection PROTECTION-MAPPING ::= {
--      SECURITY-TRANSFORMATION {genEncryption} }

-- confKeyInfo ATTRIBUTE ::= {
--      WITH SYNTAX                         ConfKeyInfo
--      EQUALITY MATCHING RULE      readerAndKeyIDMatch
--      ID                          id-at-confKeyInfo }

-- ConfKeyInfo ::= SEQUENCE {
--      keyIdentifierKeyIdentifier,
--      protectedKey        ProtectedKey }

-- readerAndKeyIDMatch MATCHING-RULE ::= {
--      SYNTAX     ReaderAndKeyIDAssertion
--      ID       id-mr-readerAndKeyIDMatch }

-- ReaderAndKeyIDAssertion ::= SEQUENCE {
--      keyIdentifierKeyIdentifier,
--      authReaders         AuthReaders OPTIONAL }
-- Object identifier assignments --
-- attributes --
id-at-clearance                                 OBJECT IDENTIFIER     ::=       {id-at
55}
-- id-at-defaultDirQop                          OBJECT IDENTIFIER     ::=     {id-at 56}
id-at-attributeIntegrityInfo                            OBJECT IDENTIFIER     ::=
          {id-at 57}
-- id-at-confKeyInfo                            OBJECT IDENTIFIER     ::=     {id-at 60}

-- matching rules --
```

```
-- id-mr-readerAndKeyIDMatch                    OBJECT IDENTIFIER    ::=    {id-mr 43}

-- contexts--
id-avc-attributeValueSecurityLabelContext       OBJECT IDENTIFIER    ::=    {id-avc
3}
id-avc-attributeValueIntegrityInfoContext       OBJECT IDENTIFIER    ::=    {id-avc
4}

END  -- EnhancedSecurity
```

This corrects the defects reported in defect report 9594/242.
Add size limit **SIZE (1..MAX)** to all optional **SET OF** and **SEQUENCE OF** constructs.

This corrects the defects reported in defect reports 9594/255.

*In 12.7.2 and in Annex A, change in the **CONTENT-RULE** information object class from:*

```
        &structuralClass                OBJECT-CLASS.&id  UNIQUE,
```

to:

```
        &structuralClass                OBJECT-CLASS              UNIQUE,
```

This corrects the defects reported in defect reports 9594/260.

*Update the **AttributeTypeAndDistinguishedValue** as shown:*

```
AttributeTypeAndDistinguishedValue  ::=  SEQUENCE  {
        type                        ATTRIBUTE.&id ({SupportedAttributes}),
        value                       ATTRIBUTE.&Type({SupportedAttributes}{@type}),
        primaryDistinguished            BOOLEAN DEFAULT TRUE,
        valuesWithContext           SET SIZE (1 .. MAX) OF SEQUENCE {
            distingAttrValue            [0]     ATTRIBUTE.&Type ({SupportedAttributes}{@type})
OPTIONAL,
            contextList                 SET SIZE (1 .. MAX) OF Context } OPTIONAL }
```

This corrects the defects reported in defect reports 9594/261.
Replace **CommonResults** with **CommonResultsSeq** in all ASN.1 constructs and in the import in Annex F.
In last paragraph of 26.5 (28.5 in addition 4) replace **CommonResults** with **CommonResultsSeq**.

This corrects the defects reported in defect reports 9594/267.
In NOTE 1 of 14.7.3, replace ITU-T Rec. X.680 | ISO/IEC 8824-1 with ITU-T Rec. X.682 | ISO/IEC 8824-3
Replace NOTE 1 in 14.7.10 with a copy of NOTE 1 in 14.7.3, but keep the last sentence.
In 25.2, swap Figure 19 and 20, but not the figure text.
In 22.2.1.2, make the **superiorKnowledge** attribute multi-valued and return to the old syntax (**AccessPoint**).

This corrects the defects reported in defect reports 9594/269.

In 12.5.2, item a), replace:

rule is applied to;

with:

...rule is applied to unless the matching rule specifies otherwise;

In 14.7.3 add **OPTIONAL** *to the **information** component of **MatchingRuleDescription**.*

Recommendation X.511 (1997) | ISO/IEC 9594-3:1998

Information processing systems - Open Systems Interconnection - The Directory - Abstract Service Definition

TECHNICAL CORRIGENDUM 1
NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 1 and 2.

Defect reports resolved by Draft Technical Corrigendum 1
(defect reports 166, 179, 188, 202, 206, 217)

This corrects the defects reported in defect report 9594/166.

Clause 7.11.1.1 Alias derefencing

Change the second last sentence of first paragraph of 7.11.1.1 the following way:

If the DSA chains the request to another DSA and receives back a referral from it, then the access controls shall be applied to the referral if the targetObject in the referral is the same as in the chained request.

This corrects the defects reported in defect report 9594/179.

Annex B, Figure B-4

In the flow chart "return of DN" add under the question "alias name available?/No" an additional question :

"Read operation?"

with the following outputs :

Yes : Name Error
No : *go to next question : "entry corresponds to (base) object of DAP operation?*

Annex B, Figure B-5

In the flow chart "Read Operation" change on the right part the text of the last step of handling "selection empty = yes"
from "return Read result" *to* "return Read result or nameError".

This corrects the defects reported in defect report 9594/188.

Clause 11.1.5 Add operation decision points for basic-access-control, bullet 3) , note 2

Reword the note 2 to read:

"The Add permission must be provided as prescriptiveACI when attempting to add an entry and as prescriptiveACI or subentryACI when attempting to add a subentry."

This corrects the defects reported in defect report 9594/202.

Clause 7.10 Security Parameters

Replace the paragraph describing ***CertificationPath*** *with the following*

The **CertificationPath** component is a sequence containing the signer's user certificate, and, optionally, a sequence of one or more certification authority (CA) certificates. (See clause 8 in ITU-T Rec. X.509 | ISO/IEC 9594-8). The user certificate is used to bind the signer's public key and distinguished name, and may be used to verify the signature on a request argument, response, or error. This parameter shall be present and contain the signer's user certificate if the request argument, response, or error is signed. Additional certificates may be present and may be used to determine if the signer's user certificate is valid. Additional certificates are not required if the recipient shares the same certification authority as the signer. If the recipient requires a certification path for validation, and an acceptable parameter is not present, whether the recipient rejects the signature, or attempts to determine a certification path, is a local matter.

Replace the paragraph describing ***time*** *with the following*

The **time** is the intended expiry time for the validity of the request, response, or error. It is used in conjunction with the random number to enable the detection of replay attacks.

Replace the 1st paragraph describing ***random*** *with the following*

The **random** value is a number that should be different for each request, response, or error. It is used in conjunction with the time parameter to enable the detection of replay attacks. If sequence integrity is required then the random argument may be used to carry a sequence integrity number as follows: …

Defect reports resolved by Draft Technical Corrigendum 2

(covering resolution to defect report 211)

This corrects the defects reported in defect report 9594/206.

Clause 10.1.3 List results

In the second last paragraph of the clause, change the first part of the first sentence ("When a DUA has requested a protection request of signed, the uncorrelatedListInfo prameter…") the following way :

"When the DUA has requested a protection request of signed, or if the Directory for other reasons are not able to correlate information, the **uncorrelatedListInfo** parameter..."

This corrects the defects reported in defect report 9594/217.

Clause 7.10 Security parameters

a) Replace syntax for operationCode in SecurityParameters to be:

```
operationCode [6] Code OPTIONAL
```

Code *should be imported from:*
Remote-Operations-Information-Objects
{joint-iso-ccitt remote-operations(4) informationObjects(5) version1(0)}

and in the paragraph describing **operationCode** *delete* "object identifier". *Also, at end of same paragraph change* "or results" *to* ", results or errors".

b) Add to the SecurityParameters syntax:

```
errorCode        [9]      Code OPTIONAL
```

and add the following description:

The **errorCode** is used to secure the error code where an error is returned in response to an operation.

(defect reports 211)

This corrects the defects reported in defect report 9594/211.

Clause 7.10

Change ***UTCTime*** *to* ***Time****:*

Insert the following after the ASN.1 definition of ***ProtectionRequest***

```
Time ::= CHOICE {
            utcTime          UTCTime,
            generalizedTime  GeneralizedTime  }
```

Insert the following after the last paragraph of 7.10 .

If the syntax of **Time** has been chosen as the **UTCTime** type, the value of the two-digit year field shall be rationalized into a four-digit year value as follows:

— If the 2-digit value is 00 through 49 inclusive, the value shall have 2000 added to it.

- If the 2-digit value is 50 through 99 inclusive, the value shall have 1900 added to it.

Note — **GeneralizedTime** shall be used if the negotiated version is **v2** or greater. The use of **GeneralizedTime** when **v1** has been negotiated may prevent interworking with implementations unaware of the possibility of choosing either **UTCTime** or **GeneralizedTime**. It is the responsibility of those specifying the domains in which this Directory Specification will be used, e.g. profiling groups, as to when the **GeneralizedTime** may be used. In no case shall **UTCTime** be used for representing dates beyond 2049.

Clause 8.1.1

Change the value of ***validity*** *in the ASN.1 type* ***SimpleCredentials*** *to*

```
validity    [1]       SET {
        validityPeriod        CHOICE  {
                              COMPONENTS OF ValidityPeriodUTC,  -- UTC when v1
                              COMPONENTS OF ValidityPeriodGT },  -- GT when > v1
        random1     [2]       BIT STRING  OPTIONAL,
        random2     [3]       BIT STRING  OPTIONAL} OPTIONAL,
```

Insert the following after the ASN.1 type ***SimpleCredentials*** *to*

```
ValidityPeriodUTC         ::=       SET {
        time1       [0]       UTCTime OPTIONAL,
        time2       [1]       UTCTime OPTIONAL }
ValidityPeriodGT  ::=       SET {
        time1       [0]       GeneralizedTime OPTIONAL,
        time2       [1]       GeneralizedTime OPTIONAL }
```

Clause 8.1.2

Insert the following after the second paragraph.

Note — **ValidityPeriodGT** shall be used if the negotiated version is **v2** or greater. The use of **ValidityPeriodGT** when **v1** has been negotiated may prevent interworking with implementations unaware of the possibility of choosing either **ValidityPeriodUTC** or **ValidityPeriodGT**. It is the responsibility of those specifying the domains in which this Directory Specification will be used, e.g. profiling groups, as to when the **ValidityPeriodGT** may be used. In no case shall **ValidityPeriodUTC** be used for representing dates beyond 2049.

Change the value of ***time*** *in the ASN.1 type* ***Token*** *to*

```
        time        [2]       Time,
```

Also make theASN.1 changes to Annex A.

Recommendation X.511 (1997) | ISO/IEC 9594-3:1998 Technical Corrigendum 2

NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 3, 4, and 5.

Defect reports covered by Draft Technical Corrigendum 3

(Covering resolutions to defect reports 231 and 232)

This corrects the defects reported in defect report 9594/231.
This technical corrigendum makes modifications to technical corrigendum 2.
Instead of the ASN.1 suggested in corrigendum 2, use the following data type:

```
SimpleCredentials ::= SEQUENCE {
        name            [0]     DistinguishedName,
        validity        [1]     SET {
                time1                   [0]     CHOICE {
                  utc                   UTCTime,
                  gt                    GeneralizedTime } OPTIONAL,
                time2                   [1]     CHOICE {
                  utc                   UTCTime,
                  gt                    GeneralizedTime } OPTIONAL,
                random1                 [2]     BIT STRING  OPTIONAL,
                random2                 [3]     BIT STRING  OPTIONAL },
        password                [2]     CHOICE {
                unprotected                     OCTET STRING,
                protected                               SIGNATURE {OCTET STRING} } OPTIONAL}
```

Change the notes suggested for 7.10 and 8.1.1 to normative text.

This corrects the defects reported in defect report 9594/232.
General:

Change all occurrences of **joint-iso-ccitt** to **joint-iso-itu-t**

In "7.2 Information types defined elsewhere":

Replace **OPTIONALLY-SIGNED** with **OPTIONALLY-PROTECTED** and **OPTIONALLY-PROTECTED-SEQ**

In annex A:

add **basicAccessControl** and **enhancedSecurity** to the import from **UsefulDefinitions**

Add a new import:

```
AttributeTypeAndValue
  FROM BasicAccessControl  basicAccessControl
```

Add **ENCRYPTED** to the import from **AuthenticationFramework**

Move the semicolon from the end of the import from **Remote-Operations-Generic-ROS-PDUs** to the end of import from **SpkmGssTokens**.

In the import from **SpkmGssTokens**, change **SPKM-REP-IT** to **SPKM-REP-TI**

Defect reports covered by Draft Technical Corrigendum 4

(Covering resolutions to defect reports 247)

This corrects the defects reported in defect report 9594/247.
In the Introduction, change from:

Annex B, which is an integral part of this Recommendation | International Standard, ..

to:

Annex B, which is not an integral part of this Recommendation | International Standard, ..

In 7.4, add the following construct and explanatory note after **CommonResults**:

```
CommonResultsSeq ::= SEQUENCE {
    securityParameters      [30]  SecurityParameters      OPTIONAL,
    performer               [29]  DistinguishedName       OPTIONAL,
    aliasDereferenced       [28]  BOOLEAN
    DEFAULT FALSE }
```

NOTE – **CommonResults** and **CommonResultsSeq** consist of the same components. The former is used when included in set types by the **COMPONENT OF** type, while the latter is used similarly in sequenced types.

In the **AbandonResult**, **AddEntryResult**, **RemoveEntryResult**, **ModifyEntryResult** and **ModifyDNResult** change **CommonResults** to **CommonResultsSeq**

Defect reports covered by Draft Technical Corrigendum 5

(Covering resolutions to defect reports 224, 228, 242, and 263)

This corrects the defects reported in defect report 9594/224.

In subclause 7.8, change "undefined" *to* "UNDEFINED" *in all places to indicate parity with "TRUE" and "FALSE" for the three-valued logic defined in this subclause.*

In subclause 7.8.2, add to the end of 3rd paragraph:

When these conditions are not met, the **FilterItem** shall evaluate to the logical value UNDEFINED.

Delete NOTE 1 and change NOTE 2 (which is now NOTE 1) to:

NOTE 1 – Access control restrictions may affect the evaluation of the **FilterItem** and may cause the **FilterItem** to evaluate to UNDEFINED.

Insert new paragraph after the new NOTE 1:

An assertion which is defined by these conditions additionally evaluates to UNDEFINED if it relates to an attribute value and the attribute type is not present in an attribute against which the assertion is being tested. An assertion which is defined by these conditions and relates to the presence of an attribute type evaluates to FALSE.

This corrects the defects reported in defect report 9594/228.

Delete any occurrence of

DIRQOP.&…-QOP{@dirqop} ,

In 9.3, change **OPTIONALLY-PROTECTED** *to* **OPTIONALLY-PROTECTED-SEQ** *in both* ***AbandonArgument*** *and* ***AbandonResult***.

In 11.1.1, change **PROTECTED** *to* **OPTIONALLY-PROTECTED-SEQ** *in* ***AddEntryResult***.

In 12.1.1, change **PROTECTED** *to* **OPTIONALLY-PROTECTED-SEQ** *in* ***RemoveEntryResult***.

In 13.1.1, change **OPTIONALLY-PROTECTED** *to* **OPTIONALLY-PROTECTED-SEQ** *in* ***ModifyEntryResult***.

In 14.1.1, change **OPTIONALLY-PROTECTED** *to* **OPTIONALLY-PROTECTED-SEQ** *in* ***ModifyDNResult***.

In Annex A, make the changes as indicated above.

In Annex A, delete

```
PROTECTED
    FROM Notation { joint-iso-itu-t genericULS (20) modules (1) notation (1) }
```

In Annex A, add **OPTIONALLY-PROTECTED-SEQ** *to and delete* **DIRQOP** *from the import from* ***EnhancedSecurity***.

This corrects the defects reported in defect report 9594/242.
Add size limit **SIZE (1..MAX)** to all optional **SET OF** and **SEQUENCE OF** constructs.

This corrects the defects reported in defect report 9594/263.
Change the last sentence of the second to the paragraph of 7.1 to:

> Each of the subclauses 7.3 through 7.10 identifies and defines an information type.

Delete NOTE 1 in 8.1.2.

Change the third paragraph of 8.1.2 to:

> **GeneralizedTime** shall be used for **time1** and **time2** if the negotiated version is **v2** or greater. The use of **GeneralizedTime** when **v1** has been negotiated may prevent interworking with implementations unaware of the possibility of choosing either **UTCTime** or **GeneralizedTime**. It is the responsibility of those specifying the domains in which this Directory Specification will be used, e.g. profiling groups, as to when the **GeneralizedTime** may be used. **UTCTime** shall not be used for representing dates beyond 2049.

Recommendation X.518 (1997) | ISO/IEC 9594-4:1998

Information processing systems - Open Systems Interconnection - The Directory - Procedures for Distributed Operation

TECHNICAL CORRIGENDUM 1
NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 1 and 2.

Defect reports resolved by Draft Technical Corrigendum 1
(defect reports 157, 159, 162, 180, 190, 198, 206, 209)

This corrects the defects reported in defect report 9594/157.

Clause 19.1.4 Modify DN operation

After the first paragraph of bullet 9), add the new paragraph:

"If the entry, alias entry or subentry was within the UnitOfReplication of one or more shadowing agreements held by the DSA, and the superior of the renamed entry, alias entry or subentry is not within this UnitOfReplication, the shadow consumers shall be updated using the procedures of the Directory shadow service specified in ITU-T Rec. X.525|ISO/IEC 9594-9; in this case the shadowed entry and all its subordinates shall be removed.

If the entry, alias entry or subentry was not within the UnitOfReplication of one or more shadowing agreements held by the DSA, and the renamed entry, alias entry or subentry is now within this UnitOfReplication, the shadow consumers shall be updated using the procedures of the Directory shadow service specified in ITU-T Rec. X.525|ISO/IEC 9594-9; in this case the shadowed entry and all its subordinates shall be shadowed."

This corrects the defects reported in defect report 9594/159.

Clause 19.3.2.2.1 Search procedure (I) , 1) b) i)

Replace the whole text of the clause 19.3.2.2.1 1) b) i) with the following text:

i) If **e** is unsuitable, make a **continuationReference** as follows and add it to **SRContinuationList**:
- **targetObject** set to the DN of DSE e
- **operationProgress** with **nameResolutionPhase** set to **proceeding** and **nextRDNtoBeResolved** set to the number of RDNs in e

- all other components of **continuationReference** are unchanged

Then return.

In the note following clause 19.3.2.2.1.1) b) i), remove the brackets with their content.

Clause 18.3.1 Find DSE procedure

Delete in step 9) the first paragraph and the Note 3

This corrects the defects reported in defect report 9594/162.

Clause 20.4.5 APInfo procedure, 5) b) second last dash

*Replace "***chainingArguments.exclusions** absent*" by the following text:*

"**chainingArguments.exclusions** is set to either the relevant exclusions for the current target object if called by the Search Continuation Reference procedure, or absent if the APInfo procedure was called by the Name Resolution or the List Continuation procedures."

This corrects the defects reported in defect report 9594/180.

Clause 10.3 Chaining Arguments

Drop bullet g) which is a duplicate of o) and renumber the following clauses. Modify the order of m) n) and) o to o), n) m) which will become with the renumbering :

l) The **entryOnly** ...
m) **uniqueIdentifier**...
n) **authenticationLevel**...

This corrects the defects reported in defect report 9594/190.

Clause 19.3.1.2.2 List procedure (II), step 1b

In bullet 1) add a new step before a) and renumber the following steps:

a) If e´ is not an entry or alias, continue with the next immediate subordinate.
b) Check ACI ...

This corrects the defects reported in defect report 9594/198.

Clause 17.3.3.1 DUA request

Insert two new clauses e) and f) into 17.3.3.1 after bullet d) and renumber the existing e), f), g) to g),h),I) to read:

d) **ChainingArguments.AuthenticationLevel** and **ChainginArgument.UniqueID** are set according to the local security policy.

e) **ChainingArguments.nameResolveOnMaster** is copied from **CommonArguments.nameResolveOnMaster**.

f) **ChainingArguments.exclusions, ChainingArguments.entryOnly** and **ChainingArguments.referenceType** are copied from **CommonArguments.exclusions, CommonArguments.entryOnly** and **CommonArguments.referenceType** if they are present, otherwise they are omitted.

g) If the **manageDSAIT** option is set …

.
This corrects the defects reported in defect report 9594/206.

Clause 21 Results Merging procedure

Add the following note after bullet 6) :

> "Note : In case a DSA receives search or list results from other DSAs and such results have parameters unknown to the DSA, the uncorrelated results shall be returned. Otherwise, the DSA shall perform merging, if the search results are not signed.
>
> A DSA which received unsigned, uncorrelated results from a DSA not able to perform consolidation, shall perform merging, if it has the proper knowledge of all parameters of the uncorrelated results."

This corrects the defects reported in defect report 9594/209.

Clause 12.1 Chained operations and Annex A

Modify as follows the ASN.1 of ERRORS :

ERRORS {operation.&Errors Except referrall dsaReferral}

Defect reports resolved by Draft Technical Corrigendum 2

(defect reports 211)

This corrects the defects reported in defect report 9594/211.

Clause 10.3

*Change **timeLimit** in **ChainingArguments** to:*

```
timeLimit    [9]        Time OPTIONAL,
```

*Insert the following after the ASN.1 definition of **ChainingArugments***

```
Time ::= CHOICE {
            utcTime          UTCTime,
            generalizedTime    GeneralizedTime  }
```

Add the following to k):

Before a value of **Time** is used in any comparison operation and if the syntax of **Time** has been chosen as the **UTCTime** type, the value of the two-digit year field shall be rationalized into a four-digit year value as follows:

— If the 2-digit value is 00 through 49 inclusive, the value shall have 2000 added to it.

■ If the 2-digit value is 50 through 99 inclusive, the value shall have 1900 added to it.

Note — The use of **GeneralizedTime** may prevent interworking with implementations unaware of the possibility of choosing either **UTCTime** or **GeneralizedTime**. It is the responsibility of those specifying the domains in which this Directory Specification will be used, e.g. profiling groups, as to when the **GeneralizedTime** may be used. In no case shall **UTCTime** be used for representing dates beyond 2049.

Also make theASN.1 changes to Annex A.

Recommendation X.518 (1997) | ISO/IEC 9594-4:1998 Technical Corrigendum 2

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 3, 4, and 5.

Defect reports covered by Draft Technical Corrigendum 3

(Covering resolutions to defect report 233 and 235)

This corrects the defects reported in defect report 9594/233.

In annex A:

Change all occurrences of **joint-iso-ccitt** to **joint-iso-itu-t**
add **enhancedSecurity** to the import from **UsefulDefinitions**
Add a semicolon to the end of import from **DirectoryAccessProtocol**.

This corrects the defects reported in defect report 9594/235.

Change 10.8 as follows:

10.8 Access point information

An **AccessPointInformation** value identifies one or more access points to the Directory.

```
AccessPointInformation ::= SET {
    COMPONENTS OF          MasterOrShadowAccessPoint,
    additionalPoints       [4]    SET OF MasterAndOrShadowAccessPoints OPTIONAL }
```

In the case of 1988 edition DSAs producing an **AccessPointInformation** value, the optional component of the set is absent. In the case of 1988 edition DSAs interpreting an **AccessPointInformation** value, any **MasterAndShadowAccessPoints** values present isare ignored.

In the case of post-1988 edition DSAs, the **MasterOrShadowAccessPoint** value component produced for an **AccessPointInformation** value may be of category master or shadow, as determined by the knowledge selection procedure of the DSA producing the value. It may be viewed as a suggested access point provided by the DSA generating the value to the DSA receiving it. A set of **MasterAndShadowAccessPoints** values may optionally also be produced for an **AccessPointInformation** value. This constitutes additional information which may be employed by the receiving DSA's knowledge selection procedure to determine an alternative access point.

Change the ASN.1 in Annex A

Defect reports covered by Draft Technical Corrigendum 4

(Covering resolutions to defect report 234 and 248)

This corrects the defects reported in defect report 9594/234.

Delete the last sentence of 15.3.1 ("If protection is performed on the arguments, request decomposition shall not be used.")

This corrects the defects reported in defect report 9594/248.

In 25.1.4 and in Annex D replace:

```
NHOBSubordinateToSuperior  ::=  SubordinateToSuperior (
      WITH COMPONENTS { ..., alias ABSENT, entryInfo ABSENT})
```

with:

```
NHOBSubordinateToSuperior  ::= SEQUENCE {
      accessPoints          [0]     MasterAndShadowAccessPoints OPTIONAL,
      subentries            [3]     SET OF SubentryInfo OPTIONAL }
```

Defect reports covered by Draft Technical Corrigendum 5

(Covering resolutions to defect report 228, 242 and 265)

This corrects the defects reported in defect report 9594/228.

Delete the last paragraph of 16.3.9 and clause 21.

Delete any occurrence of

DIRQOP.&…-QOP{@dirqop},

Add to the start of 15.5.5:

Warning – This subclause refers to specifications that have been deprecated with respect to encryption. Signing of requests is not deprecated.

In Annex A, remove the **DIRQOP** *from the import*

This corrects the defects reported in defect report 9594/242.
Add size limit **SIZE (1..MAX)** to all optional **SET OF** and **SEQUENCE OF** constructs.

This corrects the defects reported in defect report 9594/265.
In 14.5, first paragraph, replace subordinate DSA *with* those DSAs.

Add a new paragraph and a note to the end of 15.3.1:
The **argument** of a chained request (see 12.1) or subrequest shall be the unmodified operation argument if the operation was initiated by a DUA. A DSA receiving a chained request shall not change **argument** when doing request decomposition.

NOTE – The following subclauses specifies that requirement for individual components of **argument**. This should not be interpreted to mean that component not explicitly mentioned can be changed.

In the start of the last paragraph of 15.5.2, add after "If a DSA encounters an extension": it does not support. *Change* execution phase *to* evaluation phase.

Delete 19.3.1.1.3.

Recommendation X.519 (1997) | ISO/IEC 9594-5:1998

Information processing systems - Open Systems Interconnection - The Directory - Protocol Specifications

TECHNICAL CORRIGENDUM 1

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 1.

Defect reports resolved by Draft Technical Corrigendum 1

This corrects the defect reported in defect report 9594/221.

Clause 9 Conformance

9.1 Conformance by DUAs

9.1.1 Statement Conformance

Add to 9.1.1 b)
and whether conformance for signed operations is claimed.

Add the following clause:
9.1.1 e) If conformance is claimed for strong authentication, signed operations, or protected operations, identification of the Certificate and CRL extensions for which conformance is claimed.

9.1.2 Static Conformance

Add the following clause:
9.1.2 d) conform to clause 12 of ISO/IEC 9594-8 | ITU-T Rec.X.509 for the Certificate and CRL extensions for which conformance was claimed in clause 9.1.1 e.

9.2 Conformance by DSAs

9.2.1 Statement Conformance

Add to 9.2.1 e):
and whether conformance for signed operations is claimed.

Add the following clause:
9.2.1 ad) If conformance is claimed for strong authentication, signed operations, or protected operations, identification of the Certificate and CRL extensions for which conformance is claimed.

9.2.2 Static Conformance

Add the following clause:

9.2.2 x) conform to clause 12 of ISO/IEC 9594-8 | ITU-T Rec.X.509 for the Certificate and CRL extensions for which conformance was claimed in 9.2.1 ad).

Recommendation X.519 (1997) | ISO/IEC 9594-5:1998 Technical Corrigendum 2

NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 2 and 3.

Defect reports covered by Draft Technical Corrigendum 2

(Covering resolutions to defect report 236)

This corrects the defects reported in defect report 9594/236.

In Annex A, B, C, D imports:

Change **Remote-Operations-Realisations** and **realisations(8** or **9)** to **Remote-Operations-Realizations** and **realizations(9)**

Change

{joint-iso-ccitt remote-operations(4) remote-Operations-Abstract-Syntaxes(12) version1(0)}

to

{joint-iso-itu-t remote-operations(4) remote-operations-abstract-syntaxes(12) version1(0)}

In Annex A:

In the **DAP-Invokable OPERATION** construct replace **addEtry** with **addEntry**

In Annex C.

Replace **InvokeID** with **InvokeId**

In Annex D:

Change the object identifier for the module to:

{joint-iso-itu-t ds(5) module(1) dop(17) 3}

Annex G:

Changes to Annex G have been subsumed by the resolution to Defect Report 228.

Defect reports covered by Draft Technical Corrigendum 3

(Covering resolutions to defect report 228, 242 and 266)

This corrects the defects reported in defect report 9594/228.

In the **Introduction**, *delete the second last paragraph and change* Annex H *to* Annex G *in the last paragraph.*

In 2.1, delete references to Generic upper layers security

In clause 4, delete the GULS and SESE abbreviations.

Delete the last paragraph of 6.1.

In 6.7.3:

In the 3rd paragraph, delete "but not SESE".

In the 4th paragraph, replace "If the RTSE and SESE are both" *with* "If the RTSE is".

Delete the 5th and 6th paragraph including the two letter-numbered lists.

In 6.7.4:

In the 5th paragraph, delete "but not SESE".

In the 6th paragraph, replace "If the RTSE and SESE are both" *with* "If the RTSE is".

Delete the 7th and 8th paragraphs.

Delete 6.7.5

In 8.1.1, delete last paragraph.

In 8.1.1.1.2:

Delete in the first paragraph "if SESE is not used".
Delete last paragraph including its letter numbered list.

In 8.1.1.1.4, delete the last paragraph.

Delete 8.1.3.

In 8.2.1.1.2:
Delete "If SESE is not used,"
Delete the second (last) paragraph.

In 8.2.1.1.4:
Delete the single paragraph in this subclause.
Add a new paragraph instead:
The initiator of the association shall supply the Presentation Context Definition List in the **RT-OPEN** request primitive which shall contain the ACSE abstract-syntax (**id-as-acse**) and the DISP abstract-syntax that includes the RTSE (**id-as-directoryReliableShadowAS**).

Delete 8.2.3.

In 9.1.1:
In item a), delete "or **directoryAccessWith2or3seAC**"
Delete item e) and renumber next item.
In 9.1.2, item a), delete "or **directoryAccessWith2or3seAC**"

In 9.1.3, replace item a) with:

a) shall conform to the mapping onto the used service defined in clause 8 or clause 10 or both; and

In 9.2.1:
In item a), delete "**directoryAccessWith2or3seAC**, **directorySystemWith2or3seAC**,".
In item d), delete "or **directorySystemWith2or3seAC**".
In 9.2.3:
In item c), delete "or **directoryAccessWith2or3seAC**".
In item d), delete "or **directorySystemWith2or3seAC**".
In 9.3.1, item a), delete "**shadowSupplierInitiatedWith2or3seAC**, and **shadowConsumerInitiatedWith2or3seAC**".
In 9.4.1, item a), delete "**shadowSupplierInitiatedWith2or3seAC**, and **shadowConsumerInitiatedWith2or3seAC**".
In Annex A:
Remove **directorySecurityExchanges** *import from* **UsefulDefinitions.**
Delete the **id-ac-directoryAccessWith2or3seAC** *import from* **ProtocolObjectIdentifiers**
Delete the import from **directorySecurityExchanges.**
Delete the **directoryAccessWith2or3seAC** *application-context.*
In Annex B:
Remove **directorySecurityExchanges** *import from* **UsefulDefinitions.**
Delete the **id-ac-directorySystemWith2or3seAC** *import from* **ProtocolObjectIdentifiers**
Delete the import from **directorySecurityExchanges.**
Delete the **directorySystemWith2or3seAC** *application-context.*
In Annex C:
Remove **directorySecurityExchanges** *import from* **UsefulDefinitions.**
Delete the **id-ac-shadowSupplierInitiatedWith2or3seAC**, **id-ac-shadowConsumerInitiated-With2or3seAC**, **id-ac-reliableShadowSupplierInitiatedWith2or3seAC** *and* **id-ac-reliableShadowConsumerInitiatedWith2or3seAC** *imports from* **ProtocolObjectIdentifiers**
Delete the import from **directorySecurityExchanges.**
Delete the **shadowSupplierInitiatedWith2or3seAC**, **shadowConsumerInitiatedWith2or3seAC**, **reliableShadowSupplierInitiatedWith2or3seAC** *and* **reliableShadowConsumerInitiatedWith2or3seAC** *application-contexts.*

In Annex D:

Remove **directorySecurityExchanges** *import from* **UsefulDefinitions.**
Delete the **id-ac-directoryOperationalBindingManagementWith2or3seAC** *import from* **ProtocolObjectIdentifiers**
Delete the import from **directorySecurityExchanges**.
Delete the **directoryOperationalBindingManagementWith2or3seAC** *application-context*.

In Annex E:

Delete the **id-se** *import from* **UsefulDefinitions**
Delete the object identifiers **id-se-threewayse** and **id-se-spkmthreewayse**.

Delete Annex G and rename Annex H to Annex G.

This corrects the defects reported in defect report 9594/242.
Add size limit **SIZE (1..MAX)** to all optional **SET OF** and **SEQUENCE OF** constructs.

This corrects the defects reported in defect report 9594/266.
Reinstate the 9.1.1, item c) from edition 2 and changed the current item to d). Disregard the updates to 9.1.1 b) and 9.2.1 e) as required by Technical Corrigendum 1 to ITU-T Rec. X.519 (1997) | ISO/IEC 9594-5 : 1998.

Recommendation X.520 (1997) | ISO/IEC 9594-6:1998

Information processing systems - Open Systems Interconnection - The Directory - Selected Attribute Types

TECHNICAL CORRIGENDUM 1

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigendum 1.

Defect reports resolved by Draft Technical Corrigendum 1
(defect report 211)

This corrects the defects reported in defect report 9594/211.

Clause 6.3.2

Add the following to the last paragraph

The value of the two-digit year field shall be rationalized into a four-digit year value as follows:

- If the 2-digit value is 00 through 49 inclusive, the value shall have 2000 added to it.
- If the 2-digit value is 50 through 99 inclusive, the value shall have 1900 added to it.

Recommendation X.520 (1997) | ISO/IEC 9594-6:1998 Technical Corrigendum 2

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 2 and 3.

Defect reports covered by Draft Technical Corrigendum 2

(Covering resolutions to defect report 228, 237, 238 and 241)

This corrects the defects reported in defect report 9594/228.
In Annex C, add:

ub-privacy-mark-length INTEGER ::= 128

This corrects the defects reported in defect report 9594/237.
In 5.2.1:

Replace the attribute definition with:

```
name ATTRIBUTE  ::=     {
        WITH SYNTAX                 DirectoryString {ub-name}
        EQUALITY MATCHING RULE                  caseIgnoreMatch
        SUBSTRINGS MATCHING RULE                caseIgnoreSubstringsMatch
        ID          id-at-name }
```

In 5.2.9:

The upper bound shall be **ub-serial-number** and the object identifier shall be **id-at-serialNumber**.

In 7.3:

Change **localeContextSyntax** to **LocaleContextSyntax** two places and remove the two spaces between "**::**" and **=**.
Add **{ub-locale-context-syntax}** after **DirectoryString**
The same changes have to be made to Annex A.
In Annex C add **ub-locale-context-syntax INTEGER ::= 128** to the end of the list.

In Annex A:

Remove **TeletexNonBasicParameters** from the import from **MTSAbstractService**
Remove one occurrence of **ub-name** from the import from **UpperBounds**
Add **CONTEXT** to the import from **InformationFramework**
In the **FacsimileTelephoneNumber** type definition, add a comma after **TelephoneNumber.**
In the **x121Address** attribute type definition, replace **X121.Address** with **X121Address**
In **X121Address ::= NumericString (SIZE(1 ub-x121-address))** change the two spaces in the size specification to points, i.e. **SIZE(1..ub-x121-address)**
Add a right curly parenthesis at the end of the **languageContext** context definition.
Add a right curly parenthesis in the **Period** type as shown:

```
bitDay      BIT STRING { sunday (0), monday (1), tuesday (2),
                wednesday (3), thursday (4), friday (5), saturday (6) },
```

In the **NamedDay** type, replace **ENUMARATED** with **ENUMERATED**.
Add two hypens to the start of the second line of
-- id-at-encryptedTeletexTerminalIdentifier.
Add two hypens to the start of both lines of
-- id-at-encryptedTeletexTerminalIdentifier

In Annex C

:Change the last component of the object identifier for the module from **2** to **3**

The last occurrence **ub-name** shall be changed to **ub-surname**

This corrects the defects reported in defect report 9594/238.
In Clause 6.1.1 change in the first paragraph from:

attribute value of type **PrintableString**, **NumericString**, **TeletexString**, **BMPString**, **UniversalString**, or **DirectoryString**

to:

attribute value of type **DirectoryString** and each data type appearing in the choice type **DirectoryString**, e.g. **UTF8String.**

In Clause 6.1.2 - 6.1.6 change in the first paragraph from:

attribute value whose type is one of the ones listed in 6.1.1

to:

attribute value of type **DirectoryString** and each data type appearing in the choice type **DirectoryString**, e.g. **UTF8String.**

This corrects the defects reported in defect report 9594/241.
In 5.2.9

Replace “of a device” with “of an object”

Defect reports covered by Draft Technical Corrigendum 3

(Covering resolutions to defect report 270)

This corrects the defects reported in defect report 9594/270.

*In 5.8.1, replace **caseIgnoreListMatch** matching rule with:*

```
preferredDeliveryMethod  ATTRIBUTE  ::= {
      WITH SYNTAX               PreferredDeliveryMethod
      SINGLE VALUE              TRUE
      ID                  id-at-preferredDeliveryMethod }

PreferredDeliveryMethod  ::=  SEQUENCE OF INTEGER {
            any-delivery-method (0),
            mhs-delivery        (1),
            physical-delivery           (2),
            telex-delivery              (3),
            teletex-delivery            (4),
            g3-facsimile-delivery (5),
            g4-facsimile-delivery (6),
            ia5-terminal-delivery (7),
            videotex-delivery     (8),
            telephone-delivery    (9) }
```

*In 6.1.10, replace **caseIgnoreListMatch** matching rule with:*

```
      caseIgnoreListMatch  MATCHING-RULE  ::= {
            SYNTAX      CaseIgnoreList
            ID          id-mr-caseIgnoreListMatch }

      CaseIgnoreList  ::=  SEQUENCE OF DirectoryString {ub-match}
```

Recommendation X.521 (1997) | ISO/IEC 9594-7:1998

Information processing systems - Open Systems Interconnection - The Directory – Selected object classes

TECHNICAL CORRIGENDUM 1

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigendum 1.

Defect reports resolved by Draft Technical Corrigendum 1

(Covering resolutions to defect report 239)

This corrects the defects reported in defect report 9594/239.
Add **certificateExtensions** to the import from **UsefulDefinitions**
Remove **supportedAlgorithms** and **deltaRevocationList** from the import from **AuthenticationFramework**
Add a new import:

```
supportedAlgorithms, deltaRevocationList
        FROM CertificateExtensions certificateExtensions   ;
```

Recommendation X.509 (1997) | ISO/IEC 9594-8:1998

Information processing systems - Open Systems Interconnection - The Directory - Authentication framework

TECHNICAL CORRIGENDUM 1

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 3, 4, 5, and 7.

Defect reports resolved by Draft Technical Corrigendum 3

(defect reports 200, 201, 212, 213, 218, and 220)

This corrects the defects reported in defect reports 9594/200.

Clause 12.6.2

Add the following at the end of the paragraph beginning with "If this extension is flagged critical":

"Where the distribution points are used to distribute CRL information for all revocation reason codes and all certificates issued by the CA include the **crlDistributionPoint** as a critical extension, the CA is not required to also publish a full CRL at the CA entry".

This corrects the defects reported in defect reports 9594/201.

Clause 12.6.3.1

Move the second sentence of the second paragraph *"If this field is absent …CRL issuer*" to the first paragraph immediately before the sentence "*This field is defined as follows*".

Add a paragraph break following the relocated sentence, making "*This field is defined as follows*" as an independent paragraph immediately before the ASN.1.

This corrects the defects reported in defect reports 9594/212.

Clause 12.7.6

Add the following to clause 12.7.6

g) **authorityKeyIdentifier** matches if the value of this component in the stored attribute value equals that in the presented value; there is no match if the stored attribute value contains no authority key identifier extension or if not all components in the presented value are present in the stored attribute value;

This corrects the defects reported in defect reports 9594/213.

Clause 12.7.6 d

Replace the text of 12.7.6 d with the following:

"d) **reasonFlags** matches if any of the bits that are set in the presented value are also set in the **onlySomeReasons** components of the issuing distribution point extension of the stored attribute value; there is also a match if the stored attribute value contains no **reasonFlags** in the issuing distribution point extension, or if the stored attribute value contains no issuing distribution point extension;

Note: Even though a CRL matches on a particular value of **reasonFlags**, the CRL may not contain any revocation notices with that reason code."

This corrects the defects reported in defect reports 9594/218.
Clause 12.7.2 j)
Replace the text of 12.7.6 j with the following:

j) **policy** matches if at least one member of the **CertPolicySet** presented appears in the certificate policies extension in the stored attribute value; there is no match if there is no certificate policies extension in the stored attribute value;

This corrects the defects reported in defect reports 9594/220.
Clause 11.2 note 3
In Note 3, in the second sentence replace "*shall be absent*" with "*may be absent*".

In Note 3, at the beginning of the 3rd sentence, replace "*This may permit"* with *"If version is absent, this may permit"*

In Note 3, at the beginning of the 4th sentence, replace *"An implementation that supports version 2 (or greater) CRLs may"* with *"An implementation that supports version 2 (or greater) CRLs, in the absence of version, may also"*

Defect reports resolved by Draft Technical Corrigendum 4

(defect report 185)

This corrects the defects reported in defect reports 9594/185.

Clause 8

Add the following text immediately following the asn.1 for certificatePair

The **cACertificate** attribute of a CA's directory entry shall be used to store self-issued certificates (if any) and certificates issued to this CA by CAs in the same realm as this CA.
The **forward** elements of the **crossCertificatePair** attribute of a CA's directory entry shall be used to store all, except self-issued certificates issued to this CA. Optionally, the **reverse** elements of the **crossCertificatePair** attribute, of a CA's directory entry may contain a subset of certificates issued by this CA to other CAs. When both the **forward** and the **reverse** elements are present in a single attribute value, issuer name in one certificate shall match the subject name in the other and vice versa, and the subject public key in one certificate shall be capable of verifying the digital signature on the other certificate and vice versa.
When a **reverse** element is present, the forward element value and the reverse element value need not be stored in the same attribute value; in other words, they can be stored in either a single attribute value or two attribute values.
In the case of v3 certificates, none of the above CA certificates shall include a **basicConstraints** extension with the **cA** value set to **FALSE**.
The definition of realm is purely a matter of local policy.

Also, replace Figure 4 with the following:

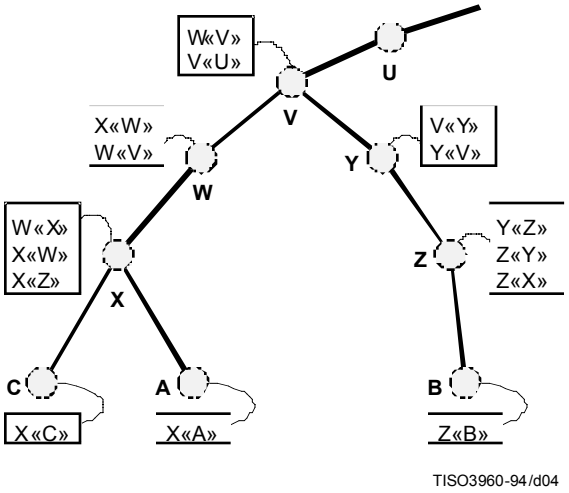


Figure 4: Certification path – hypothetical example

Defect reports resolved by Draft Technical Corrigendum 5

(defect reports 204)

This corrects the defects reported in defect reports 9594/204.

Clause 12.6.3.1

In the first sentence following the ASN.1, delete "unexpired"
Add the following as a new second sentence in the first paragraph following the ASN.1

"After a certificate appears on a CRL, it may be deleted from a subsequent CRL after the certificate's expiry."

Defect reports resolved by Draft Technical Corrigendum 7

(defect report 222)

This corrects the defects reported in defect report 222

Add the following to Section 12.1:

Certificate policy

The authentication framework contains three types of entity: the certificate user, the certification authority and the certificate subject (or end-entity). Each entity operates under obligations to the other two entities and, in return, enjoys limited warranties offered by them. These obligations and warranties are defined in a certificate policy. A certificate policy is a document (usually in plain-language). It can be referenced by a unique identifier, which may be included in the certificate policies extension of the certificate issued by the certification authority, to the end-entity and upon which the certificate user relies. A certificate may be issued in accordance with one or more than one policy. Definition of the policy, and assignment of the identifier, are performed by a policy authority. And the set of policies administered by a policy authority is called a policy domain. All certificates are issued in accordance with a policy, even if the policy is neither recorded anywhere nor referenced in the certificate. The standard does not prescribe the style or contents of the certificate policy.

The certificate user may be bound to its obligations under the certificate policy by the act of importing an authority public key and using it as a trust anchor, or by relying on a certificate that includes the associated policy identifier. The certification authority may be bound to ***its*** obligations under the policy by the act of issuing a certificate that includes the associated policy identifier. And, the end-entity may be bound to ***its*** obligations under the policy by the act of requesting and accepting a certificate that includes the associated policy identifier and by using the corresponding private key. Implementations that do not use the certificate policies extension should achieve the required binding by some other means.

For an entity to simply declare conformance to a policy does not generally satisfy the assurance requirements of the other entities in the framework. They require some reason to believe that the other parties operate a reliable implementation of the policy. However, if explicitly so stated in the policy, certificate users may accept the certification authority's assurances that its end-entities agree to be bound by their obligations under the policy, without having to confirm this directly with them. This aspect of certificate policy is outside the scope of the standard.

A certification authority may place limitations on the use of its certificates, in order to control the risk that it assumes as a result of issuing certificates. For instance, it may restrict the community of certificate users, the purposes for which they may use its certificates and/or the type and extent of damages that it is prepared to make good in the event of a failure on its part, or that of its end-entities. These matters should be defined in the certificate policy.

Additional information, to help affected entities understand the provisions of the policy, may be included in the certificate policies extension in the form of policy qualifiers.

Cross-certification

A certification authority may be the subject of a certificate issued by another certification authority. In this case, the certificate is called a cross-certificate, the certification authority that is the subject of the certificate is called the subject certification authority and the certification authority that issues the cross-certificate is called an intermediate certification authority (see Figure 1). Both the cross-certificate and the end-entity's certificate may contain a certificate policies extension.

The warranties and obligations shared by the subject certification authority, the intermediate certification authority and the certificate user are defined by the certificate policy identified in the cross-certificate, in accordance with which the subject certification authority may act as, or on behalf of, an end-entity. And the warranties and obligations shared by the certificate subject, the subject certification authority and the intermediate certification authority are defined by the certificate policy identified in the end-entity's certificate, in accordance with which the intermediate certification authority may act as, or on behalf of, a certificate user.

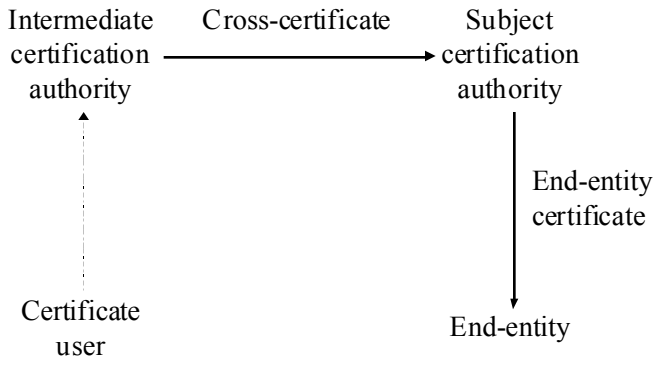


Figure 1 - Cross-certification

A certification path is said to be valid under the set of policies that are common to all certificates in the path.

An intermediate certification authority may, in turn, be the subject of a certificate issued by another certification authority, thereby creating certification paths of length greater than two certificates. And, since trust suffers dilution as certificate paths grow in length, controls are required to ensure that end-entity certificates with an unacceptably low associated trust level will be rejected by the certificate user. This is part of the function of the certification path processing procedure.

In addition to the situation described above, there are two special cases to be considered:

1. the certification authority does not use the certificate policies extension to convey its policy requirements to certificate users; and

2. the certificate user or intermediate certification authority delegates the job of controlling policy to the next authority in the path.

In the first case, the certificate should not contain a certificate policies extension at all. As a result, the set of policies under which the path is valid will be null. But the path may be valid nonetheless. Certificate users must still ensure that they are using the certificate in conformance with the policies of the authorities in the path.

In the second case, the certificate user or intermediate certification authority should include the special value *any-policy* in the *initial-policy-set* or cross-certificate. Where a certificate includes the special value *any-policy*, it should not include any other certificate policy identifiers. The identifier *any-policy* should not have any associated policy qualifiers.

The certificate user can ensure that all its obligations are conveyed in accordance with the standard by setting the *initial-explicit-policy* indicator. In this way, only authorities that use the standard certificate policies extension as their way of achieving binding are accepted in the path, and certificate users have no additional obligations. Because authorities also attract obligations when they act as, or on behalf of, a certificate user, they can ensure that all their obligations are conveyed in accordance with the standard by setting **requireExplicitPolicy** in the cross-certificate.

Policy mapping

Some certification paths may cross boundaries between policy domains. The warranties and obligations according to which the cross-certificate is issued may be materially equivalent to some or all of the warranties and obligations according to which the subject certification authority issues certificates to end-entities, even though the policy authorities under which the two certification authorities operate may have selected different unique identifiers for these materially equivalent policies. In this case, the intermediate certification authority may include a policy mappings extension in the cross-certificate. In the policy mappings extension, the intermediate certification authority assures the certificate user that it will continue to enjoy the familiar warranties, and that it should continue to fulfill its familiar obligations, even though subsequent entities in the certification path operate in a different policy domain. The intermediate certification authority should include one or more mappings for each of a subset of the policies under which it issued the cross-certificate, and it should not include mappings for any other policies. If one or more of the certificate policies according to which the subject certification authority operates is identical to those according to which the intermediate certification authority operates (i.e. it has the same unique identifier), then these identifiers should be excluded from the policy mapping extension, but included in the certificate policies extension.

Policy mapping has the effect of converting all policy identifiers in certificates further down the certification path to the identifier of the equivalent policy, as recognized by the certificate user.

Policies should not be mapped either to or from the special value *any-policy*.

Certificate users may determine that certificates issued in a policy domain other than its own should not be relied upon, even though a trusted intermediate certification authority may determine its policy to be materially equivalent to its own. It can do this by setting the *initial-policy-mapping-inhibit input* to the path validation procedure. Additionally, an intermediate certification authority may make a similar determination on behalf of its certificate users. In order to ensure that certificate users correctly enforce this requirement, it can set inhibitPolicyMapping in a policy constraints extension.

Certification path processing

The certificate user faces a choice between two strategies:

1. it can require that the certification path be valid under at least one of a set of policies pre-determined by the user; or

2. it can ask the path validation module to report the set of policies for which the certification path is valid.

The first strategy may be most appropriate when the certificate user knows, a priori, the set of policies that are acceptable for its intended use.

The second strategy may be most appropriate when the certificate user does not know, a priori, the set of policies that are acceptable for its intended use.

In the first instance, the certification path validation procedure will indicate the path to be valid only if it is valid under one or more of the policies specified in the *initial-policy-set*, and it will return the sub-set of the *initial-policy-set* under which the path is valid. In the second instance, the certification path validation procedure may indicate that the path is invalid under the *initial-policy-set*, but valid under a disjoint set: the *authorities-constrained-policy-set*. Then the certificate user must determine whether its intended use of the certificate is consistent with one or more of the certificate policies under which the path ***is*** valid. By setting the *initial-policy-set* to *any-policy*, the certificate user can cause the procedure to return a valid result if the path is valid under any (unspecified) policy.

Self-issued certificates

There are three circumstances under which a certification authority may issue a certificate to itself:

1. as a convenient way of encoding its public key for communication to, and storage by, its certificate users;

2. for certifying key usages other than certificate and CRL signing (such as time-stamping); and

3. for replacing its own expired certificates.

These types of certificate are called self-issued certificates, and they can be recognized by the fact that the issuer and subject names present in them are identical. For purposes of path validation, self-issued certificates of type one are verified with the public key contained in them, and if they are encountered in the path, they shall be ignored.

Self-issued certificates of type two may only appear as end certificates in a path, and shall be processed as end certificates.

Self-issued certificates of type three (also known as self-issued intermediate certificates) may appear as intermediate certificates in a path. As a matter of good practice, when replacing a key that is on the point of expiration, a certification authority should request the issuance of any in-bound cross-certificates that it requires for its replacement public key before using the key. Nevertheless, if self-issued certificates are encountered in the path, they shall be processed as intermediate certificates, with the following exception: they do not contribute to the path length for purposes of processing the **pathLenConstraint** component of the **basicConstraints** extension and the *skip-certificates* values associated with the *policy-mapping-inhibit-pending* and *explicit-policy-pending* indicators."

In clause 12.2.2.6, after the 2nd sentence of the 1st paragraph, add the following:

The presence of this extension in an end-entity certificate indicates the certificate policies for which this certificate is valid. The presence of this extension in a certificate issued by one CA to another CA indicates the certificate policies for which this certificate can be used to validate certification paths.

Add the following text in clause 12.2.2.6, after the 1st sentence of the 1st paragraph.

The list of certificate policies is used in determining the validity of a certification path, as described in 12.4.3. The optional qualifiers are not used in the certification path processing procedure, but relevant qualifiers are provided as an output of that process to the certificate using application to assist in determining whether a valid path is appropriate for the particular transaction.

In clause 12.2.2.7, replace the sentence "This extension is always non-critical." with the following:

This extension may, at the option of the certificate issuer, be either critical or non-critical. It is recommended that it be critical, otherwise a certificate user may not correctly interpret the stipulation of the issuing CA.

Add the following new clause 12.4.2.4:

This field specifies a constraint that indicates any-policy is not considered an explicit match for other certificate policies for the remainder of the certification path.

inhibitAnyPolicy ::= EXTENSION {
SYNTAX SkipCerts
IDENTIFIED BY {id-ce-inhibitAnyPolicy }}

This extension may, at the option of the certificate issuer, be either critical or non-critical. It is recommended that it be critical, otherwise a certificate user may not correctly interpret the stipulation of the issuing CA.

Add the following to the list of OIDs in the certificateExtensions module in Annex A:

id-ce-inhibitAnyPolicy OBJECT IDENTIFIER ::= {id-ce 54}

Replace section 12.4.3 with the following:

12.4.3 Certification path processing procedure

Certification path processing is carried out in a system which needs to use the public key of a remote end entity, e.g. a system which is verifying a digital signature generated by a remote entity. The certificate policies, basic constraints, name constraints, and policy constraints extensions have been designed to facilitate automated, self-contained implementation of certification path processing logic.

The following is an outline of a procedure for validating certification paths. A conformant implementation shall be functionally equivalent to the external behaviour resulting from this procedure. But, the algorithm used by a particular implementation to derive the correct output(s) from the given inputs is not standardized.

The inputs to the certification path processing procedure are:

a) a set of certificates comprising a certification path;

b) a trusted public key value or key identifier (if the key is stored internally to the certification path processing module), for use in verifying the first certificate in the certification path;

c) an *initial-policy-set* comprising one or more certificate policy identifiers, indicating that any one of these policies would be acceptable to the certificate user for the purposes of certification path processing; this input can also take the special value *any-policy*;

d) an *initial-explicit-policy* indicator value, which indicates whether an acceptable policy identifier must appear in the certificate policies extension field of all certificates in the path;

e) an *initial-policy-mapping-inhibit* indicator value, which indicates whether policy mapping is forbidden in the certification path; and

f) the current date/time (if not available internally to the certification path processing module).

The values of c), d), and e) will depend upon the policy requirements of the user-application combination that needs to use the certified end-entity public key.

Note that because these are individual inputs to the path validation process, a certificate user may limit the trust it places in any given trusted public key to a given set of certificate policies. This can be achieved by ensuring that a given public key is the input to process only when initial-policy-set input includes policies for which the certificate user trusts that public key. Since another input to the process is the certification path itself, this control could be exercised on a transaction by transaction basis.

The outputs of the procedure are:

a) an indication of success or failure of certification path validation;

b) if validation failed, a diagnostic code indicating the reason for failure;

c) The set of authorities-constrained policies and their associated qualifiers in accordance with which the certification path is valid, , or the special value *any-policy*;

d) The set of user-constrained policies, formed from the intersection of the *authorities-constrained-policy-set* and the *initial-policy-set*;

e) *explicit-policy-indicator*, indicating whether the certificate user or an authority in the path requires that an acceptable policy be identified in every certificate in the path; and

f) details of any policy mapping that occurred in processing the certification path.

> NOTE — If validation is successful, the certificate-using system may still choose not to use the certificate as a result of values of policy qualifiers or other information in the certificate.

The procedure makes use of the following set of state variables:

a) *authorities-constrained-policy-set:* A table of policy identifiers and qualifiers from the certificates of the certification path (rows represent policies, their qualifiers and mapping history, and columns represent certificates in the certification path);

b) *permitted-subtrees*: A set of subtree specifications defining subtrees within which all subject names in subsequent certificates in the certification path must fall, or may take the special value *unbounded*;

c) *excluded-subtrees*: A (possibly empty) set of subtree specifications (each comprising a subtree base name and maximum and minimum level indicators) defining subtrees within which no subject name in a subsequent certificate in the certification path may fall;

d) *explicit-policy-indicator*: Indicates whether an acceptable policy must be explicitly identified in every certificate in the path;

e) *path depth*: An integer equal to one more than the number of certificates in the certification path for which processing has been completed;

f) *policy-mapping-inhibit-indicator*: Indicates whether policy mapping is inhibited;

g) *pending-constraints*: Details of explicit-policy and/or inhibit-policy-mapping constraints which have been stipulated but have yet to take effect. There are two one-bit indicators called *explicit-policy-pending*, and *policy-mapping-inhibit-pending* together with, for each, an integer called *skip-certificates* which gives the number of certificates yet to skip before the constraint takes effect.

The procedure involves an initialization step, followed by a series of certificate-processing steps. The initialization step comprises:

a) Write *any-policy* in the zeroth and first columns of the zeroth row of the *authorities-constrained-policy-set* table;

b) Initialize the *permitted-subtrees* variable to *unbounded*;

c) Initialize the *excluded-subtrees* variable to an empty set;

d) Initialize the *explicit-policy-indicator* to the *initial-explicit-policy* value;

e) Initialize *path-depth* to one;

f) Initialize the *policy-mapping-inhibit-indicator* to the *initial-policy-mapping-inhibit* value;

g) Initialize the two *pending-constraints* indicators to unset.

Each certificate is then processed in turn, starting with the certificate signed using the input trusted public key. The last certificate is considered to be the end certificate; any other certificates are considered to be intermediate certificates.

The following checks are applied to a certificate:

a) Check that the signature verifies, that dates are valid, that the certificate subject and certificate issuer names chain correctly, and that the certificate has not been revoked.

b) For an intermediate certificate, if the basic constraints extension field is present in the certificate, check that the **cA** component is present and set to true. If the **pathLenConstraint** component is present, check that the current certification path does not violate that constraint (ignoring intermediate self-issued certificates).

c) If the certificate policies extension is not present, then set the *authorities-constrained-policy-set* to null by deleting all rows from the *authorities-constrained-policy-set* table.

d) If the certificate policies extension is present and the value in *authorities-constrained-policy-set*[0, *path-depth*] is not *any-policy* and the value in the extension is not *any-policy*, then set the *authorities-constrained-policy-set* to the intersection of the *authorities-constrained-policy-set* with the set of policies present in the certificate. To do this, first add the policy qualifiers from the extension to the *authorities-constrained-policy-set* table by, for each policy identifier value in the extension, locate all rows in the *authorities-constrained-policy-set* table whose [*path-depth*] column entry contains the same value as that in the extension and attach the policy qualifiers from the extension to the policy identifiers in the table, then delete all rows for which the [*path-depth*] column did not contain one of the values in the extension.

e) If the certificate policies extension is present and the value in *authorities-constrained-policy-set*[0, *path-depth*] is not *any-policy* but the value in the extension is *any-policy*, then attach the policy qualifier (if present) from the extension to each policy identifier value in the [*path-depth*] column of the *authorities-constrained-policy-set* table.

f) If the certificate policies extension is present and the value in authorities-constrained-policy-set[0, path-depth] is any-policy, then set the authorities-constrained-policy-set to the intersection of the authorities-constrained-policy-set with the set of policies present in the certificate. To do this, add new rows to the table by duplicating the zeroth row a number of times equal to the number of policy identifiers in the extension minus one, and write the policy identifiers and qualifiers from the extension in authorities-constrained-policy-set[0, path-depth] and the path-depth column of each new row (this step must be performed even if the value in the extension is any-policy).

g) If the certificate is not an intermediate self-issued certificate, check that the subject name is within the name-space given by the value of permitted-subtrees and is not within the name-space given by the value of excluded-subtrees.

For an intermediate certificate, the following constraint recording actions are then performed, in order to correctly set up the state variables for the processing of the next certificate:

a) If the **nameConstraints** extension with a **permittedSubtrees** component is present in the certificate, set the *permitted-subtrees* state variable to the intersection of its previous value and the value indicated in the certificate extension.

b) If the **nameConstraints** extension with an **excludedSubtrees** component is present in the certificate, set the *excluded-subtrees* state variable to the union of its previous value and the value indicated in the certificate extension.

c) If policy-mapping-inhibit-indicator is set:

— process any policy mappings extension by, for each mapping identified in the extension, locate all rows in the *authorities-constrained-policy-set* table whose [*path-depth*] column entry is equal to the issuer domain policy value in the extension and delete the row.

d) If *policy-mapping-inhibit-indicator* is not set:

— process any policy mappings extension by, for each mapping identified in the extension, locate all rows in the *authorities-constrained-policy-set* table whose [*path-depth*] column entry is equal to the issuer domain policy value in the extension, and write the subject domain policy value from the extension in the [*path-depth*+1] column entry of the same row. If the extension maps an issuer domain policy to more than one subject domain policy, then the affected row must be copied and the new entry added to each row. If the value in *authorities-constrained-policy-set*[0, *path-depth*] is *any-policy*, then write each issuer domain policy identifier from the policy mappings extension in the [*path-depth*] column, making duplicate rows as necessary and retaining qualifiers if they are present, and write the subject domain policy value from the extension in the [*path-depth*+1] column entry of the same row.

— if the *policy-mapping-inhibit-pending* indicator is set and the certificate is not self-issued, decrement the corresponding *skip-certificates* value and, if this value becomes zero, set the *policy-mapping-inhibit-indicator*.

— If the **inhibitPolicyMapping** constraint is present in the certificate, perform the following. For a **SkipCerts** value of 0, set the *policy-mapping-inhibit-indicator*. For any other **SkipCerts** value, set the *policy-mapping-inhibit-pending* indicator, and set the corresponding *skip-certificates* value to the lesser of the **SkipCerts** value and the previous *skip-certificates* value (if the *policy-mapping-inhibit-pending* indicator was already set).

e) For any row not modified in either step c) or d), above (and every row in the case that there is no mapping extension present in the certificate), write the policy identifier from [path-depth] column in the [path-depth+1] column of the row.

f) Increment path-depth.

For all certificates, the following actions are then performed:

a) If explicit-policy-indicator is not set:

— if the *explicit-policy-pending* indicator is set and the certificate is not a self-issued intermediate certificate, decrement the corresponding *skip-certificates* value and, if this value becomes zero, set *explicit-policy-indicator*.

- If the **requireExplicitPolicy** component is present, and the certification path includes a certificate issued by a nominated CA, it is necessary for all certificates in the path to contain, in the certificate policies extension, an acceptable policy identifier. An acceptable policy identifier is the identifier of the certificate policy required by the user of the certification path, the identifier of a policy which has been declared equivalent to it through policy mapping, or any-policy. The nominated CA is either the issuer CA of the certificate containing this extension (if the value of **requireExplicitPolicy** is 0) or a CA which is the subject of a subsequent certificate in the certification path (as indicated by a non-zero value).

For the end-certificate, the following actions are then performed:

a) If explicit-policy-indicator is set, check that the authorities-constrained-policy-set table is not empty.If any of the above checks were to fail, then the procedure shall terminate, returning a failure indication, an appropriate reason code, explicit-policy-indicator and null values in the user-constrained-policy-set and the authorities-constrained-policy-set table.

If none of the above checks were to fail on the end certificate, then the *user-constrained-policy-set* shall be calculated by making a copy of the *authorities-constrained-policy-set* table, locating the left-most column whose zeroth row does not contain *any-policy* and deleting all rows which do not contain one of the identifiers in the *initial-policy-set* in this column. If all the columns contain *any-policy* in the zeroth row, then the table shall not be modified. Then the procedure shall terminate, returning a success indication together with the *explicit-policy-indicator*, the *authorities-constrained-policy-set* table and the *user-constrained-policy-set*.

The authorities-constrained-policy-set is the left-most column in the authorities-constrained-policy-set whose zeroth row does not contain the identifier any-policy. If there is no column that qualifies, then the authorities-constrained-*policy-set* is *any-policy*.

Recommendation X.509 (1997) I ISO/IEC 9594-8:1998 Technical Corrigendum 2

NOTE – This Technical corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 8 and 9.

Defect reports resolved by Draft Technical Corrigendum 8
(defect reports 226, 227 and 240)

This corrects the defects reported in defect report 226

In clause 11.2, delete the 2nd paragraph:

"The production of a certificate … compromise unlikely.".

This corrects the defects reported in defect report 227

In clause 12.2.2.1, add the following 2 sentences to the end of the paragraph that begins with "Certification authorities shall assign…"

"The **keyIdentifier** form can be used to select CA certificates during path construction. The **authorityCertIssuer**, **authoritySerialNumber** pair can only be used to provide preference to one certificate over others during path construction."

This corrects the defects reported in defect report 240

The following corrections should be made to the 1997 edition authenticationFramework module in Annex A of X.509:

1 Add "**id-mr**" to the list of objects imported from **UsefulDefinitions** module in the **authenticationFramework** module

2 Add "**AttributeType**", "**Attribute**", and "**MATCHING-RULE**" to the set of objects imported into the **authenticationFramework** module from the **InformationFramework** module.

3 Add "**GeneralNames**" to the set of objects imported into the **authenticationFramework** module from the CertificateExtensions module.

4 Consider adding the following definition to the **authenticationFramework** module because this is imported into other modules in the X.500 Series of Recommendations, but had never been included in the 97 text of X.509:

```
HASH {ToBeHashed} ::= SEQUENCE {
    algorithmIdentifier     AlgorithmIdentifier,
    hashValue               BIT STRING ( CONSTRAINED BY {
    -- must be the result of applying a hashing procedure to the
    -- DER-encoded octets of a value of --ToBeHashed } ) }
```

5 Add the following OID assignments in the **authenticationFramework** module:

```
id-at-attributeCertificateRevocationList OBJECT IDENTIFIER ::=
    {id-at 59}

id-mr-attributeCertificateMatch OBJECT IDENTIFIER ::=
    {id-mr 42}
```

6 Add "**Time**" to the set of objects imported into the **certificateExtensions** module from the **authenticationFramework** module.

7 In the **certificateExtensions** module, and in the main text of X.509 clause 12.7.2, replace

CertPolicySet ::= SEQUENCE (1..MAX) OF CertPolicyId

with

CertPolicySet ::= SEQUENCE SIZE (1..MAX) OF CertPolicyId

Recommendation X.509 (1997) I ISO/IEC 9594-8:1998 Technical Corrigendum 2

NOTE – This Technical Corrigendum covers Draft Technical Corrigenda 8 and 9.

Defect reports resolved by Draft Technical Corrigendum 8

(covering resolutions to defect reports 226, 227 and 240)

This corrects the defects reported in defect report 226

In clause 11.2, delete the 2nd paragraph:

"The production of a certificate … compromise unlikely."

This corrects the defects reported in defect report 227

In clause 12.2.2.1, add the following 2 sentences to the end of the paragraph that begins with "Certification authorities shall assign…"

"The **keyIdentifier** form can be used to select CA certificates during path construction. The **authorityCertIssuer**, **authoritySerialNumber** pair can only be used to provide preference to one certificate over others during path construction."

This corrects the defects reported in defect report 240

The following corrections should be made to the 1997 edition authenticationFramework module in Annex A of X.509:

8 Add "id-mr" to the list of objects imported from UsefulDefinitions module in the authenticationFramework module.

9 Add "AttributeType", "Attribute", and "MATCHING-RULE" to the set of objects imported into the authenticationFramework module from the InformationFramework module.

10 Add "GeneralNames" to the set of objects imported into the authenticationFramework module from the CertificateExtensions module.

11 Consider adding the following definition to the authenticationFramework module because this is imported into other modules in the X.500-Series of Recommendations, but had never been included in the 1997 text of X.509:

```
HASH {ToBeHashed}       ::=     SEQUENCE {
        algorithmIdentifier             AlgorithmIdentifier,
        hashValue                       BIT STRING ( CONSTRAINED BY {
        -- must be the result of applying a hashing procedure to the DER-encoded octets --
```

-- of a value of ***--ToBeHashed }) }***

12 Add the following OID assignments in the authenticationFramework module:

id-at-attributeCertificateRevocationList OBJECT IDENTIFIER ::= {id-at 59}

id-mr-attributeCertificateMatch OBJECT IDENTIFIER ::= {id-mr 42}

13 Add "Time" to the set of objects imported into the certificateExtensions module from the authenticationFramework module.

14 In the certificateExtensions module, and in the main text of X.509 clause 12.7.2, replace

CertPolicySet ::= SEQUENCE (1..MAX) OF CertPolicyId

with

CertPolicySet ::= SEQUENCE SIZE (1..MAX) OF CertPolicyId

Defect reports resolved by Draft Technical Corrigendum 9

(covering resolutions to defect reports 244, 256, 257 and 258)

This corrects the defects reported in defect report 244

In clause 8:

In the paragraph that begins "The extensions field allows addition of new ...", add the following two sentences to the end of the paragraph:

"When a certificate-using implementation recognizes and is able to process an extension, then the certificate-using implementation shall process the extension regardless of the value of the criticality flag. Note that any extension that is flagged non-critical will cause inconsistent behaviour between certificate-using systems that will process the extension and certificate-using that do not recognize the extension and will ignore it."

In clause 8:

Add the following immediately after the paragraph that begins "If unknown elements appear within the extension …":

A CA has three options with respect to an extension:

i) it can exclude the extension from the certificate;

ii) it can include the extension and flag it non-critical;

iii) it can include the extension and flag it critical.

A validation engine has two possible actions to take with respect to an extension:

i) it can ignore the extension and accept the certificate (all other things being equal);

ii) it can process the extension and accept or reject the certificate depending on the content of the extension and the conditions under which processing is occuring (e.g. the current values of the path processing variables).

Some extensions can only be marked critical. In these cases a validation engine that understands the extension, processes it and acceptance/rejection of the certificate is dependent (at least in part) on the content of the extension. A validation engine that does not understand the extension rejects the certificate.

Some extensions can only be marked non-critical. In these cases a validation engine that understands the extension processes it and acceptance/rejection of the certificate is dependent (at least in part) on the content of the extension. A validation engine that does not understand the extension accepts the certificate (unless factors other than this extension cause it to be rejected).

Some extensions can be marked critical or non-critical. In these cases a validation engine that understands the extension processes it and acceptance/rejection of the certificate is dependent (at least in part) on the content of the extension, regardless of the criticality flag. A validation engine that does not understand the extension accepts the certificate if the extension is marked non-critical (unless factors other than this extension cause it to be rejected) and rejects the certificate if the extension is marked critical.

When a CA considers including an extension in a certificate it does so with the expectation that its intent will be adhered to wherever possible. If it is necessary that the content of the extension be considered prior to any reliance on the certificate, a CA would flag the extension critical. This must be done with the realization that any validation engine that does not process the extension will reject the certificate (probably limiting the set of applications that can verify the certificate). The CA may mark certain extensions non-critical to achieve backward compatibility with validation applications that cannot process the extensions. Where the need for backward compatibility and interoperability with validation applications incapable of processing the extensions is more vital than the ability of the CA to enforce the extensions, then these optionally critical extensions would be marked non-critical. It is most likely that CAs would set optionally critical extensions as non-critical during a transition period while the verifiers' certificate processing applications are upgraded to ones that can process the extensions.

In clause 12.1:

In the paragraph that begins "In a certificate or CRL, an extension is flagged ...", add the following immediately after the third sentence that ends with "... ignoring the extension":

"If an extension is flagged non-critical, a certificate-using system that does recognize the extension, shall process the extension."

In clause 12.2.2.3:

In the paragraph that begins "If the extension is flagged non-critical ...", replace the second sentence with the following:

"If this extension is present, and the certificate-using system recognizes and processes the **keyUsage** extension type, then the certificate using system shall ensure that the certificate shall be used only for a purpose for which the corresponding key usage bit is set to one."

In clause 12.2.2.4:

In the paragraph that begins "If the extension is flagged non-critical ...", replace the second sentence with the following:

"If this extension is present, and the certificate-using system recognizes and processes the **extendedKeyUsage** extension type, then the certificate using system shall ensure that the certificate shall be used only for one of the purposes indicated."

In clause 12.4.2.1:

In the 4th paragraph following the ASN.1, replace: "If this extension is present and is flagged critical then:" with the following:

"If this extension is present and is flagged critical, or is flagged non-critical but is recognized by the certificate-using system, then:"

In clause 12.4.2.2:

Replace the last sentence "If this extension is present and is flagged critical ..." with the following:

"If this extension is present and is flagged critical, or is flagged non-critical but is recognized by the certificate-using system, then the certificate-using system shall check that the certification path being processed is consistent with the value in this extension."

This corrects the defects reported in defect report 256

In clause 8:

In the first paragraph of the description of the cross certificate pair attribute (that begins "The forward elements ..."), add the following as a new 3rd sentence.

"If a CA issues a certificate to another CA, and the subject CA is not a subordinate to the issuer CA in a hierarchy, then the issuer CA must place that certificate in the **reverse** element of the **crossCertificatePair** attribute of its own directory entry."

This corrects the defects reported in defect report 257

*In clause 8 in the ASN.1 construct **CertificatePair**,*

replace "**forward**" with "**issuedByThisCA**" and
replace "**reverse**" with "**issuedToThisCA**" and make changes to the associated text as outlined below.

In the descriptive text, throughout X.509, update the text accordingly to reflect these new terms. This includes the following specific clauses:

- *general descriptive text in clause 8,*
- *ASN.1 and descriptive text for the cross certificate pair attribute in clause 8,*
- *ASN.1 and descriptive text for the associated matching rules in clauses 12.7.3 and 12.7.4 (1997), and*
- *the duplicate asn.1 constructs in Annex A.*

Also, add the following text to the end of the first paragraph of clause 11.2.3:

The term **forward** was used in previous editions for **issuedByThisCA**, and the term **reverse** was used in previous editions" for **issuedToThisCAB**

This corrects the defects reported in defect report 258

In clause 8, add the following as a new paragraph at the end of the clause, immediately before the first subclause (8.1):

"Each certificate in a certification path shall be unique. No certificate may appear more than once in a value of **theCACertificates** component of **CertificationPath** or in a value of **certificate** in the **CrossCertificates** component of **ForwardCertificationPath.**"

In clause 12.4.3 add the following note immediately after bullet a) a set of certificates …

"Note: Each certificate in a certification path is unique. A path that contains the same certificate two or more times is not a valid certification path."

Recommendation X.509 (1997) I ISO/IEC 9594-8:1998 Technical Corrigendum 3 (DTC 10)

(covering resolutions to defect reports 272, 273, 275, & 277)

This corrects the defects reported in defect report 272

*In clause 12.4.2.1, add the following text to the end of the paragraph that begins with "The **pathLenConstraint** component shall be present only if…"*

The constraint takes effect beginning with the next certificate in the path. The constraint restricts the length of the segment of the certification path between the certificate containing this extension and the end-entity certificate. It has no impact on the number of CA-certificates in the certification path between the trust anchor and the certificate containing this extension. Therefore, the length of a complete certification path may exceed the maximum length of the segment constrained by this extension. The constraint controls the number of non self-issued CA certificates between the CA certificate containing the constraint and the end-entity certificate. Therefore the total length of this segment of the path, excluding self-issued certificates, may exceed the value of the constraint by as many as two certificates. (This includes the certificates at the two endpoints of the segment plus the CA certificates between the two endpoints that are constrained by the value of this extension.)

In clause 12.4.2.1, In the paragraph that begins with "The pathLenConstraint component is meaningful only if…", replace the last two sentences of this paragraph with the following:

The constraint restricts the length of the segment of the delegation path between the certificate containing this extension and the end-entity certificate. It has no impact on the number of AA-certificates in the delegation path between the trust anchor and the certificate containing this extension. Therefore, the length of a complete delegation path may exceed the maximum length of the segment constrained by this extension. The constraint controls the number of AA certificates between the AA certificate containing the constraint and the end-entity certificate. Therefore the total length of this segment of the path may exceed the value of the constraint by as many as two certificates. (This includes the certificates at the two endpoints of the segment plus the AA certificates between the two endpoints that are constrained by the value of this extension.)

This corrects the defects reported in defect report 273

Replace clause 12.4.2.2 with the following:

12.4.2.2 Name constraints extension

This field, which shall be used only in a CA-certificate, indicates a name space within which all subject names in subsequent certificates in a certification path must be located. This field is defined as follows:

```
nameConstraints EXTENSION ::= {
        SYNTAX              NameConstraintsSyntax
        IDENTIFIED BY       id-ce-nameConstraint }

NameConstraintsSyntax ::= SEQUENCE {
```

```
        permittedSubtrees [0]       GeneralSubtrees OPTIONAL,
        excludedSubtrees  [1]       GeneralSubtrees OPTIONAL,
        requiredNameForms           [2]     NameForms OPTIONAL  }

GeneralSubtrees ::= SEQUENCE SIZE (1..MAX) OF GeneralSubtree

GeneralSubtree ::= SEQUENCE {
        base                GeneralName,
        minimum     [0]     BaseDistance DEFAULT 0,
        maximum     [1]     BaseDistance OPTIONAL }

BaseDistance ::= INTEGER (0..MAX)


NameForms  ::= SEQUENCE {
    basicNameForms      [0]     BasicNameForms OPTIONAL,
    otherNameForms      [1]     SEQUENCE SIZE (1..MAX) OF OBJECT IDENTIFIER OPTIONAL }
(ALL EXCEPT ({ --none; i.e.:at least one component shall be present-- }))

BasicNameForms  ::= BIT STRING {
        rfc822Name          (0),
        dNSName                     (1),
        x400Address                 (2),
        directoryName               (3),
        ediPartyName                (4),
        uniformResourceIdentifier   (5),
        iPAddress                   (6),
        registeredID        (7) }  (SIZE (1..MAX))
```

If present, the **permittedSubtrees** and **excludedSubtrees** components each specify one or more naming subtrees, each defined by the name of the root of the subtree and optionally, within that subtree, an area that is bounded by upper and/or lower levels. If **permittedSubtrees** is present, subject names within these subtrees are acceptable. If **excludedSubtrees** is present, any certificate issued by the subject CA or subsequent CAs in the certification path that has a subject name within these subtrees is unacceptable. If both **permittedSubtrees** and **excludedSubtrees** are present and the name spaces overlap, the exclusion statement takes precedence for names within that overlap. If neither permitted nor excluded subtrees are specified for a name form, then any name within that name form is acceptable. If **requiredNameForms** is present, all subsequent certificates in the certification path must include a name of at least one of the required name forms.

If **permittedSubtrees** is present, the following applies to all subsequent certificates in the path. If any certificate contains a subject name (in the **subject** field or **subjectAltNames** extension) of a name form for which permitted subtrees are specified, the name must fall within at least one of the specified subtrees. If any certificate contains only subject names of name forms other than those for which permittee subtrees are specified, the subject names are not required to fall within any of the specified subtrees. For example, assume that two permitted subtrees are specified, one for the DN name form and one for the rfc822 name form, no excluded subtrees are specified, but **requiredNameForms** is specified with the **directoryName** bit and **rfc822Name** bit present. A certificate that contained only names other than a directory name or rfc822 name would be unacceptable. If requiredNameForms were not specified, however, such a certificate would be acceptable. For example, assume that two permitted subtrees are specified, one for the DN name form and one for the rfc822 name form, no excluded subtrees are specified, and **requiredNameForms** is not present. A certificate that only contained a DN and where the DN is within the specified permitted subtree, would be acceptable. A certificate that contained both a DN and an rfc822 name and where only one of them is within its specified permitted subtree, would be unacceptable. A certificate that contained only names other than a DN or rfc822 name would also be acceptable.

If **excludedSubtrees** is present, any certificate issued by the subject CA or subsequent CAs in the certification path that has a subject name (in the **subject** field or **subjectAltNames** extension) within these subtrees is unacceptable. For example, assume

that two excluded subtrees are specified, one for the DN name form and one for the rfc822 name form. A certificate that only contained a DN and where the DN is within the specified excluded subtree, would be unacceptable. A certificate that contained both a DN and an rfc822 name and where at least one of them is within its specified excluded subtree, would be unacceptable.

When a certificate subject has multiple names of the same name form (including, in the case of the **directoryName** name form, the name in the subject field of the certificate if non-null) then all such names shall be tested for consistency with a name constraint of that name form.

If **requiredNameForms** is present, all subsequent certificates in the certification path must include a subject name of at least one of the required name forms.

Of the name forms available through the **GeneralName** type, only those name forms that have a well-defined hierarchical structure may be used in the **permittedSubtrees** and **excludedSubtrees** fields. The **directoryName** name form satisfies this requirement; when using this name form a naming subtree corresponds to a DIT subtree.

The **minimum** field specifies the upper bound of the area within the subtree. All names whose final name component is above the level specified are not contained within the area. A value of **minimum** equal to zero (the default) corresponds to the base, i.e. the top node of the subtree. For example, if **minimum** is set to one, then the naming subtree excludes the base node but includes subordinate nodes.

The **maximum** field specifies the lower bound of the area within the subtree. All names whose last component is below the level specified are not contained within the area. A value of **maximum** of zero corresponds to the base, i.e. the top of the subtree. An absent **maximum** component indicates that no lower limit should be imposed on the area within the subtree. For example, if **maximum** is set to one, then the naming subtree excludes all nodes except the subtree base and its immediate subordinates.

This extension may, at the option of the certificate issuer, be either critical or non-critical. It is recommended that it be flagged critical, otherwise a certificate user may not check that subsequent certificates in a certification path are located in the name space intended by the issuing CA.

Conformant implementations are not required to recognize all possible name forms.

If the extension is present and is flagged critical, a certificate-using implementation must recognize and process all name forms for which there is both a subtree specification (permitted or excluded) in the extension and a corresponding value in the **subject** field or **subjectAltNames** extension of any subsequent certificate in the certification path. If an unrecognized name form appears in both a subtree specification and a subsequent certificate, that certificate shall be handled as if an unrecognized critical extension was encountered. If any subject name in the certificate falls within an excluded subtree, the certificate is unacceptable. If a subtree is specified for a name form that is not contained in any subsequent certificate, that subtree can be ignored. If the **requiredNameForms** component specifies only unrecognized name forms, that certificate shall be handled as if an unrecognized critical extension was encountered. Otherwise, at least one of the recognized name forms must appear in all subsequent certificates in the path.

If the extension is present and is flagged non-critical and a certificate-using implementation does not recognize a name form used in any **base** component, then that subtree specification may be ignored. If the extension is flagged non-critical and any of the name forms specified in the **requiredNameForms** component are not recognized by the

certificate-using implementation, then the certificate shall be treated as if the **requiredNameForms** component was absent.

In clause 12.4.3 add a new path processing variable as follows and renumber subsequent bullets accordingly:

d) *required-name-forms:* A (possibly empty) set of sets of name forms. For each set of name forms, every subsequent certificate must contain a name of one of the name forms in the set.

In clause 12.4.3 add a new initialization step as follows and renumber subsequent bullets accordingly:

d) Initialize the *required-name-forms* to an empty set;

In clause 12.4.3, add a step to the checks applied to all certificates as follows:

h) If the certificate is not an intermediate self-issued certificate, and if required-name-forms is not an empty set, for each set of name forms in required-name-forms check that there is a subject name in the certificate of one of the name forms in the set.

In clause 12.4.3, add a step to the constraint recording actions applied to intermediate certificates as follows:

c) If the **nameConstraints** extension with a **requiredNameForms** component is present in the certificate, set the required-name-forms variable to the union of its previous value and the set consisting of the set of name forms specified in the certificate extension. If the **requiredNameForms** component contains more than one name form, the required-name-forms variable shall signal that a name of at least one of the indicated name forms in this extension shall be present in all subsequent certificates. The union of a previous value of the required-name-forms variable with the value from the current certificate extension is a set of sets signalling requirements for all subsequent certificates. For example if the current required-name-forms is set to requiring that either a DN or an rfc822 name must be present in certificates and the current extension in the certificate being processed indicates that either rfc822 names or DNS names are required, the resulting union that is the new required-name-forms indicates that each of the subsequent certificates must have either an rfc822 name or both a DN and a DNS name.

In Annex A, ***certificateExtensions*** *module update the asn.1 for* ***nameConstraints*** *extension as above*

In Annex A, ***certificateExtensions*** *module add the following:*

```
id-ce-nameConstraint                OBJECT IDENTIFIER ::=    {id-ce 30 1}
```

In Annex A, ***certificateExtensions*** *module, delete the following:*

```
id-ce-nameConstraints               OBJECT IDENTIFIER        ::=    {id-ce 30}
```

*In Annex A, **certificateExtensions** module, add the following to the set of OIDs not used in this specification:*

id-ce 30

This corrects the defects reported in defect report 275

*In clause 12.2.2.4, add the following as a new second paragraph following the ASN.1 for the **extendedKeyUsage** extension.*

A CA may assert any-extended-key-usage by using the **anyExtendedKeyUsage** identifier. This enables a CA to issue a certificate that contains OIDs for extended key usages that may be required by certificate-using applications, without restricting the certificate to only those key usages. If extended key usage would restrict key usage, then the inclusion of this OID removes that restriction.

anyExtendedKeyUsage OBJECT IDENTIFIER ::= { 2 5 29 37 0 }

This corrects the defects reported in defect report 277

In clause 12.4.2.3, in the last sentence of the first paragraph,

Replace "which is the subject of a subsequent certificate" with "which is the issuer of a subsequent certificate".

Recommendation X.525 (1997) | ISO/IEC 9594-9:1998

Information processing systems - Open Systems Interconnection - The Directory - Replication

TECHNICAL CORRIGENDUM 1
NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigendum 1.

(defect reports 182, 186)

This corrects the defects reported in defect report 9594/182.

Clause 7.2.2.3

Insert as a fourth new paragraph

> If **subordinates** is specified, then the supplier shall send subordinate entries and a subordinate reference, and the SDSEs will be of type **subr**, **entry**, and **cp**. The subordinate entries shall contain attributes according to the attribute selection. In addition, if the supplying DSE is of type **admPoint**, then the SDSE shall additionally be of type **admPoint** and the **administrativeRole** attribute shall be supplied. All appropriate subentries, with only the appropriate information, below the **admPoint** DSE shall also be supplied as SDSEs in the shadowed information.

Clause 9.2 and Annex A

*Replace the **UnitOfReplication** ASN,1 type as follows (thereby adding **subordinates**):*

```
UnitOfReplication       ::=  SEQUENCE {
    area                     AreaSpecification,
    attributes               AttributeSelection,
    knowledge                Knowledge OPTIONAL,
    subordinates             BOOLEAN DEFAULT FALSE }
```

*Insert the following after the description of **knowledgetype***

subordinates is used to indicate that subordinate entries, rather than simply subordinate references, are to be copied to the consumer DSA. **subordinates** may only be **TRUE** if **knowledge** is requested and **extendedKnowledge** is **FALSE**.

This corrects the defects reported in defect report 9594/186.

Clause 7.2.2.2

Append the following to a) in the fifth paragraph

If the **entryACI** operational attribute is present and holds relevant ACI, e.g. naming, then the attribute (containing at least the relevant ACI) shall always be included in the SDSE.

Clause 9.2.4.1

Add a new list element d)

d) If the entry is refined out, the replacement glue SDSE shall contain the necessary access control information.

Delete "prescriptive" from Note 2.

Recommendation X.525 (1997) I ISO/IEC 9594-9:1998 Technical Corrigendum 2

NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigenda 2, 3, and 4.

Defect reports covered by Draft Technical Corrigendum 2

(Covering resolutions to defect report 187, 208 and 243)

This corrects the defects reported in defect report 9594/187.
In 7.2.1.1, add **root** to the list of SDSE types
In 11.3.1.1, delete **root** from the list of SDSE types

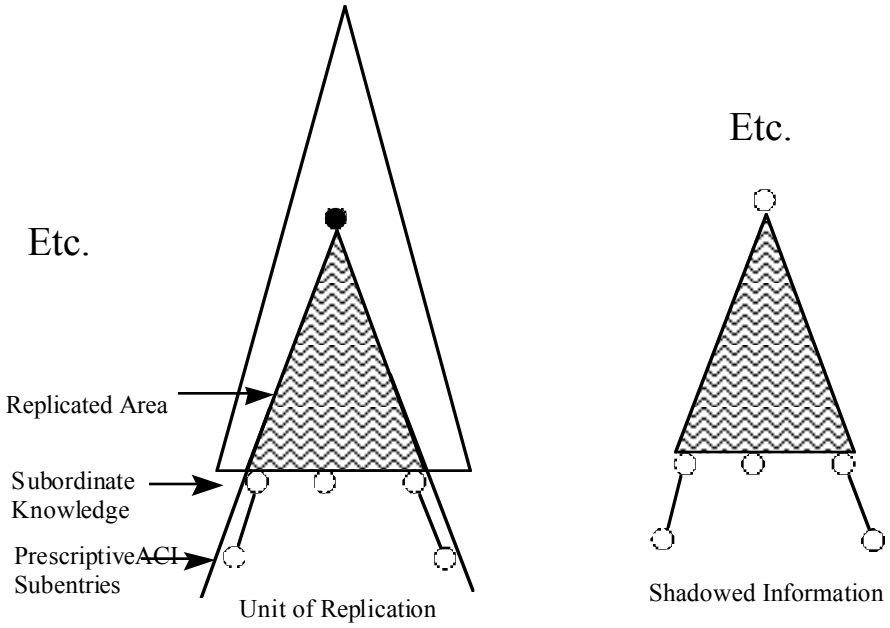
This corrects the defects reported in defect report 9594/208.

Insert the following text into 7.2.2.3, at the end of both the second paragraph and the first sentence of the third paragraph (after "appropriate knowledge"):
"and access control information."

Insert a new third paragraph into 7.2.2.3:
"If subordinate knowledge is supplied, and the supplying DSE (of type **subr)** is also of type **admPoint**, then the SDSE shall additionally be of type **admPoint** and the **administrativeRole** attribute shall be supplied. If such a DSE has any immediately subordinate subentries containing **PrescriptiveACI** relating to the administrative point, then they shall also be supplied as SDSEs in the shadowed information.

NOTE – A DSE can be of type **subr** and **admPoint** in a superior DSA, when the naming context in the subordinate DSA is the start of a new administrative area."

Update figure 3 to show a subentry immediately below a subordinate reference. The subentry contains prescriptiveACI and is part of the shadowed information.



Additions to Figure 3, Section 7.2, X.525

Add supporting text to section 7.2 in the paragraph after Figure 3. Insert after the sentence "Subordinate knowledge may also be replicated" the following sentences

"Implicit in the subordinate knowledge is the access control information which governs access to the RDN of the subordinate knowledge. When the subordinate entry is an administrative point in another DSA, then part of this access control information may be held in **prescriptiveACI** subentries beneath the subordinate knowledge."

Add a new point d) to 9.2.4.1:

"if subordinate knowledge (not extended knowledge) is shadowed then any **prescriptiveACI** in subordinate subentries shall also be copied."

This corrects the defects reported in defect report 9594/243.

In to 2.1, change all references ISO/IEC 9594-x:1997 *to* ISO/IEC 9594-x:1998

In clause 6, change ITU-T Rec. X.518| ISO/IEC 9594-5 *to* ITU-T Rec. X.519 | ISO/IEC 9594-5

In 9.2 in the **UnitOfReplication** *type, change* **ContextType** *to* **CONTEXT.&id.**

In 11.1:

change **CoordinateShadowUpdate** *to* **coordinateShadowUpdate**

remove the last right curly parenthesis in the **CoordinateShadowUpdateArgument**

Replace the ASN.1 in Annex A with:

```
DirectoryShadowAbstractService
      {joint-iso-itu-t ds(5) module(1) directoryShadowAbstractService(15) 3}
DEFINITIONS   IMPLICIT TAGS   ::=
BEGIN

-- EXPORTS All --

-- The types and values defined in this module are exported for use in the other ASN.1 modules contained
-- within the Directory Specifications, and for the use of other applications which will use them to access
-- directory services. Other applications may use them for their own purposes, but this will not constrain
-- extensions and modifications needed to maintain or improve the directory service.

IMPORTS
-- from ITU-T Rec. X.501 | ISO/IEC 9594-2

      directoryAbstractService, directoryOperationalBindingTypes, informationFramework,
      disp, distributedOperations, dsaOperationalAttributeTypes, enhancedSecurity,
      opBindingManagement
            FROM UsefulDefinitions {joint-iso-itu-t ds(5) module(1) usefulDefinitions(0) 3}

      Attribute, AttributeType, CONTEXT, DistinguishedName, RelativeDistinguishedName,
      SubtreeSpecification
            FROM InformationFramework informationFramework

      OPERATIONAL-BINDING, OperationalBindingID
            FROM OperationalBindingManagement opBindingManagement

      DSEType, SupplierAndConsumers
            FROM DSAOperationalAttributeTypes dsaOperationalAttributeTypes

      OPTIONALLY-PROTECTED, OPTIONALLY-PROTECTED-SEQ
            FROM EnhancedSecurity enhancedSecurity
-- from ITU-T Rec. X.511 | ISO/IEC 9594-3

      CommonResultsSeq, ContextSelection, directoryBind, directoryUnbind, EntryModification,
      SecurityParameters
            FROM DirectoryAbstractService directoryAbstractService
-- from ITU-T Rec. X.518 | ISO/IEC 9594-4

      AccessPoint
            FROM DistributedOperations distributedOperations
-- from ITU-T Rec. X.519 | ISO/IEC 9594-5

      id-op-binding-shadow
            FROM DirectoryOperationalBindingTypes directoryOperationalBindingTypes
```

```
        id-errcode-shadowError, id-opcode-coordinateShadowUpdate, id-opcode-
requestShadowUpdate,
        id-opcode-updateShadow, reliableShadowSupplierInitiatedAC,
reliableShadowConsumerInitiatedAC,
        shadowConsumerInitiatedAC, shadowSupplierInitiatedAC
                FROM DirectoryInformationShadowProtocol disp
-- from ITU-T Rec. X.880 | ISO/IEC 13712-1

        ERROR, OPERATION
                FROM Remote-Operations-Information-Objects
                    {joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0) }   ;

-- bind and unbind operations --

dSAShadowBind  OPERATION   ::=     directoryBind

dSAShadowUnbind        OPERATION   ::=        directoryUnbind

-- shadow operational binding --

shadowOperationalBinding OPERATIONAL-BINDING  ::= {
        AGREEMENT                       ShadowingAgreementInfo
        APPLICATION CONTEXTS {
                { shadowSupplierInitiatedAC
                  APPLIES TO        { All-operations-supplier-initiated } } |
                { shadowConsumerInitiatedAC
                  APPLIES TO { All-operations-consumer-initiated } } |
                { reliableShadowSupplierInitiatedAC
                  APPLIES TO { All-operations-supplier-initiated } } |
                { reliableShadowConsumerInitiatedAC
                  APPLIES TO { All-operations-consumer-initiated } } }
        ASYMMETRIC
                ROLE-A  {     -- shadow supplier role
                  ESTABLISHMENT-INITIATOR       TRUE
                  ESTABLISHMENT-PARAMETER       NULL
                  MODIFICATION-INITIATOR                        TRUE
                  TERMINATION-INITIATOR         TRUE }
                ROLE-B        {         -- shadow consumer role
                  ESTABLISHMENT-INITIATOR       TRUE
                  ESTABLISHMENT-PARAMETER       NULL
                  MODIFICATION-INITIATOR                        TRUE
                  MODIFICATION-PARAMETER        ModificationParameter
                  TERMINATION-INITIATOR         TRUE }
        ID      id-op-binding-shadow }

-- types --

ModificationParameter  ::=  SEQUENCE {
        secondaryShadows          SET OF SupplierAndConsumers }

AgreementID  ::=  OperationalBindingID

ShadowingAgreementInfo  ::=  SEQUENCE {
        shadowSubject                   UnitOfReplication,
        updateMode                UpdateMode DEFAULT supplierInitiated : onChange : TRUE,
        master                    AccessPoint OPTIONAL,
        secondaryShadows          [2]     BOOLEAN DEFAULT FALSE }

UnitOfReplication  ::=  SEQUENCE {
        area                      AreaSpecification,
        attributes                      AttributeSelection,
        knowledge                       Knowledge OPTIONAL,
        subordinates                    BOOLEAN DEFAULT FALSE,
        contextSelection                ContextSelection OPTIONAL,
        supplyContexts            [0]   CHOICE {
                allContexts             NULL,
                selectedContexts        SET SIZE (1..MAX) OF CONTEXT.&id } OPTIONAL }

AreaSpecification  ::=  SEQUENCE  {
        contextPrefix       DistinguishedName,
        replicationArea     SubtreeSpecification }
```

```
Knowledge ::= SEQUENCE {
        knowledgeType               ENUMERATED {
                master          (0),
                shadow          (1),
                both            (2) },
        extendedKnowledge           BOOLEAN DEFAULT FALSE }

AttributeSelection ::= SET OF ClassAttributeSelection

ClassAttributeSelection ::= SEQUENCE {
        class                       OBJECT IDENTIFIER OPTIONAL,
        classAttributes             ClassAttributes DEFAULT allAttributes : NULL }

ClassAttributes ::= CHOICE {
        allAttributes       NULL,
        include     [0]     AttributeTypes,
        exclude     [1]     AttributeTypes }

AttributeTypes ::= SET OF AttributeType

UpdateMode ::= CHOICE {
        supplierInitiated           [0]     SupplierUpdateMode,
        consumerInitiated [1]       ConsumerUpdateMode }

SupplierUpdateMode ::= CHOICE {
        onChange            BOOLEAN,
        scheduled           SchedulingParameters }

ConsumerUpdateMode ::= SchedulingParameters

SchedulingParameters ::= SEQUENCE {
        periodic            PeriodicStrategy OPTIONAL,  -- must be present if othertimes is set to
FALSE --
        othertimes          BOOLEAN DEFAULT FALSE }

PeriodicStrategy ::= SEQUENCE {
        beginTime           Time OPTIONAL,
        windowSize INTEGER,
        updateInterval      INTEGER }

Time ::= GeneralizedTime
        -- as per 34.2 b) and c) of CCITT Rec. X.208 and ISO/IEC 8824

-- shadow operations, arguments, and results --

All-operations-consumer-initiated OPERATION ::= {
            requestShadowUpdate | updateShadow }

All-operations-supplier-initiated OPERATION ::= {
            coordinateShadowUpdate | updateShadow }

coordinateShadowUpdate OPERATION ::= {
        ARGUMENT CoordinateShadowUpdateArgument
        RESULT              CoordinateShadowUpdateResult
        ERRORS              { shadowError }
        CODE        id-opcode-coordinateShadowUpdate }

CoordinateShadowUpdateArgument ::= OPTIONALLY-PROTECTED { [0] SEQUENCE {
        agreementID                 AgreementID,
        lastUpdate                  Time OPTIONAL,
        updateStrategy              CHOICE {
                standard                    ENUMERATED {
                  noChanges                 (0),
                  incremental               (1),
                  total                     (2) },
                other                       EXTERNAL },
        securityParameters          SecurityParameters OPTIONAL } }

CoordinateShadowUpdateResult ::= CHOICE {
        null            NULL,
        information         OPTIONALLY-PROTECTED { [0] SEQUENCE {
                greementID          AgreementID,
                lastUpdate                  Time OPTIONAL,
                COMPONENTS OF       CommonResultsSeq } } }
```

```
requestShadowUpdate  OPERATION  ::=  {
        ARGUMENT          RequestShadowUpdateArgument
        RESULT            RequestShadowUpdateResult
        ERRORS            { shadowError }
        CODE        id-opcode-requestShadowUpdate }

RequestShadowUpdateArgument  ::=  OPTIONALLY-PROTECTED { [0] SEQUENCE {
        agreementID                 AgreementID,
        lastUpdate                  Time OPTIONAL,
        requestedStrategy CHOICE {
              standard      ENUMERATED {
                incremental         (1),
                total               (2) },
              other         EXTERNAL },
        securityParameters          SecurityParameters OPTIONAL } }

RequestShadowUpdateResult  ::=  CHOICE {
        null            NULL,
        information         OPTIONALLY-PROTECTED { [0] SEQUENCE {
              agreementID           AgreementID,
              lastUpdate                  Time OPTIONAL,
              COMPONENTS OF     CommonResultsSeq } } }

updateShadow  OPERATION  ::=  {
        ARGUMENT UpdateShadowArgument
        RESULT            UpdateShadowResult
        ERRORS            { shadowError }
        CODE        id-opcode-updateShadow }

UpdateShadowArgument  ::=  OPTIONALLY-PROTECTED { [0] SEQUENCE {
        agreementID                 AgreementID,
        updateTime                  Time,
        updateWindow                UpdateWindow OPTIONAL,
        updatedInfo         RefreshInformation,
        securityParameters          SecurityParameters OPTIONAL } }

UpdateShadowResult  ::=  CHOICE {
        null            NULL,
        information         OPTIONALLY-PROTECTED { [0] SEQUENCE {
              agreementID           AgreementID,
              lastUpdate                  Time OPTIONAL,
              COMPONENTS OF     CommonResultsSeq } } }

UpdateWindow  ::=  SEQUENCE {
        start     Time,
        stop      Time }

RefreshInformation  ::=  CHOICE {
        noRefresh                   NULL,
        total           [0]     TotalRefresh,
        incremental     [1]     IncrementalRefresh,
        otherStrategy               EXTERNAL }

TotalRefresh  ::=  SEQUENCE  {
        sDSE    SDSEContent OPTIONAL,
        subtree SET SIZE (1..MAX) OF Subtree OPTIONAL }

SDSEContent  ::=  SEQUENCE {
        sDSEType                    SDSEType,
        subComplete     [0]     BOOLEAN DEFAULT FALSE,
        attComplete [1]     BOOLEAN OPTIONAL,
        attributes                  SET OF Attribute,
        attValIncomplete    SET OF AttributeType DEFAULT {} }

SDSEType  ::=  DSEType

Subtree  ::=  SEQUENCE {
        rdn                 RelativeDistinguishedName,
        COMPONENTS OF TotalRefresh }

IncrementalRefresh  ::=  SEQUENCE OF IncrementalStepRefresh
```

```
IncrementalStepRefresh ::= SEQUENCE {
        sDSEChanges             CHOICE {
                add                             [0]     SDSEContent,
                remove                                  NULL,
                modify                          [1]     ContentChange } OPTIONAL,
        subordinateUpdates      SEQUENCE SIZE (1..MAX) OF SubordinateChanges OPTIONAL }

ContentChange ::= SEQUENCE {
        rename          CHOICE {
                newRDN                                  RelativeDistinguishedName,
                newDN                                   DistinguishedName } OPTIONAL,
        attributeChanges CHOICE {
                replace                 [0]     SET SIZE (1..MAX) OF Attribute,
                changes                 [1]     SEQUENCE SIZE (1..MAX) OF EntryModification }
OPTIONAL,
        sDSEType                SDSEType,
        subComplete     [2]     BOOLEAN DEFAULT FALSE,
        attComplete[3]  BOOLEAN OPTIONAL,
        attValIncomplete        SET OF AttributeType DEFAULT {} }

SubordinateChanges ::= SEQUENCE {
        subordinate RelativeDistinguishedName,
        changes         IncrementalStepRefresh }
```

-- errors and parameters --

```
shadowError ERROR ::= {
        PARAMETER       OPTIONALLY-PROTECTED-SEQ { SEQUENCE {
                problem                 ShadowProblem,
                lastUpdate              Time OPTIONAL,
                updateWindow            UpdateWindow OPTIONAL,
                COMPONENTS OF   CommonResultsSeq } }
        CODE   id-errcode-shadowError }

ShadowProblem ::= INTEGER {
        invalidAgreementID              (1),
        inactiveAgreement       (2),
        invalidInformationReceived      (3),
        unsupportedStrategy             (4),
        missedPrevious                  (5),
        fullUpdateRequired              (6),
        unwillingToPerform              (7),
        unsuitableTiming        (8),
        updateAlreadyReceived   (9),
        invalidSequencing       (10),
        insufficientResources           (11) }

END  -- DirectoryShadowAbstractService
```

Defect reports covered by Draft Technical Corrigendum 3

(Covering resolutions to defect report 245)

This corrects the defects reported in defect report 9594/245.
In 9.2, **UnitOfReplication**, change the **supplyContext** component to:

```
        supplyContexts          [0]     CHOICE {
                allContexts                     NULL,
                selectedContexts                SET OF CONTEXT.&id } OPTIONAL
```

Change **CommonResults** to **CommonResultSeq** in the import from **DirectoryAbstractService**.
In **CoordinateShadowUpdateResult**, **RequestShadowUpdateResult**, **UpdateShadowResult** and **shadowError** and associated text, change **CommonResults** to **CommonResultsSeq**.
(Changes to Annex A are subsumed by resolution to Defect Report 243)

Defect reports covered by Draft Technical Corrigendum 4

(Covering resolutions to defect reports 228 and 242)
This corrects the defects reported in defect report 9594/228.

Delete any occurrence of

```
    DIRQOP.&...-QOP{@dirqop},
```

In 11.1 change **CoordinateShadowUpdateResult** *to:*

```
CoordinateShadowUpdateResult ::= CHOICE {
    null            NULL,
    information     OPTIONALLY-PROTECTED { [0] SEQUENCE {
        greementID          AgreementID,
        lastUpdate              Time OPTIONAL,
        COMPONENTS OF       CommonResultsSeq } } }
```

In 11.2 change **RequestShadowUpdateResult** *to:*

```
RequestShadowUpdateResult ::= CHOICE {
    null            NULL,
    information     OPTIONALLY-PROTECTED { [0] SEQUENCE {
        agreementID         AgreementID,
        lastUpdate              Time OPTIONAL,
        COMPONENTS OF       CommonResultsSeq } } }
```

In 11.3 change **UpdateShadowResult** *to:*

```
UpdateShadowResult ::= CHOICE {
    null            NULL,
    information     OPTIONALLY-PROTECTED { [0] SEQUENCE {
        agreementID         AgreementID,
        lastUpdate              Time OPTIONAL,
        COMPONENTS OF       CommonResultsSeq } } }
```

In clause 12 in the **shadowError** construct, change **OPTIONALLY-PROTECTED** to **OPTIONALLY-PROTECTED-SEQ**.

(Changes to Annex A are subsumed by resolution to Defect Report 243)

This corrects the defects reported in defect report 9594/242.

Add size limit **SIZE (1..MAX)** to all optional **SET OF** and **SEQUENCE OF** constructs.

Recommendation X.530 (1997) | ISO/IEC 9594-10:1998

Information processing systems - Open Systems Interconnection - The Directory – Use of systems management for administration of the Directory

TECHNICAL CORRIGENDUM 1
NOTE – This Technical Corrigendum covers the result of the ballot resolutions of Draft Technical Corrigendum 1.

Defect reports resolved by Draft Technical Corrigendum 1

(Covering resolutions to defect report 252)

This corrects the defects reported in defect report 9594/252.
In A.9:

Replace the module identification with:

DirectoryManagement {joint-iso-itu-t ds(5) module(1) directoryManagement(27) 1 }

Add **basicAccessControl** *and* **upperBounds** *to the import from* ***UsefulDefinitions*****.**

Remove ***ub-common-name*** *from the import from* ***SelectedAttributeTypes***

Add a new import:

ub-common-name
FROM UpperBounds upperBounds

Remove ***AttributeTypeAndValue*** *from the import from* ***InformationFramework****.*

Replace:

Id-mat-foundLocalEntries OBJECT IDENTIFIER ::= {id-mat 6}

with:

id-mat-foundLocalEntries OBJECT IDENTIFIER ::= {id-mat 6}

Appendix B

Technical Corrigenda to Rec. X.500 (2000&2001) I ISO/IEC 9594 : 2000&2001 4th Edition

Summary of 4th Edition Technical Corrigenda

DTC #	Defect Reports resolved	Ballot Close	Published As	History
ITU-T Rec. X.501 (2001) I ISO/IEC 9594-2: 2001				
2-DTC1	250, 259	10 Jan 2001	4th edition	Erik after Orlando 2000. Incorporated into published edition.
ITU-T Rec. X.511 (2001) I ISO/IEC 9594-3: 2001				
3-DTC1	249, 262, 268	10 Jan 2001	4th edition	Erik after Orlando 2000. Incorporated into published edition.
ITU-T Rec. X.518 (2001) I ISO/IEC 9594-4: 2001				
4-DTC1	251, 253, 254, 264	10 Jan 2001	4th edition	Erik after Orlando 2000. Incorporated into published edition.
ITU-T Rec. X.519 (2001) I ISO/IEC 9594-5: 2001				
5-DTC1	271	10 Jan 2001	4th edition	Erik after Orlando 2000. Incorporated into published edition.

DTC #	Defect Reports resolved	Ballot Close	Published As	History
ITU-T Rec. X.520 (2001) I ISO/IEC 9594-6: 2001				
6-DTC2	251, 253, 270	10 Jan 2001	4th edition	Erik after Orlando 2000. Incorporated into published edition.
ITU-T Rec. X.509 (2000) I ISO/IEC 9594-8: 2001				
8-DTC1	244, 256, 257, 258	10 Jan 2001	4th edition	Sharon after Orlando 2000. Comments resolved at Geneva 2001. Incorporated into published edition
8-DTC2	272 - 279	9 August 2001 6N 11966	8-TC1	Sharon in April 2001 SOV SC6N12012 comments resolved by editor
8-DTC3	280-282	27 Nov 2001 6N 12016		Sharon 28 June 2001

Recommendation X.509 (2000) I ISO/IEC 9594-8:2001

Information processing systems - Open Systems Interconnection - The Directory - Authentication framework

TECHNICAL CORRIGENDUM 1

Recommendation X.509 (2000) I ISO/IEC 9594-8:2001 Technical Corrigendum 1 (DTC 2)

(covering resolutions to defect reports 272, 273, 274, 275, 276, 277, 278 & 279)

This corrects the defects reported in defect report 272

*In clause 8.4.2.1, add the following text to the end of the paragraph that begins with "The **pathLenConstraint** component shall be present only if…"*

The constraint takes effect beginning with the next certificate in the path. The constraint restricts the length of the segment of the certification path between the certificate containing this extension and the end-entity certificate. It has no impact on the number of CA-certificates in the certification path between the trust anchor and the certificate containing this extension. Therefore, the length of a complete certification path may exceed the maximum length of the segment constrained by this extension. The constraint controls the number of non self-issued CA certificates between the CA certificate containing the constraint and the end-entity certificate. Therefore the total length of this segment of the path, excluding self-issued certificates, may exceed the value of the constraint by as many as two certificates. (This includes the certificates at the two endpoints of the segment plus the CA certificates between the two endpoints that are constrained by the value of this extension.)

In clause 15.5.2.1, In the paragraph that begins with "The pathLenConstraint component is meaningful only if…", replace the last two sentences of this paragraph with the following:

The constraint restricts the length of the segment of the delegation path between the certificate containing this extension and the end-entity certificate. It has no impact on the number of AA-certificates in the delegation path between the trust anchor and the certificate containing this extension. Therefore, the length of a complete delegation path may exceed the maximum length of the segment constrained by this extension. The constraint controls the number of AA certificates between the AA certificate containing the constraint and the end-entity certificate. Therefore the total length of this segment of the path may exceed the value of the constraint by as many as two certificates. (This includes the certificates at the two endpoints of the segment plus the AA certificates between the two endpoints that are constrained by the value of this extension.)

This corrects the defects reported in defect report 273

Replace clause 8.4.2.2 with the following:

8.4.2.2 Name constraints extension

This field, which shall be used only in a CA-certificate, indicates a name space within which all subject names in subsequent certificates in a certification path must be located. This field is defined as follows:

```
nameConstraints EXTENSION ::= {
        SYNTAX              NameConstraintsSyntax
        IDENTIFIED BY       id-ce-nameConstraint }

NameConstraintsSyntax ::= SEQUENCE {
        permittedSubtrees           [0]     GeneralSubtrees OPTIONAL,
        excludedSubtrees            [1]     GeneralSubtrees OPTIONAL,
        requiredNameForms                   [2]     NameForms OPTIONAL  }

GeneralSubtrees ::= SEQUENCE SIZE (1..MAX) OF GeneralSubtree

GeneralSubtree ::= SEQUENCE {
        base                GeneralName,
        minimum     [0]     BaseDistance DEFAULT 0,
        maximum     [1]     BaseDistance OPTIONAL }

BaseDistance ::= INTEGER (0..MAX)


NameForms  ::= SEQUENCE {
    basicNameForms      [0]     BasicNameForms OPTIONAL,
    otherNameForms      [1]     SEQUENCE SIZE (1..MAX) OF OBJECT IDENTIFIER OPTIONAL }
(ALL EXCEPT ({ --none; i.e.:at least one component shall be present-- }))

BasicNameForms ::= BIT STRING {
        rfc822Name          (0),
        dNSName                         (1),
        x400Address                     (2),
        directoryName                   (3),
        ediPartyName                    (4),
        uniformResourceIdentifier       (5),
        iPAddress                       (6),
        registeredID        (7) }  (SIZE (1..MAX))
```

If present, the **permittedSubtrees** and **excludedSubtrees** components each specify one or more naming subtrees, each defined by the name of the root of the subtree and optionally, within that subtree, an area that is bounded by upper and/or lower levels. If **permittedSubtrees** is present, subject names within these subtrees are acceptable. If **excludedSubtrees** is present, any certificate issued by the subject CA or subsequent CAs in the certification path that has a subject name within these subtrees is unacceptable. If both **permittedSubtrees** and **excludedSubtrees** are present and the name spaces overlap, the exclusion statement takes precedence for names within that overlap. If neither permitted nor excluded subtrees are specified for a name form, then any name within that name form is acceptable. If **requiredNameForms** is present, all subsequent certificates in the certification path must include a name of at least one of the required name forms.

If **permittedSubtrees** is present, the following applies to all subsequent certificates in the path. If any certificate contains a subject name (in the **subject** field or **subjectAltNames** extension) of a name form for which permitted subtrees are specified, the name must fall within at least one of the specified subtrees. If any certificate contains only subject names of name forms other than those for which permittee subtrees are specified, the subject names are not required to fall within any of the specified subtrees. For example, assume that two permitted subtrees are specified, one for the DN name form and one for the rfc822 name form, no excluded subtrees are specified, but **requiredNameForms** is specified with the **directoryName** bit and **rfc822Name** bit present. A certificate that contained only names other than a directory name or rfc822 name would be unacceptable. If requiredNameForms were not specified, however, such a certificate

would be acceptable. For example, assume that two permitted subtrees are specified, one for the DN name form and one for the rfc822 name form, no excluded subtrees are specified, and **requiredNameForms** is not present. A certificate that only contained a DN and where the DN is within the specified permitted subtree, would be acceptable. A certificate that contained both a DN and an rfc822 name and where only one of them is within its specified permitted subtree, would be unacceptable. A certificate that contained only names other than a DN or rfc822 name would also be acceptable.

If **excludedSubtrees** is present, any certificate issued by the subject CA or subsequent CAs in the certification path that has a subject name (in the **subject** field or **subjectAltNames** extension) within these subtrees is unacceptable. For example, assume that two excluded subtrees are specified, one for the DN name form and one for the rfc822 name form. A certificate that only contained a DN and where the DN is within the specified excluded subtree, would be unacceptable. A certificate that contained both a DN and an rfc822 name and where at least one of them is within its specified excluded subtree, would be unacceptable.

When a certificate subject has multiple names of the same name form (including, in the case of the **directoryName** name form, the name in the subject field of the certificate if non-null) then all such names shall be tested for consistency with a name constraint of that name form.

If **requiredNameForms** is present, all subsequent certificates in the certification path must include a subject name of at least one of the required name forms.

Of the name forms available through the **GeneralName** type, only those name forms that have a well-defined hierarchical structure may be used in the **permittedSubtrees** and **excludedSubtrees** fields. The **directoryName** name form satisfies this requirement; when using this name form a naming subtree corresponds to a DIT subtree.

The **minimum** field specifies the upper bound of the area within the subtree. All names whose final name component is above the level specified are not contained within the area. A value of **minimum** equal to zero (the default) corresponds to the base, i.e. the top node of the subtree. For example, if **minimum** is set to one, then the naming subtree excludes the base node but includes subordinate nodes.

The **maximum** field specifies the lower bound of the area within the subtree. All names whose last component is below the level specified are not contained within the area. A value of **maximum** of zero corresponds to the base, i.e. the top of the subtree. An absent **maximum** component indicates that no lower limit should be imposed on the area within the subtree. For example, if **maximum** is set to one, then the naming subtree excludes all nodes except the subtree base and its immediate subordinates.

This extension may, at the option of the certificate issuer, be either critical or non-critical. It is recommended that it be flagged critical, otherwise a certificate user may not check that subsequent certificates in a certification path are located in the name space intended by the issuing CA.

Conformant implementations are not required to recognize all possible name forms.

If the extension is present and is flagged critical, a certificate-using implementation must recognize and process all name forms for which there is both a subtree specification (permitted or excluded) in the extension and a corresponding value in the **subject** field or **subjectAltNames** extension of any subsequent certificate in the certification path. If an unrecognized name form appears in both a subtree specification and a subsequent certificate, that certificate shall be handled as if an unrecognized critical extension was encountered. If any subject name in the certificate falls within an excluded subtree, the certificate is unacceptable. If a subtree is specified for a name

form that is not contained in any subsequent certificate, that subtree can be ignored. If the **requiredNameForms** component specifies only unrecognized name forms, that certificate shall be handled as if an unrecognized critical extension was encountered. Otherwise, at least one of the recognized name forms must appear in all subsequent certificates in the path.

If the extension is present and is flagged non-critical and a certificate-using implementation does not recognize a name form used in any **base** component, then that subtree specification may be ignored. If the extension is flagged non-critical and any of the name forms specified in the **requiredNameForms** component are not recognized by the certificate-using implementation, then the certificate shall be treated as if the **requiredNameForms** component was absent.

In clause 10.3 add a new path processing variable as follows and renumber subsequent bullets accordingly:

d) *required-name-forms:* A (possibly empty) set of sets of name forms. For each set of name forms, every subsequent certificate must contain a name of one of the name forms in the set.

In clause 10.4 add a new initialization step as follows and renumber subsequent bullets accordingly:

d) Initialize the *required-name-forms* to an empty set;

In clause 10.5, add a step to the checks applied to all certificates as follows:

h) If the certificate is not an intermediate self-issued certificate, and if required-name-forms is not an empty set, for each set of name forms in required-name-forms check that there is a subject name in the certificate of one of the name forms in the set.

In clause 10.5, add a step to the constraint recording actions applied to intermediate certificates as follows:

d) If the **nameConstraints** extension with a **requiredNameForms** component is present in the certificate, set the required-name-forms variable to the union of its previous value and the set consisting of the set of name forms specified in the certificate extension. If the **requiredNameForms** component contains more than one name form, the required-name-forms variable shall signal that a name of at least one of the indicated name forms in this extension shall be present in all subsequent certificates. The union of a previous value of the required-name-forms variable with the value from the current certificate extension is a set of sets signalling requirements for all subsequent certificates. For example if the current required-name-forms is set to requiring that either a DN or an rfc822 name must be present in certificates and the current extension in the certificate being processed indicates that either rfc822 names or DNS names are required, the resulting union that is the new required-name-forms indicates that each of the subsequent certificates must have either an rfc822 name or both a DN and a DNS name.

In Annex A, ***certificateExtensions*** *module update the asn.1 for* ***nameConstraints*** *extension as above*

In Annex A, ***certificateExtensions*** *module add the following:*

```
id-ce-nameConstraint                    OBJECT IDENTIFIER ::=    {id-ce 30 1}
```

In Annex A, ***certificateExtensions*** *module, delete the following:*

```
id-ce-nameConstraints           OBJECT IDENTIFIER        ::=    {id-ce 30}
```

In Annex A, ***certificateExtensions*** *module, add the following to the set of OIDs not used in this specification:*

```
id-ce 30
```

This corrects the defects reported in defect report 274

In clause 12.1and Annex A in the ***AttributeCertificateInfo*** *ASN.1 production, replace:*

```
version         AttCertVersion DEFAULT v1,
```
with:

```
version         AttCertVersion  --version is v2,
```

In clause 12.1and Annex A replace the ***AttCertVersion*** *ASN.1 production with:*

```
AttCertVersion     ::=   INTEGER  {v2(1) }
```

In clause 12.1and Annex A replace the ***AttCertIssuer*** *ASN.1 production with:*

```
AttCertIssuer ::=   [0]   SEQUENCE {
    issuerName              GeneralNames  OPTIONAL,
    baseCertificateID   [0]         IssuerSerial  OPTIONAL,
    objectDigestInfo    [1]         ObjectDigestInfo  OPTIONAL }
```

In clause 12.1 and Annex A, in the ASN.1 Holder production:

Replace the comment under **objectDigestInfo** that reads "—if present, version must be v2" with the following asn.1 comment "—*used to directly authenticate the holder, eg. an executable*"

In clause 12.1, Replace the first paragraph that follows the ASN.1 with the following:

The **version** differentiates between different versions of the attribute certificate. For attribute certificates issued in accordance with the syntax in this specification, **version** must be **v2**.

This corrects the defects reported in defect report 275

*In clause 8.2.2.4, add the following as a new second paragraph following the ASN.1 for the **extendedKeyUsage** extension.*

A CA may assert any-extended-key-usage by using the **anyExtendedKeyUsage** identifier. This enables a CA to issue a certificate that contains OIDs for extended key usages that may be required by certificate-using applications, without restricting the certificate to only those key usages. If extended key usage would restrict key usage, then the inclusion of this OID removes that restriction.

anyExtendedKeyUsage OBJECT IDENTIFIER ::= { 2 5 29 37 0 }

This corrects the defects reported in defect report 276

In clause 8.1.5,

In the last sentence, replace "and explicit-policy-pending indicators" with "explicit-policy-pending and inhibit-any-policy indicators".

In clause 8.4.2.4, in the first sentence

Replace "for all certificates in the certification path" with "for all non-self-issued certificates in the certification path".

In clause 10.5, in the first bullet list, step e),

Replace "or if the *inhibit-any-policy-indicator* is set, then delete" with "or if the *inhibit-any-policy-indicator* is set and the certificate is not a self-issued intermediate certificate, then delete".

This corrects the defects reported in defect report 277

In clause 8.4.2.3, in the last sentence of the first paragraph,

Replace "which is the subject of a subsequent certificate" with "which is the issuer of a subsequent certificate".

This corrects the defects reported in defect report 278

In clause 8.6.2.6, in the first sentence,

Replace "shall be used only as a certificate extension and may be…" with "may be used either as a certificate or CRL extension. Within certificates, this extension may be…"

This corrects the defects reported in defect report 279

In clause 7, add the following immediately after the ASN.1 ***CrossCertificates*** *production:*

PkiPath ::= SEQUENCE OF Certificate

PkiPath is used to represent a certification path. Within the sequence, the order of certificates is such that the **subject** of the first certificate is the issuer of the second certificate, etc.

In clause 11.1.6,

Replace "object class **pkiCA**" with "**pkiCA** or **pkiUser**".

In the last sentence of the last paragraph of clause 7,

Replace "component of **CertPath**" with "component of **CertPath** or a value of **Certificate** in **PkiPath**."

In clause 11.2.10,

Delete the **PkiPath** ASN.1 production.

In the first sentence of 11.2.10,

Replace "cross-certificates" with "certificates".

In clause 11.2.10, replace the text following the ASN.1 with the following:

This attribute can be stored in a directory entry of object class **pkiCA** or **pkiUser**.

When stored in **pkiCA** entries, values of this attribute contain certification paths excluding end-entity certificates. As such, the attribute is used to store certification paths that are frequently used by relying parties associated with that CA. A value of this attribute can be used in conjunction with any end-entity certificate issued by the last certificate subject in the attribute value.

When stored in pkiUser entries, values of this attribute contain certification paths that include the end-entity certificate. In this case, the end-entity is the user whose entry holds this attribute. The values of the attribute represent complete certification paths for certificates issued to this user.

In clause 11.3.9, in the last sentence of the first paragraph,

Replace "issued to the CA that issued the end-entity certificate being validated." with "issued to the specified subject".

Recommendation X.509 (2000) | ISO/IEC 9594-8:2001
Draft Technical Corrigendum 3

(covering resolutions to defect reports 280, 281 & 282)

This corrects the defects reported in defect report 280

Replace the existing subclause 8.6.2.2 with the following and make associated changes to the ASN.1 in Appendix A:

8.6.2.2 Issuing distribution point extension

This CRL extension field identifies the CRL distribution point for this particular CRL, and indicates if the CRL is indirect, or if it is limited to covering only a subset of the revocation information. The limitation may be based on a subset of the certificate population or on a subset of revocation reasons. The CRL is signed by the CRL issuer's key — CRL distribution points do not have their own key pairs. However, for a CRL distributed via the Directory, the CRL is stored in the entry of the CRL distribution point, which may not be the directory entry of the CRL issuer. If this field and the CRL scope field are both absent, the CRL shall contain entries for all revoked unexpired certificates issued by the CRL issuer.

This field is defined as follows:

```
issuingDistributionPoint      EXTENSION    ::=            {
  SYNTAX              IssuingDistPointSyntax
  IDENTIFIED BY       id-ce-issuingDistributionPoint }

IssuingDistPointSyntax ::= SEQUENCE {

  distributionPoint                       [0] DistributionPointName OPTIONAL,
  onlyContainsUserPublicKeyCerts          [1] BOOLEAN DEFAULT FALSE,
  onlyContainsCACerts                     [2] BOOLEAN DEFAULT FALSE,
  onlySomeReasons                         [3] ReasonFlags OPTIONAL,
  indirectCRL                             [4] BOOLEAN DEFAULT FALSE,
     onlyContainsUserAttributeCerts         [5] BOOLEAN DEFAULT FALSE,
     onlyContainsAACerts                    [6] BOOLEAN DEFAULT FALSE,
     onlyContainsSOAPublicKeyCerts                [7] BOOLEAN DEFAULT FALSE }
```

The **distributionPoint** component contains the name of the distribution point in one or more name forms. After a certificate appears on a CRL, it may be deleted from a subsequent CRL after the certificate's expiry.

If **onlyContainsUserPublicKeyCerts** is true, the CRL only contains revocations for end-entity public-key certificates. If **onlyContainsCACerts** is true, the CRL only contains revocations for CA certificates.

If **onlySomeReasons** is present, the CRL only contains revocations for the identified reason or reasons, otherwise the CRL contains revocations for all reasons.

If **indirectCRL** is true, then the CRL may contain revocation notifications from authorities other than the issuer of the CRL. The particular authority responsible for each entry is as indicated by the certificate issuer CRL entry extension in that entry or in accordance with the defaulting rules described in 8.6.2.3. In such a CRL, it is the responsibility of the CRL issuer to ensure that the CRL is complete in that it contains all revocation entries, consistent with **onlyContainsUserPublicKeyCerts**, **onlyContainsCACerts**, **onlyContainsUserAttributeCerts** , **onlyContainsAACerts, onlyContainsSOAPublicKeyCerts** and

onlySomeReasons indicators, from all authorities that identify this CRL issuer in their certificates.

If **onlyContainsUserAttributeCerts** is true, the CRL only contains revocations for attribute certificates issued to end-entities that are not themselves AAs. If **onlyContainsAACerts** is true, the CRL only contains revocations for attribute certificates issued to subjects that are themselves AAs.

If **onlyContainsSOAPublicKeyCerts** is true, the CRL only contains revocations for public-key certificates issued to an entity that is an SOA for purposes of privilege management (i.e. certificates that contain the SOAIdentifier extension)..

For CRLs distributed via the Directory, the following rules regarding use of attributes apply. Unless the CRL is a dCRL, a CRL which has **onlyContainsCACerts**,**onlyContainsAACerts** or **onlyContainsSOAPublicKeyCerts** set shall be distributed via the **authorityRevocationList** attribute of the associated distribution point or, if no distribution point is identified, via the **authorityRevocationList** attribute of the CRL issuer entry. Otherwise the CRL shall be distributed via the **certificateRevocationList** attribute of the associated distribution point or, if no distribution point is identified, via the **certificateRevocationList** attribute of the authority entry. If the CRL is a dCRL it shall be distributed via the **deltaRevocationList** attribute of the associated distribution point or, if no distribution point is identified, via the **deltaRevocationList** attribute of the CRL issuer entry.

This extension is always critical. A certificate user which does not understand this extension cannot assume that the CRL contains a complete list of revoked certificates of the identified authority. CRLs not containing critical extensions shall contain all current CRL entries for the issuing authority, including entries for all revoked user certificates and authority certificates.

NOTE 1 — The means by which revocation information is communicated by authorities to CRL issuers is beyond the scope of this Recommendation | International Standard.

NOTE 2 — If a authority publishes, in its own directory entry (i.e. not from a separately-named CRL distribution point), a CRL with **onlyContainsUserPublicKeyCerts** or **onlyContainsCACerts** set, then the authority should ensure that all certificates covered by this CRL contain the **basicConstraints** extension.

NOTE 3 — If a authority publishes, in its own directory entry (i.e. not from a separately-named CRL distribution point), a CRL with **onlyContainsUserAttributeCerts**, **onlyContainsAACerts** or **onlyContainsSOAPublicKeyCerts** set, then the authority should ensure that all certificates covered by this CRL contain the **basicAttConstraints** extension.

In clause 8.5.2.5, and in Appendix A, replace the OnlyCertificateTypes ASN.1 construct with the following:

```
OnlyCertificateTypes        ::= BIT STRING {
    userPublicKey (0),
    CA            (1),
    userAttribute (2),
    AA            (3),
    SOAPublicKey (4) }
```

This corrects the defects reported in defect report 281

In clause 8.6.2.6, add the following paragraph after the ASN.1:

The value of type **CRLDistPointsSyntax** is as defined in the CRL distribution points extension in subclause 8.6.2.1 of this Specification.

Replace the existing subclause B.5.1.4 with the following:

In order to determine that a CRL is one of the CRLs indicated by a distribution point in the CRL distribution point extension or freshest CRL extension in a certificate, all of the following conditions shall be true:

- Either the distribution point field in the CRL's issuing distribution point extension shall be absent (only when not looking for a critical CRL DP), or one of the names in the distribution point field of the CRL DP or freshest CRL extension of the certificate shall match one of the names in the distribution point field in the issuing distribution point extension of the CRL. Alternatively, one of the names in the **cRLIssuer** field of the certificate's CRLDP or freshest CRL extensioncan match one of the names in DP of the IDP; and
- If the certificate is an end entity certificate, the CRL shall not contain **onlyContainsAuthorityCerts** field set to **TRUE** in the issuing distribution point extension of the CRL; and
- If **onlyContainsAuthorityCerts** is set to **TRUE** in the issuing distribution point extension of the CRL, then the certificate being checked shall contain the **basicConstraints** extension with the **cA** component set to **TRUE**; and
- If the **reasons** field is present in the certificate's CRL DP or freshest CRL extension, the **onlySomeReasons** field shall be either absent from the issuing distribution point extension of the CRL or contain at least one of the reason codes asserted in the CRL DP or freshest CRL extension of the certificate; and
- If the **cRLIssuer** field is absent from the relevant extension in the certificate (either CRL DP or freshest CRL) , the CRL shall be signed by the same CA that signed the certificate; and
- If the **cRLIssuer** field is present in the relevant extension in the certificate (CRL DP or freshest CRL) , the CRL shall be signed by the CRL issuer identified in the **cRLIssuer** field and the CRL shall contain the issuing distribution point extension with the **indirectCRL** field set to **TRUE**.

Note: When testing the **reasons** and **cRLIssuer** field for presence, the test succeeds only if the field is present in the same **DistributionPoint** of the CRL DP or freshest CRL extension in the certificate for which there is a name match in the corresponding distribution point field of the IDP extension in the CRL.

This corrects the defects reported in defect report 282

In clause 7, in the paragraph immediately following the definition of the version field and in the paragraph immediately following the definition of the extensions field, replace

"documented in 7.5.2.2 in ITU-T Rec. X.519 | ISO/IEC 9594-5"
with
"documented in 12.2.2 in ITU-T Rec. X.519 | ISO/IEC 9594-5".

In clause 7.3, immediately following Note 6 and in clause 12.1 immediately following the definition of the extensions field add the following new paragraph:

"If unknown elements appear within the extension, and the extension is not marked critical, those unknown elements shall be ignored according to the rules of extensibility documented in 12.2.2 in ITU-T Rec. X.519 | ISO/IEC 9594-5."

Appendix C

Summary of Defect Reports

Defects numbered 001 to 074 apply to the 1st edition only and are not documented here; for these see Version 9 of the Implementor's Guide. Defects numbered 075–156. 158, 160, 161, 165, 168, 171, 172, 174, and 175 apply to the 2nd edition only and are not documented here; for these see Version 14 of the Implementor's Guide.

The third edition (1997 / 1998) is identified by the mark 3rd. The 4th edition (2000 for X.509|9594-8 and 2001 for all others) is identified by the mark 4th.

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
157	ModifyDN and UnitOfReplication	4/19.1.4	8N363	Germany	**4-TC1 (3rd)**
159	targetObject in Search (I) procedure	4/19.3.2.2.1	8N363	Germany	**4-TC1 (3rd)**
162	APInfo procedure	4/20.4.5	8N363	Germany	**4-TC1 (3rd)**
163	Shadowed information procedure	9/7.2, 9.Fig.3	8N363	Germany	**Accepted** Source solution
164	*ASN.1 of SupplierUpdateMode*				*Rejected*
166	Alias control by alias dereferencing	3/7.11.1	8N363	Germany	**3-TC1 (3rd)**
168	*Protected password*				*Rejected*
169	Permutable property for PKCS	8/Clause 7, 8/10.2, 8/10.3		UK	**Accepted** **Not in DTC**
170	Entry selection in search procedure	3/Fig. B-11		UK	**Open**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
173	NSSRs in the root entry	2/18.5		ITU Rapp.	**2-TC1 (3rd)**
176	Access controls on aliases	3/7.11.1		ITU Rapp.	**Open**
177	Distinguished encoding of UTCTime	8/Clause 9		ISO Rapp.	**8-TC3**
178	Duplicate of 209				
179	Clarification in returnDN handling	2/Table K-1 3/7.4.11, B4, B5		Germany	**2-TC1 (3rd)** **3-TC1 (3rd)**
180	entryOnly inconsistency	3/7.3 4/10.3(g)-(o)		Germany	**Rejected** But editorial to part 4 was accepted - **4-TC1 (3rd)**
181	*Shadowing access controls*				*Withdrawn*
182	Shadowing and one-level searching	9/7.2.2.3 and 9.2		IETF	**9-TC1 (3rd)**
183	Public key usage	8/12.2.2..3		UK	**8-TC1 (3rd)**
184	*CertificationPath*	*8/8*		*UK*	***Rejected** Helsinki97*
185	Forward and reverse certificates	8/8		UK	**8-TC4 (3rd)**
186	Entry ACI and shadowing	9/7.2.2		UK	**9-TC1 (3rd)**
187	sdseType of root	9/7.2.1.1		UK	**9-DTC2(3rd)**
188	Add permission and prescriptive ACI	3/11.1.5 (3)		UK	**3-TC1 (3rd)**
189	Modify operational binding	2/24.3		UK	**2-TC1 (3rd)**
190	Access controls	4/19.3.1.2.2 1b		UK	**4-TC1 (3rd)**
191	Alias loops	4/18.3.1		UK	**Rejected**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
192	Collective attributes and content rules	2/11.7, 2/12.7.1, 2/13.6		UK	**Open**
193	*Policy constraints*				*Rejected*
194	Validity date	?			**8-TC1 (3rd)**
195	Shadowing agreement parameters	9/9.1		UK	*Rejected*
196	*Validity period*				*Withdrawn*
197	DSE type bits	2/19.4.2 4/24.3.1.2		Defect Group	**Open**
198	Additions to chaining arguments	4/17.3.3.1		UK	**4-TC1 (3rd)**
199	Presence Filter	3/7.8.2		US	**Accepted** with mod Not in DTC!!
200	CRL dist pts & full crls	8/12.6.2		Defect Group	**8-TC3 (3rd)**
201	Issuing distribution point	8/12.6.3.1		UK	**8-TC3 (3rd)**
202	Clarification of **CertificationPath** in **SecurityParameters**	3/7.10		Defect Group	**3-TC1 (3rd)**
203	Entry Information Selection	3/7.6		Defect Group	Rejected
204	Revoked certificates on CRL past expiry time	8/12.6.3.1 and 8/11.2		Defect Group	**8-TC5 (3rd)**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
205	Definition of Superior Reference			US	**2-TC1 (3rd)**
206	Handling extensions for search results	3/10.1.3 4/21		EIDQ/FDAS & ISSS/WS DIR	**3-TC1 (3rd)** **4-TC1 (3rd)**
207	Problem in the use of the Algorithm object Class	8/8 & Annex A		Rapporteur	**8-DTC6(97) ?**
208	Needed ACI when processing List using knowledge held in superior DSA	9/7.2.2.3 & 9.2.4.1		IETF IDS	**9-DTC2(3rd)**
209	DSA referrals (duplicate registration 178)			ITU rapporteur	**4-TC1 (3rd)**
210	Shadowing attribute selection			Defect Group	**Open**
211	Y2K corrections	Parts 2, 3,4, & 6		US	**2-TC2, 3-TC3, 6-TC1 (3rd)**
212	CRL matching rules	8/12.7.6		US	**8-TC3 (3rd)**
213	CRL matching rules	8/12.7.6d		US	**8-TC3 (3rd)**
214	Use of the term “canonical”	8/		Rapporteur	**8-DTC6(97) ?**
215	Access control to changing RDN			Rapporteur (UK)	**Open**
216	*CertificateAssertion*			*Australia*	***rejected***
217	Use of Operation and Error Code in Security Parameters	3/7.10		UK	**3-TC1 (3rd)**
218	Certificate Policy Match	8/12.7.2		UK	**8-TC3 (3rd)**
219	CA certificate and Basic Constraints	8/		IETF	***rejected***

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
220	CRL version number	8/		IETF/ISO rapporteur	**8-TC3 (3rd)**
221	Conformance for Certificate Extensions	5/9		Rapporteur's meeting	**5-TC1 (97 3rd)**
222	Policy Mapping	8/12.1 & 12.4.3		US (Santosh and Moses)	**8-TC7 (3rd)**
223	The naming attribute for an entry should always be shadowed.	9/9.2.2		UK	**Open**
224	The evaluation of a filter to UNDEFINED needs to be made consistent for the case where access control is/is not present.	3/7.8.2		UK	**3-DTC5(3rd)**
225	Entry Information Selection and **extraAttributes**	3/7.6		Australia	**Open**
226	CA system operational characteristics	8/11.2		Editor	**8-DTC8(3rd)**
227	Authority Key Identifier format	8/12.2.2.1		US	**8-DTC8(3rd)**
228	ASN.1 errors in protection feature in X.501	2/15.3.2, P		Editor	**1-DTC1(3rd), 2-DTC4(3rd), 3-DTC5(3rd), 4-DTC5(3rd), 5-DTC3(3rd), 9-DTC4(3rd)**
229	Wrong references and minor ASN.1 errors in X.501	2/17.4.3, 18.1.2 – 3, B, F, P		Editor	**2-DTC3(3rd)**
230	**The X.501 ASN.1 type Issuer** is unknown	2/18.1.2.1		Editor	**2-DTC3(3rd)**
231	Simple credential ASN.1 error in X.511	3/8.1.1, A		Editor	**3-DTC3(3rd)**
232	Small ASN.1 editorial errors in X.511	3/7.2, 8.11, 9.3, A		Editor	**3-DTC3(3rd)**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
233	Minor ASN.1 editorials in the import section of X.518 ASN.1 Module	4/ A		Editor	**4-DTC3(3rd)**
234	Wrong limitation on request decomposition	4/15.3.1		Editor	**4-DTC4(3rd)**
235	Error in X.518 ASN.1 datatype **AccessPointInformatio**n	4/10.8		Editor	**4-DTC3(3rd)**
236	Editorial mistakes in X.519 ASN.1 modules	5/A, B,C, D, G		Editor	**5-DTC2(3rd)**
237	ASN.1 errors in X.520	6/5.2.9, 7.6, A		Editor	**6-DTC2(3rd)**
238	Wrong reference of string types in X.520	6/6.1.1 - 6		Editor	**6-DTC2(3rd)**
239	Missing imports in X.521 ASN.1 module	7/A		Editor	**7-DTC1(3rd)**
240	Miscellaneous errors in X.509	A		Editor	**8-DTC8(3rd)**
241	SerialNumber attribute	6/5.2.9		Rapporteur	**6-DTC2(3rd)**
242	Size constraint on SET OF and SEQUENCE OF	8/		Rapporteur	**2-DTC4(3rd), 3-DTC5(3rd), 4-DTC5(3rd), 5-DTC3(3rd), 9-DTC4(3rd)**
243	Miscellaneous errors in X.525	9/2.1, 6, 9.2, 11.1-3, A		Editor	**9-DTC2(3rd)**
244	Clarification of conformance to criticality	8/see proposal		Sharon	**8-DTC9(3rd), 8-DTC1(4th)**
245	Duplicate Tags	9/9.2		Erik	**9-DTC3(3rd)**
246	Miscellaneous errors	6/5.12.2, 5.12.5, 6.8, A, C		Erik	
247	Miscellaneous errors	3/Introduction, 12.4		Erik	**3-DTC4(3rd)**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
248	ASN.1 error in NHOBSubordinateToSuperior	4/25.1.4, D		Erik	**4-DTC4(3rd)**
249	Miscellaneous errors	3/3.7.4, 7.3.2, 7.7, 7.8.2, 7.8.3		Erik	**3-DTC1(4th)**
250	Miscellaneous errors	2/various		Erik	**2-DTC1(4th)**
251	**AdministrativeLimit**	4/16.1.4.4, 6/5.12.1		Erik	**4-DTC1(4th), 6-DTC1(4th)**
252	ASN.1 errors	10/A.9		Erik	**10-DTC1(3rd)**
253	Hierarchy selections problems	4/19.3.3.2.4 (old 19.3.3.2.1. 6/5.12.		Erik	**4-DTC1(4th), 6-DTC1(4th)**
254	**chainingRequired** component misplaced	4/10.4, 10.8, A		Erik	**4-DTC1(4th)**
255	Inconsistency in **CONTENT-RULE** information object class	2/12.7.2		Erik	**2-DTC4(3rd)**
256	Populating reverse element	8/		Sharon	**8-DTC9(3rd), 8-DTC1(4th)**
257	Renaming forward & reverse	8/		Sharon	**8-DTC9(3rd), 8-DTC1(4th)**
258	Certificate path loops	8/		Sharon	**8-DTC9(3rd), 8-DTC1(4th)**
259	**PartialOutcomeQualifier** and **ContextCombination** errors	4th 2/13.6.1, 16.10		Erik	**2-DTC1(4th)**
260	Ambiguity in **AttributeTypeAndDistinguishedValue**	2/9.3, B		Erik	**2-DTC4(3rd)**
261	**CommonResults** is wrong data dytpe	2/26.5		Erik	**2-DTC4(3rd)**
262	Signal hierarchy selection not supported	4th 3/13.3		Erik	**3-DTC1(4th)**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
263	Incorrect clause references; test does not match ASN.1 for **SimpleCredentials**	3/7.1, 8.12		Erik	**3-DTC5(3rd)**
264	Optionally signal chaining; search constrained by service specific administrative area	4th 4/16.1.4.2, 19.3.2.2.4		Erik	**4-DTC1(4th)**
265	Various errors	4/14.5, 15.3.1, 19.3.1.1.3		Erik	**4-DTC5(3rd)**
266	Invalid updates of conformance clause	5/9		Erik	**5-DTC3(3rd)**
267	Various errors	2/14.7.3, 14.7.10, 25.2, 22.2.1.2		Erik	**2-DTC4(3rd)**
268	**noSubtypeSelection** in Entry information selection	4th 3/7.6		Erik	**3-DTC1(4th)**
269	Error in MatchingRuleDescription dasta type	2/12.5.2 b), 14.7.3		Erik	**2-DTC4(3rd)**
270	Data types in attribute syntaxes and matching rule assertion syntaxes	6/5.8.1, 6.1.1, 6.1.10, 6.5.3.1		Erik	**6-DTC3(3rd), 6-DTC1(4th)**
271	Use of term "packet"	4th 5/9.7		Erik	**5-DTC1(4th)**
272	Certification Path Length	3rd 8/12.4.2.1 & 4th 8/8.4.2, 15.5.2.1		Sharon	**8-DTC10(3rd), 8-DTC2(4th)**
273	Name constraints conformance	3rd 12.4.2.2 4th 8.4.2.2		Sharon	**8-DTC10(3rd), 8-DTC2(4th)**

DR #	Description of Defect	Part # and clause	DR doc #	Source	Status
274	Attribute Certificate version	4th 12.1, A		Sharon	**8-DTC2(4th)** vote for confirmation of solution already incorporated into published 4th edition
275	ExtendedKeyUsage	3rd 8/12.2.2.4 & 4th 8/8.4.2.1, 15.5.2.1		Sharon	**8-DTC10(3rd), 8-DTC2(4th)**
276	Use of anyPolicy in self issued certificates	4th 8/8.1.5, 8.4.2.4, 10.5		Sharon	**8-DTC2(4th)**
277	Requires explicit policy skip certificates value	3rd 8/12.4.2.3 & 4th 8/8.4.2.3, 10		Sharon	**8-DTC10(3rd), 8-DTC2(4th)**
278	FreshestCRL extension	4th 8/8.6.2.6		Sharon	**8-DTC2(4th)**
279	Certification path syntaxes	4th 8/7, 11.1.6, 11.2.10, 11.3.9		Sharon/Mullan	**8-DTC2(4th)**
280	IDP extension: CA/AA split in CRLs	4th 8/8.6.2.2		Sharon/Polk/Housley/Cooper	**8-DTC3(4th)**
281	FreshestCRL extension	4th 8/8.6.2.6 and B.5.1.4		Cooper	**8-DTC34th)**
282	Invalid references to 4th edition of X.519/9594-5	4th 8/7, 7.3 & 12.1		Sharon	**8-DTC3(4th)**

Appendix D

Defect Report Form

Please also send a soft copy of the defect in Microsoft Word format to the Defect Editor (hoytkesterson@earthlink.net).

DEFECT REPORT FORM

1. Defect Report Number:

   Title:

2. Source:

3. Addressed to: ISO/IEC JTC1/SC6 and ITU-T SG 7
   Editor Group on the Directory

4. (a) ISO/IEC JTC 1/SC 6 Secretariat: Fax: +82 2 369 8349
   Email: secretariat@jtc1sc06.org

   (b) ITU-T Study Group 7 Secretariat: Fax: +41 22 730 5853
   Email: sebek@itu.int

5. Date Circulated by WG Secretariat:

6. Deadline for Response from Editor:

7. Defect Report Concerning:
   (number and title of IS or DIS final text/ITU Recommendation)

8. Qualifier: (e.g.: error, omission, clarification required)

9. References in Document: (e.g.: page, clause/section, figure, and/or table numbers)

10. Nature of Defect: (complete, concise explanation of the perceived problem)

11. Solution Proposed by the Source: (optional)

12. Editor's Response:

(any material proposed for processing as an erratum to, an amendment to, or a commentary on the IS or DIS final text/ITU Recommendation or Draft Recommendation is attached separately to this completed report).

Appendix E

Defect Resolution Committee Members

The following representatives have been nominated to the Collaborative Defect Resolution Committee.

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Appendix F

Register of ASN.1 Modules Specified External to the Standard

Annex A of ITU-T Rec. X.501|ISO/IEC 9594-2 defines the OIDs of the ASN.1 modules that are specified in the X.500 series of recommendations | parts of 9594. There is a need to define ASN.1 modules that are associated with this standard but are not defined therein.

This appendix of the Implementor's guide is the definitive register of the module OIDs for those ASN.1 modules. Currently, there are no modules registered.

The root OID of the values in this register is defined in the aforesaid Annex A as

externalDefinitions ID : ::= { module externalDefinitions(34) }

OIDS constructed from the entries in this table have the value

{ joint-iso-itu-t ds(5) module(1) externalDefinitions(34) x Version(y) }

where x is the value specified in the following table and y is the revision number of the module being named.

OID x	Date	Source
0	5 September 2001	The module containing the OIDs defined in this register

```
ExternalDefinitions {joint-iso-itu-t ds(5) module(1) externalDefinitions(34) 0 version(0) }
DEFINITIONS ::=
BEGIN

-- EXPORTS All –

-- This module specifies the OIDs of ASN.1 modules that are not defined within the Directory
Specifications
-- This module is specified in Appendix F of the Directory Implementor's Guide
-- A source for the externally defined ASN.1 module may be found in the register in Appendix F of the
-- Directory Implementor's Guide

IMPORTS

-- from ITU-T Rec. X.501 | ISO/IEC 9594-2

        externalDefinitions
                FROM UsefulDefinitions { joint-iso-itu-t ds(5) module(1) usefulDefinitions(0) 4 }

ID                      ::=     OBJECT IDENTIFIER

exModule    ID          ::=     { externalDefinition }

-- categories of information object --

-- exampleModule ID ::= { exModule x(1) version(0) }


END  -- ExternalDefinitions
```