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IEEE Standard for
Local and Metropolitan Area Networks—

Timing and Synchronization for Time-Sensitive Applications

Amendment 2: YANG Data Model

IEEE Computer Society

Developed by the
LAN/MAN Standards Committee

IEEE Std 802.1ASdn™-2024
(Amendment to IEEE Std 802.1AS™-2020
as amended by IEEE Std 802.1AS™-2020/Cor 1-2021
and IEEE Std 802.1ASdr™-2024)

IEEE

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Approved 26 September 2024

IEEE SA Standards Board

Abstract: A YANG data model that allows configuration and state reporting for all managed objects of the base standard is specified in this amendment.

Keywords: amendment, data model, IEEE 802.1AS™, IEEE 802.1ASdn™, managed objects, network management, synchronization, syntonization, time-aware system, YANG

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Introduction

This introduction is not part of IEEE Std 802.1ASdn-2024, IEEE Standard for Local and Metropolitan Area Networks—Timing and Synchronization for Time-Sensitive Applications—Amendment 2: YANG Data Model.

The first edition of IEEE Std 802.1AS was published in 2011. A first corrigendum, IEEE Std 802.1AS™-2011/Cor 1-2013, provided technical and editorial corrections. A second corrigendum, IEEE Std 802.1AS™-2011/Cor 2-2015 provided additional technical and editorial corrections.

The second edition, IEEE Std 802.1AS-2020, added support for multiple gPTP domains, Common Mean Link Delay Service, external port configuration, and Fine Timing Measurement for IEEE 802.11 transport. Backward compatibility with IEEE Std 802.1AS-2011 was maintained. The corrigendum, IEEE 802.1AS-2020/Cor 1-2021, provides technical and editorial corrections. The amendment, IEEE Std 802.1ASdr-2024, changed non-inclusive terms, replacing them with suitable and inclusive terminology wherever possible.

This amendment to IEEE Std 802.1AS-2020 specifies a YANG data model that allows configuration and state reporting for all managed objects of the base standard.

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(This amendment is based on IEEE Std 802.1AS™-2020 as amended by IEEE Std 802.1AS™-2020/Cor 1-2021 and IEEE Std 802.1 ASdr-2024.)

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strikethrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Deletions and insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.[6]

[6] Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

2. Normative references

Insert the following references into Clause 2 in alphanumeric order:

IEEE Std 802d™-2017, IEEE Standard for Local and Metropolitan Area Networks—Overview and Architecture—Amendment 1: Allocation of Uniform Resource Name (URN) Values in IEEE 802® Standards.[7, 8]

IEEE Std 1588e™-2024, IEEE Standard for Precision Clock Synchronization Protocol for Networked Measurement and Control Systems—Amendment 5: MIB and YANG Modules.

IETF RFC 7950, The YANG 1.1 Data Modeling Language, August 2016.[9]

[7] The IEEE standards or products referred to in Clause 2 are trademarks owned by The Institute of Electrical and Electronics Engineers, Incorporated.
[8] IEEE publications are available from The Institute of Electrical and Electronics Engineers (https://standards.ieee.org/).
[9] IETF RFCs are available from the Internet Engineering Task Force (https://www.ietf.org/).

4. Acronyms and abbreviations

Insert the following abbreviations into Clause 4 in alphanumeric order:

NETCONF	Network Configuration Protocol
UML®	Unified Modeling Language™ [10]

[10] UML® is a registered trademark of the Object Management Group, Inc., and Unified Modeling Language™ is a trademark of the Object Management Group, Inc.

5. Conformance

5.4 PTP Instance requirements and options

5.4.2 PTP Instance options

Insert a new list item k) 4) after k) 3) in the list in 5.4.2, as follows:

4) If YANG is supported with a remote management protocol, support the YANG data model in Clause 17.

Change the title of Clause 15 as follows:

15. ~~Managed object definitions~~Management Information Base (MIB)

Insert new Clause 17 after Clause 16 as follows:

17. YANG data model

YANG (IETF RFC 7950) is a data modeling language used to model configuration data and state data for remote network management protocols. YANG-based remote network management protocols include the Network Configuration Protocol (NETCONF) (IETF RFC 6242 [B13a]) and RESTCONF (IETF RFC 8040 [B13e]). Each remote network management protocol uses a specific encoding on the wire, such as XML or JSON. A YANG module specifies the organization and rules for the management data, and a mapping from YANG to the specific encoding enables the data to be understood correctly by both client (e.g., network manager) and server (e.g., PTP Instances).

This clause specifies the YANG data model for IEEE Std 802.1AS.

This clause:

a) Introduces the organization of the data models, including the relationship with other standards (17.1)
b) Provides an overview of the hierarchy of the data models using a representation similar to the Unified Modeling Language (UML) (17.2)
c) Summarizes the structure of the YANG data model (17.3)
d) Reviews security considerations (17.4)
e) Provides a schema tree as an overview of the YANG module (17.5)
f) Specifies the YANG module (17.6)

17.1 YANG framework

The YANG framework applies hierarchy in the following areas:

a) The Uniform Resource Name (URN), as specified in IEEE Std 802d-2017.
b) The YANG objects form a hierarchy of configuration and operational data structures that define the YANG model.

Clause 14 specifies the information model for management of this standard. The data model for a specific management mechanism is derived from the information model. Since YANG-based protocols are an example of a management mechanism, the YANG data model of this clause is derived from Clause 14.

NOTE—The MIB modules specified in Clause 15 were also derived from Clause 14. Consequently, the capabilities and structure of the YANG data models are aligned with those represented by the MIB. However the YANG data model has not been derived from the MIB, and there has been no attempt to include data or modeling constructs that might appear in the MIB but not in the information model.

The information model in Clause 14 is organized as a hierarchy of data sets. Each data set contains one or more related members (items of data that can be read or written). In the context of YANG, each data set is represented as a YANG “container,” and each member is represented as a YANG “leaf.”

17.1.1 Relationship to the IEEE Std 1588 data model

The YANG data models specified in this standard are based on, and augment, those specified in IEEE Std 1588. In particular the ieee802-dot1as-gptp.yang module imports the ieee1588-ptp-tt module as a whole, augmenting that module as necessary to meet the requirements of this standard.

Some of the data sets in Clause 14 (e.g., defaultDS) are derived from IEEE Std 1588, and some of the data sets are unique to IEEE Std 802.1AS (i.e., not derived from IEEE Std 1588). For each data set in Clause 14 that is derived from IEEE Std 1588, a portion of the members are derived from IEEE Std 1588, and the remaining members are unique to IEEE Std 802.1AS. For the members that are derived from IEEE Std 1588, the specifications in both standards are analogous (same name, data type, semantics, etc.).

The YANG data model for IEEE Std 1588-2019 is published as amendment IEEE Std 1588e. The YANG module of IEEE Std 1588e (ieee1588-ptp-tt.yang) contains the hierarchy (tree) of data sets and their members.

The YANG module of this clause (ieee802-dot1as-gptp.yang) uses the YANG "import" statement to import the YANG module of IEEE Std 1588e. This effectively uses the IEEE Std 1588 YANG tree as the foundation of the IEEE Std 802.1AS YANG tree. By importing the tree and its data set containers, all members from Clause 14 that are derived from IEEE Std 1588 are also imported.

The core of the YANG module for IEEE Std 802.1AS consists of YANG "augment" statements, used to add members to the tree that are unique for IEEE Std 802.1AS.

NOTE— IETF RFC 8575 [B13g] is the standard YANG data model for IEEE Std 1588-2008. The YANG data model of IEEE Std 1588e is effectively a newer version of RFC 8575. Therefore, the YANG module of RFC 8575 is not imported by the YANG module of this clause.

17.2 IEEE 802.1AS YANG data model

This clause uses a UML-like representation to provide an overview of the hierarchy of the IEEE Std 802.1AS YANG data model.

A representation of the management model is provided in Figure 17-1 through Figure 17-4. The purpose of the diagrams is to express the model design in a concise manner. The structure of the representation shows the name of the object followed by a list of properties for the object. The properties indicate their type and accessibility. The representation is meant to express simplified semantics for the properties. It is not meant to provide the specific datatype used to encode the object in either MIB or YANG. In the representation, a box with a white background represents information that comes from sources outside of this IEEE standard. A box with a gray background represents objects that are defined by this IEEE standard.

NOTE 1—OMG® UML 2.5[11] [B24a] conventions together with C++ language constructs are used in this clause as a representation to convey model structure and relationships.

NOTE 2—This standard specifies YANG for Clause 14 of this standard. There are optional features in the YANG module of IEEE Std 1588 that are not specified in Clause 14, and are therefore not shown in the figures of this subclause. If optional IEEE Std 1588 YANG features are implemented, conformance is specified by IEEE Std 1588.

For all figures, Clause 14 data that is imported from the ieee1588-ptp-tt.yang module is shown in white, and Clause 14 data in augments of ieee802-dot1as-gptp.yang is shown in gray.

Figure 17-1 provides an overview of the IEEE Std 802.1AS YANG tree. The top level instance list provides the list of one or more PTP Instances, each with data sets. For each PTP Instance, port-ds-list provides the list of one or more PTP Ports, each with data sets. The common-services apply to all PTP Instances, including the Common Mean Link Delay Service (cmlds).

[11] OMG® is a registered trademark of the Object Management Group, Inc.

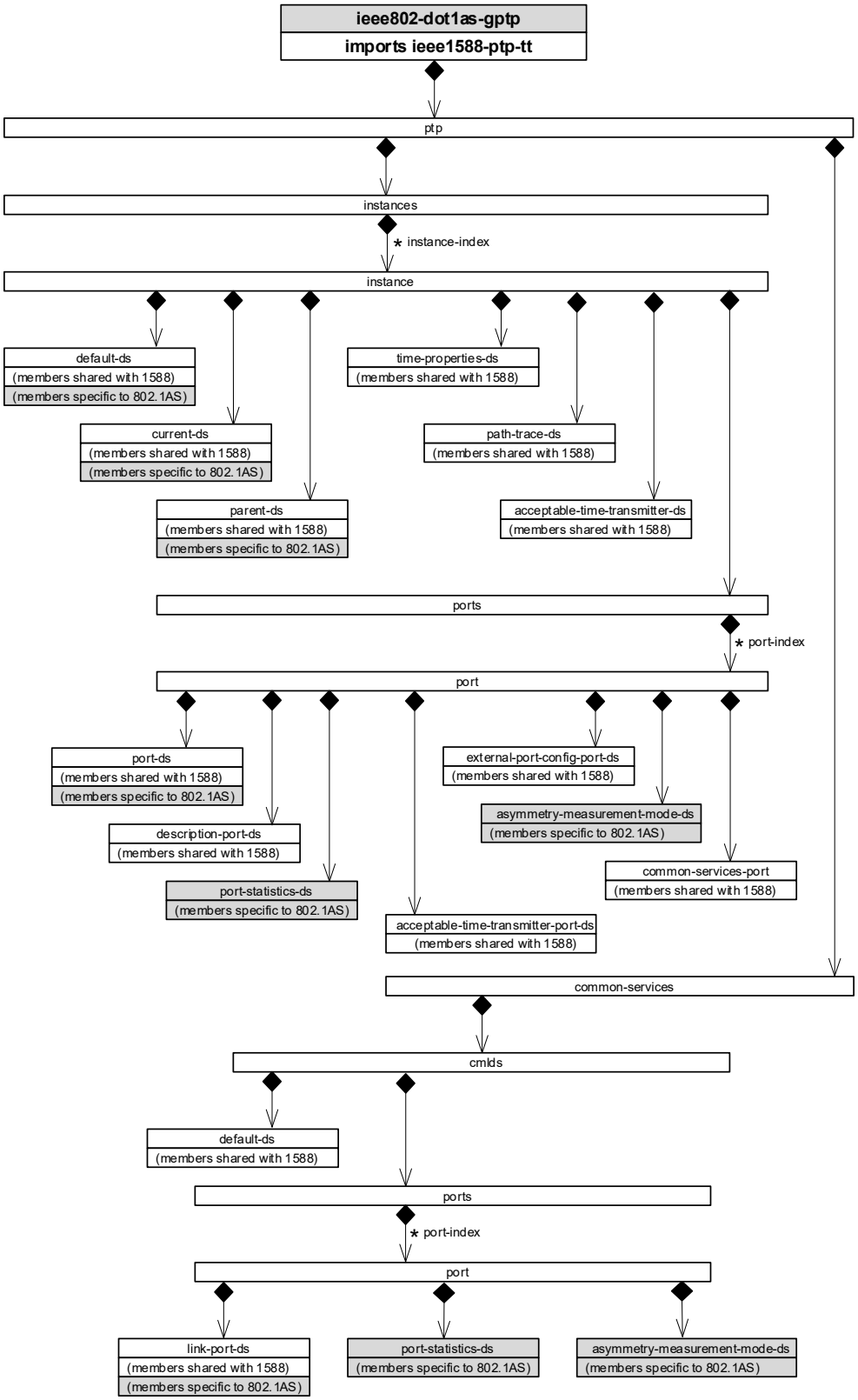

Figure 17-1—Overview of YANG tree

Figure 17-2 provides detail for the data sets of each PTP Instance, including each data set member.

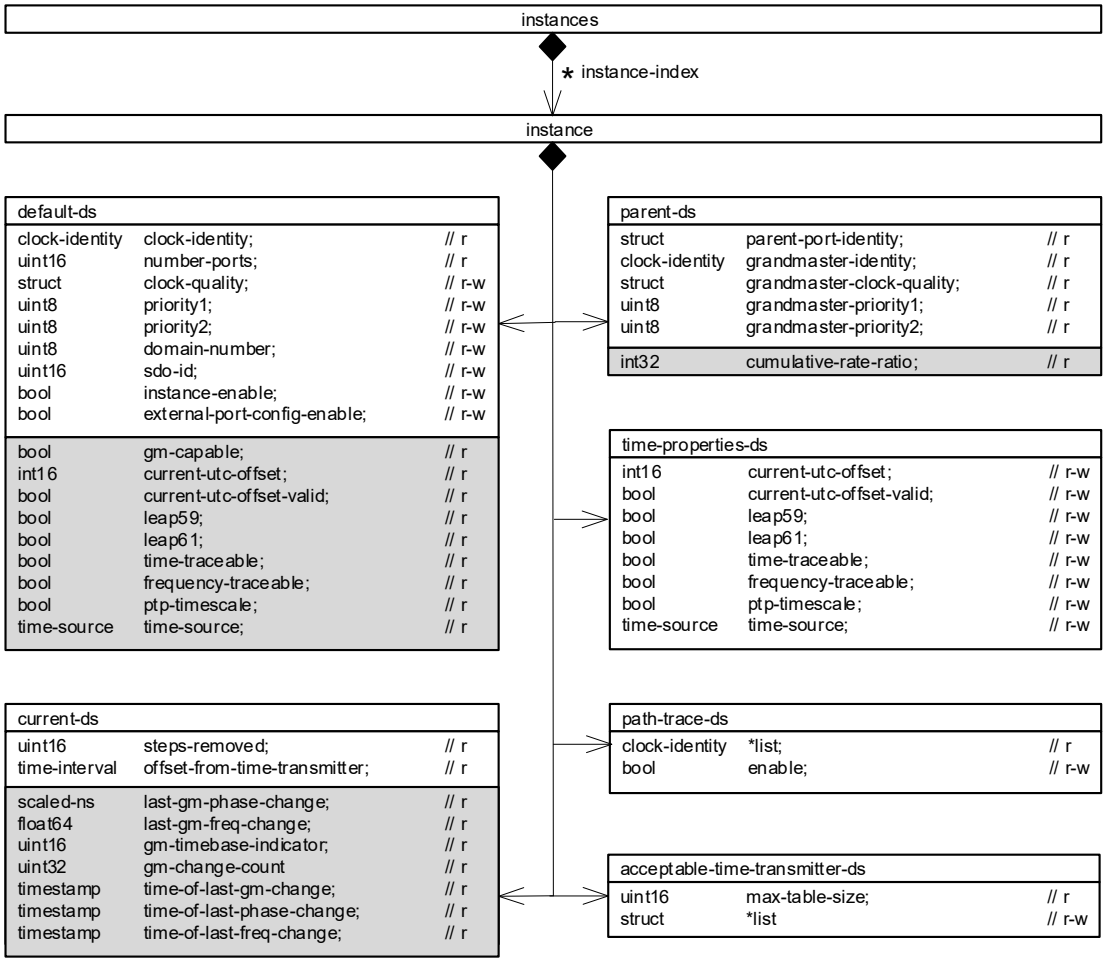

Figure 17-2—PTP Instance detail

Figure 17-3 provides detail for the data sets of each PTP Port, including each data set member.

NOTE 3—Subclause 14.8.4 specifies ptpPortEnabled (ptp-port-enabled), which is provided in YANG as the semantically equivalent node in ieee1588-ptp-tt named port-enable (in port-ds of Figure 17-3). Subclause 14.8.15 specifies mgtSettableLogAnnounceInterval (mgt-settable-log-announce-interval), which is provided in YANG as the semantically equivalent node in ieee1588-ptp-tt named log-announce-interval (in port-ds of Figure 17-3). Subclause 14.8.20 specifies mgtSettableLogSyncInterval (mgt-settable-log-sync-interval), which is provided in YANG as the semantically equivalent node in ieee1588-ptp-tt named log-sync-interval (in port-ds of Figure 17-3).

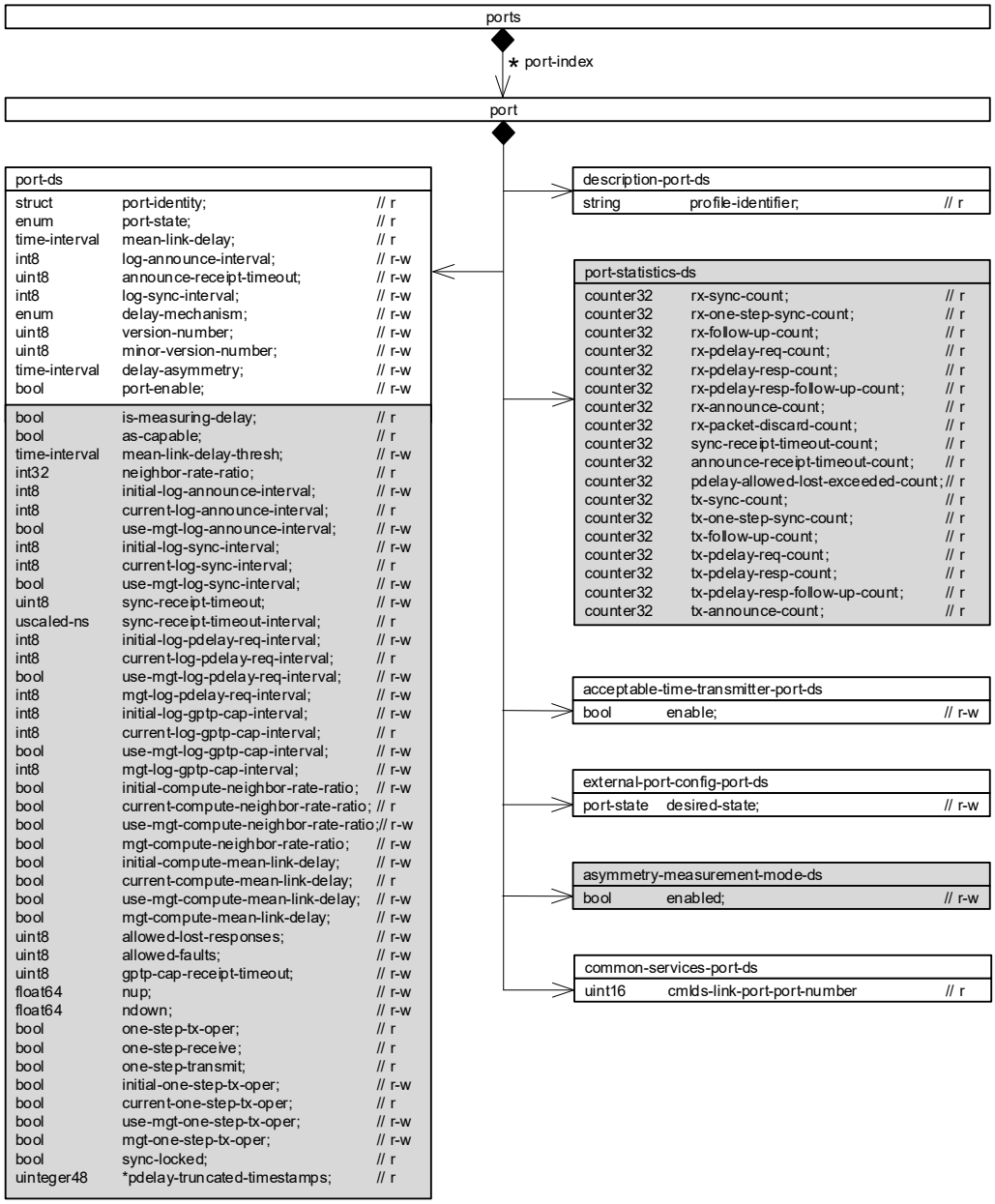

Figure 17-3—PTP Port detail

Figure 17-4 provides detail for the common services, including each data set member. The Common Mean Link Delay Service (cmlds) has a data set for the service itself (default-ds), and data sets for each PTP Link Port.

NOTE 4—Subclause 14.16.9 specifies neighborRateRatio (neighbor-rate-ratio), which is provided in YANG as the semantically equivalent node in ieee1588-ptp-tt named scaled-neighbor-rate-ratio (in link-port-ds of Figure 17-4).

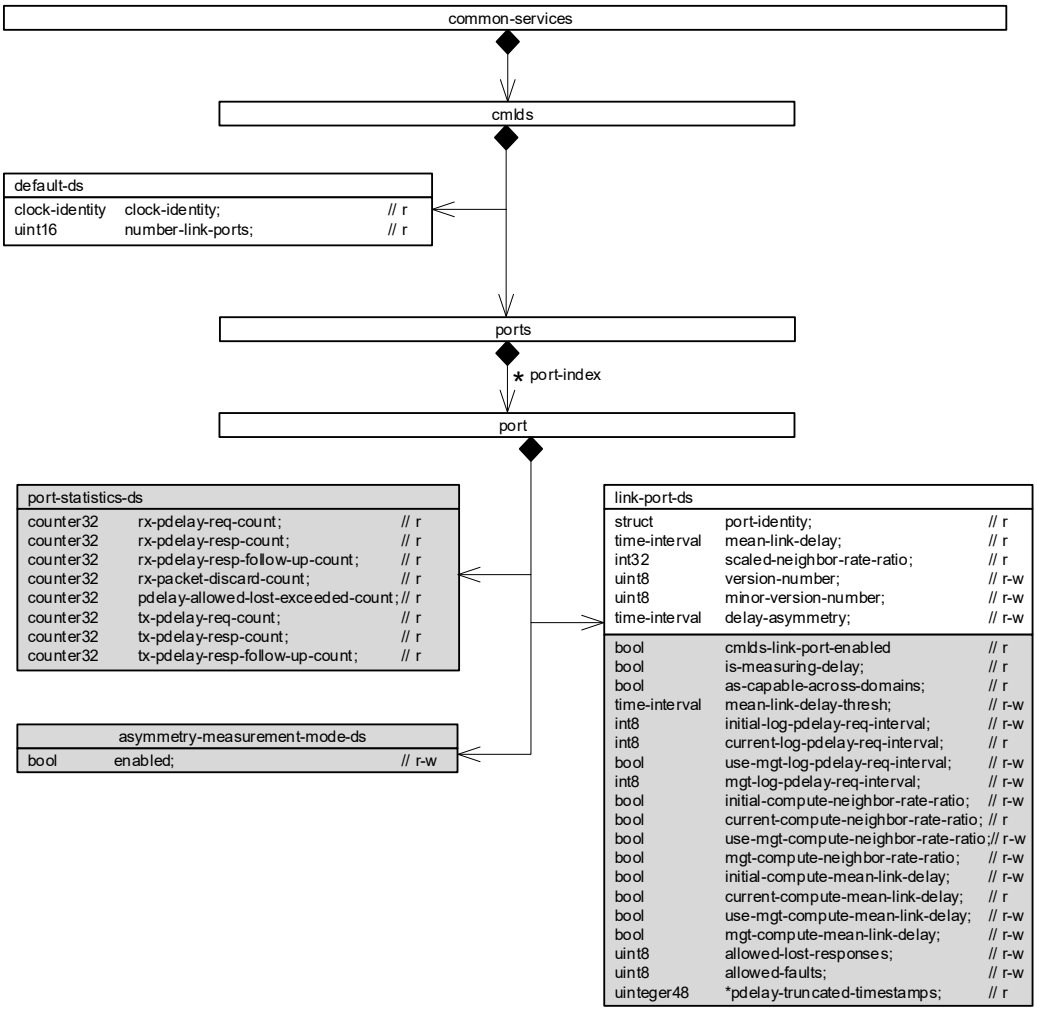

Figure 17-4—Common services detail

17.3 Structure of the YANG data model

The YANG data model specified by this standard uses the YANG modules summarized in Table 17-1.

In the YANG module definitions, if any discrepancy between the “description” text and the corresponding definition in any other part of this standard occurs, the definitions outside this clause (Clause 17) take precedence.

Table 17-1—Summary of the YANG modules

Module	Managed functionality	YANG specification notes
ietf-yang-types	Type definitions	IETF RFC 6991—Common YANG Data Types.
ieee1588-ptp-tt	Clause 14	IEEE Std 1588e—MIB and YANG Data Models. IEEE Std 802.1ASdn imports this YANG module as its foundational tree, including a subset of members from Clause 14.
ieee802-dot1as-gptp	Clause 14	IEEE Std 802.1ASdn—YANG Data Model. The YANG module of this clause uses YANG augments to add members from Clause 14 that are unique to IEEE Std 802.1AS.

17.4 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 (IETF RFC 6242 [B13a]) and RESTCONF (IETF RFC 8040 [B13e]). NETCONF and RESTCONF protocols provide the means to secure communication between client and server, using secure transport layers such as Secure Shell (SSH) (IETF RFC 6242 [B13b]) and Transport Layer Security (TLS) (IETF RFC 7589 [B13d]).

It is the responsibility of a system's implementor and administrator to ensure that the protocol entities in the system that support NETCONF, and any other remote configuration protocols that make use of these YANG modules, are properly configured to allow access only to those principals (users) that have legitimate rights to read or write data nodes. This standard does not specify how the credentials of those users are to be stored or validated.

The Network Configuration Access Control Model (IETF RFC 8341 [B13c]) provides the means to restrict access for particular NETCONF or RESTCONF users to a pre-configured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data sets in this YANG module that contain writable data nodes (IETF RFC 8040 [B13e]), such as:

```
/ptp-tt/instances/instance/default-ds
/ptp-tt/instances/instance/path-trace-ds
/ptp-tt/instances/instance/acceptable-time-transmitter-ds
/ptp-tt/instances/instance/ports/port/port-ds
/ptp-tt/instances/instance/ports/port/acceptable-time-transmitter-port-ds
/ptp-tt/instances/instance/ports/port/external-port-config-port-ds
/ptp-tt/instances/instance/ports/port/asymmetry-measurement-mode-ds
/ptp-tt/common-services/cmlds/ports/port/link-port-ds
/ptp-tt/common-services/cmlds/ports/port/asymmetry-measurement-mode-ds
```

Write operations (e.g., edit-config) to these data nodes without proper protection can have a negative effect on network operations. Specifically, an inappropriate configuration of them can adversely impact a PTP synchronization network. For example, loss of synchronization on a clock, accuracy degradation on a set of clocks, or even breakdown of a whole synchronization network.

17.5 YANG schema tree definitions

The schema tree in this clause is provided as an overview of the YANG module in 17.6. The symbols and their meaning are specified in YANG Tree Diagrams (IETF RFC 8340 [B13f]).

17.5.1 Tree diagram for ieee802-dot1as-gptp.yang

```
module: ieee802-dot1as-gptp

 augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:default-ds:

   +--ro gm-capable?               boolean

   +--ro current-utc-offset?       int16

   +--ro current-utc-offset-valid?  boolean

   +--ro leap59?                   boolean

   +--ro leap61?                   boolean

   +--ro time-traceable?           boolean

   +--ro frequency-traceable?      boolean

   +--ro ptp-timescale?            boolean

   +--ro time-source?              identityref

 augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:current-ds:

   +--ro last-gm-phase-change?     scaled-ns

   +--ro last-gm-freq-change?      float64

   +--ro gm-timebase-indicator?    uint16

   +--ro gm-change-count?          yang:counter32

   +--ro time-of-last-gm-change?   yang:timestamp

   +--ro time-of-last-phase-change?  yang:timestamp

   +--ro time-of-last-freq-change?   yang:timestamp

 augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:parent-ds:

   +--ro cumulative-rate-ratio?  int32

 augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:ports/ptp-tt:port/ptp-tt:port-ds:

   +--ro is-measuring-delay?       boolean

   +--ro as-capable?               boolean

   +--rw mean-link-delay-thresh?   ptp-tt:time-interval

   +--ro neighbor-rate-ratio?      int32
```

```
  +--rw initial-log-announce-interval?         int8
  +--ro current-log-announce-interval?         int8
  +--rw use-mgt-log-announce-interval?         boolean
  +--rw initial-log-sync-interval?             int8
  +--ro current-log-sync-interval?             int8
  +--rw use-mgt-log-sync-interval?             boolean
  +--rw sync-receipt-timeout?                  uint8
  +--ro sync-receipt-timeout-interval?         uscaled-ns
  +--rw initial-log-pdelay-req-interval?       int8
  +--ro current-log-pdelay-req-interval?       int8
  +--rw use-mgt-log-pdelay-req-interval?       boolean
  +--rw mgt-log-pdelay-req-interval?           int8
  +--rw initial-log-gptp-cap-interval?         int8
  +--ro current-log-gptp-cap-interval?         int8
  +--rw use-mgt-log-gptp-cap-interval?         boolean
  +--rw mgt-log-gptp-cap-interval?             int8
  +--rw initial-compute-neighbor-rate-ratio?   boolean
  +--ro current-compute-neighbor-rate-ratio?   boolean
  +--rw use-mgt-compute-neighbor-rate-ratio?   boolean
  +--rw mgt-compute-neighbor-rate-ratio?       boolean
  +--rw initial-compute-mean-link-delay?       boolean
  +--ro current-compute-mean-link-delay?       boolean
  +--rw use-mgt-compute-mean-link-delay?       boolean
  +--rw mgt-compute-mean-link-delay?           boolean
  +--rw allowed-lost-responses?                uint8
  +--rw allowed-faults?                        uint8
  +--rw gptp-cap-receipt-timeout?              uint8
```

```
  +--rw nup?                          float64
  +--rw ndown?                        float64
  +--ro one-step-tx-oper?             boolean
  +--ro one-step-receive?             boolean
  +--ro one-step-transmit?            boolean
  +--rw initial-one-step-tx-oper?     boolean
  +--ro current-one-step-tx-oper?     boolean
  +--rw use-mgt-one-step-tx-oper?     boolean
  +--rw mgt-one-step-tx-oper?         boolean
  +--ro sync-locked?                  boolean
  +--ro pdelay-truncated-timestamps*  uinteger48
augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:ports/ptp-tt:port:
  +--rw port-statistics-ds
    +--ro rx-sync-count?                    yang:counter32
    +--ro rx-one-step-sync-count?           yang:counter32
    +--ro rx-follow-up-count?               yang:counter32
    +--ro rx-pdelay-req-count?              yang:counter32
    +--ro rx-pdelay-resp-count?             yang:counter32
    +--ro rx-pdelay-resp-follow-up-count?   yang:counter32
    +--ro rx-announce-count?                yang:counter32
    +--ro rx-packet-discard-count?          yang:counter32
    +--ro sync-receipt-timeout-count?       yang:counter32
    +--ro announce-receipt-timeout-count?   yang:counter32
    +--ro pdelay-allowed-lost-exceeded-count?  yang:counter32
    +--ro tx-sync-count?                    yang:counter32
    +--ro tx-one-step-sync-count?           yang:counter32
    +--ro tx-follow-up-count?               yang:counter32
```

```
    +--ro tx-pdelay-req-count?                yang:counter32
    +--ro tx-pdelay-resp-count?               yang:counter32
    +--ro tx-pdelay-resp-follow-up-count?     yang:counter32
    +--ro tx-announce-count?                  yang:counter32
augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:ports/ptp-tt:port:
  +--rw asymmetry-measurement-mode-ds
    +--rw enabled?   boolean
augment /ptp-tt:ptp/ptp-tt:common-services/ptp-tt:cmlds/ptp-tt:ports/ptp-tt:port/ptp-tt:link-port-ds:
  +--ro cmlds-link-port-enabled?              boolean
  +--ro is-measuring-delay?                   boolean
  +--ro as-capable-across-domains?            boolean
  +--rw mean-link-delay-thresh?               ptp-tt:time-interval
  +--rw initial-log-pdelay-req-interval?      int8
  +--ro current-log-pdelay-req-interval?      int8
  +--rw use-mgt-log-pdelay-req-interval?      boolean
  +--rw mgt-log-pdelay-req-interval?          int8
  +--rw initial-compute-neighbor-rate-ratio?  boolean
  +--ro current-compute-neighbor-rate-ratio?  boolean
  +--rw use-mgt-compute-neighbor-rate-ratio?  boolean
  +--rw mgt-compute-neighbor-rate-ratio?      boolean
  +--rw initial-compute-mean-link-delay?      boolean
  +--ro current-compute-mean-link-delay?      boolean
  +--rw use-mgt-compute-mean-link-delay?      boolean
  +--rw mgt-compute-mean-link-delay?          boolean
  +--rw allowed-lost-responses?               uint8
  +--rw allowed-faults?                       uint8
  +--ro pdelay-truncated-timestamps*          uinteger48
```

```
 augment /ptp-tt:ptp/ptp-tt:common-services/ptp-tt:cmlds/ptp-tt:ports/ptp-tt:port:
  +--rw port-statistics-ds
     +--ro rx-pdelay-req-count?                yang:counter32
     +--ro rx-pdelay-resp-count?               yang:counter32
     +--ro rx-pdelay-resp-follow-up-count?     yang:counter32
     +--ro rx-packet-discard-count?            yang:counter32
     +--ro pdelay-allowed-lost-exceeded-count? yang:counter32
     +--ro tx-pdelay-req-count?                yang:counter32
     +--ro tx-pdelay-resp-count?               yang:counter32
     +--ro tx-pdelay-resp-follow-up-count?     yang:counter32
 augment /ptp-tt:ptp/ptp-tt:common-services/ptp-tt:cmlds/ptp-tt:ports/ptp-tt:port:
  +--rw asymmetry-measurement-mode-ds
     +--rw enabled?   boolean
```

17.6 YANG module[12, 13]

The ieee1588-ptp-tt.yang YANG module[14] specified by IEEE Std 1588e serves as the foundation of the YANG module specified in this clause.

17.6.1 Module ieee802-dot1as-gptp.yang

```
module ieee802-dot1as-gptp {
 yang-version "1.1";
 namespace urn:ieee:std:802.1AS:yang:ieee802-dot1as-gptp;
 prefix dot1as-gptp;
 import ietf-yang-types {
  prefix yang;
 }
```

[12] Copyright release for YANG modules: Users of this standard may freely reproduce the YANG modules contained in this subclause so that they can be used for their intended purpose.

[13] An ASCII version of the YANG module is attached to the PDF version of this standard, and can be obtained by Web browser from the IEEE 802.1 Website at https://1.ieee802.org/yang-modules/.

[14] An ASCII version of the IEEE Std 1588 YANG module can be obtained from https://github.com/YangModels/yang/tree/main/standard/ieee/published/1588.

```
import ieee1588-ptp-tt {
  prefix ptp-tt;
}
organization
  "IEEE 802.1 Working Group";
contact
  "WG-URL: http://ieee802.org/1/
  WG-EMail: stds-802-1-l@ieee.org

  Contact: IEEE 802.1 Working Group Chair
           Postal: C/O IEEE 802.1 Working Group
           IEEE Standards Association
           445 Hoes Lane
           Piscataway, NJ 08854
           USA

  E-mail: stds-802-1-chairs@ieee.org";
description
  "Management objects that control timing and synchronization for time
  sensitive applications, as specified in IEEE Std 802.1AS.

  Copyright (C) IEEE (2024). This version of this YANG module is part
  of IEEE Std 802.1AS; see the standard itself for full legal notices.";
revision 2024-09-11 {
  description
    "Published as part of IEEE Std 802.1ASdn-2024. Initial version.";
  reference
```

```
    "IEEE Std 802.1AS - Timing and Synchronization for Time-Sensitive
    Applications: IEEE Std 802.1AS-2020, IEEE Std 802.1AS-2020/Cor
    1-2021, IEEE Std 802.1ASdr-2024, IEEE Std 802.1ASdn-2024. IEEE Std
    1588 - IEEE Standard for a Precision Clock Synchronization Protocol
    for Networked Measurement and Control Systems: IEEE Std 1588-2019,
    IEEE Std 1588g-2022, IEEE Std 1588e-2024.";
}
typedef scaled-ns {
  type string {
    pattern "[0-9A-F]{2}(-[0-9A-F]{2}){11}";
  }
  description
    "The IEEE Std 802.1AS ScaledNs type represents signed values of
    time and time interval in units of 2^16 ns, as a signed 96-bit
    integer. Each of the 12 octets is represented as a pair of
    hexadecimal characters, using uppercase for a letter. Octets are
    separated by a dash character. The most significant octet is first.";
  reference
    "6.4.3.1 of IEEE Std 802.1AS";
}
typedef uscaled-ns {
  type string {
    pattern "[0-9A-F]{2}(-[0-9A-F]{2}){11}";
  }
  description
    "The IEEE Std 802.1AS UScaledNs type represents unsigned values of
    time and time interval in units of 2^16 ns, as an unsigned 96-bit
```

```
    integer. Each of the 12 octets is represented as a pair of
    hexadecimal characters, using uppercase for a letter. Octets are
    separated by a dash character. The most significant octet is first.";
  reference
    "6.4.3.2 of IEEE Std 802.1AS";
}
typedef float64 {
  type string {
    pattern "[0-9A-F]{2}(-[0-9A-F]{2}){7}";
  }
  description
    "The IEEE Std 802.1AS Float64 type represents IEEE Std 754
    binary64. Each of the 8 octets is represented as a pair of
    hexadecimal characters, using uppercase for a letter. Octets are
    separated by a dash character. The most significant octet is first.";
  reference
    "6.4.2 of IEEE Std 802.1AS";
}
typedef uinteger48 {
  type uint64 {
    range "0..281474976710655";
  }
  description
    "48-bit unsigned integer data type.";
  reference
    "6.4.2 of IEEE Std 802.1AS";
}
```

```
 augment
  "/ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:default-ds" {
  description
    "Augment IEEE Std 1588 defaultDS.";
  leaf gm-capable {
    type boolean;
    config false;
    description
      "The value is true if the time-aware system is capable of being a
      Grandmaster, and false if the time-aware system is not capable of
      being a Grandmaster.";
    reference
      "14.2.7 of IEEE Std 802.1AS";
  }
  leaf current-utc-offset {
    when
      "../current-utc-offset-valid='true'";
    type int16;
    config false;
    description
      "Offset from UTC (TAI - UTC). The offset is in units of seconds.
      This leaf applies to the ClockTimeTransmitter entity (i.e., local
      only, unrelated to a remote GM).";
    reference
      "14.2.8 of IEEE Std 802.1AS";
  }
  leaf current-utc-offset-valid {
```

```
    type boolean;
    config false;
    description
      "The value of current-utc-offset-valid shall be true if the value
      of current-utc-offset is known to be correct, otherwise it shall
      be false. This leaf applies to the ClockTimeTransmitter entity
      (i.e., local only, unrelated to a remote GM).";
    reference
      "14.2.9 of IEEE Std 802.1AS";
  }
  leaf leap59 {
    type boolean;
    config false;
    description
      "If the timescale is PTP, a true value for leap59 shall indicate
      that the last minute of the current UTC day contains 59 seconds.
      If the timescale is not PTP, the value shall be false. This leaf
      applies to the ClockTimeTransmitter entity (i.e., local only,
      unrelated to a remote GM).";
    reference
      "14.2.10 of IEEE Std 802.1AS";
  }
  leaf leap61 {
    type boolean;
    config false;
    description
      "If the timescale is PTP, a true value for leap61 shall indicate
```

```
      that the last minute of the current UTC day contains 61 seconds.
      If the timescale is not PTP, the value shall be false. This leaf
      applies to the ClockTimeTransmitter entity (i.e., local only,
      unrelated to a remote GM).";
    reference
      "14.2.11 of IEEE Std 802.1AS";
  }
  leaf time-traceable {
    type boolean;
    config false;
    description
      "The value of time-traceable shall be true if the timescale is
      traceable to a primary reference; otherwise, the value shall be
      false. This leaf applies to the ClockTimeTransmitter entity
      (i.e., local only, unrelated to a remote GM).";
    reference
      "14.2.12 of IEEE Std 802.1AS";
  }
  leaf frequency-traceable {
    type boolean;
    config false;
    description
      "The value of frequency-traceable shall be true if the frequency
      determining the timescale is traceable to a primary reference;
      otherwise, the value shall be false. This leaf applies to the
      ClockTimeTransmitter entity (i.e., local only, unrelated to a
      remote GM).";
```

```
    reference
      "14.2.13 of IEEE Std 802.1AS";
    }
    leaf ptp-timescale {
      type boolean;
      config false;
      description
        "If ptp-timescale is true, the timescale of the
        ClockTimeTransmitter entity is PTP, which is the elapsed time
        since the PTP epoch measured using the second defined by
        International Atomic Time (TAI). If ptp-timescale is false, the
        timescale of the ClockTimeTransmitter entity is ARB, which is the
        elapsed time since an arbitrary epoch. This leaf applies to the
        ClockTimeTransmitter entity (i.e., local only, unrelated to a
        remote GM).";
      reference
        "14.2.14 of IEEE Std 802.1AS";
    }
    leaf time-source {
      type identityref {
        base ptp-tt:time-source;
      }
      config false;
      description
        "The source of time used by the Grandmaster Clock. This leaf
        applies to the ClockTimeTransmitter entity (i.e., local only,
        unrelated to a remote GM).";
```

```
    reference
      "14.2.15 of IEEE Std 802.1AS";
  }
}
augment
  "/ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:current-ds" {
  description
    "Augment IEEE Std 1588 currentDS.";
  leaf last-gm-phase-change {
    type scaled-ns;
    config false;
    description
      "Phase change that occurred on the most recent change in either
      the Grandmaster PTP Instance or gm-timebase-indicator leaf.";
    reference
      "14.3.4 of IEEE Std 802.1AS";
  }
  leaf last-gm-freq-change {
    type float64;
    config false;
    description
      "Frequency change that occurred on the most recent change in
      either the Grandmaster PTP Instance or gm-timebase-indicator
      leaf.";
    reference
      "14.3.5 of IEEE Std 802.1AS";
  }
```

```
  leaf gm-timebase-indicator {
    type uint16;
    config false;
    description
      "The timeBaseIndicator of the current Grandmaster PTP Instance.";
    reference
      "14.3.6 of IEEE Std 802.1AS";
  }
  leaf gm-change-count {
    type yang:counter32;
    config false;
    description
      "This statistics counter tracks the number of times the
      Grandmaster PTP Instance has changed in a gPTP domain.";
    reference
      "14.3.7 of IEEE Std 802.1AS";
  }
  leaf time-of-last-gm-change {
    type yang:timestamp;
    config false;
    description
      "System time when the most recent Grandmaster Clock change
      occurred in a gPTP domain. This leaf's type is YANG timestamp,
      which is based on system time. System time is an unsigned integer
      in units of 10 milliseconds, using an epoch defined by the
      implementation (typically time of boot-up).";
    reference
```

```
      "14.3.8 of IEEE Std 802.1AS";
    }
    leaf time-of-last-phase-change {
      type yang:timestamp;
      config false;
      description
        "System time when the most recent change in Grandmaster Clock
        phase occurred. This leaf's type is YANG timestamp, which is
        based on system time. System time is an unsigned integer in units
        of 10 milliseconds, using an epoch defined by the implementation
        (typically time of boot-up).";
      reference
        "14.3.9 of IEEE Std 802.1AS";
    }
    leaf time-of-last-freq-change {
      type yang:timestamp;
      config false;
      description
        "System time when the most recent change in Grandmaster Clock
        frequency occurred. This leaf's type is YANG timestamp, which is
        based on system time. System time is an unsigned integer in units
        of 10 milliseconds, using an epoch defined by the implementation
        (typically time of boot-up).";
      reference
        "14.3.10 of IEEE Std 802.1AS";
    }
  }
```

```
 augment "/ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:parent-ds" {
  description
    "Augment IEEE Std 1588 parentDS.";
  leaf cumulative-rate-ratio {
    type int32;
    config false;
    description
      "Estimate of the ratio of the frequency of the Grandmaster Clock
      to the frequency of the LocalClock entity of this PTP Instance.
      cumulative-rate-ratio is expressed as the fractional frequency
      offset multiplied by 2^41, i.e., the quantity (rateRatio -
      1.0)(2^41).";
    reference
      "14.4.3 of IEEE Std 802.1AS";
  }
}
augment
  "/ptp-tt:ptp"+
  "/ptp-tt:instances"+
  "/ptp-tt:instance"+
  "/ptp-tt:ports"+
  "/ptp-tt:port"+
  "/ptp-tt:port-ds" {
  description
    "Augment IEEE Std 1588 portDS.


    14.8.4 of IEEE Std 802.1AS specifies ptpPortEnabled
```

```
    (ptp-port-enabled), which is provided in YANG as the semantically
    equivalent node in ieee1588-ptp-tt named port-enable (in port-ds).

    14.8.15 of IEEE Std 802.1AS specifies
    mgtSettableLogAnnounceInterval (mgt-log-announce-interval), which
    is provided in YANG as the semantically equivalent node in
    ieee1588-ptp-tt named log-announce-interval (in port-ds). In the
    context of IEEE Std 802.1AS, log-announce-interval cannot be used
    unless use-mgt-log-announce-interval is true.

    14.8.20 of IEEE Std 802.1AS specifies mgtSettableLogSyncInterval
    (mgt-log-sync-interval), which is provided in YANG as the
    semantically equivalent node in ieee1588-ptp-tt named
    log-sync-interval (in port-ds). In the context of IEEE Std 802.1AS,
    log-sync-interval cannot be used unless use-mgt-log-sync-interval
    is true.";
  leaf is-measuring-delay {
    type boolean;
    config false;
    description
      "Boolean that is true if the port is measuring PTP Link
      propagation delay.";
    reference
      "14.8.6 of IEEE Std 802.1AS";
  }
  leaf as-capable {
    type boolean;
```

```
    config false;
    description
      "Boolean that is true if and only if it is determined that this
      PTP Instance and the PTP Instance at the other end of the link
      attached to this port can interoperate with each other via the
      IEEE Std 802.1AS protocol.";
    reference
      "10.2.5.1 of IEEE Std 802.1AS
      14.8.7 of IEEE Std 802.1AS";
  }
  leaf mean-link-delay-thresh {
    type ptp-tt:time-interval;
    description
      "Propagation time threshold for mean-link-delay, above which a
      port is not considered capable of participating in the IEEE Std
      802.1AS protocol.";
    reference
      "14.8.9 of IEEE Std 802.1AS";
  }
  leaf neighbor-rate-ratio {
    type int32;
    config false;
    description
      "Estimate of the ratio of the frequency of the LocalClock entity
      of the PTP Instance at the other end of the link attached to this
      PTP Port, to the frequency of the LocalClock entity of this PTP
      Instance. neighbor-rate-ratio is expressed as the fractional
```

```
      frequency offset multiplied by 2^41, i.e., the quantity
      (rateRatio - 1.0)(2^41).";
    reference
      "14.8.11 of IEEE Std 802.1AS";
  }
  leaf initial-log-announce-interval {
    type int8;
    description
      "When use-mgt-log-announce-interval is false (i.e., change with
      Signaling message), this is the the logarithm to base 2 of the
      announce interval used when the port is initialized.";
    reference
      "14.8.12 of IEEE Std 802.1AS";
  }
  leaf current-log-announce-interval {
    type int8;
    config false;
    description
      "Logarithm to base 2 of the current announce interval.";
    reference
      "14.8.13 of IEEE Std 802.1AS";
  }
  leaf use-mgt-log-announce-interval {
    type boolean;
    description
      "Boolean that determines the source of the announce interval. If
      the value is true, the announce interval
```

```
      (current-log-announce-interval) is set equal to the value of
      mgt-log-announce-interval. If the value is false, the announce
      interval is determined by the AnnounceIntervalSetting state
      machine (i.e., changed with Signaling message).";
    reference
      "14.8.14 of IEEE Std 802.1AS";
  }
  leaf initial-log-sync-interval {
    type int8;
    description
      "When use-mgt-log-sync-interval is false (i.e., change with
      Signaling message), this is the the logarithm to base 2 of the
      sync interval used when the port is initialized.";
    reference
      "14.8.17 of IEEE Std 802.1AS";
  }
  leaf current-log-sync-interval {
    type int8;
    config false;
    description
      "Logarithm to base 2 of the current sync interval.";
    reference
      "14.8.18 of IEEE Std 802.1AS";
  }
  leaf use-mgt-log-sync-interval {
    type boolean;
    description
```

```
      "Boolean that determines the source of the sync interval. If the
       value is true, the sync interval (current-log-sync-interval) is
       set equal to the value of mgt-log-sync-interval. If the value is
       false, the sync interval is determined by the SyncIntervalSetting
       state machine (i.e., changed with Signaling message).";
     reference
       "14.8.19 of IEEE Std 802.1AS";
   }
   leaf sync-receipt-timeout {
     type uint8;
     description
       "Number of sync intervals that a timeReceiver port waits without
       receiving synchronization information, before assuming that the
       timeTransmitter is no longer transmitting synchronization
       information and that the BTCA needs to be run, if appropriate.";
     reference
       "14.8.21 of IEEE Std 802.1AS";
   }
   leaf sync-receipt-timeout-interval {
     type uscaled-ns;
     config false;
     description
       "Time interval after which sync receipt timeout occurs if
       time-synchronization information has not been received during the
       interval.";
     reference
       "14.8.22 of IEEE Std 802.1AS";
```

```
  }
  leaf initial-log-pdelay-req-interval {
    type int8;
    description
      "When use-mgt-log-pdelay-req-interval is false (i.e., change with
      Signaling message), this is the the logarithm to base 2 of the
      Pdelay_Req transmit interval used when the port is initialized.";
    reference
      "14.8.23 of IEEE Std 802.1AS";
  }
  leaf current-log-pdelay-req-interval {
    type int8;
    config false;
    description
      "Logarithm to base 2 of the current Pdelay_Req transmit interval.";
    reference
      "14.8.24 of IEEE Std 802.1AS";
  }
  leaf use-mgt-log-pdelay-req-interval {
    type boolean;
    description
      "Boolean that determines the source of the Pdelay_Req transmit
      interval. If the value is true, the Pdelay_Req transmit interval
      (current-log-pdelay-req-interval) is set equal to the value of
      mgt-log-pdelay-req-interval. If the value is false, the
      Pdelay_Req transmit interval is determined by the
      LinkDelayIntervalSetting state machine (i.e., changed with
```

```
      Signaling message).";
    reference
      "14.8.25 of IEEE Std 802.1AS";
  }
  leaf mgt-log-pdelay-req-interval {
    type int8;
    description
      "Logarithm to base 2 of the Pdelay_Req transmit interval, used if
      use-mgt-log-pdelay-req-interval is true. This value is not used
      if use-mgt-log-pdelay-req-interval is false.";
    reference
      "14.8.26 of IEEE Std 802.1AS";
  }
  leaf initial-log-gptp-cap-interval {
    type int8;
    description
      "When use-mgt-log-gptp-cap-interval is false (i.e., change with
      Signaling message), this is the the logarithm to base 2 of the
      gPTP capable message interval used when the port is initialized.";
    reference
      "14.8.27 of IEEE Std 802.1AS";
  }
  leaf current-log-gptp-cap-interval {
    type int8;
    config false;
    description
      "Logarithm to base 2 of the current gPTP capable message
```

```
      interval.";
    reference
      "14.8.28 of IEEE Std 802.1AS";
  }
  leaf use-mgt-log-gptp-cap-interval {
    type boolean;
    description
      "Boolean that determines the source of the gPTP capable message
      interval. If the value is true, the gPTP capable message interval
      (current-log-gptp-cap-interval) is set equal to the value of
      mgt-gptp-cap-req-interval. If the value is false, the gPTP
      capable message interval is determined by the
      GptpCapableMessageIntervalSetting state machine (i.e., changed
      with Signaling message).";
    reference
      "14.8.29 of IEEE Std 802.1AS";
  }
  leaf mgt-log-gptp-cap-interval {
    type int8;
    description
      "Logarithm to base 2 of the gPTP capable message interval, used
      if use-mgt-log-gptp-cap-interval is true. This value is not used
      if use-mgt-log-pdelay-req-interval is false.";
    reference
      "14.8.30 of IEEE Std 802.1AS";
  }
  leaf initial-compute-neighbor-rate-ratio {
```

```
    type boolean;
    description
      "When use-mgt-compute-neighbor-rate-ratio is false (i.e., change
      with Signaling message), this is the initial value of
      computeNeighborRateRatio.";
    reference
      "14.8.31 of IEEE Std 802.1AS";
  }
  leaf current-compute-neighbor-rate-ratio {
    type boolean;
    config false;
    description
      "Current value of computeNeighborRateRatio.";
    reference
      "14.8.32 of IEEE Std 802.1AS";
  }
  leaf use-mgt-compute-neighbor-rate-ratio {
    type boolean;
    description
      "Boolean that determines the source of computeNeighborRateRatio..
      If the value is true, computeNeighborRateRatio is set equal to
      the value of mgt-compute-neighbor-rate-ratio. If the value is
      false, computeNeighborRateRatio is determined by the
      LinkDelayIntervalSetting state machine (i.e., changed with
      Signaling message).";
    reference
      "14.8.33 of IEEE Std 802.1AS";
```

```
  }
  leaf mgt-compute-neighbor-rate-ratio {
   type boolean;
   description
    "Value of computeNeighborRateRatio, used if
    use-mgt-compute-neighbor-rate-ratio is true. This value is not
    used if use-mgt-compute-neighbor-rate-ratio is false.";
   reference
    "14.8.34 of IEEE Std 802.1AS";
  }
  leaf initial-compute-mean-link-delay {
   type boolean;
   description
    "When use-mgt-compute-mean-link-delay is false (i.e., change with
    Signaling message), this is the initial value of
    computeMeanLinkDelay.";
   reference
    "14.8.35 of IEEE Std 802.1AS";
  }
  leaf current-compute-mean-link-delay {
   type boolean;
   config false;
   description
    "Current value of computeMeanLinkDelay.";
   reference
    "14.8.36 of IEEE Std 802.1AS";
  }
```

```
  leaf use-mgt-compute-mean-link-delay {
    type boolean;
    description
      "Boolean that determines the source of computeMeanLinkDelay. If
      the value is true, computeMeanLinkDelay is set equal to the value
      of mgt-compute-mean-link-delay. If the value is false,
      computeMeanLinkDelay is determined by the
      LinkDelayIntervalSetting state machine (i.e., changed with
      Signaling message).";
    reference
      "14.8.37 of IEEE Std 802.1AS";
  }
  leaf mgt-compute-mean-link-delay {
    type boolean;
    description
      "Value of computeMeanLinkDelay, used if
      use-mgt-compute-mean-link-delay is true. This value is not used
      if use-mgt-compute-mean-link-delay is false.";
    reference
      "14.8.38 of IEEE Std 802.1AS";
  }
  leaf allowed-lost-responses {
    type uint8;
    description
      "Number of Pdelay_Req messages for which a valid response is not
      received, above which a port is considered to not be exchanging
      peer delay messages with its neighbor.";
```

```
    reference
      "14.8.39 of IEEE Std 802.1AS";
    }
    leaf allowed-faults {
      type uint8;
      description
        "Number of faults above which asCapable is set to false.";
      reference
        "14.8.40 of IEEE Std 802.1AS";
    }
    leaf gptp-cap-receipt-timeout {
      type uint8;
      description
        "Number of transmission intervals that a port waits without
        receiving the gPTP capable TLV, before assuming that the neighbor
        port is no longer invoking the gPTP protocol.";
      reference
        "14.8.41 of IEEE Std 802.1AS";
    }
    leaf nup {
      type float64;
      description
        "For an OLT port of an IEEE Std 802.3 EPON link, this value is
        the effective index of refraction for the EPON upstream
        wavelength light of the optical path.";
      reference
        "14.8.43 of IEEE Std 802.1AS";
```

```
  }
  leaf ndown {
   type float64;
   description
    "For an OLT port of an IEEE 802.3 EPON link, this value is the
    effective index of refraction for the EPON downstream wavelength
    light of the optical path.";
   reference
    "14.8.44 of IEEE Std 802.1AS";
  }
  leaf one-step-tx-oper {
   type boolean;
   config false;
   description
    "This value is true if the port is sending one-step Sync
    messages, and false if the port is sending two-step Sync and
    Follow-Up messages.";
   reference
    "14.8.45 of IEEE Std 802.1AS";
  }
  leaf one-step-receive {
   type boolean;
   config false;
   description
    "This value is true if the port is capable of receiving and
    processing one-step Sync messages.";
   reference
```

```
      "14.8.46 of IEEE Std 802.1AS";
    }
    leaf one-step-transmit {
      type boolean;
      config false;
      description
        "This value is true if the port is capable of transmitting
        one-step Sync messages.";
      reference
        "14.8.47 of IEEE Std 802.1AS";
    }
    leaf initial-one-step-tx-oper {
      type boolean;
      description
        "When use-mgt-one-step-tx-oper is false (i.e., change with
        Signaling message), this is the initial value of
        current-one-step-tx-oper.";
      reference
        "14.8.48 of IEEE Std 802.1AS";
    }
    leaf current-one-step-tx-oper {
      type boolean;
      config false;
      description
        "This value is true if the port is configured to transmit
        one-step Sync messages, either via management
        (mgt-one-step-tx-oper) or Signaling. If both
```

```
      current-one-step-tx-oper and one-step-transmit are true, the port
      transmits one-step Sync messages (i.e., one-step-tx-oper true).";
    reference
      "14.8.49 of IEEE Std 802.1AS";
  }
  leaf use-mgt-one-step-tx-oper {
    type boolean;
    description
      "Boolean that determines the source of current-one-step-tx-oper.
      If the value is true, current-one-step-tx-oper is set equal to
      the value of mgt-one-step-tx-oper. If the value is false,
      current-one-step-tx-oper is determined by the
      OneStepTxOperSetting state machine (i.e., changed with Signaling
      message).";
    reference
      "14.8.50 of IEEE Std 802.1AS";
  }
  leaf mgt-one-step-tx-oper {
    type boolean;
    description
      "If use-mgt-one-step-tx-oper is true, current-one-step-tx-oper is
      set equal to this value. This value is not used if
      use-mgt-one-step-tx-oper is false.";
    reference
      "14.8.51 of IEEE Std 802.1AS";
  }
  leaf sync-locked {
```

```
    type boolean;
    config false;
    description
      "This value is true if the port will transmit a Sync as soon as
      possible after the timeReceiver port receives a Sync message.";
    reference
      "14.8.52 of IEEE Std 802.1AS";
  }
  leaf-list pdelay-truncated-timestamps {
    type uinteger48;
    config false;
    description
      "For full-duplex IEEE Std 802.3 media, and CSN media that use the
      peer-to-peer delay mechanism to measure path delay, the values of
      the four elements of this leaf-list correspond to the timestamps
      t1, t2, t3, and t4, listed in that order. Each timestamp is
      expressed in units of 2^-16 ns (i.e., the value of each array
      element is equal to the remainder obtained upon dividing the
      respective timestamp, expressed in units of 2^-16 ns, by 2^48).
      At any given time, the timestamp values stored in the array are
      for the same, and most recently completed, peer delay message
      exchange. For each timestamp, only 48-bits are valid (the upper
      16-bits are always zero).";
    reference
      "14.8.53 of IEEE Std 802.1AS";
  }
}
```

```
 augment
  "/ptp-tt:ptp"+
  "/ptp-tt:instances"+
  "/ptp-tt:instance"+
  "/ptp-tt:ports"+
  "/ptp-tt:port" {
  description
   "Augment to add port-statistics-ds to IEEE Std 1588 PTP Port.";
  container port-statistics-ds {
   description
    "Provides counters associated with the port of the PTP Instance.";
   reference
    "14.10 of IEEE Std 802.1AS";
   leaf rx-sync-count {
    type yang:counter32;
    config false;
    description
     "Counter that increments every time synchronization information
     is received.";
    reference
     "14.10.2 of IEEE Std 802.1AS";
   }
   leaf rx-one-step-sync-count {
    type yang:counter32;
    config false;
    description
     "Counter that increments every time a one-step Sync message is
```

```
        received.";
      reference
        "14.10.3 of IEEE Std 802.1AS";
    }
    leaf rx-follow-up-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a Follow_Up message is
        received.";
      reference
        "14.10.4 of IEEE Std 802.1AS";
    }
    leaf rx-pdelay-req-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a Pdelay_Req message is
        received.";
      reference
        "14.10.5 of IEEE Std 802.1AS";
    }
    leaf rx-pdelay-resp-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a Pdelay_Resp message is
```

```
        received.";
      reference
        "14.10.6 of IEEE Std 802.1AS";
    }
    leaf rx-pdelay-resp-follow-up-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a Pdelay_Resp_Follow_Up
        message is received.";
      reference
        "14.10.7 of IEEE Std 802.1AS";
    }
    leaf rx-announce-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time an Announce message is
        received.";
      reference
        "14.10.8 of IEEE Std 802.1AS";
    }
    leaf rx-packet-discard-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a PTP message of the
```

```
        respective PTP Instance is discarded.";
      reference
        "14.10.9 of IEEE Std 802.1AS";
    }
    leaf sync-receipt-timeout-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a sync receipt timeout
        occurs.";
      reference
        "14.10.10 of IEEE Std 802.1AS";
    }
    leaf announce-receipt-timeout-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time an announce receipt timeout
        occurs.";
      reference
        "14.10.11 of IEEE Std 802.1AS";
    }
    leaf pdelay-allowed-lost-exceeded-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time the value of the variable
```

```
        lostResponses exceeds the value of the variable
        allowedLostResponses, in the RESET state of the MDPdelayReq
        state machine.";
      reference
        "14.10.12 of IEEE Std 802.1AS";
    }
    leaf tx-sync-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time synchronization information
        is transmitted.";
      reference
        "14.10.13 of IEEE Std 802.1AS";
    }
    leaf tx-one-step-sync-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a one-step Sync message is
        transmitted.";
      reference
        "14.10.14 of IEEE Std 802.1AS";
    }
    leaf tx-follow-up-count {
      type yang:counter32;
      config false;
```

```
      description
        "Counter that increments every time a Follow_Up message is
        transmitted.";
      reference
        "14.10.15 of IEEE Std 802.1AS";
    }
    leaf tx-pdelay-req-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a Pdelay_Req message is
        transmitted.";
      reference
        "14.10.16 of IEEE Std 802.1AS";
    }
    leaf tx-pdelay-resp-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time a Pdelay_Resp message is
        transmitted.";
      reference
        "14.10.17 of IEEE Std 802.1AS";
    }
    leaf tx-pdelay-resp-follow-up-count {
      type yang:counter32;
      config false;
```

```
      description
        "Counter that increments every time a Pdelay_Resp_Follow_Up
        message is transmitted.";
      reference
        "14.10.18 of IEEE Std 802.1AS";
    }
    leaf tx-announce-count {
      type yang:counter32;
      config false;
      description
        "Counter that increments every time an Announce message is
        transmitted.";
      reference
        "14.10.19 of IEEE Std 802.1AS";
    }
  }
}
augment
  "/ptp-tt:ptp"+
  "/ptp-tt:instances"+
  "/ptp-tt:instance"+
  "/ptp-tt:ports"+
  "/ptp-tt:port" {
  description
    "Augment to add asymmetry-measurement-mode-ds to IEEE Std 1588 PTP
    Port.";
  container asymmetry-measurement-mode-ds {
```

```
    description
      "Represents the capability to enable/disable the Asymmetry
      Compensation Measurement Procedure on a PTP Port. This data set
      is used instead of the CMLDS asymmetry-measurement-mode-ds when
      only a single PTP Instance is present (i.e., CMLDS is not used).";
    reference
      "14.13 of IEEE Std 802.1AS
      Annex G of IEEE Std 802.1AS";
    leaf enabled {
      type boolean;
      description
        "For full-duplex IEEE Std 802.3 media, the value is true if an
        asymmetry measurement is being performed for the link attached
        to this PTP Port, and false otherwise. For all other media, the
        value shall be false.";
      reference
        "14.13.2 of IEEE Std 802.1AS";
    }
  }
}
augment
  "/ptp-tt:ptp"+
  "/ptp-tt:common-services"+
  "/ptp-tt:cmlds"+
  "/ptp-tt:ports"+
  "/ptp-tt:port"+
  "/ptp-tt:link-port-ds" {
```

```
  description
    "Augment IEEE Std 1588 cmldsLinkPortDS.

     14.16.9 of IEEE Std 802.1AS specifies neighborRateRatio
     (neighbor-rate-ratio), which is provided in YANG as the
     semantically equivalent node in ieee1588-ptp-tt named
     scaled-neighbor-rate-ratio (in link-port-ds).";
  leaf cmlds-link-port-enabled {
    type boolean;
    config false;
    description
      "Boolean that is true if both delay-mechanism is common-p2p and
       the value of ptp-port-enabled is true, for at least one PTP Port
       that uses the CMLDS; otherwise, the value is false.";
    reference
      "11.2.18.1 of IEEE Std 802.1AS
       14.16.3 of IEEE Std 802.1AS";
  }
  leaf is-measuring-delay {
    type boolean;
    config false;
    description
      "This leaf is analogous to is-measuring-delay for a PTP Port, but
       applicable to this Link Port.";
    reference
      "14.16.4 of IEEE Std 802.1AS";
  }
```

```
  leaf as-capable-across-domains {
    type boolean;
    config false;
    description
      "This leaf is true when all PTP Instances (domains) for this Link
      Port detect proper exchange of Pdelay messages.";
    reference
      "11.2.2 of IEEE Std 802.1AS
      14.16.5 of IEEE Std 802.1AS";
  }
  leaf mean-link-delay-thresh {
    type ptp-tt:time-interval;
    description
      "Propagation time threshold for mean-link-delay, above which a
      Link Port is not considered capable of participating in the IEEE
      Std 802.1AS protocol.";
    reference
      "14.16.7 of IEEE Std 802.1AS";
  }
  leaf initial-log-pdelay-req-interval {
    type int8;
    description
      "This leaf is analogous to initial-log-pdelay-req-interval for a
      PTP Port, but applicable to this Link Port.";
    reference
      "14.16.10 of IEEE Std 802.1AS";
  }
```

```
  leaf current-log-pdelay-req-interval {
    type int8;
    config false;
    description
      "This leaf is analogous to current-log-pdelay-req-interval for a
      PTP Port, but applicable to this Link Port.";
    reference
      "14.16.11 of IEEE Std 802.1AS";
  }
  leaf use-mgt-log-pdelay-req-interval {
    type boolean;
    description
      "This leaf is analogous to use-mgt-log-pdelay-req-interval for a
      PTP Port, but applicable to this Link Port.";
    reference
      "14.16.12 of IEEE Std 802.1AS";
  }
  leaf mgt-log-pdelay-req-interval {
    type int8;
    description
      "This leaf is analogous to mgt-log-pdelay-req-interval for a PTP
      Port, but applicable to this Link Port.";
    reference
      "14.16.13 of IEEE Std 802.1AS";
  }
  leaf initial-compute-neighbor-rate-ratio {
    type boolean;
```

```
    description
      "This leaf is analogous to initial-compute-neighbor-rate-ratio
      for a PTP Port, but applicable to this Link Port.";
    reference
      "14.16.14 of IEEE Std 802.1AS";
  }
  leaf current-compute-neighbor-rate-ratio {
    type boolean;
    config false;
    description
      "This leaf is analogous to current-compute-neighbor-rate-ratio
      for a PTP Port, but applicable to this Link Port.";
    reference
      "14.16.15 of IEEE Std 802.1AS";
  }
  leaf use-mgt-compute-neighbor-rate-ratio {
    type boolean;
    description
      "This leaf is analogous to use-mgt-compute-neighbor-rate-ratio
      for a PTP Port, but applicable to this Link Port.";
    reference
      "14.16.16 of IEEE Std 802.1AS";
  }
  leaf mgt-compute-neighbor-rate-ratio {
    type boolean;
    description
      "This leaf is analogous to mgt-compute-neighbor-rate-ratio for a
```

```
      PTP Port, but applicable to this Link Port.";
    reference
      "14.16.17 of IEEE Std 802.1AS";
  }
  leaf initial-compute-mean-link-delay {
    type boolean;
    description
      "This leaf is analogous to initial-compute-mean-link-delay for a
      PTP Port, but applicable to this Link Port.";
    reference
      "14.16.18 of IEEE Std 802.1AS";
  }
  leaf current-compute-mean-link-delay {
    type boolean;
    config false;
    description
      "This leaf is analogous to current-compute-mean-link-delay for a
      PTP Port, but applicable to this Link Port.";
    reference
      "14.16.19 of IEEE Std 802.1AS";
  }
  leaf use-mgt-compute-mean-link-delay {
    type boolean;
    description
      "This leaf is analogous to use-mgt-compute-mean-link-delay for a
      PTP Port, but applicable to this Link Port.";
    reference
```

```
      "14.16.20 of IEEE Std 802.1AS";
    }
    leaf mgt-compute-mean-link-delay {
      type boolean;
      description
        "This leaf is analogous to mgt-compute-mean-link-delay for a PTP
        Port, but applicable to this Link Port.";
      reference
        "14.16.21 of IEEE Std 802.1AS";
    }
    leaf allowed-lost-responses {
      type uint8;
      description
        "This leaf is analogous to allowed-lost-responses for a PTP Port,
        but applicable to this Link Port.";
      reference
        "14.16.22 of IEEE Std 802.1AS";
    }
    leaf allowed-faults {
      type uint8;
      description
        "This leaf is analogous to allowed-faults for a PTP Port, but
        applicable to this Link Port.";
      reference
        "14.16.23 of IEEE Std 802.1AS";
    }
    leaf-list pdelay-truncated-timestamps {
```

```
    type uinteger48;
    config false;
    description
      "This leaf is analogous to pdelay-truncated-timestamps for a PTP
      Port, but applicable to this Link Port.";
    reference
      "14.16.25 of IEEE Std 802.1AS";
  }
}
augment
  "/ptp-tt:ptp"+
  "/ptp-tt:common-services"+
  "/ptp-tt:cmlds"+
  "/ptp-tt:ports"+
  "/ptp-tt:port" {
  description
    "Augment to add port-statistics-ds to IEEE Std 1588 Link Port.";
  container port-statistics-ds {
    description
      "This container is analogous to port-statistics-ds for a PTP
      Port, but applicable to this Link Port.";
    reference
      "14.17 of IEEE Std 802.1AS";
    leaf rx-pdelay-req-count {
      type yang:counter32;
      config false;
      description
```

```
        "This leaf is analogous to rx-pdelay-req-count for a PTP Port,
         but applicable to this Link Port.";
       reference
         "14.17.2 of IEEE Std 802.1AS";
     }
     leaf rx-pdelay-resp-count {
       type yang:counter32;
       config false;
       description
         "This leaf is analogous to rx-pdelay-resp-count for a PTP Port,
         but applicable to this Link Port.";
       reference
         "14.17.3 of IEEE Std 802.1AS";
     }
     leaf rx-pdelay-resp-follow-up-count {
       type yang:counter32;
       config false;
       description
         "This leaf is analogous to rx-pdelay-resp-follow-up-count for a
         PTP Port, but applicable to this Link Port.";
       reference
         "14.17.4 of IEEE Std 802.1AS";
     }
     leaf rx-packet-discard-count {
       type yang:counter32;
       config false;
       description
```

```
        "This leaf is analogous to rx-packet-discard-count for a PTP
         Port, but applicable to this Link Port.";
       reference
         "14.17.5 of IEEE Std 802.1AS";
     }
     leaf pdelay-allowed-lost-exceeded-count {
       type yang:counter32;
       config false;
       description
         "This leaf is analogous to pdelay-allowed-lost-exceeded-count
         for a PTP Port, but applicable to this Link Port.";
       reference
         "14.17.6 of IEEE Std 802.1AS";
     }
     leaf tx-pdelay-req-count {
       type yang:counter32;
       config false;
       description
         "This leaf is analogous to tx-pdelay-req-count for a PTP Port,
         but applicable to this Link Port.";
       reference
         "14.17.7 of IEEE Std 802.1AS";
     }
     leaf tx-pdelay-resp-count {
       type yang:counter32;
       config false;
       description
```

```
        "This leaf is analogous to tx-pdelay-resp-count for a PTP Port,
         but applicable to this Link Port.";
       reference
         "14.17.8 of IEEE Std 802.1AS";
     }
     leaf tx-pdelay-resp-follow-up-count {
       type yang:counter32;
       config false;
       description
         "This leaf is analogous to tx-pdelay-resp-follow-up-count for a
         PTP Port, but applicable to this Link Port.";
       reference
         "14.17.9 of IEEE Std 802.1AS";
     }
   }
 }
 augment
   "/ptp-tt:ptp"+
   "/ptp-tt:common-services"+
   "/ptp-tt:cmlds"+
   "/ptp-tt:ports"+
   "/ptp-tt:port" {
   description
     "Augment to add asymmetry-measurement-mode-ds to IEEE Std 1588 Link
     Port.";
   container asymmetry-measurement-mode-ds {
     description
```

```
        "This container is analogous to asymmetry-measurement-mode-ds for
        a PTP Port, but applicable to this Link Port.";
      reference
        "14.18 of IEEE Std 802.1AS";
      leaf enabled {
        type boolean;
        description
          "This leaf is analogous to
          asymmetry-measurement-mode-ds.enabled for a PTP Port, but
          applicable to this Link Port.";
        reference
          "14.18.2 of IEEE Std 802.1AS";
      }
    }
  }
}
```

Annex A

(normative)

Protocol Implementation Conformance Statement (PICS) proforma[15]

A.19 Remote management

Insert a new row at the end of the table in A.19 as follows:

Item	Feature	Status	References	Support
…				
RMGT-4	If a remote management protocol that supports YANG is listed in RMGT-2, is the YANG data model of Clause 17 supported?	RMGT:O	Item k) 4) of 5.4.2, Clause 17	Yes [ ] No [ ]

[15] *Copyright release for PICS proformas:* Users of this standard may freely reproduce the PICS proforma in this annex so that it can be used for its intended purpose and may further publish the completed PICS.

Annex F

(informative)

PTP profile included in this standard

F.4 PTP options

Change lettered list item c) in F.4 as follows:

c) The management mechanism is the mechanism specified in Clause 14, ~~and~~ Clause 15, and Clause 17.

Annex H

(informative)

Bibliography

Insert seven new bibliography entries after the entry [B13] for IETF RFC 2580, as follows:

[B13a] IETF RFC 6241, Network Configuration Protocol (NETCONF), June 2011.[16]

[B13b] IETF RFC 6242, Using the NETCONF Protocol over Secure Shell (SSH), June 2011.

[B13c] IETF RFC 8341, Network Configuration Access Control Model, March 2018.

[B13d] IETF RFC 7589, Using the NETCONF Protocol over Transport Layer Security (TLS) with Mutual X.509 Authentication, June 2015.

[B13e] IETF RFC 8040, RESTCONF Protocol, January 2017.

[B13f] IETF RFC 8340, YANG Tree Diagrams, March 2018.

[B13g] IETF RFC 8575, YANG Data Model for the Precision Time Protocol (PTP).

Insert a new bibliography entry after the entry [B24] for "MoCA® MAC/PHY Specification Extensions v1.1,", as follows:

[B24a] OMG Unified Modeling Language (OMG UML), Version 2.5, March 2015.[17]

[16] IETF RFCs are available from the Internet Engineering Task Force (https://www.ietf.org/).
[17] OMG documents are available from the Object Management Group (https://www.omg.org/).

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