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Tunnel Interface Types YANG Module
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Abstract

This document specifies the initial version of a YANG module containing a collection of IANA maintained YANG identities, used as interface types for tunnel interfaces. The module reflects the "tunnelType" registry maintained by IANA. The latest revision of this YANG module can be obtained from the IANA web site.

Tunnel type values are not directly added to the Tunnel Interface Types YANG module; they must instead be added to the "tunnelType" IANA registry. Once a new tunnel type registration is made by IANA for a new tunneling scheme or even an existing one that is not already listed in the current registry (e.g., LISP, NSH), IANA will update the Tunnel Interface Types YANG module accordingly.

Some of the IETF-defined tunneling techniques are not listed in the current IANA registry. It is not the intent of this document to update the existing IANA registry with a comprehensive list of tunnel technologies. Registrants must follow the IETF registration procedure for interface types whenever a new tunnel type is needed.

Editorial Note (To be removed by RFC Editor)

Please update these statements in the document with the RFC number to be assigned to this document:

- "This version of this YANG module is part of RFC XXXX;"
- "RFC XXXX: Tunnel Interface Types YANG Module";
- "reference: RFC XXXX"
- "...must be updated as defined in RFCXXXX."

Please update the "revision" date of the YANG modules.

Status of This Memo

Copyright Notice

Table of Contents

1. Introduction

This document specifies the initial version of the iana-tunnel-type YANG module containing a collection of IANA maintained YANG identities identifying tunnel interface types. The module reflects IANA's registry maintained at [TUNNELTYPE-IANA-REGISTRY]. The latest revision of this module can be obtained from the IANA web site.

Tunnel-specific extensions may be added to the Interface module [RFC8343] as a function of the tunnel type. An example of this is provided in Appendix A. It is not the intention of this document to define tunnel-specific extensions for every tunnel encapsulation technology; those are discussed in dedicated documents such as [I-D.ietf-softwire-yang]. Likewise, it is out of the scope of this document to update the existing IANA registry [TUNNELTYPE-IANA-REGISTRY] with a comprehensive list of tunnel technologies.

This document uses the common YANG types defined in [RFC6991] and adopts the Network Management Datastore Architecture (NMDA [RFC8342]).

The terminology for describing YANG modules is defined in [RFC7950]. The meanings of the symbols used in the tree diagram are defined in [RFC8340].

2. IANA Tunnel Type YANG Module

The iana-tunnel-type module imports the 'iana-if-type' module defined in [RFC7224].

The initial version of the module includes tunnel types defined in [RFC4087], [RFC7856], [RFC7870], and [RFC6346].

<CODE BEGINS> file "iana-tunnel-type@2019-04-04.yang"

```
module iana-tunnel-type {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:iana-tunnel-type";
  prefix iana-tunnel-type;

  import iana-if-type  {
    prefix ift;
    reference
      "RFC 7224: IANA Interface Type YANG Module";
  }

  organization
```

```
      "IANA";
    contact
      "Internet Assigned Numbers Authority

    Postal: ICANN
            12025 Waterfront Drive, Suite 300
            Los Angeles, CA  90094-2536
            United States of America
    Tel:    +1 310 301 5800
    <mailto:iana@iana.org>";

    description
      "This module contains a collection of YANG identities defined
      by IANA and used as interface types for tunnel interfaces.

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      authors of the code.  All rights reserved.

      Redistribution and use in source and binary forms, with or
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      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.";

    revision 2019-04-04 {
      description
        "Initial revision.";
      reference
        "RFC XXXX: Tunnel Interface Types YANG Module";
    }
    identity other {
      base ift:tunnel;
      description
        "None of the following values.";
      reference
       "RFC 4087: IP Tunnel MIB";
    }
    identity direct {
      base ift:tunnel;
      description
        "No intermediate header.";
      reference
        "RFC 2003: IP Encapsulation within IP
         RFC 4213: Basic Transition Mechanisms for IPv6 Hosts
```

```
                and Routers";
      }
      identity gre {
        base ift:tunnel;
        description
          "GRE encapsulation.";
        reference
         "RFC 1701: Generic Routing Encapsulation (GRE)
          RFC 1702: Generic Routing Encapsulation over IPv4 networks
          RFC 7676: IPv6 Support for Generic Routing Encapsulation
                    (GRE)";
     }
     identity minimal {
       base ift:tunnel;
       description
         "Minimal encapsulation.";
       reference
         "RFC 2004: Minimal Encapsulation within IP";
     }
     identity l2tp {
       base ift:tunnel;
       description
         "L2TP encapsulation.";
      reference
        "RFC 2661: Layer Two Tunneling Protocol (L2TP)";
     }
     identity pptp {
       base ift:tunnel;
       description
         "PPTP encapsulation.";
       reference
         "RFC 2637: Point-to-Point Tunneling Protocol (PPTP)";
     }
     identity l2f {
       base ift:tunnel;
       description
         "L2F encapsulation.";
       reference
         "RFC 2341: Cisco Layer Two Forwarding (Protocol) (L2F)";
     }
     identity udp {
       base ift:tunnel;
       description
         "UDP encapsulation.";
       reference
         "Section 3.1.11 of RFC 8085";
     }
     identity atmp {
```

```
      base ift:tunnel;
      description
       "ATMP encapsulation.";
      reference
        "RFC 2107: Ascend Tunnel Management Protocol - ATMP";
    }
    identity msdp {
      base ift:tunnel;
      description
        "MSDP encapsulation.";
      reference
        "RFC 3618: Multicast Source Discovery Protocol (MSDP)";
    }
    identity sixtofour {
      base ift:tunnel;
      description
        "6to4 encapsulation.";
      reference
        "RFC 3056: Connection of IPv6 Domains via IPv4 Clouds";
    }
    identity sixoverfour {
      base ift:tunnel;
      description
        "6over4 encapsulation.";
      reference
        "RFC 2529: Transmission of IPv6 over IPv4 Domains without
                   Explicit Tunnels";
    }
    identity isatap {
      base ift:tunnel;
      description
        "ISATAP encapsulation.";
      reference
        "RFC 5214:  Intra-Site Automatic Tunnel Addressing Protocol
                   (ISATAP)";
    }
    identity teredo {
      base ift:tunnel;
      description
        "Teredo encapsulation.";
      reference
        "RFC 4380: Teredo- Tunneling IPv6 over UDP through
                   Network Address Translations (NATs)";
    }
    identity iphttps {
      base ift:tunnel;
      description
        "IP over HTTPS (IP-HTTPS) Tunneling Protocol.";
```

```
      reference
        "Microsoft Corporation, IP over HTTPS (IP-HTTPS) Tunneling
         Protocol Specification,
         https://msdn.microsoft.com/en-us/library/dd358571.aspx";
    }
    identity softwiremesh {
      base ift:tunnel;
      description
        "softwire mesh tunnel.";
      reference
        "RFC 5565: Softwire Mesh Framework";
    }
    identity dslite {
      base ift:tunnel;
      description
        "DS-Lite tunnel.";
      reference
        "RFC 6333: Dual-Stack Lite Broadband Deployments Following
                   IPv4 Exhaustion";
    }
    identity aplusp {
      base ift:tunnel;
      description
        "A+P encapsulation.";
      reference
        "RFC 6346: The Address plus Port (A+P) Approach to the IPv4
                   Address Shortage";
    }
  }
  <CODE ENDS>
```

3. Security Considerations

The YANG module specified in this document defines a schema for data that is designed to be accessed via network management protocols such as NETCONF [RFC6241] or RESTCONF [RFC8040]. The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [RFC6242]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [RFC8446].

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 module defined in this document defines YANG identities for the iana-tunnel-types registry. These identies are intended to be

referenced by other YANG modules, and by themselves do not expose any nodes which are writable, contain read-only state, or RPCs. As such, there are no additional security issues to be considered relating to the module defined in this document.

4. IANA Considerations

4.1. YANG Module

This document requests IANA to register the following URI in the "ns" subregistry within the "IETF XML Registry" [RFC3688]:

```
URI: urn:ietf:params:xml:ns:yang:iana-tunnel-type
Registrant Contact: IANA.
XML: N/A; the requested URI is an XML namespace.
```

This document requests IANA to register the following following YANG module in the "YANG Module Names" subregistry [RFC7950] within the "YANG Parameters" registry.

```
Name: iana-tunnel-type
Namespace: urn:ietf:params:xml:ns:yang:iana-tunnel-type
Prefix: iana-tunnel-type
Reference: RFC XXXX
```

This document defines the initial version of the IANA-maintained iana-tunnel-type YANG module. IANA is requested to add this note:

> Tunnel type values must not be directly added to the iana-tunnel-type YANG module. They must instead be respectively added to the "tunnelType" sub-registry (under the "ifType definitions" registry).

When a tunnel type is added to the "tunnelType" sub-registry, a new "identity" statement must be added to the iana-tunnel-type YANG module. The name of the "identity" is the lower-case of the corresponding enumeration in the IANAifType-MIB (i.e., IANAtunnelType). The "identity" statement should have the following sub-statements defined:

"base": Contains 'ift:tunnel'.

"description": Replicates the description from the registry.

"reference": Replicates the reference from the registry and add the title of the document.

Unassigned or reserved values are not present in the module.

When the iana-tunnel-type YANG module is updated, a new "revision" statement must be added in front of the existing revision statements.

IANA is requested to add this note to "tunnelType" sub-registry:

> When this registry is modified, the YANG module iana-tunnel-type must be updated as defined in RFCXXXX.

4.2. Updates to the IANA tunnelType Table

This document requests IANA to update the following entries available at https://www.iana.org/assignments/smi-numbers/smi-numbers.xhtml#smi-numbers-6:

OLD:

Decimal	Name	Description	References
2	direct	no intermediate header	[RFC4087]
3	gre	GRE encapsulation	[RFC4087]
4	minimal	Minimal encapsulation	[RFC4087]
5	l2tp	L2TP encapsulation	[RFC4087]
6	pptp	PPTP encapsulation	[RFC4087]
7	l2f	L2F encapsulation	[RFC4087]
8	udp	UDP encapsulation	[RFC4087]
9	atmp	ATMP encapsulation	[RFC4087]
10	msdp	MSDP encapsulation	[RFC4087]
11	sixToFour	6to4 encapsulation	[RFC4087]
12	sixOverFour	6over4 encapsulation	[RFC4087]
13	isatap	ISATAP encapsulation	[RFC4087]
14	teredo	Teredo encapsulation	[RFC4087]
16	softwireMesh	softwire mesh tunnel	[RFC7856]
17	dsLite	DS-Lite tunnel	[RFC7870]

NEW:

Decimal	Name	Description	References
2	direct	no intermediate header	[RFC2003] [RFC4213]
3	gre	GRE encapsulation	[RFC1701] [RFC1702] [RFC7676]
4	minimal	Minimal encapsulation	[RFC2004]
5	l2tp	L2TP encapsulation	[RFC2661]
6	pptp	PPTP encapsulation	[RFC2637]
7	l2f	L2F encapsulation	[RFC2341]
8	udp	UDP encapsulation	[RFC8085]
9	atmp	ATMP encapsulation	[RFC2107]
10	msdp	MSDP encapsulation	[RFC3618]
11	sixToFour	6to4 encapsulation	[RFC3056]
12	sixOverFour	6over4 encapsulation	[RFC2529]
13	isatap	ISATAP encapsulation	[RFC5214]
14	teredo	Teredo encapsulation	[RFC4380]
16	softwireMesh	softwire mesh tunnel	[RFC5565]
17	dsLite	DS-Lite tunnel	[RFC6333]

5. Acknowledgements

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Appendix A. Example Usage

The following example illustrates how the Interface YANG module can be augmented with tunnel-specific paramters. In this example, the module is augmented with a 'remote-endpoint' for the tunnel. A tree structure is provided below:

```
module: example-iftunnel-extension
  augment /if:interfaces/if:interface:
    +--rw remote-endpoint?   inet:ipv6-address
```

The 'example-iftunnel-extension' module imports the modules defined in [RFC6991] and [RFC8343] in addition to the "iana-tunnel-type" module defined in this document.

```
module example-iftunnel-extension {
  yang-version 1.1;

  namespace "urn:ietf:params:xml:ns:yang:ietf-extension-example";
  prefix example;

  import ietf-inet-types {
    prefix inet;
    reference
      "Section 4 of RFC 6991";
  }

  import ietf-interfaces {
    prefix if;
    reference
      "RFC 8343: A YANG Data Model for Interface Management";
  }

  import iana-tunnel-type  {
    prefix iana-tunnel-type;
    reference
```

```
        "RFC XXXX:  A Tunnel Extension to the Interface Management
                    YANG Module";
    }

    organization "IETF Softwire Working Group";

    contact

      "WG Web:   <https://datatracker.ietf.org/wg/softwire/>
       WG List:  <mailto:softwire@ietf.org>

       Author:  Mohamed Boucadair
                <mailto:mohamed.boucadair@orange.com>";

     description
        "This is an example YANG module to extend the Interface YANG
         module with tunnel-specific parameters.

        Copyright (c) 2019 IETF Trust and the persons identified as
        authors of the code.  All rights reserved.

        Redistribution and use in source and binary forms, with or
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        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.";

    revision 2019-04-04 {
      description
        "Initial revision.";
      reference
        "RFC XXXX:  Tunnel Interface Types YANG Module";
    }

    augment "/if:interfaces/if:interface" {
      when "derived-from(if:type, 'iana-tunnel-type:gre')";
      description
        "Augments Interface module with specific tunnel parameters.";

      leaf remote-endpoint {
        type inet:ipv6-address;
        description
          "IPv6 address of the remote GRE endpoint.";
      }
```

```
    }
  }
```

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