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Authors: K. Watsen
Watsen Networks

YANG Groupings for HTTP Clients and HTTP Servers

Abstract

This document defines two YANG modules: the first defines a minimal grouping for configuring an HTTP client, and the second defines a minimal grouping for configuring an HTTP server. It is intended that these groupings will be used to help define the configuration for simple HTTP-based protocols (not for complete web servers or browsers).

Editorial Note (To be removed by RFC Editor)

This draft contains 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 (note: not all may be present):

- *AAAA --> the assigned RFC value for draft-ietf-netconf-crypto-types
- *BBBB --> the assigned RFC value for draft-ietf-netconf-trust-anchors
- *CCCC --> the assigned RFC value for draft-ietf-netconf-keystore
- *DDDD --> the assigned RFC value for draft-ietf-netconf-tcp-client-server
- *EEEE --> the assigned RFC value for draft-ietf-netconf-ssh-client-server
- *FFFF --> the assigned RFC value for draft-ietf-netconf-tls-client-server
- *GGGG --> 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:

*2020-08-20 --> 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

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 21 February 2021.

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1. Introduction

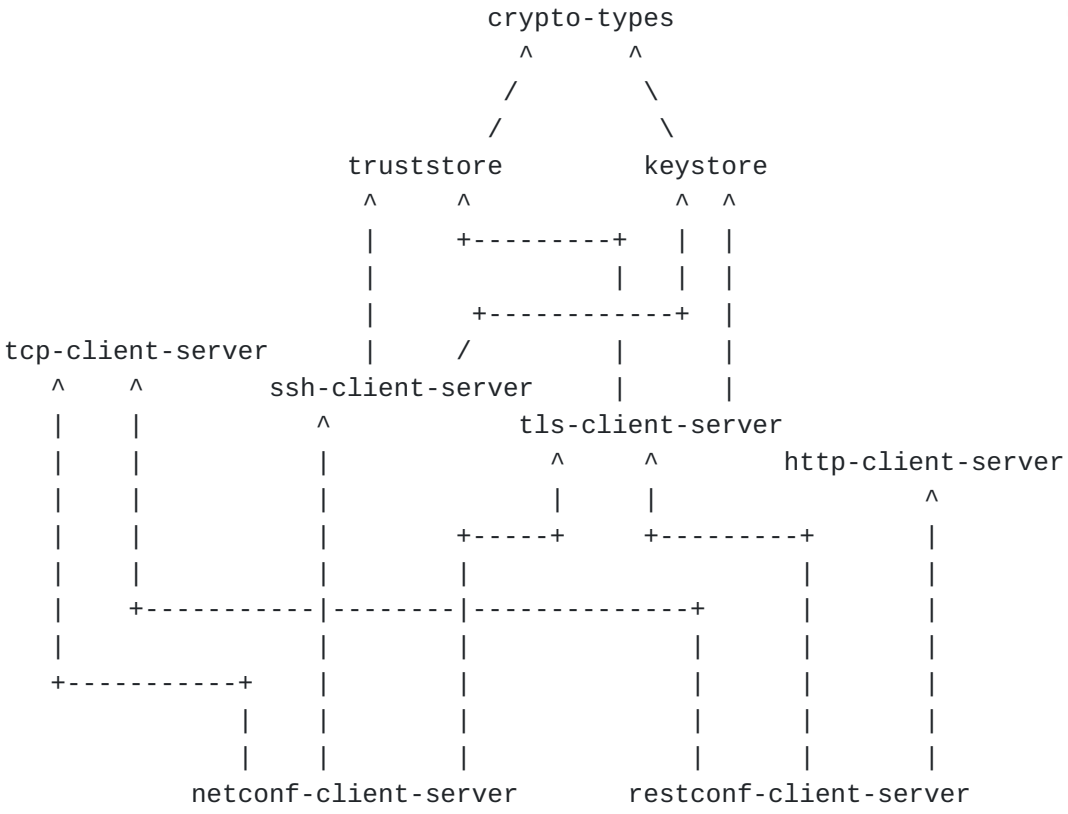
This document defines two YANG 1.1 [RFC7950] modules: the first defines a minimal grouping for configuring an HTTP client, and the second defines a minimal grouping for configuring an HTTP server. It is intended that these groupings will be used to help define the configuration for simple HTTP-based protocols (not for complete web servers or browsers).

1.1. Relation to other RFCs

This document presents one or more YANG modules [RFC7950] that are part of a collection of RFCs that work together to define configuration modules for clients and servers of both the NETCONF [RFC6241] and RESTCONF [RFC8040] protocols.

The modules have been defined in a modular fashion to enable their use by other efforts, some of which are known to be in progress at the time of this writing, with many more expected to be defined in time.

The normative dependency relationship between the various RFCs in the collection is presented in the below diagram. The labels in the diagram represent the primary purpose provided by each RFC. Hyperlinks to each RFC are provided below the diagram.



Label in Diagram	Originating RFC
crypto-types	[I-D.ietf-netconf-crypto-types]
truststore	[I-D.ietf-netconf-trust-anchors]
keystore	[I-D.ietf-netconf-keystore]
tcp-client-server	[I-D.ietf-netconf-tcp-client-server]
ssh-client-server	[I-D.ietf-netconf-ssh-client-server]
tls-client-server	[I-D.ietf-netconf-tls-client-server]
http-client-server	[I-D.ietf-netconf-http-client-server]
netconf-client-server	[I-D.ietf-netconf-netconf-client-server]
restconf-client-server	[I-D.ietf-netconf-restconf-client-server]

Table 1: Label to RFC Mapping

1.2. Specification Language

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 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

1.3. Adherence to the NMDA

This document in compliant with the Network Management Datastore Architecture (NMDA) [RFC8342]. For instance, as described in [I-

D.ietf-netconf-trust-anchors] and [I-D.ietf-netconf-keystore], trust anchors and keys installed during manufacturing are expected to appear in <operational>.

2. The "ietf-http-client" Module

This section defines a YANG 1.1 [RFC7950] module called "ietf-http-client". A high-level overview of the module is provided in Section 2.1. Examples illustatrating the module's use are provided in Examples (Section 2.2). The YANG module itself is defined in Section 2.3.

2.1. Data Model Overview

This section provides an overview of the "ietf-http-client" module in terms of its features and groupings.

2.1.1. Features

The following diagram lists all the "feature" statements defined in the "ietf-http-client" module:

```
Features:
  +-- proxy-connect
  +-- basic-auth
  +-- tcp-supported
  +-- tls-supported
```

The diagram above uses syntax that is similar to but not defined in [RFC8340].

2.1.2. Groupings

The following diagram lists all the "grouping" statements defined in the "ietf-http-client" module:

```
Groupings:
  +-- http-client-identity-grouping
  +-- http-client-grouping
  +-- http-client-stack-grouping
```

The diagram above uses syntax that is similar to but not defined in [RFC8340].

Each of these groupings are presented in the following subsections.

2.1.2.1. The "http-client-identity-grouping" Grouping

The following tree diagram [RFC8340] illustrates the "http-client-identity-grouping" grouping:

```
grouping http-client-identity-grouping
  +-- client-identity!
     +-- (auth-type)
        +--:(basic)
           +-- basic {basic-auth}?
              +-- user-id                string
              +---u ct:password-grouping
```

Comments:

*This grouping exists because it is used three times by the "http-client-grouping" discussed in Section 2.1.2.2.

*The "client-identity" node is a "presence" container so that its descendent "choice" node's "mandatory true" doesn't imply that a client identity must be configured, as a client identity may be configured at protocol layers.

*The "basic" authentication scheme is the only scheme defined by this module, albeit it must be enabled via the "basic-auth" feature (see Section 2.1.1).

*Other authentication schemes MAY be augmented in as needed by the application.

2.1.2.2. The "http-client-grouping" Grouping

The following tree diagram [RFC8340] illustrates the "http-client-grouping" grouping:

```
grouping http-client-grouping
  +---u http-client-identity-grouping
  +-- proxy-connect! {proxy-connect}?
     +-- (proxy-type)
        +--:(http)
        |  +-- http-proxy
        |     +-- tcp-client-parameters
        |     |  +---u tcpc:tcp-client-grouping
        |     +-- http-client-parameters
        |        +---u http-client-identity-grouping
        +--:(https)
           +-- https-proxy
              +-- tcp-client-parameters
              |  +---u tcpc:tcp-client-grouping
              +-- tls-client-parameters
              |  +---u tlsc:tls-client-grouping
              +-- http-client-parameters
                 +---u http-client-identity-grouping
```

Comments:

*The "http-client-grouping" defines the configuration for just "HTTP" part of a protocol stack. It does not, for instance, define any configuration for the "TCP" or "TLS" protocol layers (for that, see Section 2.1.2.3).

*Beyond configuring the client's identity, via the "http-client-identity-grouping" grouping discussed in Section 2.1.2.1, this grouping defines support for HTTP-proxies, albeit it must be enabled via a "feature" statement.

*The "proxy-connect" node is a "presence" container so that its descendent "choice" node's "mandatory true" doesn't imply that a proxy connection must be configured, assuming the server supports the "proxy-connect" feature.

*For the referenced grouping statement(s):

-The "http-client-identity-grouping" grouping is discussed in Section 2.1.2.1.
-The "tcp-client-grouping" grouping is discussed in Section 3.1.2.1 of [I-D.ietf-netconf-tcp-client-server].
-The "tls-client-grouping" grouping is discussed in Section 3.1.2.1 of [I-D.ietf-netconf-tls-client-server].

2.1.2.3. The "http-client-stack-grouping" Grouping

The following tree diagram [RFC8340] illustrates the "http-client-stack-grouping" grouping:

```
grouping http-client-stack-grouping
  +-- (transport)
     +--:(tcp) {tcp-supported}?
     |  +-- tcp
     |     +-- tcp-client-parameters
     |     |  +---u tcpc:tcp-client-grouping
     |     +-- http-client-parameters
     |        +---u http-client-grouping
     +--:(tls) {tls-supported}?
        +-- tls
           +-- tcp-client-parameters
           |  +---u tcpc:tcp-client-grouping
           +-- tls-client-parameters
           |  +---u tlsc:tls-client-grouping
           +-- http-client-parameters
              +---u http-client-grouping
```

Comments:

*The "http-client-stack-grouping" is a convenience grouping for downstream modules. It defines both the "HTTP" and "HTTPS" protocol stacks, with each option enabled by a "feature" statement for application control.

*For the referenced grouping statement(s):

-The "tcp-client-grouping" grouping is discussed in Section 3.1.2.1 of [I-D.ietf-netconf-tcp-client-server].
-The "tls-client-grouping" grouping is discussed in Section 3.1.2.1 of [I-D.ietf-netconf-tls-client-server].
-The "http-client-grouping" grouping is discussed in Section 2.1.2.2 in this document.

2.1.3. Protocol-accessible Nodes

The "ietf-http-client" module does not contain any protocol-accessible nodes.

2.2. Example Usage

This section presents two examples showing the http-client-grouping populated with some data.

The following example illustrates an HTTP client connecting directly to an HTTP server.

```
<http-client xmlns="urn:ietf:params:xml:ns:yang:ietf-http-client">
  <client-identity>
    <basic>
      <user-id>bob</user-id>
      <cleartext-password>secret</cleartext-password>
    </basic>
  </client-identity>
</http-client>
```

The following example illustrates the same client connecting through an HTTP proxy. This example is consistent with examples presented in Section 2.2 of [I-D.ietf-netconf-trust-anchors] and Section 2.2 of [I-D.ietf-netconf-keystore].

```
=============== NOTE: '\' line wrapping per RFC 8792 ================

<http-client xmlns="urn:ietf:params:xml:ns:yang:ietf-http-client">
  <client-identity>
    <basic>
      <user-id>bob</user-id>
      <cleartext-password>secret</cleartext-password>
    </basic>
  </client-identity>
  <proxy-connect>
    <https-proxy>
      <tcp-client-parameters>
        <remote-address>corp-fw2.example.com</remote-address>
        <keepalives>
          <idle-time>15</idle-time>
          <max-probes>3</max-probes>
          <probe-interval>30</probe-interval>
        </keepalives>
      </tcp-client-parameters>
      <tls-client-parameters>
        <client-identity>
          <certificate>
            <keystore-reference>
              <asymmetric-key>rsa-asymmetric-key</asymmetric-key>
              <certificate>ex-rsa-cert</certificate>
            </keystore-reference>
          </certificate>
        </client-identity>
        <server-authentication>
          <ca-certs>
            <truststore-reference>trusted-server-ca-certs</truststor\
e-reference>
          </ca-certs>
          <ee-certs>
            <truststore-reference>trusted-server-ee-certs</truststor\
e-reference>
          </ee-certs>
        </server-authentication>
      </tls-client-parameters>
      <http-client-parameters>
        <client-identity>
          <basic>
            <user-id>local-app-1</user-id>
            <cleartext-password>secret</cleartext-password>
          </basic>
        </client-identity>
      </http-client-parameters>
    </https-proxy>
```

```
  </proxy-connect>
</http-client>
```

2.3. YANG Module

This YANG module has normative references to [RFC6991].

<CODE BEGINS> file "ietf-http-client@2020-08-20.yang"

```
module ietf-http-client {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-http-client";
  prefix httpc;

  import ietf-netconf-acm {
    prefix nacm;
    reference
      "RFC 8341: Network Configuration Access Control Model";
  }

  import ietf-crypto-types {
    prefix ct;
    reference
      "RFC AAAA: YANG Data Types and Groupings for Cryptography";
  }

  import ietf-tcp-client {
    prefix tcpc;
    reference
      "RFC DDDD: YANG Groupings for TCP Clients and TCP Servers";
  }

  import ietf-tls-client {
    prefix tlsc;
    reference
      "RFC FFFF: YANG Groupings for TLS Clients and TLS Servers";
  }

  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:kent+ietf@watsen.net>";

  description
    "This module defines reusable groupings for HTTP clients that
     can be used as a basis for specific HTTP client instances.

     Copyright (c) 2020 IETF Trust and the persons identified
     as authors of the code. All rights reserved.

     Redistribution and use in source and binary forms, with
     or without modification, is permitted pursuant to, and
     subject to the license terms contained in, the Simplified
     BSD License set forth in Section 4.c of the IETF Trust's
     Legal Provisions Relating to IETF Documents
     (https://trustee.ietf.org/license-info).
```

```
   This version of this YANG module is part of RFC GGGG
   (https://www.rfc-editor.org/info/rfcGGGG); see the RFC
   itself for full legal notices.

   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 14 (RFC 2119)
   (RFC 8174) when, and only when, they appear in all
   capitals, as shown here.";

revision 2020-08-20 {
  description
    "Initial version";
  reference
    "RFC GGGG: YANG Groupings for HTTP Clients and HTTP Servers";
}

// Features

feature proxy-connect {
  description
    "Proxy connection configuration is configurable for
     HTTP clients on the server implementing this feature.";
}

feature basic-auth {
  description
    "The 'basic-auth' feature indicates that the client
     may be configured to use the 'basic' HTTP authentication
     scheme.";
  reference
    "RFC 7617: The 'Basic' HTTP Authentication Scheme";
}

feature tcp-supported {
  description
    "Indicates that the server supports HTTP/TCP.";
}

feature tls-supported {
  description
    "Indicates that the server supports HTTP/TLS.";
}


// Groupings

grouping http-client-identity-grouping {
```

```
  description
    "A grouping to provide HTTP credentials used by the
     client to authenticate itself to the HTTP server.";
  container client-identity {
    nacm:default-deny-write;
    presence
      "Indicates that HTTP-level client authentication
       is sent.  Present so that the 'choice' node's
       mandatory true doesn't imply that a client
       identity must be configured.";
    description
      "The identity the HTTP client should use when
       authenticating itself to the HTTP server.";
    choice auth-type {
      mandatory true;
      description
        "A choice amongst available authentication types.";
      case basic {
        container basic {
          if-feature "basic-auth";
          leaf user-id {
            type string;
            mandatory true;
            description
              "The user-id for the authenticating client.";
          }
          uses ct:password-grouping {
            description
              "The password for the authenticating client.";
          }
          description
            "The 'basic' HTTP scheme credentials.";
          reference
            "RFC 7617: The 'Basic' HTTP Authentication Scheme";
        }
      }
    }
  }
} // grouping http-client-identity-grouping

grouping http-client-grouping {
  description
    "A reusable grouping for configuring a HTTP client.

     This grouping is expected to be used in conjunction with
     other configurations providing, e.g., the hostname or IP
     address and port number the client initiates connections
     to.
```

```
   Note that this grouping uses fairly typical descendent
   node names such that a stack of 'uses' statements will
   have name conflicts.  It is intended that the consuming
   data model will resolve the issue (e.g., by wrapping
   the 'uses' statement in a container called
   'http-client-parameters').  This model purposely does
   not do this itself so as to provide maximum flexibility
   to consuming models.

   FIXME: it is assumed that the application can construct any
   necessary HTTP path, e.g., via a YANG 'rpc' definition...ok?";

uses http-client-identity-grouping;

container proxy-connect {
  nacm:default-deny-write;
  if-feature "proxy-connect";
  presence
    "Indicates that the HTTP-client is to connect thru an
     HTTP-level proxy server.  Present so that the 'choice'
     node's mandatory true doesn't imply that a proxy
     connection must be configured.";
  choice proxy-type {
    mandatory true;
    description
      "Choice amongst proxy server types.";
    case http {
      container http-proxy {
        description
          "Container for HTTP Proxy (Web Proxy) server
           configuration parameters.";
        container tcp-client-parameters {
          description
            "A wrapper around the TCP parameters to avoid
             name collisions.";
          uses "tcpc:tcp-client-grouping";
        }
        container http-client-parameters {
          description
            "A wrapper around the HTTP parameters to avoid
             name collisions.";
          uses http-client-identity-grouping;
        }
      }
    }
    case https {
      container https-proxy {
        description
          "Container for HTTPS Proxy (Secure Web Proxy) server
```

```
            configuration parameters.";
          container tcp-client-parameters {
            description
              "A wrapper around the TCP parameters to avoid
               name collisions.";
            uses "tcpc:tcp-client-grouping";
          }
          container tls-client-parameters {
            description
              "A wrapper around the TLS parameters to avoid
               name collisions.";
            uses "tlsc:tls-client-grouping";
          }
          container http-client-parameters {
            description
              "A wrapper around the HTTP parameters to avoid
               name collisions.";
            uses http-client-identity-grouping;
          }
        }
      }
    }
    description
      "Proxy server settings.";
  }
} // grouping http-client-grouping



grouping http-client-stack-grouping {
  description
    "A grouping that defines common HTTP-based protocol stacks.";
  choice transport {
    mandatory true;
    description
      "Choice amongst various transports type.  TCP, with and
       without TLS are defined here, with 'feature' statements
       so that they may be disabled.  Other transports MAY be
       augmented in as 'case' statements by future efforts.";
    case tcp {
      if-feature tcp-supported;
      container tcp {
        description
          "Container for TCP-based HTTP protocols.";
        container tcp-client-parameters {
          description
            "A wrapper around the TCP parameters to avoid
             name collisions.";
          uses "tcpc:tcp-client-grouping";
```

```
          }
          container http-client-parameters {
            description
              "A wrapper around the HTTP parameters to avoid
               name collisions.";
            uses http-client-grouping;
          }
        }
      }
      case tls {
        if-feature tls-supported;
        container tls {
          description
            "Container for TLS-based HTTP protocols.";
          container tcp-client-parameters {
            description
              "A wrapper around the TCP parameters to avoid
               name collisions.";
            uses "tcpc:tcp-client-grouping";
          }
          container tls-client-parameters {
            description
              "A wrapper around the TLS parameters to avoid
               name collisions.";
            uses "tlsc:tls-client-grouping";
          }
          container http-client-parameters {
            description
              "A wrapper around the HTTP parameters to avoid
               name collisions.";
            uses http-client-grouping;
          }
        }
      }
    }
  }

} // module ietf-http-client
```

<CODE ENDS>

3. The "ietf-http-server" Module

This section defines a YANG 1.1 [RFC7950] module called "ietf-http-server". A high-level overview of the module is provided in Section 3.1. Examples illustatrating the module's use are provided in Examples (Section 3.2). The YANG module itself is defined in Section 3.3.

3.1. Data Model Overview

This section provides an overview of the "ietf-http-server" module in terms of its features and groupings.

3.1.1. Features

The following diagram lists all the "feature" statements defined in the "ietf-http-server" module:

```
Features:
  +-- client-auth-config-supported
  +-- basic-auth
  +-- tcp-supported
  +-- tls-supported
```

The diagram above uses syntax that is similar to but not defined in [RFC8340].

3.1.2. Groupings

The following diagram lists all the "grouping" statements defined in the "ietf-http-server" module:

```
Groupings:
  +-- http-server-grouping
  +-- http-server-stack-grouping
```

The diagram above uses syntax that is similar to but not defined in [RFC8340].

Each of these groupings are presented in the following subsections.

3.1.2.1. The "http-server-grouping" Grouping

The following tree diagram [RFC8340] illustrates the "http-server-grouping" grouping:

```
grouping http-server-grouping
  +-- server-name?             string
  +-- client-authentication! {client-auth-config-supported}?
     +-- users
        +-- user* [user-id]
           +-- user-id?       string
           +-- (auth-type)?
              +--:(basic)
                 +-- basic {basic-auth}?
                    +-- user-id?    string
                    +-- password?   ianach:crypt-hash
```

Comments:

*The "http-server-grouping" defines the configuration for just "HTTP" part of a protocol stack. It does not, for instance, define any configuration for the "TCP" or "TLS" protocol layers (for that, see Section 3.1.2.2).

*The "server-name" node defines the HTTP server's name, as presented to HTTP clients.

*The "client-authentication" node, which must by enabled by a feature, defines a very simple user-database. Only the "basic" authentication scheme is supported, albiet it must be enabled by a "feature". Other authentication schemes MAY be augmented in.

3.1.2.2. The "http-server-stack-grouping" Grouping

The following tree diagram [RFC8340] illustrates the "http-server-stack-grouping" grouping:

```
grouping http-server-stack-grouping
  +-- (transport)
     +--:(tcp) {tcp-supported}?
     |  +-- tcp
     |     +-- tcp-server-parameters
     |     |  +---u tcps:tcp-server-grouping
     |     +-- http-server-parameters
     |        +---u http-server-grouping
     +--:(tls) {tls-supported}?
        +-- tls
           +-- tcp-server-parameters
           |  +---u tcps:tcp-server-grouping
           +-- tls-server-parameters
           |  +---u tlss:tls-server-grouping
           +-- http-server-parameters
              +---u http-server-grouping
```

Comments:

*The "http-server-stack-grouping" is a convenience grouping for downstream modules. It defines both the "HTTP" and "HTTPS" protocol stacks, with each option enabled by a "feature" statement for application control.

*For the referenced grouping statement(s):

-The "tcp-server-grouping" grouping is discussed in Section 4.1.2.1 of [I-D.ietf-netconf-tcp-client-server].
-The "tls-server-grouping" grouping is discussed in Section 4.1.2.1 of [I-D.ietf-netconf-tls-client-server].
-The "http-server-grouping" grouping is discussed in Section 3.1.2.1 in this document.

3.1.3. Protocol-accessible Nodes

The "ietf-http-server" module does not contain any protocol-accessible nodes.

3.2. Example Usage

This section presents an example showing the http-server-grouping populated with some data.

```
<http-server xmlns="urn:ietf:params:xml:ns:yang:ietf-http-server">
  <server-name>foo.example.com</server-name>
</http-server>
```

3.3. YANG Module

This YANG module has normative references to [RFC6991].

<CODE BEGINS> file "ietf-http-server@2020-08-20.yang"

```
module ietf-http-server {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-http-server";
  prefix https;

  import iana-crypt-hash {
    prefix ianach;
    reference
      "RFC 7317: A YANG Data Model for System Management";
  }

  import ietf-netconf-acm {
    prefix nacm;
    reference
      "RFC 8341: Network Configuration Access Control Model";
  }

  import ietf-tcp-server {
    prefix tcps;
    reference
      "RFC DDDD: YANG Groupings for TCP Clients and TCP Servers";
  }

  import ietf-tls-server {
    prefix tlss;
    reference
      "RFC FFFF: YANG Groupings for TLS Clients and TLS Servers";
  }

  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:kent+ietf@watsen.net>";

  description
    "This module defines reusable groupings for HTTP servers that
     can be used as a basis for specific HTTP server instances.

     Copyright (c) 2020 IETF Trust and the persons identified
     as authors of the code. All rights reserved.

     Redistribution and use in source and binary forms, with
     or without modification, is permitted pursuant to, and
     subject to the license terms contained in, the Simplified
     BSD License set forth in Section 4.c of the IETF Trust's
     Legal Provisions Relating to IETF Documents
     (https://trustee.ietf.org/license-info).
```

```
   This version of this YANG module is part of RFC GGGG
   (https://www.rfc-editor.org/info/rfcGGGG); see the RFC
   itself for full legal notices.

   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 14 (RFC 2119)
   (RFC 8174) when, and only when, they appear in all
   capitals, as shown here.";

revision 2020-08-20 {
  description
    "Initial version";
  reference
    "RFC GGGG: YANG Groupings for HTTP Clients and HTTP Servers";
}

// Features

feature client-auth-config-supported {
  description
    "Indicates that the configuration for how to authenticate
     clients can be configured herein, as opposed to in an
     application specific location.  That is, to support the
     consuming data models that prefer to place client
     authentication with client definitions, rather then
     in a data model principally concerned with configuring
     the transport.";
}

feature basic-auth {
  description
    "The 'basic-auth' feature indicates that the server
     may be configured authenticate users using the 'basic'
     HTTP authentication scheme.";
  reference
    "RFC 7617: The 'Basic' HTTP Authentication Scheme";
}

feature tcp-supported {
  description
    "Indicates that the server supports HTTP/TCP.";
}

feature tls-supported {
  description
    "Indicates that the server supports HTTP/TLS.";
}
```

```
// Groupings

grouping http-server-grouping {
  description
    "A reusable grouping for configuring an HTTP server.

     Note that this grouping uses fairly typical descendent
     node names such that a stack of 'uses' statements will
     have name conflicts.  It is intended that the consuming
     data model will resolve the issue (e.g., by wrapping
     the 'uses' statement in a container called
     'http-server-parameters').  This model purposely does
     not do this itself so as to provide maximum flexibility
     to consuming models.";

  leaf server-name {
    nacm:default-deny-write;
    type string;
    description
      "The value of the 'Server' header field.  If not set, then
       underlying software's default value is used.  Set to the
       empty string to disable.";
  }

  container client-authentication {
    if-feature "client-auth-config-supported";
    nacm:default-deny-write;
    presence
      "Indicates that HTTP based client authentication is
       supported (i.e., the server will request that the
       HTTP client send authenticate when needed).  This
       is needed as some HTTP-based protocols may only
       support, e.g., TLS-level client authentication.";
    description
      "Specifies how the HTTP server can authenticate HTTP
       clients.";
    container users {
      description
        "A list of locally configured users.";
      list user {
        key user-id;
        description
          "The list of local users configured on this device.";
        leaf user-id {
          type string;
          description
            "The user-id for the authenticating client.";
        }
```

```
        choice auth-type {
          description
            "The authentication type.";
          container basic {
            if-feature "basic-auth";
            leaf user-id {
              type string;
              description
                "The user-id for the authenticating client.";
            }
            leaf password {
              nacm:default-deny-write;
              type ianach:crypt-hash;
              description
                "The password for the authenticating client.";
            }
            description
              "The 'basic' HTTP scheme credentials.";
            reference
              "RFC 7617:
                The 'Basic' HTTP Authentication Scheme";
          }
        }
      }
    }
  } // container client-authentication
} // grouping http-server-grouping


grouping http-server-stack-grouping {
  description
    "A grouping that defines common HTTP-based protocol stacks.";
  choice transport {
    mandatory true;
    description
      "Choice amongst various transports type.  TCP, with and
       without TLS are defined here, with 'feature' statements
       so that they may be disabled.  Other transports MAY be
       augmented in as 'case' statements by future efforts.";
    case tcp {
      if-feature tcp-supported;
      container tcp {
        description
          "Container for TCP-based HTTP protocols.";
        container tcp-server-parameters {
          description
            "A wrapper around the TCP parameters to avoid
             name collisions.";
          uses "tcps:tcp-server-grouping";
```

```
        }
        container http-server-parameters {
          description
            "A wrapper around the HTTP parameters to avoid
             name collisions.";
          uses http-server-grouping;
        }
      }
    }
    case tls {
      if-feature tls-supported;
      container tls {
        description
          "Container for TLS-based HTTP protocols.";
        container tcp-server-parameters {
          description
            "A wrapper around the TCP parameters to avoid
             name collisions.";
          uses "tcps:tcp-server-grouping";
        }
        container tls-server-parameters {
          description
            "A wrapper around the TLS parameters to avoid
             name collisions.";
          uses "tlss:tls-server-grouping";
        }
        container http-server-parameters {
          description
            "A wrapper around the HTTP parameters to avoid
             name collisions.";
          uses http-server-grouping;
        }
      }
    }
  }
}
```

<CODE ENDS>

4. Security Considerations

4.1. The "ietf-http-client" YANG Module

The "ietf-http-client" YANG module defines "grouping" statements that are designed to be accessed via YANG based management protocols, such as NETCONF [RFC6241] and RESTCONF [RFC8040]. Both of these protocols have mandatory-to-implement secure transport layers (e.g., SSH, TLS) with mutual authentication.

The NETCONF access control model (NACM) [RFC8341] provides the means to restrict access for particular users to a pre-configured subset of all available protocol operations and content.

Since the module in this document only define groupings, these considerations are primarily for the designers of other modules that use these groupings.

One readable data node defined in this YANG module may be considered sensitive or vulnerable in some network environments. This node is as follows:

*The "client-identity/basic/password" node:

The cleartext "password" node defined in the "http-client-identity-grouping" grouping is additionally sensitive to read operations such that, in normal use cases, it should never be returned to a client. For this reason, the NACM extension "default-deny-all" has been applied to it.

Please be aware that this module uses the "key" and "private-key" nodes from the "ietf-crypto-types" module [I-D.ietf-netconf-crypto-types], where said nodes have the NACM extension "default-deny-all" set, thus preventing unrestricted read-access to the cleartext key values.

None of the writable data nodes defined in this YANG module are considered sensitive or vulnerable in network environments. The NACM "default-deny-write" extension has not been set for any data nodes defined in this module.

Please be aware that this module uses groupings from the "ietf-tls-client" and "ietf-tls-server" modules defined in [I-D.ietf-netconf-tls-client-server]. All of the data nodes defined in these groupings have the NACM extension "default-deny-write" set, thus preventing unrestricted write-access to the data nodes defined in those groupings.

This module does not define any RPCs, actions, or notifications, and thus the security consideration for such is not provided here.

4.2. The "ietf-http-server" YANG Module

The "ietf-http-server" YANG module defines "grouping" statements that are designed to be accessed via YANG based management protocols, such as NETCONF [RFC6241] and RESTCONF [RFC8040]. Both of these protocols have mandatory-to-implement secure transport layers (e.g., SSH, TLS) with mutual authentication.

The NETCONF access control model (NACM) [RFC8341] provides the means to restrict access for particular users to a pre-configured subset of all available protocol operations and content.

Since the module in this document only define groupings, these considerations are primarily for the designers of other modules that use these groupings.

None of the readable data nodes defined in this YANG module are considered sensitive or vulnerable in network environments. The NACM "default-deny-all" extension has not been set for any data nodes defined in this module.

None of the writable data nodes defined in this YANG module are considered sensitive or vulnerable in network environments. The NACM "default-deny-write" extension has not been set for any data nodes defined in this module.

Please be aware that this module uses groupings from the "ietf-tls-client" and "ietf-tls-server" modules defined in [I-D.ietf-netconf-tls-client-server]. All of the data nodes defined in these groupings have the NACM extension "default-deny-write" set, thus preventing unrestricted write-access to the data nodes defined in those groupings.

This module does not define any RPCs, actions, or notifications, and thus the security consideration for such is not provided here.

5. IANA Considerations

5.1. The "IETF XML" Registry

This document registers two URIs in the "ns" subregistry of the IETF XML Registry [RFC3688]. Following the format in [RFC3688], the following registrations are requested:

```
URI: urn:ietf:params:xml:ns:yang:ietf-http-client
Registrant Contact: The NETCONF WG of the IETF.
XML: N/A, the requested URI is an XML namespace.

URI: urn:ietf:params:xml:ns:yang:ietf-http-server
Registrant Contact: The NETCONF WG of the IETF.
XML: N/A, the requested URI is an XML namespace.
```

5.2. The "YANG Module Names" Registry

This document registers two YANG modules in the YANG Module Names registry [RFC6020]. Following the format in [RFC6020], the following registrations are requested:

```
name:         ietf-http-client
namespace:    urn:ietf:params:xml:ns:yang:ietf-http-client
prefix:       httpc
reference:    RFC GGGG

name:         ietf-http-server
namespace:    urn:ietf:params:xml:ns:yang:ietf-http-server
prefix:       https
reference:    RFC GGGG
```

6. References

6.1. Normative References

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6.2. Informative References

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Appendix A. Change Log

This section is to be removed before publishing as an RFC.

A.1. 00 to 01

* Modified Abstract and Intro to be more accurate wrt intended applicability.

* In ietf-http-client, removed "protocol-version" and all auth schemes except "basic".

*In ietf-http-client, factored out "client-identity-grouping" for proxy connections.

*In ietf-http-server, removed "choice required-or-optional" and "choice local-or-external".

*In ietf-http-server, moved the basic auth under a "choice auth-type" limited by new "feature basic-auth".

A.2. 01 to 02

*Removed the unused "external-client-auth-supported" feature from ietf-http-server.

A.3. 02 to 03

*Removed "protocol-versions" from ietf-http-server based on HTTP WG feedback.

*Slightly restructured the "proxy-server" definition in ietf-http-client.

*Added http-client example show proxy server use.

*Added a "Note to Reviewers" note to first page.

A.4. 03 to 04

*Added a parent "container" to "client-identity-grouping" so that it could be better used by the proxy model.

*Added a "choice" to the proxy model enabling selection of proxy types.

*Added 'http-client-stack-grouping' and 'http-server-stack-grouping' convenience groupings.

*Expanded "Data Model Overview section(s) [remove "wall" of tree diagrams].

*Updated the Security Considerations section.

A.5. 04 to 05

*Fixed titles and a ref in the IANA Considerations section

*Cleaned up examples (e.g., removed FIXMEs)

*Fixed issues found by the SecDir review of the "keystore" draft.

*Updated the "ietf-http-client" module to use the new "password-grouping" grouping from the "crypto-types" module.

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Author's Address

Kent Watsen
Watsen Networks

Email: kent+ietf@watsen.net