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YANG Groupings for UDP Clients and UDP Servers
draft-ietf-netconf-udp-client-server-05

Abstract

This document defines two YANG 1.1 modules ~~to~~ with reusable groupings ~~support~~ for ~~the~~ ~~configuration~~ managing ~~of~~ UDP clients and UDP servers.

Commenté [MB1]: As this may be used for reporting as well.

Requirements 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.

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 20 April 2025.

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Table of Contents

1. Introduction

This document defines two YANG 1.1 [RFC7950] modules with reusable groupings ~~to support the Configuration~~for managing ~~of~~ UDP clients and UDP servers [RFC768]. ~~The data models defined by t~~These modules may be used directly (e.g., ~~to~~ define a specific UDP client or UDP server) or in conjunction with the configuration defined for higher level protocols that depend on UDP.

2. The "ietf-udp-client" Module

This section defines a YANG 1.1 module called "ietf-udp-client". This YANG module defines the "udp-client" grouping for ~~configuring~~providing UDP clients with remote server information.

Section 2.1 provides ~~an~~ the overview of the YANG ~~module for configuring UDP clients~~. An example of usage is illustrated in Section 2.2, while ~~and~~ Section 2.3 defines the YANG module itself.

2.1. Data Model Overview

~~This section provides an overview of the features and the grouping defined in the "ietf-udp-client" YANG module.~~

2.1.1. Features

The "ietf-udp-client" module defines ~~only one~~the following "feature" ~~statements~~statement:

```
   Features:
     +-- local-binding
```

This ~~"local-binding"~~ feature indicates that ~~the~~ a client supports configuring local bindings (i.e., the local address and local port number) for UDP clients.

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

2.1.2. The "udp-client" Grouping

The following tree diagram [RFC8340] illustrates the tree structure of the "udp-client" grouping:

```
module: ietf-udp-client

  grouping udp-client:
    +-- remote-address    inet:host
    +-- remote-port?      inet:port-number
    +-- local-address?    inet:ip-address {local-binding}?
    +-- local-port?       inet:port-number {local-binding}?
```

Comments:

* The "remote-address", which is mandatory, may be configured as an IPv4 address, an IPv6 address, or a hostname.

* The "remote-port" is defined with neither a "default" nor a "mandatory" statement. YANG modules using this grouping SHOULD refine the grouping with a "default" statement, when the port number is well-known (e.g., a port number allocated by IANA), or with a "mandatory" statement, if a port number needs to always be configured. This MAY be ignored when the port number is neither well-known nor mandatory to configure, such as might be the case when this grouping is used by another grouping.

* The "local-address", which is enabled by the "local-binding" feature, may be configured as an IPv4 address, an IPv6 address, or a wildcard value.

* The "local-port", which ~~is enabled by~~ depends on the "local-binding" feature, is not mandatory. Its default value is "0", indicating that the operating system can ~~pick~~ select an arbitrary port number.

2.2. Example Usage

Commenté [MB2]: Stated in the sentence right before the title

Commenté [MB3]: Can be simplified/shortened to say «The module define one feature called «local-binding»»

Commenté [MB4]: Define early in the doc the «client» you are referring to here.

This is to avoid confusion with 'UDP client'

Commenté [MB5]: I don't think this is needed if you simplify as suggested above.

Commenté [MB6]: Should we indicate that the resolved address should be compatible with local address family?

Commenté [MB7]: This may be obvious, but you may indicate that the same address family is used for both local/remote.

This section presents an example of usage of the "udp-client"
grouping.

```
<!-- The outermost element below doesn't exist in the data model. -->
<!--  It simulates if the "grouping" were a "container" instead.  -->

<udp-client xmlns="urn:ietf:params:xml:ns:yang:ietf-udp-client">
  <remote-address>www.example.com</remote-address>
  <remote-port>10000</remote-port>
  <local-address>192.0.2.2</local-address>
  <local-port>12345</local-port>
</udp-client>
```

2.3. YANG Module

This module imports types defined in [RFC6991].

```
<CODE BEGINS> file "ietf-udp-client@2024-10-15"
module ietf-udp-client {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-udp-client";
  prefix udpc;

  import ietf-inet-types {
    prefix inet;
    reference
      "RFC 6991: Common YANG Data Types";
  }

  organization "IETF NETCONF (Network Configuration) Working Group";
  contact
    "WG Web:   <http:/tools.ietf.org/wg/netconf/>
     WG List:  <mailto:netconf@ietf.org>

     Authors:  Alex Huang Feng
               <mailto:alex.huang-feng@insa-lyon.fr>
               Pierre Francois
               <mailto:pierre.francois@insa-lyon.fr>";

  description
    "Defines a generic grouping for UDP-based client applications.

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    (https://trustee.ietf.org/license-info).

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

  revision 2024-10-15 {
```

```
      description
        "Initial revision";
      reference
        "RFC-to-be: YANG Groupings for UDP Clients and UDP Servers";
    }

    feature local-binding {
      description
        "Indicates that the UDP client supports configuring local
         bindings (i.e., the local address and local port number) for
         UDP clients.";
    }

    grouping udp-client {
      description
        "A reusable grouping for ~~configuring a~~ UDP clients.

        Note that this grouping uses fairly typical descendant
        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
        'udp-client-parameters').  This model purposely does
        not do this itself so as to provide maximum flexibility
        to consuming models.";

      leaf remote-address {
        type inet:host;
        mandatory true;
        description
          "The IP address or hostname of the remote UDP server.
          If a domain name is configured, then the ~~DNS~~ name resolution
should
          happen on each connection attempt. If the ~~DNS~~ name resolution
          results in multiple IP addresses, the IP addresses
          are tried according to local preference order until
          a connection has been established or until all IP
          addresses have failed.";
      }

      leaf remote-port {
        type inet:port-number;
        description
          "The port number of the remote UDP server.";
      }

      leaf local-address {
        if-feature "local-binding";
        type inet:ip-address;
        description
          "The local IP address to bind to when sending UDP
          messages to the remote server. INADDR_ANY ('0.0.0.0') or
          INADDR6_ANY ('0:0:0:0:0:0:0:0' a.k.a. '::') may be used
          so that the server can bind to any IPv4 or IPv6 address.";
      }

      leaf local-port {
        if-feature "local-binding";
```

Commenté [MB8]: As other resolution libraries may be available within the host itself.

Commenté [MB9]: The resolved address can be cached, no?

Commenté [MB10]: Shouldn't the addresses to be filtered by the local address (if configured)?

Commenté [MB11]: For IPv6, shouldn't the procedure defined at RFC 6724 - Default Address Selection for Internet Protocol Version 6 (IPv6) be followed?

```
        type inet:port-number;
        default "0";
        description
          "The local port number to bind to when sending UDP
          messages datagrams to the remote server. The port number '0',
          which is the default value, indicates that any available
          local port number may be used.";
      }
    }
  }
<CODE ENDS>
```

3. The "ietf-udp-server" Module

This section defines a YANG 1.1 module called "ietf-udp-server". This YANG module defines the "udp-server" grouping for ~~configuring~~ UDP servers.

Section 3.1 provides an overview of the YANG module for configuring UDP servers. An example of usage is illustrated in Section 3.2 while Section 3.3 defines the YANG module itself.

3.1. Data Model Overview

~~This section provides an overview of the grouping defined in the "ietf-udp-server" module.~~

Commenté [MB12]: Redundant with the previous sentence

3.1.1. The "udp-server" Grouping

The following tree diagram [RFC8340] illustrates the structure of "udp-server" grouping:

```
module: ietf-udp-server

  grouping udp-server:
    +-- local-bind* [local-address]
       +-- local-address    inet:ip-address
       +-- local-port?      inet:port-number
```

Comments:

* The "local-address", which is mandatory, may be configured as an IPv4 address, an IPv6 address, or a wildcard value.

* The "local-port" is defined with neither a "default" nor a "mandatory" statement. YANG modules using this grouping SHOULD refine the grouping with a "default" statement, when the port number is well-known (e.g., a port number allocated by IANA), or with a "mandatory" statement, if a port number needs to always be configured. This MAY be ignored when the port number is neither well-known nor mandatory to configure, such as might be the case when this grouping is used by another grouping.

3.2. Example Usage

This section presents two examples of usage of the "udp-server" grouping.

This following shows an example of a server configured for listening to an IPv4 address:

```
<!-- The outermost element below doesn't exist in the data model. -->
<!--  It simulates if the "grouping" were a "container" instead.  -->

<udp-server xmlns="urn:ietf:params:xml:ns:yang:ietf-udp-server">
  <local-bind>
    <local-address>192.0.2.2</local-address>
    <local-port>49152</local-port>
  </local-bind>
</udp-server>
```

This example shows an example of a server configured to listen to an IPv4 and IPv6 together:

```
<!-- The outermost element below doesn't exist in the data model. -->
<!--  It simulates if the "grouping" were a "container" instead.  -->

<udp-server xmlns="urn:ietf:params:xml:ns:yang:ietf-udp-server">
  <local-bind>
    <local-address>192.0.2.2</local-address>
    <local-port>49152</local-port>
  </local-bind>
  <local-bind>
    <local-address>2001:db8::0</local-address>
    <local-port>49153</local-port>
  </local-bind>
</udp-server>
```

3.3. YANG Module

The "ietf-udp-server" imports types defined in [RFC6991].

```
<CODE BEGINS> file "ietf-udp-server@2024-10-15.yang"
module ietf-udp-server {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-udp-server";
  prefix udps;

  import ietf-inet-types {
    prefix inet;
    reference
      "RFC 6991: Common YANG Data Types";
  }

  organization
    "IETF NETCONF (Network Configuration) Working Group";
  contact
    "WG Web:   <http:/tools.ietf.org/wg/netconf/>
     WG List:  <mailto:netconf@ietf.org>

     Authors:  Alex Huang Feng
               <mailto:alex.huang-feng@insa-lyon.fr>
               Pierre Francois
               <mailto:pierre.francois@insa-lyon.fr>";
  description
    "Defines a generic grouping for UDP-based server applications.
```

```
        Copyright (c) 2024-2025 IETF Trust and the persons identified as
        authors of the code.  All rights reserved.

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        terms contained in, the Revised 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-to-be; see the
RFC
        itself for full legal notices.";

      revision 2024-10-15 {
        description
          "Initial revision";
        reference
          "RFC-to-be: YANG Groupings for UDP Clients and UDP Servers";
      }

      grouping udp-server {
        description
          "Provides a reusable grouping for configuring a UDP servers.

           Note that this grouping uses fairly typical descendant
           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
           'udp-server-parameters').  This model purposely does
           not do this itself so as to provide maximum flexibility
           to consuming models.";
        list local-bind {
          key "local-address";
          min-elements 1;
          description
            "A list of bind (listen) points for this server
             instance.  A server instance may have multiple
             bind points to support, e.g., the same port number in
             different address families or different port numbers
             in the same address family.";
          leaf local-address {
            type inet:ip-address;
            mandatory true;
            description
              "The local IP address to listen on for incoming
               UDP messagesdatagrams.  To configure listening
               on all IPv4 addresses the value must be '0.0.0.0'
               (INADDR_ANY).  To configure listening on all IPv6
               addresses the value must be '::' (INADDR6_ANY).";
          }
          leaf local-port {
            type inet:port-number;
            description
```

```
            "The local port number to listen on for incoming UDP
             messages.";
        }
      }
    }
  }
  <CODE ENDS>
```

4. Security Considerations

This section uses the template described in Section 3.7 of [I-D.ietf-netmod-rfc8407bis].

The YANG modules specified in this document defines a schema for data that is designed to be accessed via network management protocols such as NETCONF [RFC6241] or RESTCONF [RFC8040]. These network management protocols are required to use a secure transport layer and mutual authentication, e.g., SSH [RFC6242] without the "none" authentication option, Transport Layer Security (TLS) [RFC8446] with mutual X.509 authentication, and HTTPS with HTTP authentication (Section 11 of [RFC9110]).

Commenté [MB13]: Please update to echo https://datatracker.ietf.org/doc/html/draft-ietf-netmod-rfc8407bis-22#name-security-considerations-sect

The Network Configuration Access Control Model (NACM) [RFC8341] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

The YANG modules defines a set of identities, types, and groupings. These nodes are intended to be reused by other YANG modules. The module by itself does not expose any data nodes that are writable, data nodes that contain read-only state, or RPCs. As such, there are no additional security issues related to the YANG module that need to be considered.

Modules that use the groupings that are defined in this document should identify the corresponding security considerations. For example, reusing some of these groupings will expose privacy-related information (e.g., 'node-example').

Commenté [MB14]: This should cite parameters that are specific to the modules.

5. IANA Considerations

~~This document describes the URIs from IETF XML Registry and the registration of a two new YANG module names~~

5.1. URIs

IANA is requested to assign two new URIs from the IETF XML Registry [RFC3688]~~. The following two URIs are suggested~~:

URI: urn:ietf:params:xml:ns:yang:ietf-udp-client
Registrant Contact: The IESG.
XML: N/A; the requested URI is an XML namespace.

URI: urn:ietf:params:xml:ns:yang:ietf-udp-server
Registrant Contact: The IESG.
XML: N/A; the requested URI is an XML namespace.

5.2. YANG M~~m~~odule N~~n~~ames

This document also requests IANA to register the following YANG modules in the YANG Module Names registry [RFC6020] within the "YANG Parameters" registry group:

```
name: ietf-udp-client
namespace: urn:ietf:params:xml:ns:yang:ietf-udp-client
prefix: udpc
maintained by IANA? N
reference: RFC-to-be

name: ietf-udp-server
namespace: urn:ietf:params:xml:ns:yang:ietf-udp-server
prefix: udps
maintained by IANA? N
reference: RFC-to-be
```

6. Acknowledgements

The authors would like to thank Mohamed Boucadair, Benoit Claise, Qiufang Ma and Qin Wu for their review and valuable comments.

7. References

7.1. Normative References

Commenté [MB15]: Many entries are informative. Please see below.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC3688] Mealling, M., "The IETF XML Registry", BCP 81, RFC 3688, DOI 10.17487/RFC3688, January 2004, <https://www.rfc-editor.org/info/rfc3688>.

[RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", RFC 6020, DOI 10.17487/RFC6020, October 2010, <https://www.rfc-editor.org/info/rfc6020>.

~~[RFC6241] Enns, R., Ed., Bjorklund, M., Ed., Schoenwaelder, J., Ed., and A. Bierman, Ed., "Network Configuration Protocol (NETCONF)", RFC 6241, DOI 10.17487/RFC6241, June 2011, <https://www.rfc-editor.org/info/rfc6241>.~~

~~[RFC6242] Wasserman, M., "Using the NETCONF Protocol over Secure Shell (SSH)", RFC 6242, DOI 10.17487/RFC6242, June 2011, <https://www.rfc-editor.org/info/rfc6242>.~~

[RFC6991] Schoenwaelder, J., Ed., "Common YANG Data Types", RFC 6991, DOI 10.17487/RFC6991, July 2013, <https://www.rfc-editor.org/info/rfc6991>.

[RFC768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, DOI 10.17487/RFC0768, August 1980, <https://www.rfc-editor.org/info/rfc768>.

[RFC7950] Bjorklund, M., Ed., "The YANG 1.1 Data Modeling Language",

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[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

[RFC8340] Bjorklund, M. and L. Berger, Ed., "YANG Tree Diagrams", BCP 215, RFC 8340, DOI 10.17487/RFC8340, March 2018, <https://www.rfc-editor.org/info/rfc8340>.

[RFC8341] Bierman, A. and M. Bjorklund, "Network Configuration Access Control Model", STD 91, RFC 8341, DOI 10.17487/RFC8341, March 2018, <https://www.rfc-editor.org/info/rfc8341>.

[RFC8446] Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.3", RFC 8446, DOI 10.17487/RFC8446, August 2018, <https://www.rfc-editor.org/info/rfc8446>.

[RFC9110] Fielding, R., Ed., Nottingham, M., Ed., and J. Reschke, Ed., "HTTP Semantics", STD 97, RFC 9110, DOI 10.17487/RFC9110, June 2022, <https://www.rfc-editor.org/info/rfc9110>.

7.2. Informative References

[I-D.ietf-netmod-rfc8407bis]
Bierman, A., Boucadair, M., and Q. Wu, "Guidelines for Authors and Reviewers of Documents Containing YANG Data Models", Work in Progress, Internet-Draft, draft-ietf-netmod-rfc8407bis-18, 11 October 2024, <https://datatracker.ietf.org/doc/html/draft-ietf-netmod-rfc8407bis-18>.

[RFC6241] Enns, R., Ed., Bjorklund, M., Ed., Schoenwaelder, J., Ed., and A. Bierman, Ed., "Network Configuration Protocol (NETCONF)", RFC 6241, DOI 10.17487/RFC6241, June 2011, <https://www.rfc-editor.org/info/rfc6241>.

[RFC6242] Wasserman, M., "Using the NETCONF Protocol over Secure Shell (SSH)", RFC 6242, DOI 10.17487/RFC6242, June 2011, <https://www.rfc-editor.org/info/rfc6242>.

[RFC8040] Bierman, A., Bjorklund, M., and K. Watsen, "RESTCONF Protocol", RFC 8040, DOI 10.17487/RFC8040, January 2017, <https://www.rfc-editor.org/info/rfc8040>.

[RFC8446] Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.3", RFC 8446, DOI 10.17487/RFC8446, August 2018, <https://www.rfc-editor.org/info/rfc8446>.

[RFC9110] Fielding, R., Ed., Nottingham, M., Ed., and J. Reschke, Ed., "HTTP Semantics", STD 97, RFC 9110,

DOI 10.17487/RFC9110, June 2022,
<https://www.rfc-editor.org/info/rfc9110>.

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