Network Working Group Internet Draft Intended status: Proposed Standard Expires: January 20, 2016

Yang Data Model for IPIPv4 Tunnel draft-liu-rtgwg-ipipv4-tunnel-yang-01.txt

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 http://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 January 20, 2009.

Copyright Notice

Copyright (c) 2015 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to $\underline{\text{BCP 78}}$ and the IETF Trust's Legal Provisions Relating to IETF Documents (http://trustee.ietf.org/license-info) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Abstract

This document defines a YANG data model for the management of IPv4 or IPv6 over IPv4 tunnels. The data model covers configuration data, operational state data and RPC execution commands.

Internet-Draft

Table of Contents

<u>1</u> .	Introduction
	<u>1.1</u> . Terminology2
	<u>1.2</u> . Tree Diagrams2
<u>2</u> .	IPv4 Tunnel Data Model3
<u>3</u> .	IPv4 Tunnel YANG Model7
<u>4</u> .	Security Considerations22
<u>5</u> .	IANA Considerations
<u>6</u> .	Acknowledgements
<u>7</u> .	References
	7.1. Normative References
	7.2. Informative References

1. Introduction

This document defines a YANG [RFC6020] data model for the management of IPv6/4-in-IPv4 tunnels. It covers the following types.

- o IPv4 in IPv4, related concepts are defined in [RFC1853]
- o IPv6 in IPv4 manual tunnel, related concepts are defined in
 [RFC2003]
- o IPv6 to IPv4 tunnel, related concepts are defined in [RFC3056]

<u>1.1</u>. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

<u>1.2</u>. Tree Diagrams

A simplified graphical representation of the data model is used in this document. The meaning of the symbols in these diagrams is as follows:

- o Brackets "[" and "]" enclose list keys.
- o Abbreviations before data node names: "rw" means configuration (read-write), and "ro" means state data (read-only).
- o Symbols after data node names: "?" means an optional node, "!" means a presence container, and "*" denotes a list and leaf-list.

- o Parentheses enclose choice and case nodes, and case nodes are also marked with a colon (":").
- o Ellipsis ("...") stands for contents of subtrees that are not shown.

2. IPv4 Tunnel Data Model

This document defines the YANG model "ietf-ipipv4-tunnel", which includes two modules, one for configuration and one for state. The data model has the following tree diagram for the IPv4 tunnels:

module: ietf-ipipv4-tunnel

```
+--rw tunnels
```

I	+rw ip-in-ip* [name]	
I	+rw name	string
I	+rw description?	string
I	+rw bind-interface?	if:interface-ref
I	+rw clear-df?	empty
I	+rw shutdown?	empty
I	+rw mtu?	uint16
I	+rw mirror-destination?	string
I	+rw hop-limit?	uint32
I	+rw tos?	int32
I	+rw peer-end-point	
I	+rw local?	inet:ipv4-address-no-zone
I	+rw remote?	inet:ipv4-address-no-zone
I	<pre>+rw routing-instance?</pre>	rt:routing-instance-ref
I	+rw ipv6to4* [name]	
Ι	+rw name	string

Internet-Draft Yang Data Model for IPIP Tunnel July 2015

I	+rw description?	string
	+rw bind-interface?	if:interface-ref
	+rw clear-df?	empty
I	+rw shutdown?	empty
I	+rw mtu?	uint16
I	+rw mirror-destination?	string
I	+rw hop-limit?	uint32
I	+rw tos?	int32
	+rw peer-end-point	
I	+rw local? inet:ip	v4-address-no-zone
I	+rw ipv6v4-manual* [name]	
I	+rw name	string
I	+rw description?	string
I	+rw bind-interface?	if:interface-ref
I	+rw clear-df?	empty
I	+rw shutdown?	empty
	+rw mtu?	uint16
I	+rw mirror-destination?	string
I	+rw hop-limit?	uint32
I	+rw tos?	int32
I	+rw peer-end-point	
	+rw local?	inet:ipv4-address-no-zone
Ι	+rw remote?	inet:ipv4-address-no-zone
I	+rw routing-instance	? rt:routing-instance-ref

+ro tunnel-state				
+ro ip	-in-ip*			
+ro	name?	string		
+ro	local-ip?	inet:ipv4-address-no-zone		
+ro	remote-ip?	inet:ipv4-address-no-zone		
+ro	state?	enumeration		
+ro	bind-interface?	if:interface-state-ref		
+ro	user-configured?	boolean		
+ro	routing-instance?	rt:routing-instance-ref		
+ro	mtu?	uint16		
+ro	clear-df?	empty		
+ro	tunnel-id?	uint32		
+ro	down-reason?	string		
+ro	resolved-interface-name?	string		
+ro	hop-limit?	uint32		
+ro	tos?	int32		
+ro ip	v6to4*			
+ro	name?	string		
+ro	local-ip?	inet:ipv4-address-no-zone		
+ro	remote-ip?	inet:ipv4-address-no-zone		
+ro	state?	enumeration		
+ro	bind-interface?	if:interface-state-ref		
+ro	user-configured?	boolean		
+ro	routing-instance?	rt:routing-instance-ref		

Ι	+ro mtu?	uint16
Ι	+ro clear-df?	empty
Ι	+ro tunnel-id?	uint32
I	+ro down-reason?	string
Ι	+ro resolved-interface-name?	string
Ι	+ro hop-limit?	uint32
Ι	+ro tos?	int32
+-	-ro ipv6v4-manual*	
	+ro name?	string
	+ro local-ip?	inet:ipv4-address-no-zone
	+ro remote-ip?	inet:ipv4-address-no-zone
	+ro state?	enumeration
	+ro bind-interface?	if:interface-state-ref
	+ro user-configured?	boolean
	+ro routing-instance?	rt:routing-instance-ref
	+ro mtu?	uint16
	+ro clear-df?	empty
	+ro tunnel-id?	uint32
	+ro down-reason?	string
	+ro resolved-interface-name?	string
	+ro resolved-interface-name? +ro hop-limit?	string uint32

augment /if:interfaces-state/if:interface:

+--ro tunnel? tunnel-type

```
Internet-Draft Yang Data Model for IPIP Tunnel July 2015
```

```
3. IPv4 Tunnel YANG Model
```

```
<CODE BEGINS>
```

```
module ietf-ipipv4-tunnel {
```

```
namespace "urn:ietf:params:xml:ns:yang:ietf-ipipv4-tunnel";
prefix "v4tln";
import ietf-interfaces {
 prefix "if";
}
import ietf-inet-types {
 prefix inet;
}
import ietf-routing {
 prefix "rt";
}
organization
 "Ericsson.";
```

```
contact
```

```
"Mandy.Liu@ericsson.com
```

```
Internet-Draft Yang Data Model for IPIP Tunnel July 2015
```

```
Adam.Foldes@ericsson.com";
```

description

"This YANG model defines the configuration data and operational state data for generic IPv4/6-in-IPv4 tunnel. It includes the IPv4 in IPv4, IPv6 to IPv4 auto and IPv6 over IPv4 manual tunnels.";

```
revision 2015-07-20 {
```

description

"This version adds the following new items:

- hop-limit

- tos

```
- tunnel-type
```

This version changes 'ipv6to4-auto' to 'ipv6to4'";

reference

"RFC XXXX: A YANG Data Model for IPv4 Tunnel.";

}

```
revision 2015-05-27 {
```

description

"Initial revision.";

reference

"RFC XXXX: A YANG Data Model for IPv4 Tunnel.";

[Page 9]

```
}
```

```
/* Typedefs */
     typedef tunnel-type {
      type enumeration {
         enum ip-ip {
           description
             "IPv4-in-IPv4 tunnel interface.";
         }
         enum ipv6v4-manual {
           description
             "IPv6v4-manual tunnel interface.";
         }
         enum ipv6to4 {
           description
             "The 6to4 tunnel interface.";
         }
      }
       description
         "Indicate the type of the IP tunnel.";
    }
    /* Grouping for tunnel */
     grouping tunnel-components {
Liu&Foldes
                      Expires January 2520, 2016
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                             July 2015
      description
         "Specify the IP addresses of the local and
         remote tunnel endpoint interfaces. Bind the
         tunnel circuit interface to the tunnel. Enable
         the tunnel.";
      leaf name {
         type string {
          length "1..50";
         }
         description
           "Name of the tunnel.";
      }
      leaf description {
         type string {
          length "1..255";
         }
         description
           "Textual description for a tunnel. Can be any "+
           "alphanumeric string, including spaces, not to exceed "+
           "255 ASCII characters.";
      }
      leaf bind-interface {
         type if:interface-ref;
         description
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                             July 2015
            "Bind to an interface.";
      }
      leaf clear-df {
         type empty;
         description
           "If clear-df is absent, it means that fragmentation of
         tunnel packets are permitted. If clear-df is present,
         it means that fragmentation of tunnel packets are not
         permitted.";
      }
      leaf shutdown {
         type empty;
         description
           "Disable/enable the tunnel.";
      }
      leaf mtu {
        type uint16 {
          range "256..16384";
         }
         description
           "Sets the Maximum Transmission Unit (MTU) size for
           packets sent in a tunnel. The default MTU is the MTU
           for the interface to which the tunnel is bound.";
      }
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                            July 2015
     leaf mirror-destination {
         type string {
          length "1..39";
         }
         description
           "Designate the name of a tunnel as a circuit
        mirror destination. ";
      }
     leaf hop-limit {
       type uint32 {
          range "0|1..255";
       }
       description
          "The IPv4 TTL or IPv6 Hop Limit which is used in the outer IP
         header. A value of 0 indicates that the calue is copied from
         the payload's header.";
     }
     leaf tos {
       type int32 {
         range "-1..63";
       }
       description
          "The method used to set the high 6 bits (the differentiated
         services codepoint) of the IPv4 TOS or IPv6 Traffic Class in
Liu&Foldes
                     Expires January 2520, 2016
                                                              [Page 12]
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                   July 2015
        the outer IP header. A value of -1 indicates that the bits are
        copied from the payload's header. A value between 0 and 63
        inclusive indicates that the bit field is set to the indicated
        value.";
     }
     }
    /*Configuration Data*/
     container tunnels {
      description
       "Configuration data for tunnels.";
      list ip-in-ip {
        key "name";
        description
          "Configuration of ip-in-ip tunnel.";
        uses tunnel-components;
       container peer-end-point {
          description
           "Assigns IP addresses to tunnel endpoints.";
          leaf local {
            type inet:ipv4-address-no-zone;
            description
              "IP address of the local end of the tunnel.";
          }
```

Expires January 2520, 2016

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                             July 2015
           leaf remote {
             type inet:ipv4-address-no-zone;
            description
               "IP address of the remote end of the tunnel.";
           }
          leaf routing-instance {
            type rt:routing-instance-ref;
            description
               "Name of the reference routing instance.";
           }
         }
       }
       list ipv6to4 {
         key "name";
         description
           "Configuration of the 6to4 model tunnel.";
         uses tunnel-components;
        container peer-end-point {
           description
            "Assigns IP addresses to tunnel endpoints.";
           leaf local {
             type inet:ipv4-address-no-zone;
            description
               "IP address of the local end of the tunnel.";
```

Liu&Foldes

Expires January 2520, 2016

```
Internet-Draft Yang Data Model for IPIP Tunnel
        }
        }
        list ipv6v4-manual {
```

key "name"; description

"Configuration of IPv6-over-v4 manual model tunnel.";

```
uses tunnel-components;
```

```
container peer-end-point {
```

description

"Assigns IP addresses to tunnel endpoints.";

```
leaf local {
```

type inet:ipv4-address-no-zone;

description

"IP address of the local end of the tunnel.";

}

leaf remote {

type inet:ipv4-address-no-zone;

description

"IP address of the remote end of the tunnel.";

}

leaf routing-instance {

type rt:routing-instance-ref;

description

July 2015

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                  July 2015
              "Name of the reference routing instance. ";
          }
        }
      }
    }
    /*Operational state data*/
    grouping tunnel-state-components {
      description
       "The basic tunnel information to be displayed.";
      leaf name {
        type string {
          length "1..50";
        }
        description
          "Name of the tunnel.";
      }
      leaf local-ip {
        type inet:ipv4-address-no-zone;
        description
          "IP address of the local end of the tunnel.";
      }
```

Liu&Foldes Expires January 2520, 2016

[Page 16]

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                            July 2015
      leaf remote-ip {
         type inet:ipv4-address-no-zone;
         description
          "IP address of the remote end of the tunnel.";
      }
      leaf state {
        type enumeration {
          enum Down {
          description
            "Tunnel down state.";
          }
          enum Up {
            description
               "Tunnel up state.";
          }
          enum Shutdown {
            description
               "Tunnel shutdown state.";
          }
         }
         description
           "Indicate the state of the tunnel.";
      }
      leaf bind-interface {
```

```
Liu&Foldes
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                              July 2015
         type if:interface-state-ref;
         description
           "Bind to an interface.";
      }
       leaf user-configured {
        type boolean;
        description
           "Indicate the tunnel is user-configured or dynamic.
           False is for dynamic.";
      }
       leaf routing-instance {
         type rt:routing-instance-ref;
         description
           "Name of the reference routing instance. ";
      }
       leaf mtu {
         type uint16;
         description
           "The Maximum Transmission Unit (MTU) size for
         packets sent in a tunnel.";
       }
       leaf clear-df {
         type empty;
         description
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                             July 2015
           "Indicate that the DF bit is cleared.";
      }
      leaf tunnel-id {
         type uint32;
         description
           "Tunnel id.";
      }
      leaf down-reason {
         type string;
         description
           "The reason of the tunnel is down.";
      }
      leaf resolved-interface-name{
         type string;
         description
           "The egress interface name of the tunnel.";
      }
     leaf hop-limit {
       type uint32;
        description
          "The IPv4 TTL or IPv6 Hop Limit which is used in the outer IP
         header. A value of 0 indicates that the calue is copied from
         the payload's header.";
     }
```

```
leaf tos {
```

type int32;

description

"The high 6 bits (the differentiated services codepoint) of the IPv4 TOS or IPv6 Traffic Class in the outer IP header. A value of -1 indicates that the bits are copied from the payload's header. A value between 0 and 63 inclusive indicates that the bit field is set to the indicated value.";

}

}

```
container tunnel-state {
```

```
config "false";
```

```
description
```

"Contain the information currently configured tunnels.";

```
list ip-in-ip {
```

description

```
"Operational state data of ip-in-ip tunnel.";
```

```
uses tunnel-state-components;
```

}

```
list ipv6to4 {
```

```
description
```

```
"Operational state data of the 6to4 tunnel.";
```

```
Internet-Draft Yang Data Model for IPIP Tunnel
                                                             July 2015
         uses tunnel-state-components;
      }
      list ipv6v4-manual {
         description
           "Operational state data of IPv6v4-manual tunnel.";
         uses tunnel-state-components;
      }
     }
     //Augment operational state data of IP interfaces
     augment "/if:interfaces-state/if:interface" {
      when "if:type = 'ianaift:tunnel'" {
         description
           "Augment IP interface.";
      }
      description
         "Augment operational state data of IP interfaces.";
      leaf tunnel {
         type tunnel-type;
         description
           "Indicate the type of the IP tunnel interface.";
      }
     }
  }// end of module ietf-ipipv4-tunnel
```

Expires January 2520, 2016

Liu&Foldes

[Page 21]

<CODE ENDS>

<u>4</u>. Security Considerations

This document does not introduce any new security risk.

5. IANA Considerations

This document makes no request of IANA.

6. Acknowledgements

The authors would like to thank Xufeng Liu, Samuel Chen, In-Wher Chen for their contributions to this work.

7. References

7.1. Normative References

[RFC1853] W. Simpson, "IP in IP Tunneling", <u>RFC 1853</u>, October 1995.

- [RFC2003] C. Perkins, "IP Encapsulation within IP", <u>RFC 2003</u>, October 1996.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", <u>BCP 14</u>, <u>RFC 2119</u>, March 1997.
- [RFC3056] B. Carpenter, K. Moore, "Connection of IPv6 Domains via IPv4 Clouds", <u>RFC 3056</u>, February 2001.
- [RFC6020] Bjorklund, M., "YANG A Data Modeling Language for the Network Configuration Protocol (NETCONF)", <u>RFC 6020</u>, October 2010.

7.2. Informative References

- [RFC6241] Enns, R., Bjorklund, M., Schoenwaelder, J., and A. Bierman, "Network Configuration Protocol (NETCONF)", <u>RFC</u> <u>6241</u>, June 2011.
- [RFC7223] Bjorklund, M., "A YANG Data Model for Interface Management", <u>RFC 7223</u>, May 2014.

Authors' Addresses

Ying Liu Ericsson No.5 Lize East Street Beijing, 100102 China

Email: Mandy.Liu@ericsson.com

Adam Mate Foldes Ericsson 300 Holger Way San Jose, CA 95134 USA

Email: Adam.Foldes@ericsson.com