Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: 13 April 2026

A. Huang-Feng
P. Francois
INSA-Lyon
K. Watsen
Watsen Networks

10 October 2025

YANG Groupings for UDP Clients and UDP Servers
draft-ietf-netconf-udp-client-server-08

Abstract

This document defines two YANG 1.1 modules with reusable groupings for managing UDP clients and UDP servers.

Status of This Memo

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

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at https://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on 13 April 2026.

Table of Contents

1. Introduction

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

1.1. 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.

1.2. Adherence to the NMDA

This document is compliant with the Network Management Datastore Architecture (NMDA) [RFC8342]. It does not define any protocol accessible nodes that are "config false".

1.3. Conventions

Various examples in this document use the XML [W3C.REC-xml-20081126] encoding. Other encodings, such as JSON [RFC8259], could alternatively be used.

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 providing UDP clients with remote server information.

Section 2.1 provides the overview of the YANG module. An example of usage is illustrated in Section 2.2, while 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 the following "feature" statement:

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

This feature indicates that the 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}?
```

The description of these parameters is provided below:

* The "remote-address", which is mandatory, may be configured as an IPv4 address, an IPv6 address, or a hostname. The resolved address should be compatible with the local address family, if also provided.

* 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 address must use the same address family as the configured remote address.

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

2.2. Example Usage

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@2025-06-10.yang"
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.

    Copyright (c) 2025 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 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 2025-06-10 {
    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 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 name resolution
            should happen before each datagram is sent, unless a
            previously resolved address is cached and still valid.";
        }

        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
            datagrams 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 client can bind to any IPv4 or IPv6 address.";
        }

        leaf local-port {
          if-feature "local-binding";
          type inet:port-number;
          default "0";
          description
            "The local port number to bind to when sending UDP
```

```
            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.

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
```

The description of these parameters is provided below:

* 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 following 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@2025-06-10.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) 2025 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 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 2025-06-10 {
      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 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 datagrams.  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
             datagrams.";
        }
      }
    }
  }
  <CODE ENDS>
```

4. Security Considerations

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

The "ietf-udp-client" and "ietf-udp-server" YANG modules defines a data model that is designed to be accessed via YANG-based management protocols, such as NETCONF [RFC6241] and RESTCONF [RFC8040]. These protocols have to use a secure transport layer (e.g., SSH [RFC6242], TLS [RFC8446], and QUIC [RFC9000]) and have to use mutual authentication.

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 define 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., 'remote-address', 'remote-port', 'local-address' or 'local-port').

5. IANA Considerations

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

5.1. URI

IANA is requested to assign two new URIs from the IETF XML Registry [RFC3688]:

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 Module Name

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, Ran Chen, Benoit Claise, Qiufang Ma, J端rgen Sch旦nw辰lder and Qin Wu for their review and valuable comments.

7. References

7.1. Normative References

[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>.

[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", RFC 7950, DOI 10.17487/RFC7950, August 2016, <https://www.rfc-editor.org/info/rfc7950>.

[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>.

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-28, 5 June 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-netmod-rfc8407bis-28>.

[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>.

[RFC8259] Bray, T., Ed., "The JavaScript Object Notation (JSON) Data Interchange Format", STD 90, RFC 8259, DOI 10.17487/RFC8259, December 2017, <https://www.rfc-editor.org/info/rfc8259>.

[RFC8342] Bjorklund, M., Schoenwaelder, J., Shafer, P., Watsen, K., and R. Wilton, "Network Management Datastore Architecture (NMDA)", RFC 8342, DOI 10.17487/RFC8342, March 2018, <https://www.rfc-editor.org/info/rfc8342>.

[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>.

[RFC9000] Iyengar, J., Ed. and M. Thomson, Ed., "QUIC: A UDP-Based Multiplexed and Secure Transport", RFC 9000, DOI 10.17487/RFC9000, May 2021, <https://www.rfc-editor.org/info/rfc9000>.

[W3C.REC-xml-20081126]
Bray, T., Paoli, J., Sperberg-McQueen, C.M., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)", World Wide Web Consortium Recommendation REC-xml-20081126, November 2008, <https://www.w3.org/TR/2008/REC-xml-20081126/>.

Authors' Addresses

Alex Huang Feng
INSA-Lyon
Lyon
France
Email: alex.huang-feng@insa-lyon.fr

Pierre Francois
INSA-Lyon
Lyon
France
Email: pierre.francois@insa-lyon.fr

Kent Watsen
Watsen Networks
Email: kent+ietf@watsen.net