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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 support for the configuration managing of~~ with reusable groupings 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

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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~~ 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.~~

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

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.

Commenté [MB3]: Can be simplified/shortened to say «The module defines one feature called «local-binding»». No need to add the tree representation

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

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

This is to avoid confusion with 'UDP client'

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

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~~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.

Commenté [MB6]: Should we indicate that the resolved address should be compatible with local address family (if also provided)?

- \* 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.

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

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@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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    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";
}

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]:** Does this cover that parallel connections may be established as well? Is that covered by «local preference»?

If so, some more explicit wording is needed, IMO.

**Commenté [MB11]:** Shouldn't the addresses to be filtered by the local address (if configured)?

**Commenté [MB12]:** For IPv6, should the procedure defined at [RFC 6724 - Default Address Selection for Internet Protocol Version 6 \(IPv6\)](#) be mentioned as an example?

```

    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 [MB13]:** 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 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 ~~example following~~ shows an example of a server configured to listen to an IPv4 and IPv6 together:

Commenté [MB14]: Avoid redundant use of example

```
<!-- 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.

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

RFC  
This version of this YANG module is part of RFC-to-be; see the  
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 define 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]).

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 module 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').

#### 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.

**Commenté [MB15]:** Please update to echo <https://datatracker.ietf.org/doc/html/draft-ietf-netmod-rfc8407bis-22#name-security-considerations-sect>

**Commenté [MB16]:** This should cite parameters that are specific to the modules.

## 5.2. YANG ~~M~~odule ~~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

- [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>>.

**Commenté [MB17]:** Many entries are informative. Please see below.

[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>>.

~~[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>>.~~

[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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