



P802.1ASdn/D2.1

May 26, 2024

(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

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The text proper of this draft begins with the title page (1). The cover pages (a), (b), (c) etc. are for 802.1 WG information, and will be removed prior to Sponsor Ballot.

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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.]

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.¹

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

P802.1ASdn/D2.1
May 26, 2024

(Amendment to
IEEE Std 802.1AS™-2020 as modified by IEEE Std 802.1AS™-2020/Cor 1-2021 and IEEE Std
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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
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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™-2024, 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.

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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™-2024, IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems—Amendment: MIB and YANG Data Models.

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) 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) [B41] and RESTCONF [B45]. 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 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-gtp.yang` module imports the `ieee1588-ntp-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 (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-ntp-tt.yang`) contains the hierarchy (tree) of data sets and their members.

The YANG module of this clause (`ieee802-dot1as-gtp.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 [B47] 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 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 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. 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 [B48] 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-ntp-tt.yang` module is shown in white, and Clause 14 data in augments of `ieee802-dot1as-gtp.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).

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

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

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

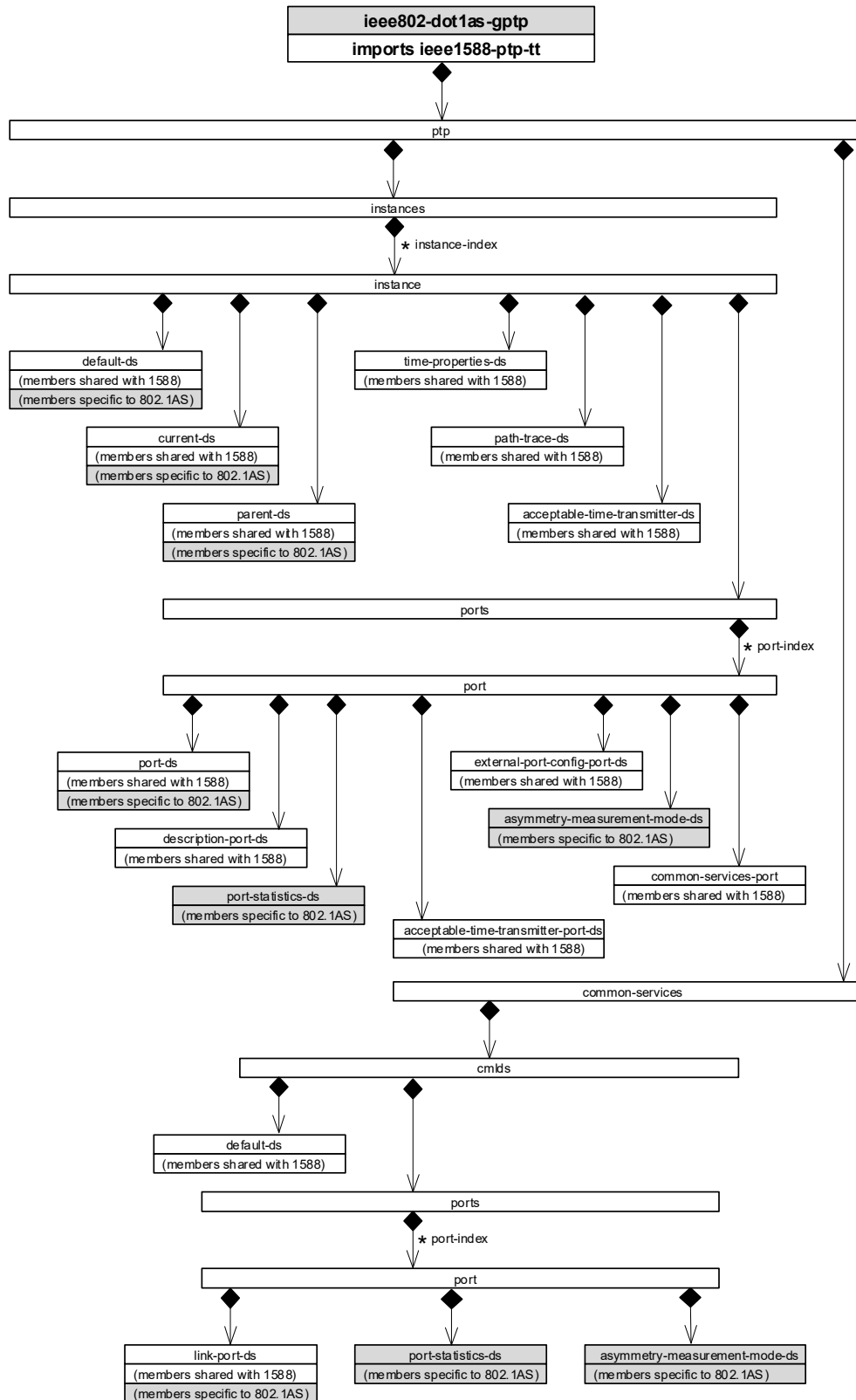


Figure 17-1—Overview of YANG tree

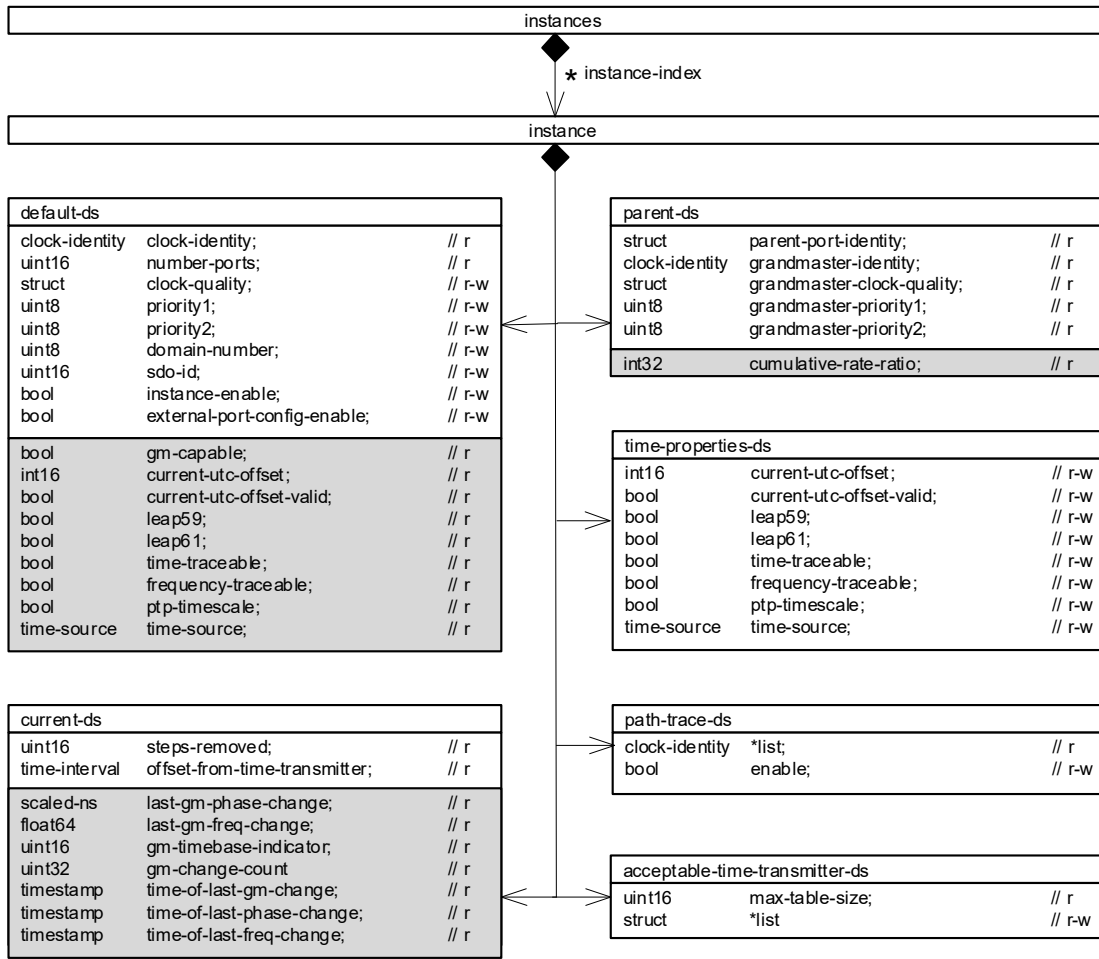


Figure 17-2—PTP Instance detail

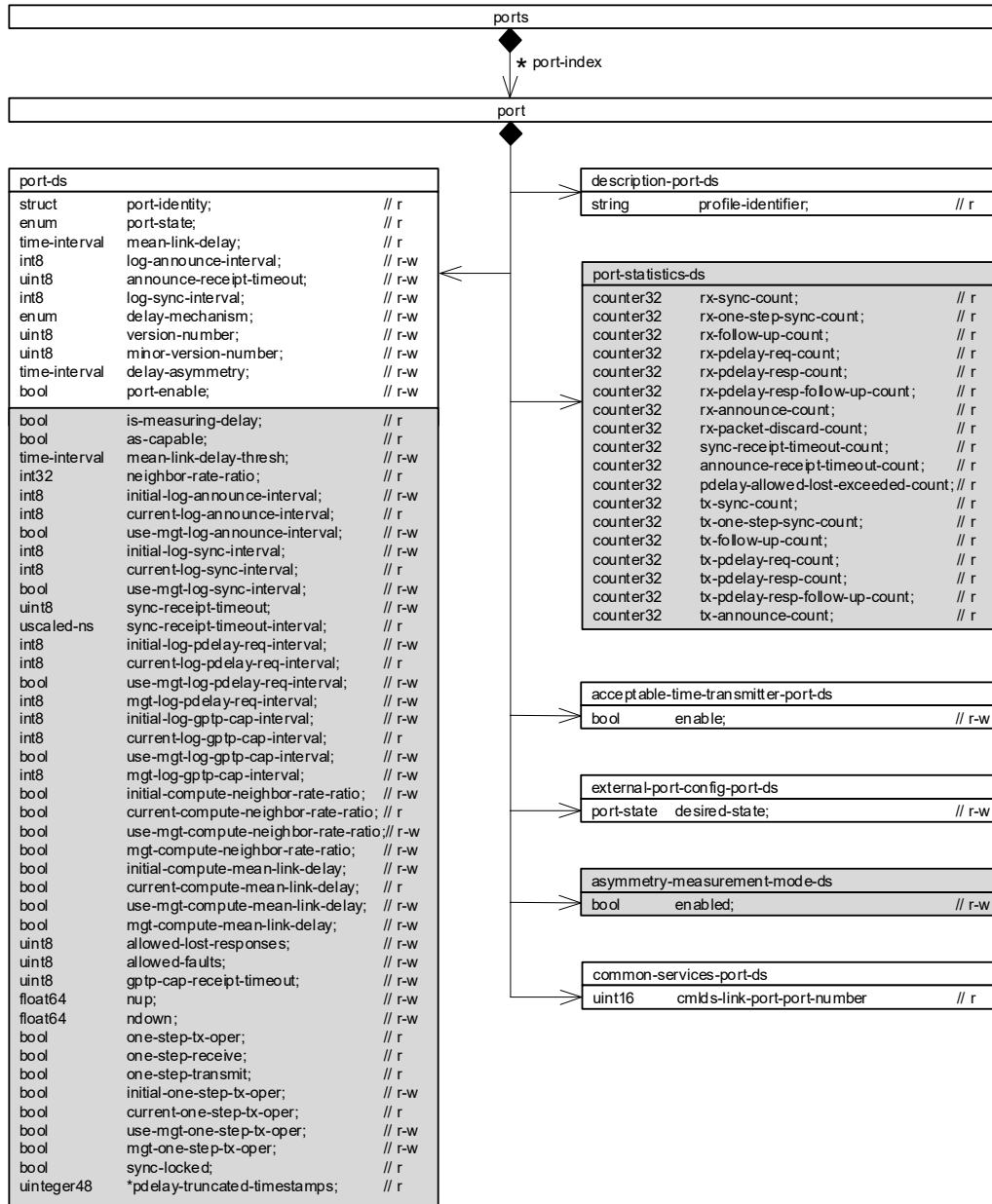


Figure 17-3—PTP Port detail

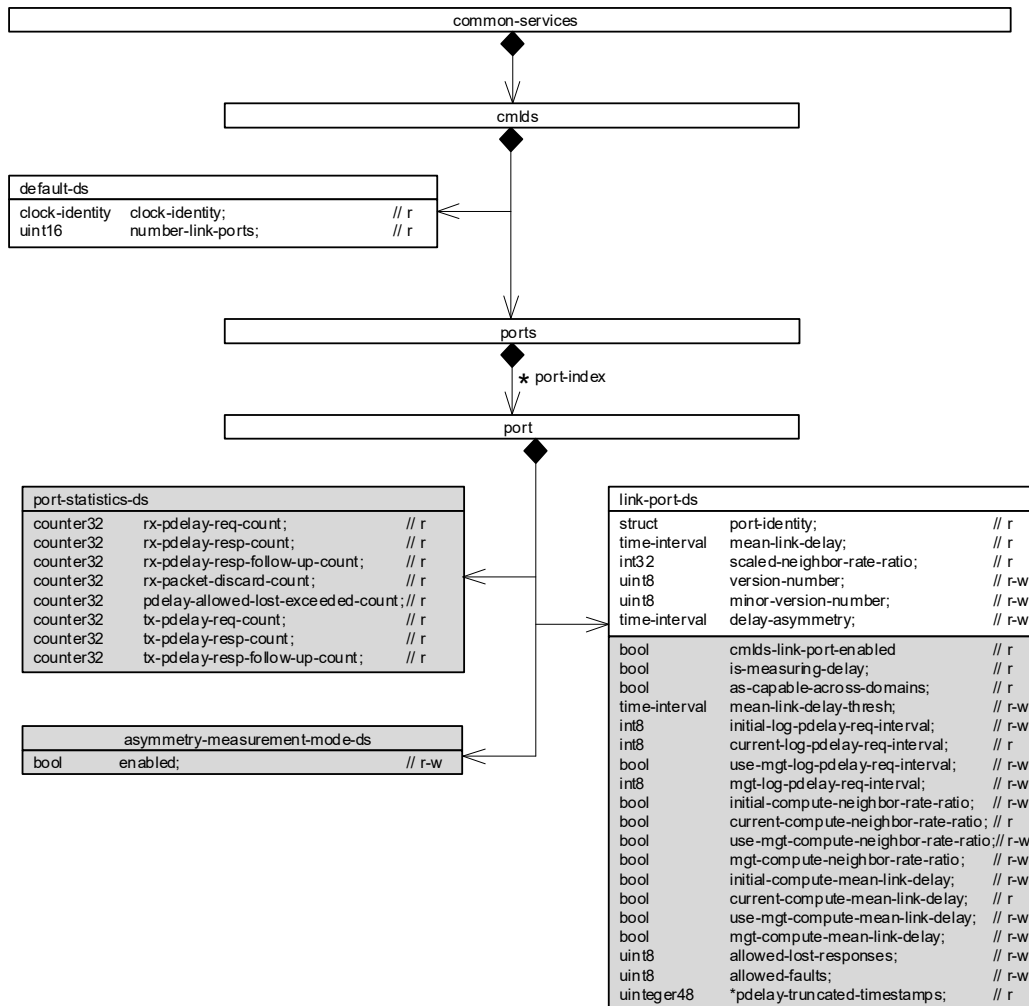


Figure 17-4—Common services detail

17.3 Structure of 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 occur, 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 ([B41]) and RESTCONF ([B45]). 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 [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-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/cmlsds/ports/port/link-port-ds
/ptp-tt/common-services/cmlsds/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 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 [B46]).

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
```

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```

1      +--ro gm-timebase-indicator?          uint16
2      +--ro gm-change-count?                yang:counter32
3      +--ro time-of-last-gm-change?         yang:timestamp
4      +--ro time-of-last-phase-change?      yang:timestamp
5      +--ro time-of-last-freq-change?       yang:timestamp
6      augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:parent-ds:
7          +--ro cumulative-rate-ratio?      int32
8      augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:ports/ptp-tt:port/
9      ptp-tt:port-ds:
10         +--ro is-measuring-delay?          boolean
11         +--ro as-capable?                  boolean
12         +--rw mean-link-delay-thresh?      ptp-tt:time-interval
13         +--ro neighbor-rate-ratio?         int32
14         +--rw initial-log-announce-interval? int8
15         +--ro current-log-announce-interval? int8
16         +--rw use-mgt-log-announce-interval? boolean
17         +--rw initial-log-sync-interval?   int8
18         +--ro current-log-sync-interval?   int8
19         +--rw use-mgt-log-sync-interval?   boolean
20         +--rw sync-receipt-timeout?        uint8
21         +--ro sync-receipt-timeout-interval? unscaled-ns
22         +--rw initial-log-pdelay-req-interval? int8
23         +--ro current-log-pdelay-req-interval? int8
24         +--rw use-mgt-log-pdelay-req-interval? boolean
25         +--rw mgt-log-pdelay-req-interval? int8
26         +--rw initial-log-gptp-cap-interval? int8
27         +--ro current-log-gptp-cap-interval? int8
28         +--rw use-mgt-log-gptp-cap-interval? boolean
29         +--rw mgt-log-gptp-cap-interval?   int8
30         +--rw initial-compute-neighbor-rate-ratio? boolean
31         +--ro current-compute-neighbor-rate-ratio? boolean
32         +--rw use-mgt-compute-neighbor-rate-ratio? boolean
33         +--rw mgt-compute-neighbor-rate-ratio? boolean
34         +--rw initial-compute-mean-link-delay? boolean
35         +--ro current-compute-mean-link-delay? boolean
36         +--rw use-mgt-compute-mean-link-delay? boolean
37         +--rw mgt-compute-mean-link-delay? boolean
38         +--rw allowed-lost-responses?      uint8
39         +--rw allowed-faults?              uint8
40         +--rw gptp-cap-receipt-timeout?    uint8
41         +--rw nup?                         float64
42         +--rw ndown?                       float64
43         +--ro one-step-tx-oper?            boolean
44         +--ro one-step-recv?               boolean
45         +--ro one-step-transmit?           boolean
46         +--rw initial-one-step-tx-oper?    boolean
47         +--ro current-one-step-tx-oper?    boolean
48         +--rw use-mgt-one-step-tx-oper?    boolean
49         +--rw mgt-one-step-tx-oper?        boolean
50         +--ro sync-locked?                 boolean
51         +--ro pdelay-truncated-timestamps* integer48
52      augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:ports/ptp-tt:port:
53          +--rw port-statistics-ds
54              +--ro rx-sync-count?          yang:counter32
55              +--ro rx-one-step-sync-count? yang:counter32
56              +--ro rx-follow-up-count?     yang:counter32
57              +--ro rx-pdelay-req-count?    yang:counter32
58              +--ro rx-pdelay-resp-count?   yang:counter32
59              +--ro rx-pdelay-resp-follow-up-count? yang:counter32

```

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```

1      +--ro rx-announce-count?                yang:counter32
2      +--ro rx-packet-discard-count?           yang:counter32
3      +--ro sync-receipt-timeout-count?        yang:counter32
4      +--ro announce-receipt-timeout-count?    yang:counter32
5      +--ro pdelay-allowed-lost-exceeded-count? yang:counter32
6      +--ro tx-sync-count?                     yang:counter32
7      +--ro tx-one-step-sync-count?            yang:counter32
8      +--ro tx-follow-up-count?                yang:counter32
9      +--ro tx-pdelay-req-count?               yang:counter32
10     +--ro tx-pdelay-resp-count?              yang:counter32
11     +--ro tx-pdelay-resp-follow-up-count?    yang:counter32
12     +--ro tx-announce-count?                 yang:counter32
13     augment /ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:ports/ptp-tt:port:
14       +--rw asymmetry-measurement-mode-ds
15       +--rw enabled?    boolean
16       augment /ptp-tt:ptp/ptp-tt:common-services/ptp-tt:cmls/ptp-tt:ports/ptp-
17       tt:port/ptp-tt:link-port-ds:
18         +--ro cmls-link-port-enabled?        boolean
19         +--ro is-measuring-delay?             boolean
20         +--ro as-capable-across-domains?      boolean
21         +--rw mean-link-delay-thresh?         ptp-tt:time-interval
22         +--rw initial-log-pdelay-req-interval? int8
23         +--ro current-log-pdelay-req-interval? int8
24         +--rw use-mgt-log-pdelay-req-interval? boolean
25         +--rw mgt-log-pdelay-req-interval?    int8
26         +--rw initial-compute-neighbor-rate-ratio? boolean
27         +--ro current-compute-neighbor-rate-ratio? boolean
28         +--rw use-mgt-compute-neighbor-rate-ratio? boolean
29         +--rw mgt-compute-neighbor-rate-ratio? boolean
30         +--ro initial-compute-mean-link-delay? boolean
31         +--ro current-compute-mean-link-delay? boolean
32         +--rw use-mgt-compute-mean-link-delay? boolean
33         +--rw mgt-compute-mean-link-delay?    boolean
34         +--rw allowed-lost-responses?         uint8
35         +--rw allowed-faults?                 uint8
36         +--ro pdelay-truncated-timestamps*    uinteger48
37         augment /ptp-tt:ptp/ptp-tt:common-services/ptp-tt:cmls/ptp-tt:ports/ptp-
38         tt:port:
39           +--rw port-statistics-ds
40             +--ro rx-pdelay-req-count?        yang:counter32
41             +--ro rx-pdelay-resp-count?       yang:counter32
42             +--ro rx-pdelay-resp-follow-up-count? yang:counter32
43             +--ro rx-packet-discard-count?    yang:counter32
44             +--ro pdelay-allowed-lost-exceeded-count? yang:counter32
45             +--ro tx-pdelay-req-count?        yang:counter32
46             +--ro tx-pdelay-resp-count?       yang:counter32
47             +--ro tx-pdelay-resp-follow-up-count? yang:counter32
48             augment /ptp-tt:ptp/ptp-tt:common-services/ptp-tt:cmls/ptp-tt:ports/ptp-
49             tt:port:
50               +--rw asymmetry-measurement-mode-ds
51               +--rw enabled?    boolean
52
53
54

```


17.6 YANG module^{1 2}

The YANG module specified by IEEE Std 1588e (ieee1588-ptp-tt.yang) serves as the foundation of the YANG³ 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;
  }
  import ieee1588-ptp-tt {
    prefix ptp-tt;
  }
  organization
    "IEEE 802.1 Working Group";
  contact
    "WG-URL: http://ieee802.org/1/
    WG-EMail: stds-802-1-1@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 2024-05-08 {
    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-2023, 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}";
```

¹Copyright 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.

²An 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/>.

³An ASCII version of IEEE Std 1588 can be obtained from <https://github.com/YangModels/yang/tree/main/standard/ieee/published/1588>.

```

1      }
2      description
3          "The IEEE Std 802.1AS ScaledNs type represents signed values of
4          time and time interval in units of 2^16 ns, as a signed 96-bit
5          integer. Each of the 12 octets is represented as a pair of
6          hexadecimal characters, using uppercase for a letter. Octets are
7          separated by a dash character. The most significant octet is first.";
8      reference
9          "6.4.3.1 of IEEE Std 802.1AS";
10     }
11     typedef unscaled-ns {
12         type string {
13             pattern "[0-9A-F]{2}(-[0-9A-F]{2}){11}";
14         }
15         description
16             "The IEEE Std 802.1AS UScaledNs type represents unsigned values of
17             time and time interval in units of 2^16 ns, as an unsigned 96-bit
18             integer. Each of the 12 octets is represented as a pair of
19             hexadecimal characters, using uppercase for a letter. Octets are
20             separated by a dash character. The most significant octet is first.";
21         reference
22             "6.4.3.2 of IEEE Std 802.1AS";
23     }
24     typedef float64 {
25         type string {
26             pattern "[0-9A-F]{2}(-[0-9A-F]{2}){7}";
27         }
28         description
29             "The IEEE Std 802.1AS Float64 type represents IEEE Std 754
30             binary64. Each of the 8 octets is represented as a pair of
31             hexadecimal characters, using uppercase for a letter. Octets are
32             separated by a dash character. The most significant octet is first.";
33         reference
34             "6.4.2 of IEEE Std 802.1AS";
35     }
36     typedef uinteger48 {
37         type uint64 {
38             range "0..281474976710655";
39         }
40         description
41             "48-bit unsigned integer data type.";
42         reference
43             "6.4.2 of IEEE Std 802.1AS";
44     }
45     augment
46         "/ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:default-ds" {
47             description
48                 "Augment IEEE Std 1588 defaultDS.";
49             leaf gm-capable {
50                 type boolean;
51                 config false;
52                 description
53                     "The value is true if the time-aware system is capable of being a
54                     grandmaster, and false if the time-aware system is not capable of
55                     being a grandmaster.";
56                 reference
57                     "14.2.7 of IEEE Std 802.1AS";
58             }
59             leaf current-utc-offset {

```

```

1      when
2          "../current-utc-offset-valid='true'";
3      type int16;
4      config false;
5      description
6          "Offset from UTC (TAI - UTC). The offset is in units of seconds.
7          This leaf applies to the ClockTimeTransmitter entity (i.e., local
8          only, unrelated to a remote GM).";
9      reference
10         "14.2.8 of IEEE Std 802.1AS";
11 }
12 leaf current-utc-offset-valid {
13     type boolean;
14     config false;
15     description
16         "The value of current-utc-offset-valid shall be true if the value
17         of current-utc-offset is known to be correct, otherwise it shall
18         be false. This leaf applies to the ClockTimeTransmitter entity
19         (i.e., local only, unrelated to a remote GM).";
20     reference
21         "14.2.9 of IEEE Std 802.1AS";
22 }
23 leaf leap59 {
24     type boolean;
25     config false;
26     description
27         "If the timescale is PTP, a true value for leap59 shall indicate
28         that the last minute of the current UTC day contains 59 seconds.
29         If the timescale is not PTP, the value shall be false. This leaf
30         applies to the ClockTimeTransmitter entity (i.e., local only,
31         unrelated to a remote GM).";
32     reference
33         "14.2.10 of IEEE Std 802.1AS";
34 }
35 leaf leap61 {
36     type boolean;
37     config false;
38     description
39         "If the timescale is PTP, a true value for leap61 shall indicate
40         that the last minute of the current UTC day contains 61 seconds.
41         If the timescale is not PTP, the value shall be false. This leaf
42         applies to the ClockTimeTransmitter entity (i.e., local only,
43         unrelated to a remote GM).";
44     reference
45         "14.2.11 of IEEE Std 802.1AS";
46 }
47 leaf time-traceable {
48     type boolean;
49     config false;
50     description
51         "The value of time-traceable shall be true if the timescale is
52         traceable to a primary reference; otherwise, the value shall be
53         false. This leaf applies to the ClockTimeTransmitter entity
54         (i.e., local only, unrelated to a remote GM).";
55     reference
56         "14.2.12 of IEEE Std 802.1AS";
57 }
58 leaf frequency-traceable {
59     type boolean;

```

```

1      config false;
2      description
3          "The value of frequency-traceable shall be true if the frequency
4          determining the timescale is traceable to a primary reference;
5          otherwise, the value shall be false. This leaf applies to the
6          ClockTimeTransmitter entity (i.e., local only, unrelated to a
7          remote GM).";
8      reference
9          "14.2.13 of IEEE Std 802.1AS";
10     }
11     leaf ptp-timescale {
12         type boolean;
13         config false;
14         description
15             "If ptp-timescale is true, the timescale of the
16             ClockTimeTransmitter entity is PTP, which is the elapsed time
17             since the PTP epoch measured using the second defined by
18             International Atomic Time (TAI). If ptp-timescale is false, the
19             timescale of the ClockTimeTransmitter entity is ARB, which is the
20             elapsed time since an arbitrary epoch. This leaf applies to the
21             ClockTimeTransmitter entity (i.e., local only, unrelated to a
22             remote GM).";
23         reference
24             "14.2.14 of IEEE Std 802.1AS";
25     }
26     leaf time-source {
27         type identityref {
28             base ptp-tt:time-source;
29         }
30         config false;
31         description
32             "The source of time used by the Grandmaster Clock This leaf
33             applies to the ClockTimeTransmitter entity (i.e., local only,
34             unrelated to a remote GM).";
35         reference
36             "14.2.15 of IEEE Std 802.1AS";
37     }
38 }
39 augment
40     "/ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:current-ds" {
41         description
42             "Augment IEEE Std 1588 currentDS.";
43         leaf last-gm-phase-change {
44             type scaled-ns;
45             config false;
46             description
47                 "Phase change that occurred on the most recent change in either
48                 the Grandmaster PTP Instance or gm-timebase-indicator leaf.";
49             reference
50                 "14.3.4 of IEEE Std 802.1AS";
51         }
52         leaf last-gm-freq-change {
53             type float64;
54             config false;
55             description
56                 "Frequency change that occurred on the most recent change in
57                 either the Grandmaster PTP Instance or gm-timebase-indicator
58                 leaf.";
59             reference

```

```

1      "14.3.5 of IEEE Std 802.1AS";
2    }
3    leaf gm-timebase-indicator {
4      type uint16;
5      config false;
6      description
7        "The timeBaseIndicator of the current Grandmaster PTP Instance.";
8      reference
9        "14.3.6 of IEEE Std 802.1AS";
10   }
11   leaf gm-change-count {
12     type yang:counter32;
13     config false;
14     description
15       "This statistics counter tracks the number of times the
16       Grandmaster PTP Instance has changed in a gPTP domain.";
17     reference
18       "14.3.7 of IEEE Std 802.1AS";
19   }
20   leaf time-of-last-gm-change {
21     type yang:timestamp;
22     config false;
23     description
24       "System time when the most recent Grandmaster Clock change
25       occurred in a gPTP domain. This leaf's type is YANG timestamp,
26       which is based on system time. System time is an unsigned integer
27       in units of 10 milliseconds, using an epoch defined by the
28       implementation (typically time of boot-up).";
29     reference
30       "14.3.8 of IEEE Std 802.1AS";
31   }
32   leaf time-of-last-phase-change {
33     type yang:timestamp;
34     config false;
35     description
36       "System time when the most recent change in Grandmaster Clock
37       phase occurred. This leaf's type is YANG timestamp, which is
38       based on system time. System time is an unsigned integer in units
39       of 10 milliseconds, using an epoch defined by the implementation
40       (typically time of boot-up).";
41     reference
42       "14.3.9 of IEEE Std 802.1AS";
43   }
44   leaf time-of-last-freq-change {
45     type yang:timestamp;
46     config false;
47     description
48       "System time when the most recent change in Grandmaster Clock
49       frequency occurred. This leaf's type is YANG timestamp, which is
50       based on system time. System time is an unsigned integer in units
51       of 10 milliseconds, using an epoch defined by the implementation
52       (typically time of boot-up).";
53     reference
54       "14.3.10 of IEEE Std 802.1AS";
55   }
56 }
57 augment "/ptp-tt:ptp/ptp-tt:instances/ptp-tt:instance/ptp-tt:parent-ds" {
58   description
59     "Augment IEEE Std 1588 parentDS.";

```

```

1      leaf cumulative-rate-ratio {
2          type int32;
3          config false;
4          description
5              "Estimate of the ratio of the frequency of the Grandmaster Clock
6              to the frequency of the LocalClock entity of this PTP Instance.
7              cumulative-rate-ratio is expressed as the fractional frequency
8              offset multiplied by 2^41, i.e., the quantity (rateRatio -
9              1.0) (2^41).";
10         reference
11             "14.4.3 of IEEE Std 802.1AS";
12     }
13     augment
14         "/ptp-tt:ptp"+
15         "/ptp-tt:instances"+
16         "/ptp-tt:instance"+
17         "/ptp-tt:ports"+
18         "/ptp-tt:port"+
19         "/ptp-tt:port-ds" {
20         description
21             "Augment IEEE Std 1588 portDS.
22
23             14.8.4 of IEEE Std 802.1AS specifies ptpPortEnabled
24             (ptp-port-enabled), which is provided in YANG as the semantically
25             equivalent node in ieee1588-ptp-tt named port-enable (in port-ds).
26
27             14.8.15 of IEEE Std 802.1AS specifies
28             mgtSettableLogAnnounceInterval (mgt-log-announce-interval), which
29             is provided in YANG as the semantically equivalent node in
30             ieee1588-ptp-tt named log-announce-interval (in port-ds). In the
31             context of IEEE Std 802.1AS, log-announce-interval cannot be used
32             unless use-mgt-log-announce-interval is true.
33
34             14.8.20 of IEEE Std 802.1AS specifies mgtSettableLogSyncInterval
35             (mgt-log-sync-interval), which is provided in YANG as the
36             semantically equivalent node in ieee1588-ptp-tt named
37             log-sync-interval (in port-ds). In the context of IEEE Std 802.1AS,
38             log-sync-interval cannot be used unless use-mgt-log-sync-interval
39             is true.";
40         leaf is-measuring-delay {
41             type boolean;
42             config false;
43             description
44                 "Boolean that is true if the port is measuring PTP Link
45                 propagation delay.";
46             reference
47                 "14.8.6 of IEEE Std 802.1AS";
48         }
49         leaf as-capable {
50             type boolean;
51             config false;
52             description
53                 "Boolean that is true if and only if it is determined that this
54                 PTP Instance and the PTP Instance at the other end of the link
55                 attached to this port can interoperate with each other via the
56                 IEEE Std 802.1AS protocol.";
57             reference
58                 "10.2.5.1 of IEEE Std 802.1AS

```

```

1      14.8.7 of IEEE Std 802.1AS";
2    }
3    leaf mean-link-delay-thresh {
4      type ptp-tt:time-interval;
5      description
6        "Propagation time threshold for mean-link-delay, above which a
7        port is not considered capable of participating in the IEEE Std
8        802.1AS protocol.";
9      reference
10       "14.8.9 of IEEE Std 802.1AS";
11    }
12    leaf neighbor-rate-ratio {
13      type int32;
14      config false;
15      description
16        "Estimate of the ratio of the frequency of the LocalClock entity
17        of the PTP Instance at the other end of the link attached to this
18        PTP Port, to the frequency of the LocalClock entity of this PTP
19        Instance. neighbor-rate-ratio is expressed as the fractional
20        frequency offset multiplied by 2^41, i.e., the quantity
21        (rateRatio - 1.0) (2^41).";
22      reference
23       "14.8.11 of IEEE Std 802.1AS";
24    }
25    leaf initial-log-announce-interval {
26      type int8;
27      description
28        "When use-mgt-log-announce-interval is false (i.e., change with
29        Signaling message), this is the the logarithm to base 2 of the
30        announce interval used when the port is initialized.";
31      reference
32       "14.8.12 of IEEE Std 802.1AS";
33    }
34    leaf current-log-announce-interval {
35      type int8;
36      config false;
37      description
38        "Logarithm to base 2 of the current announce interval.";
39      reference
40       "14.8.13 of IEEE Std 802.1AS";
41    }
42    leaf use-mgt-log-announce-interval {
43      type boolean;
44      description
45        "Boolean that determines the source of the announce interval. If
46        the value is true, the announce interval
47        (current-log-announce-interval) is set equal to the value of
48        mgt-log-announce-interval. If the value is false, the announce
49        interval is determined by the AnnounceIntervalSetting state
50        machine (i.e., changed with Signaling message).";
51      reference
52       "14.8.14 of IEEE Std 802.1AS";
53    }
54    leaf initial-log-sync-interval {
55      type int8;
56      description
57        "When use-mgt-log-sync-interval is false (i.e., change with
58        Signaling message), this is the the logarithm to base 2 of the
59        sync interval used when the port is initialized.";

```

```

1      reference
2      "14.8.17 of IEEE Std 802.1AS";
3  }
4  leaf current-log-sync-interval {
5      type int8;
6      config false;
7      description
8          "Logarithm to base 2 of the current sync interval.";
9      reference
10     "14.8.18 of IEEE Std 802.1AS";
11 }
12 leaf use-mgt-log-sync-interval {
13     type boolean;
14     description
15         "Boolean that determines the source of the sync interval. If the
16         value is true, the sync interval (current-log-sync-interval) is
17         set equal to the value of mgt-log-sync-interval. If the value is
18         false, the sync interval is determined by the SyncIntervalSetting
19         state machine (i.e., changed with Signaling message).";
20     reference
21         "14.8.19 of IEEE Std 802.1AS";
22 }
23 leaf sync-receipt-timeout {
24     type uint8;
25     description
26         "Number of sync intervals that a timeReceiver port waits without
27         receiving synchronization information, before assuming that the
28         timeTransmitter is no longer transmitting synchronization
29         information and that the BTCA needs to be run, if appropriate.";
30     reference
31         "14.8.21 of IEEE Std 802.1AS";
32 }
33 leaf sync-receipt-timeout-interval {
34     type uscaled-ns;
35     config false;
36     description
37         "Time interval after which sync receipt timeout occurs if
38         time-synchronization information has not been received during the
39         interval.";
40     reference
41         "14.8.22 of IEEE Std 802.1AS";
42 }
43 leaf initial-log-pdelay-req-interval {
44     type int8;
45     description
46         "When use-mgt-log-pdelay-req-interval is false (i.e., change with
47         Signaling message), this is the the logarithm to base 2 of the
48         Pdelay_Req transmit interval used when the port is initialized.";
49     reference
50         "14.8.23 of IEEE Std 802.1AS";
51 }
52 leaf current-log-pdelay-req-interval {
53     type int8;
54     config false;
55     description
56         "Logarithm to base 2 of the current Pdelay_Req transmit interval.";
57     reference
58         "14.8.24 of IEEE Std 802.1AS";
59 }

```



```

1      leaf use-mgt-log-pdelay-req-interval {
2          type boolean;
3          description
4              "Boolean that determines the source of the Pdelay_Req transmit
5              interval. If the value is true, the Pdelay_Req transmit interval
6              (current-log-pdelay-req-interval) is set equal to the value of
7              mgt-log-pdelay-req-interval. If the value is false, the
8              Pdelay_Req transmit interval is determined by the
9              LinkDelayIntervalSetting state machine (i.e., changed with
10             Signaling message).";
11         reference
12             "14.8.25 of IEEE Std 802.1AS";
13     }
14     leaf mgt-log-pdelay-req-interval {
15         type int8;
16         description
17             "Logarithm to base 2 of the Pdelay_Req transmit interval, used if
18             use-mgt-log-pdelay-req-interval is true. This value is not used
19             if use-mgt-log-pdelay-req-interval is false.";
20         reference
21             "14.8.26 of IEEE Std 802.1AS";
22     }
23     leaf initial-log-gtp-cap-interval {
24         type int8;
25         description
26             "When use-mgt-log-gtp-cap-interval is false (i.e., change with
27             Signaling message), this is the the logarithm to base 2 of the
28             gTP capable message interval used when the port is initialized.";
29         reference
30             "14.8.27 of IEEE Std 802.1AS";
31     }
32     leaf current-log-gtp-cap-interval {
33         type int8;
34         config false;
35         description
36             "Logarithm to base 2 of the current gTP capable message
37             interval.";
38         reference
39             "14.8.28 of IEEE Std 802.1AS";
40     }
41     leaf use-mgt-log-gtp-cap-interval {
42         type boolean;
43         description
44             "Boolean that determines the source of the gTP capable message
45             interval. If the value is true, the gTP capable message interval
46             (current-log-gtp-cap-interval) is set equal to the value of
47             mgt-gtp-cap-req-interval. If the value is false, the gTP
48             capable message interval is determined by the
49             GtpCapableMessageIntervalSetting state machine (i.e., changed
50             with Signaling message).";
51         reference
52             "14.8.29 of IEEE Std 802.1AS";
53     }
54     leaf mgt-log-gtp-cap-interval {
55         type int8;
56         description
57             "Logarithm to base 2 of the gTP capable message interval, used
58             if use-mgt-log-gtp-cap-interval is true. This value is not used
59             if use-mgt-log-pdelay-req-interval is false.";

```

```

1      reference
2      "14.8.30 of IEEE Std 802.1AS";
3  }
4  leaf initial-compute-neighbor-rate-ratio {
5      type boolean;
6      description
7          "When use-mgt-compute-neighbor-rate-ratio is false (i.e., change
8          with Signaling message), this is the initial value of
9          computeNeighborRateRatio.";
10     reference
11         "14.8.31 of IEEE Std 802.1AS";
12 }
13 leaf current-compute-neighbor-rate-ratio {
14     type boolean;
15     config false;
16     description
17         "Current value of computeNeighborRateRatio.";
18     reference
19         "14.8.32 of IEEE Std 802.1AS";
20 }
21 leaf use-mgt-compute-neighbor-rate-ratio {
22     type boolean;
23     description
24         "Boolean that determines the source of computeNeighborRateRatio..
25         If the value is true, computeNeighborRateRatio is set equal to
26         the value of mgt-compute-neighbor-rate-ratio. If the value is
27         false, computeNeighborRateRatio is determined by the
28         LinkDelayIntervalSetting state machine (i.e., changed with
29         Signaling message).";
30     reference
31         "14.8.33 of IEEE Std 802.1AS";
32 }
33 leaf mgt-compute-neighbor-rate-ratio {
34     type boolean;
35     description
36         "Value of computeNeighborRateRatio, used if
37         use-mgt-compute-neighbor-rate-ratio is true. This value is not
38         used if use-mgt-compute-neighbor-rate-ratio is false.";
39     reference
40         "14.8.34 of IEEE Std 802.1AS";
41 }
42 leaf initial-compute-mean-link-delay {
43     type boolean;
44     description
45         "When use-mgt-compute-mean-link-delay is false (i.e., change with
46         Signaling message), this is the initial value of
47         computeMeanLinkDelay.";
48     reference
49         "14.8.35 of IEEE Std 802.1AS";
50 }
51 leaf current-compute-mean-link-delay {
52     type boolean;
53     config false;
54     description
55         "Current value of computeMeanLinkDelay.";
56     reference
57         "14.8.36 of IEEE Std 802.1AS";
58 }
59 leaf use-mgt-compute-mean-link-delay {

```

```

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

```

```

1      light of the optical path";
2      reference
3      "14.8.44 of IEEE Std 802.1AS";
4  }
5  leaf one-step-tx-oper {
6      type boolean;
7      config false;
8      description
9          "This value is true if the port is sending one-step Sync
10         messages, and false if the port is sending two-step Sync and
11         Follow-Up messages.";
12      reference
13          "14.8.45 of IEEE Std 802.1AS";
14  }
15  leaf one-step-receive {
16      type boolean;
17      config false;
18      description
19          "This value is true if the port is capable of receiving and
20         processing one-step Sync messages.";
21      reference
22          "14.8.46 of IEEE Std 802.1AS";
23  }
24  leaf one-step-transmit {
25      type boolean;
26      config false;
27      description
28          "This value is true if the port is capable of transmitting
29         one-step Sync messages.";
30      reference
31          "14.8.47 of IEEE Std 802.1AS";
32  }
33  leaf initial-one-step-tx-oper {
34      type boolean;
35      description
36          "When use-mgt-one-step-tx-oper is false (i.e., change with
37         Signaling message), this is the initial value of
38         current-one-step-tx-oper.";
39      reference
40          "14.8.48 of IEEE Std 802.1AS";
41  }
42  leaf current-one-step-tx-oper {
43      type boolean;
44      config false;
45      description
46          "This value is true if the port is configured to transmit
47         one-step Sync messages, either via management
48         (mgt-one-step-tx-oper) or Signaling. If both
49         current-one-step-tx-oper and one-step-transmit are true, the port
50         transmits one-step Sync messages (i.e., one-step-tx-oper true).";
51      reference
52          "14.8.49 of IEEE Std 802.1AS";
53  }
54  leaf use-mgt-one-step-tx-oper {
55      type boolean;
56      description
57          "Boolean that determines the source of current-one-step-tx-oper.
58         If the value is true, current-one-step-tx-oper is set equal to
59         the value of mgt-one-step-tx-oper. If the value is false,

```

```

1         current-one-step-tx-oper is determined by the
2         OneStepTxOperSetting state machine (i.e., changed with Signaling
3         message).";
4         reference
5         "14.8.50 of IEEE Std 802.1AS";
6     }
7     leaf mgt-one-step-tx-oper {
8         type boolean;
9         description
10            "If use-mgt-one-step-tx-oper is true, current-one-step-tx-oper is
11            set equal to this value. This value is not used if
12            use-mgt-one-step-tx-oper is false.";
13         reference
14            "14.8.51 of IEEE Std 802.1AS";
15     }
16     leaf sync-locked {
17         type boolean;
18         config false;
19         description
20            "This value is true if the port will transmit a Sync as soon as
21            possible after the timeReceiver port receives a Sync message.";
22         reference
23            "14.8.52 of IEEE Std 802.1AS";
24     }
25     leaf-list pdelay-truncated-timestamps {
26         type uinteger48;
27         config false;
28         description
29            "For full-duplex IEEE Std 802.3 media, and CSN media that use the
30            peer-to-peer delay mechanism to measure path delay, the values of
31            the four elements of this leaf-list correspond to the timestamps
32            t1, t2, t3, and t4, listed in that order. Each timestamp is
33            expressed in units of 2-16 ns (i.e., the value of each array
34            element is equal to the remainder obtained upon dividing the
35            respective timestamp, expressed in units of 2-16 ns, by 248).
36            At any given time, the timestamp values stored in the array are
37            for the same, and most recently completed, peer delay message
38            exchange. For each timestamp, only 48-bits are valid (the upper
39            16-bits are always zero).";
40         reference
41            "14.8.53 of IEEE Std 802.1AS";
42     }
43 }
44 augment
45     "/ptp-tt:ptp"+
46     "/ptp-tt:instances"+
47     "/ptp-tt:instance"+
48     "/ptp-tt:ports"+
49     "/ptp-tt:port" {
50     description
51         "Augment to add port-statistics-ds to IEEE Std 1588 PTP Port.";
52     container port-statistics-ds {
53         description
54             "Provides counters associated with the port of the PTP Instance.";
55         reference
56             "14.10 of IEEE Std 802.1AS";
57         leaf rx-sync-count {
58             type yang:counter32;
59             config false;

```

```

1      description
2          "Counter that increments every time synchronization information
3          is received.";
4      reference
5          "14.10.2 of IEEE Std 802.1AS";
6  }
7  leaf rx-one-step-sync-count {
8      type yang:counter32;
9      config false;
10     description
11         "Counter that increments every time a one-step Sync message is
12         received.";
13     reference
14         "14.10.3 of IEEE Std 802.1AS";
15 }
16 leaf rx-follow-up-count {
17     type yang:counter32;
18     config false;
19     description
20         "Counter that increments every time a Follow_Up message is
21         received.";
22     reference
23         "14.10.4 of IEEE Std 802.1AS";
24 }
25 leaf rx-pdelay-req-count {
26     type yang:counter32;
27     config false;
28     description
29         "Counter that increments every time a Pdelay_Req message is
30         received.";
31     reference
32         "14.10.5 of IEEE Std 802.1AS";
33 }
34 leaf rx-pdelay-resp-count {
35     type yang:counter32;
36     config false;
37     description
38         "Counter that increments every time a Pdelay_Resp message is
39         received.";
40     reference
41         "14.10.6 of IEEE Std 802.1AS";
42 }
43 leaf rx-pdelay-resp-follow-up-count {
44     type yang:counter32;
45     config false;
46     description
47         "Counter that increments every time a Pdelay_Resp_Follow_Up
48         message is received.";
49     reference
50         "14.10.7 of IEEE Std 802.1AS";
51 }
52 leaf rx-announce-count {
53     type yang:counter32;
54     config false;
55     description
56         "Counter that increments every time an Announce message is
57         received.";
58     reference
59         "14.10.8 of IEEE Std 802.1AS";

```

```

1      }
2      leaf rx-packet-discard-count {
3          type yang:counter32;
4          config false;
5          description
6              "Counter that increments every time a PTP message of the
7              respective PTP Instance is discarded.";
8          reference
9              "14.10.9 of IEEE Std 802.1AS";
10     }
11     leaf sync-receipt-timeout-count {
12         type yang:counter32;
13         config false;
14         description
15             "Counter that increments every time a sync receipt timeout
16             occurs.";
17         reference
18             "14.10.10 of IEEE Std 802.1AS";
19     }
20     leaf announce-receipt-timeout-count {
21         type yang:counter32;
22         config false;
23         description
24             "Counter that increments every time an announce receipt timeout
25             occurs.";
26         reference
27             "14.10.11 of IEEE Std 802.1AS";
28     }
29     leaf pdelay-allowed-lost-exceeded-count {
30         type yang:counter32;
31         config false;
32         description
33             "Counter that increments every time the value of the variable
34             lostResponses exceeds the value of the variable
35             allowedLostResponses, in the RESET state of the MDPdelayReq
36             state machine.";
37         reference
38             "14.10.12 of IEEE Std 802.1AS";
39     }
40     leaf tx-sync-count {
41         type yang:counter32;
42         config false;
43         description
44             "Counter that increments every time synchronization information
45             is transmitted.";
46         reference
47             "14.10.13 of IEEE Std 802.1AS";
48     }
49     leaf tx-one-step-sync-count {
50         type yang:counter32;
51         config false;
52         description
53             "Counter that increments every time a one-step Sync message is
54             transmitted.";
55         reference
56             "14.10.14 of IEEE Std 802.1AS";
57     }
58     leaf tx-follow-up-count {
59         type yang:counter32;

```

```

1      config false;
2      description
3          "Counter that increments every time a Follow_Up message is
4          transmitted.";
5      reference
6          "14.10.15 of IEEE Std 802.1AS";
7  }
8  leaf tx-pdelay-req-count {
9      type yang:counter32;
10     config false;
11     description
12         "Counter that increments every time a Pdelay_Req message is
13         transmitted.";
14     reference
15         "14.10.16 of IEEE Std 802.1AS";
16 }
17 leaf tx-pdelay-resp-count {
18     type yang:counter32;
19     config false;
20     description
21         "Counter that increments every time a Pdelay_Resp message is
22         transmitted.";
23     reference
24         "14.10.17 of IEEE Std 802.1AS";
25 }
26 leaf tx-pdelay-resp-follow-up-count {
27     type yang:counter32;
28     config false;
29     description
30         "Counter that increments every time a Pdelay_Resp_Follow_Up
31         message is transmitted.";
32     reference
33         "14.10.18 of IEEE Std 802.1AS";
34 }
35 leaf tx-announce-count {
36     type yang:counter32;
37     config false;
38     description
39         "Counter that increments every time an Announce message is
40         transmitted.";
41     reference
42         "14.10.19 of IEEE Std 802.1AS";
43 }
44 }
45 }
46 augment
47     "/ptp-tt:ptp"+
48     "/ptp-tt:instances"+
49     "/ptp-tt:instance"+
50     "/ptp-tt:ports"+
51     "/ptp-tt:port" {
52     description
53         "Augment to add asymmetry-measurement-mode-ds to IEEE Std 1588 PTP
54         Port.";
55     container asymmetry-measurement-mode-ds {
56         description
57             "Represents the capability to enable/disable the Asymmetry
58             Compensation Measurement Procedure on a PTP Port. This data set
59             is used instead of the CMLDS asymmetry-measurement-mode-ds when

```



```

1      only a single PTP Instance is present (i.e., CMLDS is not used).";
2      reference
3      "14.13 of IEEE Std 802.1AS
4      Annex G of IEEE Std 802.1AS";
5      leaf enabled {
6          type boolean;
7          description
8              "For full-duplex IEEE Std 802.3 media, the value is true if an
9              asymmetry measurement is being performed for the link attached
10             to this PTP Port, and false otherwise. For all other media, the
11             value shall be false.";
12         }
13     }
14     augment
15         "/ptp-tt:ptp"+
16         "/ptp-tt:common-services"+
17         "/ptp-tt:cmllds"+
18         "/ptp-tt:ports"+
19         "/ptp-tt:port"+
20         "/ptp-tt:link-port-ds" {
21         description
22             "Augment IEEE Std 1588 cmlldsLinkPortDS.
23
24             14.16.9 of IEEE Std 802.1AS specifies neighborRateRatio
25             (neighbor-rate-ratio), which is provided in YANG as the
26             semantically equivalent node in ieee1588-ptp-tt named
27             scaled-neighbor-rate-ratio (in link-port-ds).";
28         leaf cmllds-link-port-enabled {
29             type boolean;
30             config false;
31             description
32                 "Boolean that is true if both delay-mechanism is common-p2p and
33                 the value of ptp-port-enabled is true, for at least one PTP Port
34                 that uses the CMLDS; otherwise, the value is false.";
35             reference
36                 "11.2.18.1 of IEEE Std 802.1AS
37                 14.16.3 of IEEE Std 802.1AS";
38         }
39         leaf is-measuring-delay {
40             type boolean;
41             config false;
42             description
43                 "This leaf is analogous to is-measuring-delay for a PTP Port, but
44                 applicable to this Link Port.";
45             reference
46                 "14.16.4 of IEEE Std 802.1AS";
47         }
48         leaf as-capable-across-domains {
49             type boolean;
50             config false;
51             description
52                 "This leaf is true when all PTP Instances (domains) for this Link
53                 Port detect proper exchange of Pdelay messages.";
54             reference
55                 "11.2.2 of IEEE Std 802.1AS
56                 14.16.5 of IEEE Std 802.1AS";
57         }
58         leaf mean-link-delay-thresh {

```

```

1      type ptp-tt:time-interval;
2      description
3          "Propagation time threshold for mean-link-delay, above which a
4          Link Port is not considered capable of participating in the IEEE
5          Std 802.1AS protocol.";
6      reference
7          "14.16.7 of IEEE Std 802.1AS";
8  }
9  leaf initial-log-pdelay-req-interval {
10     type int8;
11     description
12         "This leaf is analogous to initial-log-pdelay-req-interval for a
13         PTP Port, but applicable to this Link Port.";
14     reference
15         "14.16.10 of IEEE Std 802.1AS";
16 }
17 leaf current-log-pdelay-req-interval {
18     type int8;
19     config false;
20     description
21         "This leaf is analogous to current-log-pdelay-req-interval for a
22         PTP Port, but applicable to this Link Port.";
23     reference
24         "14.16.11 of IEEE Std 802.1AS";
25 }
26 leaf use-mgt-log-pdelay-req-interval {
27     type boolean;
28     description
29         "This leaf is analogous to use-mgt-log-pdelay-req-interval for a
30         PTP Port, but applicable to this Link Port.";
31     reference
32         "14.16.12 of IEEE Std 802.1AS";
33 }
34 leaf mgt-log-pdelay-req-interval {
35     type int8;
36     description
37         "This leaf is analogous to mgt-log-pdelay-req-interval for a PTP
38         Port, but applicable to this Link Port.";
39     reference
40         "14.16.13 of IEEE Std 802.1AS";
41 }
42 leaf initial-compute-neighbor-rate-ratio {
43     type boolean;
44     description
45         "This leaf is analogous to initial-compute-neighbor-rate-ratio
46         for a PTP Port, but applicable to this Link Port.";
47     reference
48         "14.16.14 of IEEE Std 802.1AS";
49 }
50 leaf current-compute-neighbor-rate-ratio {
51     type boolean;
52     config false;
53     description
54         "This leaf is analogous to current-compute-neighbor-rate-ratio
55         for a PTP Port, but applicable to this Link Port.";
56     reference
57         "14.16.15 of IEEE Std 802.1AS";
58 }
59 leaf use-mgt-compute-neighbor-rate-ratio {

```

```

1      type boolean;
2      description
3          "This leaf is analogous to use-mgt-compute-neighbor-rate-ratio
4          for a PTP Port, but applicable to this Link Port.";
5      reference
6          "14.16.16 of IEEE Std 802.1AS";
7  }
8  leaf mgt-compute-neighbor-rate-ratio {
9      type boolean;
10     description
11         "This leaf is analogous to mgt-compute-neighbor-rate-ratio for a
12         PTP Port, but applicable to this Link Port.";
13     reference
14         "14.16.17 of IEEE Std 802.1AS";
15 }
16 leaf initial-compute-mean-link-delay {
17     type boolean;
18     description
19         "This leaf is analogous to initial-compute-mean-link-delay for a
20         PTP Port, but applicable to this Link Port.";
21     reference
22         "14.16.18 of IEEE Std 802.1AS";
23 }
24 leaf current-compute-mean-link-delay {
25     type boolean;
26     config false;
27     description
28         "This leaf is analogous to current-compute-mean-link-delay for a
29         PTP Port, but applicable to this Link Port.";
30     reference
31         "14.16.19 of IEEE Std 802.1AS";
32 }
33 leaf use-mgt-compute-mean-link-delay {
34     type boolean;
35     description
36         "This leaf is analogous to use-mgt-compute-mean-link-delay for a
37         PTP Port, but applicable to this Link Port.";
38     reference
39         "14.16.20 of IEEE Std 802.1AS";
40 }
41 leaf mgt-compute-mean-link-delay {
42     type boolean;
43     description
44         "This leaf is analogous to mgt-compute-mean-link-delay for a PTP
45         Port, but applicable to this Link Port.";
46     reference
47         "14.16.21 of IEEE Std 802.1AS";
48 }
49 leaf allowed-lost-responses {
50     type uint8;
51     description
52         "This leaf is analogous to allowed-lost-responses for a PTP Port,
53         but applicable to this Link Port.";
54     reference
55         "14.16.22 of IEEE Std 802.1AS";
56 }
57 leaf allowed-faults {
58     type uint8;
59     description

```

```

1         "This leaf is analogous to allowed-faults for a PTP Port, but
2         applicable to this Link Port.";
3         reference
4         "14.16.23 of IEEE Std 802.1AS";
5     }
6     leaf-list pdelay-truncated-timestamps {
7         type uinteger48;
8         config false;
9         description
10        "This leaf is analogous to pdelay-truncated-timestamps for a PTP
11        Port, but applicable to this Link Port.";
12        reference
13        "14.16.25 of IEEE Std 802.1AS";
14    }
15    augment
16    "/ptp-tt:ptp"+
17    "/ptp-tt:common-services"+
18    "/ptp-tt:cmlds"+
19    "/ptp-tt:ports"+
20    "/ptp-tt:port" {
21        description
22        "Augment to add port-statistics-ds to IEEE Std 1588 Link Port.";
23        container port-statistics-ds {
24            description
25            "This container is analogous to port-statistics-ds for a PTP
26            Port, but applicable to this Link Port.";
27            reference
28            "14.17 of IEEE Std 802.1AS";
29            leaf rx-pdelay-req-count {
30                type yang:counter32;
31                config false;
32                description
33                "This leaf is analogous to rx-pdelay-req-count for a PTP Port,
34                but applicable to this Link Port.";
35                reference
36                "14.17.2 of IEEE Std 802.1AS";
37            }
38            leaf rx-pdelay-resp-count {
39                type yang:counter32;
40                config false;
41                description
42                "This leaf is analogous to rx-pdelay-resp-count for a PTP Port,
43                but applicable to this Link Port.";
44                reference
45                "14.17.3 of IEEE Std 802.1AS";
46            }
47            leaf rx-pdelay-resp-follow-up-count {
48                type yang:counter32;
49                config false;
50                description
51                "This leaf is analogous to rx-pdelay-resp-follow-up-count for a
52                PTP Port, but applicable to this Link Port.";
53                reference
54                "14.17.4 of IEEE Std 802.1AS";
55            }
56            leaf rx-packet-discard-count {
57                type yang:counter32;
58                config false;

```

```

1      description
2          "This leaf is analogous to rx-packet-discard-count for a PTP
3          Port, but applicable to this Link Port.";
4      reference
5          "14.17.5 of IEEE Std 802.1AS";
6  }
7  leaf pdelay-allowed-lost-exceeded-count {
8      type yang:counter32;
9      config false;
10     description
11         "This leaf is analogous to pdelay-allowed-lost-exceeded-count
12         for a PTP Port, but applicable to this Link Port.";
13     reference
14         "14.17.6 of IEEE Std 802.1AS";
15 }
16 leaf tx-pdelay-req-count {
17     type yang:counter32;
18     config false;
19     description
20         "This leaf is analogous to tx-pdelay-req-count for a PTP Port,
21         but applicable to this Link Port.";
22     reference
23         "14.17.7 of IEEE Std 802.1AS";
24 }
25 leaf tx-pdelay-resp-count {
26     type yang:counter32;
27     config false;
28     description
29         "This leaf is analogous to tx-pdelay-resp-count for a PTP Port,
30         but applicable to this Link Port.";
31     reference
32         "14.17.8 of IEEE Std 802.1AS";
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 for a
39         PTP Port, but applicable to this Link Port.";
40     reference
41         "14.17.9 of IEEE Std 802.1AS";
42 }
43 }
44 }
45 augment
46     "/ptp-tt:ptp"+
47     "/ptp-tt:common-services"+
48     "/ptp-tt:cmllds"+
49     "/ptp-tt:ports"+
50     "/ptp-tt:port" {
51     description
52         "Augment to add asymmetry-measurement-mode-ds to IEEE Std 1588 Link
53         Port.";
54     container asymmetry-measurement-mode-ds {
55         description
56             "This container is analogous to asymmetry-measurement-mode-ds for
57             a PTP Port, but applicable to this Link Port.";
58         reference
59             "14.18 of IEEE Std 802.1AS";

```

```
1      leaf enabled {
2          type boolean;
3          description
4              "This leaf is analogous to
5              asymmetry-measurement-mode-ds.enabled for a PTP Port, but
6              applicable to this Link Port.";
7          reference
8              "14.13.2 of IEEE Std 802.1AS";
9      }
10 }
11 }
```

1**Annex A**

2

3(normative)

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6**Protocol Implementation Conformance Statement (PICS)**

7**proforma⁴**

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11**A.19 Remote management**

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

14

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 []

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54⁴ 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 8040, RESTCONF Protocol, January 2017.

[B46] IETF RFC 8340, YANG Tree Diagrams, March 2018.

[B47] IETF RFC 8575, YANG Data Model for the Precision Time Protocol (PTP).

[B48] OMG Unified Modeling Language (OMG UML), Version 2.5, March 2015.