Tunnel Interface Types YANG Module
draft-ietf-softwire-iftunnel-04

Abstract
This document specifies a YANG module containing a collection of IANA maintained YANG identities, used as interface types for tunnel interfaces.

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
This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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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."
1. Introduction

This document specifies the initial version of the iana-tunnel-type YANG module 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].
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 tree diagrams 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 tunnels 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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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 4219: IPv6-in-IPv4 Encapsulation (6to4)"
}


<table>
<thead>
<tr>
<th>Identity</th>
<th>Base</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>sixoverfour</td>
<td>ift:tunnel</td>
<td>6over4 encapsulation.</td>
<td>RFC 2529: Transmission of IPv6 over IPv4 Domains without Explicit Tunnels</td>
</tr>
<tr>
<td>isatap</td>
<td>ift:tunnel</td>
<td>ISATAP encapsulation.</td>
<td>RFC 5214: Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)</td>
</tr>
<tr>
<td>teredo</td>
<td>ift:tunnel</td>
<td>Teredo encapsulation.</td>
<td>RFC 4380: Teredo- Tunneling IPv6 over UDP through Network Address Translations (NATs)</td>
</tr>
<tr>
<td>softwiremesh</td>
<td>ift:tunnel</td>
<td>softwire mesh tunnel.</td>
<td>RFC 5565: Softwire Mesh Framework</td>
</tr>
<tr>
<td>dslite</td>
<td>ift:tunnel</td>
<td>DS-Lite tunnel.</td>
<td>RFC 6333: Dual-Stack Lite Broadband Deployments Following</td>
</tr>
</tbody>
</table>

"RFC 3056: Connection of IPv6 Domains via IPv4 Clouds"
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"
}

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 identities 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 same as the corresponding enumeration in the IANAIfType-MIB (i.e., IANAIfType). The "identity" statement should have the following sub-statements defined:

"base": Contains the name assigned to the tunnel type, in lowercase.
"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:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Name</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>direct</td>
<td>no intermediate header</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>3</td>
<td>gre</td>
<td>GRE encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>4</td>
<td>minimal</td>
<td>Minimal encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>5</td>
<td>12tp</td>
<td>L2TP encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>6</td>
<td>pptp</td>
<td>PPTP encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>7</td>
<td>12f</td>
<td>L2F encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>8</td>
<td>udp</td>
<td>UDP encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>9</td>
<td>atm</td>
<td>ATMP encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>10</td>
<td>msdp</td>
<td>MSDP encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>11</td>
<td>sixToFour</td>
<td>6to4 encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>12</td>
<td>sixOverFour</td>
<td>6over4 encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>13</td>
<td>isatap</td>
<td>ISATAP encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>14</td>
<td>teredo</td>
<td>Teredo encapsulation</td>
<td>[RFC4087]</td>
</tr>
<tr>
<td>15</td>
<td>softwireMesh</td>
<td>softwire mesh tunnel</td>
<td>[RFC7856]</td>
</tr>
<tr>
<td>16</td>
<td>dsLite</td>
<td>DS-Lite tunnel</td>
<td>[RFC7870]</td>
</tr>
</tbody>
</table>

NEW:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Name</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>direct</td>
<td>no intermediate header</td>
<td>[RFC2003]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[RFC4213]</td>
</tr>
<tr>
<td>3</td>
<td>gre</td>
<td>GRE encapsulation</td>
<td>[RFC1701]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[RFC1702]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[RFC7676]</td>
</tr>
<tr>
<td>4</td>
<td>minimal</td>
<td>Minimal encapsulation</td>
<td>[RFC2004]</td>
</tr>
<tr>
<td>5</td>
<td>12tp</td>
<td>L2TP encapsulation</td>
<td>[RFC2661]</td>
</tr>
<tr>
<td>6</td>
<td>pptp</td>
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<td>7</td>
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<td>atm</td>
<td>ATMP encapsulation</td>
<td>[RFC2107]</td>
</tr>
<tr>
<td>10</td>
<td>msdp</td>
<td>MSDP encapsulation</td>
<td>[RFC3618]</td>
</tr>
<tr>
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<td>sixToFour</td>
<td>6to4 encapsulation</td>
<td>[RFC3056]</td>
</tr>
<tr>
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<td>6over4 encapsulation</td>
<td>[RFC2529]</td>
</tr>
<tr>
<td>13</td>
<td>isatap</td>
<td>ISATAP encapsulation</td>
<td>[RFC5214]</td>
</tr>
<tr>
<td>14</td>
<td>teredo</td>
<td>Teredo encapsulation</td>
<td>[RFC4380]</td>
</tr>
<tr>
<td>16</td>
<td>softwireMesh</td>
<td>softwire mesh tunnel</td>
<td>[RFC5565]</td>
</tr>
<tr>
<td>17</td>
<td>dsLite</td>
<td>DS-Lite tunnel</td>
<td>[RFC6333]</td>
</tr>
</tbody>
</table>

5. Acknowledgements

Special thanks to Tom Petch and Martin Bjorklund for the detailed review and suggestions.

Thanks to Andy Bierman for the Yangdoctors review.
6. References

6.1. Normative References


6.2. Informative References

[I-D.ietf-softwire-yang]


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

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

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

```yang
definitions { namespace "urn:ietf:params:xml:ns:yang:ietf-extension-example"
    prefix example;
}
```

Appendix A. Example Usage

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

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

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

```yang
definitions { 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.

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    (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 local GRE endpoint.";
  }
  }
  }

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