



**P802.1ASdn/D1.1**

**April 18, 2023**

(Amendment to

IEEE Std 802.1AS™-2020 as modified by IEEE Std 802.1AS™-2020/Cor 1-2021 and IEEE Std 802.1ASdr-2023)

## **Draft Standard for Local and metropolitan area networks—**

# **Timing and Synchronization for Time-Sensitive Applications**

## **Amendment: YANG Data Model**

Sponsor

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### **Time-Sensitive Networking Task Group of IEEE 802.1**

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## Editors' Foreword

This draft standard is an amendment. The scope of changes to the base standard is thus strictly limited, as detailed in the [PAR](#).

Information on participation in this project, and in the IEEE 802.1 Working Group can be found [here](#).

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## Project Authorization Request, Scope, Purpose, and Criteria for Standards Development (CSD)

The complete amendment PAR, as approved by IEEE NesCom on the 24th of September 2020, can be found at:

<https://development.standards.ieee.org/myproject-web/public/view.html#pardetail/8477>

The 'Scope of the Proposed changes' and the 'Need for the Project' specify the changes to be made by this amendment (see below).

### Scope of the Proposed changes:

This amendment specifies a YANG data model that allows configuring and state reporting for all managed objects of the base standard. This amendment specifies a Unified Modeling Language (UML)-based figure to explain the managed objects and the associated YANG data model.

### Need for the Project:

YANG (IETF RFC 7950) is a formalized data modeling language that is widely accepted and can be used to simplify network configuration. The ability to manage timing and synchronization via YANG data models is needed for compatibility with modern network management systems.

### Criteria for Standards Development:

The complete Criteria for Standards Development (CSD) can be found at:

<https://mentor.ieee.org/802-ec/dcn/20/ec-20-0202-00-ACSD-p802-1asdn.pdf>

# Draft IEEE Standard for Local and metropolitan area networks— Timing and Synchronization for Time- Sensitive Applications Amendment: YANG Data Model

[This amendment is based on IEEE Std 802.1AS™-2020 as modified by IEEE Std 802.1AS™-2020/Cor 1-2021 and IEEE Std 802.1ASdr-2023.]

<<Editor's note: Pending 802.1AS amendments are not considered to be part of P802.1ASdn. P802.1ASdn assumes that YANG work for managed objects in pending P802.1AS amendments is performed in those amendments.

This amendment does not add YANG for the following pending amendments:

- IEEE P802.1ASdm (Hot Standby)
- IEEE P802.1ASds (Half Duplex)>

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 ~~striktthrough~~ (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.<sup>1</sup>

<sup>1</sup>Notes in text, tables, and figures are given for information only, and do not contain requirements needed to implement the standard.

**P802.1ASdn/D1.1**

**April 18, 2023**

(Amendment to

IEEE Std 802.1AS™-2020 as modified by IEEE Std 802.1AS™-2020/Cor 1-2021 and IEEE Std  
802.1ASdr-2023)

# **Draft IEEE Standard for Local and metropolitan area networks— Timing and Synchronization for Time-Sensitive Applications Amendment: YANG Data Model**

Prepared by the  
**Time-Sensitive Networking Task Group of IEEE 802.1**

Sponsor  
**LAN/MAN Standards Committee**  
of the  
**IEEE Computer Society**

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**Abstract:** 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.

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

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## Introduction

This introduction is not part of IEEE Std 802.1ASdn™-20xx, IEEE Standard for Local and metropolitan area networks—Timing and Synchronization for Time-Sensitive Applications—Amendment: YANG Data Model

The first edition of IEEE Std 802.1AS was published in 2011. A first corrigendum, IEEE Std 802.1AS™-2011/Cor1-2013, provided technical and editorial corrections. A second corrigendum, IEEE Std 802.1AS™-2011/Cor2-2015 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 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-2023 changes non-inclusive terms, replacing them with their 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.

**<<Editor's note: As an aide to reviewers of this document, change bars are automatically generated in the left margin to mark text that has changed from this draft to the previous draft.>**

**<<Editor's note: P802.1ASdn has a formal dependency on P802.1ASdr, which is not published as of this draft. Prior to publication of P802.1ASdn, IEEE SA editors will replace the formal names of P802.1ASdn and P802.1ASdr to reflect the respective year of IEEE SA board approval.>**

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## 2. Normative references

*Insert the following references 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.

IEEE Std 1588e™-20xx, IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems—Amendment: MIB and YANG Data Models.

**<<Editor's note: The year for P1588e will be completed after its publication. P1588e is a formal dependency of this project (see section 5.3 of PAR for P802.1ASdn).>>**

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

## 4. Acronyms and abbreviations

*Insert the following abbreviations in alphanumeric order, renumbering footnotes as necessary:*

NETCONF      Network Configuration Protocol

UML            Unified Modeling Language

## 5. Conformance

### 5.4.2 PTP Instance Options

*Insert the following item 5.4.2 k) 4) after 5.4.2 k) 3) (MIB), renumbering as necessary:*

- 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 the following new Clause 17:*

## 17. YANG Data Model

YANG (IETF RFC 7950 [B45]) is a data modeling language used to model configuration data and state data for remote network management protocols. Examples of YANG-based remote network management protocols include NETCONF (IETF RFC 6241 [B41]) and RESTCONF (IETF RFC 8040 [B46]). 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 UML-like representation (17.2)
- c) Summarizes the structure of the YANG 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

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 1 - 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-ptp.yang` module imports the `ieee1588-ptp` module as a whole, augmenting that module as necessary to meet the requirements of this standard. This import makes existing and new IEEE Std 1588 YANG capabilities not specifically addressed by the present standard available to its implementors without delay, without the need to revise or amend IEEE Std 802.1AS.

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 (i.e., 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.yang) contains the hierarchy (tree) of data sets and their members.

The YANG module of this clause (ieee802-dot1as-ptp.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 2 - IETF RFC8575 [B48] 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 RFC8575. Therefore, the YANG module of RFC8575 is not imported by the YANG module of this clause.

## 17.2 IEEE 802.1AS YANG models

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 Figures 17-1 through 17-4. The purpose of the diagram 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. It should be noted that 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 [B49] 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 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.yang module is shown in white, and Clause 14 data in augments of ieee802-dot1as-ptp.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 (cmls).

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

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

NOTE 2 - 14.8.4 specifies ptpPortEnabled (ptp-port-enabled), which is provided in YANG as the semantically equivalent node in ieee1588-ptp named port-enable (in port-ds of Figure 17-3). 14.8.15 specifies

1 mgtSettableLogAnnounceInterval (mgt-settable-log-announce-interval), which is provided in YANG as the semantically  
2 equivalent node in ieee1588-ntp named log-announce-interval (in port-ds of Figure 17-3). 14.8.20 specifies  
3 mgtSettableLogSyncInterval (mgt-settable-log-sync-interval), which is provided in YANG as the semantically  
4 equivalent node in ieee1588-ntp named log-sync-interval (in port-ds of Figure 17-3).  
5

6 Figure 17-4 provides detail for the common services, including each data set member. The Common Mean  
7 Link Delay Service (cmls) has a data sets for the service itself (e.g., default-ds), and data sets for each PTP  
8 Link Port.  
9

10 NOTE 3 - 14.16.9 specifies neighborRateRatio (neighbor-rate-ratio), which is provided in YANG as the semantically  
11 equivalent node in ieee1588-ntp named scaled-neighbor-rate-ratio (in link-port-ds of Figure 17-4).  
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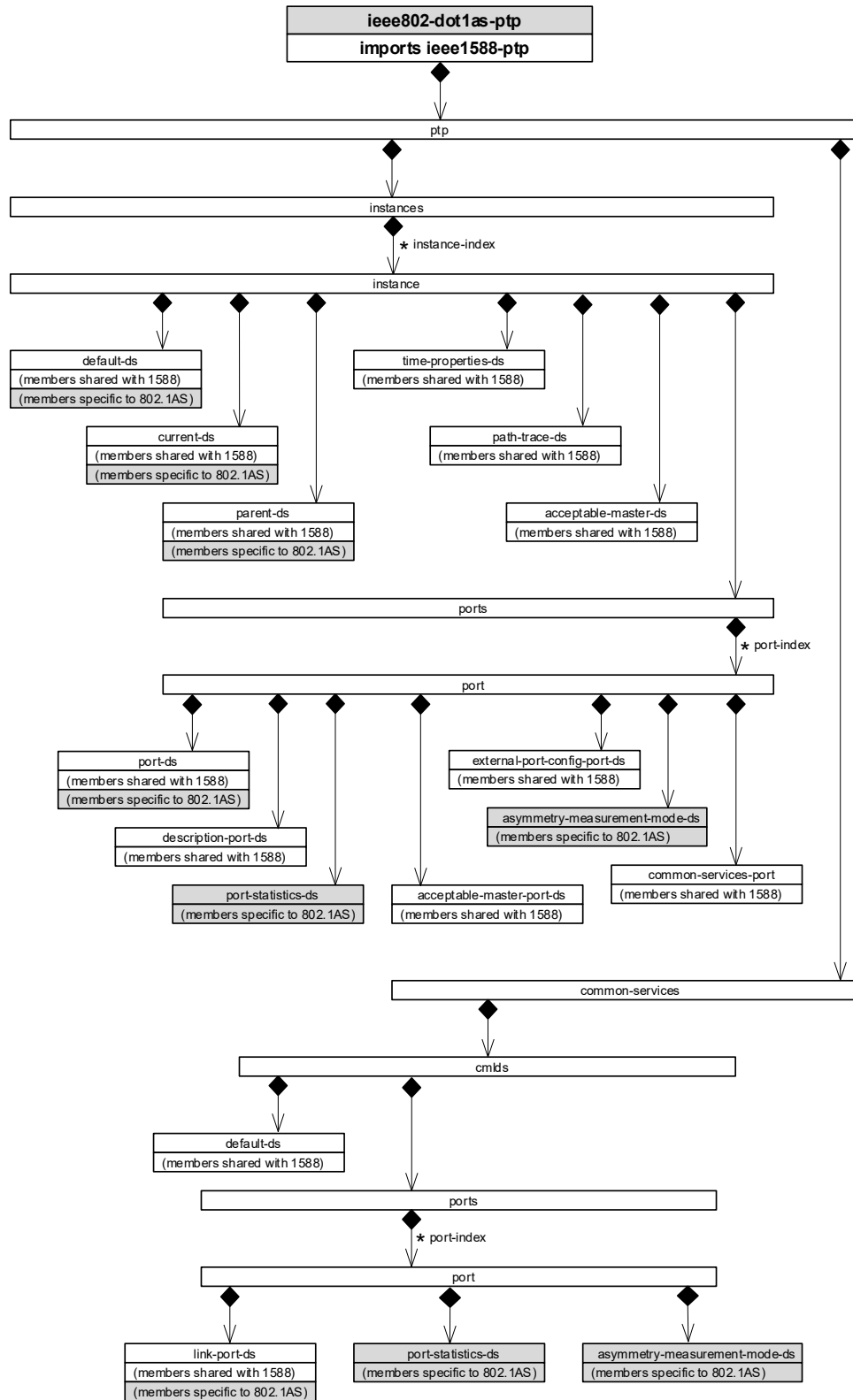


Figure 17-1—Overview of YANG tree



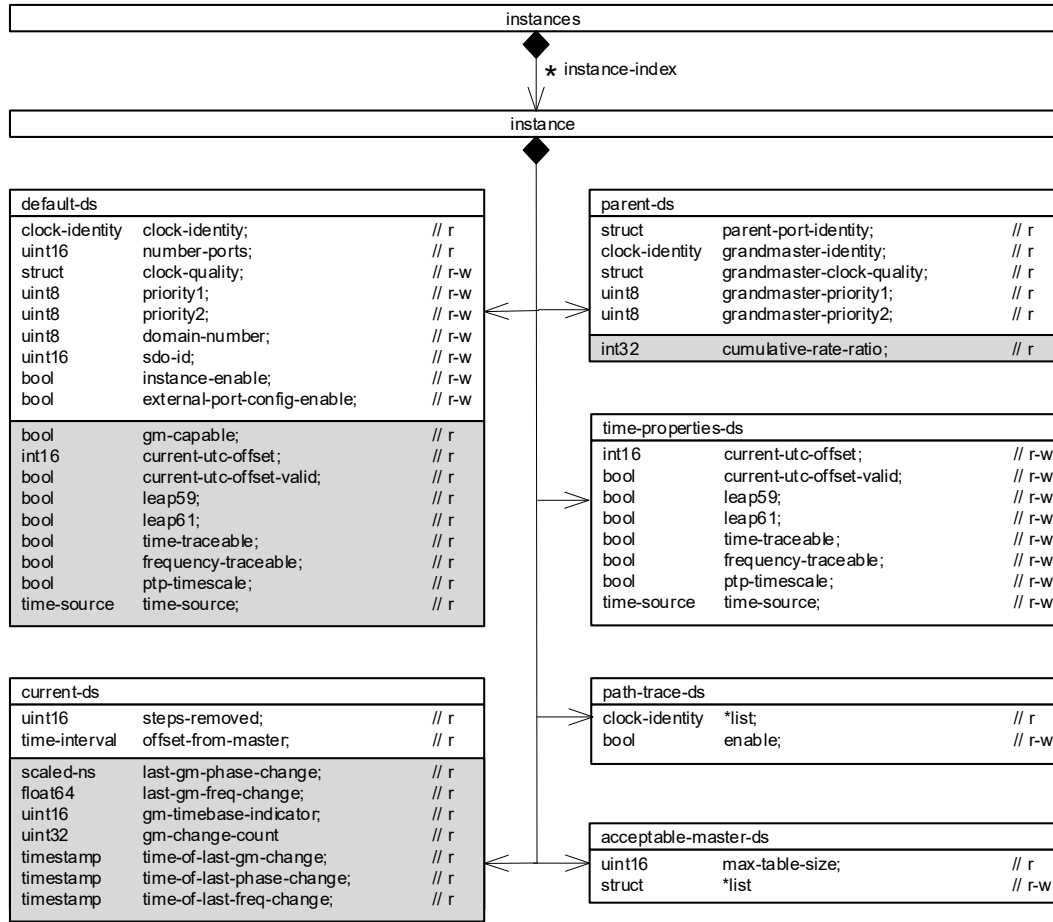


Figure 17-2—PTP Instance detail

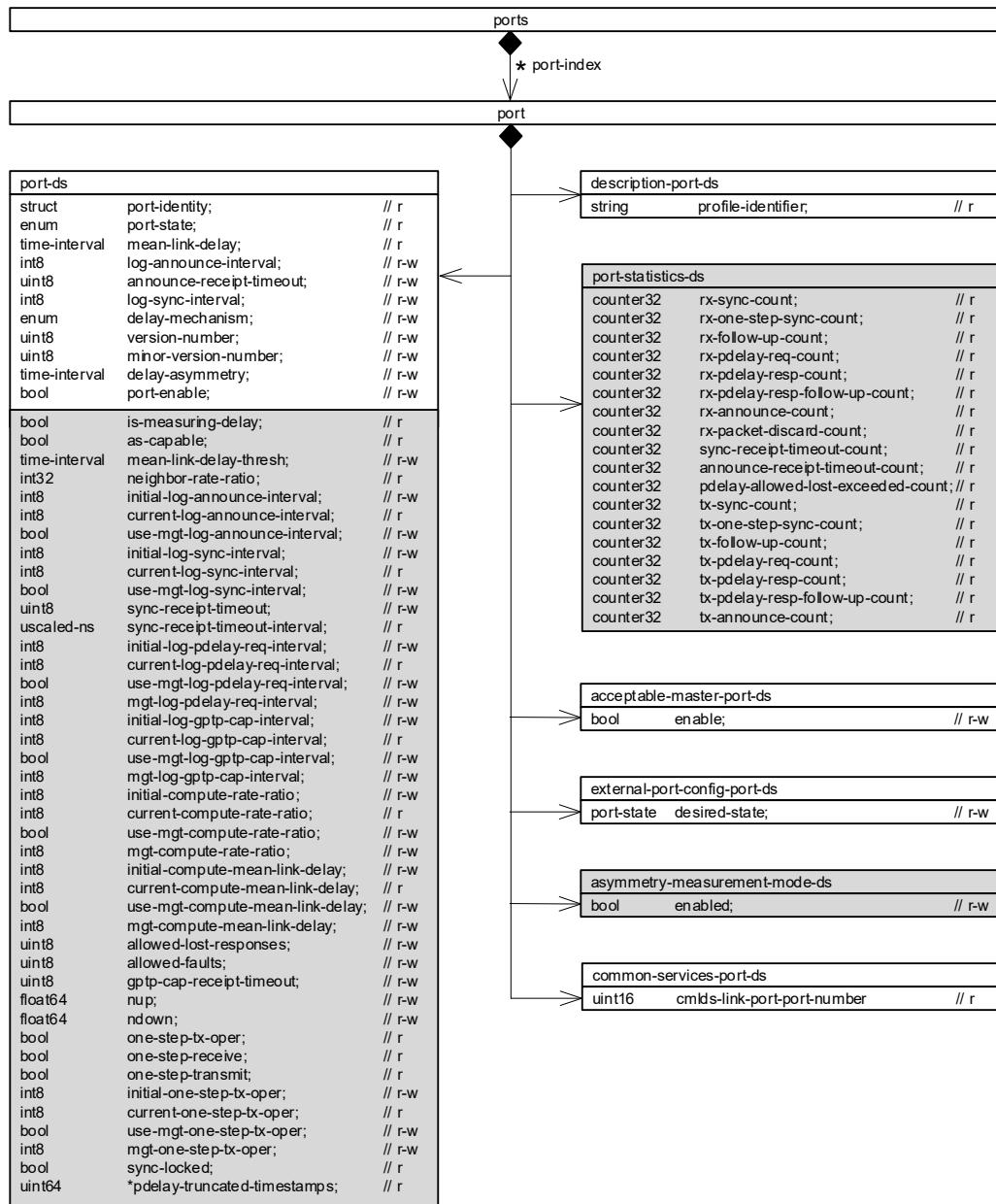


Figure 17-3—PTP Port detail

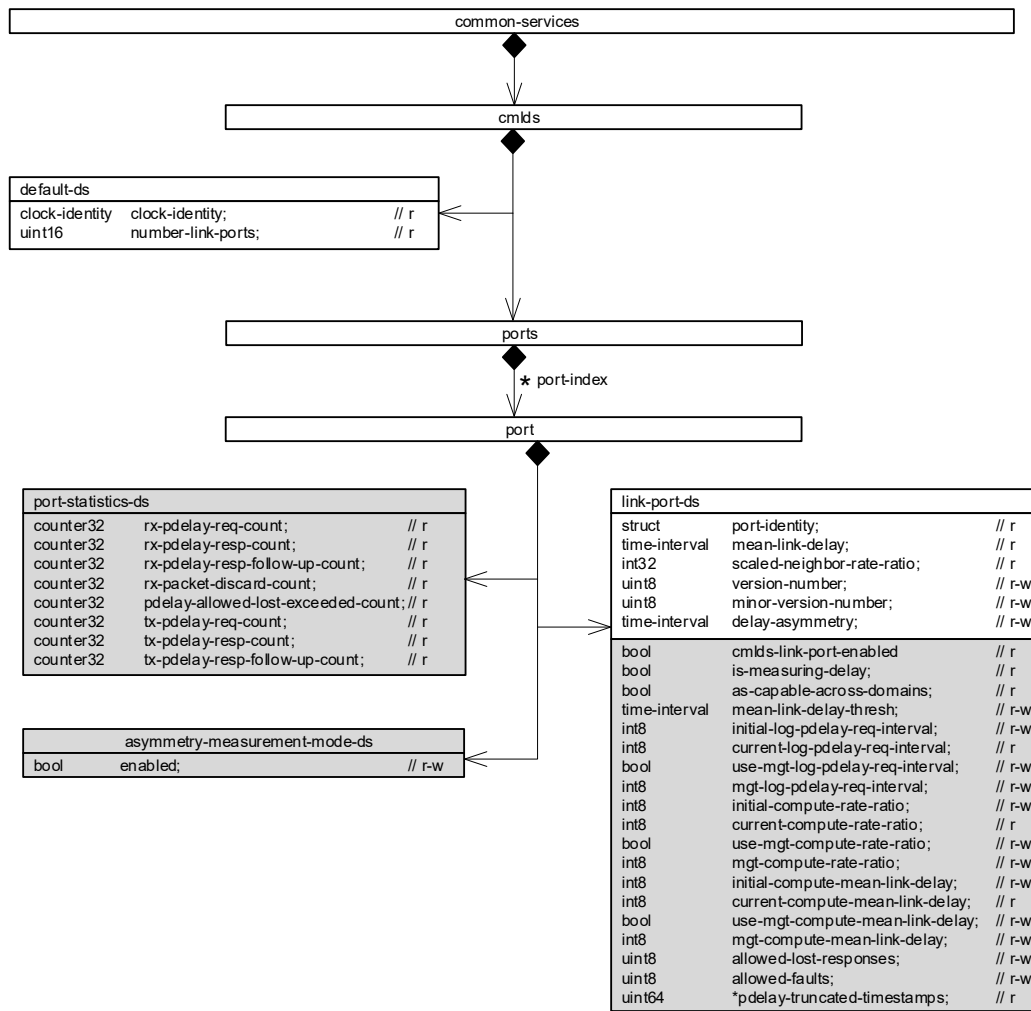


Figure 17-4—Common services detail

### 17.3 Structure of YANG models

The YANG model specified by this standard uses the YANG modules summarized in Table 17-1.<sup>1</sup>

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

<sup>1</sup>An amendment’s designation is often used to refer to functionality in an IEEE standard after the amendment has been incorporated in a revision of the standard, even if the functionality has been revised. The amendment that added each YANG module is identified to help locate the relevant provisions of this standard.

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	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-tp	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 ([B41]) and RESTCONF ([B46]). NETCONF and RESTCONF protocols provide the means to secure communication between client and server, using secure transport layers such as Secure Shell (SSH) ([B42]) and Transport Layer Security (TLS) ([B44]).

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 (NACM) ([B43]) 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.

There are a number of data sets in this YANG module that contain writable data nodes ([B45]), such as:

```
/ptp/instances/instance/default-ds
/ptp/instances/instance/path-trace-ds
/ptp/instances/instance/acceptable-master-ds
/ptp/instances/instance/ports/port/port-ds
/ptp/instances/instance/ports/port/acceptable-master-port-ds
/ptp/instances/instance/ports/port/external-port-config-port-ds
/ptp/instances/instance/ports/port/asymmetry-measurement-mode-ds
/ptp/cmls/ports/port/link-port-ds
/ptp/cmls/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 may adversely impact a PTP synchronization network. For example, loss of synchronization on a clock, accuracy degradation on a set of clocks, or even break down 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 [B47]).

### 17.5.1 Tree diagram for ieee802-dot1as-ptp.yang

```
module: ieee802-dot1as-ptp

  augment /ptp:ptp/ptp:instances/ptp:instance/ptp: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:ptp/ptp:instances/ptp:instance/ptp: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
```

```

1      +--ro time-of-last-gm-change?      yang:timestamp
2      +--ro time-of-last-phase-change?    yang:timestamp
3      +--ro time-of-last-freq-change?     yang:timestamp
4      augment /ptp:ptp/ptp:instances/ptp:instance/ptp:parent-ds:
5      +--ro cumulative-rate-ratio?      int32
6      augment /ptp:ptp/ptp:instances/ptp:instance/ptp:ports/ptp:port/ptp:port-ds:
7      +--ro is-measuring-delay?          boolean
8      +--ro as-capable?                  boolean
9      +--rw mean-link-delay-thresh?      ptp:time-interval
10     +--ro neighbor-rate-ratio?          int32
11     +--rw initial-log-announce-interval? int8
12     +--ro current-log-announce-interval? int8
13     +--rw use-mgt-log-announce-interval? boolean
14     +--rw initial-log-sync-interval?    int8
15     +--ro current-log-sync-interval?    int8
16     +--rw use-mgt-log-sync-interval?    boolean
17     +--rw sync-receipt-timeout?         uint8
18     +--ro sync-receipt-timeout-interval? uscaled-ns
19     +--rw initial-log-pdelay-req-interval? int8
20     +--ro current-log-pdelay-req-interval? int8
21     +--rw use-mgt-log-pdelay-req-interval? boolean
22     +--rw mgt-log-pdelay-req-interval?  int8
23     +--rw initial-log-gptp-cap-interval? int8
24     +--ro current-log-gptp-cap-interval? int8
25     +--rw use-mgt-log-gptp-cap-interval? boolean
26     +--rw mgt-log-gptp-cap-interval?    int8
27     +--rw initial-compute-rate-ratio?   int8
28     +--ro current-compute-rate-ratio?   int8
29     +--rw use-mgt-compute-rate-ratio?   boolean
30     +--rw mgt-compute-rate-ratio?       int8
31     +--rw initial-compute-mean-link-delay? int8
32     +--ro current-compute-mean-link-delay? int8
33     +--rw use-mgt-compute-mean-link-delay? boolean
34     +--rw mgt-compute-mean-link-delay?  int8
35     +--rw allowed-lost-responses?       uint8
36     +--rw allowed-faults?               uint8
37     +--rw gptp-cap-receipt-timeout?     uint8
38     +--rw nup?                          float64
39     +--rw ndown?                        float64
40     +--ro one-step-tx-oper?              boolean
41     +--ro one-step-receive?              boolean
42     +--ro one-step-transmit?             boolean
43     +--rw initial-one-step-tx-oper?     int8
44     +--ro current-one-step-tx-oper?     int8
45     +--rw use-mgt-one-step-tx-oper?     boolean
46     +--rw mgt-one-step-tx-oper?         int8
47     +--ro sync-locked?                  boolean
48     +--ro pdelay-truncated-timestamps*  uint64
49     augment /ptp:ptp/ptp:instances/ptp:instance/ptp:ports/ptp:port:
50     +--rw port-statistics-ds
51     +--ro rx-sync-count?                yang:counter32
52     +--ro rx-one-step-sync-count?        yang:counter32
53     +--ro rx-follow-up-count?            yang:counter32
54     +--ro rx-pdelay-req-count?           yang:counter32
55     +--ro rx-pdelay-resp-count?          yang:counter32
56     +--ro rx-pdelay-resp-follow-up-count? yang:counter32
57     +--ro rx-announce-count?             yang:counter32
58     +--ro rx-packet-discard-count?       yang:counter32
59     +--ro sync-receipt-timeout-count?    yang:counter32
60     +--ro announce-receipt-timeout-count? yang:counter32
61     +--ro pdelay-allowed-lost-exceeded-count? yang:counter32
62     +--ro tx-sync-count?                 yang:counter32
63     +--ro tx-one-step-sync-count?        yang:counter32
64     +--ro tx-follow-up-count?            yang:counter32
65     +--ro tx-pdelay-req-count?           yang:counter32
66     +--ro tx-pdelay-resp-count?          yang:counter32
67     +--ro tx-pdelay-resp-follow-up-count? yang:counter32
68     +--ro tx-announce-count?            yang:counter32
69     augment /ptp:ptp/ptp:instances/ptp:instance/ptp:ports/ptp:port:
70     +--rw asymmetry-measurement-mode-ds
71     +--rw enabled?                      boolean

```

```

1      augment /ptp:ptp/ptp:common-services/ptp:cmlds/ptp:ports/ptp:port/ptp:link-
2 port-ds:
3      +--ro cmlds-link-port-enabled?          boolean
4      +--ro is-measuring-delay?                boolean
5      +--ro as-capable-across-domains?        boolean
6      +--rw mean-link-delay-thresh?           ptp:time-interval
7      +--rw initial-log-pdelay-req-interval?   int8
8      +--ro current-log-pdelay-req-interval?   int8
9      +--rw use-mgt-log-pdelay-req-interval?   boolean
10     +--rw mgt-log-pdelay-req-interval?       int8
11     +--rw initial-compute-rate-ratio?        int8
12     +--ro current-compute-rate-ratio?        int8
13     +--rw use-mgt-compute-rate-ratio?        boolean
14     +--rw mgt-compute-rate-ratio?            int8
15     +--rw initial-compute-mean-link-delay?   int8
16     +--ro current-compute-mean-link-delay?   int8
17     +--rw use-mgt-compute-mean-link-delay?   boolean
18     +--rw mgt-compute-mean-link-delay?       int8
19     +--rw allowed-lost-responses?            uint8
20     +--rw allowed-faults?                    uint8
21     +--ro pdelay-truncated-timestamps*       uint64
22     augment /ptp:ptp/ptp:common-services/ptp:cmlds/ptp:ports/ptp:port:
23     +--rw port-statistics-ds
24     +--ro rx-pdelay-req-count?                yang:counter32
25     +--ro rx-pdelay-resp-count?               yang:counter32
26     +--ro rx-pdelay-resp-follow-up-count?     yang:counter32
27     +--ro rx-packet-discard-count?            yang:counter32
28     +--ro pdelay-allowed-lost-exceeded-count? yang:counter32
29     +--ro tx-pdelay-req-count?                yang:counter32
30     +--ro tx-pdelay-resp-count?               yang:counter32
31     +--ro tx-pdelay-resp-follow-up-count?     yang:counter32
32     augment /ptp:ptp/ptp:common-services/ptp:cmlds/ptp:ports/ptp:port:
33     +--rw asymmetry-measurement-mode-ds
34     +--rw enabled?        boolean

```

## 17.6 YANG modules<sup>1 2</sup>

Although not formally specified by this standard, the YANG module specified by IEEE Std 1588e (ieee1588-ptp.yang) serves as the foundation of the YANG module specified in this clause.

### 17.6.1 Module ieee802-dot1as-ptp.yang

```

35 module ieee802-dot1as-ptp {
36   yang-version 1.1;
37   namespace urn:ieee:std:802.1AS:yang:ieee802-dot1as-ptp;
38   prefix dot1as-ptp;
39
40   import ietf-yang-types {
41     prefix yang;
42   }
43   import ieee1588-ptp {
44     prefix ptp;
45   }
46
47   organization
48     "IEEE 802.1 Working Group";
49   contact
50     "WG-URL: http://ieee802.org/1/

```

<sup>1</sup>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.

<sup>2</sup>An ASCII version of the YANG modules are 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/>.

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-2020.

Copyright (C) IEEE (2022).

This version of this YANG module is part of IEEE Std 802.1AS;  
 see the standard itself for full legal notices.";

revision 2023-04-04 {

description

"Published as part of IEEE Std 802.1ASdn-XXXX.  
 Initial version.";

reference

"IEEE Std 802.1ASdn-XXXX - YANG Data Model";

}

// The year (XXXX) will be replaced during publication.

// This is the 4th balloted draft D1.1

// of the YANG module for amendment IEEE P802.1ASdn.

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<sup>16</sup> ns, as a signed 96-bit integer.  
 YANG does not support a signed 96-bit integer.  
 Each of the 12 octets is represented in YANG as a pair of  
 hexadecimal characters, using uppercase for a letter.  
 Each octet in the array is separated by the dash  
 character. The most significant octet is first.";

reference

"6.4.3.1 of IEEE Std 802.1AS-2020";

}

typedef unscaled-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<sup>16</sup> ns, as an unsigned 96-bit integer.  
 YANG does not support an unsigned 96-bit integer.  
 Each of the 12 octets is represented in YANG as a pair of  
 hexadecimal characters, using uppercase for a letter.  
 Each octet in the array is separated by the dash



```

1         character. The most significant octet is first.";
2     reference
3         "6.4.3.2 of IEEE Std 802.1AS-2020";
4 }
5
6 typedef float64 {
7     type string {
8         pattern "[0-9A-F]{2}(-[0-9A-F]{2}){7}";
9     }
10    description
11        "The IEEE Std 802.1AS Float64 type represents
12        IEEE Std 754 binary64 (64-bit
13        double-precision floating-point format).
14        YANG does not support floating-point,
15        Each of the 8 octets is represented in YANG as a pair of
16        hexadecimal characters, using uppercase for a letter.
17        Each octet in the array is separated by the dash
18        character. The most significant octet is first.";
19    reference
20        "6.4.2 of IEEE Std 802.1AS-2020";
21 }
22
23 augment "/ptp:ptp/ptp:instances/ptp:instance/ptp:default-ds" {
24     description
25         "Augment IEEE Std 1588 defaultDS.";
26
27     leaf gm-capable {
28         type boolean;
29         config false;
30         description
31             "The value is true if the time-aware system is capable
32             of being a grandmaster, and false if the time-aware
33             system is not capable of being a grandmaster.";
34         reference
35             "14.2.7 of IEEE Std 802.1AS-2020";
36     }
37
38     leaf current-utc-offset {
39         when "../current-utc-offset-valid='true'";
40         type int16;
41         config false;
42         description
43             "Offset from UTC (TAI- UTC).
44             The offset is in units of seconds.
45             This leaf applies to the ClockTimeTransmitter entity
46             (i.e., local only, unrelated to a remote GM).";
47         reference
48             "14.2.8 of IEEE Std 802.1AS-2020";
49     }
50
51     leaf current-utc-offset-valid {
52         type boolean;
53         config false;
54         description
55             "The value of current-utc-offset-valid shall be true
56             if the value of current-utc-offset is known to be
57             correct, otherwise it shall be false.
58             This leaf applies to the ClockTimeTransmitter entity
59             (i.e., local only, unrelated to a remote GM).";

```

```

1      reference
2        "14.2.9 of IEEE Std 802.1AS-2020";
3    }
4
5    leaf leap59 {
6      type boolean;
7      config false;
8      description
9        "If the timescale is PTP, a true value for leap59
10       shall indicate that the last minute of the
11       current UTC day contains 59 seconds.
12       If the timescale is not PTP, the value shall be
13       false.
14       This leaf applies to the ClockTimeTransmitter entity
15       (i.e., local only, unrelated to a remote GM).";
16     reference
17       "14.2.10 of IEEE Std 802.1AS-2020";
18   }
19
20   leaf leap61 {
21     type boolean;
22     config false;
23     description
24       "If the timescale is PTP, a true value for leap61
25       shall indicate that the last minute of the
26       current UTC day contains 61 seconds.
27       If the timescale is not PTP, the value shall be
28       false.
29       This leaf applies to the ClockTimeTransmitter entity
30       (i.e., local only, unrelated to a remote GM).";
31     reference
32       "14.2.11 of IEEE Std 802.1AS-2020";
33   }
34
35   leaf time-traceable {
36     type boolean;
37     config false;
38     description
39       "The value of time-traceable shall be true if the
40       timescale is traceable to a primary reference;
41       otherwise, the value shall be false.
42       This leaf applies to the ClockTimeTransmitter entity
43       (i.e., local only, unrelated to a remote GM).";
44     reference
45       "14.2.12 of IEEE Std 802.1AS-2020";
46   }
47
48   leaf frequency-traceable {
49     type boolean;
50     config false;
51     description
52       "The value of frequency-traceable shall be true if
53       the frequency determining the timescale is traceable
54       to a primary reference; otherwise, the value shall
55       be false.
56       This leaf applies to the ClockTimeTransmitter entity
57       (i.e., local only, unrelated to a remote GM).";
58     reference
59       "14.2.13 of IEEE Std 802.1AS-2020";

```

```

1      }
2
3      leaf ptp-timescale {
4          type boolean;
5          config false;
6          description
7              "If ptp-timescale is true, the timescale of
8              the ClockTimeTransmitter entity is PTP, which is
9              the elapsed time since the PTP epoch measured
10             using the second defined by International Atomic
11             Time (TAI).
12             If ptp-timescale is false, the timescale of
13             the ClockTimeTransmitter entity is ARB, which is
14             the elapsed time since an arbitrary epoch.
15             This leaf applies to the ClockTimeTransmitter entity
16             (i.e., local only, unrelated to a remote GM).";
17             reference
18                 "14.2.14 of IEEE Std 802.1AS-2020";
19         }
20     leaf time-source {
21         type identityref {
22             base ptp:time-source;
23         }
24         config false;
25         description
26             "The source of time used by the Grandmaster Clock
27             This leaf applies to the ClockTimeTransmitter entity
28             (i.e., local only, unrelated to a remote GM).";
29             reference
30                 "14.2.15 of IEEE Std 802.1AS-2020";
31     }
32     augment "/ptp:ptp/ptp:instances/ptp:instance/ptp:current-ds" {
33         description
34             "Augment IEEE Std 1588 currentDS.";
35
36         leaf last-gm-phase-change {
37             type scaled-ns;
38             config false;
39             description
40                 "Phase change that occurred on the most recent
41                 change in either the Grandmaster PTP Instance
42                 or gm-timebase-indicator leaf.";
43             reference
44                 "14.3.4 of IEEE Std 802.1AS-2020";
45         }
46
47         leaf last-gm-freq-change {
48             type float64;
49             config false;
50             description
51                 "Frequency change that occurred on the most recent
52                 change in either the Grandmaster PTP Instance
53                 or gm-timebase-indicator leaf.";
54             reference
55                 "14.3.5 of IEEE Std 802.1AS-2020";
56         }
57     }

```

```

1      leaf gm-timebase-indicator {
2          type uint16;
3          config false;
4          description
5              "The timeBaseIndicator of the current
6              Grandmaster PTP Instance.";
7          reference
8              "14.3.6 of IEEE Std 802.1AS-2020";
9      }
10
11     leaf gm-change-count {
12         type yang:counter32;
13         config false;
14         description
15             "This statistics counter tracks the number of times
16             the Grandmaster PTP Instance has changed in a
17             gPTP domain.";
18         reference
19             "14.3.7 of IEEE Std 802.1AS-2020";
20     }
21
22     leaf time-of-last-gm-change {
23         type yang:timestamp;
24         config false;
25         description
26             "System time when the most recent Grandmaster Clock
27             change occurred in a gPTP domain.
28             This leaf's type is YANG timestamp, which is based
29             on system time. System time is an unsigned integer
30             in units of 10 milliseconds, using an epoch defined
31             by the implementation (typically time of boot-up).";
32         reference
33             "14.3.8 of IEEE Std 802.1AS-2020";
34     }
35
36     leaf time-of-last-phase-change {
37         type yang:timestamp;
38         config false;
39         description
40             "System time when the most recent change in Grandmaster
41             Clock phase occurred.
42             This leaf's type is YANG timestamp, which is based
43             on system time. System time is an unsigned integer
44             in units of 10 milliseconds, using an epoch defined
45             by the implementation (typically time of boot-up).";
46         reference
47             "14.3.9 of IEEE Std 802.1AS-2020";
48     }
49
50     leaf time-of-last-freq-change {
51         type yang:timestamp;
52         config false;
53         description
54             "System time when the most recent change in Grandmaster
55             Clock frequency occurred.
56             This leaf's type is YANG timestamp, which is based
57             on system time. System time is an unsigned integer
58             in units of 10 milliseconds, using an epoch defined

```

```

1         by the implementation (typically time of boot-up).";
2     reference
3         "14.3.10 of IEEE Std 802.1AS-2020";
4     }
5 }
6
7 augment "/ptp:ptp/ptp:instances/ptp:instance/ptp:parent-ds" {
8     description
9         "Augment IEEE Std 1588 parentDS.";
10
11     leaf cumulative-rate-ratio {
12         type int32;
13         config false;
14         description
15             "Estimate of the ratio of the frequency of the Grandmaster
16             Clock to the frequency of the LocalClock entity of this
17             PTP Instance. cumulative-rate-ratio is expressed as
18             the fractional frequency offset multiplied by 2^41,
19             i.e., the quantity (rateRatio - 1.0)(2^41).";
20         reference
21             "14.4.3 of IEEE Std 802.1AS-2020";
22     }
23 }
24
25 augment "/ptp:ptp/ptp:instances/ptp:instance/ptp:ports/ptp:port/ptp:port-ds" {
26     description
27         "Augment IEEE Std 1588 portDS.
28
29         14.8.4 of IEEE Std 802.1AS-2020 specifies ptpPortEnabled
30         (ptp-port-enabled), which is provided in YANG as the
31         semantically equivalent node in ieee1588-ptp named
32         port-enable (in port-ds).
33
34         14.8.15 of IEEE Std 802.1AS-2020 specifies
35         mgtSettableLogAnnounceInterval
36         (mgt-settable-log-announce-interval), which is provided in
37         YANG as the semantically equivalent node in ieee1588-ptp named
38         log-announce-interval (in port-ds). In the context of
39         IEEE Std 802.1AS, log-announce-interval cannot be used
40         unless use-mgt-log-announce-interval is true.
41
42         14.8.20 of IEEE Std 802.1AS-2020 specifies
43         mgtSettableLogSyncInterval
44         (mgt-settable-log-sync-interval), which is provided in YANG
45         as the semantically equivalent node in ieee1588-ptp named
46         log-sync-interval (in port-ds). In the context of
47         IEEE Std 802.1AS, log-sync-interval cannot be used
48         unless use-mgt-log-sync-interval is true.";
49
50     leaf is-measuring-delay {
51         type boolean;
52         config false;
53         description
54             "Boolean that is true if the port is measuring
55             PTP Link propagation delay.";
56         reference
57             "14.8.6 of IEEE Std 802.1AS-2020";
58     }
59 }

```

```

1      leaf as-capable {
2          type boolean;
3          config false;
4          description
5              "Boolean that is true if and only if it is determined
6              that this PTP Instance and the PTP Instance at the
7              other end of the link attached to this port can
8              interoperate with each other via the IEEE Std
9              802.1AS protocol.";
10         reference
11             "10.2.5.1 of IEEE Std 802.1AS-2020
12             14.8.7 of IEEE Std 802.1AS-2020";
13     }
14
15     leaf mean-link-delay-thresh {
16         type ptp:time-interval;
17         description
18             "Propagation time threshold for mean-link-delay,
19             above which a port is not considered capable of
20             participating in the IEEE Std 802.1AS protocol.";
21         reference
22             "14.8.9 of IEEE Std 802.1AS-2020";
23     }
24
25     leaf neighbor-rate-ratio {
26         type int32;
27         config false;
28         description
29             "Estimate of the ratio of the frequency of the LocalClock
30             entity of the PTP Instance at the other end of the
31             link attached to this PTP Port, to the frequency of the
32             LocalClock entity of this PTP Instance.
33             neighbor-rate-ratio is expressed as the fractional
34             frequency offset multiplied by 2^41,
35             i.e., the quantity (rateRatio - 1.0)(2^41).";
36         reference
37             "14.8.11 of IEEE Std 802.1AS-2020";
38     }
39
40     leaf initial-log-announce-interval {
41         type int8;
42         description
43             "When use-mgt-log-announce-interval is false
44             (i.e., change with Signaling message), this is the
45             the logarithm to base 2 of the announce
46             interval used when the port is initialized.";
47         reference
48             "14.8.12 of IEEE Std 802.1AS-2020";
49     }
50
51     leaf current-log-announce-interval {
52         type int8;
53         config false;
54         description
55             "Logarithm to base 2 of the current
56             announce interval.";
57         reference
58             "14.8.13 of IEEE Std 802.1AS-2020";
59     }

```

```

1      leaf use-mgt-log-announce-interval {
2          type boolean;
3          description
4              "Boolean that determines the source of the
5              announce interval.
6              If the value is true, the announce interval
7              (current-log-announce-interval) is set equal to the value
8              of mgt-log-announce-interval.
9              If the value is false, the announce interval is determined
10             by the AnnounceIntervalSetting state machine (i.e., changed
11             with Signaling message).";
12         reference
13             "14.8.14 of IEEE Std 802.1AS-2020";
14     }
15
16     leaf initial-log-sync-interval {
17         type int8;
18         description
19             "When use-mgt-log-sync-interval is false
20             (i.e., change with Signaling message), this is the
21             the logarithm to base 2 of the sync
22             interval used when the port is initialized.";
23         reference
24             "14.8.17 of IEEE Std 802.1AS-2020";
25     }
26
27     leaf current-log-sync-interval {
28         type int8;
29         config false;
30         description
31             "Logarithm to base 2 of the current sync
32             interval.";
33         reference
34             "14.8.18 of IEEE Std 802.1AS-2020";
35     }
36
37     leaf use-mgt-log-sync-interval {
38         type boolean;
39         description
40             "Boolean that determines the source of the
41             sync interval.
42             If the value is true, the sync interval
43             (current-log-sync-interval) is set equal to the value
44             of mgt-log-sync-interval.
45             If the value is false, the sync interval is determined
46             by the SyncIntervalSetting state machine (i.e., changed
47             with Signaling message).";
48         reference
49             "14.8.19 of IEEE Std 802.1AS-2020";
50     }
51
52     leaf sync-receipt-timeout {
53         type uint8;
54         description
55             "Number of sync intervals that a timeReceiver port waits
56             without receiving synchronization information, before
57             assuming that the timeTransmitter is no longer transmitting
58             synchronization information and that the BTCA needs to be

```

```

1         run, if appropriate.";
2     reference
3         "14.8.21 of IEEE Std 802.1AS-2020";
4 }
5
6 leaf sync-receipt-timeout-interval {
7     type unscaled-ns;
8     config false;
9     description
10        "Time interval after which sync receipt timeout occurs
11        if time-synchronization information has not been
12        received during the interval.";
13    reference
14        "14.8.22 of IEEE Std 802.1AS-2020";
15 }
16
17 leaf initial-log-pdelay-req-interval {
18     type int8;
19     description
20        "When use-mgt-log-pdelay-req-interval is false
21        (i.e., change with Signaling message), this is the
22        the logarithm to base 2 of the Pdelay_Req transmit
23        interval used when the port is initialized.";
24    reference
25        "14.8.23 of IEEE Std 802.1AS-2020";
26 }
27
28 leaf current-log-pdelay-req-interval {
29     type int8;
30     config false;
31     description
32        "Logarithm to base 2 of the current Pdelay_Req transmit
33        interval.";
34    reference
35        "14.8.24 of IEEE Std 802.1AS-2020";
36 }
37
38 leaf use-mgt-log-pdelay-req-interval {
39     type boolean;
40     description
41        "Boolean that determines the source of the
42        Pdelay_Req transmit interval.
43        If the value is true, the Pdelay_Req transmit interval
44        (current-log-pdelay-req-interval) is set equal to the value
45        of mgt-log-pdelay-req-interval.
46        If the value is false, the Pdelay_Req transmit interval is
47        determined by the LinkDelayIntervalSetting state machine
48        (i.e., changed with Signaling message).";
49    reference
50        "14.8.25 of IEEE Std 802.1AS-2020";
51 }
52
53 leaf mgt-log-pdelay-req-interval {
54     type int8;
55     description
56        "Logarithm to base 2 of the Pdelay_Req transmit interval,
57        used if use-mgt-log-pdelay-req-interval is true.
58        This value is not used if use-mgt-log-pdelay-req-interval
59        is false.";

```



```

1      reference
2      "14.8.26 of IEEE Std 802.1AS-2020";
3  }
4
5  leaf initial-log-gptp-cap-interval {
6      type int8;
7      description
8          "When use-mgt-log-gptp-cap-interval is false
9          (i.e., change with Signaling message), this is the
10         the logarithm to base 2 of the gPTP capable message
11         interval used when the port is initialized.";
12     reference
13         "14.8.27 of IEEE Std 802.1AS-2020";
14 }
15
16 leaf current-log-gptp-cap-interval {
17     type int8;
18     config false;
19     description
20         "Logarithm to base 2 of the current gPTP capable message
21         interval.";
22     reference
23         "14.8.28 of IEEE Std 802.1AS-2020";
24 }
25
26 leaf use-mgt-log-gptp-cap-interval {
27     type boolean;
28     description
29         "Boolean that determines the source of the
30         gPTP capable message interval.
31         If the value is true, the gPTP capable message interval
32         (current-log-gptp-cap-interval) is set equal to the value
33         of mgt-gptp-cap-req-interval.
34         If the value is false, the gPTP capable message interval is
35         determined by the GptpCapableMessageIntervalSetting
36         state machine (i.e., changed with Signaling message).";
37     reference
38         "14.8.29 of IEEE Std 802.1AS-2020";
39 }
40
41 leaf mgt-log-gptp-cap-interval {
42     type int8;
43     description
44         "Logarithm to base 2 of the gPTP capable message interval,
45         used if use-mgt-log-gptp-cap-interval is true.
46         This value is not used if use-mgt-log-pdelay-req-interval
47         is false.";
48     reference
49         "14.8.30 of IEEE Std 802.1AS-2020";
50 }
51
52 leaf initial-compute-rate-ratio {
53     type int8;
54     description
55         "When use-mgt-compute-rate-ratio is false
56         (i.e., change with Signaling message), this is the
57         initial value of computeNeighborRateRatio.";
58     reference
59         "14.8.31 of IEEE Std 802.1AS-2020";

```

```

1      }
2
3      leaf current-compute-rate-ratio {
4          type int8;
5          config false;
6          description
7              "Current value of computeNeighborRateRatio.";
8          reference
9              "14.8.32 of IEEE Std 802.1AS-2020";
10     }
11
12     leaf use-mgt-compute-rate-ratio {
13         type boolean;
14         description
15             "Boolean that determines the source of
16             computeNeighborRateRatio..
17             If the value is true, computeNeighborRateRatio
18             is set equal to the value of mgt-compute-rate-ratio.
19             If the value is false, computeNeighborRateRatio is
20             determined by the LinkDelayIntervalSetting
21             state machine (i.e., changed with Signaling message).";
22         reference
23             "14.8.33 of IEEE Std 802.1AS-2020";
24     }
25
26     leaf mgt-compute-rate-ratio {
27         type int8;
28         description
29             "Value of computeNeighborRateRatio, used if
30             use-mgt-compute-rate-ratio is true.
31             This value is not used if use-mgt-compute-rate-ratio
32             is false.";
33         reference
34             "14.8.34 of IEEE Std 802.1AS-2020";
35     }
36
37     leaf initial-compute-mean-link-delay {
38         type int8;
39         description
40             "When use-mgt-compute-mean-link-delay is false
41             (i.e., change with Signaling message), this is the
42             initial value of computeMeanLinkDelay.";
43         reference
44             "14.8.35 of IEEE Std 802.1AS-2020";
45     }
46
47     leaf current-compute-mean-link-delay {
48         type int8;
49         config false;
50         description
51             "Current value of computeMeanLinkDelay.";
52         reference
53             "14.8.36 of IEEE Std 802.1AS-2020";
54     }
55
56     leaf use-mgt-compute-mean-link-delay {
57         type boolean;
58         description
59             "Boolean that determines the source of

```

```

1      computeMeanLinkDelay.
2      If the value is true, computeMeanLinkDelay
3      is set equal to the value of mgt-compute-mean-link-delay.
4      If the value is false, computeMeanLinkDelay is
5      determined by the LinkDelayIntervalSetting
6      state machine (i.e., changed with Signaling message).";
7      reference
8      "14.8.37 of IEEE Std 802.1AS-2020";
9  }
10 leaf mgt-compute-mean-link-delay {
11     type int8;
12     description
13         "Value of computeMeanLinkDelay, used if
14         use-mgt-compute-mean-link-delay is true.
15         This value is not used if use-mgt-compute-mean-link-delay
16         is false.";
17     reference
18         "14.8.38 of IEEE Std 802.1AS-2020";
19 }
20 leaf allowed-lost-responses {
21     type uint8;
22     description
23         "Number of Pdelay_Req messages for which a valid response
24         is not received, above which a port is considered to not
25         be exchanging peer delay messages with its neighbor.";
26     reference
27         "14.8.39 of IEEE Std 802.1AS-2020";
28 }
29 leaf allowed-faults {
30     type uint8;
31     description
32         "Number of faults above which asCapable is set to false.";
33     reference
34         "14.8.40 of IEEE Std 802.1AS-2020";
35 }
36 leaf gptp-cap-receipt-timeout {
37     type uint8;
38     description
39         "Number of transmission intervals that a port waits without
40         receiving the gPTP capable TLV, before assuming that the
41         neighbor port is no longer invoking the gPTP protocol.";
42     reference
43         "14.8.41 of IEEE Std 802.1AS-2020";
44 }
45 leaf nup {
46     type float64;
47     description
48         "For an OLT port of an IEEE Std 802.3 EPON link, this value
49         is the effective index of refraction for the EPON
50         upstream wavelength light of the optical path";
51     reference
52         "14.8.43 of IEEE Std 802.1AS-2020";
53 }
54

```

```

1      leaf ndown {
2          type float64;
3          description
4              "For an OLT port of an IEEE 802.3 EPON link, this value
5              is the effective index of refraction for the EPON
6              downstream wavelength light of the optical path";
7          reference
8              "14.8.44 of IEEE Std 802.1AS-2020";
9      }
10     leaf one-step-tx-oper {
11         type boolean;
12         config false;
13         description
14             "This value is true if the port is sending one-step
15             Sync messages, and false if the port is sending
16             two-step Sync and Follow-Up messages.";
17         reference
18             "14.8.45 of IEEE Std 802.1AS-2020";
19     }
20     leaf one-step-receive {
21         type boolean;
22         config false;
23         description
24             "This value is true if the port is capable of
25             receiving and processing one-step Sync messages.";
26         reference
27             "14.8.46 of IEEE Std 802.1AS-2020";
28     }
29     leaf one-step-transmit {
30         type boolean;
31         config false;
32         description
33             "This value is true if the port is capable of
34             transmitting one-step Sync messages.";
35         reference
36             "14.8.47 of IEEE Std 802.1AS-2020";
37     }
38     leaf initial-one-step-tx-oper {
39         type int8;
40         description
41             "When use-mgt-one-step-tx-oper is false
42             (i.e., change with Signaling message), this is the
43             initial value of current-one-step-tx-oper.";
44         reference
45             "14.8.48 of IEEE Std 802.1AS-2020";
46     }
47     leaf current-one-step-tx-oper {
48         type int8;
49         config false;
50         description
51             "This value is true if the port is configured to
52             transmit one-step Sync messages, either via management
53             (mgt-one-step-tx-oper) or Signaling. If both
54             current-one-step-tx-oper and one-step-transmit

```

```

1         are true, the port transmits one-step Sync messages
2         (i.e., one-step-tx-oper true).";
3     reference
4         "14.8.49 of IEEE Std 802.1AS-2020";
5 }
6
7 leaf use-mgt-one-step-tx-oper {
8     type boolean;
9     description
10        "Boolean that determines the source of
11        current-one-step-tx-oper.
12        If the value is true, current-one-step-tx-oper
13        is set equal to the value of mgt-one-step-tx-oper.
14        If the value is false, current-one-step-tx-oper is
15        determined by the OneStepTxOperSetting
16        state machine (i.e., changed with Signaling message).";
17    reference
18        "14.8.50 of IEEE Std 802.1AS-2020";
19 }
20
21 leaf mgt-one-step-tx-oper {
22     type int8;
23     description
24        "If use-mgt-one-step-tx-oper is true,
25        current-one-step-tx-oper is set equal to this value.
26        This value is not used if use-mgt-one-step-tx-oper
27        is false.";
28    reference
29        "14.8.51 of IEEE Std 802.1AS-2020";
30 }
31
32 leaf sync-locked {
33     type boolean;
34     config false;
35     description
36        "This value is true if the port will transmit a Sync as
37        soon as possible after the timeReceiver port receives a Sync
38        message.";
39    reference
40        "14.8.52 of IEEE Std 802.1AS-2020";
41 }
42
43 leaf-list pdelay-truncated-timestamps {
44     type uint64 {
45         range "0..281474976710655";
46     }
47     config false;
48     description
49        "For full-duplex IEEE Std 802.3 media, and CSN media that use
50        the peer-to-peer delay mechanism to measure path delay,
51        the values of the four elements of this leaf-list correspond
52        to the timestamps t1, t2, t3, and t4, listed in that order.
53        Each timestamp is expressed in units of 2-16 ns (i.e., the
54        value of each array element is equal to the remainder obtained
55        upon dividing the respective timestamp, expressed in units of
56        2-16 ns, by 248). At any given time, the timestamp values
57        stored in the array are for the same, and most recently
58        completed, peer delay message exchange. For each timestamp,
59        only 48-bits are valid (the upper 16-bits are always zero).";

```

```

1      reference
2      "14.8.53 of IEEE Std 802.1AS-2020";
3    }
4  }
5
6  augment "/ptp:ptp/ptp:instances/ptp:instance/ptp:ports/ptp:port" {
7    description
8      "Augment to add port-statistics-ds to IEEE Std 1588 PTP Port.";
9
10   container port-statistics-ds {
11     description
12       "Provides counters associated with the port of the
13       PTP Instance.";
14     reference
15       "14.10 of IEEE Std 802.1AS-2020";
16
17     leaf rx-sync-count {
18       type yang:counter32;
19       config false;
20       description
21         "Counter that increments every time synchronization
22         information is received.";
23       reference
24         "14.10.2 of IEEE Std 802.1AS-2020";
25     }
26
27     leaf rx-one-step-sync-count {
28       type yang:counter32;
29       config false;
30       description
31         "Counter that increments every time a one-step Sync
32         message is received.";
33       reference
34         "14.10.3 of IEEE Std 802.1AS-2020";
35     }
36
37     leaf rx-follow-up-count {
38       type yang:counter32;
39       config false;
40       description
41         "Counter that increments every time a Follow_Up
42         message is received.";
43       reference
44         "14.10.4 of IEEE Std 802.1AS-2020";
45     }
46
47     leaf rx-pdelay-req-count {
48       type yang:counter32;
49       config false;
50       description
51         "Counter that increments every time a Pdelay_Req
52         message is received.";
53       reference
54         "14.10.5 of IEEE Std 802.1AS-2020";
55     }
56
57     leaf rx-pdelay-resp-count {
58       type yang:counter32;
59       config false;

```

```

1      description
2          "Counter that increments every time a Pdelay_Resp
3          message is received.";
4      reference
5          "14.10.6 of IEEE Std 802.1AS-2020";
6  }
7
8      leaf rx-pdelay-resp-follow-up-count {
9          type yang:counter32;
10         config false;
11         description
12             "Counter that increments every time a Pdelay_Resp_Follow_Up
13             message is received.";
14         reference
15             "14.10.7 of IEEE Std 802.1AS-2020";
16     }
17
18     leaf rx-announce-count {
19         type yang:counter32;
20         config false;
21         description
22             "Counter that increments every time an Announce
23             message is received.";
24         reference
25             "14.10.8 of IEEE Std 802.1AS-2020";
26     }
27
28     leaf rx-packet-discard-count {
29         type yang:counter32;
30         config false;
31         description
32             "Counter that increments every time a PTP message
33             of the respective PTP Instance is discarded.";
34         reference
35             "14.10.9 of IEEE Std 802.1AS-2020";
36     }
37
38     leaf sync-receipt-timeout-count {
39         type yang:counter32;
40         config false;
41         description
42             "Counter that increments every time a sync receipt
43             timeout occurs.";
44         reference
45             "14.10.10 of IEEE Std 802.1AS-2020";
46     }
47
48     leaf announce-receipt-timeout-count {
49         type yang:counter32;
50         config false;
51         description
52             "Counter that increments every time an announce receipt
53             timeout occurs.";
54         reference
55             "14.10.11 of IEEE Std 802.1AS-2020";
56     }
57
58     leaf pdelay-allowed-lost-exceeded-count {
59         type yang:counter32;

```

```

1      config false;
2      description
3          "Counter that increments every time the value of the
4          variable lostResponses exceeds the value of the variable
5          allowedLostResponses, in the RESET state of the
6          MDPdelayReq state machine.";
7      reference
8          "14.10.12 of IEEE Std 802.1AS-2020";
9  }
10
11  leaf tx-sync-count {
12      type yang:counter32;
13      config false;
14      description
15          "Counter that increments every time synchronization
16          information is transmitted.";
17      reference
18          "14.10.13 of IEEE Std 802.1AS-2020";
19  }
20
21  leaf tx-one-step-sync-count {
22      type yang:counter32;
23      config false;
24      description
25          "Counter that increments every time a one-step Sync
26          message is transmitted.";
27      reference
28          "14.10.14 of IEEE Std 802.1AS-2020";
29  }
30
31  leaf tx-follow-up-count {
32      type yang:counter32;
33      config false;
34      description
35          "Counter that increments every time a Follow_Up
36          message is transmitted.";
37      reference
38          "14.10.15 of IEEE Std 802.1AS-2020";
39  }
40
41  leaf tx-pdelay-req-count {
42      type yang:counter32;
43      config false;
44      description
45          "Counter that increments every time a Pdelay_Req
46          message is transmitted.";
47      reference
48          "14.10.16 of IEEE Std 802.1AS-2020";
49  }
50
51  leaf tx-pdelay-resp-count {
52      type yang:counter32;
53      config false;
54      description
55          "Counter that increments every time a Pdelay_Resp
56          message is transmitted.";
57      reference
58          "14.10.17 of IEEE Std 802.1AS-2020";
59  }

```



```

1      leaf tx-pdelay-resp-follow-up-count {
2          type yang:counter32;
3          config false;
4          description
5              "Counter that increments every time a Pdelay_Resp_Follow_Up
6              message is transmitted.";
7          reference
8              "14.10.18 of IEEE Std 802.1AS-2020";
9      }
10
11     leaf tx-announce-count {
12         type yang:counter32;
13         config false;
14         description
15             "Counter that increments every time an Announce
16             message is transmitted.";
17         reference
18             "14.10.19 of IEEE Std 802.1AS-2020";
19     }
20 }
21
22 augment "/ptp:ptp/ptp:instances/ptp:instance/ptp:ports/ptp:port" {
23     description
24         "Augment to add asymmetry-measurement-mode-ds to
25         IEEE Std 1588 PTP Port.";
26
27     container asymmetry-measurement-mode-ds {
28         description
29             "Represents the capability to enable/disable the Asymmetry
30             Compensation Measurement Procedure on a PTP Port.
31             This data set is used instead of the CMLDS
32             asymmetry-measurement-mode-ds when only a single PTP
33             Instance is present (i.e., CMLDS is not used).";
34         reference
35             "14.13 of IEEE Std 802.1AS-2020
36             Annex G of IEEE Std 802.1AS-2020";
37
38         leaf enabled {
39             type boolean;
40             description
41                 "For full-duplex IEEE Std 802.3 media, the value is true
42                 if an asymmetry measurement is being performed for the
43                 link attached to this PTP Port, and false otherwise.
44                 For all other media, the value shall be false.";
45         }
46     }
47 }
48
49 augment "/ptp:ptp/ptp:common-services/ptp:cmllds/ptp:ports/ptp:port/ptp:link-
50 port-ds" {
51     description
52         "Augment IEEE Std 1588 cmlldsLinkPortDS.
53
54         14.16.9 of IEEE Std 802.1AS-2020 specifies neighborRateRatio
55         (neighbor-rate-ratio), which is provided in YANG as the
56         semantically equivalent node in ieee1588-ptp named
57         scaled-neighbor-rate-ratio (in link-port-ds).";

```

```

1      leaf cmllds-link-port-enabled {
2          type boolean;
3          config false;
4          description
5              "Boolean that is true if both delay-mechanism is common-p2p
6              and the value of ptp-port-enabled is true, for at least one
7              PTP Port that uses the CMLDS; otherwise, the value is false.";
8          reference
9              "11.2.18.1 of IEEE Std 802.1AS-2020
10             14.16.3 of IEEE Std 802.1AS-2020";
11      }
12
13     leaf is-measuring-delay {
14         type boolean;
15         config false;
16         description
17             "This leaf is analogous to is-measuring-delay
18             for a PTP Port, but applicable to this Link Port.";
19         reference
20             "14.16.4 of IEEE Std 802.1AS-2020";
21     }
22
23     leaf as-capable-across-domains {
24         type boolean;
25         config false;
26         description
27             "This leaf is true when all PTP Instances (domains)
28             for this Link Port detect proper exchange of Pdelay
29             messages.";
30         reference
31             "11.2.2 of IEEE Std 802.1AS-2020
32             14.16.5 of IEEE Std 802.1AS-2020";
33     }
34
35     leaf mean-link-delay-thresh {
36         type ptp:time-interval;
37         description
38             "Propagation time threshold for mean-link-delay,
39             above which a Link Port is not considered capable of
40             participating in the IEEE Std 802.1AS protocol.";
41         reference
42             "14.16.7 of IEEE Std 802.1AS-2020";
43     }
44
45     leaf initial-log-pdelay-req-interval {
46         type int8;
47         description
48             "This leaf is analogous to initial-log-pdelay-req-interval
49             for a PTP Port, but applicable to this Link Port.";
50         reference
51             "14.16.10 of IEEE Std 802.1AS-2020";
52     }
53
54     leaf current-log-pdelay-req-interval {
55         type int8;
56         config false;
57         description
58             "This leaf is analogous to current-log-pdelay-req-interval

```

```

1         for a PTP Port, but applicable to this Link Port.";
2     reference
3         "14.16.11 of IEEE Std 802.1AS-2020";
4 }
5
6 leaf use-mgt-log-pdelay-req-interval {
7     type boolean;
8     description
9         "This leaf is analogous to use-mgt-log-pdelay-req-interval
10        for a PTP Port, but applicable to this Link Port.";
11    reference
12        "14.16.12 of IEEE Std 802.1AS-2020";
13 }
14
15 leaf mgt-log-pdelay-req-interval {
16     type int8;
17     description
18         "This leaf is analogous to mgt-log-pdelay-req-interval
19        for a PTP Port, but applicable to this Link Port.";
20    reference
21        "14.16.13 of IEEE Std 802.1AS-2020";
22 }
23
24 leaf initial-compute-rate-ratio {
25     type int8;
26     description
27         "This leaf is analogous to initial-compute-rate-ratio
28        for a PTP Port, but applicable to this Link Port.";
29    reference
30        "14.16.14 of IEEE Std 802.1AS-2020";
31 }
32
33 leaf current-compute-rate-ratio {
34     type int8;
35     config false;
36     description
37         "This leaf is analogous to current-compute-rate-ratio
38        for a PTP Port, but applicable to this Link Port.";
39    reference
40        "14.16.15 of IEEE Std 802.1AS-2020";
41 }
42
43 leaf use-mgt-compute-rate-ratio {
44     type boolean;
45     description
46         "This leaf is analogous to use-mgt-compute-rate-ratio
47        for a PTP Port, but applicable to this Link Port.";
48    reference
49        "14.16.16 of IEEE Std 802.1AS-2020";
50 }
51
52 leaf mgt-compute-rate-ratio {
53     type int8;
54     description
55         "This leaf is analogous to mgt-compute-rate-ratio
56        for a PTP Port, but applicable to this Link Port.";
57    reference
58        "14.16.17 of IEEE Std 802.1AS-2020";
59 }

```

```

1      leaf initial-compute-mean-link-delay {
2          type int8;
3          description
4              "This leaf is analogous to initial-compute-mean-link-delay
5              for a PTP Port, but applicable to this Link Port.";
6          reference
7              "14.16.18 of IEEE Std 802.1AS-2020";
8      }
9
10     leaf current-compute-mean-link-delay {
11         type int8;
12         config false;
13         description
14             "This leaf is analogous to current-compute-mean-link-delay
15             for a PTP Port, but applicable to this Link Port.";
16         reference
17             "14.16.19 of IEEE Std 802.1AS-2020";
18     }
19
20     leaf use-mgt-compute-mean-link-delay {
21         type boolean;
22         description
23             "This leaf is analogous to use-mgt-compute-mean-link-delay
24             for a PTP Port, but applicable to this Link Port.";
25         reference
26             "14.16.20 of IEEE Std 802.1AS-2020";
27     }
28
29     leaf mgt-compute-mean-link-delay {
30         type int8;
31         description
32             "This leaf is analogous to mgt-compute-mean-link-delay
33             for a PTP Port, but applicable to this Link Port.";
34         reference
35             "14.16.21 of IEEE Std 802.1AS-2020";
36     }
37
38     leaf allowed-lost-responses {
39         type uint8;
40         description
41             "This leaf is analogous to allowed-lost-responses
42             for a PTP Port, but applicable to this Link Port.";
43         reference
44             "14.16.22 of IEEE Std 802.1AS-2020";
45     }
46
47     leaf allowed-faults {
48         type uint8;
49         description
50             "This leaf is analogous to allowed-faults
51             for a PTP Port, but applicable to this Link Port.";
52         reference
53             "14.16.23 of IEEE Std 802.1AS-2020";
54     }
55
56     leaf-list pdelay-truncated-timestamps {
57         type uint64 {
58             range "0..281474976710655";

```

```

1      }
2      config false;
3      description
4          "This leaf is analogous to pdelay-truncated-timestamps
5          for a PTP Port, but applicable to this Link Port.";
6      reference
7          "14.16.25 of IEEE Std 802.1AS-2020";
8  }
9
10     augment "/ptp:ptp/ptp:common-services/ptp:cmllds/ptp:ports/ptp:port" {
11         description
12             "Augment to add port-statistics-ds to IEEE Std 1588 Link Port.";
13
14         container port-statistics-ds {
15             description
16                 "This container is analogous to port-statistics-ds
17                 for a PTP Port, but applicable to this Link Port.";
18             reference
19                 "14.17 of IEEE Std 802.1AS-2020";
20
21             leaf rx-pdelay-req-count {
22                 type yang:counter32;
23                 config false;
24                 description
25                     "This leaf is analogous to rx-pdelay-req-count
26                     for a PTP Port, but applicable to this Link Port.";
27                 reference
28                     "14.17.2 of IEEE Std 802.1AS-2020";
29             }
30
31             leaf rx-pdelay-resp-count {
32                 type yang:counter32;
33                 config false;
34                 description
35                     "This leaf is analogous to rx-pdelay-resp-count
36                     for a PTP Port, but applicable to this Link Port.";
37                 reference
38                     "14.17.3 of IEEE Std 802.1AS-2020";
39             }
40
41             leaf rx-pdelay-resp-follow-up-count {
42                 type yang:counter32;
43                 config false;
44                 description
45                     "This leaf is analogous to rx-pdelay-resp-follow-up-count
46                     for a PTP Port, but applicable to this Link Port.";
47                 reference
48                     "14.17.4 of IEEE Std 802.1AS-2020";
49             }
50
51             leaf rx-packet-discard-count {
52                 type yang:counter32;
53                 config false;
54                 description
55                     "This leaf is analogous to rx-packet-discard-count
56                     for a PTP Port, but applicable to this Link Port.";
57                 reference
58                     "14.17.5 of IEEE Std 802.1AS-2020";

```

```

1      }
2
3      leaf pdelay-allowed-lost-exceeded-count {
4          type yang:counter32;
5          config false;
6          description
7              "This leaf is analogous to
8              pdelay-allowed-lost-exceeded-count
9              for a PTP Port, but applicable to this Link Port.";
10         reference
11             "14.17.6 of IEEE Std 802.1AS-2020";
12     }
13
14     leaf tx-pdelay-req-count {
15         type yang:counter32;
16         config false;
17         description
18             "This leaf is analogous to tx-pdelay-req-count
19             for a PTP Port, but applicable to this Link Port.";
20         reference
21             "14.17.7 of IEEE Std 802.1AS-2020";
22     }
23
24     leaf tx-pdelay-resp-count {
25         type yang:counter32;
26         config false;
27         description
28             "This leaf is analogous to tx-pdelay-resp-count
29             for a PTP Port, but applicable to this Link Port.";
30         reference
31             "14.17.8 of IEEE Std 802.1AS-2020";
32     }
33
34     leaf tx-pdelay-resp-follow-up-count {
35         type yang:counter32;
36         config false;
37         description
38             "This leaf is analogous to tx-pdelay-resp-follow-up-count
39             for a PTP Port, but applicable to this Link Port.";
40         reference
41             "14.17.9 of IEEE Std 802.1AS-2020";
42     }
43 }
44
45 augment "/ptp:ptp/ptp:common-services/ptp:cmlds/ptp:ports/ptp:port" {
46     description
47         "Augment to add asymmetry-measurement-mode-ds to
48         IEEE Std 1588 Link Port.";
49
50     container asymmetry-measurement-mode-ds {
51         description
52             "This container is analogous to asymmetry-measurement-mode-ds
53             for a PTP Port, but applicable to this Link Port.";
54         reference
55             "14.18 of IEEE Std 802.1AS-2020";
56
57         leaf enabled {
58             type boolean;

```

```
1      description
2          "This leaf is analogous to
3          asymmetry-measurement-mode-ds.enabled
4          for a PTP Port, but applicable to this Link Port.";
5      }
6  }
7 }
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## Annex A

(normative)

### Protocol Implementation Conformance Statement (PICS) proforma<sup>3</sup>

#### A.19 Remote management

*Insert the following row at the end of the table in A.19:*

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 [ ]

<sup>3</sup> 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 F.4 c) as follows:*

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

## Annex H

(informative)

### Bibliography

*Insert the following bibliography references in alphanumeric order:*

[B40] IETF RFC 6087, Guidelines for Authors and Reviewers of YANG Data Model Documents, January 2011.

[B41] IETF RFC 6241, Network Configuration Protocol (NETCONF), June 2011.

[B42] IETF RFC 6242, Using the NETCONF Protocol over Secure Shell (SSH), June 2011.

[B43] IETF RFC 8341, Network Configuration Access Control Model, March 2018.

[B44] IETF RFC 7589, Using the NETCONF Protocol over Transport Layer Security (TLS) with Mutual X.509 Authentication, June 2015.

[B45] IETF RFC 7950, The YANG 1.1 Data Modeling Language, August 2016.

[B46] IETF RFC 8040, RESTCONF Protocol, January 2017.

[B47] IETF RFC 8340, YANG Tree Diagrams, March 2018.

[B48] IETF RFC 8575, YANG Data Model for the Precision Time Protocol (PTP).

[B49] OMG Unified Modeling Language (OMG UML), Version 2.5, March 2015.