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YANG Groupings for UDP Clients and UDP Servers
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Abstract

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

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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@2025-05-14.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.

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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 2025-05-14 {
    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.
                If the name resolution results in multiple IP addresses,
                the IP addresses are tried 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
                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@2025-05-14.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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    This version of this YANG module is part of RFC-to-be; see the RFC
    itself for full legal notices."

  revision 2025-05-14 {
    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

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