Stream: Independent Submission
RFC: 9296
Category: Informational
Published: August 2022
ISSN: 2070-1721
Authors: D. Liu *Ericsson*, J. Halpern *Ericsson*, C. Zhang *Ericsson*

RFC 9296
ifStackTable for the Point-to-Point (P2P) Interface over a LAN Type: Definition and Examples

Abstract

RFC 5309 defines the Point-to-Point (P2P) circuit type, one of the two circuit types used in the link-state routing protocols, and highlights that it is important to identify the correct circuit type when forming adjacencies, flooding link-state database packets, and monitoring the link state.

This document provides advice about the ifStack for the P2P interface over a LAN Type to facilitate operational control, maintenance, and statistics.

Status of This Memo

This document is not an Internet Standards Track specification; it is published for informational purposes.

This is a contribution to the RFC Series, independently of any other RFC stream. The RFC Editor has chosen to publish this document at its discretion and makes no statement about its value for implementation or deployment. Documents approved for publication by the RFC Editor are not candidates for any level of Internet Standard; see Section 2 of RFC 7841.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at https://www.rfc-editor.org/info/rfc9296.

Table of Contents

1. Introduction

[RFC5309] defines the Point-to-Point (P2P) circuit type and highlights that it is important to identify the correct circuit type when forming adjacencies, flooding link-state database packets, and monitoring the link state.

To simplify configuration and operational control, it is helpful to represent the fact that an interface is to be considered a P2P interface over a LAN type explicitly in the interface stack. This enables, for example, routing protocols to automatically inherit the correct operating mode from the interface stack without further configuration (i.e., there is no need to explicitly configure the P2P interface in routing protocols).

It is helpful to map the P2P interface over a LAN type in the interface management stack table. If no entry specifies the lower layer of the P2P interface, then management tools lose the ability to retrieve and measure properties specific to lower layers.

In standard network management protocols that make use of ifStackTables, the P2P interface over a LAN type is intended to be used solely as a means to signal that the upper-layer interface of link-data layer is a P2P interface. Thus, the upper and lower layers of P2P over a LAN type are expected to apply appropriate semantics. In general, the higher layer of a P2P over a LAN type **SHOULD** be "ipForward" (value 142 in [Assignment]), and the lower layer of P2P over a LAN type **SHOULD** be any appropriate link-data layer of "ipForward".

The assignment of 303 as the value for the p2pOverLan ifType was made by Expert Review (see [Assignment] and [RFC8126]). The purpose of this document is to serve as a reference for ifType 303 by suggesting how the ifStackTable for the P2P interface over a LAN type is to be used and providing examples.

It should be noted that this document reflects the operating model used on some routers. Other routers that use different models may not represent a P2P as a separate interface.

2. 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.

3. Interface Stack Table for P2P Interface Type

3.1. P2P Interface: higher-layer-if and lower-layer-if

If a device implements the IF-MIB [RFC2863], then each entry in the "/interfaces/interface" list (see "A YANG Data Model for Interface Management" [RFC8343]) in the operational state is typically mapped to one ifEntry as required in [RFC8343]. Therefore, the P2P interface over a LAN type should also be fully mapped to one ifEntry by defining the "ifStackTable" ("higher-layer-if" and "lower-layer-if", defined in [RFC8343]).

In the ifStackTable, the higher layer of the P2P interface over a LAN type **SHALL** be network layer "ipForward" to enable IP routing, and the lower layer of the P2P interface over a LAN type **SHOULD** be any link-data layer that can be bound to "ipForward", including "ethernetCsmacd", "ieee8023adLag", "l2vlan", and so on (defined in the iana-if-type YANG module [IANA-ifTYPE]).

The P2P interface over the LAN type ifStackTable can be defined along the lines of the following example, which complies with [RFC8343] and [RFC6991]. In the example, "lower-layer-if" takes "ethernetCsmacd", but, in fact, "lower-layer-if" can be any other available link-data layer. See Appendix A for more examples.

```
<CODE BEGINS>

            <interface>
              <name>isis_int</name>
              <type>ianaift:ipForward</type>
            </interface>

            <interface>
              <name>eth1</name>
              <type>ianaift:ethernetCsmacd</type>
            </interface>

            <interface>
              <name>p2p</name>
              <type>ianaift:p2pOverLan</type>
              <higher-layer-if>isis_int</higher-layer-if>
              <lower-layer-if>eth1</lower-layer-if>
              <enabled>false</enabled>
              <admin-status>down</admin-status>
              <oper-status>down</oper-status>
              <statistics>
                <discontinuity-time>
                  2021-04-01T03:00:00+00:00
                </discontinuity-time>
                <!-- counters now shown here -->
              </statistics>
            </interface>


<CODE ENDS>
```

Figure 1

3.2. P2P Interface Statistics

Because multiple IP interfaces can be bound to one physical port, the statistics on the physical port **SHOULD** be a complete set that includes statistics of all upper-layer interfaces. Therefore, each P2P interface collects and displays traffic that has been sent to it via higher layers or received from it via lower layers.

3.3. P2P Interface Administrative State

The P2P interface can be shut down independently of the underlying interface.

If the P2P interface is administratively up, then the "oper-status" (defined in [RFC8343]) of that interface **SHALL** fully reflect the state of the underlying interface; if the P2P interface is administratively down, then the "oper-status" of that interface **SHALL** be down. Examples can be found in Appendix A.

4. Security Considerations

The writable attribute "admin-status" of the p2povervlan ifType is inherited from [RFC8343]. Other objects associated with the p2povervlan ifType are read-only. With this in mind, the considerations discussed in Section 7 of [RFC8343] otherwise apply to the p2povervlan ifType.

5. IANA Considerations

In the "Interface Types (ifType)" registry, value 303 is assigned to p2pOverLan [Assignment]. As this document explains how the p2pOverLan (303) ifType is to be used, IANA has amended the reference for p2pOverLan (303) to point to this document (instead of [RFC5309]) and made a similar amendment in the YANG iana-if-type module [IANA-ifTYPE] (originally specified in [RFC7224]).

6. References

6.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, DOI 10.17487/RFC2863, June 2000, <https://www.rfc-editor.org/info/rfc2863>.

[RFC5309] Shen, N., Ed. and A. Zinin, Ed., "Point-to-Point Operation over LAN in Link State Routing Protocols", RFC 5309, DOI 10.17487/RFC5309, October 2008, <https://www.rfc-editor.org/info/rfc5309>.

[RFC7224] Bjorklund, M., "IANA Interface Type YANG Module", RFC 7224, DOI 10.17487/RFC7224, May 2014, <https://www.rfc-editor.org/info/rfc7224>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

[RFC8343] Bjorklund, M., "A YANG Data Model for Interface Management", RFC 8343, DOI 10.17487/RFC8343, March 2018, <https://www.rfc-editor.org/info/rfc8343>.

6.2. Informative References

[Assignment] IANA, "Interface Types (ifType)", <https://www.iana.org/assignments/smi-numbers>.

[IANA-ifTYPE] IANA, "YANG Module Names", <https://www.iana.org/assignments/yang-parameters>.

[RFC6991] Schoenwaelder, J., Ed., "Common YANG Data Types", RFC 6991, DOI 10.17487/RFC6991, July 2013, <https://www.rfc-editor.org/info/rfc6991>.

[RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 8126, DOI 10.17487/RFC8126, June 2017, <https://www.rfc-editor.org/info/rfc8126>.

Appendix A. Examples

If the underlying interface is a VLAN sub-interface, the ifStackTable should be defined as:

```
<CODE BEGINS>

          <interface>
            <name>isis_int</name>
            <type>ianaift:ipForward</type>
          </interface>

          <interface>
            <name>eth1_valn1</name>
            <type>ianaift:l2vlan</type>
          </interface>

          <interface>
            <name>p2p</name>
            <type>ianaift:p2pOverLan</type>
            <higher-layer-if>isis_int</higher-layer-if>
            <lower-layer-if>eth1_valn1</lower-layer-if>
            <enabled>false</enabled>
            <admin-status>down</admin-status>
            <oper-status>down</oper-status>
            <statistics>
              <discontinuity-time>
                2021-04-01T03:00:00+00:00
              </discontinuity-time>
              <!-- counters now shown here -->
            </statistics>
          </interface>


<CODE ENDS>
```

Figure 2

If the underlying interface is Link Aggregation Group (LAG), the ifStackTable should be defined as:

```
<CODE BEGINS>

          <interface>
            <name>isis_int</name>
            <type>ianaift:ipForward</type>
          </interface>

          <interface>
            <name>eth1_lag1</name>
            <type>ianaift:ieee8023adLag</type>
          </interface>

          <interface>
            <name>p2p</name>
            <type>ianaift:p2pOverLan</type>
            <higher-layer-if>isis_int</higher-layer-if>
            <lower-layer-if>eth1_lag1</lower-layer-if>
            <enabled>false</enabled>
            <admin-status>down</admin-status>
            <oper-status>down</oper-status>
            <statistics>
              <discontinuity-time>
                2021-04-01T03:00:00+00:00
              </discontinuity-time>
              <!-- counters now shown here -->
            </statistics>
          </interface>


<CODE ENDS>
```

Figure 3

If the P2P interface and underlying interface are both administratively up and the underlying interface operational status is up:

```
<CODE BEGINS>

          <interface>
             <name>p2p</name>
             <type>ianaift:p2pOverLan</type>
             <higher-layer-if>isis_int</higher-layer-if>
             <lower-layer-if>eth1</lower-layer-if>
             <admin-status>up</admin-status>
             <oper-status>up</oper-status>
          </interface>


<CODE ENDS>
```

Figure 4

If the P2P interface and underlying interface are administratively up but the underlying interface operational status is down:

```
<CODE BEGINS>

          <interface>
             <name>p2p</name>
             <type>ianaift:p2pOverLan</type>
             <higher-layer-if>isis_int</higher-layer-if>
             <lower-layer-if>eth1</lower-layer-if>
             <admin-status>up</admin-status>
             <oper-status>down</oper-status>
          </interface>


<CODE ENDS>
```

Figure 5

If the P2P interface is administratively down:

```
<CODE BEGINS>

          <interface>
             <name>p2p</name>
             <type>ianaift:p2pOverLan</type>
             <higher-layer-if>isis_int</higher-layer-if>
             <lower-layer-if>eth1</lower-layer-if>
             <admin-status>down</admin-status>
             <oper-status>down</oper-status>
          </interface>


<CODE ENDS>
```

Figure 6

If the P2P interface is administratively up but the underlying interface is administratively down:

```
<CODE BEGINS>

          <interface>
             <name>p2p</name>
             <type>ianaift:p2pOverLan</type>
             <higher-layer-if>isis_int</higher-layer-if>
             <lower-layer-if>eth1</lower-layer-if>
             <admin-status>up</admin-status>
             <oper-status>down</oper-status>
          </interface>


<CODE ENDS>
```

Figure 7

Acknowledgements

The authors would like to thank Rob Wilton for his reviews and valuable comments and suggestions.

Authors' Addresses

Daiying Liu
Ericsson
No.5 Lize East Street
Beijing
100102
China
Email: harold.liu@ericsson.com

Joel Halpern
Ericsson
Email: joel.halpern@ericsson.com

Congjie Zhang
Ericsson
Email: congjie.zhang@ericsson.com