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**A YANG Data Model for IP Configuration  
draft-ietf-netmod-ip-cfg-02**

Abstract

This document defines a YANG data model for configuration of IP addresses on network interfaces.

Status of this Memo

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Table of Contents

<a href="#">1</a>	Introduction . . . . .	
<a href="#">3</a>		
<a href="#">2</a>	IP Data Model . . . . .	
<a href="#">4</a>		
<a href="#">3</a>	IP Address YANG Module . . . . .	
<a href="#">5</a>		
<a href="#">4</a>	IANA Considerations . . . . .	
<a href="#">10</a>		
<a href="#">5</a>	Security Considerations . . . . .	
<a href="#">11</a>		
<a href="#">6</a>	Normative References . . . . .	
<a href="#">12</a>		
<a href="#">Appendix A</a>	Example: NETCONF <get> reply . . . . .	
<a href="#">13</a>		
	Author's Address . . . . .	
<a href="#">14</a>		

Bjorklund  
2]

Expires August 11, 2012

[Page

## **1. Introduction**

This document defines a YANG [[RFC6020](#)] data model for configuration of IP addresses on network interfaces.

The keywords "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](#)].



## 2. IP Data Model

The module "ietf-ip" augments the "interface" list defined in the "ietf-interfaces" module [[I-D.ietf-netmod-interfaces-cfg](#)] with the following nodes, where square brackets are used to enclose a list's keys, and "?" means that the node is optional. Choice and case nodes are enclosed in parenthesis, and a case node is marked with a colon (":").

```
+--rw if:interfaces
  +--rw if:interface [name]
    ...
    +--rw ipv4
      | +--rw enabled?   boolean
      | +--rw address [ip]
      |   +--rw ip          inet:ipv4-address
      |   +--rw (subnet)?
      |     +--:(prefix-length)
      |       | +--rw ip:prefix-length?  uint8
      |       +--:(netmask)
      |         +--rw ip:netmask?        inet:ipv4-address
    +--rw ipv6
      +--rw enabled?   boolean
      +--rw address [ip]
      | +--rw ip          inet:ipv6-address
      | +--rw prefix-length?  uint8
      +--rw autoconf
        +--rw create-global-addresses?   boolean
        +--rw dup-addr-detect-transmits? uint32
```

The data model defines two containers, "ipv4" and "ipv6", representing the IPv4 and IPv6 address families. In each container, there is a leaf "enabled" that controls if the address family is enabled on that interface. In each container, there is also a list of manually configured addresses.





### 3. IP Address YANG Module

This module imports typedefs from [[RFC6021](#)] and [[I-D.ietf-netmod-interfaces-cfg](#)], and references [[RFC4862](#)].

RFC Ed.: update the date below with the date of RFC publication and remove this note.

```
<CODE BEGINS> file "ietf-ip@2012-02-08.yang"
```

```
module ietf-ip {  
  
    namespace "urn:ietf:params:xml:ns:yang:ietf-ip";  
    prefix ip;  
  
    import ietf-interfaces {  
        prefix if;  
    }  
    import ietf-inet-types {  
        prefix inet;  
    }  
  
    organization  
        "IETF NETMOD (NETCONF Data Modeling Language) Working Group";  
  
    contact  
        "WG Web: <http://tools.ietf.org/wg/netmod/>  
        WG List: <mailto:netmod@ietf.org>  
  
        WG Chair: David Kessens  
                <mailto:david.kessens@nsn.com>  
  
        WG Chair: Juergen Schoenwaelder  
                <mailto:j.schoenwaelder@jacobs-university.de>  
  
        Editor:   Martin Bjorklund  
                <mailto:mbj@tail-f.com>";  
  
    description  
        "This module contains a collection of YANG definitions for  
        configuring IP addresses on network interfaces.  
  
        Copyright (c) 2011 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 (<http://trustee.ietf.org/license-info>).

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

```
// RFC Ed.: replace XXXX with actual RFC number and remove this
// note.

// RFC Ed.: update the date below with the date of RFC publication
// and remove this note.
revision 2012-02-08 {
  description
    "Initial revision.";
  reference
    "RFC XXXX: A YANG Data Model for IP Configuration";
}

/* Features */

feature non-contiguous-netmasks {
  description
    "Indicates support for configuring non-contiguous
    subnet masks.";
}

/* Data nodes */

augment "/if:interfaces/if:interface" {
  description
    "Parameters for configuring IP addresses on interfaces.

    If an interface is not capable of running IP, the server
    must not allow the client to configure these parameters.";

  container ipv4 {
    description
      "Parameters for the IPv4 address family.";
    leaf enabled {
      type boolean;
      default true;
      description
        "Controls if IPv4 is enabled or disabled on this
        interface.";
    }
    list address {
      key "ip";
```



```
description
  "The list of manually configured IPv4 addresses
  on the interface.";

leaf ip {
  type inet:ipv4-address;
  description
    "The IPv4 address on the interface.";
}
choice subnet {
  default prefix-length;
  description
    "The subnet can be specified as a prefix-length, or,
    if the server supports non-contiguous netmasks, as
    a netmask.

    The default subnet is a prefix-length of 32.";
  leaf prefix-length {
    type uint8 {
      range "0..32";
    }
    default 32;
    description
      "The length of the subnet prefix.";
  }
  leaf netmask {
    if-feature non-contiguous-netmasks;
    type inet:ipv4-address;
    description
      "The subnet specified as a netmask.";
  }
}
}
}
}
container ipv6 {
  description
    "Parameters for the IPv6 address family.";

  leaf enabled {
    type boolean;
    default true;
    description
      "Controls if IPv6 is enabled or disabled on this
      interface.";
  }
  list address {
    key "ip";
    description
```



"The list of manually configured IPv6 addresses  
on the interface.";

```
leaf ip {
  type inet:ipv6-address;
  description
    "The IPv6 address on the interface.";
}
leaf prefix-length {
  type uint8 {
    range "0..128";
  }
  default 128;
  description
    "The length of the subnet prefix.";
}
}
container autoconf {
  description
    "Parameters to control the autoconfiguration of IPv6
    addresses, as described in RFC 4862.";
  reference
    "RFC 4862: IPv6 Stateless Address Autoconfiguration";

  // Open Issue #ip-02: should we have a leaf to control
  // the creation of a link-local address?
  //leaf create-link-local-address { ... default true; ... }

  leaf create-global-addresses {
    // Open Issue #ip-06: should we have a feature here?
    //if-feature ipv6-host;
    type boolean;
    default true;
    description
      "If enabled, the host creates global addresses as
      described in section 5.5 of RFC 4862.";
    reference
      "RFC 4862: IPv6 Stateless Address Autoconfiguration";
  }
  leaf dup-addr-detect-transmits {
    type uint32;
    default 1;
    description
      "The number of consecutive Neighbor Solicitation
      messages sent while performing Duplicate Address Detection on a
      tentative address. A value of zero indicates that
      Duplicate Address Detection is not performed on
      tentative addresses. A value of one indicates a single
```





```
        transmission with no follow-up retransmissions.";
    reference
        "RFC 4862: IPv6 Stateless Address Autoconfiguration";
    }
}
}
}
```

<CODE ENDS>



#### **4. IANA Considerations**

This document registers a URI in the IETF XML registry [[RFC3688](#)]. Following the format in [RFC 3688](#), the following registration is requested to be made.

URI: urn:ietf:params:xml:ns:yang:ietf-ip

Registrant Contact: The NETMOD WG of the IETF.

XML: N/A, the requested URI is an XML namespace.

This document registers a YANG module in the YANG Module Names registry [[RFC6020](#)].

name: ietf-ip  
namespace: urn:ietf:params:xml:ns:yang:ietf-ip  
prefix: ip  
reference: RFC XXXX



## **5. Security Considerations**

The YANG module defined in this memo is designed to be accessed via the NETCONF protocol [[RFC6241](#)]. The lowest NETCONF layer is the secure transport layer and the mandatory-to-implement secure transport is SSH [[RFC6242](#)].

There are a number of data nodes defined in the YANG module which are

writable/creatable/deletable (i.e., config true, which is the default). These data nodes may be considered sensitive or vulnerable

in some network environments. Write operations (e.g., edit-config) to these data nodes without proper protection can have a negative effect on network operations. These are the subtrees and data nodes and their sensitivity/vulnerability:

ipv4/enabled and ipv6/enabled: These nodes are used to enable or disable IPv4 and IPv6 on a specific interface. By enabling a protocol on an interface, an attacker might be able to create an unsecured path into a node (or through it if routing is also enabled). By disabling a protocol on an interface, an attacker might be able to force packets to be routed through some other interface or deny access to some or all of the network via that protocol.

IP ipv4/address and ipv6/address: These lists specify the configured

addresses on an interface. By modifying this information, an attacker can cause a node to either ignore messages destined to

it or accept (at least at the IP layer) messages it would otherwise ignore. The use of filtering or security associations may reduce the potential damage in the latter case.

Bjorklund  
11]

Expires August 11, 2012

[Page

## **6. Normative References**

- [I-D.ietf-netmod-interfaces-cfg]  
Bjorklund, M., "A YANG Data Model for Interface Configuration", [draft-ietf-netmod-interfaces-cfg-01](#) (work in progress), May 2011.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), January 2004.
- [RFC4862] Thomson, S., Narten, T., and T. Jinmei, "IPv6 Stateless Address Autoconfiguration", [RFC 4862](#), September 2007.
- [RFC6020] Bjorklund, M., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", [RFC 6020](#), October 2010.
- [RFC6021] Schoenwaelder, J., "Common YANG Data Types", [RFC 6021](#), October 2010.
- [RFC6241] Enns, R., Bjorklund, M., Schoenwaelder, J., and A. Bierman, "Network Configuration Protocol (NETCONF)", [RFC 6241](#), June 2011.
- [RFC6242] Wasserman, M., "Using the NETCONF Protocol over Secure Shell (SSH)", [RFC 6242](#), June 2011.





### [Appendix A](#). Example: NETCONF <get> reply

This section gives an example of a reply to the NETCONF <get> request for a device that implements the data model defined in this document.

```
<rpc-reply
  xmlns="urn:ietf:params:xml:ns:netconf:base:1.0"
  message-id="101">
  <data>
    <interfaces
      xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces">
      <interface>
        <name>eth0</name>
        <type>ethernetCsmacd</type>
        <location>0</location>
        <if-index>2</if-index>
        <ipv4 xmlns="urn:ietf:params:xml:ns:yang:ietf-ip">
          <address>
            <ip>192.0.2.1</ip>
            <prefix-length>24</prefix-length>
          </address>
        </ipv4>
      </interface>
    </interfaces>
  </data>
</rpc-reply>
```

Bjorklund  
13]

Expires August 11, 2012

[Page

Internet-Draft  
2012

YANG IP Configuration

February

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