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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Directory services
architecture for audiovisual and multimedia services

Directory services architecture for H.235

Recommendation ITU-T H.350.2



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For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T H.350.2

Directory services architecture for H.235

Summary

Recommendation ITU-T H.350.2 describes a lightweight directory access protocol (LDAP) schema to represent ITU-T H.235 elements. It is an auxiliary class related to Recommendation ITU-T H.350 and derives much of its functionality from that architecture. Implementers should review Recommendation ITU-T H.350 in detail before proceeding with this Recommendation. Its attributes include ITU-T H.235 identity, password and certificate elements. These elements can be downloaded to an endpoint for automatic configuration or accessed by a gatekeeper for call signalling and authentication.

The scope of this Recommendation does not include normative methods for the use of the LDAP directory itself or the data it contains. The purpose of the schema is not to represent all possible data elements in the ITU-T H.235 protocol, but rather to represent the minimal set required to accomplish the design goals enumerated in Recommendation ITU-T H.350.

This revised version of Recommendation ITU-T H.350.2 introduces several enhancements and clarifications to the previous version, primarily the addition of ITU-T X.500 directories support.

This Recommendation includes an electronic attachment containing a schema configuration file for h235Identity.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T H.350.2	2003-08-06	16
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Directory services, ITU-T H.235.0, ITU-T H.320, ITU-T H.323, LDAP, SIP, ITU-T X.500.

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Recommendation ITU-T H.350.2

Directory services architecture for H.235

1 Scope

This Recommendation¹ describes a lightweight directory access protocol (LDAP) schema to represent ITU-T H.235 elements. It is an auxiliary class related to [ITU-T H.350] and derives much of its functionality from that architecture. Implementers should review [ITU-T H.350] in detail before proceeding with this Recommendation. Its attributes include ITU-T H.235 identity, password and certificate elements. These aliases can be downloaded to an endpoint for automatic configuration or accessed by a gatekeeper for call signalling and authentication.

The scope of this Recommendation does not include normative methods for the use of the LDAP directory itself or the data it contains. The purpose of the schema is not to represent all possible data elements in the ITU-T H.235 protocol, but rather to represent the minimal set required to accomplish the design goals enumerated in [ITU-T H.350].

1.1 Extending the schema

The h235Identity classes may be extended as necessary for specific implementations. See the base [ITU-T H.350] for a discussion on schema extension.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T H.225.0] Recommendation ITU-T H.225.0 (2009), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.
- [ITU-T H.235.0] Recommendation ITU-T H.235.0 (2005), *H.323 security: Framework for security in H-series (H.323 and other H.245-based) multimedia systems*.
- [ITU-T H.235.1] Recommendation ITU-T H.235.1 (2005), *H.323 security: Baseline security profile*.
- [ITU-T H.235.2] Recommendation ITU-T H.235.2 (2005), *H.323 security: Signature security profile*.
- [ITU-T H.323] Recommendation ITU-T H.323 (2009), *Packet-based multimedia communications systems*.
- [ITU-T H.350] Recommendation ITU-T H.350 (2011), *Directory services architecture for multimedia conferencing*.
- [ITU-T X.500] Recommendation ITU-T X.500 (2008) | ISO/IEC 9594-1:2008, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services*.

¹ This Recommendation includes an electronic attachment containing a text file with a schema configuration for h235Identity.

- [ITU-T X.501] Recommendation ITU-T X.501 (2008) | ISO/IEC 9594-2:2008, *Information technology – Open Systems Interconnection – The Directory: Models.*
- [ITU-T X.509] Recommendation ITU-T X.509 (2008) | ISO/IEC 9594-8:2008, *Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks.*
- [ITU-T X.511] Recommendation ITU-T X.511 (2008) | ISO/IEC 9594-3:2008, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition.*
- [ITU-T X.518] Recommendation ITU-T X.518 (2008) | ISO/IEC 9594-4:2008, *Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation.*
- [ITU-T X.519] Recommendation ITU-T X.519 (2008) | ISO/IEC 9594-5:2008, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications.*
- [ITU-T X.520] Recommendation ITU-T X.520 (2008) | ISO/IEC 9594-6:2008, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types.*
- [ITU-T X.525] Recommendation ITU-T X.525 (2008) | ISO/IEC 9594-9:2008, *Information technology – Open Systems Interconnection – The Directory: Replication.*
- [IETF RFC 4510] IETF RFC 4510 (2006), *Lightweight Directory Access Protocol (LDAP): Technical Specification Road Map.*
- [IETF RFC 4511] IETF RFC 4511 (2006), *Lightweight Directory Access Protocol (LDAP): The Protocol.*

3 Definitions

This Recommendation defines the following terms:

3.1 commObject: An LDAP object class defined in [ITU-T H.350] that represents generic multimedia conferencing endpoints.

3.2 endpoint: A logical device that provides video and/or voice media encoding/decoding, and signalling functions. Examples include:

- 1) a group teleconferencing appliance that is located in a conference room;
- 2) an IP telephone;
- 3) a software program that takes video and voice from a camera and microphone, encodes it and applies signalling, using a host computer.

Note that from the perspective of most signalling protocols, gateways and MCUs are special cases of endpoints.

4 Abbreviations

This Recommendation uses the following abbreviations:

LDAP Lightweight Directory Access Protocol

NOTE – This is consistent with [IETF RFC 4510].

LDIF LDAP Data Interchange Format

5 Conventions

In this Recommendation, the following conventions are used:

"Shall" indicates a mandatory requirement.

"Should" indicates a suggested but optional course of action.

"May" indicates an optional course of action rather than a recommendation that something takes place.

References to clauses, subclauses, annexes and appendices refer to those items within this Recommendation, unless another specification is explicitly listed.

6 Object class definitions

The `h235Identity` object class defines two attributes, `h235IdentityEndpointID` and `h235IdentityPassword`, which are needed to be able to implement [ITU-T H.235.1]. The remaining attributes that are used, and which are already defined in LDAP, are needed to be able to implement [ITU-T H.235.2]. Those attributes are `userCertificate`, `cACertificate`, `authorityRevocationList`, `certificateRevocationList`, and `crossCertificatePair`. The definitions and purpose of each of those attributes are defined in [IETF RFC 4510].

6.1 h235Identity

```
OID: 0.0.8.350.1.1.4.2.1
objectclasses: (0.0.8.350.1.1.4.2.1
NAME 'h235Identity'
DESC 'h235Identity object'
SUP top AUXILIARY
MAY ( h235IdentityEndpointID $ h235IdentityPassword $
userCertificate $ cACertificate $ authorityRevocationList $
certificateRevocationList $ crossCertificatePair )
)
```

6.2 h235IdentityEndpointID

```
OID: 0.0.8.350.1.1.4.1.1
attributetypes: (0.0.8.350.1.1.4.1.1
NAME 'h235IdentityEndpointID'
DESC 'The Sender ID as defined in ITU-T H.235.1.'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringsMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15 )
```

Application utility class

Standard

Number of values

multi

Definition

The endpoint's `sendersID` as defined in [ITU-T H.235.1]. This is always identical to `endpointID`.

Permissible values (if controlled)

Notes

In practice, there will always be one and only one `h235identityEndpointID` attribute for every endpoint. For applications where the endpoint authenticates against an LDAP directory, this value may be equal to the `commUniqueId` value defined in [ITU-T H.350].

Semantics

Example applications for which this attribute would be useful

Example (LDIF fragment)

```
h235IdentityEndpointID: bobsmith
```

6.3 h235IdentityPassword

```
OID: 0.0.8.350.1.1.4.1.2
attributetypes: (0.0.8.350.1.1.4.1.2
NAME 'h235IdentityPassword'
DESC 'The endpoint password as defined in ITU-T H.235.1.'
EQUALITY octetStringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.40 )
```

Application utility class

Standard

Number of values

multi

Definition

The endpoint's ITU-T H.323 password as defined in [ITU-T H.235.1].

Permissible values (if controlled)

Notes

In practice, there will always be one and only one `h235IdentityPassword` attribute for every endpoint.

If the password is stored in LDAP in an encrypted format, then the LDAP encryption algorithm should match the encryption algorithm for the gatekeeper and endpoint, i.e., the gatekeeper and endpoint should support the same encryption format as the LDAP server, even as systems are upgraded over time. In this manner, the endpoint and gatekeeper may derive the unencrypted password in order to perform ITU-T H.235.1 operations. Since this may not always be possible, the password may be stored in LDAP in an unencrypted fashion. In this case, whenever the password is read by a gatekeeper or endpoint, that communication should be transacted over a secure transport mechanism, e.g., TLS.

Semantics

Example applications for which this attribute would be useful

Example (LDIF fragment)

```
h235IdentityPassword: 36zxJmCIB18dM0FVAj
```

7 h235Identity LDIF files

This clause contains a schema configuration file for `h235Identity` that can be used to configure an LDAP server to support this class. It should be noted that DESC fields have been updated to reflect the ITU-T H.235 reorganization in 2005.

```

# h235Identity Object Schema
#
# Schema for representing h235Identity Object in an LDAP Directory
#
# Abstract
#
# This Recommendation defines the schema for representing h235Identity
# object in an LDAP directory [LDAPv3]. It defines schema elements
# to represent an h235Identity object [h235Identity].
#
#           .1 = Communication related work
#           .1.4 = h235Identity
#           .1.4.1 = attributes
#           .1.4.2 = objectclass
#           .1.4.3 = syntax
#
#
# Attribute Type Definitions
#
#   The following attribute types are defined in this Recommendation:
#
#       h235IdentityEndpointID
#       h235IdentityPassword
dn: cn=schema
changetype: modify
#
# if you need to change the definition of an attribute,
#       then first delete and re-add in one step
#
# if this is the first time you are adding the h235Identity
# objectclass using this LDIF file, then you should comment
# out the delete attributetypes modification since this will
# fail. Alternatively, if your ldapmodify has a switch to continue
# on errors, then just use that switch -- if you are careful
#
delete: attributetypes
attributetypes: (0.0.8.350.1.1.4.1.1 NAME 'h235IdentityEndpointID' )
attributetypes: (0.0.8.350.1.1.4.1.2 NAME 'h235IdentityPassword' )
-
#
# re-add the attributes -- in case there is a change of definition
#
#
add: attributetypes
attributetypes: (0.0.8.350.1.1.4.1.1
    NAME 'h235IdentityEndpointID'
    DESC 'The Sender ID as defined in ITU-T H.235.1.'
    EQUALITY caseIgnoreMatch
    SUBSTR caseIgnoreSubstringsMatch
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.15 )
attributetypes: (0.0.8.350.1.1.4.1.2
    NAME 'h235IdentityPassword'
    DESC 'The endpoint ITU-T H.323 password as defined in ITU-T H.235.1.'
    EQUALITY octetStringMatch
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.40 )
-
# Object Class Definitions
#
#   The following object class is defined in this Recommendation:
#
#       h235Identity
#
# h235Identity
#
#
delete: objectclasses
objectclasses: (0.0.8.350.1.1.4.2.1 NAME 'h235Identity' )
-
add: objectclasses
objectclasses: (0.0.8.350.1.1.4.2.1

```

```

NAME 'h235Identity'
DESC 'h235Identity object'
SUP top AUXILIARY
MAY ( h235IdentityEndpointID $ h235IdentityPassword $
      userCertificate $ cACertificate $
      authorityRevocationList $ certificateRevocationList $
      crossCertificatePair )
)
-
#
# end of LDIF
#

```

8 Using ITU-T H.350 with ITU-T X.500 directories

8.1 IMPORTS of ITU-T X.500 ASN.1

To satisfy all the IMPORTS clauses, the following modules are needed:

- BasicAccessControl ([ITU-T X.501])
- DSAOperationalAttributeTypes ([ITU-T X.501])
- EnhancedSecurity ([ITU-T X.501])
- InformationFramework ([ITU-T X.501])
- OperationalBindingManagement ([ITU-T X.501])
- ServiceAdministration ([ITU-T X.501])
- UsefulDefinitions ([ITU-T X.501])
- AttributeCertificateDefinitions ([ITU-T X.509])
- AuthenticationFramework ([ITU-T X.509])
- CertificateExtensions ([ITU-T X.509])
- MTSAbstractService ([ITU-T X.509])
- PKIX1Implicit93 ([ITU-T X.509])
- DirectoryAbstractService ([ITU-T X.511])
- SpkmGssTokens ([ITU-T X.511])
- DistributedOperations ([ITU-T X.518])
- HierarchicalOperationalBindings ([ITU-T X.518])
- CommonProtocolSpecification ([ITU-T X.519])
- DirectoryOSIProtocols ([ITU-T X.519])
- DirectoryOperationalBindingTypes ([ITU-T X.519])
- OSIProtocolSpecification ([ITU-T X.519])
- SelectedAttributeTypes ([ITU-T X.520])
- DirectoryShadowAbstractService ([ITU-T X.525])
- ldap ([IETF RFC 4511])

It is noted that these modules can be downloaded from the [ITU-T ASN.1 module database](#).

8.2 h235IdentityASN1.asn

```
H235Identity { itu-t(0) recommendation(0) h(8) 350 1 cr(1) h235Identity(4) module(4) }
```

```

DEFINITIONS ::=
BEGIN

-- h235Identity Object Schema

-- Schema for representing h235Identity Object in an LDAP Directory

-- Abstract

-- This Recommendation defines the schema for representing h235Identity
-- object in an LDAP directory [LDAPv3]. It defines schema elements
-- to represent an h235Identity object [h235Identity].

--
--           .1 = Communication related work
--           .1.4 = h235Identity
--           .1.4.1 = attributes
--           .1.4.2 = objectclass
--           .1.4.3 = syntax

IMPORTS

-- from Rec. ITU-T H.350

h350-cr
    FROM CommURI { itu-t(0) recommendation(0) h(8) 350 1 cr(1) commURI(1) module(4) }

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

ATTRIBUTE, OBJECT-CLASS, top
    FROM InformationFramework {joint-iso-itu-t ds(5) module(1) informationFramework(1)
6}

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

userCertificate, cACertificate, authorityRevocationList, certificateRevocationList,
crossCertificatePair
    FROM AuthenticationFramework {joint-iso-itu-t ds(5) module(1)
authenticationFramework(7) 6}

-- from Rec. ITU-T X.520 | ISO/IEC 9594-6

UnboundedDirectoryString, caseIgnoreMatch, caseIgnoreSubstringsMatch, octetStringMatch
    FROM SelectedAttributeTypes {joint-iso-itu-t ds(5) module(1)
selectedAttributeTypes(5) 6} ;

-- Attribute Type Definitions

-- The following attribute types are defined in this Recommendation:

--
--           h235IdentityEndpointID
--           h235IdentityPassword

h235IdentityEndpointID ATTRIBUTE ::= {
    WITH SYNTAX UnboundedDirectoryString
    EQUALITY MATCHING RULE caseIgnoreMatch
    SUBSTRINGS MATCHING RULE caseIgnoreSubstringsMatch
    ID { at 1 } }

h235IdentityPassword ATTRIBUTE ::= {
    WITH SYNTAX OCTET STRING
    EQUALITY MATCHING RULE octetStringMatch
    ID { at 2 } }

-- Object Class Definitions

-- The following object class is defined in this Recommendation:

--
--           h235Identity

h235Identity OBJECT-CLASS ::= {

```

```
SUBCLASS OF { top }
MAY CONTAIN { h235IdentityEndpointID | h235IdentityPassword |
  userCertificate | cACertificate |
  authorityRevocationList | certificateRevocationList |
  crossCertificatePair }
ID { oc 1 } }
```

```
h235-Id    OBJECT IDENTIFIER ::= { h350-cr h235-Id(4) }
at        OBJECT IDENTIFIER ::= { h235-Id at(1) }
oc        OBJECT IDENTIFIER ::= { h235-Id oc(2) }
```

```
END -- end of ASN.1
```

Annex A

Indexing profile

(This annex forms an integral part of this Recommendation.)

Indexing of attributes is an implementation-specific activity and depends upon the desired application. Non-indexed attributes can result in search times sufficiently long to render some applications unusable. Notably, user and alias lookup should be fast. This annex indexing profile describes an indexing configuration for h235Identity directories that will be optimized for use in the directory of directories applications. Use of this profile is optional.

h235IdentityEndpointID: no recommendation

h235IdentityPassword: equality

Appendix I

Electronic attachment

(This appendix does not form an integral part of this Recommendation.)

The associated ZIP file for Recommendation ITU-T H.350.2 contains file `h235Identity.ldif.txt` with a text-only version of the LDIF file described in clause 7.

The ZIP file is available for free download at <http://www.itu.int/rec/T-REC-H.350.2>

Bibliography

- [b-Howes-1] Howes, T.A., PhD, Smith, M.C., and Good, G.S. (1998), *Understanding and Deploying LDAP Directory Services*, New Riders Publishing, ISBN: 1578700701.
- [b-Howes-2] Howes, T.A., PhD, and Smith, M.C. (1997), *LDAP: Programming Directory-Enabled Applications with Lightweight Directory Access Protocol*, New Riders Publishing, ISBN: 1578700000.

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