Abstract

This document defines YANG identities and typedefs useful for cryptographic applications.

Editorial Note (To be removed by RFC Editor)

This draft contains many placeholder values that need to be replaced with finalized values at the time of publication. This note summarizes all of the substitutions that are needed. No other RFC Editor instructions are specified elsewhere in this document.

Artwork in this document contains shorthand references to drafts in progress. Please apply the following replacements:

- "XXXX" --> the assigned RFC value for this draft

Artwork in this document contains placeholder values for the date of publication of this draft. Please apply the following replacement:

- "2018-06-04" --> the publication date of this draft

The following Appendix section is to be removed prior to publication:

- Appendix A. Change Log

Status of This Memo

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1. Introduction

This document defines a YANG 1.1 [RFC7950] module specifying identities and typedefs useful for cryptography.

As the YANG module only defines identities and typedefs, this draft does not present a YANG tree diagram [RFC8340] or any examples illustrating usage of the module.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP
2. YANG Module

This module has normative references for [RFC4253], [RFC5280], [RFC5480], [RFC5652], and [ITU.X690.2015] and has informational references to [RFC6234] and [RFC8017]

<CODE BEGINS> file "ietf-crypto-types@2018-06-04.yang"
module ietf-crypto-types {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-crypto-types";
  prefix "ct";
  organization
    "IETF NETCONF (Network Configuration) Working Group";
  contact
    "WG Web:  <http://datatracker.ietf.org/wg/netconf/>
    WG List:  <mailto:netconf@ietf.org>
    Author:   Kent Watsen
    <mailto:kwatsen@juniper.net>"
  description
    "This module defines common YANG types for cryptographic applications."

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  This version of this YANG module is part of RFC XXXX; see the RFC itself for full legal notices.";

  revision "2018-06-04" {
    description
      "Initial version";
    reference
      "RFC XXXX: Common YANG Data Types for Cryptography";
  }


identity hash-algorithm {
    description
        "A base identity for hash algorithm verification.";
}

identity sha-256 {
    base "hash-algorithm";
    description "The SHA-256 algorithm.";
    reference "RFC 6234: US Secure Hash Algorithms.";
}

identity rsa1024 {
    base key-algorithm;
    description
        "The RSA algorithm using a 1024-bit key.";
    reference "RFC 8017: PKCS #1: RSA Cryptography Specifications Version 2.2.";
}

identity rsa2048 {
    base key-algorithm;
    description
        "The RSA algorithm using a 2048-bit key.";
    reference "RFC 8017: PKCS #1: RSA Cryptography Specifications Version 2.2.";
}

identity rsa3072 {
    base key-algorithm;
    description
identity rsa4096 {
    base key-algorithm;
    description  
        "The RSA algorithm using a 4096-bit key.";
    reference
        "RFC 8017:
            PKCS #1: RSA Cryptography Specifications Version 2.2.";
}

identity rsa7680 {
    base key-algorithm;
    description  
        "The RSA algorithm using a 7680-bit key.";
    reference
        "RFC 8017:
            PKCS #1: RSA Cryptography Specifications Version 2.2.";
}

identity rsa15360 {
    base key-algorithm;
    description  
        "The RSA algorithm using a 15360-bit key.";
    reference
        "RFC 8017:
            PKCS #1: RSA Cryptography Specifications Version 2.2.";
}

identity secp192r1 {
    base key-algorithm;
    description  
        "The secp192r1 algorithm.";
    reference
        "RFC 5480: Elliptic Curve Cryptography Subject Public
          Key Information.";
}

identity secp256r1 {
    base key-algorithm;
    description  
        "The secp256r1 algorithm.";
    reference
        "RFC 5480: Elliptic Curve Cryptography Subject Public
          Key Information.";
}
Key Information.

identity secp384r1 {
    base key-algorithm;
    description
    "The secp384r1 algorithm."
    reference
    "RFC 5480: Elliptic Curve Cryptography Subject Public
    Key Information.";
}

identity secp521r1 {
    base key-algorithm;
    description
    "The secp521r1 algorithm."
    reference
    "RFC 5480: Elliptic Curve Cryptography Subject Public
    Key Information.";
}

ypi hash-algorithm-ref {
    type identityref {
        base "hash-algorithm";
    }
    description
    "This typedef enables importing modules to easily define an
    identityref to the 'hash-algorithm' base identity."
}

ypi key-algorithm-ref {
    type identityref {
        base "key-algorithm";
    }
    description
    "This typedef enables importing modules to easily define an
    identityref to the 'key-algorithm' base identity."
}

ypi asn1-structures {
    type identityref {
        base "asn1-structures";
    }
    description
    "This typedef enables importing modules to easily define an
    identityref to the 'asn1-structures' base identity."
}
typedef x509 {
  type binary;
  description
    "A Certificate structure, as specified in RFC 5280, encoded using ASN.1 distinguished encoding rules (DER), as specified in ITU-T X.690.";
  reference
    "RFC 5280:
      Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
      ITU-T X.690:
      Information technology - ASN.1 encoding rules:
      Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).";
}

typedef crl {
  type binary;
  description
    "A CertificateList structure, as specified in RFC 5280, encoded using ASN.1 distinguished encoding rules (DER), as specified in ITU-T X.690.";
  reference
    "RFC 5280:
      Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
      ITU-T X.690:
      Information technology - ASN.1 encoding rules:
      Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).";
}

/***********************************************/
/* Typedefs for ASN.1 structures from 5652 */
/***********************************************/

typedef cms {
  type binary;
  description
    "A ContentInfo structure, as specified in RFC 5652, encoded using ASN.1 distinguished encoding rules (DER), as specified in ITU-T X.690.";
  reference
    "RFC 5652:
      Cryptographic Message Syntax (CMS)
      ITU-T X.690:
typedef data-content-cms {
type cms;
description "A CMS structure whose top-most content type MUST be the data content type, as described by Section 4 in RFC 5652.";
reference "RFC 5652: Cryptographic Message Syntax (CMS)";
}

typedef signed-data-cms {
type cms;
description "A CMS structure whose top-most content type MUST be the signed-data content type, as described by Section 5 in RFC 5652.";
reference "RFC 5652: Cryptographic Message Syntax (CMS)";
}

typedef enveloped-data-cms {
type cms;
description "A CMS structure whose top-most content type MUST be the enveloped-data content type, as described by Section 6 in RFC 5652.";
reference "RFC 5652: Cryptographic Message Syntax (CMS)";
}

typedef digested-data-cms {
type cms;
description "A CMS structure whose top-most content type MUST be the digested-data content type, as described by Section 7 in RFC 5652.";
reference "RFC 5652: Cryptographic Message Syntax (CMS)";
}

typedef encrypted-data-cms {
type cms;
description
"A CMS structure whose top-most content type MUST be the encrypted-data content type, as described by Section 8 in RFC 5652."
reference
"RFC 5652: Cryptographic Message Syntax (CMS)"

typedef authenticated-data-cms {
type cms;
description
"A CMS structure whose top-most content type MUST be the authenticated-data content type, as described by Section 9 in RFC 5652."
reference
"RFC 5652: Cryptographic Message Syntax (CMS)"
}

/**ILING************************************************************************/
/*  Typedefs for structures related to RFC 4253  */
/*******************************************************************************/

typedef ssh-host-key {
type binary;
description
"The binary public key data for this SSH key, as specified by RFC 4253, Section 6.6, i.e.:
string    certificate or public key format
        identifier
byte[n]    key/certificate data.";
reference
"RFC 4253: The Secure Shell (SSH) Transport Layer Protocol"
}

/**ILING************************************************************************/
/*  Typedefs for ASN.1 structures related to RFC 5280  */
/*******************************************************************************/

typedef trust-anchor-cert-x509 {
type x509;
description
"A Certificate structure that MUST encode a self-signed root certificate."
}

typedef end-entity-cert-x509 {
type x509;
}
typedef trust-anchor-cert-cms {
    type signed-data-cms;
    description
    "A CMS SignedData structure that MUST contain the chain of
    X.509 certificates needed to authenticate the certificate
    presented by a client or end-entity.

    The CMS MUST contain only a single chain of certificates.
    The client or end-entity certificate MUST only authenticate
    to last intermediate CA certificate listed in the chain.

    In all cases, the chain MUST include a self-signed root
    certificate. In the case where the root certificate is
    itself the issuer of the client or end-entity certificate,
    only one certificate is present.

    This CMS structure MAY (as applicable where this type is
    used) also contain suitably fresh (as defined by local
    policy) revocation objects with which the device can
    verify the revocation status of the certificates.

    This CMS encodes the degenerate form of the SignedData
    structure that is commonly used to disseminate X.509
    certificates and revocation objects (RFC 5280).";

    reference
    "RFC 5280:
    Internet X.509 Public Key Infrastructure Certificate
    and Certificate Revocation List (CRL) Profile.";
}

typedef end-entity-cert-cms {
    type signed-data-cms;
    description
    "A CMS SignedData structure that MUST contain the end
    entity certificate itself, and MAY contain any number
    of intermediate certificates leading up to a trust
    anchor certificate. The trust anchor certificate
    MAY be included as well.

    RFC 5652
    Typedefs for ASN.1 structures related to
    RFC 5652 */

    typedef trust-anchor-cert-cms {
    type signed-data-cms;
    description
    "A Certificate structure that MUST encode a certificate
    that is neither self-signed nor having Basic constraint
    CA true.";
}

}
The CMS MUST contain a single end entity certificate. The CMS MUST NOT contain any spurious certificates.

This CMS structure MAY (as applicable where this type is used) also contain suitably fresh (as defined by local policy) revocation objects with which the device can verify the revocation status of the certificates.

This CMS encodes the degenerate form of the SignedData structure that is commonly used to disseminate X.509 certificates and revocation objects (RFC 5280)."


3. Security Considerations

In order to use YANG identities for algorithm identifiers, only the most commonly used RSA key lengths are supported for the RSA algorithm. Additional key lengths can be defined in another module or added into a future version of this document.

This document limits the number of elliptical curves supported. This was done to match industry trends and IETF best practice (e.g., matching work being done in TLS 1.3). If additional algorithms are needed, they can be defined by another module or added into a future version of this document.

The YANG module defined in this document specifies only typedefs and identities, and hence there are no YANG-specific security considerations that need to be addressed.

4. IANA Considerations

4.1. The IETF XML Registry

This document registers one URI in the "ns" subregistry of the IETF XML Registry [RFC3688]. Following the format in [RFC3688], the following registration is requested:

Registrant Contact: The NETCONF WG of the IETF.
XML: N/A, the requested URI is an XML namespace.
4.2. The YANG Module Names Registry

This document registers one YANG module in the YANG Module Names registry [RFC6020]. Following the format in [RFC6020], the following registration is requested:

```yaml
name:         ietf-crypto-types
prefix:       ct
reference:    RFC XXXX
```

5. References

5.1. Normative References


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5.2. Informative References


Appendix A. Change Log

A.1. I-D to 00

- Removed groupings and notifications.
- Added typedefs for identityrefs.
- Added typedefs for other RFC 5280 structures.
- Added typedefs for other RFC 5652 structures.
- Added convenience typedefs for RFC 4253, RFC 5280, and RFC 5652.

Acknowledgements

The authors would like to thank for following for lively discussions on list and in the halls (ordered by last name): Martin Bjorklund, Balazs Kovacs, Eric Voit, and Liang Xia.

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